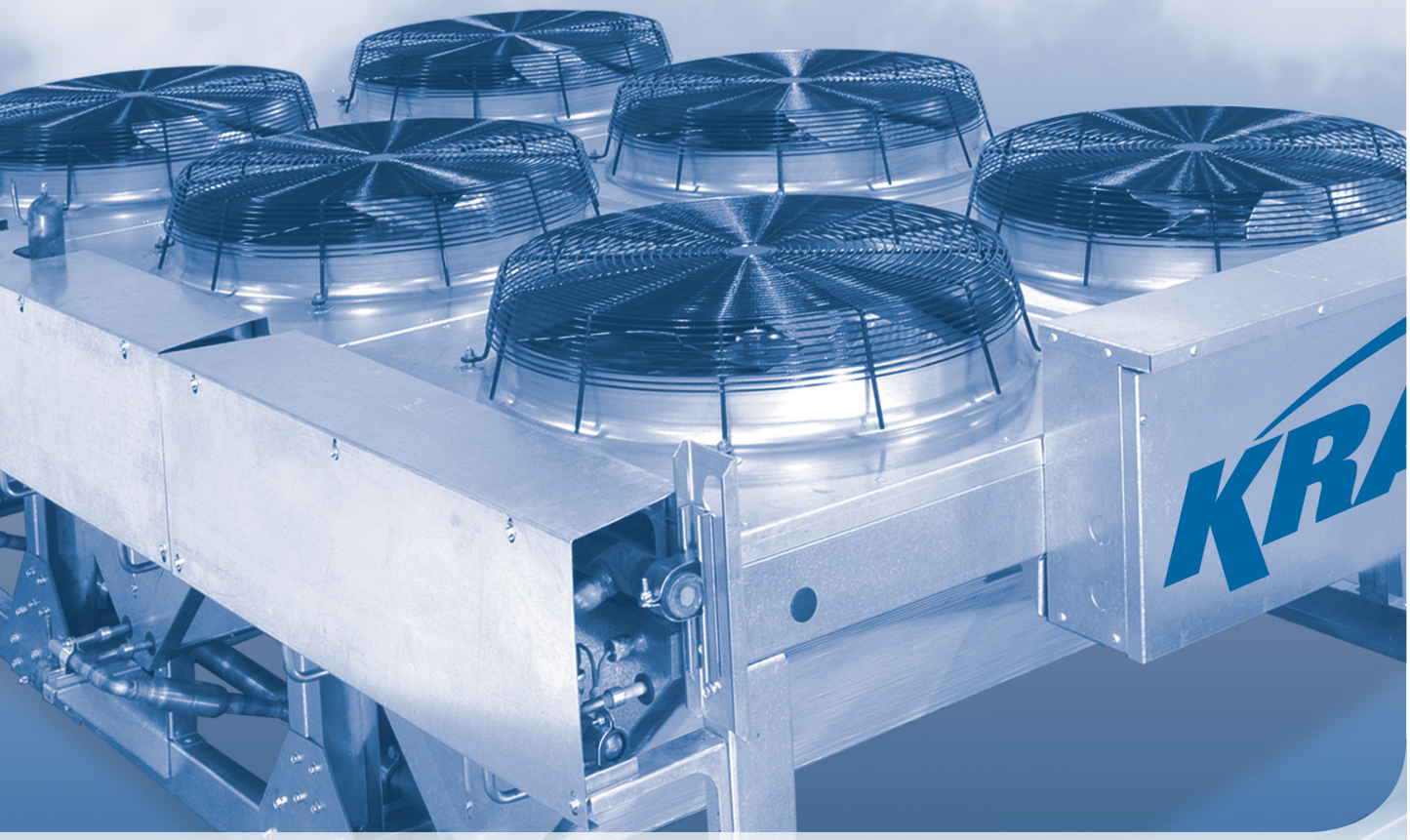
Microchannel

REMOTE AIR-COOLED CONDENSER

Technical Bulletin: MXCC_011_090523



Products that provide lasting solutions.

Microchannel Remote Air-Cooled Condenser

Krack, a Hussmann Corporation brand, has a long tradition of leadership and product innovation in the refrigeration industry.

Krack's Microchannel Remote Air-Cooled Condenser incorporates a patented modular assembly.

- Smaller size and less weight reduces cost in the building construction.
- The new coil has less internal volume resulting in a significant reduction in refrigerant charge. Less refrigerant is environmentally friendly.
- Coil slabs are easily replaced from the rear of the unit.

Environmentally Friendly Benefits

- **Reduced Coil Internal Volume -** Resulting in a significant reduction in condenser operating and flooding charge.
- **Quiet Fans -** "Swept-wing" blade design offers lower noise levels at the same speed. Quiet multi-bladed direct driven propeller fans provide uniform air distribution through the coil. Venturi fan orifices optimize efficiency. Lower noise condensers can translate into savings by minimizing the need for costly noise barriers.
- **California Energy Commission -** All Microchannel condensers are compliant with CEC Title 24 condenser efficiency requirements.
- **Vspeed Variable Speed -** Variable speed fan motors are now available as an option.

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Specifications subject to change without notice.

Microchannel Remote Air-Cooled Condenser

Benefits and Features

REMOTE AIR-COOLED CONDENSER

Patented Microchannel Condenser Modular Assembly Design (Patent #6988538)

- Arranged for vertical air discharge.
- Multi-fan sections compartmented to allow individual fan cycling while preventing off-fan "windmilling."
- Removable end panel for clean out and service access.

Corrosion Resistant

- All models employ mill galvanized steel fan sections and coil side baffles.
- Legs are heavy mill gauge galvanized steel.
- Corrosion resistance is improved with an all aluminum Microchannel coil, reducing the chance for galvanic corrosion that exists on traditional copper tube and aluminum fin coils. Additionally, the Microchannel tubes are coated with a sacrificial metallic layer that is less noble than the tube, fin, and braze material.

Vspeed Variable Speed Condenser Fan Solutions

- Krack's latest fan motor technology is now offered with a variable speed fan motor solution called Vspeed under the MXK configuration that utilizes a Brushless Permanent Motor (BPM) and panel mounted electronic drive (per motor). The electronic drive will vary the fan speeds (1140 RPM at 0 volts / 0 RPM at 10 volts) to match the loads saving more energy versus single speed fans. Fan blade configurations, mounting, and capacities are equivalent to the standard 1140 RPM motor options

COMPACT DESIGN

- Lighter weight.
  - Up to 35% weight reduction compared to traditional condenser design.
- Modular construction and fewer parts.
  - Available in 2 to 14 fan models.

PROTECTIVE COVER PANELS

Weather Resistant Fan Motors

- Outdoor condenser motors designed with ball bearings inherent overheat protection in each phase; shaft slingers; enclosure, hardware, and lubrication for all weather conditions.
- Each motor lead is wired to terminals in an electrical enclosure.
- Inverter duty suitable fan motors are standard for 230/3 and 460/3.
- Variable speed fan motors available in 230/3 and 460/3.

Versatile Fan Cycling Control Methods

- Electronic relay boards.
- Pressure fan cycling.
- Temperature fan cycling.

Replaceable High Efficiency Coil

- Extruded aluminum Microchannel coil construction increases coil efficiency, while reducing refrigerant operating charge, unit weight and footprint.
- Unit design allows for coil replacement from rear of unit.

OPTIONAL FEATURES

- Electrofin coated coils.
- Mounted receiver.
- Reusable air filter.
- Winter reduction control solenoids.
- Modular isolation ball valves.

Modular Winter Reduction Solenoid

- Maintains condenser pressure by isolating coil sections in conjunction with fan cycling.
- Reduction in coil volume results in reduced refrigerant operating and flooding charge.

Specifications subject to change without notice.

Microchannel Remote Air-Cooled Condenser

System Selections

THR - Total Heat of Rejection

- Condenser total heat of rejection (BTU/H) is the sum of the evaporator refrigeration effect and the heat of compression which varies with compressor type and operating conditions.

THR Calculation Method

- THR = Open Reciprocating Compressor Capacity (BTU/H) + (2545 x BHP)
- THR = Suction Gas Cooled Hermetic Reciprocating Compressor Capacity (BTU/H) + (3413 x kW)

THR Estimated Method

- THR may be estimated by multiplying the rated compressor BTU/H capacity by the compressor operating condition factor shown in Table 1 or 2.
  Multiply result by altitude factor when applicable.

