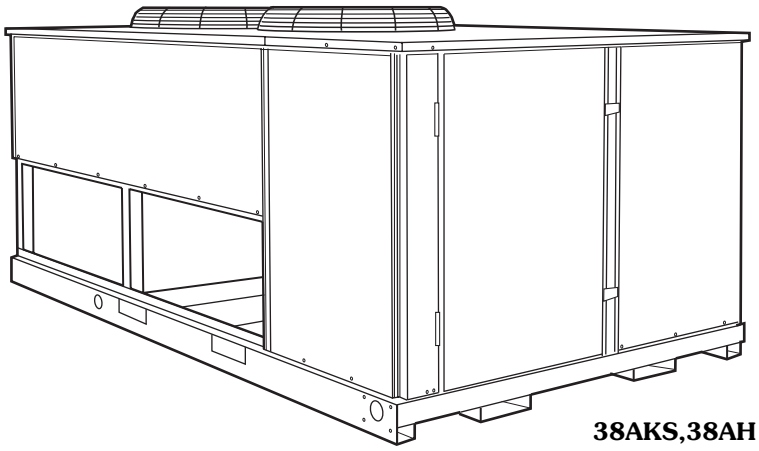
Carrier

Product Data

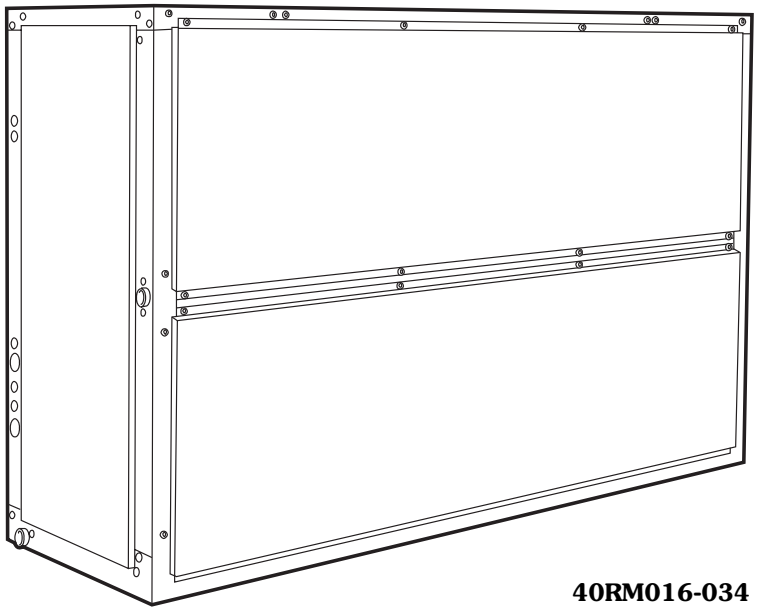
GEMINI™
38AKS028-044
38AH024-034
With 40RM016-034
Commercial Air-Cooled Split Systems

20 to 40 Nominal Tons

Carrier GEMINI SPLIT SYSTEMS



38AKS,38AH



40RM016-034

ASHRAE 90.1 COMPLIANT

These dependable split systems match Carrier's indoor-air handlers with outdoor condensing units for a wide selection of commercial cooling solutions.

Features/Benefits

Building owners will appreciate the high unit EERs (Energy Efficiency Ratios) offered by the 38AKS and 38AH units. These units provide greater efficiency than similar units in the marketplace, which translates into year-round operating savings. Latest safety standards for 38AKS and 38AH units are assured through UL and UL, Canada approvals.

Constructed for long life

The 38AKS and 38AH units are designed and built to last. Cabinets are constructed of pre-painted galvanized steel, delivering unparalleled protection against the environment. Inside and outside surfaces are protected to ensure long life, good looks and reliable performance. The copper tube-aluminum fin outdoor coil construction provides long term reliability and improved heat transfer. Where conditions require them, copper fin coils are available. For corrosive or coastal environments an epoxy barrier is available to provide superior coil durability.

Reliability

The 38AKS and 38AH condensing units offer the building owner components and operating controls designed for performance dependability. These condensing units feature the time proven highly reliable 06D and 06E

compressors. Unloading capability for superior part load performance is a standard feature of these compressors.

The compressor mounting system has vibration isolation to provide quiet operation and reduce component stress.

Each compressor is equipped with a crankcase heater to eliminate the occurrence of liquid slugging at start-up. The compressors also include an oil level sight glass for maintenance ease.

The following safety features are included in each unit:

- Anti short cycling control
- Low oil pressure safety
- Low refrigerant pressure safety
- High refrigerant pressure safety
- Calibrated circuit breakers

38AH series

38AH condensing units feature 2 compressors and 2 refrigeration circuits. These units can be matched with a single air handler or two separate air handlers.

Standard units are designed for constant volume control. A variable air volume (VAV) control is available as a factory installed option. The VAV units feature electrically controlled compressor unloading to precisely match unit capacity to building loads. The VAV equipped unit has a simple control interface for connection to a VAV discharge air control system.

Ease of installation and service

These units are equipped with hinged control box access panels, control interface terminal boards, liquid line shut off valves and compressor service valves.

Innovative Carrier 40RM air-handling units — ideal matches for 38AKS and 38AH condensing units

The 40RM Series has excellent fan performance, efficient direct-expansion (DX) coils, a unique combination of indoor air quality features, and easy installation. Its versatility and state-of-the-art features help to ensure that your split system provides economical performance now and in the future.

Indoor-air quality (IAQ) features

The unique combination of IAQ features in the 40RM Series air handlers helps to make sure that only clean, fresh, conditioned air is delivered to the occupied space.

Direct-expansion (DX) cooling coils prevent the build-up of humidity in the room, even during part-load conditions. The 40RM016-034 sizes feature dual-circuit coils.

Standard 2-in. disposable filters remove dust and airborne particles from the occupied space.

The pitched PVC drain pan can be adjusted for a right-hand or left-hand connection to provide positive drainage and to prevent standing condensate.

The 40RM accessory economizer can provide ventilation air to improve indoor-air quality. When used with CO_2 sensors, the economizer admits fresh outdoor air to replace stale, recirculated indoor air.

Economy

The 40RM Series packaged air handlers have low initial costs, and they continue to save money by providing reduced installation expense and energy-efficient performance.

Quick installation is ensured by the multipoise design. Units can be installed in either the horizontal or vertical configuration without modifications. All units have drain-pan connections on both sides, and pans can be pitched for right-hand or left-hand operation with a simple adjustment. Fan motors and contactors are prewired and thermostatic expansion valves (TXVs) are factory-installed on all 40RM models.

High efficiency, precision-balanced fans minimize air turbulence, surging, and unbalanced operation, cutting operating expenses.

The economizer accessory precisely controls the blend of outdoor air and room air to achieve comfort levels. When the outside air enthalpy is suitable, outside air dampers can fully open to provide "free" cooling.

Rugged dependability

40RM units are made to last. The die-formed galvanized steel panels ensure structural integrity under all operating conditions. Galvanized steel fan housings are securely mounted to a die-formed galvanized steel deck. Mechanically bonded coil fins provide improved heat transfer. Rugged pillow-block bearings are securely fastened to the solid steel fan shaft with split collets and clamp locking devices.

Coil flexibility

Model 40RM direct-expansion coils have galvanized steel casings; inlet and outlet connections are on the same end. The coils are designed for use with Refrigerant 22 and have $^3/_8$-in. diameter copper tubes mechanically bonded to aluminum sine-wave fins. The coils include matched, factory-installed TXVs with matching distributor nozzles. Accessory hot water and steam coils and electric heaters are also available.

Easier installation and service

The multipoise design and component layout help you to get the unit installed and running quickly. The DX coils have factory-installed TXVs with matching distributor nozzles. Units can be converted from horizontal to vertical operation by simply repositioning the unit. Drain pan connections are duplicated on both sides of the unit. The filters, motor drive, TXVs, and coil connections are all easily accessed by removing a single side panel.

ARI* capacity ratings

CONDENSING UNIT	AIR HANDLER/ INDOOR COIL	SYSTEM†			CONDENSING UNIT ONLY**		
		Net Capacity (Btuh)	EER	IPLV	Net Capacity (Btuh)	EER	IPLV
38AKS028	40RM024H 40RM028H 40RM034H	282,000 300,000 316,000	8.8 9.0 8.9	11.0 11.2 11.0	330,000	10.2	12.1
38AKS034	40RM028H 40RM034H	332,000 345,000	8.6 8.8	10.6 10.6	370,000	10.1	13.1
38AKS044††	—	—	—	—	506,000	10.1	13.0
38AH024	40RM016H 40RM024H 40RM028H	222,000 240,000 250,000	9.8 9.6 10.2	9.4 9.7 10.3	250,000	11.7	13.7
38AH028	40RM024H 40RM028H 40RM034H	268,000 282,000 290,000	9.4 9.6 9.4	9.5 9.5 9.3	290,000	11.2	12.9
38AH034	40RM028H 40RM034H	324,000 332,000	9.4 9.5	9.2 8.9	344,000	11.1	12.9

LEGEND

EER — Energy Efficiency Ratio
IPLV — Integrated Part Load Value
SST — Saturated Suction Temperature

*Air Conditioning and Refrigeration Institute.
†Ratings in accordance with ARI Standard 360/365.
**Condensing unit only ratings are at 45 F SST and 95 F entering-air temperature.
††38AKS044 units combine with 39 series air handlers. For capacity ratings on these units refer to ***AHU*Builder®** software.

38AKS028-044, 38AH024-034 SOUND LEVELS, dB

UNIT	OCTAVE BAND								
	63	125	250	500	1000	2000	4000	8000	dBA
38AKS028	95	95	93	90	89	84	82	81	93.5
38AKS034	96	96	94	91	90	85	83	83	94.6
38AKS044	99	99	96	93	92	88	86	86	96.9
38AH024	95	95	93	90	89	84	82	81	93.5
38AH028	95	95	93	90	89	84	82	81	93.5
38AH034	96	96	94	91	90	85	83	83	94.6

NOTES:
1. Estimated sound power levels, dB re 1 Picowatt.
2. This data is based upon a limited amount of actual testing with the estimated sound power data being generated from this data in accordance with ARI standard 370 for large outdoor refrigerating and air-conditioning equipment.
3. Since this data is estimated, the sound power levels should not be guaranteed or certified as being the actual sound power levels.
4. The acoustic center of the unit is located at the geometric center of the unit.

40RM016-034 ESTIMATED SOUND POWER LEVELS (Lw)

UNIT	CFM	dB(A)	OCTAVE BAND CENTER FREQUENCY						
			63	125	250	500	1000	2000	4000
40RM016	6,000	92.7	98.9	94.9	90.9	91.9	85.9	83.9	79.9
40RM024	8,000	96.4	102.6	98.6	94.6	95.6	89.6	87.6	83.6
40RM028	10,000	96.2	102.5	98.5	94.5	95.5	89.5	87.5	83.5
40RM034	12,000	98.5	104.7	100.7	96.7	97.7	91.7	89.7	85.7

NOTE: Since this data is calculated, these sound power levels may be different than the actual sound power levels. The accoustic center of the unit is located at geometric center of the unit.

Table of contents

Options and accessories

38AKS, 38AH factory-installed options

***Enviro-Shield*™ condenser options** are available to match coil protection to site conditions for optimum durability. See table below and refer to the Application Data for selection guidance. Consult your Carrier representative for further information.

VAV option (38AH only) provides unit with 2 electric unloaders and control box modifications necessary to connect to a field-installed VAV controller.

38AKS, 38AH field-installed accessories

Electric unloader package includes hardware and solenoid valve to convert a pressure-operated unloader to electric unloading.

–20 F low-ambient temperature kit (Motormaster®) controls outdoor-fan motor operation to maintain the correct head pressure at low outdoor ambient temperatures. Only one low ambient temperature kit is required per unit.

Gage panel package provides a suction and a discharge pressure gage for the refrigerant circuit.

VAV controller allows systems to operate as VAV (variable air volume) systems. Includes microprocessor, satellite sequencer, 4 status lights, 5-hour bypass timer, and locked enclosure.

Hot-gas bypass kit (38AKS) prevents the indoor coil from freezing up during low airflow or low return-air temperature applications by maintaining minimum suction pressure.

Carrier's line of thermostats provide both programmable and non-programmable capability with the new **Debonair®** line of commercial programmable thermostats, the **Commercial Electronic** thermostats provide 7-day programmable capability for economical applications.

PremierLink™ controller is a field retrofit split system control compatible with the Carrier Comfort Network (CCN) and other building automation systems (BAS). This control is designed to allow users the access and ability to change factory-defined settings thus expanding the function of the standard unit.

Part-winding-start timing relay (38AKS) reduces inrush current and locked rotor amps on start-up. This accessory may require a special-order unit. See table below.

PART-WINDING-START TABLE

UNIT SIZE 38AKS	VOLTAGE (60 Hz)			
	208/230	380	460	575
028 034 044	Note 1	Note 2	Note 3	Note 2

NOTES:
1. Can be field modified to part winding start by adding a time delay relay (part no. HN67ZA001).
2. Requires **special order** to change circuit breakers and contactors.
3. Requires **special order** to change circuit breakers and contactors, and cannot use triple-voltage compressor.

CONDENSER COIL OPTIONS

COPPER-TUBE COILS WITH *ENVIRO-SHIELD* OPTION*	ENVIRONMENT					
	Standard	Mild Coastal	Moderate Coastal	Severe Coastal	Industrial	Combined Industrial/Coastal
Al Fins (Standard Coils)	X					
Cu Fins			X			
Al Fins, E-Coating					X	
Cu Fins, E-Coating				X		X
Al Fins, Pre-coated		X				

LEGEND

Al — Aluminum
Cu — Copper
Enviro-Shield — Family of Coil Protection Options
E-Coated — Epoxy coating Applied to Entire Coil Assembly
Pre-Coated — Epoxy coating Applied to Fin Stock Material

*See "Selection Guide: Environmental Corrosion Protection" Catalog No. 811-287 for more information.

Options and accessories (cont)

40RM factory-installed options

Prepainted steel units are available from the factory for applications that require painted units. Units are painted with American Sterling Gray color.

High-capacity 4-row coils are available to provide increased latent/sensible capacities and efficiencies.

Alternate fan motors and drives are available to provide the widest possible range of performance.

40RM field-installed accessories

Discharge plenum directs the air discharge directly into the occupied space; integral horizontal and vertical louvers enable redirection of airflow. Accessory is available unpainted or painted.

Two-row hot water coils have $^{5}/_{8}$-in. diameter copper tubes mechanically bonded to aluminum plate fins. Coils have non-ferrous headers.

One-row steam coil has 1-in. OD copper tube and aluminum fins. The Inner Distributing Tube (IDT) design provides uniform temperatures across the coil face. The steam coil has a broad operating pressure range; up to 20 psig at 260 F. IDT steam coils are especially suited to applications where sub-freezing air enters the unit.

Electric resistance heat coils have an open-wire design and are mounted in a rigid frame. Safety cutouts for high temperature conditions are standard.

Economizer (enthalpy controlled) provides ventilation air and "free" cooling if outside ambient temperature and humidity are suitable. Can also be used with CO_2 sensors to help meet indoor air quality requirements.

Return-air grille provides a protective barrier over the return-air opening and gives a finished appearance to units installed in the occupied space. Accessory is available unpainted or painted.

Subbase provides a stable, raised platform and room for condensate drain connection for floor-mounted units. Accessory is available unpainted or painted.

Overhead suspension package includes necessary brackets to support units in horizontal ceiling installations.

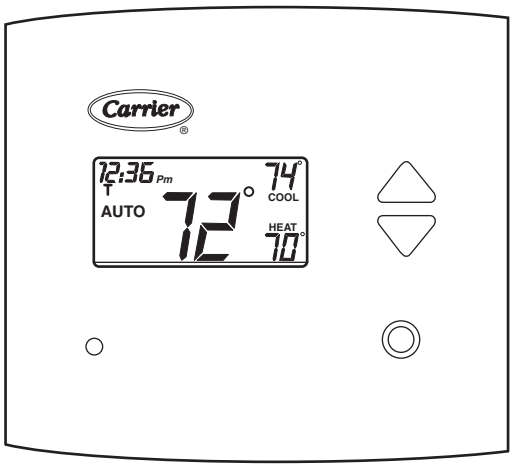
CO_2 sensors can be used in conjunction with the economizer accessory to help meet indoor air quality requirements. The sensor signals the economizer to open when the CO_2 level in the space exceeds the set point. A Carrier Comfort System programmable thermostat can also be used to override the sensor if the outside air temperature is too high or too low.

Condensate drain trap includes an overflow shutoff switch that can be wired to turn off the unit if the trap becomes plugged. The kit also includes a wire harness that can be connected to an alarm if desired. The transparent trap is designed for easy service and maintenance.

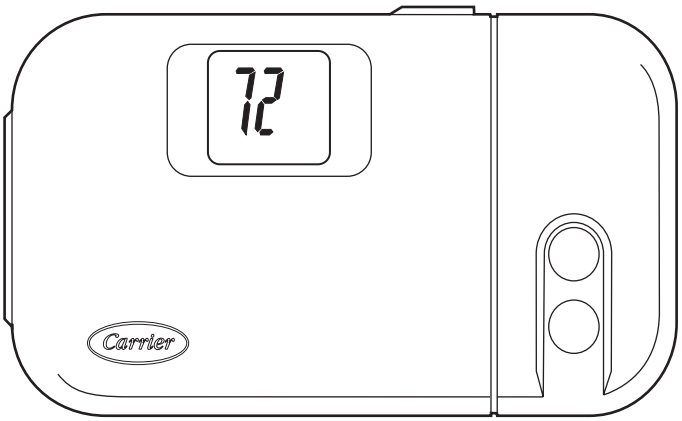
UV-C germicidal lamps kill mold and fungus, which may grow on evaporator coil and condensate pan surfaces. The use of UV-C germicidal lamps eliminates the foul odors that result from this growth of mold and fungus. It also provides a self-cleaning function for the evaporator coil and drain pan.

CARRIER CONTROLS

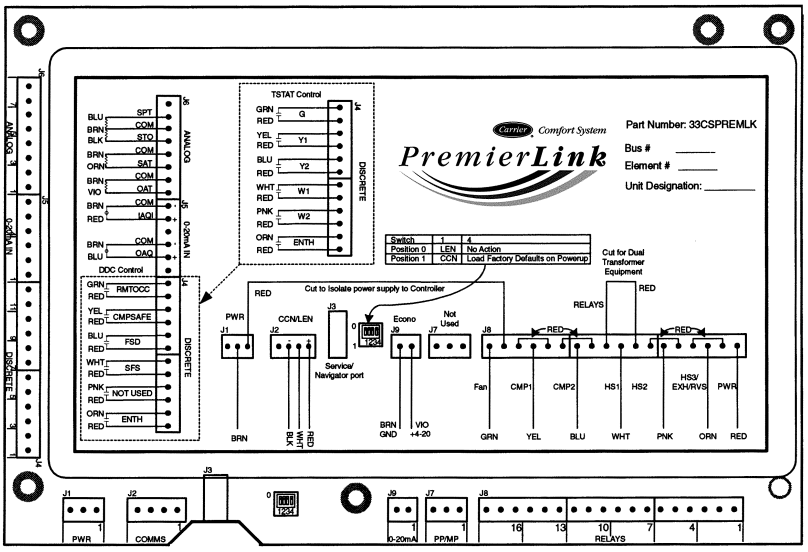
DEBONAIR® COMMERCIAL PROGRAMMABLE THERMOSTAT



COMMERCIAL ELECTRONIC THERMOSTAT

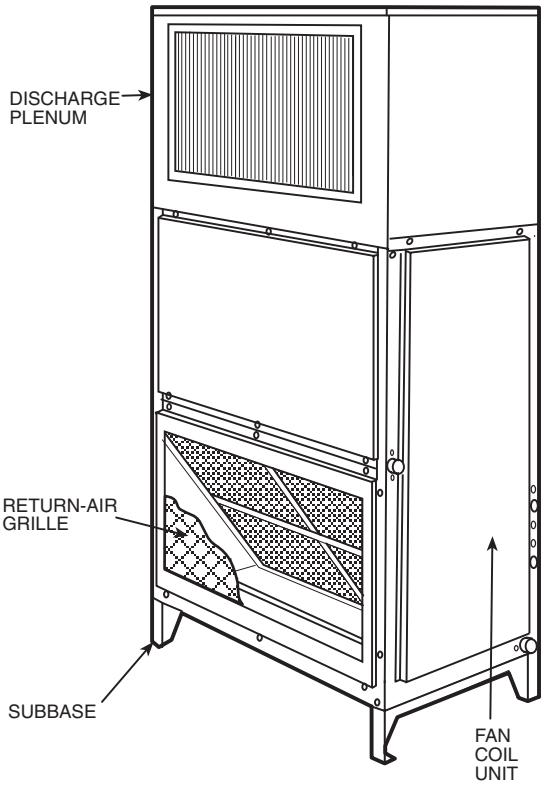


PREMIERLINK™ COMMUNICATING CONTROLS



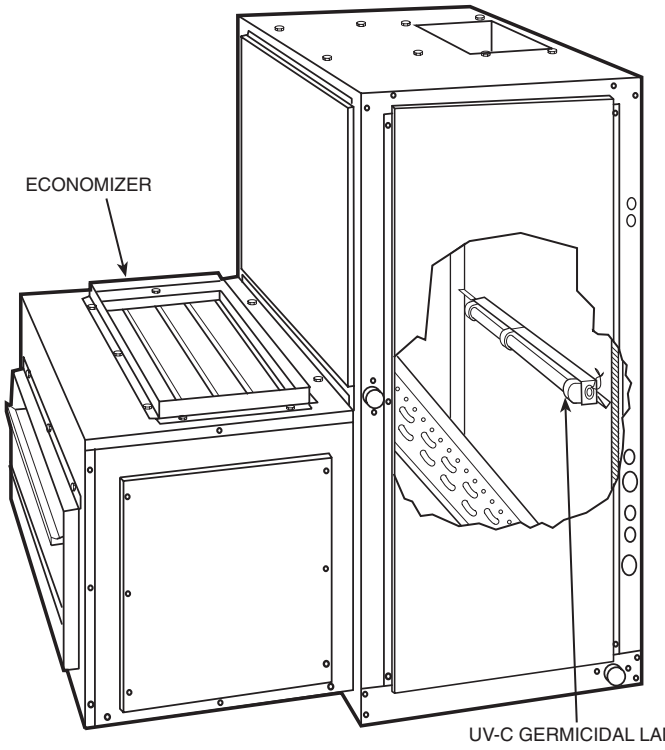
Options and accessories (cont)

40RM WITH DISCHARGE PLENUM, RETURN GRILLE AND SUBBASE

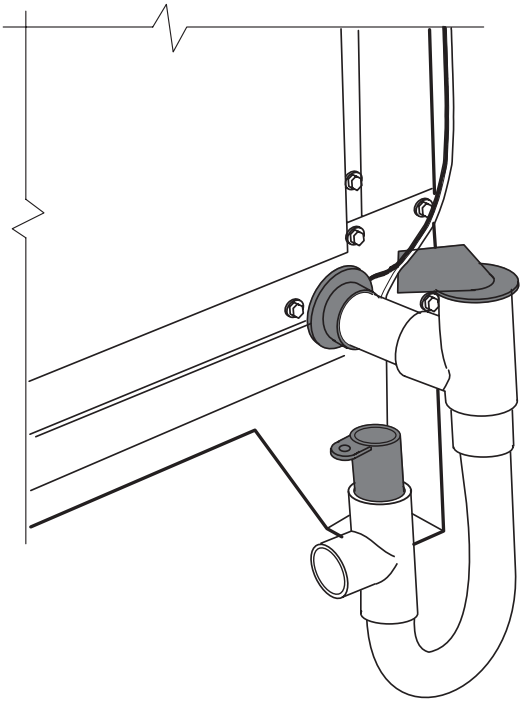


40RM WITH HOT WATER OR STEAM COIL

40RM WITH ECONOMIZER WITH UV-C GERMICIDAL LAMPS



40RM WITH CONDENSATE DRAIN TRAP



Selection procedure — 38AH024-034/40RM

NOTE: See the Performance Data section for combination ratings for 38AH024-034 units and matching 40RM air handlers. If the 38AH units are matched with 39 series air handlers, use the Carrier Electronic Catalog ***AHU*Builder®** software package for combination ratings. If Totaline® P702 water coolers are used, determine the performance by cross-plotting the condensing unit performance found in this book against the P702 performance in the P702 product data book. If the 38AH condensing units are matched with 2 independent 40RM units, cross-plot for performance ratings or contact Carrier Application Engineering for assistance.

I Determine cooling load, evaporator-air temperature and quantity.

Given:

Total Cooling Capacity Required (TC) . . . . . .235,000 Btuh

Sensible Heat Capacity Required (SHC) . . . . . .185,000 Btuh

Temperature Air Entering Condenser (Edb) . . . . . .95 F

Temperature Air Entering Evaporator (db/wb) . . . . . 80 F db, 67 F wb

Evaporator Air Quantity. . . . . 8000 cfm

External Static Pressure . . . . . .0.80 in. wg

Length of Interconnecting Refrigerant Piping . . . . . .30 ft (Linear)

II Select condensing unit air-handler combination.

For this example, select a 38AH024 matched with a 40RM024. (See Combination Ratings table.) This 38AH024/40RM024 condensing unit-air handler combination provides 237,200 Btuh of total cooling capacity and 188,600 Btuh of sensible capacity at the given conditions. If other temperatures or airflow values are required, interpolate the values from the combination ratings.

III Determine sizes of liquid and suction lines.

Enter the Refrigerant Pipe Sizes table. The sizes shown are based on an equivalent length of pipe. This equivalent length is equal to the linear length of pipe indicated at the top of each sizing column, plus a 50% allowance for fitting losses. (For a more accurate determination of actual equivalent length in place of using the estimated 50% value, refer to Carrier System Design Manual.) For this example, note in the linear length column that the proper pipe size is $^5/_8$ in. for the liquid lines and $1^3/_8$ in. for the suction lines.

IV Determine fan rpm and bhp (brake horsepower).

In the 40RM Fan Performance table section, enter the 40RM024 section at 8000 cfm and move to the External Static Pressure (ESP) column. Note that the conditions require 876 rpm at 4.21 bhp.

V Determine motor and drive.

Enter the Fan Motor Data tables and find that the standard motor for a 40RM024 unit is rated at 5 hp. Since the bhp required is 4.21, a standard motor satisfies the requirement and should be used.

Next, find the type of drive that satisfies the 876 rpm requirement in the Drive Data tables. For a 40RM024 unit, the Medium-Static Drive table shows an rpm range of 798 to 984. Since the rpm required is 876, the medium-static drive satisfies the requirement and should be used. Select the standard motor and medium-static drive combination (option code HC or FD).

Operating sequences

38AKS028-044 — When space thermostat calls for cooling, the no. 1 condenser fan and compressor starts after control module (CM) initial time delay of seconds. If an optional airflow switch is used, compressor and no. 1 condensing fan will not start until sufficient indoor airflow has closed the switch. After 7 seconds the compressor starts and the liquid line solenoid valve (for solenoid drop control) opens. The crankcase heater is deenergized. If the head pressure reaches 260 psig, the second condenser fan starts.

If cooling demand is low, suction pressure at the compressor drops. As the pressure drops, the compressor unloads 1 or 2 banks of cylinders as required. If cooling demand is high and 2-stage operation is used, the second step of the thermostat activates the capacity control liquid line solenoid which activates the second stage evaporator coil. The compressor cylinders load or unload in response to compressor suction pressure to meet evaporator load.

For two and a half minutes after the compressor starts, the low-pressure switch (LPS) is ignored. If the LPS trips during the first $2^1/_2$ minutes of operation, the compressor remains operational. If a high-pressure switch (HPS) trips at any time, or the LPS trips after $2^1/_2$ minutes, the compressor cannot restart until the 3-minute CM anti-short cycle timer expires.

As the space cooling load is satisfied, the second stage of the thermostat opens, and closes the field-supplied capacity control liquid line solenoid valve to deactivate the second stage coil. The compressor adjusts the number of active cylinders to meet the new load. When the space temperature is satisfied, the first stage of the thermostat opens and the control relay opens. This closes the solenoid drop control valve. The compressor stops and the crankcase heater is energized, preventing refrigerant from migrating to the compressor during the off cycle solenoid drop refrigerant control). The CM anti-short-cycling timer is energized and runs for approximately 3 minutes. During this time, the compressor is not able to restart.

38AH024-034 standard constant volume unit with 2-stage cooling thermostat — Seven seconds after a thermostat call for the first stage of cooling, compressor no. 1 and the outdoor fans start. The no. 2 fan only starts if the outdoor ambient temperature is above 70 F (21.1 C). The oil-pressure switch and the low-pressure switch are bypassed for the 1 and $2^1/_2$ minutes, respectively. If either the low-pressure switch or oil pressure switch remain open after the delay, the unit shuts down and goes into alarm mode. The indoor-fan motor starts immediately whenever there is a call for cooling. If a liquid line solenoid valve has been installed (for refrigerant control during the off cycle), then the solenoid valve for compressor no. 1 opens immediately upon a call for cooling.

On standard units, compressor no. 1 operates either fully loaded or at one step of unloading, depending on the suction pressure, which is dependent on the evaporator load conditions.

As the cooling demand increases, the thermostat calls for the second stage of cooling. Within 7 seconds from a call for the second stage of cooling, compressor no. 2 starts. The oil switch and low-pressure switch for circuit no. 2 are bypassed during start-up.

As the cooling load is satisfied, the thermostat stops the call for the second stage of cooling, which in turn deenergizes compressor no. 2, closes the no. 2 liquid line solenoid (if installed) and energizes the compressor no. 2 crankcase heater.

If the space temperature continues to decrease, then the thermostat stops the call for the first stage of cooling, which then deenergizes compressor no. 1 and the outdoor fans, closes the no. 1 liquid line solenoid valve (if installed), and energizes the compressor no. 1 crankcase heater.

The unit controls prevent both compressors from reenergizing within 3 minutes from a previous call for operation.

If the unit safeties trip during operation, refer to the Start-Up, Installation and Service instructions.

NOTE: If the thermostat fan switch is in the auto position, the indoor fan cycles on and off as the thermostat calls for cooling (or heating). If the switch is in the continuous position, the fan runs when the outdoor unit is powered.

38AH024-034 optional variable air volume unit with ModuPanel™ control — The ModuPanel control regulates up to 10 stages of cooling to maintain a leaving-air temperature for variable air volume (VAV) applications. When connected to one 38AH condensing unit, only 6 stages are used. See the table on next page for unit loading and compressor operating sequence.

When the timeclock connected to the panel closes, the indoor-fan contactor is energized through a field-supplied relay. (The relay must be a pilot-duty SPST relay with 115-v coil and 30 va maximum coil draw.) After the time delays programmed into the ModuPanel control have elapsed, and with the leaving air above the set point, the stages of mechanical cooling are sequenced as follows:

1. Stage 1 starts compressor no. 1 with 2 banks of cylinders unloaded ($^1/_3$ loaded). Both unloader solenoids are energized.
2. Stage 2 loads one bank of compressor no. 1 cylinders ($^2/_3$ loaded) by deenergizing unloader solenoid no. 1.
3. Stage 3 loads the second bank of compressor no. 1 by deenergizing unloader solenoid no. 2.
4. Stage 4 starts compressor no. 2 and unloads 2 banks of compressor no. 1 cylinders unloaded ($^1/_3$ loaded). Both unloader solenoids are energized.
5. Stage 5 loads one bank of compressor no. 1 cylinders ($^2/_3$ loaded) by deenergizing unloader solenoid no. 1.
6. Stage 6 loads one bank of compressor no. 1 cylinders (fully loaded) by deenergizing unloader solenoid no. 2.

Two 38AH024-034 optional variable air volume units with a single ModuPanel™ control — The ModuPanel control regulates up to 10 stages of cooling to maintain a leaving-air temperature for variable air volume (VAV) applications. When connected to two 38AH condensing units, all 10 stages are used. See the table below for unit loading and compressor operating sequence.

When the timeclock connected to the panel closes, the indoor-fan contactor is energized through a field-supplied relay. (The relay must be a pilot-duty SPST relay with 115-v coil and 30 va maximum coil draw.) After the time delays programmed into the ModuPanel control have elapsed, and with the leaving air above the set point, the stages of mechanical cooling are sequenced as follows:

1. Stage 1 starts unit no. 1 compressor no. 1 with 2 banks of cylinders unloaded ($^1/_3$ loaded). Both unloader solenoids are energized.
2. Stage 2 loads one bank of unit no. 1 compressor no. 1 cylinders ($^2/_3$ loaded) by deenergizing unloader solenoid no. 1.
3. Stage 3 turns off unit no. 1 compressor no. 1 and starts compressor no. 2 fully loaded.
4. Stage 4 starts unit no. 1 compressor no. 1 with 2 banks of cylinders unloaded ($^1/_3$ loaded). Both unloader solenoids are energized.
5. Stage 5 loads one bank of unit no. 1 compressor no. 1 cylinders ($^2/_3$ loaded) by deenergizing unloader solenoid no. 1.
6. Stage 6 loads one bank of unit no. 1 compressor no. 1 cylinders (fully loaded) by deenergizing unloader solenoid no. 2.
7. Stage 7 starts unit no. 2 compressor no. 1 with 2 banks of cylinders unloaded ($^1/_3$ loaded). Both unloader solenoids are energized.
8. Stage 8 turns off unit no. 2 compressor no. 1 and starts compressor no. 2 fully loaded.
9. Stage 9 starts unit no. 2 compressor no. 1 with 2 banks of cylinders unloaded ($^1/_3$ loaded). Both unloader solenoids are energized.
10. Stage 10 loads 2 banks of unit no. 2 compressor no. 1 cylinders (fully loaded) by deenergizing both unloader solenoids.

Restart — Manual reset of the 24-v control circuit is required if unit is shut down by any of the safety devices. Applicable devices include the high pressure switch (HPS), low-pressure switch (LPS), oil-pressure switch (OPS), and compressor overtemperature protection (COTP) switch. To restart the unit after the unit has been shut down, raise the thermostat set point above the space temperature (thereby removing the call for cooling) and then lower the set point back to the desired setting.

If unit circuit breakers trip during unit shutdown, they must be reset manually.

