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

HERC

20 TON INDUSTRIAL AC UNIT

-

17F-0794

20 TON INDUSTRIAL AC UNIT

NEMA 4

-

-

460V/3PH/60HZ

GENERAL PURPOSE

5/7/2018

INSTALLATION & OPERATION MANUAL

BOOK ASSEMBLED BY: JONATHAN O'MALLEY
DATE: 5/7/2018

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SECTION

01

JOB SCOPE

Quote No:	
Quote Date:	10-27-2017
Project Type:	(15) 20 Ton Industrial AC Units-NEMA 4-Non Classified
Drawing Delivery:	2 weeks after receipt of order
Equipment Delivery:	12-14 weeks After Receipt of Approved Drawings (ARAD)
Freight Terms:	
Payment Terms:	

Item	Qty	Description		
1.	15	CAPS Model #: **PPKH-20TD-0NN0NN-5E5-P2-S1CEUP** Provide the labor and material to manufacture one (1) custom built air condition unit as follows: • The skid shall be fabricated from 3/16” thick, 6” X 4” rectangular steel tube. The skid size is to be constructed in length and width plus piping headers so that no part of the unit is outside of the rack. The fork truck lifting slots are made of the same material and are incorporated into the design on centers and are 48” apart. The skid components are continuously welded at all joints. All tubing ends are capped and continuously welded. All serial numbers are to be Laser cut on 10 gauge 304 stainless steel sheet and attached with powder actuated fasteners on the skid at opposite corner locations. • The lifting frame material shall be 3” X 3” square steel tubing. This rack 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 rack has a 3/8” steel plate gusset welded to the horizontal tubing and incorporates a 1/2" eyebolt application. • The entire skid/lifting frame assembly shall be hot dipped galvanized before component installation. • The condenser housing will be of single wall construction. The housing skin and all dividers will be formed from 16 gauge 304 stainless steel. • Condenser coils shall have copper tubes and aluminum fins with 3 rows and 14 fins per inch sized to match compressor heat rejection specifications. Condenser coils will be provided with EnergyGuard protective coatings. • Four (4) direct drive propeller fans are provided to include 21” non-sparking poly glass fan blades, stainless steel housing and a 1 HP, 460-3-60 TEFC motor. • The unit will be double wall construction. The exterior skin shall be formed from 18 gauge type 304 stainless steel. The inner wall shall be fabricated from 20 gauge type 304 stainless steel. The floor shall be fabricated from the same material.		

Item	Qty	Description		
		• The insulation for the unit shall be 1", 3-pound density liner. An adhesive is applied to all metal surfaces to be insulated and the insulation is fitted to match. • The hardware shall be from non-corrosive material to include: Stainless steel TEK-screws and positive acting compression latches. • The doors shall be double-wall construction using 18 gauge type 304 stainless steel on the outer wall and 20 gauge type 304 stainless steel on the inner wall. "Close cell ¼" neoprene gasket is installed on the door frames for air sealing. • The drain pan shall be formed and continuously welded using T-304 stainless steel. The coil hat sections shall be formed and welded using T-304 stainless steel and designed to allow for easy coil removal. All coil drain lines and P traps shall be fitted from 1-½" galvanized fittings. • The return air section on the unit shall have a stainless steel inlet panel with two (2) 20" return air duct collars provided with 2"-30% filters in slide racks. The duct connections are provided with hinged covers that can be secured in the closed position using "Jeep Latch" style clamps. Provide four (4) stainless steel friction lock duct clamps on each collar. • Each unit shall have one (1) 20" stainless steel discharge collars that fit to the interior liner and welded to the exterior wall. Supply air duct connections are provided with hinged covers that can be secured in the closed position using "Jeep Latch" style clamps. Provide four (4) stainless steel friction lock duct clamps on each collar. The supply air connection shall have a seven (7)-position steel quadrant is welded in place for CFM adjustment • The fan shall be a belt-drive plenum fan as manufactured by Greenheck (or equal). The fan is sized for 2,800 CFM at 7.0" of total static pressure. The fan bearings are warranted for 100,000 hours of operation. The drive shall be a belt system rated for a 1.5 service factor. • The evaporator fan motor shall be TEFC, 5 horsepower, 460-3-60. • The evaporator coil shall be sized to condition air at an entering temperature of 95F db, 80F wb, and a leaving air temperature of 53F db, 53F wb. The coil shall be 6 rows, 13 fins per inch, dual circuited with aluminum fins and copper tubes. The total capacity of the system shall be rated at 258,300 Btu/hr with a sensible capacity of 125,200 Btu/hr. Evaporator coils will be provided with EnergyGuard protective coatings. • The compressors shall be scroll type (separate circuits) especially for R-410A refrigerant along with all refrigeration specialties and piping as required per industrial standards. • Replaceable core filter driers with ball valves on each circuit. The ball valves will have access ports. • System will include a hot gas bypass on both circuits for low ambient conditions. • All refrigerant specialties are to be installed per industry standards. • All control wiring and tubing is to be installed per industry standards. Main high voltage panel (for all electrical components greater than 50 volts)-disconnects, controls, and all electric panels shall be installed in a NEMA 4 enclosure. Power on and phase incorrect pilot lights as well as an Off/On 2 position switch shall be incorporated into the control panel. Four (4) single pole cam style connectors will be provided for power connections. • Main low voltage panel (for all electrical components less than 50 volts)-Carrel Controller, entering and leaving temperature selector switch contained in this NEMA 4 enclosure. • Siemens Logo controller digital outputs:		

Item	Qty	Description		
		o Each compressor to be controlled by output from controller o Set point, differential and dead band to be adjustable o Adjustable anti-short cycle o Ability to lock out either circuit on "2 strikes and out" and provide common digital out trouble contact closure for each circuit: ▪ Low pressure ▪ High pressure ▪ "2 strikes and out" – automatic warning flag set to monitor a fault (low or high pressure) for a period of 30 minutes from first fault signal. If during normal operation, a high or low pressure condition occurs, the warning flag will be set and the compressor will shut off immediately. After the anti-short cycle delay, the compressor will be allowed to start. If the high or low pressure condition occurs again within this 30 minute period, the controller will lock out that particular circuit and provide a trouble contact closure. Otherwise, if the compressor continues to operate, the warning flag will be reset after 30 minutes of successful run time. • Controller analog inputs o One (1) supply air temperature sensor o One (1) return air temperature sensor o One (1) low pressure (suction), pressure transmitter per circuit o One (1) high pressure (discharge), pressure transmitter per circuit • All control wiring and tubing is to be installed per industry standards. • Unit is primarily constructed of stainless steel and a galvanized skid. There is a requirement for painting compressors, exposed refrigerant piping and some electrical components. All painting of these components to be white. • Units will be tested, logged and documented at CAPS facility. • Electrical characteristics of the unit will be 460/3/60, 70 Amp circuit breaker.		

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SECTION

02

EVAPORATOR COMPONENTS

Customer:	Custom Air Products	Date:	2/16/2015
Contact:	Mr. Andrew Hubley	From:	Matthew Merrill
Telephone:	713-460-9009	Company:	DE McElhany and Assoc
Cell:		Return Tel:	817-251-1708
Fax:	713-460-9499	Return Fax:	817-251-1904
Job:	20 Ton Jetson Evap	Email:	matthew.merrill@luvatasales.com
Quote #:			

Construction

Item:	20 Ton Evap
Coils Per Bank:	1
Tube OD IN:	1/2
Style:	EJ
Fins Per Inch:	Optimize
Rows:	6
Fin Surface:	Optimize ABC
Fin Height (IN):	25.00
Finned Length (IN):	36.00
Tubing Mat. (IN):	0.016 Copper Rifled
Fin Mat. (IN):	0.0060 Aluminum
Circuiting:	-15
Face Area (SQ FT):	6.25

Air Side

Air Flow (Sft^3/min)	2770.0
Altitude FT:	0.00
Ent. Air DB/WB °F:	95.00 / 80.00
Lvg. Air DB/WB °F:	0.00 / 0.00
Total / Sensible MBH:	255.0 / 0.00
Max Air PD "H2O:	0.00

Refrigerant Side

Refrigerant:	410A
Super Heat °F:	20.00
Saturated Suction Temp °F:	45.00
Liquid Temp °F:	110.0

OUTPUT DATA				OPTIONS	
Model Number:		4EJ1306C		Casing Material:	Galvanized
Air Velocity:	(Sft/min)	443.2		Casing Type:	Flanged
Total Capacity:	MBH	258.9		Hand:	Right
Sens. Capacity:	MBH	125.2		Connection Material:	Copper
Lvg. Air DB:	°F	53.15		ByPass Kit Quantity:	2
Lvg. Air WB:	°F	53.15		ByPass Kit Size:	0
Standard APD	"H2O	0.83		Label Kit:	No
Code 18/19:		7008/10		Coating: None	
Code 18/19_2:		7007/10		Mounting Holes:	No
Suction Conn.:	IN	(2) 1.375		Drain Headers:	No
Distributor Conn 1:	IN	(1) 0.875		Boxed Headers:	No
Distributor Conn 2:	IN	(1) 0.875			
Refg. PD:	lbf/in^2	3.48			
Refg. Velocity:	ft/min	1396.3			
Internal Volume:	in^3	1033.0			
Weight:	lbm	122.5			
Notes:		CJMU			

Notes:

C) Coil is NOT certified by AHRI.
J) Coil Will Be Supplied With Multiple Distributors.
M) Coil rating valid for Heatcraft coils only.
U) User-entered circuiting. Check circuiting for dropped tubes or opposite-end connections

Performance	
Quantity	1
Volume (CFM)	2,770
External SP (in. wg)	7
Total SP (in. wg)	7
Operating Power (hp)	4.35
Start-Up Power (hp)	4.35
Fan RPM	3509
Max Fan RPM	3,929
Oper. Frequency (Hz)	60
Elevation (ft)	105
Start-up Temp.(F)	70
Operating Temp.(F)	70

Fan Configuration	
Size	15
Class	II
Arrangement	4
Rotation	CW
Orientation	Horizontal

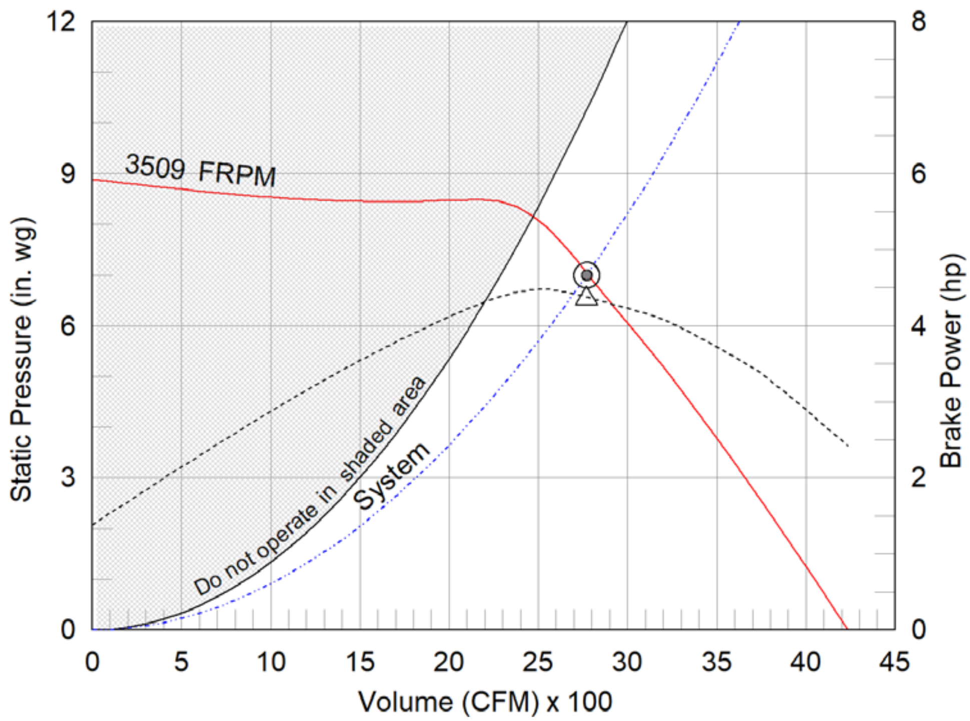
Equipment Weights	
Fan (LMD)(lb)	70
Motor/Drive (lb)	99
Accessories (lb)	9

