Installation and Maintenance	IM-708
	Group: **Applied Systems**
	Part Number: **IM708**
	Date: **February 2002**

Self-contained Air Conditioning System

Type SWP Vintage Sizes 18D thru 95D, 105E

MEA

368-93-E

Table of Contents

Introduction

General Description

Models SWP018 through 105 are factory assembled, refrigerant charged and tested, water cooled packaged air conditioning units designed for ducted applications.

Each unit contains multiple hermetic compressors, water cooled condensers, multi-circuit evaporator, thermal expansion valves, interconnecting refrigerant piping, forward curved centrifugal fan, belt drive, fan motor, pleated filters and all necessary operating and safety controls.

All rigging, installation, power and control wiring external to the unit, and condenser water and condensate piping are the responsibility of the installer.

The MicroTech II self-contained unit controller is standard equipment. For a detailed description of the MicroTech II components, input/output configurations, field wiring options and requirements, and service procedures, refer to Bulletin No. IM 710, "MicroTech II Self-contained Unit Controller." For a description of operation and information on using and programming the MicroTech II unit controller, refer to the appropriate operation manual (see Table 1).

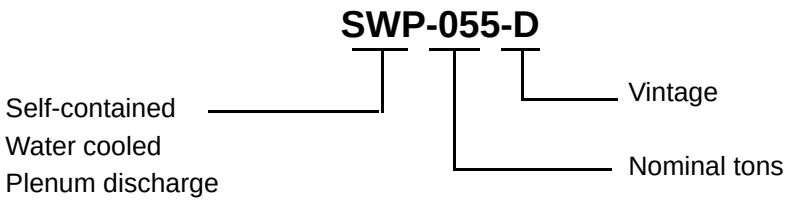
Table 1: Self-contained unit operation manual literature

UNIT CONTROL CONFIGURATION	OPERATION MANUAL BULLETIN NUMBER
Variable Air Volume (VAV) Discharge Air Control (DAC)	OM711
Constant Air Volume Space Comfort Control (SCC)	OM712
Constant Air Volume Discharge Air Control (DAC)	OM711

Inspection

When the equipment is received, all items should be carefully checked against the bill of lading to insure a complete shipment. The shipping receipt should not be signed until all items have been accounted for. All units should be carefully inspected for damage upon arrival. All shipping damage should be reported to the carrier and a claim filed. The unit serial plate should be checked before unloading the unit to be sure that it agrees with the power supply available.

Nomenclature



Installation

Note: Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.

⚠ CAUTION

Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

Handling

Units are shipped with a protective covering which should remain in place while the unit is being moved to its final location. Note: Check for concealed damage as soon as possible.

Never allow any part of the unit to fall during unloading or moving as this may result in serious damage. Units are provided with lifting lugs for rigging with a crane. If units are lifted by crane, protection against chaffing damage by slings or cable must be provided and spreader bars must be used across the top of the cabinet to prevent any structural damage to the frame.

The unit base frame will accept dollies or Johnson bars for transporting the unit. Furniture dollies can be placed at both ends of the chassis or at one end and a Johnson bar used at the other end for maneuvering.

⚠ CAUTION

Do not attempt to install dollies in the center of the unit.

⚠ CAUTION

Units must not be moved in an upended position.

Floor surfaces must be protected when equipment is moved across finished flooring. Plywood sheeting may be used to protect surfaces and distribute weight loading.

Vibration Isolators

All units are provided with 1” neoprene isolation pads, shipped separately. Pads are to be installed beneath the unit and located at each corner and the center of each base channel. For units provided with more than six (6) isolator pads, evenly space the additional pads under the front and rear base channels.

Setting Factory Supplied Plenum

If the unit is provided with a factory plenum for field mounting, a forklift, slings or other suitable lifting means is required. Foam rubber gasket is provided around the perimeter of unit top. Carefully set plenum. Attach with mounting hardware provided with the plenum.

Location/Service Access

For good installation, service and maintenance access the following recommended clearances should be followed. Minimum clearances required by local, state, or federal codes, such as the NEC take precedence over those listed below. Clearance is required to allow room for side filter access, mechanical cleaning of the condenser tubes and economizer coil, access to expansion valves and other control components and to allow for possible fan shaft or compressor removal.

Unit front - 42"

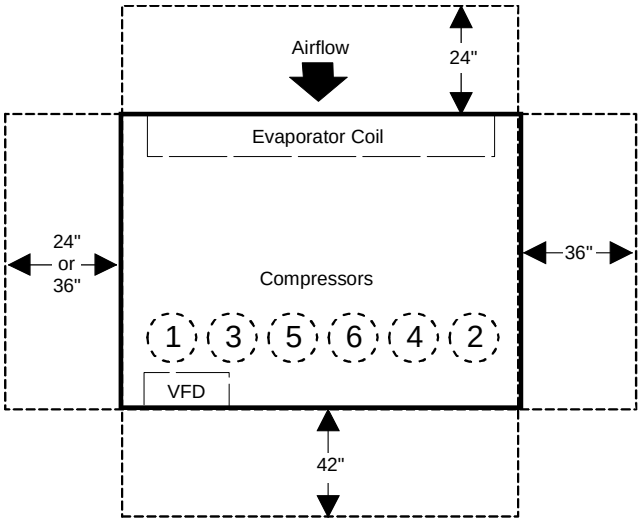
Unit rear - 24"

Motor location side - 36"

Piping location side - 36"

Side without motor or piping -24"

Figure1. Recommended Service and Maintenance Clearance



Removal of Shipping Restraints

Mechanical restraints are used to secure the spring mounted fan during shipment. Restraints and shipping blocks must be removed after unit has been set in its final location.

Refrigerant Piping

Pressure Relief Valves

All units have individual condensers per refrigerant circuit and each condenser is provided with a spring loaded relief valve. The valve is set to open when refrigerant pressure reaches 400 psig. The relief valve will accommodate a 1/2" flare connection for applications where it is necessary to connect vent piping and run it outside the building.

⚠ CAUTION

When refrigerant is vented to the outside of the building, the vent piping should be installed as recommended in ASHRAE Standard 15-1994.

Water Connections

General

Due to the variety of piping practices, it is advisable to follow the recommendations of local authorities. They can supply the installer with the proper building and safety codes required for a safe and proper installation.

The piping should be installed with a minimum number of bends and elevation changes for best performance. Piping should contain:

1. Vibration eliminators to reduce vibration and noise transmission to the building.
2. Shutoff valves to isolate the unit from the piping system during unit servicing.
3. Manual or automatic air vent valves at the high points of the system.
4. Some means of maintaining adequate system water pressure (e.g., expansion tank or regulating valve).
5. Temperature and pressure indicators located at the unit to aid in servicing.
6. A strainer or some means of removing foreign matter from the water before it enters the pump. It should be placed far enough upstream to prevent cavitation at the pump inlet (consult pump manufacturer for recommendations). The use of a strainer will prolong pump life and help maintain system performance.
7. Size piping to minimize system pressure drop.

Condenser Piping

1. Units may be specified with water and condensate connections on either the left or right side of the unit.
2. All units have an individual condenser per refrigerant circuit. All condensers are factory piped for a common condenser water supply and a common condenser water return connection.
3. Field piping connections are made to factory provided piping located as indicated on the unit submittal drawings. The piping connections are run to the outside of the unit cabinet. Connections are located behind a factory mounted shipping cover. All connections are copper sweat connections as indicated on unit dimensional drawings.
4. Supply and return water connections must be made at the proper locations as indicated by the dimensional drawings. Supply (water in) connection is always the lower connection.
5. Units with factory mounted water side economizer should not require head pressure control. The economizer will typically elevate the water temperature by 5 to 10°F before entering the condenser, allowing suitable condenser water temperatures whenever the tower supply temperature is 50°F or higher. Mechanical cooling is locked out below 55°F EWT.
6. Head pressure control must be provided if entering condenser water temperatures will go below 55°F. Fan cycling and/or modulating discharge dampers on the cooling tower are often used, or a 3-way bypass around the tower to maintain condenser water temperature. Cooling tower control to maintain the temperature at >55°F is generally more cost effective if multiple units are in the loop. If valves are installed on the individual SWP units, a single water regulating valve controlled by circuit #1 head pressure should be used. The Lead/Lag option needs to equal “NO”. When Lead/Lag equals “NO” circuit #1 is always first on and last off. The refrigerant pressure line from the valve should be connected to a gauge port on any liquid line service valve located in the compressor #1 refrigerant circuit. Compressor #1 is located at the far left of the cabinet.

If the water regulating valve is placed in service with the unit condensers, it should be installed in the water line leaving the condenser and should shut down to prevent water from siphoning out of the condensers. For systems where a constant pumping head is required, the water regulating valve may be installed in a bypass line around the condensers. It must then open on falling discharge pressure.

These typical systems, depending on the specific application, must maintain a constant condensing pressure regardless of temperature conditions and must assure adequate head pressure for proper thermal expansion valve operation. A minimum head pressure of 180 psi (95°F condensing temperature) is recommended.

7. Condenser tube velocities must not exceed 10 feet per second.

Figure2. Condenser Regulating Valve (refrigerant pressure controlled)

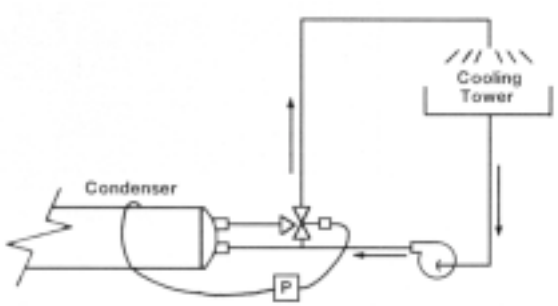
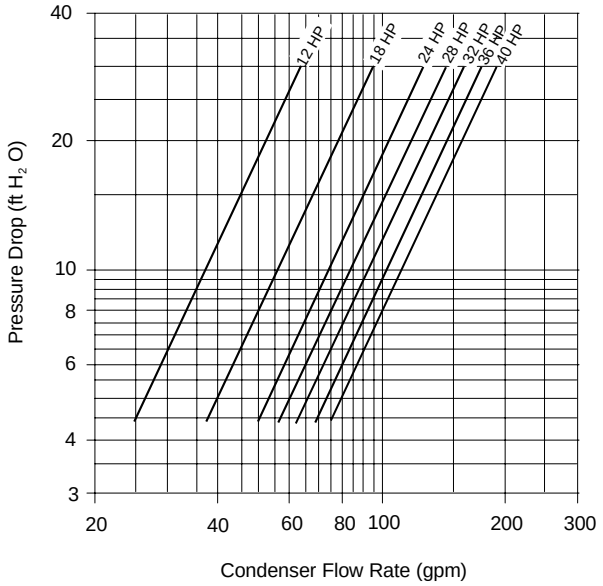
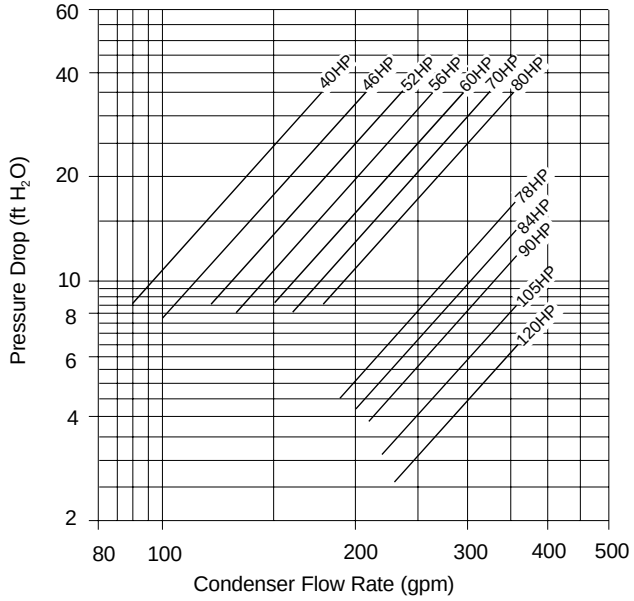


Figure3. Condenser water pressure drop SWP018 - SWP040



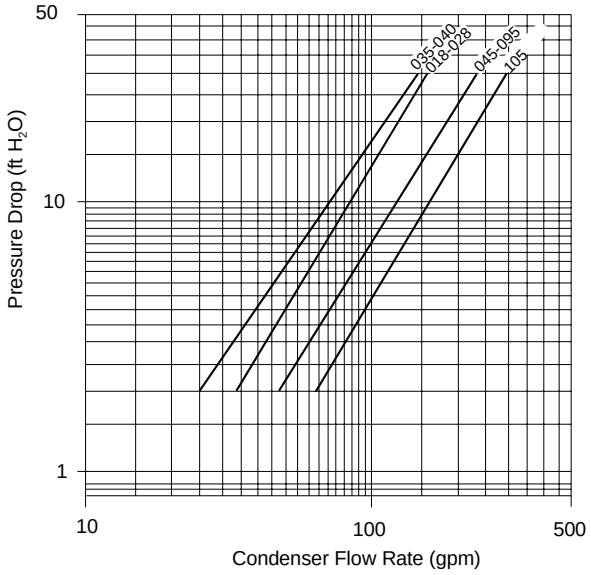
Note: HP = total unit compressor horsepower.

Figure4. Condenser water pressure drop SWP045 - SWP105



Note: HP = total unit compressor horsepower.

Figure5. Economizer water pressure drop, SPW018-SPW105



Note: ① Includes coil, control valves and interconnecting piping.

② Add thisΔP to condenser ΔP to obtain unit ΔP for pump selection.

Figure6. Water regulating valve pressure drop. Head pressure control

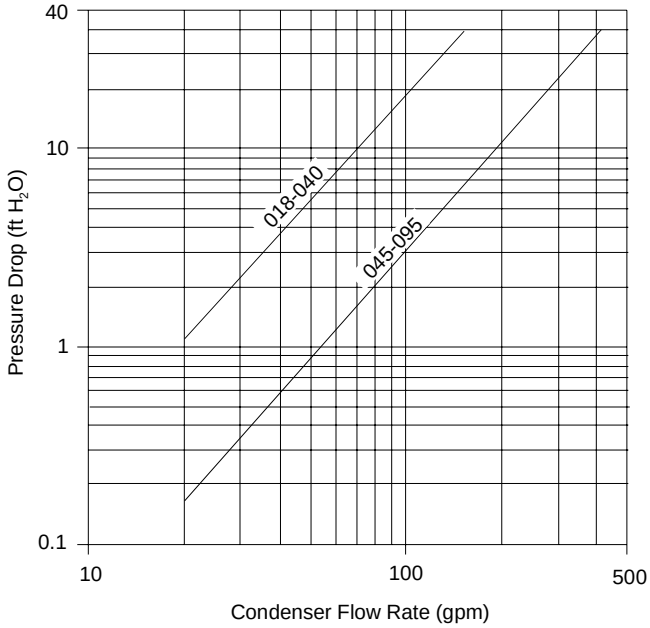
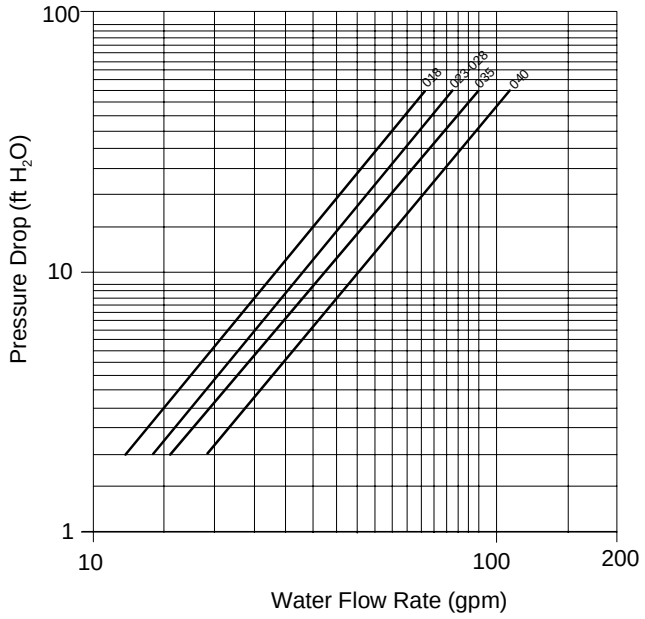
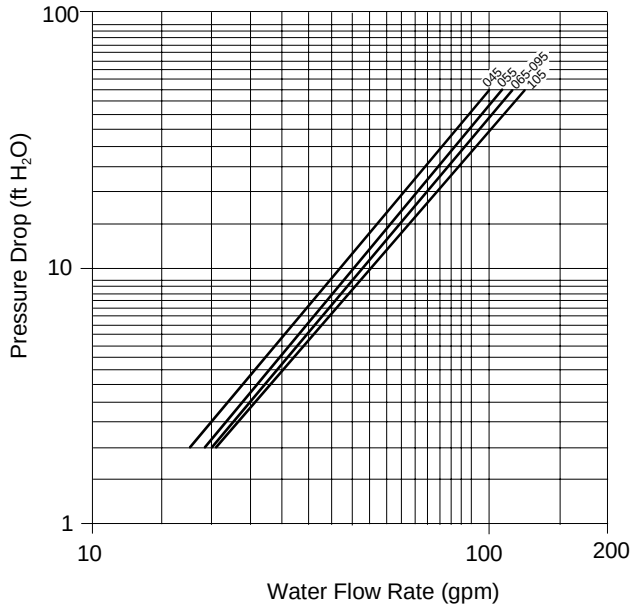


Figure7. Hot water coil pressure drop, SWP018 - SWP040



Hot water coil pressure drop, SWP045 - SWP105



Condensate Drain Connection

The condensate drain connection is 1 1/8" O.D.S. copper and is located on the same end of the unit as the condenser water connections. The drain is internally trapped at the factory requiring no external trap. The condensate line should be pitched away from the unit with a minimum slope of 1/8" per foot.