TABLE 2

EVAPORATOR TEMP (° F)	OPEN COMPRESSOR CONDENSING TEMPERATURE (° F) 90	100	110	120	130	140
-30	1.37	1.42	1.47	*	*	*
-20	1.33	1.37	1.42	1.47	*	*
-10	1.28	1.32	1.37	1.42	1.47	*
0	1.24	1.28	1.32	1.37	1.41	1.47
10	1.21	1.24	1.28	1.32	1.36	1.42
20	1.17	1.20	1.24	1.28	1.32	1.37
30	1.14	1.17	1.20	1.24	1.27	1.32
40	1.12	1.15	1.17	1.20	1.23	1.28
50	1.09	1.12	1.14	1.17	1.20	1.24

* Beyond the normal limits for single-stage compressor application.

TABLE 1

EVAPORATOR TEMP (° F)	HERMETIC COMPRESSOR CONDENSING TEMPERATURE (° F) 90	100	110	120	130	140
-40	1.66	1.73	1.80	2.00	*	*
-30	1.57	1.62	1.68	1.80	*	*
-20	1.49	1.53	1.58	1.65	*	*
-10	1.42	1.46	1.50	1.57	1.64	*
0	1.36	1.40	1.44	1.50	1.56	1.62
5	1.33	1.37	1.41	1.46	1.52	1.59
10	1.31	1.34	1.38	1.43	1.49	1.55
15	1.28	1.32	1.35	1.40	1.46	1.52
20	1.26	1.29	1.33	1.37	1.43	1.49
25	1.24	1.27	1.31	1.35	1.40	1.45
30	1.22	1.25	1.28	1.32	1.37	1.42
40	1.18	1.21	1.24	1.27	1.31	1.35
50	1.14	1.17	1.20	1.23	1.26	1.29

* Beyond the normal limits for single-stage compressor application.

TABLE 3

ALTITUDE FEET	FACTOR	FEET	FACTOR
1,000	1.02	5,000	1.12
2,000	1.05	6,000	1.15
3,000	1.07	7,000	1.17
4,000	1.10	8,000	1.24

Model Key

MX	K	-	10	M

UNIT TYPE:
MX = Microchannel

FAN/MOTOR COMBINATION:
A = 850 RPM, 1.0 HP, 30"
C = 850 RPM, 1.5 HP, 30"
E = 575 RPM, 0.5 HP, 30"
F = 1140 RPM, 1.5 HP, 30"
K = 1140 RPM, 1.5 HP, 30"*

NUMBER OF FANS:
2 10
4 12
6 14
8

MOTOR VOLTAGE:
K = 208-230/3/60
M = 460/3/60
P = 575/3/60
U = 380/3/50**

Note:
* K Vspeed Variable Speed BPM (brushless permanent magnet motors) and panel mounted electronic drive are 208-240/3/60, 380/3/50, 380/3/60, and 460/3/60. Gravity dampers should not be used with K motor applications.

** De-rate capacity data 10% for 50 Hz applications with all motors except K (variable speed BPM motors and panel mounted drive) which have no reduction in capacity for the change in frequency.

Applications

- **Locate Condensers** no closer than their width from wall or other condensers. Avoid locations near exhaust fans, plumbing vents, flues or chimneys. Reference the IOM for other considerations for locating condensers.
- **Parallel Condensers** should be the same model resulting in the same refrigerant side pressure drops. Compressor discharge lines should have equal pressure drops to each condenser.
- **Condenser Refrigerant Charge** for Summer conditions are listed on the Performance Data Table. The additional Winter Flooding charge required is difficult to predict with fan cycling and is maximized with holdback; however, the maximum additional refrigerant charge is also listed on the Performance Data Table for Winter conditions at -20˚F. The Summer operating and Winter maximum flooding charge is substantially less than that required for traditional tube and fin condensers due to the reduced internal volume of the Microchannel coils. Further reduction in flooding charge can be obtained with the "Modular Winter Reduction" option, by "shutting down" the associated refrigerant circuit in combination with fan cycling.
- **Receiver Capacity** should be sized to store condenser winter charge.
- **Compressor Discharge** lines should be sized to minimize pressure drops and maintain oil return gas velocities. Each connection should be looped to the top of the condenser.
- **Gravity Liquid Drain Lines** should drop from each outlet as low as possible before headering or running horizontally. Pitch downhill to receiver.
- **Off-Line Coil Sections** will have refrigerant pressures corresponding to the ambient. Check valves or isolating valves should be installed in the liquid line drains to prevent refrigerant migration and receiver pressure loss.

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Performance Data

PERFORMANCE DATA

	MX MODEL	TOTAL HEAT OF REJECTION (MBH) R-404A / R-507A TEMP DIFFERENCE 10° F	15° F	20° F	R-407A, R-448A / R-449A TEMP DIFFERENCE 10° F	15° F	20° F	AIR FLOW (CFM)	SOUND dBA EST @10 FT	SUMMER CHARGE (LBS R-404A)	WINTER CHARGE (LBS R-404A)	SHIP WEIGHT (LBS)
MXF / MXK 1.5 HP 1140 RPM	MX( )-02	180.6	270.9	361.2	177.8	266.6	355.5	25,600	75	4	17	560
	MX( )-04	361.2	541.9	722.5	355.5	533.3	711.0	51,200	78	8	34	1,170
	MX( )-06	541.9	812.8	1083.7	533.3	799.9	1066.6	76,800	80	11	50	1,705
	MX( )-08	722.5	1083.7	1445.0	711.0	1066.6	1422.1	102,400	81	15	67	2,280
	MX( )-10	903.1	1354.7	1806.2	888.8	1333.2	1777.6	128,000	82	19	84	2,850
	MX( )-12	1083.7	1625.6	2167.4	1066.6	1599.8	2133.1	153,600	83	23	101	3,385
	MX( )-14	1264.3	1896.5	2528.7	1244.3	1866.5	2488.6	179,200	84	26	117	3,920
MXC 1.5 HP 850 RPM	MXC-02	168.9	253.3	337.7	164.9	247.4	329.8	22,830	68	4	17	560
	MXC-04	337.7	506.6	675.4	329.8	494.7	659.6	45,660	71	8	34	1,170
	MXC-06	506.6	759.9	1013.1	494.7	742.1	989.3	68,490	73	11	50	1,705
	MXC-08	675.4	1013.1	1350.8	659.6	989.3	1319.1	91,320	74	15	67	2,280
	MXC-10	844.3	1266.4	1688.5	824.5	1236.7	1648.9	114,150	75	19	84	2,850
	MXC-12	1013.1	1519.7	2026.2	989.3	1484.0	1978.7	136,980	76	23	101	3,385
	MXC-14	1182.0	1773.0	2363.9	1154.2	1731.4	2308.5	159,810	77	26	117	3,920
MXA 1.0 HP 850 RPM	MXA-02	160.8	241.2	321.6	155.3	233.0	310.6	20,800	66	4	17	560
	MXA-04	321.6	482.5	643.3	310.6	466.0	621.3	41,600	69	8	34	1,170
	MXA-06	482.5	723.7	964.9	466.0	698.9	931.9	62,400	71	11	50	1,705
	MXA-08	643.3	964.9	1286.6	621.3	931.9	1242.6	83,200	72	15	67	2,280
	MXA-10	804.1	1206.2	1608.2	776.6	1164.9	1553.2	104,000	73	19	84	2,850
	MXA-12	964.9	1447.4	1929.8	931.9	1397.9	1863.8	124,800	74	23	101	3,385
	MXA-14	1125.7	1688.6	2251.5	1087.2	1630.9	2174.5	145,600	75	26	117	3,920
MXE 0.5 HP 575 RPM	MXE-02	115.0	172.5	229.9	112.0	168.0	224.0	12,600	55	4	17	560
	MXE-04	229.9	344.9	459.8	224.0	335.9	447.9	25,200	58	8	34	1,170
	MXE-06	344.9	517.3	689.7	335.9	503.9	671.9	37,800	60	11	50	1,705
	MXE-08	459.8	689.7	919.6	447.9	671.9	895.8	50,400	61	15	67	2,280
	MXE-10	574.8	862.2	1149.5	559.9	839.9	1119.8	63,000	62	19	84	2,850
	MXE-12	689.7	1034.6	1379.4	671.9	1007.8	1343.8	75,600	63	23	101	3,385
	MXE-14	804.7	1207.0	1609.3	783.9	1175.8	1567.7	88,200	64	26	117	3,920