Causes of complete unit shutdown:

- interruption of supplied power
- open compressor overtemperature protection (COTP)
- compressor electrical overload protection (CB1 or CB2)
- open high-pressure or low-pressure safety switches
- open oil pressure switch

38AH UNIT LOADING SEQUENCE WITH MODUPANEL CONTROL

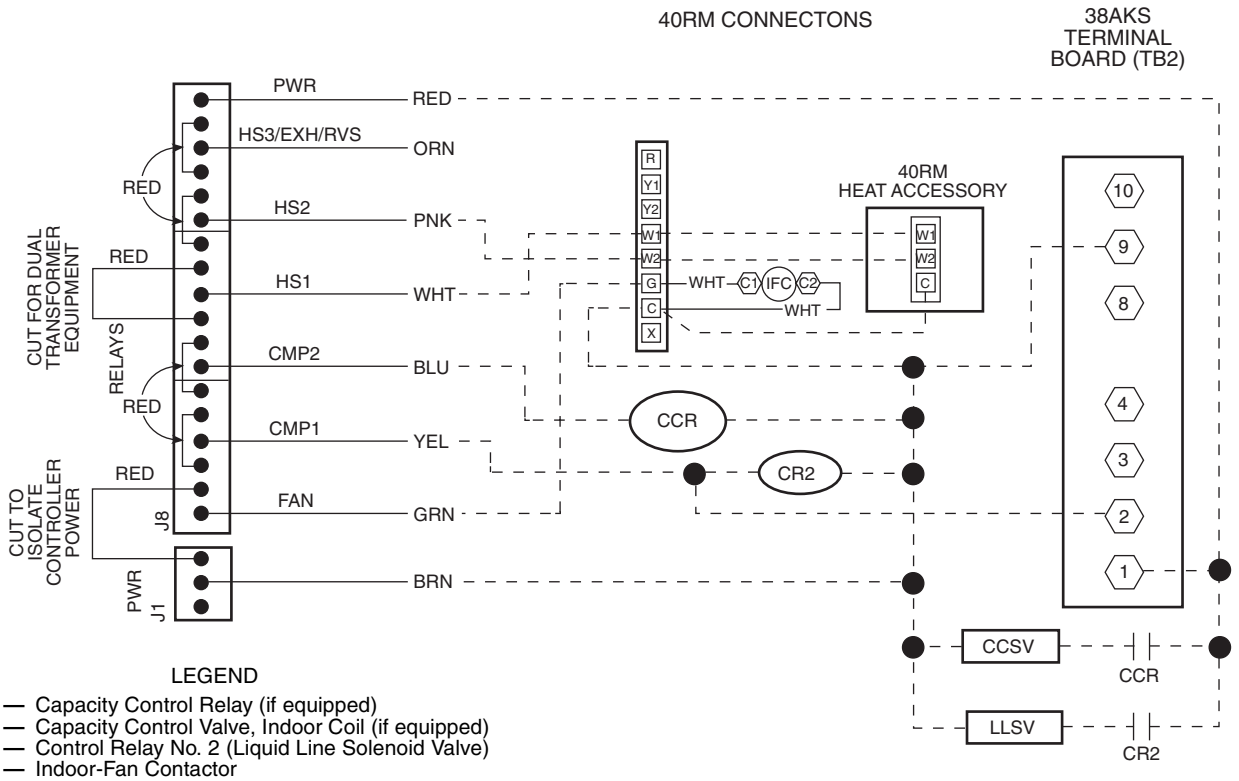
STAGE	NO. CYLINDERS	LOADED CYLINDERS		CAPACITY STEP (%)
		Compressor No. 1	Compressor No. 2	
1	2	2	—	17
2	4	4	—	33
3	6	6	—	50
4	8	2	6	67
5	10	4	6	83
6	12	6	6	100

LOADING SEQUENCE, TWO 38AH CONDENSING UNITS WITH MODUPANEL CONTROL

STAGE	NO. CYLINDERS	UNIT 1 LOADED CYLINDERS		UNIT 2 LOADED CYLINDERS		CAPACITY STEP (%)
		Compressor No. 1	Compressor No. 2	Compressor No. 1	Compressor No. 2	
1	2	2	—	—	—	8
2	4	4	—	—	—	17
3	6	—	6	—	—	25
4	8	2	6	—	—	33
5	10	4	6	—	—	41
6	12	6	6	—	—	50
7	14	6	6	2	—	58
8	18	6	6	—	6	75
9	20	6	6	2	6	83
10	24	6	6	6	6	100

Controls (cont)

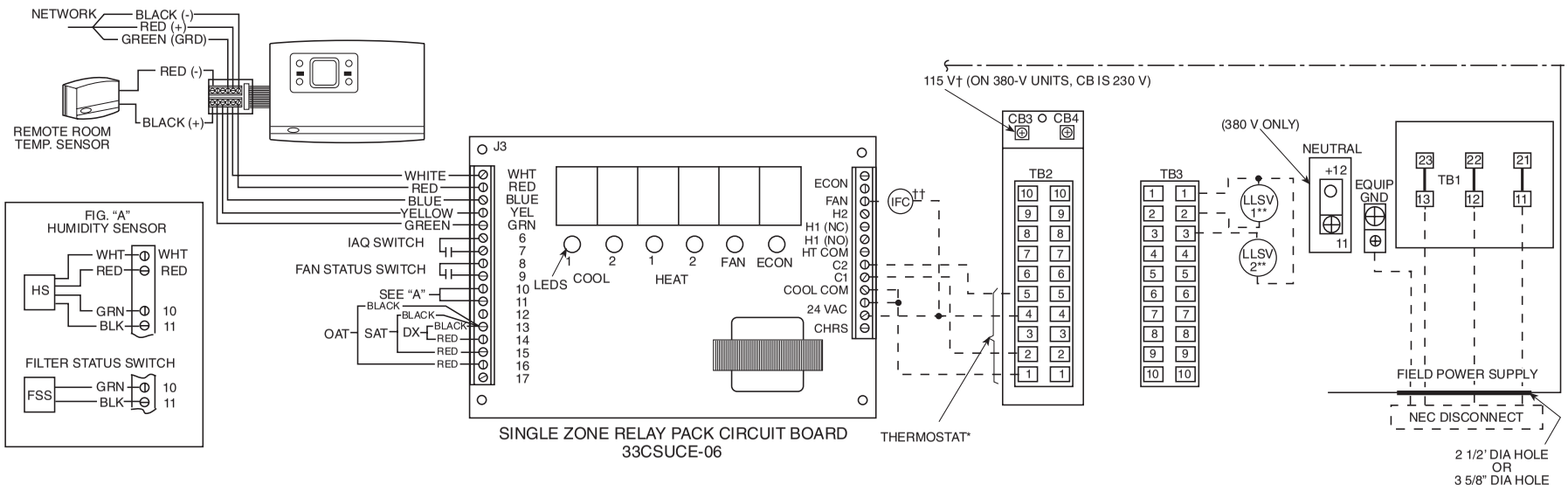
PREMIERLINK™ APPLICATIONS



LEGEND

CCR — Capacity Control Relay (if equipped)
CCSV — Capacity Control Valve, Indoor Coil (if equipped)
CR2 — Control Relay No. 2 (Liquid Line Solenoid Valve)
IFC — Indoor-Fan Contactor
LLSV — Liquid Line Solenoid Valve

38AH024-034 UNITS WITH SINGLE AIR HANDLER



LEGEND

CB	—	Circuit Breaker
COM	—	Common
DX	—	Direct Expansion
EQUIP	—	Equipment
GND	—	Ground
IAQ	—	Indoor-Air Quality
IFC	—	Indoor-Fan Contactor
LLSV	—	Liquid Line Solenoid Valve
NEC	—	National Electrical Code
OAT	—	Outdoor-Air Thermistor
SAT	—	Supply-Air Thermistor
TB	—	Terminal Block
- - - -		Field Control Wiring
———		Factory Wiring
▬ ▬ ▬		Field Power Wiring

*Use thermostat wiring shown here for single air-handler applications.
†CB3 protects control circuit at the following unit voltages:

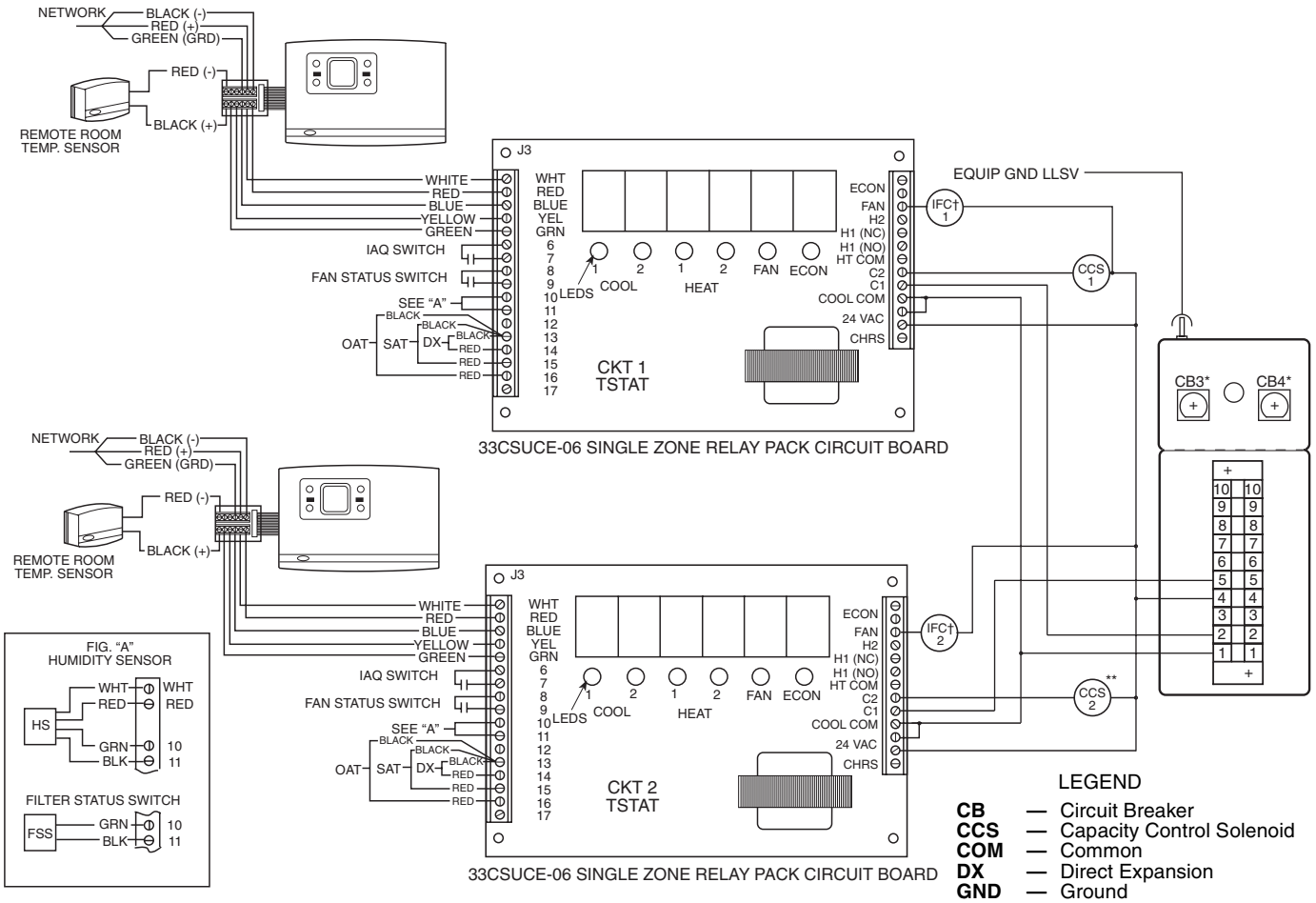
CONTROL CIRCUIT PROTECTED AT: (V-Ph-Hz)	UNIT (V-Ph-Hz)
115-1-60	208/230-3-60 460-3-60 575-3-60
230-1-60	380-3-60

**For a single air handler, LLSV valve 1 is to be used on the lower (no. 1) evaporator circuit. The LLSV valve 2 is to be used on the upper (no. 2) evaporator circuit.
††Only one indoor-fan contactor is required on single air-handler applications. Use Carrier accessory part no. 40RR900181 for indoor-fan contactor.

NOTES:
1. CB4 protects TB2 circuit; CB3 protects TB3 circuits.
2. LLSV1 and LLSV2 are field supplied.
3. On the Single Zone Relay Pack, the outside-air sensor, supply-air sensor, and direct expansion coil sensor are available as options.
4. TB2 is 24 v and TB3 is 115 v.

Typical control wiring (cont)

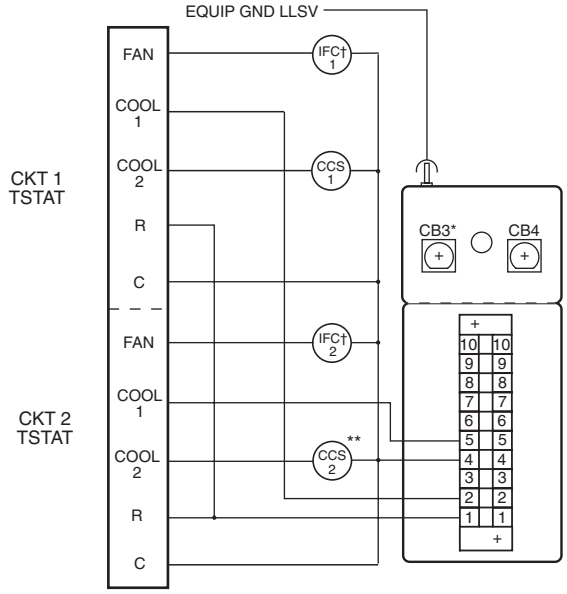
38AH024-034 UNITS WITH 2 AIR HANDLERS THERMOSTAT WIRING



LEGEND

CB	—	Circuit Breaker
CCS	—	Capacity Control Solenoid
COM	—	Common
DX	—	Direct Expansion
GND	—	Ground
IAQ	—	Indoor-Air Quality
IFC	—	Indoor-Fan Contactor
LLSV	—	Liquid Line Solenoid Valve
OAT	—	Outdoor-Air Sensor
SAT	—	Supply Air Sensor
TB	—	Terminal Block
	—	Field Control Wiring
	—	Factory Wiring
	—	Field Power Wiring

OPTIONAL WIRING TO FACILITATE CONNECTION TO OTHER CONTROL DEVICES



*CB3 protects control circuit as follows:

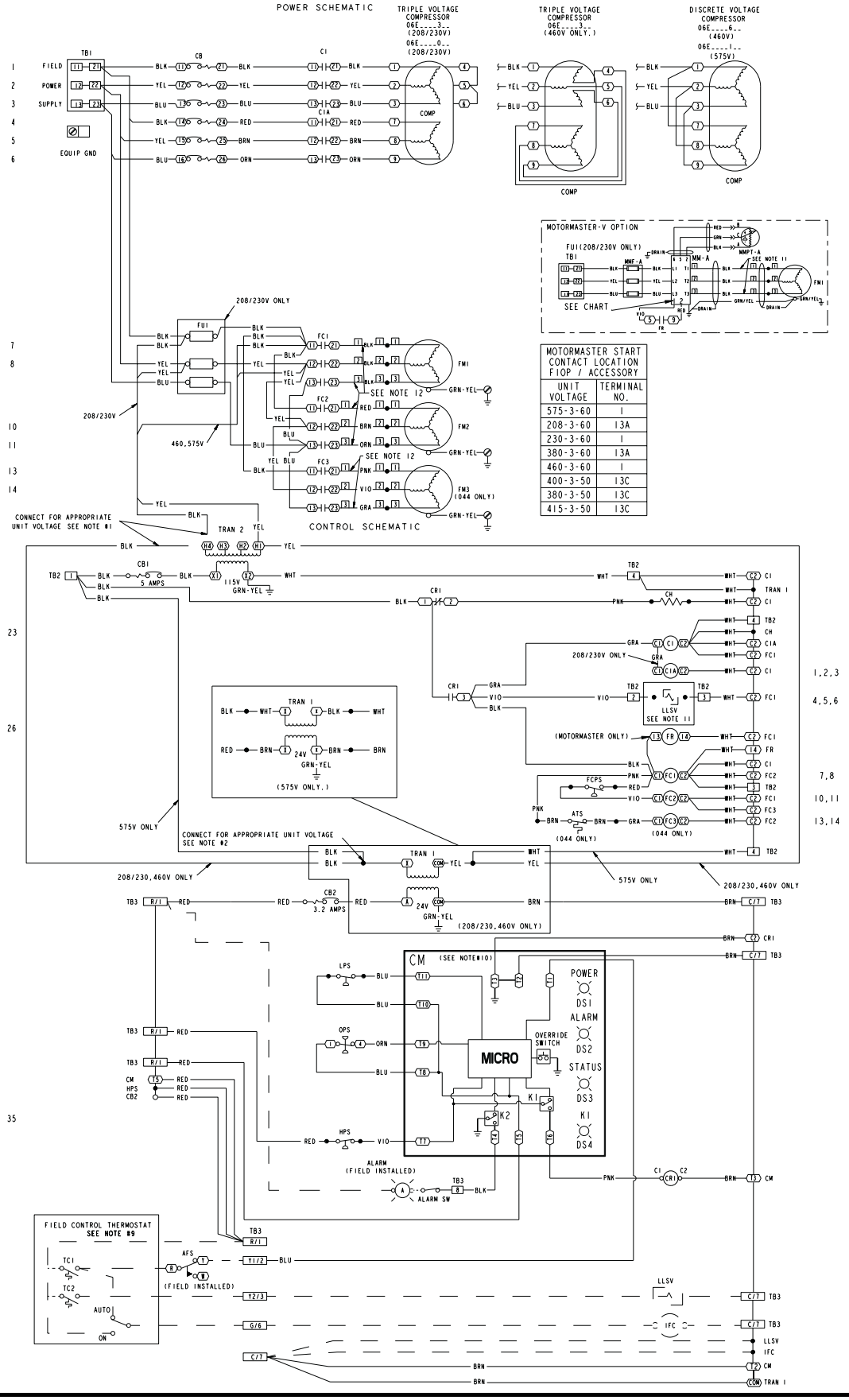
CONTROL CIRCUIT PROTECTED AT: (V-Ph-Hz)	UNIT (V-Ph-Hz)
115-1-60	208/230-3-60 460-3-60 575-3-60
230-1-60	380-3-60

†Use Carrier accessory part no. 40RR900181 for indoor-fan contactor.
**Do not install CCS2 unless accessory unloader is field-installed on circuit no. 2 compressor.

NOTES:
1. Capacity control solenoid (and liquid line solenoid drop refrigerant control) valves are field supplied.
2. On the 33CSUCE-06 Relay Pack, the outside-air sensor, supply-air sensor, and direct expansion coil sensor are available as options.
3. 33CSUCE-06 relay pack requires 10 va.
4. Install LLS valve no. 1 in the liquid line of the air handler controlled by the 38AH circuit no. 1 thermostat. Install LLS valve no. 2 in the liquid line of the air handler controlled by the 38AH circuit no. 2 thermostat. The LLS valves are field supplied. Wire LLS for circuit 1 to TB3 terminals 1 and 2. Wire LLS for circuit 2 to TB3 terminals 1 and 3.

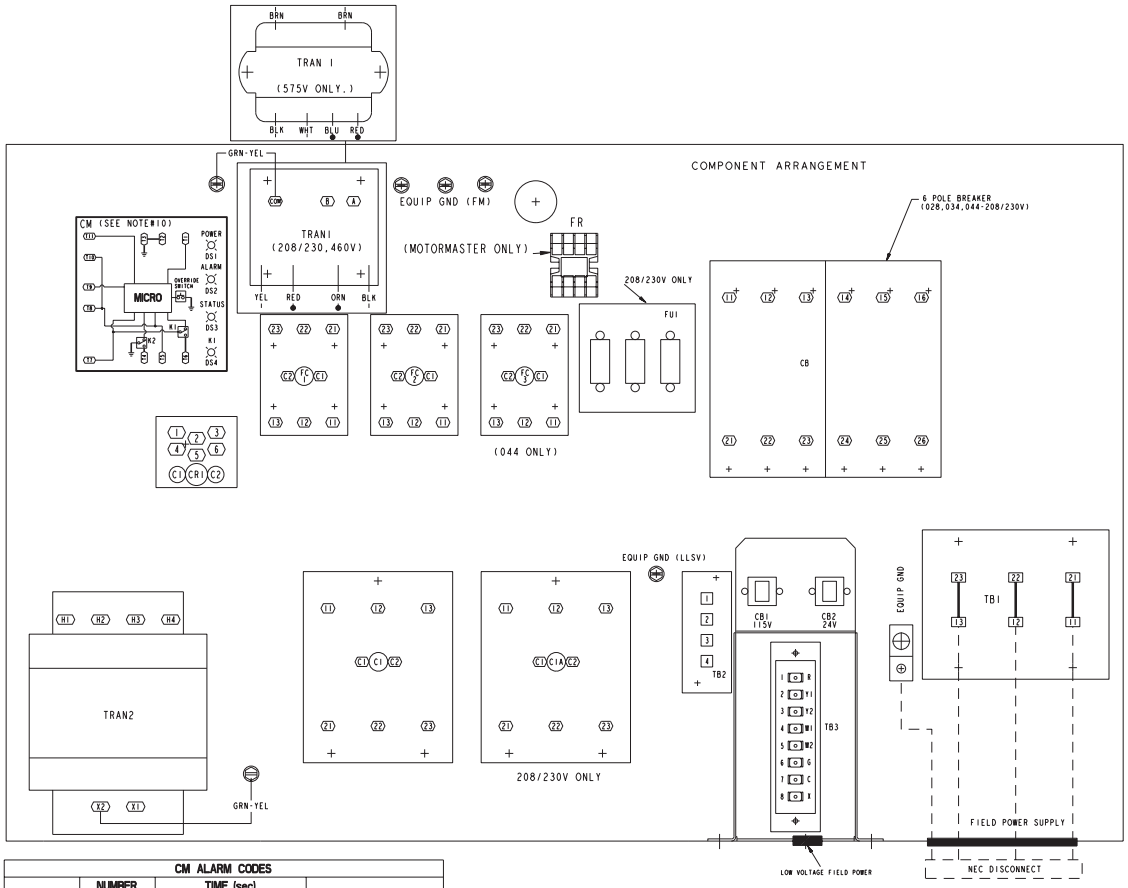
Typical wiring schematic

38AKS028-044



Typical wiring schematic (cont)

38AKS028-044 (cont)



CM ALARM CODES				
LED	NUMBER OF BLINKS *	TIME (sec) ON	TIME (sec) OFF	STATUS
DS1 POWER LED				
	1	1/4	1/4	NORMAL OPERATION
		STEADY		LOCKOUT STATE
DS2 ALARM LED				
		STEADY		HPS OR COTP OPEN
	1	1/4	1	LPS OPEN
	2	1/4	1	OPS OPEN
	3	1/4	1	LPS/OPS OPEN
DS3 STATUS LED				
			STEADY	NO CALL FOR COOLING
		STEADY		COOLING
	1	1/4	1/4	3 MIN. CMP DELAY
DS4 "K1" LED				
		STEADY		RELAY K1 CLOSED

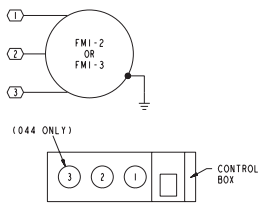
* - MULTIPLE BLINKS ARE A SERIES OF ON/OFF FLASHES OF EQUAL DURATION FOLLOWED BY 1 SECOND OFF.

NOTES:
1. CONNECT TRAN2 TO TERMINAL H3 FOR 230V,H4 FOR 460V, AND H2 FOR 575V UNITS. IF 208/230V UNITS ARE RUN WITH A 208V POWER SUPPLY CONNECT TO TERMINAL H2.
2. CONNECT TRAN1 TO ORN LEAD FOR 230V,BLK LEAD FOR 460V,AND WHT LEAD FOR 575V UNITS. IF 208/230V UNITS ARE RUN WITH A 208V POWER SUPPLY CONNECT TO RED LEAD.
3. COMPRESSOR & FAN MOTORS THERMALLY PROTECTED. THREE PHASE MOTORS PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
4. REPLACEMENT OF ORIGINAL WIRES MUST BE WITH TYPE 90°C WIRE OR ITS EQUIVALENT.
5. LINE # INDICATES LOCATION OF CONTACTS: "#,#" SIGNIFIES SINGLE POLE DOUBLE THROW CONTACTS;# SIGNIFIES A NORMALLY CLOSED CONTACT;# SIGNIFIES A NORMALLY OPEN CONTACT.
6. FACTORY WIRING IS IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC). FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
7. WIRING FOR FIELD POWER SUPPLY MUST BE RATED 60°C . USE COPPER, COPPER-CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
8. TERMINALS G/6,Y2/3 & C/7 OF TB3 ARE FOR CLASS 2 (24V) FIELD EXTERNAL INTERLOCK CONNECTIONS. CLASS 1 FIELD INTERLOCK CONTACTS MUST HAVE MINIMUM RATING OF 180 VA, 220V, 50/60HZ PILOT DUTY. CLASS 2 FIELD INTERLOCK CONTACTS MUST HAVE MINIMUM RATING OF 70 VA, 24V, 50/60HZ PILOT DUTY.
9. THERMOSTAT FOR STANDARD UNITS: HH01AD042, HH07AT172 & HH07AT174. SUBBASE: HH93AZ042, HH93AZ176 & HH93AZ180.
10. CONTROL MODULE INTERNAL ILLUSTRATED TO INDICATE COMPONENTS ORIENTATIONAL SEQUENCE. ALL ITEMS ILLUSTRATED ARE THEORETICALLY REPRESENTED AS INTERNAL TO COMPONENT.
11. THE FACTORY SUPPLIED LLSV DROP CONTROL IS SHIPPED WITH THE 38AKS UNIT BUT FIELD INSTALLED AT THE INDOOR UNIT.
12. TO CHANGE FAN ROTATION, INTERCHANGE FAN MOTOR CONNECTIONS 1 & 3.

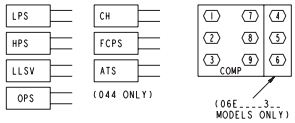
LEGEND

AFS	AIR FLOW SWITCH
ATS	AIR TEMPERATURE SWITCH
BPR	BYPASS RELAY
C	CONTACTOR,COMPRESSOR
CB	CIRCUIT BREAKER
CH	CRANKCASE HEATER
CM	CONTROL MODULE
COMP	COMPRESSOR
CR	CONTROL RELAY
EQUIP	EQUIPMENT
FC	FAN CONTACTOR
FCPS	FAN CYCLING PRESSURE SWITCH
FM	FAN MOTOR
FR	FAN RELAY
FU	FUSE
GND	GROUND
HPS	HIGH PRESSURE SWITCH
LLSV	LIQUID LINE SOLENOID VALVE
LPS	LOW PRESSURE SWITCH
OPS	OIL PRESSURE SWITCH
TB	TERMINAL BLOCK
TC	THERMOSTAT-COOLING
TRAN	TRANSFORMER

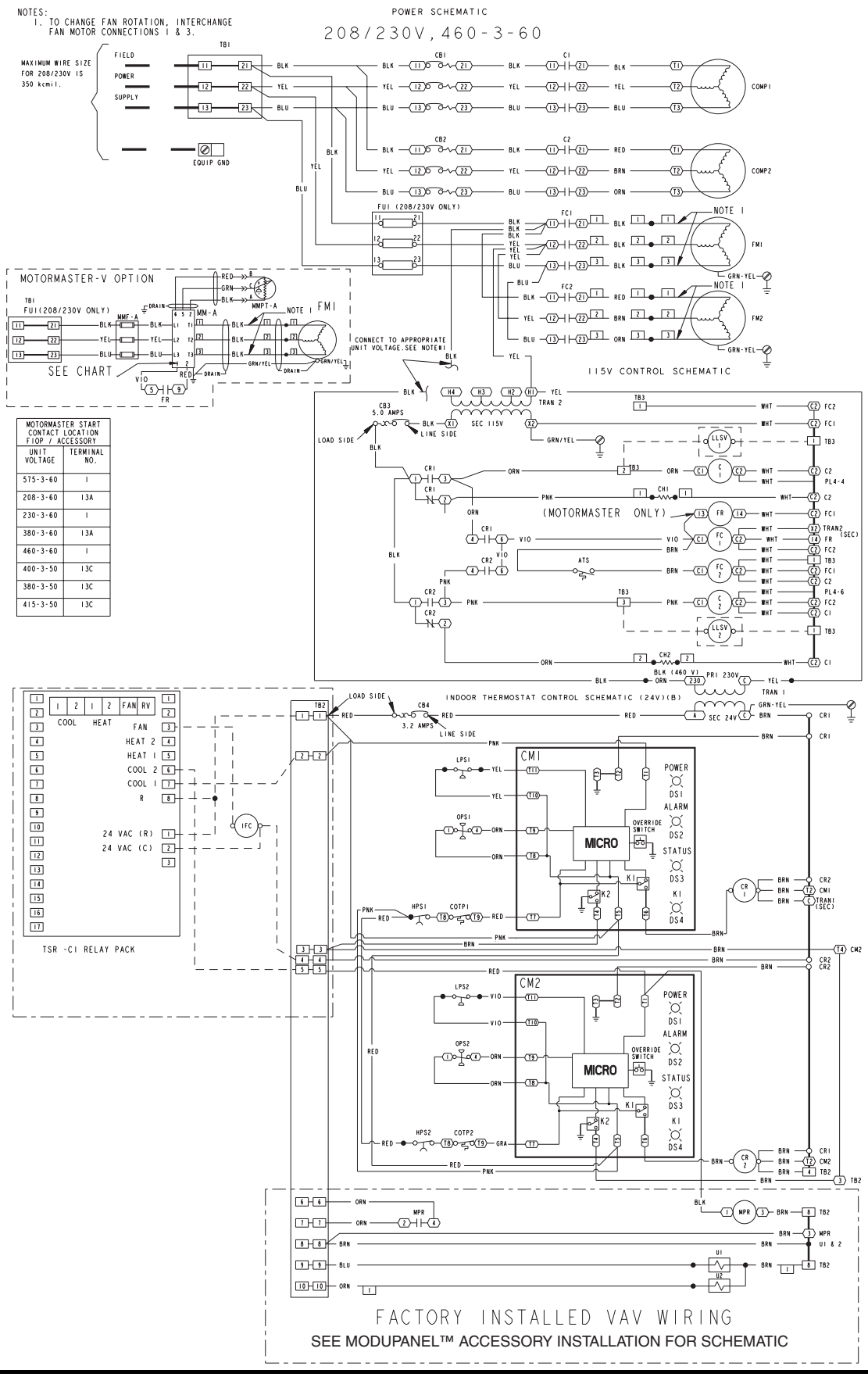
- TERMINAL BLOCK CONNECTION
- MARKED TERMINAL
- UNMARKED TERMINAL
- MARKED SPLICE
- UNMARKED SPLICE
- FACTORY WIRE
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- INDICATES COMMON POTENTIAL DOES NOT REPRESENT WIRING



COMPRESSOR AND FAN ARRANGEMENT



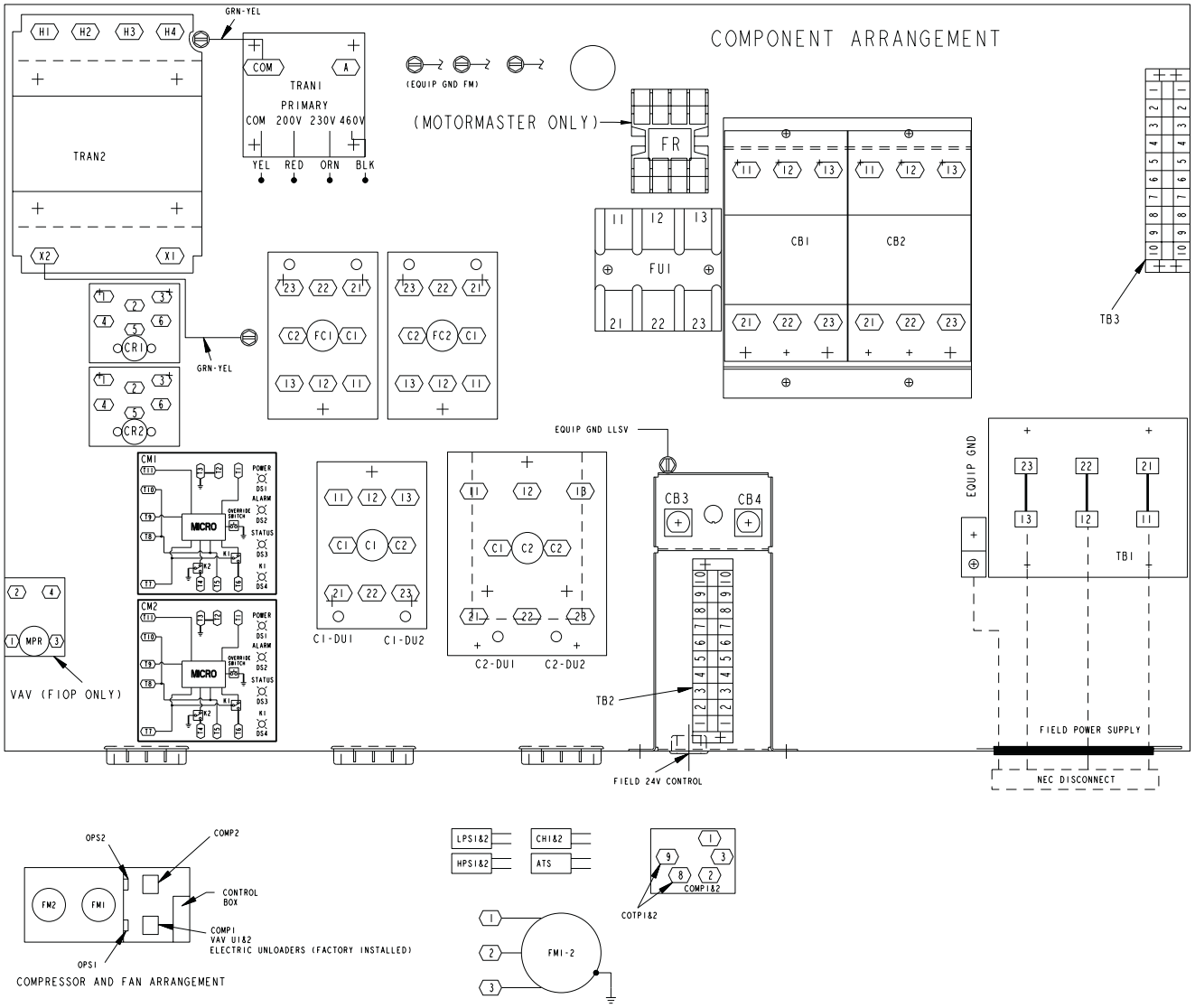
38AH024-034



MOTORMASTER START CONTACT LOCATION F10P / ACCESSORY	
UNIT VOLTAGE	TERMINAL NO.
575-3-60	1
208-3-60	13A
230-3-60	1
380-3-60	13A
460-3-60	1
400-3-50	13C
380-3-50	13C
415-3-50	13C

Typical wiring schematic (cont)

38AH024-034 (cont)



NOTES:

1. FOR TRANS 2 FOR 208/230 CONNECT TO H3. FOR 460V CONNECT TO H4.
2. TRANS 1 CONNECTED TO ORANGE LEAD FOR 208/230 AND TO BLK FOR 460V.
3. COMPRESSOR & FAN MOTORS THERMALLY PROTECTED. THREE PHASE MOTORS PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
4. REPLACEMENT OF ORIGINAL WIRES MUST BE WITH TYPE 90°C WIRE OR ITS EQUIVALENT.
5. FACTORY WIRING IS IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC). FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
6. WIRING FOR FIELD POWER SUPPLY MUST BE RATED 75°C . USE COPPER, COPPER-CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
7. V.A.AVAILIBLE TB2 IS (40A)
8. FUI (208-230V ONLY)

CM ALARM CODES				
LED	NUMBER OF BLINKS *	TIME (sec) ON	TIME (sec) OFF	STATUS
DS1 POWER LED				
	1	1/4	1/4	NORMAL OPERATION
		STEADY		LOCKOUT STATE
DS2 ALARM LED				
		STEADY		HPS OR COTP OPEN
	1	1/4	1	LPS OPEN
	2	1/4	1	OPS OPEN
	3	1/4	1	LPS/OPS OPEN
DS3 STATUS LED				
			STEADY	NO CALL FOR COOLING
		STEADY		COOLING
	1	1/4	1/4	3 MIN. CMP DELAY
DS4 "K1" LED				
		STEADY		RELAY K1 CLOSED

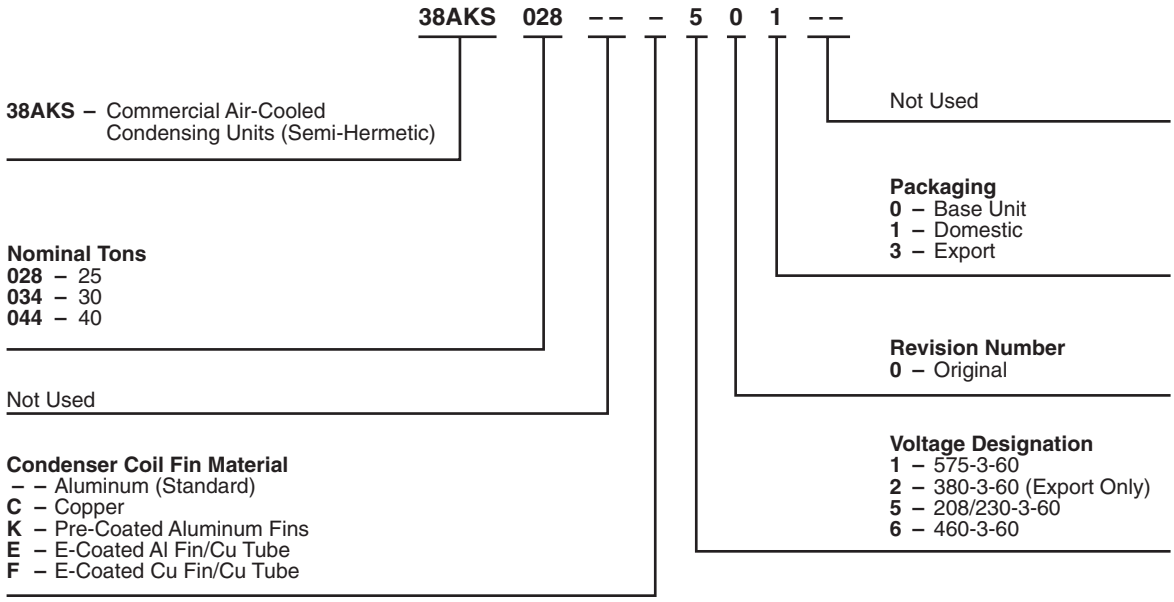
* - MULTIPLE BLINKS ARE A SERIES OF ON/OFF FLASHES OF EQUAL DURATION FOLLOWED BY 1 SECOND OFF.

