



ROOFTOP PACKAGED UNIT
Technical Manual



ROOFTOP PACKAGED UNIT **CE**
CARDIFF CAHP SERIES

R22
R22

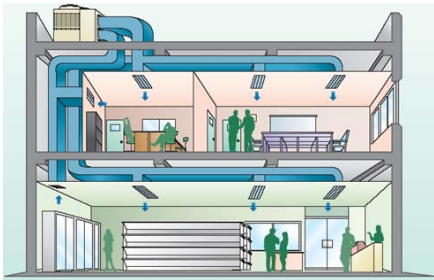
TECHNICAL BOOKLET

COMPANY
WITH QUALITY SYSTEM
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Typical installation

When installing or carrying out operations on the unit, closely follow the recommendations and procedures given in this manual, observe warnings on the machine and take all precautionary measures as required by the situation. Failure to comply with the procedures recommended by this manual or unauthorized modification to the unit will automatically render the guarantee null and void.

Cardiff reserves the right to alter the features of their products without notice in the interests of continuous improvement.



UNIT DESCRIPTION AND TECHNICAL DATA

PREFACE

CARDIFF Rooftop Packaged Units are single packaged units which are factory assembled, tested and shipped completely with compressor, evaporator and condenser coils, fans and controls. These packages are designed for outdoor installation, and they may be used for cooling only or cooling and heat pump.

The units are ideal for residential, commercial and industrial applications and are available in nominal cooling capacity from 9.9 kW to 188.5 kW. Quality design and construction make **CARDIFF** air-cooled rooftop package units with hermetic scroll compressors the preferred applications and easy installation and maintenance. Operation range of outdoor temperature is from -10°C to 45°C.

Rooftop packaged systems are unobtrusive, quiet, and designed to provide year round comfort – warming in winter and cooling in summer. **CARDIFF**'s wide product range offers a unit of performance capacity to suit small to large packaged air conditioner applications, e.g. offices, shops, motels, fast food outlets, restaurants, petrol stations, open plan office and work spaces, supermarkets, shopping malls and auditoriums.

Units are suited to high static pressure applications where large volume spaces are to be air conditioned. Long pipe and duct runs are possible enabling greater installation flexibility.

This range of units has been developed to meet the needs of typical applications. Should you have special requirements, such as higher air flows or greater sensible duty units contact your nearest **CARDIFF** representatives. **CARDIFF** engineers have extensive experience in designing air conditioning equipment for specific applications.



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FEATURES

Efficient. These reverse cycle (heat pump) air conditioners provide one of the most efficient forms of heating you can invest in. For every 1 kW of power consumed, up to 2.8 kW of heat is generated. For every 1 kW of power consumed, up to 3.1 kW of heat is generated. Each outdoor unit incorporates high efficiency scroll compressors. Heat exchange coils use high efficient tube for better heat transfer.

Performance. These systems have been designed and tested to perform in ambient conditions as low as -10°C and as high as 45°C. For the models from CAAHP 25 to CAAHP 190 belt drive fan motors are used to match the supply air requirements. The smaller units(models from CAAHP 10 to CAAHP 20) have 3 speed direct drive fans for adjusting air flows.

Durable. Our packaged systems are built tough to withstand all weathers. Their durable construction ensures a long life and excellent return on your investment. The outdoor air coils' aluminum fins are epoxy coated for extra protection in corrosive environments, e.g. salt laden sea air. Cabinets are constructed from high grade steel - polyester powder coated for all weather protection. External fasteners are stainless steel or galvanized type. Corrosion resistant drain trays are also included.

Insulation. Indoor air sections are generously insulated to reduce condensation and contain noise.

More Safe. The refrigeration system includes a number of protection facilities, including: HP and LP switches, phase sequence relay, circuit breaker control etc.

Economy. Some models feature the flexibility and economy of 2~4 stages operation. Compressors are progressively switched on only as they are needed. This has the added advantage of lowering start-up current.

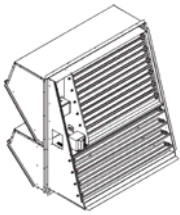
Economizer Option. If the outdoor air heat content or temperature is below that of the return air, a fresh air damper opens and the return air damper closes to provide the first stage of cooling. Operating costs are reduced as the compressor(s) will only operate to provide more cooling if it is required.

Fresh Air Introduction. An optional fresh air damper is available for most models. For applications using high proportions of fresh air (50%+) a hot gas bypass and HP fan speed controller are recommended and are available as options.

Peace of mind. The manufacturer operates a quality management system that conforms to international standard like CE, ISO14001, ISO9001:2000. CARDIFF products have been chosen, against worldwide competition, for use in some of the most exclusive projects — chosen because of their proven efficiency, durability, performance, reliability and value.

Easy service. Quick release fasteners are provided on electrical and compressor panel.

Quiet design. Apartments are provided on electrical and compressor section, low noise.



**WITH ECONOMIZER
IS OPTIONAL**



WITH CE CERTIFICATE

Components or Assembly Descriptions

A) Quiet operation. The packaged Rooftop series are basic constructed and engineered with noise reduction as a first consideration, low noise mounted fans are used, 15mm wave type acoustic Insulation for compressor section and compressors are mounted on vibration isolators.

B) Low Cost Installation. Units are factory assembled and pre-charged, with a single point electrical connection. On arrival to the job site they are ready to be lifted to their operating position through the lifting supports available on the units.

C) Capacities to Fit. There is a large production line of packaged units, with capacities ranging from 9.9 to 188.5kW for 50 Hz refrigeration tons at nominal conditions.

D) Casing. Heavy grade steel casing with polyester epoxy powder electrostatic oven-baked paint of coating finish, designed for outdoor installation with 10mm insulation for evaporator section only. All units are provided with an 8mm thickness aluminum frame filter that slides out or easy cleaning or replacement.

E) Compressor. The compressor used is hermetic refrigerant gas cooled, with internal thermal protection in each phase, scroll type. The terminal boxes are rain tight, starting is direct-on-line. With high efficiency, low sound, so as to match all other CARDIFF products' reliability and efficiency.

F) Evaporator and Condenser Coils. The evaporator and condenser coils are designed to deliver their respective duties at optimum performance at all design conditions. Coils are manufactured from seamless copper tubes mechanically expanded into aluminum fins. All coils are tested at 30kg/cm² (450 Psi) air pressure, under water to avoid leakage. They also undergo dry chemical cleaning after manufacturing for optimum system cleanness.

G) Direct Driven Condenser Axial Fans. All condenser fans are of the axial type, which are directly mounted on the motor shaft. All fans are selected for optimum efficiency and for maximum sound power reduction. Fan blades are made for maximum corrosion resistance, and are statically and dynamically balanced before Installation. CARDIFF tries its bests to

ensure the low noise operation with high efficiency. All condenser fans are equipped with wire guards.

H) Condenser Fan Motor. All fans motors are of totally enclosed air-cooled, internal thermal current overload protected, with class “IP56” electrical insulation.

I) Belt Drive Evaporator Fan. Fans are of the centrifugal type that is designed for maximum efficiency for uniform air distribution. V—belt driven with variable pitch pulley as optional. All fans are statically and dynamically balanced to ensure quiet operation and smooth performance.

J) Evaporator Fan Motors. Motors are of the totally enclosed induction type, with fan motor assembly placed on a floating base with a flexible connection at the fan/casing interface. All fan motors of direct-driven are of the 3-speed type, highly efficient induction type motors, totally enclosed air-cooled, squirrel-cage type, internal thermal current protected and with class “B” insulation. Fan motors with V-belt-driven type are of 1 speed type.

K) Filters

All Models are provided with 8mm thickness aluminum frame filter (as standard features). Other filters are available upon request.

L) Drain Pan

All units are provided with a drain pan having drain connection from one side. The drain pan is painted galvanized steel type and insulated on the underside to prevent condensation.

M) Insulation

All units are internally lined with 10mm thermal insulation for coil and fan section (evaporator side only).

N) Easy Installation

The package rooftop has a compact design. It is supplied as a complete package ready for operation, with no extra controls or other items to be installed. The units have a single power point entry with simple connections. All units are designed to ensure maximum compliance with international standards.

Quick start-up is assured once installation is completed, as each rooftop unit is manufactured in an ISO9001:2000 listed facility to guarantee quality. All units are tested at the factory to provide reliable start up.

Standard Features

Easily accessible system components.

Ample space for easy access to power and control panels.

Heavy duty mounting chassis for the whole unit with lifting holes.

Anti-vibration mounting compressor.

Weather-proof, polyester epoxy powder electrostatic paint oven-baked finish for sheet metal and base frame.

All units are shipped out from factory tested and protecting devices seated against client requirement.

8mm nylon filter as standard for Returning air inlet.

Single skin evaporator side with 10mm thermal insulation.

Condenser coil with treated blue fins.

Quick release fasteners to be provided on electrical and compressor apartment cabinet.

Electrical features:

- Control and power panels include the direct-on-line starting contactors for the compressors and condenser fan motor.
- Internal thermal motor protector for condenser and evaporator fan motor.
- Compressor internal thermal protection.
- Anti-recycling protection (time delay) for compressors through microprocessor.
- Crank case heater for each compressor.

- Control circuit breaker.
- Microprocessor controller with the following main functions:
 - Compressor lead-lag operation to ensure longer life for the compressors and equal running hours between compressors.
 - External remote ON/OFF button for remote operation of the unit using external ON/OFF switch or connection to building management system.
 - Volt-free terminals available for general alarm indication signal to remote monitoring station.
- Dual power supply input.
- High and low pressure safety switches (capsule type, factory Pre-set) from all models.
- Remote control panel with the same functions as the on-board panel. It can be used with a shielded cable at a distance of 20m.

