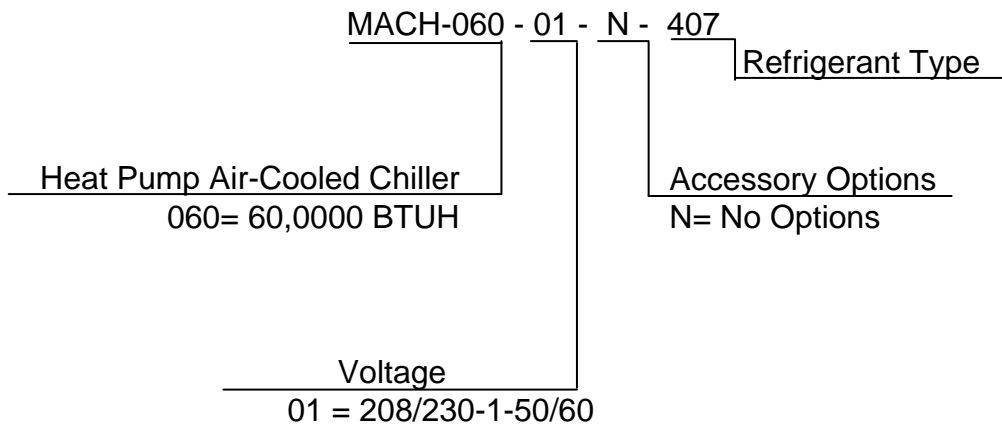




MACH060-01-N-407 Heat Pump Air-Cooled Chiller

Heat Pump Air-Cooled Chillers for Global Residential
and Light Commercial Microclimates

MACH NOMENCLATURE BREAKDOWN



Available Model Numbers
MACH-060-01-N-407



HVAC Guide Specifications

Heat Pump Air Cooled Liquid Chiller

Size Range:

5 Tons

Multi aqua Model Number:

MACH060-01-N-407

Part 1 — General

1.01 SYSTEM DESCRIPTION

Multi aqua air cooled liquid heat pump chiller are designed using a scroll compressor, low sound condenser fans and a high efficiency pump.

1.02 QUALITY ASSURANCE

- A. Unit shall be certified in accordance with U.L. Standard 95, latest revision (U.S.A)
- B. Construction shall comply with ASHRAE 15 Safety Code, NEC and ASME applicable codes (U.S.A. codes)
- C. Manufactured in a facility registered to ISO 9002, Manufacturing Quality Standard.
- D. ETL Certified.
- E. Fully load run tested at the factory.
- F. Damage resistant packaging.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Packaged and readied for shipment from the factory.
- B. Unit controls shall be capable of withstanding 150F storage temperatures in the control compartment.
- C. Stored and handled per unit manufacturer's recommendations.

1.04 WARRANTY

- A. Complete unit, first year parts only warranty against manufacturer's defects.
- B. Compressor, years 2-5, parts only warranty against manufacturer's defects.

Part 2 — Products

2.01 EQUIPMENT

A. General:

1. Factory-assembled, air cooled heat pump chiller.
2. Shall be assembled on heavy gauge steel mounting/lifting rails.
3. Contained within the unit cabinet shall be all factory wiring, piping controls, refrigerant charge (R-407c), and special requirements prior to field start-up.
4. Brass body strainer with 20 mesh screen and blow down shall be supplied in cabinet as a field installable accessory.

B. Unit Cabinet:

1. Cabinet shall be galvanized steel casing with a baked polyester powder finish.
2. Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM (U.S.A) standard.

C. Condenser Fans:

1. 4-blade, condenser fans shall be direct-driven, aluminum construction, and shall be statically and dynamically balanced with inherent corrosion protection.
2. Air shall be discharged horizontally.
3. Motors and fans shall be protected by coated steel wire safety guards.

D. Fan Motors:

1. Condenser fan motors shall be single speed, direct drive.
2. Totally enclosed.
3. Permanently lubricated sleeve bearings and Class F insulation.
4. Internal overload protection.

