MARINE WATER COOLED SCREW CHILLER

Introduction:

BlueConnect marine water-cooled chiller units are special designed for marine ships and offshore unit HVAC system and other cooling application in both marine and offshore field, as well as industrial application.

The unit fitted with:

- Marine type anti-corrosion paint and coating.
- Compact Screw type compressor built-in oil separator.
- Ecological HFC refrigerant R407C, R134a.
- Mechanically cleanable shell and tube type evaporators and condensers.
- One or two refrigerant circuits are available.
- All units are equipped with PLC controller to optimize the efficiency of refrigerant circuit.
- Multiple installation type for choice.

Features:

- Quality design and construction make the units the preferred choice.
- Environmental Zero Ozone-depletion HFC refrigerant.
- The chiller unit equipped with screw compressors for extremely quite operation and low-vibration levels.
- Four stages capacity regulation for each compressor saving on operation costs.
- The control is fully automatic. The leaving water temperature is continuously monitored to detect load and flow changes. This combination provides the most precise temperature control available.
- Two independent refrigerant circuits – the second one takes over automatically, when the first circuit malfunctions, maintaining partial cooling under all circumstance.
- PLC touch screen can quick display of units running status, alarm, refrigerant and water pressure and temperature.
- Multiple compressor concept for optimized part-load efficiency and minimized starting current.
- Hot gas bypass capacity regulation valves are available to ensure compressor running capacity less than 25%, even to 0%.
- Unload direct starter, part wind starter, star/delta starter and soft starter are available.
- Fresh water cooled and sea water cooled condensers are available.
- AC 440~480V/3PH/60HZ, AC 380~415V/3PH/50HZ, AC 690V/3PH/60HZ multiple power feeding is available.

Easy Installation

- The unit is supplied as a complete package for easy installation. There are no extra controls, times, starter or other items to install.
- The chiller units are supplied with a full refrigerant charge, and conveniently located power supply and water inlet and outlet connections.
- The units have a single power point and one main disconnect/isolator switch. The hydraulic connection are simple and facilitated by the use of flange or Victaulic connections for the evaporator and condenser.
- Total two option arrangement types for user installation choice.

  Type A: Single compressor vertical type, one condenser.

  Type B: Twin compressor vertical type, two condensers.

Simple to Service

The unit fitted with:

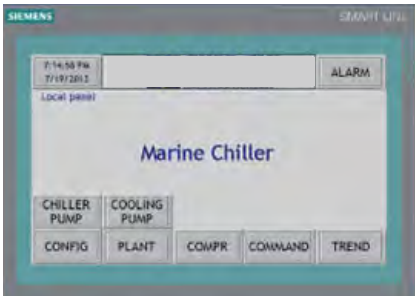
- Mechanically-cleanable evaporator and condenser
- Twin-screw compressors which require minimum routine service or maintenance.
- Easily accessed suction and discharge pressure and temperature information via a display module.
- All main components inlet and outlet such as compressors suction and discharge, evaporator, condenser, electronic expansion valve, dry filter, pressure and temperature sensor, etc. fitted with service valves for easy connect/disconnect these devices.

PLC Controller Function:

PLC controller ensure intelligent leaving water temperature control and optimizes energy requirements.

- The PI control algorithm with permanent compensation for the heat exchanger entering or leaving temperature, anticipates load variations, guarantees leaving water temperature stability and prevent unnecessary compressor cycling.
- Electronic expansion valves (EXV) allows a significant energy efficiency improvement at part load conditions, and faultless chiller operation in a wider temperature range.

- Equalization of compressor operating hours
- PLC Controller monitor all chiller safety parameters.
- The fault history function and the fault codes facilitate immediate location of faults and in certain cases the conditions causing the alarm.
- Easy to operate the chillers via PLC Touch screen, all running status and parameters can displayed on the schematic chiller diagram. The user immediately knows all operating parameter: refrigerant pressures, temperatures, entering and leaving water temperatures, EXV opening ratio, and compressors ruing hours, etc.
- Remote control and alarm output connections.

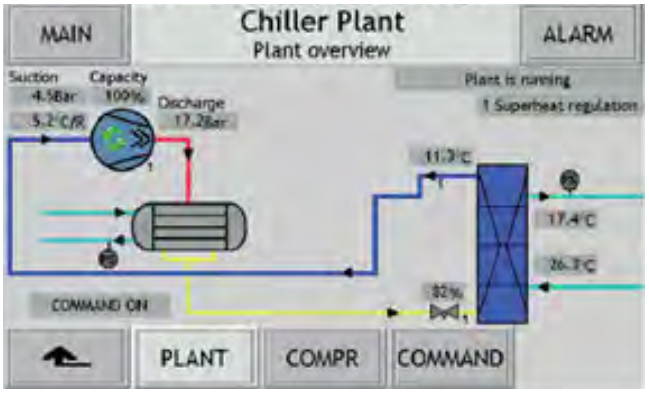


Chiller Unit control concept integrates control & monitoring of maximum two compressors.

Standard configuration:

Logical operation at a color touch screen operator panel.
Compressor supervision and control.
Superheat control of electronic expansion valve.
Delayed start after blackout.
Password and alarm system.
Trend & event display and storage.
Common alarm output to main alarm system.
Integrated electrical starter and control.

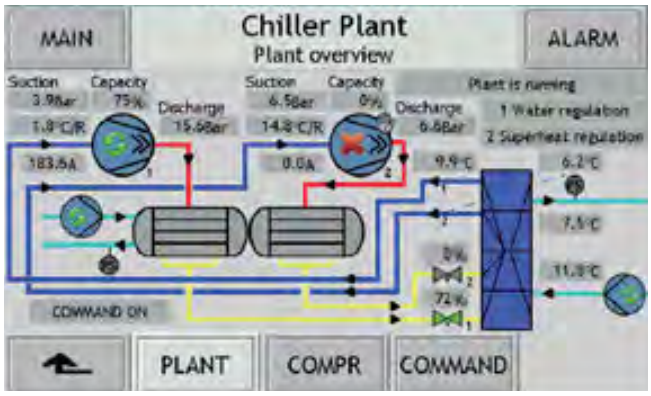
Plant with only 1 compressor.



Panel in IP44 execution, including:
Compressor motor starter(s)
Main switch, ammeters, and control lamps

Option configuration:
Condenser pressure control
Cooling water pump control
Chilled water pump control
Network communication, on request, to Slindex S100 Scada system
RS485 communication via Modbus RTU or profibus D/P to VMS

Plant with 2 compressor.



Sequencer panel with common chilled water (inlet/outlet) control
Remote touch screen

PLC control selections:

System control : Stopped - Local panel -Remote(Only active) - Sequencer (Only active)
System water regulation :Outlet chilled water sensor - Inlet chilled water sensor
Power management system(Heavy load request)
Compressor capacity control by means of chilled water temperature demand
Compressor supervision by means of pressure switches or transmitters
Compressor status ,running hours, including service warnings
Evaporator superheat supervision
Condenser- and chilled water pump control and flow supervision
Motor protection device for Semi-Hermetic compressor
Maximum Operating Pressure (MOP) function
Manual/auto mode

The unit fitted with:
- Compressor protection against.
- High discharge pressure.
- Low suction pressure.
- Low lubrication oil pressure or oil level.
- Low condenser-water pressure.
- Low chilled water flow.
- Motor overload and recycling.

Model number name principle

Function	Standard Code				Addtional Code				Descrpition
Sample	W	SC	035	S	75	A	S	2	Water cooled
Cooling Type	W								Screw type compressor
Compressor		SC							Normal cooling capacity
Capacity (RT)			035						US RT
Circuit				S					Single Circuit
				D					Double Circuit
Compressor Code					65				65:CSH6553 66:CSH6563
					65				75:CSH7553 76:CSH7563
					65				77:CSH7573 78:CSH7583
					65				79:CSH7593 86:CSH8563
					65				87:CSH8573 88:CSH8583
					65				89:CSH8593 96:CSH9563
					65				97:CSH8573 98:CSH9583
					65				99:CSH9593 910:CSH95103
Refrigerant						A			R407C
						B			R134a
						C			R404A
						D			R417a
Cooling Medium							S		Sea water
							F		Fresh water
Power Source								1	AC380V-415V/3PH/50Hz
								2	AC440V-480V/3PH/60HZ
								3	AC690V/3PH/50HZ
								4	AV690V/3PH/60HZ

Physical data - semi-hermetic reciprocating compressor unit

Model		WSC035 S65A	WSC045 S66A	WSC050 S75A	WSC055 S76A	WSC065 S77A	WSC080 S78A	WSC090 S79A	WSC100 S86A	WSC110 S87A
Normal Cooling Capacity	Kww	122	153	177	201	233	273	310	335	387
Compressors		Compact screw compressor								
QTY.		1	1	1	1	1	1	1	1	1
Capacity Control		PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC
Capacity Control Steps		4	4	4	4	4	4	4	4	4
Min Step Cap.	%	25	25	25	25	25	25	25	25	25
Evaporator		Horizontal shell and tube type								
Water Flow	m^3/h	17.4	21.9	25.3	28.8	33.4	39.1	44.4	48	55
Water Connection										
Inlet/Outlet	in	2-1/2	3	3	3	4	4	5	5	5
Condenser		Horizontal shell and tube type, fresh or sea water cooled								
Sea/fresh Water Flow	m^3/h	27.9	34.9	40.4	45.7	53.1	62.0	70.6	76.1	88
Water Connection										
Inlet/Outlet	in	3	3	4	4	4	5	5	5	5
Refrigerant		R407C								
Charge	kg	25	26	28	30	35	40	42	50	52
Dimension										
Length	mm	1850	1850	2000	2000	2000	2200	2200	3000	3000
Width	mm	750	750	850	850	850	850	850	1000	1000
Height	mm	1600	1600	1700	1700	1700	1750	1750	2000	2000
Net Weight	kg	1150	1250	1550	1600	1700	1800	1850	2500	2600
Operation Weight	kg	1230	1330	1640	1700	1830	1940	2000	2690	2800
Electrical Data 60Hz										
Power Source		AC 440~480V 3PH 60Hz								
Control Power		AC 220/230V 1PH 60Hz								
Power Input	kW	41.5	51.6	60	67.2	77.6	89.7	103.2	110.8	127
Current	A	42	52	60	67	78	90	103	111	183
Current Max.	A	86	108.0	128.0	144.0	162.0	170	180	216	226

Standard condition: Evaporator entering /leaving water temperature 12℃/6℃, fresh water cooled condenser entering /leaving water temperature 36℃/41℃, evaporator and condenser fouling factor=0.000044m^2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.

Physical data - single circuit

Model		WSC110 S87A	WSC120 S88A	WSC145 S89A	WSC160 S96A	WSC200 S97A	WSC230 S98A	WSC260 S99A	WSC280 S910A	WSC370 S1270A	WSC390 S1530A
Normal Cooling Capacity	kW	387	431	516	577	684	783	890	984	1296	1731
Compressors		Compact screw compressor									
QTY. – Circuit A		1	1	1	1	1	1	1	1	1	1
Capacity Control		PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC
Capacity Control Steps		4	4	4	4	4	4	4	4	4	4
Min Step Cap.	%	25	25	25	25	25	25	25	25	25	25
Evaporator		Horizontal shell and tube type									
Water Flow	m^3/h	55.4	61.7	73.9	82.6	97.9	112.1	127.4	140.9	185	247
Water Connection		Horizontal shell and tube type, fresh or sea water cooled									
Inlet/Outlet	in	5	5	6	6	6	8	8	8	8	8
Condenser		Horizontal shell and tube type, fresh or sea water cooled									
Sea/Fresh Water Flow	m^3/h	87.8	97.9	115.5	129.1	151.9	174.2	196.6	220.6	291	375
Water Connection		Flanges or Victaulic connections									
Inlet/Outlet	in	5	6	6	6	8	8	8	10	10	10
Refrigerant		R407C									
Charge	kg	52	55	58	64	66	80	100	110	160	260
Dimension											
Length	mm	3000	3000	3000	3600	3600	3600	3800	3800	4400	5500
Width	mm	1000	1000	1000	1200	1200	1200	1200	1200	1800	2200
Height	mm	2000	2000	2200	2600	2600	2600	2670	2670	2100	2270
Net Weight	kg	2600	2700	2800	3450	3750	4100	4250	4400	6500	9400
Operation Weight	kg	2800	2910	3200	3750	4050	4450	4750	4900	7200	11000
Electrical Data 60Hz											
Power Source		AC 440~480V 460V 3PH 60Hz									
Control Power		AC 220/230V 1PH 60Hz									
Power Input	kW	126.6	142.7	159.9	178.9	205	237	261	308	402	462
Current	A	176	196	228	246	281	323	353	418	585	664
Current Max.	A	246.0	260.0	310.0	370.0	420.0	450.0	450.0	566.0	744	879

Standard condition: Evaporator entering /leaving water temperature 12℃/6℃, fresh water cooled condenser entering /leaving water temperature 36℃/40℃, evaporator and condenser fouling factor=0.000044m^2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.

Physical data - twin circuit

Model		WSC070 D65A	WSC090 D66A	WSC100 D75A	WSC110 D76A	WSC130 D77A	WSC160 D78A	WSC180 D79A	WSC200 D86A	WSC220 D867A
Normal Cooling Capacity	kW	243	305	354	402	466	546	620	670	774
Compressors		Compact screw compressor								
QTY. – Circuit A		1	1	1	1	1	1	1	1	1
QTY. – Circuit B		1	1	1	1	1	1	1	1	1
Capacity Control		PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC
Capacity Control Steps		8	8	8	8	8	8	8	8	8
Min Step Cap.	%	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Evaporator		Horizontal shell and tube type								
Water Flow	m^3/h	35	44	51	58	67	78	89	96	111
Water Connection		Flanges or Victaulic connections								
Inlet/Outlet	in	3	4	4	5	5	5	6	6	6
Condenser		Horizontal shell and tube type, fresh or sea water cooled								
Sea/fresh Water Flow	m^3/h	28	35	40	46	53	62	71	76	88
Water Connection		Flanges or Victaulic connections								
Inlet/Outlet	in	3	3	4	4	4	5	5	5	5
Refrigerant		R407C								
Charge – Circuit A	kg	25	26	28	30	35	40	42	50	52
Charge – Circuit B	kg	25	26	28	30	35	40	42	50	52
Dimension										
Length	mm	2500	2500	2900	2900	2900	2900	2900	3900	3900
Width	mm	1300	1300	1400	1400	1400	1400	1400	1400	1400
Height	mm	1800	1800	1900	2000	2000	2000	2000	2200	2200
Net Weight	kg	1780	1800	2280	2320	2630	2700	2720	4120	4140
Operation Weight	kg	1940	1960	2460	2500	2860	2960	2980	4500	4500
Electrical Data 60Hz										
Power Source		AC 440~480V 3PH 60Hz								
Control Power		AC 220/230V 1PH 60Hz								
Power Input	kW	83	103	120	134	155	179	206	222	253
Circuit A	kW	41.5	51.6	60	67.2	77.6	89.7	103.2	110.8	127
Circuit B	kW	41.5	51.6	60	67.2	77.6	89.7	103.2	110.8	127
Current										
Circuit A	A	42	52	60	67	78	90	103	111	183
Circuit B	A	42	52	60	67	78	90	103	111	183
Current Max.										
Circuit A	A	86	108	128	144	162	170	180	216	226
Circuit B	A	86	108	128	144	162	170	180	216	226

Evaporator entering /leaving water temperature 12℃/7℃, fresh water cooled condenser entering /leaving water temperature 36℃/41℃, evaporator and condenser fouling factor=0.000044m^2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.

Physical data - twin circuit

Model		WSC220 D87A	WSC240 D88A	WSC290 D89A	WSC320 D96A	WSC400 D97A	WSC460 D98A	WSC520 D99A	WSC560 D910A	WSC740 D1270A	WSC780 D1530A
Normal Cooling Capacity	kW	774	862	1032	1154	1368	1566	1780	1968	2592	3462
Compressors		Compact screw compressor									
QTY. – Circuit A		1	1	1	1	1	1	1	1	1	1
QTY. – Circuit B		1	1	1	1	1	1	1	1	1	1
Capacity Control		PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC
Capacity Control Steps		8	8	8	8	8	8	8	8	8	8
Min Step Cap.	%	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Evaporator		Horizontal shell and tube type									
Water Flow	m^3/h	111	123	148	165	196	224	255	282	370	494
Water Connection		Flanges or Victaulic connections									
Inlet/Outlet	in	6	8	8	8	8	8	10	10	12	14
Condenser		Horizontal shell and tube type, fresh or sea water cooled									
Sea/fresh Water Flow	m^3/h	88	93	115	129	152	174	197	221	291	375
Water Connection		Flanges or Victaulic connections									
Inlet/Outlet	in	5	6	6	6	8	8	8	8	10	10
Refrigerant		R407C									
Charge – Circuit A	kg	52	55	58	64	66	80	100	110	160	260
Charge – Circuit B	kg	52	55	58	64	66	80	100	110	160	260
Dimension											
Length	mm	3900	3900	3900	4200	4200	4500	4500	4600	5500	5500
Width	mm	1400	1400	1400	1600	1600	1800	1800	1800	2200	3000
Height	mm	2200	2200	2200	2300	2300	2300	2300	2300	2100	2200
Net Weight	kg	4140	4260	4440	5860	5950	6580	7000	7340	13000	9400
Operation Weight	kg	4500	4700	4880	6460	6520	7200	7960	8280	14500	110000
Electrical Data 60Hz											
Power Source		AC 440~480V 3PH 60Hz									
Control Power		AC 220/230V 1PH 60Hz									
Power Input	kW	253	285	320	358	410	474	522	616	804	924
Circuit A	kW	126.6	142.7	159.9	178.9	205	237	261	308	402	462
Circuit B	kW	126.6	142.7	159.9	178.9	205	237	261	308	402	462
Current											
Circuit A	A	176	196	228	246	281	323	353	437	585	664
Circuit B	A	176	196	228	246	281	323	353	437	585	664
Current Max.											
Circuit A	A	246.0	260.0	310.0	370.0	420.0	450.0	450.0	560	744	879
Circuit B	A	246.0	260.0	310.0	370.0	420.0	450.0	450.0	560	744	879

Evaporator entering /leaving water temperature 12℃/6℃, fresh water cooled condenser entering /leaving water temperature 36℃/41℃, evaporator and condenser fouling factor=0.000044m^2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000088m^2k/w.

Operation limits

Condenser fresh water flow rates:

Model	Sea Water Cooled		Fresh Water Cooled	
	Minimum flow rate, m^3/h*	Maximum flow rate, m^3/h**	Minimum flow rate, m^3/h*	Maximum flow rate, m^3/h**
WSC035/070				
WSC045/090				
WSC050/100				
WSC055/110				
WSC065/130				
WSC080/160				
WSC090/180				
WSC100/200				
WSC110/220				
WSC120/240				
WSC145/290				
WSC160/320				
WSC200/400				
WSC230/460				
WSC260/520				
WSC280/560				

*based on a velocity of 0.9m/s **based on a velocity of 3.6m/s
Max condenser water leaving temperature is 50℃ at full load.

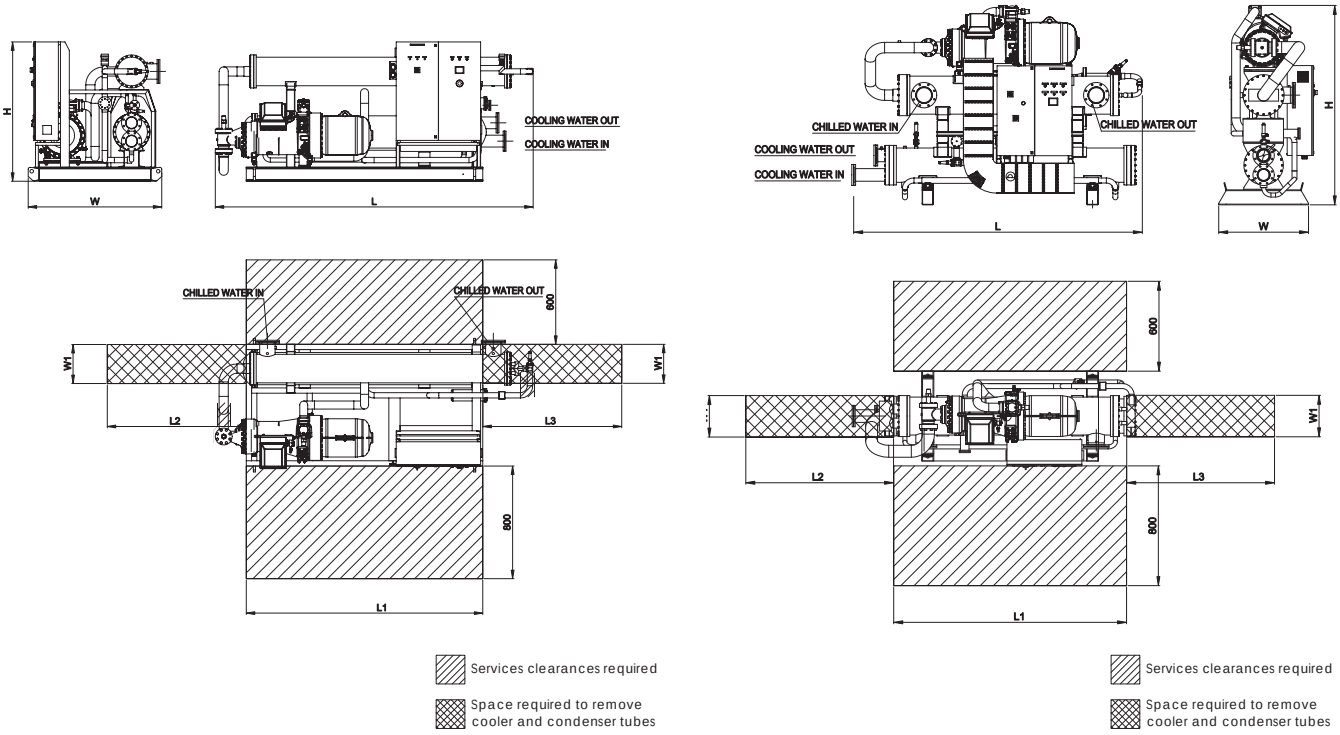
Model	Minimum Flow Rate, m^3/h	Maximum Flow Rate, m^3/h
WSC035/070		
WSC045/090		
WSC050/100		
WSC055/110		
WSC065/130		
WSC080/160		
WSC090/180		
WSC100/200		
WSC110/220		
WSC120/240		
WSC145/290		
WSC160/320		
WSC200/400		
WSC230/460		
WSC260/520		
WSC280/560		

*based on a velocity of 0.9m/s **based on a velocity of 3.6m/s
Max condenser water leaving temperature is 50℃ at full load.

Installation responsibilities chart for chiller units

Requirement	BlueConnect supplied, BlueConnect installed	Blue Connect supplied Field-installed	Field-supplied Field-installed
Rigging			Safety chains
Vibration Isolation		Isolation damper (optional supplied)	Isolation damper
	Circuit breaker		Power supply
Electrical	Unit starter		Signal output wiring
	Refrigerant temperature sensors		Remote control wiring if required
	Refrigerant pressure sensors		Chilled water pump starter and wiring
			Cooling water pump starter and wiring
Cooling Water Piping	Water thermometers	Flexible hoses (option)	Flexible hoses
			Isolation valves
	Water pressure gauges	Water pressure gauge	Water pressure gauges
Chilled Water Piping	Cooling water pressure switch	Orifice for sea water cooled pipe	Water strainers
	Water thermometers	Flexible hoses (option)	Flexible hoses
	Water flow switch (optional)	Water flow switch	Isolation valves
	Water temperature sensors	Water pressure gauge (option)	Water pressure gauges
			Water strainers
Pressure Relief	Refrigerant relief valves		Vent line and flexible connector
Insulation	Unit-mounted insulation		Water pipe insulation
Refrigerant	Refrigerant		
Oil	Oil		

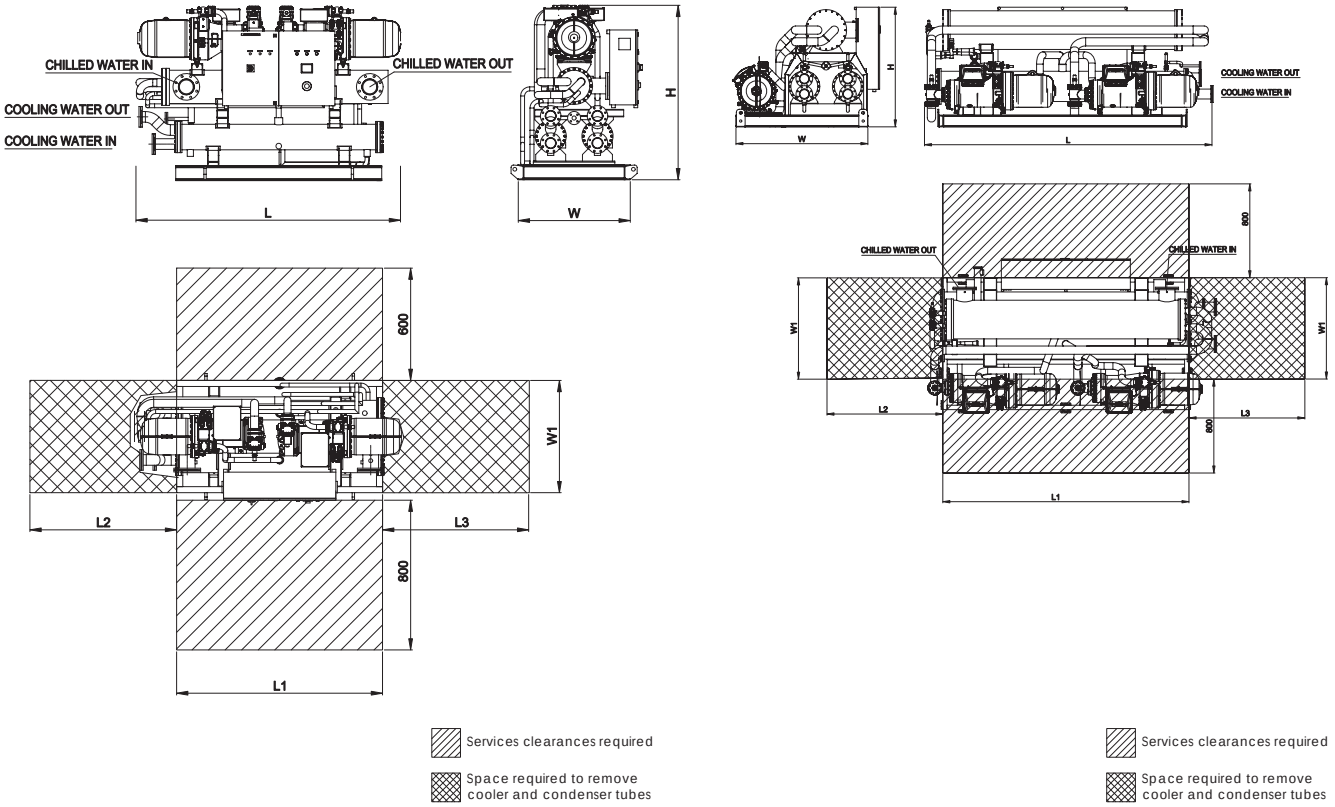
Dimensions/clearances, type a vertical type single compressor



Dimension: vertical type single compressor units

Model	L	L1	L2	L3	W	W1	H
WSC035S65	1850	1600	1600	1600	750	300	1600
WSC045S66	1850	1600	1600	1600	750	300	1600
WSC050S75	2000	1850	1850	1850	850	350	1700
WSC055S76	2000	1850	1850	1850	850	350	1700
WSC065S77	2000	1850	1850	1850	850	350	1700
WSC080S78	2200	1850	1850	1850	850	400	1750
WSC090S79	2200	1850	1850	1850	850	400	1750
WSC100S86	3000	2100	2100	2100	1000	450	2000
WSC110S87	3000	2100	2100	2100	1000	450	2000
WSC120S88	3000	2100	2100	2100	1000	550	2000
WSC145S89	3000	2100	2100	2100	1000	550	2200
WSC160S96	3600	3100	3100	3100	1000	550	2600
WSC200S97	3600	3100	3100	3100	1200	600	2600
WSC230S98	3600	3100	3100	3100	1200	600	2600
WSC260S99	3800	3300	3300	3300	1200	600	2670
WSC280S910	3800	3300	3300	3300	1200	600	2670
WSC370S1270A	4400	3600	3600	3600	1800	800	2100

Dimensions/clearances, type B twin compressor



Dimensions: vertical type single compressor units

Model	L	L1	L2	L3	W	W1	H
WSC070D65	2500	1600	1600	1600	1300	1300	1800
WSC090D66	2500	1600	1600	1600	1300	1300	1800
WSC100D75	2900	1850	1850	1850	1400	1400	1900
WSC110D76	2900	1850	1850	1850	1400	1400	2000
WSC130D77	2900	1850	1850	1850	1400	1400	2000
WSC160D78	2900	1850	1850	1850	1400	1400	2000
WSC180D79	2900	1850	1850	1850	1400	1400	2000
WSC200D86	3900	2100	2100	2100	1400	1400	2200
WSC220D87	3900	2100	2100	2100	1400	1400	2200
WSC240D88	3900	2100	2100	2100	1400	1400	2200
WSC290D89	3900	2100	2100	2100	1400	1400	2200
WSC320D96	4200	3100	3100	3100	1600	1600	2300
WSC400D97	4200	3100	3100	3100	1600	1600	2300
WSC460D98	4500	3100	3100	3100	1800	1800	2300
~~WSC520D99~~	4500	3300	3300	3300	1800	1800	2300
~~WSC560D910~~	4600	3300	3300	3300	1800	1800	2300
WSC560D910	4600	3300	3300	3300	1800	1800	2300
WSC780D1530A	5500	4200	4200	4200	3000	3000	2200

Main Components Description

General

Factory assembled, single-piece, water-cooled liquid chiller contained within the unit shall be all factory wiring, piping, controls, refrigerant charge, required prior to field start-up.

Compressor

- Semi-hermetic screw compressor with internal
- muffler, capacity regulation solenoid valves, oil level switch, oil sight glass, check valves, safety device.
- Each compressor shall be equipped with one suction shout-off valve and one discharge shut-off valve.
- Capacity control shall be provided by regulation solenoid valves, capable of reducing unit capacity to 25% of full load. Compressor shall start in unload condition.
- Motor cooling shall be provided by direct liquid injection and protected by internal overload thermistor.
- Lube oil system shall include internal filter.
- Compressors are provided with an ECO economizer connection, capable of equipped with an external economizer for additional cooling.

Evaporator

- Unit shall be equipped with a single evaporator.
- Shall be tested and stamped in accordance with applicable
- European pressure code for a refrigerant-side operating pressure of 1700 kPa and a maximum water side pressure of 1000 kPa.
- Shall be mechanically cleanable shell-and-tube type with removable heads.
- Tubes shall be internally-enhanced, seamless-copper type, and shall be rolled into tube sheets.
- Shall be equipped with flanges or Victaulic water connections
- Shell shall be insulated with 19-mm closed-cell, polyvinyl-chloride foam with a maximum K factor of 0.28.
- Shall have an evaporator drain and vent.
- Design shall incorporate 2 independent refrigerant circuits.
- Shall incorporate a refrigerant level control system.
- ASME, NR13, and Class certificate can be provided as option

Condenser

- Unit shall be equipped with a single or twin condenser.
- Shall be tested and stamped in accordance with applicable
- European pressure code for a refrigerant-side operating pressure of 1700 kPa, and 2500 kPa for option 150 and 150A and a maximum water-side pressure of 1000 kPa.
- Shall be mechanically cleanable shell-and-tube type with removable heads.
- Tubes shall be internally-enhanced, seamless-copper type for fresh water-cooled condensers, for sea water cooled condensers, the tubes shall be B10 Cu/Ni material, B30 Cu/Ni tubes are available, and shall be rolled into tube sheets, for sea water cooled condensers, the SUS316L, Aluminum-bronze, Sacrificial anode end cover are available.
- Shall be equipped with Flange or Victaulic water connections
- Design shall incorporate 2 independent refrigerant circuits.
- Fitted with safety valves, purge valves
- Fitted with refrigerant liquid level sight glass.
- ASME, NR60, and Class certificate can be provide.

Refrigeration Circuits

Refrigeration system components shall include high and low pressure sensors, discharge and suction line, liquid line shut-off valves, filter driers, moisture indicating sight glass, electronic expansion valves, refrigerant economizers (option), and complete operating charge of refrigerant and compressor oil.

Electronic Expansion Valve

The electronic expansion valves (EXV) have a high resolution and control accuracy function for refrigerant flow control. EXV include one refrigerant valve and one magnetic actuator, the opening ratio can be controlled by chiller PLC controller to guarantee compressor suction gas degree of superheat within the allow range of set point value.

Safeties

Unit shall be equipped with all necessary components, and in conjunction with the control system shall provide the unit with protection against the following:

- Loss of refrigerant charge
- Reverse rotation
- Low chilled fluid temperature
- Low oil level
- Current imbalance
- Thermal overload
- High pressure
- Low pressure
- Electrical overload
- Loss of phase
- Temperature sensor error alarm.

Finish

Electrical cabinet colour: RAL7035
Compressor /heat exchanger colour: RAL5002

MARINE WATER COOLED CONDENSING UNIT

Introduction

BlueConnect marine water-cooled condensing units are specially designed for marine use as the part of direct expansion refrigerant circuit air condition plant.
The unit fitted with:

- Marine type anti-corrosion paint and coating.
- Reciprocating, scroll or screw type compressor.
- Motor coupling direct driven for open type compressor as standard, motor belt driven as option.
- Mechanically cleanable sea water cooled or fresh water cooled shell and tube type condensers.
- Oil separator for reciprocating compressor
- Liquid receiver and suction accumulator with heat exchanger.
- Dry filter, refrigerant, oil and water pressure switch and other fittings.
- Cooling water inlet/outlet thermometers.
- Unload direct starter, part wind starter, star/delta starter and soft starter are available.
- AC 440~480V/3PH/60Hz, AC 380~415V/3PH/50Hz, AC 690V/3PH/60Hz multiple power feeding is available.
- Two condensing units can be installed on one common skid as option.

Following accessories can be optional:

- Unit vibration dampers.
- Flexible hose for water inlet/outlet piping.
- Flexible connection for refrigerant piping.

Code Principle

Function	Standard Code				Addtional Code			Descrpition
Sample	T	MCU	- 4HE	035	S	C	2	
	T							Twin units on one common skid
Cooling Type		MCU						Water cooled
		MACU						Air cooled
Compressor			4HE					Compressor model code
Capacity (kW)				035				Each condenser heating rejection
Cooling Medium					S			Sea water cooled
					F			Fresh water cooled
					A			Air cooled
Refrigerant						A		R404A
						B		R134a
						C		R407C
						D		R417A
Power Source							1	AC380V-415V/3PH/50Hz
							2	AC440V-480V/3PH/60Hz
							3	AC690V/3PH/50Hz
							4	AV690V/3PH/60Hz

Unit type: The unit can be divided into reciprocating type and screw type based on compressor type.

Open Type Reciprocating Compressor Unit:

Open reciprocating compressor can be used for all type refrigerants. Due to the open drive design, standard motors can be attached to the compressors through coupling housing or belt drive. Reliability and easy maintenance have made them popular options for years. The pressure oil lubrication is by means of reversible gear pump. Depth oil crankcase with oil heater ensure the compressor is well lubricated, Compressor is fitted suction and discharge stop valves,

All 4,6,8 cylinder single stage compressor are available with capacity control, the possible residual capacity is 50% for 4 cylinder compressor, 66%-33% for 6 cylinder compressor and 75%-50%-25% for 8 cylinder compressor, also step-less capacity regulation can be obtained by being fitted with variable frequency motor for open type compressor.

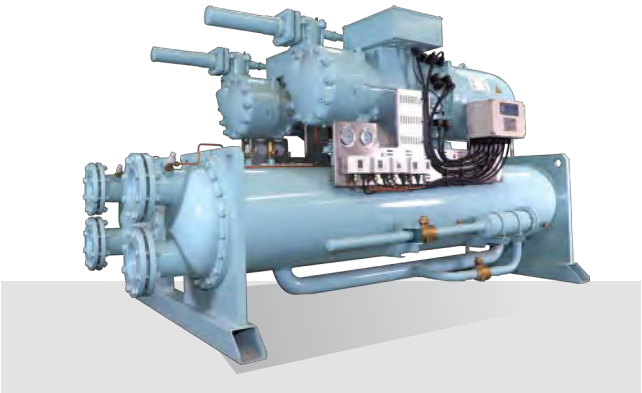
Semi-hermetic Reciprocating Compressor Unit:

This type compressor has fitted motor built-in compressor housing. The motor is without shaft seal and thereby have reduced the risk of leakage. The motor is cooled by suction refrigerant gas and does not need space heater. The pressure oil lubrication is by means of reversible gear pump. Marine type depth oil crankcase with oil heater ensure the compressor is well lubricated, Compressor is fitted suction and discharge stop valves
All 4,6,8 cylinder single stage compressor are available with capacity control, the possible residual capacity is 50% for 4 cylinder compressor, 66%-33% for 6 cylinder compressor and 75%-50%-25% for 8 cylinder compressor, also step-less capacity regulation can be obtained by fitted with variable frequency convertor.

Screw Type Compressor Unit:

Factory assembled, single-piece, water-cooled liquid chiller contained within the unit shall be all factory wiring, piping, controls, refrigerant charge, required prior to field start-up.

- Semi-hermetic screw compressor with internal muffler, capacity regulation solenoid valves, oil level switch, oil sight glass, check valves, safety device.
- Each compressor shall be equipped with one suction shut-off valve and one discharge shut-off valve.
- Capacity control shall be provided by regulation solenoid valves, capable of reducing unit capacity to 25% of full load. Compressor shall start in unload condition.
- Motor cooling shall be provided by direct liquid injection and protected by internal overload thermistor.
- Lube oil system shall include internal filter.
- Compressors are provided with an ECO economizer connection, capable of being equipped with an external economizer for additional cooling.



Condenser

- Shall be mechanically cleanable shell-and-tube type with removable heads.
- Tubes shall be internally-enhanced, seamless-copper type for fresh water-cooled condensers, for sea water cooled condensers, the tubes shall be B10 Cu/Ni material, B30 Cu/Ni tubes are available, and shall be rolled into tube sheets, for sea water cooled condensers, the SUS316L, Aluminum-bronze, Sacrificial anode end cover are available.
- Shall be equipped with flange or victaulic water connections.
- Fitted with safety valves, purge valves.
- Fitted with refrigerant liquid level sight glass.
- ASME, NR60, and Class certificate can be provided.

Finish

Electrical cabinet color: RAL7035
Compressor /heat exchanger color: RAL5002

Physical data—semi-hermetic reciprocating compressor unit (R404A)

Model		MCU-4NE/084	MCU-4JE/093	MCU-4HE/108	MCU-4GE/124	MCU-4FE/148	MCU-6HE/159	MCU-6GE/180	MCU-6FE/220	MCU-8GE/260	MCU-8FE/311
Cooling Capacity	kW	65	72	84	96	114	123	139	169	196	232
Compressors		Semi-hermetic reciprocating compressor									
Capacity Regulation	%	0-50-100					0-33-66-100			0-25-50-75-100	
Speed	rpm	1750			1750					1750	
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil pressure switch, compressor overload, compressor phase absence protection									
Condenser		Horizontal shell and tube type, fresh or sea water cooled									
Sea/fresh Water Flow	m^3/h	14.3	15.9	18.6	21.4	25.5	27.3	31.0	37.9	44.8	53.4
Water Connection		Counter flanges									
Inlet/Outlet	DN	50	50	65	65	65	80	80	80	100	100
Refrigerant		R404A									
Net Weight	kg	500	515	525	540	600	610	650	700	850	900
Operation Weight	kg	510	527	540	556	618	630	675	730	890	950
Electrical Data 60Hz											
Power Source		AC 440V~480V 3PH 60Hz									
Control Power		AC 220/230V 1PH 60Hz									
Power Input	kW	18.5	20.6	24.4	28.2	34.8	35.7	41.5	51.5	64.7	78.9

Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/40℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w

Physical data - semi-hermetic reciprocatng compressor unit (R407C)

Model		MCU-4NE/084	MCU-4JE/093	MCU-4HE/108	MCU-4GE/124	MCU-4FE/148	MCU-6HE/159	MCU-6GE/180	MCU-6FE/220	MCU-8GE/260	MCU-8FE/311
Cooling Capacity	kW	58.8	66	78	92	108	113	133	156	193	229
Compressors		Semi-hermetic reciprocating compressor									
Capacity Regulation	%	0-50-100					0-33-66-100			0-25-50-75-100	
Speed	rpm	1750			1750					1750	
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil pressure switch, compressor overload, compressor phase absence protection									
Condenser		Horizontal shell and tube type, fresh or sea water cooled									
Sea/fresh Water Flow	m^3/h	16.0	18.1	21.3	25.0	29.5	31.1	36.5	43.0	53.4	63.8
Water Connection		Counter flanges									
Inlet/outlet	DN	50	50	65	65	65	80	80	80	100	100
Refrigerant		R407C									
Net Weight	kg	520	535	555	590	660	710	750	870	980	1050
Operation Weight	kg	530	550	575	615	700	755	800	920	1050	1040
Electrical Data 60Hz											
Power Source		AC 440v~480v 3PH 60Hz									
Control Power		AC 220/230V 1PH 60HZ									
Power Input	kW	15.56	17.98	21.2	24.7	29.5	31.7	37.1	43.9	55.6	67.8

Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/40℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w

Physical data - open type reciprocating compressor unit

Model		MCU-FX14/140-A	MCU-FX14/165-A	MCU-FX16/210-A	MCU-FX16/250-A	MCU-FX14/140-C	MCU-FX14/165-C	MCU-FX16/210-C	MCU-FX16/250-C
Cooling Capacity	kW	110	129	165	194	94	111	142	171
Compressors		Open type reciprocating				Open type reciprocating			
Capacity Regulation	%	0-50-100		0-33-66-100		0-50-100		0-33-66-100	
Speed	rpm	1750				1750			
Driven		Motor coupling direct driven				Motor coupling direct driven			
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil level switch, compressor overload,							
Condenser		Horizontal shell &tube type, fresh/sea water cooled							
Sea/fresh Water Flow	m^3/h	24.1	28.2	36.1	42.1	20.9	24.6	31.5	37.4
Water Connection		Counter flanges				Counter flanges			
Inlet/Outlet	DN	65	80	80	80	65	80	80	80
Refrigerant		R404A				R407C			
Net Weight	kg	1100	1140	1300	1380	1160	1210	1400	1500
Operation Weight	kg	24.1	28.2	36.1	42.1	20.9	24.6	31.5	37.4
Electrical Data 60Hz									
Power Source		AC 440V~480V 3PH 60Hz				AC 440V~480V 3PH 60Hz			
Control Power		AC 220/230V 1PH 60Hz				AC 220/230V 1PH 60Hz			
Compressor Power Input	kW	30.1	35.3	45.2	51	27.4	32.2	41.2	46.6
Motor Power Output	kW	34.5	42.6	51.8	51.8	34.5	42.6	51.8	51.8

Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/40℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w

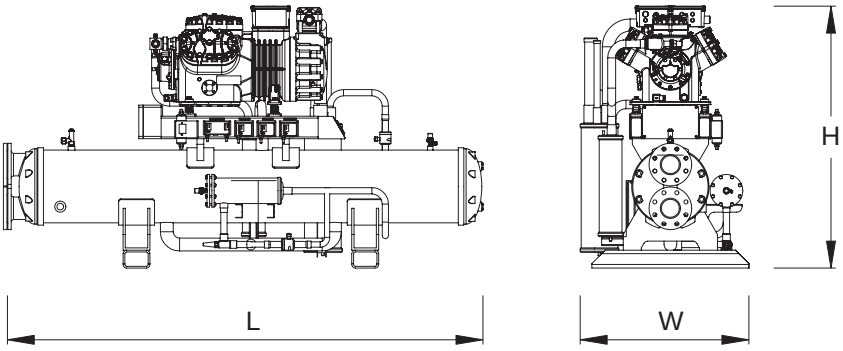
Physical data - screw type compressor unit

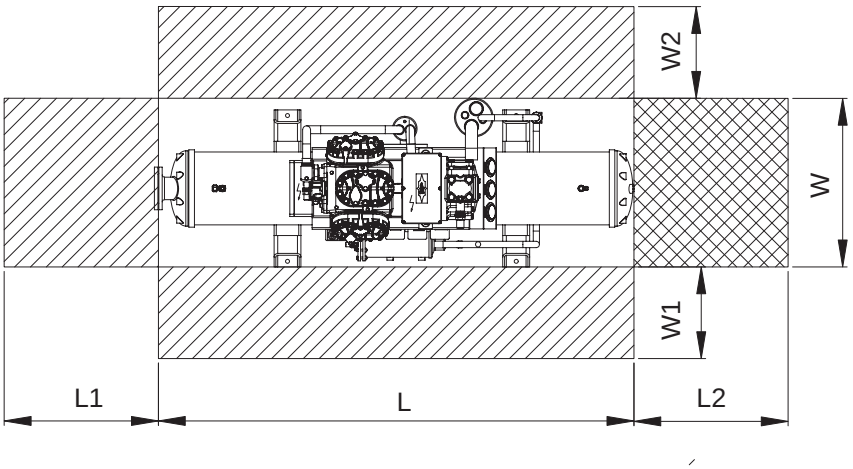
Model		MCU-SC66/230	MCU-SC75/270	MCU-SC76/310	MCU-SC77/355	MCU-SC78/410	MCU-SC79/470	MCU-SC86/510	MCU-SC87/580
Normal Cooling Capacity	kW	183	214	243	280	326	370	400	460
Compressors		Screw type compressor							
Capacity Regulation	%	0-25-50-75-100			0-25-50-75-100			0-25-50-75-100	
Condenser		Horizontal shell &tube type, fresh/sea water cooled							
Sea/fresh Water Flow	m^3/h	40.1	46.8	53.2	61.1	71.0	80.9	87.2	100.1
Water Connection		Flanges							
Inlet/Outlet	DN	80	100	100	100	125	125	125	125
Refrigerant		R407C							
Net Weight	kg	1100	1250	1300	1315	1335	1360	1930	1980
Operation Weight	kg	1147	1300	1355	1375	1400	1430	2050	2070
Electrical Data 60Hz									
Power Source		AC 440v~480v 3PH 60Hz							
Control Power		AC 220/230v 1PH 60Hz							
Power Input	kW	50.3	58.1	66.6	75.4	87.4	100.9	107.3	122.5

Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/40℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w

Dimension and clearance

Semi-hermetic compressor unit





Services clearances required

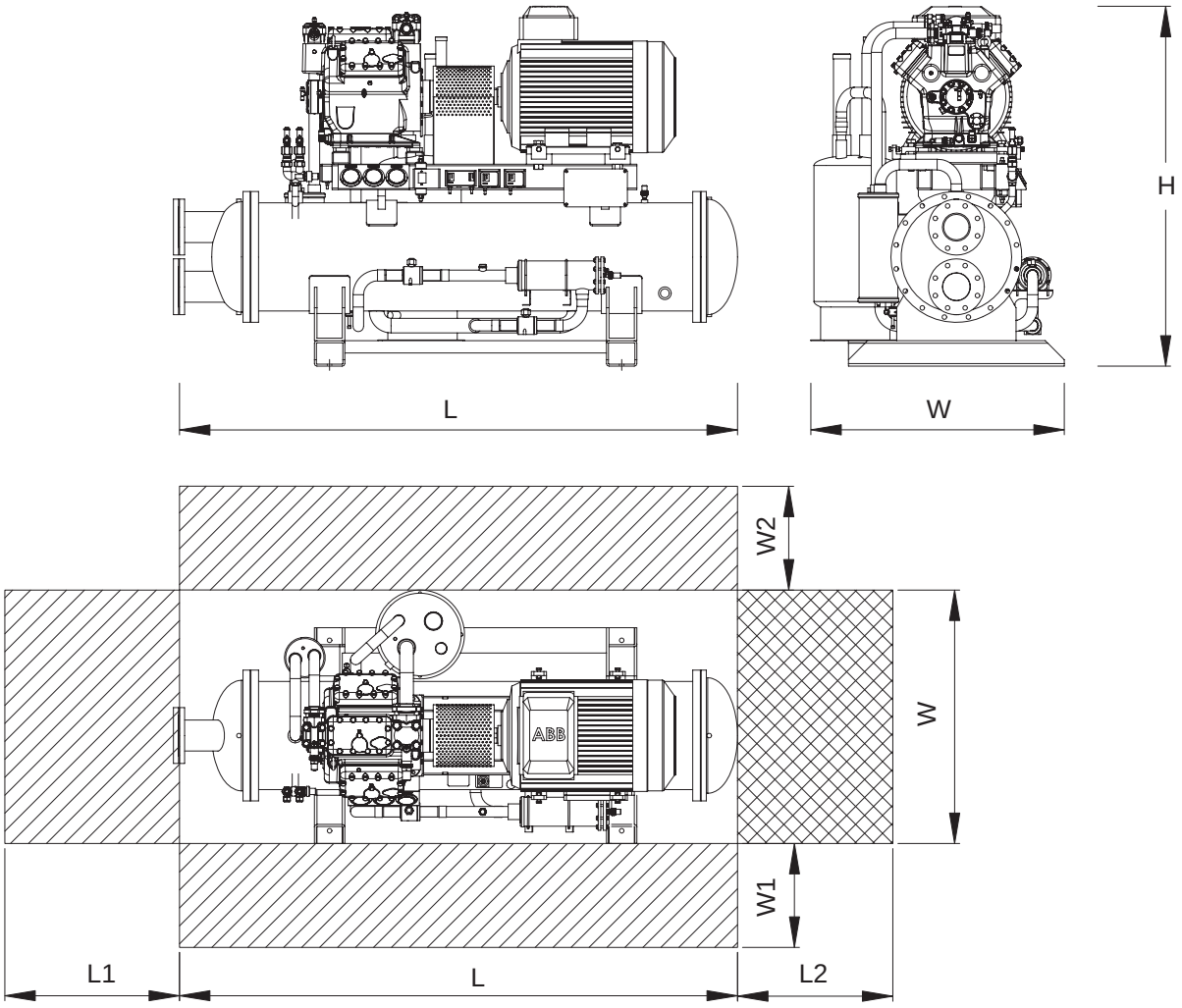
Space required to remove cooler and condenser tubes

Model	MCU-4NE/084	MCU-4JE/093	MCU-4HE/108	MCU-4GE/124	MCU-4FE/148	MCU-6HE/159	MCU-6GE/180	MCU-6FE/220	MCU-8GE/260	MCU-8FE/311
Dimension										
L mm	1900	1900	2000	2000	2000	2000	2200	2200	2200	2250
W mm	700	700	700	700	700	700	700	750	950	1050
H mm	1200	1200	1200	1200	1200	1250	1250	1250	1300	1400
Clearance										
L1 mm	1300	1300	1400	1400	1400	1400	1600	1600	1600	1600
L2 mm	1500	1500	1600	1600	1600	1600	1800	1800	1800	1800
W1 mm	800	800	800	800	800	800	800	800	800	800
W2 mm	600	600	600	600	600	600	600	600	600	600

Remark: L=Length, W=Width, H=Height

Dimension and clearance

Open type compressor unit



Services clearances required

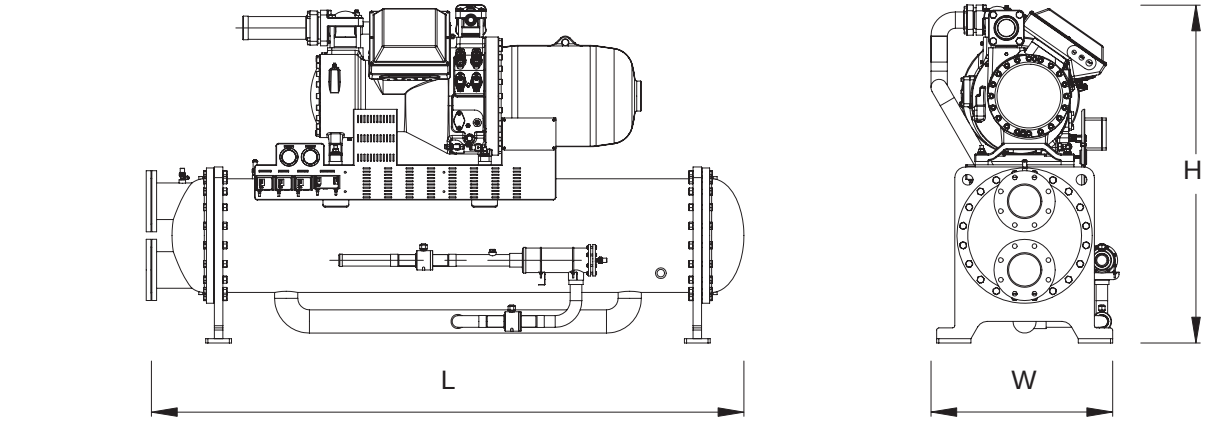
Space required to remove cooler and condenser tubes

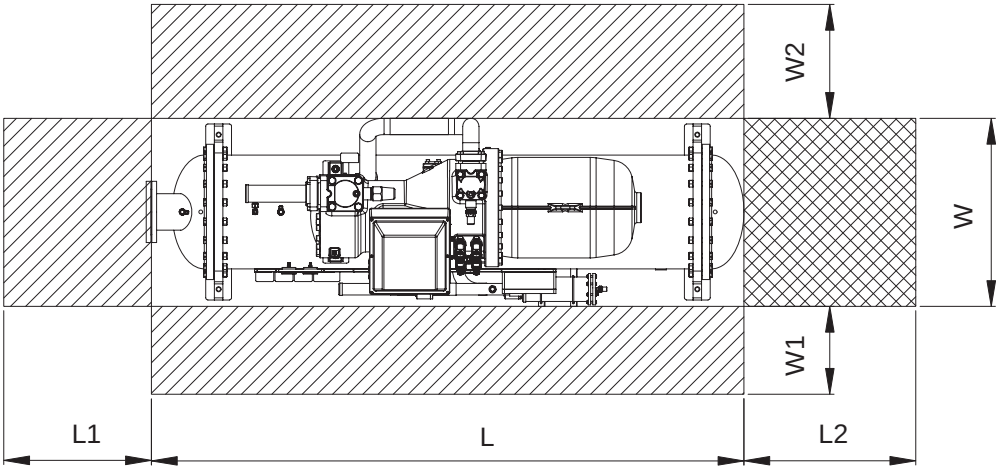
Model	MCU-FX14/140-A	MCU-FX14/165-A	MCU-FX16/210-A	MCU-FX16/250-A	MCU-FX14/140-C	MCU-FX14/165-C	MCU-FX16/210-C	MCU-FX16/250-C
Dimension								
L mm	2000	2000	2200	2200	2000	2000	2200	2200
W mm	700	700	1000	1000	700	700	1000	1000
H mm	1250	1250	1450	1450	1250	1250	1350	1350
Clearance								
L1 mm	1400	1400	1600	1600	1400	1400	1600	1600
L2 mm	1600	1600	1800	1800	1600	1600	1800	1800
W1 mm	800	800	800	800	800	800	800	800
W2 mm	600	600	600	600	600	600	600	600

Remark: L=Length, W=Width, H=Height

Dimension and clearance

Screw compressor type unit





Services clearances required

Space required to remove cooler and condenser tubes

Model	MCU-SC66/230	MCU-SC75/270	MCU-SC76/310	MCU-SC77/355	MCU-SC78/410	MCU-SC79/470	MCU-SC86/510	MCU-SC87/580
Dimension								
L mm	2400	2400	2400	2400	2400	2400	2800	2800
W mm	750	750	750	750	750	750	820	820
H mm	1300	1300	1300	1300	1300	1300	1580	1580
Clearance								
L1 mm	1800	1800	1800	1800	1800	1800	2200	2200
L2 mm	2000	2000	2000	2000	2000	2000	2200	2200
W1 mm	800	800	800	800	800	800	800	800
W2 mm	600	600	600	600	600	600	600	600

Remark: L=Length, W=Width, H=Height

MARINE AIR HANDLING UNIT

Description

BlueConnect MAU marine air handling unit is specially designed for marine & offshore installation air conditioningsystem with all of function section needed to meet virtually any air handling requirement.

It is modular section design, tailor made is available for customer flexibility.

The air flow range is 1000 m^3/h to 160000 m^3/h, the pressure has High/Medium/Low pressure type available.

Max. pressure differential: 3500 Pa.
max. working temperature: 70°C.

Design Feature

The unit has following design feature:

- The units are designed in accordance with European Standard DIN EN1886 for air handling units.
- The casing panels are of double-skin design with 50mm thick mineral wool insulation for good thermal and acoustic insulation.
- Cover an airflow range from 1000m^3/h to 160000m^3/h at pressure up to 3500Pa.
- The Air Handling Units are normally supplied assembled or depending on transport and mounting in one or two long sections for assembly on site. On request, the air handling units can also be delivered in blocks with one or more functional sections in order to facilitate transport and installation in confined spaces.
- Panels can be easily detachable for simplify maintenance and service.
- Built on a robust framework of box-section steel frame members screwed together with strong corner pieces and clad with 50mm thick panels to create a rigid casing with excellent thermal and sound attenuating characteristics.
- The units are specially designed for marine and offshore installation.
- Mechanically secured cellular rubber sealing strips at the inspection doors reduce the air leakage to a minimum.
- Sturdy box-section framework contributes to be high strength of the casing.
- Hygienic and are available in a supper-hygienic version for clean room. Totally smooth inside and outside surface are easy to clean.
- Wide choice of materials and surface treatment of the unit casing.
- The base frame consists of two longitudinal girders stabilized by transverse girder stiffeners. The base frame is provided with lifting holes. The section are assembled, mounted and fixed with bolts on a base frame.
- Surface treatment-anti-corrosion treatment
- When stainless steel section are required, the framework and the panels are made of stainless steel AISI 304 or 316L.
- The major part of the components, such as heating coils, cooling coils, mist eliminator, are mounted on rails and are consequently easy to pull out for servicing and maintenance. The individual sections are assembled by means of bolts and special U-cleats.
- Marine type deepened drain pan, made of stainless steel SUS316, with two drain connection on both side is fitted on the cooling and humidifying section.
- As standard, the section framework and panels surface are Alu-Zinc. Galvanized sheet steel coated with powder and Stainless steel are available.
- Position designations

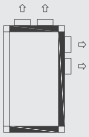
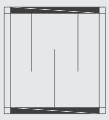
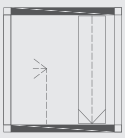
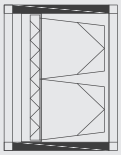
  The position designations of the air handling units generally refer to the direction of air flow through the unit seen from the access side (where door, connections, etc. are located).
  Position R: Air flow direction from left to right
  Position L: Air flow direction from right to left.
  The position designation for each individual section is according to the same principles.