LEGEND

ATS	—	Air Temperature Switch
C	—	Contactor, Compressor
CB	—	Circuit Breaker
CH	—	Crankcase Heater
CM	—	Control Module
COMP	—	Compressor
COTP	—	Compressor Overtemperature Protection
CR	—	Control Relay
EQUIP	—	Equipment
FC	—	Fan Contactor
FM	—	Fan Motor
FR	—	Fan Relay
FU	—	Fuseblock
GND	—	Ground
HPS	—	High-Pressure Switch
IFC	—	Indoor-Fan Contactor
LLSV	—	Liquid Line SolenoidValve
LPS	—	Low-Pressure Switch
MPR	—	ModuPanel™ Relay
OPS	—	Oil Pressure Switch
PL	—	Plug Assembly
TB	—	Terminal Block
TRAN	—	Transformer
U	—	Unloader
VAV	—	Variable Air Volume

Plug
Receptacle
Terminal Block Connection
Marked Terminal
Unmarked Terminal
Marked Splice
Unmarked Splice
Factory Wiring
Field Control Wiring
Field Power Wiring
Indicates Common Potential, Does Not Represent Wiring

Model number nomenclature — 38AKS units



LEGEND

Al — Aluminum
Cu — Copper

Quality Assurance

Certified to ISO 9001:2000

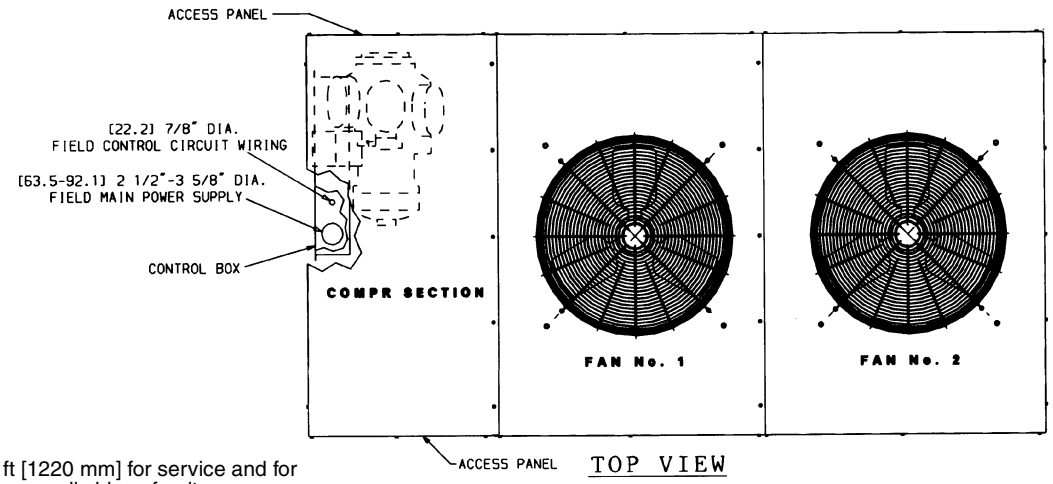
Physical data

38AKS028-044 UNITS

UNIT 38AKS	028	034	044
NOMINAL CAPACITY (tons)	25	30	40
OPERATING WEIGHTS (lb)			
With Aluminum-Fin Coils (standard)	1650	1803	2437
With Copper-Fin Coils (optional)	1804	2009	2745
REFRIGERANT*		R-22	
Operating Charge, Typical (lb)†	30.5	43.5	65.0
Shipping Charge (lb)	3	4	5
COMPRESSOR		Reciprocating, Semi-Hermetic	
Qty...Model	1...06E9265	1...06E9275	1...06E9299
Oil Charge (pt)	20	20	19
No. Cylinders	6	6	6
Speed (rpm)		1750	
Capacity Steps (%)		100, 66, 33	
Unloader Setting (psig)			
Unloader No. 1 Load		76	
Unload		58	
Unloader No. 2 Load		78	
Unload		60	
Crankcase Heater Watts		180	
CONDENSER FANS		Propeller Type — Direct Drive	
Qty...Rpm		2...1140	3...1140
Diameter (in.)		30	
Nominal Hp		1.0	
Nominal Airflow (cfm total)		15,700	
Watts (total)	1490	1750	1520
CONDENSER COIL		Enhanced Copper Tubes, Lanced Aluminum Fins	
Rows...Fins/in.	2...19	3...17	3...17
Face Area (sq ft)	39.2	39.2	58.4
Storage Capacity (lb)**	37.7	56.6	84.4
CONTROLS			
Pressurestat (psig)			
High-Pressure			
Open		426 ± 7	
Close		320 ± 20	
Low-Pressure			
Open		27 ± 3	
Close		44 ± 5	
Oil Pressure (psi)			
Open		6.2	
Close		9.0	
FAN CYCLING CONTROLS			
Operating Pressure (psig)			
No. 2 Fan, Close		255 ± 10	
Open		160 ± 10	
PRESSURE RELIEF		Fusible Plug	
Location		Liquid and Suction Line	
Temperature (F)		210	
PIPING CONNECTIONS (in. ODM)			
Suction	$1\frac{5}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
Liquid		$\frac{7}{8}$	
Hot Gas Stub		$\frac{5}{8}$	

*Unit is factory-supplied with holding charge only.
†Typical operating charge with 25 ft of interconnected piping. Operating charge is approximate for maximum system capacity.
**Storage capacity is 80% full at liquid saturated temperature of 125 F.

38AKS028, 034



NOTES:
1. There must be 4 ft [1220 mm] for service and for unrestricted airflow on all sides of unit.
2. There must be minimum 8 ft [2440 mm] clear air space above unit.
3. The approximate operating weight of the unit is:

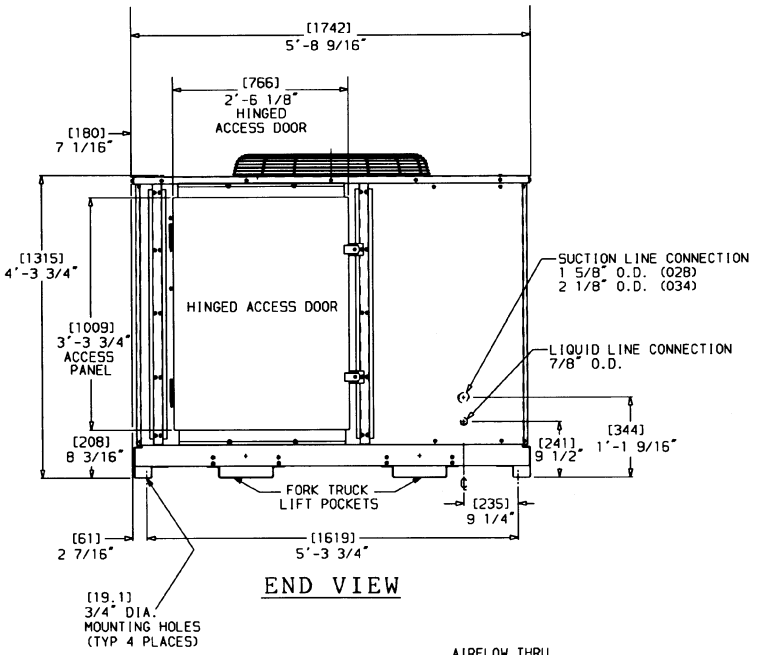
UNIT 38AKS	WEIGHT (lb)	WEIGHT (kg)
028	1650	748
028C	1804	818
034	1803	818
034C	2009	911

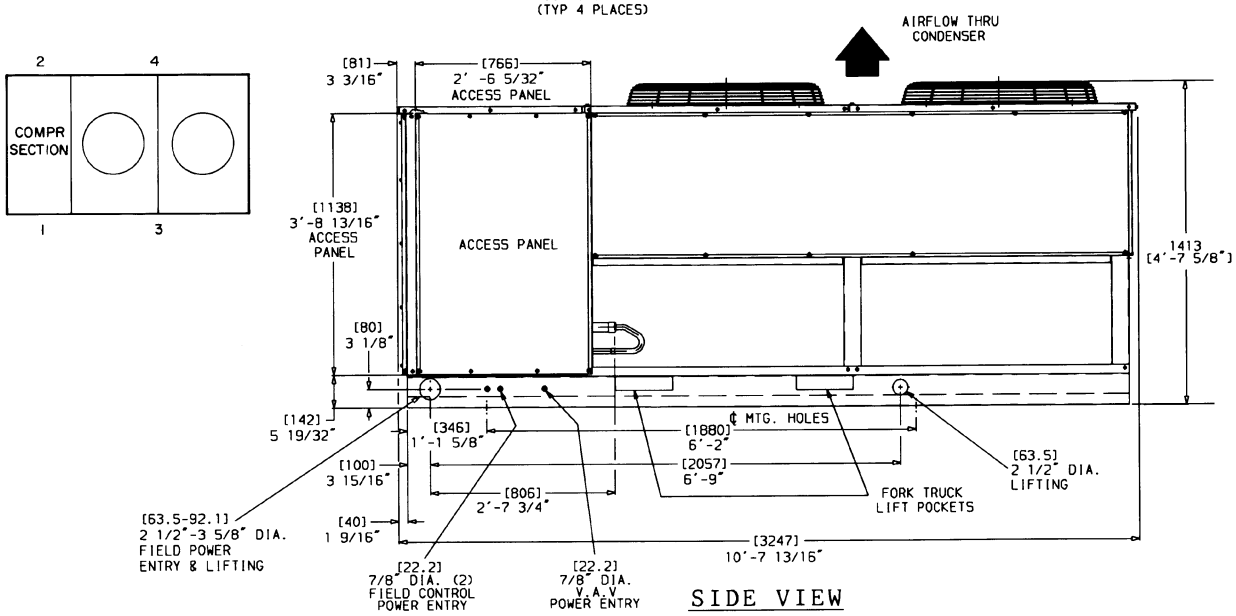
NOTE: A “C” in model number indicates unit has optional factory-installed copper-fin coil.

APPROX. OPER. WT (lb) AT SUPPORT POINTS*

UNIT 38AKS	1	2	3	4	TOTAL
028	418	626	242	364	1650
034	459	673	272	399	1803

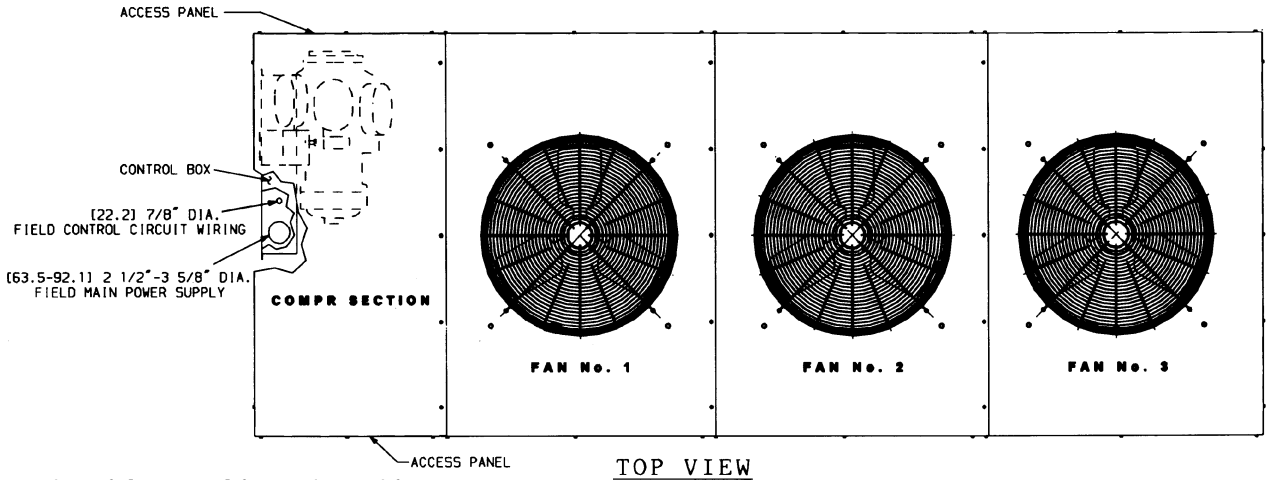
*Standard copper tube aluminum-fin coil.





Dimensions (cont)

38AKS044



NOTES:
1. There must be 4 ft [1220 mm] for service and for unrestricted airflow on all sides of unit.
2. There must be minimum 8 ft [2440 mm] clear air space above unit.
3. The approximate operating weight of the unit is:

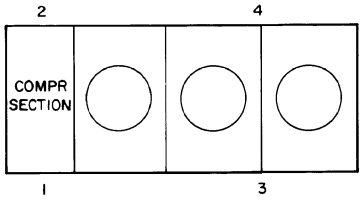
UNIT 38AKS	WEIGHT (lb)	WEIGHT (kg)
044	2437	1106
044C	2745	1246

NOTE: A "C" in model number indicates unit has optional factory-installed copper-fin coil.

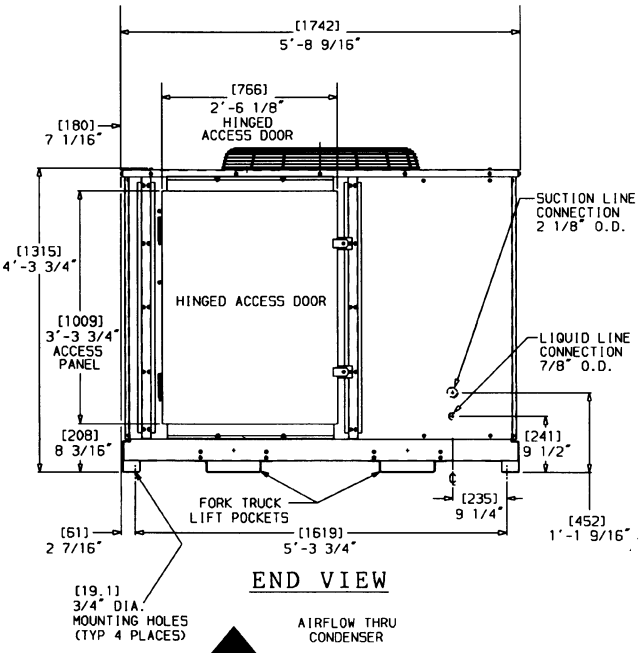
APPROX. OPER. WT (lb) AT LIFTING HOLES*

UNIT 38AKS	1	2	3	4	TOTAL
044	720	900	455	362	2437

*Standard copper tube aluminum-fin coil.

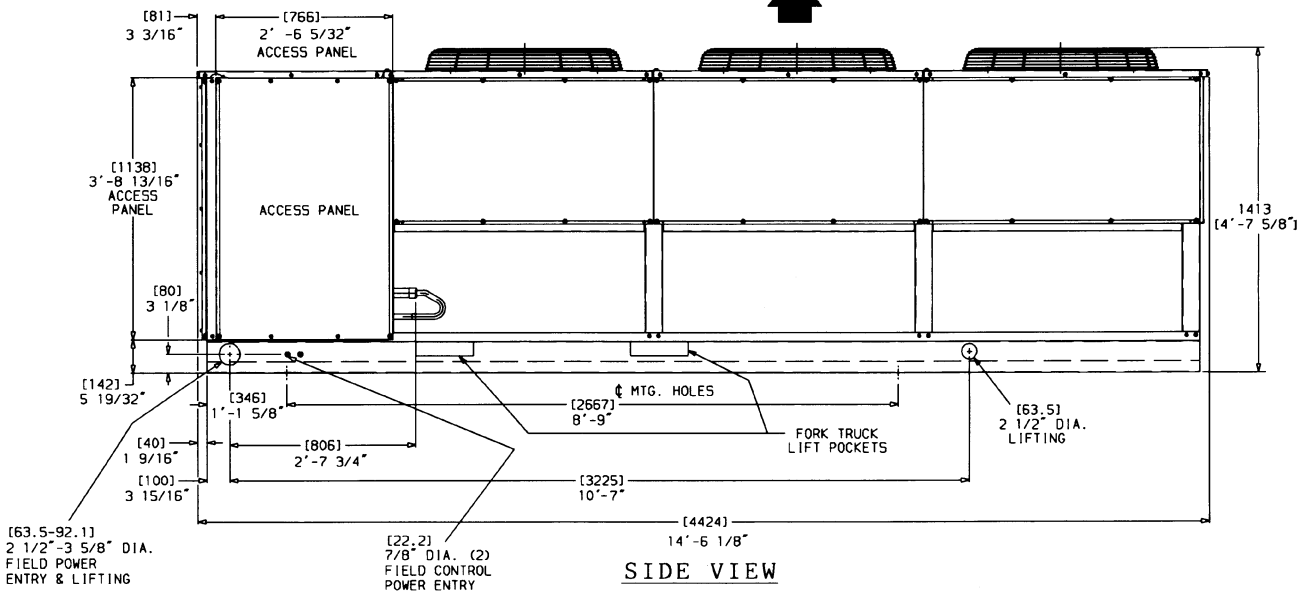


TOP VIEW



END VIEW

AIRFLOW THRU CONDENSER



SIDE VIEW

Performance data

CONDENSING UNIT RATINGS

38AKS028

SST (F)		Air Temperature Entering Condenser (F)					
		80	85	95	100	105	115
25	TC	238	230	213	204	196	180
	kW	21.9	22.2	23.2	23.7	24.1	24.9
	SDT	107	111	120	124	129	138
30	TC	269	261	242	233	224	206
	kW	23.3	23.6	24.8	25.4	25.9	26.8
	SDT	110	114	123	127	131	140
35	TC	300	292	271	261	252	232
	kW	24.7	25.0	26.4	27.0	27.6	28.7
	SDT	112	117	125	130	134	143
40	TC	333	323	301	290	279	258
	kW	26.1	26.4	28.0	28.7	29.3	30.6
	SDT	115	120	128	133	137	145
45	TC	365	354	330	319	307	284
	kW	27.3	27.8	29.5	30.3	31.1	32.4
	SDT	118	123	131	135	140	148
50	TC	398	386	361	348	336	312
	kW	28.8	29.3	31.2	32.0	32.9	34.4
	SDT	121	126	134	138	142	151

38AKS034

SST (F)		Air Temperature Entering Condenser (F)					
		80	85	95	100	105	115
25	TC	268	260	241	232	223	205
	kW	25.0	25.1	26.2	26.6	27.0	27.7
	SDT	106	110	119	124	128	137
30	TC	302	293	273	264	254	234
	kW	26.5	26.6	27.9	28.4	28.9	29.8
	SDT	109	113	122	126	131	140
35	TC	337	326	305	295	284	263
	kW	27.9	28.1	29.6	30.2	30.8	31.9
	SDT	112	116	125	129	133	142
40	TC	371	359	337	326	314	292
	kW	29.3	29.6	31.3	32.1	32.8	34.0
	SDT	115	119	128	132	136	145
45	TC	405	393	369	357	345	321
	kW	30.7	31.1	33.0	33.9	34.7	36.1
	SDT	117	122	130	135	139	147
50	TC	440	428	402	390	377	351
	kW	32.3	32.7	34.8	35.7	36.6	38.2
	SDT	120	125	133	138	142	150

38AKS044

SST (F)		Air Temperature Entering Condenser (F)					
		80	85	95	100	105	115
25	TC	362	352	330	319	308	287
	kW	33.6	34.0	35.5	36.2	36.8	38.0
	SDT	103	107	117	122	126	136
30	TC	410	398	374	362	350	326
	kW	35.6	36.0	37.8	38.6	39.4	40.8
	SDT	105	110	119	124	129	138
35	TC	456	444	417	404	391	36
	kW	37.6	37.1	40.1	41.0	41.9	43.5
	SDT	109	113	122	126	131	140
40	TC	503	490	461	447	433	405
	kW	40.0	40.2	42.4	43.5	44.4	46.2
	SDT	111	115	124	129	133	142
45	TC	551	536	505	489	474	444
	kW	41.5	42.2	44.7	45.9	47.0	49.0
	SDT	114	118	127	131	136	145
50	TC	599	584	550	534	518	485
	kW	43.6	44.4	47.1	48.3	49.6	51.8
	SDT	116	120	129	134	138	147

LEGEND

kW — Compressor Power
SDT — Saturated Discharge Temperature at Compressor (F)
SST — Saturated Suction Temperature (F)
TC — Gross Cooling Capacity (1000 Btuh)

Performance data (cont)

COMBINATION RATINGS

UNIT 38AKS028

38AKS028/40RM024 WITH STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		6000			8000			10,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	305.1	279.8	—	320.3	295.8	—	330.3	305.7	279.5
	SHC	150.5	184.8	—	167.6	213.3	—	183.0	239.4	279.5
	kW	25.59	24.45	—	26.28	25.17	—	26.73	25.62	24.44
95	TC	292.8	268.8	—	306.8	283.5	257.9	315.7	292.9	269.6
	SHC	145.8	180.3	—	162.7	208.1	257.9	177.8	233.6	269.6
	kW	27.58	26.34	—	28.30	27.09	25.77	28.76	27.58	26.38
100	TC	286.3	262.5	237.6	300.0	276.8	252.2	308.6	286.1	263.9
	SHC	143.3	177.7	227.0	160.3	205.3	252.2	175.3	230.5	263.9
	kW	28.50	27.18	25.81	29.25	27.97	26.61	29.72	28.49	27.26
105	TC	279.8	256.7	232.8	292.9	270.3	247.1	300.9	279.4	258.6
	SHC	140.8	175.3	222.8	157.7	202.5	247.1	172.6	227.4	258.6
	kW	29.35	27.86	26.33	30.19	28.74	27.25	30.71	29.32	27.99
115	TC	266.8	245.0	223.2	278.7	257.4	236.9	285.7	265.9	248.0
	SHC	135.9	170.5	214.4	152.6	197.1	236.9	167.3	221.3	248.0
	kW	31.21	29.70	28.19	32.03	30.56	29.14	32.52	31.15	29.91

38AKS028/40RM024 WITH HIGH-CAPACITY 4-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		6000			8000			10,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	341.7	312.2	284.6	364.1	333.8	304.9	377.8	347.4	318.6
	SHC	133.1	175.5	216.7	149.5	203.1	255.5	164.0	228.6	290.8
	kW	28.00	26.64	25.34	29.05	27.67	26.34	29.67	28.31	26.97
95	TC	327.7	299.3	272.7	347.9	318.9	291.2	360.7	331.7	303.8
	SHC	128.9	170.8	211.9	144.6	198.3	250.0	159.7	223.9	284.9
	kW	29.94	28.46	27.02	31.03	29.51	28.04	31.68	30.19	28.73
100	TC	320.6	292.8	266.6	339.7	311.4	284.4	352.3	323.8	296.9
	SHC	126.7	168.7	209.4	142.6	196.0	247.7	157.7	221.7	282.1
	kW	30.92	29.38	27.88	32.01	30.43	28.91	32.71	31.14	29.64
105	TC	313.3	286.0	260.4	331.5	303.9	277.5	343.6	315.8	289.8
	SHC	124.6	166.3	207.0	140.4	193.6	245.1	155.5	219.3	278.9
	kW	31.91	30.29	28.72	33.00	31.37	29.78	33.73	32.09	30.54
115	TC	298.4	272.2	247.5	315.0	288.7	267.1	326.2	299.3	274.4
	SHC	120.2	161.6	202.0	136.1	189.0	240.9	151.4	214.7	274.4
	kW	33.79	32.01	30.30	34.90	331.6	31.22	35.66	33.87	32.16

38AKS028/40RM028 WITH STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		7500			10,000			12,500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	330.8	305.4	277.1	344.8	318.8	293.3	353.4	329.1	307.4
	SHC	168.9	212.4	270.1	189.8	245.6	293.3	209.5	275.9	307.3
	kW	26.75	25.61	24.33	27.39	26.21	25.06	27.77	26.67	25.69
95	TC	316.6	292.0	266.5	329.6	304.5	282.3	337.3	314.4	295.9
	SHC	163.7	207.0	260.4	184.4	239.8	282.3	204.1	269.5	295.9
	kW	28.81	27.54	26.22	29.48	28.18	27.03	29.88	28.69	27.73
100	TC	309.7	285.0	260.4	322.5	297.3	276.3	329.8	307.2	289.9
	SHC	161.2	204.2	254.8	181.9	236.8	276.3	201.6	266.4	289.9
	kW	29.79	28.42	27.07	30.49	29.10	27.94	30.90	29.65	28.69
105	TC	302.3	277.9	254.8	314.5	289.8	270.4	321.4	299.5	283.8
	SHC	158.4	201.3	249.7	179.1	233.7	270.4	198.8	263.0	283.7
	kW	30.80	29.23	27.75	31.58	29.99	28.75	32.03	30.62	29.61
115	TC	287.5	264.0	243.6	298.6	274.9	258.7	304.6	284.3	271.5
	SHC	153.0	195.7	239.4	173.5	227.6	258.7	193.2	256.4	271.5
	kW	32.64	31.01	29.60	33.41	31.77	30.65	33.83	32.42	31.53

38AKS028/40RM028 WITH HIGH-CAPACITY 4-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		7500			10,000			12,500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	348.1	319.4	292.1	365.9	336.7	309.1	377.1	347.9	320.4
	SHC	175.1	191.4	240.3	159.4	222.4	283.2	176.6	251.7	320.4
	kW	28.21	26.89	25.61	29.06	27.71	26.42	29.55	28.22	26.94
95	TC	333.1	305.7	282.5	349.1	321.3	294.5	359.6	331.8	307.1
	SHC	137.2	187.0	236.4	155.2	217.9	277.2	172.5	247.2	307.1
	kW	30.13	28.70	27.14	30.98	29.52	28.10	31.52	30.08	28.78
100	TC	325.6	298.6	272.9	340.7	313.8	287.7	350.8	323.7	301.0
	SHC	135.2	184.7	233.1	153.1	215.6	274.5	170.5	245.0	301.0
	kW	31.11	29.61	28.12	31.95	30.47	28.97	32.52	31.01	29.75
105	TC	318.0	291.4	266.0	332.3	305.8	281.0	342.1	315.5	294.3
	SHC	133.2	182.4	230.4	151.1	213.4	271.3	168.5	242.8	294.3
	kW	32.10	30.50	28.94	32.94	31.37	29.86	33.53	31.97	30.66
115	TC	301.6	276.8	252.8	315.2	290.1	266.4	324.3	298.7	281.4
	SHC	128.6	177.8	225.3	147.0	209.0	266.4	164.5	238.0	281.4
	kW	33.93	32.22	30.56	34.83	33.14	31.51	35.45	33.73	32.52

38AKS028/40RM034 WITH STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		9000			12,000			15,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	353.9	325.8	300.2	367.2	339.2	318.4	374.7	350.2	378.8
	SHC	186.0	238.4	293.9	212.4	276.3	318.4	234.9	311.5	272.3
	kW	27.80	26.53	25.37	28.40	27.13	26.19	28.74	27.63	28.92
95	TC	337.9	310.6	288.0	350.0	323.1	305.6	356.7	333.7	327.6
	SHC	179.9	232.4	282.8	206.6	269.8	305.6	228.9	304.2	309.3
	kW	29.91	28.50	27.33	30.53	29.14	28.24	30.88	29.69	29.37
100	TC	330.6	303.1	281.4	342.4	315.4	299.1	348.8	326.0	305.6
	SHC	177.2	229.4	276.8	204.0	266.7	299.1	226.3	300.9	325.3
	kW	30.94	29.42	28.23	31.59	30.10	29.20	31.94	30.69	29.56
105	TC	322.2	295.2	274.9	333.4	307.1	292.3	339.4	317.4	283.3
	SHC	174.0	226.2	270.9	210.0	263.4	292.3	223.1	297.1	341.4
	kW	32.08	30.34	29.04	32.80	31.10	30.15	33.19	31.77	29.57
115	TC	305.6	279.5	262.0	315.7	290.5	278.7	—	300.4	244.7
	SHC	167.7	220.0	259.2	195.0	256.7	278.7	—	289.6	369.4
	kW	33.90	32.09	30.88	34.59	32.85	32.04	—	33.54	29.68

38AKS028/40RM034 WITH HIGH-CAPACITY 4-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		9000			12,000			15,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	371.5	341.2	312.3	387.9	357.4	328.9	398.8	368.1	345.4
	SHC	156.7	216.0	273.5	178.5	253.1	320.9	199.3	288.0	345.4
	kW	29.39	28.01	26.68	30.14	28.78	27.45	30.66	29.27	28.19
95	TC	354.9	325.8	298.2	370.2	341.0	314.4	380.1	350.5	331.7
	SHC	152.3	211.2	268.2	174.3	248.5	314.4	195.2	283.0	331.7
	kW	31.39	29.87	28.42	32.18	30.69	29.27	32.69	31.18	30.17
100	TC	346.6	318.1	291.3	361.3	332.5	306.7	370.6	341.7	324.8
	SHC	150.2	208.9	265.5	172.3	246.2	306.7	193.1	280.5	324.8
	kW	32.39	30.82	29.31	33.23	31.64	30.17	33.72	32.15	31.18
105	TC	338.1	310.4	283.7	352.2	324.0	300.6	361.0	332.7	318.0
	SHC	148.1	206.7	262.0	170.2	243.8	300.6	190.8	277.8	318.0
	kW	33.40	31.76	30.17	34.24	32.58	31.16	34.75	33.09	32.21
115	TC	321.1	294.7	269.6	333.7	306.8	287.6	341.8	314.9	303.4
	SHC	143.7	201.8	256.8	165.9	238.8	287.6	186.7	272.7	303.4
	kW	35.31	33.57	31.85	36.14	34.37	33.07	36.69	34.91	34.12

LEGEND

— — Out of Range
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. Evaporator fan heat not deducted from ratings.
3. Ratings based on approximately 12 F superheat leaving coil.
4. Formulas:

$$\text{Leaving db} = \text{entering db} - \frac{\text{sensible heat capacity (Btuh)}}{1.1 \times \text{cfm}}$$

Leaving wb = wet-bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where h_{ewb} = enthalpy of air entering coil.