Drain pans and the drain trap should be kept clean by periodic cleaning. A cleanout is provided as standard in the trap to aid in cleaning.

Duct Connections

Supply Air

For connection of supply ductwork directly to the unit, a duct collar must first be mounted at the fan outlet, avoiding the mounting screws located around the perimeter of the fan discharge opening (see Figure 8). Fan discharge opening sizes are indicated on the unit dimensional drawings. When connecting ductwork to the unit, a canvas type connecting collar is recommended.

Units are available in two fan configurations and should be ducted as shown in Figure 9. Duct take-offs which go opposite to the direction of fan rotation will result in an associated system effect loss and reduced fan performance.

If a field fabricated plenum is used, duct take-off locations should again be correctly oriented to the rotation of the fan to minimize system losses. Refer to unit dimensional drawings and Figure 8 for plenum mounting size requirements. Canvas type connectors are recommended at the duct connection to the plenum.

Units are also available with a factory provided discharge plenum. Supply duct connections to the plenum opening(s) should include a canvas type connector. Plenum opening sizes and locations will be indicated on the job submittal.

Figure8. Unit top detail

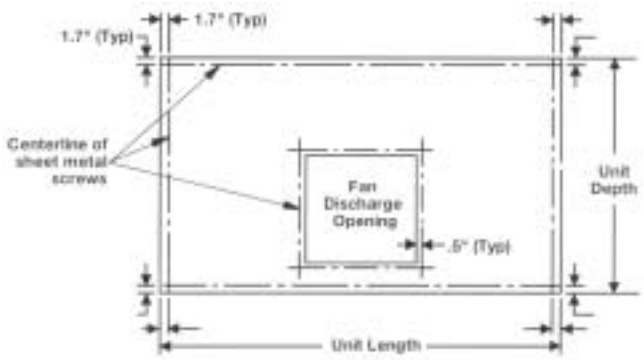
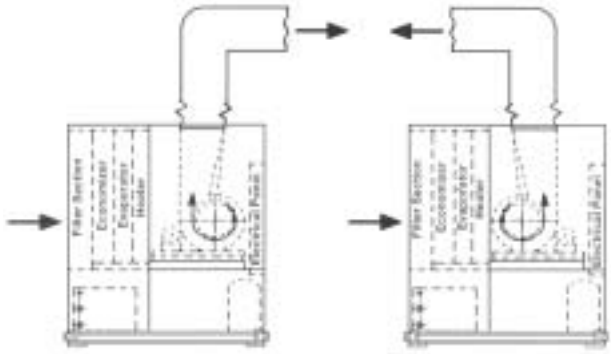


Figure9. Discharge duct configurations



Return Air

Return air to the unit can be arranged in two ways.

1. Ducted return

Return ductwork may be attached to the 2" flange around the perimeter of the unit's return air opening (Refer to Figure 10). A canvas type duct connecting collar is recommended. All ductwork connected to the unit should be of adequate size and construction for the application. A canvas type connector is also recommended where the duct penetrates the machine room wall(s). This will prevent vibration generated by air movement in the duct from being transmitted out to the occupied spaces.

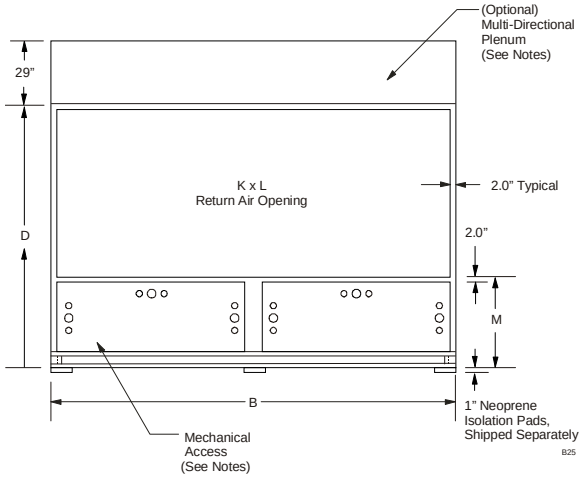
Note: Do not obstruct unit access panel located below the return opening.

2. Free return

The mechanical equipment room may be used as a return plenum with no hard connection at the unit.

Note: Some building codes do not allow the use of the mechanical room as a return plenum. Applicable local codes should be checked for each installation.

Figure10.Back Elevation



Physical Data

Table 2: SWP 018 Through SWP 105

Data	SWP Model Size											
	018	023	028	035	040	045	055	065	070	080	095	105
Compressor												
Quantity	2, 3, 4	3, 4	4	4	4	4	4	4	4	4	4, 6	6
Size	See Unit Data Plate											
Evaporator Coil												
Face Area (Ft.^{2})	11.8	15.3	17.7	23.3	27.7	30.7	36.1	41.5	46.3	51.1	55.9	63.2
Rows	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	6	6	6	6	6	6
Fpi	12	12	12	12	12	12	12	12	12	12	12	12
Waterside Economizer Coil												
Face Area (Ft.^{2})	11.8	15.3	17.7	23.3	27.7	30.7	36.1	41.5	46.3	51.1	55.9	63.2
Rows	4	4	4	4	4	4	4	4	4	4	4	4
Fpi	12	12	12	12	12	12	12	12	12	12	12	12
Maximum Working Pressure (psig)	400	400	400	400	400	400	400	400	400	400	400	400
Hot Water Heating Coil												
Face Area (Ft.^{2})	9.3	12.8	15.2	20.2	24.5	26.8	30.4	35.8	39.9	44.4	48.3	51.9
Rows	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1	1	1
Fpi	12	12	12	12	12	12	12	12	12	12	12	12
Electric Heat												
Kw	34	34	34	34	34	68	68	68	68	68	68	68
Filters												
(Quantity) Size 4" Depth	(6)20x20x4 (2)25x20x4	(6)20x20x4 (2)25x20x4	(6)20x20x4 (2)25x20x4	(10)25x20x4	(10)25x20x4	(12)25x20x4	(12)25x20x4	(18) 20x20x4	(6)16x20x4 (12)25x20x4	(3)20x20x4 (15)25x20x4	(6)16x20x4 (15)25x20x4	(4)16x20x4 (17)20x25x4 (1)16x25x4
Evaporator Fan[a]												
Quantity	1	1	1	1	1	1	1	1	1	1	1	1
Size	15	18	18	20	20	22	25	25	25	27	27	33
Minimum Horsepower	5	7.5	10	10	15	15	20	20	20	25	30	40
Maximum Horsepower	10	15	20	20	25	30	40	40	40	50	60	60
Minimum Design cfm, CV	2950	3825	4425	5825	6925	7675	9025	10375	11575	12775	13975	15800
Minimum Design cfm, VAV	4720	6120	7080	9320	11080	12280	14440	16600	18520	20440	22360	25280
Maximum Design cfm	7080	9180	10620	13980	16620	18420	21660	24900	27780	30660	33540	37920
Condenser												
Quantity	2, 3, 4	3, 4	4	4	4	4	4	4	4	4	4, 6	6
Waterside Working Pressure (psig)	400	400	400	400	400	400	400	400	400	400	400	400
Minimum Entering Temperature (F)	55°	55°	55°	55°	55°	55°	55°	55	55°	55°	55°	55°
Minimum GPM	25	41	53	66	69	94	105	105	121	134	138	180
Maximum GPM	88	108	125	159	166	215	237	237	251	349	358	493

a. Standard fan TSP limit is 5.5 inch of water. Consult your local McQuay sales representative for applications beyond this range.

Table 3: Compressor circuit charge

COMPRESSOR (HP)	*REFRIGERANT CHARGE PER CIRCUIT (R-22)	OIL CHARGE PER CIRCUIT (OZ.)
6	9 lbs.	66
10	14 lbs.	112
13	18 lbs.	128
15	22 lbs.	256
20	27 lbs.	256

*Charge quantities listed are average. Actual charge quantity is dependent on individual unit evaporator coil circuiting. Actual charge quantities are stamped on each unit nameplate.

Dimensional Data

Figure 11. Left Side Front (CW) Discharge with 0ptional Multi-Directional Plenum

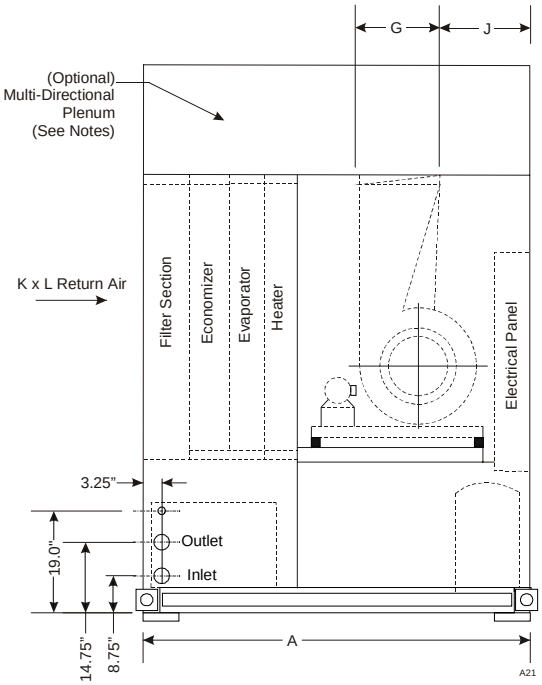
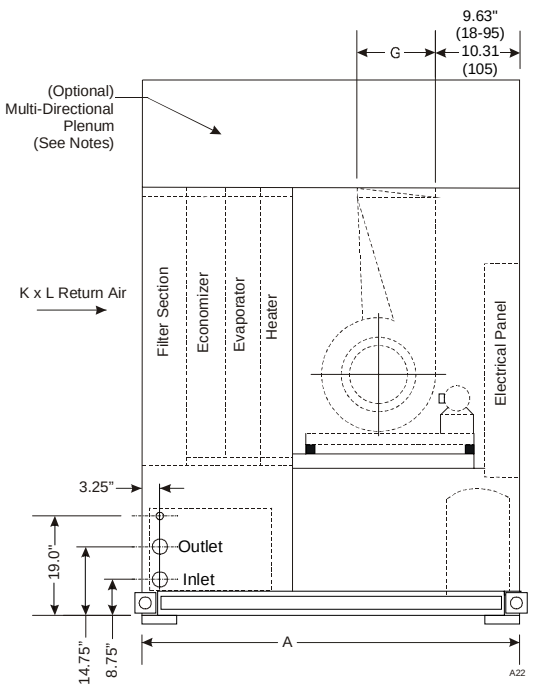


Figure 12. Left Side Back (CCW) Discharge with 0ptional Multi-Directional Plenum



Note: Select unit arrangement on the unit selection.
Plenum can be shipped separately. Please indicate on the unit submittal. Indicate size and location of plenum openings on the unit submittal. All openings are on plenum centerline. For additional information refer to plenum certified drawing .

Table 4:

BASIC UNIT		018	023	028	035	040	045	055	065	070	080	095	105
A	Depth[a b]	72.00	72.00	72.00	72.00	72.00	81.00	81.00	81.00	81.00	84.00	84.00	96.00
B	Length[a b]	84.00	84.00	84.00	100.00	100.00	120.00	120.00	120.00	132.00	144.00	156.00	156.00
D	Height[a b]	82.00	82.00	82.00	82.00	82.00	82.00	82.00	88.00	88.00	88.00	88.00	96.00
F	Fan Disch.	18.62	21.88	21.88	24.75	24.75	27.25	31.25	31.25	31.25	34.25	34.25	47.25
G	Fan Disch. ^ Opening	15.88	18.88	18.88	24.75	24.75	27.25	31.25	31.25	31.25	34.25	34.25	34.94
H	Fan Disch. Location	32.69	31.06	31.06	37.62	37.62	46.38	44.38	44.38	50.38	54.88	60.88	54.40
J	Fan Disch. Location	22.50	18.81	18.81	20.12	20.12	21.06	21.32	21.32	21.32	23.82	23.82	33.46
K	Return Opening Height	41.44	41.44	41.44	51.44	51.44	51.44	51.44	62.20	62.20	62.20	62.20	70.20
L	Return Opening Length	80.00	80.00	80.00	96.00	96.00	116.00	116.00	116.00	128.00	140.00	152.00	152.00
M	Base of Return Opening	28.62	28.62	28.62	28.62	28.62	28.62	28.62	23.87	23.87	23.87	23.87	23.87
N	Water Out/In (ODS)	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	2-5/8	3-1/8	3-1/8	3-1/8	3-1/8	3-1/8	3-1/8
P	1 Row HW Donn (ODS)	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8
P	2 Row HW Conn (ODS)	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-1/8	-	-	-

a. Dimensions do not include handle, latch or fastener extensions.
b. For shipping dimensions add 4" (102mm) to depth, 8" (204mm) to length, and 4" (102mm) to height.

Figure 13. Unit Front Plan

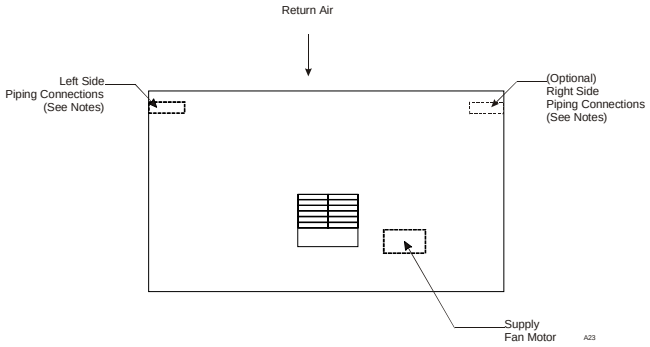
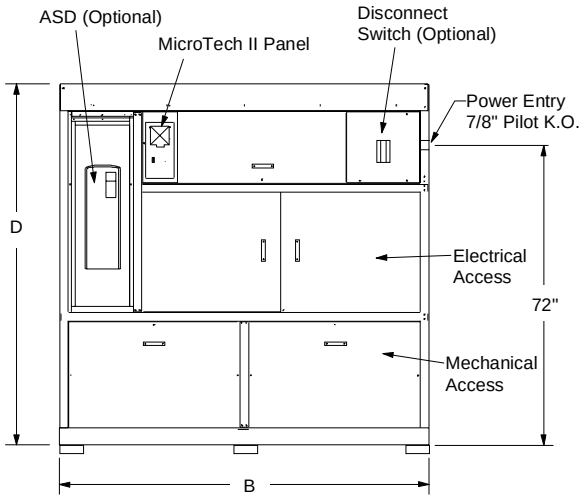


Figure 14. Front Elevation



Note: Service connections determined when facing the front of the unit. Left-hand standard, right-hand optional. Please indicate on the unit submittal.

Note: Unit sizes 018, 023 and 028 have a single mechanical access panel in bottom front and bottom back.