E. Compressors:

1. Fully hermetic scroll type compressor.
2. Direct Drive, 3500 rpm (50/60 Hz)
3. Compressor shall be suction gas cooled.
4. Internal motor protected.
5. Protected by high pressure and loss of charge devices.
6. External vibration isolation.

- F. Pump:
 - 1. Circulating pump shall be stainless steel with high efficiency enclosed motor.
 - 2. Unit shall have chilled liquid solution piping to the exterior of the cabinet.
 - 3. Shall have a max working pressure of 60 psig.
- G. Evaporator:
 - 1. Evaporator shall have one independent refrigeration circuit and one liquid solution circuit.
 - 2. Rated for a refrigerant side working pressure of 450 psig and shall be tested for a maximum fluid-side pressure of 150 psig.
 - 2. Single pass, ANSI type 316 stainless steel, brazed plate construction.
 - 4. Insulated with closed cell, elastometric foam (ASTM 518)
- H. Condenser:
 - 1. Shall be air cooled with integral sub-cooler.
 - 2. One independent refrigeration circuit.
 - 3. Constructed of rifled copper tubing mechanically bonded to aluminum fins.
 - 3. Tubes shall be cleaned, dehydrated and sealed.
 - 4. Assembled condenser coils shall be leak tested and pressure tested at 450 psig.
- I. Refrigeration Components:
 - 1. Refrigeration circuit components shall include sight glass, reversing valve, thermal expansion device, and complete operating charge of both refrigerant (R-407c) and compressor POE oil.

PART 3-Controls and Safties

3.01 Controls

- A. Controls:

Unit control shall include the following minimum components.

 - 1. Control transformer to serve all controllers, relays and control components.
 - 2. Pump bypass timer
 - 3. Compressor recycle timer.
 - 4. Optional low pressure bypass timer for low ambient operation.
 - 5. Optional fan cycling control for low ambient operation.
 - 6. Flow switch.
 - 7. Defrost printed circuit board and thermostat.
 - 8. Leaving water temperature thermostat with thermistors installed to measure cooler leaving water flow.
 - 9. Manual heat/cool changeover switch.
- B. Unit controls shall include the following functions.
 - 1. Capacity control based on leaving chilled fluid temperature. Temperature setpoint accuracy of +/- 1.0F.
 - 2. Chilled water pump start/stop control.

3.02 Safeties:

- A. Unit shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit with the following protectants:
 - 1. Low refrigerant pressure.
 - 2. High refrigerant pressure.
 - 3. Low liquid solution flow.
 - 4. Thermal overload.
 - 5. Short cycling.

PART 4 Operating Characteristics:

4.01 Temperatures

- A. Unit shall be capable of starting and running in cooling mode at outdoor ambient temperatures from 55°F to 120°F.
- B. Optional Low Ambient Kit shall allow starting and running at outdoor temperatures to – 20°F. A field supplied and installed crankcase heater must be used when operating at these temperatures.
- C. Unit shall be capable of starting and running in heating mode at outdoor ambient temperatures from 70°F to 17°F.
- D. Unit shall be capable of starting up in cooling with a maximum 80°F and a sustained 70°F entering liquid solution temperature to the evaporator.
- E. Unit shall be capable of starting up in heating with a minimum 55°F liquid solution temperature.
- F. Minimum 10% Propylene Glycol solution is required. For outdoor temperatures below 32°, reference MAC Glycol Solution Data Table.



4.02 Electrical Requirements

- A. Primary electrical power supply shall enter the unit at a single point.
- B. Electrical power supply shall be rated to withstand 120°F operating ambient temperature.
- C. Unit shall be available in 208/230-01-50/60.
- D. Control points shall be accessed through a terminal block.