CORRECTION FACTOR FOR OTHER REFRIGERANTS

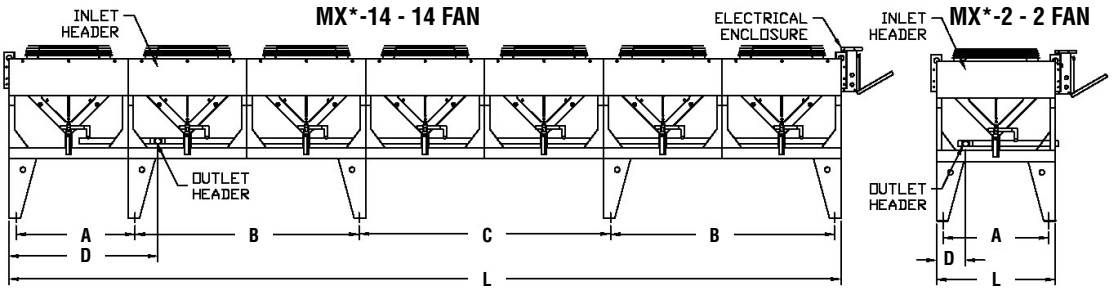
REFRIGERANT	MULTIPLY R-404A BY CAPACITY FACTOR	CHARGE CORRECTION FACTOR SUMMER	WINTER
R-404A	1.00	1.00	1.00
R-134a	0.97	1.17	1.11
R-410A	1.02	1.02	1.03
R-22	1.02	1.14	1.09
R-407A	See R-407A Chart	1.10	1.08
R-407C	0.98 x R-407A	1.09	1.07
R-448A / R-449A	See R-448A / R-449A Chart	1.06	1.04
R-513A	See R-404A / R-507A Chart	1.10	1.05

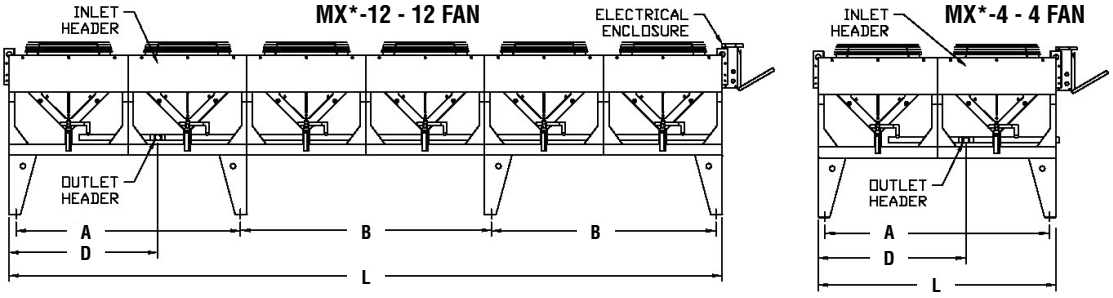
NOTE FOR ABOVE TABLE:
See Correction Factor Table to the left for refrigerant charge. CEC TITLE 24 COMPLIANT indicates condenser meets the 65 BTU/H / watt efficiency requirement. To complete the TITLE 24 compliance, fan speed must vary requiring an additional VFD and controller on fixed speed motors (F, A, C, E, and B). Krack recommends the K motor option which has variable speed capability and need only a controller to provide the 0-10 V control signal to meet the regulation. Gravity dampers should not be used with K motor applications.

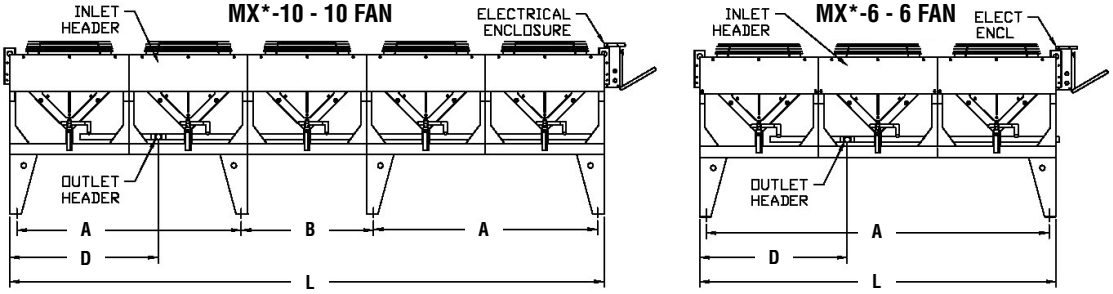
NOTE FOR TABLES TO THE LEFT:
For units using 380/3/50, multiply capacity by 0.90.

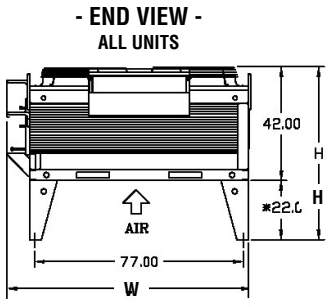
NOTE: 1. Additional winter flooding charge shown is without module isolation/reduction. 2. Ship weight includes "ship loose" leg weights. 3. Sound data is an estimate only. It can be greatly affected by surroundings.

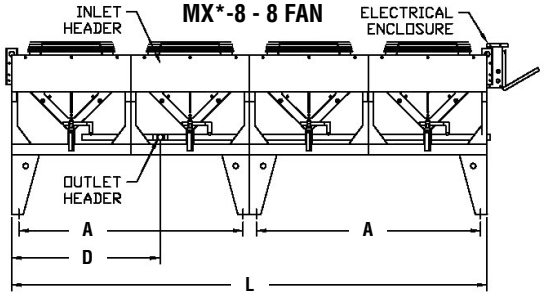
Dimensional Drawings - Standard Model









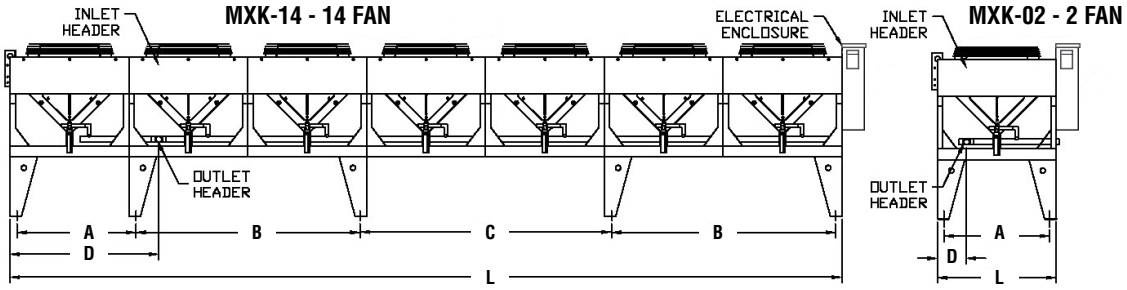


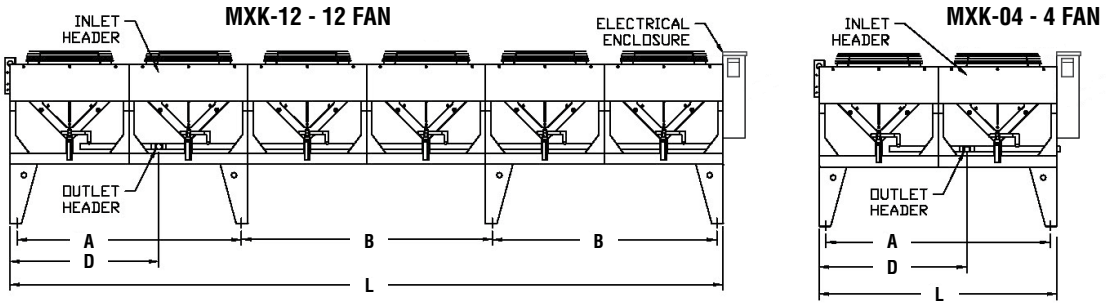
	L	W	H	A	B	C	D
MX*-02***	44	95	64	39	-	-	11
MX*-04***	88	95	64	83	-	-	55
MX*-06***	132	95	64	127	-	-	55
MX*-08***	176	95	64	83	-	-	55
MX*-10***	220	95	64	83	49	-	55
MX*-12***	264	95	64	83	93	-	55
MX*-14***	308	95	64	44	83	93	55

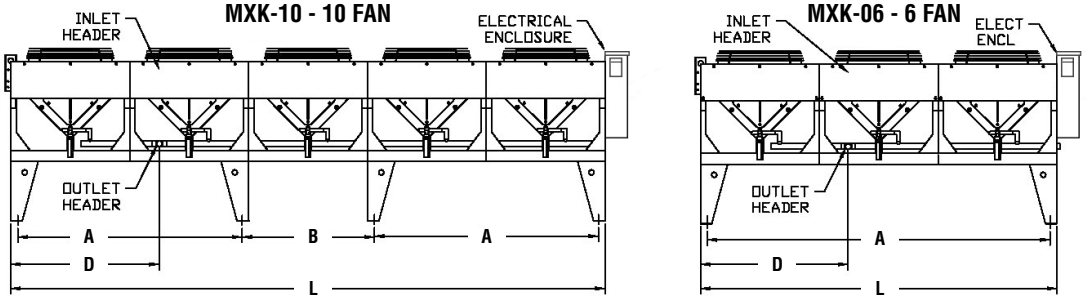
NOTE:
* Indicates fan/motor combination.
*** Indicates Rows and FPI.
'H' height value includes standard 22" legs (shipped loose).
Electrical Enclosure width is 7.87.