Figure 15. Back Elevation

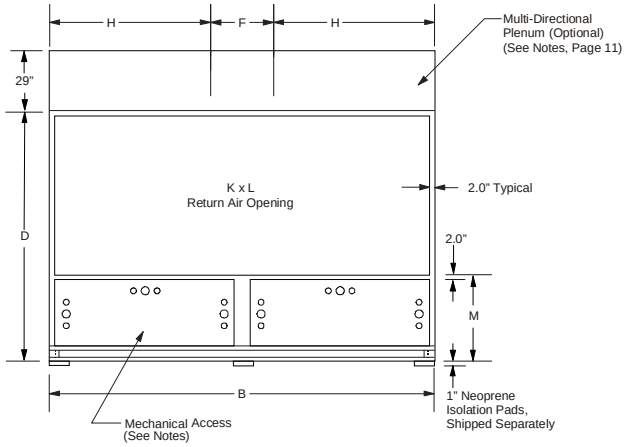


Figure 16. Left Side

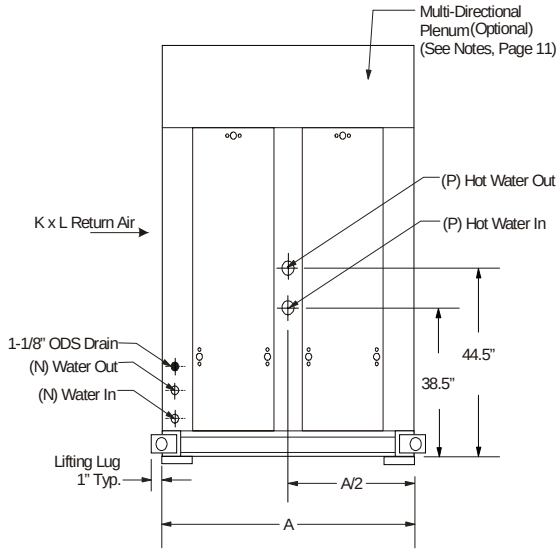


Figure 17. Discharge Plenum (Optional)

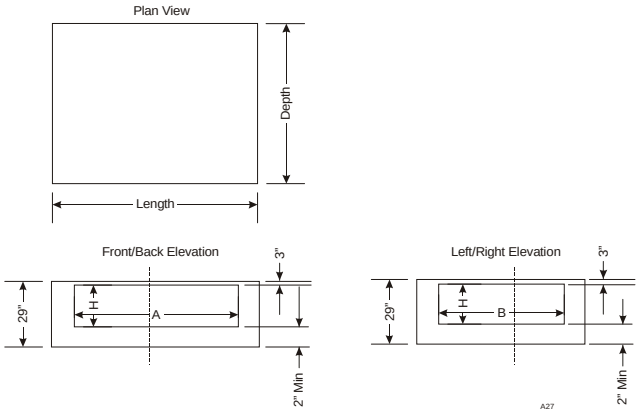


Table 5. Discharge Plenum

Unit Size	Length (in.)	Depth (in.)	Height (in.)
018D-028D	84	72	29
035D-040D	100	72	29
045D-065D	120	81	29
070D	132	81	29
080D	144	84	29
095D-105D	156	84	29

Unit Weights

Table 6. Unit and Component Weight in lbs.

Unit Weights		Unit Size											
		018	023	028	035	040	045	055	065	070	080	095	105
Basic Configuration													
SWP basic unit[a]		2226	2313	2318	2638	2643	3110	3279	3406	3734	4021	4246	4673
Filters													
4" 30% or 65% efficiency		38	38	38	55	55	66	66	79	87	96	104	112
Evaporator Coil													
6 Row, 12 fpi		250	294	321	417	468	506	577	642	693	755	819	926
4 Row, 12 fpi		206	238	257	333	368	395	-	-	-	-	-	-
Water Economizer Coil[b c]													
4 Row, 12 fpi		306	338	357	458	493	520	598	648	678	723	820	927
Water weight		51	66	75	94	111	119	150	168	187	203	218	281
Hot Water Coil[d] c													
1 Row, 12 fpi		71	97	114	130	158	160	170	200	328	337	345	371
Water weight		16	20	23	28	32	37	41	49	55	59	62	62
Electric Heat													
34 KW		20	20	20	20	20	-	-	-	-	-	-	-
68 KW		-	-	-	-	-	40	40	40	40	40	40	40
Supply Fan Motors													
3 HP ODP		71	-	-	-	-	-	-		-	-	-	-
5 HP ODP		82	-	-	-	-	-	-		-	-	-	-
7.5 HP ODP		124	124	-	-	-	-	-		-	-	-	-
10 HP ODP		144	144	144	144	-	-	-		-	-	-	-
15 HP ODP		-	185	185	185	185	185	-		-	-	-	-
20 HP ODP		-	-	214	214	214	214	214	214	214	-	-	-
25 HP ODP		-	-	-	-	266	266	266	266	266	266	-	-
30 HP ODP		-	-	-	-	-	310	310	310	310	310	310	-
40 HP ODP		-	-	-	-	-	-	404	404	404	404	404	404
50 HP ODP		-	-	-	-	-	-	-		-	452	452	452
60 HP ODP		-	-	-	-	-	-	-		-	-	620	620
75 HP ODP		-	-	-	-	-	-	-		-	-	-	836
3 HP TEFC		72	-	-	-	-	-	-		-	-	-	-
5 HP TEFC		85	-	-	-	-	-	-		-	-	-	-
7.5 HP TEFC		140	140	-	-	-	-	-		-	-	-	-
10 HP TEFC		170	170	170	170	-	-	-		-	-	-	-
15 HP TEFC		-	235	235	235	235	235	-		-	-	-	-
20 HP TEFC		-	-	300	300	300	300	300	300	300	-	-	-
25 HP TEFC		-	-	-	-	330	330	330	330	330	330	-	-
30 HP TEFC		-	-	-	-	-	390	390	390	390	390	390	-
40 HP TEFC		-	-	-	-	-	-	510	510	510	510	510	510
50 HP TEFC		-	-	-	-	-	-	-		-	570	570	570
60 HP TEFC		-	-	-	-	-	-	-		-	-	850	850
75 HP TEFC		-	-	-	-	-	-	-		-	-	-	900
Compressor/Condenser Assembly													
	Water Weight												
(2)6HP	26	368	-	-	-	-	-	-		-	-	-	-
(3)6HP	35	538	538	-	-	-	-	-		-	-	-	-
(4)6HP	43	699	699	699	699	-	-	-		-	-	-	-
(3)6HP, (1)10HP	57	-	843	843	843	843	-	-		-	-	-	-
(2)6HP, (2)10HP	66	-	-	974	974	974	-	-		-	-	-	-
(1)6HP, (3)10HP	74	-	-	-	1115	1115	-	-		-	-	-	-
(4)10HP	95	-	-	-	1263	1263	1263	1263	1263	-	-	-	-
(2)10HP, (2)13HP	106	-	-	-	-	-	1404	1404	1404	-	-	-	-
(4)13HP	118	-	-	-	-	-	1549	1549	1549	1549	-	-	-
(2)13HP, (2)15HP	129	-	-	-	-	-	1709	1709	1709	1709	1709	1709	-
(4)15HP	141	-	-	-	-	-	1867	1867	1867	1867	1867	1867	-
(2)15HP, (2)20HP	152	-	-	-	-	-	-	-	1982	1982	1982	1982	-
(4)20HP	190	-	-	-	-	-	-	-		-	2096	2096	-
(6)13HP	167	-	-	-	-	-	-	-		-	-	2265	2265
(3)13HP, (3)15HP	178	-	-	-	-	-	-	-		-	-	2479	2479
(6)15HP	188	-	-	-	-	-	-	-		-	-	2693	2693
(3)15HP, (3)20HP	209	-	-	-	-	-	-	-		-	-	2914	2914
(6)20HP	229	-	-	-	-	-	-	-		-	-	3135	3135
Discharge Plenum													
Factory Installed, 29”		636	636	636	711	711	862	862	862	922	1003	1064	1064

a. Base Weight includes supply fan without motor.
b. Water economizer weight includes valves and piping.
c. The values in this table do not include water weight.
d. Hot water coil weight includes valve and piping.

Field Wiring

General

Wiring must comply with all applicable codes and ordinances. Warranty is voided if wiring is not in accordance with specifications. An open fuse indicates a short, ground or overload. Before replacing a fuse or restarting a compressor or fan motor, the trouble must be found and corrected. Copper wire is recommended for all power lead terminations. Contact factory for information concerning aluminum wire power lead terminations.

A single power terminal block is provided as standard and wiring within the unit is done in accordance with the National Electric Code. All branch circuits within the control panel are individually fused. A single field supplied disconnect is required or a unit mounted nonfused disconnect can be ordered with the unit.

A 7/8” knockout is located on the right-hand unit upright for locating unit power entry. 24V field connections are suitable for Class II wiring.

Unit Disconnect

Disconnecting means are addressed by Article 440 of the National Electric Code (NEC) which requires 'disconnecting means capable of disconnecting air conditioning and refrigerant equipment including motor-compressors, and controllers, from the circuit feeder." The disconnect switch should be selected and located within the NEC guidelines. Location requirements per NEC are that the disconnect be located in a readily accessible position within sight (50 feet) of the unit.

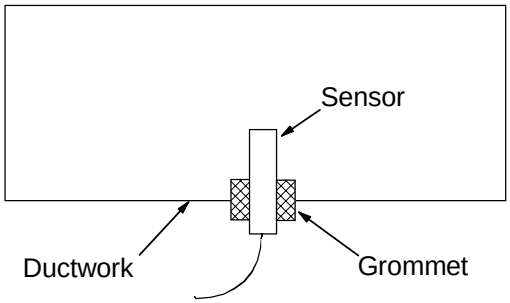
A factory mounted nonfused disconnect is available.

Return Air and Outside Air Sensors

All units are provided with a return air sensor. The outside air sensor is optional and can be ordered with the unit. The return air sensor is connected to the input control board and is coiled up and placed in the control box of the unit for shipment. The return air sensor must be field installed in the return air stream for proper unit operation. The outside air sensor is shipped loose in a package and is located on the floor of the fan section. The mixed air temperature sensor is already installed at the inlet of the unit.

The sensors must be mounted in areas that are exposed to representative temperature conditions. The sensor should be mounted at a position that has good air mixing and does not have stratification. The sensor can be mounted in the ductwork using a grommet, see Figure 18.

Figure 18. Return/Outside Air Sensor Mounting



The return air sensor is connected to the unit’s input board at location AI4, see IM710. The outside air sensor is field wired to terminal strip TB2. The sensor is to be connected at terminals 124 and 125.

Table 7. Compressor Motors

Compressor HP	208/60/3		230/60/3		400/50/3		460/60/3		575/60/3	
	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
6	17.9	156.0	16.2	156.0	8.1	70.0	8.1	70.0	6.5	54.0
10	31.2	239.0	28.2	239.0	14.1	125.0	14.1	125.0	11.3	80.0
13	35.6	350.0	32.0	350.0	16.0	158.0	16.0	158.0	12.8	125.0
15	42.1	425.0	38.0	425.0	19.0	187.0	19.0	187.0	15.2	148.0
20	74.0	360.0	67.2	360.0	33.6	180.0	33.6	180.0	36.9	144.0

Table 8. Electric Heaters

SWP UNIT SIZE	208V/60HZ/3PH			230V/60HZ/3PH			400V/50HZ/3PH			460V/60HZ/3PH			575V/60HZ/3PH		
	kW	MBH	FLA	kW	MBH	FLA	kW	MBH	FLA	kW	MBH	FLA	kW	MBH	FLA
018 - 040	27.8	94	77.2	34	116	85.6	25.7	88	37.2	34	116	42.8	34	116	34.2
045 - 105	55.6	190	154.4	68	232	170.9	51.4	175	74.4	68	232	85.6	68	232	68.4

Table 9. SAF Motor Nameplate Amp Table

Horsepower	TYPE	208/60/3	230/60/3	400/50/3[a]	460/60/3	575/60/3
		FLA	FLA	FLA	FLA	FLA
3	High Efficiency	9.9	9.0	4.5	4.5	3.4
	Premium Efficiency	9.3	8.2	4.1	4.1	3.1
5	High Efficiency	14.8	14.0	7.0	7.0	5.3
	Premium Efficiency	15.7	13.6	6.8	6.8	5.2
7.5	High Efficiency	22.3	21.6	10.8	10.8	8.2
	Premium Efficiency	22.3	20.0	10.0	10.0	7.4
10	High Efficiency	29.7	28.0	14.0	14.0	11.0
	Premium Efficiency	29.0	25.8	12.9	12.9	10.3
15	High Efficiency	44.4	40.6	20.3	20.3	16.2
	Premium Efficiency	43.4	37.8	18.9	18.9	14.1
20	High Efficiency	57.0	50.0	25.0	25.0	20.0
	Premium Efficiency	57.0	49.0	24.5	24.5	18.9
25	High Efficiency	69.8	62.0	31.0	31.0	24.3
	Premium Efficiency	70.5	61.0	30.5	30.5	24.2
30	High Efficiency	86.5	75.0	37.5	37.5	30.0
	Premium Efficiency	83.3	72.4	36.2	36.2	29.8
40	High Efficiency	117.0	102.0	51.0	51.0	40.0
	Premium Efficiency	110.0	96.0	48.0	48.0	38.0
50	High Efficiency	138.0	124.0	62.0	62.0	49.2
	Premium Efficiency	137.0	120.0	60.0	60.0	47.5
60	High Efficiency	154.0	144.0	72.0	72.0	57.4
	Premium Efficiency	159.0	140.0	70.0	70.0	56.0
75	High Efficiency	189.0	176.0	88.0	88.0	71.0
	Premium Efficiency	195.0	170.0	85.0	85.0	65.5

a. 460/60/3 motors are used. Derate nameplate horsepower to 0.83 to obtain actual horsepower.

Supply Power Wiring

1. Units require three-phase power supply.
2. Allowable voltage tolerances:

a. 60 Hertz

Nameplate 208V: Min.187V, Max. 229V

Nameplate 230V: Min.207V, Max. 253V

Nameplate 460V: Min.414V, Max. 506V

Nameplate 575V: Min.518V, Max. 632V

b. 50 Hertz

Nameplate 400V: Min. 342V, Max. 418V

3. Power lead wire sizing:

a. For units with cooling capability (all concurrent loads) with or without hot water heating and circuits with motor loads only:

MCA = 1.25 (largest motor RLA or FLA) + other loads + 2 amps.

b. For units with cooling capability and nonconcurrent electric heat capability:

In the cooling mode, the loads will be composed of supply fan motor and compressors. In heating mode, the loads will be composed of supply fan motor and electric heater. The MCA is calculated for unit running in either mode; the highest value obtained is used for the MCA.

(1)For unit in cooling mode:

MCA = 1.25 (largest RLA or FLA) + other loads + 2 amps.

(2)For unit in heating mode:

MCA = 1.25 (electric heat FLA + Fan FLA) + 2 amps.

4. Size wires in accordance with Table 310-16 or 310-19 of the National Electrical Code.
5. Wires should be sized for a maximum of 3% voltage drop.

Lug Sizes For Single Disconnect or Power Block

Table 10. Single Disconnect

UNIT	VOLTAGE	SIZE (AMPS)
018-028	208/230	225
018-028	400/460	100
018-028	575	100
035-040	208/230	225
035-040	400/460	150
035	575	100
040	575	150
045	208/230	400
045	400/460	150[a]
045	575	150
055-070	208/230	400
055-070	400/460	250
055-070	575	150
080-095	208/230	600
080-095	400/460	250
080-095	575	250
095-105 (6 Comp)	208/230	N/A
095-105 (6 Comp)	400/460	250
095-105 (6 Comp)	575	250

a. Disconnect is 250 amps with electric heat.

Table 11. Lug Sizes For Single Disconnect

DISCONNECT SIZE	LUG SIZE
100	#6-2/0
150	#2-3/0
225	#3-300 MCM
250	#4-350 MCM
400	250 MCM-500 MCM
600	250 MCM-350 MCM

Table 12. Lug Sizes For Power Block

UNIT	VOLTAGE	LUG SIZE
018-045	ALL	#6-400 MCM
055-105	400/460/575	#6-400 MCM
055-105	208/230	1/0-600 MCM

Note: Use copper wire only.

Control Center

All electrical controls are enclosed in a central control center located at the front of the unit. The control center is divided into two separate compartments, high and low voltage. The lower compartment houses the high voltage components and can be accessed through the “Electrical Access" panels indicated on the dimensional drawing. Behind these access panels are hinged dead front panels for further operator safety. High voltage components include:

1. Fan Motor Contactor, M30
2. Fan Motor Overload, OL10
3. Fan Motor Fuse, FB10
4. Compressor Contactors, M1-M6
5. Compressor Fuses, FB1-FB6
6. Electric Heat Contactors, M11-M16
7. Transformer, T1, T2, T3
8. Disconnect Switch, DS1-DS2
9. Power Block, PB1-PB2

If the optional disconnect switch is provided, the switch handle is visible and accessible without removing any safety or access panels.