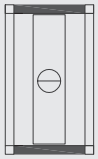
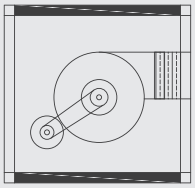
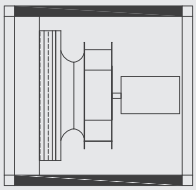
Function

The air handling functions are encased in sections which are assembled into complete units on a common base frame.

The sections/functional components have shut-off damper, mix section, air filter, enthalpy exchangers, heater coil, cooling coil, humidifiers, fan, discharge section, silencers, and corner sections.




Code	Symbol	Functions (Component)
SOD		Shut-off, mixing and recirculation
HC		Heating coil Including steam heater hot water heater electric heater
ED		End distribution chamber
SL		Silencer
HD		Humidifier Including water spray humidifer, steam humidifer, evaporator humidifer
FF		Air filter Including panel filter short bag filter long bag filter

Code	Symbol	Functions (Component)
ME		Mist eliminator Including stainless steel aluminium material
CC		Cooling coil Including chilled water cooling coil direct expansion cooling coil
SRW		Enthalpy exchanger rotor wheel
EA	 	Supply air fan Including centrifugal fan plug fan

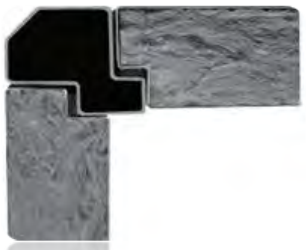
Construction

The casing are constructed of framework of steel sections covered with double skinned sheet steel panels with an intermediate layer of 50 mm mineral wool. The casing are made of galvanized; Al-Zinc;AISI304/316/316L, 5083-H111/H112 available.

The access side is provided with panels or tight-fitting doors which, in principle, are constructed as the panels.

The panels can be removed from the unit. In all unit sizes, the inspection doors are hung on adjustable hinges and are equipped with mechanically secured sealing strips. The inspection doors are also available with door locks.

To simplify maintenance and service, many of the unit sections can be fitted with inspection windows.



Frame Members

Specially designed, enclosed frame members, made of 1.5mm thick or 2 mm thick sheet steel, available in aluminium-zinc plated or stainless steel, connected by unit angles, this method of construction makes sure that the unit can be fully disassembled.

Panels

Closed, double-skin sheet steel with 50mm thick insulation sandwiched between the sheet steel. The skin consists of 0.8 or 1.0 mm thick Al-Zinc or stainless sheet steel. 80kg/m^3 or 140kg/m^3 mineral wool slabs are used as insulation. The panels are flush-mounted to the framework by means of screws to form smooth internal and exterior surface and can be easily detachable.

Inspection Doors

The doors are provided with a mechanically attached sealing strip, hinges and a recessed tongue lock which is operated by means of a handle. The doors can be opened up to 180°and they are easily detachable in case opposite door opening position should be required.

Casing Performance

Heater transfer coefficient

Panel Sheet Metal Thickness	Panel Insulation 80kg/m^3	Panel Insulation 140kg/m^3
0.8mm	Class T3	Class T3
1.0mm	Class T3	Class T4

Thermal bridging factor of the casing will conform to class en1886 TB2, and TB3.

Leakage Class

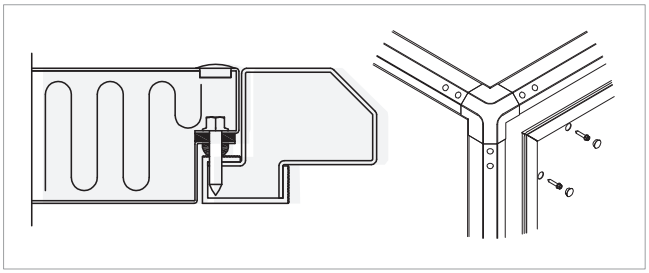
EN1886 class L3 and L2 is available.

Strength of the casing

EN1886 class 1A with 0.8mm thick panels
EN1886 class 2A with 1.0mm thick panels
Maximum permissible pressure above or below atmospheric is 3200Pa for size 8/8~32/32 and 2500Pa for large size units.

Sound attenuation in the unit casing

Sheet mm	Insulation Kg/m^3	Octave Band 63	125	250	500	1k	2k	4k	8k
0.8	50	10	10	19	29	28	26	26	29
0.8	140	12	12	22	29	31	28	32	33
1.0	50	12	12	22	29	28	26	27	29
1.0	140	13	15	23	29	31	29	31	33



Themal Insulation of the Unit
Heat Loss from the Casing

The heat transfer coefficient of the unit casing is given in W/(m²℃) when the temperature differential between the inside and outside of the casing under steady-state conditions, is 20℃. The size and appearance of the test unit and the test procedure are well defined in the standards.

According to EN1886 standard, the heat transfer coefficient U=W(m²℃) of the unit casing is classified in accordance with the following table.

Class	
T1	0 < U < 0.5
T2	0.5 < U < 1.0
T3	1.0 < U < 1.4
T4	1.4 < U < 2.0
T5	No requirements

Thermal Bridging

Determine the thermal bridging factor Kb as followings:

$K_b = \triangle t_{min} / \triangle t_{air}$

Where

$\triangle t_{min}$ ($=t_i - t_{max}$) is the least temperature difference;

$\triangle t_{air}$($=t_i - t_a$) is the air-to-air temperature difference;

T_i is the mean internal air temperature;

T_a is the mean external air temperature;

T_{max} is the maximum external surface temperature;

The thermal bridging factor Kb of the casing shall be graded in accordance with following table:

Class	
TB1	0.75 < Kb < 1.00
TB2	0.60 < Kb < 0.75
TB3	0.45 < Kb < 0.60
TB4	0.30 < Kb < 0.45
TB5	No requirements

The lowest value of the bridging factor measured on the outside of the casing determine the insulation class to which the unit casing is assigned.

The bridging factor can be used as a guide to whether there is risk of condensation occurring. The lower the value of K_b, the higher the likelihood of condensation occurring on parts of the units casing in which the air temperature is low.

Casing Tightness

As per EN1886 standard leakage rates for air handling units as follows.

Leakage Class	Suction -400pa Leakage Flow Max L/s,m²	Pressure +700pa Leakage Flow Max L/s,m²
L3	1.32	1.90
L2	0.44	0.64
L1	0.15	0.22

The leakage flow rate for a unit only subjected to suction must not exceed the above tabulated figures at -400Pa.

The leakage flow rate for a unit only subjected to pressure must not exceed the above tabulated figures at +700Pa.

Corrosion resistance/environmental class.

Corrosion Class Bsk99	Panel	Frame
C3	1.32	1.90
C4	0.44	0.63
C5	0.15	0.22

Dimension Quick Selection

Using the quick selection tables

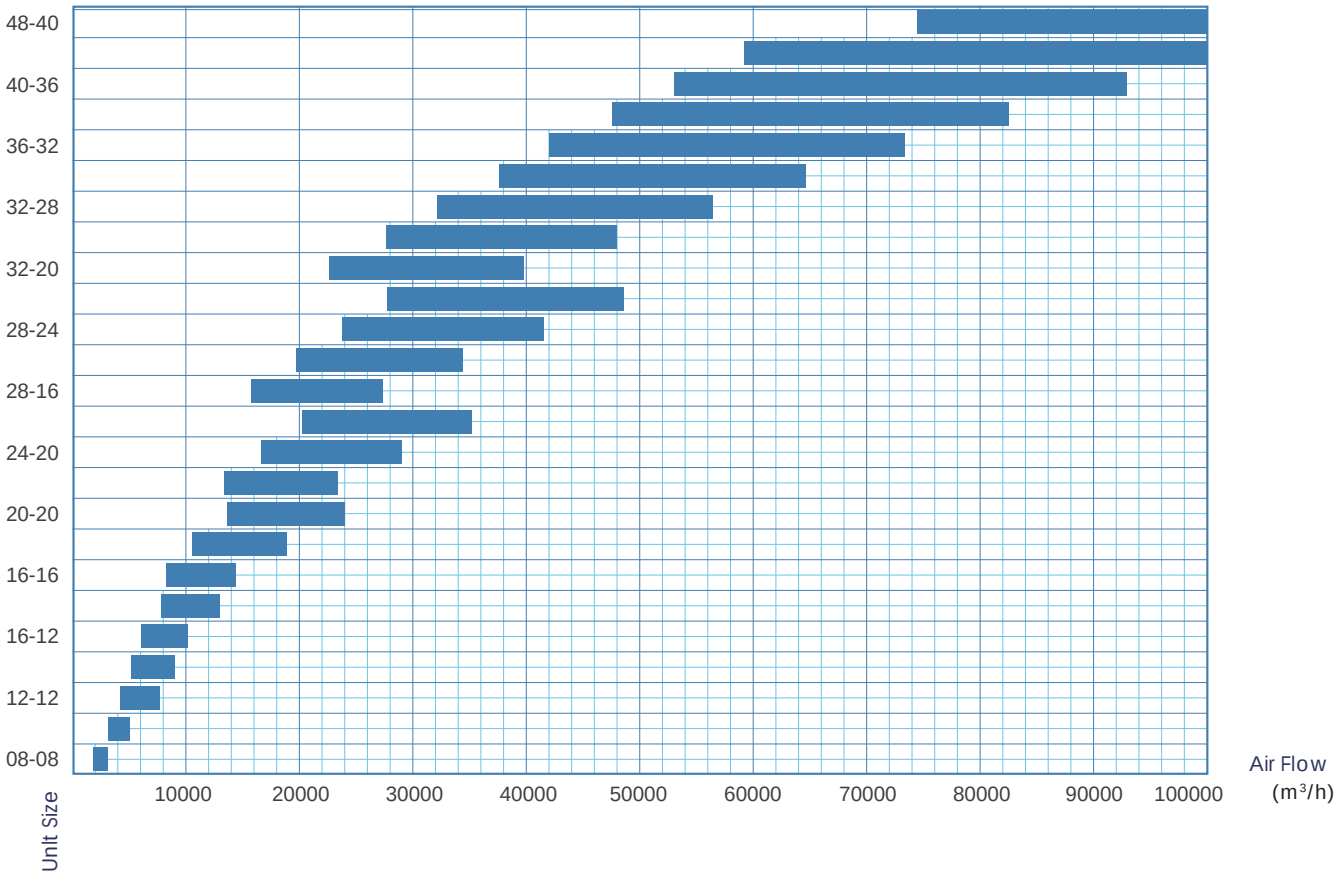
- Starting on the left hand side of the airflows and section dimension table, find the column with an appropriate air velocity and then find a suitable unit size for the airflow rate you have.
- The width and height of the unit are found in the columns further to the right side.
- Selection the section function, following the unit size you have selected find the individual section length on the overall lengths table, the overall length of AHU is determined by summing the individual section lengths together with the casing length 100mm.
- Detail of the duct connections air to be found according as duct velocity.

Total AHU length definition (outside): L tot = number of raster N x raster length 76.5mm +104mm

Example

Quick selection diagram airflows and section dimension

AHU quick selection digram



Quick selection table airflows and section dimension

The airflows are listed in the table below, velocity in blower stream face the cooling coil of the unit with clearance 2.0m/s~3.0m/s

Unit Size	Air Flow (m^3/h)				Section Dimension				Air Filter			
	Cooling Coil Face Velocity [m/s]				Inside [mm]		Outside [mm]					
	2.0 m/s	2.5 m/s	3.0 m/s	Max.	Width	Height	Width	Height	595x595	595x298	298x298	298x595
08-08	1770	2478	2655	3098	612	612	716	716	1	-	-	-
12-08	2977	4168	4466	5210	918	612	1022	716	1	-	-	1
12-12	4339	5424	6508	7593	918	918	1022	1022	1	1	1	1
14-12	5230	6538	7846	9153	1071	918	1175	1022	1	1	1	1
16-10	5130	6412	7695	8977	1224	765	1328	869	2	-	-	-
16-12	6062	7578	9094	10609	1224	918	1328	1022	2	2	-	-
16-14	7462	9327	11192	13058	1224	1071	1328	1175	2	2	-	-
16-16	8394	10493	12591	14690	1224	1224	1328	1328	4	-	-	-
18-12	6820	8524	10229	11934	1377	918	1481	1022	2	2	-	-
20-10	6468	8086	9703	11320	1530	765	1634	869	2	2	-	-
20-16	10781	13476	16171	18866	1530	1224	1634	1328	4	-	-	2
20-20	13656	17070	20483	23897	1530	1530	1634	1634	4	2	1	2
24-16	13332	16665	19998	23331	1836	1224	1940	1328	6	-	-	-
24-20	16679	20848	25018	29188	1836	1530	1940	1634	6	-	-	3
24-24	20190	25237	30285	35332	1836	1836	1940	1940	9	-	-	-
28-12	11467	14333	17200	20067	2142	918	2246	1022	6	3	-	-
28-16	15636	19545	23454	27363	2142	1224	2246	1328	6	-	-	2
28-20	19806	24757	29709	34660	2142	1530	2246	1634	6	3	1	2
28-24	23723	29654	35585	41516	2142	1836	2246	1940	9			3
28-28	27849	34811	41773	48736	2142	2142	2246	2246	9	3	1	3
32-12	13156	16445	19735	23024	2448	918	2552	1022	4	4	-	-
32-20	22725	28406	34087	39768	2448	1530	2552	1634	8	4	-	-
32-24	27509	34386	41263	48140	2448	1836	2552	1940	12	-	-	-
32-28	32293	40366	48439	56513	2448	2142	2552	2246	12	-	-	4
32-32	37077	46346	55616	64885	2448	2448	2552	2552	16	-	-	-
36-32	41839	52299	62759	73219	2754	2448	2858	2552	16	4	-	-
36-36	47238	59047	70857	82666	2754	2754	2858	2858	16	4	-	4
40-36	53191	66488	79786	93084	3060	2754	3164	2858	20	5	-	-
40-40	59270	74087	88904	103722	3060	3060	3164	3164	25	-	-	-
48-40	74568	93211	111853	130495	3672	3060	3776	3164	30	-	-	-
64-48	109361	136702	164042	191382	4896	3672	5000	3776	48	-	-	-
72-48	127760	159700	191640	223580	5508	3672	5612	3776	81	-	-	-

Note
1. Height not include installation skid, installation skid=200mm

Quick selection table overall lengths

Functional Sections –section Lengths/weight in mm/kg

Filter section

Unite Size	Intake Damper		Mix Section		Panel Filter G3, G4		Short Bag Filter G3, G4, F5		Bag Filter F5,F6,F7,F8,F9		Enthalpy Exchanger	
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
08-08	125	-	306	44	153	18	459	44	765	70	505	-
12-08	125	-	306	56	153	22	459	53	765	83	505	-
12-12	125	-	459	82	153	27	459	63	765	98	-	-
14-12	125	-	459	91	153	28	459	65	765	102	505	-
16-10	125	-	459	92	153	27	459	64	765	100	505	-
16-12	125	-	459	99	153	32	459	73	765	112	505	-
16-14	125	-	459	105	153	33	459	75	765	116	505	-
16-16	125	-	459	112	153	38	459	84	765	127	-	-
18-12	125	-	459	107	153	33	459	75	765	116	505	-
20-10	125	-	459	108	153	33	459	75	765	116	505	-
20-16	125	-	459	130	153	44	459	95	765	144	-	-
20-20	125	-	459	145	153	51	459	108	765	162	-	-
24-16	125	-	459	149	153	50	459	107	765	159	-	-
24-20	125	-	459	166	153	58	459	121	765	179	-	-
24-24	125	-	612	210	153	66	459	135	765	197	-	-
28-12	125	-	612	172	153	56	459	116	765	169	505	-
28-16	125	-	612	193	153	56	459	118	765	175	-	-
28-20	125	-	612	214	153	65	459	134	765	197	-	-
28-24	125	-	612	234	153	74	459	150	765	217	-	-
28-28	125	-	612	255	153	83	459	166	765	238	-	-
32-12	125	-	612	191	153	52	459	112	765	169	505	-
32-20	125	-	612	236	153	72	459	147	765	214	-	-
32-24	125	-	612	258	153	82	459	164	765	236	-	-
32-28	125	-	612	281	153	92	459	181	765	259	-	-
32-32	125	-	612	303	153	102	459	199	765	280	-	-
36-32	125	-	612	331	153	112	459	216	765	303	-	-
36-36	125	-	765	394	153	123	459	233	765	326	-	-
40-36	125	-	765	426	153	135	459	253	765	351	-	-
40-40	125	-	765	454	153	147	459	273	765	376	-	-
48-40	125	-	765	521	153	171	459	313	765	427	-	-
64-48	125	-	765	733	153	256	459	452	765	601	-	-
72-48	125	-	765	807	153	395	459	654	765	834	-	-

Quick selection table overall lengths (cont.)

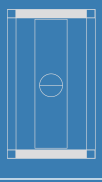
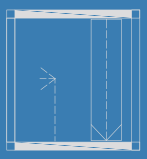
Functional Sections –section Lengths/weight in, mm/kg

Heating Coil

Unite Size	Steam Heater				Hot Water Heater								Electric Heater	
	Row 2		Row 4		Row 2		Row 4		Row 6		Row 8			
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
08-08	153	22	306	43	153	20	306	39	306	46	306	51	153	13
12-08	153	28	306	55	153	27	306	52	306	64	306	72	153	15
12-12	153	35	306	68	153	34	306	67	306	91	306	105	153	17
14-12	153	40	306	76	153	39	306	76	306	105	306	122	153	17
16-10	153	39	306	75	153	38	306	75	306	103	306	120	153	17
16-12	153	44	306	85	153	43	306	84	306	118	306	138	153	18
16-14	153	51	306	98	153	50	306	97	306	138	306	163	153	19
16-16	153	56	306	107	153	55	306	106	306	152	306	180	153	20
18-12	153	48	306	92	153	47	306	92	306	130	306	152	306	39
20-10	153	46	306	88	153	46	306	89	306	125	306	146	306	39
20-16	153	68	306	130	153	66	306	128	306	188	306	224	306	44
20-20	153	83	306	158	153	80	306	154	306	230	306	276	306	48
24-16	153	81	306	155	153	79	306	152	306	226	306	270	306	48
24-20	153	98	306	188	153	94	306	182	306	274	306	330	306	52
24-24	153	116	306	222	153	110	306	213	306	325	306	392	306	56
28-12	153	71	306	137	153	71	306	137	306	201	306	239	306	48
28-16	153	93	306	178	153	90	306	173	306	260	306	312	306	52
28-20	153	114	306	218	153	109	306	210	306	320	306	386	306	56
28-24	153	134	306	256	153	127	306	244	306	376	306	455	306	59
28-28	153	155	306	296	153	146	306	280	306	434	306	527	306	63
32-12	153	80	306	153	153	80	306	154	306	227	306	271	306	52
32-20	306	142	306	247	306	152	306	236	306	362	306	438	306	59
32-24	306	166	306	293	306	176	306	277	306	430	306	522	306	63
32-28	306	191	306	340	306	199	306	318	306	497	306	605	306	67
32-32	306	215	306	386	306	222	306	359	306	565	306	688	306	71
36-32	306	240	306	432	306	246	306	400	306	632	306	772	306	74
36-36	306	267	306	485	306	271	306	445	306	708	306	865	459	117
40-36	306	298	306	543	306	299	306	495	306	791	306	968	459	123
40-40	306	329	306	602	306	328	306	546	306	876	306	1073	459	128
48-40	306	396	306	729	306	389	306	655	306	1057	306	1298	459	139
64-48	306	630	306	1174	306	599	306	1034	306	1690	306	2084	459	173
72-48	306	710	306	1326	306	671	306	1164	306	1907	306	2353	459	184

Quick selection table overall lengths (cont.)

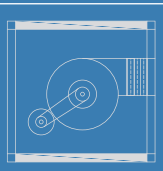
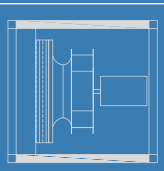
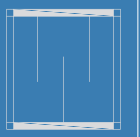
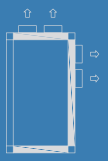
Functional Sections –section Lengths/weight in mm/kg

Unite Size	Cooling Coil						Humidifier						Mist Eliminator	
							Water Spray		Steam 		Evaporator Humidifer			
	Row 4		Row 6		Row 8									
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
08-08	306	46	306	51	306	56	459	40	459	40	306	28	153	28
12-08	306	61	306	69	306	77	459	45	459	45	306	33	153	37
12-12	306	82	306	96	306	110	459	51	459	51	306	41	153	45
14-12	306	93	306	110	306	127	459	53	459	53	306	44	153	51
16-10	306	92	306	109	306	126	459	53	459	53	306	42	153	50
16-12	306	103	306	123	306	144	459	56	459	56	306	47	153	56
16-14	306	119	306	144	306	169	459	59	459	59	306	52	153	62
16-16	306	130	306	158	306	186	459	62	459	62	306	57	153	67
18-12	306	113	306	136	306	158	459	58	459	58	306	50	153	61
20-10	306	110	306	131	306	153	459	58	459	58	306	48	153	60
20-16	306	158	306	194	306	230	459	67	459	67	306	65	153	80
20-20	306	191	306	236	306	282	459	72	459	72	306	76	153	93
24-16	306	188	306	233	306	277	459	72	459	72	306	72	153	93
24-20	306	225	306	281	306	337	459	77	459	77	306	85	153	109
24-24	306	264	306	332	306	399	459	83	459	83	306	98	153	125
28-12	306	170	306	208	306	247	459	71	459	71	306	66	153	87
28-16	306	216	306	268	306	320	459	77	459	77	306	80	153	105
28-20	306	261	306	327	306	393	459	82	459	82	306	94	153	124
28-24	306	304	306	383	459	491	459	88	459	88	306	109	153	142
28-28	306	349	306	442	459	566	459	94	459	94	306	123	153	160
32-12	306	191	306	235	459	305	459	76	459	76	306	72	153	98
32-20	306	295	306	370	459	475	459	87	459	87	306	104	153	139
32-24	306	346	306	438	459	561	459	93	459	93	306	119	153	159
32-28	306	398	306	505	459	646	459	99	459	99	306	135	153	180
32-32	306	449	306	573	459	731	459	104	459	104	306	151	153	201
36-32	306	501	306	641	459	817	459	109	459	109	306	165	153	223
36-36	306	559	306	717	459	912	459	115	459	115	306	182	153	246
40-36	306	623	306	800	459	1018	459	120	459	120	306	197	153	270
40-40	306	687	306	885	459	1124	459	126	459	126	306	216	153	295
48-40	306	849	306	1068	459	1354	459	136	459	136	306	250	153	349
64-48	306	1222	306	1703	459	2153	459	167	459	167	306	372	153	535
72-48	306	1415	306	1921	459	2426	459	177	459	177	306	412	153	598

Quick selection table overall lengths (cont.)

Functional Sections –section Lengths/weight in mm/kg

Supply Air Fan

Unite Size	Centrifugal fan						Plug fan						Silencer		End Distribution Chamber	
																
	L		M		H		L		M		H					
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
08-08	918	40	918	42	918		918	41	918	44	918		765	88	459	56
12-08	918	68	918	58	918		918	51	918	55	918		765	110	459	71
12-12	918	80	918	78	918	105	918	71	918	88	918	88	765	119	459	82
14-12	918	105	918	94	918	107	918	82	918	95	918	103	918	164	459	91
16-10	918	105	918	105	918	107	918	100	918	105	918	105	918	178	459	92
16-12	1224	107	1224	96	1224	114	1224	118	1224	163	1224	163	918	184	459	99
16-14	1224	137	1224	128	1224	177	1224	118	1224	163	1224	163	918	189	612	125
16-16	1224	137	1224	142	1224	190	1224	133	1224	163	1224	163	918	195	612	132
18-12	1224	140	1224	155	1224	206	1224	155	1224	155	1224	155	918	189	612	126
20-10	1224	140	1224	155	1224	206	1224	155	1224	155	1224	155	918	204	612	127
20-16	1377	164	1377	206	1377	206	1224	246	1224	212	1224	262	918	221	612	153
20-20	1530	225	1530	223	1530	255	1530	249	1530	215	1530	265	918	232	612	169
24-16	1530	228	1530	226	1530	258	1530	281	1530	319	1530	319	918	262	612	173
24-20	1683	274	1683	267	1683	300	1530	302	1530	400	1530	368	918	273	765	217
24-24	1683	295	1683	369	1683	428	1530	285	1530	323	1530	323	918	284	612	210
28-12	1377	278	1377	278	1377	300	1224	302	1224	319	1224	323	918	276	765	196
28-16	1683	278	1683	271	1683	304	1530	306	1530	404	1530	372	918	288	765	219
28-20	1836	299	1836	373	1836	432	1530	333	1530	423	1530	423	918	299	918	269
28-24	1836	299	1836	390	1836	453	1530	341	1530	479	1530	504	918	310	918	294
28-28	2142	393	2142	434	2142	472	1530	351	1530	441	1530	441	918	321	918	318
32-12	1530	299	1530	259	1530	453	1530	351	1530	479	1530	423	918	317	765	217
32-20	1838	319	1838	410	1838	458	1530	384	1530	522	1530	522	918	339	918	295
32-24	2142	423	2142	458	2142	477	1530	563	1530	639	1530	639	918	351	918	321
32-28	2142	541	2142	527	2142	593	1530	605	1530	801	1530	737	918	362	918	348
32-32	2142	583	2142	731	2142	849	1836	702	1836	882	1836	882	918	373	918	374
36-32	2983	638	2983	820	2983	916	1836	702	1836	882	1836	882	918	399	918	405
36-36	2983	638	2983	820	2983	916	1836	768	1836	468	1836	468	918	410	918	433
40-36	2983	846	2983	916	2983	954	1836	491	1836	1044	1836	1044	918	451	918	467
40-40	2983	914	2983	990	2983	890	1836	842	1836	1078	1836	1078	918	462	918	497
48-40	2983	1066	2983	1262	2983	1298	1836	888	1836	1158	1836	1158	918	529	918	567
64-48	2983	1126	2983	1226	2983	1329	1836	925	1836	1272	1836	1313	918	684	918	791
72-48	2983	1299	2983	1352	2983	1413	1836	998	1836	1411	1836	1455	918	751	918	869

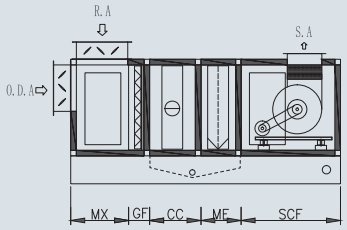
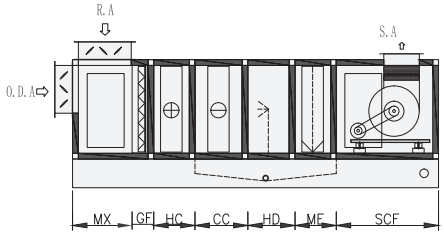
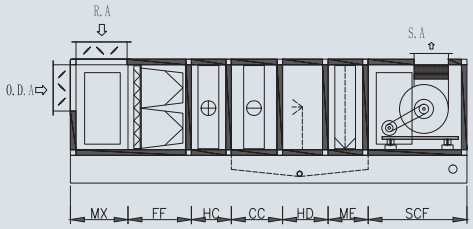
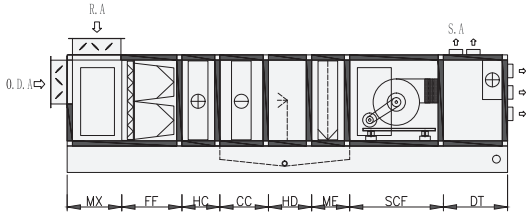
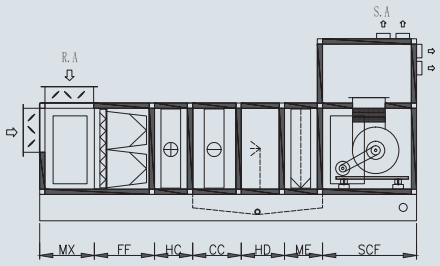
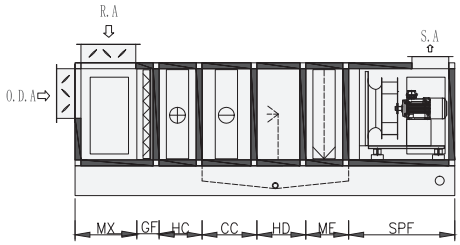
Note: The overall length of a section containing more functions/components is calculated as the sum of the individual component lengths +104 mm.
he total is calculated as the sum of the individual section, but not include the weight of dampers, electric heater, humidifier, energy recovery wheel.

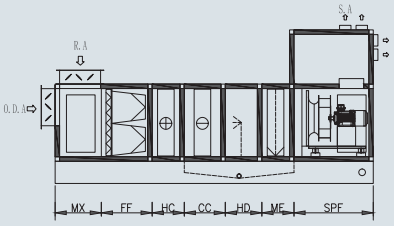
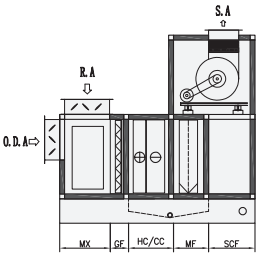
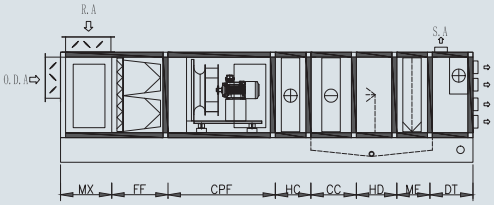
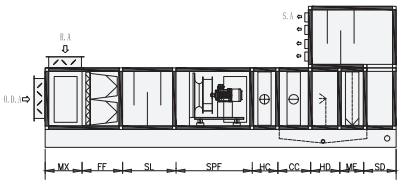
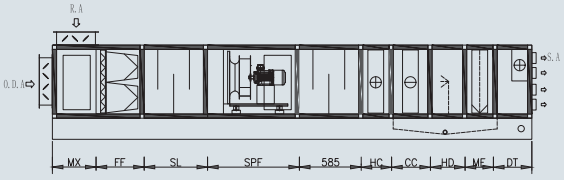
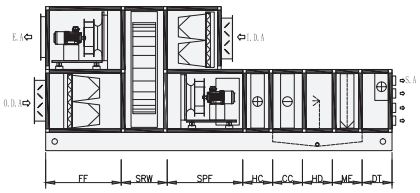
Length Dimensions

Modulus	Length (Mm)	Modulus	Length (Mm)	Modulus	Length (Mm)	Modulus	Length (Mm)	Modulus	Length (Mm)
1	76.5	16	1224	31	2371.5	46	3519	61	4666.5
2	153	17	1300.5	32	2448	47	3595.5	62	4743
3	229.5	18	1377	33	2524.5	48	3672	63	4819.5
4	306	19	1453.5	34	2601	49	3748.5	64	4896
5	382.5	20	1530	35	2677.5	50	3825	65	4972.5
6	459	21	1606.5	36	2754	51	3901.5	66	5049
7	535.5	22	1683	37	2830.5	52	3978	67	5125.5
8	612	23	1759.5	38	2907	53	4054.5	68	5202
9	688.5	24	1836	39	2983.5	54	4131	69	5278.5
10	765	25	1912.5	40	3060	55	4207.5	70	5355
11	841.5	26	1989	41	3136.5	56	4284	72	5508
12	918	27	2065.5	42	3213	57	4360.5	76	5814
13	994.5	28	2142	43	3289.5	58	4437	80	6120
14	1071	29	2218.5	44	3366	59	4513.5	84	6426
15	1147.5	30	2295	45	3442.5	60	4590	88	6732

Total ahu length definition (outside): l tot= modulus n x length one modulus 76.5mm +104mm

Installation examples

Combination Code	Example	Description
1		Horizontal installation, with mix section, panel filter, cooling coil and belt driven centrifugal fan
2		Horizontal installation, with mix section, panel filter, heating coil, cooling coil, humidifier and belt driven centrifugal fan
3		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier and belt driven centrifugal fan
4		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier, belt driven centrifugal fan and end air distribution chamber
5		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier, belt driven centrifugal fan and upon end air distribution chamber
6		Horizontal installation, with mix section, panel filter, heating coil, cooling coil, humidifier and plug fan

Combination Code	Example	Description
7		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier, plug fan and upon end air distribution chamber
8		Vertical Nstallation, with mix Section, bag filter, heating coil, cooling Coil, centrifugal
9		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier, plug fan and upon end air distribution chamber built-in re-heater coil
10		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier, plug fan and upon end air distribution chamber built-in silencer function
11		Horizontal installation, with mix section, bag filter, heating coil, cooling coil, humidifier, plug fan, silencer section and end air distribution chamber built-in re-heater function
12		Horizontal installation, with energy recovery rotor wheel, bag filter, heating coil, cooling coil, humidifier, supply and exhauster plug fan and end air distribution chamber

Energy recovery with rotary heat exchanger thermal wheel air handling unit

	Air Flow [m³/h]						Supply Air											Rotary Heat Exchanger			Extract Air			
Unit Size	Minimum	Standard	Maximum	Total Length [mm]	Total Width [mm]	Total Height [mm]	Air Filter Section Length [mm]	Class	Cooling Coil Section Length [mm]	Cooling Coil Facing Area [m²]	Heating Coil Section Length [mm]	Heating Coil Facing Area [m²]	Humidify Section Length [mm]	Drip Eliminator Section Length [mm]	Supply Air Fan Section Length [mm]	Supply Air Fan Type	Distribution Chamber Section Length [mm]	Section Length [mm]	Section Width [mm]	Section Heigh [mm]	Air Filter Section Length	Air Filter Class	Extract Air Fan Section Length [mm]	Extract Air Fan Type
08/08	2028	2704	3090	4082	716	1632	947	F7	612	0.27	306	0.27	306	306	945	Plug fan	461	505	1022	1632	765	F5	947	Plug fan
10/08	2661	3549	4056	4082	869	1632	947	F7	612	0.35	306	0.35	306	306	945	Plug fan	461	505	1175	1632	765	F5	947	Plug fan
12/08	3211	4281	4892	4082	1022	1632	947	F7	612	0.42	306	0.42	306	306	945	Plug fan	461	505	1328	1632	765	F5	947	Plug fan
16/08	4309	5745	6566	4082	1328	1632	947	F7	612	0.57	306	0.57	306	306	945	Plug fan	461	505	1481	1632	765	F5	947	Plug fan
18/10	5860	7814	8930	4235	1481	1938	947	F7	612	0.78	306	0.78	306	306	945	Plug fan	614	505	1634	1938	765	F5	947	Plug fan
18/12	7052	9403	10746	4235	1481	1938	947	F7	612	0.93	306	0.93	306	306	945	Plug fan	614	505	1787	1938	765	F5	947	Plug fan
20/10	6918	9224	10541	4235	1634	1938	947	F7	612	0.92	306	0.92	306	306	945	Plug fan	614	505	1787	1938	765	F5	947	Plug fan
20/12	8175	10901	12458	4235	1634	2091	947	F7	612	1.08	306	1.08	306	306	945	Plug fan	614	505	1940	2091	765	F5	947	Plug fan
24/12	10266	13687	15643	4388	1940	2244	947	F7	612	1.36	306	1.36	306	306	1098	Plug fan	614	505	2093	2244	765	F5	947	Plug fan
24/14	12132	16176	18487	4388	1940	2244	947	F7	612	1.60	306	1.60	306	306	1098	Plug fan	614	505	2093	2244	765	F5	947	Plug fan
28/12	12040	16053	18347	4388	2246	2244	947	F7	612	1.59	306	1.59	306	306	1098	Plug fan	614	505	2246	2244	765	F5	947	Plug fan
28/14	14229	18972	21682	4541	2246	2550	1100	F7	612	1.88	306	1.88	306	306	1098	Plug fan	614	505	2246	2550	765	F5	1100	Plug fan
28/16	16418	21891	25018	4541	2246	2550	1100	F7	612	2.17	306	2.17	306	306	1098	Plug fan	614	505	2399	2550	765	F5	1100	Plug fan
32/16	18838	25117	28705	4694	2552	2856	1100	F7	612	2.49	306	2.49	306	306	1251	Plug fan	614	505	2552	2856	765	F5	1100	Plug fan
32/18	21349	28466	32532	4847	2552	2856	1253	F7	612	2.82	306	2.82	306	306	1251	Plug fan	614	505	2552	2856	765	F5	1253	Plug fan
32/20	23861	31815	36359	4847	2552	2856	1253	F7	612	3.16	306	3.16	306	306	1251	Plug fan	614	505	2705	2856	765	F5	1253	Plug fan
36/16	21257	28343	32392	4847	2858	2856	1253	F7	612	2.81	306	2.81	306	306	1251	Plug fan	614	505	2828	2856	765	F5	1253	Plug fan
36/18	24091	32122	36711	5153	2858	3162	1406	F7	612	3.19	306	3.19	306	306	1404	Plug fan	614	505	2858	3162	765	F5	1406	Plug fan
36/20	26926	35901	41029	5153	2858	3162	1406	F7	612	3.56	306	3.56	306	306	1404	Plug fan	614	505	2858	3162	765	F5	1406	Plug fan
40/18	27127	36170	41337	5153	3164	3162	1406	F7	612	3.59	306	3.59	306	306	1404	Plug fan	614	505	3164	3468	765	F5	1406	Plug fan
40/20	30319	40425	46200	5153	3164	3468	1406	F7	612	4.01	306	4.01	306	306	1404	Plug fan	614	505	3164	3468	765	F5	1406	Plug fan

Material classification

Unit Components		Quality Levels	
	Parameter Profiles	Standard	Option
Construction	Out panel	Al-zinc steel sheet	Gal. Steel with powder; aisi304/316/316l,5083-h111/h112
Double-Skinned Construction	Inner panel: Wall and cover	Al-zinc steel sheet	Gal. Steel with powder; aisi304/316/316l, 5083-h111/h112
With Intermediary Insulation	Frame	Al-zinc steel sheet	Gal. Steel with powder; aisi304/316/316l
	Base	Carbon steel with powder coating	Aisi304/316/316l
	Insulation	Thickness 50mm, 48kg/m^3, mineral fibre sheets	Thickness 50mm, 80kg/m^3, rock wool sheets
	Shut-off damper	Aluminum blade with galvanized steel frame	Aluminum blade with aisi304/316/316l frame
	Filter	G3,g4, f5,f7	
	Filter frame	Electrolyte galvanized steel sheet	Aisi304/316/316l
	Electrical air heater	Aisi304 tube and frame	Aisi316/316l tube and frame
Steam Air Heater	Pipes	Copper tube al fins	Copper tube copper fins
			Copper tube al fins with epoxy coating
			Copper tube copper fins with epoxy coating
	Frame	Aisi 304	Aisi 316/316l
	Connections	Copper tube/st painted	
Hot Water Air Heater	Pipes	Copper tube al fins	Copper tube copper fins
			Copper tube al fins with epoxy coating
			Copper tube copper fins with epoxy coating
	Frame	Aisi 304	Aisi 316/316l
	Connections	Copper tube/st painted	
Air Cooler	Pipes	Copper tube al fins	Copper tube copper fins
			Copper tube al fins with epoxy coating
			Copper tube copper fins with epoxy coating
	Frame	Aisi 304	Aisi 316/316l
	Connections	Copper tube/st painted	
	Humidifier	On request	On request
	Silencer casing	Galvanized steel, aisi304	Al-zinc; aisi304/316/316l, 5083-h111/h112
	Silencer cover	Fibre glass	Fibre glass
	Moisture separator	Aluminum	Aisi304/316/316l
Fan	Housing	Galvanized steel with Powder coating	Aisi304/316/316lpowder coating
	Impeller	Steel painted	Aisi304/316/316lpowder coating
	Shaft	Steel	
	Fan motor	Cast iron painted	
	Fan and motor pulley	Steel	

Damper Section

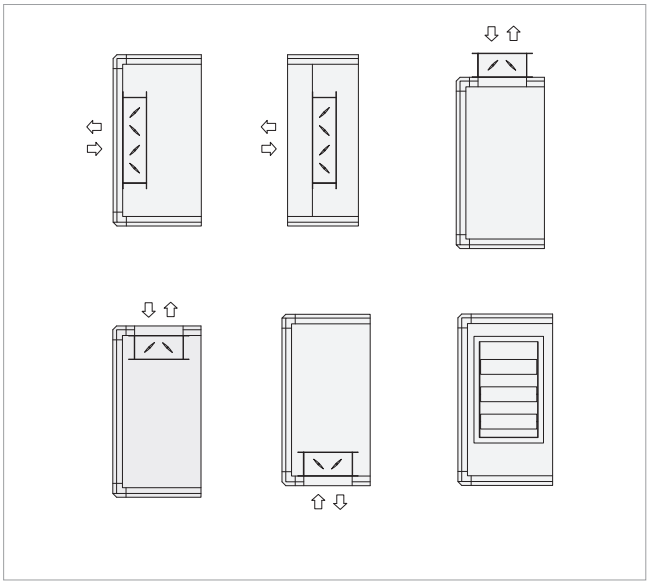
As standard, the air handling unit fitted with fresh air and return air shut-off dampers for air flow balance. The standard dampers blade are made of extruded aluminum and supported on nylon bushings in a sheet steel frame. The shafts are made of stainless steel. Other combinations of material are available on request.

The dampers can be operated manually or automatically by damper motors.

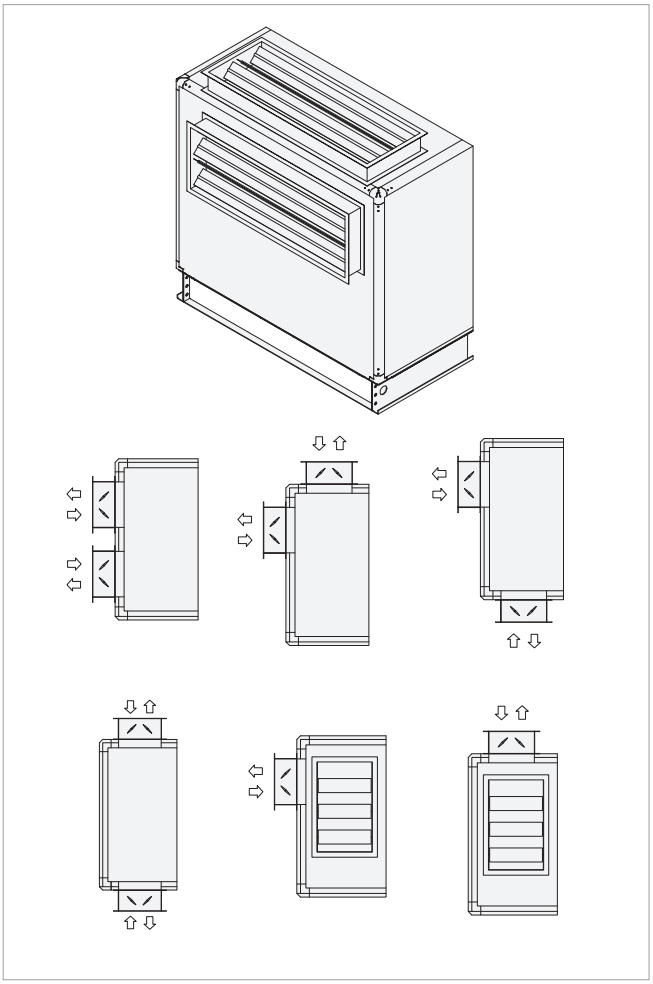
The fresh air and return air dampers can be mounted either inside or outside the air handling unit.

Shut-off damper that mounted outside/inside the air handling unit is shown below.

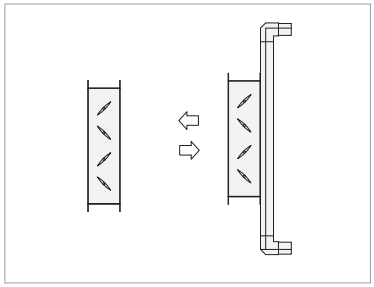
Connection Frame Section



Mixing Section



End Connection Frame



Air Filter Section

The air filters are available in different qualities depending on the degree of air cleaning required, see table below.

Two (2) different types of air filters, panel type and bag type filter, are available.

All bag type filters are provided with vertical pockets.

Pressure difference meter for visual control filter pressure loss are available.

As standard, the panel type filter , (filter class G3, G4) is recommended.

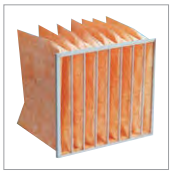
If the degree of air cleaning required is of filter class F7~F9, it is recommended to mount a basic filter as pre-filter.

Filter, panel type

EN7795: 2002 G2, G3, G4, cleanable

Filter, panel type

EN7795: 2002 G2, G3, G4, cleanable



Filter cassettes. Long bag type

Cleanable or disposable, synthetic media

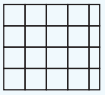
EN779: 2002 ,F5, F6, F7, F8, F9

The different filter types available are listed in the table below:

Dimension and Parameters

Filter Type	Description	Filter Class	Material	Colorimetric Efficiency	Filter Size	Length of Filter Units
Panel Type	Coarse filter	G2 G3 G4	Synthetic medium with aluminium or galvanized steel frame		595*595, 595*295,295*295	46 46 46
Bag Type	Coarse filter	G2 G3 G4	Synthetic medium with aluminium or galvanized steel frame		595* 595, 595*295,295*295	350 350 350
Bag Type	Midium efficiency filter	F5 F7 F8 F9	Glass fibre medium with aluminium or galvanized steel frame	55% 65% 85% 95%	595*595, 595*295,295*295	350 650 650 650

Number of Filter Units per Air Channel

Unit Size	Cassette Arrangement	Air Filter Number				Unit Size	Cassette Arrangement	Air Filter Number			
		595x595	595x295	298x295	295x295			595x595	595x295	298x295	295x295
08/08		1	-	-	-	24/20		6	-	-	3
12/08		1	-	-	1	24/24		9	-	-	-
12/12		1	1	1	1	28/16		6	-	-	2
14/12		1	1	1	1	28/20		9	-	-	3
16/12		2	2	-	-	28/24		9	-	-	3
16/14		2	2	-	-	28/28		8	4	-	-
16/16		4	-	-	-	32/24		12	-	-	-
20/16		4	-	-	2	32/28		12	4	-	-
20/20		4	2	1	2	32/32		16	-	-	-
24/16		6	-	-	-	36/32		16	-	-	4

Air Heaters

The heating function can be provided with heating coils for hot water, steam or electricity.

The heating coils for water and steam are supplied with different numbers of tubes and circuits depending on the heating requirement.

The coils are dimensioned on basis of the counter flow principle.

The length of the heating function depends on the number of tube rows.

The water is supplied and discharged through headers of copper/steel extended through the access side of the unit. As standard, the headers are provided with Flange or BSP connections.

All the water heating coils are provided with a drain screw. Air relief connections are available.

The heating coils are mounted in rails in the unit. This means that the coils can easily be pulled out for inspection and maintenance after removal of the pipe connections, the access side panels and the bolts which fasten the coils to the sections.

Air Heater for Hot Water

The heating coils for water consist of copper tubes with aluminum or copper fins housed in a stainless sheet steel frame. Other material combinations are available on request.

- Tubes/fins: Cu/Al, Cu/ Cu,Cu/ CuSn corropaint
- The heresite coating, Epoxy Coating for fins are available.
- Max. permissible operating pressure: 10/16bar
- Max. permissible operating temperature: 190/100℃

Air Heater, Steam

The heating coils for steam consist of tubes fins housed in a stainless sheet steel frame. Other materials are available on request.

- Tubes/fins: Cu/Al, Cu/Cu, Steel/Al, Steel/Steel
- The Heresite coating, Epoxy Coating for fins are available.
- Max. permissible operating pressure: 10/16bar
- Max. permissible surface temperature: 185℃

Air Heater, Electric

- Frame Material : Stainless sheet steel; Galvanized sheet steel
- Tubes/fins: Stainless steel 304, 316
- Safety thermostats: 75℃ automatic reset and 110℃ manual reset.
- Voltage: 3*230 / 3*400 / 3*415 / 3*440V / 3*480

Technical Specification	Hot water heating coil	Steam Heating Coil
Pipes	Cu 3/8" *0.41, 1/2" *0.41, 5/8" *0.41, cu	Cu 3/8" *0.75, 1/2" *0.75, 5/8" *0.75 Stainless steel 5/8"
Pipe Division	25.4*22, 31.75*27.5, 38.1*33	25.4 * 22, 31.75 * 27.5, 38.1* 33 for copper pipes, 38*33 for st pipes
Fins	Cu 0.15mm, al 0.15mm	
Fin Space	2.1 mm,2.3mm, 2.5 mm or 3.2 mm	2.1 mm, 2.3mm,2.5 mm or 3.2 mm
Vent Connection	Yes	Yes
Drain Screw	Yes	Yes
Max. Working Pressure	10 bar	16bar
Max. Working Temperature	100.°c	180.°c
Position	Right (r), left (l)	Right (r), left (l)

Air Cooler for Chilled Water or Direct Expansion

The cooling coils consist of copper tubes with aluminium or copper fins with stainless steel frame.

The cooling coils are used for cooling and dehumidification.

The coils are available with different numbers of pips and circuits, depending on the cooling requirement. The fin pitch is variable of 2.1 mm, 2.3mm,2.5 mm or 3.2 mm

The coils consist of copper tubes and fins.

The water is supplied and discharged through headers of copper/steel extended through the access side of the unit. As standard, the headers are provided with Flange or BSP connections.

All the cooling coils are provided with a drain screw.

Air relief connections are available.

Special Water Trap

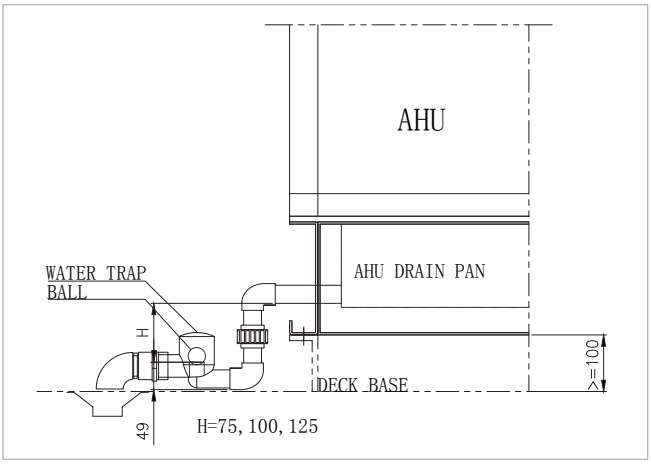
It is beneficial to use BlueConnect special water trap for drains from wet sections.

Note: there are two drains from the drip pan on cooling coils.

The advantage of this special water trap compared to others of more traditional design, is that it has an integral non-return valve. When the water in the water trap has evaporated, there is no need of filling housed in a stainless sheet steel frame. Other material combinations are available on request.

The marine type drop pan, made of stainless steel sheet, is provided with two drains, dia. 32mm or 40mm.

The cooling coils are mounted in rails in the unit.



Cooling Coil Parameters:

Technical specification	Cooling Coil
Pipes	Cu 3/8"*0.41, 1/2"*0.41, 5/8" *0.41, Cu
Pipe division	25.4*22, 31.75 * 27.5, 38.1*33
Fins	CU 0.15mm, Al 0.15mm
Fin space	2.1mm, 2.3mm, 2.5 mm or 3.2mm
Vent connection	yes
Drain screw	yes
Max. working pressure	10 bar
Position	Right (R), Left (L)

- Tubes/fins: Cu/Al, Cu/Cu, Cu/CuSn, Corropaint
- The Heresite coating, Epoxy Coating for fins are available
- Max. permissible operating pressure: 10/16bar

Humidifiers

Available humidifiers

- Steam humidifier
- Jet Spray compressed air and water spray humidifier
- Evaporator humidifier

Evaporator humidifier with humidifier fills made of aluminium or glass fibre.

Unit section for humidifier consists of an empty section with drain tray made of stainless steel, and a support for installation of steam distribution lances.

Steam Humidifier

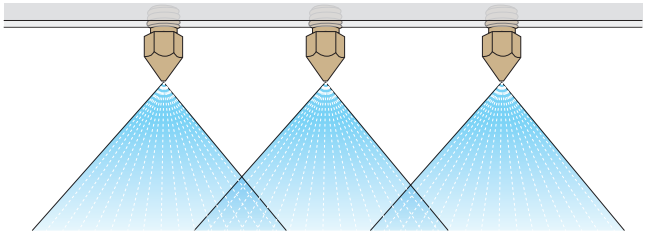
The operation of immersed electrode humidifiers is based on a very simple physical principle. As common drinking water contains a certain quantity of dissolved mineral salts, and is consequently slightly conductive, applying a voltage to metal electrodes immersed in the water creates an electric current that heats the water until producing steam (Joule effect). The quantity of steam produced is proportional to the electric current, which is in turn proportional to the water level.

This electric current is measured by a current transformer: by varying the level of water using a drain solenoid valve and due to the evaporation process, the current, and consequently steam production, can be modulated. As the steam produced does not carry mineral salts, the salt concentration in the water and therefore the conductivity increases, and has to be periodically diluted by draining part of it using the drain pump and replacing it with new water.

Jet Spray Compressed Air and Water Spray Humidifier:

Jet Sprays precision engineered self-cleaning nozzles have the lowest air consumption of any air/water humidifier.

The Jet Spray humidifier uses 90% less energy than electric steam humidifiers.

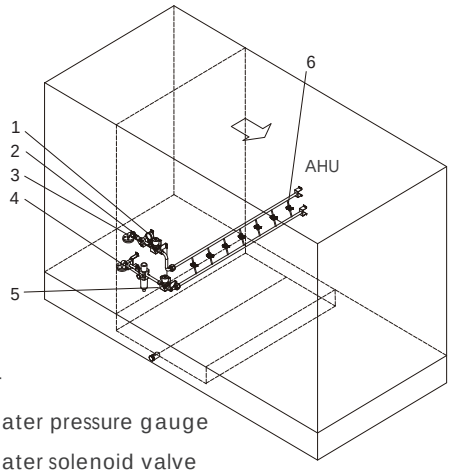


A compressed air and water humidifier offers guaranteed evaporation of the moisture into the atmosphere without any potential risk of drips. By forcing the water to mix with the air under pressure the sprays produced are rapidly absorbed and highly directional.

Unlike spot humidifiers that deliver high humidification outputs to the local area and rely on air movement to disperse the humidity, the Jet Spray evenly introduces moisture across AHU. The nozzles are strategically positioned to consistently spread the humidification with no areas of high or low humidity.

The Jet spray is a sealed system with no open water tanks, minimizing the risk of water contamination, using drinking water supply line promoting hygienic operation.

Excellent moisture distribution is guaranteed by the choice of nozzle capacity, suitable spacing on the manifold, correct positioning of the manifold in the AHU and the capacity to change the orientation in relation to the airflow.

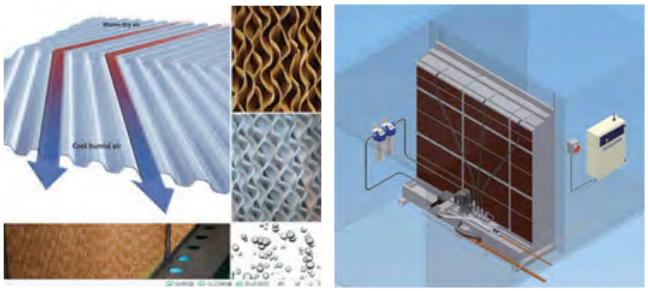


1 Strainer
2 Fresh water pressure gauge
3 Fresh water solenoid valve
4 Compressed air pressure reducing valve
5 Compressed air solenoid valve
6 Spray nozzle

Drop Separator for AHU

The droplet separator has the purpose of capturing the droplets of water that have not completely evaporated to prevent them passing beyond the evaporative humidification/cooling section. It is supplied in easy-to-assemble modular panels to cover the cross-section of the AHU.

Evaporator Humidifier



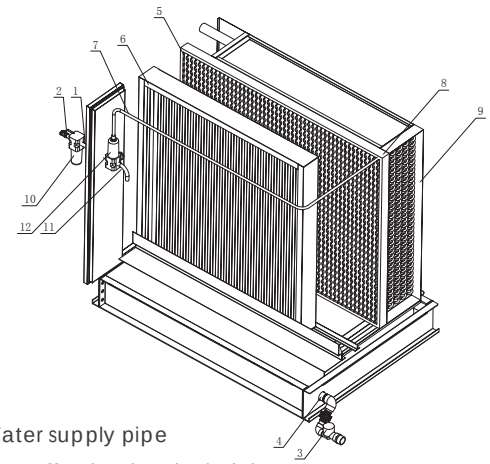
Evaporative humidifiers provide humidification and cooling without any aerosols in the AHU. This means they can be situated in short section lengths without the risk of wetting on bends. As minerals left behind after evaporation are regularly flushed to drain, service requirements are considerably less than steam humidification.

Fresh water is pumped to the top of the evaporative module and flows down the corrugated surfaces of the evaporative cassettes. As air passes through the module it is humidified and cooled without droplets.

Touch screen control panel.