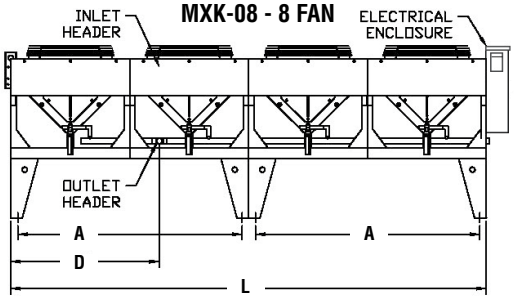
Microchannel Remote Air-Cooled Condenser

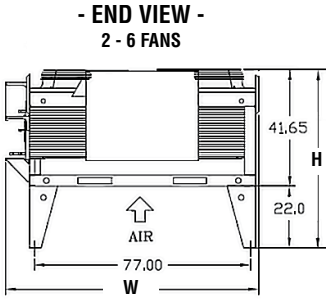
Dimensional Drawings - K Fan Motor Model

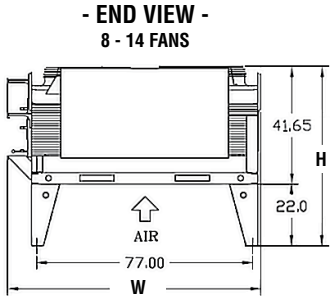








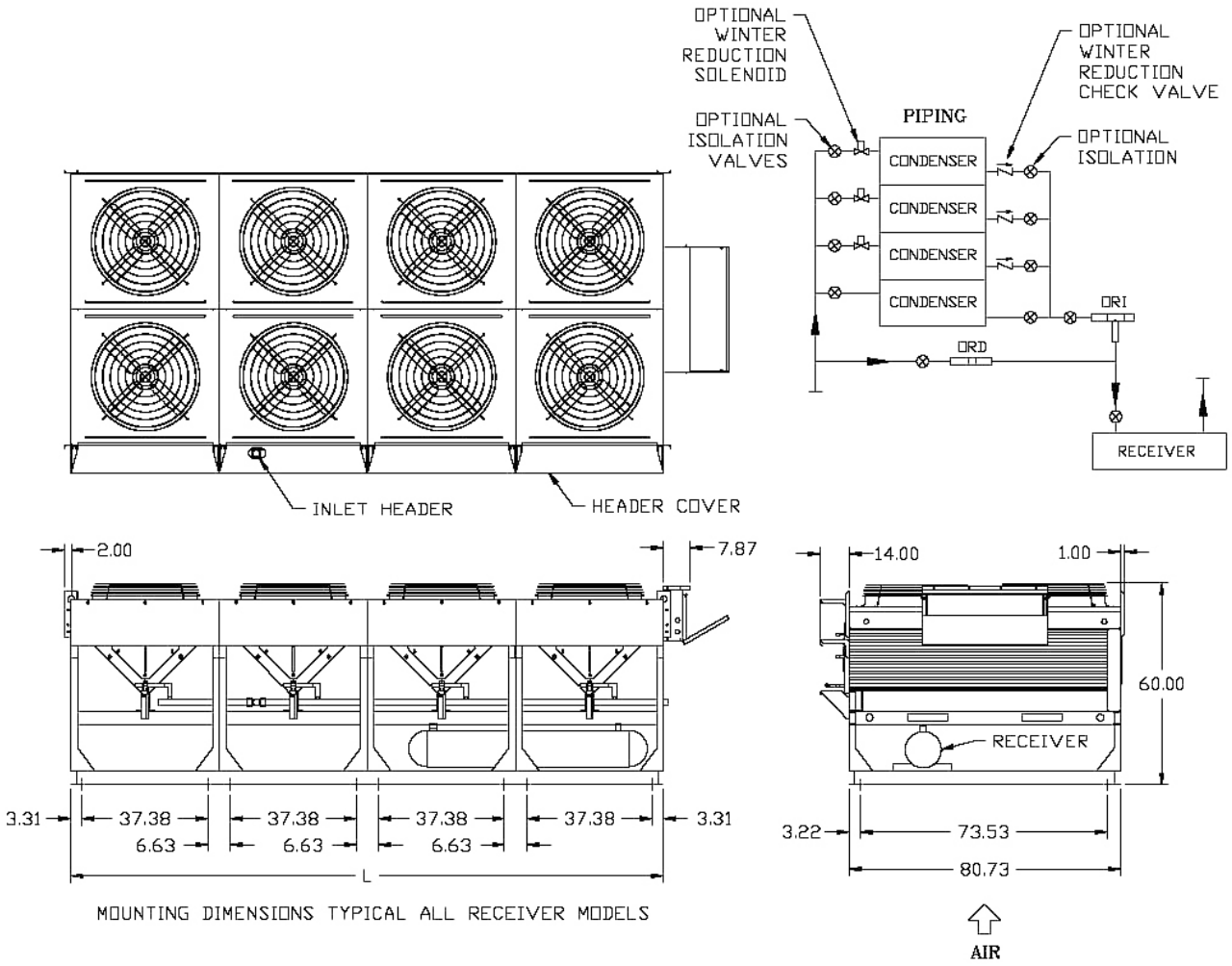




	L	W	H	A	B	C	D
MXK-02***	44	95	63.65	39	-	-	11
MXK-04***	88	95	63.65	83	-	-	55
MXK-06***	132	95	63.65	127	-	-	55
MXK-08***	176	95	63.65	83	-	-	55
MXK-10***	220	95	63.65	83	49	-	55
MXK-12***	264	95	63.65	83	93	-	55
MXK-14***	308	95	63.65	44	83	93	55

NOTE:
* Indicates fan/motor combination.
*** Indicates Rows and FPI.
'H' height value includes standard 22" legs (shipped loose).
Electrical Enclosure width is 10.75".

Dimensional Data - Receiver Model (If Applicable)



Microchannel Remote Air-Cooled Condenser

Receiver Data

Microchannel is available with a mounted receiver for applications where a remote receiver is desired. Included in the option are extended legs, receiver, 3-way valve, relief valve, rotalocks, ball valves, and ORI / ORD valves. Optional heated and insulated receivers are available.

RECEIVER CAPACITIES @ 80% FULL

SIZE	R-404A / R-507A (LBS)	R-407A (LBS)	R-40748A / R-449A (LBS)
10-3/4" x 48"	114	126	121
10-3/4" x 60"	144	159	153
12-3/4" x 72"	245	270	260
14-3/4" x 96"	395	435	419

ADDITIONAL UNIT WEIGHT

NUMBER OF FANS	NUMBER OF RECEIVERS	
	1	2
02	220	-
04	290	-
06	360	550
08	440	620
10	600	900
12	680	980
14	750	1,050

CONNECTION SIZES

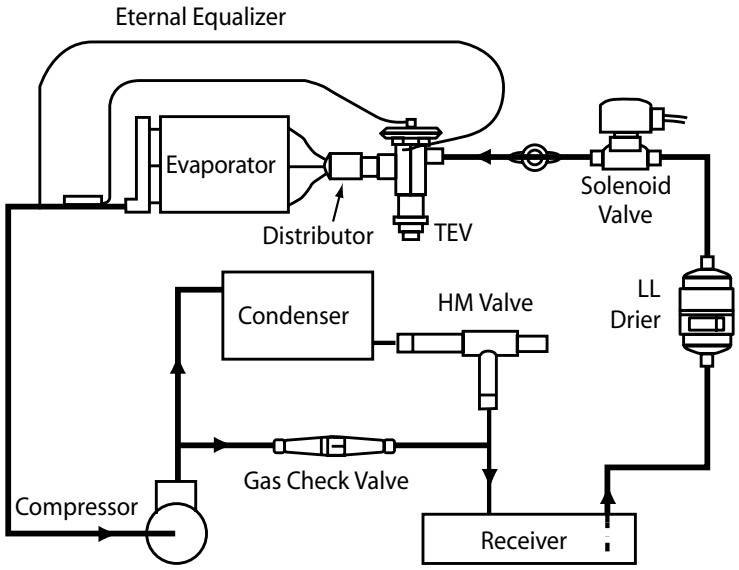
NUMBER OF FANS	INLET	OUTLET
2	1-3/8"	1-3/8"
4	1-3/8"	1-3/8"
6	2-1/8"	2-1/8"
8	2-1/8"	2-1/8"
10	2-5/8"	2-5/8"
12	3-1/8"	3-1/8"
14	3-1/8"	3-1/8"

Includes ORI / ORD flooding valve, isolation ball valves, gauge-type liquid level indicator, and dual relief valve. Optional heat tape and insulation.