MACH060-01-N-407 Product Specifications

Physical Data

Model Number	Coil				Chiller				Weight (lbs)	
	Height (in)	Length (in)	Copper Diameter (in)	Coil Rows	Height (in)	Length (in)	Width (in)	Refrigerant R407c	Net	Shipping
MACH060	38	48	3/8	2	49.75	39.75	16.25	92.95 oz	313	316

Electrical Data

Model Number	Volts/ Phase/ Hertz	Compressor		Condenser Fan Motor (2 qty)		Pump Motor		Fuse or HACR Circuit Breaker Per Circuit	
		(RLA)	(LRA)	(FLA)	(RPM)	(FLA)	(RPM)	Minimum Amps	Maximum Amps
MACH060-01-N-407	208/230-1-50/60	32.1	169	1.05	1050	3.70	3450	45.93	70

	MACH060
Compressor	Copeland Scroll
Refrigerant	R407c
Heat Exchanger	Brazed Plate
Max. Pump Head Pressure	50 ft.
Max Flow Rate	14.4 gpm
Min Flow Rate	9.0 gpm
Supply Water Temp	44°
Return Water Temp	54°
Min. Solution Content	25 Gallons
Expansion Tank Size	2 Gallons
Pump	0.5 HP
Water Connections	1" S & 1.25" R
Internal Pressure loss	1.85 ft of head

		Copper Wire Size (1% Voltage Drop)							
Supply Wire Length in Feet	200	6	4	4	4	3	3	2	2
	150	8	6	6	4	4	4	3	3
	100	10	8	8	6	6	6	4	4
	50	14	12	10	10	8	8	6	6
		15	20	25	30	35	40	45	50
		Supply Circuit Ampacity							

Multi aqua chillers are designed to operate exclusively with R407c refrigerant in a self-contained, pre-charged refrigerant system. Do not access the closed refrigerant circuit for any reason other than after-sale, after installation component replacement. Routine maintenance and service is to be performed by qualified personnel only.

These specifications are subject to change without notice.

MACH060-01-N-407 Product Specifications

MACH060 Capacity / Watts / EER							
O/A Temp (°F)	MACH060 COOLING			O/A Temp (°F)	MACH060 HEATING		
	Tons	KW	EER		Tons	KW	EER
82	5.1	5.3	11.55	17	3.19	4.6	8.32
95	4.9	5.9	9.97	35	3.68	4.7	9.40
100	4.8	6.1	9.44	45	4.25	4.8	10.63
105	4.7	6.4	8.81	55	4.79	4.8	11.98
110	4.7	6.5	8.68	65	5.32	4.9	13.03

Notes: Cooling is based on 44°F leaving water temperature. Heating is based on 130°F leaving water temperature

Glycol Solution Data				
Propylene Glycol %	Water Flow	Capacity	Min. Ambient Temp	GPM Adjustment= 100% Capacity
10%	x 1.020	x 0.99	26°F	x 1.01
20%	x 1.028	x 0.98	18°F	x 1.03
30%	x 1.036	x 0.98	8°F	x 1.07
40%	x 1.048	x 0.97	-7°F	x 1.11
50%	x 1.057	x 0.96	-29°F	x 1.16

Example: 30% glycol solution.

Maximum Flow Rate = 12gpm x 1.036

System capacity x .98

Use Propylene Glycol Only

Important

If the outside temperature is expected to fall below freezing (32°F) in the area the Multiaqua chiller is to be installed; the installer must take the following precautions. Failure to do so will void the warranty.

To not engage in cold ambient mitigation will result in the failure of components such as the heat exchanger, piping, circulating pump, etc... and or property damage.

- Keep the liquid solution at a minimum of ten percent propylene glycol even in areas where there is no danger of freezing.
- The percentage amount of glycol recommended is dependent on the expected ambient temperatures and the solution makeup recommendation of the glycol manufacturer. Refer to the Glycol Solution Data table above.
- Ensure the system circulating pump is in a constant energized mode to keep a continuous circulation of liquid solution.