Refrigeration features:

1. High efficient Hermetic scroll compressor.
2. Filter drier (for mod. 63 and above only).
3. Charging points pin valve.
4. Thermal expansion valve (for mod. 72 and above only).
5. Fully charged unit with refrigerant.
6. Oil equalizing lines installed between parallel installed compressors

Optional Features

A) Construction options:

1. Metal mesh on condenser section.
2. Optional supply/return air configurations, optional bottom supply and return type.
3. Evaporator with treated anti-corrosion protection for coils (blue fins)for copper/aluminum coils only.
4. "25mm (1")" or "50mm(2)" thick flat filter.
5. Economizer option with fresh, return and exhaust air dampers with cowl.

If this option is installed in the unit the unit has the ability to work with free cooling or free heating mode allowing it to exploit the external environmental condition as much as possible, since it avoids turning on the heaters and the compressors. This function can be achieved by controlling the opening/closing of the external air damper. With reference to the difference between the outdoor air temperature(std)/enthalpy and the indoor air temperature(std)/enthalpy.

6. High Static condenser fan option will also required a sealed + drain condensing section.
7. Upgraded Evaporator Fan Motor Drives.

B) Electrical options:

1. Power circuit breaker for each motor.
2. Main power molded case circuit breaker for the whole unit (can also be available with an external handle as an option).
3. Low ambient control:

The refrigeration systems in all unit are inherently designed to operate efficiently, without extra controls or modifications. To permit the unit to operate in low ambient condition a head pressure control can be Installed either by:

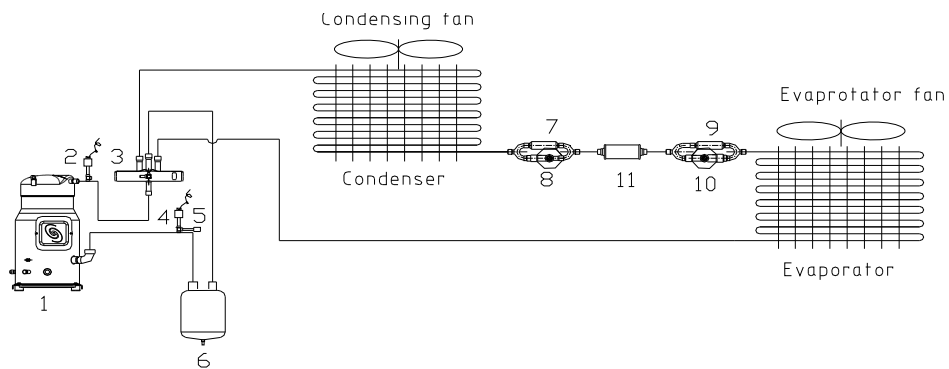
- ON/OFF condenser fans sequencing (for models with 2 condenser fans).
 - 3 speed of the condenser fan motor.
4. Earth leakage relay for each compressor.
 5. Earth leakage relay for the whole unit.

6. External overload relay for each motor.
7. Power factor correction capacitor.
8. Automatic or manual provision for pump down operation of each compressor stop.
9. Building automation system interface. Interfacing with other building management systems can be Achieved by an optional card which can communicate with other devices using the serial communication port.
10. Voltage monitor controller (phase sequence relay) for monitoring the main incoming power supply for the unit which provides protection from single-phasing, under-voltage, phase-voltage imbalance and phase-non-sequence

Refrigeration options:

1. Heat pump packaged unit with 4-way reversing valve, suction accumulator is a standard feature in heat pump option.
2. Pressure gauges for each refrigeration circuit (high/low pressure gauges).
3. Hot gas bypass (where low-local situation occurs and where it is necessary avoid low suction pressure and “compressor cycling”)
4. Extra refrigerant accessories such as suction accumulators (for cooling units only), refrigerant liquid receivers, oil separators etc..
5. Solenoid valve for heat pump mode.
6. High and low pressure controller for models

Refrigerant Piping Diagram (Sample only)



1	COMPRESSOR	7	SINGLE WAY VALVE
2	HIGH PRESSURE SWITCH	8	EXPANSION VALVE (or CAPILLARY)
3	REVERSING VALVE (HEATING MODEL ONLY)	9	SINGLE WAY VALVE
4	LOW PRESSURE SWITCH	10	EXPANSION VALVE or CAPILLARY
5	PIN VALVE	11	FILTER
6	OIL SEPARATOR	<i>Refrigerant Piping Diagram (Sample only)</i>	

UNIT DESCRIPTION AND TECHNICAL DATA

NOMENCLATURE

NOMENCLATURE

C AA H C P 10
 ① ② ③ ④ ⑤ ⑥

① **C:** Cardiff products
 ② Unit type
AA: Air to Air
AW: Air to Water
WA: Water to Air
WW: Water to Water

③ **C:** Cooling only
H: Heat pump
 ④ Refrigerant type
 --: R22
A: R410a
B: R134a
C: R407c
 ⑤ Type of unit
P: Packaged type
S: Split type

⑥ Model

TECHNICAL DATA

MODEL		CAAHP	10	12	14	17	20	22		
NOMINAL COOLING CAPACITY		kW	9.9	11.6	13.5	17.7	19.8	23.2		
NOMINAL HEATING CAPACITY		kW	10.89	12.76	14.85	19.47	21.78	25.52		
RATED TOTAL POWER CONSUMPTION (COOLING)		kW	3.91	4.32	5.12	6.50	7.31	8.49		
RATED TOTAL POWER CONSUMPTION (HEATING)		kW	3.72	4.08	4.87	6.08	6.60	8.13		
RATED RUNNING CURRENT (COOLING)		Amps	6.5	7.2	8.1	9.8	12.2	13.6		
RATED RUNNING CURRENT (HEATING)		Amps	6.1	6.7	7.5	9.1	11.5	12.5		
EER (COOLING) / COP (HEATING)		kW/kW	2.53 / 2.92	2.68 / 3.13	2.63 / 3.05	2.72 / 3.20	2.71 / 3.30	2.73 / 3.14		
MAXIMUM STARTING CURRENT		Amps	42.0	48.0	55.0	66.0	47.5	54.5		
POWER SUPPLY		V/Ph/Hz	380V/3Ph/50Hz							
CAPACITY STEPS		%	0、100%				0、50、100%			
EVAPORATOR SECTION	MOTOR	POWER INPUT	kW	0.55	0.55	0.55	0.76	0.93	0.93	
		POWER SUPPLY	V/Ph/Hz	220V/1Ph/50Hz						
	FAN	FAN TYPE	Centrifugal fan							
		DRIVE TYPE (DIRECT / BELT)	Direct Drive							
		FAN SPEED	RPM	1440/1245/1390	1430/1400/1360			1380		
		AIR FLOW	L/S	500/400/320	590/480/370	700/550/440		810	1000	1180
			CMH	1800/1440/1152	2124/1728/1332	2520/1980/15		2916	3600	4248
	EXTERNAL STATIC PRESSURE	Pa	160.0	150.0	180.0	180.0	170.0	150.0		
	COIL	FIN TYPE	Aluminum Fins							
		ROWS / FIN PER INCH		3/12.7	4/12.7					
FACE AREA		m ² /ft ²	0.28/3.013	0.28/3.013	0.28/3.013	0.46/4.95	0.51/5.488	0.6/6.456		
TUBE MATERIAL		Copper Tubes								
CONDENSER SECTION	MOTOR	POWER INPUT	kW	0.16	0.16	0.33	0.38	0.38	0.48	
		POWER SUPPLY	V/Ph/Hz	380V/3Ph/50Hz						
	FAN	FAN TYPE	Axial type							
		QUANTITY		1	1	1	1	1	1	
		FAN SPEED	RPM	695.0	695.0	965.0	965.0	710.0	710.0	
		AIR FLOW	L/S	1,100.0	1,050.0	1,530.0	1,950.0	2,400.0	2,400.0	
	CMH		3,961	3,781	5,509	7,021	8,641	8,641		
	COIL	FIN TYPE	Aluminum Blue Fins							
		ROWS / FIN PER INCH		2/15.88	3/12.7	3/14.0	2/15.88	3/14.0	3/15.88	
		FACE AREA	m ² /ft ²	0.825/8.877	0.825/8.877	0.825/8.877	1.125/12.105	1.125/12.105	1.125/12.105	
TUBE MATERIAL		Copper Tubes								
COMPRESSOR	TYPE	Hermetic scroll compressor								
	BRAND		Sanyo	Sanyo	Sanyo	Sanyo	Sanyo	Sanyo		
	QUANTITY		1	1	1	1	2	2		
	POWER INPUT	kW	3.20	3.61	4.24	5.35	2x3.0	2x3.52		
	POWER SUPPLY	V/Ph/Hz	380V/3Ph/ 50Hz							
	ANCILLIARIES	Crank case heater								
	REFRIGERANT TYPE	R22 (FACTORY CHARGED)								
REFRIGERANT	CHARGE PER CIRCUIT	Kg	3.0	3.6	4.2	5.8	6.2	7.3		
	REFRIGERANT CONTROL	Thermal Expansion Valve control								
	QTY OF CIRCUITS		1	1	1	1	1	1		
UNIT DIMENSIONS	LENGTH	mm	1280	1280	1280	1660	1780	1780		
	WIDTH	mm	1040	1040	1040	1040	1390	1390		
	HEIGHT	mm	895	895	895	1045	1045	1045		
	NET WEIGHT	kg	240	240	243	360	402	420		
CASING	MATERIAL - CASING / BASE	High Grade Sheet Steel casing and frame								
	EXTERNAL FINISHING	Weather—proof, polyester epoxy powder electrostatic paint oven—baked finishing								
	COLOUR	White, Code PCTC70105								
CONTROL	INSULATION	Wave acoustic insulation 15mm for compressor section. Thermal insulation 10mm for fan section								
	ROOM TEMPERATURE OPERATION	Easy operation Line controller Unit mounted Microprocessor Controller								
SOUND PRESSURE LEVELS	db(A)	67	67	68	71.7	72.6	72.6			
AIR FILTER	TYPE	Coarse efficiency Nylon filter								
	SIZE (No.-LxWxH)	mm	1-790x340x8	1-790x340x8	1-790x340x8	1-788x276x8	1-831x420x8	1-831x420x8		
CONDENSATE DRAIN CONNECTION	in	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"			
PROTECTION DEVICES	Compressor - external overload protection, Phase protection Anti-cycle timers HP/ LP Switches									

* Performance values refer to the following conditions:

Cooling: room air temperature 27.0°C DB RH 50%, ambient air temperature 35°C;

Heating: room air temperature 21.0°C DB, ambient air temperature 7°C DB / 6°C WB

** Noise level measured by adopting average value in the noise lab with background noise of 25 dB(A), at a distance of 1.5m high fan speed.