FACTORY MOUNTED RECEIVERS

MICROCHANNEL MODEL	SIZE	RECEIVER SIZE
MX* FAN MODEL 1 Receiver	MX*-06	10.75" x 60"
	MX*-04	10.75" x 60"
	MX*-06	12.75" x 72"
	MX*-08	12.75" x 72"
	MX*-10	12.75" x 72"
	MX*-12	12.75" x 72"
	MX*-14	12.75" x 72"
MX* FAN MODEL 2 Receivers for Independent Slab Operation	MX*-06	(2) 10.75" x 60"
	MX*-08	(2) 10.75" x 60"
	MX*-10	(2) 12.75" x 72"
	MX*-12	(2) 12.75" x 72"
	MX*-14	(2) 12.75" x 72"

Control System



Piping Schematic for Winter Control

Head pressure control for systems with air-cooled condenser is accomplished with two pressure regulating valves designed specifically for this type of application. When low ambient conditions are encountered during winter operation on air-cooled systems with a resultant drop in condensing pressure, the Head pressure control's purpose is to hold back enough of the condenser liquid refrigerant so that some of the condenser surface is rendered inactive. This reduction of active condensing surface results in a rise in the condensing pressure and sufficient liquid line pressure for normal system operation.

Modular Winter Reduction

Maintains condenser pressure by isolating coil sections in conjunction with fan cycling. Reduction in coil volume results in reduced refrigerant operating and flooding charge.

Fan Cycling Controls

Factory installed and tested fan cycling control panels (optional, see pages 10 - 15 for details).

Microchannel Remote Air-Cooled Condenser

Electrical Motor Data

MOTOR TYPE A - 1 HP 850 RPM *(FLA, MCA MOP)*

	K - 230/3/60				U - 380/3/50				M - 460/3/60				P - 575/3/60			
MODEL	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP
2X1	9.6	12.6	13.8	20.0	4.6	6.6	7.2	15.0	4.8	6.3	6.9	15.0	3.6	4.8	5.3	15.0
2X2	19.2	22.2	23.4	30.0	9.2	11.2	11.8	15.0	9.6	11.1	11.7	15.0	7.2	8.4	8.9	15.0
2X3	28.8	31.8	33.0	40.0	13.8	15.8	16.4	20.0	14.4	15.9	16.5	20.0	10.8	12.0	12.5	15.0
2X4	38.4	41.4	42.6	60.0	18.4	20.4	21.0	30.0	19.2	20.7	21.3	30.0	14.4	15.6	16.1	20.0
2X5	48.0	51.0	52.2	70.0	23.0	25.0	25.6	35.0	24.0	25.5	26.1	35.0	18.0	19.2	19.7	25.0
2X6	57.6	60.6	61.8	80.0	27.6	29.6	30.2	40.0	28.8	30.3	30.9	40.0	21.6	22.8	23.3	30.0
2X7	67.2	70.2	71.4	90.0	32.2	34.2	34.8	45.0	33.6	35.1	35.7	45.0	25.2	26.4	26.9	35.0

MOTOR TYPE B - 0.5 HP 1140 RPM *(FLA, MCA MOP)*

	K - 230/3/60				M - 460/3/60				P - 575/3/60				A - 230/1/60			
MODEL	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP
2X1	5.0	8.0	8.6	15.0	2.6	4.1	4.4	15.0	2.0	3.2	3.5	15.0	8.4	11.4	12.5	15.0
2X2	10.0	13.0	13.6	20.0	5.2	6.7	7.0	15.0	4.0	5.2	5.5	15.0	16.8	19.8	20.9	25.0
2X3	15.0	18.0	18.6	25.0	7.8	9.3	9.6	15.0	6.0	7.2	7.5	15.0	25.2	28.2	29.3	40.0
2X4	20.0	23.0	23.6	30.0	10.4	11.9	12.2	15.0	8.0	9.2	9.5	15.0	33.6	36.6	37.7	50.0
2X5	25.0	28.0	28.6	35.0	13.0	14.5	14.8	20.0	10.0	11.2	11.5	15.0	42.0	45.0	46.1	60.0
2X6	30.0	33.0	33.6	45.0	15.6	17.1	17.4	25.0	12.0	13.2	13.5	20.0	50.4	53.4	54.5	70.0
2X7	35.0	38.0	38.6	50.0	18.2	19.7	20.0	25.0	14.0	15.2	15.5	20.0	58.8	61.8	62.9	80.0

Notes:
- Condenser Fan FLA for VFD Sizing
- Unit FLA - Number of Fans X FLA of Fan Motors + Control Circuit Amps*
- Minimum Unit Circuit Amps - 1.25 x FLA of One Motor + FLA of All Remaining Motors + (voltage-specific) Control Circuit Amps*
- Maximum Unit Overland Protection - 2.25 x FLA of One Motor + FLA of All Remaining Motors + (voltage-specific) Control Circuit Amps* (Round Down to Next Standard Breaker)

* Control Circuit amps are:
  - 208-230/3/60 – 3.0 Amps
  - 460/3/60 – 1.5 Amps
  - 575/3/60 – 1.2 Amps
  - 380/3/50 and 60 – 2.0 Amps

Electrical Motor Data

MOTOR TYPE C - 1.5 HP 850 RPM *(FLA, MCA MOP)*

	K - 230/3/60				U - 380/3/50				M - 460/3/60				P - 575/3/60			
MODEL	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP
2X1	13.8	16.8	18.5	25.0	5.8	7.8	8.5	15.0	6.6	8.1	8.9	15.0	5.0	6.2	6.8	15.0
2X2	27.6	30.6	32.3	40.0	11.6	13.6	14.3	20.0	13.2	14.7	15.5	20.0	10.0	11.2	11.8	15.0
2X3	41.4	44.4	46.1	60.0	17.4	19.4	20.1	25.0	19.8	21.3	22.1	30.0	15.0	16.2	16.8	25.0
2X4	55.2	58.2	59.9	80.0	23.2	25.2	25.9	35.0	26.4	27.9	28.7	35.0	20.0	21.2	21.8	30.0
2X5	69.0	72.0	73.7	90.0	29.0	31.0	31.7	40.0	33.0	34.5	35.3	45.0	25.0	26.2	26.8	35.0
2X6	82.8	85.8	87.5	110.0	34.8	36.8	37.5	50.0	39.6	41.1	41.9	60.0	30.0	31.2	31.8	40.0
2X7	96.6	99.6	101.3	125.0	40.6	42.6	43.3	60.0	46.2	47.7	48.5	60.0	35.0	36.2	36.8	50.0