Features:

- Very low energy consumption
- High humidification & cooling duties from a single unit
- Instant evaporation requiring very short section length

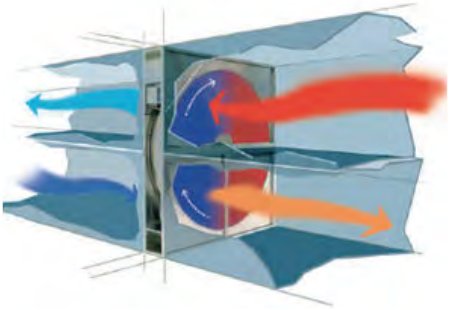


1 Water supply pipe
2 Shut-off valve (not include)
3 Water trap (accessory)
4 Drain pipe
5 Humidifier fill
6 Droplet eliminator (option)
7 Spray pipe
8 End plug
9 Side wall
10 Water filter, max. 500mm mesh (not include)
11 Hose connection for cleaning by flushing (not include)
12 Pulse valve and constant flow valve

Heat Recovery

Rotary heat exchanger

The rotary heat exchanger is used for recovering and transferring heat or cooling energy and, if required, moisture from the extract air to the supply air. The system is especially beneficial for installations, where high temperature and humidification efficiency is desirable.



General principle of rotary heat exchanger

Rotary heat exchangers belong to the group regenerative heat exchangers. Rotor movement means that exhaust air and supply air pass the rotor medium alternately. A major proportion of the energy in the exhaust air is transferred to the supply air via the rotor medium. Thanks to the alternating airflow direction, the rotor is self-cleaning and frost proof to a large extent.

The ability to recover both thermal (sensible) and humidity (latent) energy makes rotary heat exchangers very efficient. Efficiency between 70 – 90 % with a pressure drop under 200 Pa is normal for rotary heat exchangers. And efficiency is easily adjusted by regulating motor RPM.

Sorption rotors provide an excellent method of cooling and de-humidifying outdoor air before it reaches the air handling unit cooling coil.

-Direct investment pay off
-Lower investment cost in cooling capacity
-Lower energy consumption in cooling period
-Better indoor air quality
-Minimum carry over
-Increased humidity in winter season
-Lower investment and running costs for humidification
-Better performance for dry cooling systems
-Increased cooling capacity in existing systems
-5 – 10 °C lower freezing temperature

The energy recovery unit consists of a casing, a hygroscopic rotor, and a drive unit. The recovery unit can be installed for:

– Horizontal air flow
– Cooling and heat recovery

Frame material: Galvanized with powder-coated, stainless sheet steel is available.

Rotor: Aluminium with 2.5% magnesium content sea water resistant foil for marine applications.

Heat Recovery Calculation

According to the fundamental laws of thermodynamics, heat energy is transported from the warmer to the cooler substance. Similarly, during the winter, sensible heat energy in extract air is transferred to the storage mass and from the storage mass to the cooler outdoor air. The amount of heat transfer is generally specified by the temperature efficiency.

The temperature efficiency of rotary heat exchangers in counter flow operations is usually between 70 % and 90 % and for the supply air side is calculated according to the following equation:

$\eta_t = (t_{22} - t_{21}) / (t_{11} - t_{21})$

Temperature efficiency can be determined relatively easily in terms of both measurement and theory. It is largely dependent on the size of the heat transfer surface area, rotor material, air speed through the storage mass channels and rotor speed.

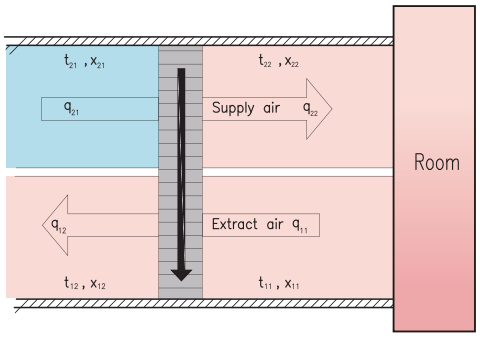


Fig. Temperature and humidity designation

An important parameter that affects temperature efficiency is the face velocity on the rotor surface.

The Reynold number inside the storage mass is very low, which results in laminar airflow.

The larger the supply air flow is in relation to the extract airflow, the lower the temperature efficiency. Rotor speed should be around 12 rpm for optimal heat recovery. If rpm is reduced, temperature efficiency drops.

Furthermore, temperature efficiency is not dependant on the relationship of air temperature, which makes it easier to calculate the recovery rate for varying air temperatures.

Humidity Recovery

Humidity efficiency depends on temperature and humidity content in outdoor air and extract air; it is defined by the following equation:

$\eta_x = (x_{22} - x_{21}) / (x_{11} - x_{21})$

In general, there are 2 humidity transfer principles:

-Humidity transfer via condensation and evaporation (condensation rotors)
-Humidity transfer via physical adsorption and desorption (hygroscopic or sorption rotors)

Centrifugal Fans/plug Fans

Belt-Driven Centrifugal Fans

Fans with spiral casing and forward or backward-curved blades specifically designed for air conditioning and ventilation. The fan unit – consisting of a fan, motor, V-belt drive and base frame is mounted on spring anti-vibration mountings. The fan's outlet flange is connected to the unit with a flexible connection so that vibrations from the fan are not transferred to the unit.

Fans with Forward-Curved Blades

The fan is characterized by small dimensions in relation to pressure and airflow rate and by a low sound level. The fan type is suitable for system with low and medium pressure and relatively constant system resistance.

Fans with Backward-Curved Blades

These fans are highly efficient and thus provide good operating economy. The sound level id low in relative to the fan performance. The design of this fan type makes it well suited for installation in which the system resistance varies, as these variations cause only moderate changes in air flow rate and power consumption.

Material

Galvanized sheet steel / stainless sheet steel

Options

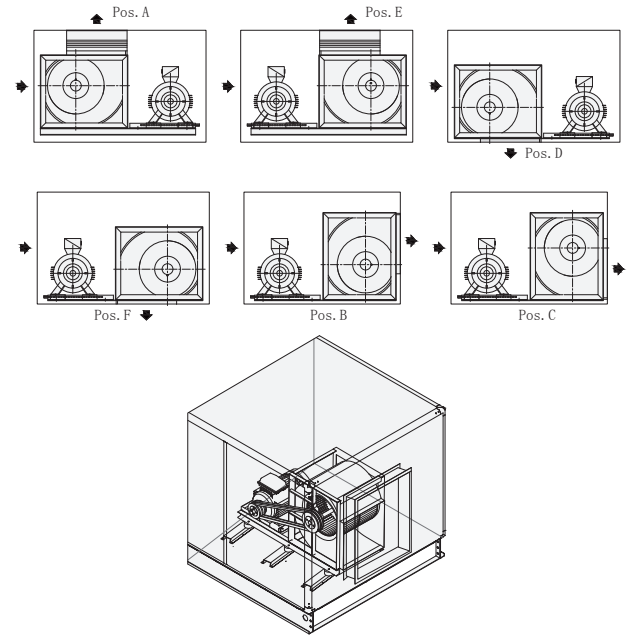
- With air flow measurement
- Spark-proof fans
- With bimetallic / thermistor type thermal relays in the motor
- Belt drive with V-belts/flat belt
- Rubber / steel spring anti-vibration mountings
- VFD type

Inlet

—Unit cross section / backside / roof /bottom

Outlet Positions

—Forward / upwards / downwards



Direct-Driven Plug Fans:

Plug fans are especially well-suited for hygienic applications. The lack of fan casing and driven-belt makes the fan simple to clean and more reliable. Since the fan can be balanced for low vibration levels, it is well-suited for applications in which vibration-free operation is required.

Material

Galvanized sheet steel / stainless sheet steel

Options

- With air flow measurement
- Spark-proof fans
- With bimetallic/thermistor type thermal relays in the motor
- Rubber / steel spring anti-vibration mountings

Inlet

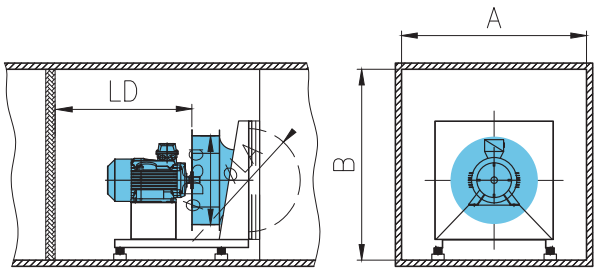
—Unit cross section

Outlet

—Forward / upwards / towards backside.

Variable Rpm Regulation by Means of Frequency Inversion

- The use of motor directly driven fans mans that the working range restrict in the maximum permissible motor RPM.
- Therefore, frequency inverters are used together with the plug fans.



Installation instruction

Distances to other components

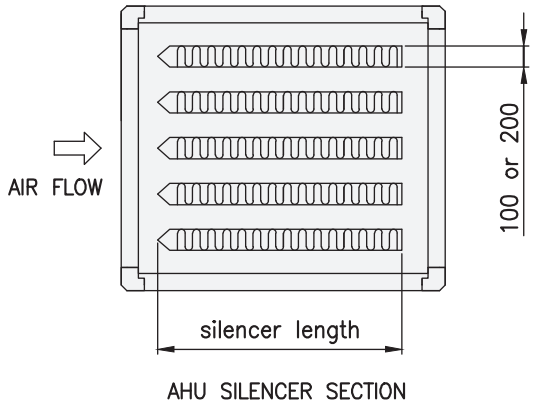
Distance on the suction side: LA ≥ 0.5*DSa

In the case of disturbance flow (per example curved pipe at the suction side, flaps etc.): LA ≥ 1*DSa

Distance on the duct side: LD ≥ 1*DSa

Housing wall distances: A ≥ 1.8*DSa; A = B

Silencers



Absorption silencer consist of functions with lengths 600, 900,1200mm equipped with a number of vertical sound-absorbing baffles 100, or 200mm thick.

The silencers can be directly connected to other sections with full cross section.

The baffle elements contain incombustible, sound absorbing mineral wool slabs protected by a woven outer layer which prevent entrainment of wool fibres by the airflow.

Baffle elements are available in versions for fry or wet cleaning.

Material: Galvanized sheet steel / stainless sheet steel

Inspection door: with/without.

With drawable sound baffles: yes/no.

Sound Attenuation (dB)

Silencer Length (mm)		Octave Band Frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
600	△L(dB)	2	4	9	19	26	24	17	11
900	△L(dB)	2	6	15	26	37	34	21	13
1200	△L(dB)	3	7	18	30	42	41	25	16

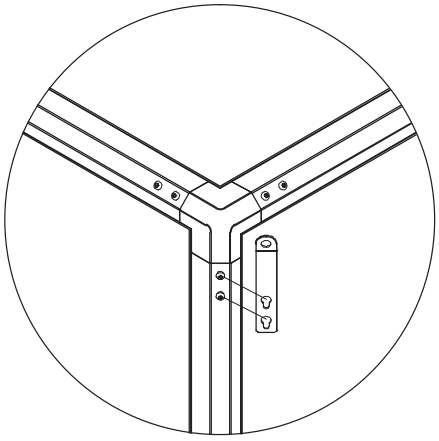
△L: Sound attenuation

Accessories

Lifting lugs / lifting wires

Proposal A

The lifting lugs to the upper corner pieces of the unit.
Max. permissible load with 4 lifting lugs is 1050kg



Proposal B

The lifting lugs to the lower corner pieces of the unit.
Max. permissible load with 4 lifting lugs is 3000kg

Proposal C

Lifting tubes
Max. permissible load with
2 lifting tubes is 6000kg

Inspection Window
With one or two Plexiglas
panes

Base frame

A very stable and torsionally rigid base frame, either for whole unit or for one several blocks.

The frame of the air handling unit is secured to the base frame by means of brackets.

The length and width of the base frame shall be selected to suit the size of the air handling unit and the combination of function sections.

Water trap

Light fitting

Manometer

For measure the pressure drop across the filter.
Measurement range: up to 500/1000/2500Pa

Differential pressure gauge
Flush-mounted in the inspection door.
Measurement range: up to 250/500Pa

MARINE WATER COOLED PROVISION CONDENSING UNIT

- Marine type anti-corrosion paint and coating.
- Reciprocating or scroll type compressor.
- Motor coupling direct driven for open type compressor as standard, motor belt driven as option.
- Mechanically cleanable sea water cooled or fresh water cooled shell and tube type condensers.
- Oil separator for reciprocating compressor.
- Liquid receiver.
- Suction accumulator with heat exchanger.
- Dry filter, refrigerant, oil and water pressure switch and other fittings.
- Cooling water inlet/outlet thermometers.
- Direct starter, part wind starter for 4 cylinder compressor as option.
- AC 440~480V/3PH/60Hz, AC 380~415V/3PH/50Hz, AC 690V/3PH/60Hz multiple power feeding is available.
- Two condensing units to be installed on one common skid as standard.

Following accessories can be option supplied:

- Unit vibration dampers
- Flexible hose for water inlet/outlet piping
- Flexible connection for refrigerant piping
- VFD controller for compressor

Introduction

BlueConnect marine water-cooled provision condensing units are special designed for marine use as the part of direct expansion refrigerant circuit provision refrigerant system.

Name principle

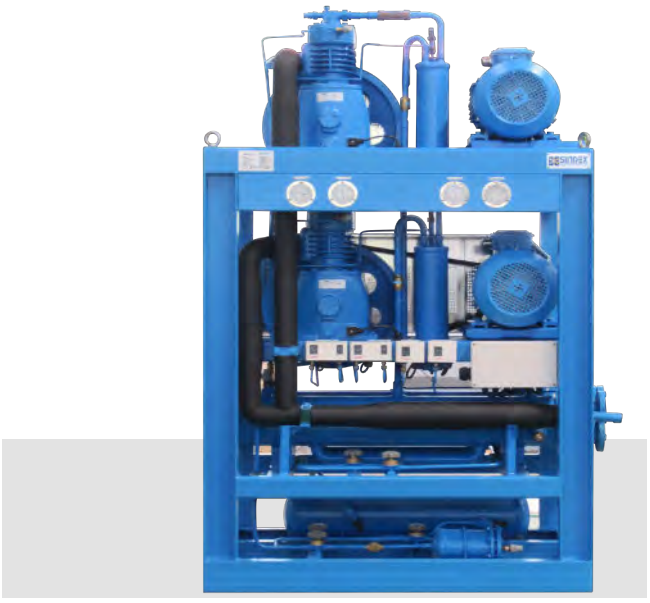
Function	Standard Code					Addtional Code			Descrpition
Sample	T	MCU	-	4HE	035	S	C	2	
	T								Twin units on one common skid
Cooling Type		MCU							Water cooled
		MACU							Air cooled
Compressor				4HE					Compressor model code
Capacity (Kw)					035				Each Condenser heating rejection
Cooling Medium						S			Sea water cooled
						F			Fresh water cooled
Refrigerant							A		R404A
							B		R134a
							C		R407C
							D		R417A
Power Source								1	AC380V-415V/3PH/50Hz
								2	AC440V-480V/3PH/60HZ
								3	AC690V/3PH/50HZ
								4	AV690V/3PH/60HZ

Unit type: The unit can be divided into semi-hermetic reciprocating type and open reciprocating type based on compressor type.

Open type reciprocating compressor unit:

Open Reciprocating compressor can be use for all type refrigerant, due to the open drive design, standard motors can be attached to the compressors via coupling housing or belt drive. Reliability and easy maintenance have made them popular options for years. The pressure oil lubrication is by means of reversible gear pump. Depth oil crankcase with oil heater ensure the compressor is well lubricated, Compressor fitted suction and discharge stop valves.

All 4,6 cylinder single stage compressor are available with capacity control, the possible residual capacity is 50% for 4 cylinder compressor, also step-less capacity regulation can be obtained by fitted with variable frequency motor for open type compressor.



Semi-hermetic reciprocating compressor unit:

This type compressor has fitted motor built-in compressor housing, the motor is without shaft seal and thereby have reduced risk of leakage. The motor is cooled by suction refrigerant gas and no need space heater. The pressure oil lubrication is by means of reversible gear pump. Marine type depth oil crankcase with oil heater ensure the compressor is well lubricated, Compressor fitted suction and discharge stop valves.

All 4 cylinder single stage compressor are available with capacity control, the possible residual capacity is 50%, also step-less capacity regulation can be obtained by fitted with variable frequency convertor.

Condenser

- Shall be mechanically cleanable shell-and-tube type with removable heads.
- Tubes shall be internally-enhanced, seamless-copper type for fresh water-cooled condensers, for sea water cooled condensers, the tubes shall be B10 Cu/Ni material, B30 Cu/Ni tubes are available, and shall be rolled into tube sheets, for sea water cooled condensers, the SUS316L, Aluminum-bronze, Sacrificial anode end cover are available.
- Shall be equipped with Flange or Victaulic water connections.
- Fitted with safety valves, purge valves.
- Fitted with refrigerant liquid level sight glass.
- ASME, NR60, and Class certificate can be provide as option.

Finish

Unit color: RAL5002 as standard, other color to be available as option.

Physical data - semi-hermetic reciprocating compressor unit (R404A refrigerant)

Model		MCU-2FE/008	MCU-2EE/010	MCU-2DE/012	MCU-4FE/015	MCU-4EE/020	MCU-4DE/025	MCU-4CE/030	MCU-4TE/035	MCU-4PE/040	MCU-4NE/048	MCU-4HE/065	MCU-4GE/075
Normal Cooling Capacity	kW	2.7	3.5	4.1	5.7	7.1	8.4	10.4	12.7	14.0	17.4	23.8	27.5
Compressors		Semi-hermetic reciprocating compressor											
Capacity Regulation	%	0-100			0-50-100								
Speed	rpm	1750											
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil pressure switch, compressor overload, compressor phase absence protection											
Condenser		Horizontal shell and tube type, fresh or sea water cooled											
Sea/fresh Water Flow	m^3/h	1.4	2.1	2.4	3.4	4.2	4.9	6.2	7.6	8.6	10.4	13.8	15.9
Water Connection		Counter flanges											
Inlet/Outlet	dn	20	20	20	25	32	32	32	40	40	40	50	50
Refrigerant		R404A											
Dimension													
Length	mm	1120	1120	1120	1120	1120	1120	1120	1320	1320	1320	1520	1520
Width	mm	750	750	750	750	750	750	750	850	850	850	1000	1000
Height	mm	1260	1260	1260	1300	1300	1300	1300	1450	1450	1450	1750	1750
Net Weight	kg	345	350	355	395	405	415	425	700	715	735	830	845
Operation Weight	kg	348	354	360	401	412	423	435	720	740	765	880	900
Electrical Data 60Hz													
Power Source		AC 440V~480V 3PH 60Hz											
Control Power		AC 220/230V 1PH 60Hz											
Power Input	kW	1.92	2.17	2.54	3.61	4.43	5.2	6.37	7.44	8.2	10.11	13.78	15.95

-Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/41℃, condenser fouling factor=0.000044m^2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.
-The length of the unit not include the length of condensing cooling water connection pipe, about 150mm~200mm.

Physical data - semi-hermetic reciprocating compressor unit (R407C refrigerant)

Model		MCU-2FE/008	MCU-2EE/010	MCU-2DE/012	MCU-4FE/015	MCU-4EE/020	MCU-4DE/025	MCU-4CE/030	MCU-4TE/035	MCU-4PE/040	MCU-4NE/048	MCU-4HE/065	MCU-4GE/075
Normal Cooling Capacity	kW	2.7	3.0	3.4	4.4	5.6	6.6	8.6	10.6	11.6	14.1	18.1	22.4
Compressors		Semi-hermetic reciprocating compressor											
Capacity Regulation	%	0-100			0-50-100								
Speed	rpm	1750											
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil pressure switch, compressor overload, compressor phase absence protection											
Condenser		Horizontal shell and tube type, fresh or sea water cooled											
Sea/fresh Water Flow	m^3/h	1.7	1.8	2.1	2.8	3.5	4.1	5.3	6.6	7.4	8.8	11.6	13.9
Water Connection		Counter Flanges											
Inlet/Outlet	dn	20	20	20	25	32	32	32	40	40	40	50	50
Refrigerant		R404A											
Dimension													
Length	mm	1120	1120	1120	1120	1120	1120	1120	1320	1320	1320	1520	1520
Width	mm	750	750	750	750	750	750	750	850	850	850	1000	1000
Height	mm	1260	1260	1260	1300	1300	1300	1300	1450	1450	1450	1750	1750
Net Weight	kg	335	340	345	385	395	405	415	690	705	725	820	835
Operation Weight	kg	338	344	350	491	402	413	425	710	730	755	870	890
Electrical Data 60Hz													
Power Source		AC 440V~480V 3PH 60Hz											
Control Power		AC 220/230V 1PH 60Hz											
Power Input	kW	1.7	1.8	2.1	2.7	3.4	4.0	5.1	6.1	6.7	8.1	10.8	13.2

-Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/41℃, condenser fouling factor=0.000044m^2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.
-The length of the unit not include the length of condensing cooling water connection pipe, about 150mm~200mm.

Physical data - open type reciprocating compressor unit, belt driven (R404A refrigerant)

Model		MCU-FKX20/010-A	MCU-FKX20/012-A	MCU-FKX30/018-A	MCU-FKX30/021-A	MCU-FKX30/025-A	MCU-FKX30/028-A
Max. Cooling Capacity	kW	3.0	4.1	6.7	7.9	9.3	9.9
Compressors		Open type reciprocating					
Capacity Regulation*	%	0-100					
Max. Speed	rpm	1750					
Driven		Motor belt driven					
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil level switch					
Condenser		Horizontal shell &tube type, fresh/sea water cooled					
Sea/fresh Water Flow	m^3/h	1.5	2.1	3.1	3.7	4.3	4.8
Water Connection		Counter flanges					
Inlet/Outlet	DN	20	20	25	25	32	32
Refrigerant		R404A					
Length	mm	1120	1120	1120	1120	1120	1120
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1200	1200	1260	1260	1260	1260
Net Weight	kg	590	610	665	690	720	730
Operation Weight	kg	610	625	685	710	745	760
Electrical Data 60Hz							
Power Source		AC 440V~ 480V/3PH/60Hz					
Control Power		AC 220/230V 1PH 60Hz					
Compressor Power Input	kW	1.87	2.7	3.7	4.39	5.16	5.66
Motor Power Output	kW	3.45	4.6	6.33	6.33	8.6	8.6

-Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/41℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.
-The length of the unit not include the length of condensing cooling water head pipe, about 150mm~200mm.
* Unit capacity regulation can be step-less by using VFD Motor.

Physical data - open type reciprocating compressor unit, belt driven (R407C refrigerant)

Model		MCU-FKX20/008-C	MCU-FKX20/010-C	MCU-FKX30/012-C	MCU-FKX30/018-C	MCU-FKX30/014-C	MCU-FKX30/021-C
Max. Cooling Capacity	kW	2.4	3.6	4.7	5.6	6.6	7.8
Compressors		Open type teciprocating					
Capacity Regulation*	%	0-100*					
Max. Speed	rpm	1750					
Driven		Motor belt driven					
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil level switch					
Condenser		Horizontal shell &tube type, fresh/sea water cooled					
Sea/fresh Water Flow	m^3/h	1.2	1.8	2.4	2.8	3.3	4.0
Water Connection		Counter flanges					
Inlet/Outlet	DN	20	20	25	25	32	32
Refrigerant		R407C					
Length	mm	1120	1120	1120	1120	1120	1120
Width	mm	1100	1100	1100	1100	1100	1100
Height	mm	1200	1200	1260	1260	1260	1260
Net Weight	kg	590	610	665	690	720	730
Operation Weight	kg	610	625	685	710	745	760
Electrical Data 60Hz							
Power Source		AC 440V~ 480V/3PH/60Hz					
Control Power		AC 220/230V 1PH 60Hz					
Compressor Power Input	kW	1.6	2.2	3.1	3.7	4.3	5.1
Motor Power Output	kW	3.45	4.6	6.33	6.33	8.6	8.6

-Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/41℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.
-The length of the unit not include the length of condensing cooling water head pipe, about 150mm~200mm.
* Unit capacity regulation can be step-less by using VFD Motor.

Physical data—open type reciprocating compressor unit, coupling driven (R404A refrigerant)

Model		MCU-FKX20/010-A	MCU-FKX20/012-A	MCU-FKX30/018-A	MCU-FKX30/021-A	MCU-FKX30/025-A	MCU-FKX30/028-A
Max. Cooling Capacity	kW	3.0	4.1	6.7	7.9	9.3	9.9
Compressors		Open type reciprocating					
Capacity Regulation*	%	0-100*					
Max. Speed	rpm	1750					
Driven		Motor coupling direct driven					
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil level switch					
Condenser		Horizontal shell &tube type, fresh/sea water cooled					
Sea/fresh Water Flow	m^3/h	1.5	2.1	3.1	3.7	4.3	4.8
Water Connection		Counter flanges					
Inlet/Outlet	DN	20	20	25	25	32	32
Refrigerant		R404A					
Length	mm	1120	1120	1120	1120	1120	1120
Width	mm	750	750	750	750	750	750
Height	mm	1200	1200	1260	1260	1260	1260
Net Weight	kg	510	560	615	640	670	680
Operation Weight	kg	520	575	635	660	695	710
Electrical Data 60Hz							
Power Source		AC 440V~ 480V/3PH/60Hz					
Control Power		AC 220/230V 1PH 60Hz					
Compressor Power Input	kW	1.87	2.7	3.7	4.39	5.16	5.66
Motor Power Output	kW	3.45	4.6	6.33	6.33	8.6	8.6

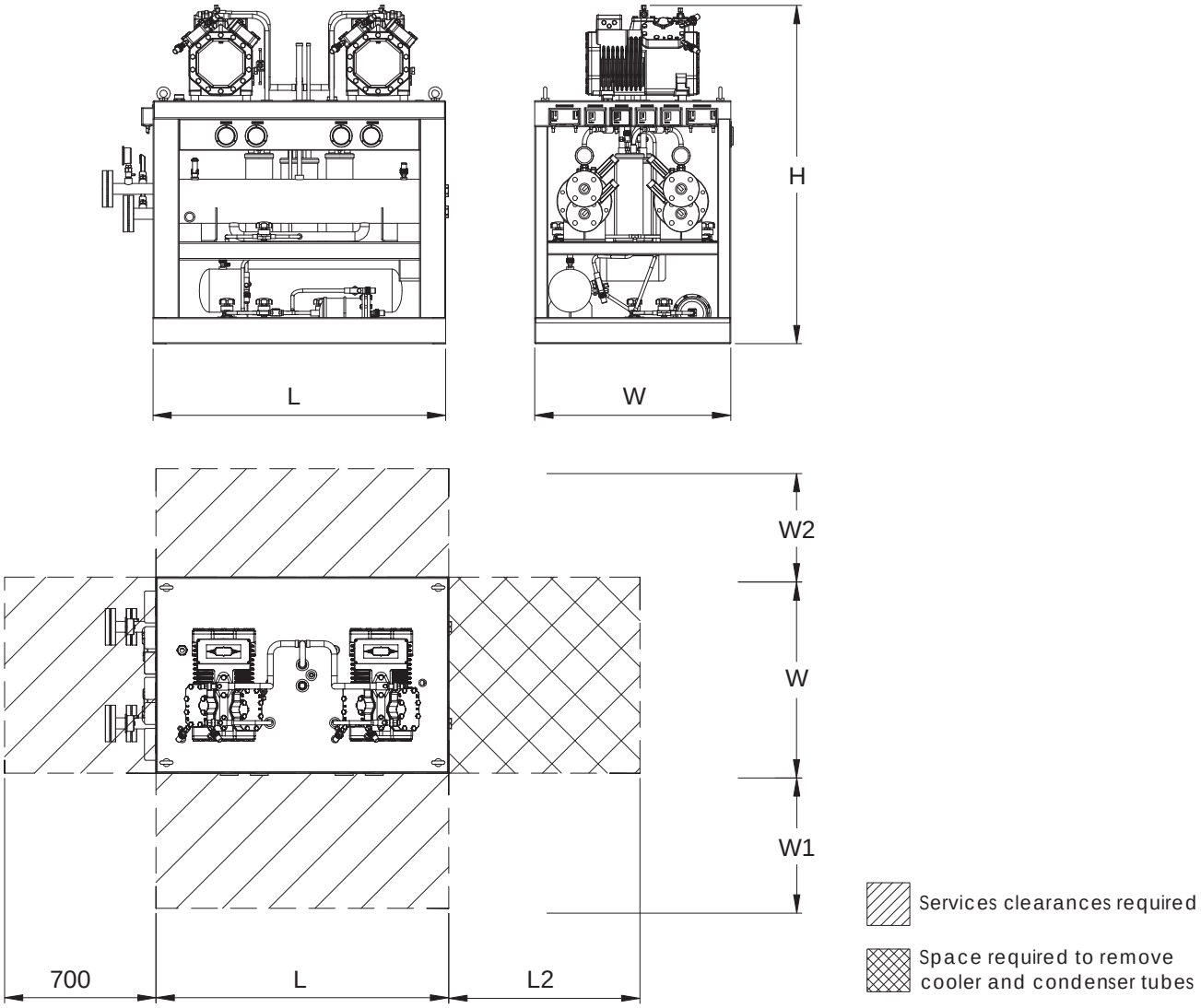
-Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/41℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.
The length of the unit not include the length of condensing cooling water head pipe, about 150mm~200mm
*Unit capacity regulation can be step-less by using VFD Motor.

Physical data—open type reciprocating compressor unit, coupling driven (R407C refrigerant)

Model		MCU-FKX20/008-C	MCU-FKX20/010-C	MCU-FKX30/012-C	MCU-FKX30/018-C	MCU-FKX30/014-C	MCU-FKX30/021-C
Max. Cooling Capacity	kW	2.4	3.6	4.7	5.6	6.6	7.8
Compressors		Open type reciprocating					
Capacity Regulation*	%	0-100*					
Max. Speed	rpm	1750					
Driven		Motor coupling direct driven					
Protection Devices		Refrigerant high/low pressure switch, cooling water pressure switch, oil level switch					
Condenser		Horizontal shell &tube type, fresh/sea water cooled					
Sea/fresh Water Flow	m^3/h	1.2	1.8	2.4	2.8	3.3	4.0
Water Connection		Counter flanges					
Inlet/Outlet	DN	20	20	25	25	32	32
Refrigerant		R407C					
Length	mm	1120	1120	1120	1120	1120	1120
Width	mm	750	750	750	750	750	750
Height	mm	1200	1200	1260	1260	1260	1260
Net Weight	kg	510	560	615	640	670	680
Operation Weight	kg	520	575	635	660	695	710
Electrical Data 60Hz							
Power Source		AC 440V~ 480V/3PH/60Hz					
Control Power		AC 220/230V 1PH 60Hz					
Compressor Power Input	kW	1.6	2.2	3.1	3.7	4.3	5.1
Motor Power Output	kW	3.45	4.6	6.33	6.33	8.6	8.6

-Standard condition: fresh water cooled condenser entering /leaving water temperature 36℃/41℃, condenser fouling factor=0.000044m^2k/w.
Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m^2k/w.
-The length of the unit not include the length of condensing cooling water head pipe, about 150mm~200mm
*Unit capacity regulation can be step-less by using VFD Motor.

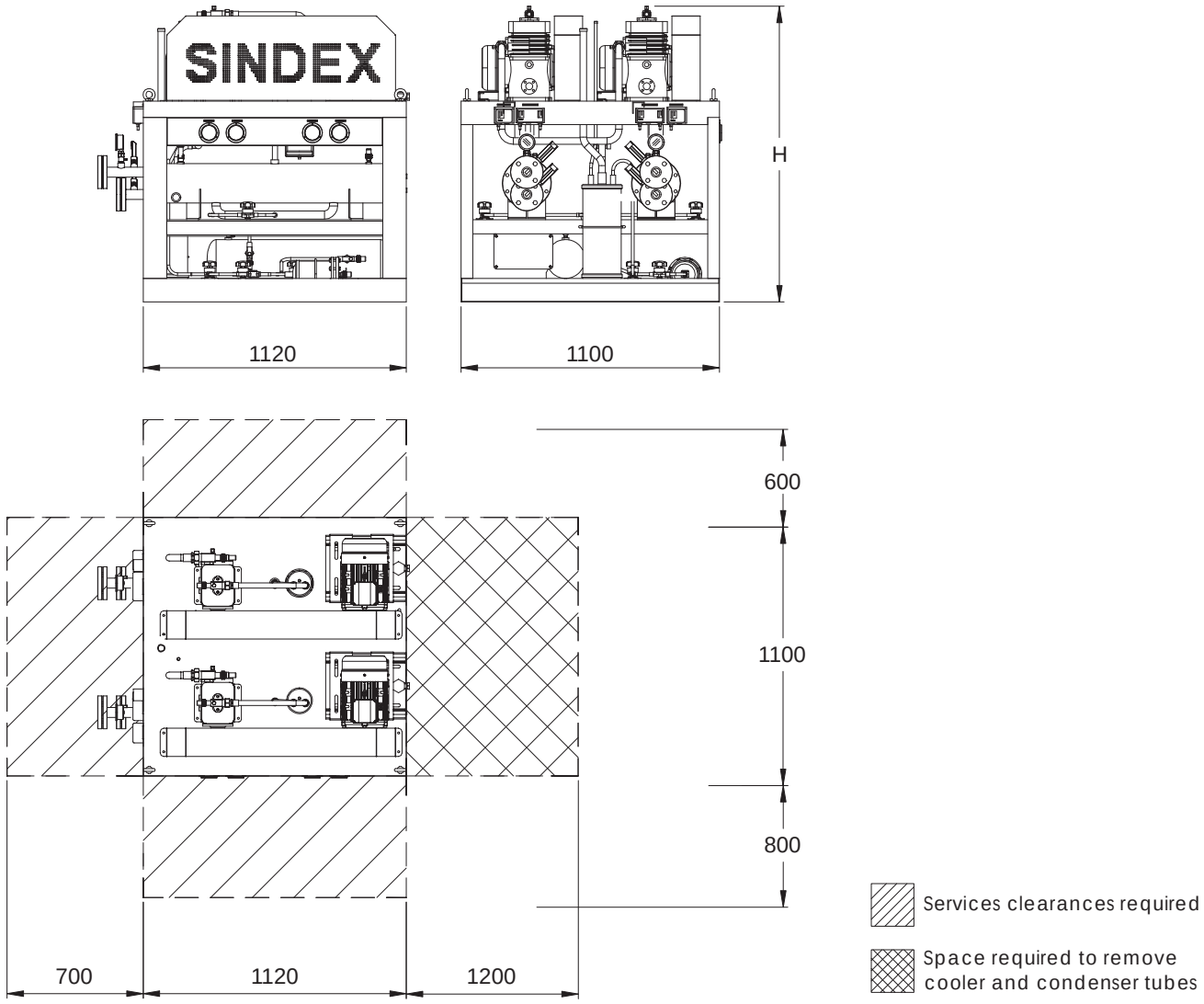
Typical overall drawing for semi-hermetic compressor unit



Dimension

Model	MCU-2FE/008	MCU-2EE/010	MCU-2DE/012	MCU-4FE/015	MCU-4EE/020	MCU-4DE/025	MCU-4CE/030	MCU-4TE/035	MCU-4PE/040	MCU-4NE/048	MCU-4HE/065	MCU-4GE/075
L mm	1120	1120	1120	1120	1120	1120	1120	1320	1320	1320	1520	1520
W mm	750	750	750	750	750	750	750	850	850	850	1000	1000
H mm	1260	1260	1260	1300	1300	1300	1300	1450	1450	1450	1750	1750
L2 mm	1300	1300	1300	1300	1300	1300	1300	1500	1500	1500	1500	1500
W1 mm	800	800	800	800	800	800	800	800	800	800	800	800
W2 mm	600	600	600	600	600	600	600	600	600	600	600	600

Typical overall drawing for open type compressor unit, motor belt direct driven

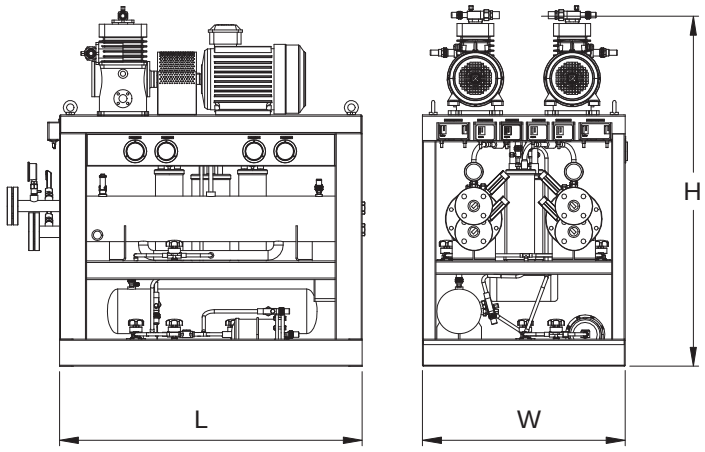


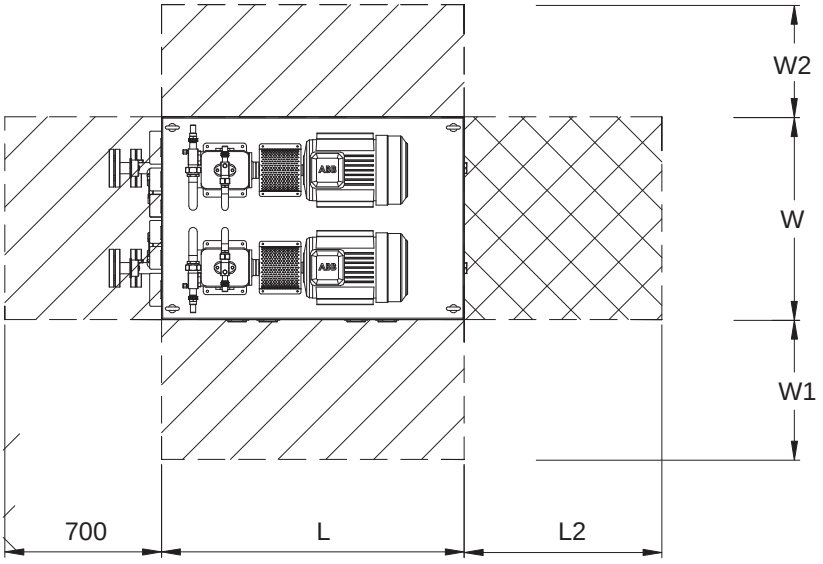
Dimension

Model	MCU-FKX20/010-A	MCU-FKX20/012-A	MCU-FKX30/018-A	MCU-FKX30/021-A	MCU-FKX30/025-A	MCU-FKX30/028-A
H mm	1200	1200	1260	1260	1300	1300

Model	MCU-FKX20/008-C	MCU-FKX20/010-C	MCU-FKX30/012-C	MCU-FKX30/018-C	MCU-FKX30/014-C	MCU-FKX30/021-C
H mm	1200	1200	1260	1260	1300	1300

Typical overall drawing for open type compressor unit, motor coupling direct driven





Services clearances required

Space required to remove cooler and condenser tubes

Dimension

Model	MCU-FKX20/010	MCU-FKX20/012	MCU-FKX30/018	MCU-FKX30/021	MCU-FKX30/025	MCU-FKX30/028
L mm	1120	1120	1120	1120	1120	1120
W mm	750	750	750	750	750	750
H mm	1200	1200	1300	1300	1300	1300
L2 mm	1300	1300	1300	1300	1300	1300
W1 mm	800	800	800	800	800	800
W2 mm	600	600	600	600	600	600

PACKAGE AIR CONDITIONER

Description

Marine package air conditioner is designed with consideration of the special conditions on ships and offshore installation.

The units to be classified as plenum chamber type and duct connection type according to air supply connection, and, sea water, fresh water units and air cooled split type package air conditioner as per condenser cooling medium.

Ecological HFC refrigerant R404A, R407C, R134a are available. The power source of the unit can be AC 440~480V/3PH/60Hz, AC380~415V/3PH/50Hz. Standard cooling capacity range from 2RT to 25RT.

Material

Casing: Galvanized Steel with Powder Coating for indoor unit.
Stainless steel SUS316L for outdoor unit of split air conditioner.

Insulation: Rubber sponge insulation material.

Cooling coil: Copper Tube Aluminium/ Copper fins with stainless steel frame.

Reheat coil: Stainless steel SUS304, tube and fins.

Drip tray: Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation.

Compressor

Low noise scroll type hermetic compressor.
Fitted with crankcase oil heater and internal suction accumulator for long-life running.

Condenser

Cleanable shell and tube, copper tube type condensers with tube plate is used for fresh water. Copper/nickel tube, carbon steel coved with Cu/Ni coating tube plate is used for sea water.

Multi-pass crossed fin tube coil, copper tube and copper fins with SUS316L coil frame for air cooled condensers.

Evaporator

Multi-pass crossed fin tube type coil is standard.

Copper tube aluminium fin and copper tube copper fins are available as option, for galley air conditioner with 100% fresh air, copper tube copper fins cooling coil is standard.

Fan

Motor direct drive centrifugal fan with motor for plenum chamber type units, belt drive centrifugal fan for duct connection type units.

Fan mountings with vibration dampers and belt tensioning mechanism base ensure low level noise and vibration.

Controller and Electrical panel

Micro-computerized Air conditioner Controller with its sensors place at the front of the unit ensures correct temperature control, compressor control, fan motor controller, electrical heater control, and the unit operation mode change, fault alarm. Room temperature, compressor, fan, heater running status, alarm signals to be indicated on the controller displayer.

Electrical panel includes automatic circuit breaker for convenience service. The compressor safety device include high and low pressure switch, low water pressure switch, anti-phase protection and compressor built-in overload protection device. A solenoid valve in the liquid line and filter dryer as well as fitting to plug in pressure gauges.

Option equipment

—Fresh air intake damper with counter flanges.
—Flexible connections and counter flanges for air intake and outlet.
—Stainless steel casing.
—Copper tube/copper fins evaporator coil for the units without 100% fresh air ratio.
—Electrical heater.
—Flexible connections and counter flanges for cooling water inlet and outlet.
—Water pressure gauges with gauge cocks for cooling water inlet and outlet.
—Cooling water thermometer.
—Sea water flow temperature control valve.
—Other refrigerants such as R404A, R134a, R417A.
—Low noise level unit.

Packaged Air Conditioner Model Nomenclature

M(G)PU — 5 F P A 6 H C I

Edition Code :
I- First edition Ⅱ、Ⅲ、Ⅳ、V- the last edition

Special Design :
C - Low noise unit (≤52dB(A))
S - Stainless frame construction
O - Others

Heater type:
H - With electric heater
Space - Without electric heater

Power Source type:
5 - 380~415V / 3PH / 50Hz
6 - 440~480V / 3PH / 60Hz

Refrigerant type:
A- R404A
B - R407C
C - R134A
D - R417A

Air outlet type :
D - Duct connection type
P - Plenum chamber type

Cooling water type:
F - Fresh water
S - Sea water

Normal Cooling Capacity in [RT]:
5 - 5RT

Product Code:
MPU - Marine package AC unit
MGPU - Marine galley Package AC unit

Water cooled plenum chamber type

	Model		MPU-2_P	MPU-3_P	MPU-4_P	MPU-5_P	MPU-6_P
General Parameter	Cooling cpapacity, 60Hz/50Hz	kW	7/6.5	10.5/10.0	14/12.5	17.5/16.5	21/19.5
	Heating capacity, 60Hz/50Hz	kW	3	6	6	9	9
	Dimension (L x W x H)	mm	700 x 450 x1650	800 x 500 x1720		1050 x 550 x1850	
	Power source		Ac440～480v-3PH-60Hz / AC380～415v-3PH-50Hz				
	Control power		Ac220～230v-1PH-60Hz / AC220～230v-1PH-50Hz				
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection				
	External pressure	Pa	20	30	30	30	30
	Noise	dB(A)	53	57	58	60	62
	Refrigerant		R404A/R407C				
	Weight	kg	195	245	255	335	355
	Casing material/colour		Carbon steel / RAL6034				
Compressor	QTY.		1	1	1	1	1
	Type		Hermetic scroll				
	Power consumpoition, 60Hz/50Hz	kW	2.0/1.7	2.8/2.4	3.9/3.3	4.7/4.1	5.6/4.8
Condenser	Type		Horiztal shell & tube				
	Water in/out TEMP.(fresh water)	℃	36/40	36/40	36/40	36/40	36/40
	Water in/out TEMP.(sea water)	℃	32/36	32/36	32/36	32/36	32/36
	Water flow, 60Hz/50Hz	m³/h	2.0/1.7	2.9/2.4	3.9/3.5	4.8/4.1	5.7/5.0
	Cooling water connection		DN25 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE
Evaporator	Type		Copper tube and fins				
	Material		Copper tube al fans with SUS304 frame				
Ele.heater	Heating capacity	kW	3	6	6	9	9
	Type		Electrical heating, tube with fins				
	Material		SUS304 tube with SUS304 frame				
Supply Fan	Air volume	m³/h	1040	1560	2080	2600	3120
	Type		Centrifugal fan				
	Motor power, 60Hz/50Hz	kW	0.19/0.15	0.30/0. 25	0.30/0. 25	0.40/0.33	0.40/0.33
Air Filter	Material(filter/frame)		Nylon+ Alalloy				
TEMP. Controller			Micro-computerized air conditioner controller				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
2.Cooling fresh water inlet temperature 36℃ and cooling sea water inlet temperature 32℃.

Optional specification

Model	MPU-2_P	MPU-3_P	MPU-4_P	MPU-5_P	MPU-6_P
Fresh Water Humidifier	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●

Water cooled plenum chamber type

	Model		MPU-7_P	MPU-8_P	MPU-10_P	MPU-12_P	MPU-15_P
General Parameter	Cooling cpapacity, 60Hz/50Hz	kW	24.5/21.5	28/24.5	35/33.5	42/40	55/49
	Heating capacity, 60Hz/50Hz	kW	12	12	15	15	20
	Dimension (L x W x H)	mm	1350x750x1950		1350x800x1950		1450x850x2400
	Power source		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz				
	Control power		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz				
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection				
	External pressure	Pa	40	40	50	50	50
	Noise	dB(A)	67	70	72	70	70
	Refrigerant		R404A/R407C				
	Weight	kg	460	480	570	685	820
	Casing material/colour		Carbon steel / RAL6034				
Compressor	QTY.		1	1	1	1	1
	Type		Hermetic scroll				
	Power consumpoition, 60Hz/50Hz	kW	6.4/5.3	7.5/6.2	10.2/8.2	12.2/10.1	15.8/12.6
Condenser	Type		Horiztal shell & tube				
	Water in/out TEMP.(fresh water)	℃	36/40	36/40	36/40	36/40	36/40
	Water in/out TEMP.(sea water)	℃	32/36	32/36	32/36	32/36	32/36
	Water flow, 60Hz/50Hz	m³/h	6.6/5.8	7.6/6.6	9.7/8.9	11.6/10.7	15.2/13.2
	Cooling water connection		DN40 FLANGE	DN40 FLANGE	DN50 FLANGE	DN50 FLANGE	DN65 FLANGE
Evaporator	Type		Copper tube and fins				
	Material		Copper tube al fans with SUS304 frame				
Ele.heater	Heating capacity	kW	12	12	15	15	20
	Type		Electrical heating, tube with fins				
	Material		SUS304 tube with SUS304 frame				
Supply Fan	Air volume	m³/h	3640	4160	5200	6240	7800
	Type		Centrifugal fan				
	Motor power, 60Hz/50Hz	kW	0.63/0.55	0.86/0.75	0.86/1.1	0.86/1.1	1.27/1.1
Air Filter	Material(filter/frame)		Nylon+Alalloy				
TEMP. Controller			Micro-computerized air conditioner controller				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
2.Cooling fresh water inlet temperature 36℃ and cooling sea water inlet temperature 32℃.

Optional specification

Model	MPU-7_P	MPU-8_P	MPU-10_P	MPU-12_P	MPU-15_P
Fresh Water Humidifier	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●

Water cooled duct connection type

	Model		MPU-2_D	MPU-3_D	MPU-4_D	MPU-5_D	MPU-6_D	MPU-7FD
General Parameter	Cooling cpapacity, 60Hz/50Hz	kW	7/6.5	10.5/10.0	14/12.5	17.5/16.5	21/19.5	24.5/21.5
	Heating capacity, 60Hz/50Hz	kW	3	6	6	9	9	12
	Dimension (L x W x H) Power source	mm	700x450 x1650	800x500 x1720		1050x550 x1850		1350x750 x1950
	Control power		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
	Protecting device		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
	External pressure		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection					
	Noise	Pa	200	300	300	300	400	400
	Refrigerant		R404A/R407C					
	Weight	kg	180	225	235	320	340	450
	Casing material/colour		Carbon steel / RAL6034					
Compressor	QTY.		1	1	1	1	1	1
	Type		Hermetic scroll					
	Power consumpoition, 60Hz/50Hz	kW	2.0/1.7	2.8/2.4	3.9/3.3	4.7/4.1	5.6/4.8	6.4/5.3
Condenser	Type		Horiztal shell & tube					
	Water in/out TEMP.(fresh water)	℃	36/40	36/40	36/40	36/40	36/40	36/40
	Water in/out TEMP.(sea water)	℃	32/36	32/36	32/36	32/36	32/36	32/36
	Water flow, 60Hz/50Hz	m³/h	2.0/1.7	2.9/2.4	3.9/3.5	4.8/4.1	5.7/5.0	6.6/5.8
	Cooling water connection		DN25 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE	DN40 FLANGE
Evaporator	Type		Copper tube and fins					
	Material		Copper tube al fans with SUS304 frame					
Ele.heater	Heating capacity	kW	3	6	6	9	9	12
	Type		Electrical heating, tube with fins					
	Material		SUS304 tube with SUS304 frame					
Supply Fan	Air volume	m³/h	1040	1560	2080	2600	3120	3640
	Type		Centrifugal fan					
	Motor power, 60Hz/50Hz	KW	0.43/0.37	0.43/0.37	0.63/0.55	0.86/1.1	1.27/1.1	1.27/1.1
Air Filter	Material(filter/frame)		Nylon+Alalloy					
TEMP. Controller			Micro-computerized air conditioner controller					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
2.Cooling fresh water inlet temperature 36℃ and Cooling sea water inlet temperature 32℃.

Optional specification

Model	MPU-2_D	MPU-3_D	MPU-4_D	MPU-5_D	MPU-6_D	MPU-7_D
Fresh Water Humidifier	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●

Water cooled duct connection type, cont.

	Model		MPU-8_D	MPU-10_D	MPU-12_D	MPU-15_D	MPU-20_D	MPU-25_D
General Parameter	Cooling cpapacity, 60Hz/50Hz	kW	28/24.5	35/33.5	42/40	55/49	70/60	90/75
	Heating capacity, 60Hz/50Hz	kW	12	15	15	20	25	30
	Dimension (L x W x H) Power source	mm	1350x750 x1950			1600x950 x1750		1800x1000 x1850
	Control power		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
	Protecting device		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
	External pressure		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection					
	Noise	Pa	400	500	500	600	600	600
	Refrigerant		R404A/R407C					
	Weight	kg	480	550	630	780	1050	1250
	Casing material/colour		Carbon steel/RAL6034					
Compressor	QTY.		1	1	1	1	1	1
	Type		Hermetic scroll					
	Power consumpoition, 60Hz/50Hz	kW	7.5/6.2	10.2/8.2	12.2/10.1	15.8/12.6	20.6/17.2	26.0/21.6
Condenser	Type		Horiztal shell & tube					
	Water in/out TEMP.(fresh water)	℃	36/40	36/40	36/40	36/40	36/40	36/40
	Water in/out TEMP.(sea water)	℃	32/36	32/36	32/36	32/36	32/36	32/36
	Water flow, 60Hz/50Hz	m³/h	7.6/6.6	9.7/8.9	11.6/10.7	15.2/13.2	19.4/16.5	24.8/20.7
	Cooling water connection		DN40 FLANGE	DN50 FLANGE	DN50 FLANGE	DN65 FLANGE	DN65 FLANGE	DN80 FLANGE
Evaporator	Type		Copper tube and fins					
	Material		Copper tube al fans with SUS304 frame					
Ele.heater	Heating capacity	kW	12	15	15	20	25	30
	Type		Electrical heating, tube with fins					
	Material		SUS304 tube with SUS304 frame					
Supply Fan	Air volume	m³/h	4160	5200	6240	7800	10400	13000
	Type		Centrifugal fan					
	Motor power, 60Hz/50Hz	KW	1.27/1.5	1.73/1.5	2.53/2.2	3.0/3.45	4.6/5.5	6.3/5.5
Air Filter	Material(filter/frame)		Nylon+Alalloy					
TEMP. Controller			Micro-computerized air conditioner controller					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
2.Cooling fresh water inlet temperature 36℃ and Cooling sea water inlet temperature 32℃.

Optional specification

Model	MPU-8_D	MPU-10_D	MPU-12_D	MPU-15_D	MPU-20_D	MPU-25_D
Fresh Water Humidifier	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●

Water cooled duct connection type

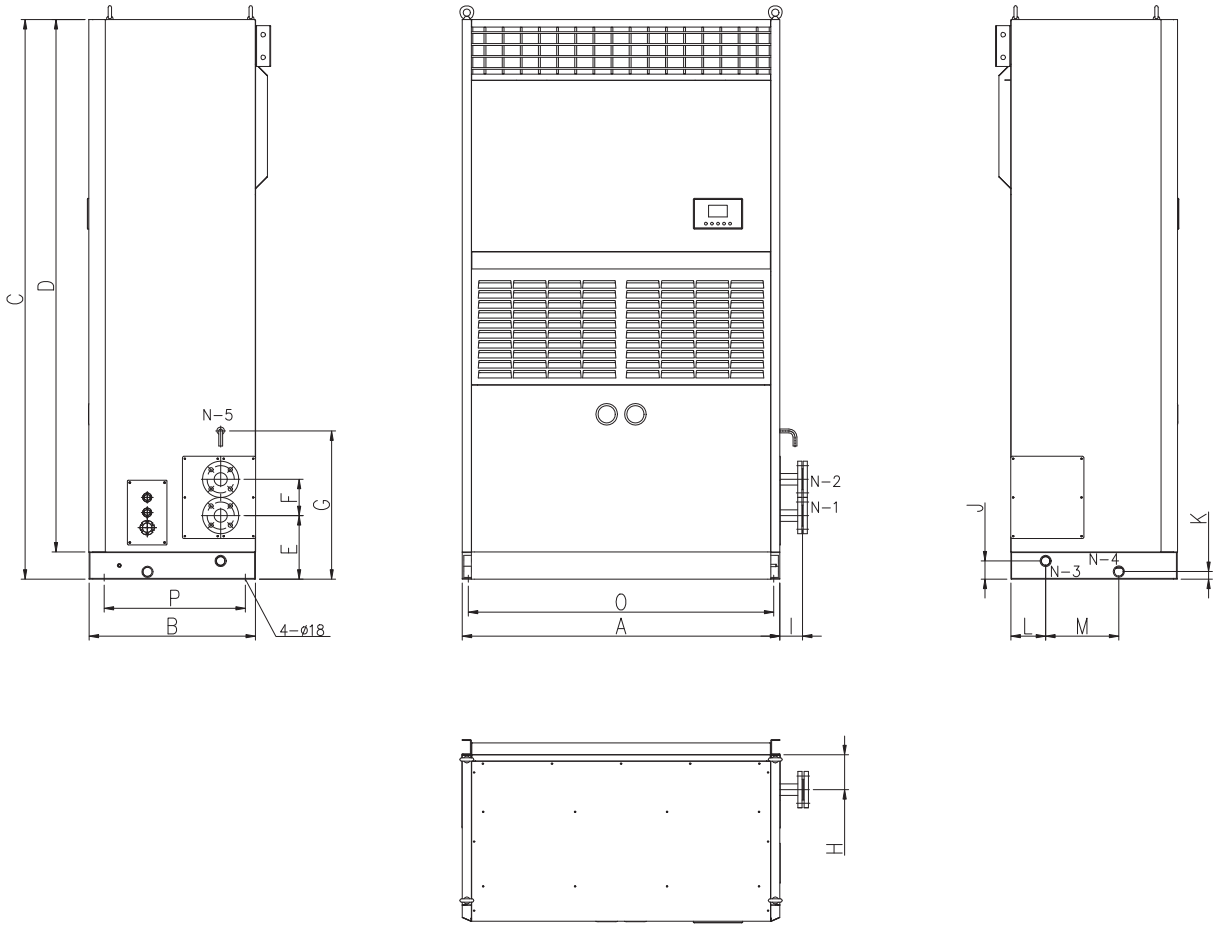
	Model		MGPU-3_D	MGPU-4_D	MGPU-4_D	MGPU-6_D	MGPU-7_D	MGPU-8_D
General Parameter	Cooling cpapacity, 60Hz/50Hz	kW	10.5/10.0	14/12.5	17.5/16.5	21/19.5	24.5/21.5	28/24.5
	Heating capacity, 60Hz/50Hz	kW	9	9	15	15	20	20
	Dimension (L x W x H) Power source	mm	800x500 x1510		1050x550 x1640		1350x750 x1740	
	Control power		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
	Protecting device		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
	External pressure		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase abse nt protection					
	Noise	Pa	300	300	400	400	500	500
	Refrigerant		R404A/R407C					
	Weight	kg	220	230	310	330	435	460
	Casing material/colour		Carbon steel/RAL6034					
Compressor	QTY.		1	1	1	1	1	1
	Type		Hermetic scroll					
	Power consumpoition, 60Hz/50Hz	kW	2.8/2.4	3.9/3.3	4.7/4.1	5.6/4.8	6.4/5.3	7.5/6.2
Condenser	Type		Horiztal shell & tube					
	Water in/out TEMP.(fresh water)	℃	36/40	36/40	36/40	36/40	36/40	36/40
	Water in/out TEMP.(sea water)	℃	32/36	32/36	32/36	32/36	32/36	32/36
	Water flow, 60Hz/50Hz	m³/h	2.9/2.4	3.9/3.5	4.8/4.1	5.7/5.0	6.6/5.8	7.6/6.6
	Cooling water connection		DN32 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE	DN40 FLANGE	DN40 FLANGE
Evaporator	Type		Copper tube and fins					
	Material		Copper tube al fans with SUS304 frame					
Ele.heater	Heating capacity	kW	9	9	15	15	20	20
	Type		Electrical heating, tube with fins					
	Material		SUS304 tube with sus304 frame					
Supply Fan	Air volume	m³/h	600	800	1000	1200	1400	1600
	Type		Centrifugal fan					
	Motor power, 60Hz/50Hz	KW	0.43/0.37	0.43/0.37	0.43/0.37	0.63/0.55	0.63/0.55	0.63/0.55
Air Filter	Material(filter/frame)		Nylon+Alalloy					
	TEMP. Controller		Micro-computerized air conditioner controller					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
2.Cooling fresh water inlet temperature 36℃ and Cooling sea water inlet temperature 32℃.