5. SHC is based on 80 F db temperature of air-entering evaporator coil.

COMBINATION RATINGS (cont)

UNIT 38AKS034

38AKS034/40RM028 WITH STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		7500			10,000			12,500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	352.5	326.2	—	368.2	341.0	310.1	378.3	351.7	324.8
	SHC	176.9	220.8	—	198.0	254.7	310.1	217.8	285.8	324.8
	kW	29.31	28.15	—	30.01	28.81	27.44	30.45	29.28	28.09
95	TC	339.4	313.7	283.7	354.1	327.7	300.1	363.2	338.1	314.4
	SHC	172.1	215.8	276.1	193.0	249.3	300.1	212.7	279.9	314.4
	kW	31.43	30.06	28.47	32.21	30.80	29.34	32.69	31.36	30.10
100	TC	332.6	307.3	278.7	346.8	320.8	294.9	355.4	331.0	308.9
	SHC	169.6	213.2	271.5	190.4	246.4	294.9	210.1	276.8	308.9
	kW	32.48	31.01	29.35	33.30	31.80	30.29	33.81	32.39	31.11
105	TC	325.3	299.8	272.2	339.1	313.1	288.5	347.5	323.3	302.6
	SHC	166.9	210.2	265.6	187.8	243.3	288.5	207.5	273.4	302.6
	kW	33.49	31.93	30.24	34.34	32.74	31.24	34.85	33.37	32.10
115	TC	311.0	286.2	261.5	323.8	298.6	277.4	331.2	308.5	291.0
	SHC	161.6	204.7	255.8	182.4	237.3	277.4	202.1	267.0	290.9
	kW	35.38	33.58	31.79	36.30	34.48	32.94	36.84	35.20	33.92

38AKS034/40RM034 WITH STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		9000			12,000			15,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	378.5	349.4	319.1	393.6	364.1	338.1	402.6	375.7	354.0
	SHC	195.3	247.7	311.0	221.4	286.4	338.1	244.2	322.7	354.0
	kW	30.46	29.18	27.84	31.13	29.83	28.68	31.52	30.34	29.38
95	TC	363.6	335.2	307.9	377.5	349.0	326.3	385.6	360.2	341.7
	SHC	189.7	242.1	300.8	215.9	280.3	326.3	238.5	315.9	341.7
	kW	32.71	31.20	29.75	33.45	31.94	30.73	33.88	32.53	31.55
100	TC	355.9	327.8	302.0	369.2	341.3	320.2	376.8	352.2	335.3
	SHC	186.7	239.2	295.5	213.1	277.1	320.2	235.6	312.4	335.3
	kW	33.83	32.21	30.71	34.61	32.99	31.76	35.05	33.62	32.64
105	TC	348.1	319.8	295.0	361.1	333.1	313.3	368.4	344.1	328.4
	SHC	183.8	236.0	289.2	210.4	273.8	313.3	232.8	308.8	328.4
	kW	34.89	33.16	31.64	35.69	33.97	32.75	36.14	34.64	33.70
115	TC	331.9	304.5	282.6	343.8	316.8	300.3	350.2	327.4	314.8
	SHC	177.7	229.9	277.9	204.5	267.3	300.3	226.7	301.5	314.8
	kW	36.89	34.90	33.32	37.75	35.80	34.60	38.22	36.57	35.65

LEGEND

— — Out of Range
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

38AKS034/40RM028 WITH HIGH-CAPACITY 4-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		7500			10,000			12,500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	368.7	338.3	309.5	387.9	357.4	328.0	401.1	370.3	340.7
	SHC	147.1	197.7	247.2	165.2	229.0	290.7	182.6	258.3	328.6
	kW	30.30	28.87	27.47	31.20	29.77	28.38	31.83	30.38	28.99
95	TC	353.9	324.5	299.7	371.8	342.6	314.2	383.7	354.0	325.2
	SHC	142.9	193.1	243.2	161.1	224.3	285.4	178.3	253.6	3252
	kW	32.14	30.57	28.88	33.09	31.57	30.02	33.72	32.15	30.61
100	TC	346.0	317.4	290.1	363.4	334.7	307.1	374.7	345.7	318.5
	SHC	140.7	190.8	239.7	158.9	221.9	282.5	176.2	251.2	318.5
	kW	33.07	31.42	29.84	34.05	32.43	30.84	34.67	33.05	31.49
105	TC	338.2	310.3	283.5	354.8	326.6	299.5	365.6	337.3	311.5
	SHC	138.6	188.4	237.2	156.7	219.5	279.5	174.0	248.8	311.5
	kW	34.00	32.30	30.65	35.00	33.30	31.64	35.63	33.95	32.37
115	TC	326.3	300.2	269.7	337.0	310.2	284.6	347.0	320.1	298.1
	SHC	135.6	185.1	231.9	152.3	214.7	273.2	169.8	244.2	298.1
	kW	36.68	33.80	32.15	36.79	34.96	33.19	37.47	35.65	34.14

38AKS034/40RM034 WITH HIGH-CAPACITY 4-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		9000			12,000			15,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	392.5	360.8	330.6	410.5	378.6	348.0	422.4	390.3	362.6
	SHC	162.3	221.7	279.7	183.6	258.3	329.0	204.0	292.9	362.6
	kW	31.43	29.95	28.53	32.26	30.78	29.35	32.80	31.34	30.03
95	TC	376.4	345.9	316.5	392.9	362.3	333.5	403.9	373.2	349.2
	SHC	157.8	217.0	274.5	179.2	253.6	322.5	199.7	288.3	349.2
	kW	33.35	31.75	30.17	34.23	32.60	31.08	34.80	33.19	31.92
100	TC	368.0	338.0	309.4	383.9	353.9	325.7	394.5	364.6	342.2
	SHC	155.5	214.5	271.7	177.0	251.2	318.6	197.7	285.8	342.2
	kW	34.32	32.64	30.99	35.19	33.52	31.93	35.81	34.14	32.87
105	TC	359.2	330.1	302.1	374.7	345.4	317.9	385.1	355.5	335.2
	SHC	153.2	212.0	268.9	174.9	248.8	317.9	195.6	283.3	335.2
	kW	35.26	33.53	31.82	36.18	34.45	32.79	36.81	35.05	33.84
115	TC	341.5	313.7	287.3	355.9	328.0	303.4	365.1	336.8	320.5
	SHC	148.6	207.0	263.2	170.5	244.0	303.4	191.0	278.0	320.5
	kW	37.09	35.20	33.39	38.06	36.19	34.50	38.66	36.78	35.67

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. Evaporator fan heat not deducted from ratings.
3. Ratings based on approximately 12 F superheat leaving coil.
4. Formulas:

$$\text{Leaving db} = \text{entering db} - \frac{\text{sensible heat capacity (Btuh)}}{1.1 \times \text{cfm}}$$

Leaving wb = wet-bulb temperature corresponding to enthalpy of air leaving coil (h_{lwb}).

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where h_{ewb} = enthalpy of air entering coil.

5. SHC is based on 80 F db temperature of air-entering evaporator coil.

Electrical data

38AKS028-044

UNIT 38AKS	NOMINAL VOLTAGE	VOLTAGE RANGE*		FLA	COMPRESSOR		FAN MOTORS		POWER SUPPLY		
	(3 Ph, 60-Hz)	Min	Max		RLA	LRA	Qty	FLA (ea)	MCA	MOCP†	ICF
028	208/230	187	254	102.2	89.8	446	2	6.2	124.6	200	452.2
	380**	342	418	53.3	45.5	247		3.9	64.7	110	250.9
	460	414	508	49.8	43.6	223		3.1	60.7	100	226.1
	575	518	632	43.3	36.5	164		3.4	52.5	80	167.4
034	208/230	187	254	118.4	106.5	506	2	6.2	145.5	250	512.2
	380**	342	418	60.4	52.6	280		3.9	72.5	125	283.9
	460	414	508	56.2	50.0	253		3.1	68.7	110	256.1
	575	518	632	45.3	38.5	176		3.4	54.9	90	179.4
044	208/230	187	254	165.6	147.5	690	3	6.2	203.0	350	702.4
	380**	342	418	91.2	79.5	382		3.9	111.1	175	389.8
	460	414	508	74.7	65.4	345		3.1	91.0	150	351.2
	575	518	632	67.3	57.1	276		3.4	81.5	125	282.8

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning, and Refrigeration
ICF — Maximum Instantaneous Current Flow during starting. (The point in the starting sequence where the sum of the LRA for the starting compressor, plus the total RLA for all running compressors, plus the total FLA for all running motors is maximum.)
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (Complies with National Electrical Code [NEC], Section 430-24)
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
UL — Underwriters' Laboratories

*Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed minimum and maximum limits.
†Fuse or HACR circuit breaker.
**The 380-v units are export models not listed with UL or UL, Canada.

Application data — 38AKS028-044

Installation

Select equipment to match or to be slightly less than peak load. This provides better humidity control, less unit cycling, and less part-load operation.

When selecting vapor line sizes, oil return should be evaluated, particularly at part-load conditions.

The indoor fan must always be operating when outdoor fan is operating.

Unit cycles should be limited to 3 or less per hour.

Multiple outdoor units may be used with a single indoor unit; this involves multiple refrigeration circuits.

IMPORTANT: When application is in a variable air volume (VAV) system, total building load is not the sum of the individual peak loads. If individual peak loads are summed, the equipment tends to be oversized for the load.

To minimize return-air temperature extremes, use the equipment room as a return-air plenum when applying VAV systems with supply-to-return air recycle as used with Carrier VVT® Control Systems.

IMPORTANT: Condensing units applied in VVT or VAV systems must have field-supplied and installed accumulators. Order part number 38AK500410 from Service Parts.

Indoor equipment should be selected at no less than 300 cfm/ton.

OPERATING LIMITS

Maximum Outdoor Ambient	115 F
Minimum Outdoor Ambient	Additional head pressure control may be required below 35 F outdoor ambient.
Minimum Return-Air Temperature	55 F
Maximum Return-Air Temperature	95 F
Normal Acceptable Saturation Suction Temperature Range	30 to 55 F
Maximum Discharge Temperature	295 F
Minimum Discharge Superheat	60 F

MINIMUM OUTDOOR-AIR OPERATING TEMPERATURE (F)

UNIT 38AKS	COMPR CAP. (%)	COND TEMP (F)	MIN OUTDOOR TEMP	
			Standard Unit	Low Ambient Control
028	100 67 33	90 80 70	31 35 43	–20
034	100 67 33	90 80 70	30 34 42	
044	100 67 33	90 80 70	25 30 35	

MAXIMUM LIQUID LIFT

UNIT 38AKS	FT
028	76
034	67
044	76

REFRIGERANT PIPING SIZES

SINGLE SUCTION RISERS

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, (Ft)									
	16-25		26-50		51-75		76-100		101-200	
	L	S	L	S	L	S	L	S	L	S
028	7/8	1 5/8	7/8	2 1/8*	7/8	2 1/8*	7/8	2 1/8*	7/8	2 1/8*
034	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	1 1/8	2 1/8	1 1/8	2 5/8*
044	7/8	2 1/8	7/8	2 1/8	1 1/8	2 5/8*	1 1/8	2 5/8*	1 1/8	2 5/8*

LEGEND

L — Liquid Line
S — Suction Line

NOTE: Liquid and suction line sizes are OD (in.)

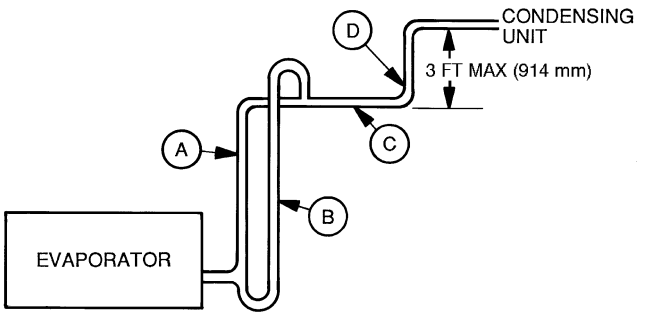
* IMPORTANT: Requires a double suction riser, if evaporator is below condensing unit. See table below.

DOUBLE SUCTION RISERS

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, (Ft)											
	26-50			51-75			76-100			101-200		
	A	B	C	A	B	C	A	B	C	A	B	C
028	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8
034	—	—	—	—	—	—	—	—	—	1 5/8	2 1/8	2 5/8
044	—	—	—	1 5/8	2 1/8	2 5/8	1 5/8	2 1/8	2 5/8	1 5/8	2 1/8	2 5/8

NOTE: A, B, and C dimensions relate to reference diagram below.

SUCTION LINE PIPING



LEGEND

A — Suction Riser *Without* Trap
B — Suction Riser *With* Trap
C — Horizontal Suction Line to Condensing Unit
D — Short Vertical Riser:
38AKS028 — 1 5/8 in. OD
38AKS034, 044 — 2 1/8 in. OD

Do NOT bury refrigerant piping underground.

Field-supplied Refrigerant Specialty parts are shown in the table on the following page.

Application data — 38AKS028-044 (cont)

REFRIGERANT SPECIALTIES PART NUMBERS

UNIT	LIQUID LINE SIZE (in.)	LIQUID LINE SOLENOID VALVE (LLSV)	SIGHT GLASS	FILTER DRIER
38AKS028	7/8	*	AMI-1TT7	C-487
38AKS034	7/8	*	AMI-1TT7	C-487
	1 1/8	*	AMI-1TT9	C-969
38AKS044	7/8	*	AMI-1TT7	C-967
	1 1/8	*	AMI-1TT9	C-969

*Shipped loose with the condensing unit for field installation.

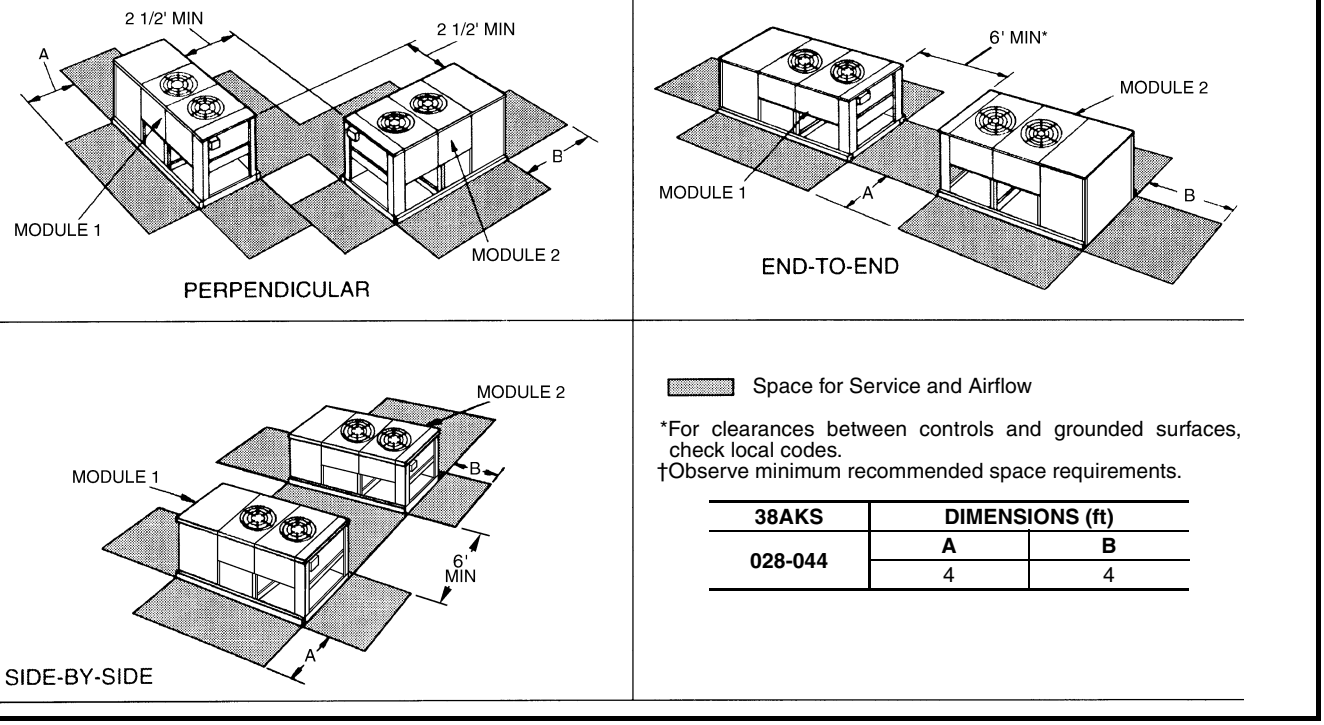
E-coated coils

E-coated aluminum-fin coils have a flexible and durable epoxy coating uniformly applied to all coil surfaces. Unlike brittle phenolic dip and bake coatings, E-coating provides superior protection with unmatched flexibility, edge coverage, metal adhesion, thermal performance, and most importantly, corrosion resistance.

E-coated coils provide this protection since all coil surfaces are completely encapsulated from environmental contamination. This coating is especially suitable in industrial environments.

E-coated copper-fin coils have the same flexible and durable epoxy coating as E-coated aluminum-fin coils. However, this option combines the natural salt and environmental resistance of all-copper construction with high levels of corrosion protection. This coating is recommended in harsh combinations of coastal and industrial environments.

Multiple condensing unit arrangements*

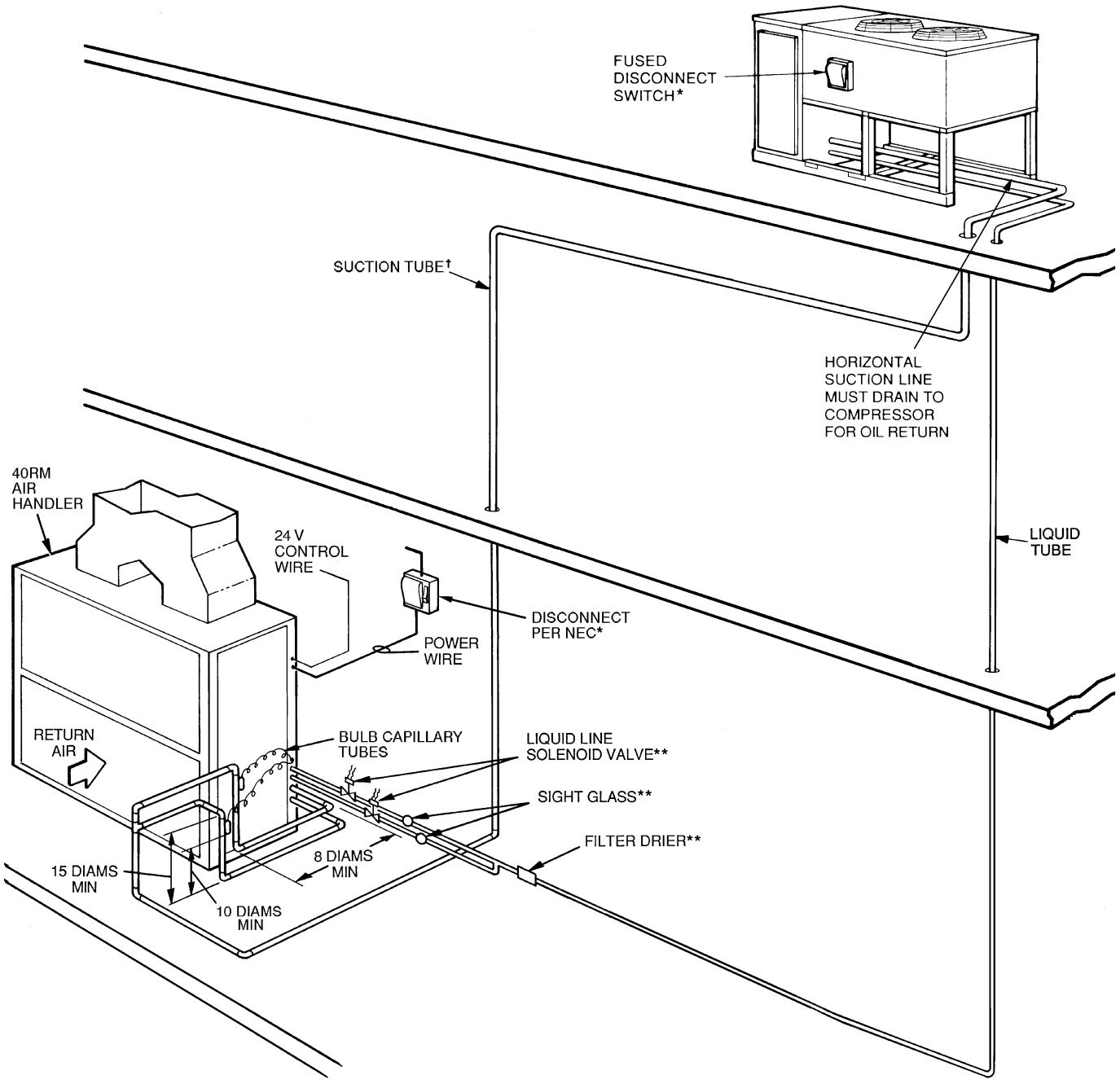


*For clearances between controls and grounded surfaces, check local codes.
†Observe minimum recommended space requirements.

38AKS	DIMENSIONS (ft)	
	A	B
028-044	4	4

Typical piping and wiring

ROOFTOP INSTALLATION — 38AKS028-044



LEGEND

NEC — National Electrical Code
TXV — Thermostatic Expansion Valve
Piping

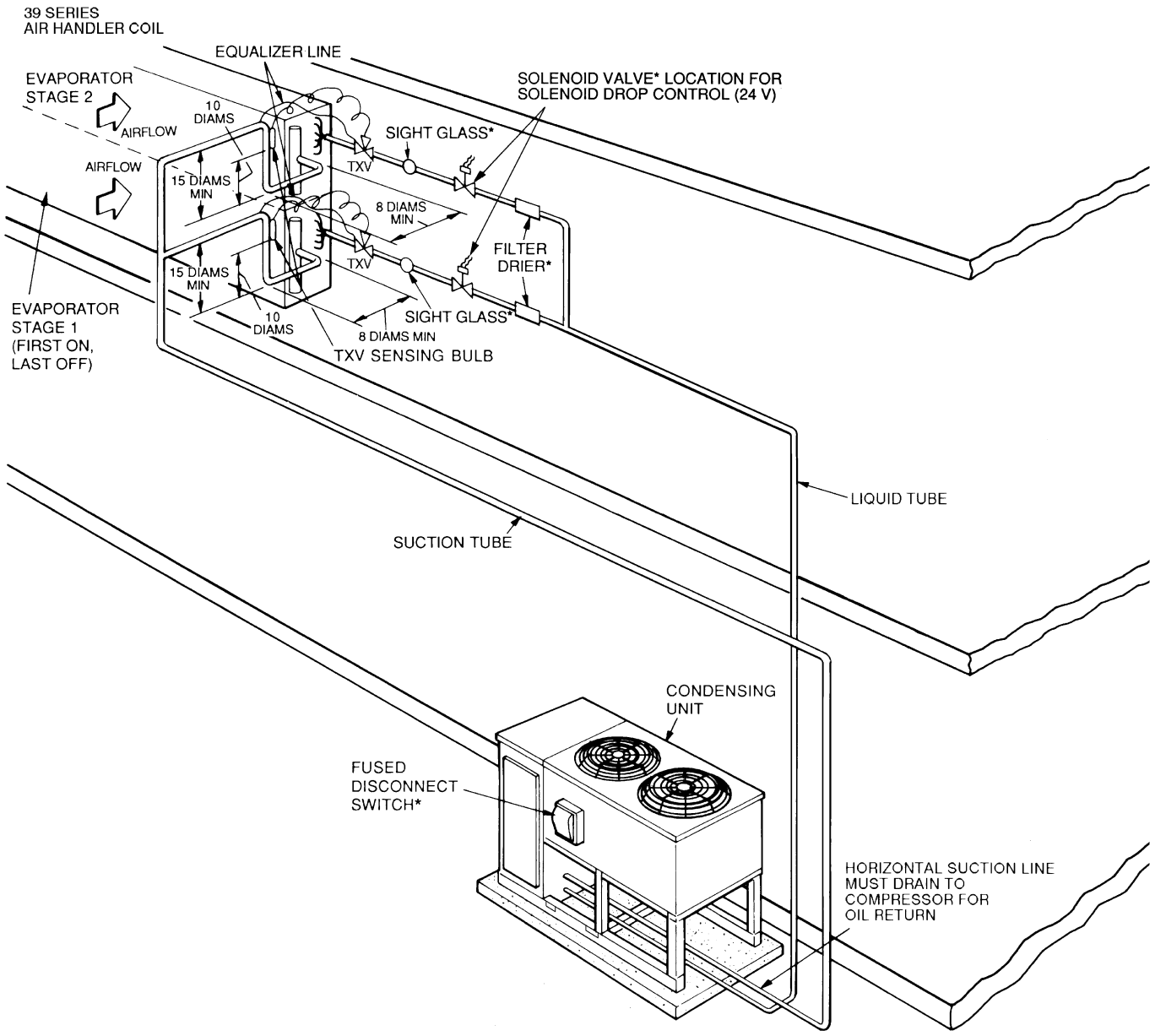
*Field supplied.
†Double riser may be required. Consult Application section for details.
**Refer to Refrigerant Specialties table.

NOTES:

1. All piping must follow standard refrigerant piping techniques. Refer to Carrier System Design Manual for details.
2. All wiring must comply with the applicable local and national codes.
3. Wiring and piping shown are general points-of-connection guides only and are not intended for, or to include all details for, a specific installation.
4. Liquid line solenoid valve (solenoid drop control) is recommended to prevent refrigerant migration to the compressor.
5. Internal factory-supplied TXVs not shown.

Typical piping and wiring (cont)

GROUND-LEVEL INSTALLATION — 38AKS028-044



LEGEND

TXV — Thermostatic Expansion Valve

Piping

*Field supplied.

NOTES:

1. All piping must follow standard refrigerant piping techniques. Refer to Carrier System Design Manual for details.
2. All wiring must comply with the applicable local and national codes.
3. Wiring and piping shown are general points-of-connection guides only and are not intended for, or to include all details for, a specific installation.
4. Liquid line solenoid valve (solenoid drop control) is recommended to prevent refrigerant migration to the compressor.

Guide specifications — 38AKS028-044

Commercial Air-Cooled Condensing Units

HVAC Guide Specifications

Size Range: **25 to 40 Tons, Nominal**

Carrier Model Number: **38AKS**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor-mounted, air-cooled condensing unit suitable for on-the-ground or rooftop installation. Unit shall consist of a semi-hermetic reciprocating compressor, an air-cooled coil, propeller-type condenser fans, and a control box. Unit shall discharge supply air upward as shown on contract drawings. Unit shall be used in a refrigeration circuit to match a packaged fan coil unit.

1.02 QUALITY ASSURANCE

A. Unit shall be rated in accordance with ARI Standard 365, latest edition and shall be certified and listed in the latest ARI directory.

B. Unit shall be manufactured in a facility registered to the ISO 9001:2000 manufacturing quality standard.

C. Unit construction shall comply with latest edition of ANSI/ASHRAE and with NEC.

D. Unit shall be constructed in accordance with UL standards and shall carry the UL and UL, Canada label of approval.

E. Unit cabinet shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).

F. Air-cooled condenser coils shall be leak tested at 150 psig and pressure tested at 450 psig.

1.03 DELIVERY, STORAGE AND HANDLING

Unit shall be shipped as single package only, and shall be stored and handled per unit manufacturer's recommendations.

1.04 WARRANTY (FOR INCLUSION BY SPECIFYING ENGINEER.)

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory assembled, single piece, air-cooled condensing unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, holding charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet:

1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a prepainted, baked enamel finish.
2. End unit access panel shall be hinged for compressor and control box service access.
3. Lifting holes shall be provided to facilitate rigging.

C. Fans:

1. Condenser fans shall be direct-drive propeller type, discharging air vertically upward.
2. Condenser fan motors shall be totally enclosed, 3-phase type with class B insulation and permanently lubricated bearings.
3. Shafts shall have inherent corrosion resistance.
4. Fan blades shall be statically and dynamically balanced.
5. Condenser fan openings shall be equipped with PVC-coated steel wire safety guards.

D. Compressor:

1. Compressor shall be serviceable, reciprocating, semi-hermetic type.
2. Compressor shall be equipped with an automatically reversible oil pump, operating oil charge, suction and discharge shutoff valves, and an insert-type, factory-sized crankcase heater to control oil dilution.
3. Compressor shall be mounted on spring vibration isolators with an isolation efficiency of no less than 95%.
4. Compressor speed shall not exceed 1750 rpm.
5. Compressor shall unload using suction cutoff unloading (electrical solenoid unloading shall be available as an accessory).

E. Condenser Coil:

1. Condenser coil shall be air cooled, circuited for integral subcooler.
2. Coil shall be constructed of aluminum fins mechanically bonded to internally grooved, seamless copper tubes which are then cleaned, dehydrated, and sealed.
3. Coil shall be protected by a sheet metal casing to eliminate the need for wind baffles for low ambient temperature operation.
4. Coil shall be protected to avoid damage due to the elements and vandalism.

F. Refrigeration Components:

Refrigeration circuit components shall include hot gas muffler, high-side pressure relief device, liquid line shut-off valve, suction and discharge shutoff valves, holding charge of refrigerant R-22, and compressor oil.

G. Controls and Safeties:

1. Minimum control functions shall include:
   a. Power and control terminal blocks.
   b. Three-minute anti-short-cycling timer to prevent compressor short-cycling.
   c. Lockout on auto-reset safety until reset from thermostat.

d. Capacity control on the compressor shall be by suction cutoff unloaders in response to compressor suction pressure. Electric solenoid unloading shall be available as an accessory.

e. A 115-v solenoid shall be provided for solenoid drop control.

f. Head pressure control to 35 F by fan cycling. One condenser fan shall be cycled by discharge pressure to maintain proper head pressure.

g. Winter start control to prevent nuisance trip-outs at low ambient temperatures.

2. Minimum safety devices shall include:

Automatic reset (after resetting first at control circuit power supply)

a. High discharge-pressure cutout.

b. Low suction-pressure cutout.

c. Condenser fan motors to be protected against overload or single-phase condition by internal overloads.

Manual reset at the unit

a. Low oil-pressure cutout.

b. Compressor electrical overload protection through the use of definite-purpose contactors and calibrated, ambient-compensated, magnetic-trip circuit breakers. Circuit breakers shall open all 3 phases in the event of an overload in any one of the phases or a single-phase condition.

H. Operating Characteristics:

1. The capacity of the condensing unit shall meet or exceed _____ Btuh at a suction temperature of _____ F. The power consumption at full load shall not exceed _____ kW.

2. The combination of the condensing unit and the evaporator or fan coil unit shall have a total net cooling capacity of _____ Btuh or greater at conditions of: _____ cfm entering-air temperature at the evaporator at _____ F wet bulb and _____ F dry bulb, and air entering the condensing unit at _____ F.

3. The system shall have an EER of _____ Btuh/Watt or greater at standard ARI conditions.

I. Electrical Requirements:

1. Nominal unit electrical characteristics shall be _____ v, 3-ph, 60 Hz. The unit shall be capable of satisfactory operation within voltage limits of _____ v to _____ v.

2. Unit electrical power shall be single point connection.

3. Unit control circuit shall contain a 24-v transformer for unit control, with capacity to operate an indoor fan interlock.

J. Special Features:

1. Low-Ambient Control:

Control shall regulate fan motor speed in response to the saturated condensing temperature of the unit. The control shall be capable of maintaining a condensing temperature of 100 F ± 10° F with outdoor temperatures at –20 F (motor change required).

2. Electric Solenoid Unloader:

Unloader valve piston, coil, and hardware shall be supplied to convert any pressure-operated compressor unloader to 115-v electric unloading. Control box or field-supplied step controller shall be provided for electrical unloading.

3. Hot-Gas Bypass:

A hot-gas bypass valve and a 115-v pilot line solenoid valve shall be provided for low-load operation of the refrigeration system.

4. Part-Winding Start:

Part-winding start shall be provided to reduce inrush current and locked rotor amps on start-up.

5. Gage Panel:

A gage panel package shall be provided which includes a suction and discharge pressure gage for the refrigerant circuit.

6. Control Box:

Control box shall be provided to allow system to operate as a VAV system.

7. Optional Condenser Coil Materials:

a. Pre-Coated Aluminum-Fin Coils:

Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

b. Copper-Fin Coils:

Shall be constructed of copper-fins mechanically bonded to copper-tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to minimize potential for galvanic corrosion between the coil and pan. All copper construction shall provide protection in moderate coastal environments.

c. E-Coated Aluminum-Fin Coils:

Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss requirements of 60° of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to a minimum of 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum fins mechanically bonded to copper tubes.

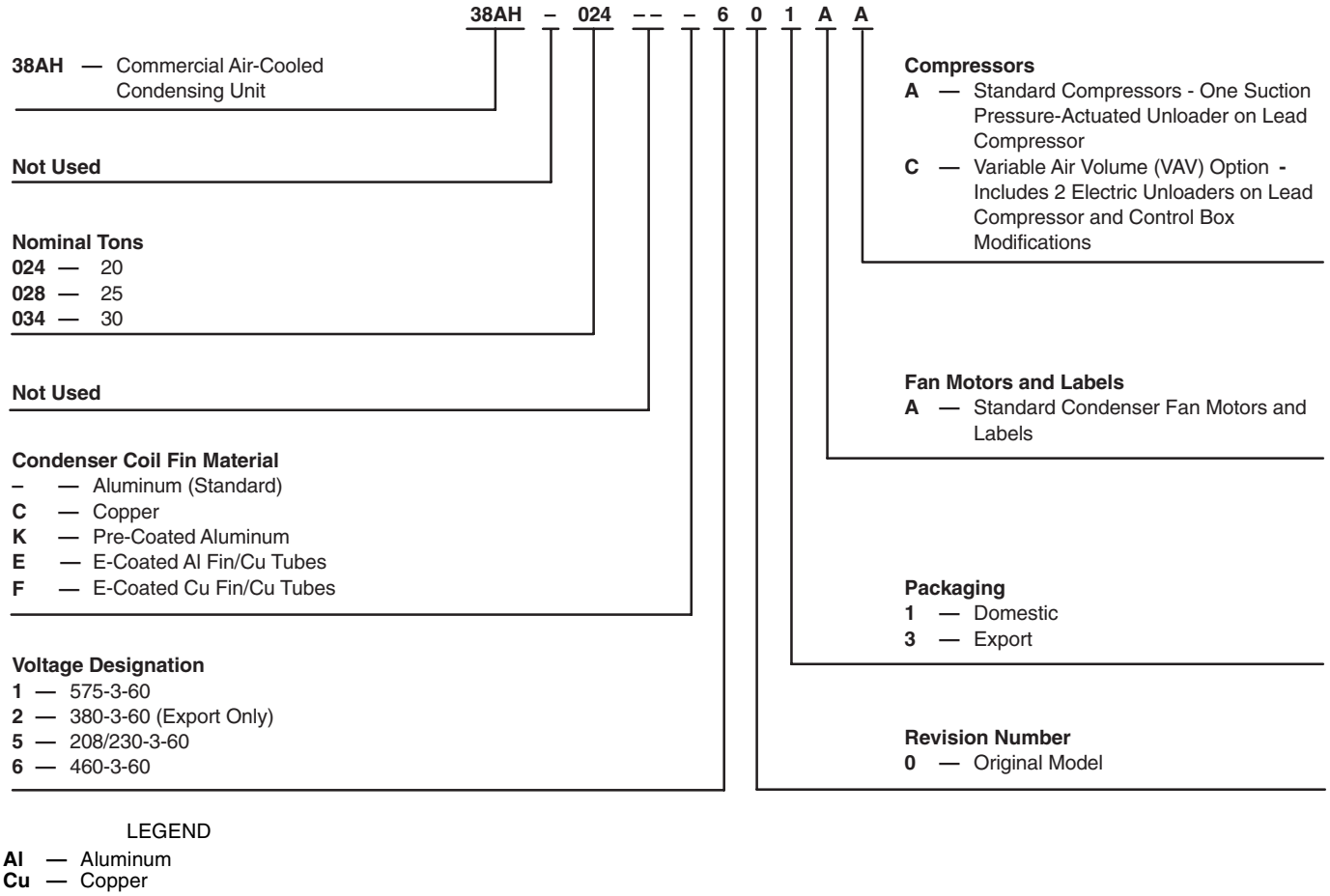
d. E-Coated Copper-Fin Coils:

Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss requirements of 60° of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to a minimum of 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be copper-fins mechanically bonded to copper-tubes with copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between the coil and pan.