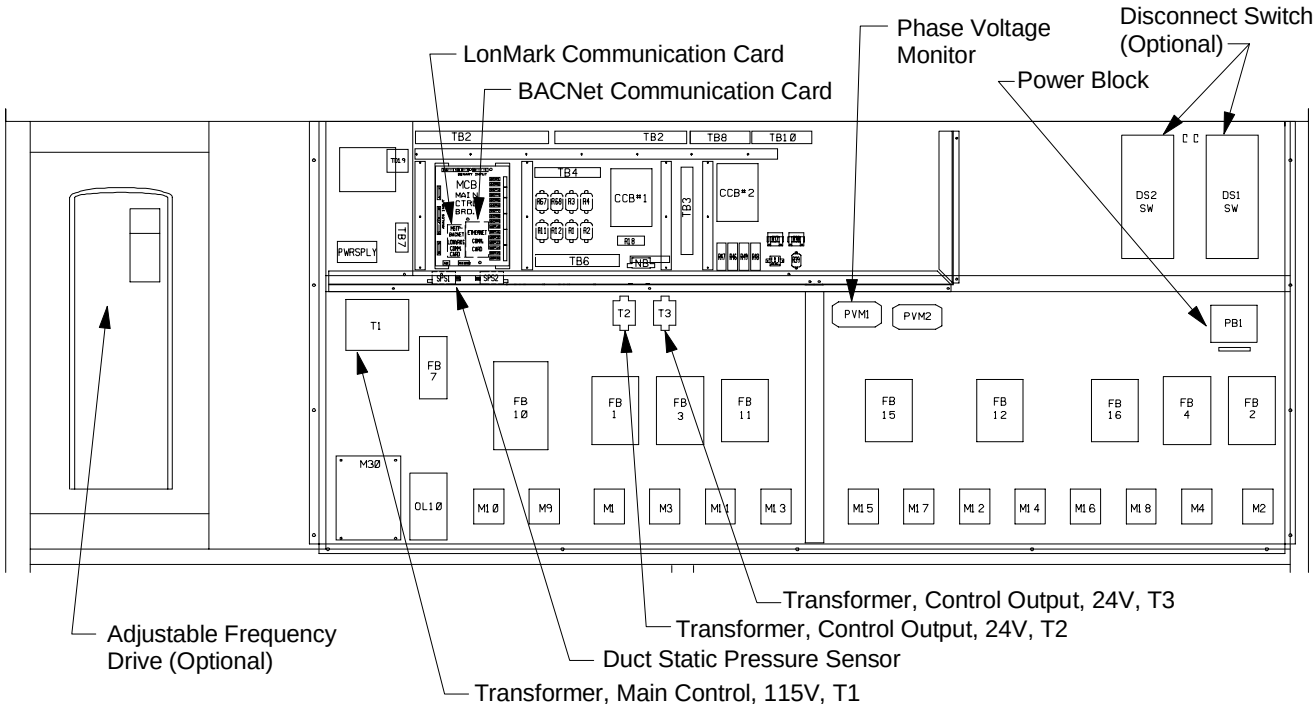
Low voltage components are located in the upper left compartment, and include:

1. MicroTech II Main Control Board, MCB
2. Duct Static Pressure Sensor, SPS1
3. Optional 2nd Duct Static Pressure Sensor, SPS2
4. Optional BACNet Ethernet Communication Card,
5. Optional BACNet MSTP Communication Card,
6. Optional LonMark Communication Card,
7. Compressor Control Board, CCB #1
8. Compressor Control Board, CCB #2
   (6 compressor units only)

Located on the face of the unit is the interactive MicroTech II keypad/display, unit switch, system indicator light and power indicator.

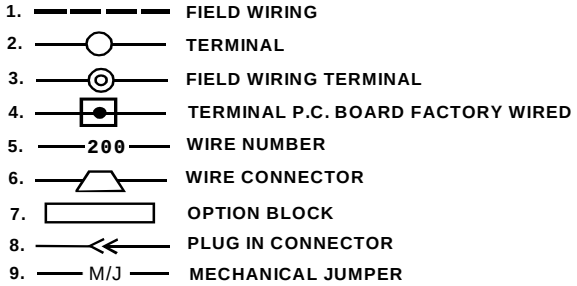
Note: IM710 has additional layout of the control center.

Figure 19. Typical Control Center Layout
High and Low Voltage Compartments



Electrical Legend

Designation	Description	Standard Location	Designation	Description	Standard Location
ACT1	ACTUATOR,VARIABLE INLET VANES	SUPPLY FAN SECTION	**OAE**	OUTSIDE AIR ENTHALPY	EXTERNAL
ACT2	ACTUATOR,BYPASS VALVE	CONDENSER VALVE	**OAT**	OUTSIDE AIR TEMP. SENSOR	EXTERNAL
ACT3	ACTUATOR,WATERSIDE ECONOMIZER	WATERSIDE ECONO VALVE	**OL10**	OVERLOAD RELAY--SUPPLY FAN	MAIN CONTROL
AFD10	ADJUST.FREQUENCY DRIVE--SUPPLY FAN	MAIN CONTROL	**PB1**	POWER BLOCK--TOTAL UNIT OR COMPR/HEAT	MAIN CONTROL
CCB1,2	COMPR CONTROL BOARDS--REFRIG. CIRCUITS	MAIN CONTROL	**PB2**	POWER BLOCK--SAF/RAF/CONTROLS	MAIN CONTROL
COMPR#1-6	COMPRESSORS #1--6	COMPRESSOR SECTION	**PC5**	PRESSURE CONTROL--CLOGGED FILTER	FAN SECTION
DAT	DISCHARGE AIR TEMP. SENSOR	NEAR FAN INLET	**PC7**	PRESSURE CONTROL--PROOF AIRFLOW	FAN SECTION
DHL	DUCT HI-LIMIT	FAN SECTION	**PM1**	PHONE MODEM	MAIN CONTROL
DS1	DISCONNECT--TOTAL UNIT OR COND/HEAT	MAIN CONTROL	**PSR1,2**	PRESSURE SENSOR,REFRIGERANT	LIQ. SHUTOFF VALVES
DS2	DISCONNECT--SAF/RAF/CONTROLS	MAIN CONTROL	**PVM1**	PHASE VOLTAGE MONITOR	MAIN CONTROL
EWT	ENT. COND. WATER SENSOR	COND. WATER INLET	**PVM2**	PHASE VOLTAGE MONITOR	MAIN CONTROL
F1	FUSE--CONTROL CIRCUIT	MAIN CONTROL	**R11**	RELAY--ELECTRIC HEAT STAGE 1 HW/S CLOSE	MAIN CONTROL
FB10	FUSEBLOCK--SUPPLY FAN	MAIN CONTROL	**R12**	RELAY--ELECTRIC HEAT STAGE 2 HW/S OPEN	MAIN CONTROL
FB11,12	FUSEBLOCKS--ELECTRIC HEAT	MAIN CONTROL	**R1-6**	RELAYS--HI-PRESSURE	MAIN CONTROL
FB1--6	FUSEBLOCKS--COMPRESSOR #1-6	MAIN CONTROL	**R18**	RELAY--COOL ENABLE	MAIN CONTROL
FB8	FUSEBLOCK--MAIN TRANSFORMER	MAIN CONTROL	**R67**	RELAY--ENABLE SUPPLY FAN	MAIN CONTROL
FP1-6	FROST PROTECTION--REFRIG. CIRCUITS	EVAP. COIL	**RAE**	RETURN AIR ENTHALPY	EXTERNAL
FS1	FREEZESTAT CONTROL	BT/DT COIL	**RAT**	RETURN AIR TEMP. SENSOR	EXTERNAL
GRD	GROUND	ALL CONTROL BOX	**S1**	SWITCH--SYSTEM ON/OFF	MAIN CONTROL
HL13-14	HI-LIMITS, PWR, ELEC HEATERS	ELECTRIC HEAT JCT.BOX	**S4,5**	SWITCHES--INVERTER BYPASS	MAIN CONTROL
HP1-6	HI-PRESSURE CONTROLS, REFRIG	ON COMPRESSORS #1-6	**S7**	SWITCH--LOCAL ON/OFF TO CONTROLLER	MAIN CONTROL
HTR-11,12	ELECTRIC HEATERS	DX COIL	**S8**	SWITCH--COOL ENABLE	MAIN CONTROL
HTR-15,16	ELECTRIC HEATERS	DX COIL	**S9**	SWITCH--HEAT	MAIN CONTROL
HTR1-6	CRANKCASE HEATERS	ON COMPRESSORS #1-6	**SD1**	SMOKE DETECTOR--SUPPLY FAN	EXTERNAL
HUM1	HUMIDSTAT SENSOR	EXTERNAL	**SD2**	SMOKE DETECTOR--RETURN FAN	EXTERNAL
LP1-6	LO-PRESSURE CONTROLS, REFRIG	ON COMPRESSORS #1-6	**SPS1,2**	STATIC PRESSURE SENSORS--DUCT/BLDG	MAIN CONTROL
LWT	LEAVING COND. WATER SENSOR	COND. WATER OUTLET	**T1**	TRANSFORMER--MAIN CONTROL (LINE/115V)	MAIN CONTROL
M10	CONTACTOR--SUPPLY FAN	MAIN CONTROL	**T2**	TRANSFORMER--CONTROL INPUT 24V	MAIN CONTROL
M11,12	CONTACTORS--ELECTRIC HEAT CONTROL	MAIN CONTROL	**T3**	TRANSFORMER--CONTROL OUTPUT 24V	MAIN CONTROL
M13,14	CONTACTORS--ELECTRIC HEAT SAFETY	MAIN CONTROL	**TB10**	TERMINAL BLOCK--	MAIN CONTROL
M15,16	CONTACTORS--ELECTRIC HEAT CONTROL	MAIN CONTROL	**TB2**	TERMINAL BLOCK--24V-FACTORY/FIELD	MAIN CONTROL
M1-6	CONTACTORS--COMPR#1-6	MAIN CONTROL	**TB3**	TERMINAL BLOCK--24V-	MAIN CONTROL
M17,18	CONTACTORS--ELECTRIC HEAT SAFETY	MAIN CONTROL	**TB4**	TERMINAL BLOCK--24V-COMPRESSOR	MAIN CONTROL
M30	CONTACTOR--INVERTER BYPASS	MAIN CONTROL	**TB5**	TERMINAL BLOCK--115V-FACTORY/FIELD	MAIN CONTROL
MAT	MIXED AIR TEMP SENSOR	BEHIND FILTERS	**TB6**	TERMINAL BLOCK--115V/24V FACTORY	MAIN CONTROL
MCB1	MICROPROCESSOR CIRCUIT BOARD #1	MAIN CONTROL	**TB8**	TERMINAL BLOCK--	MAIN CONTROL
MJ	MECHANICAL JUMPERS	ON TEMINAL BLOCKS	**VM1**	VALVE MOTOR #1--HEATING	NEAR HOT WATER INLET
MP1-6	MOTOR PROTECTOR--COMPR#1-6	ON COMPRESSORS #1-6	**VM5**	VALVE MOTOR #5--COOLING	NEAR CHILLED WATER
NB1	NEUTRAL BLOCKS	MAIN CONTROL	**WF1**	CONDENSER WATER FLOW SWITCH	NEAR CONDENSER
			ZNT1	ZONE TEMP. SENSOR--SETBACK	FIELD INSTALLED



Typical Wiring Schematics

Figure 20. Power Schematic

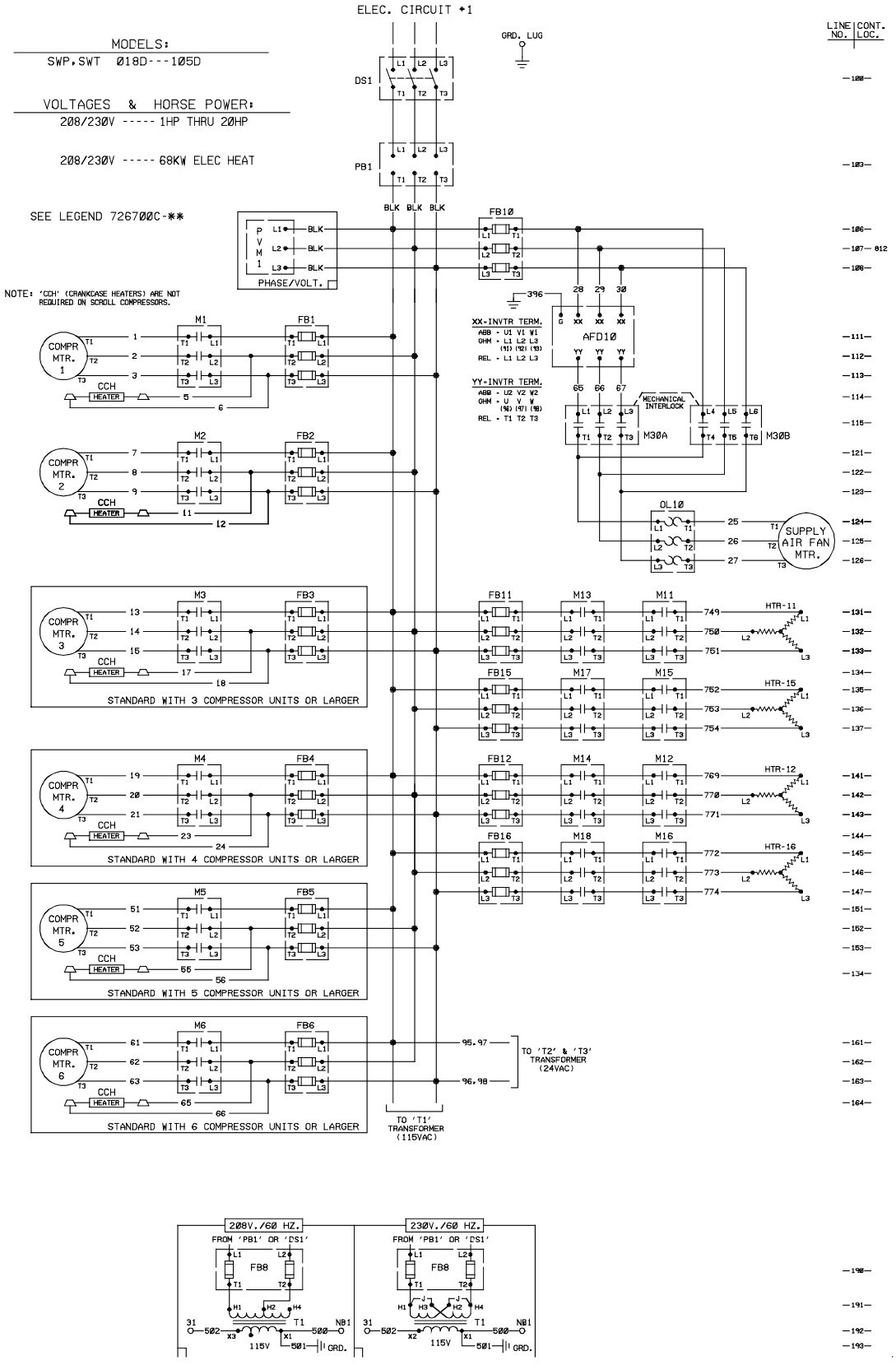


Figure 21. Input Schematic, Discharge Air Control (DAC)