TECHNICAL DATA

MODEL CAAHP		25	28	30	32	35	42		
NOMINAL COOLING CAPACITY		kW	25.2	27	30.2	32.4	35.6	41.6	
NOMINAL HEATING CAPACITY		kW	27.3	29.7	32.4	34.6	38	44.6	
RATED TOTAL POWER CONSUMPTION (COOLING)		kW	9.71	10.31	11.16	11.30	12.74	14.70	
RATED TOTAL POWER CONSUMPTION (HEATING)		kW	9.12	9.79	10.32	10.55	11.60	13.14	
RATED RUNNING CURRENT (COOLING)		Amps	15.1	17.0	18.5	19.6	23.1	27.9	
RATED RUNNING CURRENT (HEATING)		Amps	14.0	15.6	17.2	17.8	21.6	26.1	
EER (COOLING) / COP (HEATING)		kW/kW	2.82/2.99	2.62/3.03	2.71/3.14	2.87/3.28	2.79/3.28	2.83/3.39	
RATED RUNNING CURRENT (COOLING)		Amps	15.1	17.0	18.5	19.6	23.1	27.9	
MAXIMUM STARTING CURRENT		Amps	61.5	62.5	62.9	59.9	75.3	87.9	
POWER SUPPLY		V/Ph/Hz	380V/ 3Ph/50Hz						
CAPACITY STEPS		%	0,46,54,100	0,50,100	0,46,54,100	0,50,100	0,50,100	0,37,63,100	
EVAPORATOR SECTION	MOTOR	POWER INPUT	kW	1.22	1.22	1.5	1.5	2.2	2.2
		POWER SUPPLY	V/Ph/Hz	380V/3Ph/50Hz					
	FAN	FAN TYPE	Centrifugal fan						
		DRIVE TYPE (DIRECT / BELT)	Belt Drive						
		FAN SPEED	RPM	1320	1320	1400	1120	940	940
		AIR FLOW	L/S	1250	1500	1580	1750	1890	2200
			CMH	4500	5400	5688	6300	6804	7920
		EXTERNAL STATIC PRESSURE	Pa	255	235	305	290	270	250
	COIL	FIN TYPE	Aluminum Fins						
		ROWS / FIN PER INCH	4.0/ 12.7				3.0/ 12.7		4.0/ 12.7
FACE AREA		m ² /ft ²	0.6/6.456	0.607/6.532	0.633/6.811	0.732/7.877	0.952/10.244	0.952/10.244	
TUBE MATERIAL		Copper Tubes							
MOTOR	POWER INPUT	kW	0.61	0.61	0.80	0.80	2x0.37	2x0.45	
	POWER SUPPLY	V/Ph/Hz	380V / 3Ph / 50Hz						
FAN	FAN TYPE	Axial type							
	QUANTITY		1	1	1	1	2	2	
	FAN SPEED	RPM	920	920	710	940	950	940	
	AIR FLOW	L/S	2620	2620	3120	3420	2x2083	2x2444	
		CMH	9434	9434	11234	12314	2x7500	2x8800	
COIL	FIN TYPE	Aluminum Blue Fins							
	ROWS / FIN PER INCH		3/15.88	3/15.88	3/14.0	3/15.88	3/14.0	3/12.7	
	FACE AREA	m ² /ft ²	1.44/15.50	1.44/15.50	1.8/19.37	1.8/19.37	1.98/21.305	2.47/26.577	
	TUBE MATERIAL	Copper Tubes							
COMPRESSOR	TYPE	Hermetic scroll compressor							
	BRAND		Sanyo	Sanyo	Sanyo	Sanyo	Sanyo	Sanyo	
	QUANTITY		2	2	2	2	2	2	
	POWER INPUT	kW	3.3+3.8	2x4.24	4.06+4.8	2x4.5	2x4.9	4.2+7.4	
	POWER SUPPLY	V/Ph/Hz	380V / 3Ph / 50Hz						
	ANCILLIARIES	Crank case heater							
	REFRIGERANT	REFRIGERANT TYPE	R22 (FACTORY CHARGED)						
	CHARGE PER CIRCUIT	Kg	8.1	8.4	9.8	10.5	12.0	5+9.2	
	REFRIGERANT CONTROL	Thermal Expansion Valve control							
	QTY OF CIRCUITS		1.0	1	1	1	2	2	
UNIT DIMENSION	LENGTH	mm	1940	1940	2240	2240	2540	2540	
	WIDTH	mm	1390	1390	1390	1390	1860	1860	
	HEIGHT	mm	1045	1045	1045	1045	1045	1195	
	NET WEIGHT	kg	461	461	503	505	650	725	
CASING	MATERIAL - CASING / BASE	High Grade Sheet Steel casing and frame							
	EXTERNAL FINISHING	Weather – proof, polyester epoxy powder electrostatic paint oven – baked finishing							
	COLOUR	White, Code PCTC70105							
	INSULATION	Wave acoustic insulation 15mm for compressor section. Thermal insulation 10mm for fan section							
CONTROL	ROOM TEMPERATURE OPERATION	Easy operation Line controller							
		Unit mounted Microprocessor Controller							
SOUND PRESSURE LEVELS		db(A)	70.0	70.0	72.0	72.0	72.0	72.0	
AIR FILTER	TYPE	Coarse efficiency Nylon filter							
	SIZE (No.-LxWxH)	mm	2-502x395x8	2-502x395x8	772x502x8	2-502x395x8	2-592x395x8	2-592x470x8	
CONDENSATE DRAIN CONNECTION		in	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	
PROTECTION DEVICES		Compressor - external overload protection, Phase protection Anti-cycle timers							
		HP/ LP Switches							

* Performance values refer to the following conditions:

Cooling: room air temperature 27.0°C DB RH 50%, ambient air temperature 35°C;

Heating: room air temperature 21.0°C DB, ambient air temperature 7°C DB / 6°C WB

** Noise level measured by adopting average value in the noise lab with background noise of 25 dB(A), at a distance of 1.5m high fan speed.