Optional specification

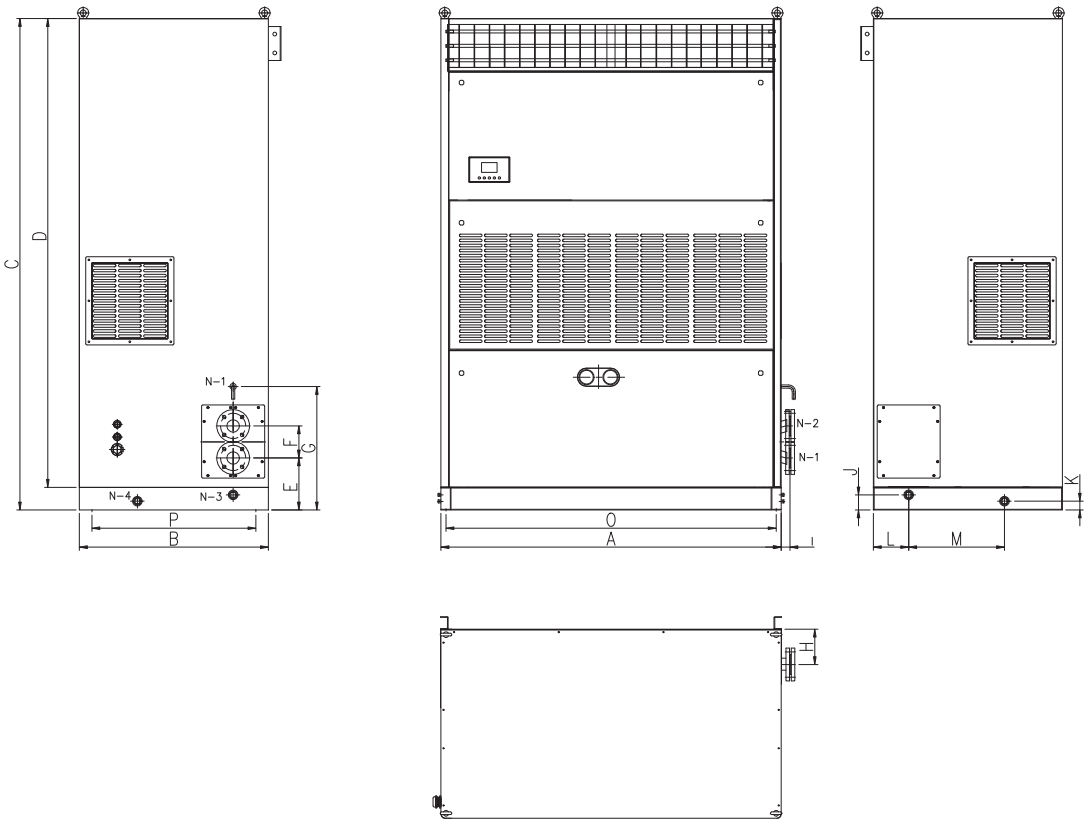
Model	MGPU-3_D	MGPU-3_D	MGPU-5_D	MGPU-6_D	MGPU-7_D	MGPU-8_D
Fresh Water Humidifier	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●

Overall drawings for MPU-2_P,MPU-3_P,MPU-4_P,MPU-5_P,MPU-6_P
plenum chamber type Package Air Conditioner



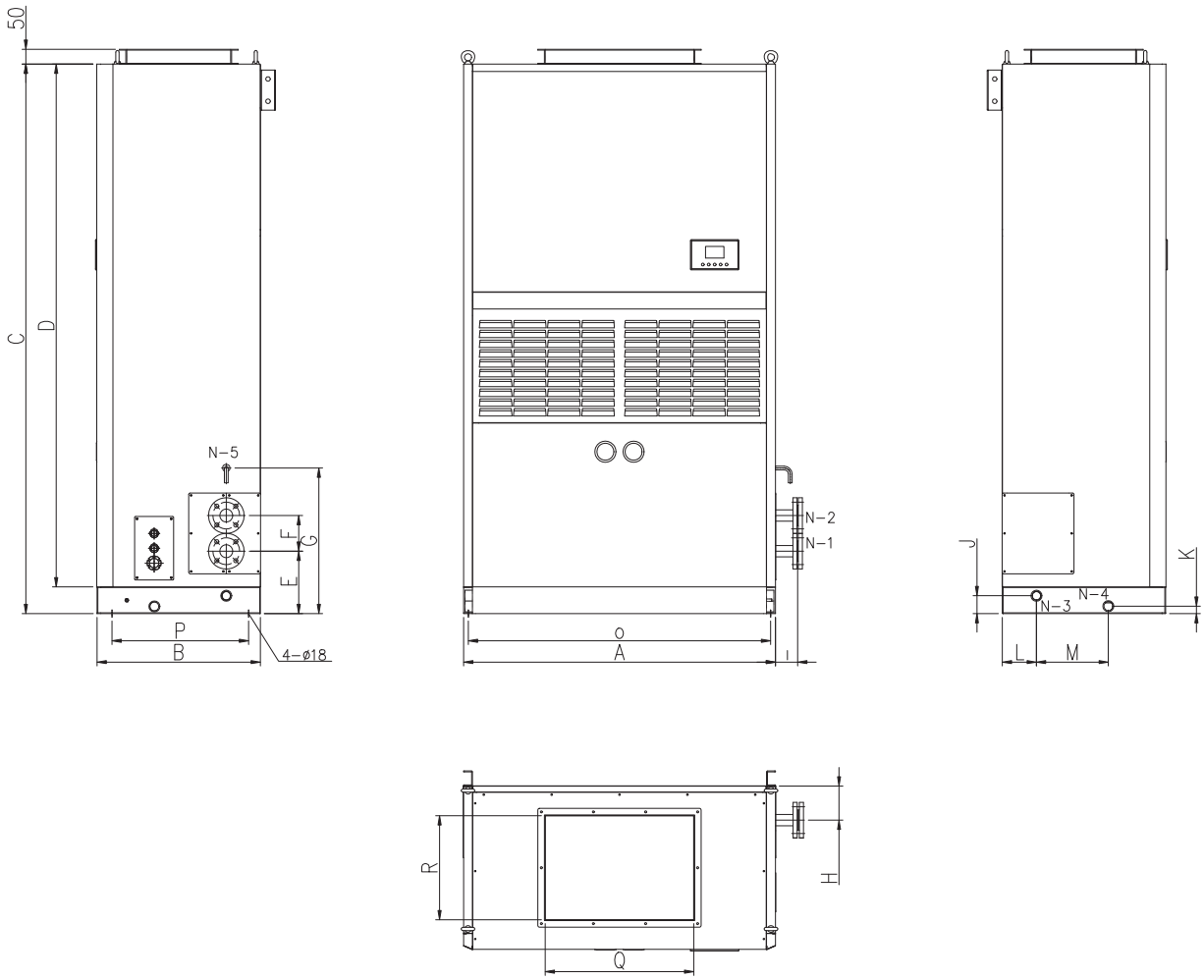
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MPU-2_P	700	450	1650	1560	172	106	440	115	50	60	35	115	142	660	370	DN25	DN25	G1"	G1"	1/2"
MPU-3_P	800	500	1720	1630	210	120	490	115	60	60	35	115	192	760	420	DN32	DN32	G1"	G1"	1/2"
MPU-4_P	800	500	1720	1630	210	120	490	115	60	60	35	115	192	760	420	DN32	DN32	G1"	G1"	1/2"
MPU-5_P	1050	550	1850	1760	210	120	490	115	75	60	35	115	242	1010	470	DN32	DN32	G1"	G1"	1/2"
MPU-6_P	1050	550	1850	1760	210	120	490	115	75	60	35	115	242	1010	470	DN32	DN32	G1"	G1"	1/2"

Overall drawings for MPU-7_P,MPU-8_P,MPU-10_P,MPU-12_P,MPU-15_P
plenum chamber type Package Air Conditioner



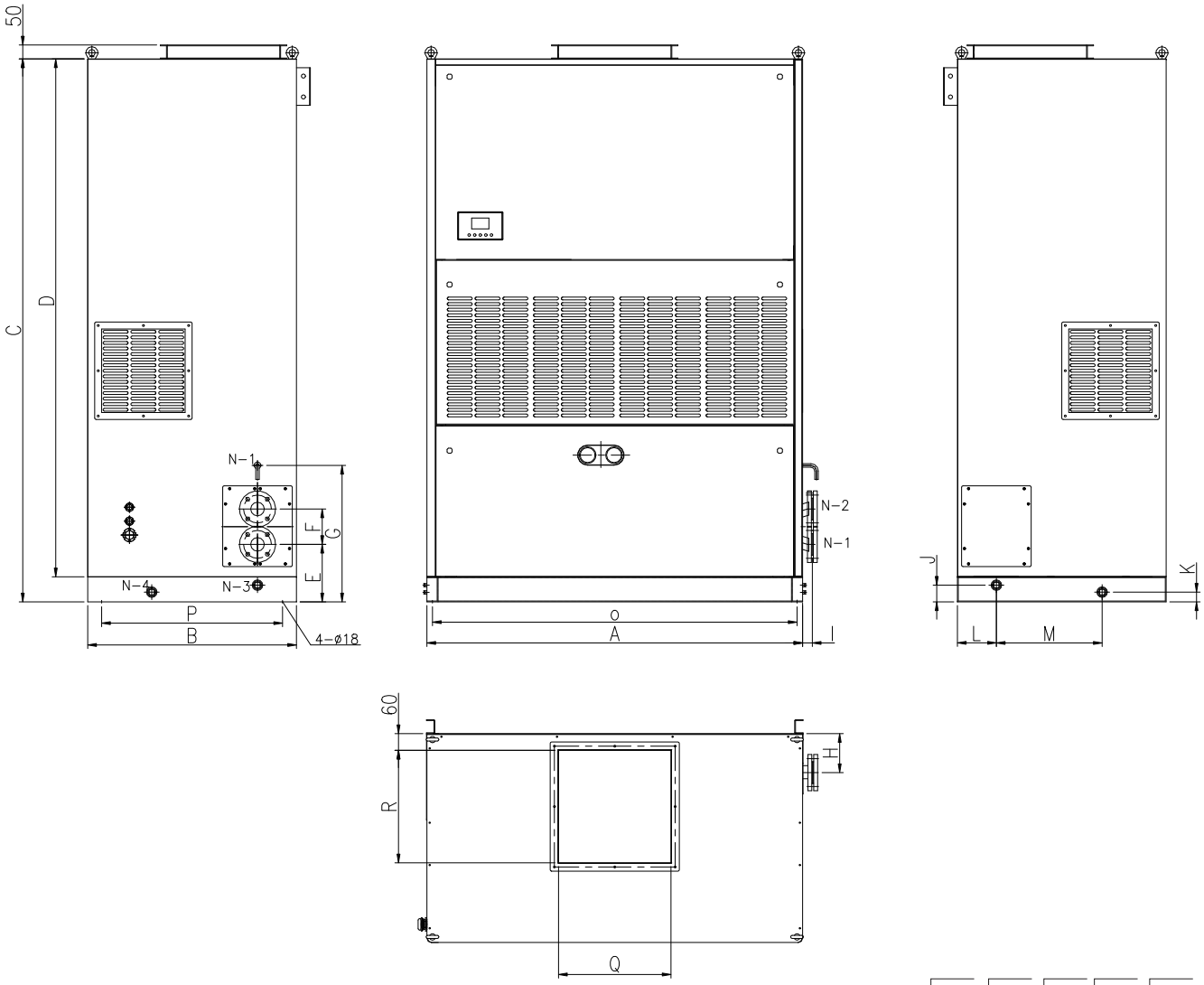
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MPU-7_P	1350	750	1950	1860	206.5	127	490	140	35	60	35	140	380	1310	670	DN40	DN40	G1”	G1”	1/2”
MPU-8_P	1350	750	1950	1860	206.5	127	490	140	35	60	35	140	380	1310	670	DN40	DN40	G1”	G1”	1/2”
MPU-10_P	1350	800	1950	1860	210	160	540	140	70	60	35	140	430	1310	720	DN50	DN50	G1”	G1”	1/2”
MPU-12_P	1350	850	1950	1860	210	160	540	140	70	60	35	140	430	1310	720	DN50	DN50	G1”	G1”	1/2”
MPU-15_P	1450	850	2400	2300	220	160	540	140	70	60	35	140	480	1410	770	DN65	DN65	G1”	G1”	1/2”

Overall drawings for MPU-2_D,MPU-3_D,MPU-4_D,MPU-5_D,MPU-6_D duct connection Package Air Conditioner



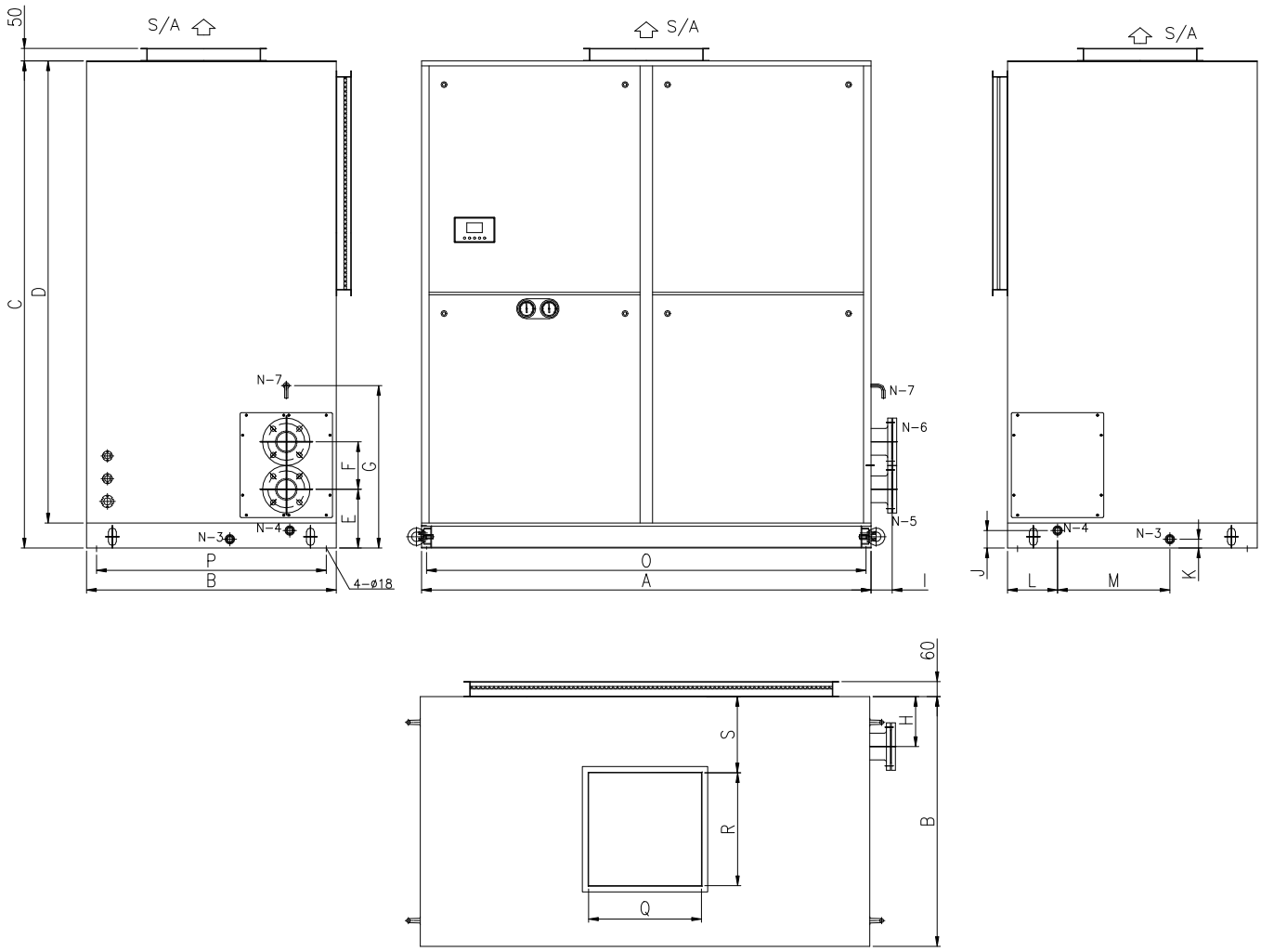
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q	R	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MPU-2_D	700	450	1650	1560	172	106	440	115	50	60	35	115	142	660	370	300	200	DN25	DN25	G1"	G1"	1/2"
MPU-3_D	800	500	1720	1630	210	120	490	115	60	60	35	115	192	760	420	400	300	DN32	DN32	G1"	G1"	1/2"
MPU-4_D	800	500	1720	1630	210	120	490	115	60	60	35	115	192	760	420	400	300	DN32	DN32	G1"	G1"	1/2"
MPU-5_D	1050	550	1850	1760	210	120	490	115	75	60	35	115	242	1010	470	470	350	DN32	DN32	G1"	G1"	1/2"
MPU-6_D	1050	550	1850	1760	210	120	490	115	75	60	35	115	242	1010	470	470	350	DN32	DN32	G1"	G1"	1/2"

Overall Drawings for MPU-7_D,MPU-8_D,MPU-10_D,MPU-12_D
duct connection Package Air Conditioner



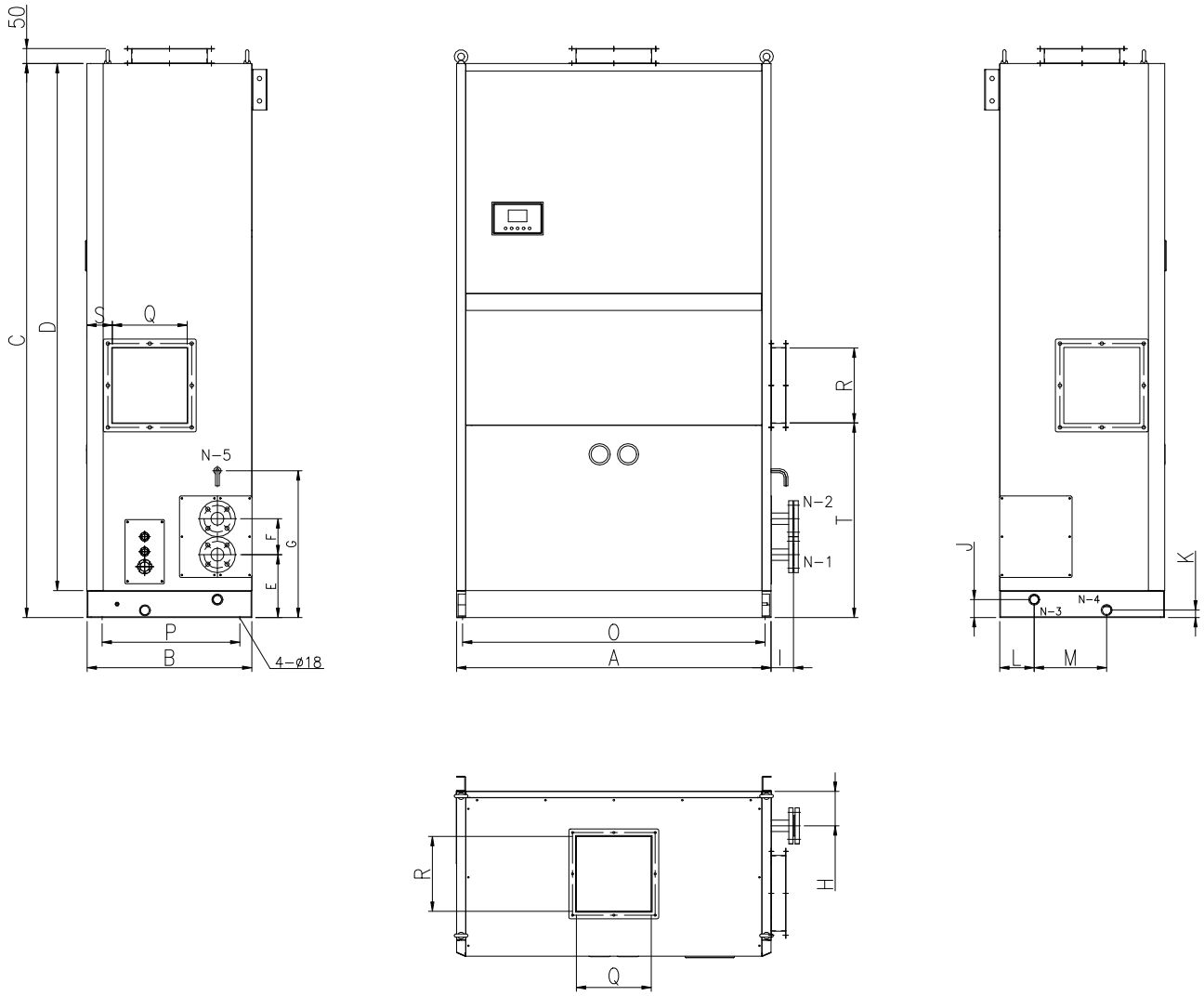
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q	R	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MPU-7_D	1350	750	1950	1860	206.5	127	490	140	35	60	35	140	380	1310	670	360	360	DN40	DN40	G1"	G1"	1/2"
MPU-8_D	1350	750	1950	1860	206.5	127	490	140	35	60	35	140	380	1310	670	360	360	DN40	DN40	G1"	G1"	1/2"
MPU-10_D	1350	800	1950	1860	210	160	540	140	70	60	35	140	430	1310	720	404	404	DN50	DN50	G1"	G1"	1/2"
MPU-12_D	1350	800	1950	1860	210	160	540	140	70	60	35	140	430	1310	720	404	404	DN50	DN50	G1"	G1"	1/2"

Overall drawings for MPU-15_D,MPU-20_D,MPU-25_D duct connection
Package Air Conditioner



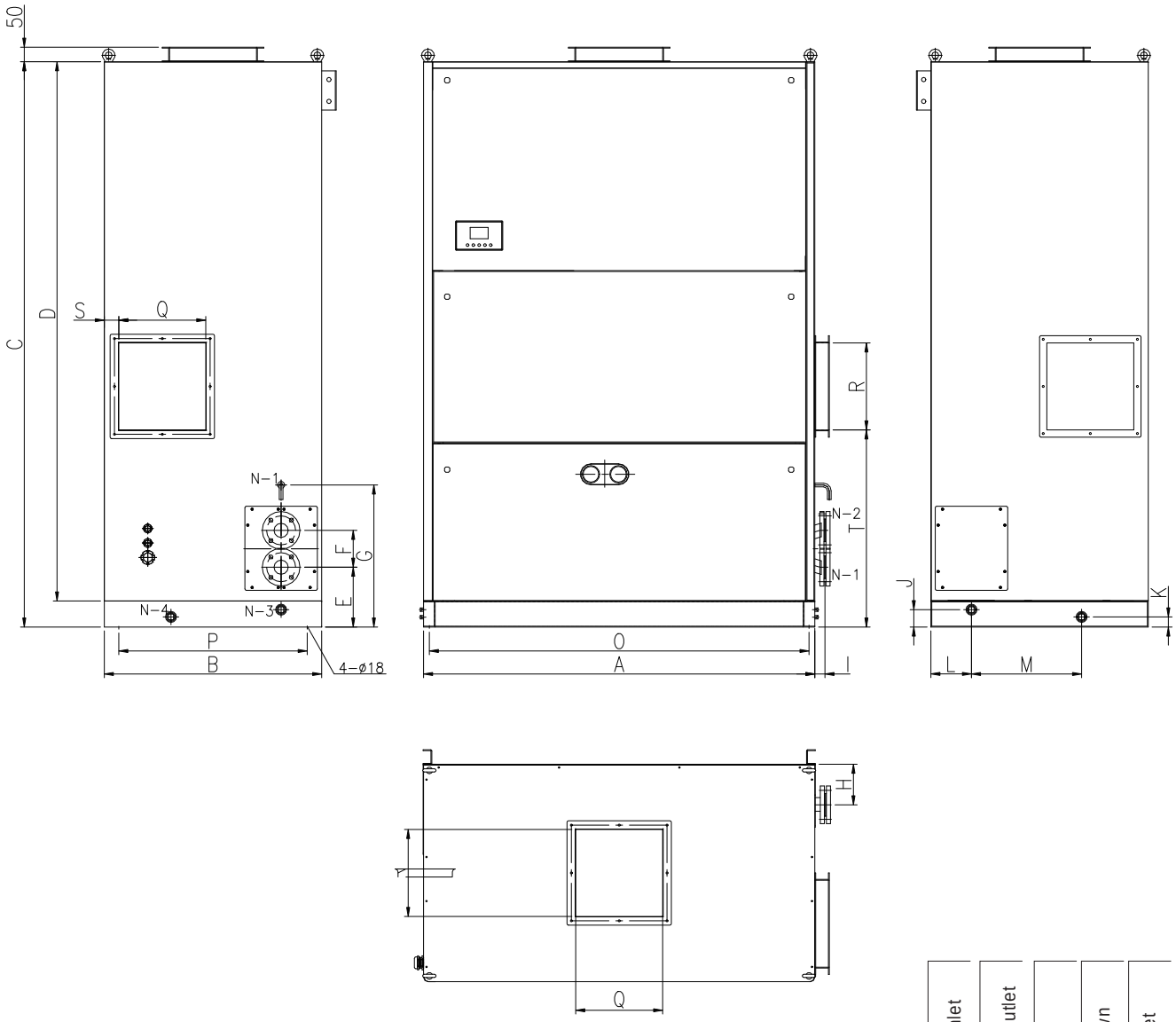
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q	R	S	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MPU-15_D	1600	950	1750	1650	220	160	540	140	70	60	35	140	450	1560	870	452	452	210	DN65	DN65	G1"	G1"	1/2"
MPU-20_D	1600	950	1750	1650	220	160	540	200	85	70	35	140	450	1560	870	452	452	250	DN65	DN65	G1"	G1"	1/2"
MPU-25_D	1800	1000	1850	1750	235	190	650	200	85	70	35	200	450	1750	920	506	506	220	DN80	DN80	G1"	G1"	1/2"

Overall drawings for MGPU-3_D,MGPU-4_D,MGPU-5_D,MPGU-6_D galley Package Air Conditioner



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q	R	S	T	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MGPU-3_D	800	500	1720	1630	210	120	490	115	60	60	35	115	192	760	420	200	200	85	635	DN32	DN32	G1"	G1"	1/2"
MGPU-4_D	800	500	1720	1630	210	120	490	115	65	60	35	115	192	760	420	200	200	85	635	DN32	DN32	G1"	G1"	1/2"
MGPU-5_D	1050	550	1850	1760	210	120	490	115	75	60	35	115	242	1010	470	250	250	85	650	DN32	DN32	G1"	G1"	1/2"
MGPU-6_D	1050	550	1850	1760	210	120	490	115	75	60	35	115	242	1010	470	250	250	85	650	DN32	DN32	G1"	G1"	1/2"

Overall drawings for MGPU-7_D,MGPU-8_D galley Package Air Conditioner



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q	R	S	T	Cooling water inlet N-1	Cooling water outlet N-2	Drain water up N-3	Drain water down N-4	Safty valve outlet N-5
MGPU-7_D	1350	750	1950	1860	206.5	127	490	140	35	60	35	140	380	1310	670	300	300	50	680	DN40	DN40	G1”	G1”	1/2”
MGPU-8_D	1350	750	1950	1860	206.5	127	490	140	35	60	35	140	380	1310	670	300	3200	50	680	DN40	DN40	G1”	G1”	1/2”

MARINE SPLIT AIR CONDITIONING UNIT

Description

BlueConnect Marine Split Air Conditioning Unit is exclusively designed for the applications on ships and offshore installations.

The units to be classified as air cooled type air conditioner as per condenser cooling medium for marine split installation.

Ecological HFC refrigerant R407C for normal whether condition, R134a for hot weather condition. The power source of the unit can be AC 440~480V/3PH/60Hz, AC380~415V/3PH/50Hz. Standard cooling capacity range from 2RT to 15RT.

Features/Benefits

Split air conditioner comprised with indoor fan coil unit, design with compressor, evaporator, heating coil, supply air fan, cooling fan and other refrigerant fittings are inside one common casing house and outdoor air cooled condenser with condenser coil and cooling fan and fan motor.

Anti-corrosion marine type material and IP56 protection class ensure long-life running.

Refrigerant R407C is standard, R134a refrigerant and special condensing coil and fans design ensure the unit can be operation reliably at peak hot weather condition, such as, ambient temperature higher than 45 ℃.

Weather Condition

The unit is designed based on following two weather condition:

- C1 Operation condition, Normal weather condition, rated capacity based on cooling standard: 27℃ DB, 19.5 ℃ WB indoor temperature and 35℃ DB, outdoor temperature. Unit operating ambient temperature range on cooling: up to 43℃.

- C2 Operation condition, Hot temperature weather condition, rated capacity based on cooling standard: 27℃ DB, 19.5 ℃ WB indoor temperature and 45℃ DB, outdoor temperature. Unit operating ambient temperature range on cooling: up to 55℃.

Material

Casing:	Carbon steel sheet and painting for indoor unit and stainless steel SUS316L for outdoor unit.
Insulation:	Rubber sponge insulation material .
Cooling coil:	Copper tube aluminium/copper fins with stainless steel frame.
Reheat coil:	Stainless steel SUS304, tube and fins.
Drip tray:	Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation.
Condensing coil:	Copp tube, Copper fins with stainless steel frame.

Compressor

Low noise scroll type hermetic compressor.
Fitted with crankcase oil heater and internal suction accumulator for long-life running.

Condenser

Multi-pass crossed fin tube coil, copper tube and copper fins with SUS316L coil frame for air cooled condensers.

Evaporator

Multi-pass crossed fin tube type coil is standard.
Copper tube aluminium fins are standard and copper tube copper fins are available as option.

Fan

There are two type mode of the unit for Motor direct drive centrifugal fan and motor with belt drive centrifugal fan.

Fan mountings with vibration dampers and belt tensioning mechanism base ensure low level noise and vibration.

Controller and Electrical Panel

Micro-computerized Room Temperature Controller with its sensors to be supplied ensures correct temperature control, compressor control, fan motor controller, electrical heater control, and the unit operation mode change, fault alarm. Room temperature, compressor, fan, heater running status, alarm signals to be indicated on the controller displayer.

Electrical panel includes automatic circuit breaker for convenience service.

Accessary

The compressor safety devices include high and low pressure switch, anti-phase protection and compressor built-in overload protection device. A solenoid valve in the liquid line and filter dryer as well as fitting to plug in pressure gauges.

Option Equipment

- EC supply air fan
- Condenser coil with anti-corrosion coating
- Evaporator coil with copper tube and copper fin
- Electrical heater

Unit Model Nomenclature

Indoor uni t(compressor in indoor unit)

M(G)PU — 5 A P B 6 H I

- Product change code :
  Ⅰ - The first edition
  Ⅱ、Ⅲ、Ⅳ、Ⅴ...- The last code
- Heater type:
  Spacing - Without electric heate
- Power source type:
  6 - 440～480V / 3PH / 60Hz
  5 – 380~415V / 3PH / 50Hz
- Refrigerant type:
  B - R407C ，C - R134a
- Air outlet type :
  D - Duct connecting type
  P - Plenum chamber type
- Cooling method :
  A - Air cooled
- Normal capacity in [RT]:
  5 is 5RT
- Product code:
  MPU - Marine package air-conditioning unit
  SPU - Marine silent package air-conditioning unit
  MGPU - Marine galley package air-conditioning unit

Outdoor unit (compressor in indoor unit)

MACC — 5 N 6 1 I

- Product change code :
  Ⅰ - The first edition
  Ⅱ、Ⅲ、Ⅳ、Ⅴ...- The last code
- Condenser coil material :
  1 - Copper tube, copper fins
  2 - Copper tube, Aluminum fins with anti-corrosion coating
  3 - Copper tube, Copper fins with anti-corrosion coating
- Power source type:
  6 - 440～480V / 3PH / 60Hz
  5 – 380~415V / 3PH / 50Hz
- Weather condition:
  N - C1 operation condition
  H - C2 operation condition
- Normal capacity in [RT]:
  5 is 5RT
- Product code:
  MACC - Marine air cooled condenser

Indoor unit (compressor in outdoor unit)

F(G)CU — 5 A P B 6 H I

Product change code :
Ⅰ- The first edition
Ⅱ、Ⅲ、Ⅳ、Ⅴ...- The last code

Heater type:
H - Electric heater
Spacing - Without electric heater

Power source type:
6 - 440～480V / 3PH / 60Hz
5 – 380~415V / 3PH / 50Hz

Refrigerant type:
B - R407C ，C - R134a

Air outlet type :
D - Duct connecting type
P - Plenum chamber type

Cooling method :
A - Air cooled

Normal capacity in [RT]:
5 is 5RT

Product code:
FCU - Marine fan coil unit
SFCU - Marine silent fan coil unit
FGCU - Marine galley fan coil unit

Outdoor unit (compressor in outdoor unit)

MACU — 5 N 6 1 I

Product change code :
Ⅰ- The first edition
Ⅱ、Ⅲ、Ⅳ、Ⅴ...- The last code

Condenser coil material :
1 - Copper tube, copper fins
2 - Copper tube, Aluminum fins with anti-corrosion coating
3 - Copper tube, Copper fins with anti-corrosion coating

Power source type:
6 - 440～480V / 3PH / 60Hz
5 – 380~415V / 3PH / 50Hz

Weather condition:
N - C1 operation condition
H - C2 operation condition

Normal capacity in [RT]:
5 is 5RT

Product code:
MACU - Marine air cooled compression condensing unit

Table 1, product data, C1 operation condition plenum chamber type

Model				MPU-2AP MACC-2N	MPU-3AP MACC-3N	MPU-4AP MACC-4N	MPU-5AP MACC-5N	MPU-6AP MACC-6N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	7.3/7.4	10.5/10.8	15.6/14.0	18.9/17.8	21.3/21.8
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	950x450x670	1050x500x820	1050x500x820	1200x550x820	1200x550x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	20	30	30	30	30
	Noise, indoor unit		dB(A)	53	57	58	60	62
	Refrigerant			R407c				
	Weight (indoor/outdoor)		Kg	150/95	180/110	195/120	270/155	295/180
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	2.61/2.57	3.61/3.61	5.34/4.24	6.19/5.81	7.06/6.94
Evaporator	Type material			Copper tube and fins Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.19/0.15	0.30/0.25	0.30/0.25	0.40/0.33	0.40/0.33
Air Filter	Material (filter / frame)			Nylon + Al Alloy				
TEMP.Controller				Micro-computerized air conditioner controller				
Outdoor Condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow, m^3/h			3100	4300	6200	7500	8600
	Fan motor power, 60Hz/50Hz		Kw	0.21	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃
2.Other heating capacity and supply air pressure can be available

Table 1, product data, C1 operation condition plenum chamber type, cont.

Model				MPU-7AP MACC-7N	MPU-8AP MACC-8N	MPU-10AP MACC-10N	MPU-12AP MACC-12N	MPU-15AP MACC-15N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	26.1/24.5	29.5/28.6	34.7/32.8	42.8/41.7	51.6/52.7
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	1450x850x2400
		Outdoor	mm	1650x600x875	1650x600x875	1650x600x975	1800x650x975	1950x700x1280
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	40	40	50	50	50
	Noise, indoor unit		dB(A)	67	70	72	70	70
	Refrigerant			R407c				
	Weight (indoor/outdoor)		Kg	390/230	405/250	460/295	490/330	625/420
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	8.3/7.6	9.2/8.9	10.9/10.2	13.9/13.6	16.7/18.1
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.63/0.55	0.86/0.75	0.86/1.1	0.86/1.1	1.27/1.1
Air filter	Material (filter / frame)			Nylon + Al Alloy				
Temp.controller				Micro-computerized air conditioner controller				
Outdoor condenser								
Condenser coil	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser fan	Type			Low noise axial fan				
	Air flow, m^3/h			10200	11500	13500	16800	21000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.45	2x0.68	2x0.68	2x0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃
2.Other heating capacity and supply air pressure can be available

Table 2, product data, C2 operation condition plenum chamber

Model				MPU-2AP MACC-2H	MPU-3AP MACC-3H	MPU-4AP MACC-4H	MPU-5AP MACC-5H	MPU-6AP MACC-6H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	6.8/6.7	10.8/10.2	14.1/13.0	18.2/15.6	21.8/20.0
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	950x450x670	1050x500x820	1050x500x820	1200x550x820	1200x550x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	20	30	30	30	30
	Noise, indoor unit		dB(A)	53	57	58	60	62
	Refrigerant			R134a				
	Weight (indoor/outdoor)		Kg	155/95	195/110	215/120	290/155	305/180
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	2.9/2.9	4.0/4.1	5.6/5.3	7.0/5.8	8.2/7.8
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.19/0.15	0.30/0.25	0.30/0.25	0.40/0.33	0.40/0.33
Air filter	Material (filter / frame)			Nylon + Al Alloy				
Temp.controller				Micro-computerized air conditioner controller				
Outdoor condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser fan	Type			Low noise axial fan				
	Air flow, m^3/h			4250	5200	7300	9400	11000
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 45℃
2.Other heating capacity and supply air pressure can be available

Table 2, product data, C2 operation condition plenum chamber type, cont.

Model				MPU-7AP MACC-7H	MPU-8AP MACC-8H	MPU-10AP MACC-10H	MPU-12AP MACC-12H	MPU-15AP MACC-15H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	23.9/22.2	27.0/26.5	32.1/34.4	41.4/42.8	51.8/53.3
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	1450x850x2400
		Outdoor	mm	1650x600x875	1650x600x875	1650x600x975	1800x650x975	1950x700x1275
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	40	40	50	50	50
	Noise, indoor unit		dB(A)	67	70	72	70	70
	Refrigerant			R134a				
	Weight (indoor/outdoor)		Kg	405/230	415/250	530/295	590/330	660/420
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	9.3/8.6	10.5/10.6	12.6/13.8	16.7/17.0	20.9/20.5
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.63/0.55	0.86/0.75	0.86/1.1	0.86/1.1	1.27/1.1
Air filter	Material (filter / frame)			Nylon + Alalloy				
Temp.controller				Micro-computerized air conditioner controller				
Outdoor condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser fan	Type			Low noise axial fan				
	Air flow, m^3/h			12500	14000	16500	21500	27000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.45	2x0.68	2x0.93	2x0.93
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 45℃
2.Other heating capacity and supply air pressure can be available

Table 3, product data, C1 operation condition duct connection type

	Model			MPU-2AD MACC-2N	MPU-3AD MACC-3N	MPU-4AD MACC-4N	MPU-5AD MACC-5N	MPU-6AD MACC-6N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	7.3/7.4	10.5/10.8	15.6/14.0	18.9/17.8	21.3/21.8
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	950x450x670	1050x500x820	1050x500x820	1200x550x820	1200x550x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	200	300	300	400	400
	Refrigerant					R407c		
	Weight (indoor/outdoor)		Kg	150/95	180/110	195/120	270/155	295/180
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	2.61/2.57	3.61/3.61	5.34/4.24	6.19/5.81	7.06/6.94
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.63/0.55	0.86\1.1	1.27/1.1
Air filter	Material (filter / frame)			Nylon + Alalloy				
Temp.controller				Micro-computerized air conditioner controller				
Outdoor condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser fan	Type			Low noise axial fan				
	Air flow, m^3/h			3100	4300	6200	7500	8600
	Fan motor power, 60Hz/50Hz		Kw	0.21	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃.
2.Other heating capacity and supply air pressure can be available.

Table 3, product data, C1 operation condition duct connection type, cont.

	Model			MPU-7AD MACC-7N	MPU-8AD MACC-8N	MPU-10AD MACC-10N	MPU-12AD MACC-12N	MPU-15AD MACC-15N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	26.1/24.5	29.5/28.6	34.7/32.8	42.8/41.7	51.6/52.7
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	16000x950x1750
		Outdoor	mm	1650x600x875	1650x600x875	1650x600x975	1800x650x975	1950x700x1280
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	400	400	500	500	600
	Refrigerant					R407c		
	Weight (indoor/outdoor)		Kg	390/230	405/250	460/295	490/330	595/420
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	8.3/7.6	9.2/8.9	10.9/10.2	13.9/13.6	16.7/18.1
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	1.27/1.1	1.27/1.5	1.73/1.5	2.53/2.2	3.45/3.0
Air filter	Material (filter / frame)			Nylon + Alalloy				
Temp.controller				Micro-computerized air conditioner controller				
Outdoor condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser fan	Type			Low noise axial fan				
	Air flow, m^3/h			10200	11500	13500	16800	21000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.45	2x0.68	2x0.68	2x0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27℃, humidity 50%.
Cooling air inlet temperature 35℃.
2.Other heating capacity and supply air pressure can be available.

Table 4, Product data, C2 operation condition duct connection type

	Model			MPU-2AD MACC-2H	MPU-3AD MACC-3H	MPU-4AD MACC-4H	MPU-5AD MACC-5H	MPU-6AD MACC-6H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	6.8/6.7	10.8/10.2	14.1/13.0	18.2/15.6	21.8/20.0
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	950x450x670	1050x500x820	1050x500x820	1200x550x820	1200x550x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	200	300	300	400	400
	Refrigerant					R134a		
	Weight (indoor/outdoor)		Kg	155/95	195/110	215/120	290/155	305/180
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	2.9/2.9	4.0/4.1	5.6/5.3	7.0/5.8	8.2/7.8
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.63/0.55	0.86\1.1	1.27/1.1
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor Condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow, m^3/h			4250	5200	7300	9400	11000
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 45℃.
2.Other heating capacity and supply air pressure can be available.

Table 4, Product data, C2 operation condition duct connection type, cont.

	Model			MPU-7AD MACC-7H	MPU-8AD MACC-8H	MPU-10AD MACC-10H	MPU-12AD MACC-12H	MPU-15AD MACC-15H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	23.9/22.2	27.0/26.5	32.1/34.4	41.4/42.8	51.8/53.3
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	16000x950x1750
		Outdoor	mm	1650x600x875	1650x600x875	1650x600x975	1800x650x975	1950x700x1275
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	400	400	500	500	600
	Refrigerant					R134a		
	Weight (indoor/outdoor)		Kg	405/230	415/250	530/295	590/330	625/420
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor package air conditioning unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	9.3/8.6	10.5/10.6	12.6/13.8	16.7/17.0	20.9/20.5
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	1.27/1.1	1.27/1.5	1.73/1.5	2.53/2.2	3.45/3.0
Air filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor Condenser								
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow, m^3/h			12500	14000	16500	21500	27000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.68	2x0.68	2x0.93	2x0.93
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27℃, humidity 50%.
Cooling air inlet temperature 45℃.
2.Other heating capacity and supply air pressure can be available.

Table 5, product data, C1 operation condition plenum chamber type

	Model			FCU-2AP MACU-2N	FCU-3AP MACU-3N	FCU-4AP MACU-4N	FCU-5AP MACU-5N	FCU-6AP MACU-6N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	7.3/7.4	10.5/10.8	15.6/14.0	18.9/17.8	21.3/21.8
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	1050x500x670	1200x550x820	1200x550x820	1350x600x820	1350x600x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	20	30	30	30	30
	Noise, indoor unit		dB(A)	53	57	58	60	62
	Refrigerant			R407c				
	Weight (indoor/outdoor)		Kg	135/130	155/150	160/175	230/215	255/240
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor fan coil unit								
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.19/0.15	0.30/0.25	0.30/0.25	0.40/0.33	0.40/0.33
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor air cooling compressing & condensing unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power consumption 60Hz/50Hz		Kw	2.61/2.57	3.61/3.61	5.34/4.24	6.19/5.81	7.06/6.94
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	3100	4300	6200	7500	8600
	Fan motor power, 60Hz/50Hz		Kw	0.21	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 35 ℃.
2.Other heating capacity and supply air pressure can be available.

Table 5, Product data, C1 operation condition plenum chamber type, cont.

	Model			FCU-7AP MACU-7N	FCU-8AP MACU-8N	FCU-10AP MACU-10N	FCU-12AP MACU-12N	FCU-15AP MACU-15N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	26.1/24.5	29.5/28.6	34.7/32.8	42.8/41.7	51.6/52.7
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	1450x850x2400
		Outdoor	mm	1850x650x875	1850x650x875	1950x700x975	2050x750x975	2150x750x1280
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	40	40	50	50	50
	Noise, indoor unit		dB(A)	67	70	72	70	70
	Refrigerant			R407c				
	Weight (indoor/outdoor)		Kg	345/305	355/330	410/385	430/430	565/580
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor fan coil unit								
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.63/0.55	0.86/0.75	0.86/1.1	0.86/1.1	1.27/1.1
Air Filter	Material (filter / frame)			Nylon + Al Alloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor air cooling compressing & condensing unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	8.3/7.6	9.2/8.9	10.9/10.2	13.9/13.6	16.7/18.1
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	10200	11500	13500	16800	21000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.45	2x0.68	2x0.68	2x0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃.
2.Other heating capacity and supply air pressure can be available.

Table 6, Product data, C2 operation condition plenum chamber type

	Model			FCU-2AP MACU-2H	FCU-3AP MACU-3H	FCU-4AP MACU-4H	FCU-5AP MACU-5H	FCU-6AP MACU-6H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	6.8/6.7	10.8/10.2	14.1/13.0	18.2/15.6	21.8/20.0
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	1050x500x670	1200x550x820	1200x550x820	1350x600x820	1350x600x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	20	30	30	30	30
	Noise, indoor unit		dB(A)	53	57	58	60	62
	Refrigerant			R134a				
	Weight (indoor/outdoor)		Kg	135/130	165/160	175/195	245/230	260/255
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				

Indoor fan coil unit

Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.19/0.15	0.30/0.25	0.30/0.25	0.40/0.33	0.40/0.33
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				

Outdoor air cooling compressing & condensing unit

Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	2.9/2.9	4.0/4.1	5.6/5.3	7.0/5.8	8.2/7.8
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	4250	5200	7300	9400	11000
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 45 ℃.
2.Other heating capacity and supply air pressure can be available.

Table 6, Product data, C2 operation condition plenum chamber type, cont.

	Model			FCU-7AP MACU-7H	FCU-8AP MACU-8H	FCU-10AP MACU-10H	FCU-12AP MACU-12H	FCU-15AP MACU-15H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	23.9/22.2	27.0/26.5	32.1/34.4	41.4/42.8	51.8/53.3
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	1450x850x2400
		Outdoor	mm	1850x650x875	1850x650x875	1950x700x975	2050x750x975	2150x750x1280
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	40	40	50	50	50
	Noise, indoor unit		dB(A)	67	70	72	70	70
	Refrigerant			R134a				
	Weight (indoor/outdoor)		Kg	355/305	365/330	470/380	495/440	535/615
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor fan coil unit								
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.63/0.55	0.86/0.75	0.86/1.1	0.86/1.1	1.27/1.1
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor air cooling compressing & condensing unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	9.3/8.6	10.5/10.6	12.6/13.8	16.7/17.0	20.9/20.5
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	12500	14000	16500	21500	27000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.68	2x0.68	2x0.93	2x0.93
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 45℃.
2.Other heating capacity and supply air pressure can be available.

Table 7, Product data, C1 operation condition duct connection type

	Model			FCU-2AD MACU-2N	FCU-3AD MACU-3N	FCU-4AD MACU-4N	FCU-5AD MACU-5N	FCU-6AD MACU-6N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	7.3/7.4	10.5/10.8	15.6/14.0	18.9/17.8	21.3/21.8
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	1050x500x670	1200x550x820	1200x550x820	1350x600x820	1350x600x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	200	300	300	400	400
	Refrigerant			R407c				
	Weight (indoor/outdoor)		Kg	135/130	155/150	160/175	230/215	255/240
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor fan coil unit								
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.63/0.55	0.86\1.1	1.27/1.1
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor air cooling compressing & condensing unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	2.61/2.57	3.61/3.61	5.34/4.24	6.19/5.81	7.06/6.94
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	3100	4300	6200	7500	8600
	Fan motor power, 60Hz/50Hz		Kw	0.21	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 35 ℃.
2.Other heating capacity and supply air pressure can be available.

Table 7, Product data, C1 operation condition duct connection type, cont.

	Model			FCU-7AD MACU-7N	FCU-8AD MACU-8N	FCU-10AD MACU-10N	FCU-12AD MACU-12N	FCU-15AD MACU-15N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	26.1/24.5	29.5/28.6	34.7/32.8	42.8/41.7	51.6/52.7
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	16000x950x1750
		Outdoor	mm	1850x650x875	1850x650x875	1950x700x975	2050x750x975	2150x750x1280
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	400	400	500	500	600
	Refrigerant			R407c				
	Weight (indoor/outdoor)		Kg	345/305	355/330	410/385	430/430	535/615
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				

Indoor fan coil unit

Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	1.27/1.1	1.27/1.5	1.73/1.5	2.53/2.2	3.45/3.0
Air Filter	Material (filter / frame)			Nylon + Al Alloy				
Temp.Controller				Micro-computerized air conditioner controller				

Outdoor air cooling compressing & condensing unit

Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	8.3/7.6	9.2/8.9	10.9/10.2	13.9/13.6	16.7/18.1
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	10200	11500	13500	16800	21000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.45	2x0.68	2x0.68	2x0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃.
2.Other heating capacity and supply air pressure can be available.

Table 8, Product data, C2 operation condition duct connection type

	Model			FCU-2AD MACU-2H	FCU-3AD MACU-3H	FCU-4AD MACU-4H	FCU-5AD MACU-5H	FCU-6AD MACU-6H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	6.8/6.7	10.8/10.2	14.1/13.0	18.2/15.6	21.8/20.0
	Heating capacity 60Hz/50Hz		Kw	3	6	6	9	9
	Dimension (L X W X H)	Indoor	mm	700x450x1650	800x500x1720	800x500x1720	1050x550x1850	1050x550x1850
		Outdoor	mm	1050x500x670	1200x550x820	1200x550x820	1350x600x820	1350x600x820
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	200	300	300	400	400
	Refrigerant			R134a				
	Weight (indoor/outdoor)		Kg	135/130	165/160	175/195	245/230	260/255
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				
Indoor fan coil unit								
Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	3	6	6	9	9
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	1040	1560	2080	2600	3120
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.63/0.55	0.86\1.1	1.27/1.1
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				
Outdoor air cooling compressing & condensing unit								
Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	2.9/2.9	4.0/4.1	5.6/5.3	7.0/5.8	8.2/7.8
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	4250	5200	7300	9400	11000
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.32	0.45	0.45	0.68
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 45 ℃.
2.Other heating capacity and supply air pressure can be available.

Table 8, Product data, C2 operation condition duct connection type, cont.

	Model			FCU-7AD MACU-7H	FCU-8AD MACU-8H	FCU-10AD MACU-10H	FCU-12AD MACU-12H	FCU-15AD MACU-15H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	23.9/22.2	27.0/26.5	32.1/34.4	41.4/42.8	51.8/53.3
	Heating capacity 60Hz/50Hz		Kw	12	12	12	15	15
	Dimension (L X W X H)	Indoor	mm	1350x750x1950	1350x750x1950	1350x800x1950	1350x800x1950	16000x950x1750
		Outdoor	mm	1850x650x875	1850x650x875	1950x700x975	2050x750x975	2150x750x1280
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz				
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz				
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure		Pa	400	400	500	500	600
	Refrigerant			R134a				
	Weight (indoor/outdoor)		Kg	355/305	365/330	470/385	495/440	535/615
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit				

Indoor fan coil unit

Evaporator	Type			Copper tube and fins				
	Material			Copper tube aluminum fins with SUS304 frame				
Electric Heater	Heating capacity		Kw	12	12	12	15	15
	Type			Electrical heating, tube with fins				
	Material			SUS304 tube with SUS304 frame				
Supply Fan	Air volume		m^3/h	3640	4160	5200	6240	7800
	Type			Motor direct driven plug fan				
	Fan motor power, 60Hz/50Hz		Kw	1.27/1.1	1.27/1.5	1.73/1.5	2.53/2.2	3.45/3.0
Air Filter	Material (filter / frame)			Nylon + Alalloy				
Temp.Controller				Micro-computerized air conditioner controller				

Outdoor air cooling compressing & condensing unit

Compressor	Quantity			1	1	1	1	1
	Type			Hermetic scroll				
	Power Consumption 60Hz/50Hz		Kw	9.3/8.6	10.5/10.6	12.6/13.8	16.7/17.0	20.9/20.5
Condenser	Type			Multi-pass crossed fin tube coil				
	Material			Copper tube and copper fins with SUS316L coil frame				
Condenser Fan	Type			Low noise axial fan				
	Air flow		m^3/h	12500	14000	16500	21500	27000
	Fan motor power, 60Hz/50Hz		Kw	2x0.45	2x0.68	2x0.68	2x0.93	2x0.93
	Motor IP			IP56				

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 45℃.
2.Other heating capacity and supply air pressure can be available.

Table 9, Product data, C1 operation condition Galley air conditioner

	Model			MGPU-3A MACC-3N	MGPU-4A MACC-4N	MGPU-5A MACC-5N	MGPU-6A MACC-6N	MGPU-7A MACC-7N	MGPU-8A MACC-8N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	10.5/10.8	15.6/14.0	18.9/17.8	21.3/21.8	26.1/24.5	29.5/28.6
	Heating capacity 60Hz/50Hz		Kw	9	9	15	15	20	20
	Dimension (L X W X H)	Indoor	mm	800x500x 1510	800x500x 1510	1050x550x 1640	1050x550x 1640	1350x750x 1740	1350x750x 1740
		Outdoor	mm	1050x500x 820	1050x500x 820	1200x550x 820	1200x550x 820	1650x600x 875	1650x600x 875
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz					
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz					
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection					
	External pressure		Pa	300	300	400	400	500	500
	Refrigerant			R407c					
	Weight (indoor/outdoor)		Kg	170/110	185/120	255/155	280/180	365/230	385/250
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit					
Indoor package air conditioning unit									
Compressor	Quantity			1	1	1	1	1	1
	Type			Hermetic scroll					
	Power consumption 60Hz/50Hz		Kw	3.61/3.61	5.34/4.24	6.19/5.81	7.06/6.94	8.3/7.6	9.2/8.9
Evaporator	Type			Copper tube and fins					
	Material			Copper tube aluminum fins with SUS304 frame					
Electric Heater	Heating capacity		Kw	9	9	15	15	20	20
	Type			Electrical heating, tube with fins					
	Material			SUS304 tube with SUS304 frame					
Supply Fan	Air volume		m^3/h	600	800	1000	1200	1400	1600
	Type			Motor direct driven plug fan					
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.43/0.37	0.63/0.55	0.63/0.55	0.63/0.55
Air Filter	Material (filter / frame)			Nylon + Alalloy					
Temp.Controller				Micro-computerized air conditioner controller					
Outdoor Condenser									
Condenser	Type			Multi-pass crossed fin tube coil					
	Material			Copper tube and copper fins with SUS316L coil frame					
Condenser Fan	Type			Low noise axial fan					
	Air flow, m^3/h			4300	6200	7500	8600	10200	11500
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.45	0.45	0.68	2x0.45	2x0.45
	Motor IP			IP56					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃.
2.Other heating capacity and supply air pressure can be available.

Table 9, product data, C2 operation condition Galley air conditioner

	Model			MGPU-3A MACC-3H	MGPU-4A MACC-4H	MGPU-5A MACC-5H	MGPU-6A MACC-6H	MGPU-7A MACC-7H	MGPU-8A MACC-8H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	10.8/10.2	14.1/13.0	18.2/15.6	21.8/20.0	23.9/22.2	27.0/26.5
	Heating capacity 60Hz/50Hz		Kw	9	9	15	15	20	20
	Dimension (L X W X H)	Indoor	mm	800x500x 1510	800x500x 1510	1050x550x 1640	1050x550x 1640	1350x750x 1740	1350x750x 1740
		Outdoor	mm	1050x500x 820	1050x500x 820	1200x550x 820	1200x550x 820	1650x600x 875	1650x600x 875
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz					
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz					
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection					
	External pressure		Pa	300	300	400	400	500	500
	Refrigerant			R134a					
	Weight (indoor/outdoor)		Kg	180/110	195/120	270/155	285/180	375/230	395/250
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit					
Indoor package air conditioning unit									
Compressor	Quantity			1	1	1	1	1	1
	Type			Hermetic scroll					
	Power consumption 60Hz/50Hz		Kw	4.0/4.1	5.6/5.3	7.0/5.8	8.2/7.8	9.3/8.6	10.5/10.6
Evaporator	Type			Copper tube and fins					
	Material			Copper tube aluminum fins with SUS304 frame					
Electric Heater	Heating capacity		Kw	9	9	15	15	20	20
	Type			Electrical heating, tube with fins					
	Material			SUS304 tube with SUS304 frame					
Supply Fan	Air volume		m^3/h	600	800	1000	1200	1400	1600
	Type			Motor direct driven plug fan					
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.43/0.37	0.63/0.55	0.63/0.55	0.63/0.55
Air Filter	Material (filter / frame)			Nylon + Alalloy					
Temp.Controller				Micro-computerized air conditioner controller					
Outdoor Condenser									
Condenser	Type			Multi-pass crossed fin tube coil					
	Material			Copper tube and copper fins with SUS316L coil frame					
Condenser Fan	Type			Low noise axial fan					
	Air flow, m^3/h			5200	7300	9400	11000	12500	14000
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.45	0.45	0.68	2x0.45	2x0.68
	Motor IP			IP56					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27℃, humidity 50%.
Cooling air inlet temperature 45℃.
2.Other heating capacity and supply air pressure can be available.