8. Thermostat Controls:
   a. Programmable multi-stage thermostat with 7-day clock, holiday scheduling, large backlit display, remote sensor capability, and Title 24 compliance.
   b. Commercial Electronic Thermostat with 7-day timeclock, auto-changeover, multi-stage capability, and large LCD temperature display.
   c. Non-programmable thermostat with fan switch subbase.
   d. Carrier PremierLink™ Controller:

      This control will function with CCN and ComfortVIEW™ software. It shall also be compatible with *Comfort*Link™ controllers. It shall be ASHRAE 62-99 compliant and Internet ready. It shall accept a CO_2 sensor in the conditioned space and be Demand Control Ventilation (DCV) ready. The communication rate must be 38.4K or faster. It shall include an integrated economizer controller.

Model number nomenclature — 38AH024-034



LEGEND

Al — Aluminum
Cu — Copper

Quality Assurance

Certified to ISO 9001:2000

Physical data

38AH024-034 UNITS

UNIT 38AH	024		028		034	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
NOMINAL CAPACITY (tons)*	20		25		30	
OPERATING WEIGHT (lb)						
With Aluminum-Fin Coil (standard)	1760		1820		1880	
With Copper-Fin Coil (optional)	1923		1982		2097	
REFRIGERANT, TYPE†	R-22					
Operating Charge, Typical (lb)	20	20	20	20	25	25
Shipping Charge (lb)	3	3	3	3	3	3
COMPRESSOR	Reciprocating Semi-Hermetic					
Qty...Model	1...06DH824	1...06DA824	1...06DH328	1...06DA328	1...06DH328	1...06DA537
No. Cylinders (per circuit)	6	6	6	6	6	6
Speed (rpm)	1750	1750	1750	1750	1750	1750
Oil Charge Per Circuit (pt)	10					
Capacity Steps (%)	67**,33††	—	67**,33††	—	67**,33††	—
Unloader Setting (psig)	Factory Installed					
Load	76	—	76	—	76	—
Unload	58	—	58	—	58	—
CONDENSER FANS	Propeller Type — Direct Driven					
Qty...RPM	2...1140					
Diameter (in.)	30		30		30	
Nominal Hp	1.0		1.0		1.0	
Nominal Airflow (cfm)	16,700		16,700		15,700	
Watts (total)	1550					
CONDENSER COIL	Enhanced Copper Tubes, Lanced Aluminum Fins					
Rows...Fins/in.	2...19		2...19		3...17	
Face Area (sq ft)	39.20		39.20		39.20	
Storage Cap. (lb)***	37.7		37.7		56.6	
CONTROLS						
Pressurestat (psig)						
High Pressure						
Open	426 ± 7					
Close	320 ± 20					
Low Pressure						
Open	27 ± 3					
Close	44 ± 5					
Oil Pressure	Manual Reset					
Open	6.0					
Close	8.8					
FAN CYCLING CONTROLS						
No. 2 Fan:						
Temp Close (F)	70 ± 3					
Temp Open (F)	60 ± 3					
PRESSURE RELIEF						
Location	Liquid Line, Suction Line, Compressor					
Temperature (F)	210					
PIPING CONNECTIONS (in. ODM)						
Suction — in. OD	$1\frac{3}{8}$					
Liquid — in. OD	$\frac{5}{8}$					
Hot Gas Bypass — in. OD	$\frac{5}{8}$					

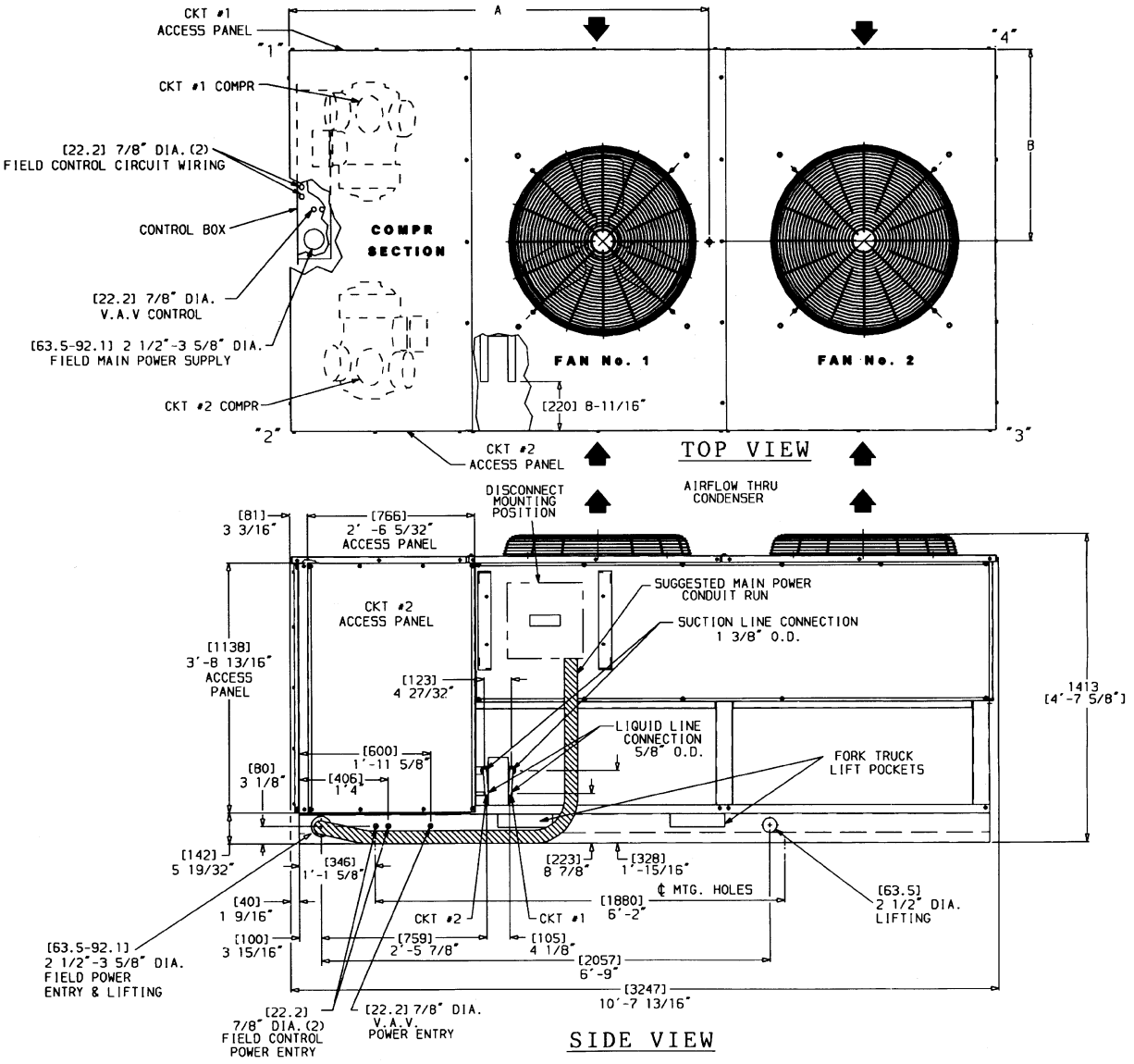
LEGEND

FIOP — Factory-Installed Option

*Rating conditions are 80 F db, 67 F wb at 95 F ambient temperature.
†Typical operating charge with 25 ft of interconnecting piping. Operating charge is approximate for maximum system capacity.
**Standard unit — single suction pressure-actuated unloader on compressor no. 1.
††VAV FIOP — two electrically actuated unloaders on compressor no. 1.
***Condenser 80% full of liquid R-22 at 120 F.

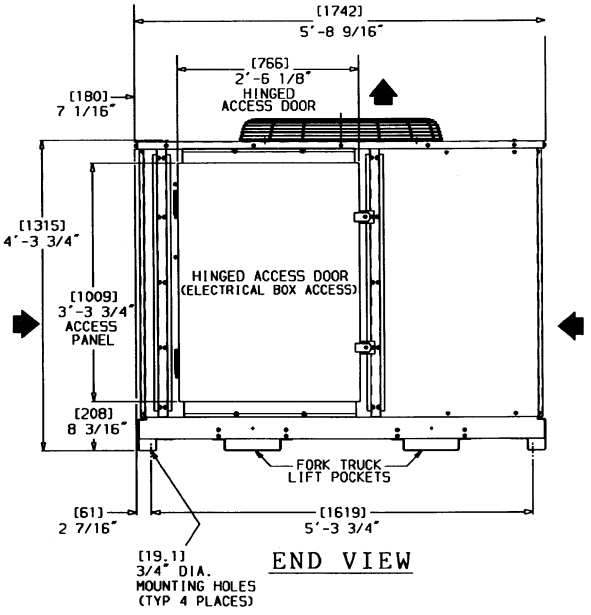
NOTE: Refer to Unloading Sequences table, page 44 for additional capacity step data.

Dimensions



NOTES:
1. There must be 4 ft [1220 mm] for service and for unrestricted airflow on all sides of unit.
2. There must be minimum 8 ft [2440 mm] clear air space above unit.
3. "C" in the package number indicates copper coils.
4. Dimensions in [ ] are in millimeters.
5. The approximate operating weight of the unit is shown below.
6. Certified dimensional drawing is available on request.

UNIT 38AH	CORNER WEIGHT — lb [kg]				CENTER OF GRAVITY		TOTAL UNIT WT lb [kg]
	"1"	"2"	"3"	"4"	A Dim. in. [mm]	B Dim. in. [mm]	
024	631.6 [286.5]	577.6 [262.0]	263.1 [119.3]	287.7 [130.5]	40.00 [1016]	32.75 [832]	1760 [798.3]
024C	666.5 [302.3]	609.5 [276.5]	309.0 [140.2]	337.9 [153.3]	43.00 [1092]		1923 [872.3]
028	658.7 [298.8]	602.4 [273.3]	267.0 [121.1]	291.9 [132.4]	39.25 [997]		1820 [825.6]
028C	693.0 [314.3]	633.8 [287.5]	313.0 [142.0]	342.2 [155.2]	42.25 [1073]		1982 [899.0]
034	667.0 [302.5]	610.0 [276.7]	288.0 [130.7]	315.0 [142.9]	41.00 [1041]		1880 [853.0]
034C	718.3 [325.8]	656.8 [297.9]	344.8 [156.4]	377.0 [171.0]	44.00 [1117]		2097 [951.2]



Performance data

CONDENSING UNIT RATINGS

38AH024

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	157	143	136	129	115
	kW	14.1	14.9	15.2	15.5	16.0
	SDT	105	115	120	125	135
25	TC	178	163	156	149	134
	kW	14.7	15.6	16.0	16.4	17.0
	SDT	106	116	121	126	135
30	TC	198	183	176	168	153
	kW	15.3	16.3	16.8	17.3	18.1
	SDT	107	117	121	126	135
35	TC	221	205	197	189	173
	kW	15.9	17.1	17.6	18.1	19.1
	SDT	109	118	123	128	137
40	TC	244	227	219	210	193
	kW	16.6	17.9	18.5	19.0	20.1
	SDT	111	120	125	129	138
45	TC	270	251	243	233	215
	kW	17.2	18.6	19.3	19.9	21.1
	SDT	113	122	127	131	140
50	TC	295	276	266	257	237
	kW	17.8	19.4	20.1	20.8	22.1
	SDT	116	125	129	133	142

38AH028

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	187	173	167	160	147
	kW	17.1	18.1	18.6	19.1	19.9
	SDT	107	116	121	126	135
25	TC	209	194	187	180	166
	kW	17.9	19.1	19.6	20.1	21.1
	SDT	109	118	123	127	137
30	TC	231	216	208	200	185
	kW	18.7	20.0	20.6	21.2	22.2
	SDT	111	120	124	129	138
35	TC	256	239	231	223	206
	kW	19.5	20.9	21.6	22.2	23.4
	SDT	113	122	126	131	140
40	TC	282	263	254	245	228
	kW	20.3	21.9	22.6	23.3	24.6
	SDT	115	124	128	133	142
45	TC	310	290	280	271	252
	kW	21.1	22.8	23.6	24.4	25.9
	SDT	118	126	131	135	144
50	TC	338	317	306	296	275
	kW	22.0	23.8	24.6	25.5	27.1
	SDT	120	129	133	138	146

38AH034

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	223	206	199	190	175
	kW	21.2	22.5	23.1	23.7	24.8
	SDT	107	117	122	127	137
25	TC	249	232	224	215	209
	kW	22.2	23.6	24.2	24.9	26.2
	SDT	109	118	123	128	137
30	TC	276	258	249	241	222
	kW	23.1	24.7	25.4	26.2	27.6
	SDT	110	119	124	129	138
35	TC	307	287	277	267	248
	kW	24.2	25.9	26.7	27.6	29.0
	SDT	112	121	126	130	140
40	TC	336	314	305	294	274
	kW	25.3	27.1	28.0	28.9	30.5
	SDT	115	123	128	132	141
45	TC	369	346	335	324	302
	kW	26.3	28.3	29.3	30.3	32.0
	SDT	117	126	136	135	144
50	TC	402	378	366	354	330
	kW	27.4	29.6	30.6	31.7	33.6
	SDT	120	128	133	137	146

LEGEND

kW — Compressor Power
SDT — Saturated Discharge Temperature at Compressor (F)
SST — Saturated Suction Temperature (F)
TC — Gross Cooling Capacity (1000 Btuh)

Performance data (cont)

CONDENSING UNIT RATINGS (cont)

38AH024 — CIRCUIT NO. 1 OR 2*

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	78	71	68	65	58
	kW	7.03	7.44	7.61	7.76	8.01
	SDT	105	115	120	125	135
25	TC	89	82	78	74	67
	kW	7.34	7.80	8.01	8.20	8.52
	SDT	106	116	121	126	135
30	TC	99	92	88	84	77
	kW	7.65	8.17	8.41	8.63	9.03
	SDT	107	117	121	126	135
35	TC	111	103	99	95	87
	kW	7.96	8.55	8.82	9.07	9.54
	SDT	109	118	123	128	137
40	TC	122	114	109	105	97
	kW	8.28	8.93	9.23	9.52	10.0
	SDT	111	120	125	129	138
45	TC	135	126	121	117	108
	kW	8.59	9.30	9.64	9.96	10.6
	SDT	113	122	127	131	140
50	TC	148	138	133	128	119
	kW	8.90	9.68	10.0	10.4	11.1
	SDT	116	125	129	133	142

38AH028 — CIRCUIT NO. 1 OR 2*

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	93	87	83	80	74
	kW	8.55	9.07	9.31	9.54	9.97
	SDT	107	116	121	126	135
25	TC	104	97	94	90	83
	kW	8.95	9.53	9.80	10.1	10.5
	SDT	109	118	123	127	137
30	TC	116	108	104	100	93
	kW	9.35	9.99	10.3	10.6	11.1
	SDT	111	120	124	129	138
35	TC	128	120	116	111	103
	kW	9.76	10.5	10.8	11.1	11.7
	SDT	113	122	126	131	140
40	TC	141	132	127	123	114
	kW	10.2	10.9	11.3	11.6	12.3
	SDT	115	124	128	133	142
45	TC	155	145	140	135	126
	kW	10.6	11.4	11.8	12.2	12.9
	SDT	118	126	131	135	144
50	TC	169	158	153	148	138
	kW	11.0	11.9	12.3	12.7	13.5
	SDT	120	129	133	138	146

38AH034 — CIRCUIT NO. 1

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	93	85	82	78	71
	kW	8.69	9.26	9.53	9.78	10.2
	SDT	105	115	120	125	135
25	TC	105	97	93	89	81
	kW	9.02	9.64	9.94	10.2	10.8
	SDT	106	116	121	125	135
30	TC	117	109	105	101	92
	kW	9.34	10.0	10.3	10.7	11.3
	SDT	107	116	121	126	135
35	TC	131	122	117	113	104
	kW	9.70	10.5	10.8	11.2	11.8
	SDT	109	118	123	127	137
40	TC	144	134	130	125	116
	kW	10.1	10.9	11.3	11.7	12.4
	SDT	111	120	124	129	138
45	TC	159	148	143	138	128
	kW	10.4	11.3	11.7	12.2	12.9
	SDT	113	122	127	131	140
50	TC	174	163	157	152	141
	kW	10.8	11.8	12.2	12.7	13.5
	SDT	116	124	129	133	142

38AH034 — CIRCUIT NO. 2

SST (F)		Air Temp Ent Condenser (F)				
		85	95	100	105	115
20	TC	130	121	117	112	104
	kW	12.5	13.2	13.6	13.9	14.6
	SDT	109	118	123	128	138
25	TC	144	135	131	126	117
	kW	13.2	14.0	14.3	14.7	15.4
	SDT	111	120	124	129	139
30	TC	159	149	144	140	130
	kW	13.8	14.7	15.1	15.5	16.3
	SDT	113	122	126	131	140
35	TC	176	165	160	154	144
	kW	14.5	15.4	15.9	16.4	17.2
	SDT	115	124	128	133	142
40	TC	192	180	175	169	158
	kW	15.2	16.2	16.7	17.2	18.1
	SDT	118	126	131	135	144
45	TC	210	198	192	186	174
	kW	15.9	17.0	17.6	18.1	19.1
	SDT	120	129	133	138	147
50	TC	228	215	209	202	189
	kW	16.6	17.8	18.4	19.0	20.1
	SDT	123	132	136	140	149

LEGEND

kW — Compressor Power
SDT — Saturated Discharge Temperature at Compressor (F)
SST — Saturated Suction Temperature (F)
TC — Gross Cooling Capacity (1000 Btuh)

*Circuits no. 1 and 2 on 38AH024 and 028 have identical capacities.

COMBINATION RATINGS

38AH024/40RM016 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		4500/0.03			6000/0.05			7500/0.08		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	231.9	209.9	—	244.2	223.5	203.7	252.5	232.4	213.2
	SHC	113.4	139.3	—	127.0	161.0	203.7	138.6	179.7	213.2
	kW	16.32	15.81	—	16.61	16.13	15.67	16.80	16.33	15.89
95	TC	222.4	202.0	—	233.6	214.6	196.4	241.3	222.8	205.5
	SHC	110.0	135.8	—	123.0	156.7	196.3	134.6	174.9	205.5
	kW	17.77	17.17	—	18.09	17.54	17.01	18.32	17.78	17.27
100	TC	217.8	197.6	179.2	228.6	210.0	192.1	236.2	218.0	201.3
	SHC	108.4	133.8	171.6	121.1	154.4	192.1	132.8	172.5	201.3
	kW	18.46	17.79	17.17	18.82	18.20	17.60	19.07	18.47	17.91
105	TC	212.4	193.1	175.3	222.6	204.9	187.9	229.9	212.5	196.8
	SHC	106.5	131.8	168.2	118.9	152.0	187.9	130.5	169.7	196.8
	kW	19.09	18.34	17.64	19.49	18.80	18.13	19.78	19.10	18.48
115	TC	202.0	183.9	167.1	211.3	194.8	179.0	218.2	201.9	187.8
	SHC	102.8	127.6	161.0	114.6	147.1	179.0	126.4	164.4	187.7
	kW	20.51	19.68	18.92	20.93	20.18	19.46	21.25	20.50	19.86

38AH024/40RM024 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		6000/0.03			8000/0.06			10,000/0.07		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	258.1	236.6	215.6	269.7	248.5	229.3	276.2	257.0	240.4
	SHC	132.6	167.1	207.7	149.3	193.3	229.3	163.9	217.2	240.4
	kW	16.93	16.43	15.94	17.19	16.70	16.26	17.34	16.90	16.52
95	TC	246.6	226.4	207.2	257.1	237.2	220.4	262.7	245.2	231.0
	SHC	128.2	162.9	200.5	144.8	188.6	220.4	159.2	211.8	230.9
	kW	18.47	17.88	17.32	18.78	18.20	17.71	18.94	18.43	18.02
100	TC	241.5	221.5	202.7	251.9	232.0	215.9	257.2	239.9	226.4
	SHC	126.2	160.9	196.5	142.8	186.4	215.9	157.3	209.4	226.4
	kW	19.25	18.58	17.96	19.59	18.93	18.40	19.77	19.20	18.75
105	TC	235.1	215.8	197.9	244.9	225.7	210.8	249.8	233.3	221.1
	SHC	123.8	158.5	192.4	140.3	183.7	210.8	154.6	206.4	221.1
	kW	19.98	19.23	18.53	20.37	19.61	19.03	20.56	19.91	19.43
115	TC	223.2	204.7	188.3	232.3	213.8	200.8	236.5	221.1	210.9
	SHC	119.3	154.0	184.0	135.8	178.7	200.8	150.0	200.8	210.9
	kW	21.47	20.63	19.89	21.89	21.04	20.45	22.08	21.38	20.91

LEGEND

BF — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heating Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The SHC is based on 80 F dry-bulb temperature of air entering evaporator coil. Below 80 F dry-bulb, subtract (correction factor x cfm) from SHC. *Above 80 F dry bulb, add (correction factor x cfm) to SHC.*

BYPASS FACTOR	ENTERING-AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
0.10	0.99	1.98	2.97	3.96	4.95	Use formula below.
0.20	0.88	1.76	2.64	3.52	4.40	
0.30	0.77	1.54	2.31	3.08	3.85	

Interpolation is permissible.
Correction Factor = 1.1 x (1 – BF) x (db – 80).

38AH024/40RM016 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		4500			6000			7500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	247.3	247.3	225.7	262.2	240.8	220.7	273.0	251.1	230.1
	SHC	117.0	117.0	140.5	128.9	159.5	189.5	139.3	176.7	211.9
	kW	16.43	16.43	15.89	16.77	16.27	15.77	17.02	16.52	16.00
95	TC	236.5	215.9	196.4	250.6	230.0	212.4	260.3	239.4	219.4
	SHC	112.5	136.1	158.6	123.9	154.8	185.2	134.8	172.1	206.1
	kW	17.90	17.27	16.64	18.34	17.72	17.13	18.59	17.99	17.38
100	TC	233.0	212.9	191.9	244.7	226.5	206.8	253.8	233.5	213.9
	SHC	111.1	135.0	156.5	121.7	153.6	183.7	132.2	169.6	203.2
	kW	18.95	18.22	17.26	19.09	18.74	17.98	19.37	18.72	18.05
105	TC	225.4	205.9	187.3	240.9	218.8	199.8	247.3	227.5	208.4
	SHC	108.1	131.5	154.3	120.4	150.0	179.4	130.0	167.2	200.3
	kW	19.35	18.62	17.88	20.14	19.10	18.38	20.13	19.42	18.71
115	TC	218.0	202.5	177.8	226.1	207.3	196.3	234.2	215.4	197.3
	SHC	105.2	130.3	149.9	114.8	145.6	178.7	125.4	162.5	193.4
	kW	21.36	19.93	19.10	21.27	20.46	19.60	21.61	20.82	20.02

38AH024/40RM024 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		6000			8000			10,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	275.6	252.5	230.6	289.0	265.9	244.2	298.1	274.5	254.5
	SHC	132.9	166.6	298.6	148.2	191.3	231.4	162.5	214.1	254.5
	kW	17.12	16.60	16.07	17.40	16.91	16.42	17.61	17.11	16.64
95	TC	263.1	241.1	220.0	275.7	253.5	232.8	289.8	261.1	244.3
	SHC	128.2	161.5	193.8	143.4	186.4	225.4	159.6	208.9	244.3
	kW	18.72	18.10	17.45	19.06	18.47	17.85	19.99	18.67	18.19
100	TC	256.7	235.2	214.7	269.0	247.0	226.7	276.4	254.4	239.0
	SHC	125.7	159.2	191.3	141.1	183.9	222.2	155.1	206.5	239.0
	kW	19.49	18.82	18.13	19.88	19.21	18.54	20.08	19.43	18.95
105	TC	250.3	229.3	209.3	261.9	240.3	220.7	269.0	247.5	233.8
	SHC	123.4	156.8	188.8	138.6	181.3	220.7	152.6	203.8	233.8
	kW	20.27	19.53	18.79	20.66	19.93	19.21	20.88	20.18	18.70
115	TC	237.4	217.2	197.7	247.6	227.0	210.1	254.0	233.7	222.7
	SHC	118.5	151.9	183.3	133.6	176.3	210.1	147.6	198.5	222.7
	kW	21.78	20.95	20.07	22.18	21.35	20.62	22.43	21.63	21.16

3. Gross capacities shown do not include a deduction for evaporator fan motor heat.
4. Formulas:

$$t_{ldb} = t_{edb} - \frac{\text{sensible heat capacity (Btuh)}}{1.1 \times \text{cfm}}$$

t_{lwb} = wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.51 \times \text{cfm}}$$

5. Combination ratings are based on a 2° F line loss. For a close-coupled system (less than 15 ft), *add 2%* to ratings. Piping sizes in Refrigerant Pipe Sizes table on page 44 are based on 2° F line loss. All combination ratings are based on R-22.

Performance data (cont)

COMBINATION RATINGS (cont)

38AH024/40RM028 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		7500/0.04			10,000/0.06			12,500/0.08		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	278.4	254.6	235.5	289.1	265.4	250.7	294.9	274.8	263.5
	SHC	149.6	191.9	232.0	170.2	223.7	250.7	190.0	252.2	263.5
	kW	17.39	16.85	16.40	17.64	17.09	16.75	17.77	17.31	17.05
95	TC	265.2	242.4	225.7	275.0	252.3	240.3	279.9	261.3	252.5
	SHC	144.8	187.0	223.0	165.2	218.3	240.3	185.0	246.4	252.2
	kW	19.01	18.35	17.86	19.30	18.64	18.29	19.44	18.90	18.64
100	TC	259.8	237.0	220.9	269.4	246.7	235.6	274.2	255.7	247.8
	SHC	142.8	184.8	218.6	163.2	216.0	235.6	183.1	243.9	247.8
	kW	19.86	19.10	18.56	20.18	19.42	19.05	20.34	19.72	19.46
105	TC	252.5	230.2	215.4	261.6	239.5	229.7	266.1	248.3	241.6
	SHC	140.1	182.1	213.5	160.5	213.1	229.7	180.4	240.7	241.6
	kW	20.66	19.79	19.21	21.02	20.15	19.77	21.19	20.50	20.24
115	TC	239.5	217.6	204.7	248.0	226.4	218.8	251.8	235.0	230.3
	SHC	135.4	177.0	203.7	155.7	207.7	218.7	175.6	234.9	230.3
	kW	22.21	21.22	20.63	22.60	21.62	21.27	22.77	22.01	21.80

38AH028/40RM024 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		6000/0.03			8000/0.06			10,000/0.07		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	281.6	258.4	—	294.8	272.1	248.7	302.9	281.2	260.2
	SHC	141.5	176.0	—	158.4	203.3	248.7	173.3	228.3	260.2
	kW	20.29	19.63	—	20.66	20.02	19.35	20.90	20.28	19.68
95	TC	270.0	247.7	225.1	282.4	260.5	239.2	289.7	269.3	250.5
	SHC	137.1	171.6	216.1	153.9	198.4	239.2	168.7	222.8	250.5
	kW	22.13	21.39	20.64	22.55	21.82	21.11	22.79	22.11	21.48
100	TC	264.3	242.6	221.0	276.1	254.8	234.7	283.0	263.4	245.8
	SHC	134.9	169.5	212.5	151.6	196.0	234.7	166.3	220.1	245.8
	kW	23.00	22.16	21.33	23.45	22.63	21.86	23.71	22.96	22.28
105	TC	258.7	237.2	216.1	270.4	249.1	229.9	276.9	257.6	240.9
	SHC	132.8	167.3	208.2	149.5	193.6	229.8	164.2	217.5	240.9
	kW	23.88	22.97	22.08	24.37	23.47	22.66	24.65	23.83	23.13
115	TC	247.3	227.1	207.8	257.8	237.8	220.9	263.4	245.8	231.5
	SHC	128.4	163.2	201.0	145.0	188.8	220.9	159.4	212.1	231.5
	kW	25.64	24.55	23.50	26.21	25.13	24.22	26.52	25.57	24.79

LEGEND

BF — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heating Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The SHC is based on 80 F dry-bulb temperature of air entering evaporator coil. Below 80 F dry-bulb, subtract (correction factor x cfm) from SHC. *Above 80 F dry bulb, add (correction factor x cfm) to SHC.*

BYPASS FACTOR	ENTERING-AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
0.10	0.99	1.98	2.97	3.96	4.95	Use formula below.
0.20	0.88	1.76	2.64	3.52	4.40	
0.30	0.77	1.54	2.31	3.08	3.85	

Interpolation is permissible.
Correction Factor = 1.1 x (1 – BF) x (db – 80).

38AH024/40RM028 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		7600			10,000			12,500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	299.4	275.5	245.2	309.9	285.9	258.0	311.2	287.3	272.9
	SHC	157.5	204.4	225.2	177.5	236.5	258.0	180.7	241.5	272.9
	kW	17.65	17.15	16.46	17.86	17.37	16.74	17.88	17.40	17.08
95	TC	291.4	262.2	233.1	295.0	271.9	247.6	296.4	273.2	261.4
	SHC	154.7	199.1	219.3	172.3	230.9	247.6	175.6	235.9	261.4
	kW	20.15	18.72	17.91	19.58	18.99	18.31	19.62	19.03	18.71
100	TC	278.1	255.5	227.4	287.6	265.0	242.4	288.9	266.3	255.6
	SHC	150.1	196.8	216.7	169.7	228.2	242.4	173.1	233.2	255.6
	kW	20.16	19.49	18.59	20.43	19.78	19.08	20.46	19.82	19.48
105	TC	270.8	248.7	221.6	280.0	257.9	237.0	281.2	259.1	249.7
	SHC	147.6	194.1	213.8	167.5	225.7	237.0	170.7	230.6	249.7
	kW	20.96	20.24	19.28	21.25	20.56	19.84	21.29	20.60	20.26
115	TC	256.2	235.0	209.6	264.8	243.4	225.8	265.7	244.1	237.9
	SHC	142.5	188.8	206.8	162.1	219.9	225.8	165.3	224.5	237.9
	kW	22.53	21.71	20.64	22.87	22.05	21.30	22.91	22.08	21.84

38AH028/40RM024 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		6000			8000			10,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	302.4	277.4	253.6	318.8	293.3	269.1	329.4	303.6	279.9
	SHC	143.6	177.3	209.7	159.1	202.7	243.6	173.3	225.5	272.3
	kW	20.63	19.94	19.25	21.07	20.40	19.71	21.33	20.68	20.02
95	TC	290.0	266.0	243.1	304.9	280.5	257.5	320.2	290.1	267.4
	SHC	138.7	172.3	204.6	154.0	197.1	238.1	170.5	219.9	267.4
	kW	22.43	21.63	20.83	22.91	22.11	21.33	24.02	22.44	21.68
100	TC	283.8	260.1	237.5	298.0	274.1	251.1	307.3	283.3	261.9
	SHC	136.2	169.7	202.1	151.5	194.5	234.9	165.7	217.5	261.9
	kW	23.32	22.45	21.58	23.82	22.96	22.11	24.14	23.31	22.51
105	TC	277.3	258.7	231.9	290.9	267.4	245.4	300.0	276.4	255.9
	SHC	133.6	169.2	199.5	148.9	192.0	232.2	163.1	214.9	255.9
	kW	24.19	22.96	22.33	24.71	23.80	22.90	25.06	24.15	23.32
115	TC	263.8	241.8	226.3	276.4	254.2	233.6	284.5	262.0	244.9
	SHC	128.5	162.0	197.5	143.7	186.8	226.1	157.9	209.5	244.9
	kW	25.94	24.91	23.87	26.53	25.51	24.53	26.90	25.87	25.05

3. Gross capacities shown do not include a deduction for evaporator fan motor heat.
4. Formulas:

$$t_{ldb} = t_{edb} - \frac{\text{sensible heat capacity (Btuh)}}{1.1 \times \text{cfm}}$$

t_{lwb} = wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.51 \times \text{cfm}}$$

5. Combination ratings are based on a 2° F line loss. For a close-coupled system (less than 15 ft), *add 2%* to ratings. Piping sizes in Refrigerant Pipe Sizes table on page 44 are based on 2° F line loss. All combination ratings are based on R-22.