TECHNICAL DATA

MODEL	CAAHP		48	52	63	72	90	105	
NOMINAL COOLING CAPACITY		kW	47.2	53.2	63.3	71.4	87.2	103.1	
NOMINAL HEATING CAPACITY		kW	50.2	56.4	67	75.6	93.3	109.5	
RATED TOTAL POWER CONSUMPTION (COOLING)		kW	16.7	18.70	22.50	26.30	31.40	38.30	
RATED TOTAL POWER CONSUMPTION (HEATING)		kW	16.04	18.13	21.07	25.55	29.83	36.78	
RATED RUNNING CURRENT (COOLING)		Amps	30.9	33.7	39.0	48.3	55.6	69.7	
RATED RUNNING CURRENT (HEATING)		Amps	28.7	31.3	36.5	44.9	52.7	66.6	
EER (COOLING) / COP (HEATING)		kW/kW	2.83/3.13	2.84/3.11	2.81/3.18	2.71/2.96	2.78/3.13	2.69/2.98	
MAXIMUM STARTING CURRENT		Amps	103.9	108	111.4	114.2	154.1	197.7	
POWER SUPPLY		V/Ph/Hz	380V/3Ph/50Hz						
CAPACITY STEPS		%	0,32,68,100	0,40,60,100	0,50,100	0,50,100	0,50,100	0,50,100	
EVAPORATOR SECTION	NO-OR	POWER INPUT	kW	3	3	3	4	4	5.5
		POWER SUPPLY	V/Ph/Hz	380V/3Ph/50Hz					
	FAN	FAN TYPE	Centrifugal fan						
		DRIVE TYPE (DIRECT / BELT)	Belt Drive						
		FAN SPEED	RPM	1000	750	750	850	850	900
		AIR FLOW	L/S	2600	2900	3520	4000	4600	5400
			CMH	9360	10440	12672	14400	16560	19440
	EXTERNAL STATIC PRESSURE	Pa	290	280	275	380	345	390	
	COIL	FIN TYPE	Aluminum Fins						
		ROWS / FIN PER INCH	4.0/ 12.7						
FACE AREA		m ² /ft ²	1.08/11.62	1.174/12.632	1.41/15.115	1.7/18.292	1.95/20.982	2.21/23.780	
TUBE MATERIAL		Copper Tubes							
CONDENSER SECTION	NO-OR	POWER INPUT	kW	2x0.55	2x0.55	2x0.75	2x1.1	2x1.5	2x1.5
		POWER SUPPLY	V/Ph/Hz	380V/3Ph/50Hz					
	FAN	FAN TYPE	Axial type						
		QUANTITY		2	2	2	2	2	2
		FAN SPEED	RPM	940	920	720	725	720	720
		AIR FLOW	L/S	2x2611	2x2975	2x3420	2x4166	2x5555	2x5555
			CMH	2x9400	2x10710	2x12310	2x15000	2x20000	2x20000
	COIL	FIN TYPE	Aluminum Blue Fins						
		ROWS / FIN PER INCH		3/ 15.88	3/14.0	3/12.7	3/12.7	3/14.0	3/12.7
		FACE AREA	m ² /ft ²	2.47/26.577	2.984/32.108	3.77/40.565	4.68/50.357	4.68/50.357	6.44/69.295
TUBE MATERIAL		Copper Tubes							
COMPRESSOR	TYPE	Hermetic scroll compressor							
	BRAND		Sanyo	Sanyo	Sanyo	Sanyo	Sanyo	Sanyo	
	QUANTITY		2	2	2	2	4	4	
	POWER INPUT	kW	4.1+8.5	4.1+10.5	2x9.5	2x10.5	4x7.04	4x7.1	
	POWER SUPPLY	V/Ph/Hz	380V/3Ph/50Hz						
	ANCILLIARIES	Crank case heater							
	REFRIGERANT	REFRIGERANT TYPE	R22 (FACTORY CHARGED)						
UNIT DIMENSIONS	REFRIGERANT CONTROL	Thermal Expansion Valve control							
	QTY OF CIRCUITS		2	2	2	2	2	2	
	LENGTH	mm	2540	2490	2490	2840	2840	3410	
CASING	WIDTH	mm	1860	2050	2210	2210	2210	2210	
	HEIGHT	mm	1195	1390	1490	1580	1665	1810	
	NET WEIGHT	kg	801	884	890	980	1160	1450	
	MATERIAL - CASING / BASE	High Grade Sheet Steel casing and frame							
CONTROL	EXTERNAL FINISHING	Weather – proof, polyester epoxy powder electrostatic paint oven – baked finishing							
	COLOUR	White, Code PCTC70105							
SOUND PRESSURE LEVELS	INSULATION	Wave acoustic insulation 15mm for compressor section. Thermal insulation 10mm for fan section							
	ROOM TEMPERATURE OPERATION	Easy operation Line controller Unit mounted Microprocessor Controller							
AIR FILTER	TYPE	Coarse efficiency Nylon filter							
	SIZE (No.-LxWxH)	mm	2-592x470x8	2-628x541x8	2-757x591x	3-761x391x	3-761x391x	2-756x646x8	
PROTECTION DEVICES	CONDENSATE DRAIN CONNECTION	in	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	
		Compressor - external overload protection, Phase protection Anti-cycle timers HP/LP Switches							

* Performance values refer to the following conditions:

Cooling: room air temperature 27.0°C DB RH 50%, ambient air temperature 35°C;

Heating: room air temperature 21.0°C DB, ambient air temperature 7°C DB / 6°C WB

** Noise level measured by adopting average value in the noise lab with background noise of 25 dB(A), at a distance of 1.5m high fan speed.

TECHNICAL DATA

MODEL		CAAHP	120	130	150	170	190	
NOMINAL COOLING CAPACITY		kW	118.8	131.2	153.4	168.6	188.5	
NOMINAL HEATING CAPACITY		kW	126.8	141.2	164.3	182	202	
RATED TOTAL POWER CONSUMPTION (COOLING)		kW	46.10	49.70	56.70	65.40	75.48	
RATED TOTAL POWER CONSUMPTION (HEATING)		kW	42.90	45.70	50.70	59.28	69.40	
RATED RUNNING CURRENT (COOLING)		Amps	86.5	90.9	105.7	116.0	142.7	
RATED RUNNING CURRENT (HEATING)		Amps	82.0	86.2	100.5	111.0	136.1	
EER (COOLING) / COP (HEATING)		kW/kW	2.57/2.96	2.64/3.09	2.65/3.16	2.51/3.0	2.46/2.85	
MAXIMUM STARTING CURRENT		Amps	161	166	183	192	243	
POWER SUPPLY		V/Ph/Hz	380V/3Ph/50Hz					
CAPACITY STEPS		%	0、25、50、75、100					
EVAPORATOR SECTION	MOTOR	POWER INPUT	kW	7.5	7.5	7.5	11	15
		POWER SUPPLY	V/Ph/Hz	380V/3Ph/50Hz				
	FAN	FAN TYPE	Centrifugal fan					
		DRIVE TYPE (DIRECT / BELT)	Belt Drive					
		FAN SPEED	RPM	800	800	800	850	740
		AIR FLOW	L/S	6120	6750	8100	9200	10200
			CMH	22032	24300	29160	33120	36720
	EXTERNAL STATIC PRESSURE	Pa	390	385	360	420	430	
COIL	FIN TYPE	Aluminum Fins						
	FACE AREA	m ² /ft ²	2.52/27.115	2.73/29.375	3.35/36.046	3.77/40.565	4.09/44.009	
	TUBE MATERIAL	Copper Tubes						
MOTOR	POWER INPUT	kW	4x0.75	4x0.75	4x1.5	4x1.5	4x1.5	
	POWER SUPPLY	V/Ph/Hz	380V / 3Ph / 50Hz					
FAN	FAN TYPE	Axial type						
	QUANTITY		4	4	4	4	4	
	FAN SPEED	RPM	940	940	725	720	720	
	AIR FLOW	L/S	4x3420	4x3420	4x4166	4x5555	4x5555	
		CMH	4x12310	4x12310	4x15000	4x20000	4x20000	
COIL	FIN TYPE	Aluminum Blue Fins						
	ROWS / FIN PER INCH		3/14.0	3/14.0	4/12.7	4/14.0	4/14.0	
	FACE AREA	m ² /ft ²	6.44/69.295	7/75.32	7/75.32	7/75.32	7/75.32	
COMPRESSOR	TUBE MATERIAL	Copper Tubes						
	TYPE	Hermetic scroll compressor						
	BRAND		Danfoss	Danfoss	Danfoss	Danfoss	Danfoss	
	QUANTITY		4	4	4	4	4	
	POWER INPUT	kW	4x8.9	4x9.8	4x10.8	4x12.2	4x13.62	
	POWER SUPPLY	V/Ph/Hz	380V / 3Ph / 50Hz					
REFRIGERANT	ANCILLIARIES	Crank case heater						
	REFRIGERANT TYPE	R22 (FACTORY CHARGED)						
	CHARGE PER CIRCUIT	Kg	2x22.5	2x24	2x26.5	2x30	2x35	
	REFRIGERANT CONTROL	Thermal Expansion Valve control						
QTY OF CIRCUITS		2	2	2	2	2		
UNIT DIMENSIONS	LENGTH	mm	4700	5200	5500	5800	5880	
	WIDTH	mm	2230	2230	2230	2230	2230	
	HEIGHT	mm	1640	1640	1810	1810	2010	
	NET WEIGHT	kg	1910	2010	2280	2460	2530	
CASING	MATERIAL - CASING / BASE	High Grade Sheet Steel casing and frame						
	EXTERNAL FINISHING	Weather – proof, polyester epoxy powder electrostatic paint oven – baked finishing						
	COLOUR	White, Code PCTC70105						
CONTROL	INSULATION	Wave acoustic insulation 15mm for compressor section. Thermal insulation 10mm for fan section						
	ROOM TEMPERATURE OPERATION	Easy operation Line controller						
SOUND PRESSURE LEVELS	db(A)	80	80	80	82	82.5		
AIR FILTER	TYPE	Coarse efficiency Nylon filter						
	SIZE (No.-LxWxH)	mm	9-581x400x8	9-681x400x	12-585x397	12-660x397x8	9-495x765	
CONDENSATE DRAIN CONNECTION	in	3/4"	3/4"	3/4"	3/4"	3/4"		
PROTECTION DEVICES	Compressor - external overload protection, Phase protection Anti-cycle timers HP/ LP Switches							

* Performance values refer to the following conditions:

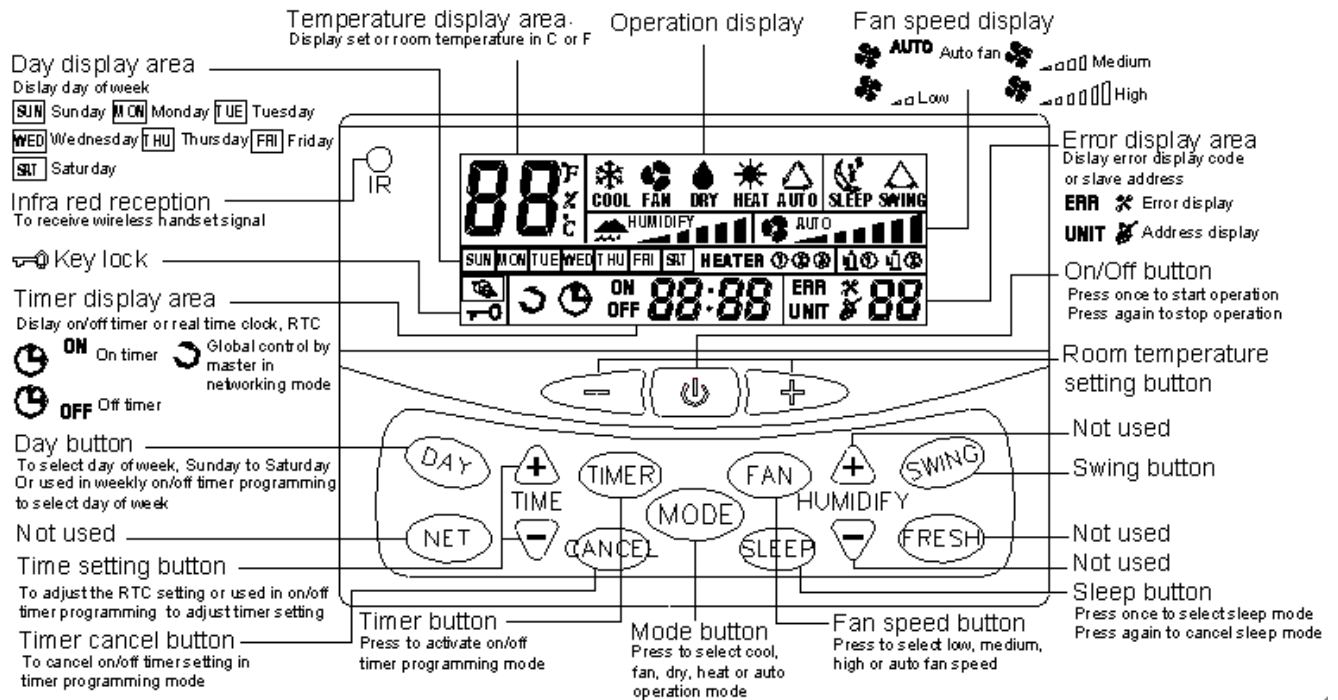
Cooling: room air temperature 27.0°C DB RH 50%, ambient air temperature 35°C;

Heating: room air temperature 21.0°C DB, ambient air temperature 7°C DB / 6°C WB

** Noise level measured by adopting average value in the noise lab with background noise of 25 dB(A), at a distance of 1.5m high fan speed.

OPERATION INSTRUCTIONS

USE OF BUTTONS ON LCD WALL PAD CONTROLLER



1. On/Off

- ◆ Press to start or stop the air conditioner.

2. Temperature setting

- ◆ Press or to decrease or increase the set temperature.

When any of these buttons is pressed, temperature display area will flash with the old temperature setting for 4 seconds. Should there be no further key press it will then return to room temperature display.

- ◆ Press and together for 5 seconds will change the temperature setting from C to F.

Valid temperature set range is 16C-30C or 60F-85F.


- ◆ Temperature setting is bypass in Fan mode.

3. Mode setting


- ◆ Press button to change the operation mode as follow:-

Cool→dry→fan→heat→auto cool/heat


4. Fan speed setting

- ◆ Press  button to change the fan speed: Auto→Low→Medium→High. Auto fan setting is bypass in Fan mode. Fan speed setting is bypass in dry mode.

5. Sleep setting

- ◆ Press  button to activate or deactivate sleep setting. Sleep is bypass in Fan and Dry mode.








6. Swing setting

- ◆ Press  button to activate or deactivate swing setting. The availability of this function depends on the model of main board.


7. Fresh air

- ◆ For main board with fresh air function, symbol  will light up automatically. Sleep and dry mode is not available for this model.







8. Clock setting

- ◆ Press  or  button to change the real time clock [RTC] setting.
- ◆ Press  or  button will activate the clock programming mode, clock symbol  flashes.
- ◆ Subsequent press of  or  button will increase or decrease the current setting in 1 minute. Holding down the button will change the current setting in a faster speed.







9. Day of week setting

- ◆ Press  button to change current day of week from Sunday to Saturday.

10. On timer setting

- ◆ Press  button to select on timer or off timer programming mode. When on timer programming mode is selected, **ON** symbol and day of week flashing.
- ◆ Flashing of day of week indicates the on timer selected for this day. Press  button to change the day the on timer to be programmed.
- ◆ If on timer for this day is empty, timer display area shows $\Delta \circ \Delta \Delta$, otherwise the on timer setting will be shown.
- ◆ Press  or  button to change the on timer setting. Holding down the button will change the setting in a faster speed.
- ◆  lights up indicating there is timer being programmed.
- ◆ Press  key to cancel the current on timer selected and the timer display area shows $\Delta \circ \Delta \Delta$.
- ◆ Should there be no further key press, system will exit from on timer programming mode 6 seconds later.





11. Off timer setting

- ◆ Press  button to select on timer or off timer programming mode. When off timer programming mode is selected, **OFF** symbol and day of week flashing.
- ◆ Flashing of day of week indicates the on timer selected for this day. Press  button to change the day the off timer to be programmed.
- ◆ If off timer for this day is empty, timer display area shows $\Delta \circ \Delta \Delta$, otherwise the off timer setting will be shown.
- ◆ Press  or  button to change the off timer setting. Holding down the button will change the setting in a faster speed.
- ◆  lights up indicating there is timer being programmed.
- ◆ Press  key to cancel the current off timer selected and the timer display area shows $\Delta \circ \Delta \Delta$.
- ◆ Should there be no further key press, system will exit from on timer programming mode 6 seconds later.








12. Cancel all timer setting

- ◆ In non on or off timer programming mode, hold down  key for 5 seconds will cancel all the on or off timer being programmed.





13. Hot water coil

- ◆ This function can be activated in fan or heat mode only. The availability of this function depends on the model of main board.
- ◆ Press  and  to activate hot water coil function, symbol **HEATER** will light up. Repeat the same step to exit this function.
- ◆ Press  or  to decrease or increase the set temperature.



14. Coil temperature display

- ◆ Hold down  and  buttons to activate coil temperature display function. Timer display area will show the coil temperature selected in the range of -33C to 78C while temperature display area shows the selection of either indoor coil or outdoor coil temperature to be displayed. Repeat the same sequence to cancel coil temperature display function.
- ◆ Press  or  to select either indoor coil or outdoor coil temperature to be displayed. C1 will be shown when indoor coil temperature display is selected. C2 will be shown when outdoor coil temperature display is selected.
- ◆ For dual stage system, press  to select the data of the system to be display. Symbol  will be shown for #1 system and  for #2 system.






15. Key lock

- ◆ In order to prevent unauthorized access to the system setting, a key lock function is provided to prevent mischief.
- ◆ When the system is on, hold down  and  buttons for 3 seconds to activate the key lock function, key lock symbol  will light up. Repeat the same sequence to cancel key lock function.
- ◆ Only  button press is acknowledged.










16. Time shortening

- ◆ This function is to activate the time shortening program in the main board.
- ◆ It must be used with care and is recommended for PCB testing only.
- ◆ This function can only be activated within first 1 minute after system is powered on.
- ◆ Hold down  and  buttons to activate this function.

17. Main board parameter editing

- ◆ This function is used to edit the defrost and heat mode parameters for the main board.
- ◆ This function can only be activated when system is in standby mode.
- ◆ Hold down  and  buttons to activate this function. Temperature display area shows “EP” requesting for password entry at timer and error display area. Timer and error display area shows “0000” initially with first digit stand still while the remaining 3 digits flashing. This indicates the first digit password entry. Press  or  to edit the numerical input from “0” to “9”. Upon completion of editing the number, press  to confirm the entry of this digit and this digit will then mask with “-“. The next available digit will then be replaced by the number just entered, i.e. if the first digit is “8”, it will be displayed as“-800”. Second digit stand still and the remaining 2 digits flashing. This indicates the second digit password entry. Follow the same arguments above to complete the password entry for these four digits. The password to enter into parameter editing mode is “8699”.
- ◆ If password entry is correct, system will respond with a beep sound. If password is wrongly entered 3 times consecutively or 60 seconds for password entry times up, system will exit from this mode automatically and user needs to repeat the complete process in order to access this function.
- ◆ Upon successful of password entry, temperature display area shows the submenu selection and timer display area shows the value of parameter to be edited.

Submenu	Parameter	Value	Default value	Remarks
1	Defrost termination temperature	XX	10	Set range 10C~15C or 5C~15C. Depends on model.
2	Defrost run time	XX	10	Set range 5min~10min. Depends on model.
3	Heat mode indoor fan activation indoor coil temperature.	XX	30	Set range 22C~30C. Depends on model.
4	Defrost activation temperature	XX	-6	Set range [-8]C~[-3]C. Depends on model.
5	Heat mode solenoid valve control temperature [outdoor air temperature]	XX	0	Set range [-5]C~5C. Depends on model.
6	Water source temperature protection in cool/dry mode	XX	4	Set range 0C~20C. Depends on model.
7	Water source temperature protection in cool/dry mode	XX	4	Set range [-10]C~10C. Depends on model.

- ◆ Press  or  to select the sub-menu to be edited. Depends on the model of main board, some of the sub-menu is not available.
- ◆ For certain dual stage system, only sub-menu 1 is available. Press  to select the data of the system to be edited. Symbol  will be shown for #1 system and  for #2 system.
- ◆ Press  or  to edit the value of the parameter selected.
- ◆ Hold down  and  buttons to exit this function or the system will exit automatically 10 seconds after last button press.


