



**APH SERIES**

# PRODUCT BROCHURE

## R410a Rooftop Packaged Unit



**R410A**

**High External Static**

**Extra Long Life**

**High Efficiency**

## Features

Flexible Solutions

R410A Refrigeration

Cooling Capacity: 10.2--188.5kW

Heating Capacity: 11.7--202 kW

Gas Fired Condensing Heating Option

Advanced Microprocessor Control

Superior operating range up to 50°C DB cooling and -10°C DB heating

Powder coated outdoor panels to withstand 1000-hour salt spray exposure

High external pressure, long air supply distance.

Metal or plastic mesh for condensing coil.

Upgraded evaporator fan motor drives.

## Technology advantage

### **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 10 to 188kW 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 for 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/cm<sup>2</sup> (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.

#### **Electrical features**

1.Control and power panels include the direct-on-line starting contactors for the compressors and condenser fan motor.

2.Internal thermal motor protector for condenser and evaporator fan motor.

3.Compressor internal thermal protection.

4.Anti-recycling protection (time delay) for compressors through microprocessor.

5.Crank case heater for each compressor.

6.Control circuit breaker.

7.Microprocessor controller with the following main functions.

A,Compressor lead-lag operation to ensure longer life for the compressors and equal running hours between compressors.

B,External remote ON/OFF button for remote operation of the unit using external ON/OFF switch or connection to building management system.

C, Volt-free terminals available for general alarm indication signal to remote monitoring station.

8. Dual power supply input.

9. High and low pressure safety switches (capsule type, factory Pre-set) from all models.

10. 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 all models).

5. Fully charged unit with refrigerant.

6. Oil equalizing lines installed between parallel installed compressors

### **Optional Features**

#### **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 require a sealed + drain condensing section.

7. Upgraded Evaporator Fan Motor Drives.

#### **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.  
High and low pressure controller for models

### Specifications

Model		APH10D3D	APH12D3D	APH14D3D	APH17D3D	APH20D3D	
Cooling capacity	KW	10.2	12	14.3	17.1	20.4	
Heating capacity	KW	10.7	12.4	14.8	17.8	21.4	
Power supply		380V/3Ph/50Hz					
Compressor	Type	scroll					
	Quantity	1	1	1	1	2	
	Cooling Power Input	KW	3.17	3.62	4.29	5.15	2×3.17
	Heating Power Input	KW	2.88	3.25	3.87	4.61	2×2.88
Refrigerant	Control Tpye	Thermal expansion valve					
	Type	R410A					
	Charge	kg	3	3.5	4.2	4.8	6.1
Condenser type		Fin heat exchanger					
Outdoor Fan	Type/power supply	Axial fan/380V/3Ph/50Hz					
	Quantity	1	1	1	1	1	
	Drive type	direct drive					
	Motor power input	KW	0.25	0.37	0.37	0.55	0.45
	Air flow (m <sup>3</sup> /h)	m <sup>3</sup> /h	4550	5150	6100	7020	8640
Evaporator type		Fin heat exchanger					
Indoor fan	Type	Centrifugal fan					
	Quantity	1	1	1	1	1	
	Motor power input	KW	0.5	0.5	0.7	0.7	0.7
	Ar flow (m <sup>3</sup> /h)	H	2120	2520	2920	2920	4250
		M	1700	1980	1900	1900	
		L	1330	1580	1510	1510	
Drive type	Direct drive						
External static pressure	Pa	150	150	180	180	150	
Filter		Nylon filter					
Noise dB(A)		67	68	70	71.7	72.6	
Dimension	L	mm	1350	1350	1350	1350	1820
	W	mm	990	990	990	990	1400
	H	mm	880	880	880	880	1100
Net weight		kg	240	250	260	260	380

Remark: The above design and specification are subject to change without prior notice for product improvement.

Rating Cooling Conditions: indoor Temperature 27°C DB/19°C WB ,outdoor Temperature 35°C DB/24°C WB

Rating Heating Conditions: indoor Temperature 20°C DB/15°C WB ,outdoor Temperature 7°C DB/6°C WB

Model		APH24D3D	APH28D3D	APH34D3D	APH38D3D	APH45D3D	
Cooling capacity	KW	24	28.6	34.2	39.1	45	
Heating capacity	KW	24.8	29.6	35.6	40.9	47.2	
Power supply		380V/3Ph/50Hz					
Compressor	Type	scroll					
	Quantity	2	2	2	2	2	
	Cooling Power Input	KW	2×3.62	2×4.29	2×4.29	2×6.07	2×6.7
	Heating Power Input	KW	2×3.25	2×3.87	2×3.87	2×5.45	2×6.04
Refrigerant	Control Tpye	Thermal expansion valve					
	Type	R410A					
	Charge	kg	7	8.2	8.8	10	11.2
Condenser type		Fin heat exchanger					
Outdoor Fan	Type/power supply	Axial fan/380V/3Ph/50Hz					
	Quantity	1	1	1	2	2	
	Drive type	direct drive					
	Motor power input	KW	0.55	0.75	0.75	2×0.37	2×0.55
	Air flow (m <sup>3</sup> /h)	m <sup>3</sup> /h	9430	11230	12300	14220	19200
Evaporator type		Fin heat exchanger					
Indoor fan	Type	Centrifugal fan/ 380V/3Ph/50Hz					
	Quantity	1	1	1	1	1	
	Motor power input	KW	1.1	1.5	1.5	2.2	3
	Ar flow (m <sup>3</sup> /h)	H	5400	5700	6300	6800	9350
		M					
		L					
Drive type	Direct drive			Belt drive			
External static pressure	Pa	235	305	290	270	290	
Filter		Nylon filter					
Noise dB(A)		70	72	72	72	75	
Dimension	L	mm	1820	1820	1820	2540	2540
	W	mm	1400	1400	1400	1860	1860
	H	mm	1100	1100	1100	1180	1180
Net weight		kg	430	480	500	780	830