MOTOR TYPE E - 0.5 HP 575 RPM *(FLA, MCA MOP)*

	K - 230/3/60				U - 380/3/50				M - 460/3/60				P - 575/3/60			
MODEL	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP
2X1	6.8	9.8	10.7	15.0	2.8	4.8	5.2	15.0	3.2	4.7	5.1	15.0	3.0	4.2	4.6	15.0
2X2	13.6	16.6	17.5	25.0	5.6	7.6	8.0	15.0	6.4	7.9	8.3	15.0	6.0	7.2	7.6	15.0
2X3	20.4	23.4	24.3	30.0	8.4	10.4	10.8	15.0	9.6	11.1	11.5	15.0	9.0	10.2	10.6	15.0
2X4	27.2	30.2	31.1	40.0	11.2	13.2	13.6	20.0	12.8	14.3	14.7	20.0	12.0	13.2	13.6	20.0
2X5	34.0	37.0	37.9	50.0	14.0	16.0	16.4	20.0	16.0	17.5	17.9	25.0	15.0	16.2	16.6	20.0
2X6	40.8	43.8	44.7	60.0	16.8	18.8	19.2	25.0	19.2	20.7	21.1	30.0	18.0	19.2	19.6	25.0
2X7	47.6	50.6	51.5	70.0	19.6	21.6	22.0	30.0	22.4	23.9	24.3	30.0	21.0	22.2	22.6	30.0

Notes:
- Condenser Fan FLA for VFD Sizing
- Unit FLA - Number of Fans X FLA of Fan Motors + Control Circuit Amps*
- Minimum Unit Circuit Amps - 1.25 x FLA of One Motor + FLA of All Remaining Motors + (voltage-specific) Control Circuit Amps*
- Maximum Unit Overland Protection - 2.25 x FLA of One Motor + FLA of All Remaining Motors + (voltage-specific) Control Circuit Amps* (Round Down to Next Standard Breaker)

* Control Circuit amps are:
- 208-230/3/60 – 3.0 Amps
- 460/3/60 – 1.5 Amps
- 575/3/60 – 1.2 Amps
- 380/3/50 and 60 – 2.0 Amps

Microchannel Remote Air-Cooled Condenser

Electrical Motor Data

MOTOR TYPE F - 1.5 HP 1140 RPM *(FLA, MCA MOP)*

	K - 230/3/60				U - 380/3/50				M - 460/3/60				P - 575/3/60				L - 380/3/60			
MODEL	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP
2X1	10.8	13.8	15.2	20.0	4.2	6.2	6.7	15.0	5.0	6.5	7.1	15.0	5.0	6.2	6.8	15.0	6.0	8.0	8.8	15.0
2X2	21.6	24.6	26.0	35.0	8.4	10.4	10.9	15.0	10.0	11.5	12.1	15.0	10.0	11.2	11.8	15.0	12.0	14.0	14.8	20.0
2X3	32.4	35.4	36.8	45.0	12.6	14.6	15.1	20.0	15.0	16.5	17.1	25.0	15.0	16.2	16.8	25.0	18.0	20.0	20.8	30.0
2X4	43.2	46.2	47.6	60.0	16.8	18.8	19.3	25.0	20.0	21.5	22.1	30.0	20.0	21.2	21.8	30.0	24.0	26.0	26.8	35.0
2X5	54.0	57.0	58.4	80.0	21.0	23.0	23.5	30.0	25.0	26.5	27.1	35.0	25.0	26.2	26.8	35.0	30.0	32.0	32.8	45.0
2X6	64.8	67.8	69.2	90.0	25.2	27.2	27.7	35.0	30.0	31.5	32.1	40.0	30.0	31.2	31.8	40.0	36.0	38.0	38.8	50.0
2X7	75.6	78.6	80.0	100.0	29.4	31.4	31.9	40.0	35.0	36.5	37.1	50.0	35.0	36.2	36.8	50.0	42.0	44.0	44.8	60.0

MOTOR TYPE K - 1.5 HP 1140 RPM *(FLA, MCA MOP)*

	K - 230/3/60				M - 460/3/60			
MODEL	FAN FLA	UNIT FLA	MCA	MOP	FAN FLA	UNIT FLA	MCA	MOP
2X1	10.8	13.8	15.2	20.0	6.0	7.5	8.3	15.0
2X2	21.6	24.6	26.0	35.0	12.0	13.5	14.3	20.0
2X3	32.4	35.4	36.8	45.0	18.0	19.5	20.3	25.0
2X4	43.2	46.2	47.6	60.0	24.0	25.5	26.3	35.0
2X5	54.0	57.0	58.4	80.0	30.0	31.5	32.3	40.0
2X6	64.8	67.8	69.2	90.0	36.0	37.5	38.3	50.0
2X7	75.6	78.6	80.0	100.0	42.0	43.5	44.3	60.0

Notes:
- Condenser Fan FLA for VFD Sizing
- Unit FLA - Number of Fans X FLA of Fan Motors + Control Circuit Amps*
- Minimum Unit Circuit Amps - 1.25 x FLA of One Motor + FLA of All Remaining Motors + (voltage-specific) Control Circuit Amps*
- Maximum Unit Overland Protection - 2.25 x FLA of One Motor + FLA of All Remaining Motors + (voltage-specific) Control Circuit Amps* (Round Down to Next Standard Breaker)

* Control Circuit amps are:
  - 208-230/3/60 – 3.0 Amps
  - 460/3/60 – 1.5 Amps
  - 575/3/60 – 1.2 Amps
  - 380/3/50 and 60 – 2.0 Amps

Electrical Motor Watts Data

MODEL	Motor kW
MXA	1.92
MXC	2.26
MXE	0.58
MXF	2.44
MXK	2.40

These values apply to a 230/460 volt two fan module and need to be multiplied by the approximate number of modules for larger units.

Notes

Microchannel Remote Air-Cooled Condenser

Control Panel Nomenclature

CPC	NC	B	4	1	5	N

RELAY BOARD:
- N - None
- CPC - CPC 8RO
- CPC1 - Multiflex 88
- CPC2 - Multiflex 88AO
- AKC - Danfoss 88 with AK2-XM205B (TP78-Old)*
- AKS - Danfoss 88 with AK2-XM205B (RS485)*
- DAN - Danfoss
- MTH - Microthermo 508
- MTH1 - Microthermo 722F and 784A
- NOV - Novar
- HSM - Hussmann Controller

RELAY BOARD CONTROLS:
- NC - No Controls
- PT - Pressure Fan Cycling Controls
- TF - Temp. Fan Cycling Controls
- TP - Temp. and Pressure Fan Cycling Control
- *PV - Pressure Control w/Variable Speed
- *TV - Temp. Control w/Variable Speed
- *VN - No Controls w/Variable Speed
- KB - KB Drive

CONTROL VOLTAGE:
- A - 208/230 V
- B - 115 V
- C - No Control Voltage
- D - 24 V
- E - 208/230 V without Transformer
- F - 115 V with Transformer
- H - 24 V without Transformer

CONTROL TYPE:
- 3 - Johnson Electronic
- 4 - No Controls

FUSES AND BREAKERS:
- 1 - Individual Fuses and Contactors
- 2 - Individual Circuit Breakers and Contactors
- 3 - Fuses and Contactors per Pair of Fans
- 4 - Terminal Blocks Only
- 5 - Circuit Breaker and Contactor per Pair of Fans
- 6 - Fuses per Motor
- 7 - Individual Circuit Breaker per Fan
- 8 - Individual Fuses and Contactors - H SCCR
- 9 - Per Pair Fuses and Contactors - H SCCR

TYPE OF APPLICATION:
- 1 - Standard
- 4 - No Control Operation (Terminal Blocks Only)
- 5 - Modular Winter Reduction (Four Fans or More)

AMBIENT AIR SENSOR:
- T - Ambient Air Sensor
- N - Sensor Not Required

Note:
* Controller model required to provide correct com module.
[1] Contact Application Engineering for quoting.

FUSES AND BREAKERS:
1. Only fan motor types A, C, E, and F shall be used for higher SCCR.
2. Options 8 and 9 should only be available for selection when choosing higher SCCR fan motor types A, C, E, or F.
3. Only when selected fan motor types A, C, E, or F and either Fuses and Breakers option 8 or 9 is chosen, then the default Disconnect option should be FRS Fuse and Fuse Block with the option to select a fused disconnect.

Condenser Control Panel

Fan Cycling Control Panel Arrangement

- Electronic temperature control cycles fans in response to entering air temperature. Set points and differential for each step are adjustable.
- Electronic pressure control with single point pressure transducer cycles fans in response to condenser pressure. Set points and differential for each step are adjustable..

Motors Wired to Fan Cycling Control Panel

- The fan cycling control panel for Microchannel units contains a series of pressure or temperature controllers.
- The fans cycle on and off from the signal by the pressure or temperature sensor.
- Fans cycle in pairs, starting at the control panel end of the unit. The header end fan of the first pair is continuously on when the compressor is running. The second fan in this pair cycles and will be the first-on, last-off.