Table 10, product data, C1 operation condition Galley air conditioner

	Model			FGCU-3A MACU-3N	FGCU-4A MACU-4N	FGCU-5A MACU-5N	FGCU-6A MACU-6N	FGCU-7A MACU-7N	FGCU-8A MACU-8N
General Parameter	Cooling capacity 60Hz/50Hz		Kw	10.5/10.8	15.6/14.0	18.9/17.8	21.3/21.8	26.1/24.5	29.5/28.6
	Heating capacity 60Hz/50Hz		Kw	9	9	15	15	20	20
	Dimension (L X W X H)	Indoor	mm	800x500x 1510	800x500x 1510	1050x550x 1640	1050x550x 1640	1350x750x 1740	1350x750x 1740
		Outdoor	mm	1200x500x 820	1200x500x 820	1350x550x 820	1350x550x 820	1850x600x 875	1850x600x 875
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz					
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz					
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection					
	External pressure		Pa	300	300	400	400	500	500
	Refrigerant			R407c					
	Weight (indoor/outdoor)		Kg	155/150	165/170	220/215	245/240	335/305	350/330
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit					
Indoor fan coil unit									
Evaporator	Type			Copper tube and fins					
	Material			Copper tube aluminum fins with SUS304 frame					
Electric Heater	Heating capacity		Kw	9	9	15	15	20	20
	Type			Electrical heating, tube with fins					
	Material			SUS304 tube with SUS304 frame					
Supply Fan	Air volume		m^3/h	600	800	1000	1200	1400	1600
	Type			Motor direct driven plug fan					
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.43/0.37	0.63/0.55	0.63/0.55	0.63/0.55
Air Filter	Material (filter / frame)			Nylon + Al Alloy					
Temp.Controller				Micro-computerized air conditioner controller					
Outdoor Condenser									
Compressor	Quantity			1	1	1	1	1	1
	Type			Hermetic scroll					
	Power Consumption 60Hz/50Hz		Kw	3.61/3.61	5.34/4.24	6.19/5.81	7.06/6.94	8.3/7.6	9.2/8.9
Condenser	Type			Multi-pass crossed fin tube coil					
	Material			Copper tube and copper fins with SUS316L coil frame					
Condenser Fan	Type			Low noise axial fan					
	Air flow, m^3/h			4300	6200	7500	8600	10200	11500
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.45	0.45	0.68	2x0.45	2x0.45
	Motor IP			IP56					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 35℃.
2.Other heating capacity and supply air pressure can be available.

Table 10, product data, C2 operation condition Galley air conditioner

	Model			FGCU-3A MACU-3H	FGCU-4A MACU-4H	FGCU-5A MACU-5H	FGCU-6A MACU-6H	FGCU-7A MACU-7H	FGCU-8A MACU-8H
General Parameter	Cooling capacity 60Hz/50Hz		Kw	10.8/10.2	14.1/13.0	18.2/15.6	21.8/20.0	23.9/22.2	27.0/26.5
	Heating capacity 60Hz/50Hz		Kw	9	9	15	15	20	20
	Dimension (L X W X H)	Indoor	mm	800x500x 1510	800x500x 1510	1050x550x 1640	1050x550x 1640	1350x750x 1740	1350x750x 1740
		Outdoor	mm	1200x550x 820	1200x550x 820	1350x600x 820	1350x600x 820	1850x650x 875	1850x650x 875
	Power source			AC440～480V-3PH-60Hz /AC380～415V-3PH-50Hz					
	Control power			AC220～230V-1PH-60Hz /AC220～230V-1PH-50Hz					
	Protecting device			Refrigerant high/low pressure switch, compressor overload protection, phase absent protection					
	External pressure		Pa	300	300	400	400	500	500
	Refrigerant			R134a					
	Weight (indoor/outdoor)		Kg	155/160	165/170	220/230	245/255	335/320	350/340
	Casing material			Carbon steel sheet and painting for indoor unit; SUS316L for outdoor unit					
Indoor fan coil unit									
Evaporator	Type			Copper tube and fins					
	Material			Copper tube aluminum fins with SUS304 frame					
Electric Heater	Heating capacity		Kw	9	9	15	15	20	20
	Type			Electrical heating, tube with fins					
	Material			SUS304 tube with SUS304 frame					
Supply Fan	Air volume		m^3/h	600	800	1000	1200	1400	1600
	Type			Motor direct driven plug fan					
	Fan motor power, 60Hz/50Hz		Kw	0.43/0.37	0.43/0.37	0.43/0.37	0.63/0.55	0.63/0.55	0.63/0.55
Air Filter	Material (filter / frame)			Nylon + Alalloy					
Temp.Controller				Micro-computerized air conditioner controller					
Outdoor Condenser									
Compressor	Quantity			1	1	1	1	1	1
	Type			Hermetic scroll					
	Power Consumption 60Hz/50Hz		Kw	4.0/4.1	5.6/5.3	7.0/5.8	8.2/7.8	9.3/8.6	10.5/10.6
Condenser	Type			Multi-pass crossed fin tube coil					
	Material			Copper tube and copper fins with SUS316L coil frame					
Condenser Fan	Type			Low noise axial fan					
	Air flow, m^3/h			5200	7300	9400	11000	12500	14000
	Fan motor power, 60Hz/50Hz		Kw	0.32	0.45	0.45	0.68	2x0.45	2x0.68
	Motor IP			IP56					

Note:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
Cooling air inlet temperature 45℃.
2.Other heating capacity and supply air pressure can be available.

Table 11, Performance data

C1 Operation condition refrigerant R407C, 50Hz

Model			M(G)PU-2_B/F(G)CU-2_B MACC-2N/MACU-2N	M(G)PU-3_B/F(G)CU-3_B MACC-3N/MACU-3N	M(G)PU-4_B/F(G)CU-4_B MACC-4N/MACU-4N	M(G)PU-5_B/F(G)CU-5_B MACC-5N/MACU-5N	M(G)PU-6_B/F(G)CU-6_B MACC-6N/MACU-6N
EAT [℃]	27	TC	7.4	10.8	14.0	17.8	21.8
		SHC	4.9	7.3	9.7	12.1	14.6
	25	TC	7.1	10.4	13.4	17.0	20.9
		SHC	4.5	6.8	9.0	11.3	13.5
	24	TC	7.1	10.3	13.4	17.0	20.9
		SHC	3.8	5.7	7.6	9.5	11.4

Model			M(G)PU-7_B/F(G)CU-7_B MACC-7N/MACU-7N	M(G)PU-8_B/F(G)CU-8_B MACC-8N/MACU-8N	M(G)PU-10_B/F(G)CU-10_B MACC-10N/MACU-10N	M(G)PU-12_B/F(G)CU-12_B MACC-12N/MACU-12N	M(G)PU-15_B/F(G)CU-15_B MACC-15N/MACU-15N
EAT [℃]	27	TC	24.5	28.6	32.8	41.7	52.7
		SHC	17.0	19.4	24.3	29.1	36.4
	25	TC	23.5	27.4	31.5	40.0	50.6
		SHC	15.8	18.0	22.5	27.0	33.8
	24	TC	23.5	27.4	31.4	39.9	50.5
		SHC	13.3	15.3	19.1	22.9	28.6

C1 Operation condition refrigerant R407C, 60Hz

Model			M(G)PU-2_B/F(G)CU-2_B MACC-2N/MACU-2N	M(G)PU-3_B/F(G)CU-3_B MACC-3N/MACU-3N	M(G)PU-4_B/F(G)CU-4_B MACC-4N/MACU-4N	M(G)PU-5_B/F(G)CU-5_B MACC-5N/MACU-5N	M(G)PU-6_B/F(G)CU-6_B MACC-6N/MACU-6N
EAT [℃]	27	TC	7.5	10.5	15.9	18.9	21.3
		SHC	4.9	7.3	9.7	12.1	14.6
	25	TC	7.2	10.1	15.3	18.1	20.4
		SHC	4.5	6.8	9.0	11.3	13.5
	24	TC	4.2	6.2	8.3	10.4	12.5
		SHC	3.8	5.7	7.6	9.5	11.4

Model			M(G)PU-7_B/F(G)CU-7_B MACC-7N/MACU-7N	M(G)PU-8_B/F(G)CU-8_B MACC-8N/MACU-8N	M(G)PU-10_B/F(G)CU-10_B MACC-10N/MACU-10N	M(G)PU-12_B/F(G)CU-12_B MACC-12N/MACU-12N	M(G)PU-15_B/F(G)CU-15_B MACC-15N/MACU-15N
EAT [℃]	27	TC	26.1	29.5	34.7	42.8	51.6
		SHC	17.0	19.4	24.3	29.1	36.4
	25	TC	25.0	28.3	33.3	41.1	49.5
		SHC	15.8	18.0	22.5	27.0	33.8
	24	TC	14.6	16.6	20.8	25.0	31.2
		SHC	13.3	15.3	19.1	22.9	28.6

EAT: Entering air temperature
SHC: Sensible heating capacity, kW

Table 12, Performance data

C2 Operation condition refrigerant R134a, 50Hz

Model			M(G)PU-2_C/F(G)CU-2_C MACC-2H/MACU-2H	M(G)PU-3_C/F(G)CU-3_C MACC-3H/MACU-3H	M(G)PU-4_C/F(G)CU-4_C MACC-4H/MACU-4H	M(G)PU-5_C/F(G)CU-5_C MACC-5H/MACU-5H	M(G)PU-6_C/F(G)CU-6_C MACC-6H/MACU-6H
EAT [℃]	27	TC	6.7	10.2	13.0	15.6	20.0
		SHC	4.5	6.8	9.0	11.3	13.5
	25	TC	6.4	9.8	12.5	14.9	19.2
		SHC	4.2	6.2	8.3	10.4	12.5
	24	TC	6.4	9.8	12.4	14.9	19.1
		SHC	3.8	5.7	7.6	9.5	11.4

Model			M(G)PU-7_C/F(G)CU-7_C MACC-7H/MACU-7H	M(G)PU-8_C/F(G)CU-8_C MACC-8H/MACU-8H	M(G)PU-10_C/F(G)CU-10_C MACC-10H/MACU-10H	M(G)PU-12_C/F(G)CU-12_C MACC-12H/MACU-12H	M(G)PU-15_C/F(G)CU-15_C MACC-15H/MACU-15H
EAT [℃]	27	TC	22.2	26.5	34.4	42.8	53.3
		SHC	15.8	18.0	22.5	27.0	33.8
	25	TC	21.3	25.5	33.1	41.1	51.2
		SHC	14.6	16.6	20.8	25.0	31.2
	24	TC	21.3	25.4	32.9	41.0	51.0
		SHC	13.3	15.3	19.1	22.9	28.6

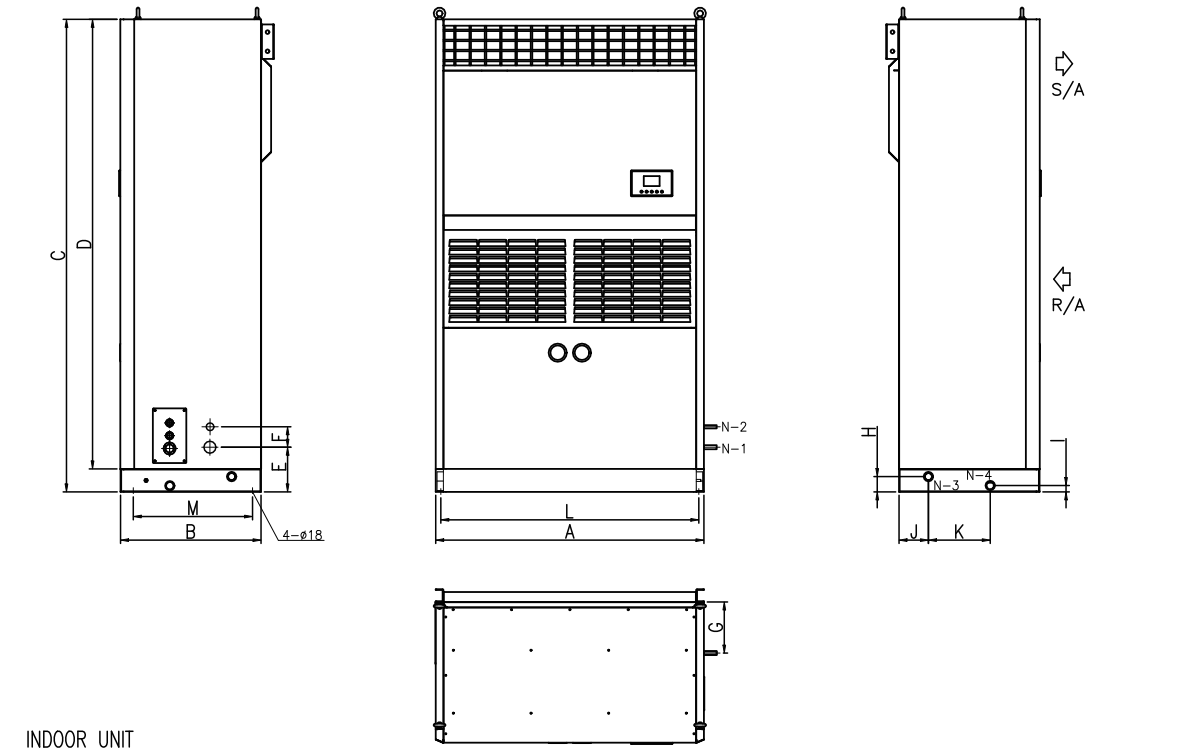
C2 Operation condition refrigerant R134a, 60Hz

Model			M(G)PU-2_C/F(G)CU-2_C MACC-2H/MACU-2H	M(G)PU-3_C/F(G)CU-2_C MACC-3H/MACU-2H	M(G)PU-4_C/F(G)CU-4_C MACC-4H/MACU-4H	M(G)PU-5_C/F(G)CU-5_C MACC-5H/MACU-5H	M(G)PU-6_C/F(G)CU-6_C MACC-6H/MACU-6H
EAT [℃]	27	TC	7.5	10.5	15.9	18.9	21.3
		SHC	4.9	7.3	9.7	12.1	14.6
	25	TC	7.2	10.1	15.3	18.1	20.4
		SHC	4.5	6.8	9.0	11.3	13.5
	24	TC	4.2	6.2	8.3	10.4	12.5
		SHC	3.8	5.7	7.6	9.5	11.4

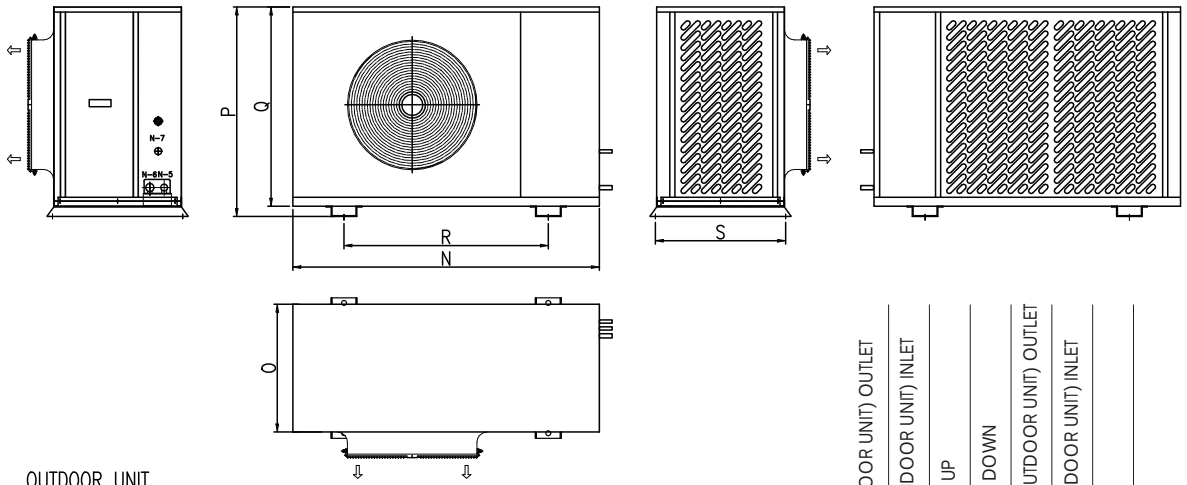
Model			M(G)PU-7_C/F(G)CU-7_C MACC-7H/MACU-7H	M(G)PU-8_C/F(G)CU-8_C MACC-8H/MACU-8H	M(G)PU-10_C/F(G)CU-10_C MACC-10H/MACU-10H	M(G)PU-7_C/F(G)CU-12_C MACC-7H/MACU-12H	M(G)PU-15_C/F(G)CU-15_C MACC-15H/MACU-15H
EAT [℃]	27	TC	23.9	27.0	32.1	41.4	51.8
		SHC	15.8	18.0	22.5	27.0	33.8
	25	TC	23.0	26.0	30.9	39.8	49.8
		SHC	14.6	16.6	20.8	25.0	31.2
	24	TC	22.9	25.9	30.7	39.6	49.6
		SHC	13.3	15.3	19.1	22.9	28.6

EAT: Entering air temperature
SHC: Sensible heating capacity, kW

Plenum chamber type & compressor in Indoor unit dimension Drawings,2RT,3RT,4RT,5RT,6RT



INDOOR UNIT

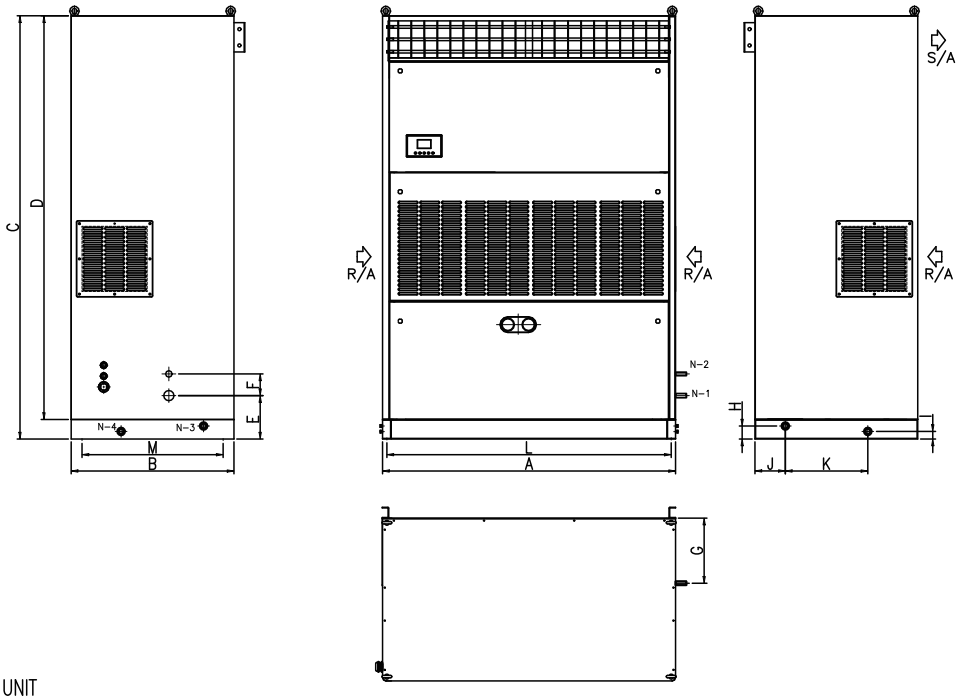


OUTDOOR UNIT

GAS PIPE(INDOOR UNIT) OUTLET
LIQUID PIPE(INDOOR UNIT) INLET
DRAIN WATER UP
DRAIN WATER DOWN
LIQUID PIPE(OUTDOOR UNIT) OUTLET
GAS PIPE(OUTDOOR UNIT) INLET
SAFTEY VALVE

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	N-1	N-2	N-3	N-4	N-5	N-6	N-7
MPU-2P MACC-2	700	450	1650	1560	160	65	150	60	35	115	142	660	370	950	450	670	630	600	460	1/2"	3/8"	G1"	G1"	3/8"	1/2"	1/2"
MPU-3P MACC-3	800	500	1720	1630	175	80	180	60	35	115	192	760	420	1050	500	820	780	700	510	1/2"	3/8"	G1"	G1"	3/8"	1/2"	1/2"
MPU-4P MACC-4	800	500	1720	1630	175	80	180	60	35	115	192	760	420	1050	500	820	780	700	510	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"
MPU-5P MACC-5	1050	550	1850	1760	175	80	200	60	35	115	242	1010	470	1200	550	820	780	800	560	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"
MPU-6P MACC-6	1050	550	1850	1760	175	80	200	60	35	115	242	1010	470	1200	550	820	780	800	560	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"

Plenum chamber type & compressor in Indoor unit dimension Drawings,7RT,8RT,10RT,12RT,15RT



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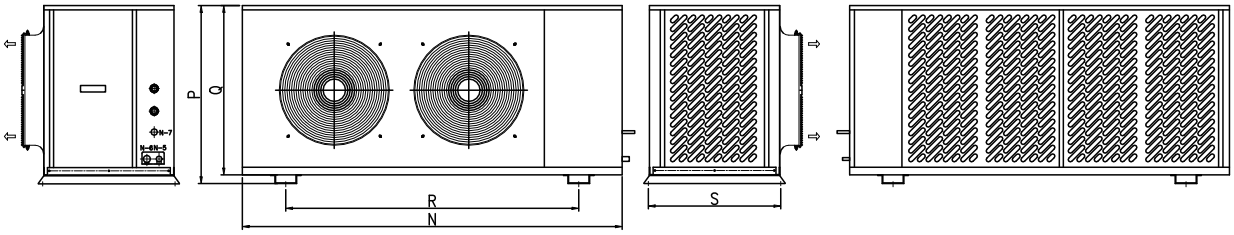
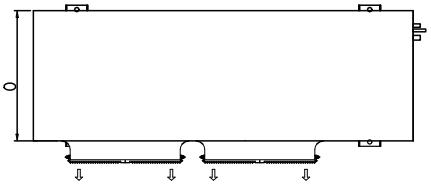
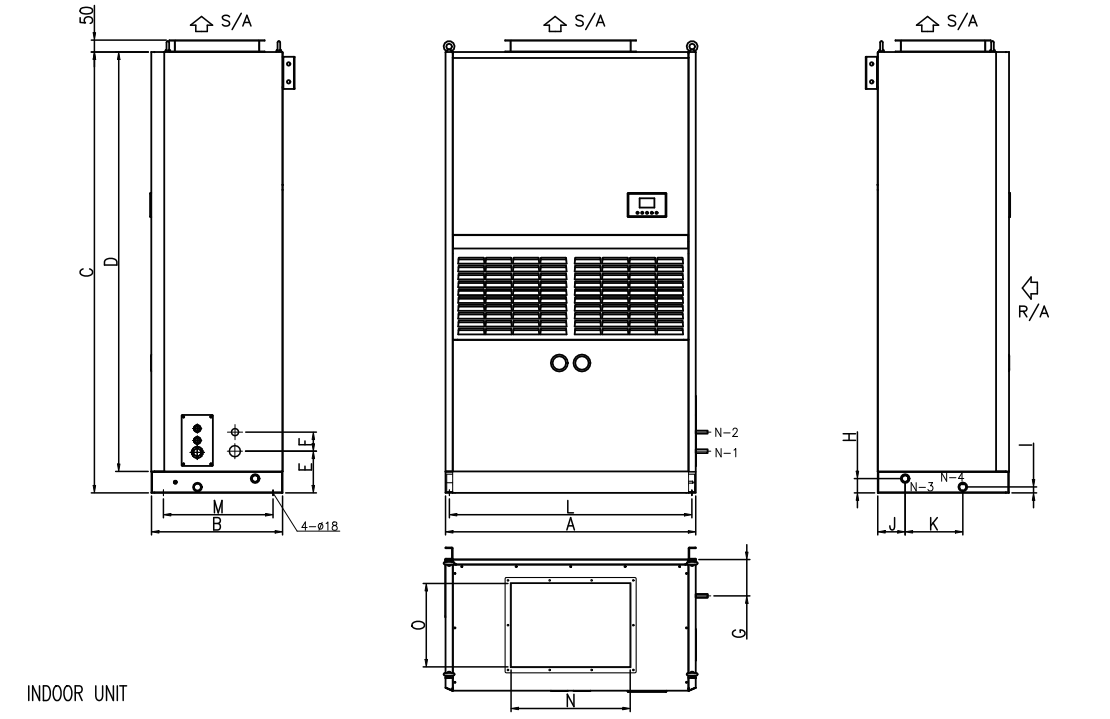




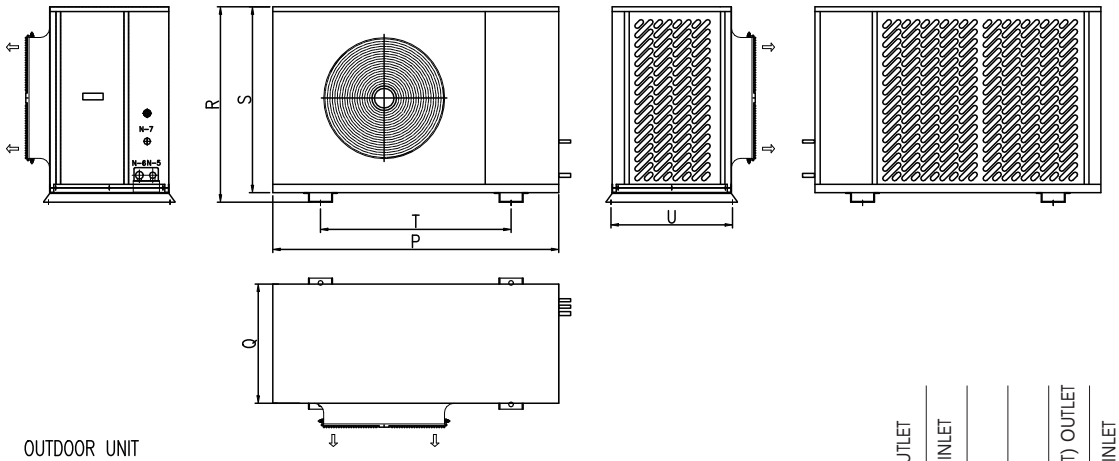
OUTDOOR UNIT

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 DRAIN WATER DOWN	N-5 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-6 GAS PIPE(OUTDOOR UNIT) INLET	N-7 SAFTEY VALVE
MPU-7P MACC-7	1350	750	1950	1860	200	100	300	60	35	140	380	1310	670	1650	600	875	825	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-8P MACC-8	1350	750	1950	1860	200	100	300	60	35	140	380	1310	670	1650	600	875	825	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-10P MACC-10	1350	800	1950	1860	220	100	350	60	35	140	430	1310	720	1650	600	975	925	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-12P MACC-12	1350	800	1950	1860	220	100	350	60	35	140	430	1310	720	1800	650	975	925	1400	660	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-15P MACC-15	1450	850	2400	2300	250	120	400	60	35	140	480	1410	770	1950	700	1280	1230	1550	710	1-1/8"	7/8"	G1"	G1"	7/8"	1-1/8"	1/2"

Duct connetion type & compressor in Indoor unit dimension Drawings,2RT,3RT,4RT,5RT,6RT



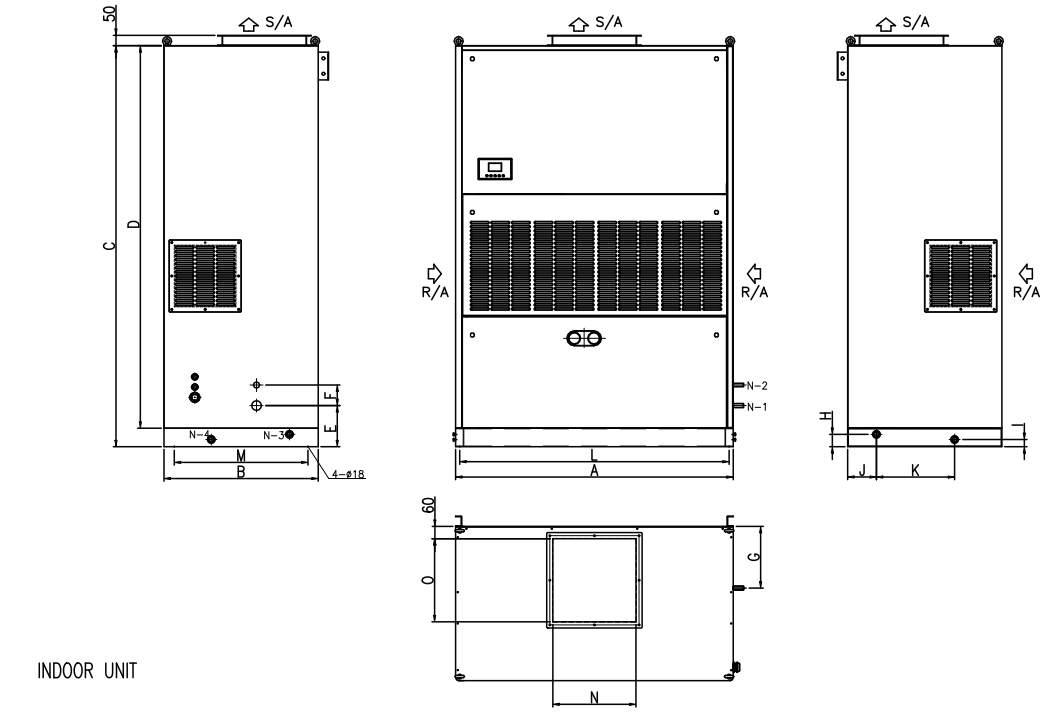
INDOOR UNIT



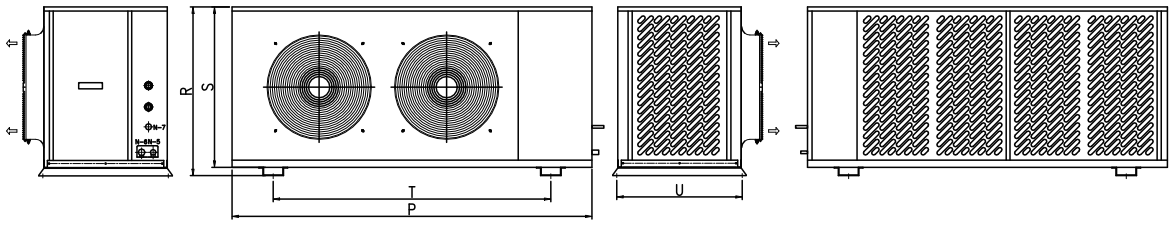
OUTDOOR UNIT

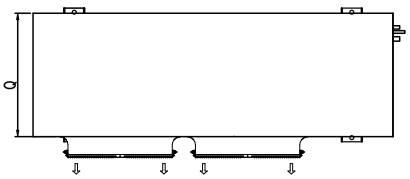
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 DRAIN WATER DOWN	N-5 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-6 GAS PIPE(OUTDOOR UNIT) INLET	N-7 SAFTEY VALVE
MPU-2D MACC-2	700	450	1650	1560	160	65	150	60	35	115	142	660	370	300	200	950	450	670	630	600	460	1/2"	3/8"	G1"	G1"	3/8"	1/2"	1/2"
MPU-3D MACC-3	800	500	1720	1630	175	80	180	60	35	115	192	760	420	400	300	1050	500	820	780	700	510	1/2"	3/8"	G1"	G1"	3/8"	1/2"	1/2"
MPU-4D MACC-4	800	500	1720	1630	175	80	180	60	35	115	192	760	420	400	300	1050	500	820	780	700	510	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"
MPU-5D MACC-5	1050	550	1850	1760	175	80	200	60	35	115	242	1010	470	500	350	1200	550	820	780	800	560	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"
MPU-6D MACC-6	1050	550	1850	1760	175	80	200	60	35	115	242	1010	470	500	350	1200	550	820	780	800	560	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"

Duct connetion type & compressor in indoor unit dimension
Drawings, 7RT,8RT,10RT,12RT



INDOOR UNIT

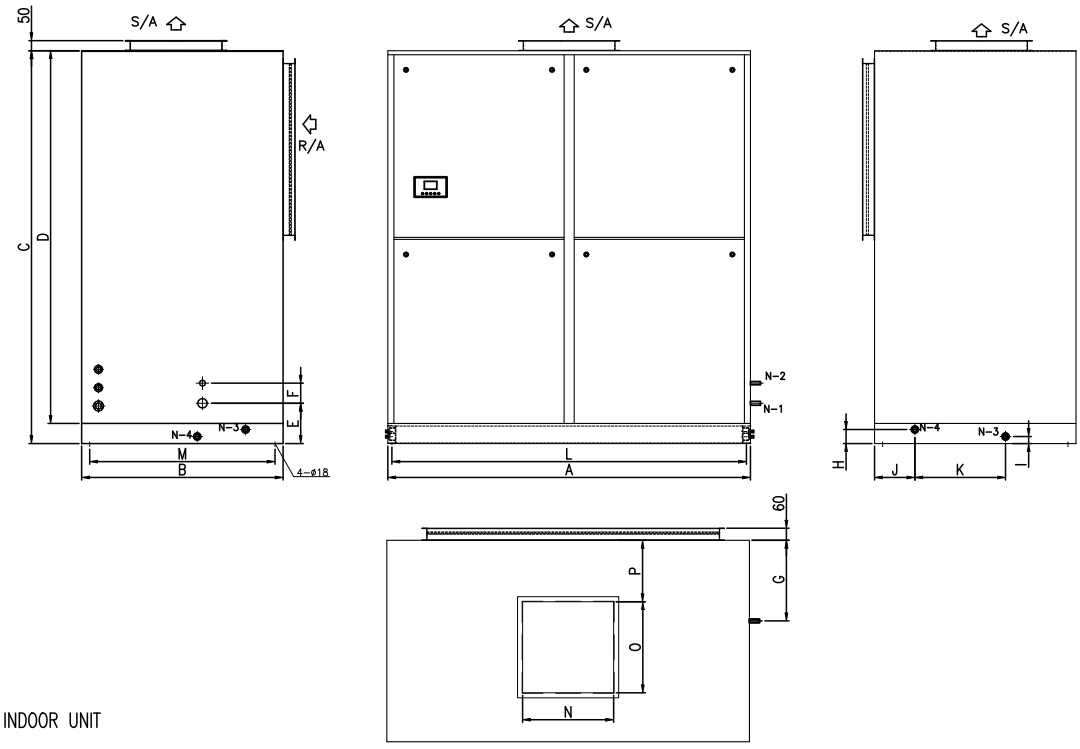


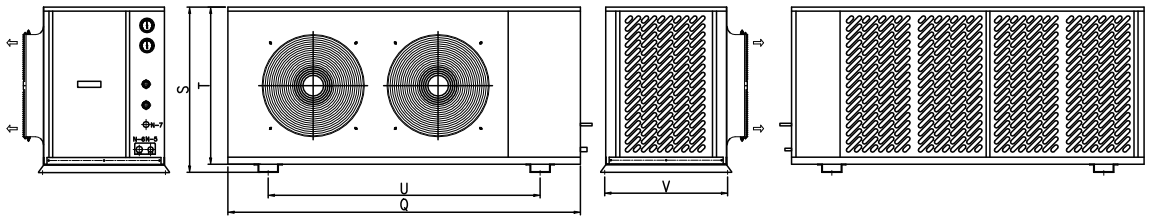


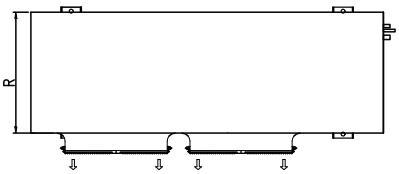
OUTDOOR UNIT

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 DRAIN WATER DOWN	N-5 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-6 GAS PIPE(OUTDOOR UNIT) INLET	N-7 SAFTEY VALVE
MPU-7D MACC-7	1350	750	1950	1860	200	100	300	60	35	140	380	1310	670	360	360	1650	600	875	825	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-8D MACC-8	1350	750	1950	1860	200	100	300	60	35	140	380	1310	670	360	360	1650	600	875	825	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-10D MACC-10	1350	800	1950	1860	220	100	350	60	35	140	430	1310	720	404	404	1650	600	975	925	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MPU-12D MACC-12	1350	800	1950	1860	220	100	350	60	35	140	430	1310	720	404	404	1800	650	975	925	1400	660	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"

Duct connetion type & compressor in indoor unit dimension
Drawings, 15RT

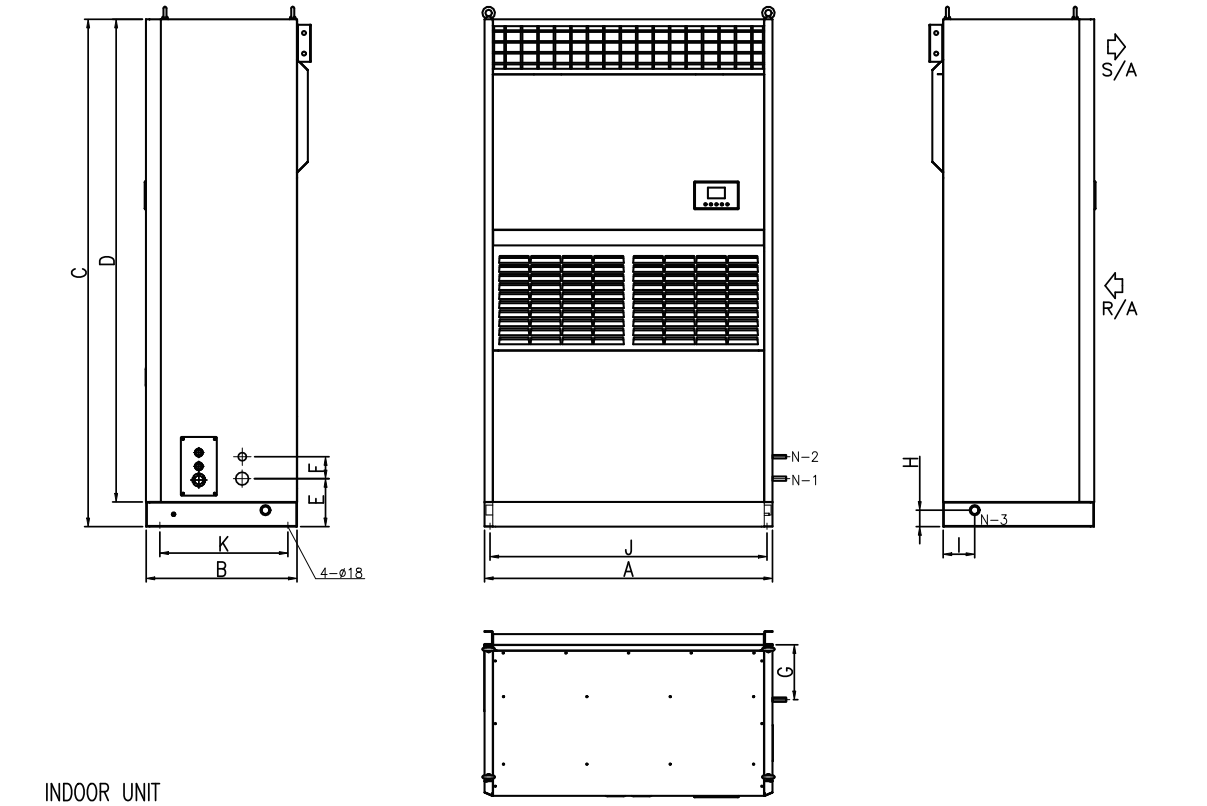




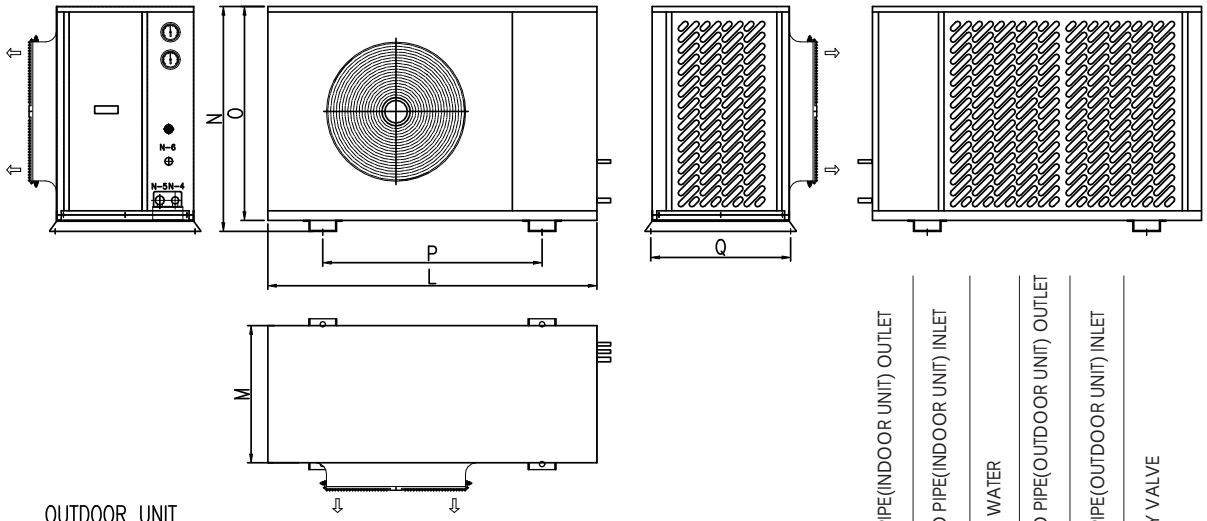


Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 DRAIN WATER DOWN	N-5 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-6 GAS PIPE(OUTDOOR UNIT) INLET	N-7 SAFTEY VALVE
MPU-15D MACC-15	1600	950	1750	1650	250	120	400	70	35	140	450	1560	870	452	452	210	1950	700	1280	1230	1550	710	1-1/8"	7/8"	G1"	G1"	7/8"	1-1/8"	1/2"

Plenum chamber type & compressor in indoor unit dimension Drawings,2RT,3RT,4RT,5RT,6RT



INDOOR UNIT

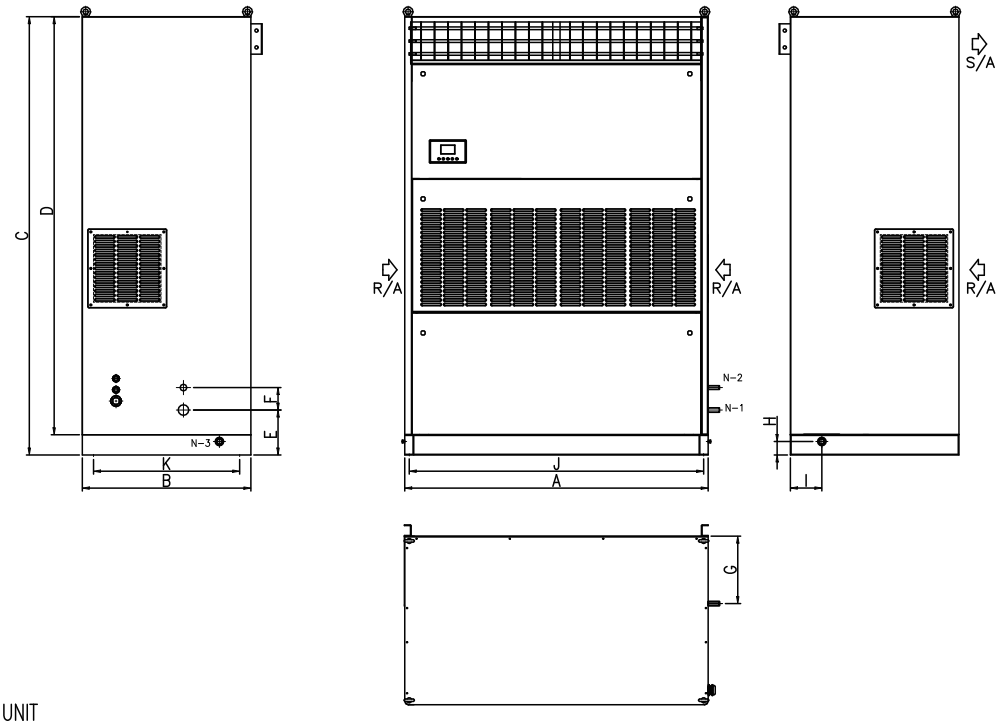


OUTDOOR UNIT

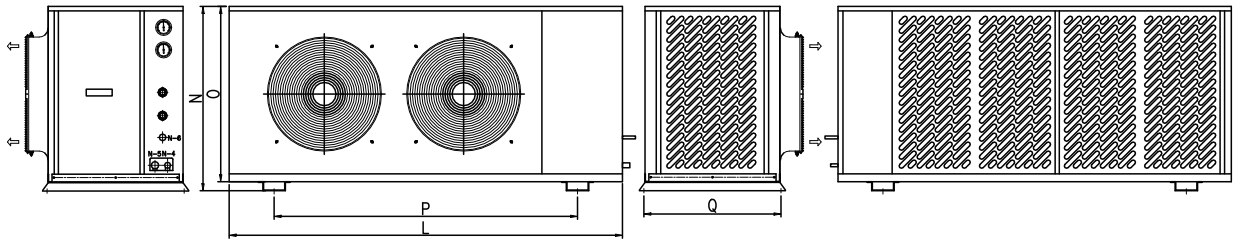
GAS PIPE(INDOOR UNIT) OUTLET
LIQUID PIPE(INDOOR UNIT) INLET
DRAIN WATER
LIQUID PIPE(OUTDOOR UNIT) OUTLET
GAS PIPE(OUTDOOR UNIT) INLET
SAFTEY VALVE

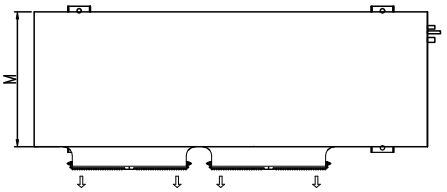
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	N-1	N-2	N-3	N-4	N-5	N-6
FCU-2P MACU-2	700	450	1650	1560	160	65	150	60	115	660	370	1050	500	670	630	700	510	5/8"	3/8"	G1"	3/8"	5/8"	1/2"
FCU-3P MACU-3	800	500	1720	1630	175	80	180	60	115	760	420	1200	550	820	780	850	560	3/4"	3/8"	G1"	3/8"	3/4"	1/2"
FCU-4P MACU-4	800	500	1720	1630	175	80	180	60	115	760	420	1200	550	820	780	850	560	7/8"	1/2"	G1"	1/2"	7/8"	1/2"
FCU-5P MACU-5	1050	550	1850	1760	175	80	200	60	115	1010	470	1350	600	820	780	950	610	7/8"	1-1/8"	G1"	1/2"	1-1/8"	1/2"
FCU-6P MACU-6	1050	550	1850	1760	175	80	200	60	115	1010	470	1350	600	820	780	950	610	5/8"	1-1/8"	G1"	1/2"	1-1/8"	1/2"

Plenum chamber type & compressor in indoor unit dimension Drawings,7RT,8RT,10RT,12RT,15RT



INDOOR UNIT

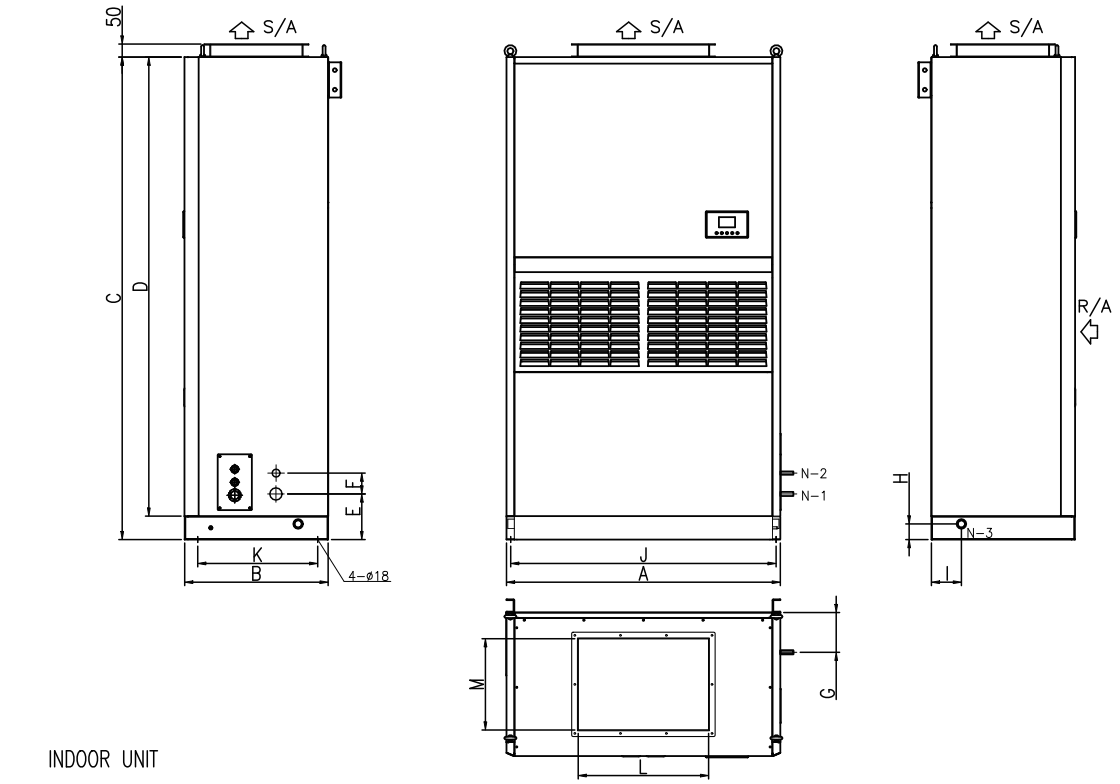




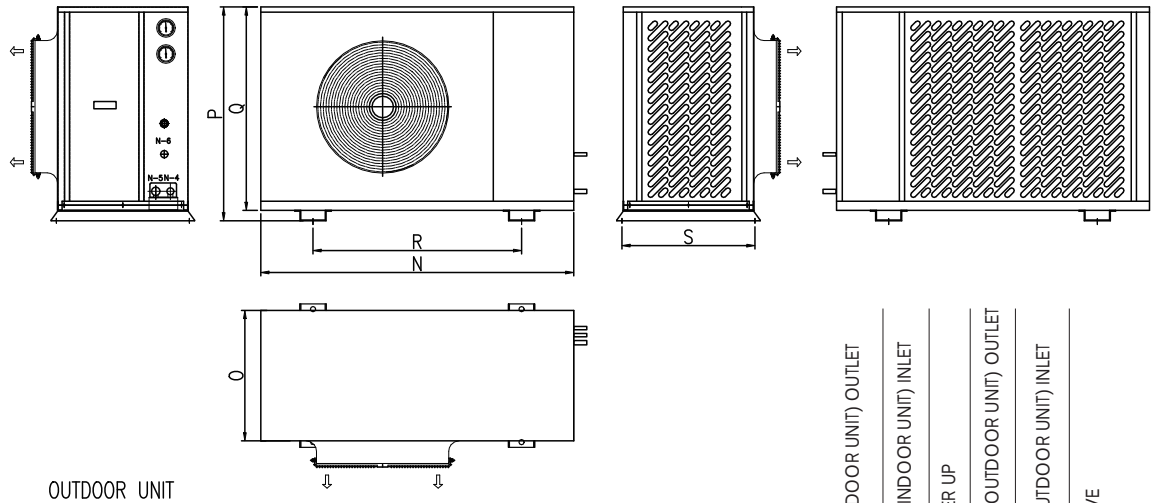
OUTDOOR UNIT

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-5 GAS PIPE(OUTDOOR UNIT) INLET	N-6 SAFTEY VALVE
FCU-7P MACU-7	1350	750	1950	1860	200	100	300	60	140	1310	670	1850	650	875	825	1450	660	1-3/8"	5/8"	G1"	5/8"	1-3/8"	1/2"
FCU-8P MACU-8	1350	750	1950	1860	200	100	300	60	140	1310	670	1850	650	875	825	1450	660	1-3/8"	5/8"	G1"	5/8"	1-3/8"	1/2"
FCU-10P MACU-10	1350	800	1950	1860	220	100	350	60	140	1310	720	1950	700	975	925	1550	710	1-5/8"	5/8"	G1"	5/8"	1-5/8"	1/2"
FCU-12P MACU-12	1350	800	1950	1860	220	100	350	60	140	1310	720	2050	750	975	925	1600	760	1-5/8"	5/8"	G1"	5/8"	1-5/8"	1/2"
FCU-15P MACU-15	1450	850	2400	2300	250	120	400	60	140	1410	770	2150	750	1280	1230	1650	760	1-5/8"	7/8"	G1"	7/8"	1-5/8"	1/2"

Duct connetion type & compressor in indoor unit dimension Drawings,2RT,3RT,4RT,5RT,6RT



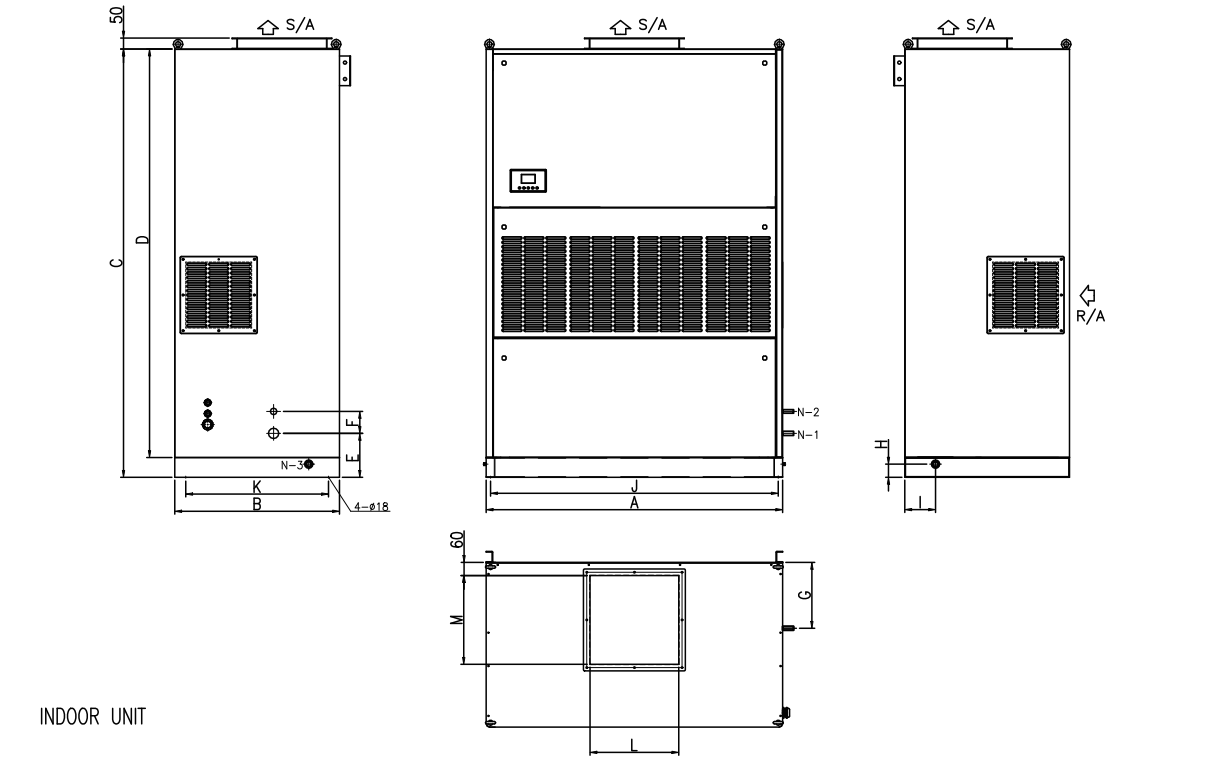
INDOOR UNIT



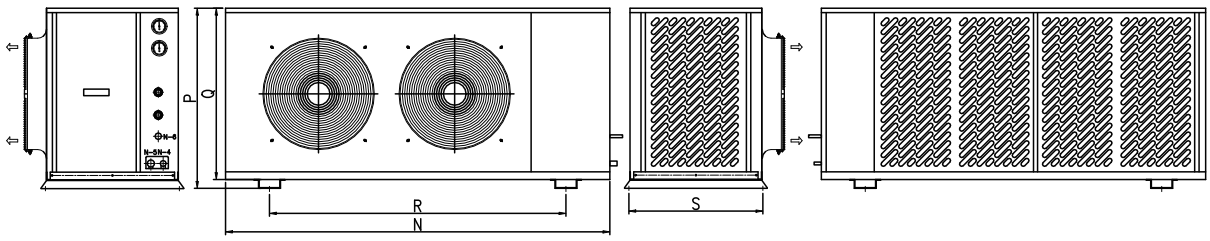
OUTDOOR UNIT

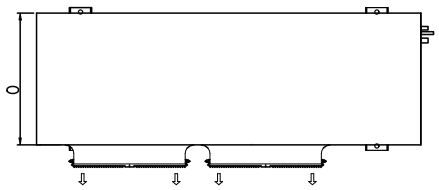
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-5 GAS PIPE(OUTDOOR UNIT) INLET	N-6 SAFTEY VALVE
FCU-2D MACU-2	700	450	1650	1560	160	65	150	60	115	660	370	300	200	1050	500	670	630	700	510	5/8"	3/8"	G1"	3/8"	5/8"	1/2"
FCU-3D MACU-3	800	500	1720	1630	175	80	180	60	115	760	420	400	300	1200	550	820	780	850	560	3/4"	3/8"	G1"	3/8"	3/4"	1/2"
FCU-4D MACU-4	800	500	1720	1630	175	80	180	60	115	760	420	400	300	1200	550	820	780	850	560	7/8"	1/2"	G1"	1/2"	7/8"	1/2"
FCU-5D MACU-5	1050	550	1850	1760	175	80	200	60	115	1010	470	500	350	1350	600	820	780	950	610	1-1/8"	1/2"	G1"	1/2"	1-1/8"	1/2"
FCU-6D MACU-6	1050	550	1850	1760	175	80	200	60	115	1010	470	500	350	1350	600	820	780	950	610	1-1/8"	1/2"	G1"	1/2"	1-1/8"	1/2"