18. Error code display

- ◆ Should there be any fault happen with the main board, the relevant error code will be shown on the error display area and symbol **ERR ✖** will light up.
- ◆ If there is multiple faults happen at the same time, the error code will be shown one after another.
- ◆ Depends on the model of main board, the error codes available are:-

Fault	Error code	Remarks
Room sensor failure	1	
#1 indoor coil sensor failure	2	
#1 outdoor coil sensor failure	3	
#1 insufficient of refrigerant	4	
#1 compressor overload	5	

#1 low pressure failure	6	
#1 high pressure failure	7	
Water source temperature protection	8	Water source heatpump
#2 indoor coil sensor failure	9	
#2 outdoor coil sensor failure	10	
#2 insufficient of refrigerant	11	
#2 compressor overload	12	
#2 low pressure failure	13	
#2 high pressure failure	14	
Communication failure	15	
#1 indoor anti freeze	16	
#2 indoor anti freeze	17	
Prevent heatpump function in low ambient	18	
Flow switch failure	19	
Condensate water drainage failure	20	

19. Defrost

- ◆ Symbol  HEAT flashes when system enter into outdoor defrost.

20. Infra red signal reception

- ◆ The system is able to receive the infra-red wireless commands from LCD handset or non LCD handset.

21. Buzzer

- ◆ Buzzer beeps in responding to valid button press or wireless signal reception.
- ◆ It beeps twice when the system is turned on, otherwise beeps once to all other valid acknowledgement



22. Backlight

- ◆ Back light colour changes according to the operating mode setting.

Operating Mode	Backlight Colour
Cool	Blue
Fan	Yellow
Dry	Pink
Heat	Reddish orange
Auto	Light violet

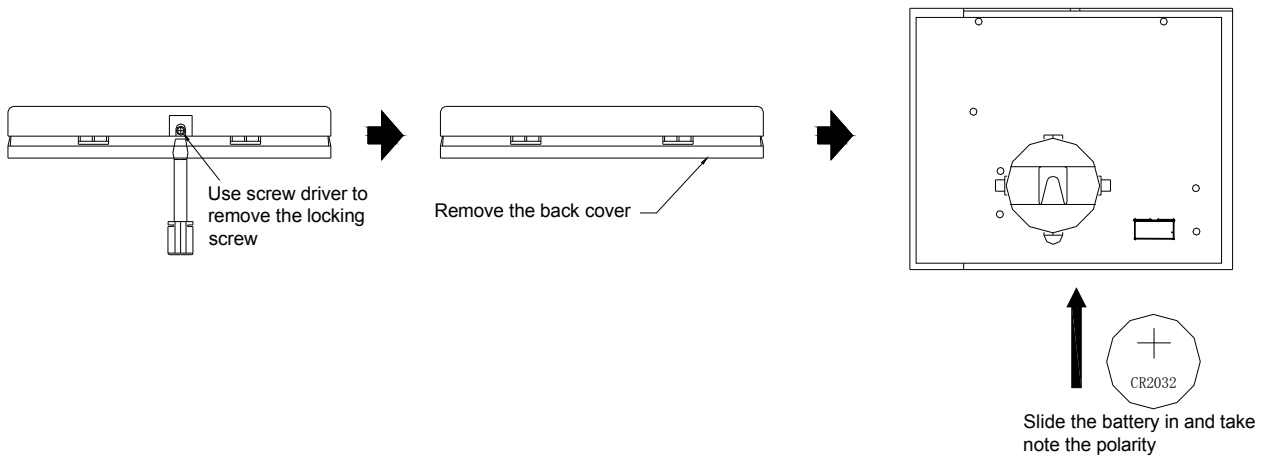
- ◆ The colour will change to red whenever there is system fault. Whenever the fault is cleared, backlight colour will return to original.
- ◆ If the unit is on, backlight will turn off 30 seconds after the last button press.
- ◆ If the unit is off, any button press will turn on the backlight and the screen display. The backlight will turn off 10 seconds after last button press.

23. Master-slave

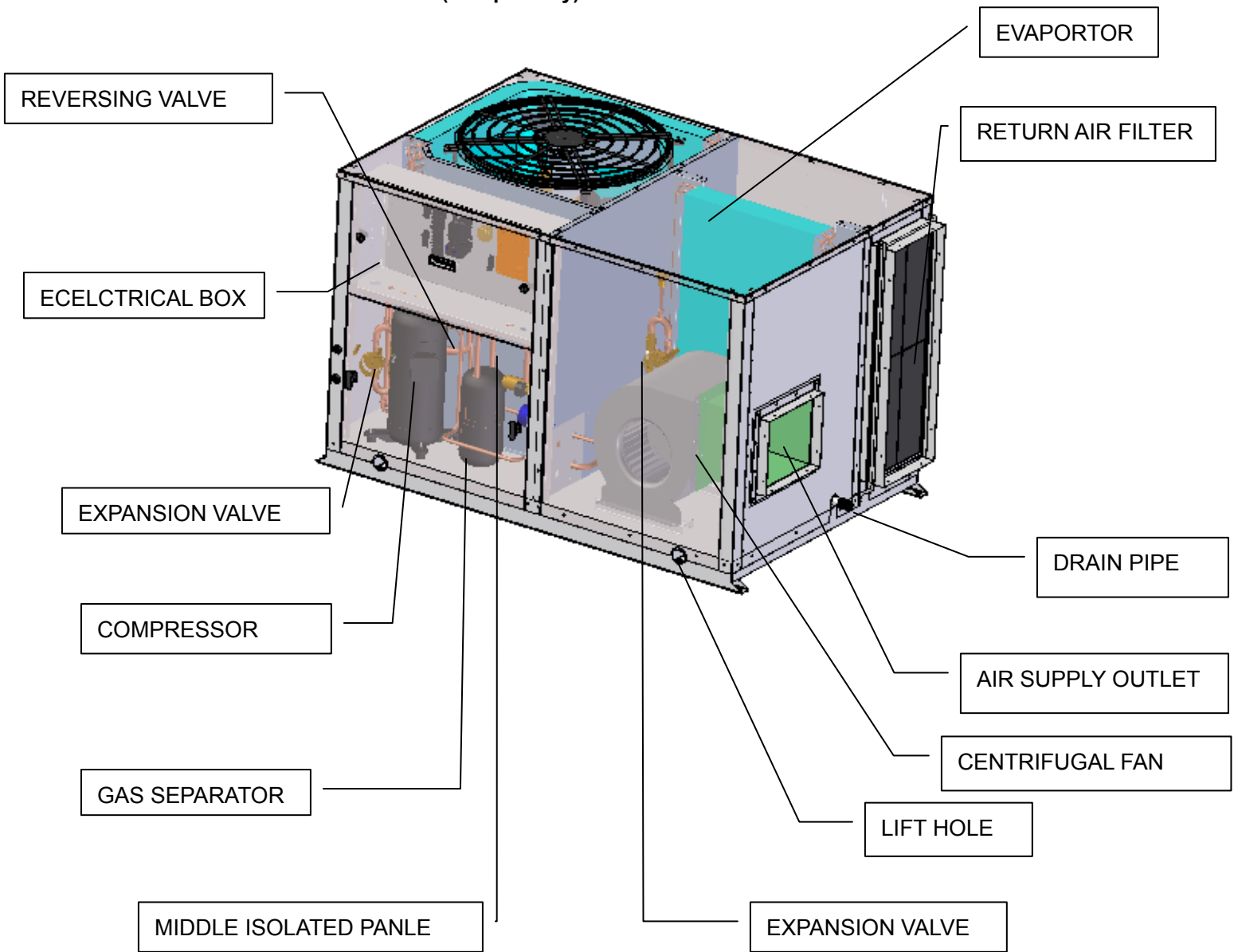
- ◆ If the wall pad is connected to a gateway card, a master controller can control it.
- ◆ The address setting of the gateway card will be shown on the error display area with symbol **UNIT**  lights up. This symbol will turn off and replace by error symbol display if there is any fault happen to the main board. Whenever the fault is cleared, it will return to gateway address display.
- ◆ If the master controller is working in global control mode, symbol  lights up. None of the button or infra-red reception will be acknowledged until master controller give up global control mode.

24. Battery

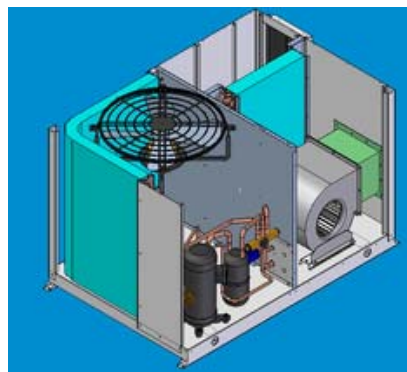
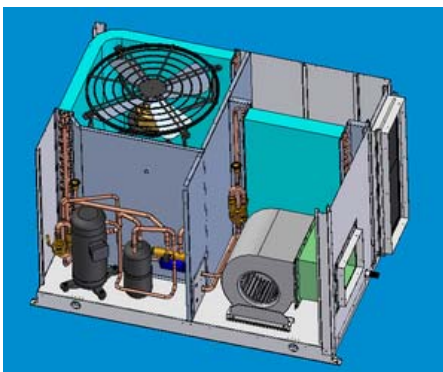
- ◆ A battery is used to sustain the operation of the internal real time clock when the power supply is cut off.
- ◆ The installation of the battery is shown as follow:



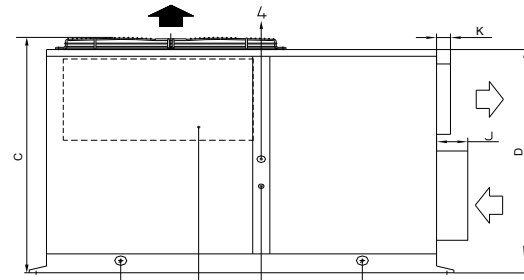
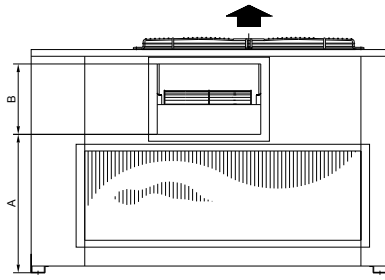
EXPLODED COMPONENTS VIEW (Sample only)