Control Panel

- Standard weather resistant enclosure is mounted on the right side of the unit when looking at the headers.
- Control power is 24, 115, or 230 volts. A transformer is factory installed when required.
- Fan contactor with branch circuit fuse protection. Each motor or bank of motors protected by fuses.
- Variable speed fan motor option comes with mini drives in the control panel.

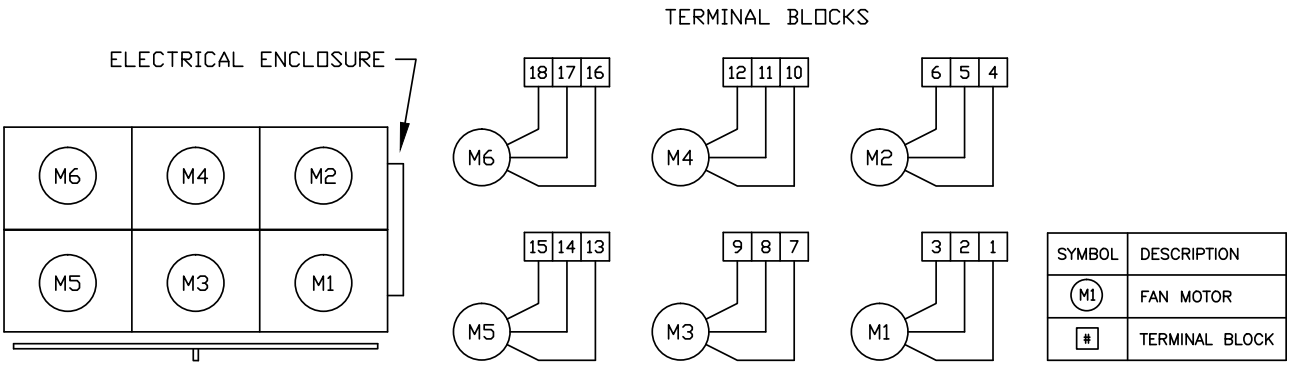
Optional Arrangements

- Fan motor contactor and fuses only.
- Fan motor contactor and fuses only which operate via a customer specified solid state board. Circuit board is factory mounted and wired.
- Modular winter reduction available on models with 4 or more fans.
- Disconnect not included, but may be required to meet local codes.

EXAMPLE WIRING DIAGRAM - TERMINAL BLOCK ONLY WIRING DIAGRAMS (NC - C444)

Motors Wired to Terminals Blocks

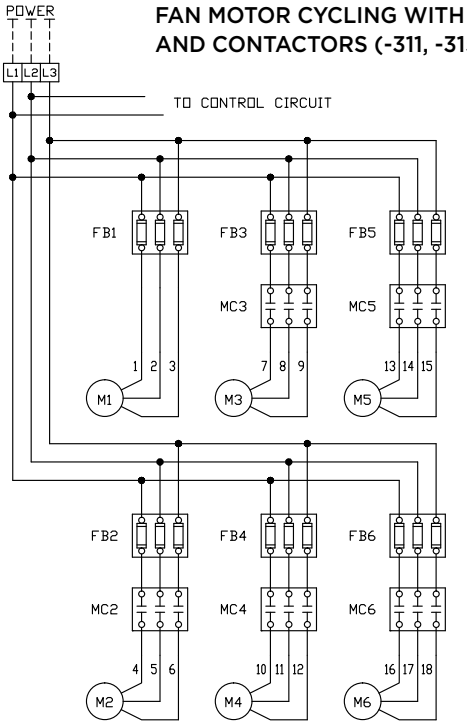
- Diagram below shows typical unit wirings to terminal blocks.
- Fan motors are turned on and off by controls outside of the unit by others.
- Fan motors M1 must be energized at all times while compressor is running.



Specifications subject to change without notice.

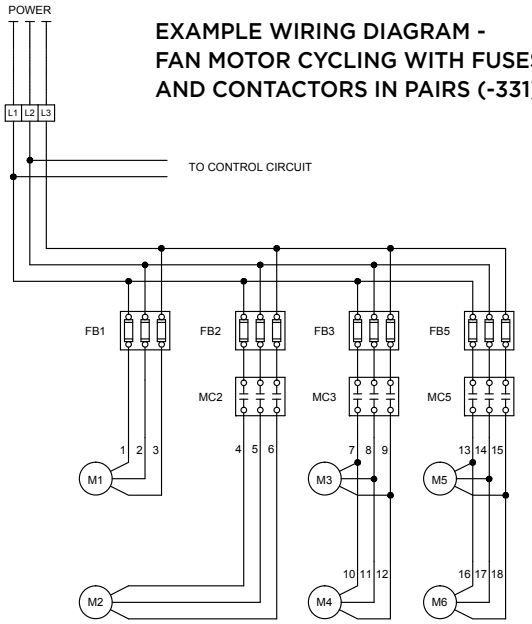
Condenser Control Panel

EXAMPLE WIRING DIAGRAM - FAN MOTOR CYCLING WITH INDIVIDUAL FUSES AND CONTACTORS (-311, -315, -411, -415)



SYMBOL	DESCRIPTION
M#	FAN MOTOR
#	TERMINAL BLOCK
MC#	MOTOR CONTACTOR
MC#	MOTOR CONTACTOR COIL
FB#	FUSE BLOCK

EXAMPLE WIRING DIAGRAM - FAN MOTOR CYCLING WITH FUSES AND CONTACTORS IN PAIRS (-331)

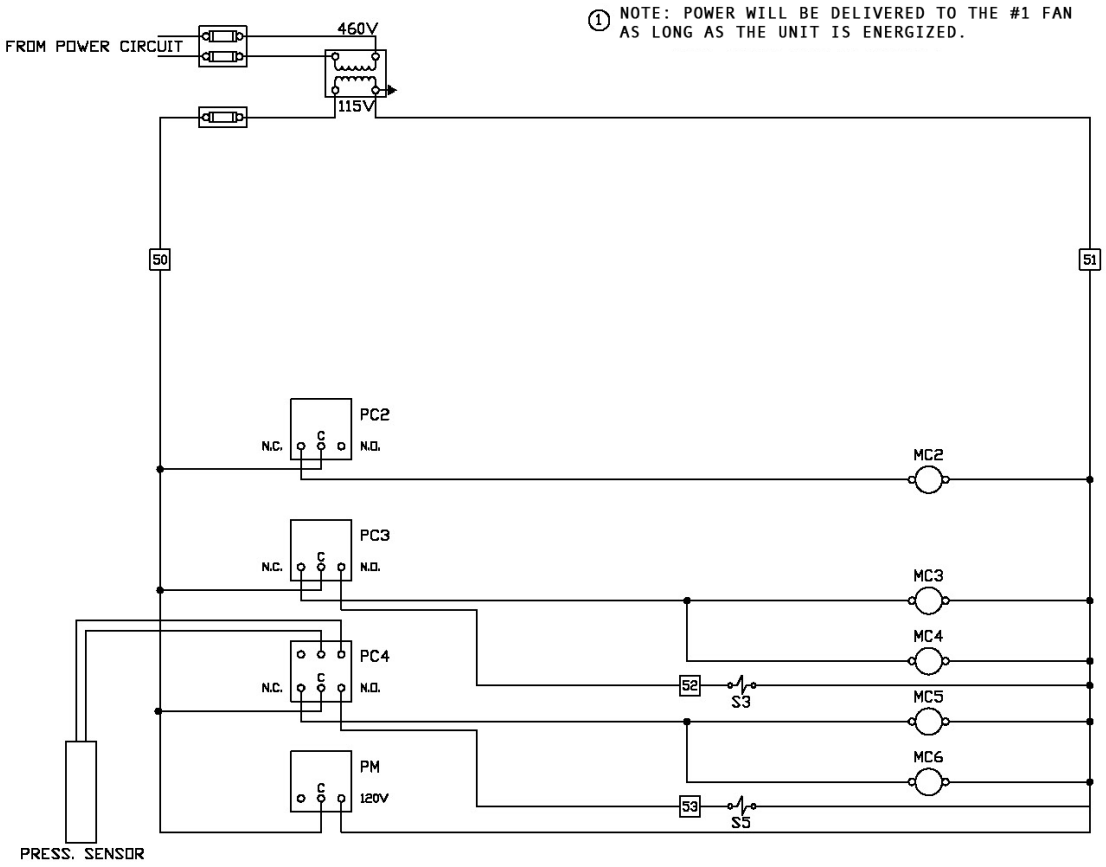


SYMBOL	DESCRIPTION
M#	FAN MOTOR
#	TERMINAL BLOCK
MC#	MOTOR CONTACTOR
MC#	MOTOR CONTACTOR COIL
FB#	FUSE BLOCK
	TRANSFORMER