Misc Fan Data	
FEG	80
Outlet Velocity (ft/min)	1,610
Static Efficiency (%)	70
Tip Speed (ft/min)	13,779
Corner Weight A (lb)	45
Corner Weight B (lb)	45
Corner Weight C (lb)	44
Corner Weight D (lb)	44

Motor and Drives	
Motor	Included
Size (hp)	5
RPM	3500
Enclosure	TEFC
Voltage	460
Cycle	60
Phase	3
Frame Size	184T
Max Frame Size	215
Location	Centered

Model: 15-APH-4-65-II-50
Plenum Fan

Operating Performance



△ Operating Bhp point
○ Operating point at Total External SP
• Operating point at External SP
Fan curve
System curve
Brake horsepower curve

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	90	91	85	88	83	80	78	77	89	78	30
Outlet	89	89	87	92	90	88	85	82	95	83	41

LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft

Model: 15-APH-4-65-II-50

Plenum Fan

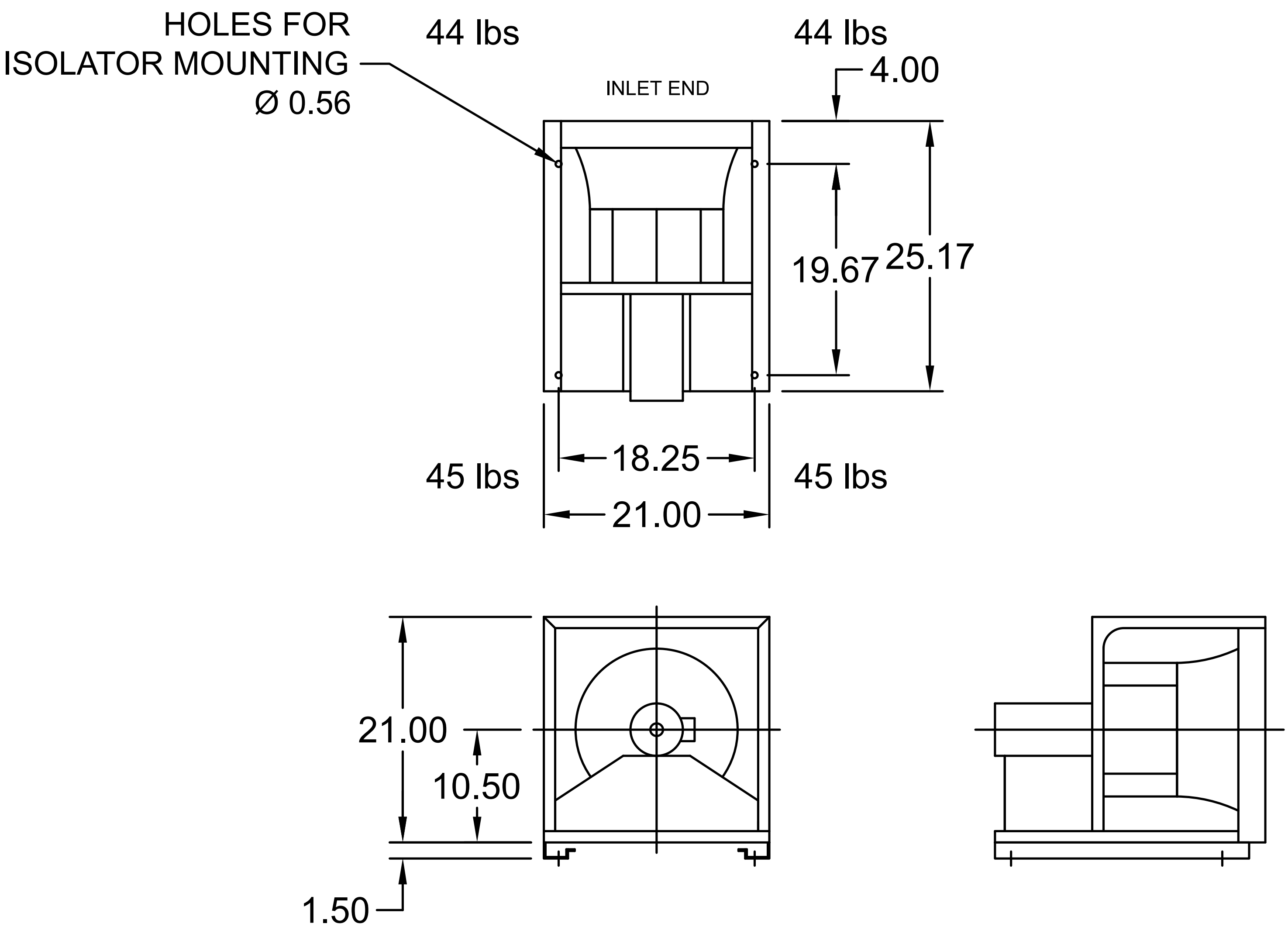
Standard Construction Features:

HOUSING: Heavy gauge, welded steel mounting frame with die formed flanges - Inlet panel is heavy gauge steel with die formed flanges with welded corners - Steel components are phosphatized and coated - Corrosion resistant fasteners BEARINGS, SHAFT, AND WHEEL: Heavy duty, concentric locking, self-aligning ball or roller pillow block bearings - Polished, solid steel shafts - Welded, aluminum centrifugal wheel - 12 bladed construction- Airfoil blade profile

Selected Options & Accessories:

Motor PN - 304656, Baldor Motor Model Number - EM3663T
NEMA Premium Efficient Motor - meets NEMA Table 12-12
Motor VFD Rated without Shaft Grounding Protection
Motor with Minimum 40 Degree C Ambient Temperature
Motor with Class B or Greater Insulation
Fan Class - II
Motor Position - Centered
Coating - Permatector, Concrete Gray-RAL 7023, Fan and Attached Accessories, Mill Finish on Aluminum Wheel
Fan Orientation - Horizontal
Inlet Guard
Protective Cage - Totally Enclosed, coated w/Safety yellow finish
Factory Vibration Test, 0.08 in/sec, peak, filter-in as measured at the fan RPM
Unit Warranty: 1 Yr (Standard)

Model: 15-APH-4-65-II-50 Plenum Fan



Notes: All dimensions shown are in units of in.
Drawings are not to scale. Drawings are of standard unit and do not include dimensions for accessories or design modifications.

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SECTION

03

CONDENSER COMPONENTS

Fan specification:

Fan article number	FP00002M77100	
Customer article numer	CND50	
Voltage	265/460	V
Frequency	60	Hz
Fan speed	1760	RPM
Minimum ambient temperature	-25 (-13)	°C (°F)
Maximum ambient temperature	55 (131)	°C (°F)
Frequency control	YES	
Insulation class	CL.F	
IP Class Fan	IP55	

Motor specification:

Motor article number	FM0458M7G0100	
Approvals	cURUs	
Shaft power	1.1	kW
Shaft power	1.5	HP
Voltage	265/460	V
Frequency	60	Hz
Minimum ambient temperature	-25 (-13)	°C (°F)
Maximum ambient temperature	55 (131)	°C (°F)
Frequency control	YES	
Insulation class	CL.F	
IP Class Fan	IP55	

Impeller specification:

Impeller type number	524/3-3/P4ZL/35/PACAS	
Diameter	524 (20.6)	mm (inch)
No. of blades	3	
Hub size	3	
Blade profile	P4Z	
Rotation direction	L	
Pitch angle	35	°
Blade material	PACAS	
Shaft diameter	19 (0.75)	mm (inch)
Key width	6 (0.24)	mm (inch)
Hub length	42 (1.65)	mm (inch)
Assembly form	A	

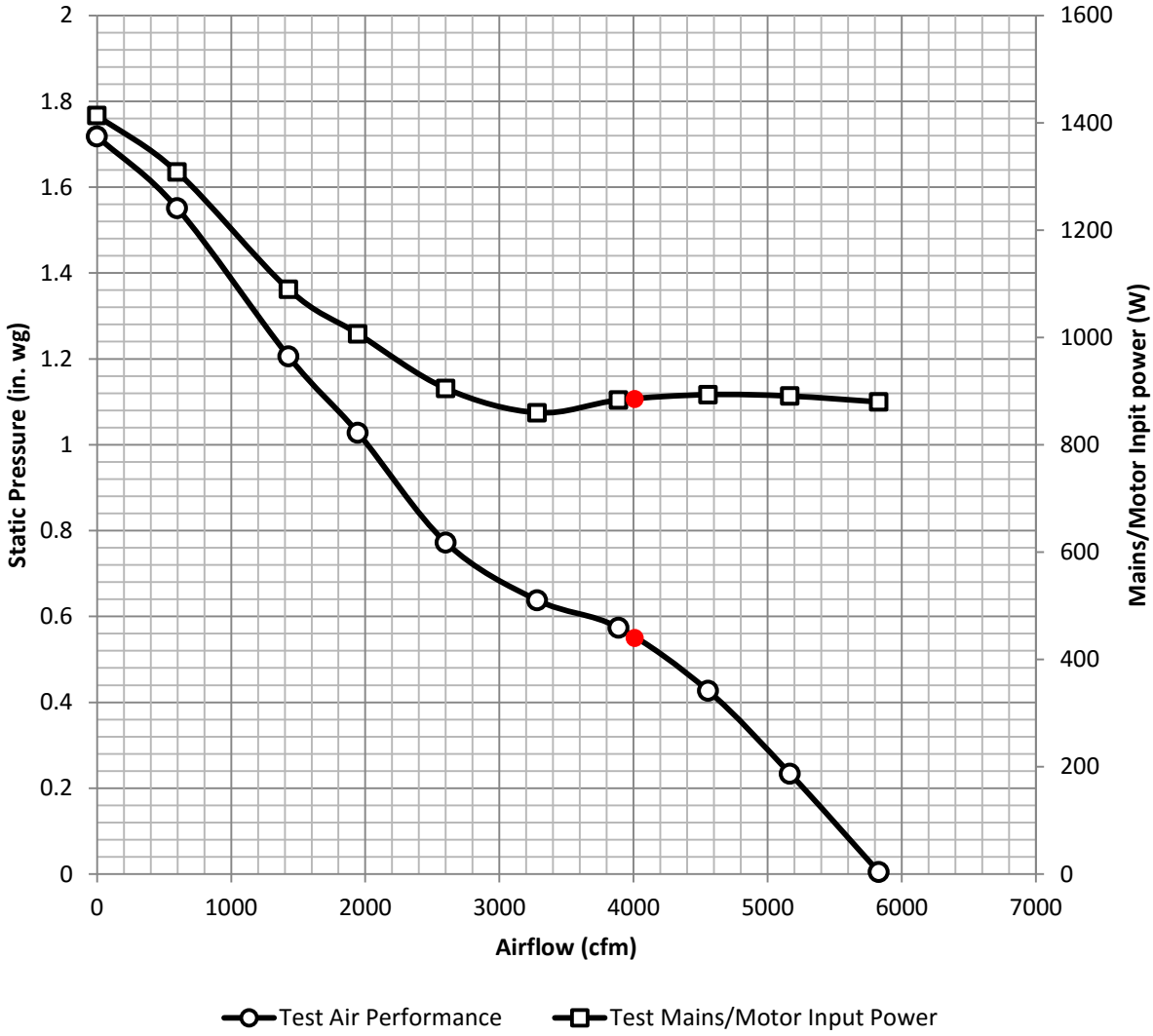
Fan performance:

Test institute	AMCA	
Test method	ANSI / AMCA 210-16	
Installation Type	A	
Test number	34742-A1	
Test date	09/13/2017	

Results at Standard Air:

Det. No.	Pt	Pv	Ps	Q	W
	(in. wg)	(in. wg)	(in. wg)	(cfm)	(W)
1	0.372	0.366	0.005	5829	880
2	0.522	0.288	0.234	5167	891
3	0.651	0.224	0.427	4556	893
4	0.736	0.163	0.574	3890	883
5	0.753	0.116	0.638	3282	860
6	0.845	0.073	0.772	2601	905
7	1.068	0.041	1.028	1945	1007
8	1.228	0.022	1.206	1427	1090
9	1.555	0.004	1.551	598	1308
10	1.718	0.000	1.718	0	1413

Results at Standard Air:



Specific design point:

Det. No.	Pt	Pv	Ps	Q	W
	(in. wg)	(in. wg)	(in. wg)	(cfm)	(W)
-	-	-	0.55	4010	4010

Fan performance:

Test institute	AMCA	
Test method	ANSI / AMCA 300-14	
Installation Type	A	
Test number	34742-S1	
Test date	09/13/2017	

Test conditions:

Det. No.	Pt	Pv	Ps	Q	W
	(in. wg)	(in. wg)	(in. wg)	(cfm)	(W)
3	-	-	0.549	4064	-

Full Octave Band Analysis:

Sound Power Lever Lw in dB per Octave Band:

	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4kHz	8 kHz	
Lw	83.8	83.5	85.5	83.9	83.4	84.4	81.7	74.3	**dB**

Total Sound Power Level Lw in dB:

Lw	92.4	**dB**

Sound Power Lever LwA with A-weighting in dB(A) per Octave Band:

	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4kHz	8 kHz	
LwA	57.6	67.4	76.9	80.7	83.4	85.6	82.7	73.2	**dB(A)**

Total Sound Power Lever LwA with A-weighting in dB(A):

LwA	89.8	**dB(A)**

Calculated Sound Pressure Level LpA at 3 meters with A-weighting in dB(A) per Octave Band:

	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4kHz	8 kHz	
LpA	40.1	49.9	59.4	63.2	65.9	68.1	65.2	55.7	**dB(A)**

Total calculated Sound Pressure Level LpA at 3 meters with A-weighting in dB(A):

LpA	72.3	**dB(A)**

Note: Sound Pressure Level LpA at 3 meters was calculated using an ideal hemisphere under free field conditions, therefore LpA levels cannot be guaranteed in actual applications.

Article number: FP00002M77100

Panel fans

Technical data

Voltage	U	265/460	V
Phase		3	~
Frequency		60	Hz
Speed		1760	RPM
Power consumption	P_e	880	W
Nominal current	I	3/1.7	A
Maximum current	I	3.0/1.7	A
Capacitor		-	µF
Ambient temperature	$T_{amb\ min/max}$	-13...131	°F
Insulation Class		CL.F	
IP Class Fan		IP55	

Fan details

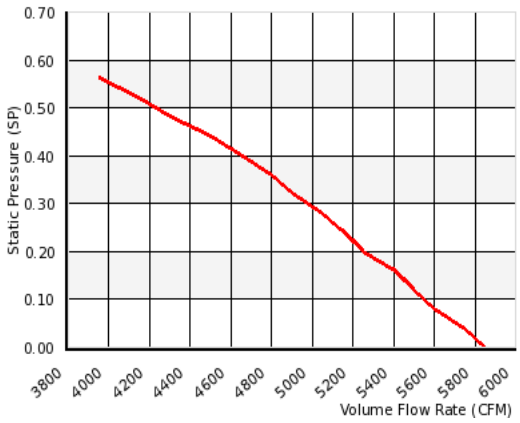
Impeller blades	3
Impeller type	P4
Impeller system	Z
Impeller material	PC

Control options

Triac controller	No
Transformer	No
Frequency drive	Yes
Intelligent Fan Drive	No

Characteristics

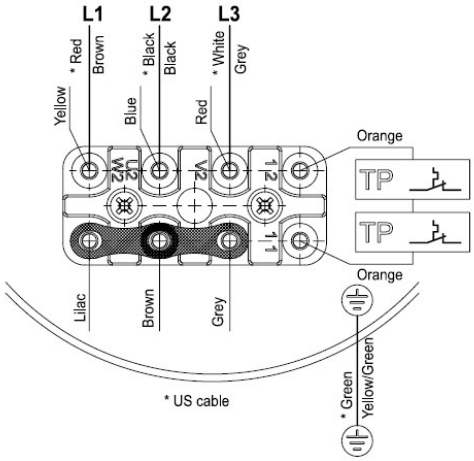
0.00 in. wg	5850 CFM
0.40 in. wg	4650 CFM



Please note: Picture may deviate from original product

Wiring diagram - Fan

AC01 - CCW



Vostermans Ventilation B.V.
Venlo - The Netherlands
+31 (0)77 389 32 32
ventilation@vostermans.com
www.vostermans.com

Vostermans Ventilation Inc.
Bloomington, IL - U.S.A.
+1 309 827 9798
ventilation@vostermansusa.com
www.vostermansusa.com

Vostermans Ventilation S.A.R.L.
Evreux Cedex - France
+33 (0)2 32 38 11 00
ventilation@vostermansfrance.com
www.vostermans.com

Vostermans Ventilation Sdn. Bhd.
Tmn Klang Jaya - Malaysia
+60 (0)33324 3638
ventilation@vostermansasia.com
www.vostermansasia.com

Version 2.4 19Sep2017

Technical data

Voltage	U	265/460	V
Current	I	3.8/2.2	A
Capacitor		0/0	µF/V
Cos phi		0.76	
P_2		1.10	kW
P_2 (Horsepower)		1.50	Hp
Phase		3	~
Poles		4	
Frequency		60	Hz
Speed		1740	RPM
Ambient temperature	$T_{amb\ min/max}$	-25...55	°C
Insulation Class		CL.F	
IP Class		IP55	
Weight		12.7	kg
Efficientie class		IE2	

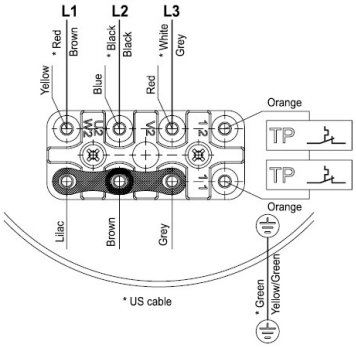
Efficiency IE2

100% Load	84.8%
80% Load	84.2%
50% Load	81.8%

Control options

Triac controller	No
Transformer	No
Frequency drive	Yes

Wiring diagram



VOSTERMANS VENTILATION **Multifan**

READ AND SAVE THESE INSTRUCTIONS!

CND50 and CND63 Condenser Fans

FOLLOW INSTALLATION INSTRUCTIONS CAREFULLY.
DO NOT TAKE ANY SHORTCUTS!

CHECKLIST UPON RECEIPT OF GOODS

1. Inspect for any damage that may have occurred in transit. Report any damage within 48 hours.
2. Check all bolts, screws, set screws etc. for looseness, and re-tighten if necessary.
3. Before installation, rotate the blade to make sure it moves freely. Adjust if necessary.
4. Before installation, please read the entire information sheet carefully.

GENERAL SAFETY INFORMATION

WARNING!
TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONNEL, OBSERVE THE FOLLOWING:

1. Use this unit only in the manner intended by the manufacturer. If you have any questions, contact the manufacturer.
2. Before servicing or cleaning the unit, switch the power off at the service panel. Lock the service panel to prevent the power from being accidentally switched on. If the service panel cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
3. Installation work and electrical wiring must be done by qualified persons in accordance with all applicable codes and standards, including standards on fire-resistant construction.
4. Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
5. When cutting or drilling into a wall or ceiling, do not damage electrical wiring and other hidden utilities.
6. Ducted fans must always be vented to the outdoors.

CAUTION - For general ventilation use only. Do not use to exhaust hazardous or explosive materials or vapors.

LIMITED WARRANTY

Vostermans Ventilation Inc. warrants the Multifan and MF Flex motors, to the original user, against defects in workmanship on materials, under normal use and service (rental use excluded) for the indicated period of guarantee after date of purchase. Any part which is determined to be defective in material or workmanship should be returned to the dealer from whom it was purchased. All shipping cost will be paid by the customer unless arranged differently prior to return. Parts will be repaired or replaced at the dealer's discretion.

DISCLAIMER

The warranties contained herein are made expressly in view of any and all other warranties expressed or implied. The liability of the seller is limited to the repair or replacement of any product which does not conform to the warranties expressly provided herein.

GUIDELINES FOR INSTALLATION

1. All moving parts should be guarded.
2. The unit should be securely installed in a rigid framework. **Caution:** *allowing the fan frame to bend or move will result in unwanted vibrations and possible premature motor or blade failure.*
3. Connect the power to the motor using an approved wiring method.
4. Before activating the fan, double check to ensure that there are no obstructions (framing, packaging, debris, cord, etc.) that can interfere with proper fan operation.
5. Ensure proper installation/removal of drain plug, see diagram.
6. Use liquid tight fittings and conduits.
7. If fan is used to inflate advertising tubes make sure that placement will not interfere with traffic flow, hinder visibility or makes contact with overhead power lines.
8. Do not use a three-phase fan with any solid-state speed control devices!
9. Three-phase fans require field-provided motor overload protection. The overload protection device shall be rated or selected in compliance with the applicable installation code as specified by the authority having jurisdiction.
10. Vostermans advises the use of a motor protection switch (MPS) with single-phase fans.
    ALWAYS use an MPS with three-phase fans!
11. Motor must be securely and adequately grounded.

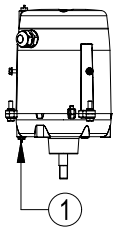
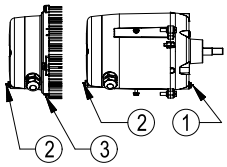
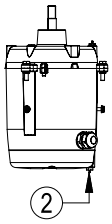
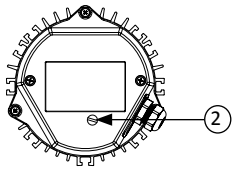
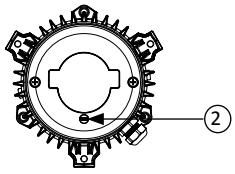
USE LIMITATIONS

1. Verify that fan/motor is capable of variable speed operation before attaching speed control devices.
2. Installation instructions for fan and controller must be followed carefully. All warranty rights and conditions are rendered null and void if a low quality controller is used.
3. Assure sufficient air supply over the motor under all circumstances. Limits of operating ambient temperatures are –13 to 131 degrees F (-25 to 55° C).

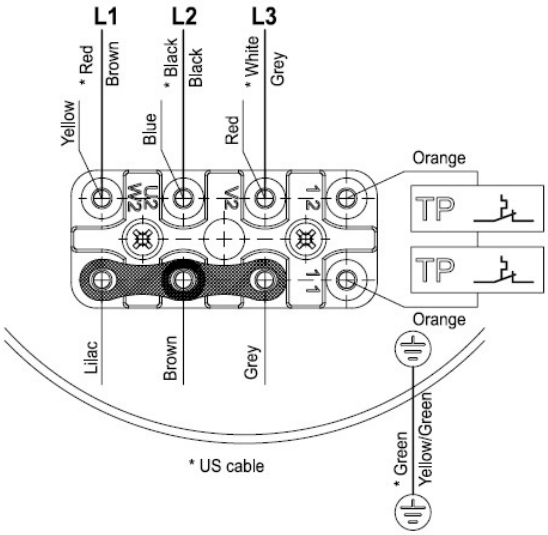
NOTE: DRAIN HOLES:
Each Vostermans motor has 2, 3 or 4 drain holes:

- 1 or 2 on the back cover.
- 1 or 2 on the front shield.

Depending on the installation angle, the drain hole at the **lowest point** needs to be open, the others plugged.

Motor Position	Action
	Remove Plug 1
	Remove Plug 1, 2 and 3
	Remove Plug 2
	An example of an old motor type with a different drain plug position. Remove Plug 2
	An example of an old motor type with a different drain plug position. Remove Plug 2

3~ Motor Wiring Diagram



NOTE:
ALL VOSTERMANS THREE-PHASE FANS ARE WIRED TO 460V. SEE WIRING DIAGRAMS FOR INSTRUCTIONS TO CHANGE THIS TO 240V.

*Please check the motor label for the wiring diagram number (ex. WD: AA01) or contact Vostermans Ventilation Inc. for assistance.