Inner Structure



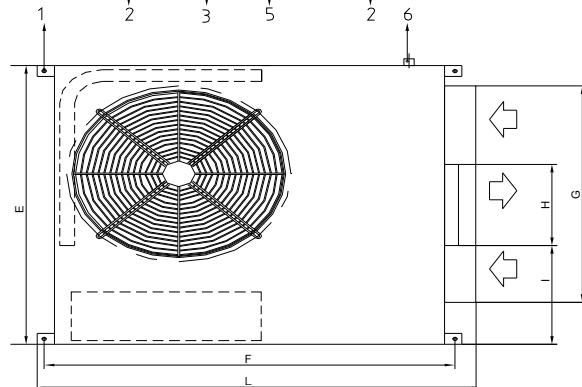
CAAHP10 12



Code	Dimension	Code	Dimension
A	541.5	G	795
B	260	H	300
C	895	I	439
D	855	J	90
E	1040	K	40
F	1190	L	1280

Note:

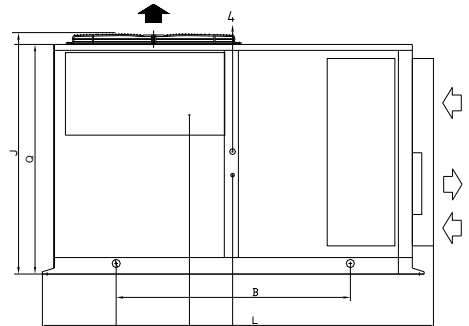
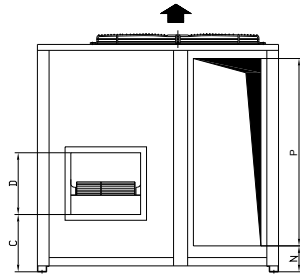
- 1, Unit fixed hole 4 × φ 12.5
- 2, Unit single hole 4 × φ 50
- 3, Unit electric control panel
- 4, Unit power cable entry φ 22
- 5, Unit signal wire hole φ 16
- 6, Unit condensing water discharge pipe 3/4"



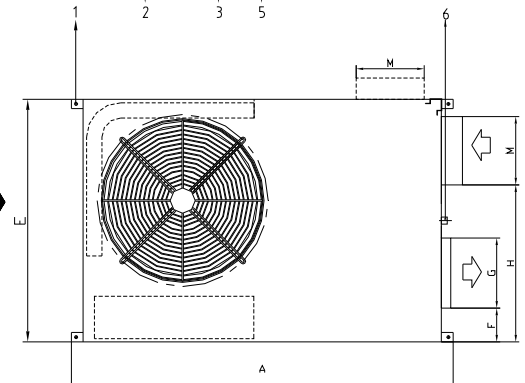
CAAHP14-32

Note:

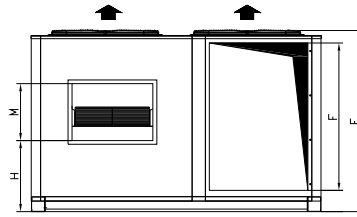
- 1, Unit fixed hole 4 × φ 12.5
- 2, Unit single hole 4 × φ 50
- 3, Unit electric control panel
- 4, Unit power cable entry φ 22
- 5, Unit signal wire hole φ 16
- 6, Unit condensing water discharge pipe 3/4"



MODEL	CAAHP14	CAAHP17,20	CAAHP22,25	CAAHP28	CAAHP30/32
A	1610	1730	1900	2200	2200
B	1130	1230	1100	1400	1400
C	286	286	345	345	409
D	262	262	268	268	318
E	1040	1390	1390	1390	1390
F	113	190	118	118	118
G	298	298	330	330	330
H	701	825	787	786.5	786.5
M	280	423	495	507	495
L	1670	1780	1940	2240	2240
J	1045	1050	1045	1045	1045
N	91	110	150	120	150
P	795	843	795	780	795
Q	1005	1008	1005	1005	1005



CAAHP35-105

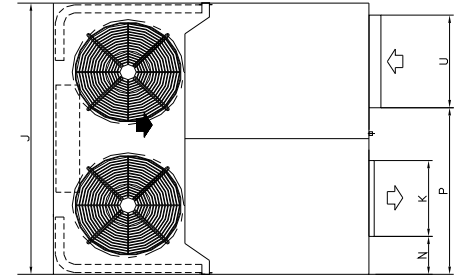
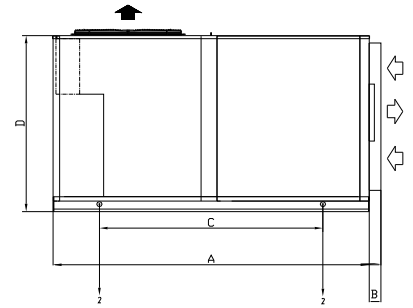


Note:

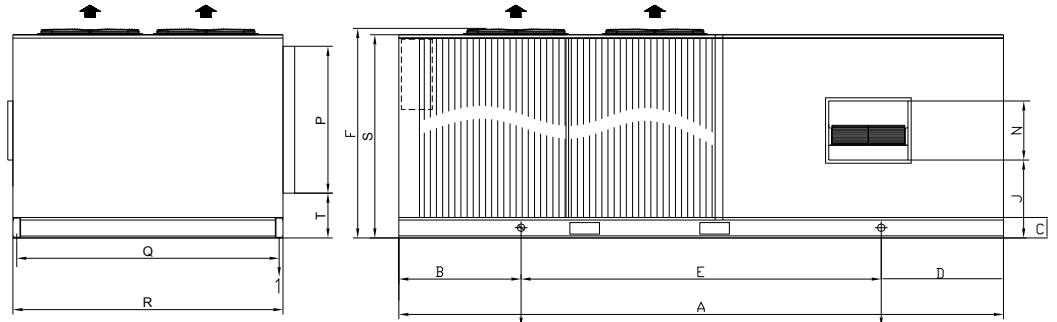
1, Unit fixed hole $4 \times \phi 12.5$

2, Unit single hole $4 \times \phi 50$

MODEL	CAAHP35	CAAHP42,48	CAAHP52	CAAHP63	CAAHP72,90	CAAHP105
A	2540	2540	2490	2495	2750	3410
B	86.5	86.5	90	90	90	92
C	1620	1620	1700	1660	1800	1600
D	1005	1155	1345	1447	1465	1590
E	1045	1195	1390	1490	1550	1810
F	795	945	1095	1195	1182	1300
H	358	358	589	595.5	609	615
M	420	420	462	462	462	462
J	1860	1860	2050	2210	2210	2210
N	199	199	237.5	309	307.5	282.5
K	460	460	615	615	615	615
P	1166.5	1161	1336.5	1353	1331.5	1326.5
U	585	596	630	750	750	750



CAAHP120-190

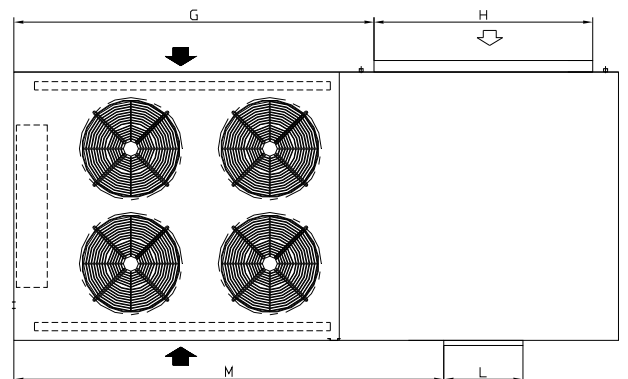


Note:

1, Unit fixed hole $4 \times \phi 16.5$

2, Unit single hole $4 \times \phi 60$

MODEL	CAAHP120	CAAHP130	CAAHP150	CAAHP170	CAAHP190
A	4700	5200	5500	5800	5870
B	800	800	800	800	800
C	160	160	160	160	160
D	800	1622	1300	1350	2070
E	3100	2778	3400	3650	3000
F	1590	1640	1720	1720	2010
G	2750	2846	3046	3046	3383
H	1755	2054	2354	2654	2300
M	3288.5	3438.5	3788.5	3938.5	4036.5
L	723	723	723	718	718
J	813	813	813	650	650
N	400	400	400	718	718
P	1214	1214	1214	1214	1500
Q	2000	2000	2000	2000	2040
R	2230	2230	2230	2230	2230
S	1590	1590	1590	1590	1790
T	215	215	215	215	215



INSTALLATION AND MAINTENANCE

PREFACE

● UNPACKING

Retain packing materials until the unit is operated and found to be in good condition. If the unit shows external or internal damage, or does not operate properly, contact the transportation company and file a damage claim.

● AFTER-SALES SUPPORT

BRIGHT is committed to customer service both during and after the sale. If you have questions concerning the operation of your unit or the information of this booklet, contact our Sales Department. If your units fail to operate properly, or if you have questions concerning spare parts or Service Contact, contact our Sales Department.

SECTION I: SAFETY

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of heating and/or air conditioning appliances. Some local codes require licensed installation/service personnel for this type equipment. All installations must be in accordance with these instructions and with all applicable national and local codes and standards.

We recommend that you read this instruction manual carefully before use to gain full advantage of the functions of the unit and to avoid malfunction due to mishandling.

