

APMR Series

Packaged Air Conditioners



50Hz

R-410A
REFRIGERANT



Range 5 TR to 28 TR
(17 kW to 98 kW)



CE

Contents

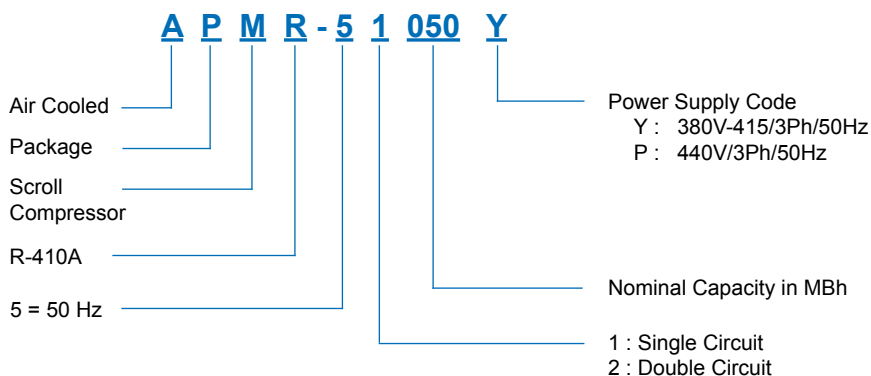
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Legend

The following legends are used throughout this manual:

AFR	Air Flow Rate	lbs.....	Pounds weight
BPF.....	By Pass Factor	L/s.....	Liters per second
CFM.....	Cubic feet per minute	MBh.....	BTUHx1000
EER.....	Energy Efficiency Ratio	Pa.....	Pascal
ESP.....	External Static Pressure	Ph.....	Phase
Hz	Hertz	PI	Power Input of Compressor in kW
in. wg.....	Inch water gauge	RPM	Revolutions Per Minute
kW.....	Kilowatts	RPS.....	Rated Power Supply
kg.....	Kilogram	TR.....	Tons of Refrigeration
		V.....	Volts

Nomenclature



SKM reserves the right to change, in part or in whole the specifications of its Air Conditioning Equipment at any time in order to add the latest technology. Therefore, the enclosed information may change without any prior notice.

Introduction

SKM **APMR** New Packaged Air Conditioners Series are designed and manufactured to meet the requirements of Gulf's severe climatic conditions and are built specifically for ducted systems which will enable them to be installed easily on roof tops or on the ground.

The **APMR** series Packaged Air Conditioners are compact, quiet, most efficient and self contained units are ideal for commercial and top end residential applications.

Available in 15 different sizes from 5 to 28 TR (17kW to 98kW) in 50 Hz at nominal AHRI conditions. **APMR** series packaged air conditioners are designed to operate in a wide ambient temperature range between 50°F (10°C) to 125°F (51.7°C), based on specific conditions & model applies. Two independent refrigeration circuits are provided where two compressors are used.

APMR units are designed, rated and manufactured in accordance with AHRI 210/240 and 340/360 standards.

APMR series units from SKM are completely assembled, leak tested, vacuumed, internally wired and fully charged with R-410A refrigerant at factory. Each unit is fully factory tested before dispatch and is ready for installation. All that is required on the site is to connect ducts, drain lines, main power supply and field wiring to the thermostat. This greatly reduces the installation work and cost.

SKM provides qualified service and stock of replacement parts in all major cities of the G.C.C. countries, Egypt, Jordan, and Pakistan. See back cover for details or call SKM.

SKM Air Conditioning LLC



You name it.....We cool it



General Features

The **APMR** Series is a modern, diversified and environment friendly series of packaged air conditioners which use R-410A refrigerant.

The **APMR** Series Packaged Air Conditioners are yet another new unique series from SKM incorporates many salient features which, together, provides a heavy duty, robust, long lasting commercial unit meant for high end residential and commercial applications. The **APMR** series models combine high efficiency condenser and cooling coils, evaporator blower and heavy duty motor in addition to premium safety and operational controls.

The complete **APMR** packaged unit provides an extremely rugged, long life, energy efficient, self contained packaged air conditioner that will provide cooling with higher efficiency over a long and extended life.

What makes **APMR** series yet another model in the top class range of SKM products is the use of:

- High efficiency totally sealed scroll hermetic compressors.
- Totally enclosed, Class F insulated, condenser and evaporator fan motors.
- Heavy duty condenser and evaporator coils optimised in design for long-life maintenance free operation.
- Cabinet construction specifically designed for Gulf climates.
- Electronic control board for the unit operation.
- Typically, much heavier gauge tubing and thicker fins for ruggedness and long life.

Main Component Features

The common standard features of all **APMR** series packaged units include the following

Compressors

Compressors used in **APMR** packaged unit series are hermetically sealed, compact scroll with the following features:

- High Efficiency.
- Quiet operation, Low Sound levels.
- Compact and light.
- Limited wear.
- 70% fewer moving parts than comparably sized reciprocating compressors.
- Unique ability to handle liquid refrigerant.
- Suction gas motor cooling.
- Suction screen.
- Centrifugal oil pumps with filter and magnet.
- Brazed fittings or Rotalock options.
- Two refrigerant circuits on larger units provides efficient part load.
- No internal valves.

Condenser Coils

Condenser coils are manufactured from Corrugated fin and Hi-X seamless copper tubes mechanically bonded to aluminium fins to ensure optimum heat transfer. All coils are tested against leakage by high air pressure 715psig (4930kPa) under water. An integral subcooling circuit is incorporated in the lower section of the condenser to increase system capacity. The additional condenser surface provides more cooling using less energy at no additional cost.

Condenser Fans

Condenser fans are propeller type with aluminum alloy blades and are directly driven by electric motors. Motors are Totally Enclosed Air Over (TEAO), six pole or four pole with Class F insulation and IP54/55 protection depending on models. Complete fan assembly is provided with fan guard.

Evaporator

Evaporator coils are manufactured from Hi-X seamless copper tubes mechanically bonded to aluminium Corrugated fins to ensure optimum heat transfer. All evaporator coils are tested against leakage by high air pressure of 450 psig (3100kPa) under water. Coils conform to AHRI-410.

Evaporator Fan & Drive

Evaporator fans are forward curved centrifugal double inlet, double width, statically and dynamically balanced. Bearings used in the fans are self aligning and lubricated for life. Evaporator fans are belt driven and use "V" belts with an adjustable variable pitch motor pulley resulting in an accurate fan air flow adjustment.

Fans are driven by Totally Enclosed, IP-55 Protected, 4 pole Class F insulated electric motors. The motors are factory wired to the control panel where the motor starters are located to control the operation of the motors. The motors conform to relevant IEC standards.

Casing and Structure

The unit casing used in **APMR** series is made of hot dip galvanized (zinc coated) steel sheets, conforming to JIS-G 3302 and ASTMA653, which is phosphatized and baked after an electrostatic powder coat of approx. 60 microns. This finish and coating can pass a 1000 hour in 5% salt spray testing at 95°F (35°C) and 95% relative humidity as per ASTM B117.

The evaporator section is insulated from all the sides with 1" thick fiber glass insulation with extremely tough and durable black composite surface. The insulation cum sound liner meets the fire requirements of NFPA90A & 90B and is secured with mechanical fasteners in addition to water resistant adhesive.

Refrigerant R- 410A

Why 410A?

R-410A has a higher volumetric cooling capacity compared to R-22 and has better thermal exchange properties. This results in overall performance gains in terms of system efficiency. The greater density of the vapour in R-410A permits higher system velocities, reduces pressure drop losses and allows smaller diameter tubing to be used. In other words a smaller unit can be developed using a smaller displacement compressor, less coil and less refrigerant while maintaining system efficiencies comparable to current day R-22 equipment.

Benefits

- **No ozone depletion potential or phase-out date**

Using chlorine-free R-410A with zero Ozone Depletion Potential (ODP) helps protect both the environment and your investment. That's because new equipment using R-410A faces no mandated phase-out date over a 20 to 30 year equipment life expectancy.

- **Reduced service costs**

R-410A refrigerant has no significant "glide." If a leak occurs, only the lost refrigerant must be replaced.

Attention points

- Pressure level: 1.6 times of R-22.
- Lubricating oil: Ester Oil absorb moisture easily (Never mix with mineral oil).
- Tools exclusive for R-410A.
- Never mix R-410A with other refrigerant.
- Driers, valves and even copper tube must be approved for use with R-410A.
- Never allow refrigerant cylinders to exceed 60°C.

Control Panel

The APMR packaged Air Conditioners are provided with IP-54 control panel enclosure comprising all starting, operating & safety controls. The panel is factory wired in accordance with NEC 430 & 440, labelled, tagged and features 220V / 240V controls.

- Starting contactors for compressors and motors.
- Internal overload protection for compressors.
- Internal or External overload protection for the motors (depending on the model).
- Electronic control board for unit operation.
- Diagnostic LEDs on the control board for easy troubleshooting.
- Compressor short cycling protection.
- Control switch for unit on/off.
- Control circuit breaker.
- Power and control circuit terminal blocks.
- High pressure protection.
- Low pressure protection.

Optional Features

As with all SKM air conditioning units, the **APMR** Series Packaged Units are available with multitude of optional features available on request:

Double Skin Evaporator (DSE)

Double skin evaporator section with galvanized inner skin.

Double Skin Insulation (DSI)

Inner skin in the evaporator section is provided with foam board insulation.

Temperature Based Economizer (ECRU)

Simple temperature based economizer.

2" (50mm) Flat Filter Section (FSIP2)

For heavy filtration need a section can be provided without or with aluminium cleanable filter.

Alternative Condenser Material

Made of copper tubes and alternative fin material and/or protective coating.

- Pre Coated aluminum fins (FAP).
- Aluminum Fins with Aeris post Coat Protection (FAA).
- Copper Fins (FC).
- Copper Fins with Aeris post Coat Protection (FCA).

Alternative Evaporator Material

Made of copper tubes and alternative fin material and/or protective coating.

- Pre Coated aluminum fins (EFAP).
- Aluminum Fins with Aeris post Coat Protection (EFAA).
- Copper Fins (EFC).
- Copper Fins with Aeris post Coat Protection (EFCA).

Anti-Freeze Thermostat (AFT)

For evaporator coil freeze -up protection.

Western Make Scroll Compressor (WMSC)

Western make scroll compressor.

Compressor Run Hour Meter (RHM)

To monitor operating hours of each compressor.

Circuit Breaker for compressor (CBC)

For those electrical specification which requires additional short circuit and overload protection for the compressors.

Rotalock Valves on compressors (RVC)

For additional facilitation of maintenance of unit.

External Overload Protection (EOP)

For those electrical specification requires additional overload protection for the compressors.(Not required with CBC option)



Electric Heating (HTR1)

Electric heating batteries are made up of finned heating elements, constructed from high quality 80/20 nickel chrome resistance wire centred in metal tube by compressed magnesium oxide. Helical fins are tightly wound around the tubular heating element. Heater batteries when ordered comes with stage contactors, primary auto reset thermal safety cut-out, secondary manual reset thermal safety cut-out and air flow switch.