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Rating Cooling Conditions: indoor Temperature 27°C DB/19°C WB ,outdoor Temperature 35°C DB/24°C WB

Rating Heating Conditions: indoor Temperature 20°C DB/15°C WB ,outdoor Temperature 7°C DB/6°C WB

Model		APH55D3D	APH64D3D	APH72D3D	APH88D3D	APH104D3D	
Cooling capacity	KW	53.2	63.3	72.4	88.2	104.2	
Heating capacity	KW	56.4	67	75.6	93.3	109.6	
Power supply		380V/3Ph/50Hz					
Compressor	Type	scroll					
	Quantity	2	2	2	2	4	
	Cooling Power Input	KW	2×7.78	8.97+9.87	2×10.86	2×12.15	4×7.78
	Heating Power Input	KW	2×7.01	8.07+8.9	2×9.5	2×10.4	4×7.01
Refrigerant	Control Tpye	Thermal expansion valve					
	Type	R410A					
	Charge	kg	12.6	15	17	20.8	24.6
Condenser type		Fin heat exchanger					
Outdoor Fan	Type/power supply	Axial fan/380V/3Ph/50Hz					
	Quantity	2	2	2	2	4	
	Drive type	direct drive					
	Motor power input	KW	2×0.55	2×0.75	2×0.75	2×1.1	4×0.75
	Air flow (m <sup>3</sup> /h)	m <sup>3</sup> /h	21420	24620	28400	37500	43680
Evaporator type		Fin heat exchanger					
Indoor fan	Type	Centrifugal fan/ 380V/3Ph/50Hz					
	Quantity	1	1	1	1	1	
	Motor power input	KW	3	3	4	4	5.5
	Ar flow (m <sup>3</sup> /h)	H	10450	11700	14400	16600	19940
		M					
L							
Drive type	Belt drive						
External static pressure	Pa	280	275	380	345	390	
Filter		Nylon filter					
Noise dB(A)		73	73	75	75	75	
Dimension	L	mm	2540	2540	3400	3400	4700
	W	mm	1860	1860	2200	2200	2240
	H	mm	1180	1180	1590	1590	1650
Net weight	kg	850	900	1400	1500	1700	

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Rating Cooling Conditions: indoor Temperature 27°C DB/19°C WB ,outdoor Temperature 35°C DB/24°C WB

Rating Heating Conditions: indoor Temperature 20°C DB/15°C WB ,outdoor Temperature 7°C DB/6°C WB



Model			APH120D3D	APH128D3D	APH150D3D	APH170D3D	APH190D3D
Cooling capacity	KW		119.5	130.4	151.2	171.3	188.5
Heating capacity	KW		125.7	141	163.6	181	202
Power supply			380V/3Ph/50Hz				
Compressor	Type		scroll				
	Quantity		4	4	4	4	4
	Cooling Power Input	KW	4×8.97	4×9.96	4×11.25	4×12.94	4×14.43
	Heating Power Input	KW	4×8.1	4×8.9	4×10.08	4×10.83	4×13.2
Refrigerant	Control Tpye		Thermal expansion valve				
	Type		R410A				
	Charge	kg	28.3	31.3	36.5	41	48
Condenser type			Fin heat exchanger				
Outdoor Fan	Type/power supply		Axial fan/380V/3Ph/50Hz				
	Quantity		4	4	4	4	4
	Drive type		direct drive				
	Motor power input	KW	4×0.75	4×0.75	4×1.1	4×1.5	2×2.2
	Air flow (m <sup>3</sup> /h)	m <sup>3</sup> /h	49200	51200	67500	76500	84000
Evaporator type			Fin heat exchanger				
Indoor fan	Type		Centrifugal fan/ 380V/3Ph/50Hz				
	Quantity		1	1	1	1	1
	Motor power input	KW	7.5	7.5	7.5	11	15
	Ar flow (m <sup>3</sup> /h)	H	22000	24300	29000	31400	34900
		M					
L							
Drive type		Belt drive					
External static pressure		Pa	390	385	360	420	430
Filter			Nylon filter				
Noise dB(A)			80	80	80	82	83.5
Dimension	L	mm	4700	4700	5200	5800	5800
	W	mm	2240	2240	2240	2240	2240
	H	mm	1650	1650	1650	1650	1650
Net weight		kg	1750	1800	2300	2500	2800

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Rating Cooling Conditions: indoor Temperature 27°C DB/19°C WB ,outdoor Temperature 35°C DB/24°C WB

Rating Heating Conditions: indoor Temperature 20°C DB/15°C WB ,outdoor Temperature 7°C DB/6°C WB