The Multiaqua chiller is a self-contained air-cooled condenser, coupled with an insulated brazed plate heat exchanger (evaporator). The system utilizes a scroll compressor to circulate refrigerant between the condenser and heat exchanger. The refrigerant is metered into the heat exchanger with a thermostatic expansion valve. Protecting the system are high and low pressure switches as well as a pump flow switch.

Liquid solution (water and propylene glycol; minimum 10 % is required) is circulated through the heat exchanger by an externally mounted pump. The liquid solution flows through the heat exchanger to the system supply piping and on to the air handlers.

Low ambient kits are available for operating ambient temperatures down to -20 degrees Fahrenheit. The low ambient kits consist of an ICM 325 (+) ICM (175) for single and three phase 208/230 vac chillers. For the three phase 380/460 vac chillers a pressure activated fan control is used.

These specifications are subject to change without notice.

MACH060-01-N-407 Cooling Performance Data

MACH060 CAPACITIES with 0% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	82		95		100		105		110	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
35	3.90	12.0	3.70	12.0	3.60	12.0	3.50	12.0	3.50	12.0
40	4.50		4.30		4.20		4.10		4.10	
42	4.80		4.60		4.50		4.30		4.40	
44	5.10		4.90		4.80		4.70		4.70	
45	5.30		5.10		5.00		4.80		4.80	
46	5.40		5.20		5.10		5.00		5.00	
48	5.80		5.60		5.40		5.30		5.30	
50	6.10		5.90		5.70		5.60		5.60	
55	7.00		6.70		6.40		6.30		6.20	
60	7.80		7.50		7.30		7.10		7.00	

MACH060 CAPACITIES with 10% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	82		95		100		105		110	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
35	3.86	12.0	3.66	12.0	3.56	12.0	3.47	12.0	3.47	12.0
40	4.46		4.26		4.16		4.06		4.06	
42	4.75		4.55		4.46		4.26		4.36	
44	5.05		4.85		4.75		4.65		4.65	
45	5.25		5.05		4.95		4.75		4.75	
46	5.35		5.15		5.05		4.95		4.95	
48	5.74		5.54		5.35		5.25		5.25	
50	6.04		5.84		5.64		5.54		5.54	
55	6.93		6.63		6.34		6.24		6.14	
60	7.72		7.43		7.23		7.03		6.93	

MACH060 CAPACITIES with 20% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	82		95		100		105		110	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
35	3.82	12.0	3.63	12.0	3.53	12.0	3.43	12.0	3.43	12.0
40	4.41		4.21		4.12		4.02		4.02	
42	4.70		4.51		4.41		4.21		4.31	
44	5.00		4.80		4.70		4.61		4.61	
45	5.19		5.00		4.90		4.70		4.70	
46	5.29		5.10		5.00		4.90		4.90	
48	5.68		5.49		5.29		5.19		5.19	
50	5.98		5.78		5.59		5.49		5.49	
55	6.86		6.57		6.27		6.17		6.08	
60	7.64		7.35		7.15		6.96		6.86	

These specifications are subject to change without notice.

MACH060-01-N-407 Cooling Performance Data

MACH060 CAPACITIES with 30% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	82		95		100		105		110	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
35	3.82	12.0	3.63	12.0	3.53	12.0	3.43	12.0	3.43	12.0
40	4.41		4.21		4.12		4.02		4.02	
42	4.70		4.51		4.41		4.21		4.31	
44	5.00		4.80		4.70		4.61		4.61	
45	5.19		5.00		4.90		4.70		4.70	
46	5.29		5.10		5.00		4.90		4.90	
48	5.68		5.49		5.29		5.19		5.19	
50	5.98		5.78		5.59		5.49		5.49	
55	6.86		6.57		6.27		6.17		6.08	
60	7.64		7.35		7.15		6.96		6.86	