Control of the heaters will be from the unit controller. Following are the optional kW ratings for electric heater. Ratings other than those specified here can be supplied on request. Consult SKM for details

Table 1

Advanced Micro Processor Control System (AMCS)

An advanced microprocessor based controller can be provided for the units as option, in case required. This controller will be with built-in display keypad and has many features. For this feature, additional options can be provided and to be specified during time of order:

• DTS – Duct Temperature Sensor *

(In order to control the unit based on return/supply air duct temperature.) (This is not required with CHTS/CHTS-Wifi options)

• BMSP – BMS Protocol *

(For interfacing the units with major BMS protocols such as BACnet, Modbus or LON. An extra hardware may be required depending on the protocol)

Pump Down Facility (PD)

The compressor will switch off each time with a Pump Down Cycle in order to prevent Liquid refrigerant migration to the compressor during off Cycle periods.

With this option, each circuit will be provided with an additional discharge check valve (if required) to prevent Refrigerant Migration from High side to Low side when the compressor is off.

Applicable for models from APMR-52300 & 52340

Pump Down Facility with solenoid Valve (PDS)

The compressors will switch off each time with a Pumpdown Cycle in order to prevent Liquid refrigerant migration to the compressor during Off Cycle periods.

Applicable for models from APMR-51050 to 52270

Extra Ball Valve (XFV)

Extra ball valve can be incorporated in the liquid line.

Pressure relief valve (PRV)

To protect the unit from being over - pressurized.

Pressure Gauges (SDG1)

Suction and discharge indication of each refrigerant circuit. Gauges mounted outside the Control Panel.

Manual Reset Type High Pressure Switch (MHP)

To replace standard auto reset, capsule type pressure switch.

Liquid Line Sight Glass (RSG)

For monitoring refrigerant charge and to provide visual indication of moisture presence in the system.

Condenser Coil Guard (CGP)

Wire mesh guard, in painted finish for condensers coils.

Recommended on ground level installation where coil needs to be protected against vandalism.

Stainless Steel Drain Pan (Grade 304) (SDP)

Stainless steel drain pan(Grade 304). Insulation under drain pan as per SKM standard.

Stainless Steel Drain Pan (SSP)

Heavy gauge 316 stainless steel drain pan under the entire cooling coil.

Insulation under drain pan as per SKM standard.

Marine Painted Inner Skin (IS-MP)

Painted Inner Skin (IS-P)

Marine Paint (MP)

To provide increased corrosion resistance for coastal environments and offshore location.

Stainless Steel SS316L Fasteners (SSF)

Anti-corrosion clear coating for fasteners (JHT)

Anti-corrosion clear coating for fasteners applicable with SSF option.

Marine Painted Condenser Coil end plate (MP-CCEP)

Marine Painted Evaporator Coil end plate (MP-ECEP)

SS316L Laser Printed Unit Tag Plates (TO-SS-LA)

Up Size Evaporator Motor (USM)**

Unit with one up size evaporator motor.

Circuit breaker for Motors (CBM)**

For those electrical specification which requires additional short circuit and overload protection for the fan motors.

IP 55 Control Panel (ICP)

Control Panel for special applications to meet IP55 requirements.

Main Isolator (without door interlock) (ISO)

For main power isolation. (**Consult SKM**)

Control Transformer (CXT)

This option is necessary and available for unit models rated for 440V/3PH/50Hz or power supplies without neutral.

When ordering for these voltages, this option must be ordered.

BMS Interface Volt Free Contacts (BMVF)

Volt free contacts for run status, common fault status, auto mode status and provision for remote on/off shall be provided as option if required.

For additional requirements, please contact SKM.

Voltage Monitor Module (VMM)

Provides protection in the event of:

- Phase burn-out.
- Phase reversal.
- Under / over voltage on the incoming line voltage.

Voltage Monitoring Module as per DEWA (DVM)

Under voltage relay as per DEWA regulations. This option is available for Dubai, UAE only. (**VMM option is not required if this option is opted.**)

Ball Valve (BLV)

Ball valve can be incorporated in the liquid line.

Fan Cycling Switch (FCS)

Fan Cycling switch for single compressor units with two condenser fans. (**Not required with AMCS option**)

Fire Alarm Interlock (VFC-F)

To provide provision for fire alarm interlock.

Options for Field Installation**Anti-vibration mounts (CAVM)**

Recommended for roof mounted units or other location in the vicinity of occupied spaces. where noise may be objectionable.

Low Voltage Thermostat (CHTS)

For wall mounting and for cooling /heating operation with 1 or 2 stages as per model. (**Not required with AMCS/CHTS-Wifi options**).

Low Voltage Thermostat with Wi-Fi (CHTS-WiFi)

For wall mounting and for cooling /heating operation with 1 or 2 stages as per model and with wireless connectivity or Wi-Fi. (**Not required with AMCS/CHTS options**).

- **DTS-TH – Duct Temperature Sensor for 24V Thermostat ***
(In order to control the unit based on return/supply air duct temperature.) (**This is not required with AMCS options**)

Note:

- *DTS & BMSP options are only available along with AMCS option.
- *DTS-TH option is only available along with CHTS/CHTS-Wifi options.
- **If CBM combined with USM option please consult SKM as component might changed.
- Whenever multiple options related to unit control, please consult SKM for the drawings, as the size of the control panel might change.



ENGINEERING SPECIFICATIONS - 50 Hz

Model		APMR	51050	51060	51075	51080	51100	52115	52125
Cooling Capacity (1)	MBh		53.4	59.0	74.4	80.4	98.6	113.7	120.0
	kW		15.6	17.3	21.8	23.6	28.9	33.3	35.2
Cooling Capacity (2)	MBh		47.4	52.4	66.4	70.8	87.6	99.9	106.8
	kW		13.9	15.4	19.5	20.7	25.7	29.3	31.3
Cooling Capacity (3)	MBh		46.1	51.1	64.6	68.8	85.2	97.2	103.8
	kW		13.5	15.0	18.9	20.2	25.0	28.5	30.4
Compressor	Type	-	Hermetic Scroll						
	Quantity	-	1	1	1	1	1	2	2
	Oil Charge	US Gal	0.45	0.47	0.48	0.71	0.9	0.9	0.94
		Litre	1.7	1.77	1.8	2.7	3.4	3.4	3.54
Condenser Coil	Type	-	Hi-X tubes						
	Face Area	ft	19.4	26.7	26.7	26.7	26.7	26.7	40
		m	1.8	2.5	2.5	2.5	2.5	2.5	3.7
Condenser Fan	Type	-	Propeller Direct Drive						
	Code / Quantity	-	550/1	550/2	550/2	550/2	550/2	550/2	630/2
Condenser Motor	Type	-	Totally Enclosed Air Over, Class-F insulation, 4 pole or 6 pole, IP54 protected						
Evaporator Coil	Type	-	Hi-X-Tubes						
	Face Area	ft	4.6	4.6	6.4	6.4	8.7	9.7	9.7
		m	0.4	0.4	0.6	0.6	0.8	0.9	0.9
Evaporator Fan	Type	-	Centrifugal DIDW Belt Drive						
	Code / Quantity	-	10/10	10/10	10/10	12/12	12/12	12/12	12/12
	Air Flow Rate	cfm	1670	2000	2400	2900	3220	4000	4000
		l/s	788	944	1133	1369	1520	1888	1888
Evaporator Motor	Type	-	Totally Enclosed Fan Cooled, Class-F insulation, 4-pole, IP55 Protected.						
	Size	kW	0.55	0.55	0.75	1.1	1.1	1.5	1.5
Refrigerant (R - 410A) Operating Charge	lbs		7.5	10	10	10	17	17	26
	kg		3.4	4.5	4.5	4.5	7.7	7.7	11.8
Number of Refrigerant Circuits	-		1	1	1	1	1	2	2
Unit Operating Weight	lbs		673	783	800	887	1045	1207	1428
	kg		305	355	363	402	474	547	648

Table 2

Notes:

- (1) Capacity ratings are based on AHRI Standard 210/240 & 340/360. Evaporator entering air conditions of 80°/67°F (27°/19.5°C) dry bulb/wet bulb and condenser entering air temperature of 95°F (35°C) dry bulb.
- (2) Evaporator entering air conditions of 80°/67°F (27°/19.5°C) dry bulb/wet bulb and condenser entering air temperature of 114.8°F (46°C) dry bulb.
- (3) Evaporator entering air conditions of 80°/67°F (27°/19.5°C) dry bulb/wet bulb and condenser entering air temperature of 118.4°F (48°C) dry bulb.
- (4) Capacity is gross capacity which does not include the effect of evaporator fan motor heat.

ENGINEERING SPECIFICATIONS - 50 Hz

Model		APMR	52150	52170	52200	52230	52240	52270	52300	52340
Cooling Capacity (1)	MBh		150.3	168.1	194.6	227.1	233.7	264.5	299.5	337.6
	kW		44.1	49.3	57.0	66.6	68.5	77.5	87.8	98.9
Cooling Capacity (2)	MBh		134.6	149.3	173	198.3	206.8	229.1	259.9	298.9
	kW		39.4	43.8	50.7	58.1	60.6	67.1	76.2	87.6
Cooling Capacity (3)	MBh		131.0	145.1	168.3	192.8	200.9	222.5	252.3	290.7
	kW		38.4	42.5	49.3	56.5	58.9	65.2	73.9	85.2
Compressor	Type	-	Hermetic Scroll							
	Quantity	-	2	2	2	2	2	2	2	2
	Oil Charge	US Gal	0.95	1.43	1.80	1.80	1.80	1.80	1.80	1.80
		Litre	3.6	5.4	6.8	6.8	6.8	6.8	6.8	6.8
Condenser Coil	Type	-	Hi-X tubes							
	Face Area	² ft	40.0	40.0	48.0	48.0	54.7	54.7	53.3	53.3
		² m	3.7	3.7	4.5	4.5	5.1	5.1	5.0	5.0
Condenser Fan	Type	-	Propeller Direct Drive							
	Code / Quantity	-	630/2	710/2	710/2	710/2	800/2	800/2	800/2	800/2
Condenser Motor	Type	-	Totally Enclosed Air Over, Class-F insulation, 6 pole, IP54/IP55 depending on models							
Evaporator Coil	Type	-	Hi-X-Tubes							
	Face Area	² ft	12.5	13.3	15.6	15.6	19.5	19.5	21.7	21.7
		² m	1.2	1.2	1.4	1.4	1.8	1.8	2.0	2.0
Evaporator Fan	Type	-	Centrifugal DIDW Belt Drive							
	Code / Qty.	-	15/15	12/12 R2	12/12 R2	12/12 R2	15/15 R2	15/15 R2	15/15 R2	15/15 R2
	Air Flow Rate	cfm	5000	6000	7000	7000	8000	8000	9100	10500
		l/s	2360	2832	3304	3304	3776	3776	4295	4955
Evaporator Motor	Type	-	Totally Enclosed Fan Cooled, Class-F insulation, 4-pole, IP55 Protected.							
	Size	kW	2.2	2.2	3	3	3	3	3	4
Refrigerant (R - 410A) Operating Charge	lbs		26.0	26.0	30.0	31.0	34.0	36.0	51.0	52.0
	kg		11.8	11.8	13.6	14.1	15.4	16.3	23.1	23.6
Number of Refrigerant Circuits		-	2	2	2	2	2	2	2	2
Unit Operating Weight	lbs		1468	1689	1966	2003	2160	2215	2357	2559
	kg		666	766	892	907	979	1005	1070	1160

Table 3

Notes:

- (1) Capacity ratings are based on AHRI Standard 210/240 & 340/360. Evaporator entering air conditions of 80°/67°F (27°/19.5°C) dry bulb/wet bulb and condenser entering air temperature of 95°F (35°C) dry bulb.
- (2) Evaporator entering air conditions of 80°/67°F (27°/19.5°C) dry bulb/wet bulb and condenser entering air temperature of 114.8°F (46°C) dry bulb.
- (3) Evaporator entering air conditions of 80°/67°F (27°/19.5°C) dry bulb/wet bulb and condenser entering air temperature of 118.4°F (48°C) dry bulb.
- (4) Capacity is gross capacity which does not include the effect of evaporator fan motor heat.