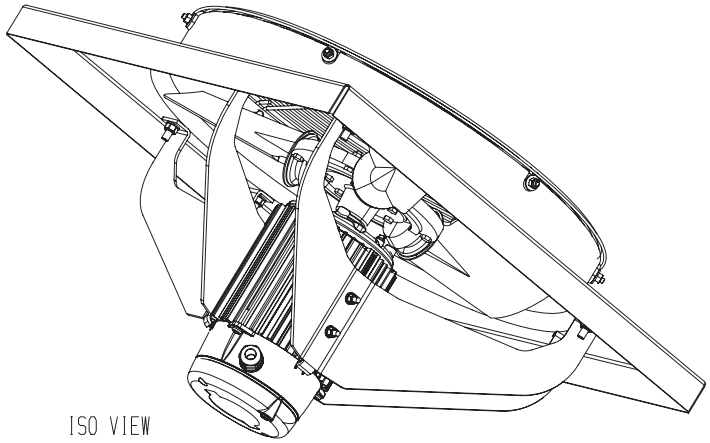
TO REVERSE MOTOR ROTATION:
For 1~ motors, switch the red and brown wires.
For 3~ motors, switch any two-line wires.

MAINTENANCE

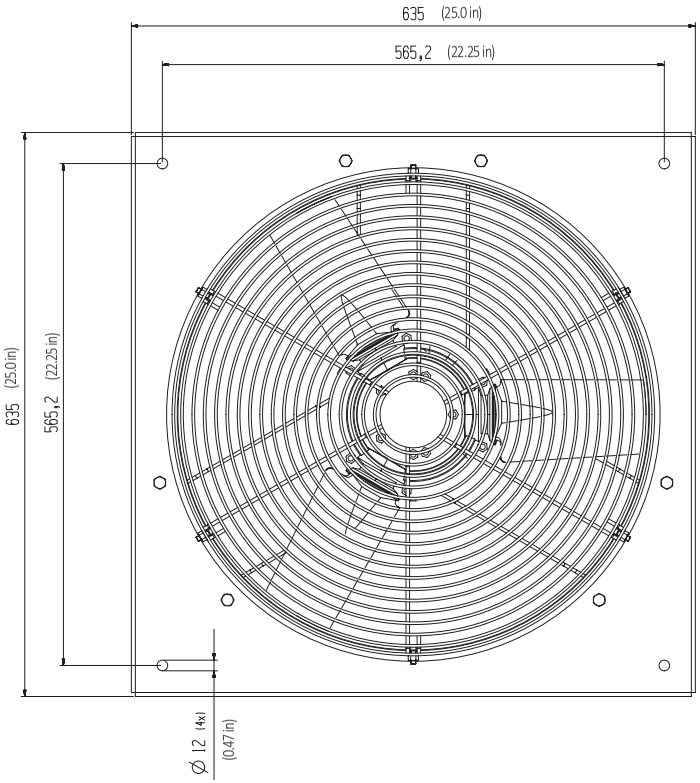
1. Disconnect all sources of power before servicing.
2. When cleaning the motor, the drain holes have to be closed with a drain plug.
3. After wash down, it is recommended to run all motors for 2 hours to dry.
4. Periodically clean the wire guard for better efficiency and correct air movement.
5. Periodically clean the blades and motor to remove any excessive accumulation of dirt.
6. In all Multifan or MF FLEX motors, the bearings are sealed and do not require greasing.
7. The only field-serviceable parts in the motor are the capacitor(s) and the bearings, see www.vostermansusa.com.

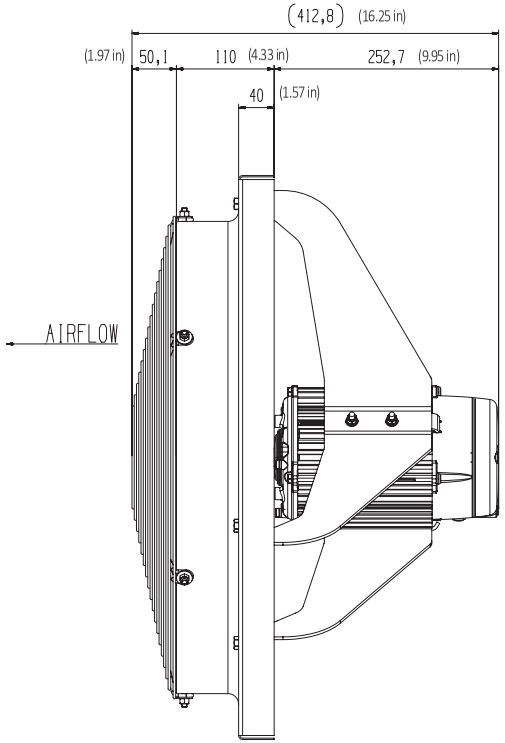
VOSTERMANS VENTILATION
Vostermans Ventilation Inc.
2439 S.Main St. – USA
Bloomington, IL 61704
Tel. +1 309 827 - 9798
Toll Free 800-458-5532
Fax +1 309 829 - 1993
ventilation@vostermansusa.com
www.vostermansusa.com

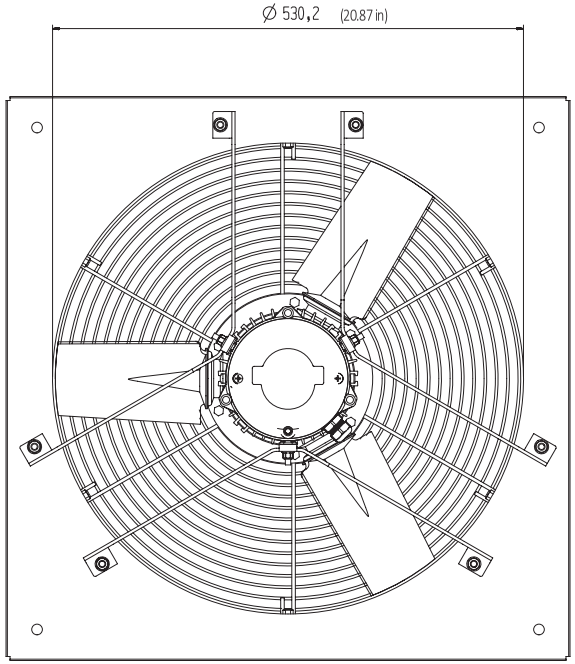
Multifan MF FLEX



ISO VIEW







			A	18-9-2017					
Mat. no.	Rev.	Date	Init.	Remarks					
Drawn	Marcel Harward		Remarks				Westermann companies		
Date	18-9-2017								
Checked									
General roughness	General tolerance according		Material		Surface treatment	CAD File	Units	Projection	Scale
							mm		1:2
Description							Size	Drawing no.	Rev.
Assembly CAPS 20 inch condensor fan							A0	VS3031	A
VS3031								sheet 1 of 1 sheets	

Customer:		Date:	3/31/2014
Contact:		From:	Larry Novak
Telephone:		Company:	Custom Air Products
Cell:		Return Tel:	(713) 460-9009
Fax:		Return Fax:	
Job:		Email:	larryn@customairproducts.com
Quote #:			

Construction

Item :	Condenser
Coils Per Bank :	1
Duty :	Condenser
Style :	CF
Condensing Sections :	2
Tube OD IN:	3/8
Fins Per Inch:	14
Rows :	3
Fin Surface :	B
Circuiting :	14
Fin Height IN:	64.00
Finned Length IN:	54.00
Tubing Material:	0.016 Copper Rifled
Fin Material:	0.0075 Aluminum
Face Area (SQ FT):	24.00

Air Side

Air Flow -S ft^3/min:	14,500.00
Altitude FT:	0
Ent. Air DB °F:	95.00
Lvg. Air DB °F:	0.00
✓ Total Capacity MBH:	328.65
Max Air PD "H2O:	0.00

Refrigerant Side

Refrigerant Type:	410A
Condensing Temp. °F:	125.00
Vapor Temp. °F:	189.00
Subcooling Temp. °F:	15.00
% Condensing Load:	

OUTPUT DATA		Most Economical			Specified Coil		
		Coil 1	Coil 2	Coil 3	Coil 4 ✓	Coil 5	Coil 6
Model Number					**3CF1403B**		
Air Velocity -S	ft/min				**604.17**		
Total Capacity	MBH				**328.74**		
Leaving Air DB	°F				**115.90**		
Standard APD	"H2O				**0.42**		
Refrigerant PD	lbf/in^2				**8.11**		
Refg. Mass Flow	lbm/hr				**3654.02**		
Leaving Refg.	°F						
Circuits					**14.00**		
Subcooling Temp.	°F				**14.66**		
Fixed Subcool	MBH				**0.00**		
Liquid Conn. Size	IN				**(2) 0.63**		
Vapor Conn. Size	IN				**(2) 0.88**		
Tubes of Liquid					**8.76**		
Internal Volume					**1124.45**		
Weight	lbm				**249.14**		
Notes					**DM**		

Notes:

D) Coil Has Opposite End Connections.

M) Coil rating valid for Heatcraft coils only.

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SECTION

04

COMPRESSOR

BITZER Output data

Created on : 06.11.2017 17:29:35

Table of content

Project survey

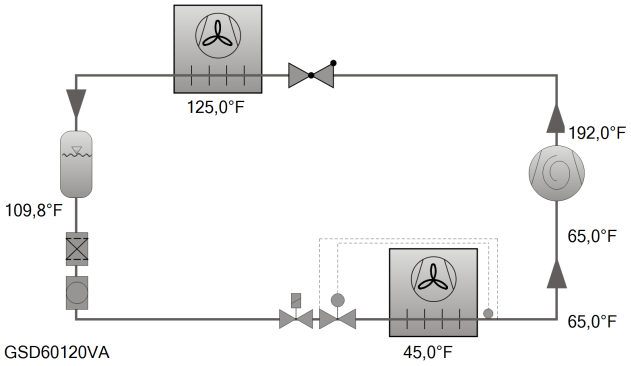
Selected compressors

Scroll-Compressor	1x	GSD60120VA

Selection: Scroll-Compressor

Input Values

Cooling capacity	120,0 kBtu/h
Refrigerant	R410A
Reference temperature	Dew point temp.
Evaporating SST	45,0 °F
Condensing SDT	125,0 °F
Liq. subc. (in condenser)	15,00 °F
Suct. gas superheat	20,00 °F
Power supply	460V-3-60Hz UL
Useful superheat	100%

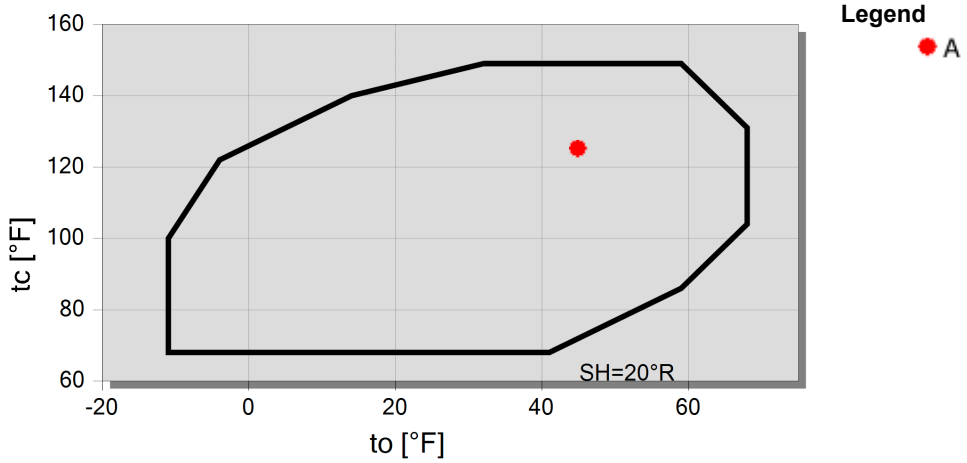


Result

Compressor	**GSD60120VA_4**
Capacity steps	100%
Cooling capacity	128,0 kBtu/h
Cooling capacity *	128,0 kBtu/h
Evaporator capacity	128,0 kBtu/h
Power input	10,26 kW
Current (460V)	14,18 A
Voltage range	460V
Condenser Capacity	163,0 kBtu/h
COP/EER	12,48
COP/EER *	12,48
Mass flow	1823 lb/h
Discharge gas temp. w/o cooling	192,0 °F