Duct connetion type & compressor in indoor unit dimension
Drawings, 7RT,8RT,10RT,12RT



INDOOR UNIT



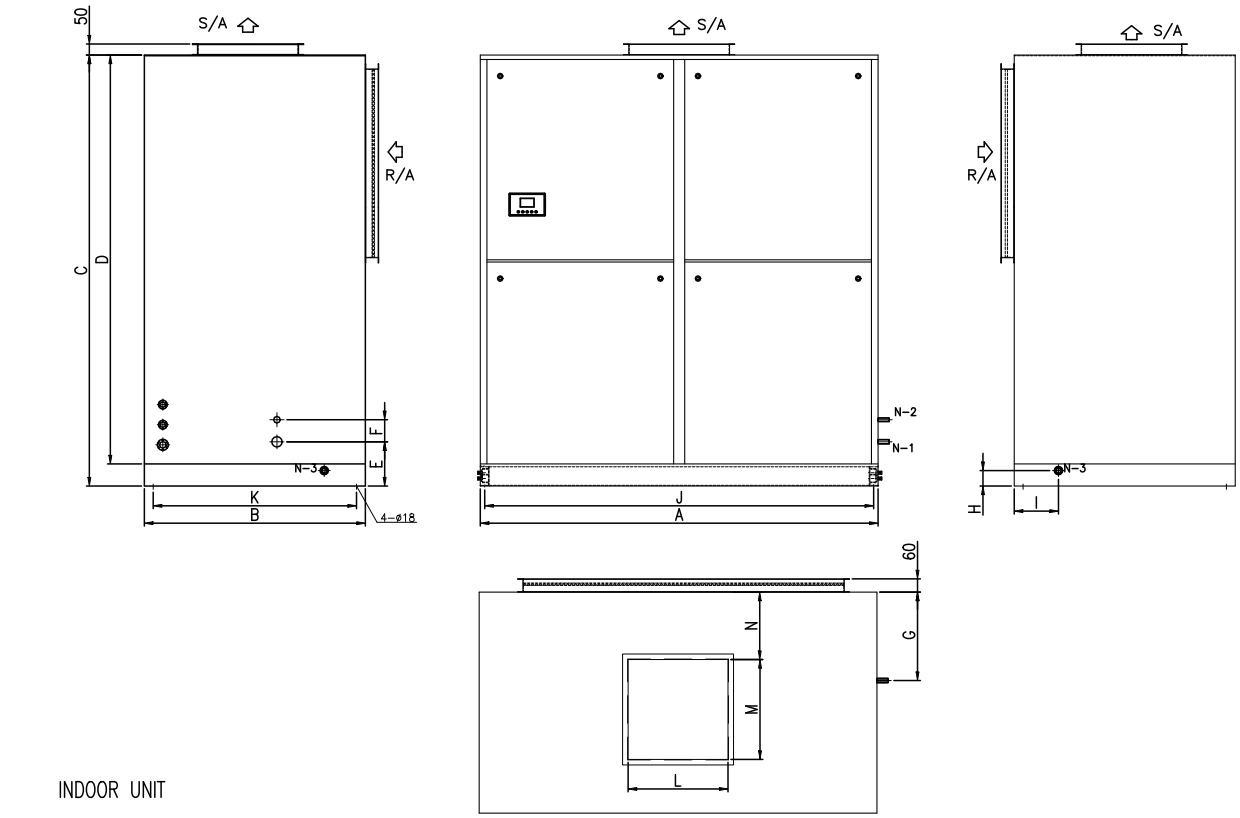


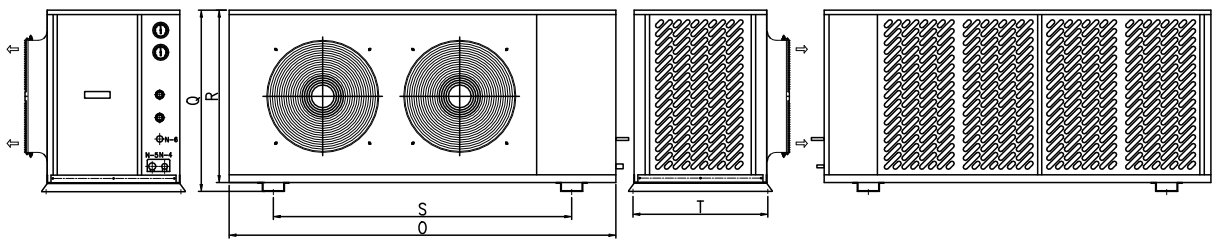
OUTDOOR UNIT

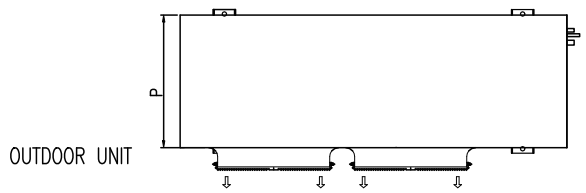
GAS PIPE(INDOOR UNIT) OUTLET
LIQUID PIPE(INDOOR UNIT) INLET
DRAIN WATER
LIQUID PIPE(OUTDOOR UNIT) OUTLET
GAS PIPE(OUTDOOR UNIT) INLET
SAFTEY VALVE

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	N-1	N-2	N-3	N-4	N-5	N-6
FCU-7D MACU-7	1350	750	1950	1860	200	100	300	60	140	1310	670	360	360	1850	650	875	825	1450	660	1-3/8"	5/8"	G1"	5/8"	1-3/8"	1/2"
FCU-8D MACU-8	1350	750	1950	1860	200	100	300	60	140	1310	670	360	360	1850	650	875	825	1450	660	1-3/8"	5/8"	G1"	5/8"	1-3/8"	1/2"
FCU-10D MACU-10	1350	800	1950	1860	220	100	350	60	140	1310	720	404	404	1950	700	975	925	1550	710	1-5/8"	5/8"	G1"	5/8"	1-5/8"	1/2"
FCU-12D MACU-12	1350	800	1950	1860	220	100	350	60	140	1310	720	404	404	2050	750	975	925	1600	760	1-5/8"	5/8"	G1"	5/8"	1-5/8"	1/2"

Duct connetion type & compressor in indoor unit dimension Drawing, 15RT

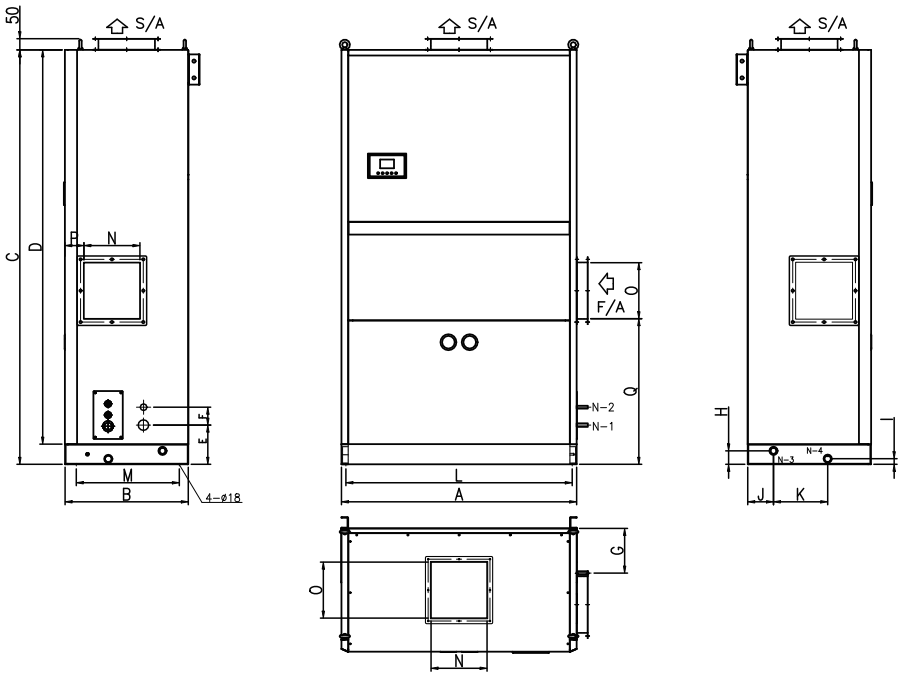




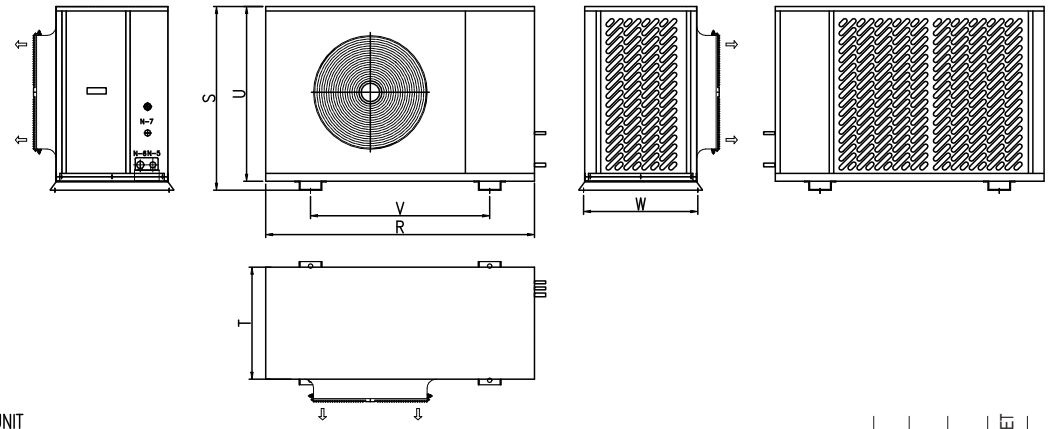


Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER	N-4 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-5 GAS PIPE(OUTDOOR UNIT) INLET	N-6 SAFTEY VALVE
FCU-15D MACU-15	1600	950	1750	1650	250	120	400	70	140	1560	870	452	452	210	2150	750	1280	1230	1650	760	1-5/8"	7/8"	G1"	7/8"	1-5/8"	1/2"

Galley type & compressor in indoor unit dimension Drawings,3RT,4RT,5RT,6RT



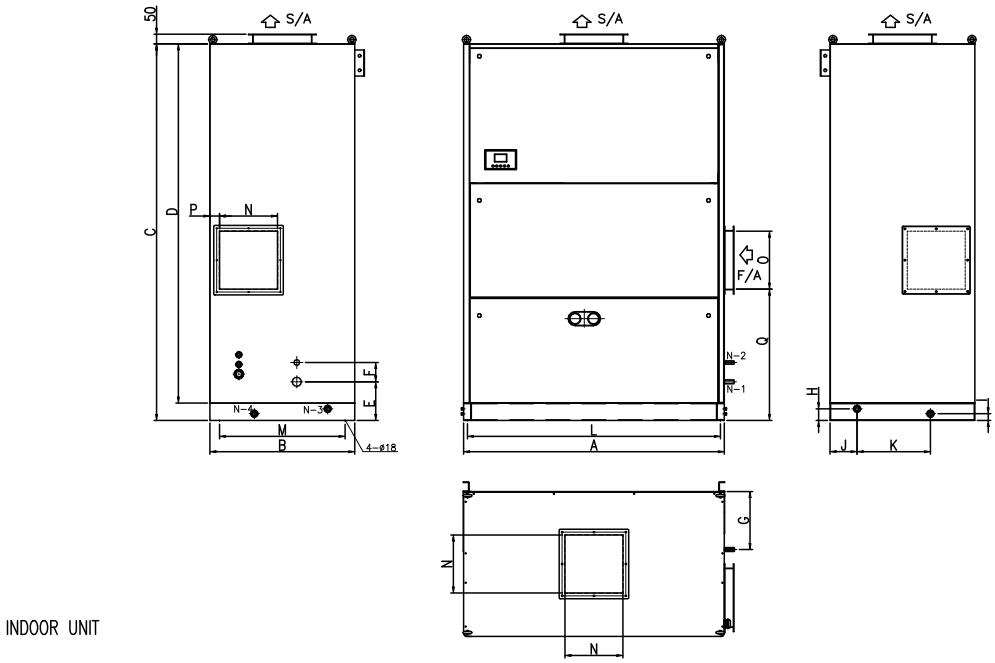
INDOOR UNIT

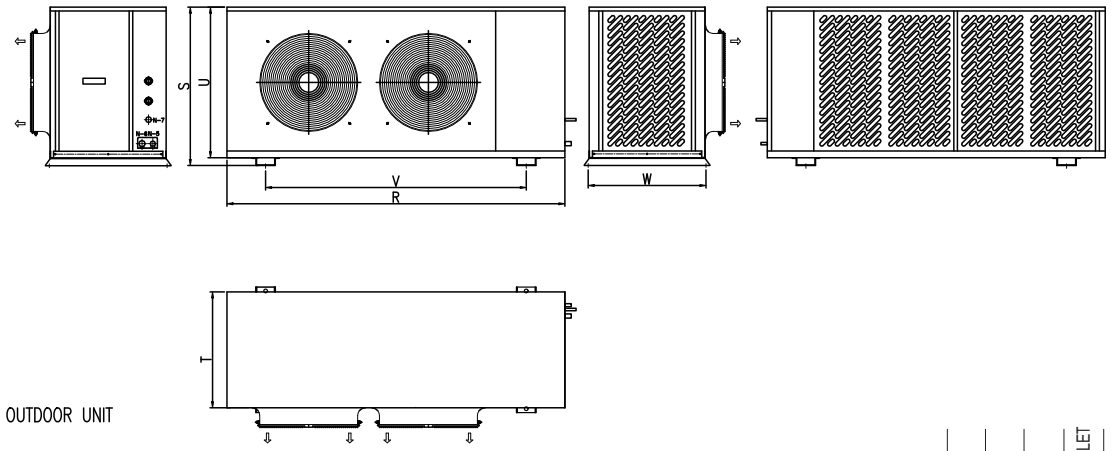


OUTDOOR UNIT

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER UP	N-4 DRAIN WATER DOWN	N-5 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-6 GAS PIPE(OUTDOOR UNIT) INLET	N-7 SAFTEY VALVE
MGPU-3P MACC-3	800	500	1510	1420	175	80	180	60	35	115	192	760	420	200	200	85	635	1050	500	820	780	700	510	1/2"	3/8"	G1"	G1"	3/8"	1/2"	1/2"
MGPU-4P MACC-4	800	500	1720	1630	175	80	180	60	35	115	192	760	420	200	200	85	635	1050	500	820	780	700	510	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"
MGPU-5P MACC-5	1050	550	1850	1760	175	80	200	60	35	115	242	1010	470	250	250	85	650	1200	550	820	780	800	560	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"
MGPU-6P MACC-6	1050	550	1850	1760	175	80	200	60	35	115	242	1010	470	250	250	85	650	1200	550	820	780	800	560	5/8"	1/2"	G1"	G1"	1/2"	5/8"	1/2"

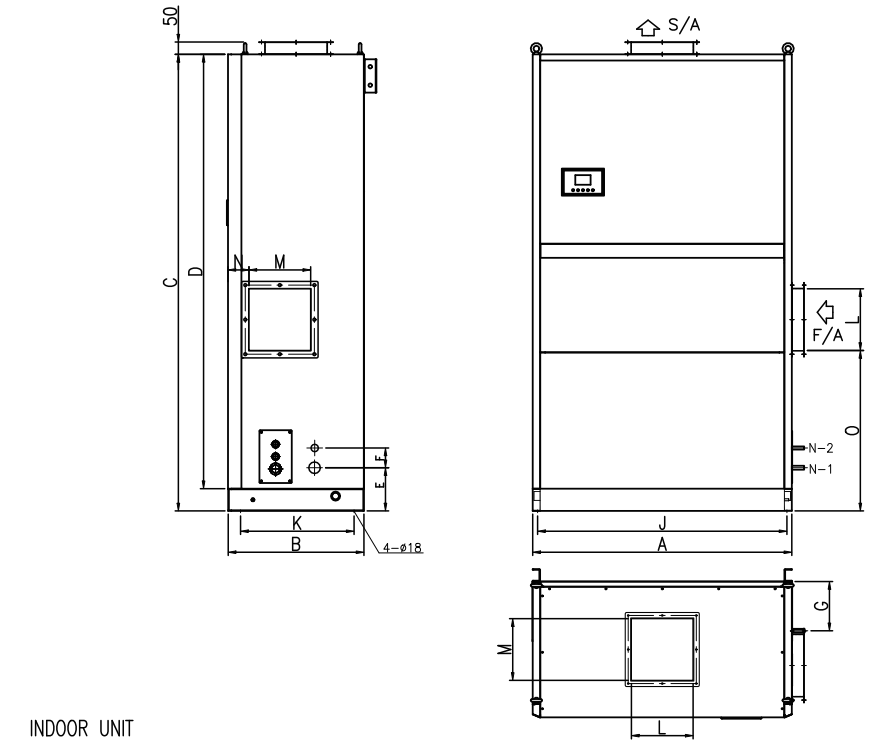
Galley type & compressor in indoor unit dimension Drawings,7RT,8RT



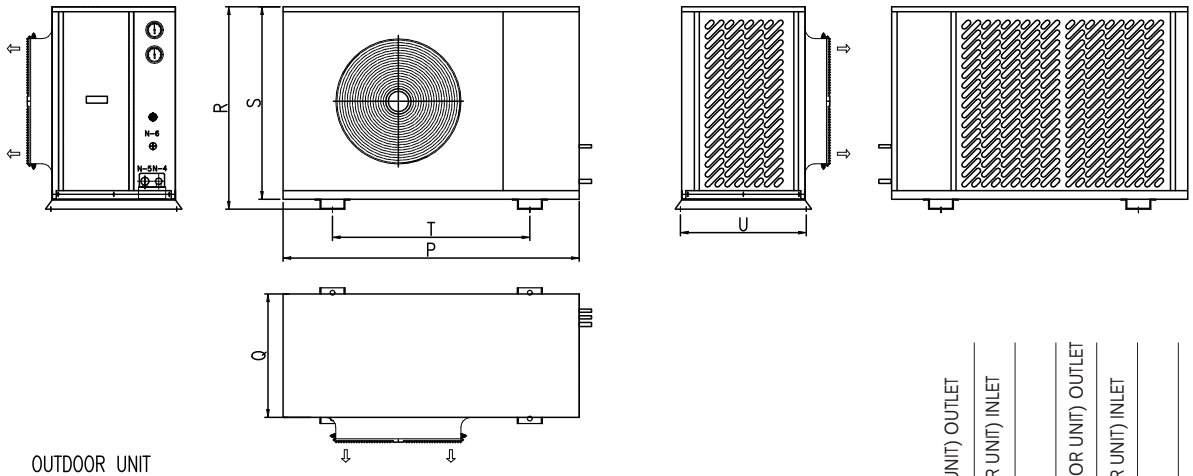


Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	N-1	N-2	N-3	N-4	N-5	N-6	N-7
																								GAS PIPE(INDOOR UNIT) OUTLET	LIQUID PIPE(INDOOR UNIT) INLET	DRAIN WATER UP	DRAIN WATER DOWN	LIQUID PIPE(OUTDOOR UNIT) OUTLET	GAS PIPE(OUTDOOR UNIT) INLET	SAFTEY VALVE	
MGPU-7D MACC-7	1350	750	1740	1650	200	100	300	60	35	140	380	1310	670	360	360	50	680	1650	600	875	825	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"
MGPU-8D MACC-8	1350	750	1740	1650	200	100	300	60	35	140	380	1310	670	360	360	50	680	1650	600	875	825	1250	610	7/8"	5/8"	G1"	G1"	5/8"	7/8"	1/2"

Galley type & compressor in outdoor unit dimension Drawings,3RT,4RT,5RT,6RT



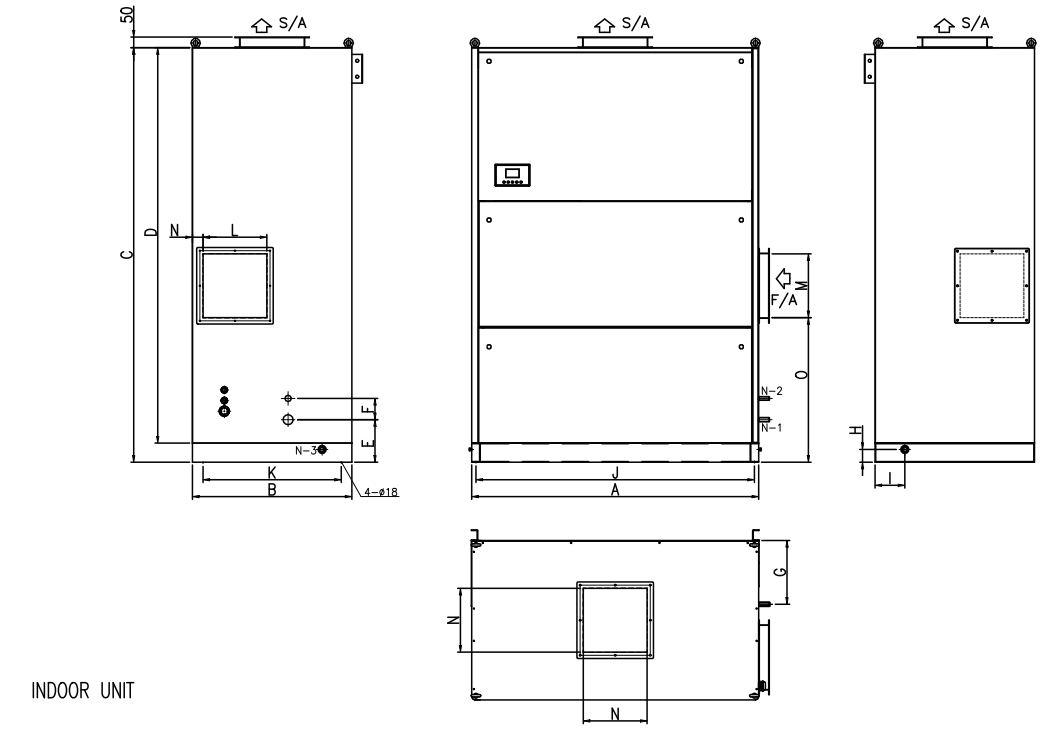
INDOOR UNIT

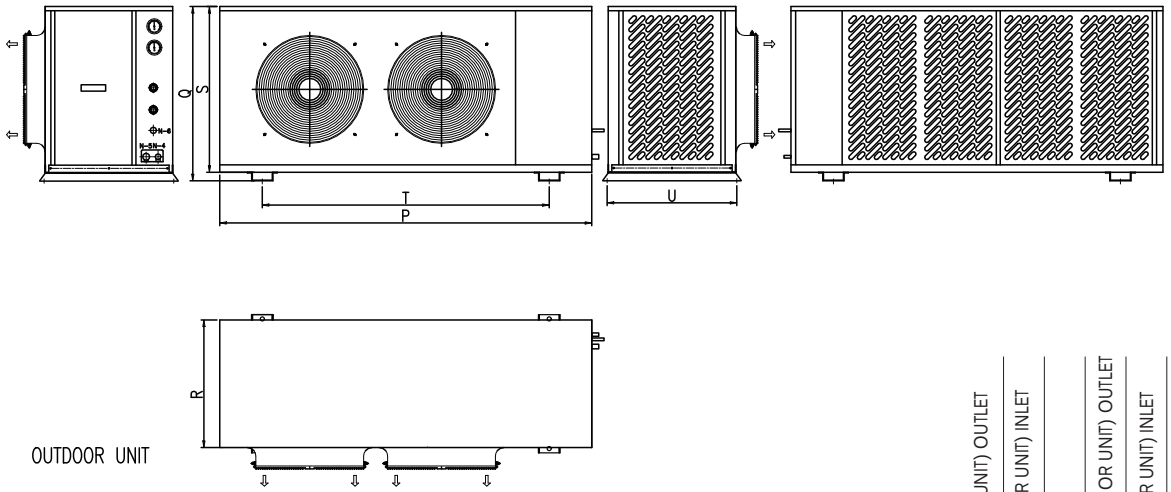


OUTDOOR UNIT

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	N-1 GAS PIPE(INDOOR UNIT) OUTLET	N-2 LIQUID PIPE(INDOOR UNIT) INLET	N-3 DRAIN WATER	N-4 LIQUID PIPE(OUTDOOR UNIT) OUTLET	N-5 GAS PIPE(OUTDOOR UNIT) INLET	N-6 SAFTEY VALVE
FGCU-3D MACU-3	800	500	1510	1420	175	80	180	60	115	760	420	200	200	85	635	1200	550	820	780	850	560	1/2"	3/8"	G1"	3/8"	1/2"	1/2"
FGCU-4D MACC-4	800	500	1510	1420	175	80	180	60	115	760	420	200	200	85	635	1200	550	820	780	850	560	5/8"	1/2"	G1"	1/2"	5/8"	1/2"
FGCU-5D MACU-5	1050	550	1640	1550	175	80	200	60	115	1010	470	250	250	85	650	1350	600	820	780	950	610	5/8"	1/2"	G1"	1/2"	5/8"	1/2"
FGCU-6D MACU-6	1050	550	1640	1550	175	80	200	60	115	1010	470	250	250	85	650	1350	600	820	780	950	610	5/8"	1/2"	G1"	1/2"	5/8"	1/2"

Galley type & compressor in outdoor unit dimension
Drawings, 7RT, 8RT





Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	N-1	N-2	N-3	N-4	N-5	N-6
FGCU-7D MACU-7	1350	750	1740	1650	200	100	300	60	140	1310	670	360	360	50	680	1850	650	875	825	1450	660	7/8"	5/8"	G1"	5/8"	7/8"	1/2"
FGCU-8D MACU-8	1350	750	1740	1650	200	100	300	60	140	1310	670	360	360	50	680	1850	650	875	825	1450	660	7/8"	5/8"	G1"	5/8"	7/8"	1/2"

N-1 GAS PIPE(INDOOR UNIT) OUTLET
N-2 LIQUID PIPE(INDOOR UNIT) INLET
N-3 DRAIN WATER
N-4 LIQUID PIPE(OUTDOOR UNIT) OUTLET
N-5 GAS PIPE(OUTDOOR UNIT) INLET
N-6 SAFTEY VALVE

MARINE ROOFTOP AC UNIT

Description

BlueConnect Marine Rooftop Air Conditioning Unit is exclusively designed for the applications on ships and offshore installations.

The units to be classified as air cooled compact type air conditioner as per condenser cooling medium for marine rooftop installation.

Ecological HFC refrigerant R407C for normal whether condition, R134a for hot weather condition.

The power source of the unit can be AC 440~480V/3PH/60Hz, AC380~415V/3PH/50Hz.

Standard cooling capacity range from 2RT to 15RT.

Features/benefits

Compact design with compressor, condenser, evaporator, heating coil, supply air fan, cooling fan and other refrigerant fittings are inside one common casing house for easy installation. The unit can be installed on the top of the ships, such as on the top of bridge deck, not occupy indoor space.

Anti-corrosion marine type material and IP56 protection class ensure long-life running.

As standard, R134a refrigerant and special condensing coil and fans design ensure the unit can be operation reliably at peak hot weather condition, such as, ambient temperature large than 45 ℃.

Weather Condition

The unit is designed based on following two weather condition:

- C1 operation condition, Standard weather condition, Rated capacity based on cooling standard: 27℃ DB, 19.5 ℃ WB indoor temperature and 35℃ DB, outdoor temperature, Unit operating ambient temperature range on cooling: up to 43 ℃.
- C2 Operation condition, hot temperature weather condition, rated capacity based on cooling standard: 27℃ DB, 19.5 ℃ WB indoor temperature and 46℃ DB, outdoor temperature, Unit operating ambient temperature range on cooling:up to 55 ℃.

Material

Casing:	Stainless steel SUS316L.
Insulation:	Rubber sponge insulation material.
Cooling coil:	Copper tube aluminium/ copper fins with stainless steel frame.
Reheat coil:	Stainless steel SUS304, tube and fins.
Drip tray:	Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation.
Reheat coil:	Copper fins with stainless steel frame.

Compressor

Low noise scroll type hermetic compressor.
Fitted with crankcase oil heater and internal suction accumulator for long-life running.

Condenser

Multi-pass crossed fin tube coil, copper tube and copper fins with SUS316L coil frame for air cooled condensers.

Evaporator

Multi-pass crossed fin tube type coil is standard.
Copper tube aluminium fin and copper tube copper fins are available as option.

Fan

Motor direct drive centrifugal fan with motor for plenum chamber type units, belt drive centrifugal fan for duct connection type units, motor direct driven plug fan is available .
Fan mountings with vibration dampers and belt tensioning mechanism base ensure low level noise and vibration.

Controller and Electrical Panel

Micro-computerized room temperature controller with its sensors to be supplied ensures correct temperature control, compressor control, fan motor controller, electrical heater control, and the unit operation mode change, fault alarm. Room temperature, compressor, fan, heater running status, alarm signals to be indicated on the controller displayer.

Electrical panel includes automatic circuit breaker for convenience service.

Accessary

The compressor safety devices include high and low pressure switch, anti-phase protection and compressor built-in overload protection device. A solenoid valve in the liquid line and filter dryer as well as fitting to plug in pressure gauges.

Features

- EC supply air fan.
- Condenser coil with anti-corrosion coating.
- Fresh air intake damper with counter flanges.
- Flexible connections and counter flanges for air intake and outlet.
- Electrical heater.

Unit Model Nomenclature

MRTU — 05 A T E B 6 H 1 I

Edition code :
I –First edition
II,III,IV,V – the last edition

Condenser / evporator coil material :
1 - Cu-Cu / Cu-Al 2 - Cu-Cu / Cu-Cu
3 - Cu-Cu / Cu-Al with anti-corrosion coating
4 - Cu-Cu / Cu-Cu with anti-corosion coating

Heater type:
H - With electric heater
Space - Without electric heater

Power source type:
5 - 380v / 3PH / 50Hz
6 - 440v / 3PH / 60Hz

Refrigerant type:
B - R407C, C - R134A

Supply air fan:
A - AC fan E - EC fan

Cooling air blow direction:
T- Cooling air top blow
H -Cooling air horizontal blow

Ambient condition:
A - Operation condition C1
B - Operation condition C2

Normal cooling capacity in [RT]
05 - Cooling capacity 5RT

Product code:
Mrtu - Marine rooftop AC unit

Product data, C1 operation condition refrigerant R407C, 50Hz

Model		MRTU-2A	MRTU-3A	MRTU-4A	MRTU-5A	MRTU-6A
General Parameter	Cooling capacity, kW	7.4	10.8	14.0	17.8	21.8
	Heating capacity, kW	3	6	6	9	9
	Dimension (L x W x H)	1500x1250x640	1500x1250x790	1500x1250x790	1500x1250x790	1500x1250x960
	Power source	AC380～415V-3PH-50Hz				
	Control power	AC220～230V-1PH-50Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, Phase absent protection				
	External pressure, AC fan PA	150	150	250	250	250
	External pressure, EC fan PA	280	330	330	380	380
	Noise, dB(A)	55	61	62	64	68
	Refrigerant	R407c				
	Weight, kg	270	325	356	390	420
	Casing material	SUS316l				
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	2.57	3.61	4.24	5.81	6.94
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	3100	4300	5300	7100	7100
	Fan motor power,kW	0.21	0.32	0.45	0.45	0.68
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	3	6	6	9	9
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	1040	1560	2080	2600	3120
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.22	0.22	0.56	0.56	0.69
	EC fan motor power, kW	0.31	0.53	0.63	0.63	0.81
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27℃, humidity 50%. Cooling air inlet temperature 35℃.

2.Other heating capacity and supply air pressure can be available.

Optional specification

Model	MRTU-2A	MRTU-3A	MRTU-4A	MRTU-5A	MRTU-6A
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C1 operation condition refrigerant R407C, 50Hz, cont.

Model		MRTU-7A	MRTU-8A	MRTU-10A	MRTU-12A	MRTU-15A
General Parameter	Cooling capacity, kW	24.5	28.6	32.8	41.7	52.7
	Heating capacity, kW	12	12	12	15	15
	Dimension (L x W x H)	2050x1250x960	2050x1250x960	2050x1250x960	2200x1180x1160	2200x1800x1360
	Power source	AC380～415V-3PH-50Hz				
	Control power	AC220～230V-1PH-60Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure, AC fan PA	250	350	350	350	350
	External pressure, EC fan PA	400	400	400	450	450
	Noise, dB(A)	67	68	71	74	76
	Refrigerant	R407c				
	Weight, kg	525	550	590	745	805
	Casing material	SUS316l				
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	7.6	8.9	10.2	13.6	18.1
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	9800	10000	13500	14200	19600
	Fan motor power,kW	0.68	0.68	0.93	2x0.68	2x0.68
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	12	12	12	15	15
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	3640	4160	5200	6240	7800
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.69	1.1	1.56	1.8	1.8
	EC fan motor power, kW	0.81	0.93	1.73	2.2	2.2
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 35℃.

2.Other heating capacity and supply air pressure can be available.

Optional specification

Model	MRTU-7A	MRTU-8A	MRTU-10A	MRTU-12A	MRTU-15A
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C2 operation condition refrigerant R134A, 50Hz

Model		MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B
General Parameter	Cooling capacity, kW	6.7	10.2	13.0	15.6	20.0
	Heating capacity, kW	3	6	6	9	9
	Dimension (L x W x H)	1500x1250x640	1500x1250x790	1500x1250x790	1500x1250x790	1500x1250x960
	Power source	AC380～415V-3PH-50Hz				
	Control power	AC220～230V-1PH-50Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, Phase absent protection				
	External pressure, AC fan PA	130	130	230	190	180
	External pressure, EC fan PA	280	330	330	380	380
	Noise, dB(A)	55	61	62	64	65
	Refrigerant	R134C				
	Weight, kg	280	335	370	405	435
	Casing material	SUS316L				
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	2.9	4.1	5.3	5.8	7.8
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with sus316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	4250	5200	7100	7100	10000
	Fan motor power,kW	0.32	0.32	0.45	0.45	0.68
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with sus304 frame				
ELE.Heater	Heating capacity, kW	3	6	6	9	9
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	1040	1560	2080	2600	3120
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.22	0.22	0.56	0.56	0.69
	EC fan motor power, kW	0.31	0.53	0.63	0.63	0.81
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 45℃.

2.Other heating capacity and supply air pressure can be available .

Optional specification

Model	MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C2 operation condition refrigerant R134A, 50Hz, cont.

Model		MRTU-7B	MRTU-8B	MRTU-10B	MRTU-12B	MRTU-15B
General Parameter	Cooling capacity, kW	22.2	26.5	34.4	42.8	53.3
	Heating capacity, kW	12	12	12	15	15
	Dimension (L x W x H)	2050x1250x960	2050x1250x960	2050x1250x1060	2200x1180x1160	2200x1800x1360
	Power source	AC380～415V-3PH-50Hz				
	Control power	AC220～230V-1PH-50Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, Phase absent protection				
	External pressure, AC fan PA	250	350	350	350	350
	External pressure, EC fan PA	400	400	400	450	450
	Noise, dB(A)	67	68	71	74	76
	Refrigerant	R134a				
	Weight, kg	535	555	605	760	820
	Casing material	SUS316l				
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	8.6	10.6	13.8	17.0	20.5
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m³/h	9800	13000	14500	20000	26000
	Fan motor power,kW	0.68	0.93	0.93	2x0.93	2x0.93
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	12	12	12	15	15
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m³/h	3640	4160	5200	6240	7800
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.69	1.1	1.56	1.8	1.8
	EC fan motor power, kW	0.81	0.93	1.73	2.2	2.2
Air Filter	Material(filter/frame)	Nylon+Aalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 45℃.

2.Other heating capacity and supply air pressure can be available.

Optional specification

Model	MRTU-2B	MRTU-8B	MRTU-10B	MRTU-12B	MRTU-15B
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C1 operation condition refrigerant R407C, 60Hz

Model		MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B
General Parameter	Cooling capacity, kW	7.5	10.5	15.9	18.9	21.3
	Heating capacity, kW	3	6	6	9	9
	Dimension (L x W x H)		1500x1250x790	1500x1250x790	1500x1250x790	1500x1250x960
	Power source	AC440～480V-3PH-60Hz				
	Control power	AC220～230V-1PH-60Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure, AC fan PA	150	150	250	250	250
	External pressure, EC fan PA	280	330	330	380	380
	Noise, dB(A)	55	61	62	64	65
	Refrigerant			R407c		
	Weight, kg	270	325	356	390	420
	Casing material			SUS316l		
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	2.62	3.61	5.34	6.19	7.06
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	3100	4300	5300	7100	7100
	Fan motor power,kW	0.21	0.32	0.45	0.45	0.68
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	3	6	6	9	9
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	1040	1560	2080	2600	3120
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.31	0.31	0.63	0.63	0.63
	EC fan motor power, kW	0.31	0.53	0.63	0.63	0.81
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 35℃.

2.Other heating capacity and supply air pressure can be available.

Optional specification

Model	MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C1 operation condition refrigerant R407C, 60Hz, cont.

Model		MRTU-7A	MRTU-8A	MRTU-10A	MRTU-12A	MRTU-15A
General Parameter	Cooling capacity, kW	26.1	29.5	34.7	42.8	51.6
	Heating capacity, kW	12	12	12	15	15
	Dimension (L x W x H)	2050x1250x960	2050x1250x960	2050x1250x1060	2200x1180x1160	2200x1800x1360
	Power source	AC440～480V-3PH-60Hz				
	Control power	AC220～230V-1PH-60Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure, AC fan PA	250	350	350	350	350
	External pressure, EC fan PA	400	400	400	450	450
	Noise, dB(A)	67	68	71	74	76
	Refrigerant			R407c		
	Weight, kg	525	550	590	745	805
	Casing material			SUS316l		
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	8.3	9.2	10.9	13.9	15.9
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	9800	10000	13500	14200	19600
	Fan motor power,kW	0.68	0.68	0.93	2x0.68	2x0.68
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	12	12	12	15	15
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	3640	4160	5200	6240	7800
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.69	1.1	1.56	1.8	1.8
	EC fan motor power, kW	0.81	0.93	1.73	2.2	2.2
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 35℃.

2.Other heating capacity and supply air pressure can be available.

Optional specification

Model	MRTU-7A	MRTU-8A	MRTU-10A	MRTU-12A	MRTU-15A
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C2 operation condition refrigerant R134A, 60Hz

Model		MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B
General Parameter	Cooling capacity, kW	6.8	10.8	14.1	18.2	21.8
	Heating capacity, kW	3	6	6	9	9
	Dimension (L x W x H)	2050x1250x960	1500x1250x790	1500x1250x790	1500x1250x790	1500x1250x960
	Power source	AC440～480V-3PH-60Hz				
	Control power	AC220～230V-1PH-60Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure, AC fan PA	130	130	230	190	180
	External pressure, EC fan PA	280	330	330	380	380
	Noise, dB(A)	55	61	62	64	65
	Refrigerant	R134a				
	Weight, kg	280	335	370	405	435
	Casing material	SUS316l				
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic scroll				
	Power consumpoition, kW	2.9	4.1	5.6	7.0	8.2
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	4250	5200	7100	8400	10000
	Fan motor power,kW	0.32	0.32	0.45	0.45	0.68
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	3	6	6	9	9
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	1040	1560	2080	2600	3120
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.22	0.22	0.56	0.56	0.69
	EC fan motor power, kW	0.31	0.53	0.63	0.63	0.81
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 45℃.

2.Other heating capacity and supply air pressure can be available.

Optional specification

Model	MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Product data, C2 operation condition refrigerant R134A, 60Hz, cont.

Model		MRTU-7B	MRTU-8B	MRTU-10B	MRTU-12B	MRTU-15B
General Parameter	Cooling capacity, kW	23.9	27.0	32.1	41.4	51.8
	Heating capacity, kW	12	12	12	15	15
	Dimension (L x W x H)	2050x1250x960	2050x1250x960	2050x1250x1060	2200x1180x1160	2200x1800x1360
	Power source	AC440～480V-3PH-60Hz				
	Control power	AC220～230V-1PH-60Hz				
	Protecting device	Refrigerant high/low pressure switch, compressor overload protection, phase absent protection				
	External pressure, AC fan PA	250	350	350	350	350
	External pressure, EC fan PA	400	400	400	450	450
	Noise, dB(A)	67	68	71	74	76
	Refrigerant			R134a		
	Weight, kg	535	555	605	760	820
	Casing material			SUS316l		
Compressor	QTY.	1	1	1	1	1
	Type	Hermetic Scroll				
	Power consumpoition, kW	9.3	10.5	12.6	16.7	20.9
	IP	IP56				
Condenser Coil	Type	Multi-pass crossed fin tube coil				
	Material	Copper tube and copper fins with SUS316l coil frame				
Condenser Fan	Type	Low noise axial fan				
	Air flow, m^3/h	9800	13000	14500	20000	26000
	Fan motor power,kW	0.68	0.93	1.05	2x0.93	2x0.93
	Motor IP	IP56				
Evaporator	Type	Copper tube and fins				
	Material	Copper tube aluminum fins with SUS304 frame				
ELE.Heater	Heating capacity, kW	12	12	12	15	15
	Type	Electrical heating, tube with fins				
	Material	SUS304 tube with SUS304 frame				
Supply Air Fan	Air volume, m^3/h	3640	4160	5200	6240	7800
	Type	Motor direct driven plug fan				
	AC fan motor power, kW	0.69	1.1	1.56	1.8	1.8
	EC fan motor power, kW	0.81	0.93	1.73	2.2	2.2
Air Filter	Material(filter/frame)	Nylon+Alalloy				
TEMP. Controller		Micro-computerized air conditioner controller				

Note:

1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%. Cooling air inlet temperature 45℃

2.Other heating capacity and supply air pressure can be available

Optional specification

Model	MRTU-7B	MRTU-8B	MRTU-10B	MRTU-12B	MRTU-15B
Fresh Water Humidifier	•	•	•	•	•
Copper Tube Copper Fins Evaporator	•	•	•	•	•

Performance Data

C1 operation condition refrigerant R407C, 50Hz,

Model			MRTU-2A	MRTU-3A	MRTU-4A	MRTU-5A	MRTU-6A	MRTU-7A	MRTU-8A	MRTU-10A	MRTU-12A	MRTU-15A
EAT [℃]	27	TC	7.4	10.8	14.0	17.8	21.8	24.5	28.6	32.8	41.7	52.7
		SHC	4.9	7.3	9.7	12.1	14.6	17.0	19.4	24.3	29.1	36.4
	25	TC	7.1	10.4	13.4	17.0	20.9	23.5	27.4	31.5	40.0	50.6
		SHC	4.5	6.8	9.0	11.3	13.5	15.8	18.0	22.5	27.0	33.8
	24	TC	7.1	10.3	13.4	17.0	20.9	23.5	27.4	31.4	39.9	50.5
		SHC	3.8	5.7	7.6	9.5	11.4	13.3	15.3	19.1	22.9	28.6

C1 operation condition refrigerant R407C, 60HZ,

Model			MRTU-2A	MRTU-3A	MRTU-4A	MRTU-5A	MRTU-6A	MRTU-7A	MRTU-8A	MRTU-10A	MRTU-12A	MRTU-15A
EAT [℃]	27	TC	7.5	10.5	15.9	18.9	21.3	26.1	29.5	34.7	42.8	51.6
		SHC	4.9	7.3	9.7	12.1	14.6	17.0	19.4	24.3	29.1	36.4
	25	TC	7.2	10.1	15.3	18.1	20.4	25.0	28.3	33.3	41.1	49.5
		SHC	4.5	6.8	9.0	11.3	13.5	15.8	18.0	22.5	27.0	33.8
	24	TC	4.2	6.2	8.3	10.4	12.5	14.6	16.6	20.8	25.0	31.2
		SHC	3.8	5.7	7.6	9.5	11.4	13.3	15.3	19.1	22.9	28.6

C2 operation condition refrigerant R134A, 50HZ

Model			MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B	MRTU-7B	MRTU-8B	MRTU-10B	MRTU-12B	MRTU-15B
EAT [℃]	27	TC	6.7	10.2	13.0	15.6	20.0	22.2	26.5	34.4	42.8	53.3
		SHC	4.5	6.8	9.0	11.3	13.5	15.8	18.0	22.5	27.0	33.8
	25	TC	6.4	9.8	12.5	14.9	19.2	21.3	25.5	33.1	41.1	51.2
		SHC	4.2	6.2	8.3	10.4	12.5	14.6	16.6	20.8	25.0	31.2
	24	TC	6.4	9.8	12.4	14.9	19.1	21.3	25.4	32.9	41.0	51.0
		SHC	3.8	5.7	7.6	9.5	11.4	13.3	15.3	19.1	22.9	28.6

C2 operation condition refrigerant R134A, 60HZ

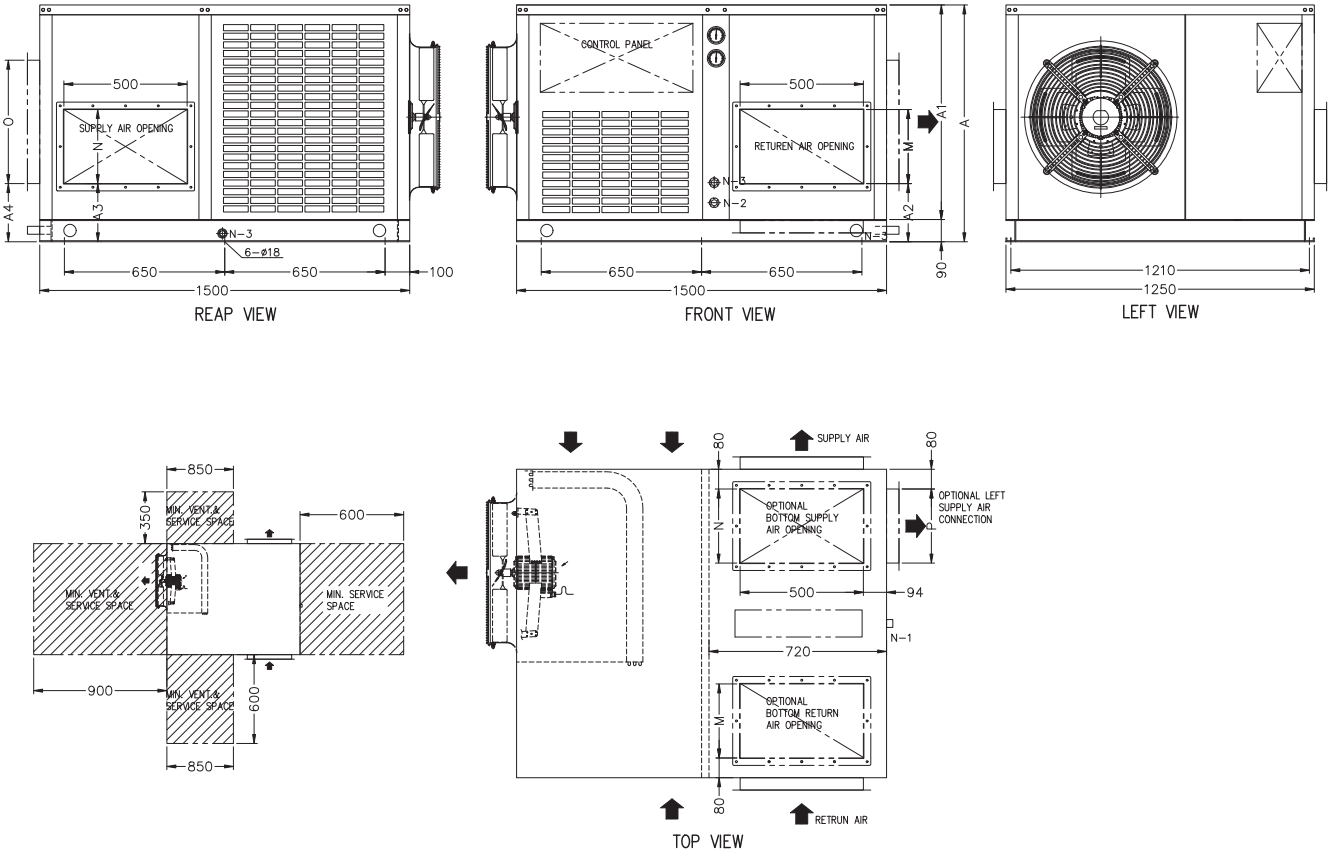
Model			MRTU-2B	MRTU-3B	MRTU-4B	MRTU-5B	MRTU-6B	MRTU-7B	MRTU-8B	MRTU-10B	MRTU-12B	MRTU-15B
EAT [℃]	27	TC	6.8	10.8	14.1	18.2	21.8	23.9	27.0	32.1	41.4	51.8
		SHC	4.5	6.8	9.0	11.3	13.5	15.8	18.0	22.5	27.0	33.8
	25	TC	6.5	10.4	13.5	17.4	21.0	23.0	26.0	30.9	39.8	49.8
		SHC	4.2	6.2	8.3	10.4	12.5	14.6	16.6	20.8	25.0	31.2
	24	TC	6.5	10.3	13.5	17.4	20.9	22.9	25.9	30.7	39.6	49.6
		SHC	3.8	5.7	7.6	9.5	11.4	13.3	15.3	19.1	22.9	28.6

EAT: Entering air temperature

TC: Total cooling capacity, kW

SHC: Sensible heating capacity, kW

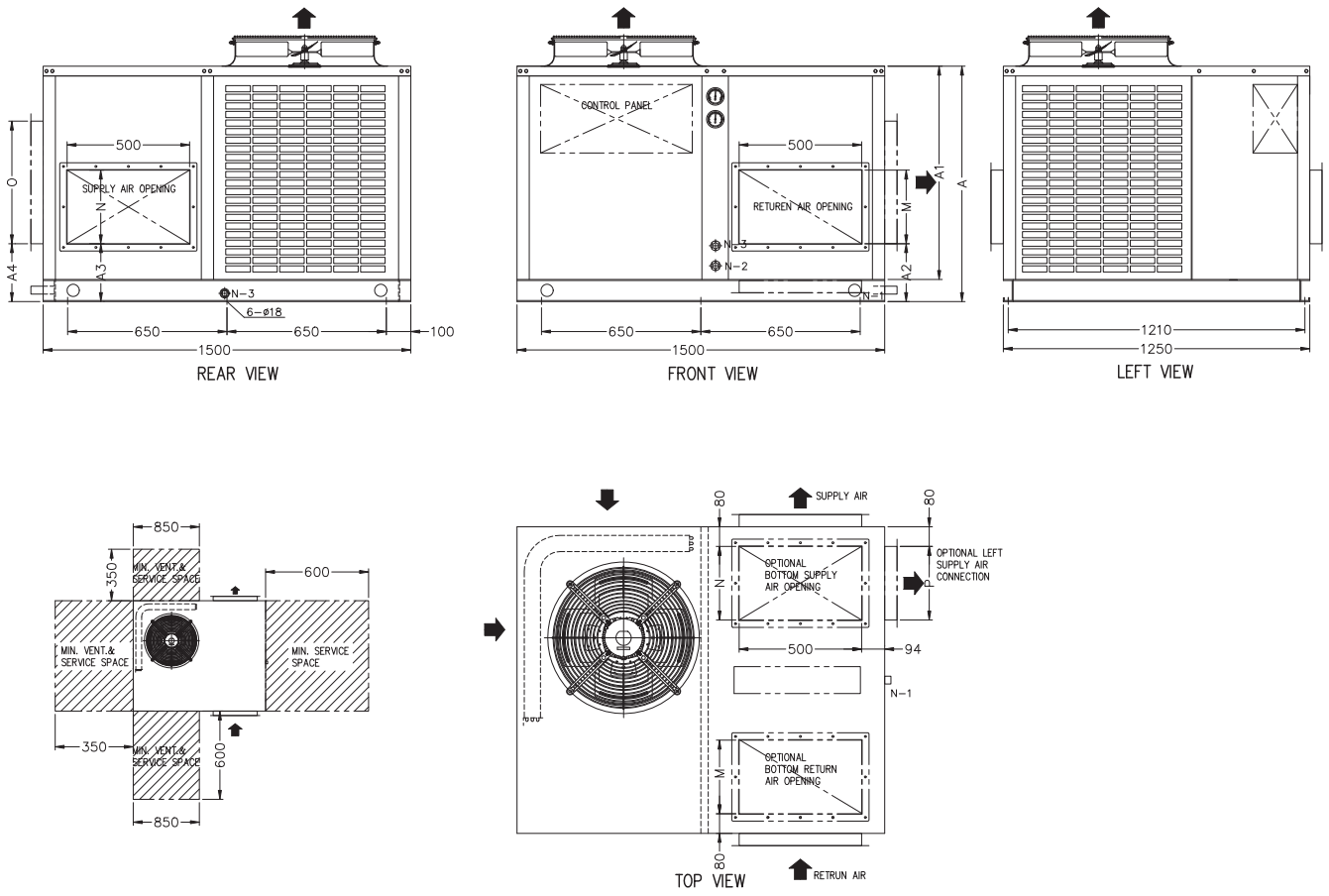
Dimension drawings, 2RT,3RT,4RT,5RT,6RT,cooling air horizontal blow



Dimension

Unit Model	A	A1	A2	A3	A4	M	N	O	P	N-1
MPTU-7	640	550	250	250	250	150	120	300	200	DN25
MPTU-8	790	700	250	250	250	200	180	300	300	DN25
MPTU-4	790	700	250	250	250	300	250	400	300	DN25
MPTU-5	960	870	250	250	250	350	300	500	300	DN25
MPTU-6	960	870	250	250	250	350	300	500	300	DN25

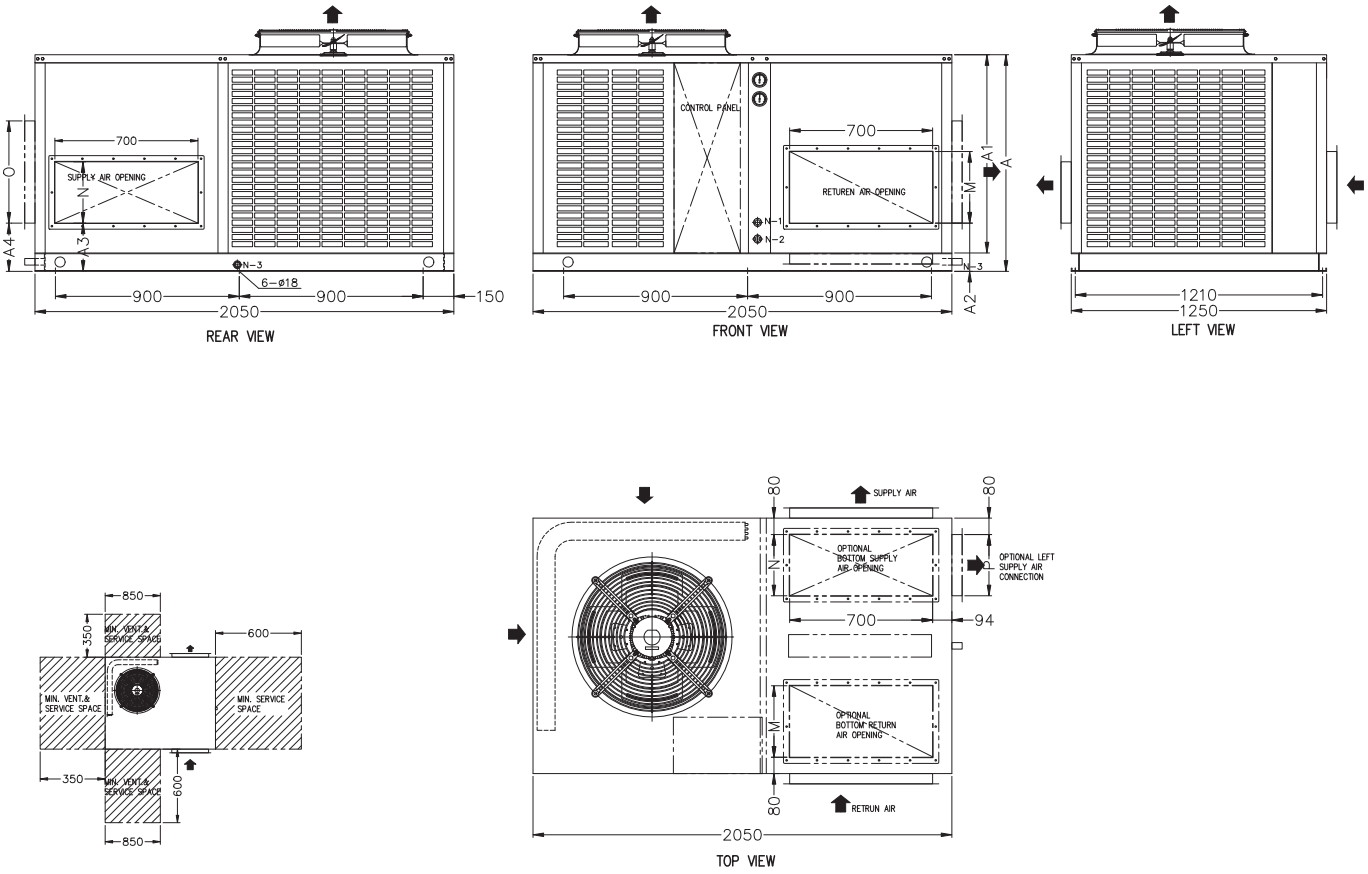
Dimension drawings,2RT,3RT,4RT,5RT,6RT,cooling air top blow



Dimension

Unit Model	A	A1	A2	A3	A4	M	N	O	P	N-1
MPTU-2	640	550	250	250	250	150	120	300	200	DN25
MPTU-3	790	700	250	250	250	200	180	300	300	DN25
MPTU-4	790	700	250	250	250	300	250	400	300	DN25
MPTU-5	960	870	250	250	250	350	300	500	300	DN25
MPTU-6	960	870	250	250	250	350	300	500	300	DN25

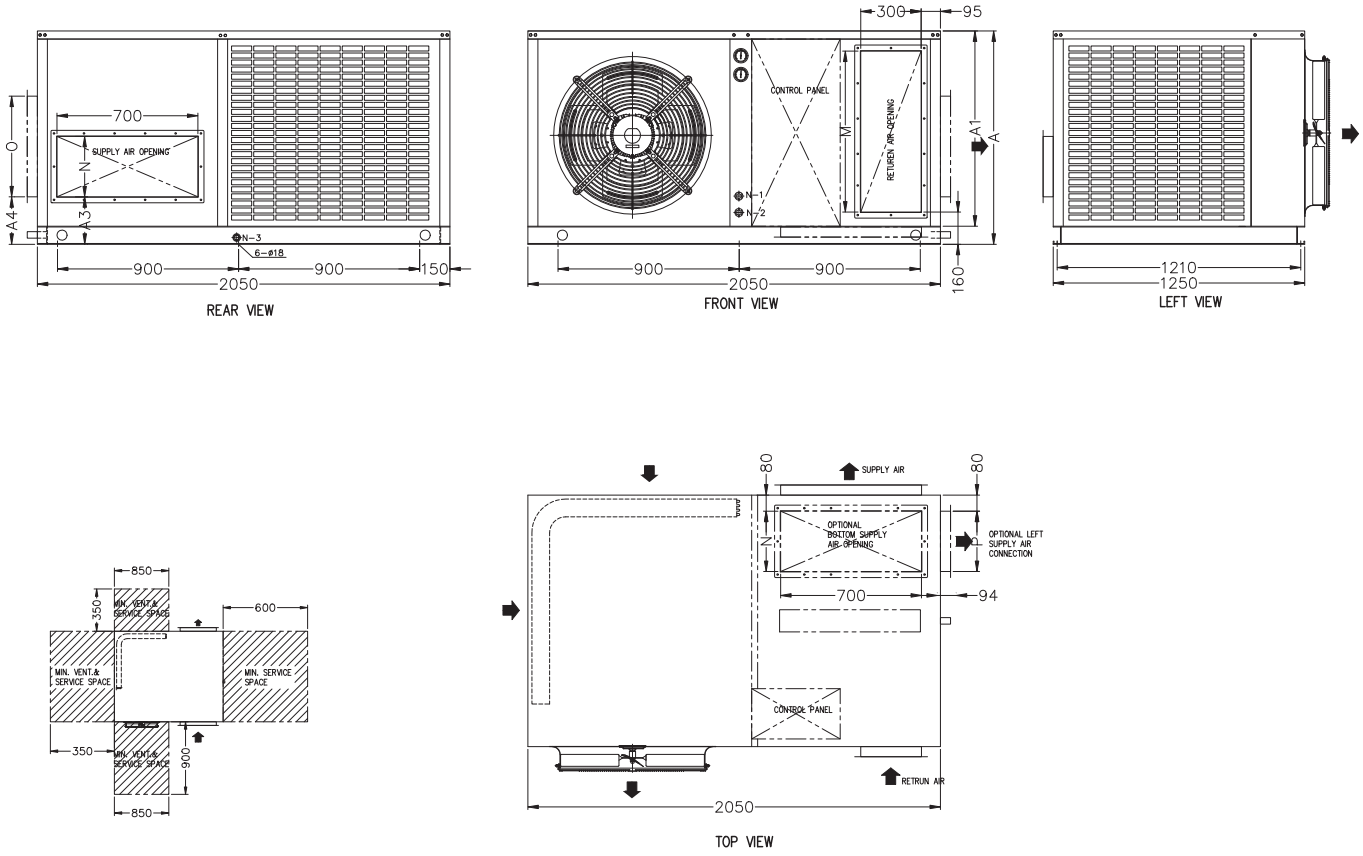
Dimension drawings 7RT,8RT,10RT, cooling air top blow



Dimension

Unit Model	A	A1	A2	A3	A4	M	N	O	P	N-1
MPTU-7	960	870	250	250	250	350	300	600	350	DN25
MPTU-8	960	870	250	250	250	350	300	600	350	DN25
MPTU-10	1060	970	250	250	250	350	300	700	350	DN25

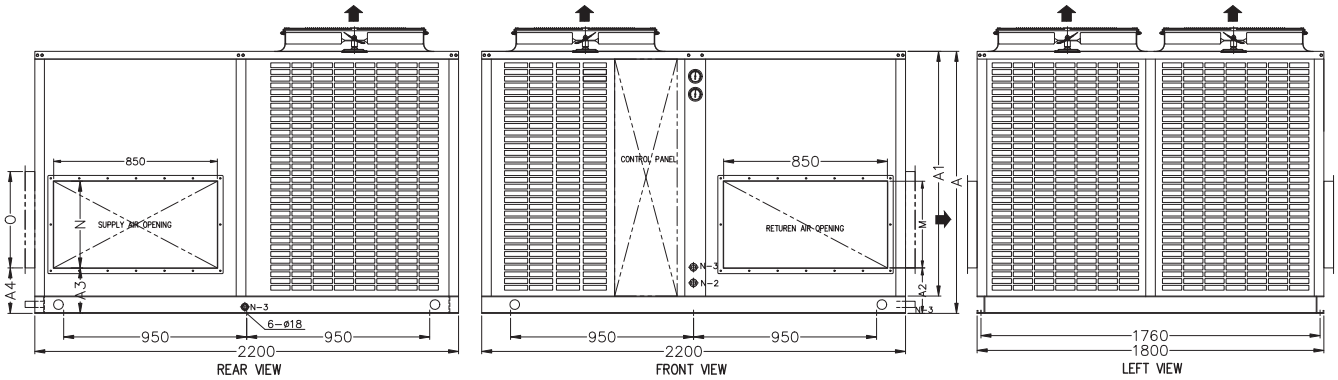
Dimension drawings 7RT,8RT,10RT, cooling air horizontal blow

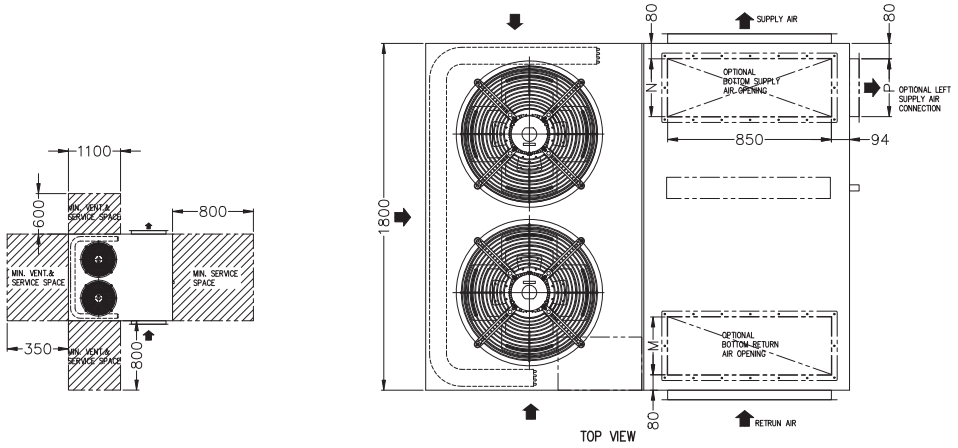


Dimension

Unit Model	A	A1	A2	A3	A4	M	N	O	P	N-1
MPTU-7	960	870	250	250	250	700	300	600	350	DN25
MPTU-8	960	870	250	250	250	700	300	600	350	DN25
MPTU-10	1060	970	250	250	250	700	300	700	350	DN25

Dimension drawings 7RT,8RT,10RT, cooling air top blow





Dimension

Unit Model	A	A1	A2	A3	A4	M	N	O	P	N-1
MPTU-12	1160	1070	250	250	250	450	350	800	350	DN25
MPTU-15	1360	1270	250	250	250	450	350	800	350	DN25

MARINE DECK UNIT

Description

Marine Deck Unit is designed with consideration of the special conditions on ships and offshore installation.