GROSS CAPACITY RATINGS - 50 Hz

Model APMR	AFR cfm l/s	EWB	Condenser Entering Air Temperature																		
			95°F (35°C)						105°F (40.6°C)						114.8°F (46°C)						
			Total Capacity			Sensible Capacity			PI			Total Capacity			Sensible Capacity			PI			
			MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	
51050	(BPF)	°F	°C	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW
	1260	62	16.7	47	13.8	39.4	11.5	4.2	43.7	12.8	37.9	11.1	4.9	40.4	11.8	36.5	10.7	5.5	39.3	11.5	5.7
	595	67	19.4	51	14.9	33	9.7	4.3	48.1	14.1	31.8	9.3	4.9	45.3	13.3	30.7	9	5.5	44.3	13	5.7
	0.17	72	22.2	55	16.1	26.4	7.8	4.4	51.9	15.2	25.4	7.4	4.9	48.9	14.3	24.3	7.1	5.4	47.9	14	5.6
	1670	62	16.7	48.2	14.1	44.9	13.2	4.3	44.9	13.2	43.5	12.8	4.9	41.7	12.2	41.7	12.2	5.5	40.6	11.9	5.7
	788	67	19.4	53.4	15.6	37.4	10.9	4.3	50.3	14.8	36.2	10.6	4.9	47.4	13.9	35.1	10.3	5.5	46.1	13.5	5.6
	0.2	72	22.2	57.4	16.8	29.1	8.5	4.4	54.2	15.9	28.1	8.2	4.9	51.1	15	27.1	7.9	5.4	50	14.6	5.6
	2521	62	16.7	50.1	14.7	50.1	14.7	4.3	46.8	13.7	46.8	13.7	4.9	43.7	12.8	43.7	12.8	5.5	42.6	12.5	5.7
	1190	67	19.4	56.2	16.5	45.4	13.3	4.4	52.3	15.3	44	12.9	4.9	48.7	14.3	42.7	12.5	5.4	47.4	13.9	5.6
	0.26	72	22.2	60.2	17.6	34.1	10	4.4	--	--	--	--	--	--	--	--	--	--	--	--	--
51060	1260	62	16.7	50.7	14.9	41	12	4.2	47.9	14	39.8	11.7	4.8	44.5	13	38.2	11.2	5.4	43.1	12.6	5.6
	595	67	19.4	54.7	16	34.5	10.1	4.3	51.9	15.2	33.3	9.8	4.9	48.8	14.3	32.1	9.4	5.5	47.7	14	5.7
	0.17	72	22.2	59.1	17.3	27.9	8.2	4.3	56	16.4	26.8	7.9	4.9	52.7	15.4	25.6	7.5	5.6	51.5	15.1	5.7
	2000	62	16.7	53.5	15.7	51	15	4.2	50	14.7	49.6	14.5	4.8	46.5	13.6	46.5	13.6	5.4	45.2	13.2	5.7
	944	67	19.4	59	17.3	42.2	12.4	4.3	55.8	16.3	41	12	4.9	52.4	15.4	39.8	11.7	5.6	51.1	15	5.8
	0.22	72	22.2	63.3	18.6	32.7	9.6	4.4	59.8	17.5	31.5	9.2	5	56.2	16.5	30.4	8.9	5.7	54.8	16.1	5.9
	2521	62	16.7	54.5	16	54.5	16	4.2	51.1	15	51.1	15	4.8	47.6	13.9	47.6	13.9	5.5	46.3	13.6	5.7
	1190	67	19.4	60.7	17.8	47	13.8	4.4	57.3	16.8	45.8	13.4	5	53.2	15.6	44.3	13	5.6	51.7	15.2	5.8
	0.26	72	22.2	65	19	35.6	10.4	4.4	61.3	18	34.5	10.1	5.1	--	--	--	--	--	--	--	--
	1769	62	16.7	65.4	19.2	55	16.1	5.5	61.2	17.9	53.2	15.6	6.3	57.1	16.7	51.4	15.1	7.1	55.6	16.3	7.3
51075	835	67	19.4	70.8	20.8	46	13.5	5.6	67.2	19.7	44.6	13.1	6.4	63.5	18.6	43.1	12.6	7.2	62.2	18.2	7.5
	0.17	72	22.2	76.4	22.4	36.8	10.8	5.7	72.4	21.2	35.4	10.4	6.5	68.4	20	34.1	10				

GROSS CAPACITY RATINGS - 50 Hz

Model APMR	AFR cfm /s	EWB °F °C	Condenser Entering Air Temperature																										
			95°F (35°C)						105°F (40.6°C)						114.8°F (46°C)						118.4°F (48°C)								
			Total Capacity			Sensible Capacity			PI			Total Capacity			Sensible Capacity			PI			Total Capacity			Sensible Capacity					
			MBh	kW	MBh	kW	MBh	kW	PI	MBh	kW	MBh	kW	PI	MBh	kW	MBh	kW	PI	MBh	kW	MBh	kW	PI	MBh	kW	PI		
52170	3667	62	16.7	144.3	42.3	118	34.6	11	136.6	40	114.5	33.6	12.7	126.8	37.2	110.2	32.3	14.6	123.1	36.1	108.6	31.8	15.4	116.8	34.2	105.9	31	16.5	
	1731	67	19.4	155.7	45.6	99	29	11.2	147.7	43.3	95.8	28.1	13	139.3	40.8	92.4	27.1	14.9	136.2	39.9	91.2	26.7	15.6	130.5	38.3	89	26.1	16.7	
	0.17	72	22.2	167.7	49.2	79.7	23.4	11.6	159.1	46.6	76.7	22.5	13.3	150.1	44	73.5	21.5	15.1	146.8	43	72.3	21.2	15.7	140.7	41.2	70.2	20.6	16.6	
	6000	62	16.7	151.8	44.5	149	43.7	11.2	142.4	41.7	142.4	41.7	12.8	132.9	39	132.9	39	14.8	129.5	38	129.5	38	15.5	123.4	36.2	123.4	36.2	16.6	
	2832	67	19.4	168.1	49.3	122.8	36	11.6	159.1	46.6	119.6	35	13.3	149.3	43.8	116.1	34	15.1	145.1	42.5	114.6	33.6	15.7	137.8	40.4	112	32.8	16.6	
	0.23	72	22.2	180.3	52.8	94.7	27.7	12	170.5	50	91.5	26.8	13.6	160.6	47.1	88.3	25.9	15.1	--	--	--	--	--	--	--	--	--	--	--
	7333	62	16.7	154.2	45.2	154.2	45.2	11.2	145	42.5	145	42.5	12.9	135.5	39.7	135.5	39.7	14.8	132.1	38.7	132.1	38.7	15.5	126	36.9	126	36.9	16.6	
	3461	67	19.4	172.2	50.5	135	39.6	11.7	162.4	47.6	131.6	38.6	13.4	150.9	44.2	127.6	37.4	15.1	146.8	43	126.1	37	15.7	139.6	40.9	123.7	36.2	16.6	
	0.26	72	22.2	184.3	54	102.2	30	12.1	174.3	51.1	99	29	13.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4278	62	16.7	166.9	48.9	136.9	40.1	12.9	158	46.3	133	39	14.7	146.6	43	128	37.5	16.6	142.5	41.8	126.2	37	17.3	135.4	39.7	123.1	36.1	18.5	
	2019	67	19.4	180.2	52.8	114.9	33.7	13.1	171.1	50.2	111.2	32.6	15	161.5	47.3	107.4	31.5	16.9	158	46.3	106	31.1	17.6	151.7	44.5	103.6	30.4	18.8	
52200	0.17	72	22.2	194.3	57	92.5	27.1	13.4	184.5	54.1	89	26.1	15.2	174.2	51.1	85.4	25	17.2	170.4	50	84.1	24.6	17.9	163.7	48	81.8	24	19	
	7000	62	16.7	175.3	51.4	173.1	50.7	13	164.7	48.3	164.7	48.3	14.8	154	45.1	154	45.1	16.7	150.1	44	150.1	44	17.4	143.3	42	143.3	42	18.6	
	3304	67	19.4	194.6	57	142.8	41.8	13.4	184.4	54	139	40.7	15.2	173	50.7	135	39.6	17.1	168.3	49.3	133.3	39.1	17.8	162.4	46.9	130.4	38.2	18.9	
	0.23	72	22.2	208.7	61.2	109.9	32.2	13.6	197.6	57.9	106.3	31.2	15.5	186.5	54.7	102.8	30.1	17.5	--	--	--	--	--	--	--	--	--	--	--
	8556	62																											



FAN PERFORMANCE - 50 Hz

Model APMR	AirFlowRate		Internal Static Pressure		External Static Pressure - in.wg (Pa)														RPM Range 50 Hz
					0.2 (50)		0.4 (100)		0.5 (125)		0.6 (150)		0.8 (200)		1 (250)		1.25 (313)		
	cfm	l/s	in.wg	Pa	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	
51050	1260	595	0.24	59.69	606	0.12	726	0.16	784	0.18	841	0.21	-	-	-	-	-	-	770 to 993
	1670	788	0.41	101	723	0.24	819	0.29	865	0.31	910	0.34	999	0.4	1085	0.46	1192	0.55	
	2521	1190	0.96	239.22	1017	0.73	1085	0.81	1118	0.84	1150	0.88	1213	0.96	1275	1.04	1350	1.14	
51060	1260	595	0.24	59.69	606	0.12	726	0.16	784	0.18	841	0.21	-	-	-	-	-	-	809 to 1043
	2000	944	0.59	147.23	833	0.38	916	0.44	956	0.47	995	0.51	1071	0.57	1145	0.64	1237	0.73	
	2521	1190	0.96	239.22	1017	0.73	1085	0.81	1118	0.84	1150	0.88	1213	0.96	1275	1.04	1350	1.14	
51075	1769	835	0.24	59.71	646	0.22	747	0.27	794	0.3	839	0.32	926	0.38	1011	0.44	1114	0.52	739 to 922
	2400	1133	0.43	106.01	803	0.48	883	0.55	922	0.58	959	0.62	1031	0.69	1099	0.77	1181	0.86	
	3538	1670	0.96	239.14	1130	1.43	1184	1.53	1212	1.58	1239	1.63	1293	1.73	1345	1.84	1409	1.97	
51080	1769	835	0.24	59.71	-	-	643	0.23	690	0.26	735	0.29	823	0.36	908	0.44	-	-	695 to 866
	2900	1369	0.63	157.7	768	0.61	839	0.7	872	0.74	905	0.79	968	0.88	1028	0.98	1101	1.1	
	3538	1670	0.96	239.14	913	1.06	973	1.17	1001	1.23	1029	1.28	1084	1.39	1136	1.5	1200	1.64	
51100	2387	1126	0.24	59.71	-	-	665	0.37	707	0.4	746	0.44	822	0.52	894	0.6	979	0.7	793 to 989
	3220	1520	0.42	104.78	713	0.63	784	0.73	818	0.78	851	0.83	915	0.93	976	1.03	1048	1.16	
	4774	2253	0.96	239.15	1006	1.9	1055	2.05	1080	2.12	1104	2.2	1152	2.34	1198	2.49	1255	2.68	
52115	2674	1262	0.24	59.73	-	-	681	0.45	721	0.49	759	0.53	831	0.62	899	0.7	980	0.81	622 to 775
	4000	1888	0.52	130.04	816	1.07	875	1.18	904	1.25	933	1.31	989	1.43	1043	1.56	1108	1.71	
	5347	2523	0.96	239.16	1062	2.45	1106	2.6	1128	2.68	1150	2.76	1194	2.92	1237	3.09	1290	3.3	
52125	2674	1262	0.24	59.73	-	-	681	0.45	721	0.49	759	0.53	831	0.62	899	0.7	980	0.81	793 to 989
	4000	1888	0.52	130.04	816	1.07	875	1.18	904	1.25	933	1.31	989	1.43	1043	1.56	1108	1.71	
	5347	2523	0.96	239.16	1062	2.45	1106	2.6	1128	2.68	1150	2.76	1194	2.92	1237	3.09	1290	3.3	
52150	3438	1622	0.24	59.73	481	0.4	556	0.5	591	0.55	624	0.6	686	0.71	745	0.83	816	0.98	624 to 778
	5000	2360	0.49	122.56	632	1.07	689	1.21	716	1.28	743	1.35	793	1.49</					