Read these instructions thoroughly before starting the installation. Follow all precautions and warnings contained within these instructions and on the unit.

1. SAFETY CONSIDERATIONS

The unit is designed to provide safe and reliable service when operating within design specifications. To avoid injury to personnel and damage to equipment or property when operating the equipment, the following safe practices should be observed as a minimum.

- Check the unit weight to be sure the lifting equipment is adequate.
- Disconnect power to the unit before working on it.
- Do not remove access panels or doors until fans have completely stopped.
- Do not enter an enclosed fan cabinet or into the unit while the fan is running.
- Protect materials when welding or flame cutting. Use suitable cloth to contain sparks. Have a fire extinguisher at hand and ready for immediate use.

2. WARNING and CAUTION

The precautions described below are WARNING and CAUTION. These are very important precautions concerning safety. Be sure to observe all of them without fail.

WARNING

The matters with possibilities leading to serious consequences such as death or serious injury due to erroneous handling.

CAUTION

These are the matters with possibilities leading to injury or material damage due to erroneous handling including probabilities leading to serious consequences in some cases.

Installation and servicing of air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service air conditioning equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

3. ADDITIONAL WARNINGS

In addition to the specific warnings listed on the previous page the following general warnings apply to your unit: Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the manufacturer's warranty.

Transport the unit with care. Sudden jolts or drops can damage the refrigeration lines.

- Observe all warning labels.
- Never remove warning labels.
- Never operate damaged or leaking equipment.
- Always turn off the unit and disconnect the power cord from the power source before performing any service or maintenance procedures, or before moving the unit.
- Never operate equipment with damaged power cords.
- Refer service and repairs to a qualified technician.
- Do not overcharge with refrigerant.

SECTION II INSTALLATION

1) INSTALLATION REQUIREMENTS

EQUIPMENT APPLICATION

Before beginning the installation, verify that the unit model is correct for the job. The unit model number is printed on the data label.

Charge Adjustment

As stated previously, the system is pre-charged. If further charge is required to be added, this can be done by CAREFULLY drawing LIQUID refrigerant only through the compressor suction pipe valve.

ELECTRICAL

All electrical work must be carried out by a qualified and licensed electrician. The installation must comply with the current relevant standards wiring rules and local authority requirements. Wire sizing is the responsibility of the installer, as it depends on the conditions and regulations applicable to each installation site. Refer to the electrical drawing and specification of the unit for the electrical data. The electrical installation requirements are generally as follows: The air-conditioning unit shall be supplied directly from a distribution board through a mains lockable isolating switch.

Pre punched holes have been provided in the unit casing for the isolating switch. Do not drill into the cabinet as pipes may be located behind.

REQUIREMENTS AND CODES


The unit should be installed in accordance with all national and local codes and regulations which govern the installation of this type of equipment. In lieu of local codes, the equipment should be installed in accordance with National Electric Code, and in accordance with the recommendations made by the National Board of Fire Underwriters.

UNIT LOCATION

The electric unit is designed only for outdoor installations. Choosing the location of the unit should be based on minimizing the length of the supply ducts. Consideration should also be given to availability, service access, noise, and shade. The unit installation shall avoid areas where condensate drainage may cause problems.

CLEARANCES


The units require certain clearances for proper operation and service. Installer must make provisions for adequate ventilation air, normally 2000mm's spaces all around the units. It's required to place a anti wind/rain hood 2000mm above the unit.

 **CAUTION**

DO NOT PERMIT OVERHANGING STRUCTURES OR SHRUBS TO OBSTRUCT CONDENSER AIR DISCHARGE OUTLET, AIR INLET OR VENT OUTLETS.

AIR FILTER REQUIREMENT

A suitable air filter must be installed in the unit. This unit is supplied with air filters. Air filter(s) must be installed ahead of the evaporator coil of this unit.

 **CAUTION**

NEVER OPERATE UNIT WITHOUT A FILTER. A FAILURE TO FOLLOW THIS WARNING COULD RESULT IN A PERSONAL INJURY OR DEATH.

UNIT INSTALLATION

GROUND LEVEL

If installing the unit at ground level, provide a concrete mounting pad separate from the building foundation. The pad must be level to ensure proper condensate disposal and strong enough to support the unit's weight.

UNCONDITIONED SPACES

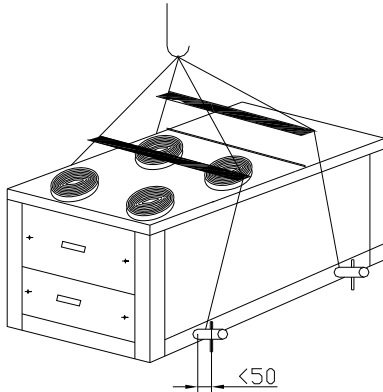
All ductwork passing through unconditioned spaces must be properly insulated to minimize duct losses and prevent condensation. Refer to local codes for any insulation material requirements.

RIGGING AND HOISTING

This unit is *not* designed to be handled with a fork-truck Exercise care when moving the unit. Rig the unit by attaching chain or cable slings to the holes provided in lifting lugs. Spreaders **MUST** be used across the top of the

unit. Ensure the lifting equipment is adequate for the load. Keep the unit in an upright position at all times. The rigging must be located outside the units center of gravity. Lifting plates may be removed after installation.

Typical lifting arrangement:



*ALL ACCESS PANELS MUST BE SECURELY IN PLACE
WHEN RIGGING AND HOISTING.*

MOUNTING

The unit should be fastened to a firm flat horizontal base plinth using the holes supplied in the mounting rails. When the unit is being installed on a roof it is recommended that the unit is installed on a substantial structure with vibration isolating springs beneath the unit. These springs are not supplied with the unit. Three channels are provided under the base for spring mounts or bolting down.

Flexible duct connections are recommended between the supply and return ducts and the unit.

SECTION III OPERATION

1. Leave the on/off switch in the off position and close the mains isolating switch. A four hour delay period is required to allow the crankcase heaters to drive any liquid refrigerant out of the compressor oil.
2. Check that the shipping blocks beneath each compressor have been removed and that each compressor is secure on its mounts.
3. Check that all fan motors are free running.
4. Check that the thermostat is correctly wired to the unit and is set at the desired temperature.
5. Check that the air filters have been correctly installed if fitted.
6. Check air diffuser dampers are open if appropriate.

START UP PROCEDURE

Use the supplied Commissioning Sheet to help you complete the following procedure:

1. After the four hour delay period has expired, switch on the unit.

System 1's compressor will start straight away. System 2's compressor will start six minutes later due to the built in delay timer.

2. Check the supply voltage between each phase and neutral.
3. Compressors fitted are directional. Check for correct rotation. If rotation is incorrect the compressor will not pump, be noisy, and will draw minimal current. To correct motor rotation, change the phasing at the main power terminal.
4. Measure the current draw on each phase to the compressor motors and measure the current draw of each fan motor. Check all readings against the specified values in the wiring diagram.
5. Fit gauges and measure the suction and discharge pressures of both refrigeration circuits.

6. Check that the outdoor air fan motors are running smoothly.
7. Test the operation of the reversing valve by running the unit in both the heating and cooling mode.
8. Check the indoor unit's fan belt tension after 20 mins of operation and adjust if necessary (refer Commissioning Sheet).
9. Check the supply air flow at each outlet.
10. Check the tightness of all electrical connections and sign the check label.
11. Touch up any outdoor unit paintwork damage to prevent corrosion.
12. Running the unit in both the heating and cooling mode.

THE UNIT IS EQUIPPED WITH CRANKCASE HEATERS. ALLOW 24 HOURS PRIOR TO CONTINUING START UP PROCEDURES TO ALLOW FOR HEATING OF THE REFRIGERANT COMPRESSOR CRANKCASE. FAILURE TO COMPLY MAY RESULT IN DAMAGE AND COULD CASUE PREMATURE OF THE SYSTEM. THIS WARNING SHOULD BE FOLLOWED AT INITIAL START UP AND ANY TIME THE POWER HAS BEEN REMOVED FOR 12 HOURS OR LONGER.

SECTION IV MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on the air conditioning equipment. The units should be inspected at least once each year by a qualified service person. The minimum maintenance requirements for this equipment are as follows:

<i>MAINTENANCE TIME SCHEDULE</i>		
Monthly		4. Check for excessive noise and vibration and correct as necessary.
1. Check air filters, Replace throwaway type filters when they become logged with dust and lint or clean cleanable type filters monthly.	3. Check suction and discharge operating pressures.	5. Check fan and motor bearings and lubricate or replace as necessary.
2. Check condensate drain for free drainage.	4. Replace indoor air filters (if fitted).	6. Check for insulation and duct damage and repair as necessary.
3. Check compressor compartment for oil stains indicating refrigerant leaks.	5. Check condensate drain for free drainage.	7. Remove lint and dust accumulation from outdoor coil fins.
Three Monthly (or every 1200 hrs of operation)		8. Touch up any paintwork damage to prevent corrosion.
Check the indoor unit's fan belt tension and adjust if necessary.	Yearly	Inspect outdoor coil. Clean when necessary.
Six Monthly	1. Check all refrigerant piping for chafing and vibration.	Ensure that fan blades are clean and adequately balanced.
1. Check the tightness of electrical connections.	2. Check the operation of electric heaters, if fitted.	Check refrigerant charge by measurement of superheat and sub cooling where necessary, adjust charge and TX valve to achieve optimum performance.
2. Check the tightness of all fans, motor mountings, pulleys and belt tension.	3. Check air supply at all diffusers.	Check the tightness of electrical connections.