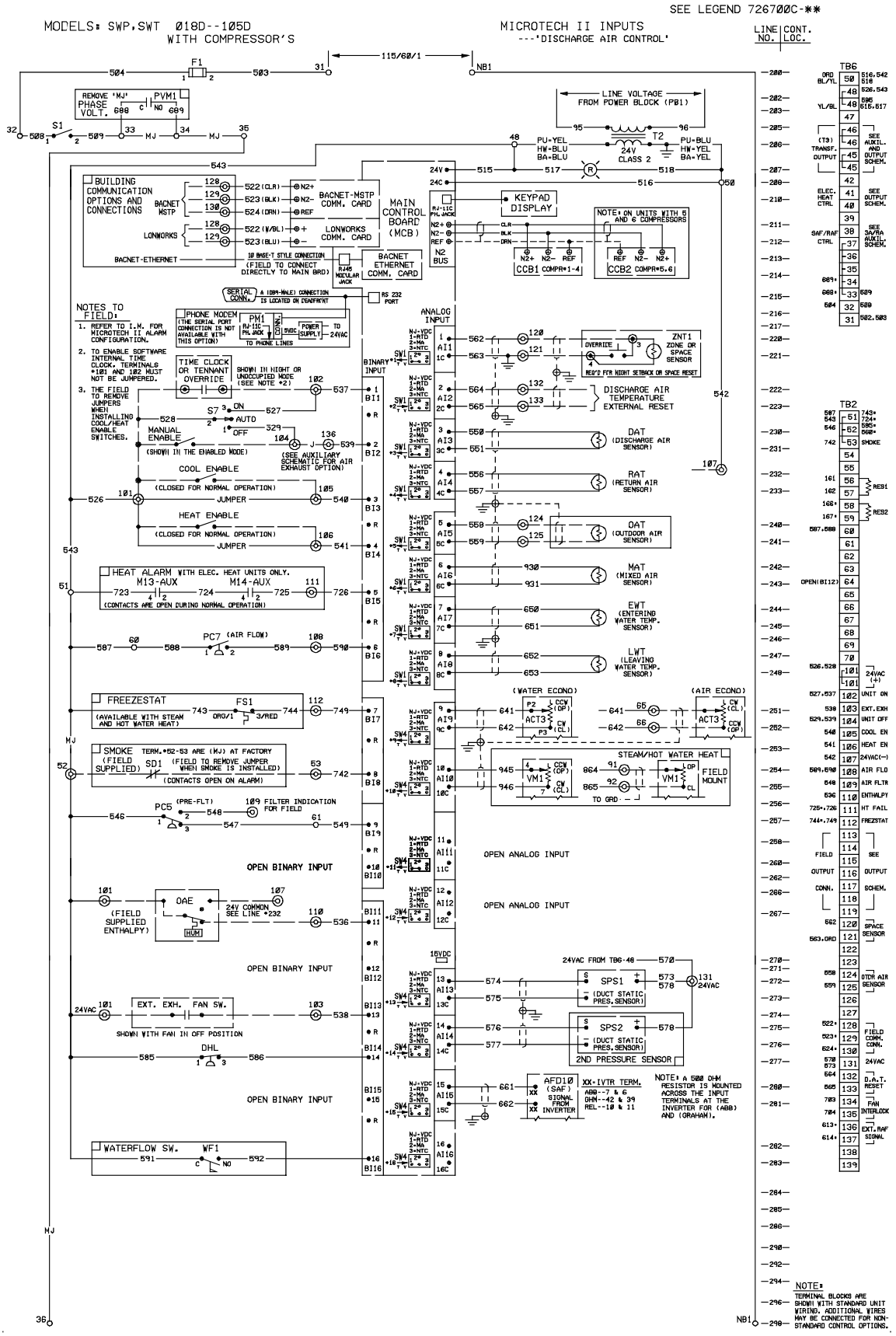


Figure 22. Input Schematic, Zone or Space Comfort Control (SCC)

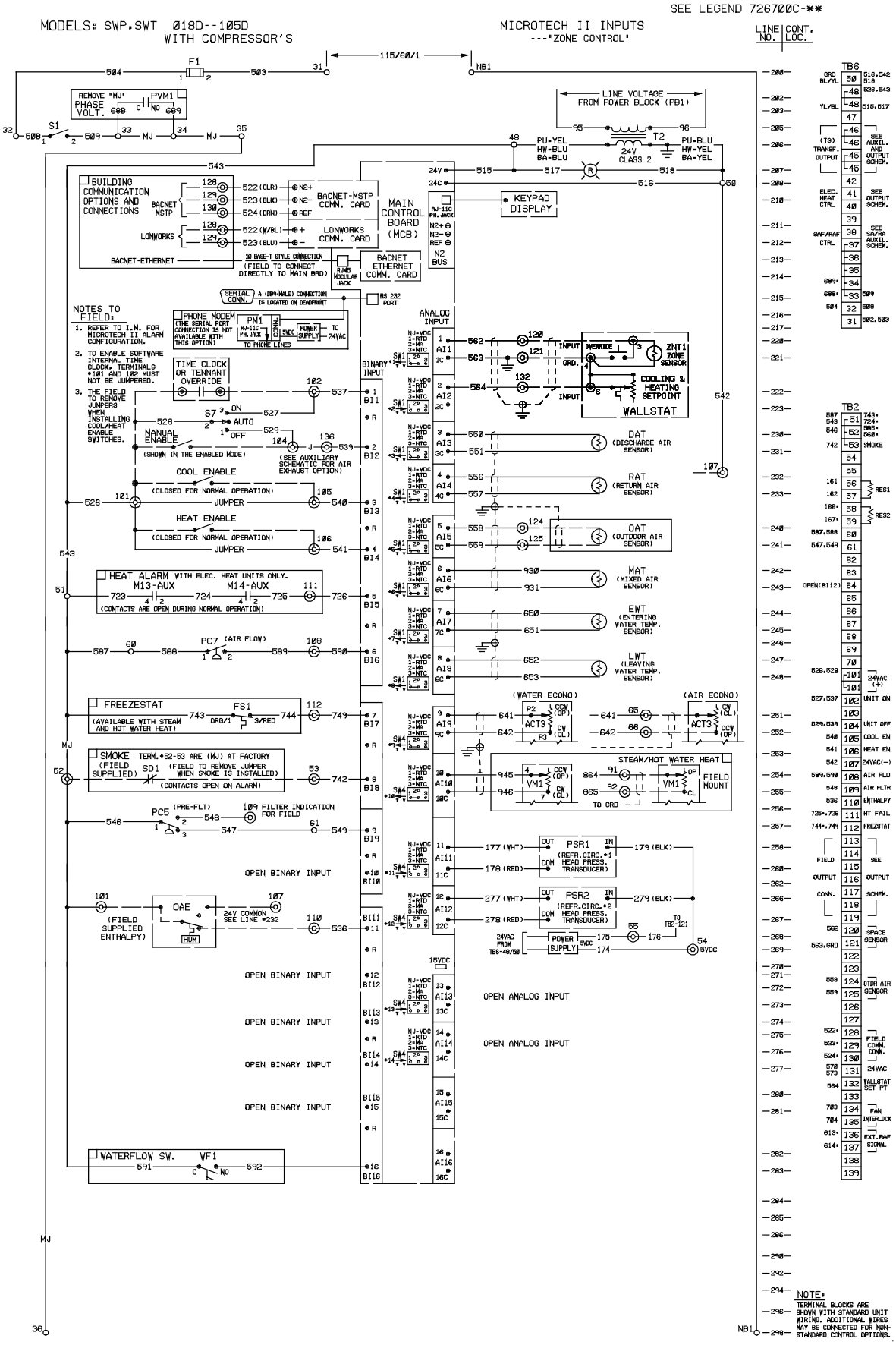


Figure 23. Output Schematic, Actuator Control

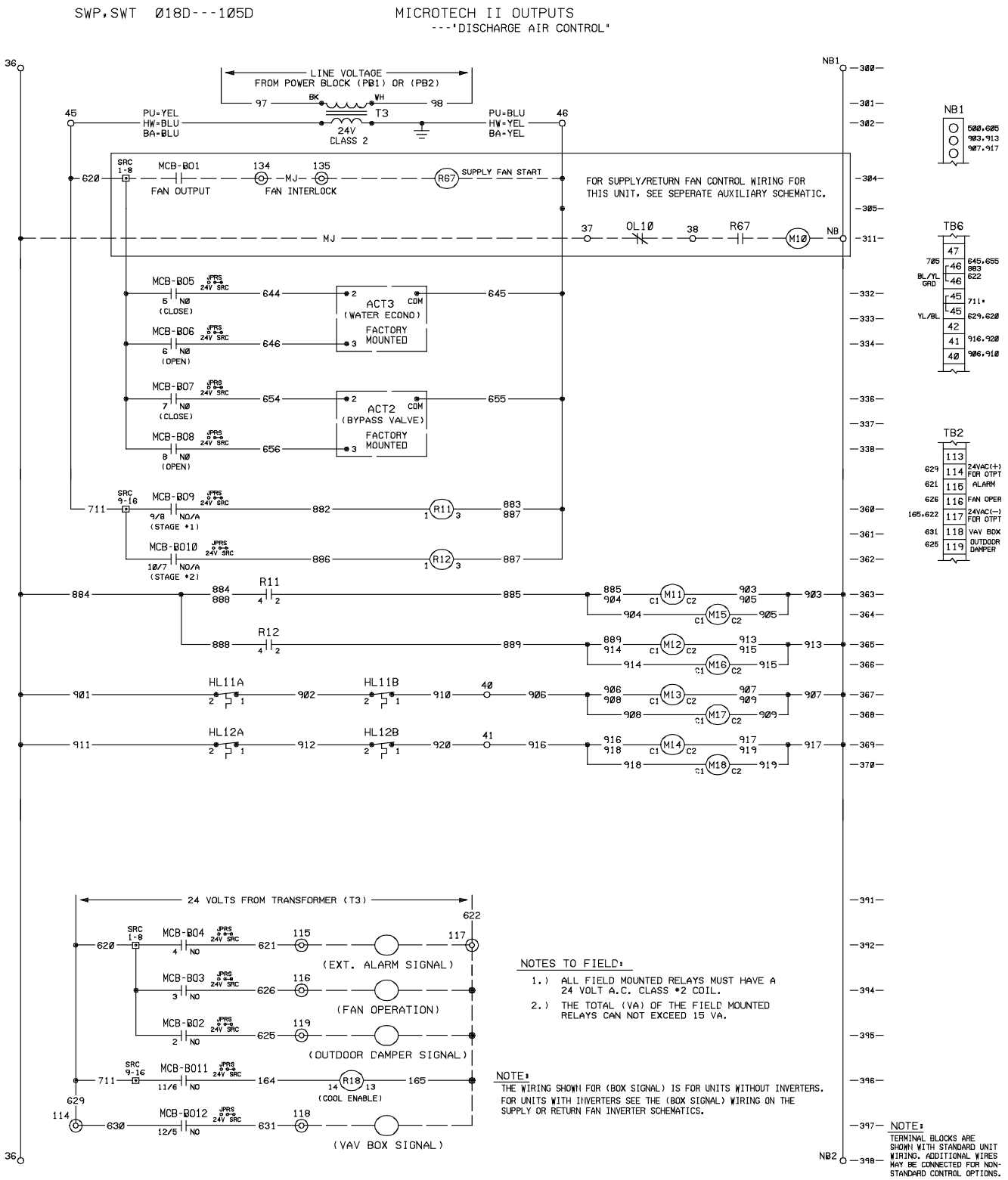


Figure 24. Output Schematic, Auxiliary Fan Start/Stop Control

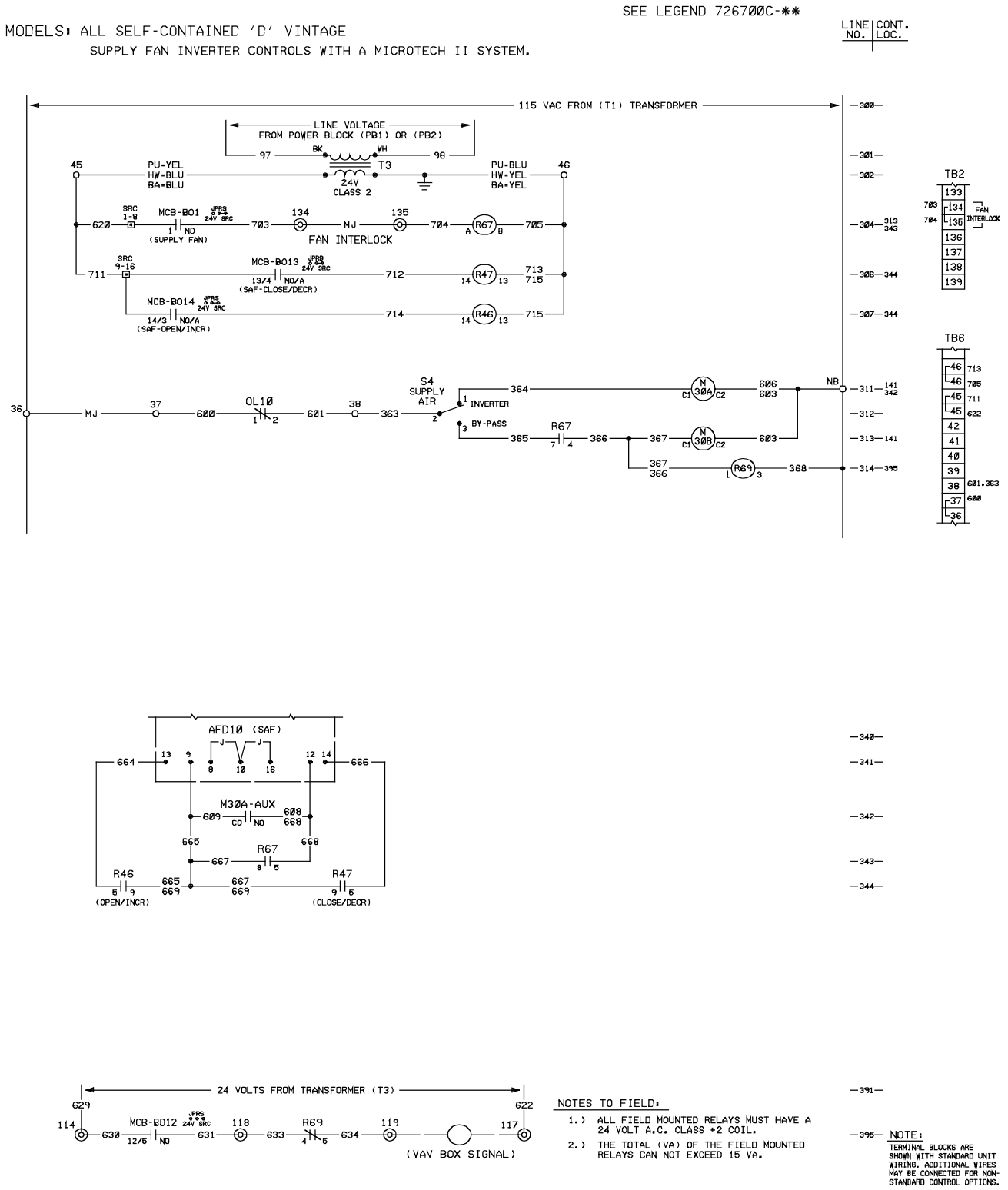


Figure 25. Output Schematic, Actuator Control

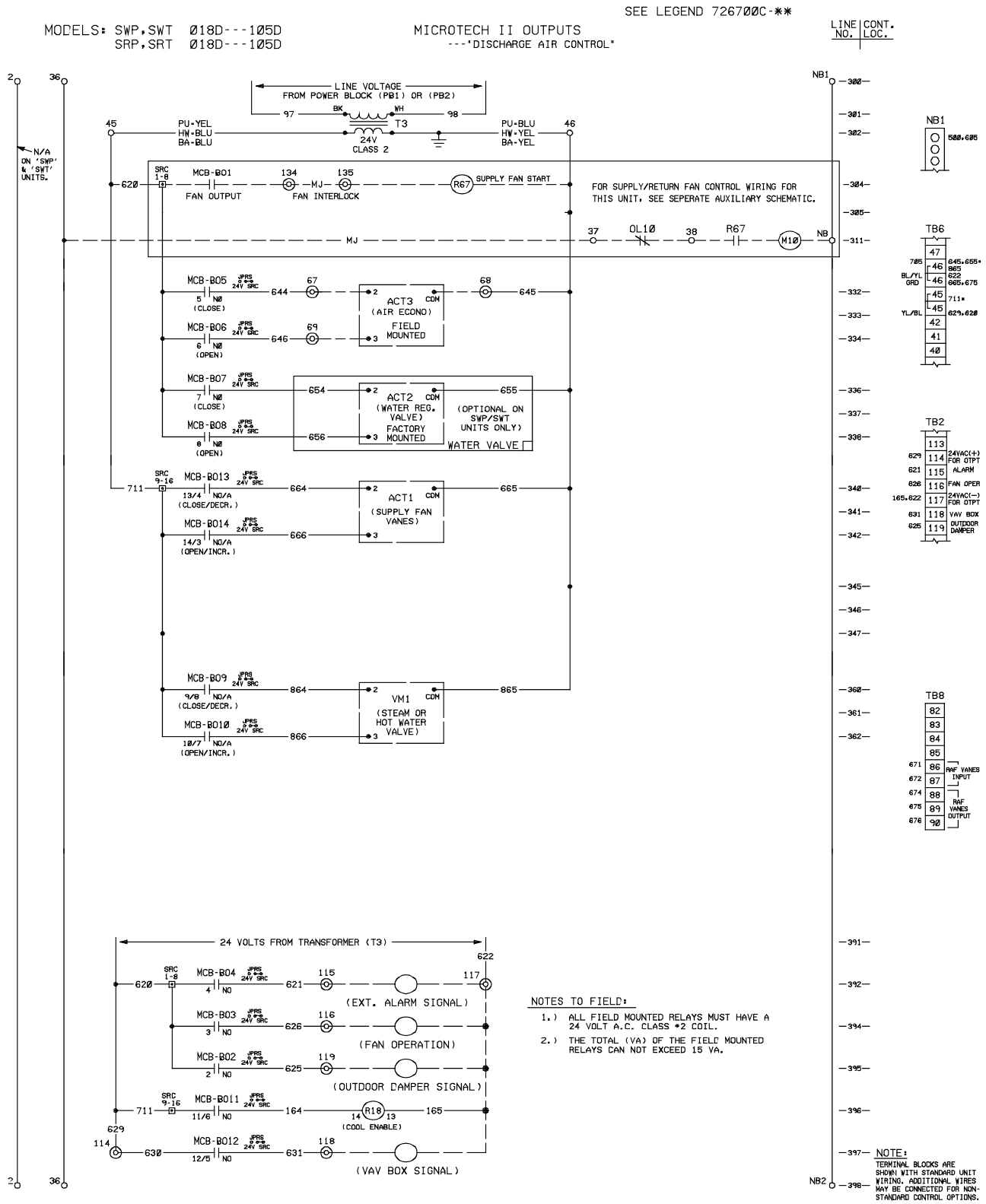


Figure 26. Output Schematic, Compressor Control (4 Compressors/4, 5 or 6 Stage)