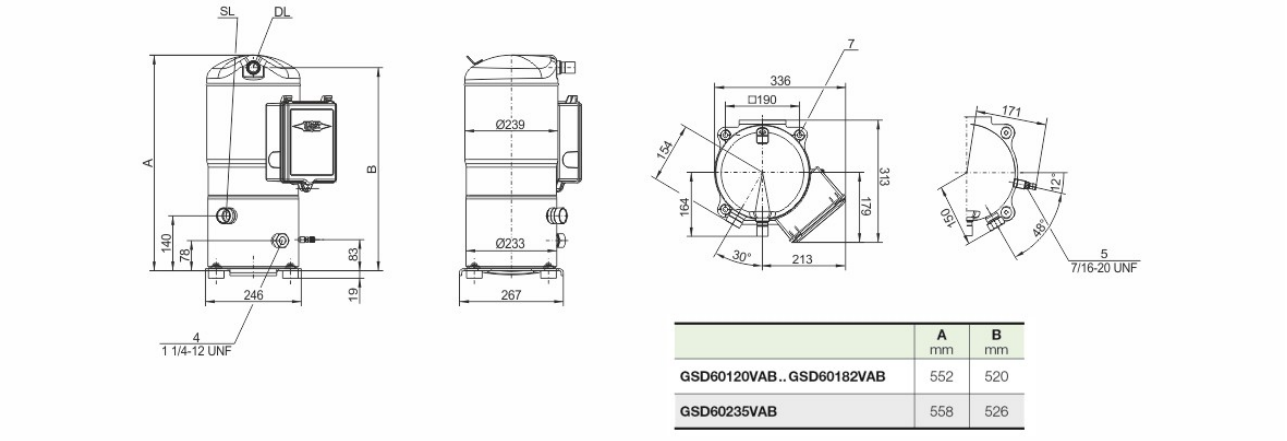
Tentative Data.
Smallest compressor type
according to ARI540 (20°Fsuction gas superheat, 15°F liquid subcooling)

Application Limits



Technical Data: GSD60120VA

Dimensions and Connections



	A mm	B mm
GSD60120VAB.. GSD60182VAB	552	520
GSD60235VAB	558	526

Technical Data

Technical Data	
Displacement (2900 RPM 50 Hz)	11,7 CFM
Displacement (3500 RPM 60 Hz)	14,1 CFM
Weight	195 lb
Max. pressure (LP/HP)	480 / 650 psi
Connection suction line	
Direct brazing connection	1 3/8 (Standard)
Connection discharge line	
Direct brazing connection	7/8 (Standard "B" version)
Oil type R410A	BVC32 (Standard)
Motor data	
Motor voltage (more on request)	460V -60Hz UL
Max operating current	21.9 A
Starting current (Rotor locked)	122.0 A
MCC	33.0 A
RLA (MCC/1.40)	23.6 A
RLA (MCC/1.56)	21.2 A
Max. Power input	14,6 kW
Extent of delivery (Standard)	
Oil charge	95 fl oz
Motor protection	SE-B3
Enclosure class	IP54
Available Options	
Oil heater	90 W
Discharge gas temperature sensor	Option
Motor protection	SE-E1
Vibration dampers	Option
Sound measurement	

Scroll-Compressor

Legend of connection positions according to "Dimensions":

ESH/ELH/ELA:

1 High pressure measurement connection (HP) - Schrader
2 High pressure connection (HP) alternatively: connection for discharge gas temperature sensor
3 Low pressure connection (LP)
4 Sight glass
5 Oil maitenance connection
6 Connection for oil and gas equalization (parallel operation)
SL Suction line
DL Discharge line
Dimensions can show tolerances according to EN ISO 13920-B.

GSD:

1 -
2 High pressure connection (HP) alternatively: connection for discharge gas temperature sensor
3 -
4 Sight glass
5 Oil maitenance connection
6 Connection for oil and gas equalization (parallel operation)
7 Mounting position for vibration dampers
8 Mounting position for Tandem and Trio fixing rails
SL Suction gas line
DL Discharge gas line
Dimensions can show tolerances according to EN ISO 13920-B.

GSD Rotalock:

1 High pressure measurement connection (HP) - Schrader
2 High pressure connection (HP) alternatively: connection for discharge gas temperature sensor
3 Low pressure connection (LP)
4 Sight glass
5 Oil maitenance connection
6 Connection for oil and gas equalization (parallel operation)
7 Mounting position for vibration dampers
8 Mounting position for Tandem and Trio fixing rails
SL Suction gas line
DL Discharge gas line
Dimensions can show tolerances according to EN ISO 13920-B.

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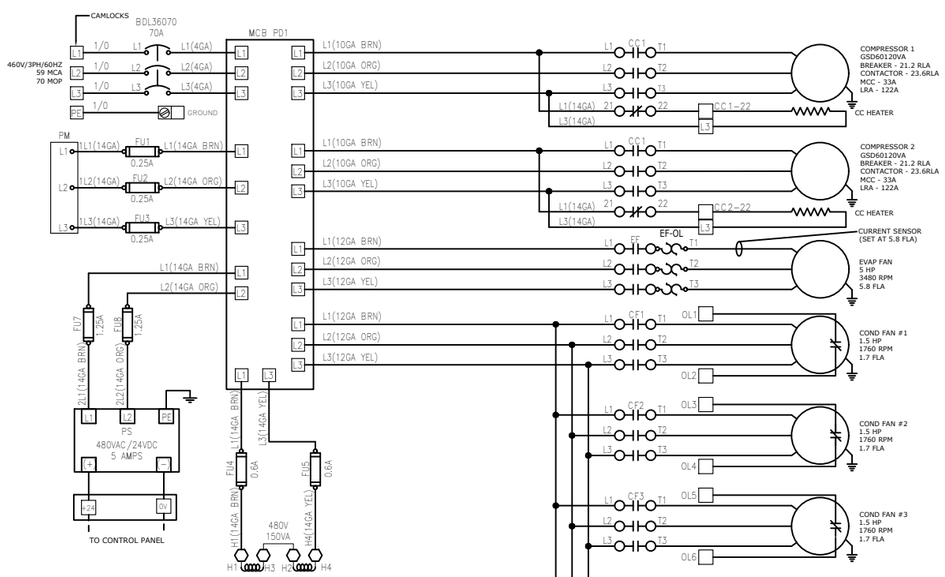
SECTION

05

ELECTRICAL DRAWINGS

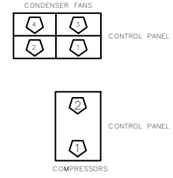


WIRING NOTES

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

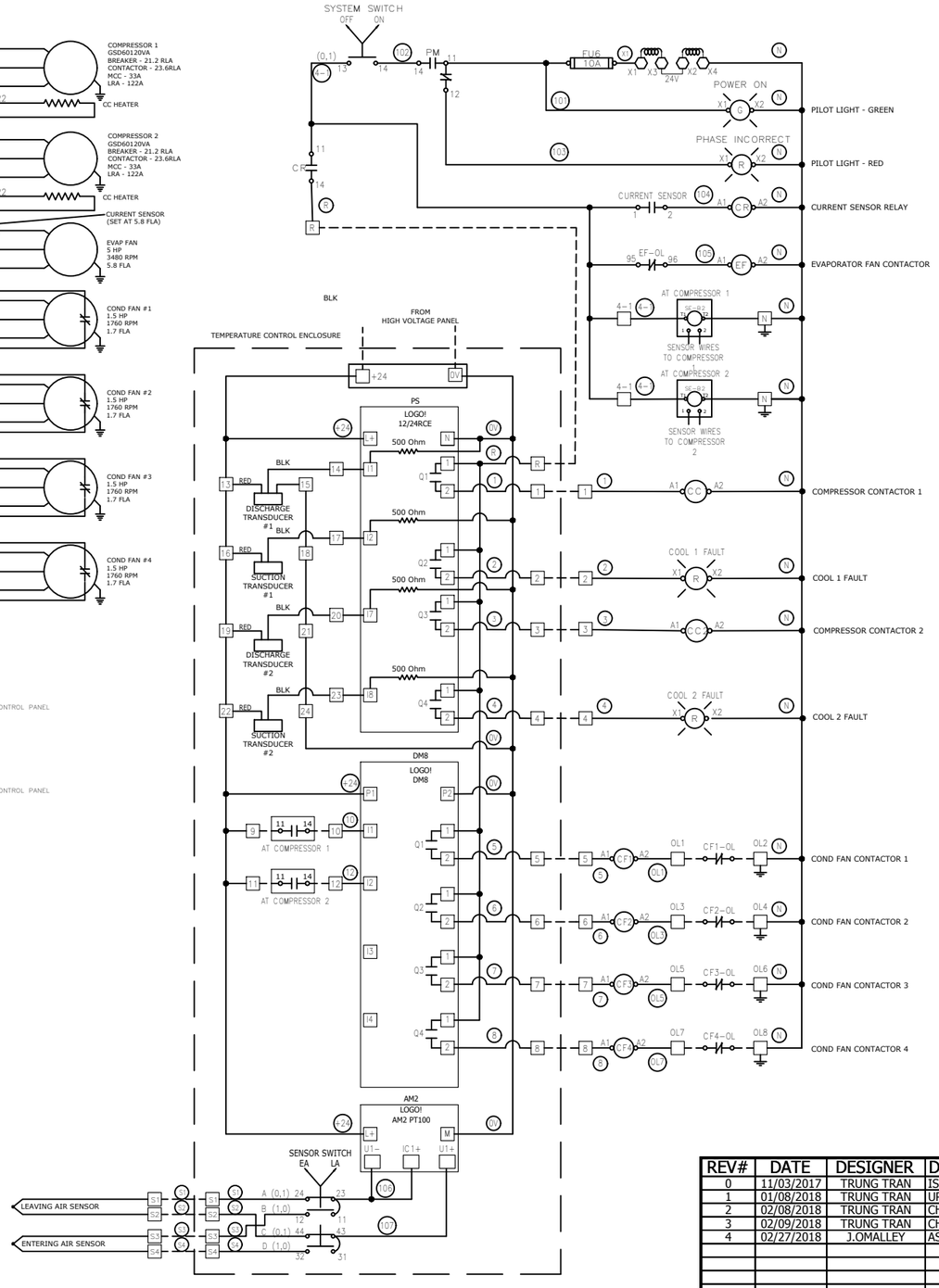


NOTES:

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.
5. USE FERRULES FOR ALL CONNECTIONS.