COMBINATION RATINGS (cont)

38AH028/40RM028 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		7500/0.04			10,000/0.06			12,500/0.08		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	304.2	279.9	256.5	316.4	291.8	272.1	323.5	301.5	285.4
	SHC	159.1	202.1	251.2	179.8	234.5	272.1	199.5	263.9	285.4
	kW	20.93	20.24	19.57	21.28	20.58	20.02	21.48	20.86	20.40
95	TC	291.5	267.4	246.2	303.0	278.7	261.6	309.3	288.3	274.6
	SHC	154.4	197.1	241.7	175.0	229.2	261.6	194.8	258.2	274.6
	kW	22.85	22.05	21.34	23.23	22.42	21.85	23.44	22.74	22.29
100	TC	284.9	261.3	241.3	295.9	272.2	256.4	301.9	281.6	269.2
	SHC	152.0	194.6	237.3	172.6	226.5	256.4	192.3	255.2	269.2
	kW	23.79	22.88	22.11	24.21	23.30	22.69	24.44	23.66	23.18
105	TC	279.0	255.3	236.1	289.8	266.0	251.3	295.6	275.4	264.0
	SHC	149.9	192.2	232.5	170.4	224.0	251.3	190.2	252.5	264.0
	kW	27.74	23.74	22.92	25.20	24.19	23.57	25.44	24.59	24.11
115	TC	265.8	243.1	226.3	275.7	253.0	240.9	280.7	262.0	253.1
	SHC	145.0	187.3	223.5	165.4	218.6	240.9	185.2	246.7	253.1
	kW	26.65	25.42	24.51	27.18	25.95	25.30	27.45	26.44	25.96

38AH028/40RM028 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		6000			8000			10,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	321.7	295.1	270.3	336.2	309.9	285.1	346.1	319.6	297.8
	SHC	156.6	197.5	236.7	174.2	226.5	274.6	190.8	253.4	297.8
	kW	21.19	20.49	19.79	21.56	20.90	20.23	21.83	21.16	20.55
95	TC	307.6	282.6	258.5	321.4	296.3	281.0	330.3	304.8	286.4
	SHC	151.0	191.9	231.1	168.9	221.1	272.5	185.7	247.5	286.4
	kW	23.04	22.24	21.42	23.49	22.71	21.99	23.76	22.98	22.36
100	TC	300.4	276.2	252.6	314.0	289.2	265.9	322.5	297.4	280.7
	SHC	148.4	189.3	228.4	166.4	218.4	265.9	183.0	245.0	280.7
	kW	23.95	23.10	22.22	24.43	23.58	22.71	24.71	23.86	23.26
105	TC	293.5	274.5	246.8	306.3	282.0	260.1	314.4	289.8	274.9
	SHC	145.8	188.5	225.7	163.8	215.7	260.1	180.3	242.1	274.9
	kW	24.86	23.67	23.01	25.34	24.44	23.55	25.63	24.74	24.15
115	TC	279.3	256.5	234.4	290.7	267.5	248.8	298.1	274.8	262.8
	SHC	140.5	181.5	219.8	158.4	210.2	248.8	174.9	236.3	262.8
	kW	26.71	25.68	24.64	27.22	26.19	25.30	27.54	26.52	25.96

38AH028/40RM034 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		9000/0.04			12,000/0.06			15,000/0.08		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	324.3	297.3	276.8	335.5	309.2	294.1	341.6	319.6	289.1
	SHC	174.8	227.1	272.6	201.7	264.2	294.1	223.9	298.0	337.2
	kW	21.51	20.74	20.15	21.83	21.08	20.65	22.00	21.37	20.50
95	TC	310.3	283.6	265.2	320.8	295.0	282.3	326.2	305.1	253.1
	SHC	169.4	221.6	262.1	196.7	258.5	282.3	218.7	291.7	363.3
	kW	23.48	22.59	21.97	23.83	22.96	22.54	24.01	23.30	21.57
100	TC	302.8	276.7	259.5	312.8	287.6	276.3	317.9	297.5	237.4
	SHC	166.6	218.9	257.0	194.0	255.5	276.3	216.0	288.4	374.6
	kW	24.48	23.47	22.81	24.86	23.89	23.46	25.06	24.27	21.96
105	TC	296.6	270.3	253.9	306.4	281.1	270.7	311.3	291.1	221.1
	SHC	164.3	216.4	251.9	191.9	252.9	270.7	213.8	285.5	386.4
	kW	25.48	24.37	23.68	25.90	24.83	24.39	26.10	25.25	22.29
115	TC	281.8	256.6	242.6	290.5	266.6	258.6	294.7	276.0	195.2
	SHC	158.6	210.9	241.6	186.5	247.0	258.6	208.2	278.9	405.2
	kW	27.51	26.15	25.39	27.99	26.69	26.26	28.21	27.20	22.83

38AH028/40RM034 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		9000			12,000			15,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	341.1	313.9	288.0	354.8	327.1	303.5	363.5	323.2	320.5
	SHC	170.3	219.8	266.7	191.9	254.3	303.5	211.1	280.6	320.5
	kW	21.75	21.06	20.38	22.10	21.41	20.75	22.31	20.07	21.22
95	TC	326.4	299.9	274.8	338.7	312.1	292.1	347.0	320.4	307.8
	SHC	165.1	214.3	260.7	186.2	248.6	292.1	205.9	279.6	307.8
	kW	23.72	22.89	22.07	24.08	23.27	22.62	24.34	23.54	23.11
100	TC	318.7	292.7	268.4	330.6	304.6	286.4	338.6	312.6	301.4
	SHC	162.3	211.5	257.6	183.5	245.8	286.4	203.1	276.8	301.4
	kW	24.65	23.77	22.89	25.05	24.18	23.53	25.32	24.46	24.05
105	TC	310.9	291.1	262.1	322.4	297.0	280.3	330.2	304.9	294.9
	SHC	159.6	210.8	254.3	180.5	242.9	280.3	200.5	273.8	294.9
	kW	25.59	24.32	23.70	26.00	25.08	24.43	26.30	25.38	24.98
115	TC	295.2	271.0	248.8	306.0	281.6	268.0	313.1	288.2	282.0
	SHC	154.2	203.3	248.8	175.4	237.2	268.0	195.0	267.0	282.0
	kW	27.49	26.44	25.40	27.96	26.92	26.27	28.27	27.21	26.91

LEGEND

BF — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heating Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The SHC is based on 80 F dry-bulb temperature of air entering evaporator coil. Below 80 F dry-bulb, subtract (correction factor x cfm) from SHC. *Above 80 F dry bulb, add (correction factor x cfm) to SHC.*

BYPASS FACTOR	ENTERING-AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
0.10	0.99	1.98	2.97	3.96	4.95	Use formula below.
0.20	0.88	1.76	2.64	3.52	4.40	
0.30	0.77	1.54	2.31	3.08	3.85	

Interpolation is permissible.
Correction Factor = 1.1 x (1 – BF) x (db – 80).

3. Gross capacities shown do not include a deduction for evaporator fan motor heat.
4. Formulas:

$$t_{ldb} = t_{edb} - \frac{\text{sensible heat capacity (Btuh)}}{1.1 \times \text{cfm}}$$

t_{lwb} = wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.51 \times \text{cfm}}$$

5. Combination ratings are based on a 2° F line loss. For a close-coupled system (less than 15 ft), *add 2%* to ratings. Piping sizes in Refrigerant Pipe Sizes table on page 44 are based on 2° F line loss. All combination ratings are based on R-22.

Performance data (cont)

COMBINATION RATINGS (cont)

38AH034/40RM028 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb		Evaporator Air — Cfm/BF								
		7500/0.04			10,000/0.06			12,500/0.08		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	338.9	312.7	282.3	353.8	326.9	299.0	363.1	337.4	313.5
	SHC	171.9	215.4	274.9	192.9	248.9	299.0	212.7	279.6	313.5
	kW	25.39	24.59	23.67	25.84	25.02	24.18	26.12	25.34	24.62
95	TC	325.5	299.5	271.5	339.6	313.0	288.1	348.2	323.5	302.4
	SHC	167.0	210.0	265.0	187.9	243.3	288.1	207.7	273.5	302.4
	kW	27.53	26.56	25.51	28.06	27.06	26.13	28.38	27.46	26.66
100	TC	319.5	294.4	268.1	332.8	307.2	284.1	340.8	317.3	297.9
	SHC	164.7	208.0	261.8	185.5	240.9	284.1	205.3	270.8	297.9
	kW	28.63	27.54	26.40	29.21	28.10	27.09	29.55	28.53	27.69
105	TC	312.6	287.4	262.1	325.7	300.0	278.2	333.4	310.2	292.0
	SHC	162.2	205.2	256.3	183.1	237.9	278.2	202.8	267.7	292.0
	kW	29.77	28.59	27.41	30.38	29.18	28.16	30.74	29.66	28.81
115	TC	281.0	257.3	237.8	291.8	268.1	253.0	297.7	277.5	265.8
	SHC	150.6	193.0	234.1	171.1	224.8	253.0	190.9	253.4	265.8
	kW	32.40	31.04	29.91	33.03	31.66	30.79	33.37	32.20	31.52

38AH034/40RM034 STANDARD 3-ROW COIL

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm/BF								
		9000/0.04			12,000/0.06			15,000/0.08		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	363.5	334.5	306.8	377.7	348.6	325.5	385.9	360.0	417.3
	SHC	189.6	241.8	299.8	216.0	280.1	325.5	238.6	315.8	244.4
	kW	26.13	25.25	24.41	26.56	25.68	24.98	26.81	26.03	27.76
95	TC	348.8	319.9	294.7	362.1	333.5	313.2	369.6	344.7	362.7
	SHC	184.0	236.0	288.8	210.7	274.0	313.2	233.2	309.1	283.9
	kW	28.40	27.32	26.37	28.90	27.83	27.07	29.19	28.25	28.93
100	TC	341.4	313.6	290.1	353.9	326.4	308.0	360.8	337.2	337.8
	SHC	181.3	233.5	284.7	207.9	271.2	308.0	230.3	305.8	302.0
	kW	29.58	28.37	27.35	30.12	28.93	28.13	30.42	29.40	29.42
105	TC	334.2	306.1	283.6	346.4	318.8	301.6	353.1	329.6	315.0
	SHC	178.5	230.6	278.8	205.4	268.1	301.6	227.7	302.5	318.5
	kW	30.77	29.47	28.41	31.34	30.06	29.25	31.66	30.56	29.88
115	TC	298.7	272.4	255.8	308.5	283.3	272.6	313.5	293.2	226.5
	SHC	165.1	217.2	253.6	192.6	253.8	272.6	214.5	286.5	382.5
	kW	33.42	31.91	30.95	33.99	32.54	31.92	34.28	33.11	29.26

LEGEND

BF — Bypass Factor
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
kW — Compressor Motor Power Input
SHC — Sensible Heating Capacity (1000 Btuh)
TC — Total Capacity (1000 Btuh)

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The SHC is based on 80 F dry-bulb temperature of air entering evaporator coil. Below 80 F dry-bulb, subtract (correction factor x cfm) from SHC. *Above 80 F dry bulb, add (correction factor x cfm) to SHC.*

BYPASS FACTOR	ENTERING-AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
0.10	0.99	1.98	2.97	3.96	4.95	Use formula below.
0.20	0.88	1.76	2.64	3.52	4.40	
0.30	0.77	1.54	2.31	3.08	3.85	

Interpolation is permissible.
Correction Factor = 1.1 x (1 – BF) x (db – 80).

38AH034/40RM028 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb		Evaporator Air — Cfm								
		7500			10,000			12,500		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	376.4	346.1	317.3	393.3	362.8	334.3	404.4	373.6	350.1
	SHC	185.9	234.4	281.1	207.1	269.0	322.7	226.9	300.8	350.1
	kW	26.61	25.60	24.61	27.19	26.18	25.21	27.55	26.55	25.72
95	TC	361.0	335.7	307.7	376.4	347.0	321.1	386.5	357.1	336.8
	SHC	180.1	230.3	276.8	201.2	262.9	313.4	220.8	294.4	336.8
	kW	28.71	27.60	26.33	29.32	28.19	27.14	29.71	28.60	27.75
100	TC	353.0	324.4	297.3	367.7	339.0	314.5	377.6	348.8	330.1
	SHC	177.2	225.4	271.3	198.2	259.8	308.5	217.9	291.3	330.1
	kW	29.75	28.55	27.37	30.36	29.18	28.11	30.79	29.60	28.76
105	TC	344.9	317.0	290.5	359.0	331.0	307.9	368.5	340.3	326.4
	SHC	174.2	222.5	267.9	195.2	256.7	303.7	214.9	288.0	326.3
	kW	30.80	29.55	28.30	31.44	30.20	29.10	31.87	30.63	29.50
115	TC	328.2	301.8	276.7	341.3	320.1	294.0	350.0	323.0	312.6
	SHC	168.0	216.4	262.1	189.1	253.1	294.0	208.7	281.1	312.6
	kW	32.88	31.50	30.14	33.55	32.23	31.05	33.99	32.63	31.78

38AH034/40RM034 HIGH-CAPACITY 4-ROW COILS

Temp (F) Air Entering Condenser (Edb)		Evaporator Air — Cfm								
		9000			12,000			15,000		
		Evaporator Air — Ewb (F)								
		72	67	62	72	67	62	72	67	62
85	TC	385.1	353.5	323.6	402.4	370.6	342.0	413.9	381.8	358.4
	SHC	188.1	238.2	286.2	210.3	274.3	330.0	230.9	307.4	358.4
	kW	26.95	25.92	24.91	27.52	26.50	25.52	27.90	26.89	26.05
95	TC	369.4	352.8	310.0	385.2	354.6	329.8	395.8	365.3	344.7
	SHC	182.2	243.8	279.9	204.3	268.0	321.7	224.8	301.2	344.7
	kW	29.08	28.20	26.76	29.68	28.53	27.45	30.09	28.97	28.09
100	TC	365.2	346.0	303.2	376.3	346.5	321.8	386.7	356.9	337.8
	SHC	180.6	241.9	276.7	201.1	265.0	315.4	221.8	298.0	337.8
	kW	29.73	29.28	27.69	30.76	29.55	28.48	31.20	30.00	29.13
105	TC	356.5	337.7	296.3	367.6	338.4	315.0	377.6	348.2	331.1
	SHC	177.6	238.7	273.3	198.2	261.8	310.5	218.8	294.7	331.1
	kW	30.99	30.30	28.63	31.85	30.57	29.48	32.30	31.03	30.18
115	TC	335.8	311.7	282.5	349.7	324.0	300.7	358.7	332.7	317.4
	SHC	169.9	221.3	266.8	192.1	254.0	300.7	212.6	288.7	317.4
	kW	33.27	31.09	30.50	33.99	32.59	31.43	34.44	33.05	32.30

3. Gross capacities shown do not include a deduction for evaporator fan motor heat.
4. Formulas:

$$t_{ldb} = t_{edb} - \frac{\text{sensible heat capacity (Btuh)}}{1.1 \times \text{cfm}}$$

t_{lwb} = wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.51 \times \text{cfm}}$$

5. Combination ratings are based on a 2° F line loss. For a close-coupled system (less than 15 ft), *add 2%* to ratings. Piping sizes in Refrigerant Pipe Sizes table on page 44 are based on 2° F line loss. All combination ratings are based on R-22.

Electrical data

38AH024-034 UNITS

UNIT 38AH	NOMINAL VOLTAGE	VOLTAGE RANGE*		COMPRESSOR				FAN MOTORS†		POWER SUPPLY		
				RLA		LRA		Qty	FLA (ea)	MCA	MOCP**	ICF
	3 Ph, 60 Hz	Min	Max	Ckt 1	Ckt 2	Ckt 1	Ckt 2					
024	208/230	187	254	39.3	39.3	198	198	2	(1) 5.5 (2) 6.6	100.5	125	249.7
	380††	342	418	24.0	24.0	93	93		3.9	61.8	80	124.8
	460	414	508	19.6	19.6	99	99		(1) 2.8 (2) 3.3	50.2	60	124.8
	575	518	632	15.7	15.7	79	79		3.4	42.1	50	101.5
028	208/230	187	254	43.6	43.6	228	228	2	(1) 5.5 (2) 6.6	110.2	150	284.0
	380††	342	418	26.4	26.4	104	104		3.9	67.2	90	138.2
	460	414	508	22.1	22.1	114	114		(1) 2.8 (2) 3.3	55.8	70	142.3
	575	518	632	19.7	19.7	91	91		3.4	47.1	60	117.5
034	208/230	187	254	43.6	63.6	228	266	2	(1) 5.5 (2) 6.6	135.2	175	322.0
	380††	342	418	26.4	34.3	104	145		3.9	77.0	110	179.2
	460	414	508	22.1	30.0	114	120		(1) 2.9 (2) 3.3	65.7	90	148.3
	575	518	632	17.9	22.9	91	96		3.4	53.3	70	120.7

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
ICF — Maximum Instantaneous Current Flow during starting (the point in the starting sequence where the sum of the LRA for the starting compressor, plus the total RLA for all running compressors, plus the total FLA for all running fan motors is maximum).
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (complies with National Electrical Code [NEC], Section 430-24)
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps
UL — Underwriters' Laboratories

*Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed minimum and maximum limits.
†All fans are protected by a single circuit breaker.
**Fuse or HACR circuit breaker.
††380-v units are export models.

NOTE: The 208/230-v, 460-v and 575-v base units are UL and UL, Canada approved.

Application data — 38AH024-034

Installation

Select equipment to match or to be slightly less than peak load. This provides better humidity control, less unit cycling, and less part-load operation.

When selecting vapor line sizes, oil return must be evaluated, particularly at part-load conditions.

The indoor fan must always be operating when outdoor unit is operating.

IMPORTANT: When application is in a VAV (variable air volume) system, total building load is not the sum of the individual peak loads. If individual peak loads are summed, the equipment tends to be oversized for the load.

To minimize return-air temperature extremes, use the equipment room as a return-air plenum when applying VVT® (variable volume and temperature) systems with supply-to-return air recycle as used with Carrier VVT control systems.

Ductwork should be sized according to unit size, not building load.

To minimize the possibility of air recirculation, avoid the use of concentric supply/return grilles.

Indoor equipment should be selected at no less than 300 cfm/ton.

Do NOT bury refrigerant piping underground.

IMPORTANT: Condensing units applied in VVT or VAV systems must have field-supplied and installed accumulators. Order part number --KH--73LZ-001 from Service Parts.

OPERATING LIMITS

Maximum Outdoor Ambient	115 F
Minimum Outdoor Ambient	See Minimum Outdoor-Air Operating Temperature table at right.
Minimum Return-Air Temperature	55 F
Maximum Return-Air Temperature	95 F
Normal Acceptable Saturation Suction Temperature Range	20 to 50 F
Maximum Discharge Temperature	275 F
Minimum Discharge Superheat	60 F

UNLOADING SEQUENCES

UNIT 38AH	CAPACITY/STAGE (%)	
	CV Units (Standard)*	VAV Units (Optional)
024	100, 83, 50, 33	100, 83, 67, 50, 33, 17
028	100, 83, 50, 33	100, 83, 67, 50, 33, 17
034	100, 85, 43, 28	100, 85, 71, 43, 28, 14

LEGEND

CV — Constant Volume
VAV — Variable Air Volume

*Additional unloading available with field-installed accessory unloader.

NOTE: Capacities are based on 45 F saturated suction temperature and 95 F outdoor air temperature.

MINIMUM OUTDOOR-AIR OPERATING TEMPERATURE AND UNLOADING SEQUENCES

UNIT 38AH	QUANTITY OF LOADED COMPRESSOR CYLINDERS			SYSTEM CAPACITY (%)	MINIMUM OUTDOOR-AIR TEMP	
	Ckt A	Ckt B	Total		With Standard Fans (F)	With Motormaster® V Control (F)
024	6	6	12	100	53	–20
	4	6	10	83		–20
	2	6	8	67*		–20†
	6	0	6	50		–20
	4	0	4	33		–20
	2	0	2	17*		–20†
028	6	6	12	100	53	–20
	4	6	10	83		–20
	2	6	8	67*		–20†
	6	0	6	50		–20
	4	0	4	33		–20
	2	0	2	17*		–20†
034	6	6	12	100	53	–20
	4	6	10	83		–20
	2	6	8	67*		–20†
	6	0	6	50		–20
	4	0	4	33		–20
	2	0	2	17*		–20†

*VAV or accessory unloader on Circuit 1.
†Motormaster® V cannot be used with 2 unloaders when unit is connected to 2 separate air handlers.

NOTE: Minimum outdoor-air operating temperature is based on 90 F saturated condensing temperature and 100% capacity.

REFRIGERANT PIPE SIZES
SINGLE SUCTION RISERS

UNIT 38AH		LENGTH OF INTERCONNECTING PIPING, FOR EACH CIRCUIT (Ft)									
		0-25		25-50		50-75		75-100		100-200	
		L	S	L	S	L	S	L	S	L	S
024	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8*	7/8	1 5/8*
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8†	7/8	1 5/8†
028	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	7/8	1 5/8*	7/8	2 1/8**
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	7/8	1 5/8†	7/8	2 1/8**
034	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 5/8*	7/8	1 5/8*	7/8	2 1/8**
	Ckt 2	1/2	1 3/8	5/8	1 5/8	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8†

LEGEND

L — Liquid Line
S — Suction Line

*Double suction riser required if evaporator is below condensing unit and 2 unloaders are used on that circuit.
†Double suction riser required if evaporator is below condensing unit and compressor is equipped with 2 unloaders. Note the only time circuit no. 2 may be equipped with 2 unloaders is if it is serving its own air handler and the unit does not require low ambient operation (Motormaster® III control).
**Double suction riser required if evaporator is below condensing unit and compressor has one or more unloader(s).

NOTES:
1. All line sizes are inches OD.
2. Standard unit comes with one pressure-operated unloader on circuit no. 1. If unit serves one air handler, an additional unloader may be field installed on circuit no. 1 compressor only. If the unit serves 2 separate air handlers and low ambient operation is required (Motormaster III control), each circuit's compressor may only be equipped with *one* unloader.

DOUBLE SUCTION RISERS

UNIT 38AH		LENGTH OF INTERCONNECTING PIPING (Ft)								
		50-75			75-100			100-200		
		A	B	C	A	B	C	A	B	C
024	Ckt 1	—	—	—	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
	Ckt 2	—	—	—	1 1/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8
028	Ckt 1	—	—	—	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
	Ckt 2	—	—	—	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
034	Ckt 1	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
	Ckt 2	—	—	—	—	—	—	1 3/8	1 5/8	2 1/8

NOTE: Refer to figure on page 45 for A, B, and C dimensions.

MAXIMUM LIQUID LIFT

UNIT 38AH	MAXIMUM LIQUID LIFT PER CIRCUIT (Ft)
024	76
028	73
034	100

WIRE SIZES FOR FIELD POWER SUPPLY

UNIT 38AH	V-Ph-Hz	FIELD POWER WIRE SIZE TB1 WILL ACCEPT
024-034	208-230/3/60	350 kcmil
	380-3-60 460-3-60 375-3-60	2/0 AWG

LEGEND

AWG — American Wire Gage
kcmil — Thousand Circular Mils
TB — Terminal Block

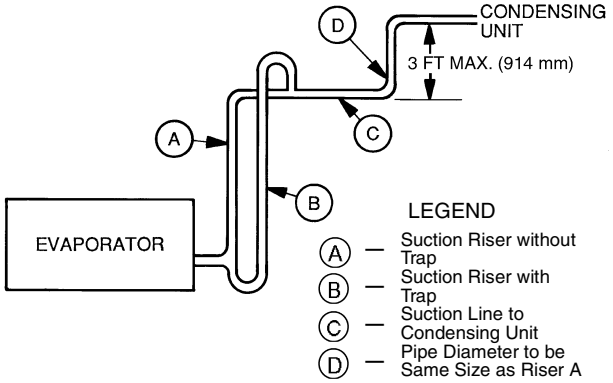
E-coated coils

E-coated aluminum-fin coils have a flexible and durable epoxy coating uniformly applied to all coil surfaces. Unlike brittle phenolic dip and bake coatings, E-coating provides superior protection with unmatched flexibility, edge coverage, metal adhesion, thermal performance, and most importantly, corrosion resistance.

E-coated coils provide this protection since all coil surfaces are completely encapsulated from environmental contamination. This coating is especially suitable in industrial environments.

E-coated copper-fin coils have the same flexible and durable epoxy coating as E-coated aluminum-fin coils. However, this option combines the natural salt and environmental resistance of all-copper construction with high levels of corrosion protection. This coating is recommended in harsh combinations of coastal and industrial environments.

SUCTION LINE PIPING

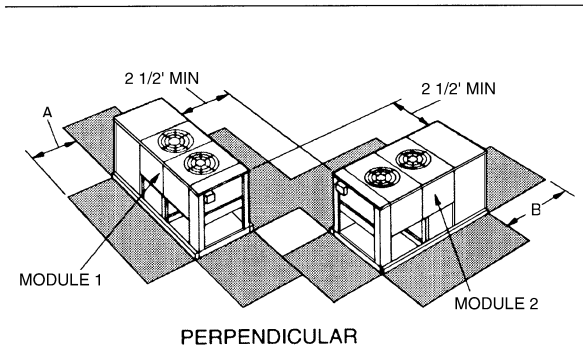


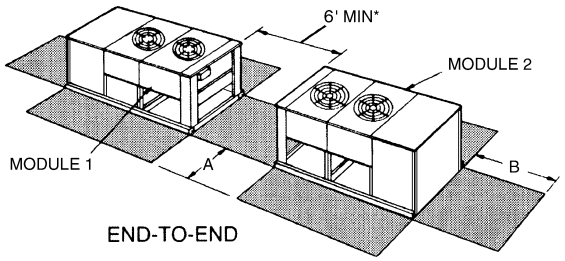
REFRIGERANT SPECIALTIES PART NUMBERS

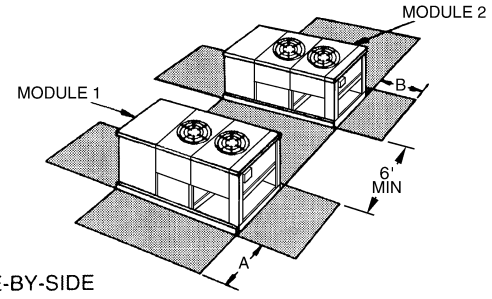
UNIT	LIQUID LINE SIZE (in.)	LIQUID LINE SOLENOID VALVE (LLSV)	LLSV COIL	SIGHT GLASS	FILTER DRIER
38AH024	1/2	200RB6T4M Qty 2	AMG/24V Qty 2	AMI-1TT4 Qty 2	P502-8304S Qty 2
	5/8	200RB6T5M Qty 2	AMG/24V Qty 2	AMI-1TT5 Qty 2	P502-8305S Qty 2
	7/8	200RB7T7M Qty 2	AMG/24V Qty 2	AMI-1TT7 Qty 2	P502-8307S Qty 2
38AH028	1/2	200RB7T4M Qty 2	AMG/24V Qty 2	AMI-1TT4 Qty 2	P502-8305S* Qty 2
	5/8	200RB7T5M Qty 2	AMG/24V Qty 2	AMI-1TT5 Qty 2	P502-8305S Qty 2
	7/8	200RB7T7M Qty 2	AMG/24V Qty 2	AMI-1TT7 Qty 2	P502-8307S Qty 2
38AH034	1/2	200RB7T4M Qty 2	AMG/24V Qty 2	AMI-1TT4 Qty 2	P502-8307S* Qty 2
	5/8	200RB7T5M Qty 2	AMG/24V Qty 2	AMI-1TT5 Qty 2	P502-8307S* Qty 2
	7/8	200RB7T7M Qty 2	AMG/24V Qty 2	AMI-1TT7 Qty 2	P502-8307S Qty 2

*Bushings required.

Multiple condensing unit arrangements*







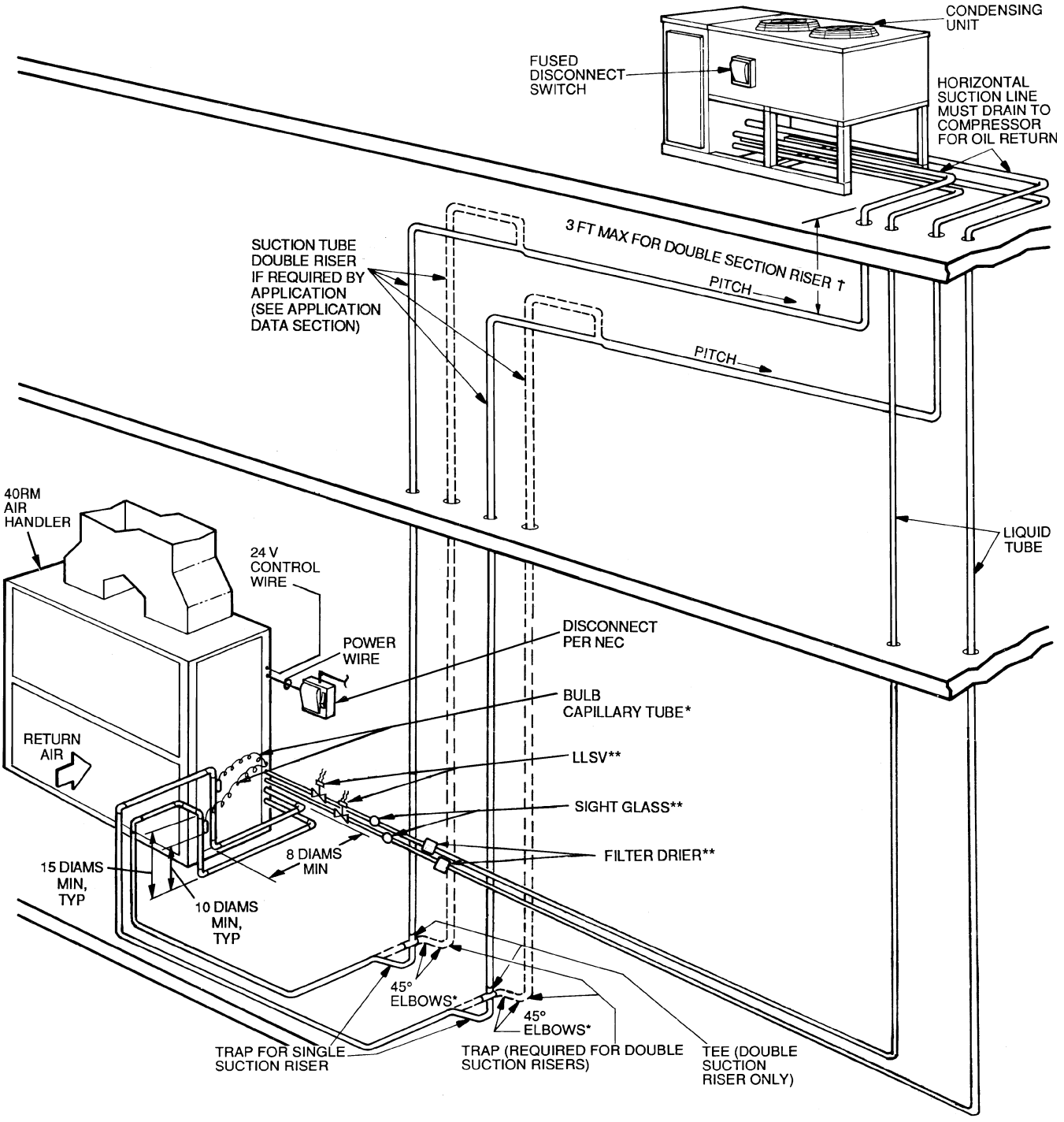
Space for Service and Airflow

*For clearances between controls and grounded surfaces, check local codes.

38AH	DIMENSIONS (ft)	
	A	B
028-034	4	4

Typical piping and wiring

ROOFTOP INSTALLATION — 38AH024-034



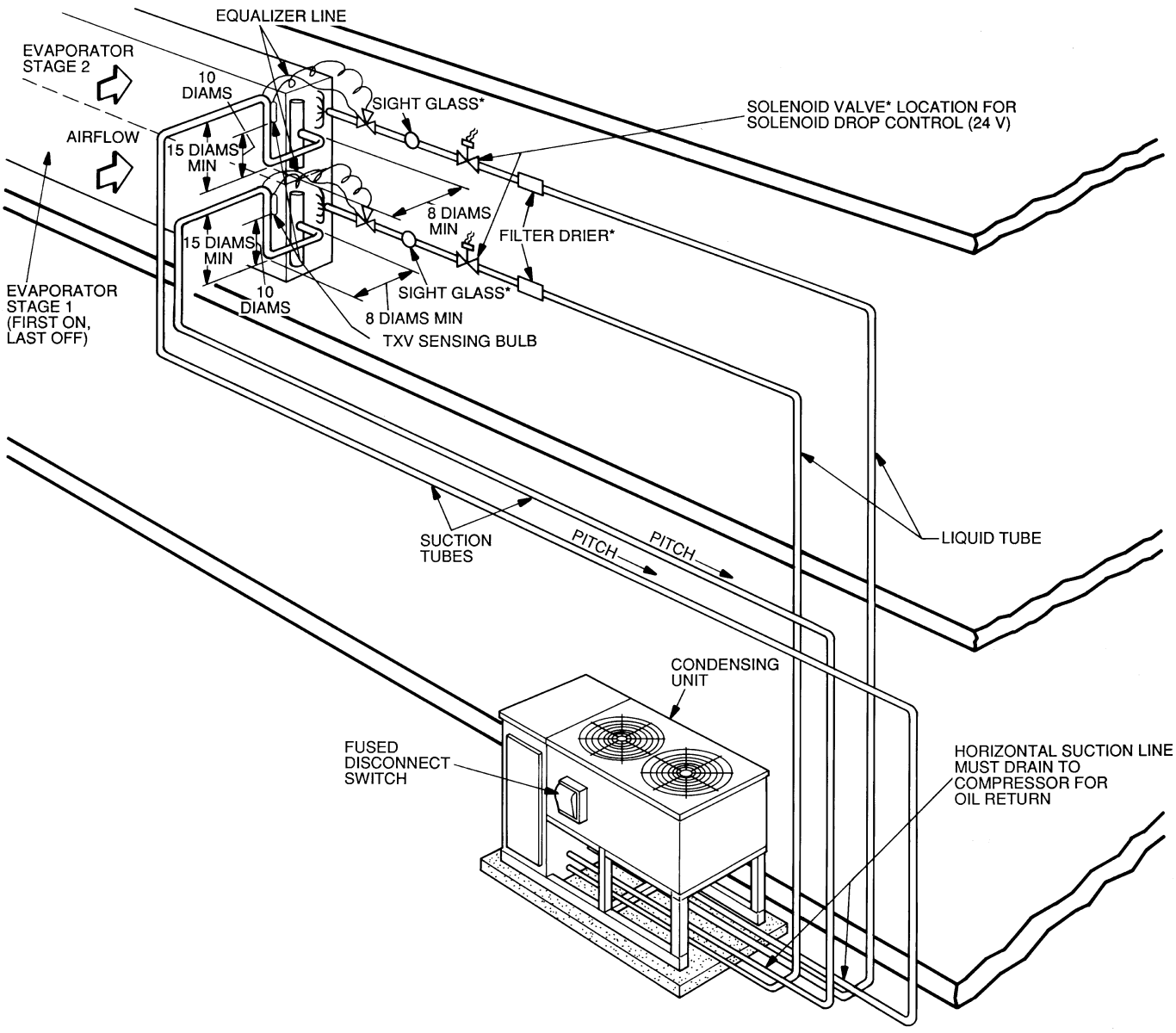
LEGEND

LLSV — Liquid Line Solenoid Valve
NEC — National Electrical Code
TXV — Thermostatic Expansion Valve
Piping
Double Riser Piping (if required)

*Field supplied.
†If double suction riser is required for piping system, size pipe diameter of 3 ft (maximum) riser according to application data on page 44.
**See Refrigerant Specialties table.