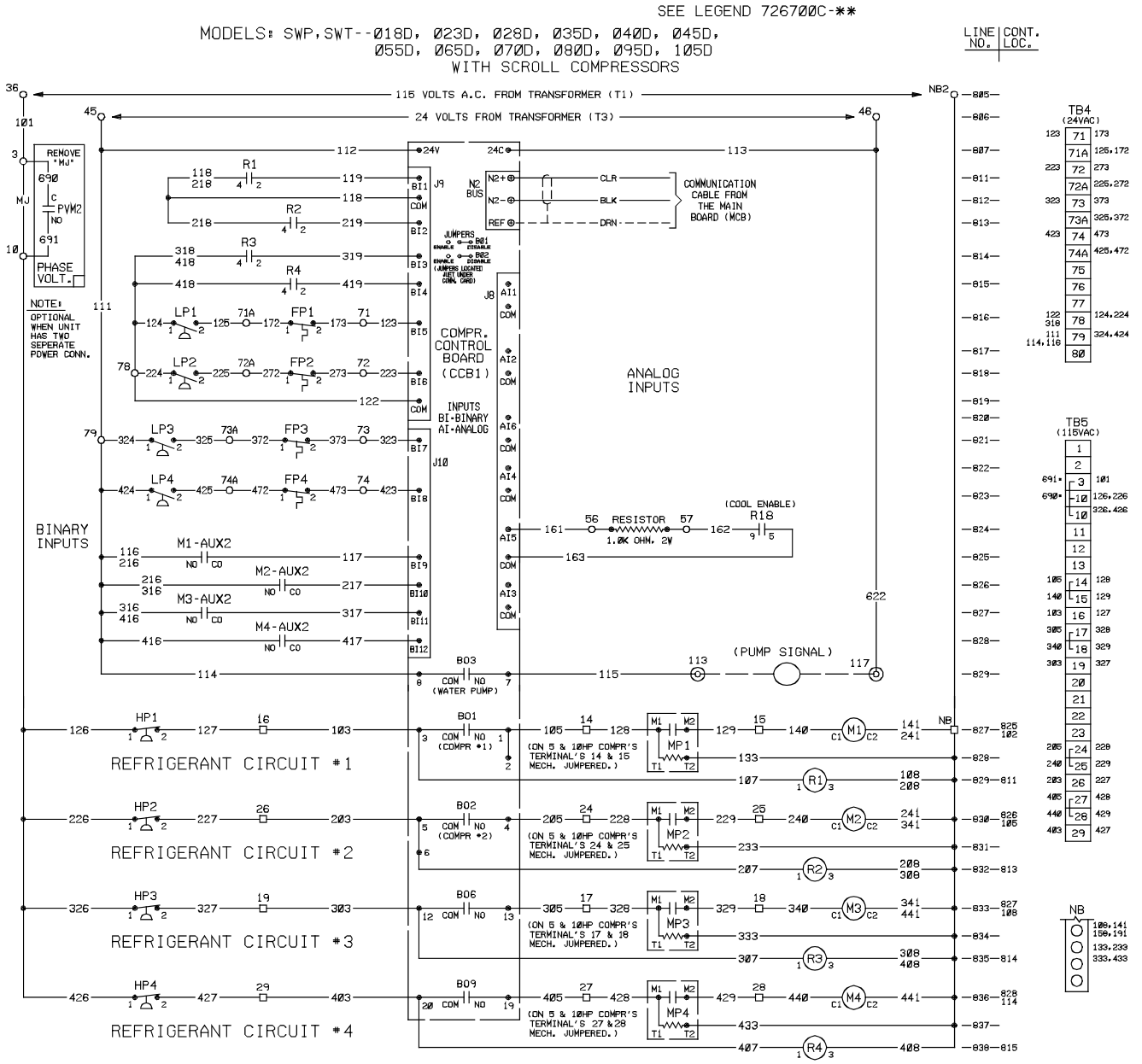
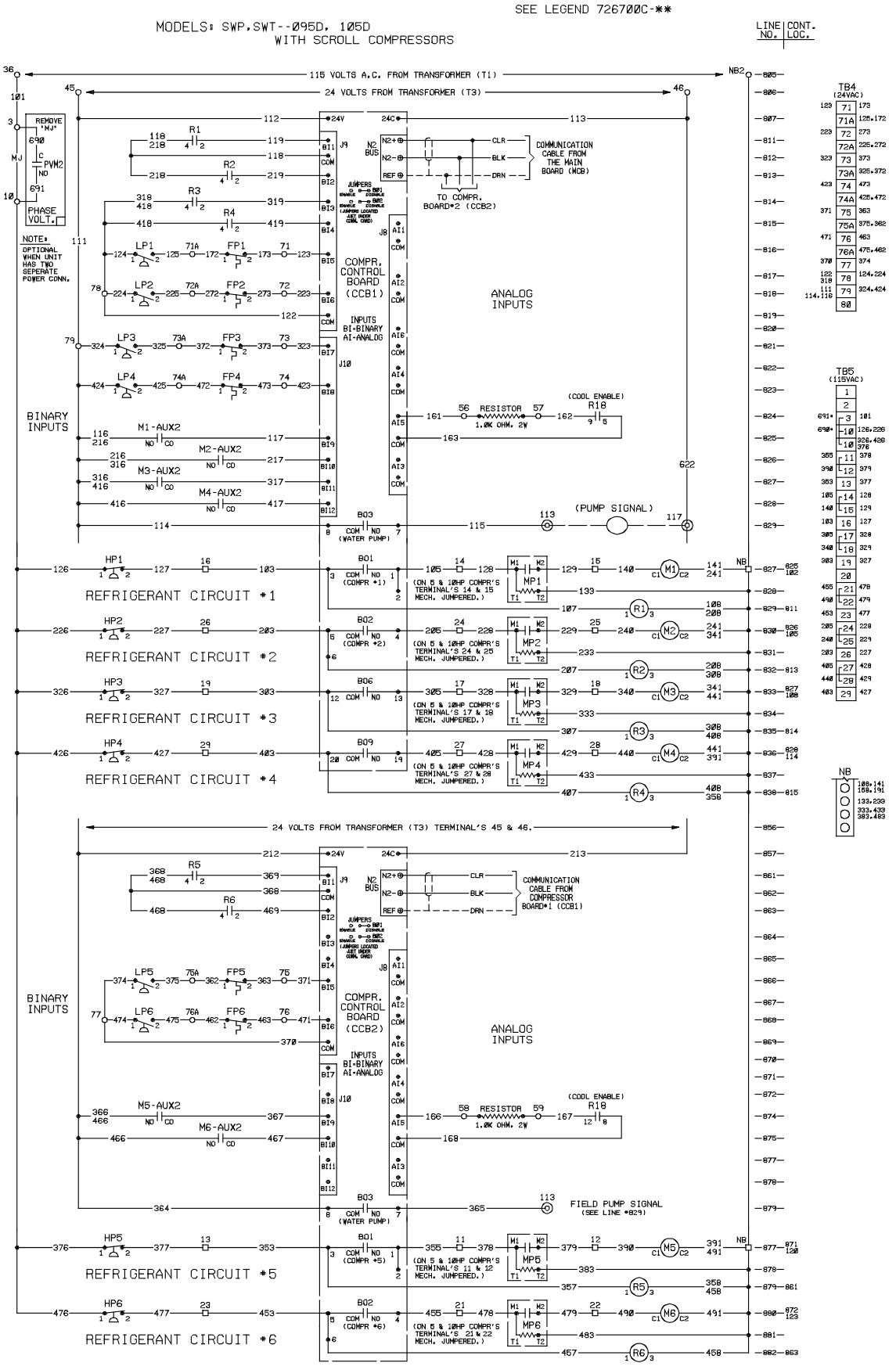


Figure 27. Output Schematic, Compressor Control (6 Compressors / 6 Stage)



Standard Controls

High Pressure Switches

The high pressure switch (HP1-HP6) is a single pole pressure activated device that opens on a pressure rise. When the switch opens it de-energizes the compressor circuit, shutting down the compressor. The MicroTech II controller will display an alarm condition. Once the cause of the fault has been identified and corrected, the unit may be manually reset through the MicroTech II keypad/display interface. The control is attached to a Shrader fitting and is located at the compressor. To check the control, shut off water flow to the condensers and observe the cutout point on a high pressure gauge. The high pressure control should open at 360 psig and close at 300 psig. After testing the high pressure control, check the pressure relief device for leaks.

Low Pressure Switches

The low pressure switch (LP1-LP6) is a single pole pressure activated device which closes on a pressure rise. It senses evaporator pressure and is factory set to close at 60 psig and open at 35 psig. Compressor operation is not allowed until the switch closes. The low pressure switch is an automatic reset control. If the condition occurs on any one compressor three times in a 24-hour period, the alarm will have to be manually reset through the MicroTech II keypad/display interface to restart the compressor. The low pressure switch is attached to a Shrader fitting and is located at the compressor.

Compressor Motor Protector

All compressors are thermally protected. All 13 horsepower and larger compressors use a solid state protection device (MP1 - MP6) located in the compressor junction box. Whenever the protection system opens the compressor is shut down for a period of 36 minutes and an alarm indication is made at the MicroTech II controller.

All 6 and 10 horsepower compressors have in-line protection. The control automatically resets when the alarm condition is removed and the time delay is satisfied.

If the condition occurs on any one compressor three times in a 24-hour period, the alarm will have to be manually reset through the MicroTech II keypad/display interface to restart the compressor.

Proof of Airflow Switch

A positive proof of airflow switch (PC7) is provided with all units. The switch is factory set to close at 0.2 inches of water column. The switch has a field adjustable set point range of 0.17 to 5.0 inches of water column. Turn adjustment screw clockwise to decrease differential pressure setting. Turn adjustment screw counterclockwise to increase differential pressure setting. In a constant volume system, if the fan system is energized and the minimum pressure setting of the switch has not been reached, the unit will be shut down and a loss of airflow alarm indicated at the MicroTech II controller. For variable air volume units, the unit will shutdown due to loss of airflow only if the airflow switch is open AND the duct static pressure is less than half the duct static pressure setpoint. Once the reason for the fault has been corrected, the unit can be manually reset through the MicroTech II keypad/display interface. PC7 is located in the fan section on the motor side.

Frost Protection Switches

A frost protection switch (FP1-FP6) is used on each refrigerant circuit to protect against evaporator coil freeze up. The frost protection switches are normally closed and open on a drop in temperature. When a frosting condition is sensed the compressor circuit is shutdown until the condition has been removed. The frost protection control is an automatic reset control. If the condition occurs on any one compressor three times in a 24 hour period, the alarm will have to be manually reset through the MicroTech II keypad/display interface to restart the compressor. The MicroTech II control will indicate a warning when a frost condition exists. The temperature sensors are located on a return bend for each refrigerant circuit.

Clogged Filter Switch

A clogged filter switch (PC5) is provided to indicate when unit filters are to be changed. The switch is factory set to close at 0.6 inches of H_2O. The switch has a field adjustable set point range of 0.17 to 5.0 inches of H_2O. Turn adjustment screw clockwise to decrease differential pressure setting. Turn adjustment screw counterclockwise to increase differential pressure setting. When the filter pressure differential exceeds the switch setpoint, a clogged filter indication is made at the MicroTech II controller. The unit is allowed to continue operation. PC5 is located in the fan section on the motor side.

Duct High Limit

A duct high limit (DHL) pressure control is provided as standard with all units having variable air volume control. The duct high limit is intended to protect the ductwork, etc. from over pressurization caused by tripped fire dampers or a control failure. When the duct pressure exceeds the setting of the control, the unit is de-energized via the MicroTech II controller and an alarm condition indicated. After the reason for trip has been identified and corrected, the control can be reset via the MicroTech II keypad/display interface.

The duct high limit is factory installed including sensing tubing, and preset for a 3.0" wc trip point. The control can be readjusted in the field to match the specific ductwork of a project. The switch has a field adjustable set point range of 0.17 to 5.0 inches of H2O. Turn adjustment screw clockwise to decrease differential pressure setting. Turn adjustment screw counterclockwise to increase differential pressure setting. DHL is located in the fan section on the motor side.

Phase Fail/Under Voltage Protection

The monitor is a microprocessor controlled device which provides protection against three-phase electrical motor loss due to low voltage, phase loss, voltage unbalance and phase reversal. The microprocessor constantly monitors the three-phase line voltages and detects these harmful power line conditions. Whenever any of these conditions occur, the SWP controls are deactivated and remain deactivated until power line conditions return to an acceptable level. Trip and reset delays have been provided to prevent nuisance tripping due to rapid power fluctuations. The trip and reset delays are field adjustable. The monitor also provides a variable line voltage adjustment.

Duct Static Pressure Sensor

All units provided with variable air volume control include a factory mounted static pressure sensor (SPS1). The unit can also have an optional second static pressure sensor, SPS2. The sensor is factory wired and requires field installation of 1/4" I.D. sensor tubing to the selected duct location.

Note: Be sure that tubing complies with local code requirements. Flame retardant plastic or metal tubing may be required. Carefully select the ductwork sensing point for the pressure sensor. Improper location of the sensing point will result in unsatisfactory operation of the entire variable air volume system. The following guidelines should be adhered to:

1. Sense near the end of long duct runs to ensure that all terminal box take-offs along the run will have adequate static pressure to operate.
2. The end of the sensing tube must be perpendicular to the airflow in order to sense only static pressure.
3. The sensing tube should be located in a nonturbulent flow area of the duct. Keep several duct widths away from take-off points, bends or neck downs.

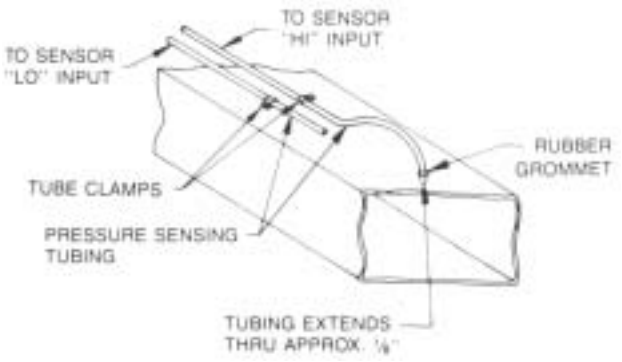
Mounting instructions (See Figure 28)

1. Drill hole in duct at remote sensing point and install a rubber grommet. Insert sensing tube 1/8" into the duct and securely clamp tubing to the duct, being sure not to stress or kink the tubing. The end of the sensing tube must be smooth and cut straight across. An angle cut will affect operation.
2. Clamp a second tube to the outside of the duct at the location of the sensing point.
3. Run both tubes along the ductwork and back to the unit. The tubing may be routed to the pressure sensor (SPS1) by drilling two holes through the unit upright post. A grommet must be used at each hole to protect the tubing and seal the cabinet.

Note: To avoid confusion between "high" and "low" tubing, it is recommended that two different tubing colors be used and that this information be recorded, along with the sensing point location, on the master building blueprints.

4. Connect tubing to the high and low ports on the sensor.

Figure 28



Building Static Pressure Sensor

If a unit has direct building static pressure control capability, static pressure taps must be field installed and connected to pressure sensor SPS1 in the unit. This sensor is located on the control panel.

The two static pressure sensing taps must be carefully located and installed. Improper location or installation of the sensing taps will cause unsatisfactory operation. Following are pressure tap location and installation recommendations for both building envelope and lab, or "space within a space," pressure control applications. The installation must comply with local code requirements.

⚠ CAUTION

Fragile sensor fittings. May damage pressure sensor.

If tubing must be removed from a pressure sensor fitting, use care. Do not wrench the tubing back and forth to remove or the fitting may break off.