MACH060 CAPACITIES with 40% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	82		95		100		105		110	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
35	3.78	12.0	3.59	12.0	3.49	12.0	3.40	12.0	3.40	12.0
40	4.37		4.17		4.07		3.98		3.98	
42	4.66		4.46		4.37		4.17		4.27	
44	4.95		4.75		4.66		4.56		4.56	
45	5.14		4.95		4.85		4.66		4.66	
46	5.24		5.04		4.95		4.85		4.85	
48	5.63		5.43		5.24		5.14		5.14	
50	5.92		5.72		5.53		5.43		5.43	
55	6.79		6.50		6.21		6.11		6.01	
60	7.57		7.28		7.08		6.89		6.79	

MACH060 CAPACITIES with 50% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	82		95		100		105		110	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
35	3.74	12.0	3.55	12.0	3.46	12.0	3.36	12.0	3.36	12.0
40	4.32		4.13		4.03		3.94		3.94	
42	4.61		4.42		4.32		4.13		4.22	
44	4.90		4.70		4.61		4.51		4.51	
45	5.09		4.90		4.80		4.61		4.61	
46	5.18		4.99		4.90		4.80		4.80	
48	5.57		5.38		5.18		5.09		5.09	
50	5.86		5.66		5.47		5.38		5.38	
55	6.72		6.43		6.14		6.05		5.95	
60	7.49		7.20		7.01		6.82		6.72	

These specifications are subject to change without notice.

MACH060-01-N-407 Heating Performance Data

MACH060 CAPACITIES with 0% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	17		35		45		55		65	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
130	3.19	12	3.68	12	4.25	12	4.79	12	5.32	12

MACH060 CAPACITIES with 10% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	17		35		45		55		65	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
130	3.16	12	3.64	12	4.21	12	4.74	12	5.27	12

MACH060 CAPACITIES with 20% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	17		35		45		55		65	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
130	3.13	12	3.61	12	4.17	12	4.69	12	5.21	12

MACH060 CAPACITIES with 30% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	17		35		45		55		65	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
130	3.13	12	3.61	12	4.17	12	4.69	12	5.21	12

MACH060 CAPACITIES with 40% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	17		35		45		55		65	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
130	3.09	12	3.57	12	4.12	12	4.65	12	5.16	12