LEGEND

EF	- EVAPORATOR FAN CONTACTOR
CF	- CONDENSOR FAN CONTACTOR
CC	- COMPRESSOR CONACTOR
PM	- PHASE MONITOR
PDB	- POWER DISTRIBUTION BLOCK



REV#	DATE	DESIGNER	DESCRIPTION
0	11/03/2017	TRUNG TRAN	ISSUE FOR CONSTRUCTION
1	01/08/2018	TRUNG TRAN	UPDATE NUCO DRAWING PER ECN# 00303
2	02/08/2018	TRUNG TRAN	CHANGE LOGO INPUT PER ECR#00349
3	02/09/2018	TRUNG TRAN	CHANGE MAIN BREAKER W/MCA & MOP PER ECR# 00354
4	02/27/2018	J.OMALLEY	AS BUILT

CUSTOM AIR PRODUCTS & SERVICES, INC.
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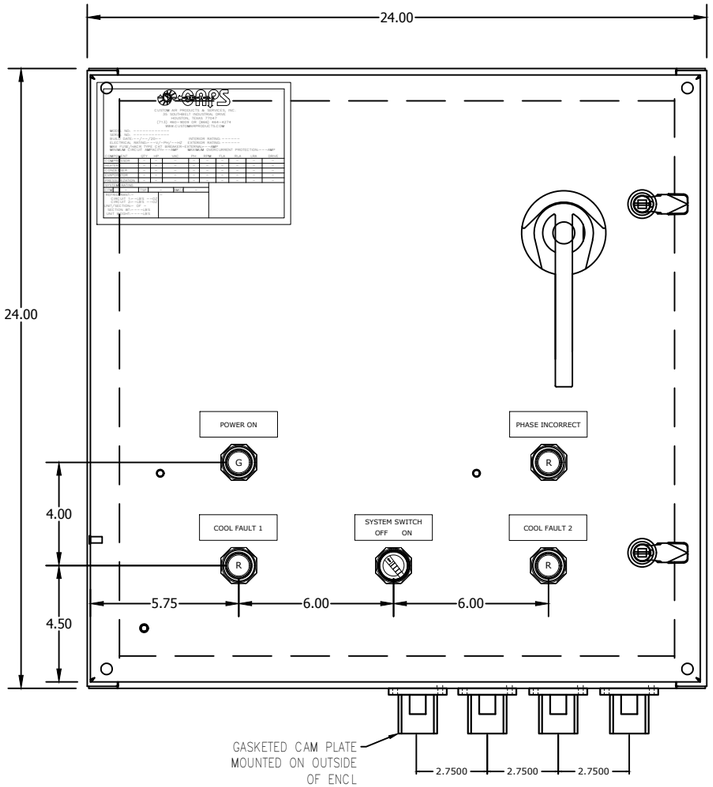
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM NUMBER F-14008

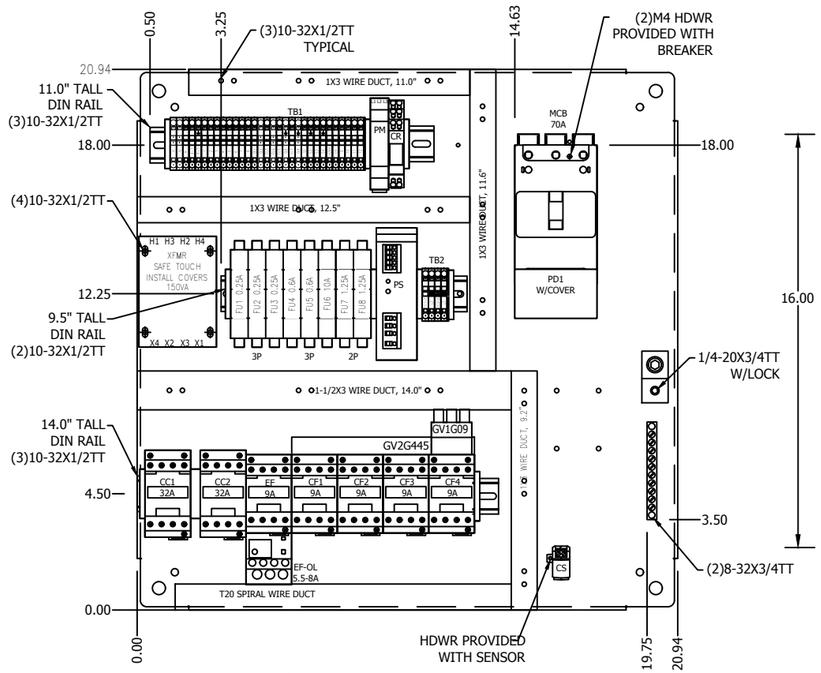
CERTIFIED AS-BUILT

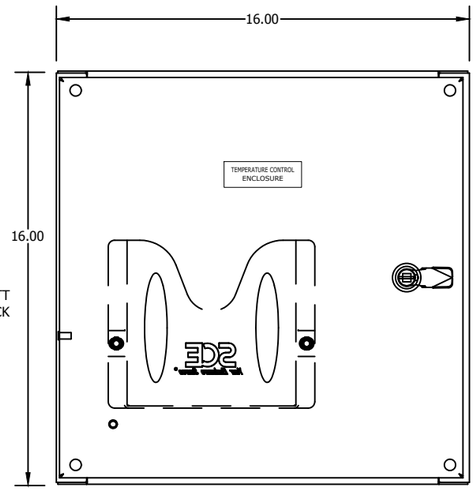
CHECKER: _____ DATE: _____

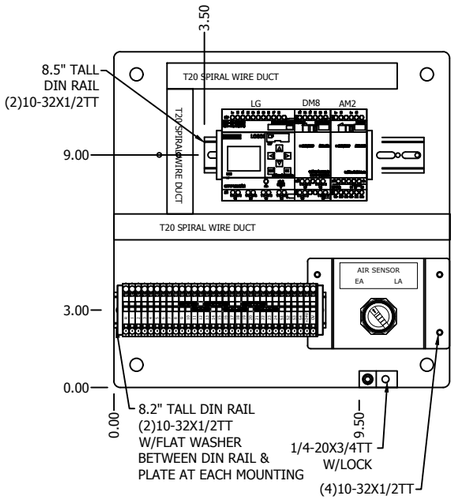
APPROVER: _____ DATE: _____

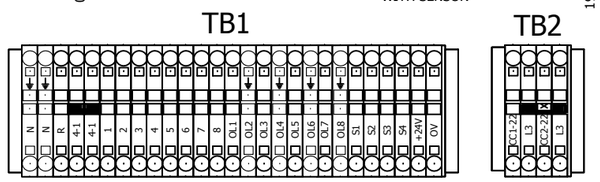
CAPS NO.: 17F-0794	DRAWING: AE1	DRAWN BY: DAVID NGUYEN	DATE: 11/09/2017	CUSTOMER: HERC
CUST. PO#:	SHEET: 1 OF 3	CHECKED BY: DAVID NGUYEN	DATE: 02/09/2018	20 TON INDUSTRIAL AC UNIT NEMA 4 GENERAL PURPOSE 460V/3P/60HZ ELECTRICAL DESIGN ELECTRICAL WIRING DIAGRAM
SIZE: B	REV: 4	APPROVED BY: LARRY NOVAK	DATE: 02/27/2019	

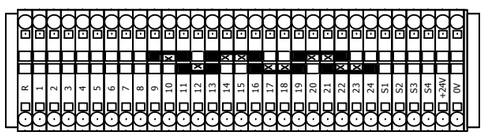












LEGEND

EF	- EVAPORATOR FAN CONTACTOR
CF	- CONDENSOR FAN CONTACTOR
CC	- COMPRESSOR CONACTOR
PM	- PHASE MONITOR
PDB	- POWER DISTRIBUTION BLOCK

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

REV#	DATE	DESIGNER	DESCRIPTION
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4	02/27/2018	J.OMALLEY	AS BUILT

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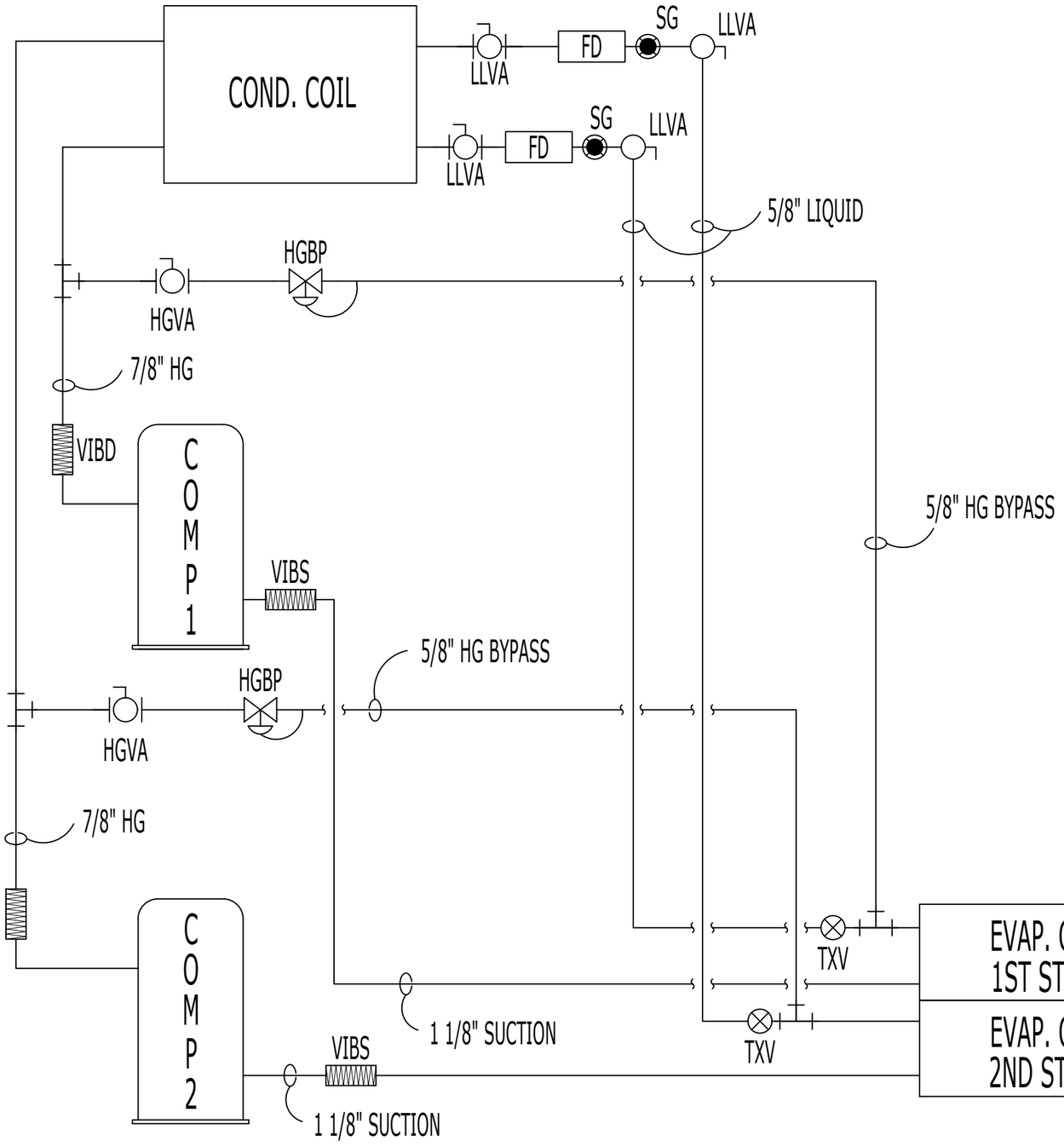
APPROVER: _____ DATE: _____

CAPS NO.: 17F-0794	DRAWING: AE2	DRAWN BY: DAVID NGUYEN	DATE: 11/09/2017	CUSTOMER: HERC
CUST. PO#:	SHEET: 2 OF 3	CHECKED BY: DAVID NGUYEN	DATE: 02/09/2018	20 TON INDUSTRIAL AC UNIT NEMA 4 GENERAL PURPOSE 460V/3P/60HZ ELECTRICAL DESIGN PANEL LAYOUT
SIZE: B	REV: 4	APPROVED BY: LARRY NOVAK	DATE: 02/27/2019	



REV#	DATE	DESIGNER	DESCRIPTION
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1	01/08/2018	TRUNG TRAN	UPDATE NUCO DRAWING PER ECN# 00303
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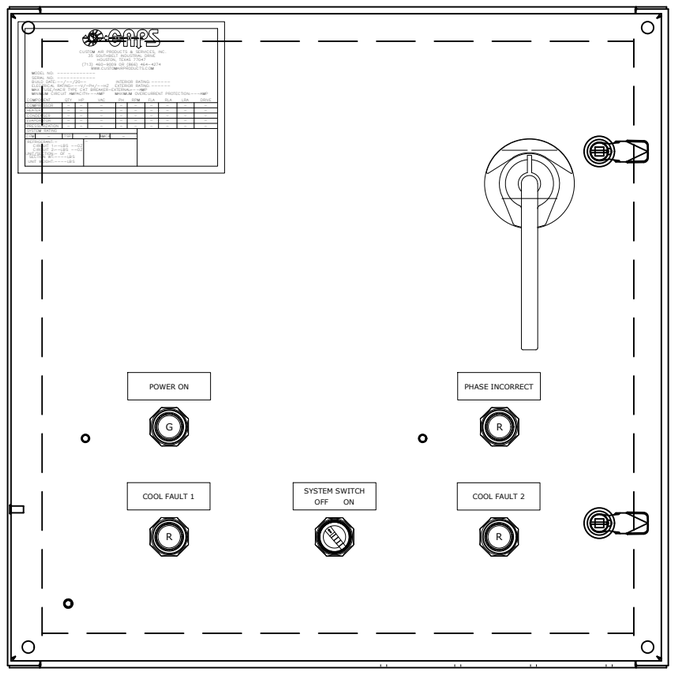
CHECKER: _____ DATE: _____