Building pressurization applications

1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor. This will facilitate connecting a manometer or pressure gauge if testing is required.
2. Locate the building pressure (HI) tap in the area that requires the closest control. Typically, this is a ground level floor that has doors to the outside.
3. Locate the building tap so that it is not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
4. Connect the tube to the 1/4 inch HI fitting on sensor SPS1. Assure that the sensor does not support the weight of the tubing; use tube clamps or some other means.
5. Locate the reference pressure (LO) tap on the roof. Keep it away from the condenser fans, walls, or anything else that may cause air turbulence. Mount it high enough above the roof so that it is not affected by snow. If the reference tap is not connected to the sensor, unsatisfactory operation will result.
6. Use an outdoor static pressure top (Dwyer A306 or equivalent) to minimize the adverse effects of wind. Place some type of screen over the sensor to keep out insects. Loosely packed cotton works well.
7. Route the outdoor tap tube out of the main control panel through a small field-cut opening in the edge of the control wiring raceway cover. Cut this "mouse hole" in the vertical portion of the edge. Seal the penetration to prevent water from entering. Connect the tube to the 1/4 inch LO fitting on sensor SPS1.

Freezestat

A non-averaging type freezestat (FS1) is available to protect hydronic coils from subfreezing temperatures. If the unit has an economizer coil the control is mounted on the entering face of the economizer coil. If the unit does not have an economizer coil the control will be mounted on the leaving face of the hot water coil. Upon sensing a hazardous temperature, the unit will shutdown, open hydronic control valves and send an alarm indication via the MicroTech II controller. The freezestat has a field adjustable setpoint range of 35°F to 40°F. The setpoint may be changed by turning the adjustment screw until pointer is opposite the desired cutout point. The adjustment screw is accessible at the bottom of the control or at the top when the cover is removed.

Condenser Water Flow Switch

A pressure differential type flow switch (WF1) is available to verify flow to the unit condensers before compressor operation is allowed. The flow switch is factory installed in the unit next to the condenser piping connections. If a loss of condenser water flow is sensed, the cooling will be locked out via the MicroTech II controller. When flow is restored, the unit will automatically reset.

The factory settings for the water flow switch N.O. contacts are as follows:

Unit Size	Close Ft. wc	Adj. Range	Open Ft. wc	Adj. Range
018D-040D	3.0	+0.0	1.5	+0.5
		-0.5		-0.5
045D-105D	4.5	+0.0	3.0	+0.5
		-0.5		-0.5

Water Side Economizer

A completely factory installed, piped and controlled water side economizer system is available on any constant or variable air volume system. Whenever the entering water temperature is more than 3°F (adjustable at the MicroTech II keypad/display) below the mixed air temperature to the unit, the control valves modulate to provide cooling directly from the tower water. The economizer system can be used to provide 100% of the cooling demand or supplement mechanical cooling by precooling the return air. The economizer system consists of a water coil and two, two-way control valves. The unit's MicroTech II controller will modulate the control valves to satisfy the cooling demand whenever the entering water is suitable. When the control valves are in the 90% open position, the unit's compressors will be allowed to be staged on to satisfy the cooling load. When the entering water temperature is no longer suitable, the economizer control valve will close and the unit will be on 100% mechanical cooling.

Two valve control arrangements are available from the factory. The first maintains full flow through the unit condensers at all times. This control arrangement is used for systems with constant pumping systems. For installations with a variable pumping system, the control valves will be sequenced such that flow is removed from the unit whenever cooling is not required. A mechanical clutch is provided on each valve to manually close or open the valves.

The economizer system is factory piped and the coil takes advantage of the same drain pan and condensate connection. Air may be vented from the economizer coil by using the uppermost clean out plug. The torque requirement for the cleanout plugs is 10 inch-lb.

Condenser Water, Head Pressure Control

An optional condenser head pressure control valve is available on units without water side economizer. This option permits operation with entering water temperatures below 55°F. The valve is a two-way regulating valve controlled via MicroTech II to maintain refrigerant head pressure .

Variable Inlet Vanes

An optional variable inlet vane assembly is available for variable air volume applications. The assembly consists of inlet funnels with integral sets of lever-actuated radial vanes, one assembly for each side of the fan. The vanes, upon opening, direct air in the direction of wheel rotation.

The vanes rotate 90 degrees from closed to full open in response to the factory installed actuator motor. The actuator is controlled by the unit's MicroTech II controller. The inlet vanes operate in unison and are properly adjusted and tested before the unit leaves the factory. The start-up contractor must check the adjustments and retighten all bolts and ball joints to insure that shipping and handling has not caused misalignment.

Adjustable Frequency Drive

As an option an adjustable frequency drive (AFD), is available for airflow modulation. A manually activated bypass contactor is provided to allow system operation in the event of drive service.

Static pressure is controlled by the unit mounted MicroTech II controller. Indication of current airflow is available at the MicroTech II controller. Static pressure is sensed by one or two factory mounted duct sensors. The installer provides and installs the sensor tubing from unit mounted sensor(s) to duct location(s). The static pressure setpoint is keypad adjustable through the MicroTech II DDC controller.

All variable air volume units include field adjustable duct high limit safety control to protect ductwork from excessive duct pressure.

Disconnect Switch

A factory mounted, nonfused main circuit interrupter for disconnecting the main electrical power is available. The switch is located at the front of the unit on the control panel and is accessible without unit penetration. The lug size information is provided in Tables 11 and 12.

Dual Power Supply

The dual power block is an option for the power supply. This allows the fan motor and control circuit to be isolated from the compressor circuit. If the unit has the optional electric heat it will be circuited with the compressors.

Electric Heat

Optional electric heat is available. Heat is controlled by the unit's MicroTech II unit controller to maintain setpoint. The heaters are factory installed and wired including branch fusing and all safety controls.

Hot Water Control

A factory mounted, 1 or 2 row hot water coil is available, with or without factory mounted control valve. The hot water control valve is controlled by the unit's MicroTech II controller to provide morning warm-up heat or heat for constant volume application.

System Check, Test and Start

⚠ WARNING

Electric shock hazard. Failure to bond the frame of this equipment to the building electrical ground by use of the grounding terminal provided or other acceptable means may result in electric shock. Disconnect electric power before servicing equipment.

General

Only qualified personnel should perform the start-up and service of this equipment. A representative of the owner or the operator should be present during start-up to receive instruction in the operation, care and adjustment of the unit.

To assure proper warranty coverage, the unit must be put through a check, test and start-up procedure. The completed check test and start form (supplied with each unit) must be signed and returned to McQuay International.

Note: Always open power disconnect switch before opening service panels.

Pre Start-up

1. Check that the unit is completely and properly installed with ductwork connected. Check that all construction debris is removed and filters are clean.
2. With all electrical disconnects open, check all electrical connections to be sure they are tight. Although all factory connections are tight before shipment, some loosening may have resulted from shipping vibration.
3. Check all compressor valve connections for tightness to avoid refrigerant loss at start-up. Although all factory connections are tight before shipment, some loosening may have resulted from shipping vibration. Refer to Table 13 for proper valve torque values.
4. Check tightness of setscrews in bearings, drives, and fan wheels. If retightening is needed, make certain fan wheels are centered between the inlet openings and setscrews are torqued per Table 14.
5. Check that the fan rotates freely. Check belt tension and alignment.
6. Check that the unit condenser water connections and condensate drain connections have been made.
7. Before attempting to operate the unit, review the control layout description to become familiar with the control locations. Review all equipment service literature and the unit wiring diagrams supplied with each unit. Review optional controls to determine which are included in the unit.
8. Make sure that the return air temperature sensor and optional space temperature sensor, if used, have been installed in the return air duct and that the wiring terminations have been made at the unit Input Board.
9. Make sure that entering and leaving condenser water temperature sensors are mounted.
10. Make sure that the optional duct static pressure sensor is connected to the duct with appropriate tubing. The unit may have one optional static pressure sensor, SPS1. The other option would be that or SPS1 and SPS2.
11. Check the voltage of the unit power supply and see that it is within the ±10% tolerance that is allowed. Phase voltage unbalance must be within ±2%.
12. Check the unit power supply wiring for adequate ampacity and a minimum insulation rating of 75°C.
13. Verify that all mechanical and electrical inspections have been completed per local codes.
14. Open the compressor suction and discharge shutoff valves until backseated. Always replace valve seal caps.
15. The following must be done only for units with 20 hp compressors. Making sure unit switch S7 is in the "OFF" position, throw the main power disconnect to "ON." This will energize the crankcase heaters. Wait a minimum of 24 hours before starting up the unit.

Table 13. Valve Torques

COUPLING NUT SIZE INCH	GAGE PORT CAP TORQUE LBS-FT	STEM CAP TORQUE LBS-FT	COUPLING NUT TORQUE LBS-FT
1.00	7±1	32±2	55+5
1.25	7±1	32±2	90+10
1.75	7±1	45±3	205+15

Table 14. Setscrew Torque

SETSCREW DIAMETER	TORQUE MIN. (FT.-LBS.)
#10	4.3
1/4”	10.0
5/16”	20.0
3/8”	25.0

Start-up

General

All units are factory tested to assure proper operation in the field.

1. Close disconnect switch with switch S7 in the "OFF" position. Allow crankcase heaters to operate for 24 hours.
2. Power should now be supplied to the MicroTech II controller and the LEDs on MCB1 should follow the normal startup sequence.

3. Set internal MicroTech II time clock or external time clock if used.
4. Set cooling setpoint to a value which will assure a full call for cooling.
5. Start the auxiliary equipment for the installation such as water pumps, cooling towers, etc.

Fan start-up

1. Place the unit into the "FAN ONLY" mode through the keypad:

System summary:
Control Mode:
Off
Auto
Heat/Cool
Heat only
Cool only
Fan only

2. Turn switch S7 to "ON". The supply air fan should start and run.
3. Observe fan rotation. If fan is rotating backward, reverse two legs of the main unit supply power. Unit compressors are factory “phased” to match the supply fan. Do not reverse internal fan motor power leads as this will result in the compressor being out of phase. If fan does not run:

a. Check the control circuit fuse F1.
b. Check control transformer fuse FB7.
c. Verify that the fan overload is not tripped.
d. Check the fan motor power fuses.
e. Trace the circuits.

Compressor start-up

With the supply air fan operational, prepare for compressor operation. Note: The unit is shipped with the refrigeration service valves closed. Backseat (open) the suction, discharge and liquid line valves and replace service caps.

Connect service gauges and crack valves off the backseat position (one turn forward). Verify that the unit has not lost its refrigerant charge due to shipping damage or leaks. The 20 hp compressor have crankcase heaters that need to be verified they are operating. These should operate at least 24 hours before starting compressors.

1. Set Cooling Control Setpoint, menu 13, to a value which will assure a call for full cooling.
2. Place unit into the “COOL ONLY” mode through keypad/display.
3. If desired, the MicroTech internal control timers can be reduced to 20 seconds. The amount of time it operates in this “Fast” mode can be entered through the keypad:

Setup/Service
Timer setting
Service

Note: "Fast" timers should only be used to verify sequencing of compressors during start-up. The timer must be returned to "Normal" for proper unit operation.

Do not allow compressors to come on repeatedly in the "Fast" timer mode as this may damage compressors and/or will indicate "Motor Protector Failure" under compressor alarms.

The compressors should now start. Start compressors one at a time, beginning with compressor number 1. Facing the unit, from left to right, compressors are numbered #1, #3, #4 and #2.

If the compressor motor hums but does not run, verify that the unit is getting three phase power.

The compressors should run continuously. If a compressor cycles on the low pressure switch:

a. Verify that the circuit is not low on charge.
b. Check for low airflow.
c. Check for clogged filters.
d. Check for restricted ductwork.
e. Check for very low mixed air temperatures to the unit.
f. Verify that all the distributor tubes, expansion valve and liquid line components are feeding the evaporator coil.
g. Verify that all fan section access panels are in place.
h. Verify that the suction service valves and the liquid line service valves are completely open.
i. Verify that all sensor inputs are connected.

Economizer start-up

The economizer is modulated to maintain the cooling setpoint. With entering water temperature more than 3°F below the mixed air return to the unit, place the water sensor in a cold bath if supply water to the unit is too warm, and the unit calling for cooling, observe that the economizer control valve modulates open. Readjust control setting or remove the sensor from the bath and observe that the economizer control valve drives closed.

Hot water start-up

The hot water valve is modulated to maintain the discharge heating setpoint. To verify the hot water valve operation, adjust the heating setpoint through the keypad:

Temperatures
Zone heating
OCC HTG SPT

Set the heating setpoint to a temperature greater than the control temperature plus the dead band. Note the cooling setpoint must be higher than the heating setpoint. With the heating setpoint set properly the hot water valve should modulate open. To close the hot water valve adjust the heating setpoint below the control temperature minus the dead band. After testing the hot water valve, return the heating setpoint to its proper setting.

Expansion valve superheat adjustment

It is very important that superheat is set properly. It should be between 10°F and 12°F under full load conditions. Lower entering air conditions, lower airflow rates and higher condensing temperatures reduce the load on the expansion valve. Under reduced load conditions, the superheat could be

as low as 6°F to 8°F. Insufficient superheat will cause liquid floodback to the compressor and possible liquid slugging. Excessive superheat will reduce system performance and shorten compressor life. Verify that the sensing bulb is properly located (see Figure 23) and securely strapped to the refrigerant line. Turn the adjusting stem clockwise to increase superheat. Adjust the stem (maximum one turn at a time) and observe the superheat. Allow up to 30 minutes for the system to rebalance at the final setting.

Refrigerant Charge

Units are shipped with a full operating charge of refrigerant and oil. However, in the event of a leak in the system, some added charge may be required. If an undercharged situation occurs, any of the following may be experienced:

1. If a circuit is slightly undercharged, bubbles will show in the sightglass.
2. If a circuit is moderately undercharged, it may trip on its frost protection sensor.
3. If the circuit is severely undercharged, it may trip on its low pressure safety.

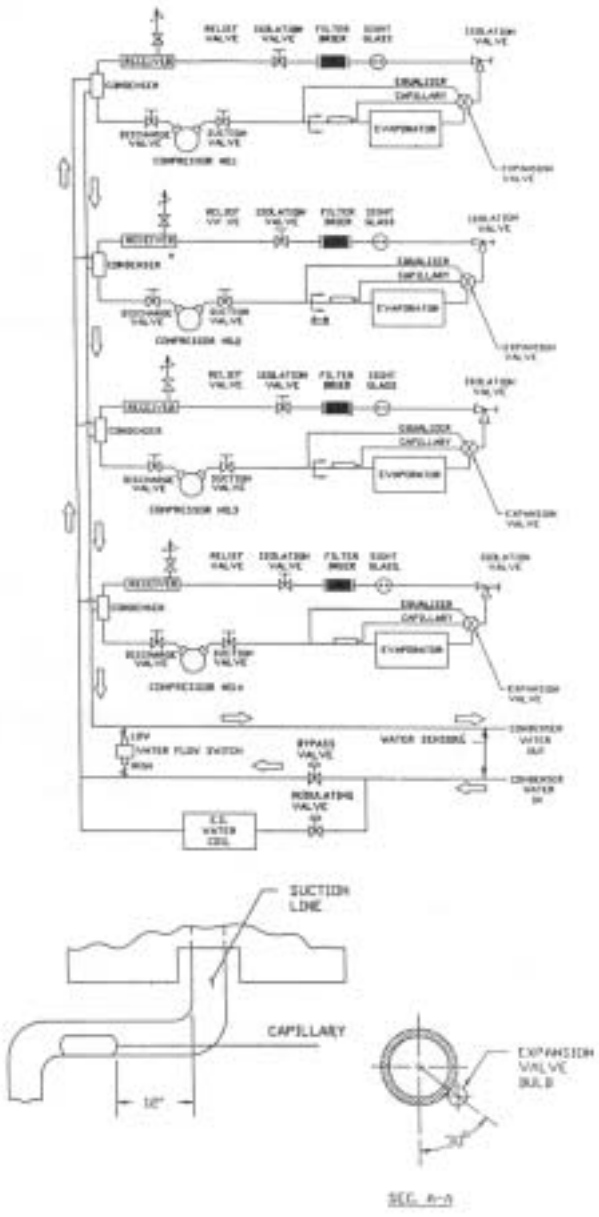
If any of these conditions occur, first identify and correct the source of the leak and then follow the charging procedure described below.

Using the liquid line sight-glass as the sole means of metering additional refrigerant charge into a self-contained unit, or any AC unit, will not always provide the desired result. Depending on the load conditions experienced by the equipment during the charging process, adding refrigerant until the sight-glass is clear of all bubbles may over charge the system and cause future operating issues. The better way to charge a circuit is to use liquid sub-cooling and suction line superheat as indicators, using the following procedure:

1. Verify that superheat is set per the System Check, Test & Start procedures in this manual.
2. Measure the discharge pressure reading and convert it to a discharge temperature.
3. Measure and record the circuit's liquid line temperature.
4. Measure and record the entering condenser water temperature using the MicroTech II display.
5. Calculate liquid subcooling: subcooling = discharge temperature - liquid line temperature
6. If the calculated subcooling value is less than 8ºF, refrigerant needs to be added.
7. Monitoring discharge pressure and liquid line temperature, add refrigerant until the discharge temperature minus the liquid line temperature is equal to 8ºF ± 2ºF. If the system is running at light load conditions, subcooling should be at the low end of the range. If the system is running near design conditions, subcooling should be near the upper end of the range.
8. Verify that superheat is still in the prescribed range.