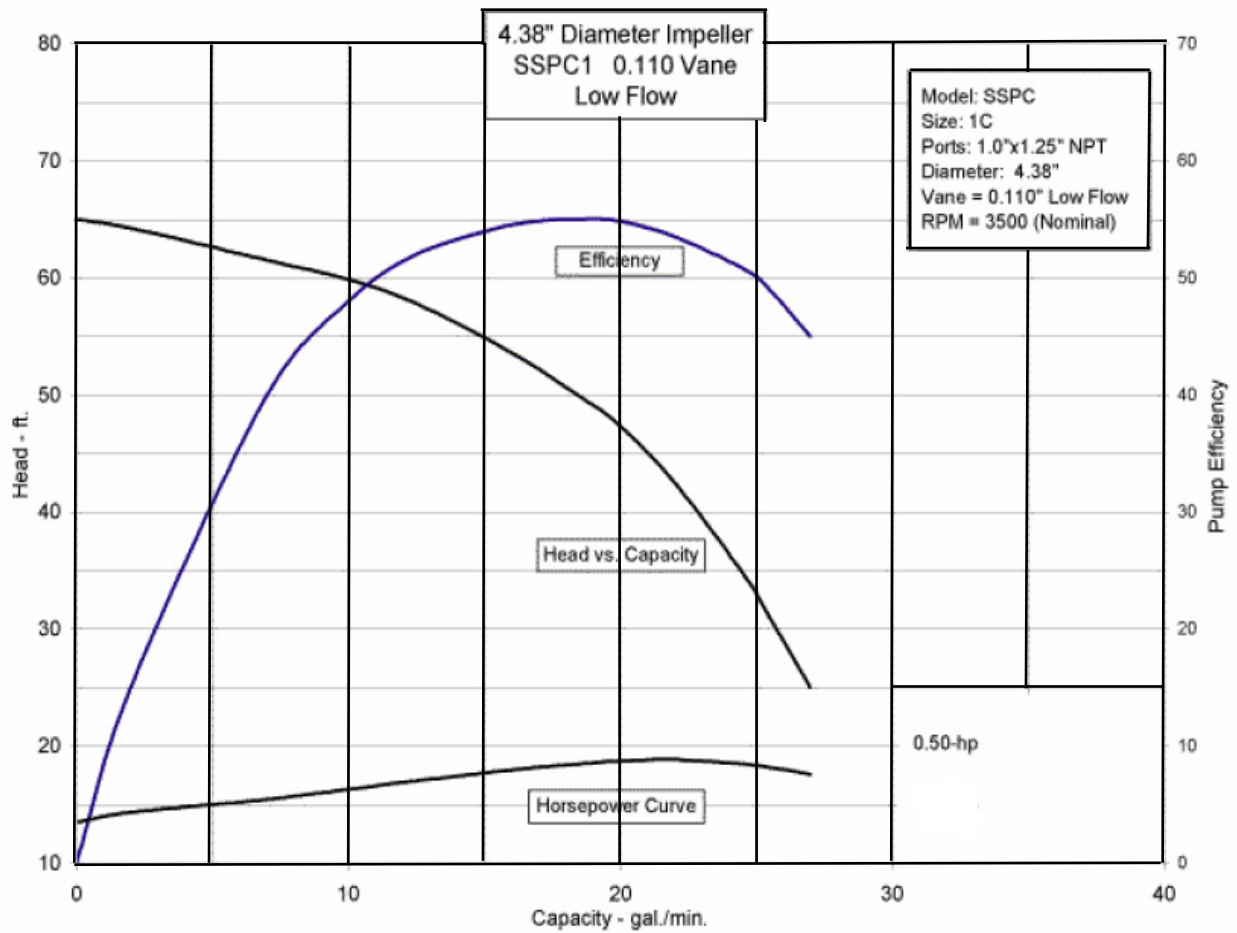
MACH060 CAPACITIES with 50% Glycol										
LWT (°F)	ENTERING AIR TEMPERATURE (°F)									
	17		35		45		55		65	
	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM	TONS	GPM
130	3.06	12	3.53	12	4.08	12	4.60	12	5.11	12

Based on compressor data.

These specifications are subject to change without notice.