NOTES:
1. All piping must follow standard refrigerant piping techniques. Refer to Carrier System Design Manual for details.
2. All wiring must comply with the applicable local and national codes.
3. Wiring and piping shown are general points-of-connection guides only and are not intended for, or to include all details for, a specific installation.
4. Liquid line solenoid valve (solenoid drop control) is recommended to prevent refrigerant migration to the compressor.
5. Internal factory-supplied TXVs not shown.

GROUND LEVEL INSTALLATION — 38AH024-034



LEGEND

TXV — Thermostatic Expansion Valve
Piping

*Field supplied.

NOTES:
1. All piping must follow standard refrigerant piping techniques. Refer to Carrier System Design Manual for details.
2. All wiring must comply with the applicable local and national codes.
3. Wiring and piping shown are general points-of-connection guides only and are not intended for, or to include all details for, a specific installation.
4. Liquid line solenoid valve (solenoid drop control) is recommended to prevent refrigerant migration to the compressor.

Guide specifications — 38AH024-034

Commercial Air-Cooled Condensing Units

HVAC Guide Specifications — Section 15675

Size Range: **20 to 30 Tons, Nominal**
Carrier Model Number: **38AH**

Part 1 — General

1.01 SYSTEM DESCRIPTION

A. Outdoor-mounted, air-cooled condensing unit suitable for on-the-ground or rooftop installation. Unit shall have 2 independent refrigerant circuits. Unit shall consist of semi-hermetic reciprocating compressors, an air-cooled coil, propeller-type condenser fans, and a control box. Unit shall discharge condenser air upward as shown on contract drawings.

B. Unit shall be used in a refrigeration circuit to match up to Packaged Air Handler Unit(s), Section 15859.

1.02 QUALITY ASSURANCE

A. Unit shall be rated in accordance with ARI Standard 365, latest edition.

B. Systems up to 20 tons shall be certified and listed in the latest ARI directory (ARI Standard 360).

C. Unit construction shall comply with latest edition of ASHRAE and with NEC.

D. Unit shall be constructed in accordance with UL standards and shall carry the UL and UL, Canada label of approval.

E. Unit cabinet shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).

F. Air-cooled condenser coils shall be leak tested at 150 psig and pressure tested at 480 psig.

G. Unit shall be manufactured in facility registered to the ISO 9001:2000 manufacturing quality standard.

1.03 DELIVERY, STORAGE AND HANDLING

Unit shall be shipped as single package only, and shall be stored and handled per unit manufacturer's recommendations.

1.04 WARRANTY (FOR INCLUSION BY SPECIFYING ENGINEER)

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory-assembled, single-piece, air-cooled condensing unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressors, holding charge, and special features required prior to field start-up.

B. Unit Cabinet:

1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a prepainted, baked enamel finish.
2. Unit access panels shall be hinged for control box service access.
3. Lifting holes shall be provided to facilitate rigging.

C. Fans:

1. Condenser fans shall be direct-driven propeller type, discharging air vertically upward.
2. Condenser fan motors shall be 3-phase type with class B insulation and permanently lubricated bearings.
3. Shafts shall have inherent corrosion resistance.
4. Fan blades shall be statically and dynamically balanced.
5. Condenser fan openings shall be equipped with PVC-coated steel wire safety guards.

D. Compressors:

1. Compressors shall be serviceable, reciprocating, semi-hermetic type.
2. Compressors shall be equipped with an automatically reversible oil pump, operating oil charge, suction and discharge shutoff valves, and an insert-type, factory-installed crankcase heater to control oil dilution.
3. Compressor shall be mounted on spring vibration isolators with an isolation efficiency of no less than 95%.
4. Compressor speed shall not exceed 1750 rpm.
5. Lead compressor shall unload using pressure-operated suction cutoff unloading (electrical solenoid unloading shall be available as an accessory).

E. Condenser Coil:

1. Condenser coil shall be air cooled, circuited for integral subcooler.
2. Coil shall be constructed of aluminum fins (copper fins optional) mechanically bonded to internally grooved, seamless copper tubes which are then cleaned, dehydrated, and sealed.
3. Coil shall be protected by a sheet metal casing to eliminate the need for wind baffles for low ambient temperature operation.
4. Coil shall be protected to avoid damage due to the elements and vandalism.

F. Refrigeration Components:

Refrigeration circuit components shall include hot gas mufflers, hot gas bypass stub tubes, high-side pressure relief devices, liquid line shut-off valves, suction and discharge shutoff valves, holding charge, and compressor oil.

G. Controls and Safeties:

1. Minimum control functions shall include:
   a. Power and control terminal blocks.
   b. Three-minute time delay protection to prevent compressor short-cycling.
   c. Lockout on auto-reset safety until reset from thermostat.

d. Capacity control on the lead compressor shall be by suction cutoff unloaders in response to compressor suction pressure. Electric solenoid unloading shall be available as an accessory.

e. Head pressure control to 53 F by fan cycling. One condenser fan shall be cycled by ambient temperature to maintain proper head pressure.

2. Minimum safety devices shall include:

a. Compressor oil pressure switches.

b. High discharge-pressure cutout.

c. Compressor overtemperature cutout.

d. Low suction-pressure cutout.

e. Condenser-fan motors to be protected against overload or single-phase condition by internal overloads.

f. Electrical overload protection through the use of definite-purpose contactors and calibrated, ambient-compensated, magnetic trip circuit breakers. Circuit breakers shall open all 3 phases in the event of an overload in any one of the phases or a single-phase condition.

H. Operating Characteristics:

1. The capacity of the condensing unit shall meet or exceed _____ Btuh at a suction temperature of _____ F. The power consumption at full load shall not exceed _____ kW.

2. The combination of the condensing unit and the evaporator or fan coil unit shall have a total net cooling capacity of _____ Btuh or greater at conditions of: _____ cfm entering-air temperature at the evaporator at _____ F wet bulb and _____ F dry bulb, and air entering the condensing unit at _____ F.

3. The system shall have an EER of _____ Btuh/Watt or greater at standard ARI conditions.

I. Electrical Requirements:

1. Nominal unit electrical characteristics shall be _____ v, 3-ph, 60 Hz. The unit shall be capable of satisfactory operation within voltage limits of _____ v to _____ v.

2. Unit electrical power shall be single-point connection.

3. Unit control circuit shall contain a 24-v transformer for unit control, with capacity to operate an indoor-fan interlock.

J. Special Features:

1. Low Ambient Temperature Kit:

Control shall regulate fan motor speed in response to the saturated condensing temperature of the unit. The control shall be capable of maintaining a condensing temperature of 100 F ± 10° F with outdoor temperatures at –20 F.

2. Electric Solenoid Unloader:

Unloader valve piston, coil, and hardware shall be supplied to convert any pressure-operated compressor unloader to 115-v electric unloading. Accessory control box or field-supplied step controller shall be provided for control of electrical unloading.

3. Gage Panel:

A gage panel package shall be provided which includes a suction and discharge pressure gage. One is required for each refrigerant circuit.

4. Control Box:

Control box shall be provided to allow system to operate as a VAV (variable air volume) system.

5. VAV Option:

A factory-installed variable air volume option shall be supplied to provide unit with 2 electric unloaders and control box modifications necessary to connect to a field-installed control box. (Field supplied accumulators required for each circuit.)

6. Optional Condenser Coil Materials:

a. Pre-Coated Aluminum-Fin Coils:

Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

b. Copper-Fin Coils:

Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. All copper construction shall provide protection in moderate coastal applications.

A polymer strip shall prevent the coil assembly from contacting the sheet metal coil pan to minimize the potential for galvanic corrosion between the coil and the pan. All copper construction shall provide protection in moderate coastal environments.

c. E- Coated Aluminum-Fin Coils:

Shall be constructed of aluminum fins mechanically bonded to copper tubes. Coating process shall have a flexible epoxy polymer coating uniformly applied to all coil surfaces without material bridging between the fins. The coating process shall ensure complete coil encapsulation. Color shall be high-gloss black with gloss at 60° of 65% to 90% per ASTM D523-89. Uniform dry film thickness shall be 0.8 mil to 1.2 mil on all

surfaces, including the fin edges. Superior hardness characteristics shall meet those requirements of 2H, per ASTM D3363-92A. Cross-hatch adhesion shall meet the requirements of 4B-5B, per ASTM D3359-93. Impact resistance shall be up to 160 in./lb, per ASTM D2794-93. Humidity resistance shall be up to a minimum of 1000 hours per ASTM D2247-92. Water immersion resistance shall be up to a minimum of 250 hours per ASTM D870-92. Durability shall be confirmed through testing to no less than 1000 hours of salt spray per ASTM B117-90.

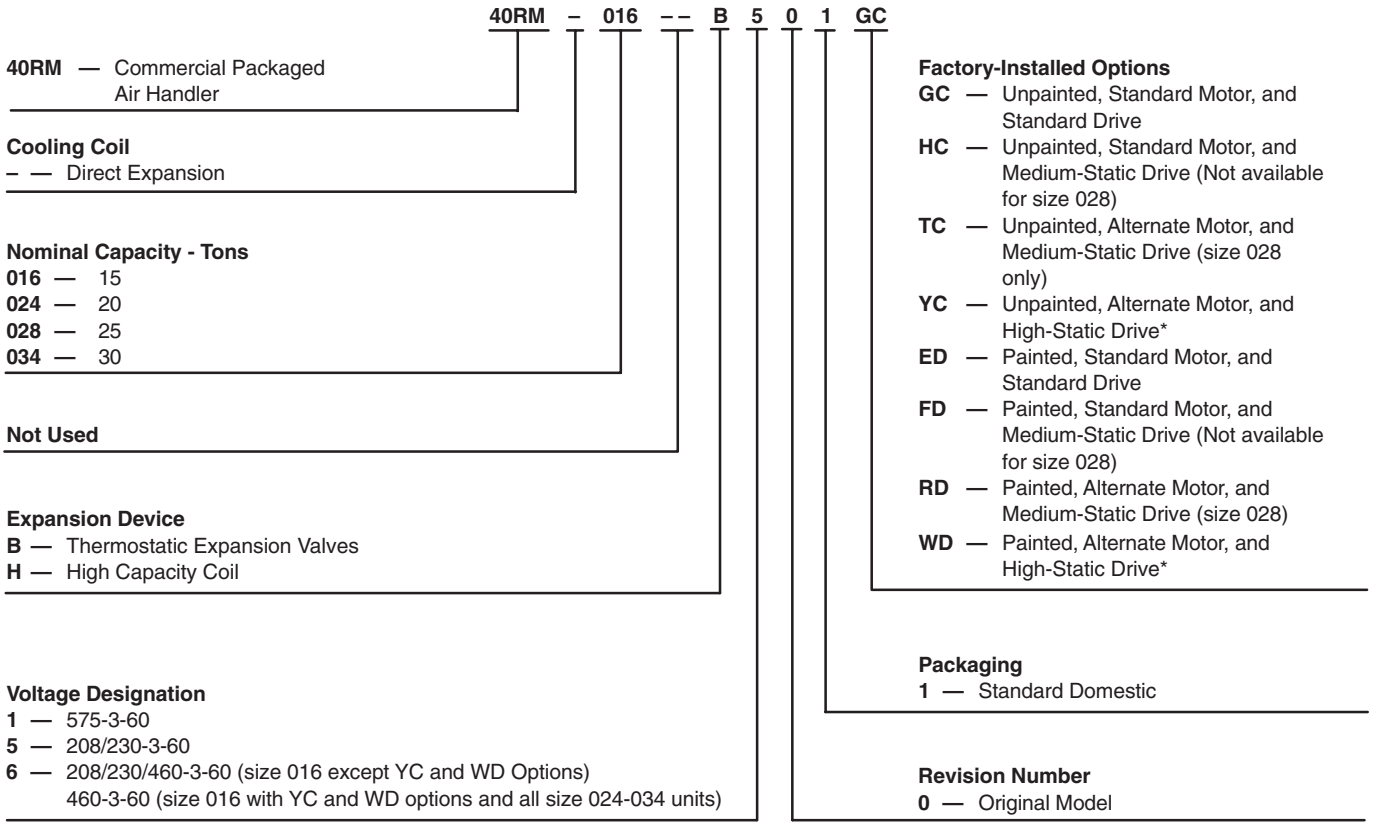
d. E-Coated Copper Fin Coils:

Shall be copper fins mechanically bonded to copper tubes with copper tube sheets. Coating process shall have a flexible epoxy polymer coating uniformly applied to all coil surfaces without material bridging between the fins. The coating process shall ensure complete coil encapsulation. Shall be high-gloss black with gloss at 60° of 65% to 90% per ASTM D523-89. Uniform dry film thickness shall be 0.8 mil to 1.2 mil on all surfaces, including the fin edges. Superior hardness characteristics shall meet those requirements of 2H, per ASTM D3363-92A. Cross-hatch adhesion shall meet the requirements of 4B-5B, per ASTM D3359-93. Impact resistance shall be up to 150 in./lb, per ASTM D2794-93. Humidity resistance shall be up to a minimum of 1000 hours per ASTM D2247-92. Water immersion resistance shall be up to a minimum of 250 hours per ASTM D980-92. Durability shall be confirmed through testing to no less than 1000 hours of salt spray per ASTM B117-90.

7. Thermostat Controls:
   a. Programmable multi-stage thermostat with 7-day clock, holiday scheduling, large backlit display, remote sensor capability, and Title 24 compliance.
   b. Commercial Electronic Thermostat with 7-day timeclock, auto-changeover, multi-stage capability, and large LCD temperature display.
   c. Non-programmable thermostat with fan switch subbase.
   d. Carrier PremierLink™ Controller:

   This control will function with CCN and ComfortVIEW™ software. It shall also be compatible with *Comfort*Link™ controllers. It shall be ASHRAE 62-99 compliant and Internet ready. It shall accept a CO_2 sensor in the conditioned space and be Demand Control Ventilation (DCV) ready. The communication rate must be 38.4K or faster. It shall include an integrated economizer controller.

Model number nomenclature — 40RM



*Size 034 units use 10 Hp motor only; YC and WD option codes for 034 size designate standard motor and high-static drive.

Quality Assurance

Certified to ISO 9001:2000

Physical data

40RM016-034 UNITS

UNIT 40RM	016	024	028	034
NOMINAL CAPACITY (tons)	15	20	25	30
OPERATING WEIGHTS (lb)				
Base Unit with TXV (3-Row/4-Row)	685/713	690/730	1020/1050	1030/1062
Plenum	225	225	325	325
FANS				
Qty...Diam. (in.)	2...15	2...15	2...18	2...18
Nominal Airflow (cfm)	6000	8000	10,000	12,000
Airflow Range (cfm)	4500-7500	6000-10,000	7500-12,500	9000-15,000
Nominal Hp (Standard Motor)				
208/230-3-60 and 460-3-60	3.7	5.0	7.5	10.0
575-3-60	3.0	5.0	7.5	10.0
Speed (rpm)				
208/230-3-60 and 460-3-60	1725	1745	1745	1745
575-3-60	1725	1745	1755	1755
REFRIGERANT	R-22			
Operating charge (lb) (approx per circuit)*	2.5/2.5	3.5/3.5	4.5/4.5	5.0/5.0
DIRECT-EXPANSION COIL	Enhanced Copper Tubes; Aluminum Sine-Wave Fins			
Max Working Pressure (psig)	435			
Face Area (sq ft total)	17.67	19.88	24.86	29.83
No. of Splits	2	2	2	2
Split Type...Percentage	Face...50/50			
No. of Circuits per Split (3 Row/4 Row)	12/16	13/18	15/20	18/24
Fins/in.	15	17	15	15
STEAM COIL				
Max Working Pressure (psig)†	175			
Face Area (sq ft total)	13.33	13.33	15.0	15.0
Rows...Fins/in.	1...10	1...10	1...10	1...10
HOT WATER COIL				
Max Working Pressure (psig)	150			
Face Area (sq ft total)	13.33	13.33	15.0	15.0
Rows...Fins/in.	2...8.5	2...8.5	2...12.5	2...12.5
Water Volume				
(gal)	13.9		14.3	
(ft^3)	1.85		1.90	
PIPING CONNECTIONS				
Qty...Size (in.)				
DX Coil — Suction (ODF)	2...1 1/8	2...1 1/8	2...1 3/8	2...1 3/8
DX Coil — Liquid Refrigerant (ODF)	2...5/8			
Steam Coil, In (MPT)	1...2 1/2			
Steam Coil, Out (MPT)	1...1 1/2			
Hot Water Coil, In (MPT)	1...2			
Hot Water Coil, Out (MPT)	1...2			
Condensate (PVC)	1...1 1/4			
FILTERS	Throwaway — Factory Supplied			
Qty...Size (in.)	4...16 x 20 x 2 4...16 x 24 x 2		4...16 x 24 x 2 4...20 x 25 x 2	
Access Location	Either Side			

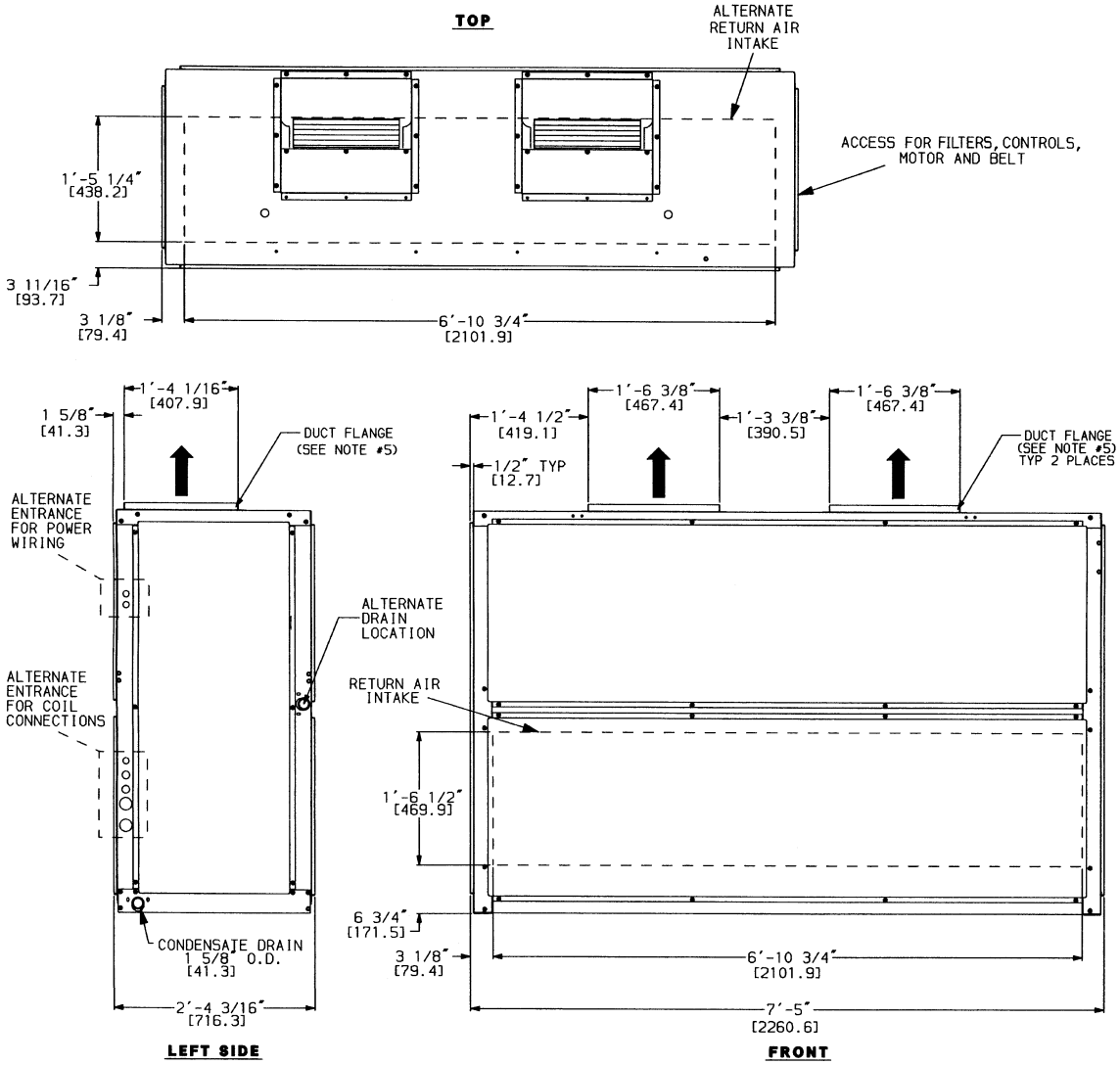
LEGEND

TXV — Thermostatic Expansion Valve

*Units are shipped without refrigerant charge.
†Maximum working pressure (psig) at 400 F.

Dimensions

40RM016, 024



LEGEND

TXV — Thermostatic Expansion Valve

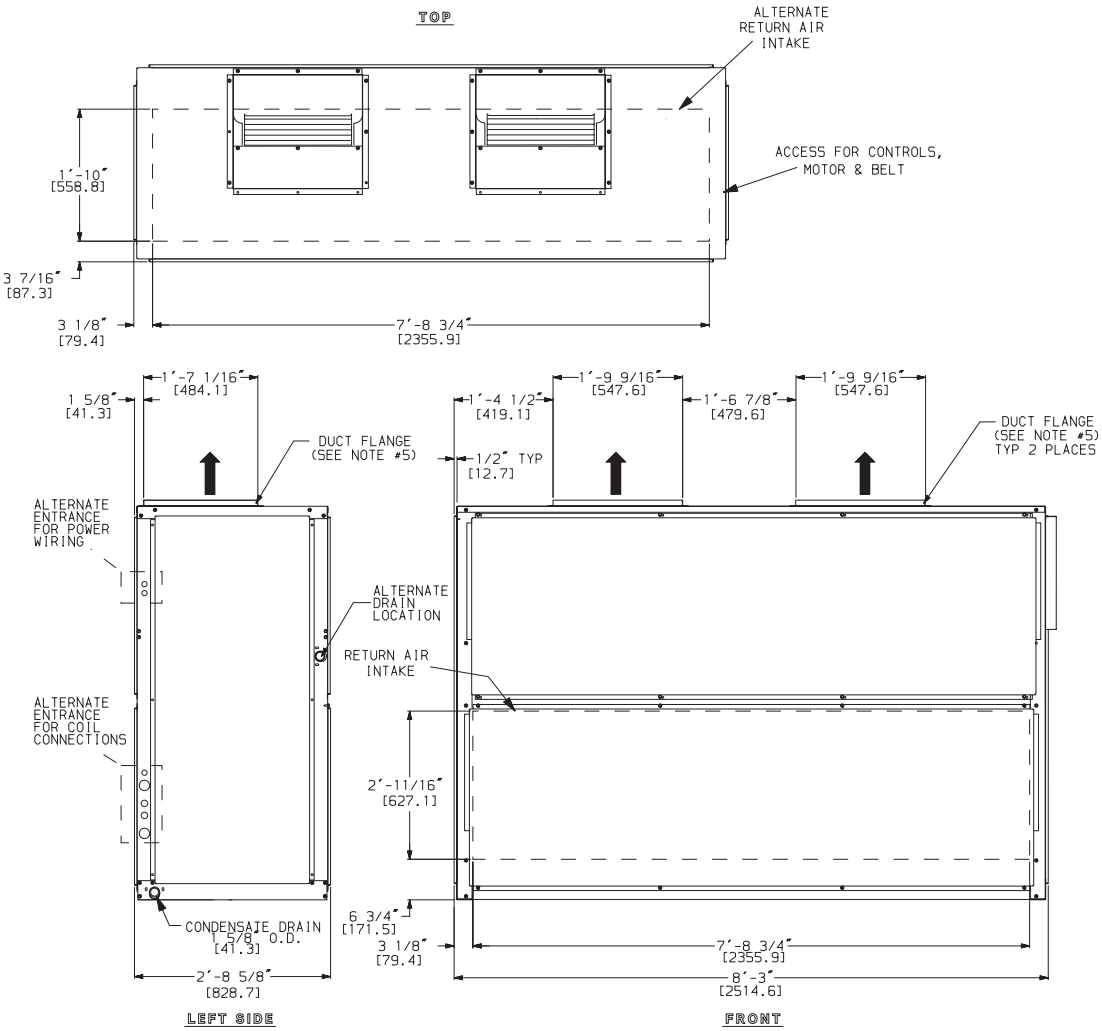
NOTES:

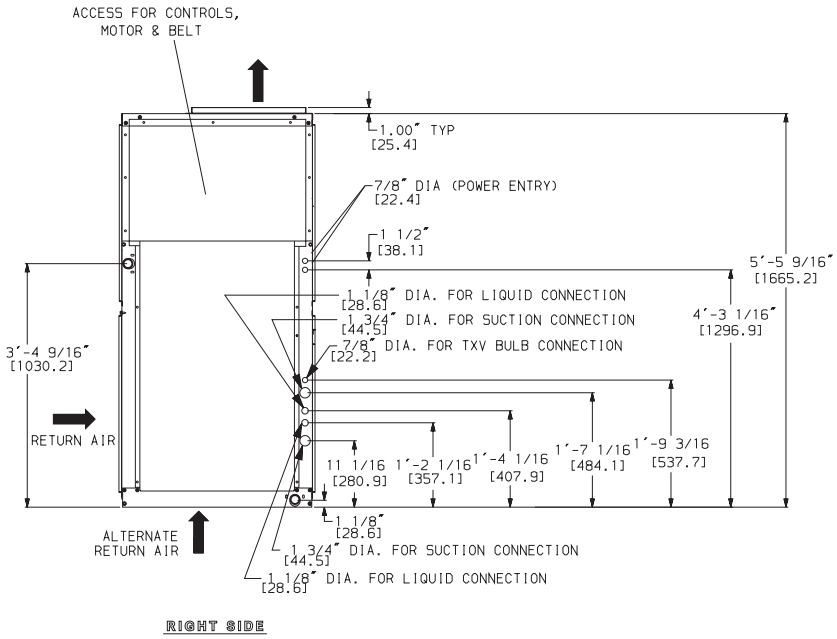
1. Dimensions in [ ] are in millimeters.
2. ➡ Direction of airflow.
3. Recommended clearance:
   - Rear: 3″
   - Front: 2′-6″
   - Right Side: 2′-6″
   - Left Side: 2′-6″
   - Local codes or jurisdiction may prevail.
4. Liquid piping not supplied by Carrier.
5. Duct flange is factory supplied and field installed.

UNIT 40RM		UNIT WEIGHT (lb)
STANDARD 3-ROW COIL	016	685
	024	690
HIGH-CAPACITY 4-ROW COIL	016	713
	024	730

Dimensions (cont)

40RM028, 034





LEGEND

TXV — Thermostatic Expansion Valve

NOTES:

1. Dimensions in [ ] are in millimeters.
2. ➡ Direction of airflow.
3. Recommended clearance:
   - Rear: 3″
   - Front: 2′-6″
   - Right Side: 2′-6″
   - Left Side: 2′-6″
   - Local codes or jurisdiction may prevail.
4. Liquid piping not supplied by Carrier.
5. Duct flange is factory supplied and field installed.

UNIT 40RM		UNIT WEIGHT (lb)
STANDARD 3-ROW COIL	028	1020
	034	1030
HIGH-CAPACITY 4-ROW COIL	028	1050
	034	1062

Performance data

40RM WITH STANDARD 3-ROW COIL FAN PERFORMANCE DATA — 0.0-2.4 ESP

UNIT 40RM	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
		0.0		0.2		0.4		0.6		0.8		1.0		1.2	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
016	**4,500**	**428**	**0.59**	**475**	**0.70**	570	0.99	656	1.33	730	1.68	796	2.02	856	2.38
	5,300	**488**	**0.92**	**528**	**1.04**	609	1.34	689	1.71	762	2.11	827	2.51	886	2.92
	6,000	542	1.29	578	1.43	649	1.74	721	2.11	791	2.55	855	3.00	914	3.46
	6,800	604	1.83	637	1.99	700	2.32	763	2.70	826	3.15	888	3.64	946	4.15
	7,500	660	2.42	690	2.59	747	2.95	804	3.34	861	3.79	919	4.29	975	4.83
024	**6,000**	**532**	**1.25**	**569**	**1.39**	**639**	**1.69**	711	2.06	781	2.48	846	2.93	905	3.39
	7,000	**608**	**1.93**	**641**	**2.09**	702	2.42	763	2.80	824	3.23	885	3.71	943	4.23
	8,000	686	2.83	716	3.01	770	3.38	823	3.77	876	4.21	930	4.70	983	5.24
	9,000	764	3.97	791	4.18	841	4.59	888	5.02	935	5.47	982	5.96	1030	6.51
	10,000	843	5.38	868	5.62	914	6.09	957	6.55	1000	7.02	1042	7.53	1084	8.08
028	**7,500**	**456**	**1.29**	**490**	**1.47**	**556**	**1.85**	**621**	**2.25**	**678**	**2.64**	729	3.06	778	3.60
	8,750	**521**	**1.98**	**551**	**2.18**	**608**	**2.61**	**664**	**3.07**	720	3.53	770	3.99	816	4.45
	10,000	**587**	**2.88**	**614**	**3.11**	**664**	**3.59**	714	4.09	763	4.62	812	5.15	857	5.68
	11,250	**653**	**4.03**	**678**	**4.29**	724	4.82	768	5.37	812	5.95	856	6.54	899	7.14
	12,500	720	5.46	743	5.75	785	6.33	825	6.93	865	7.55	904	8.20	944	8.86
034	**9,000**	**521**	**1.99**	**550**	**2.25**	**616**	**2.77**	676	3.23	731	3.72	782	4.20	829	4.70
	10,500	**596**	**3.16**	**623**	**3.40**	**672**	**3.89**	720	4.40	767	4.94	814	5.50	859	6.05
	12,000	**673**	**4.63**	698	4.90	743	5.45	785	6.02	826	6.62	867	7.23	908	7.87
	13,500	751	6.51	773	6.82	815	7.44	853	8.06	890	8.71	927	9.38	963	10.07
	15,000	829	8.84	850	9.19	888	9.88	924	10.57	958	11.27	991	11.99	1024	12.73

UNIT 40RM	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
		1.4		1.6		1.8		2.0		2.2		2.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
016	**4,500**	912	2.75	967	3.13	1019	3.52	1070	3.92	1120	4.35	1168	4.79
	5,300	940	3.33	992	3.75	1041	4.18	1088	4.61	1134	5.06	**1179**	**5.52**
	6,000	968	3.92	1018	4.38	1066	4.85	1112	5.32	1156	5.80	**1198**	**6.29**
	6,800	1000	4.67	1050	5.19	1097	5.71	1142	6.23	**1185**	**6.76**	—	—
	7,500	1028	5.39	1078	5.97	1125	6.54	1170	7.11	—	—	—	—
024	**6,000**	954	3.83	1005	4.27	1052	4.72	1098	5.22	1142	5.67	—	—
	7,000	990	4.74	1040	5.24	1090	5.80	1135	6.30	1176	6.84	—	—
	8,000	1028	5.79	1078	6.38	1130	7.00	1173	7.60	—	—	—	—
	9,000	1073	7.11	1120	7.72	1169	8.37	—	—	—	—	—	—
	10,000	1126	8.75	1166	9.37	—	—	—	—	—	—	—	—
028	**7,500**	831	4.41	870	5.10	913	5.90	950	6.88	985	7.70	—	—
	8,750	859	4.97	901	5.59	944	6.42	980	7.20	1020	8.10	—	—
	10,000	900	6.20	939	6.74	976	7.33	1013	8.00	1050	8.82	—	—
	11,250	941	7.73	980	8.32	1017	8.90	1052	9.51	**1086**	**10.16**	—	—
	12,500	984	9.53	1022	10.19	1058	10.84	**1093**	**11.49**	—	—	—	—
034	**9,000**	866	5.20	899	5.85	950	6.65	989	7.38	1029	8.32	**1077**	**9.74**
	10,500	902	6.60	942	7.14	980	7.70	1016	8.31	1051	8.99	**1085**	**9.77**
	12,000	949	8.50	988	9.14	1026	9.76	1062	10.38	**1095**	**11.01**	—	—
	13,500	1000	10.78	1036	11.49	1073	12.21	—	—	—	—	—	—
	15,000	1057	13.49	**1090**	**14.28**	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
ESP — External Static Pressure

Bold indicates special field-supplied drive is required.
Plain type indicates standard drive and standard motor.
Underline indicates a different motor and drive combination is required. Refer to the fan motor and drive tables, pages 61 and 62, to complete the selection.

NOTES:
1. Maximum allowable fan speed is 1100 rpm for unit sizes 028 and 034; 1200 rpm for all other sizes.
2. Fan performance is based on deductions for wet coil, clean 2-in. filters, and unit casing. See right for factory-supplied filter pressure drop.
3. Factory-supplied motor for 034 size is standard 10 Hp motor only; alternate motor not available.