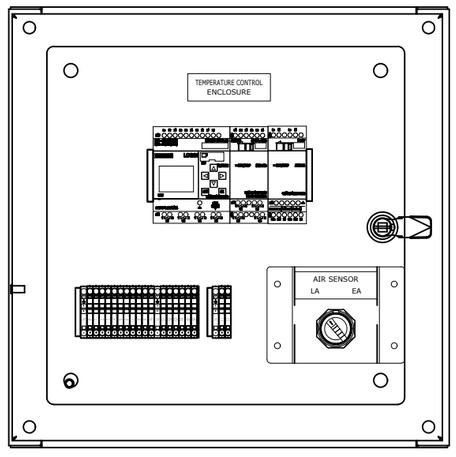
APPROVER: _____ DATE: _____

CAPS NO.: 17F-0794	DRAWING: AE3	DRAWN BY: DAVID NGUYEN	DATE: 11/09/2017
CUST. PO#:	SHEET: 3 OF 3	CHECKED BY: DAVID NGUYEN	DATE: 02/09/2018
SIZE: B	REV: 4	APPROVED BY: LARRY NOVAK	DATE: 02/27/2019

CUSTOMER: HERC

20 TON INDUSTRIAL AC UNIT NEMA 4
GENERAL PURPOSE
460V/3P/60HZ
ELECTRICAL DESIGN
P & ID





SEQUENCE OF OPERATION

The system is placed into initial operation as follows:

- Turn System Switch to “OFF”
- Turn Circuit Breaker "ON"
  - If the "Phase Incorrect" light is on, turn off the circuit breaker; 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 "Power On" light is on and the "Phase Incorrect" light is off, the unit is ready for operation
- Turn System Switch to "ON"
- Air Sensor Switch settings:
  1- Leaving: The HVAC is controlled by the leaving air temperature
  2- Entering: The HVAC is controlled by the return air temperature
- Thermostat field settings:

1- Press PRG
2- Press DOWN buttons to move down to next screen (temperature setpoint)
3- Press ENTER to highlight temperature setting and use up and down arrows to change temperature.
4 - Press Enter to accept the change
5 - Press Escape to return to main screen.

- If a Compressor is failed, it will be turned off and locked out then its light alarm will be turned on.
- Only use System Switch to turn off the unit

NOTE: THIS UNIT IS "COOL" ONLY

REV#	DATE	DESIGNER	DESCRIPTION
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CHECKER: _____ DATE: _____

APPROVER: _____ DATE: _____

CAPS NO.: 17F-0794	DRAWING: AE3	DRAWN BY: DAVID NGUYEN	DATE: 11/09/2017	CUSTOMER: HERC	
CUST. PO#:	SHEET: 3 OF 3	CHECKED BY: DAVID NGUYEN	DATE: 02/09/2018	20 TON INDUSTRIAL AC UNIT NEMA 4 GENERAL PURPOSE 460V/3P/60HZ ELECTRICAL DESIGN SEQUENCE OF OPERATION	
SIZE: B	REV: 4	APPROVED BY: LARRY NOVAK	DATE: 02/27/2019		

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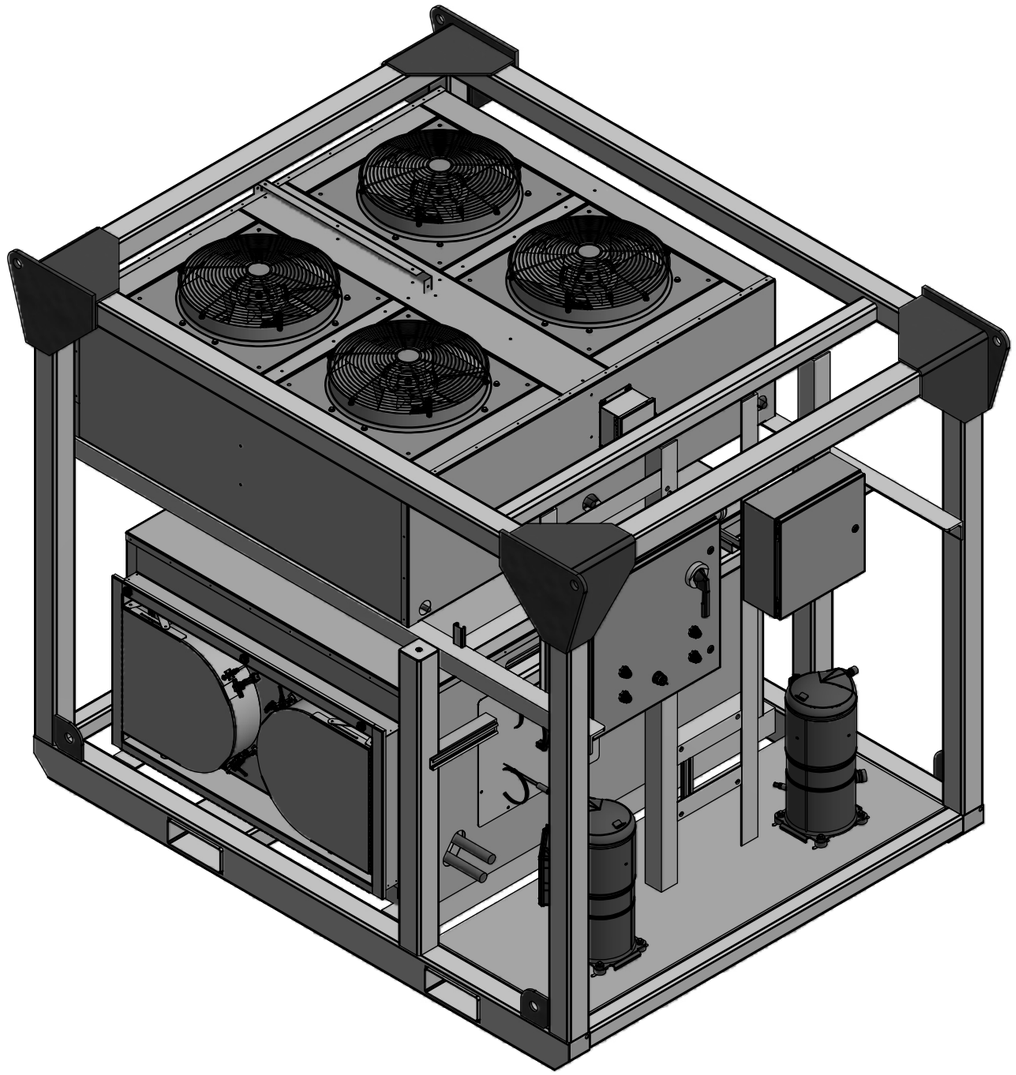
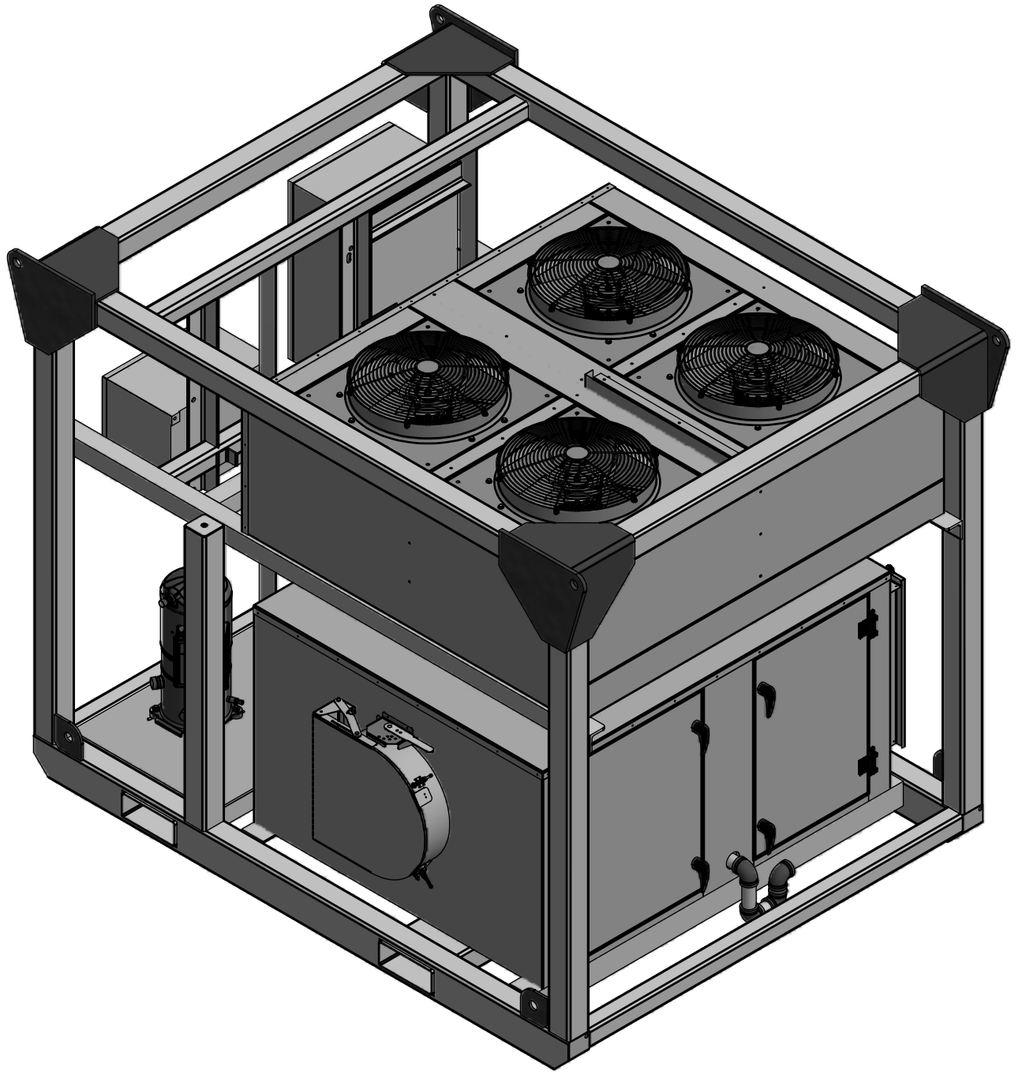
SECTION

06

MECHANICAL DRAWINGS

CAPS - MERIDIAN
20 TON INDUSTRIAL PACKAGE UNIT
GALV. SKID, GALV. CAGE, S.S. HOUSINGS
460V/3PH/60HZ, NEMA 4 CONSTRUCTION
17F-0794





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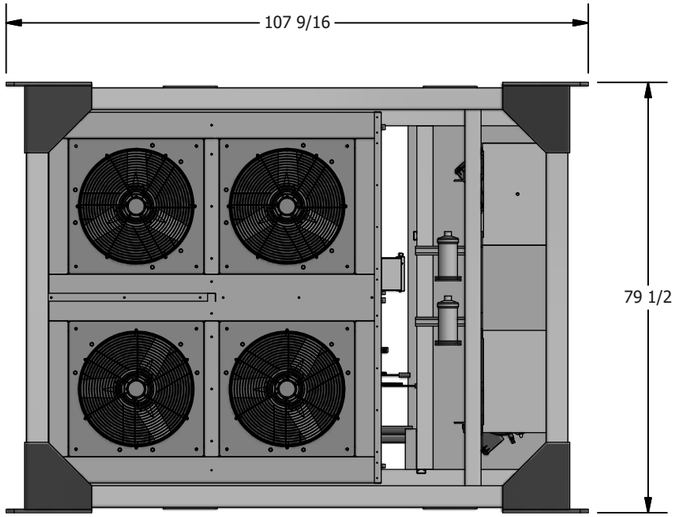
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM NUMBER F-14008