ELECTRICAL DATA

Power Supply: 380~415V/3PH/50Hz

Model APMR	Unit Characteristic			Compressor			Condenser Fan Motor			Evaporator Fan Motor	
	MFA	MCA	ICF	QTY	RLA	LRA	QTY	FLA	LRA	FLA	LRA
51050	32	17	68	1	11	64	1	0.9	2.6	1.4	7.3
51060	32	19	79	1	12	74	2	0.9	2.6	1.4	7.3
51075	40	22	106	1	14	101	2	0.9	2.6	1.9	9.7
51080	40	25	101	1	16	95	2	0.9	2.6	2.6	14.8
51100	50	29	117	1	19	111	2	0.9	2.6	2.6	14.8
52115	50	30	82	2	11	64	2	0.9	2.6	3.4	18.8
52125	50	33	94	2	12	74	2	1.2	3.6	3.4	18.8
52150	63	39	125	2	14	101	2	1.2	3.6	4.8	27.1
52170	63	46	127	2	16	95	2	2.2	9.0	4.8	27.1
52200	80	54	148	2	19	111	2	2.2	9.0	6.6	42.6
52230	80	56	156	2	20	118	2	2.2	9.0	6.6	42.6
52240	80	60	165	2	20	118	2	4.0	16.5	6.6	42.6
52270	100	62	166	2	21	118	2	4.0	16.5	6.6	42.6
52300	100	71	192	2	25	140	2	4.0	16.5	6.6	42.6
52340	125	82	232	2	29	174	2	4.0	16.5	8.6	53.6

Table 7

Power Supply: 440V/3PH/50Hz

Model APMR	Unit Characteristic			Compressor			Condenser Fan Motor			Evaporator Fan Motor	
	MFA	MCA	ICF	QTY	RLA	LRA	QTY	FLA	LRA	FLA	LRA
51050	32	16	68	1	11	64	1	0.9	2.6	1.3	6.7
51060	32	19	79	1	12	74	2	0.9	2.6	1.3	6.7
51075	40	21	106	1	14	101	2	0.9	2.6	1.7	8.8
51080	40	25	101	1	16	95	2	0.9	2.6	2.3	13.5
51100	50	28	117	1	19	111	2	0.9	2.6	2.3	13.5
52115	50	30	82	2	11	64	2	0.9	2.6	3.1	17.0
52125	50	33	94	2	12	74	2	1.2	3.6	3.1	17.0
52150	63	39	124	2	14	101	2	1.2	3.6	4.4	24.6
52170	63	46	127	2	16	95	2	2.5	8.8	4.4	24.6
52200	80	54	147	2	19	111	2	2.5	8.8	6.0	38.8
52230	80	56	155	2	20	118	2	2.5	8.8	6.0	38.8
52240	80	59	162	2	20	118	2	3.7	14.0	6.0	38.8
52270	100	61	163	2	21	118	2	3.7	14.0	6.0	38.8
52300	100	70	189	2	25	140	2	3.7	14.0	6.0	38.8
52340	125	81	229	2	29	174	2	3.7	14.0	7.9	48.7

Table 8

Legend

MFA Maximum Fuse Amps (for fuse/circuit breaker sizing), complies with NEC Article 440-22 & 430-52.

MCA Minimum Circuit Amps. (for wire sizing), complies with NEC article 440-33.

ICF Maximum Instantaneous Current Flow

RLA Rated Load Amps. (at worst operating condition)

LRA Locked Rotor Amps

FLA Full Load Amps

Note : Voltage imbalance not to exceed $\pm 2\%$ of the rated voltage.



Field Connections

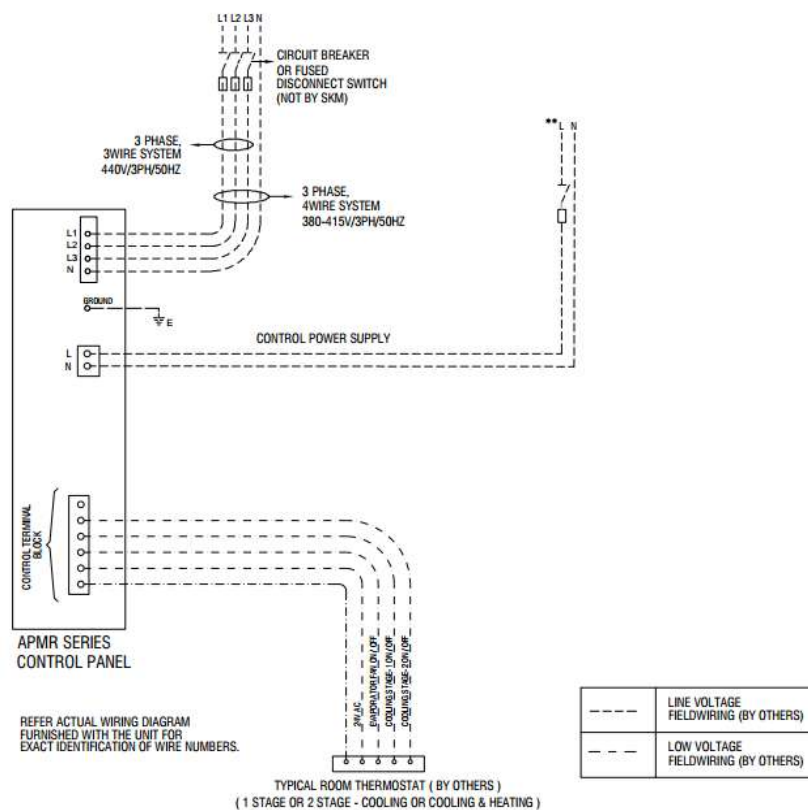
APMR series self-contained heavy duty air cooled packaged units are designed for minimum field interaction. Power hook ups and control wiring of room thermostat as per field wiring diagram is all that is required to electrically connect any model of APMR series. Every APMR series packaged air conditioning unit requires, at most, field installed fused disconnect switches or circuit breakers and room thermostat.

Refer below for schematic representation of required field electrical hook-ups for a standard APMR series packaged air conditioning unit. All field wiring must be done in accordance with applicable local & national codes.

For the maximum fuse ampere for fuse sizing & minimum circuit amps for cable sizing, see page 12.

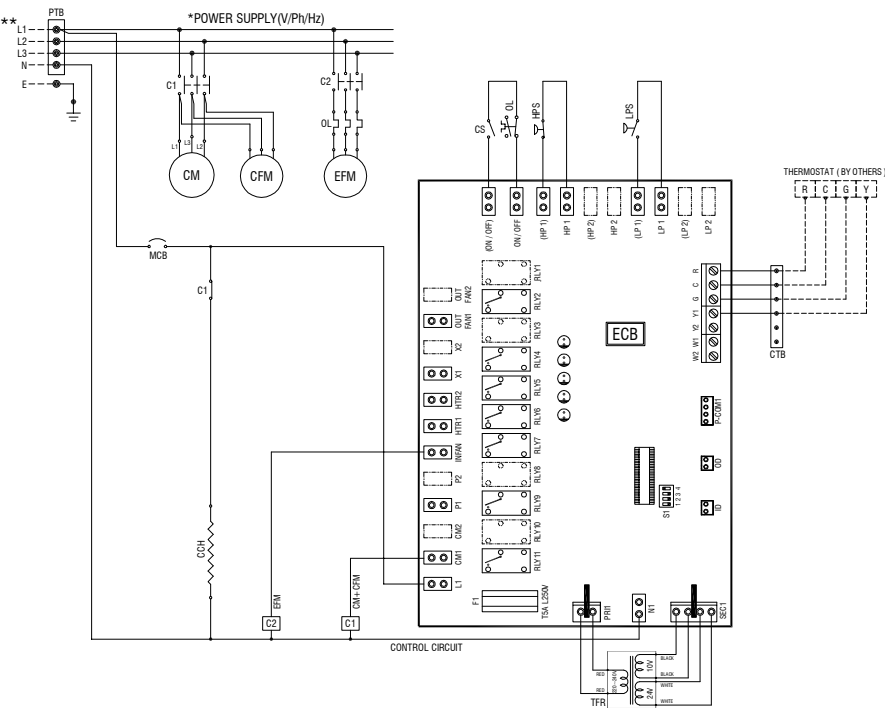
The APMR series is then ready to provide cooling, on demand.

Field Wiring Requirement Schematic



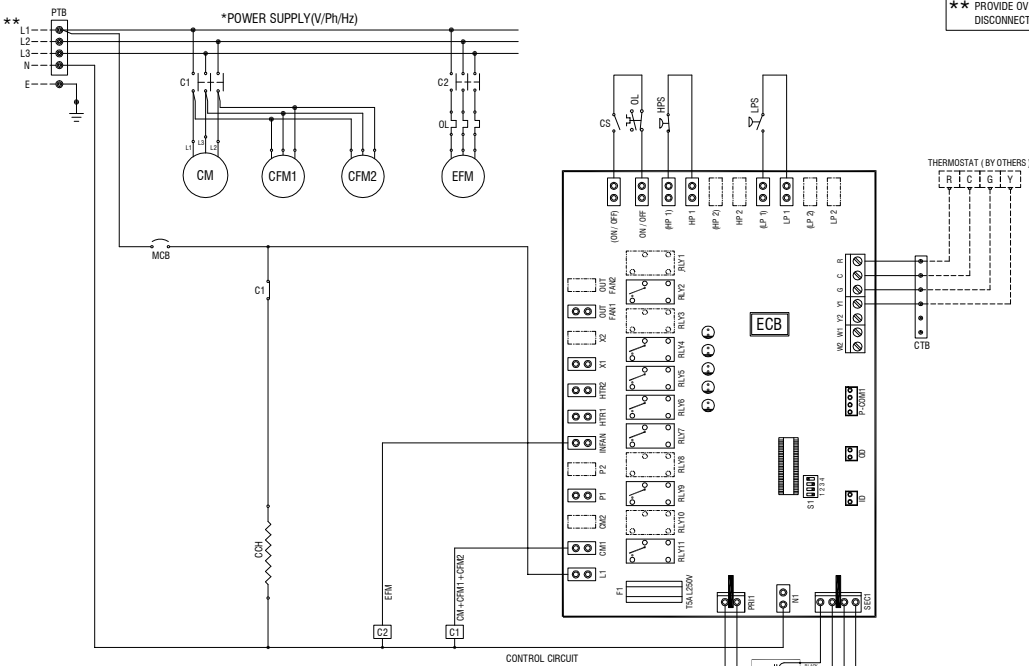
The **APMR series units rated for 440V/3Ph/50Hz or power supplies with out neutral require separate source of control power supply through field supplied and installed 15A/220V fused control disconnect switch or order with factory buit in option 'CXT'.