Condenser Control Panel

EXAMPLE WIRING DIAGRAM -
CONTROL CIRCUIT WIRING DIAGRAM (-XX5)

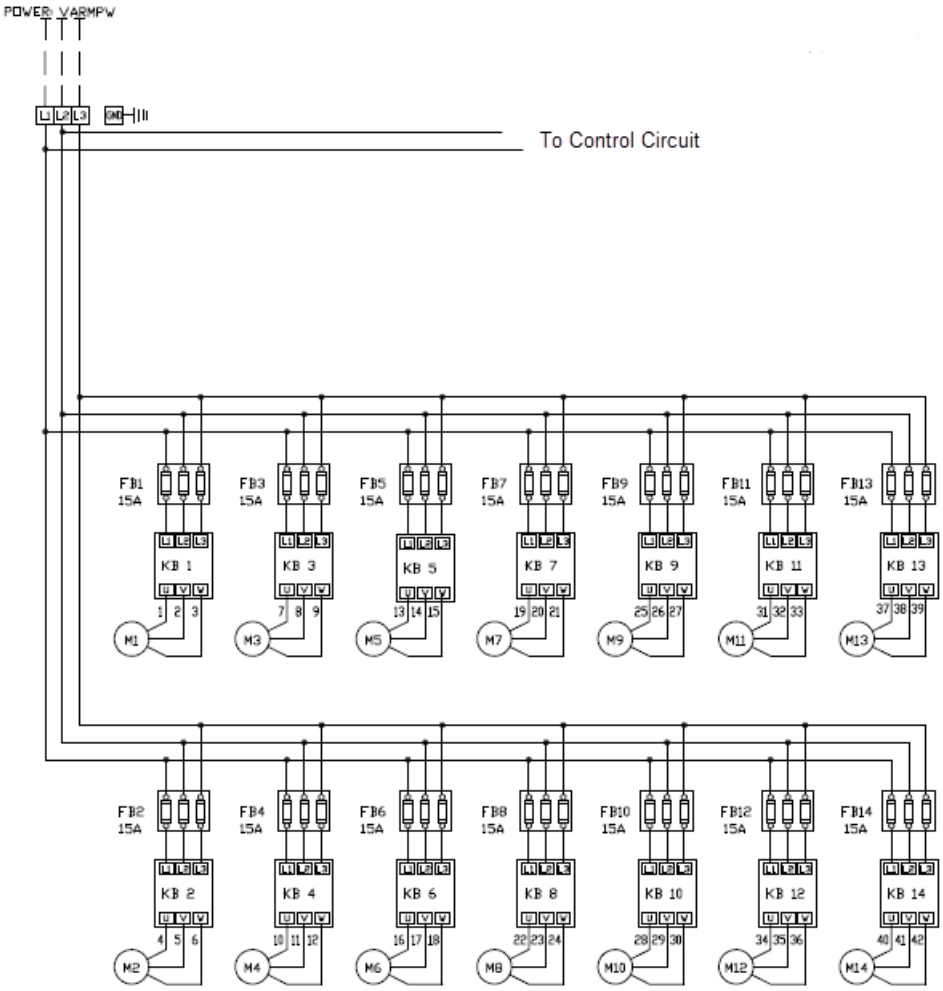
Optional Winter Reduction Solenoids shown.



SYMBOL	DESCRIPTION
	FUSE BLOCK
	TRANSFORMER
#	TERMINAL BLOCK
MC#	MOTOR CONTACTOR COIL
N.C. PC# N.O.	PRESSURE CONTROL MODULE P352AB-1
N.C. PC# N.O.	PRESSURE CONTROL STAGE MODULE S352AA-1
240V PM 120V	POWER MODULE Y350R-1
S#	OPTIONAL MODULAR WINTER REDUCTION

Condenser Control Panel - K Fan Motor Model

EXAMPLE WIRING DIAGRAM -
K FAN MOTOR WIRING DIAGRAM



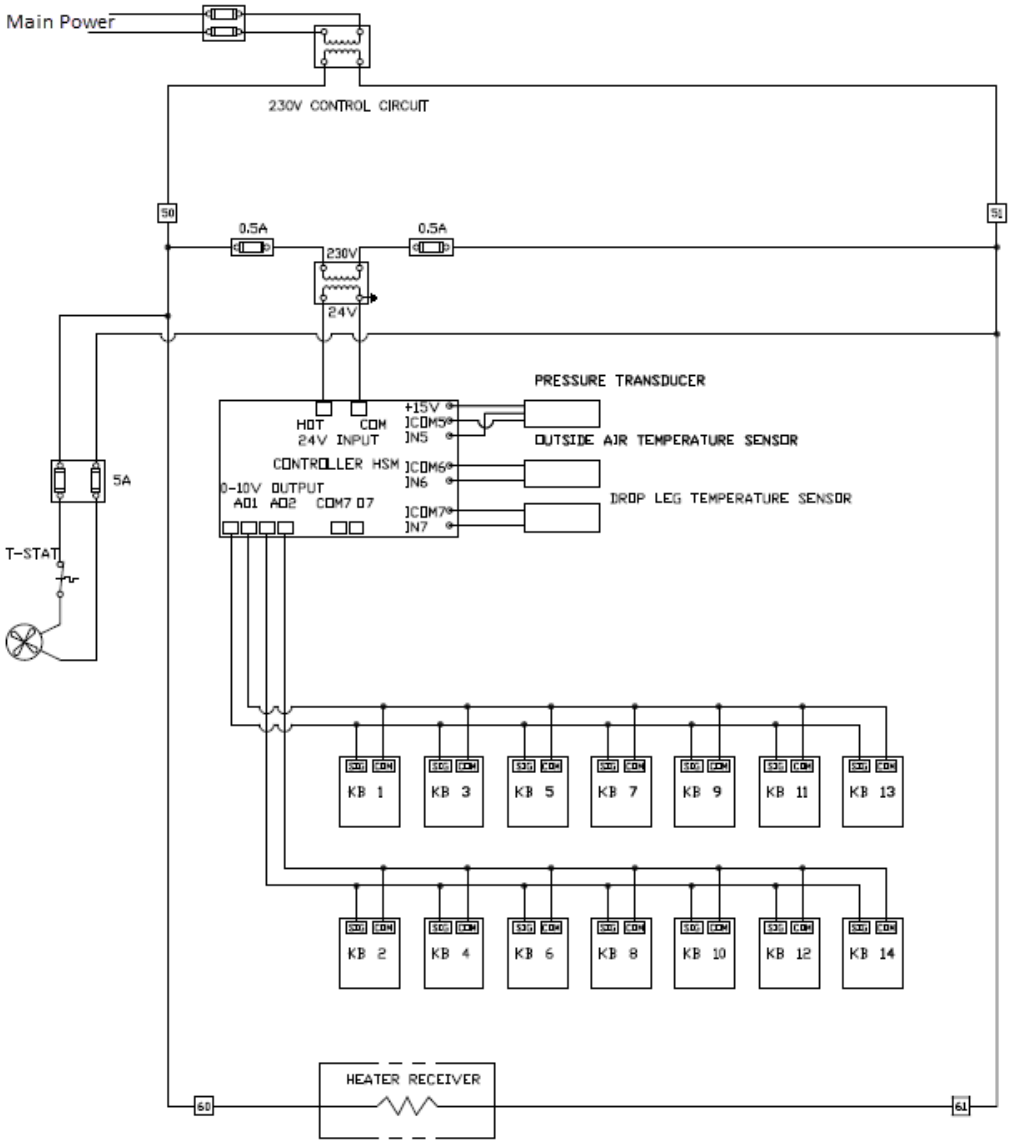
LEGEND:

SYMBOL	DESCRIPTION
	FAN MOTOR
	TERMINAL BLOCK
	FUSE BLOCK
	TRANSFORMER
	KB DRIVE POWER SIDE
	KB DRIVE CONTROL SIDE

Condenser Control Panel - K Fan Motor Model

EXAMPLE WIRING DIAGRAM -
K FAN MOTOR HUSSMANN CONTROLLER WIRING DIAGRAM

Model is also available with CPC / Multiflex IO board 810-3063 88AO, DANFOSS MCX06D and MicroThermo MT-700 series.



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Notes

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