FACTORY-SUPPLIED FILTER PRESSURE DROP (in. wg)

UNIT 40RM	AIRFLOW (Cfm)	PRESSURE DROP (in. wg)
016	**4,500**	0.08
	6,000	0.12
	7,500	0.17
024	**6,000**	0.12
	8,000	0.19
	10,000	0.26
028	**7,500**	0.15
	10,000	0.22
	12,500	0.30
034	**9,000**	0.19
	12,000	0.29
	15,000	0.40

Performance data (cont)

Carrier®

40RM WITH HIGH-CAPACITY 4-ROW COIL FAN PERFORMANCE DATA — 0.0-2.4 ESP

UNIT 40RM	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
		0.0		0.2		0.4		0.6		0.8		1.0		1.2	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
016	**4,500**	**437**	**0.61**	**483**	**0.72**	576	1.01	660	1.35	732	1.69	797	2.03	856	2.38
	5,300	**499**	**0.95**	538	1.07	617	1.37	696	1.74	767	2.13	830	2.53	888	2.94
	6,000	**555**	**1.34**	590	1.48	659	1.79	730	2.17	798	2.59	860	3.04	918	3.49
	6,800	620	1.91	651	2.06	712	2.39	774	2.78	836	3.22	896	3.71	952	4.21
	7,500	677	2.52	706	2.69	761	3.04	817	3.44	873	3.89	929	4.39	984	4.93
024	**6,000**	**542**	**1.29**	**577**	**1.42**	**646**	**1.72**	716	2.09	785	2.51	849	2.95	907	3.40
	7,000	**620**	**1.99**	**652**	**2.15**	711	2.48	771	2.85	831	3.28	890	3.76	947	4.27
	8,000	700	2.92	728	3.10	781	3.46	833	3.85	885	4.29	938	4.78	990	5.32
	9,000	781	4.10	806	4.30	854	4.71	900	5.13	946	5.58	993	6.08	1039	6.62
	10,000	862	5.56	885	5.79	929	6.24	971	6.70	1012	7.18	1054	7.69	1096	8.24
028	**7,500**	**476**	**1.39**	**510**	**1.58**	**579**	**1.99**	**644**	**2.40**	701	2.81	752	3.29	804	3.96
	8,750	**545**	**2.14**	**574**	**2.35**	**633**	**2.81**	691	3.29	747	3.77	797	4.25	842	4.76
	10,000	**615**	**3.12**	**641**	**3.36**	692	3.87	743	4.41	794	4.96	843	5.51	888	6.05
	11,250	685	4.37	709	4.64	754	5.20	800	5.79	845	6.40	891	7.02	935	7.64
	12,500	756	5.92	778	6.22	819	6.83	860	7.47	901	8.14	942	8.83	983	9.52
034	**9,000**	**539**	**2.18**	**569**	**2.39**	**626**	**2.85**	683	3.34	739	3.83	791	4.32	837	4.82
	10,500	**620**	**3.37**	**646**	**3.62**	695	4.13	744	4.68	793	5.25	842	5.83	888	6.41
	12,000	701	4.94	724	5.22	769	5.80	811	6.40	854	7.04	897	7.69	940	8.36
	13,500	783	6.95	804	7.27	844	7.91	883	8.57	920	9.26	958	9.97	996	10.71
	15,000	865	9.45	884	9.81	921	10.52	956	11.24	991	11.98	1025	12.75	1059	13.54

UNIT 40RM	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
		1.4		1.6		1.8		2.0		2.2		2.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
016	**4,500**	912	2.75	967	3.12	1019	3.52	1070	3.92	1120	4.35	1168	4.79
	5,300	942	3.34	992	3.76	1041	4.18	1088	4.61	1134	5.06	**1179**	**5.52**
	6,000	971	3.95	1020	4.40	1067	4.86	1112	5.33	1156	5.81	**1198**	**6.29**
	6,800	1005	4.72	1054	5.23	1101	5.75	1145	6.27	**1187**	**6.79**	—	—
	7,500	1036	5.48	1084	6.04	1131	6.61	**1174**	**7.17**	—	—	—	—
024	**6,000**	961	3.86	1011	4.31	1058	4.77	1104	5.24	1147	5.71	—	—
	7,000	1000	4.79	1050	5.32	1097	5.85	1142	6.38	1184	6.91	—	—
	8,000	1041	5.88	1090	6.47	1137	7.07	1181	7.67	—	—	—	—
	9,000	1086	7.21	1133	7.82	1178	8.47	—	—	—	—	—	—
	10,000	1138	8.83	1180	9.46	—	—	—	—	—	—	—	—
028	**7,500**	874	5.33	897	5.91	940	6.80	990	7.50	—	—	—	—
	8,750	886	5.36	930	6.13	982	7.32	1020	8.10	—	—	—	—
	10,000	930	6.60	969	7.20	1007	7.89	1045	8.71	—	—	—	—
	11,250	976	8.25	1014	8.86	1051	9.49	**1086**	**10.17**	—	—	—	—
	12,500	1023	10.20	1061	10.88	**1097**	**11.56**	—	—	—	—	—	—
034	**9,000**	881	5.37	923	6.03	967	6.89	1020	8.25	—	—	—	—
	10,500	930	6.97	970	7.55	1008	8.17	1045	8.86	—	—	—	—
	12,000	981	9.02	1021	9.67	1058	10.32	**1094**	**10.97**	—	—	—	—
	13,500	1035	11.45	1072	12.20	—	—	—	—	—	—	—	—
	15,000	1093	14.35	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
ESP — External Static Pressure

Bold indicates special field-supplied drive is required.
Plain type indicates standard drive and standard motor.
Underline indicates a different motor and drive combination is required. Refer to the fan motor and drive tables, pages 61 and 62, to complete the selection.

NOTES:
1. Maximum allowable fan speed is 1100 rpm for unit sizes 028 and 034; 1200 rpm for all other sizes.
2. Fan performance is based on deductions for wet coil, clean 2-in. filters, and unit casing. See right for factory-supplied filter pressure drop.
3. Factory-supplied motor for 034 size is standard 10 Hp motor only; alternate motor not available.

FACTORY-SUPPLIED FILTER PRESSURE DROP (in. wg)

UNIT 40RM	AIRFLOW (Cfm)	PRESSURE DROP (in. wg)
016	**4,500**	0.08
	6,000	0.12
	7,500	0.17
024	**6,000**	0.12
	8,000	0.19
	10,000	0.26
028	**7,500**	0.15
	10,000	0.22
	12,500	0.30
034	**9,000**	0.19
	12,000	0.29
	15,000	0.40

40RM ACCESSORY PLENUM AIR THROW DATA (ft)

UNIT 40RM	AIRFLOW (Cfm)	VANE DEFLECTION		
		Straight	22½°	45°
016	6,000	50	43	31
024	8,000	60	51	37
028	10,000	76	65	47
034	12,000	85	72	52

NOTE: Throw distances shown are for 75 fpm terminal velocity. Use the following multipliers to determine throw values for other terminal velocities.

TERMINAL VELOCITY (Fpm)	THROW FACTOR
50	X 1.50
100	X 0.75
150	X 0.50

40RM ACCESSORY PRESSURE DROP (in. wg)

UNIT 40RM	AIRFLOW (Cfm)	DISCHARGE PLENUM	RETURN AIR GRILLE	HEATING COILS			ECONOMIZER
				Hot Water	Steam	Electric	
016	4,500	0.10	0.01	0.15	0.15	0.06	0.06
	6,000	0.16	0.02	0.23	0.23	0.10	0.09
	7,500	0.23	0.03	0.33	0.33	0.15	0.15
024	6,000	0.16	0.02	0.23	0.23	0.10	0.09
	8,000	0.26	0.04	0.37	0.37	0.17	0.17
	10,000	0.37	0.06	0.53	0.53	0.26	0.28
028	7,500	0.15	0.02	0.28	0.28	0.09	0.06
	10,000	0.24	0.03	0.44	0.44	0.16	0.09
	12,500	0.34	0.05	0.63	0.63	0.24	0.14
034	9,000	0.20	0.03	0.37	0.37	0.13	0.08
	12,000	0.32	0.05	0.59	0.59	0.22	0.14
	15,000	0.46	0.07	0.85	0.85	0.34	0.21

40RM HYDRONIC HEATING CAPACITIES

UNIT 40RM	AIRFLOW (Cfm)	1-ROW STEAM*		2-ROW HOT WATER COIL†			
		Cap.	Ldb	Cap.	Ldb	Gpm	PD
016	4,500	402	141	412.0	145	41.2	4.5
	6,000	458	129	471.0	133	47.1	5.5
	7,500	479	118	529.0	125	52.9	6.6
024	6,000	458	129	506.0	138	50.6	5.1
	8,000	487	115	584.0	128	58.4	6.3
	10,000	499	105	652.0	120	65.2	7.5
028	7,500	511	122	649.0	140	64.9	5.7
	10,000	575	112	752.0	130	75.2	7.1
	12,500	626	106	842.0	122	84.2	8.5
034	9,000	560	117	735.0	136	73.5	6.2
	12,000	621	107	850.0	126	85.0	7.8
	15,000	670	101	950.0	119	95.0	9.3

LEGEND

Cap. — Capacity (Btuh in thousands)
Ldb — Leaving-Air Dry-Bulb Temp (F)
PD — Pressure Drop (ft water)

*Based on 5 psig steam, 60 F entering-air temperature. All steam coils are non-freeze type.
†Based on 200 F entering water, 20 F water temperature drop, 60 F entering-air temperature.

NOTES:
1. Maximum operating limits for steam heating coils: 175 psig at 400 F.
2. Maximum operating limit for hot water heating coils is 150 psig.
3. Leaving db = ent db (F) + $\frac{\text{Capacity (Btuh)}}{1.1 \times \text{cfm}}$
4. See Heating Correction Factors table.

40RM HEATING CORRECTION FACTORS

HOT WATER COIL						
Water Temp Drop (F)	Ent Water Temp (F)	Entering-Air Temp (F)				
		40	50	60	70	80
10	140	0.72	0.64	0.57	0.49	0.41
	160	0.89	0.81	0.74	0.66	0.58
	180	1.06	0.98	0.90	0.83	0.75
	200	1.22	1.15	1.07	1.00	0.92
	220	1.39	1.32	1.24	1.17	1.09
20	140	0.64	0.57	0.49	0.41	0.33
	160	0.81	0.74	0.66	0.58	0.51
	180	0.98	0.91	0.83	0.75	0.68
	200	1.15	1.08	1.00	0.93	0.85
	220	1.32	1.25	1.17	1.10	1.02
30	140	0.56	0.49	0.41	0.33	0.24
	160	0.74	0.66	0.58	0.51	0.43
	180	0.91	0.83	0.76	0.68	0.60
	200	1.08	1.00	0.93	0.85	0.78
	220	1.25	1.18	1.10	1.03	0.95

STEAM COIL					
Steam Pressure (psig)	Entering-Air Temp (F)				
	40	50	60	70	80
0	1.06	0.98	0.91	0.85	0.78
2	1.09	1.02	0.95	0.89	0.82
5	1.13	1.06	1.00	0.93	0.87

NOTE: Multiply capacity given in the Hydronic Heating Capacities table by the correction factor for conditions at which unit is actually operating. Correct leaving-air temperature using formula in Note 3 of Hydronic Heating Capacities table.

Electrical data

40RM STANDARD MOTORS

UNIT 40RM	V*-PH-Hz	VOLTAGE LIMITS	FAN MOTOR		POWER SUPPLY	
			Hp	FLA	MCA	MOCP
016	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	3.7 3.7 3.0	10.2 4.8 3.8	12.8 6.0 4.8	20 15 15
024	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	5.0 5.0 5.0	15.3/12.8 6.4 5.1	19.1/16.0 8.0 6.4	30/25 15 15
028	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	7.5 7.5 7.5	21.5/19.4 9.7 7.8	28.0/24.3 12.1 9.8	50/40 20 15
034	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	10.0 10.0 10.0	28.2/26.8 13.4 10.3	35.3/33.5 16.8 12.9	60/60 30 20

40RM ALTERNATE MOTORS

UNIT 40RM	V*-PH-Hz	VOLTAGE LIMITS	FAN MOTOR		POWER SUPPLY	
			Hp	FLA	MCA	MOCP
016	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	5.0 5.0 5.0	15.3/12.8 6.4 5.1	19.1/16.0 8.0 6.4	30/25 15 15
024	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	7.5 7.5 7.5	22.5/19.4 9.7 7.8	20.8/24.3 12.1 9.8	50/40 20 15
028	208/230-3-60 460-3-60 575-3-60	187-253 414-506 518-632	10.0 10.0 10.0	28.2/26.8 13.4 10.3	35.3/33.5 16.8 12.9	60/60 30 20

LEGEND

FLA — Full Load Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection

*Motors are designed for satisfactory operation within 10% of nominal voltages shown. Voltages should not exceed the limits shown in the Voltage Limits column.

40RM ELECTRIC HEATER DATA

HEATER PART NO.	UNIT	V-PH-Hz	FAN MOTOR			ELECTRIC HEATER(S)					MCA*	MOCP*
						Nominal Capacity (kW)	Actual Capacity (kW)			FLA		
			Hp	kW	FLA		Stage 1	Stage 2	Total			
CAELHEAT016A00	40RM016,024	208-3-60	3.7	2.76	10.2	10	7.5	—	7.5	20.8	38.8	40
			5.0	3.73	14.6	10	7.5	—	7.5	20.8	41.3	50
			7.5	5.59	21.5	10	7.5	—	7.5	20.8	52.9	60
		240-3-60	3.7	2.76	10.2	10	10.0	—	10.0	24.1	42.8	50
			5.0	3.73	12.8	10	10.0	—	10.0	24.1	46.1	50
			7.5	5.59	19.4	10	10.0	—	10.0	24.1	54.4	60
CAELHEAT017A00		480-3-60	3.7	2.76	4.8	10	10.0	—	10.0	12.0	21.0	25
			5.0	3.73	6.4	10	10.0	—	10.0	12.0	23.0	25
			7.5	5.59	9.7	10	10.0	—	10.0	12.0	27.2	30
CAELHEAT018A00		575-3-60	3.0	2.24	3.8	10	10.0	—	10.0	10.0	17.3	20
			5.0	3.73	5.1	10	10.0	—	10.0	10.0	19.6	20
			7.5	5.59	7.8	10	10.0	—	10.0	10.0	22.1	25
CAELHEAT019A00		208-3-60	3.7	2.76	10.2	20	14.9	—	14.9	41.5	64.6	70
			5.0	3.73	14.6	20	14.9	—	14.9	41.5	70.1	80
			7.5	5.59	21.5	20	14.9	—	14.9	41.5	78.7	80
		240-3-60	3.7	2.76	10.2	20	19.9	—	19.9	47.9	72.6	80
			5.0	3.73	12.8	20	19.9	—	19.9	47.9	75.8	80
			7.5	5.59	19.4	20	19.9	—	19.9	47.9	84.1	80
CAELHEAT020A00		480-3-60	3.7	2.76	4.8	20	20.0	—	20.0	24.1	36.1	40
			5.0	3.73	6.4	20	20.0	—	20.0	24.1	39.1	40
			7.5	5.59	9.7	20	20.0	—	20.0	24.1	43.2	50
CAELHEAT021A00		575-3-60	3.0	2.24	3.8	20	20.0	—	20.0	20.1	29.9	30
			5.0	3.73	5.1	20	20.0	—	20.0	20.1	31.5	35
			7.5	5.59	7.8	20	20.0	—	20.0	20.1	34.9	35
CAELHEAT022A00		208-3-60	3.7	2.76	10.2	30	15.0	7.5	22.5	62.5	90.9	100
			5.0	3.73	14.6	30	15.0	7.5	22.5	62.5	96.4	100
			7.5	5.59	21.5	30	15.0	7.5	22.5	62.5	105.0	110
		240-3-60	3.7	2.76	10.2	30	20.0	10.0	30.0	72.2	103.0	110
			5.0	3.73	12.8	30	20.0	10.0	30.0	72.2	106.2	110
			7.5	5.59	19.4	30	20.0	10.0	30.0	72.2	114.5	125
CAELHEAT023A00		480-3-60	3.7	2.76	4.8	30	20.0	10.0	30.0	36.1	51.1	60
			5.0	3.73	6.4	30	20.0	10.0	30.0	36.1	53.1	60
			7.5	5.59	9.7	30	20.0	10.0	30.0	36.1	57.2	60
CAELHEAT024A00		575-3-60	3.0	2.24	3.8	30	20.0	10.0	30.0	30.1	42.4	50
			5.0	3.73	5.1	30	20.0	10.0	30.0	30.1	44.0	50
			7.5	5.59	7.8	30	20.0	10.0	30.0	30.1	47.4	50

Electrical data (cont)

40RM ELECTRIC HEATER DATA (cont)

HEATER PART NO.	UNIT	V-PH-Hz	FAN MOTOR			ELECTRIC HEATER(S)					MCA*	MOCP*
						Nominal Capacity (kW)	Actual Capacity (kW)			FLA		
			Hp	kW	FLA		Stage 1	Stage 2	Total			
CAELHEAT025A00	40RM016,024	208-3-60	3.7	2.76	10.2	50	22.6	15.0	37.6	104.3	143.1	150
			5.0	3.73	14.6	50	22.6	15.0	37.6	104.3	148.6	150
			7.5	5.59	21.5	50	22.6	15.0	37.6	104.3	157.2	175
		240-3-60	3.7	2.76	10.2	50	30.0	20.0	50.0	120.3	163.1	175
			5.0	3.73	12.8	50	30.0	20.0	50.0	120.3	166.4	175
			7.5	5.59	19.4	50	30.0	20.0	50.0	120.3	174.6	200
CAELHEAT026A00		480-3-60	3.7	2.76	4.8	50	30.0	20.0	50.0	60.1	81.2	90
			5.0	3.73	6.4	50	30.0	20.0	50.0	60.1	83.2	90
			7.5	5.59	9.7	50	30.0	20.0	50.0	60.1	87.3	90
CAELHEAT027A00		575-3-60	3.0	2.24	3.8	50	30.0	20.0	50.0	50.2	67.5	70
			5.0	3.73	5.1	50	30.0	20.0	50.0	50.2	69.1	70
			7.5	5.59	7.8	50	30.0	20.0	50.0	50.2	72.5	80
CAELHEAT028A00	40RM028,034	208-3-60	7.5	5.59	19.8	20	14.9	—	14.9	41.5	78.7	80
			10.0	7.46	28.2	20	14.9	—	14.9	41.5	87.1	100
		240-3-60	7.5	5.59	19.4	20	19.9	—	19.9	47.9	81.4	90
			10.0	7.46	26.8	20	19.9	—	19.9	47.9	93.3	110
CAELHEAT029A00		480-3-60	7.5	5.59	9.7	20	20.0	—	20.0	24.1	42.2	50
			10.0	7.46	13.4	20	20.0	—	20.0	24.1	46.8	50
CAELHEAT030A00		575-3-60	7.5	5.59	7.8	20	20.0	—	20.0	20.1	34.9	35
			10.0	7.46	10.3	20	20.0	—	20.0	20.1	38.0	40
CAELHEAT031A00		208-3-60	7.5	5.59	19.8	40	15.0	15.0	30.0	83.4	131.1	150
			10.0	7.46	28.0	40	15.0	15.0	30.0	83.4	139.5	150
		240-3-60	7.5	5.59	19.4	40	20.0	20.0	40.0	96.2	144.5	150
			10.0	7.46	26.8	40	20.0	20.0	40.0	96.2	153.8	175
CAELHEAT032A00		480-3-60	7.5	5.59	9.7	40	20.0	20.0	40.0	47.9	71.9	80
			10.0	7.46	13.4	40	20.0	20.0	40.0	47.9	76.6	80
CAELHEAT033A00		575-3-60	7.5	5.59	7.8	40	20.0	20.0	40.0	40.2	60.0	60
			10.0	7.46	10.3	40	20.0	20.0	40.0	40.2	63.1	70

LEGEND

FLA — Full Load Amps
Hp — Horsepower
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection (Amps)

*Values shown are for single-point connection of electric heat accessory and air handler.

NOTES:
1. Electrical resistance heaters are rated at 240 v, 480 v, or 575 v. To determine heater capacity (kW) at unit nameplate multiply the 240-v, 480-v, or 575-v capacity (kW) by the factor shown in the table below for the unit voltage.

HEATER RATING VOLTAGE	ACTUAL HEATER VOLTAGE										
	200	208	230	240	400	440	460	480	550	575	600
240	0.694	0.751	0.918	1	—	—	—	—	—	—	—
480	—	—	—	—	0.694	0.84	0.918	1	—	—	—
575	—	—	—	—	—	—	—	—	0.915	1	1.089

2. The following equation converts kW of heat energy to Btuh: kW x 3,412 = Btuh.
3. Heater contactor coils are 24 v and require 8 va holding current.
4. Electric heaters are tested and ETL approved at maximum total external static pressure of 1.9 in. wg.
5. MCA and MOCP values apply to both standard and alternate factory-supplied motors.
6. Approximate shipping weight for CAELHEAT016A00-027A00 is 60 lb each. Approximate shipping weight for CAELHEAT028A00-033A00 is 75 lb each.

Application data — 40RM

Operating limits

Maximum fan speed — 40RM016,024 . . . . . 1200 rpm
Maximum fan speed — 40RM028,034 . . . . . 1100 rpm

General

Select equipment to match or to be slightly less than peak load. This provides better humidity control, less unit cycling, and less part-load operation. Equipment should be selected to perform at no less than 300 cfm/ton.

The air handler fan must always be operating when the condensing unit is operating.

Ductwork should be sized according to unit size, not building load. For larger units with two fans, a split duct transition is recommended at the fan outlets, but a plenum can be used with slight reduction in external static pressure capability.

For variable air volume (VAV) systems with supply-to-return air recycling, use the equipment room as a return air plenum.

FACTORY-INSTALLED NOZZLE AND DISTRIBUTOR DATA

UNIT	COIL TYPE	TXV Qty...Part No.*	DISTRIBUTOR Qty...Part No.†	FEEDER TUBES PER DISTRIBUTOR Qty...Size (in.)	NOZZLE Qty...Part No.
40RM016	3 Row 4 Row	2...TDEBX8 2...TDEBX8	2...1116 2...1126	12...1/4 16...1/4	2...E6 2...C6
40RM024	3 Row 4 Row	2...TDEBX11 2...TDEBX11	2...1116 2...1126	13...1/4 18...3/16	2...E8 2...C8
40RM028	3 Row 4 Row	2...TDEBX11 2...TDEBX11	2...1126 2...1126	15...1/4 20...3/16	2...C10 2...C15
40RM034	3 Row 4 Row	2...TDEBX16 2...TDEBX16	2...1126 2...1126	18...1/4 24...3/16	2...C12 2...C17

*Danfoss part numbers shown.
†Sporlan Valve Co. part numbers shown.
NOTE: Hot gas bypass applications require field-supplied auxiliary side connector.

STANDARD FAN MOTOR DATA
208/230-3-60 AND 460-3-60 MOTORS

UNIT 40RM	016	024	028	034
Speed (rpm)	1725	1745	1745	1745
Hp	3.7	5.0	7.5	10.0
Frame (NEMA)	56Y	S184T	S213T	S215T
Shaft Dia (in.)	7/8	1 1/8	1 3/8	1 3/8

LEGEND
NEMA — National Electrical Manufacturers Association

ALTERNATE FAN MOTOR DATA
208/230-3-60 AND 460-3-60 MOTORS

UNIT 40RM	016	024	028
Speed (rpm)	1745	1745	1750
Hp	5.0	7.5	10.0
Frame (NEMA)	S184T	S213T	S215T
Shaft Dia (in.)	1 1/8	1 3/8	1 3/8

LEGEND
NEMA — National Electrical Manufacturers Association

575-3-60 MOTORS

UNIT 40RM	016	024	028	034
Speed (rpm)	1725	1745	1755	1755
Hp	3.0	5.0	7.5	10.0
Frame (NEMA)	56HZ	184T	S213T	S215T
Shaft Dia (in.)	7/8	1 1/8	1 3/8	1 3/8

LEGEND
NEMA — National Electrical Manufacturers Association

575-3-60 MOTORS

UNIT 40RM	016	024	028
Speed (rpm)	1745	1755	1750
Hp	5.0	7.5	10.0
Frame (NEMA)	184T	S213T	S215T
Shaft Dia (in.)	1 1/8	1 3/8	1 3/8

LEGEND
NEMA — National Electrical Manufacturers Association

Application data — 40RM (cont)

STANDARD DRIVE DATA

UNIT 40RM	016	024	028	034
MOTOR DRIVE				
Motor Pulley Pitch Diameter	2.8-3.8	3.7-4.7	4.3-5.3	4.3-5.3
Pulley Factory Setting Full Turns Open	2.5	3.0	3.0	3.0
FAN DRIVE				
Pulley Pitch Dia (in.)	9.0	9.4	11.0	11.0
Pulley Bore (in.)	$1\frac{7}{16}$	$1\frac{7}{16}$	$1\frac{15}{16}$	$1\frac{15}{16}$
Belt No. — Section	1—A	2—B	2—B*	2—B*
Belt Pitch (in.)	42.3	41.8	(2) 42.8 or (2) 43.8	(2) 42.8 or (2) 43.8
FAN SPEEDS (rpm)				
Factory Setting	632	771	752	752
Range	537-728	679-863	682-841	674-831
Max Allowable Speed	1200	1200	1100	1100
Change per $\frac{1}{2}$ Turn of Moveable Motor Pulley Flange	19.1	15.3	13.1	13.1
MAX FULL TURNS FROM CLOSED POSITION	5	6	6	6
SHAFTS CENTER DISTANCE (in.)	10.44-12.32	9.12-10.99	6.67-9.43	6.67-9.43

*Four belts shipped with unit. Use one set of 2 belts sized according to the pulley setting.

HIGH-STATIC DRIVE DATA

UNIT 40RM	016	024	028	034
MOTOR DRIVE				
Motor Pulley Pitch Diameter	4.3-5.3	4.3-5.3	4.3-5.3	4.3-5.3
Pulley Factory Setting Full Turns Open	2.5	3.0	3.0	3.0
FAN DRIVE				
Pulley Pitch Dia (in.)	7.9	7.4	8.6	8.6
Pulley Bore (in.)	$1\frac{7}{16}$	$1\frac{7}{16}$	$1\frac{15}{16}$	$1\frac{15}{16}$
Belt No. — Section	1—B	2—B	2—B	2—B
Belt Pitch (in.)	39.8	36.8	37.8	37.8
FAN SPEEDS (rpm)				
Factory Setting	1060	1118	1024	1024
Range	950-1171	1014-1200	873-1075	873-1075
Max Allowable Speed	1200	1200	1100	1100
Change per $\frac{1}{2}$ Turn of Moveable Motor Pulley Flange	30.8	19.4	16.7	16.7
MAX FULL TURNS FROM CLOSED POSITION	5	6	6	6
SHAFTS CENTER DISTANCE (in.)	9.16-10.99	8.16-10.02	6.67-9.43	6.67-9.43

MEDIUM-STATIC DRIVE DATA

UNIT 40RM	016	024	028	034
MOTOR DRIVE				
Motor Pulley Pitch Diameter	3.7-4.7	4.3-5.3	4.3-5.3	4.3-5.3
Pulley Factory Setting Full Turns Open	3.0	3.0	3.0	3.0
FAN DRIVE				
Pulley Pitch Dia (in.)	8.6	9.4	9.4	9.4
Pulley Bore (in.)	$1\frac{7}{16}$	$1\frac{7}{16}$	$1\frac{15}{16}$	$1\frac{15}{16}$
Belt No. — Section	1—B	2—B	2—B*	2—B*
Belt Pitch (in.)	41.8	41.8	(2) 38.8 or (2) 39.8	(2) 38.8 or (2) 39.8
FAN SPEEDS (rpm)				
Factory Setting	842	881	881	881
Range	742-943	798-984	798-984	798-984
Max Allowable Speed	1200	1200	1100	1100
Change per $\frac{1}{2}$ Turn of Moveable Motor Pulley Flange	16.7	15.3	15.3	15.3
MAX FULL TURNS FROM CLOSED POSITION	6	6	6	6
SHAFTS CENTER DISTANCE (in.)	10.44-12.32	9.16-10.99	6.67-9.43	6.67-9.43

*Four belts shipped with unit. Use one set of 2 belts sized according to the pulley setting.

Guide specifications — 40RM016-034

Commercial Packaged Air-Handling Unit

HVAC Guide Specifications — Section 15859

Size Range: **2,400 to 12,000 Cfm, Nominal Airflow**
15 to 30 Tons, Nominal Cooling

Carrier Model Number: **40RM (Direct-Expansion Coil)**

Part 1 — General

1.01 SYSTEM DESCRIPTION

A. Indoor, packaged air-handling unit for use in commercial split systems. Unit shall have a multipoise design and shall be capable of horizontal or vertical installation on a floor or in a ceiling, with or without ductwork. (Only vertical units are to be applied without ductwork.)

B. Unit shall have a direct-expansion coil and shall be used in a refrigerant circuit with a matching air-cooled condensing unit.

1.02 QUALITY ASSURANCE

A. Coils shall be designed and tested in accordance with ASHRAE 15 Safety Code for Mechanical Refrigeration, latest edition.

B. Unit shall be constructed in accordance with ETL and ETL, Canada, standards and shall carry the ETL and ETL, Canada, labels.

C. Unit insulation and adhesive shall comply with NFPA-90A requirements for flame spread and smoke generation. Insulation shall contain an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM standards G21 and 22.

D. Unit shall be manufactured in a facility registered to the ISO 9001:2000 manufacturing quality standard.

E. Direct-expansion coils shall be burst tested at 435 psi and leak tested at 150 psi.

1.03 DELIVERY AND STORAGE

Units shall be stored and handled per manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT

Indoor mounted, draw-thru, packaged air-handling unit that can be used in a suspended horizontal configuration or a vertical configuration. Unit shall consist of forward-curved belt-driven centrifugal fan(s), motor and drive assembly, prewired fan motor contactor, factory-installed refrigerant metering devices, cooling coil, 2-in. disposable air filters, and condensate drain pans for vertical or horizontal configurations.

A. Base Unit:

1. Cabinet shall be constructed of mill-galvanized steel.
2. Cabinet panels shall be fully insulated with $1/2$-in. fire-retardant material.
3. Unit shall contain condensate drain pans for both vertical and horizontal applications. Drain pans shall have connections on right and left sides of unit to facilitate field connection. Drain pans shall have the ability to be sloped toward the right or left side of the unit to prevent standing water from accumulating in pans.
4. Unit shall have factory-supplied 2-in. throw-away-type filters installed upstream from the cooling coil. Filter access shall be from either the right or left side of the unit.

B. Coils:

Coils shall consist of 3 rows of $3/8$-in. copper tubes with sine-wave aluminum fins bonded to the tubes by mechanical expansion. Coil tubing shall be internally rifled to maximize heat transfer. Suction and liquid line connections shall be made on the same side of the coil. Direct-expansion coils shall feature factory-installed thermostatic expansion valves (TXVs) for refrigerant control. The TXVs shall be capable of external adjustment.

C. Operating Characteristics:

Unit shall be capable of providing _____ cfm airflow at an external static pressure of _____ in wg.

D. Motor:

Fan motor of the size and electrical characteristics specified on the equipment schedule shall be factory supplied and installed.

E. Special Features:

1. Alternate Motor and Drive:

   An alternate motor and medium-static or high-static drive shall be available to meet the air flow and external static pressure requirements specified on the equipment schedule.

2. High-Capacity Coil:

   The high-capacity coil consists of 4 rows of $3/8$-in. copper tubes with sine-wave aluminum fins bonded to the tubes by mechanical expansion. Coil tubing shall be internally rifled to maximize heat transfer. Suction and liquid line connections shall be made on the same side of the coil. Direct-expansion coils shall feature factory-installed thermostatic expansion valves (TXVs) for refrigerant control. The TXVs shall be capable of external adjustment.

3. External Paint:

   Where conditions require, units shall be painted with an American Sterling Gray finish.

4. Hot Water Coil:

   Coil shall be 2-row, U-bend coil with copper tubes and aluminum plate fins bonded to the tubes by mechanical expansion. Coil shall be mounted in a galvanized steel housing that shall be fastened to the unit's fan deck for blow-thru heating operation. Coil shall have maximum working pressure of 150 psig.

5. Steam Distributing Coil:

   Coil shall consist of one row of copper tubes with aluminum plate fins, and shall have inner steam distributing tubes. Coil shall be mounted in a galvanized steel housing and shall be fastened to the unit's fan deck for blow-thru heating operation. Coil shall have maximum working pressure of 20 psig at 260 F.

6. Electric Heaters:

   Heaters for nominal 240, 480, or 575-volt, 3-phase, 60 Hz power supply shall be factory-supplied for field installation as shown on the equipment drawings. Electric heat assembly shall be ETL agency approved, and shall have single-point power wiring. Heater assembly shall include contactors with 24-v coils, power wiring, 24-v control wiring terminal blocks, and a hinged access panel.

7. Air Discharge Plenum:

   Plenum shall be factory supplied to provide free-blow air distribution for vertical floor-mounted units. A grille with moveable vanes for horizontal or vertical airflow adjustment shall be included. Plenum housing shall be field-installed on the unit's fan deck for blow-thru air distribution.

8. Return-Air Grille:

   Grille shall be factory supplied for field installation on the unit's return air opening.

9. Unit Subbase:

   Subbase assembly shall be factory supplied for field installation. Subbase shall elevate floor-mounted vertical units to provide access for correct condensate drain connection.

10. Economizer:

    Economizer for ventilation or "free" cooling shall be factory provided for field installation. For free cooling applications, economizer shall be compatible with factory-supplied thermostat; economizer dampers shall open when outdoor air enthalpy is suitable for free cooling. Economizer shall be compatible with factory-supplied CO_2 sensor; economizer dampers shall open when indoor CO_2 level rises above predetermined set point.

11. Overhead Suspension Package:

    Package shall include necessary brackets to support units in a horizontal ceiling installation.

12. CO_2 Sensor:

    Sensor shall provide the ability to signal the economizer to open when the space CO_2 level exceeds the predetermined set point.

13. Condensate Drain Trap:

    Trap shall have transparent, serviceable design for easy cleaning. Kit shall include overflow shutoff switch and wiring harness for connection to alarm if desired.

14. UV-C Germicidal Lamps:

    a. UV-C emitters and fixtures shall be specifically designed for use inside an HVAC system. An ASME nozzled test apparatus using a 45 F (7.2 C) airstream moving at not less than 400 fpm (189 liters/sec.) shall measure individual lamp output. Lamp output at 253.7 nm shall not be less than 10μW/cm^2 per inch of arc length measured at a distance of one meter.

    b. UV-C power supplies shall be high efficiency, electric type which are matched to the emitters and are capable of producing the specified output intensity with an input power no more than 80 watts.

    c. Emitters and fixtures shall be installed in sufficient quantity and arranged so as to provide an equal distribution of UV-C energy on the coil and drain pan.

    d. The minimum UV-C energy striking the leading edge of the coil fins shall be not less than 820 μW/cm^2 at the closest point and through placement, not less than 60% of that value at the farthest point. Equal amounts are to strike the drain pan, either directly or indirectly through reflection.

    e. Emitters and fixtures shall be installed at right angles to the conforming lines of the coil fins, such that through incident angle reflection, UV-C energy strikes all target surfaces of the coil, drain pan, and the available line of sight airstream.

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