Typical Wiring Diagram
APMR Model - 51050



LEGEND	
-----	FIELD WIRING & FIELD SUPPLIED DEVICES
LPS	LOW PRESSURE SWITCH
HPS	HIGH PRESSURE SWITCH
CS	CONTROL SWITCH
CCH	CRANK CASE HEATER
MCB	MINIATURE CIRCUIT BREAKER
EFM	EVAPORATOR FAN MOTOR
OL	OVERLOAD RELAY
CFM	CONDENSER FAN MOTOR
CM	COMPRESSOR MOTOR
C	CONTACTOR
ECB	ELECTRONIC CONTROL BOARD
PTB	POWER TERMINAL BLOCK
CTB	CONTROL TERMINAL BLOCK
TFR	TRANSFORMER

APMR Models - 51060, 51075, 51080 & 51100

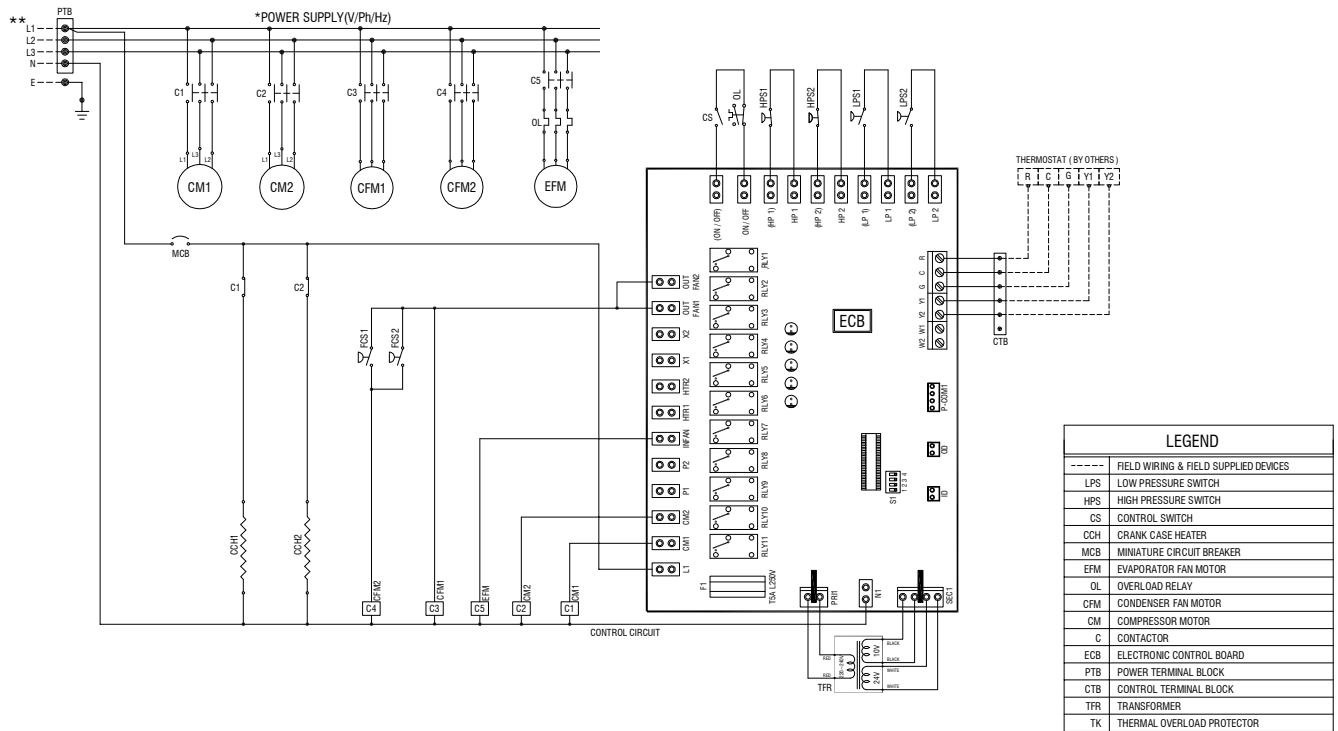


NOTE
★ TYPICAL WIRING DIAGRAM SHOWN IS SUITABLE FOR 380-415V/3Ph/50Hz ONLY, FOR 440V/3Ph/50Hz PLEASE CONSULT SKM
★★ PROVIDE OVERCURRENT, EARTH FAULT PROTECTION, SHORT CIRCUIT AND DISCONNECT MEANS AS REQUIRED BY LOCAL & NATIONAL ELECTRIC CODE.

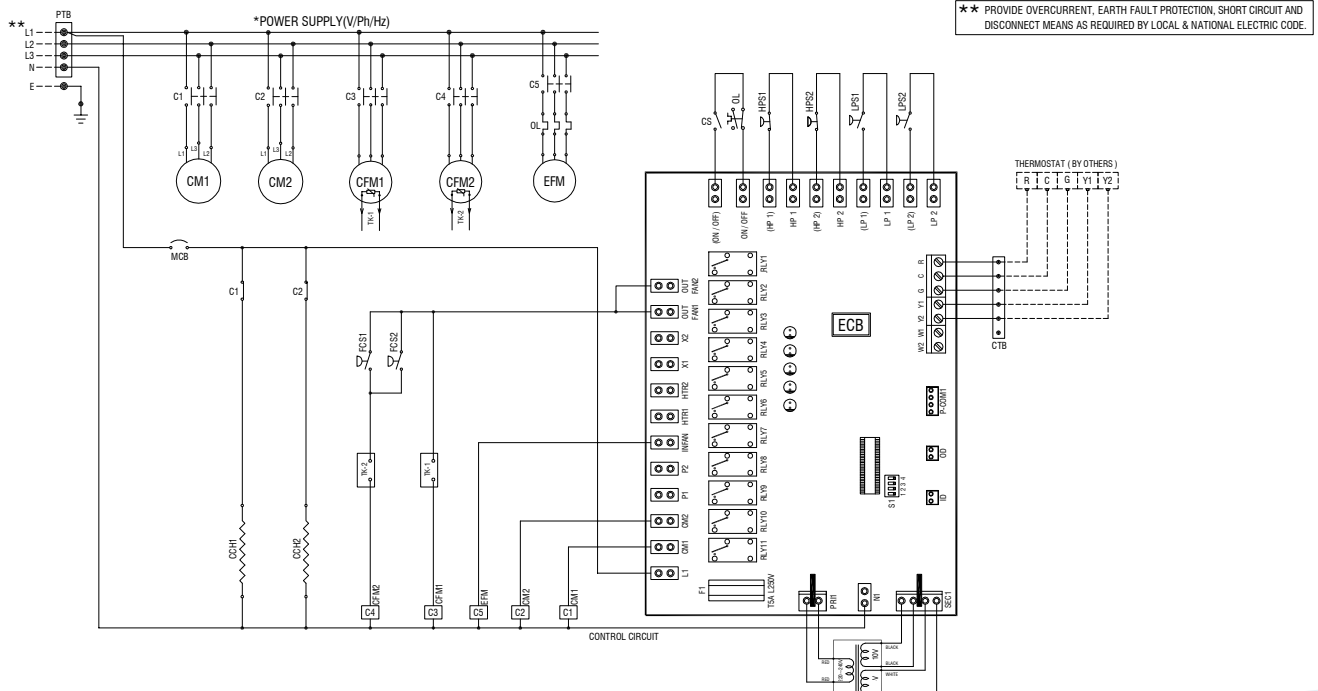


Typical Wiring Diagram

APMR Models - 52115, 52125 & 52150

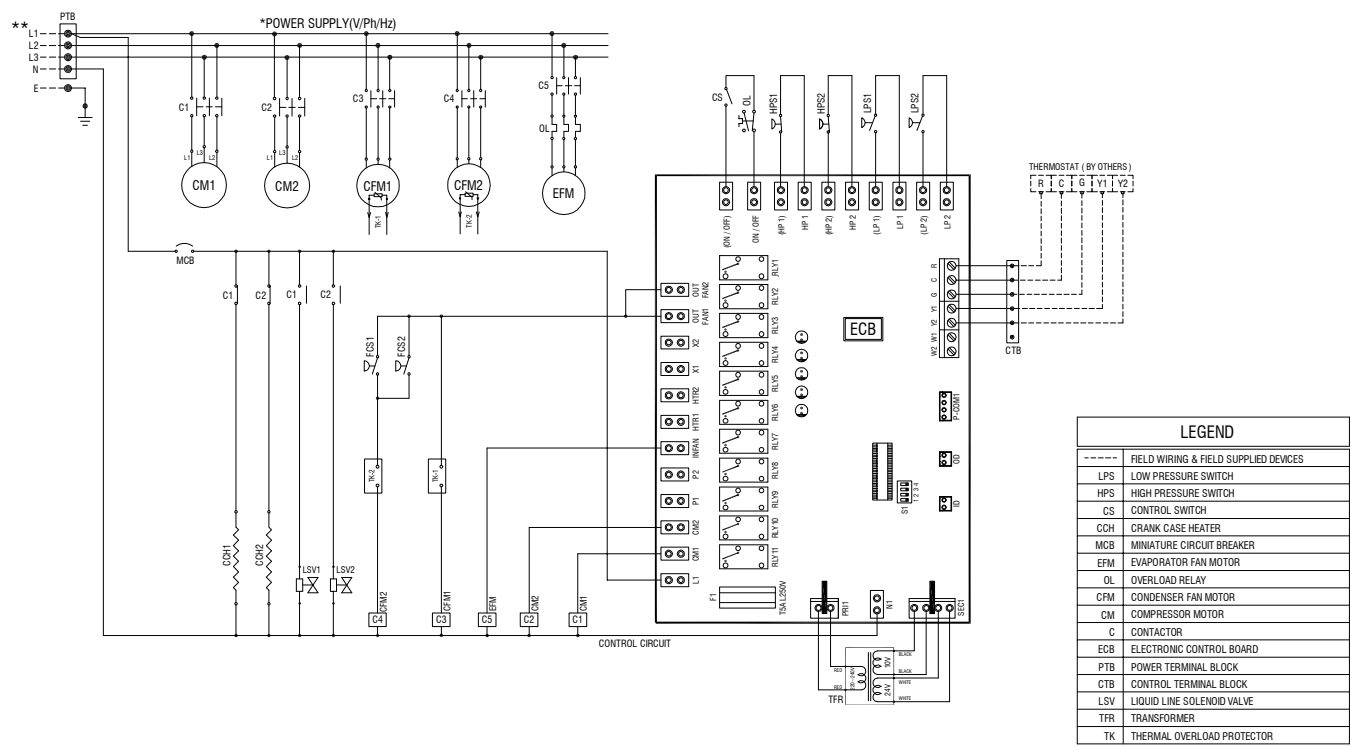


APMR Models - 52170 to 52270



Typical Wiring Diagram

APMR Models - 52300 & 52340



NOTE

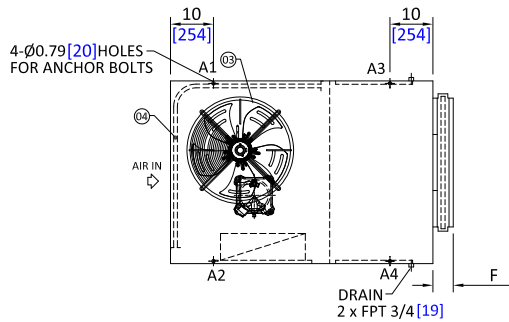
* TYPICAL WIRING DIAGRAM SHOWN IS SUITABLE FOR 380-415V/3Ph/50Hz ONLY. FOR 440V/3Ph/50Hz PLEASE CONSULT SKM

** PROVIDE OVERCURRENT, EARTH FAULT PROTECTION, SHORT CIRCUIT AND DISCONNECT MEANS AS REQUIRED BY LOCAL & NATIONAL ELECTRIC CODE.