The units consist of two (2) or more compressors, one(1) or two(2) water cooled condensers and evaporators, fan and fan motor, electrical control panel and all refrigerant circuits control valves installed on one common skid.

Ecological HFC refrigerant R404A, R407C are available The power source of the unit can be AC 440~480V/3PH/60Hz, AC380~415V/3PH/50Hz.

Standard cooling capacity range from 25RT to 110RT.

Material

Casing:	Galvanized Steel with Powder Coating.
Insulation:	Rubber sponge insulation material.
Cooling coil:	Copper Tube Aluminium fins with stainless steel frame, Cu tube Cu fins are available as option.
Reheat coil:	Stainless steel SUS304 tube and fins for electric heater. Copper tube aluminium fins for steam or hot water heating coil.
Drip tray:	Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation

Compressor

Low noise scroll type hermetic compressor, semi-hermetic reciprocating compressors are available as option.

Compressor fitted with crankcase oil heater for long-life running.

Semi-hermetic compressor built-in motor and capacity regulation solenoid valves, and suction and discharge valve.

Condenser

Cleanable shell and tube, copper tube, type condensers with tube plate is used for fresh water. Copper/nickel tube, carbon steel coved with Aluminium bronze tube plate is used for sea water.

Multi-pass crossed fin tube coil, copper tube and copper fins with SUS316L coil frame for air cooled condensers.

Evaporator

Multi-pass crossed fin tube type coil is standard.
Copper tube aluminium fin and copper tube copper fins are available as option

Fan

Motor belt drive centrifugal fan for duct connection type units.

Fan motor is F class, IP54, with space heater.

Fan mountings with vibration dampers and belt tensioning mechanism base ensure low level noise and vibration.

Heating Coil

Heating can be electrical heater, steam heater or hot water heater

Material of electrical heater coil is stainless steel SUS304 tube, the steam and hot water heater is a cross fin coil type, made of copper tube aluminium fins with high anti-corrosive and hydrophilic treatment.

Humidifier

Fresh water spray, steam humidifier are available.

Controller and Electrical Panel

Micro-computerized Air conditioner controller with its sensors place at the front of the unit ensures correct temperature control, compressor control, fan motor controller, electrical heater control, and the unit operation mode change, fault alarm. Room temperature, compressor, fan, heater running status, alarm signals to be indicated on the controller displayer.

Electrical panel includes automatic circuit breaker for convenience service. The compressor safety device include high and low pressure switch, low water pressure

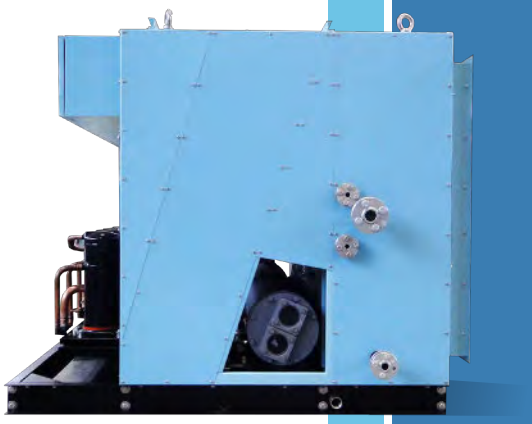
switch, anti-phase protection and compressor built-in overload protection device. A solenoid valve in the liquid line and filter dryer as well as fitting to plug in pressure gauges.

Option Equipment

- Return and fresh air mix box with dampers.
- Flexible connections and counter flanges for air intake and outlet.
- Stainless steel casing.
- Copper tube/copper fins evaporator coil for the units without 100% fresh air ratio.
- Flexible connections and counter flanges for cooling water inlet and outlet.
- Water pressure gauges with gauge cocks for cooling water inlet and outlet .
- Cooling water thermometer.
- Sea water flow temperature control valve.
- Other refrigerants such as R404A.

Features

- The adoption of hermetic compressors ensure very less operating vibration and lower noise designed for installing in accommodation.This allow units can be installed in accommodation area without troublesome problem.
- The casing material, painting, sea water cooled condensers, and marine type construction design ensure the unit more reliable for marine use.
- Economical maintenance on board, installing compressors in plural not only realizes the free maintenance on board, but also save the service cost of compressor by half compared with conventional units. This also enables the unit continuously operate even in trouble of one compressor. Furthermore, the lighter compressor provided with lifting hook allows replacing work to be
- easier on board.
  The high-performance, high static pressure fan can adapt the complex duct system with middle to high
- pressure.
  The light weight and compact design of top level in
- the field.
  Optimally designed hermetic scroll compressor and heat exchangers combined with high performance fan reduce the power consumption by 15% to 20%,
- compared with conventional units.
  Easier and safer maintenance on board, the compressor suction and discharge pipe is flanged connection type that it can be replaced on board more easily and safely in case of gas carrier. Furthermore, liquid line sight glass ensure easier to watch refrigerant leakage.



Comparison of traditional AC and deck unit

Features	Traditional Split AC	Compact Deck Unit	Value Added
Overall dimension & installation space	Big	40~45% reduced	Save much more space for other application
Refrigerant charged	More	50~60% reduced	Less refrigerant needed; less environment emission
Refrigerant piping from cu to AHU	Long	40~15% reduced	Less refrigerant leakage; high reliability of system
Overall weight	Heavy	Minimum 22% reduced	Minimum 22% reduced
Refrigerant piping and internal cable installation	Refrigerant piping has to be done at site	All internal piping and internal finished and test in factory	Not necessary
Commissioning work	Vacuum and Pressure test need to be done	3~4days reduced	Much simplified with minimum
Quality & reliability	Quality depending on site workmanship	Finshed product with factory standard workmanship	Deck Unit is much higher and reliable
Electric control	Traditional or PLC control	Micro-Computerized Controller	Improvement of Operability
Vibration	Higher	Vibration reduced	Reduced more than 75%
Replacement of Comrpessor	Difficult	Much easier with small unit	Conveninent
Maintenance cost	Higher	Much lower as	Simple and lower
Overall cost	Higher	Lower	Save cost to yard; save cost for owner

Deck Unit Model Nomenclature

MCDU — 25 F H A 6 H R

- Compressor :
  Space - Hermetic scroll compressor
  R - Semi - hermetic reciprocating compressor
  Special Design
- Heater type:
  E - Electric heater
  S - Steam heater
  Space - without electric heater
- Power Source type:
  5 - 380~415V / 3PH / 50Hz
  6 - 440~480V / 3PH / 60Hz
- Refrigerant type:
  A- R404A, B - R407C
- Air pressure type :
  L - Low pressure
  M - Middle pressure
  H - High pressure
- Cooling water type:
  F - Fresh water
  S - sea water
- Normal Cooling Capacity in [RT]:
  25 - 25RT
- Product Code:
  MCDU — Multiple compressor compact Deck unit
  TCDU — Twin compressor compact Deck unit

Single Packaged Cerntral Type Hermetic Scroll Compressor

- Light weight and compact design
- High performance
- High durability
- Energy saving
- Maintenance saving
- Refrigerant : R407C R404A
- Capacity: 25,30,35,40,50,60, 70,80,100RT

Compact deck unit multiple compressor, R407C

	Model		TCDU-25_HB	MCDU-30_HB	MCDU-35_HB	MCDU-40_HB	MCDU-50_HB	MCDU-60_HB	MCDU-65_HB	MCDU-80_HB	MCDU-100_HB
General Parameter	Cooling cpapacity, 60/50Hz	KW	91/75	105/90	125/106	140/120	175/145	210/175	228/190	280/235	350/295
	Heating capacity, 60/50Hz	KW	90	120	140	150	190	235	260	310	380
	Dimension (LxWxH)	mm	2000x1250x1650		2000x1800x1550			2400x2000x1650		2600x 2100x 1750	3000x 2200x 1750
	Power source		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz								
	Control power		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz								
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection								
	External pressure, 60/50Hz	Pa	1450	1450	1550	1550	1550	1550	1700	1700	1800
	Noise	dB(A)	89	90	91	92	94	94	95	95	96
	Weight	kg	1150	1380	1540	1665	1690	1980	2150	2280	2450
	Casing material/colour		Carbon steel/ral6034								
Compressor	Qty.		1+1	2+1	2+1	2+2	2+2	2+2	2+2	2+2	2+2
	Type		Hermetic scroll								
	Power consumpoition, 60/50hz	KW	21.5/17.9	25.8/21.5	30.4/25.4	34.4/28.7	40.6/33.8	50.3/41.9	54.1/45.1	67.0/55.8	84.5/70.4
Condenser	Type		Horiztal shell & tube								
	Sea water in/out temp	℃	32/37	32/37	32/37	32/37	32/37	32/37	32/37	32/37	32/37
	Fresh water in/out temp	℃	36/40	36/40	36/40	36/40	36/40	36/40	36/40	36/40	36/40
	Sea water flow, 60/50Hz	m^3/h	19.3/15.9	22.4/19.1	26.2/22.5	29.9/25.5	38.5/32.0	44.5/35.7	48.3/40.2	59.4/49.7	74.3/62.5
	Fresh water flow, 60/50Hz	m^3/h	24.1/19.9	28.0/23.9	33.7/28.1	37.3/31.8	48.2/40.0	55.7/44.6	60.3/50.3	74.2/62.2	92.9/78.1
	Cooling water connection		DN65 FLANGE	DN65 FLANGE	DN80 FLANGE	DN80 FLANGE	DN100 FLANGE	DN100 FLANGE	DN100 CUTTING SLEEVE	DN125 CUTTING SLEEVE	DN125 CUTTING SLEEVE
Evaporator	Type		Cross fins and tube								
	Material		Copper tube aluminium fans with SUS304 frame								
Heater	Heating capacity	KW	90	120	140	150	190	235	260	310	380
	Type		By steam,cross fin coil								
	Material		Copper tube, aluminium fins with SUS304 frame								
Humidifier	Type		Fresh water spray / Steam spray								
Supply Fan	Type		Double inlet centrifugal fan								
	Air volume	m^3/h	8400	10500	12000	13500	15500	19800	22000	26500	33500
	fan static PRESS.	Pa	1700	1700	1800	1800	1900	2000	2200	2200	2300
	Fan QTY.		1	1	1	1	1	1	1	1	1
	Motor QTY.		1	1	1	1	1	1	1	1	1
	Motor power, 60/50Hz	KW	6.3/7.5	8.6/7.5	12.7/11	12.7/11	17.3/15	17.3/18.5	21.3/22	34.5/30	42.6/37
Air Filter	Material(filter/frame)		Polyvinyl chloride fiber + Alalloy								
TEMP. Controller			Micro-computerized air conditioner controller								
Capacity Steps			0-50% -100%	0-33%-66%-100%		0-50%-100%					

Note:

1.The cooling capacity data is based on the operation conditions in which the return air temperature 30℃ DB/24℃WB.

2.Cooling sea water inlet temperature 32℃, fresh water inlet temperature 36℃.

3.Condition for heater inlet: inlet air temperature 10℃DB, Inlet steam pressure 0.4MPa.

4.Humidifying capacity is based on the condition of saturated steam at the 0.035MPa.

Model	TCDU-25_HB	MCDU-30_HB	MCDU-35_HB	MCDU-40_HB	MCDU-50_HB	MCDU-60_HB	MCDU-65_HB	MCDU-80_HB	MCDU-100_HB
Lower / Higher Pressure Fan	●	●	●	●	●	●	●	●	●
Hot Water Heater	●	●	●	●	●	●	●	●	●
Humidifing & Heating Valve Panel	●	●	●	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●	●	●	●
Return Air/ Fresh Air Mix Box with Damper	●	●	●	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●	●	●	●
Fresh Water Humidifier	●	●	●	●	●	●	●	●	●

Compact deck unit multiple compressor, R404A

	Model		TCDU-25_HA	MCDU-35_HA	MCDU-40_HA	MCDU-45_HA	MCDU-60_HA	MCDU-70_HA	MCDU-75_HA	MCDU-90_HA	MCDU-110_HA
General Parameter	Cooling cpapacity, 60/50Hz	KW	90/75	120/100	140/115	160/135	202/170	245/200	254/212	315/260	385/330
	Heating capacity, 60/50Hz	KW	90	120	140	150	190	235	260	310	380
	Dimension (LxWxH	mm	2000 x1250 x1650		2000x1800x1550			2400x2000x1650		2600x 2100x 1750	3000x 2200x 1750
	Power source		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz								
	Control power		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz								
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection								
	External pressure, 60/50Hz	Pa	1450	1450	1550	1550	1550	1550	1700	1700	1800
	Noise	dB(A)	89	90	91	92	94	94	95	95	96
	Weight	kg	1150	1380	1540	1665	1690	1980	2150	2280	2450
	Casing material/colour		Carbon steel/RAL6034								
Compressor	QTY.		1+1	2+1	2+1	2+2	2+2	2+2	2+2	2+2	2+2
	Type		Hermetic scroll								
	Power consumpoition, 60/50Hz	KW	23.9/19.9	31.7/26.4	35.8/29.9	42.2/35.2	52.8/44.0	58.8/49.0	66.3/55.3	82.2/68.5	103.7/86.4
Condenser	Type		Horiztal shell & tube								
	Sea water in/out temp	℃	32/37	32/37	32/37	32/37	32/37	32/37	32/37	32/37	32/37
	Fresh water in/out temp	℃	36/40	36/40	36/40	36/40	36/40	36/40	36/40	36/40	36/40
	Sea water flow, 60/50Hz	m^3/h	19.5/16.3	26.0/21.7	30.1/24.8	34.6/29.1	43.6/36.6	52.0/42.6	54.8/45.7	67.9/56.2	83.6/71.2
	Fresh water flow, 60/50Hz	m^3/h	24.4/20.3	32.5/27.0	37.6/31.0	43.2/36.4	54.5/45.8	65.0/53.2	68.5/57.2	84.9/70.2	104.5/89.0
	Cooling water connection		DN65 FLANGE	DN65 FLANGE	DN80 FLANGE	DN80 FLANGE	DN100 FLANGE	DN100 FLANGE	DN100 CUTTING SLEEVE	DN125 CUTTING SLEEVE	DN125 CUTTING SLEEVE
Evaporator	Type		Cross fins and tube								
	Material		Copper tube aluminium fans with SUS304 frame								
Heater	Heating capacity	KW	90	120	140	150	190	235	260	310	380
	Type		By steam, cross fin coil								
	Material		Copper tube, aluminium fins with SUS304 frame								
Humidifier	Type		Fresh water spray / Steam spray								
Supply Fan	Type		Double inlet centrifugal fan								
	Air volume	m^3/h	8400	10500	12000	13500	15500	19800	22000	26500	33500
	Fan static PRESS.	Pa	1700	1700	1800	1800	1900	2000	2200	2200	2300
	Fan QTY.		1	1	1	1	1	1	1	1	1
	Motor QTY.		1	1	1	1	1	1	1	1	1
	Motor power, 60/50Hz	KW	6.3/7.5	8.6/7.5	12.7/11	12.7/11	17.3/15	17.3/18.5	21.3/22	34.5/30	42.6/37
Air Filter	Material(filter/frame)		Polyvinyl chloride fiber + Alalloy								
Temp. Controller			Micro-computerized air conditioner controller								
Capacity Steps			0-50% -100%	0-33%-66%-100%		0-50%-100%					

Note:

1.The cooling capacity data is based on the operation conditions in which the return air temperature 30℃ DB/24℃WB.

2.Cooling sea water inlet temperature 32℃, fresh water inlet temperature 36℃.

3.Condition for heater inlet: inlet air temperature 10℃DB, Inlet steam pressure 0.4MPa.

4.Humidifying capacity is based on the condition of saturated steam at the 0.035MPa.

Model	TCDU-25_HB	MCDU-35_HA	MCDU-40_HA	MCDU-45_HA	MCDU-60_HA	MCDU-70_HA	MCDU-75_HA	MCDU-90_HA	MCDU-110_HA
Lower / Higher Pressure Fan	●	●	●	●	●	●	●	●	●
Hot Water Heater	●	●	●	●	●	●	●	●	●
Humidifing & Heating Valve Panel	●	●	●	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●	●	●	●
Return Air/ Fresh Air Mix Box with Damper	●	●	●	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●	●	●	●
Fresh Water Humidifier	●	●	●	●	●	●	●	●	●

Compact deck unit twin compressor, R407C

	Model		TCDU-25_HB	TCDU-30_HB	TCDU-35_HB	TCDU-40_HB	TCDU-50_HB	TCDU-65_HB
General Parameter	Cooling cpapacity, 60/50Hz	KW	91/75	108/90	114/95	141/118	178/148	218/182
	Heating capacity, 60/50Hz	KW	90	120	150	190	235	260
	Dimension (LxWxH	mm	2000x1250x1650		2000x1800x1550			2400x 2000x 1650
	Power source		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
	Control power		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection					
	External pressure, 60/50Hz	Pa	1450	1450	1550	1550	1550	1700
	Noise	dB(A)	89	90	92	94	94	95
	Weight	kg	1150	1380	1665	1690	1980	2150
	Casing material/colour		Carbon steel/ral6034					
Compressor	QTY.		1+1	1+1	1+1	1+1	1+1	1+1
	Type		Hermetic scroll					
	Power consumpoition, 60/50Hz	KW	21.5/17.9	25.6/21.3	27.0/22.5	33.5/27.9	42.2/35.2	51.8/43.1
Condenser	Type		Horiztal shell & tube					
	Sea water in/out temp	℃	32/37	32/37	32/37	32/37	32/37	32/37
	Fresh water in/out temp	℃	36/40	36/40	36/40	36/40	36/40	36/40
	Sea water flow, 60/50Hz	m^3/h	19.3/15.9	22.9/19.1	24.1/20.1	29.9/25.0	37.7/31.4	46.2/38.5
	Fresh water flow, 60/50Hz	m^3/h	24.1/19.9	28.6/23.8	30.2/25.1	37.3/31.2	47.1/39.2	57.7/48.1
	Cooling water connection		DN65 FLANGE	DN65 FLANGE	DN80 FLANGE	DN100 FLANGE	DN100 FLANGE	DN100 CUTTING SLEEVE
Evaporator	Type		Cross fins and tube					
	Material		Copper tube aluminium fans with SUS304 frame					
Heater	Heating capacity,	KW	90	120	150	190	235	260
	Type		By steam,cross fin coil					
	Material		Copper tube, aluminium fins with SUS304 frame					
Humidifier	Type		Fresh water spray / Steam spray					
Supply Fan	Type		Double inlet centrifugal fan					
	Air volume	m^3/h	8400	10500	13500	15500	19800	22000
	Fan static PRESS.	Pa	1700	1700	1800	1900	2000	2200
	Fan QTY.		1	1	1	1	1	1
	Motor QTY.		1	1	1	1	1	1
	Motor power, 60/50Hz	KW	6.3/7.5	8.6/7.5	12.7/11	17.3/15	17.3/18.5	21.3/22
Air Filter	Material(filter/frame)		Polyvinyl chloride fiber + Alalloy					
Temp. Controller			Micro-computerized air conditioner controller					
Capacity Steps			0~50%~100%			0~37.5%~50%~75%~100%		

Note:
1.The cooling capacity data is based on the operation conditions in which the return air temperature 30℃ DB/24℃WB.
2.Cooling sea water inlet temperature 32℃, fresh water inlet temperature 36℃.
3.Condition for heater inlet: inlet air temperature 10℃DB, Inlet steam pressure 0.4MPa.
4.Humidifying capacity is based on the condition of saturated steam at the 0.035MPa.

Model	TCDU-25_HB	TCDU-30_HB	TCDU-35_HB	TCDU-40_HB	TCDU-50_HB	TCDU-65_HB
Lower / Higher Pressure Fan	●	●	●	●	●	●
Hot Water Heater	●	●	●	●	●	●
Humidifing & Heating Valve Panel	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●
Return Air/ Fresh Air Mix Box with Damper	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●
Fresh Water Humidifier	●	●	●	●	●	●
Hot Gas Bypass –valve #	●	●	●	–	–	–

NOTE: The capacity steps is 0-37.5%-50%-75%-100% with the "#"

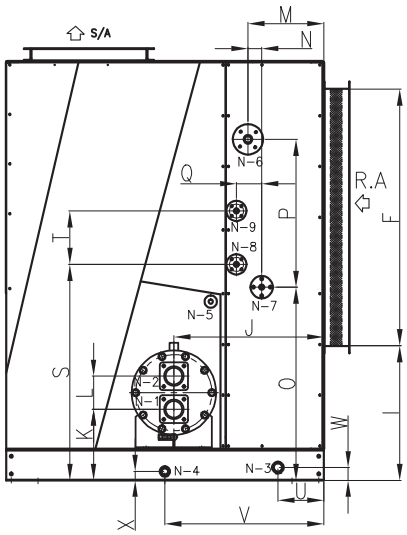
Compact deck unit twin compressor, R404A

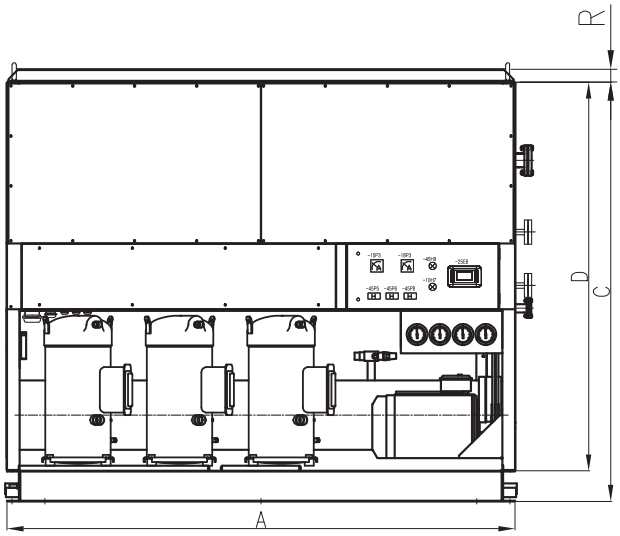
	Model		TCDU-25_HA	TCDU-30_HA	TCDU-35_HA	TCDU-45_HA	TCDU-55_HA	TCDU-70_HA
General Parameter	Cooling cpapacity, 60/50Hz	KW	95/80	102/88	124/105	160/134	202/169	248/207
	Heating capacity, 60/50Hz	KW	90	120	150	190	235	260
	Dimension (LxWxH	mm	2000x1250x1650		2000x1800x1550			2400x 2000x 1650
	Power source		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
	Control power		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, Compressore overload protection, phase absent protection					
	External pressure, 60/50Hz	Pa	1450	1450	1550	1550	1550	1700
	Noise	dB(A)	89	90	92	94	94	95
	Weight	kg	1150	1380	1665	1690	1980	2150
	Casing material/colour		Carbon steel/RAL6034					
Compressor	QTY.		1+1	1+1	1+1	1+1	1+1	1+1
	Type		Hermetic scroll					
	Power consumpoition, 60/50Hz	KW	24.1/20.1	26.4/22.0	33.2/27.7	41.1/34.2	51.8/43.2	63.5/52.9
Condenser	Type		Horiztal shell & tube					
	Sea water in/out temp	℃	32/37	32/37	32/37	32/37	32/37	32/37
	Fresh water in/out temp	℃	36/40	36/40	36/40	36/40	36/40	36/40
	Sea water flow, 60/50Hz	m^3/h	20.4/17.2	22.0/18.8	26.9/22.7	34.4/28.8	43.4/36.3	53.3/44.5
	Fresh water flow, 60/50Hz	m^3/h	25.5/21.4	27.5/23.5	33.6/28.4	43.0/36.0	54.3/45.4	66.6/55.6
	Cooling water connection		DN65 FLANGE	DN65 FLANGE	DN80 FLANGE	DN100 FLANGE	DN100 FLANGE	DN100 CUTTING SLEEVE
Evaporator	Type		Cross fins and tube					
	Material		Copper tube aluminium fans with SUS304 frame					
Heater	Heating capacity,	KW	90	120	150	190	235	260
	Type		By steam, cross fin coil					
	Material		Copper tube, aluminium fins with SUS304 frame					
Humidifier	Type		Fresh water spray / Steam spray					
Supply Fan	Type		Double inlet centrifugal fan					
	Air volume	m^3/h	8400	10500	13500	15500	19800	22000
	Fan static PRESS.	Pa	1700	1700	1800	1900	2000	2200
	Fan QTY.		1	1	1	1	1	1
	Motor QTY.		1	1	1	1	1	1
	Motor power, 60/50Hz	KW	6.3/7.5	8.6/7.5	12.7/11	17.3/15	17.3/18.5	21.3/22
Air Filter	Material(filter/frame)		Polyvinyl chloride fiber + Alalloy					
Temp. Controller			Micro-computerized air conditioner controller					
Capacity Steps			0~50%~100%			0~37.5%~50%~75%~100%		

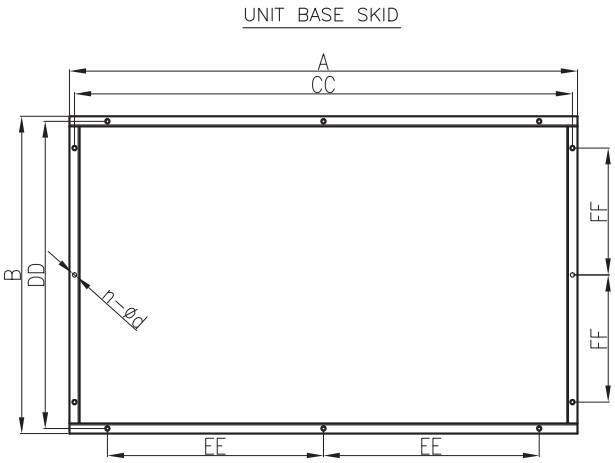
Note:
1.The cooling capacity data is based on the operation conditions in which the return air temperature 30℃ DB/24℃WB.
2.Cooling sea water inlet temperature 32℃, fresh water inlet temperature 36℃.
3.Condition for heater inlet: inlet air temperature 10℃DB, Inlet steam pressure 0.4MPa.
4.Humidifying capacity is based on the condition of saturated steam at the 0.035MPa.

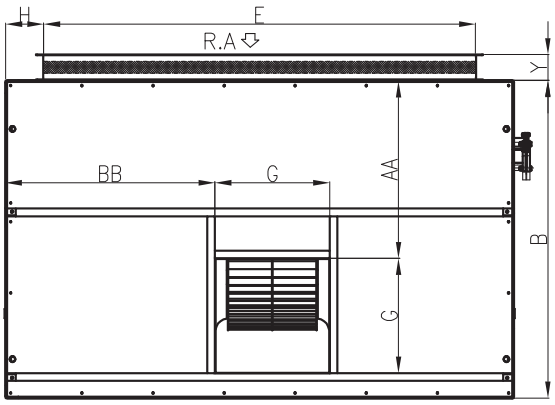
Model	TCDU-25_HA	TCDU-30_HA	TCDU-35_HA	TCDU-45_HA	TCDU-55_HA	TCDU-70_HA
Ower / Higher Pressure Fan	●	●	●	●	●	●
Hot Water Heater	●	●	●	●	●	●
Humidifing & Heating Valve Panel	●	●	●	●	●	●
Water Flexobal Hose	●	●	●	●	●	●
Return Air/ Fresh Air Mix Box with Damper	●	●	●	●	●	●
Sea Water Fow Regulation Valve	●	●	●	●	●	●
Copper Tube Copper Fins Evaporator	●	●	●	●	●	●
Fresh Water Humidifier	●	●	●	●	●	●
Hot Gas Bypass –valve #t	●	●	●	–	–	–

NOTE: The capacity steps is 0-37.5%-50%-75%-100% with the "#"



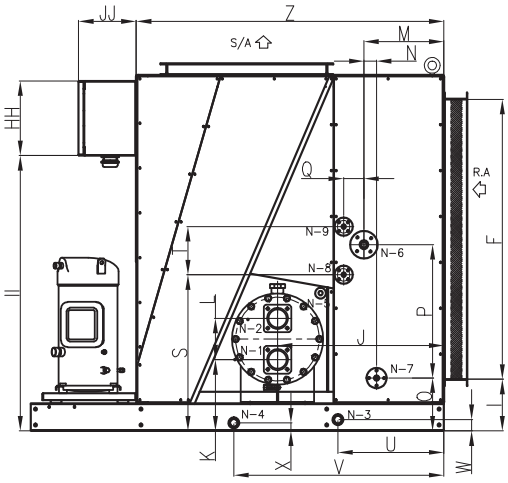


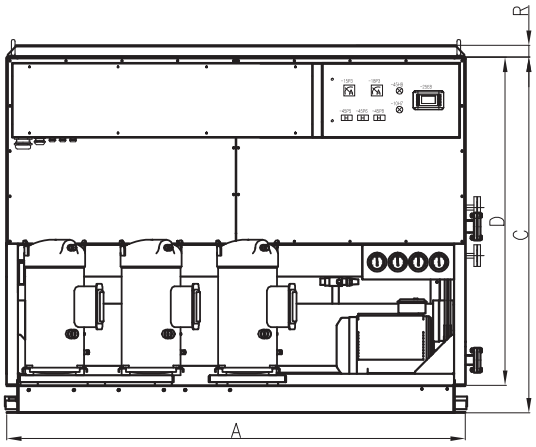


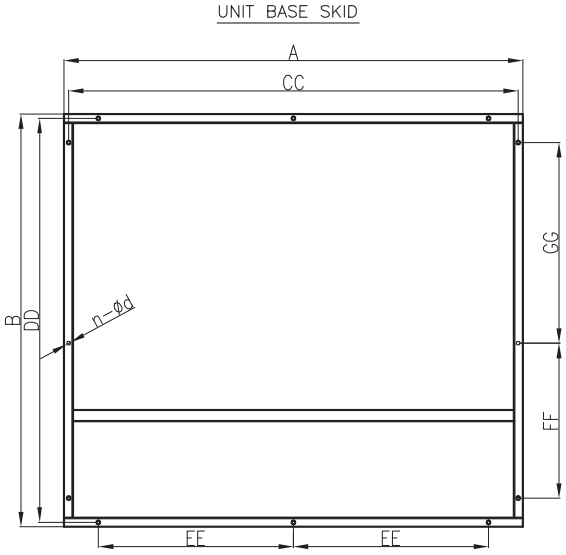


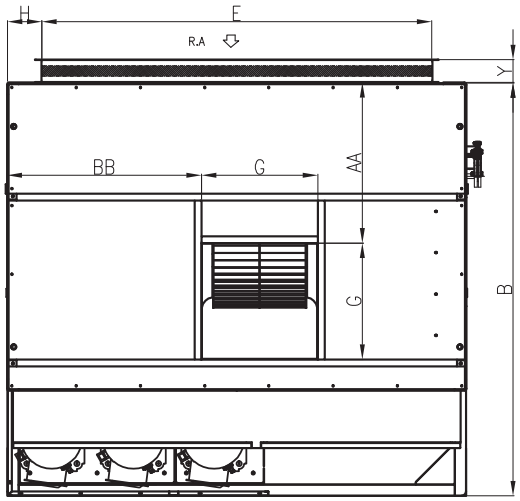
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
MCDU-30_HB MCDU-35_HA	2000	1250	1650	1530	1700	1010	452	150	530	590	280	130	298	55	760	582	100	50	850	210	180

Model	V	W	X	Y	AA	BB	CC	DD	EE	FF	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
MCDU-30_HB MCDU-35_HA	625	50	35	100	698	825	1960	1210	850	500	18	12	DN65	DN65	DN32	DN25	1/2"	DN32	DN20	DN15	DN15



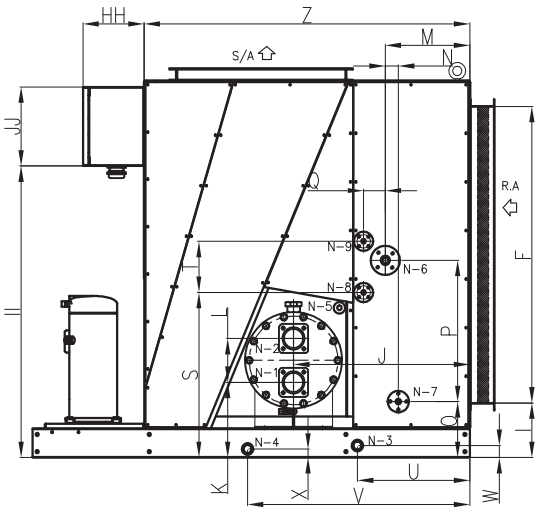


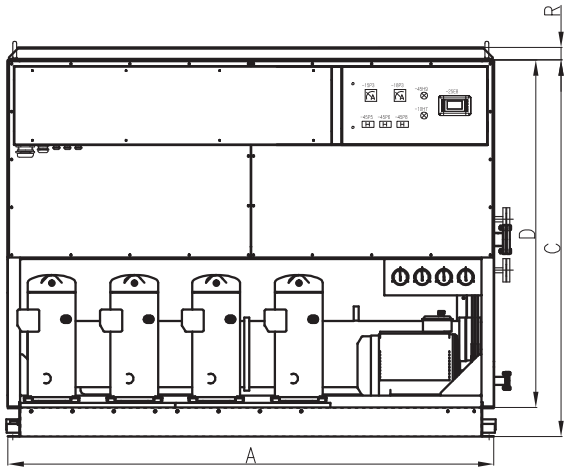




Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
MCDU-35_HB MCDU-40_HA	2000	1800	1550	1430	1700	1220	507	150	225	725	310	180	348	55	230	582	89	50	680	210	462	915	50	35

Model	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
MCDU-35_HB MCDU-40_HA	100	1340	698	825	1960	1760	850	675	875	325	1200	250	18	12	DN80	DN80	DN32	DN25	1/2"	DN32	DN20	DN15	DN15





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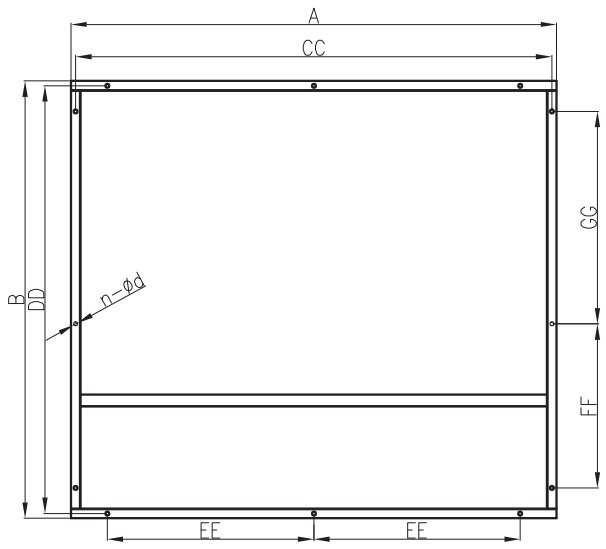
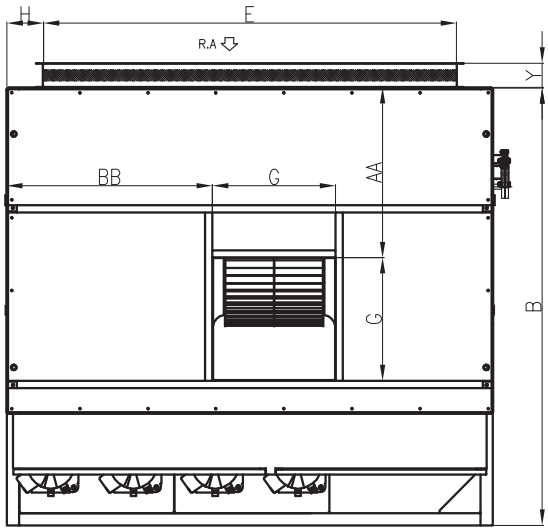
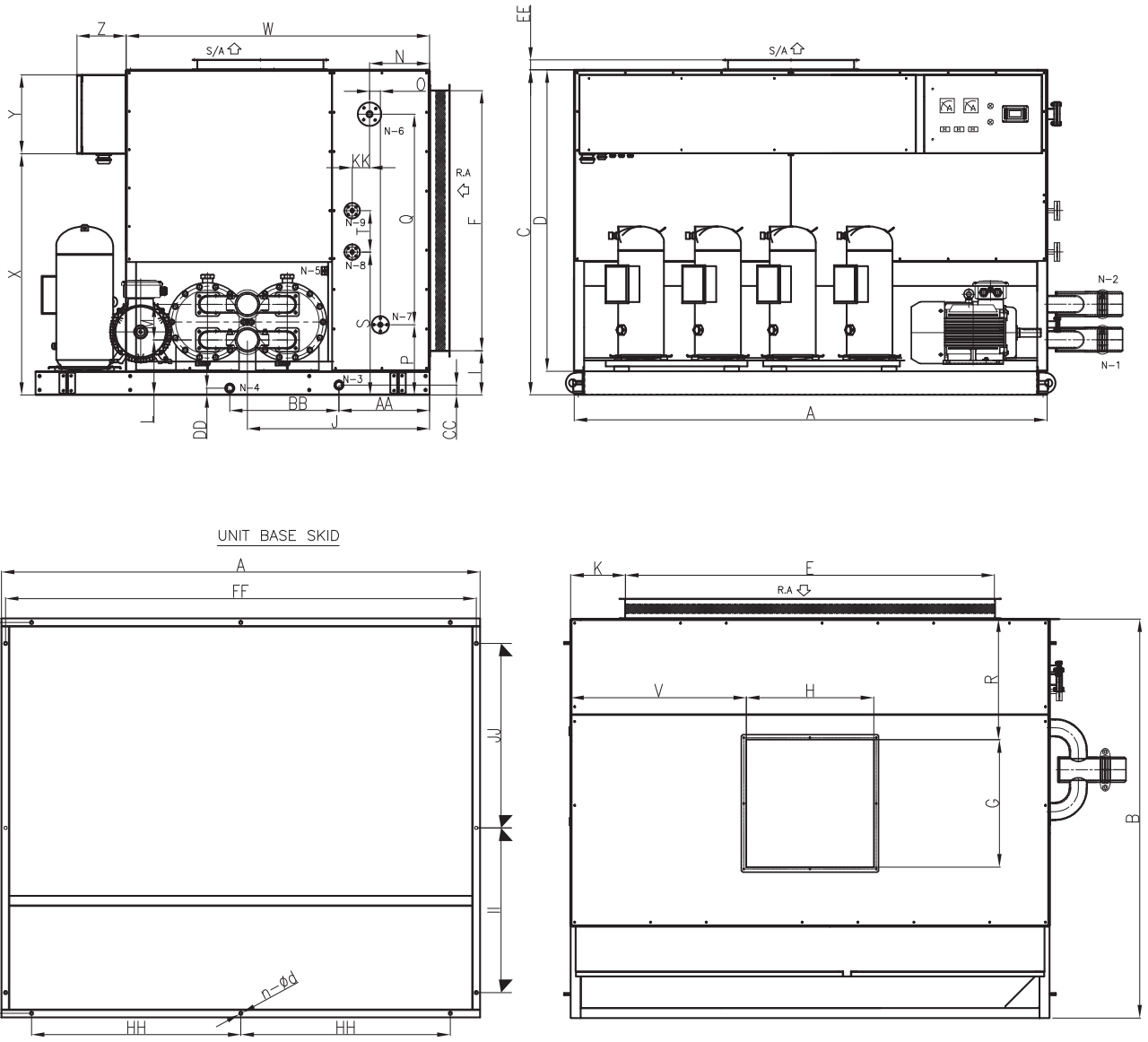




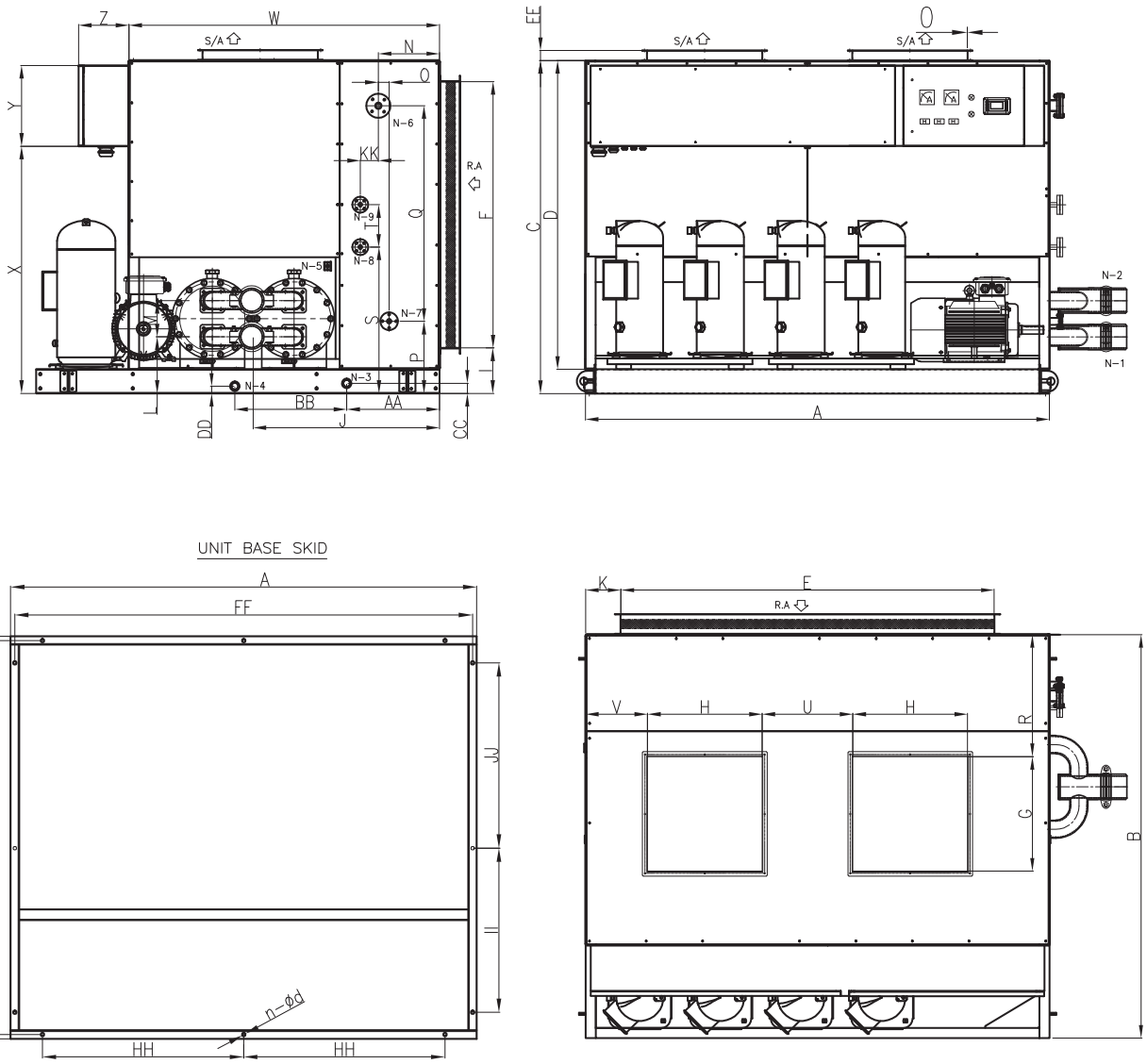
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
MCDU-40_HB	2000	1800	1550	1430	1700	1220	568	150	225	750	275	280	190	348	55	582	89	50	680	210	462	915	50	35
MCDU-50_HB MCDU-45_HA	2000	1800	1550	1430	1700	1220	568	150	225	750	275	275	190	348	55	582	89	50	680	210	462	915	50	35
MCDU-60_HB MCDU-70_HA	2400	2000	1650	1530	1850	1320	638	275	225	780	270	275	200	348	55	1069	89	50	730	210	462	955	50	35

Model	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
MCDU-40_HB	100	1340	674	716	1960	1760	850	675	875	250	1200	325	18	12	DN100	DN100	DN32	DN25	1/2"	DN32	DN20	DN15	DN15
MCDU-50_HB MCDU-45_HA	100	1340	674	716	1960	1760	850	675	875	250	1200	325	18	12	DN100	DN100	DN32	DN25	1/2"	DN32	DN20	DN15	DN15
MCDU-60_HB MCDU-70_HA	100	1540	480	881	2360	1960	1050	725	925	250	1225	400	20	12	DN100	DN100	DN32	DN25	1/2"	DN40	DN25	DN15	DN15



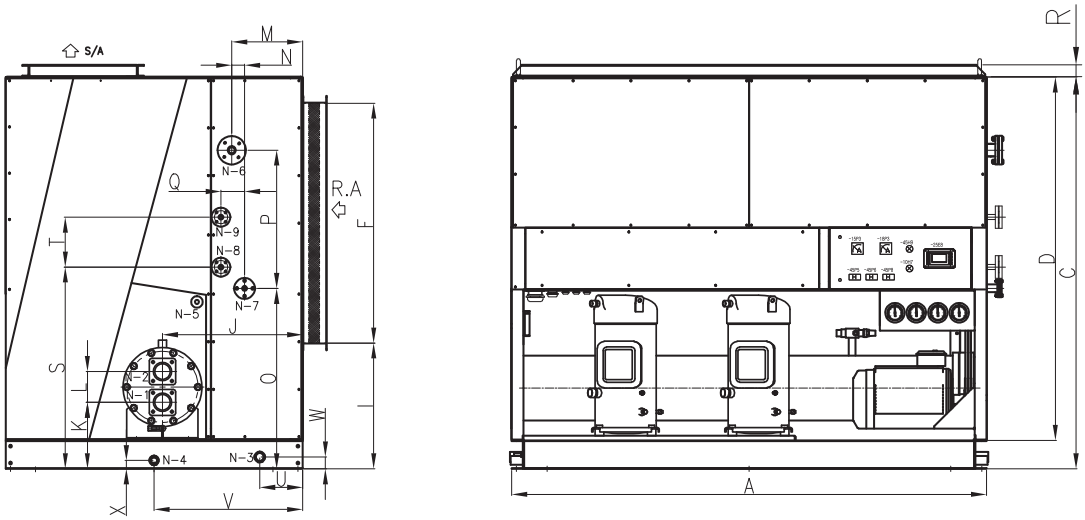
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	V	W	X	Y
MCDU-65_HB MCDU-70_HA MCDU-75_HA	2400	2000	1650	1530	1850	1320	638	638	225	925	325	280	180	304	55	357	1069	480	725	210	881	1540	1225	400

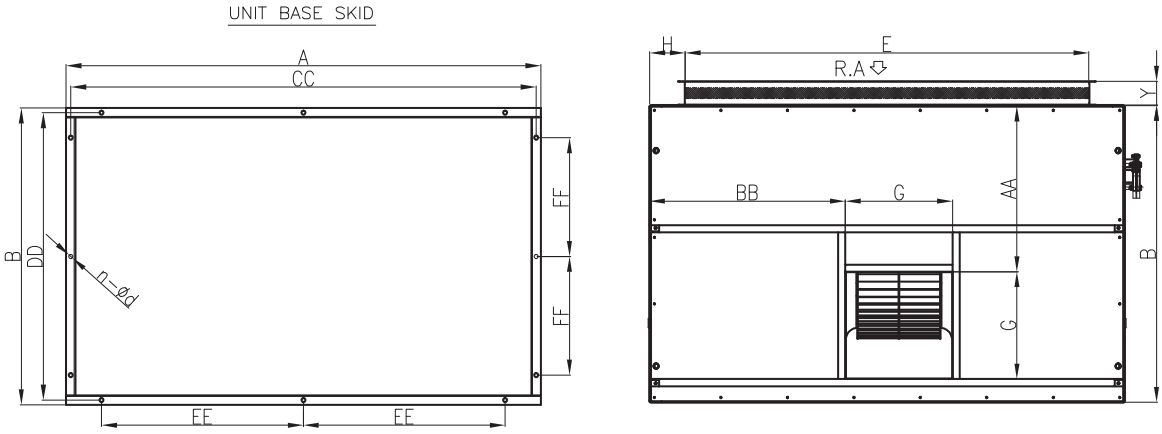
Model	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
MCDU-65_HB MCDU-70_HA MCDU-75_HA	250	460	605	50	35	50	2360	1960	1000	800	900	89	20	12	DN100	DN100	DN32	DN25	1/2”	DN40	DN25	DN15	DN15



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
MCDU-80_HB MCDU-90_HA	2600	2100	1750	1530	2100	1420	568	568	225	975	250	275	190	354	55	582	1069	680	825	210	500	507	1640	1325
MCDU-100_HB MCDU-110_HB	3000	2200	1750	1530	2500	1420	638	638	225	1025	250	275	190	354	55	582	1069	700	825	210	550	512	1740	1325

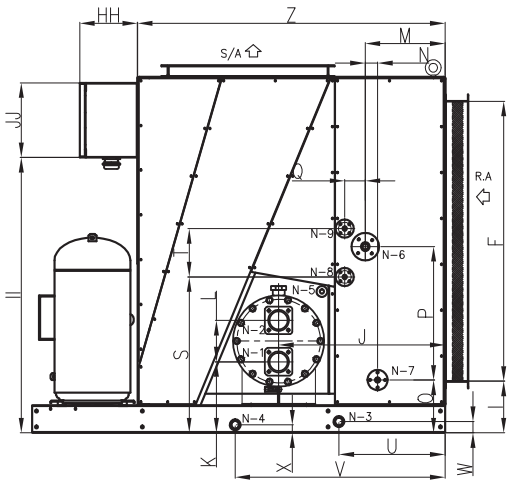
Model	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
MCDU-85_HB MCDU-90_HA	400	250	510	655	50	35	50	2550	2050	1100	825	925	89	22	12	DN125	DN125	DN32	DN25	1/2"	DN40	DN25	DN15	DN15
MCDU-105_HB MCDU-110_HA	400	250	510	705	50	35	50	2950	2150	1250	850	950	89	22	12	DN125	DN125	DN32	DN25	1/2"	DN40	DN25	DN15	DN15