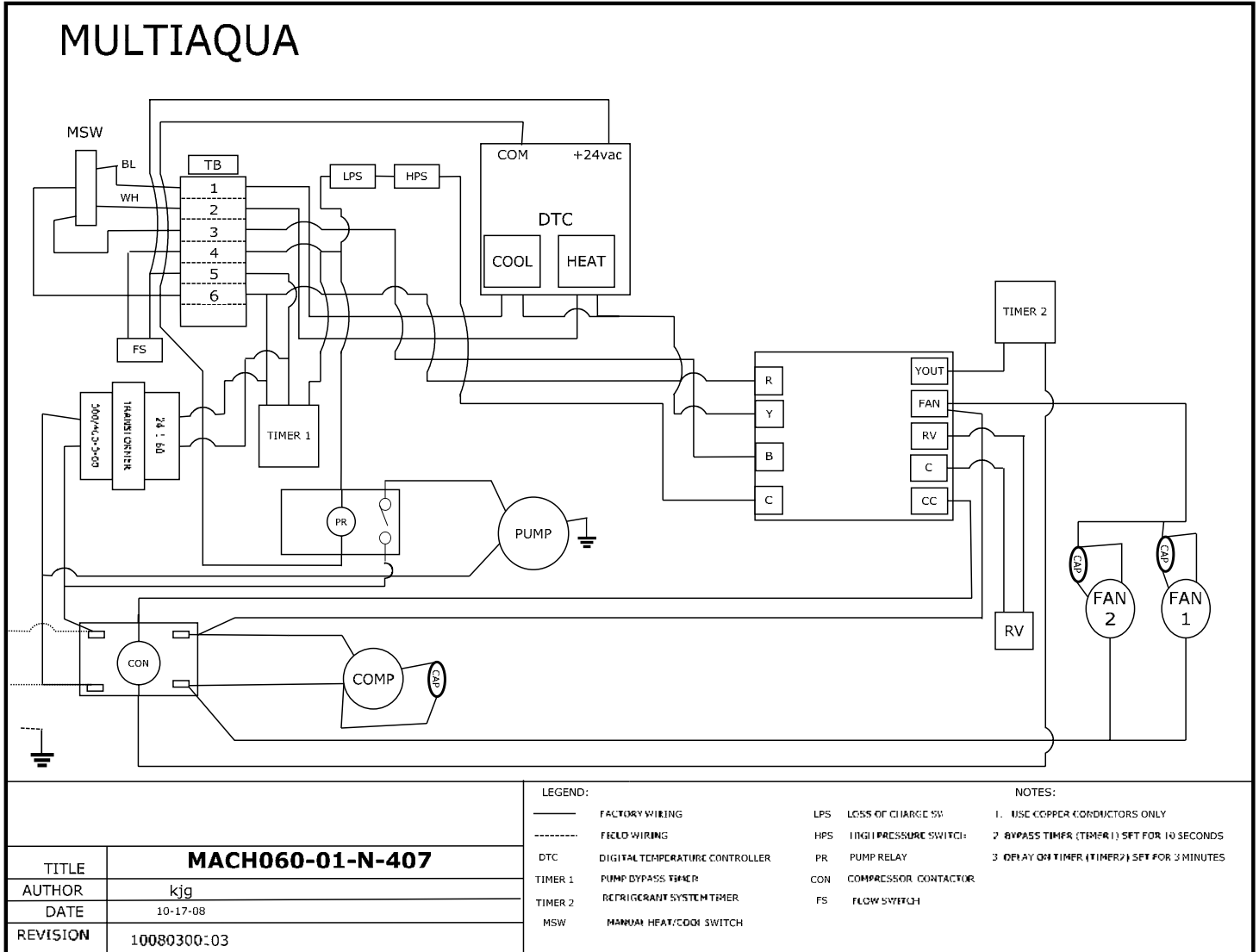
MACH060-01-N-407 Heat Pump Chiller Pump Curve

Pump Model Numbers
 SSP-1 = 208/230-1-50/60
 SSP-2 = 208/230/460-3-50/60
 0.5 Horsepower