Dimensional Data

APMR Model - 51050



LEGEND

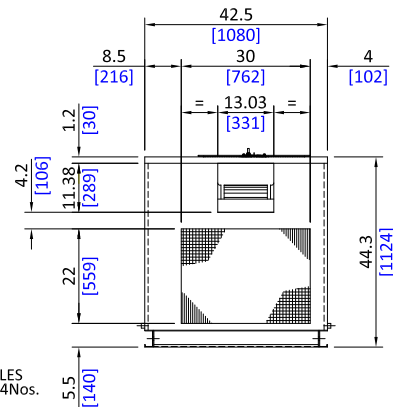
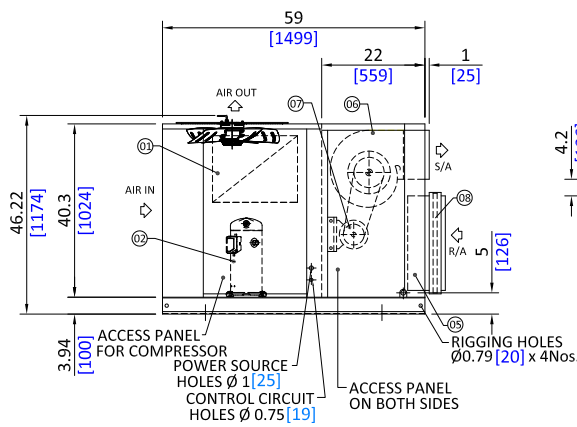
01	CONTROL PANEL
02	COMPRESSOR
03	CONDENSER FAN
04	CONDENSER COIL
05	EVAPORATOR COIL
06	EVAPORATOR FAN
07	EVAPORATOR FAN MOTOR
08	1" THICK FLAT FILTER

ALL DIMENSIONS ARE IN INCHES [mm]

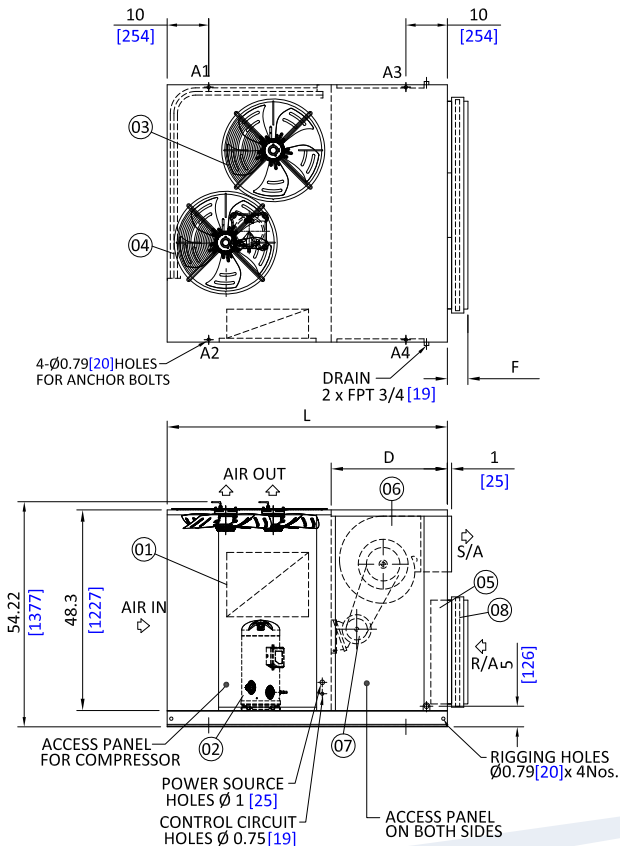
A1-A4 ARE LOADING POINTS

F=3.94 [100] FOR 1" FLAT FILTER(STANDARD)

F=4.93 [125] FOR 2" FLAT FILTER(OPTIONAL)



APMR Models - 51060 to 52115

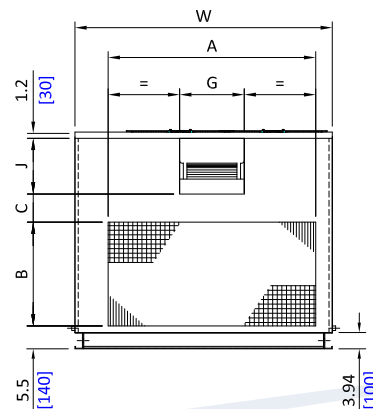


Model APMR	DIMENSIONS							
	L	W	A	B	C	D	J	G
51060	61.5 [1562]	50.6 [1285]	30 [762]	22 [559]	12.2 [309]	22 [559]	11.38 [289]	13.03 [331]
51075		50.6 [1285]	38.6 [980]	24 [610]	10.2 [259]	22 [559]	11.38 [289]	13.03 [331]
51080		50.6 [1285]	38.6 [980]	24 [610]	8.1 [207]	28 [711]	13.43 [341]	15.55 [395]
51100	67.5 [1714]	62 [1575]	50 [1270]	25 [635]	7.1 [181]	28 [711]	13.43 [341]	15.55 [395]
*52115		68 [1727]	56 [1422]	25 [635]	7.1 [181]	28 [711]	13.43 [341]	15.55 [395]

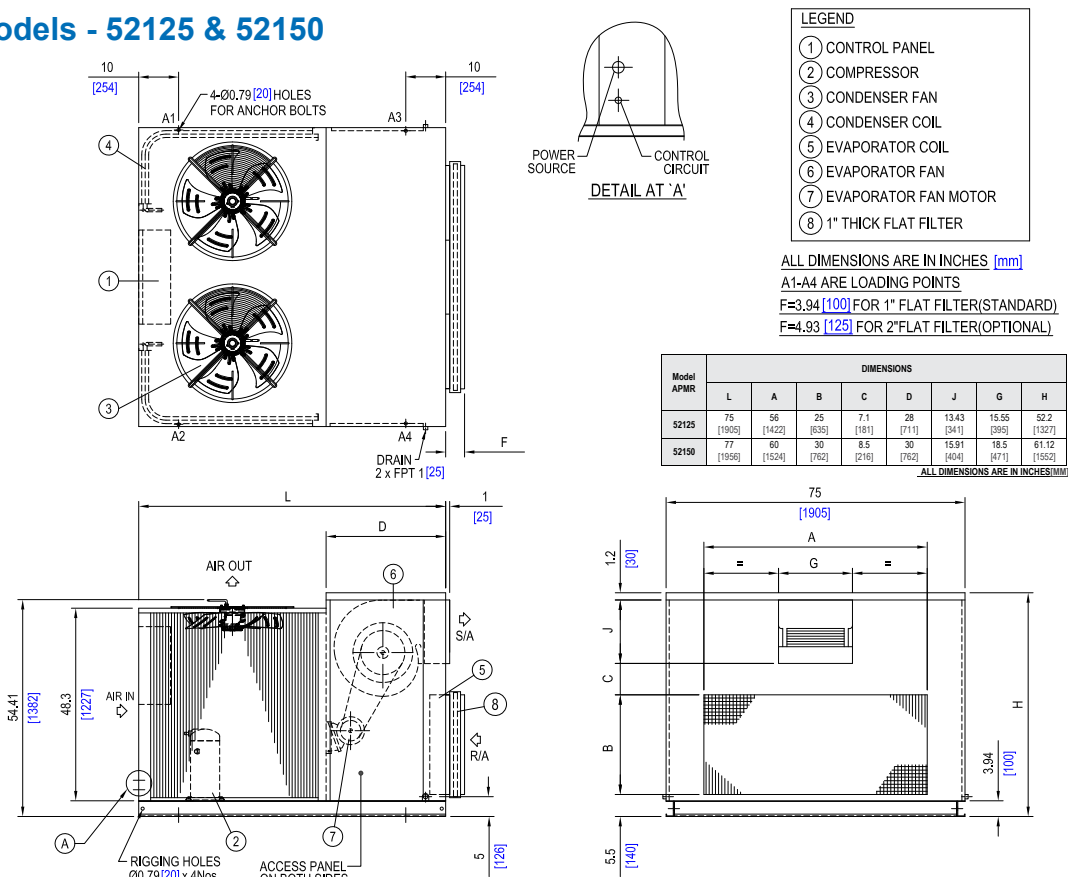
*MODEL WITH TWO COMPRESSOR

ALL DIMENSIONS ARE IN INCHES[MM]