   Following this method should prevent over charging of the circuit.

Figure 29. Water and Refrigerant Piping Schematic



Note: Water Temperature Sensor to be installed by others in field after the condenser water connections are made.

Variable air volume (VAV) start-up

Enter the duct static pressure setpoint value and parameters through the keypad:

Air/Water Flow

Duct static pressure

Ducts tsp SPT

When the appropriate number of VAV terminal boxes are opened by setting down there respective thermostats, the vanes should go to the maximum airflow. Upon closing enough VAV boxes by setting their respective thermostats up, the inlet vanes should go to the minimum airflow position.

Rpm changes

All units are provided with fixed pitch sheaves selected for the specified operating conditions. If a new fan rpm selection is required a new sheave selection will need to be field installed. Adjust belt tension as described below.

Drive sheave alignment and belt tension

Drive sheave alignment should be checked using the four-point method shown in Figure 30. When measuring from the straight edge to the belt, the dimensions A, B, C and D must be equal for correct alignment.

Check drive for adequate run-in belt tension. Use the following procedure to determine proper belt tension:

Step 1. Measure span length (t) as shown in Figure 31.

Step 2. From Figure 31, the deflection height (h) is always 1/64" per inch of span length (t). For example, a 32" span length would require a deflection of 32/64" or 1/2".

Step 3. Determine the minimum and maximum recommended pounds force using Table 14. Find the minimum recommended deflection force for the belt section and type based upon the small sheave diameter. For intermediate sheave diameters and/or drive ratio combinations, the minimum force may be interpolated.

Step 4. Using a spring scale, apply a perpendicular force to any **one** of the belts at the midpoint of the span as shown in Figure 31. Compare this value with the values found in Step 3.

a. If the value is below the minimum, the belts are too loose and should be tightened.

b.If the value is higher, the belts are too tight and tension should be decreased.

When new belts are installed, the initial tension will drop. Check tightness of all setscrews on the fan hub, bearing sleeves and retighten belts after 48 hours of operation.

Note: If after all tension adjustments, the belts slip or squeal when starting, increase tension slightly and replace the belts if they are worn or glazed.

Final control settings

When all of the start-up procedures have been completed, set the individual control parameters for operation.

1. Unit switch S7 to AUTO.
2. Heating/Cooling control parameters set as required.
3. Alarm limits set as required.
4. Night setback parameters set as required.
5. Duct static pressure, building static pressure, as required.
6. Economizer control parameters set as required.
7. Control timers set as required.
8. Date and time set as required.
9. Operating schedule set as required.
10. Holiday schedule set as required.

Note: See Operation manual per Table 1 on page 3, for the keypad menu structure.

Maintaining control parameter records

After the unit has been checked, tested and started and the final control parameters are set, the final settings should be recorded and kept on file. This file should be updated whenever changes are made to the control parameters. This will facilitate any required analysis and troubleshooting of the system operation.

Figure 30. Drive Alignment

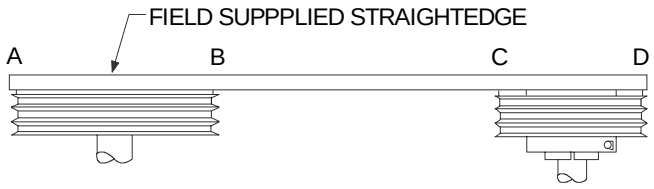


Figure 31. Belt Tension

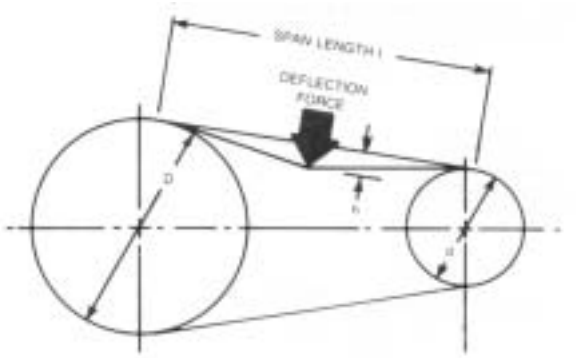


Table 15. Recommended Pounds Force Per Belt

BELT SECTION	SMALL SHEAVE DIA. (IN)	MINIMUM	MAXIMUM
A	3.0 - 3.6	3.00	4.25
	3.8 - 4.8	3.5	5.00
	5.0 - 7.0	4.00	5.50
B	3.4 - 4.2	4.00	5.50
	4.4 - 5.6	5.13	7.13
	5.8 - 8.6	6.38	8.75
BX	3.4 - 5.6	6.50	9.13
	4.4 - 5.6	6.50	9.13
	5.8 - 8.6	7.38	10.13
5VX	4.7 - 6.7	10.00	15.00
	7.1 - 10.8	12.88	18.75
	11.8 - 16.0	15.00	22.00

System Maintenance

⚠ WARNING

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and are experienced with this type of equipment.

⚠ WARNING

Moving machinery and electrical power hazards. May cause severe personal injury or death.

Disconnect and lock off power before servicing equipment.

.

⚠ CAUTION

Sharp edges are inherent to sheet metal parts, screws, clips and similar items. May cause personal injury.

Exercise caution when servicing equipment.

Preventative Maintenance

Preventative maintenance is the best way to avoid unnecessary expense and inconvenience. Have this system inspected at regular intervals by a qualified service technician. The required frequency of inspections will depend on installation and operating duty. Routine maintenance should cover the following items:

1. Tighten all belts, setscrews, and wire connections. (See table 14, page 31.)
2. Clean evaporator or economizer coils mechanically or with cold water, if necessary. Usually any fouling is only matted on the entering air face of the coil and can be removed by brushing.
3. Clean condenser and economizer tubes on a periodic basis. Condenser and economizer coils can be cleaned chemically or mechanically. Tubing should be kept clean to maintain system performance.
4. Lubricate motor and fan shaft bearings.
5. Align or replace belts as needed.
6. Replace filters as needed.
7. Check refrigerant sightglass. Check for refrigerant leaks if sightglass is not solid with steady-state full load operation of unit. (Note: A partially full sightglass is not uncommon at part load conditions. Check for proper superheat.)
8. Check for blockage of condensate drain. Clean condensate pan as needed.
9. Check power and control voltages.
10. Check running amperage.
11. Check operating temperatures and pressures.
12. Check and adjust temperature and pressure controls.
13. Check and adjust linkages.
14. Check operation of all safety controls.
15. Lubricate door latch mechanisms.

Motor Bearings

Fan motors should have grease added after every 2,000 hours of operation. Relubricate while motor is warm and at a standstill. Remove and clean upper and lower grease plugs, insert grease fitting into upper hole adding a small amount of clean grease with a low pressure gun. Run motor for five minutes before replacing plugs.

Note: Specific greasing instructions are to be found on a tag attached to the motor. If special lubrication instructions are shown on the motor nameplate, they will supersede all other instructions.

⚠ CAUTION

Bearing overheating potential. Can cause damage to the equipment.

Do not overlubricate. Use only a high grade mineral grease with a 200°F safe operating temperature. Refer to unit lubrication instruction label for specific lubricants

Replacement Parts

Description	McQuay Part Number
Zone temperature sensor with tenant override	111048101
Outside air temperature sensor	060004703
Airflow proving switch	060015801
Discharge air temperature sensor	060004702
Return air temperature sensor	060004703
Freeze stat	072502001

Filters

Unit Size	Filter Size	Qty	Part Number			
			2"-35%	4"-35%	4"-65%	4"-85%
018-028	20 x 20 20 x 25	6 2	072407703 072407704	072402303 072402304	072405703 072405704	072407603 072407604
035-040	20 x 25	10	072407704	072402304	072405704	072405704
045-055	20 x 25	12	072407704	072402304	072405704	072405704
065	20 x 20	18	072407703	072402303	072405703	072407603
070	16 x 20 20 x 25	6 12	072407701 072407704	072402301 072402304	072405701 072405704	072407601 072407604
080	20 x 20 20 x 25	3 15	072407703 072407704	072402303 072402304	072405703 072405704	072407603 072407604
095	16 x 20 20 x 25	6 15	072407701 072407704	072402301 072402304	072405701 072405704	072407601 072407604
105	16 x 20 16 x 25 20 x 25	4 1 17	072407701 072407702 072407704	072402301 072402302 072402304	072405701 072405702 072405704	072407601 072407602 072407604

Service and Warranty Procedure

In Warranty Return Material Procedure

Material may not be returned except by permission of authorized factory service personnel of McQuay International at Minneapolis, Minnesota.

A "return goods" tag will be sent to be included with the returned material. Enter the information as called for on the tag in order to expedite handling at our factories and prompt issuance of credits. All parts shall be returned to the factory designated on the return goods tag, transportation charges prepaid.

The return of the part does not constitute an order for replacement. A purchase order for the replacement part must be entered through your nearest McQuay representative. The order should include part number and description, and the model and serial numbers of the unit involved.

Following inspection of the returned part by our personnel and if it is determined that the failure is due to faulty material or workmanship, credit will be issued on customer's purchase order.

Replacement Parts

When writing to McQuay for service or replacement parts, refer to the model number, serial number, and G.O. number of the unit as stamped on the serial plate attached to the unit. For questions regarding wiring diagrams, it will be necessary to provide the number on the specific diagram. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunction and a description of the replacement parts required.

Product Warranty

McQuay International, hereinafter referred to as the "Company," warrants that it will provide, at the Company's option, either free replacement parts or free repair of component parts in the event any product manufactured by the Company and used in the United States proves defective in material or workmanship within twelve (12) months from initial start-up or eighteen (18) months from the date shipped by the Company, whichever comes first. For additional consideration, the Company warrants that for four (4) years following the initial warranty period it will provide, at the Company's option, free replacement parts for the motor-compressor, or, free replacement for any integral component of the motor-compressor which provides defective in material or workmanship. (Extended warranties for motor-compressors are not applicable unless separately purchased.)

To obtain assistance under the parts warranty or extended motor-compressor warranty, simply contact the selling agency. To obtain information or to gain factory help, contact McQuay International, Warranty Claims Department, P.O. Box 1551, Minneapolis, MN 55440; telephone (763) 553-5330.

This warranty constitutes the buyer's sole remedy. It is given in lieu of all other warranties. There is no implied warranty of merchantability or fitness for a particular purpose. In no event and under no circumstances shall the Company be liable for incidental or consequential damages, whether the theory be breach of this or any other warranty, negligence or strict tort.

This parts warranty and the optional extended warranties extend only to the original user. Of course, abuse, misuse, or alteration of the product in any manner voids the Company's warranty obligation. Neither the parts or extended warranty obligates the Company to pay any labor or service costs for removing or replacing parts, or any shipping charges. Refrigerant fluids, oils, and expendable items such as filters are not covered by this warranty.

The extended warranties apply only to integral components of the motor-compressor or heat exchanger, not to refrigerant controls, electrical controls, or mechanical controls, or to failures caused by failure of those controls.

Attached to this warranty is a requirement for equipment containing motor-compressors and/or furnaces to report start-up information. The registration form accompanying the product must be returned to McQuay International within ten (10) days of original equipment start-up. If that is not done, the date of shipment shall be presumed to be the date of start-up and the warranty shall expire twelve (12) months from that date.

No person (including any agent, salesman, dealer, or distributor) has authority to extend the Company's obligation beyond the terms of this express warranty, or to state that the performance of the product is other than that published by the Company.

Check, Test and Start Procedure Form

Compressorized Equipment Warranty Registration Form:
This form must be filled out and returned to McQuay, Warranty Department, within 10 days in order to comply with the terms of McQuay Warranty.

Check, Test and Start Procedure for SWP/SWT (Self-contained Air Conditioning Systems)

Job Name:_____ **McQuay G.O. No.:**_____

Installation Address:_____

City:_____ **State:**_____

Purchasing Contractor:_____

City:_____ **State:**_____

Unit Model No.:_____ **Serial No.:**_____
Compressor No. 1 Serial No._____ Compressor No. 2 Serial No._____
Compressor No. 3 Serial No._____ Compressor No. 4 Serial No._____
Compressor No. 5 Serial No._____ Compressor No. 6 Serial No._____
Mark N/A on all items not applying to the type of the unit. See IM Bulletin for more information. Any additional comments may be made on a separate sheet of paper and attached to this form.

INITIAL CHECK

A.	Is any shipping damage visible?	Yes	No
B.	Is unit installed level?	Yes	No
C.	Is unit positioned to provide adequate free area for service and operation?	Yes	No
D.	Are fan drives properly aligned and belts adjusted?	Yes	No
E.	Does fan turn freely?	Yes	No
F.	Tightened all setscrews on pulleys, bearings and fans?	Yes	No
G.	Have the Condenser Water Temperature Sensors been located correctly?	Yes	No
H.	Has the Installing Contractor installed the Return Air Temperature Sensor in the Return Air stream?	Yes	No
I	Has the Installing Contractor installed the high & low Static Pressure Sensor tubing in the ductwork?	Yes	No
J.	Does electrical service correspond to unit nameplate?	Yes	No
K.	Adequate disconnect and circuit protectors installed?	Yes	No
L.	Is the unit adequately grounded?	Yes	No
M.	Are all electrical power connections tight?	Yes	No
N.	Have the compressor heaters operated continuously for 24 hours prior to start up?	Yes	No
O.	Does all electrical wiring conform to unit electrical diagram?	Yes	No
P.	Does all field wiring conform to electrical diagrams?	Yes	No
Q .	Are all service valves open?	Yes	No
R.	Have all the shipping hold-down plates securing the fan frame been removed?	Yes	No
S.	Unit with ducted return, has the low side tubing for PC5 (dirty filter switch) been Installed?	Yes	No
T.	Are all the cleanout plugs installed (condenser, condensate trap & optional waterside economizer)?	Yes	No

START-UP

A. Does the unit start & perform per sequence of operation as stated in IM Bulletin? Yes No

B. Does the fan rotate in the right direction? Yes No

C. Condenser inlet water temperature Deg. F _____

D. Condenser outlet water temperature Deg. F. _____

E. Number of Compressors Operating Deg. F. _____

F. Return air temperature Deg. F. _____

G. Mixed air temperature Deg. F. _____

H. Supply air temperature Deg. F. _____

I. Compressor Readings:

Reading	Compressor #1	Compressor #2	Compressor #3	Compressor #4	Compressor #5	Compressor #6
Suction Pressure, psig						
Discharge Pressure, psig						
Superheat Setting @ TXV Bulb, Deg. F						
Compressor RLA (name plate)						
Current, Line L1, amps						
Current, Line L2, amps						
Current, Line L3, amps						

J. Electrical Heat Readings (When installed):

FLA _____ amps (nameplate)

Reading	68KW Heat, 230v or 208v Only			
	@ Contactor M11	@ Contactor M12	@ Contactor M15	@ Contactor M16
Current, Line Ll, amps				
Current, Line L2, amps				
Current, Line L3, amps				

K. Fan Motor Current Per Phase: _____ amps _____ amps _____ amps
FLA:_____ amps
Variable Frequency Drive: _____ % Speed / _____ Hertz

L. Fan Speed: _____ rpm at above frequency

M. Unit Voltage across each phase: _____ volts _____ volts _____ volts
N. Unit Current per phase: _____ amps _____ amps _____ amps

CONTROL CHECK

A. Compressor Low and High Pressure Cut-outs:

	Comp. No. 1	Comp. No. 2	Comp. No. 3	Comp. No. 4
Low Press Cut-out, psig				
Low Press Cut-in, psig				
High Press Cut-out, psig				

	Comp. No. 5	Comp. No. 6
Low Press Cut-out, psig		
Low Press Cut-in, psig		
High Press Cut-out, psig		

GENERAL

A.	Are all control lines secure to prevent excessive vibration and wear?	Yes	No
B.	Are all gauge ports shut off, valve caps and packings tight after start-up?	Yes	No
C.	Are VAV boxes set to keep a minimum airflow of 40% of design?	Yes	No
D.	Do the Economizer, Water Regulating, and Hot Water valves rotate freely?	Yes	No

Performed By:_____ Title:_____

Signature:_____ Date of Start-up: _____

RETURN COMPLETED FORM TO:

McQuay International
Warranty Department
13600 Industrial Park Boulevard
Minneapolis, MN 55441

Comments:_____

McQuay International

13600 Industrial Park Boulevard, Minneapolis, MN 55441 USA (763) 553-5330