MACH060-01-N-407 Wiring Diagram

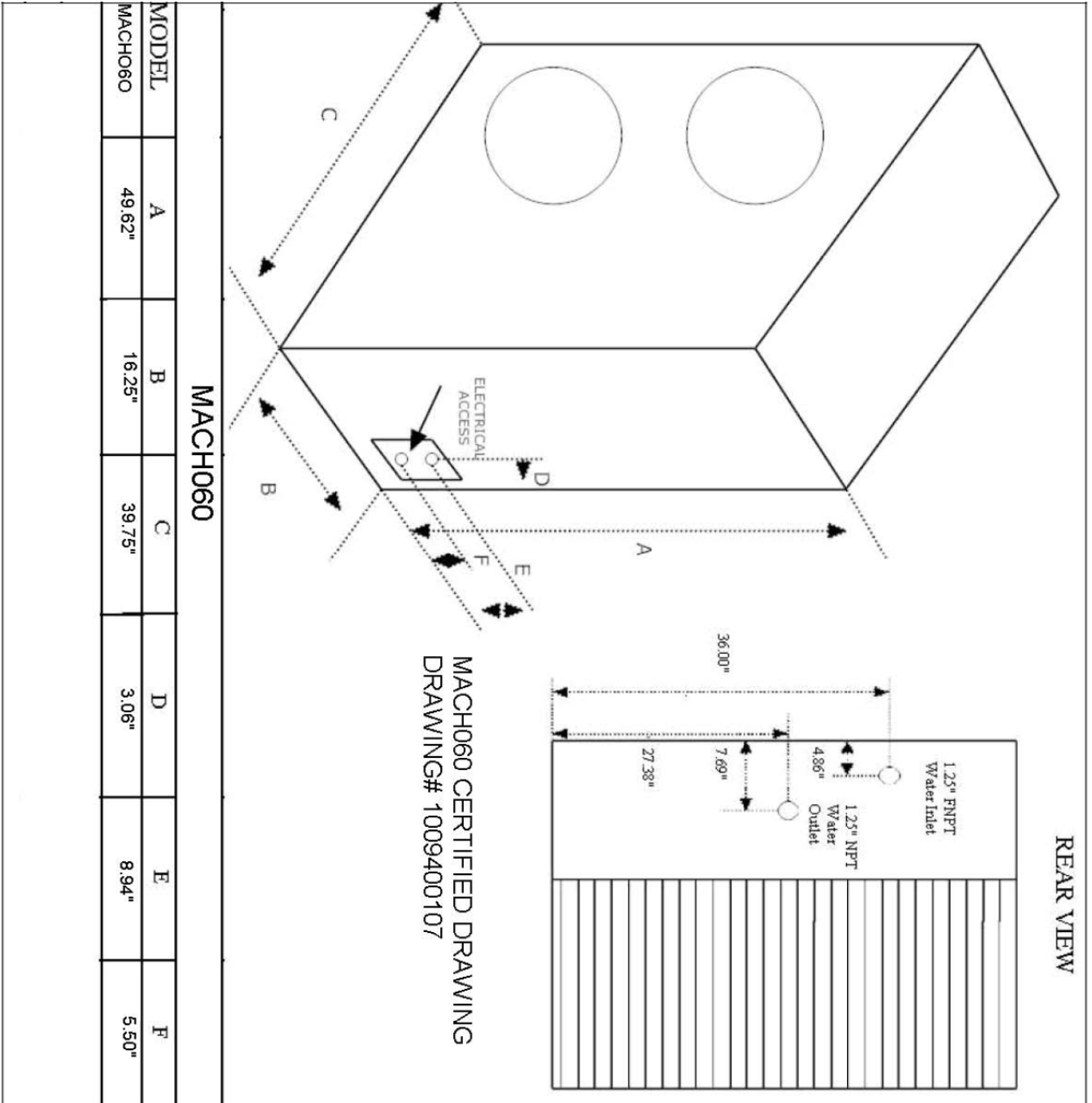
208/230-1-50/60



TITLE	MACH060-01-N-407
AUTHOR	kjg
DATE	10-17-08
REVISION	10080300:03

LEGEND:		NOTES:	
————	FACTORY WIRING	LPS	LOSS OF CHARGE SW
-----	FIELD WIRING	HPS	HIGH PRESSURE SWITCH
DTC	DIGITAL TEMPERATURE CONTROLLER	PR	PUMP RELAY
TIMER 1	PUMP BYPASS TIMER	CON	COMPRESSOR CONTACTOR
TIMER 2	REFRIGERANT SYSTEM TIMER	FS	FLOW SWITCH
MSW	MANUAL HEAT/COOL SWITCH		
			1. USE COPPER CONDUCTORS ONLY
			2. BYPASS TIMER (TIMER 1) SET FOR 10 SECONDS
			3. DELAY ON TIMER (TIMER 2) SET FOR 3 MINUTES

MACH060-01-N-407 CERTIFIED DRAWING



MACH060 CERTIFIED DRAWING
DRAWING# 1009400107

MACH060

MODEL	A	B	C	D	E	F
MACH060	49.62"	16.25"	39.75"	3.06"	8.94"	5.50"