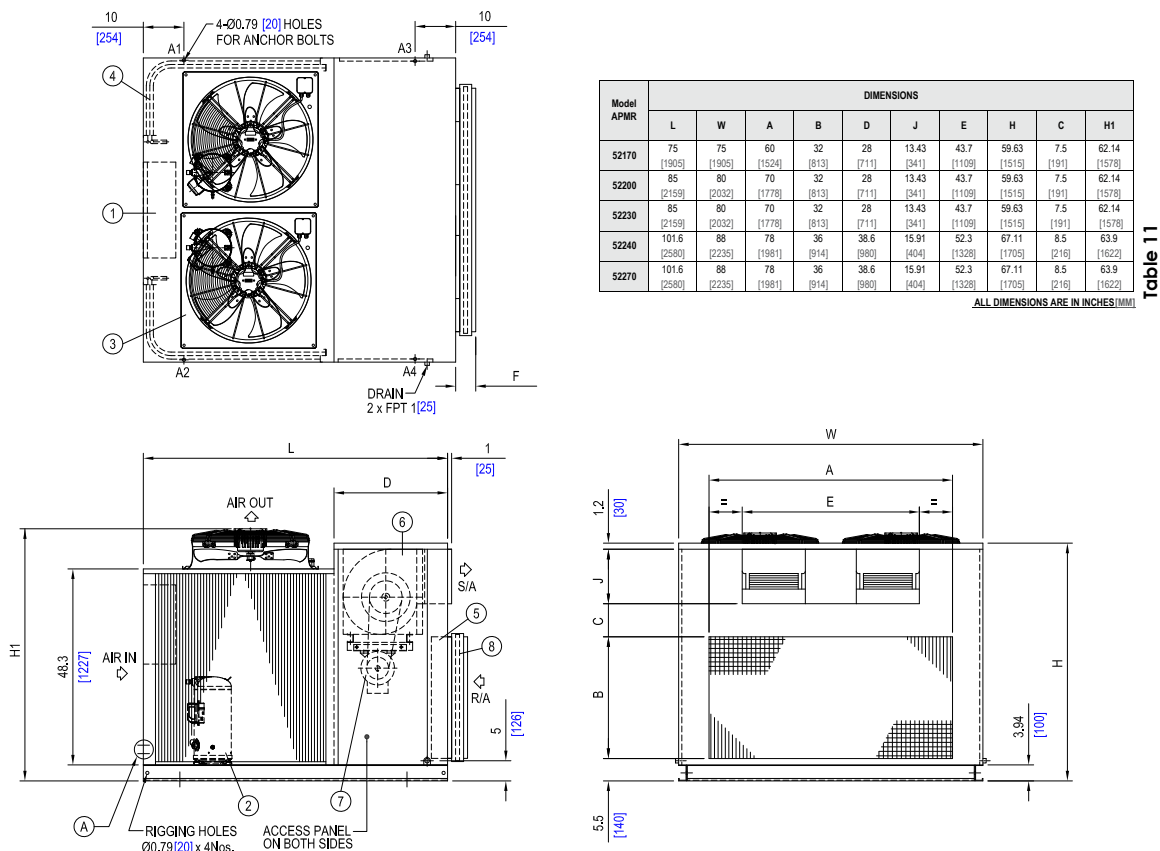
Table 9



Dimensional Data
APMR Models - 52125 & 52150



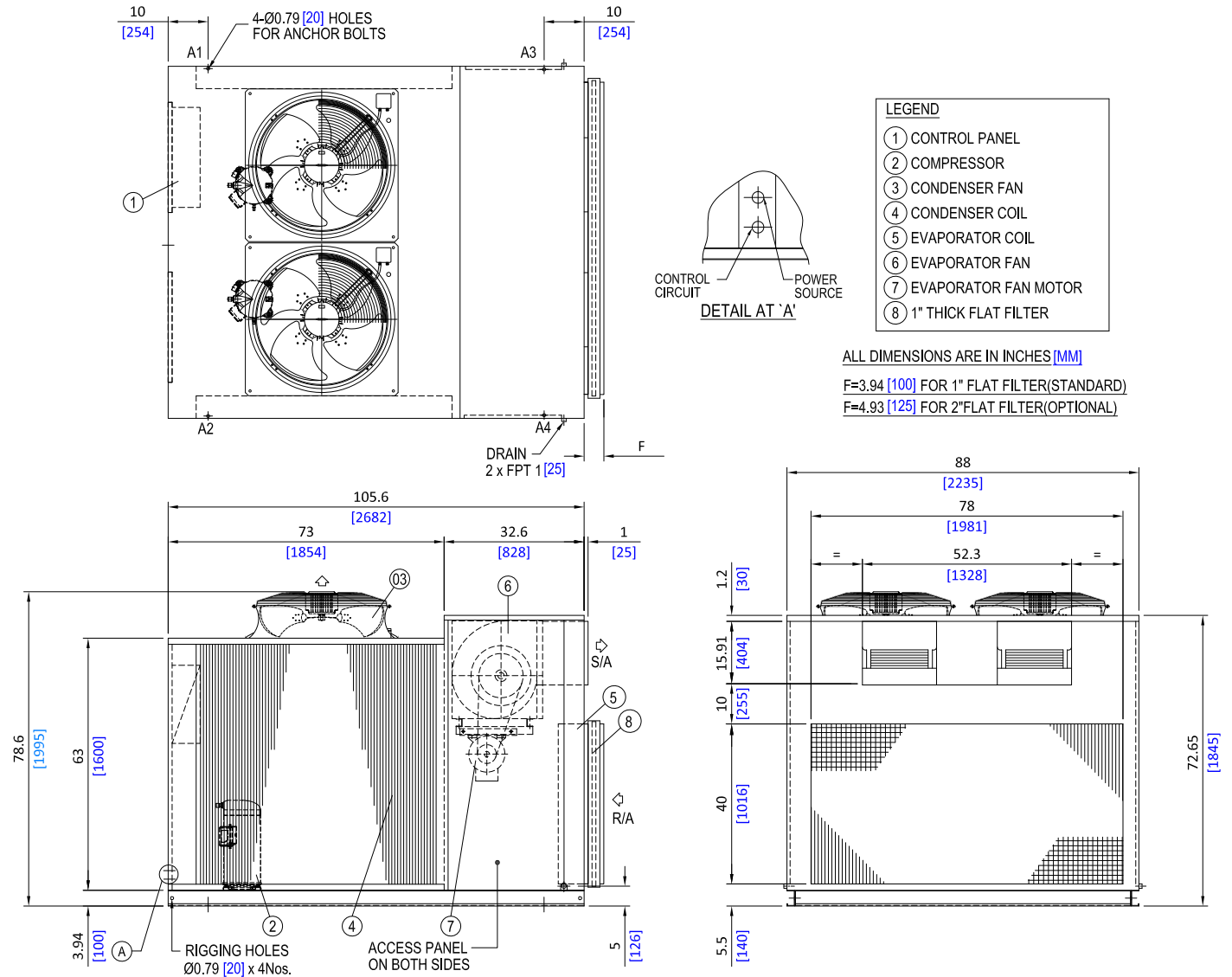
APMR Models - 52170 to 52270





Dimensional Data

APMR Models - 52300 & 52340



Loading Points

MODEL APMR	LOAD AT EACH POINT Lbs (Kgs)				TOTAL WEIGHT
	A1	A2	A3	A4	
51050	163 [74]	178 [81]	166 [75]	166 [75]	673 [305]
51060	187 [85]	220 [100]	186 [84]	190 [86]	783 [355]
51075	189 [86]	220 [100]	194 [88]	197 [89]	800 [363]
51080	200 [91]	255 [116]	213 [96]	219 [99]	887 [402]
51100	255 [116]	292 [132]	247 [112]	251 [114]	1045 [474]
52115	285 [129]	351 [159]	279 [127]	292 [132]	1207 [547]
52125	377 [171]	383 [174]	324 [147]	344 [156]	1428 [648]
52150	378 [172]	385 [175]	343 [155]	362 [164]	1468 [666]
52170	432 [196]	440 [200]	396 [179]	421 [191]	1689 [766]
52200	503 [228]	511 [232]	463 [210]	489 [222]	1966 [892]
52230	504 [228]	512 [232]	480 [217]	507 [230]	2003 [907]
52240	543 [246]	551 [250]	521 [236]	545 [247]	2160 [979]
52270	550 [249]	558 [253]	541 [245]	566 [257]	2215 [1004]
52300	621 [282]	484 [220]	636 [288]	616 [280]	2357 [1070]
52340	690 [313]	553 [251]	667 [302]	649 [294]	2559 [1160]

Table 12

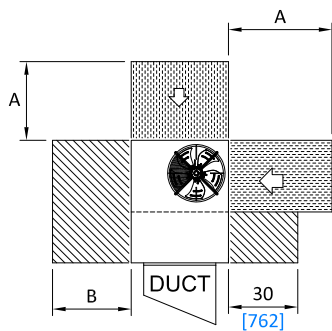


Recommended Clearances

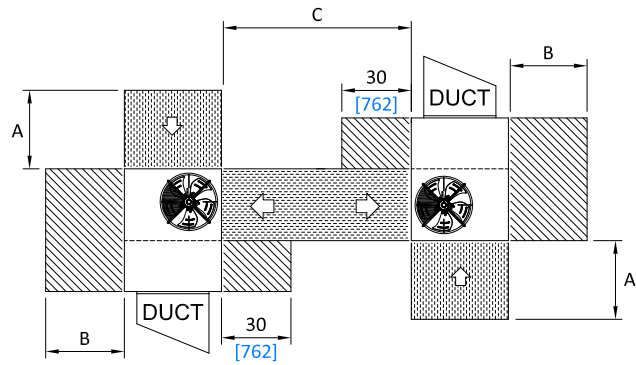
MODEL APMR	A	B	C
51050	44 [1118]	34 [864]	72 [1829]
51060	52 [1321]	42 [1067]	88 [2235]
51075		54 [1372]	
51080		60 [1524]	
52115			

ALL DIMENSIONS ARE IN INCHES [MM]