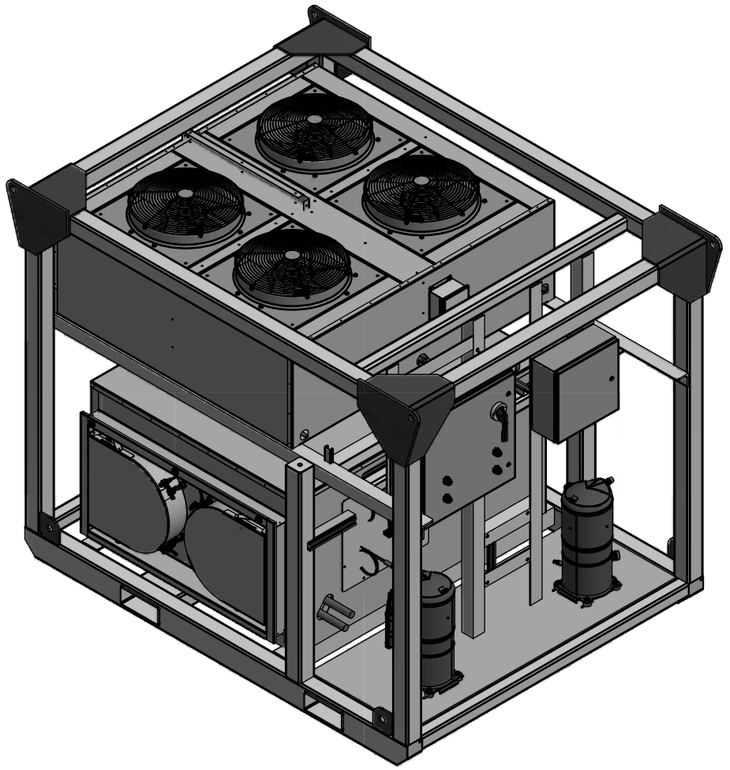
CERTIFIED AS BUILT

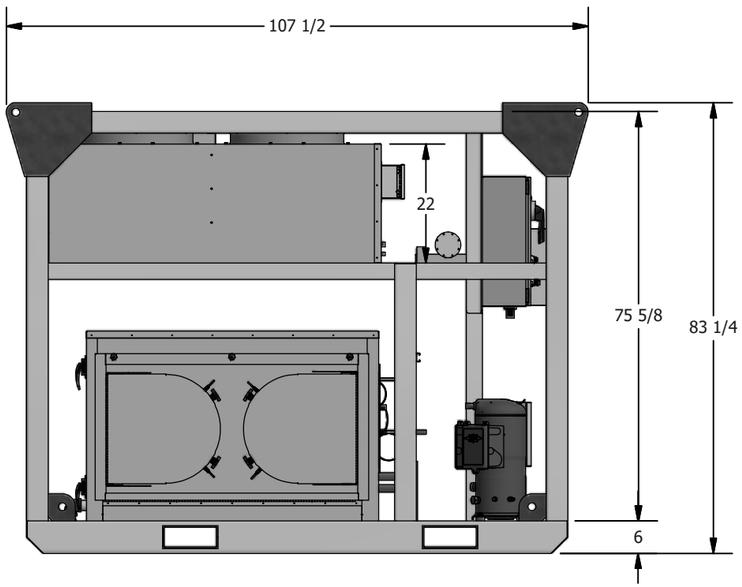
CHECKER:_____ DATE:_____

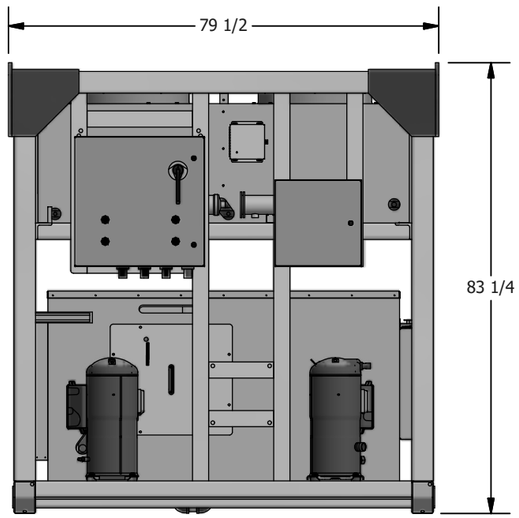
APPROVER:_____ DATE:_____

CAPS NO.:	DRAWING:	DESIGNER:	DATE:	CUSTOMER:
17F-0794	M1	TIEN NGUYEN	4/14/2014	HERC
CUST. PO#:	SHEET: 1 OF 2	CHECKER: DAVID POTTS	DATE: 10/31/2017	20 TON INDUSTRIAL PACKAGE UNIT GALV. SKID, GALV. CAGE, S.S. HOUSINGS 460V/3PH/60HZ, NEMA 4 CONSTRUCTION
SIZE: B	REV: 12	APPROVER: JOHN PHAN	DATE: 10/31/2017	MECHANICAL DESIGN COVER PAGE









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FIRM NUMBER F-14008

CERTIFIED AS BUILT

CHECKER:_____ DATE:_____

APPROVER:_____ DATE:_____

CAPS NO.: 17F-0794	DRAWING: M1	DESIGNER: TIEN NGUYEN	DATE: 4/14/2014	CUSTOMER: HERC
CUST. PO#:	SHEET: 2 OF 2	CHECKER: DAVID POTTS	DATE: 10/31/2017	20 TON INDUSTRIAL PACKAGE UNIT GALV. SKID, GALV. CAGE, S.S. HOUSINGS 460V/3PH/60HZ, NEMA 4 CONSTRUCTION MECHANICAL DESIGN UNIT LAYOUT NEMA7 DESIGN
SIZE: B	REV: 12	APPROVER: JOHN PHAN	DATE: 10/31/2017	

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SECTION

07

BILL OF MATERIAL

BILL OF MATERIAL	REV
MAJOR COMPONENTS	0
PIPING	0
ELECTRICAL	1
MISC	0

SUGGESTED SPARE PARTS

JOB #:	**17F-0794**	**REVISION #:**	**0**
CUSTOMER	**HERC**		
PROJECT	**20 TON INDUSTRIAL AC UNIT**		

ITEM #	DESIGNATION	BRAND	MODEL/PART #	DESCRIPTION	QTY	CAPS#
1	EVAPORATOR COIL	LUVATA HEATCRAFT	4EJ1306C	DWG# 12634350, 25"FHx36"FLx8.38"D, COATED FEEDER TUBE	1	
2	CONDENSER COIL	LUVATA HEATCRAFT	3CF1403B	DWG# 126342400, 64"FHx54"FLx5"D	1	
3	EVAPORATOR FAN	GREENHECK	15-APH-4-65-II-50	2770 CFM, 5 HP, 3500, FAN GUARD	1	
4	CONDENSER FAN	VOSTERMANS	FP00002M77100	3.625 CFM, 1.5 HP, 0.55 SP (COMPLETED ASSEMBLY)	1	
5	COMPRESSORS	BITZER	GSD60120VAB422	10 TON COMPRESSOR, R-410A, 460V/3P/60HZ	1	
6	MOUNTING KIT	BITZER	370024-03	MOUNTING KIT ASSY	1	
7	CRANKCASE HEATER	BITZER	343256-07	CRANKCASE HEATER 90W 460V	1	
8	SYSTEM SWITCH	SQUARE D	9001KS11B	2 POSITION SWITCH	1	
9	CONTACT BLOCK	SQUARE D	9001KA2	CONTACT BLOCK 1-N0	1	
10	CONTACT BLOCK	SQUARE D	9001KA3	CONTACT BLOCK 1-NC	1	
11	CC1 - CC2	SQUARE D	LC1D25B7	COMPRESSOR CONTACTOR, 25A, 24VAC CONTROL	1	
12	EF	SQUARE D	LC1D09B7	EVAP FAN CONTACTOR, 9A, 24VAC CONTROL	1	
13	EF-OL	SQUARE D	LRD12	OVERLOAD RELAY, 5.5-8 AMPS	1	
14	CF1 - CF4	SQUARE D	LC1D09B7	CONDENSER FAN CONTACTOR, 9A, 24VAC CONTROL	1	
15	TRANSFORMER	HPS	SP150QR	TRANSFORMER, 150VA, 240/480 X 12/24V	1	
16	PM	SQUARE D	RM17TU00	PHASE MONITOR	1	
17	FUSE BLOCK	WAGO	811-430	FUSE HOLDER, 3P, 30A, 600V, CLASS CC, CAGE CLAMP	1	
18	F1,F2,F3	MERSEN	ATQR1/4	1/4A FUSE, PHASE MONITOR	1	
19	F4,F5	MERSEN	ATQR6/10	6/10A FUSE, TRANSFORMER, PRIMARY	1	
20	F6	MERSEN	ATQR10	10A FUSE, TRANSFORMER, SECONDARY	1	
21	MAIN CB	SQUARE D	BDL36070	CIRCUIT BREAKER 70A 3P AC 18KA AT 480/440V	1	
22	PILOT LIGHT	SQUARE D	9001KP35G31	PILOT LIGHT, GREEN, 24VAC	1	
23	PILOT LIGHT	SQUARE D	9001KP35R31	PILOT LIGHT, RED, 24VAC	1	
24	POWER SUPPLY	PHX	2866462	PWR SPLY, TRIO-PS/3AC/24DC/5A	1	
25	FUSE	MERSEN	ATQR1-1/4	1-1/4A FUSE, POWER SUPPLY	1	
26	LOGO!	SIEMENS	6ED1052-1MD00-0BA8	SMART RELAY 12/24RCE, 24VDC, 8 INPUTS, 4 OUTPUTS	1	
27	LOGO! EXP	SIEMENS	6ED1055-1HB00-0BA2	LOGO! EXPANSION MODULE DM8 24R, 4 INPUTS, 4 OUTPUTS, 24V AC/DC	1	
28	LOGO! EXP AM2 PT100	SIEMENS	6ED1055-1MD00-0BA2	LOGO! 8 AM2 RTD EXPAN MODULE PU DC 12/24V, 2AI, -50-+200D, PT100/1000	1	
29	TEMP SENSOR	ACI	A/100-2W-DO-4"-6" CL2P	SENSOR 100 OHM @ 32F (0 DEGREE C)	1	
30	TRANSDUCER	JOHNSON CONTROLS	P499ACP-107C	750PSI, 4-20mA TRANSDUCER	1	
31	TRANSDUCER CABLE	JOHNSON CONTROLS	WHA-PKD3-600C	19-5/8" TRANDUSCER CABLE	1	
32	CURRENT SENSOR RELAY	WAGO	788-512	RELAY, 24VAC, DPDT, W/SOCKET & LATCH, 8A, 250V, PUSH IN CAGE CLAMP	1	
33	CURRENT SENSOR	SENVA	C-1220	CURRENT SWITCH, N.O., .75-50A RANGE	1	
34	XFMR COVER	HPS	SPFG1	XFMR FINGER GUARD, SPARTAN	1	
35	HGBV	SPORLAN	HGBE-5	HOT GAS BYPASS VALVE, 5/8 ODF	1	
36	FD	SPORLAN	C-R425G	REPLACEABLE CORE FILTER DRIER, 5/8 ODF	1	
37	FC	SPORLAN	RCW-42	FILTER DRIER CORES	1	
38	SG	SPORLAN	SA-15S	SIGHT GLASS, 5/8" ODF	1	
39	LLVA	SPORLAN	EBVT-1050	BALL VALVE, 5/8" ODF	1	
40	HGVA	SPORLAN	EBVT-1050	BALL VALVE, 5/8" ODF	1	
41	VIBS	VIBRASORBER	VAFS-9	VIBRATION ISOLATOR, 1-1/8" (SUCTION)	1	
42	VIBD	VIBRASORBER	VAFS-8	VIBRATION ISOLATOR, 7/8" (DISCHARGE)	1	
43	FILTERS	GLASFLOSS	30% PLEATED	24" x 20" x 2"	1	