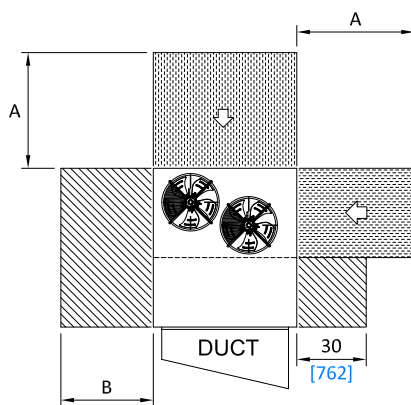
Table 13



APMR- 51050

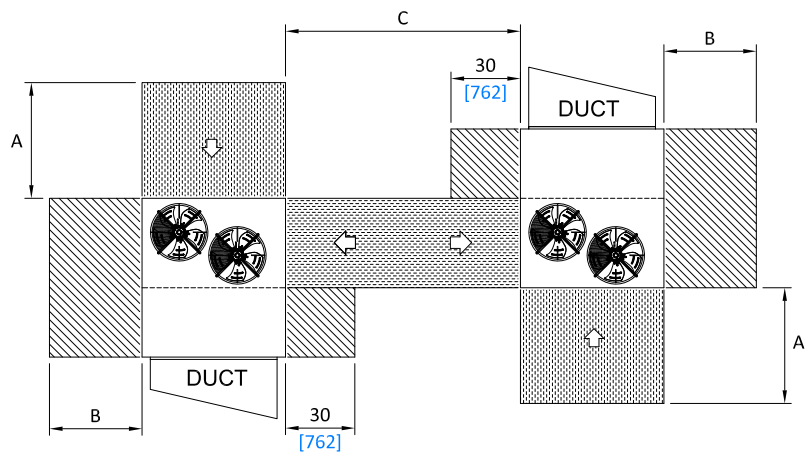


APMR- 51050



APMR- 51060 to 52115

SINGLE UNIT



APMR- 51060 to 52115

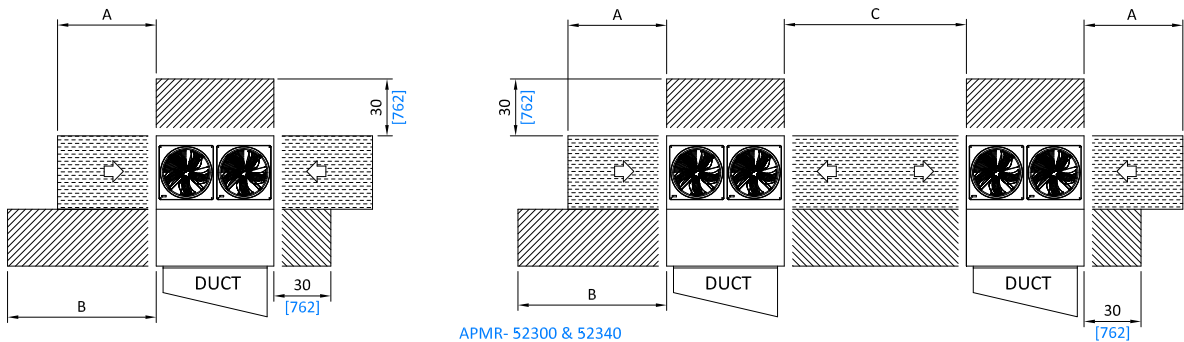
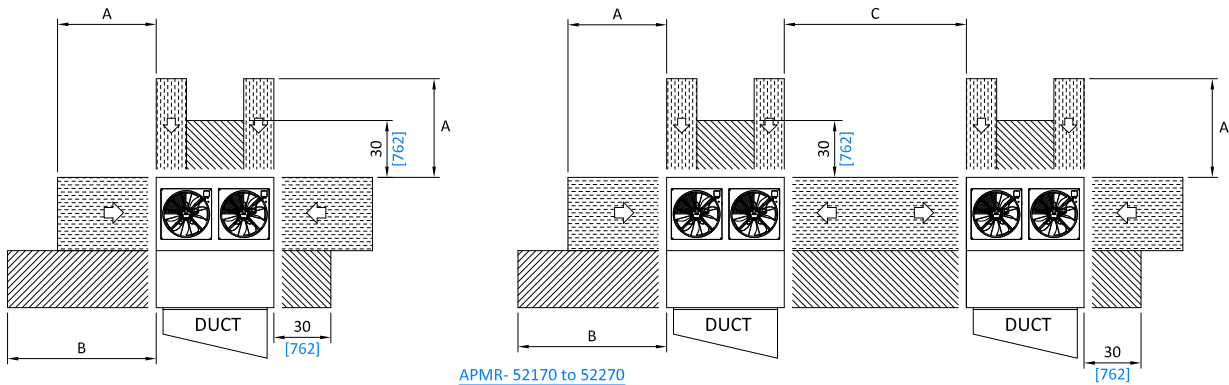
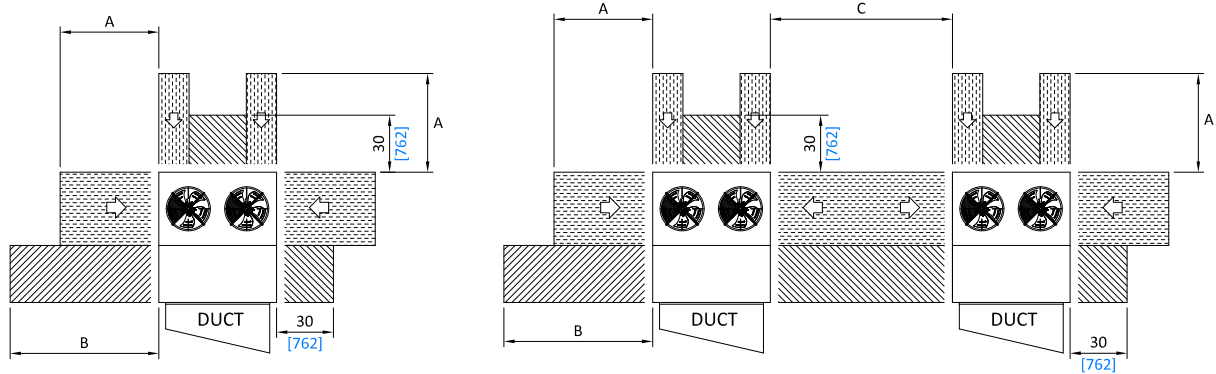
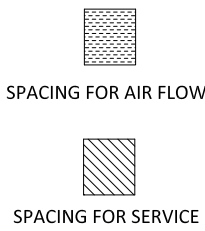
MULTIPLE UNIT

Recommended Clearances

MODEL APMR	A	B	C
52125	52 [1321]	60 [1524]	88 [2235]
52150		64 [1626]	
52170		74 [1880]	
52200		82 [2083]	
52230			
52240			
52270			
52300	68 [1727]		120 [3048]
52340			

ALL DIMENSIONS ARE IN INCHES [MM]

Table 14



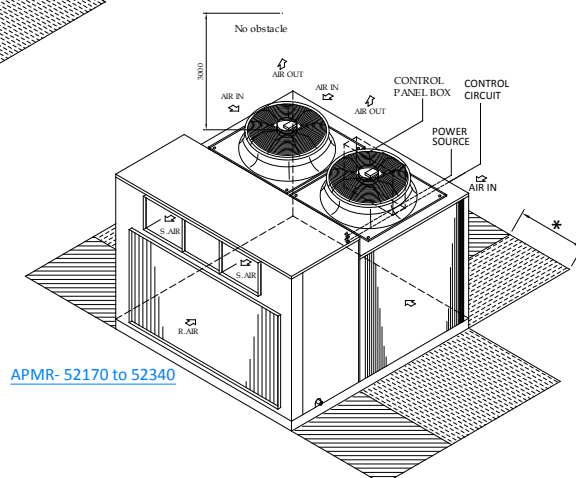
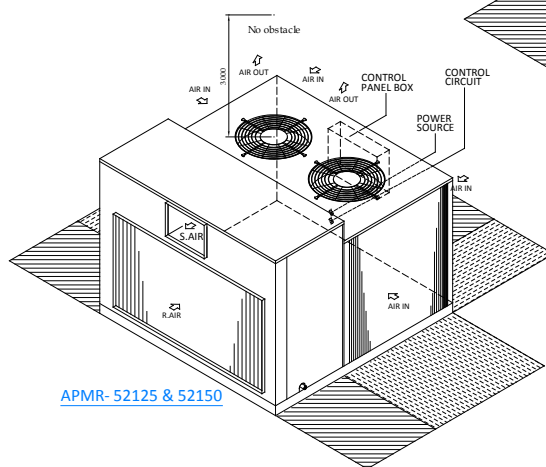
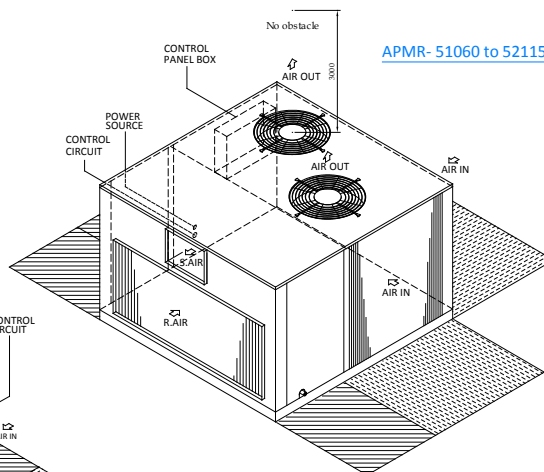
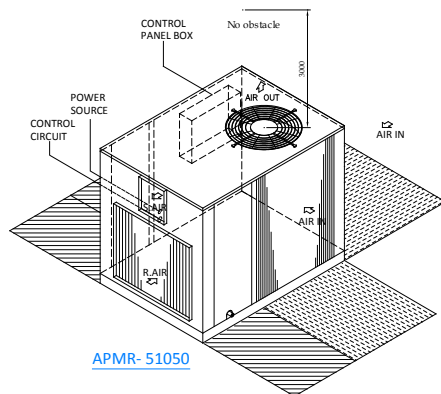
SINGLE UNIT

MULTIPLE UNIT



Installation and Commissioning

- Install the unit in such a location which is flat and strong enough to support its weight.
- Provide a trap of over 2" (50mm) in the drain piping for water seal.
- All field wiring must comply with applicable local and national codes.
- Service spacing should be provided as shown in the figure. If any obstacles are around the unit, distributed air is short-circuited so that the unit stops frequently and access to the unit is difficult for inspection and aftersales services.



GUIDE SPECIFICATIONS

GENERAL

Packaged Air Conditioners shall be composed of compressor(s), condenser & evaporator coils with fans, refrigerant piping, electrical components & enclosing cabinet in one piece. These units shall be factory assembled, internally wired, fully refrigerant charged with R410A, tested under strict quality standards & are suitable for outdoor installation on rooftop or ground level with ducted system.

COMPRESSOR(S)

Compressor shall be hermetic scroll, refrigerant gas cooled furnished with internal overload protection device, crankcase heater, and shall be mounted on rubber isolators.

CONDENSER COIL(S)

Condenser coils shall be air cooled with integral sub cooler, constructed of special inner grooved seamless copper tubes 3/8" OD mechanically expanded into corrugated aluminum cross fins with maximum 16 fpi (1.6mm) spacing. These coils shall be tested against leakage by high air pressure air 715psig (4930kPa) under water, cleaned & dehydrated at the factory.

CONDENSER FAN(S) & MOTOR(S)

Condenser Fans shall be direct driven propeller type discharging air vertically upward, equipped with statically & dynamically balanced aluminum alloy blades, inherent corrosion resistant shaft & PVC coated steel wire fan guard. Condenser fan motor(s) shall be Totally Enclosed Air Over (TEAO), 4 pole or 6 pole with class-F insulation, minimum IP-54 protection & wired to unit control panel.

EVAPORATOR COIL

Evaporator coil shall be constructed of Hi-X copper tubes 3/8" OD mechanically bonded to aluminum (copper) corrugated fins with maximum 14 fpi (1.8mm) spacing. Coil consists of headers of seamless copper tubing, thermostatic expansion valve(s) & multi-circuited distributor(s). These coils shall be tested against leakage by high air pressure 450psig (3100kPa) under water, cleaned & dehydrated at the factory. Coil shall conform to AHRI-410.

EVAPORATOR FAN & MOTOR

Fans of evaporator shall be forward curved, double inlet double width (DIDW), centrifugal type, statically & dynamically balanced, mounted on a single heavy duty shaft with permanently lubricated bearings and belt driven by V belts with an adjustable variable pitch motor pulley. Motor shall be Totally Enclosed Fan Cooled (TEFC), 4 poles, class-F insulated, minimum IP55 protection & wired to unit control panel.

REFRIGERANT PIPING

The refrigerant circuit piping shall be fabricated from ACR grade copper piping, with 1 & 2 refrigeration circuits, each liquid line shall include filter drier and thermostatic expansion valve.

Suction line shall be insulated with 1/2" (12mm) wall thickness enclosed cell pipe insulation with maximum K factor 0.28 Btu.in /ft² .h.°F. (0.040 W/mK).

CASING

Casing shall be made of hot dip galvanized (zinc coated), phosphatized steel sheets which are then electrostatically polyester powder coated to provide an extremely tough, scratch resistance & excellent anti-corrosive protection. Casing shall pass 1000 hours in 5% salt spray testing at 95°F (35°C) & 95% relative humidity as per ASTM B117. Evaporator section shall be sealed with vinyl gaskets & completely insulated faced with black glass tissue (BGT) heavy density, fire retardant, permanent odorless fiberglass insulation of minimum 1" (25 mm) thickness and 32 kg/m³ density having maximum k factor 0.23 Btu.in/ft² h°F. (0.033 W / m °K). Unit casing shall be provided with access panels for easy service and maintenance of all unit parts.

FILTER SECTION

Flat Filter Section incorporating 1" (25mm) thick is provided as standard and 2" (50mm) thick filter having an average arrestance efficiency of 54% as per ASHRAE Standard 52.1 or equivalent can be provided as an option.

CONTROL PANEL

The panel shall be factory wired and confirm to IP-54 requirements. Control panel shall contain compressor and motor starting contactors, electronic control board for unit operation, compressor anti-recycle time delay, control on/off switch, control circuit breaker and power & control terminal blocks. High and Low pressure switches should be provided for protection.

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