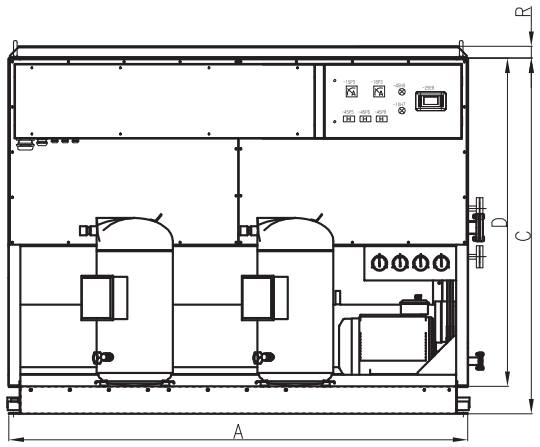




Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
TCDU-25_HB TCDU-25_HA	2000	1250	1650	1530	1700	1010	452	150	530	590	280	130	298	55	760	582	100	50	850	210	180
TCDU-30_HB TCDU-30_HA	2000	1250	1650	1530	1700	1010	452	150	530	590	280	130	298	55	760	582	100	50	850	210	180

Model	V	W	X	Y	AA	BB	CC	DD	EE	FF	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
TCDU-25_HB TCDU-25_HA	625	50	35	100	698	825	1960	1210	850	500	18	12	DN65	DN65	DN32	DN25	1/2"	DN32	DN20	DN15	DN15
TCDU-30_HB TCDU-30_HA	625	50	35	100	698	825	1960	1210	850	500	18	12	DN65	DN65	DN32	DN25	1/2"	DN32	DN20	DN15	DN15





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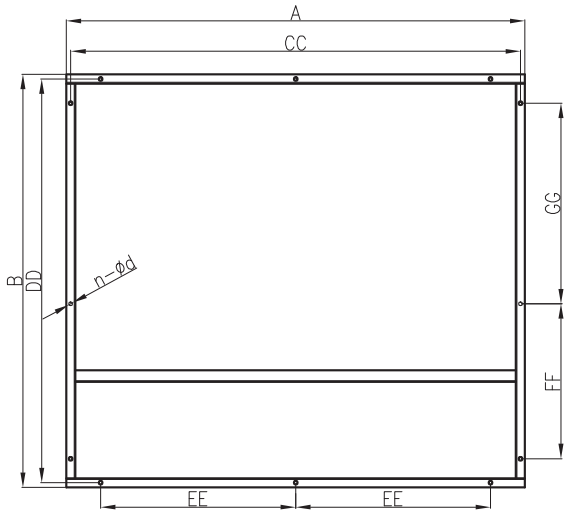
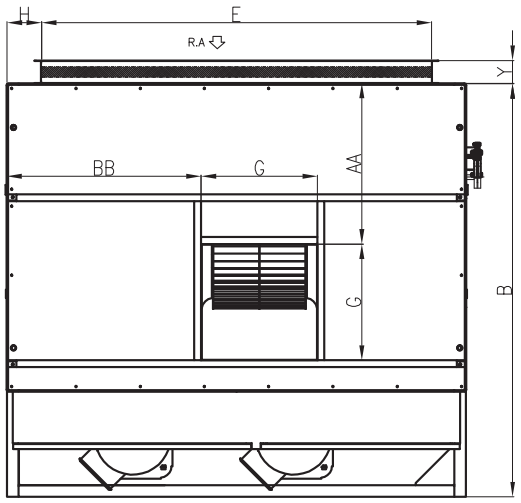
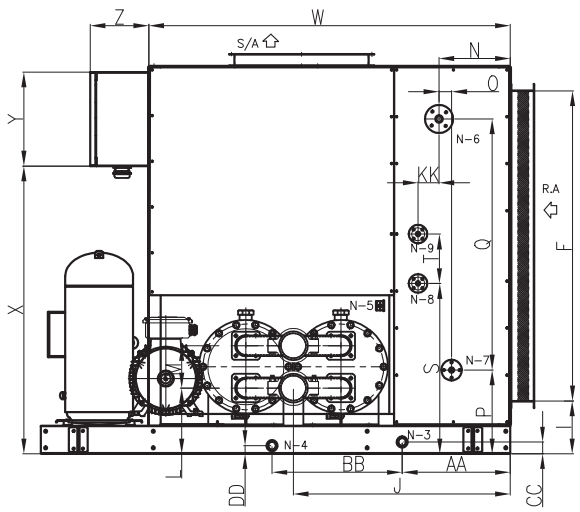
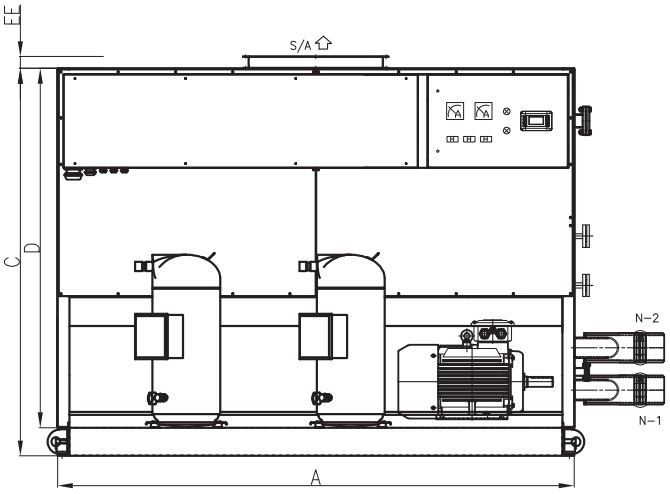


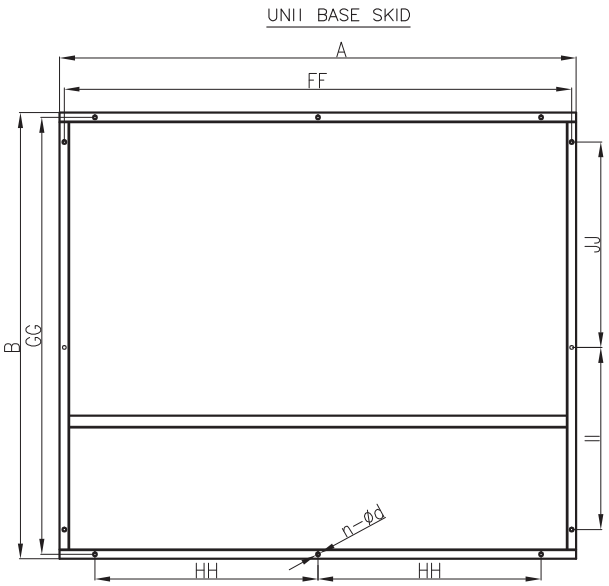


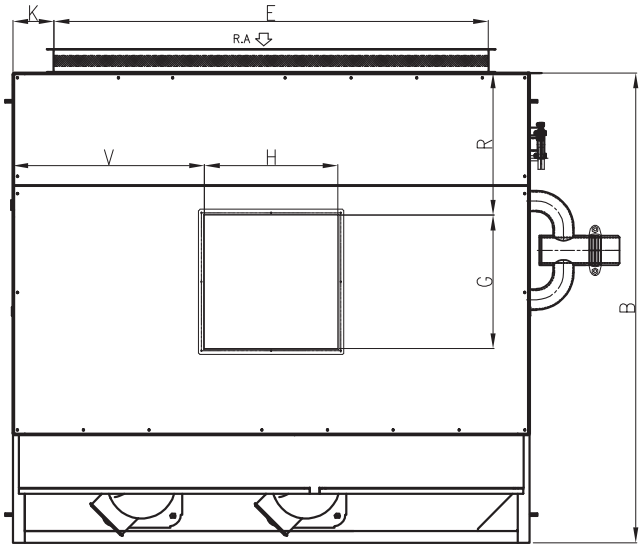
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
TCDU-35_HB TCDU-35_HA	2000	1800	1550	1430	1700	1220	507	150	225	725	310	180	348	55	230	582	89	50	680	210	462	915	50	35
TCDU-40_HB TCDU-45_HA	2000	1800	1550	1430	1700	1220	507	150	225	750	280	180	348	55	230	582	89	50	680	210	462	915	50	35
TCDU-50_HB TCDU-55_HA	2000	1800	1550	1430	1700	1220	568	150	225	750	275	190	348	55	230	582	89	50	680	210	462	915	50	35

Model	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
TCDU-35_HB TCDU-35_HA	100	1340	698	825	1960	1760	850	675	875	325	1200	250	18	12	DN80	DN80	DN32	DN25	1/2"	DN32	DN20	DN15	DN15
TCDU-40_HB TCDU-45_HA	100	1340	698	825	1960	1760	850	675	875	250	1200	325	18	12	DN80	DN80	DN32	DN25	1/2"	DN32	DN20	DN15	DN15
TCDU-50_HB TCDU-55_HA	100	1340	674	716	1960	1760	850	675	875	250	1200	325	18	12	DN100	DN100	DN32	DN25	1/2"	DN32	DN20	DN15	DN15









Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	V	W	X	Y
TCDU-65_HB TCDU-70_HA	2400	2000	1650	1530	1850	1320	638	638	225	925	325	280	180	304	55	357	1069	480	725	210	881	1540	1225	400

Model	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK	d	n	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9
TCDU-65_HB TCDU-70_HA	250	460	605	50	35	50	2360	1960	1000	800	900	89	20	12	DN100	DN100	DN32	DN25	1/2"	DN40	DN25	DN15	DN15

MARINE PRECISION AIR CONDITIONER

The complete precision climate control

Description

Marine type communication room and data central precision air conditioning unit (MCPU) is designed with consideration of the special conditions for communication room, data central or control room on ships and offshore installation.

The units consist of one or two compressors, one or two water cooled or air cooled condensers, evaporators, EC supply air fan, electrical control panel and all refrigerant circuits control valves installed on one common skid or as split unit type for air cooled units.

Ecological HFC refrigerant R407C, R134a, R404A are available. Unit with other refrigerant can be provided upon request.

The power source of the unit can be AC 440V~480V/3PH/60Hz, AC380V~415V/3PH/50Hz, other power sources are available.

Standard cooling capacity range from 6RT to 20RT.

Material	
Casing:	Galvanized steel with powder coating for indoor unit. SUS casing upon request.
Insulation:	Rubber sponge insulation material.
Cooling Coil:	Copper tube aluminium fins with stainless steel frame. Option: -Copper tube Copper fins -Coil with anti-corrosion coating
Reheating Coil:	Stainless steel SUS304 tube and fins for electric heater. Copper tube aluminium fins for steam or hot water heating coil.
Condenser	Copper tube is used for fresh water cooled condensers, Copper/Nickel tube, carbon steel coved with aluminium bronze tube plate is used for sea water cooled condensers. Copper tube and copper fins with SUS316L coil frame for air cooled condensers. Option: -Coil with anti-corrosion coating for air cooled condensing coil.
Drip Tray:	Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation.

Option Equipment

- Flexible connections and counter flanges for air intake and outlet.
- Flexible connections and counter flanges for cooling water inlet and outlet.
- Water pressure gauges with gauge cocks for cooling water inlet and outlet.
- Cooling water thermometer.
- Sea water flow temperature control valve.

Model-Number Nomenclature

For example

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MCPU	-	1	0	D	A	0	S	1	C	E	E	1	-	-

Model-Number Digit Definitions

Digit 1 and 2 =MCPU (Marine Communication room ,data central precision air conditioning unit)

Digit 3 And 4 = Nominal Cooling Capacity, RT

08 = 8RT, 28kW

10 = 10RT, 35kW

12 = 12RT, 42kW

15 = 15RT, 52.5kW

20 = 20RT, 70kW

Digit 5 = Air Distribution

D= Down-flow

U= Up-flow

Digit 6 = Condenser Cooling Type

A= Air cooled

S= Sea water cooled

F= Fresh water cooled

Digit 7 = Cooling Circuit

0=Single circuit

T=Twin circuits

Digit 8 = Compressor Type

S=Scroll compressor

R=Semi-hermetic reciprocating compressor

Digit 9 = Voltage

1=AC380V~415V/50Hz

2=AC440V~480V/60Hz

Digit 10 = Refrigerant Type

A=R407c

B=R134a

C=R404a

Digit 11= Fan Type

A=AC Fan

E=EC Fan

Digit 12 = Re-heater Type

0=None

E=3-stage electric

H=Hot water

Digit 13 = Humidifier Type

0=None

1=Steam generator

2=Wet film humidifier

Digit 14~15= Factory Configuration Number

Features

The precision climate control precision cooling, maximum availability and energy efficiency

★ Precision temperature and humidity control

Precision air-conditioning systems precisely regulate temperature and humidity for sensitive technology.

In communication room and data centres, the continuous operation reliably ensures the high availability of computer systems. This is increasingly challenging as the performance of modern information and telecommunications technology improves.

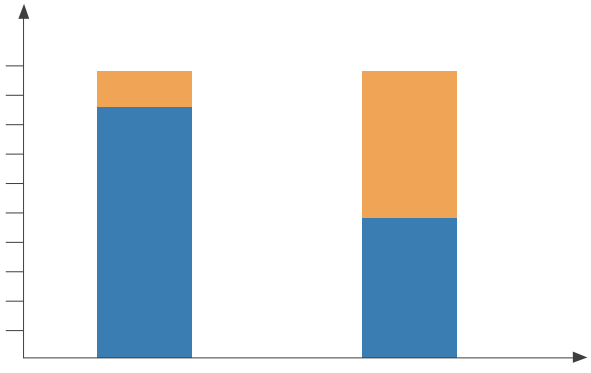
In general, a distinction is made between comfort and precision air-conditioning. While comfort air-conditioning creates a pleasant environment for people, precision air-conditioning technology provides reliable cooling that is geared towards the requirements of technical infrastructure. Dedicated equipment rooms in data centres or switching stations require precisely controlled relative humidity, room temperature, air conduction and air distribution. Precision air-conditioning units enable you to create precisely defined climatic conditions – with pinpoint accuracy and outstanding reliability.

MCPU precision air conditioner is capable of control to within±1°C and ±10% RH by analysing the rate of change in temperature or the moisture content in the environment, the control system anticipates what is going to happen in the room, not simply responding to what has happened.

★ Energy efficiency

The MCPU provides maximum energy efficiency without compromising the accuracy and reliability demanded by sensitive electronics. All enhancements to energy efficiency are designed to reduce operating time of key components and increase the Mean Time Between Failure. This is accomplished by taking advantage of precisely system control to minimize compressor operation when heat loads in the conditioned space are lower. Energy savings is also gained through the use of high efficiency components such as advanced scroll or 4-step semi-hermetic compressors, EC fan, electric expansion valve (EEV).

High sensible cooling capacity=low operating costs



Precision air-conditioning unit: 0-5% air dehumidification

Comfort air-conditioning unit: 40-50% air dehumidification

The sensible cooling capacity lowers the temperature, while the latent capacity dehumidifies the air. Comfort air-conditioning units use up to 50 % of their energy for dehumidification, while precision units convert more than 95 % of the energy used exclusively to cooling power. The technology required to achieve this pays off quickly through lower running costs.

Precision air-conditioning units from filter and circulate two or three times the amount of air as comfort units with the same rated capacity. They reliably dissipate isolated heat loads even from distant corners of the room, while continuously monitoring and precisely controlling the temperature and air filtration.

★ Front access and serviceability save valuable floor space

— Total front access provides space and serviceability benefits not found on previous models or competitive units.
— The unit can be placed adjacent to or in back of other equipment or against a wall or partition.
— All key components are visible and accessible - from the front of the unit for easy maintenance and removal. Compressors are removable from front - isolated from air stream for easier maintenance.

★ Quality, rugged construction for marine using

The durable design of the Unit provides a stable, virtually vibration less platform for compressor and fan operation:

— Marine standard frame coating - protects frame against marine condition corrosion for years of reliable service.
— Welded frame-14 gauge steel provides rugged construction, proven to withstand shipping
— Durable powder coated exterior panels—look good and stay that way.
— Optional double-skin panels—eliminate insulation in the air stream. This allows for easy panel cleaning.
— Copper/nickel tube, carbon steel coved with Cu/Ni coating tube plate is used for sea water cooled condenser.
— Multi-pass crossed fin tube coil, copper tube and copper fins with SUS316L coil frame and casing for air cooled condensers to ensure the unit more reliable.

Dependable, Effective Cooling System

★ Compressor

The scroll compressor design provides high efficiency, low sound levels and excellent durability.

The standard Low noise reliable scroll type hermetic compressor, Fitted with crankcase oil heater and internal suction accumulator for long-life running. Scroll compressor offers efficient, reliable performance with a robust design that contains only a few moving parts. Quiet operation is accomplished through a continual, smooth compression process. Discharge gas and vibration are kept at a low level. This allow units can be installed in accommodation area without troublesome problem.

- A standard fixed-capacity scroll compressor.
- An optional Digital Scroll compressor with energy saving, variable capacity operation.
- An optional Semi-hermetic compressor built-in motor and capacity regulation solenoid valve and suction and discharge valve.

• two-step semi-hermetic compressors:
Two-Step system achieves high levels of energy efficiency through the integration of one high-efficiency semi-hermetic compressors with capacity control valves, an advanced microprocessor control system and a computer-optimized cooling coil.
• The four-step system reduces compressor cooling capacity and energy consumption during periods of low room load conditions. As a result, four distinct stages of cooling are activated to more closely respond to changing room conditions. Reliability is enhanced by fewer and less stressful compressor starts for reduced wear.

★ Condenser

Cleanable shell and tube, copper tube, type condensers with tube plate is used for fresh water. Copper/nickel tube, carbon steel coved with Cu/Ni coating tube plate is used for sea water.

Water flow regulation valve as option fit to keep condensing pressure within a stable operation range.
Multi-pass crossed fin tube coil, copper tube and copper fins with SUS316L coil frame for air cooled condensers ensure the unit more reliable for long life marine use.

★ Evaporator

Multi-pass crossed fin tube type coil is standard.
Copper tube aluminium fin and copper tube copper fins are available as option.

★ A-Frame Coil

This designed and manufactured A-Frame coil features a large face area/low face velocity design for precise control of cooling and dehumidification—and is designed to optimize heat transfer and minimize pressure drop.

★ Refrigeration system fitting

Each refrigeration circuit includes:
- Sight glasses serve as a means of quick visual inspection to determine if there is moisture in the system and if the system is properly charged.
- Refrigerant dyer filter assure a moisture-free refrigerant system for extended component life.
- As standard, there are two separate refrigerant circuits with two compressors for 15RT and 20RT unit to save the energy and increase operation life further more, two refrigerant circuits for 6RT to 12RT units can be available as option.
- Expansion valves – Externally equalized expansion valves smoothly control refrigerant flow during indoor heat loads and outdoor ambient by controlling evaporator superheat.
- Electronic expansion valve
The electronic expansion valves (EEV) have a high resolution and control accuracy function for refrigerant flow control. The valve include one refrigerant valve and one magnetic actuator, the opening ratio can be controlled by PLC controller to guarantee compressor suction gas degree of superheat within the allow range of set point value. With its pinpoint response to temperature and pressure fluctuations, the electronic expansion valve (EEV) permanently increases the performance and efficiency of your air-conditioning system. In ideal operating conditions, efficiency is raised by up to 37 %. It ensures that sensitive hardware is kept cool with a uniformly high volume of air, even during
- dehumidification.
Muffler – Specially engineered mufflers afford a quiet
- pulsation-free refrigeration system as option.
Safety controls – Each compressor has an automatic reset high pressure switch which locks-out after the third trip. A low pressure transducer protects against coil freezing and low refrigerant pressure.

Air Supply System Design

★ Energy efficient EC plug fan

As standard, the supply air system fitted with one or two energy efficient EC Plug Fan. These electrically commutated fans are a backward curved motorized impeller powered by a direct drive DC Motor with integrated AC-DC conversion.

This design uses less energy than standard centrifugal blowers by lowering motor kW. The EC Plug Fan uses 10-30% less energy on average than standard AC motors.

The EC Plug fan is located in the area beneath the raised floor or within the unit. Superior energy savings can be realized with the fans located beneath the raised floor. Placing the fan in the raised floor space, is 30percent more energy efficient than centrifugal blowers. The EC Plug Fan also provides greater energy savings than traditional variable speed.

No belt plug fan ensure the unit more reliable and Minimal maintenance work.

★ Humidity control

A key to the ability of a quality Precision Cooling system to control conditions within the critical space is its high “sensible heat ratio.”

Unlike comfort systems, precision air conditioning systems typically have a high ratio of sensible-to-total cooling capacity to remove heat from the air. This capability is provided through the use of integrate humidification systems to provide the necessary level of moisture control, higher air supply capacity and larger coil size.

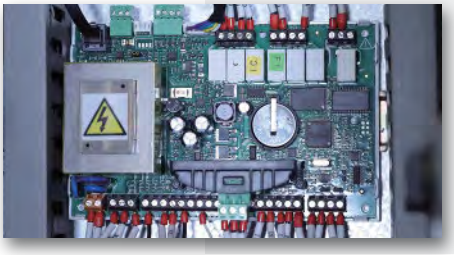
Maintaining the correct humidity level in the room is just as important as maintaining proper temperature. In adequate humidity control can cause static electricity if it’s too dry-or condensation that can corrode circuitry if the air is too moist. The unit utilizes an integrated humidification system to provide the necessary level of moisture control.

Standard Infrared Humidifier
Instant Humidification—on when needed, off when not needed.

— Optional steam generating Canister Humidifier
Utilizes replaceable bottle - requires a specific water quality level for optimum operation.
— Utilizes a drain and refill cycle - to maintain a current set point.

★ Dehumidification control

The compressors operate at full capacity during dehumidification. The precision control of the unit saves energy by tightly regulating compressor operation and avoiding over dehumidification that causes the humidifier to come on when not needed.



★ Reheat function

The reheat function of the unit is primarily used to keep the temperature from going too low during the dehumidification cycle.

Standard Reheat
Three-stage electric reheat - low watt-density, 304stainless-steel fin-tubular reheater, location maximizes airflow to maximize element life and improve reliability.

Reheat Options
SCR electric reheat - For specialized applications requiring tight temperature control. Multiple pulses of reheat VS. three equal stages provide smooth temperature adjustment.

Optional hot water reheat - Uses existing building hot water saving energy.

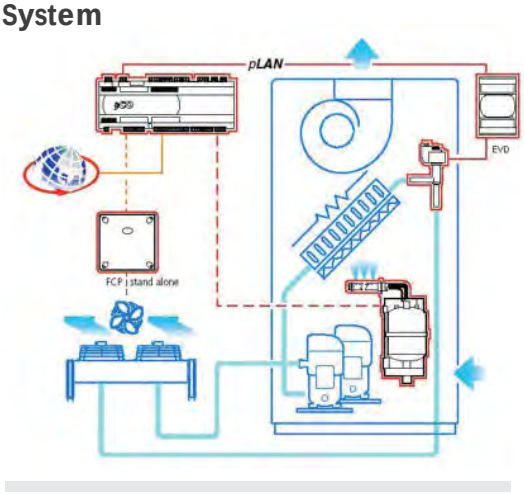
Reheat/humidifier
Lockout - Reduces power requirements during emergency power operation.

★ Filtration system

The unit fitted with integral air filtration to protect against airborne contaminants within the critical environment. Without proper air filtration, even small amounts of dust and other particles can damage storage media and charged electronic components.

High-efficiency air-filtration - removes damaging particles from air.
Standard filter - class G4
Optional high - efficiency filter - class F5~F8

Precision Air-Conditioners Program Control System



Precision Air-conditioners Program Control System featured on the units brings high-level supervision to multiple units allowing them to work together as a single system to optimize room performance. The control system offers a variety of advantages.

Various intelligent control methods
- Return air temperature is a traditional method that changes the unit capacity based on the return air temperature to the unit;
- Supply air temperature is a method that changes the unit capacity based on the unit outlet air temperature.
- Static pressure control uses a single pressure sensor to adjust the fan speed. The airflow compensates for floor tile layout changes;

Precision Air-conditioners Program Controller The main functions of the program are:

- Management of the temperature and the humidity in technological environments;
- Management of 1 or 2 hermetic or semi-hermetic compressors;
  - Management of 1 or 2 electric heaters (including with binary management, up to 3 heating steps);
  - Modulating heating valves, 0 to 10 Volt and 3 point;
  - Modulating cooling valves, 0 to 10 Volt and 3 point;
  - External or built-in humidifier control;
  - ON/OFF or modulating condenser fans, controlled by pressure or temperature;
  - Outlet temperature control;
  - Alarm management, alarm log, device timers, signals;
- Complete management of the device timers;
- Connection to local supervision networks and BMS (via LonWorks, BACnet, Modbus...).

The terminal with LCD can be used to display and modify the following data at any time:

- Readings and calibration of the probes connected
- Unit ON/OFF;
- Alarm detection;
- Programming of the configuration parameters and the operating parameters with password-protected access;
- Operating hours of the controlled devices and time bands with password-protected access; programming of the clock and the time bands with password-protected access;
- Choice between different languages (English, Italian, German, French);
- In addition, the following functions can be managed via a pLAN connection;
- Balancing of operating hours between the air-conditioners by rotation of the spare unit
- (standby);
  Activation of the spare unit if another unit is
- shut-down due to a serious alarm or blackout;
  Activation of the spare unit to compensate for
- excessive thermal load;
  Control of up to 8 air-conditioners with just one
- external LCD terminal;
  Operation of all the air-conditioners based on the probe readings on the Master, to harmonise the overall action.

Intelligent communications and monitoring plan network

The plan network identifies a physical connection between the units and the external terminals.
The purpose of the pLAN network connection between the units is to exchange variables, according to the logic decided by the program, so as the units can operate together. The variables exchanged between the units are established by the program, as is the direction of exchange, and therefore there are no user settings; the only operation required by the user involves the electrical connections.

- Saves energy
- Built-in Lead/Lag Functions for enhanced system reliability;
- Wellness Calculation alerts service personnel before problems occur;
- Unit to Unit Communications allows Lead/Lag and optional teamwork settings for maximum flexibility of control of up to 12 units per zone.

Blower Configurations

Fig.1 Down-flow configurations, front or rear supply with EC fan

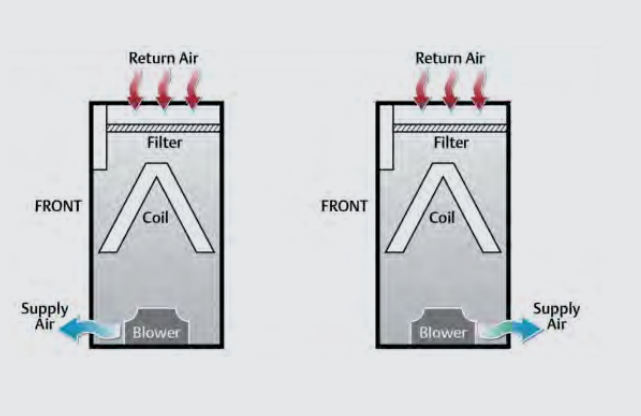


Fig.2 Down-flow configurations, bottom or under floor supply with EC fan

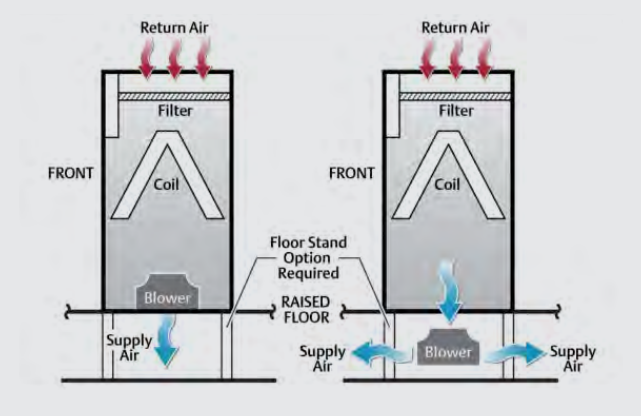


Fig. 3 Up-flow configurations with EC fan in a plenum, supply air exits the front or rear only

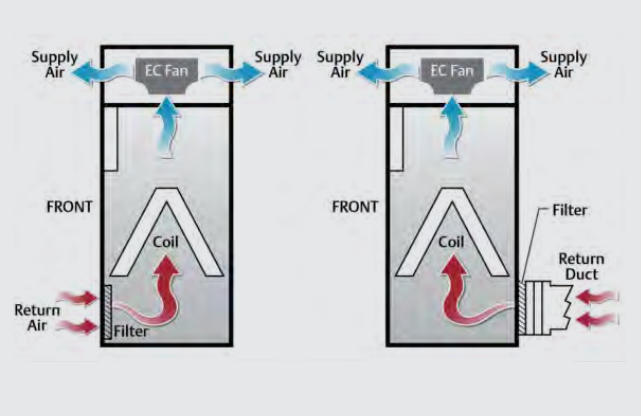


Fig.4 Up-flow configurations, front-return with forward-curved blowers

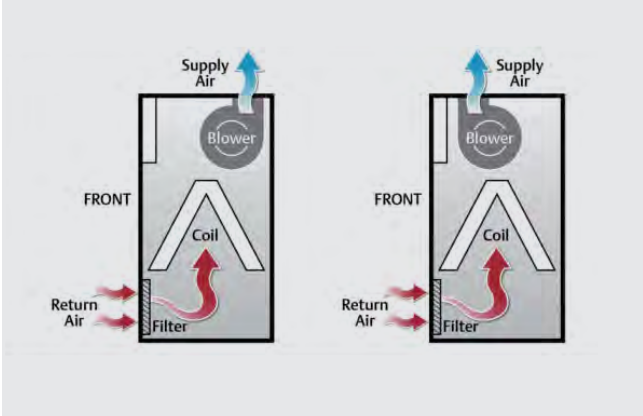
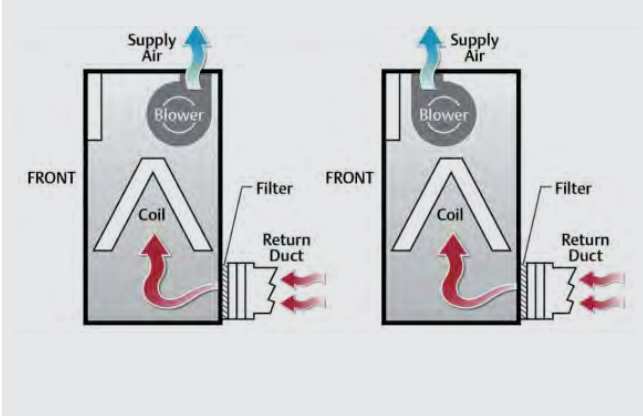
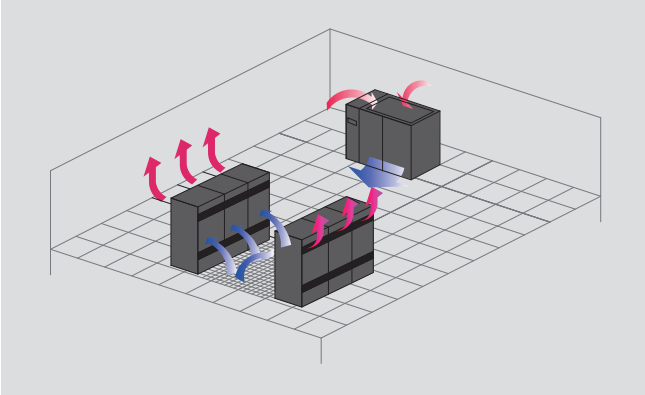


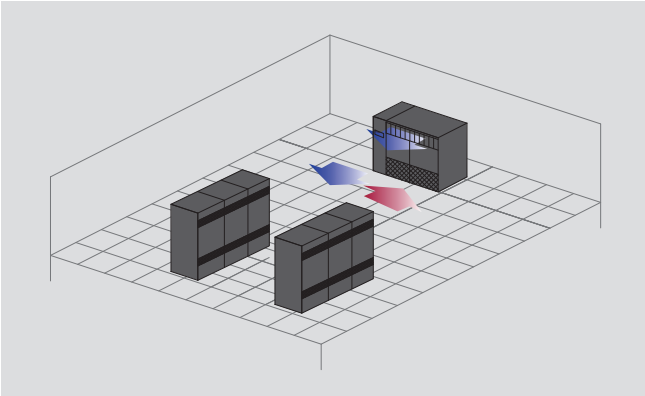
Fig.5 Up-flow configurations rear-return with forward-curved blowers



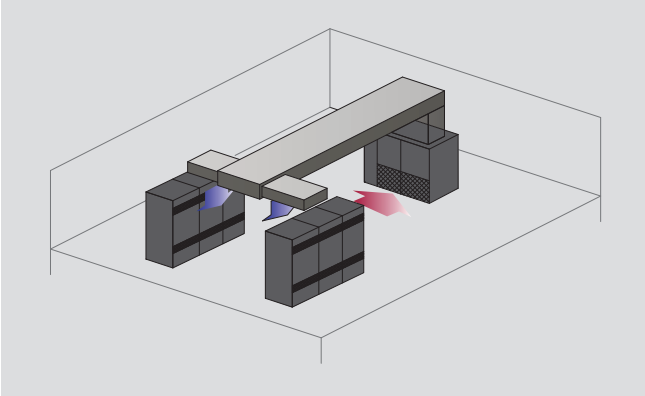
The Widest Variety of Air Distribution Choices



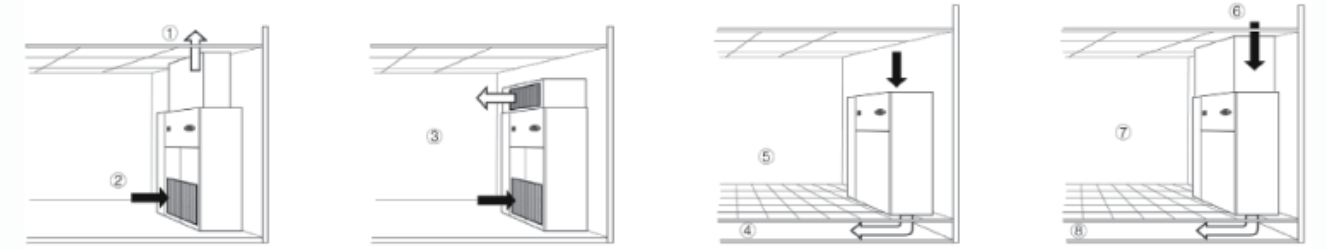
Down-flow supply
Designed for raised-floor applications, the down-flow air supply configuration is commonly found in data centers and other similar facilities housing sensitive electronic equipment.



Top front supply with plenum & grille and front return
In-the-space applications without ductwork, such as telecommunications, networks and switching centers, benefit from this economical configuration. Optional high filtration may be desirable.



Top front supply and front return
Engineered for in-the-space applications utilizing duct work, this airflow design is commonly used for telecommunications or industrial applications. High static pressure and filtering options may be selected.



Ducted up-flow unit
w/return grill

1.Ducted discharge
2.Free inlet & casing radiated

Up-flow unit w/return
Grille & plenum

3.Free inlet & free outel
& casing radiated

Down-flow unit
w/open return

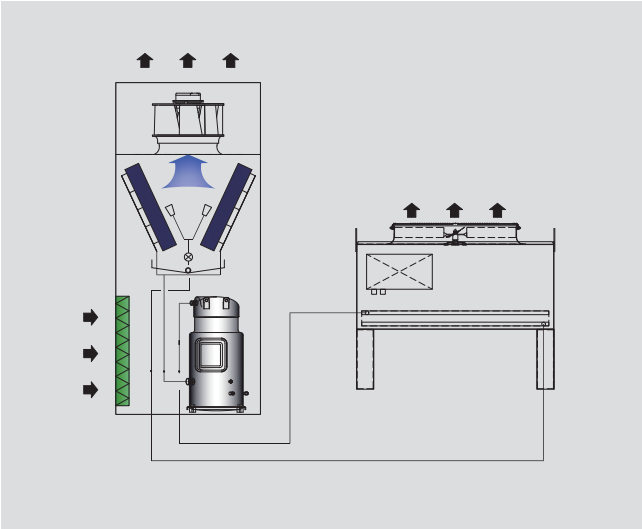
4.Ducted discharge
5.Free inlet & casing radiated

Down-flow unit
w/ducted return

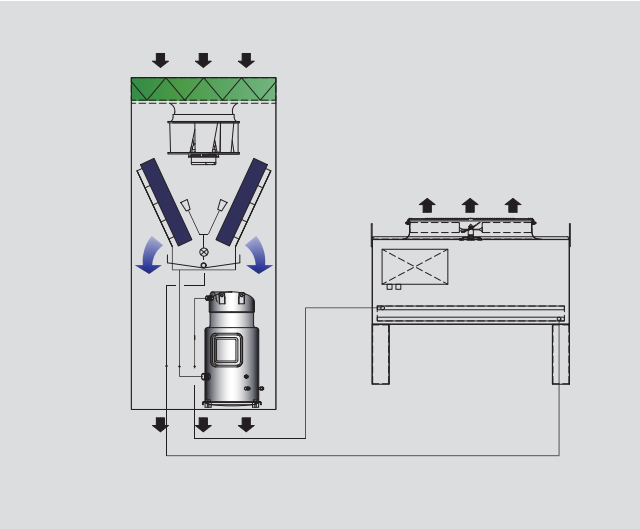
6.Ducted discharge
7.Casing radiated
8.Ducted inlet

Cooling System Configuration

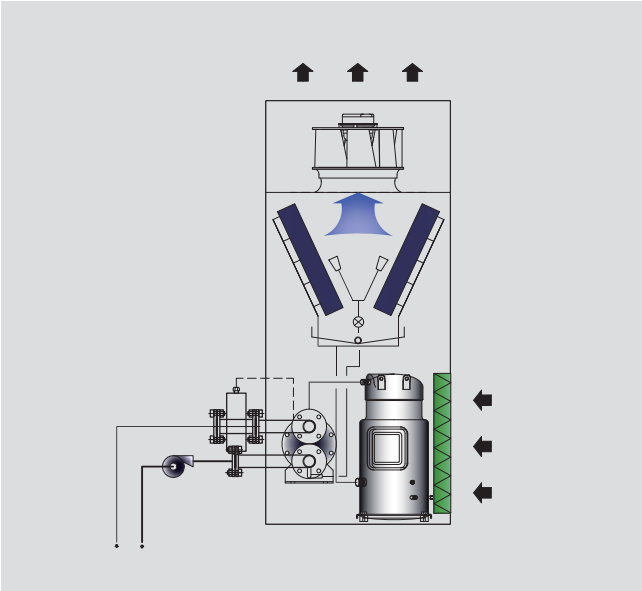
Air cooled up-flow configuration



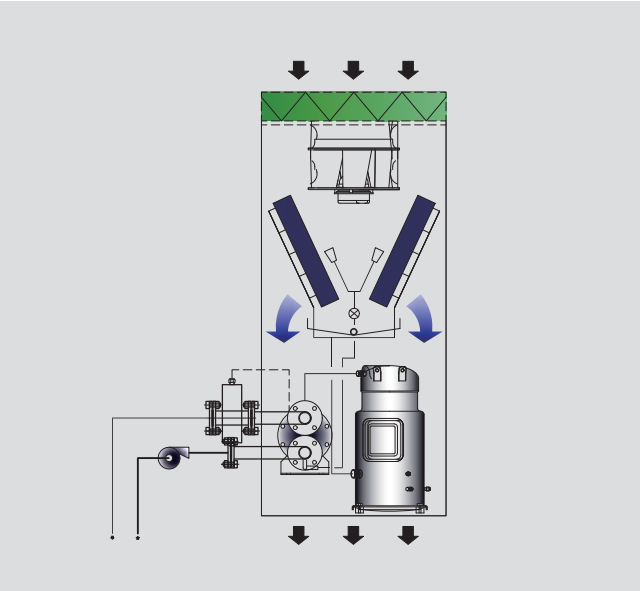
Air cooled down-flow configuration



Water cooled up-flow configuration



Water cooled down-flow configuration



General Performence Data - Air Cooled Split Unit with EC FAN

Model	MCPU-06	MCPU-08	MCPU-10	MCPU-12	MCPU-15	MCPU-20
Normal Cooling Cpapacity, Kw	21.0	28.0	35.0	42.0	52.5	70.0
Application Condition	29.4DB, 18.1WB, 32.4%RH					
Total Cap, Kw	21.6	29.8	35.1	43.3	50.9	70.2
Sensible Cap, Kw	21.0	27.9	33.1	42.4	50.5	66.7
Application Condition	26.7DB, 17.1WB, 38.2%RH					
Total Cap, Kw	21.4	29.6	34.9	43.1	50.6	69.8
Sensible Cap,Kw	20.1	26.7	31.7	40.7	48.4	63.9
Application Condition	23.9DB, 16.2WB, 45.1%RH					
Total Cap, Kw	21.1	29.1	34.3	42.3	49.7	68.6
Sensible Cap, Kw	19.3	25.6	30.4	38.9	46.3	61.1
Heating Capacity, Kw	12	15	15	15	25	30
Humidifier Capacity, Kg/h	5	5	5	5	10	10
Max Air Flow,m^3/h	5200	6900	8200	10500	12500	16500
Fan Motor, Kw						
Power Source	AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
Control Power	AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
Protecting Device	Refrigerant high/low pressure switch, compressor overload protection, Phase absent protection					
Refrigerant	R407C					
Indoor Unit Dimension (LxWxH)	1400x890x1950	1850x890x1950	1850x890x1950	1850x890x1950	2500x890x1950	2500x890x1950
Indoor Unit Weight, Kg	590	640	730	780	890	950
Outdoor Unit Dimension (LxWxH)	1160x1160x975	1160x1160x975	1160x1160x975	2320x1160x975	2320x1160x975	2320x1160x975
Outdoor Weight, Kg	165	195	220	370	390	440
Casing Outdoor Unit	SUS316L	SUS316L	SUS316L	SUS316L	SUS316L	SUS316L
IP Outdoor Unit	IP56	IP56	IP56	IP56	IP56	IP56

Note:
1.The cooling capacity data is based on the operation conditions per ASHRAE 127-2012 with 5% tolerance, in which the ambient air temperature 35℃.

Physical Data - Air Cooled Split Unit with EC FAN

Unit Model		MCPU-06	MCPU-08	MCPU-10	MCPU-12	MCPU-15	MCPU-20
Indoor Unit							
Compressor	QTY.	1	1	1	1	2	2
	Type	Hermetic scroll					
	Power consumption, Kw	7.1	9.2	10.9	13.9	16.7	21.7
Evaporator	Type	Copper tube and fins					
	Material	Copper tube al fans with SUS304 frame					
Re-Heater	Heating capacity, Kw	12	15	15	15	25	30
	Type	Electric heater					
	Material	Stainless steel tube and fins					
Humidifier	Type	Steam generator					
	Capacity, Kw	5	5	5	5	10	10
	Power consumption, Kw						
Supply Air Fan	Type	EC plug fan					
	Air volume, m³/h	5200	6900	8200	10500	12500	16500
	Unit external static press Down-flow unit, Pa	50	50	50	50	50	50
	Unit external static press Up-flow unit, Pa	250	250	250	250	250	250
	Motor power, Kw	3.65	3.65	3.65	7.3	7.3	7.3
Air Filter	Class	G4	G4	G4	G4	G4	G4
Temp. & Humidity Controller		Precision air-conditioners program controller					

Outdoor Condenser

Model		MACU-06	MACU-08	MACU-10	MACU-12	MACU-15	MACU-20
Condenser	Type	Air cooled tube and fins					
Compressor	Material	Copper tube copper fins condenser coil with SUS316l frame and casing					
	Air flow, m³/h	8600	12500	13500	17200	25000	27000
	Conednser fan QTY.	1	1	1	2	2	2
	Fan motor power, Kw	0.68	0.68	0.93	2x0.68	2x0.68	2x0.93
	IP	IP56	IP56	IP56	IP56	IP56	IP56
Refrigerant Connection	Gas line, copper pipe	7/8”	7/8”	7/8”	7/8”	2x7/8”	2x7/8”
	Liquid line, copper pipe	5/8”	5/8”	5/8”	5/8”	2x5/8”	2x5/8”
Fresh Water Connection		3/4”	3/4”	3/4”	3/4”	3/4”	3/4”
Drain		1”	1”	1”	1”	1”	1”

General Performence Data - Water Cooled Unit with EC FAN

Model	MCPU-06	MCPU-08	MCPU-10	MCPU-12	MCPU-15	MCPU-20
Normal Cooling Cpapacity, Kw	21.0	28.0	35.0	42.0	52.5	70.0
Application Condition	29.4DB, 18.1WB, 32.4%RH					
Total Cap, Kw	21.2	29.4	38.2	44.5	56.8	76.4
Sensible Cap, Kw	20.5	28.6	35.4	44.2	53.4	70.7
Application Condition	26.7DB, 17.1WB, 38.2%RH					
Total Cap, Kw	20.8	28.9	36.8	43.6	55.7	73.6
Sensible Cap, Kw	18.8	26.3	32.5	40.7	49.2	65.0
Application Condition	23.9DB, 16.2WB, 45.1%RH					
Total Cap, Kw	20.5	28.6	35.4	42.0	53.6	20.5
Sensible Cap, Kw	18.0	25.2	31.1	38.9	47.0	62.2
Heating Capacity, Kw	12	15	15	15	25	30
Humidifier Capacity, Kg/h	5	5	5	5	10	10
Max Air Flow, m^3/h	5200	6900	8200	10500	12500	16500
Fan Motor, Kw	3.65	3.65	3.65	7.3	7.3	7.3
Power Source	AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz					
Control Power	AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz					
Protecting Device	Refrigerant high/low pressure switch, compressore overload protection, Phese absent protection					
Refrigerant	R407C					
Unit Dimension (LxWxH)	1400x890x1950	1850x890x1950	1850x890x1950	1850x890x1950	2500x890x1950	2500x890x1950
Unit Weight, Kg	620	680	750	830	940	1020

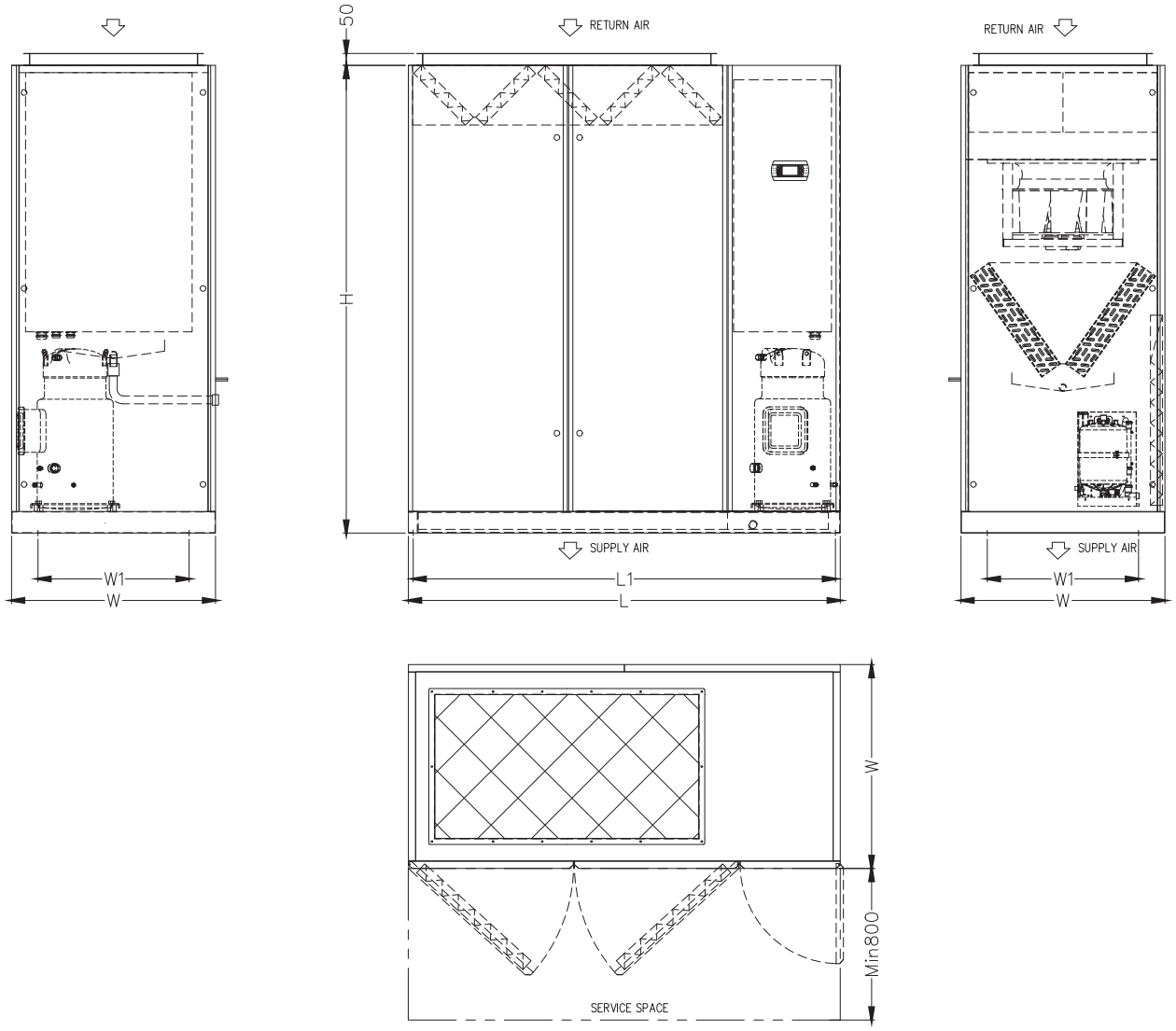
Note:
The cooling capacity data is based on the operation conditions per ASHRAE 127-2012 with 5% tolerance, in which the ambient air temperature 35℃.

Physical Data - Water Cooled Unit with EC FAN

Unit Model		MCPU-06	MCPU-08	MCPU-10	MCPU-12	MCPU-15	MCPU-20
Compressor	Qty.	1	1	1	1	2	2
	Type	Hermetic scroll					
	Power consumption, Kw	7.1	9.2	10.9	13.9	16.7	21.7
Condenser	Type	Horiztal shell & tube					
	Fresh water in/out temp, ℃	36/41	36/41	36/41	36/41	36/41	36/41
	Fresh water flow, m³/h	4.5	6.2	8.1	9.4	12.2	16.2
	Sea water in/out temp, ℃	32/37	32/37	32/37	32/37	32/37	32/37
	Sea water flow, m³/h	4.5	6.2	8.1	9.4	12.2	16.2
	Water connection	DN32 flange	DN40 flange	DN50 flange			DN65 flange
Evaporator	Type	Copper tube and fins					
	Material	Copper tube al fans with SUS304 frame					
Re-Heater	Heating capacity, Kw	12	15	15	15	25	30
	Type	Eletric heater					
	Material	Stainless steel tube and fins					
Humidifier	Type	Steam generator					
	Capacity, Kw	5	5	5	5	10	10
	Power consumption, Kw	3.75	3.75	3.75	3.75	6.0	7.5
Supply Air Fan	Type	EC plug fan					
	Air volume, m³/h	5200	6900	8200	10500	12500	16500
	Unit external static press Down-flow unit, Pa	50	50	50	50	50	50
	Unit external static press Up-flow unit, Pa	250	250	250	250	250	250
	Motor power, Kw	3.65	3.65	3.65	7.3	7.3	7.3
Air Filter	Class	G4					
Temp. & Humidity Controller		Precision air-conditioners program controller					

Overall Drawings Air Cooled Unit Indoor Unit, Down-Flow Type

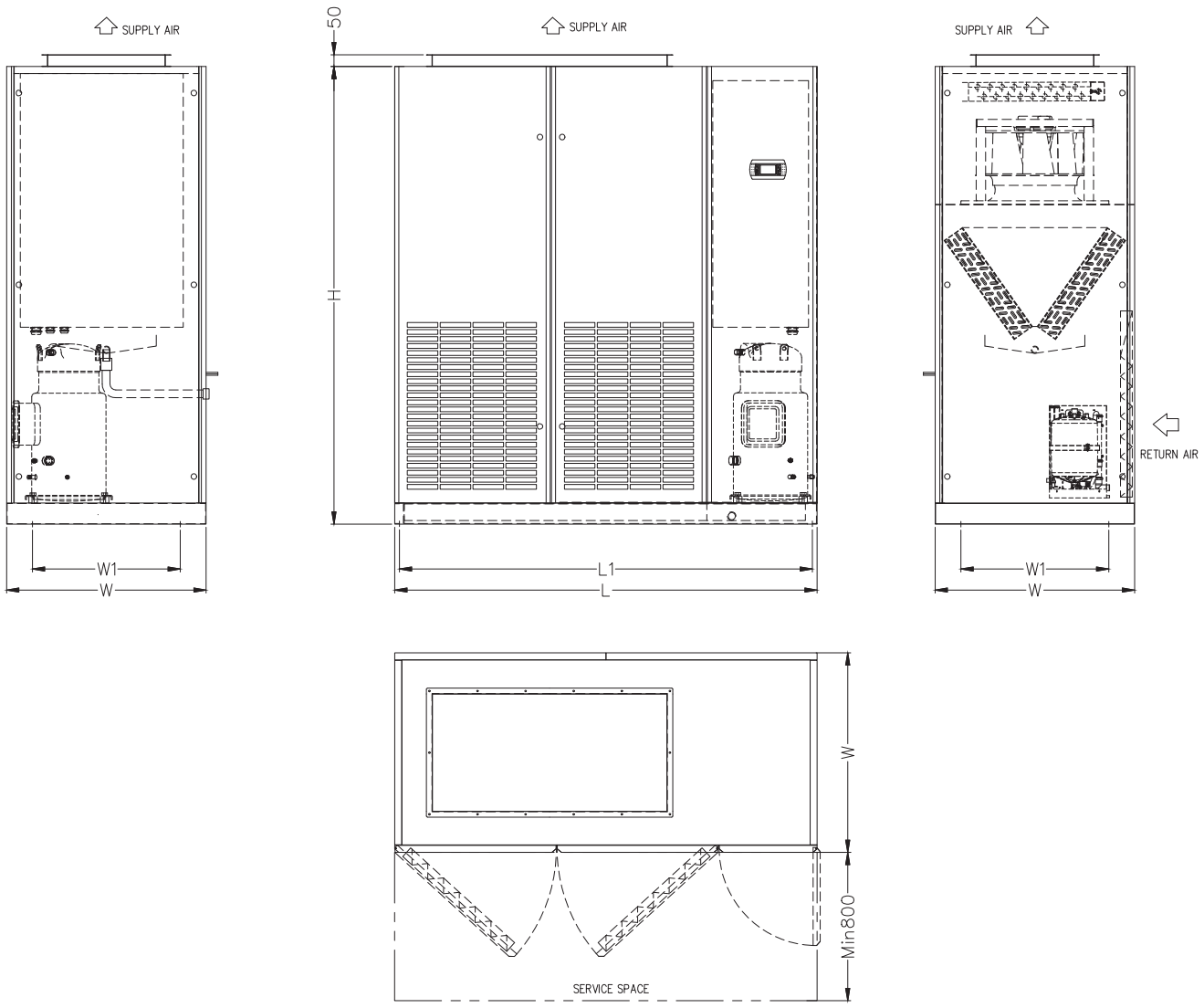
Air cooled down-flow indoor units dimension



Dimension	L	W	H	L1	W1
MCPU-06	1400	890	1950	1350	790
MCPU-08	1850	890	1950	1800	790
MCPU-10	1850	890	1950	1800	790
MCPU-12	1850	890	1950	1800	790
MCPU-15	2500	890	1950	2000	790
MCPU-20	2500	890	1950	2000	790

Overall Drawings Air Cooled Unit Indoor Unit, Up-Flow Type

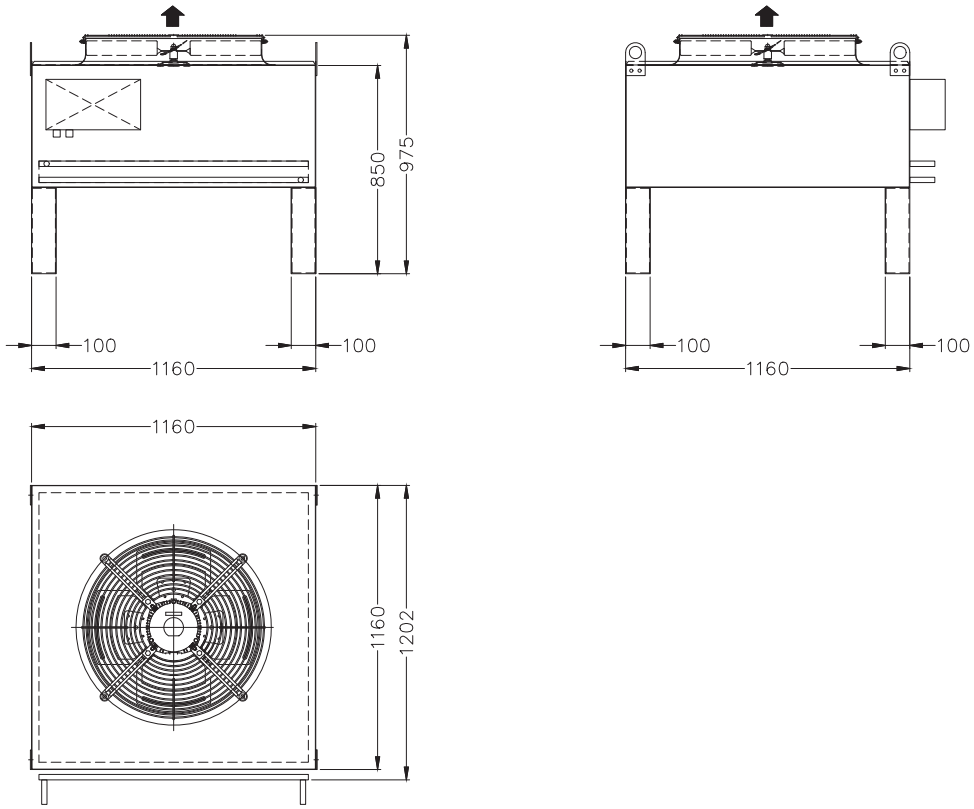
Air cooled upflow indoor units dimension



Dimension	L	W	H	L1	W1
MCPU-06	1400	890	1950	1350	790
MCPU-08	1850	890	1950	1800	790
MCPU-10	1850	890	1950	1800	790
MCPU-12	1850	890	1950	1800	790
MCPU-15	2500	890	1950	2000	790
MCPU-20	2500	890	1950	2000	790

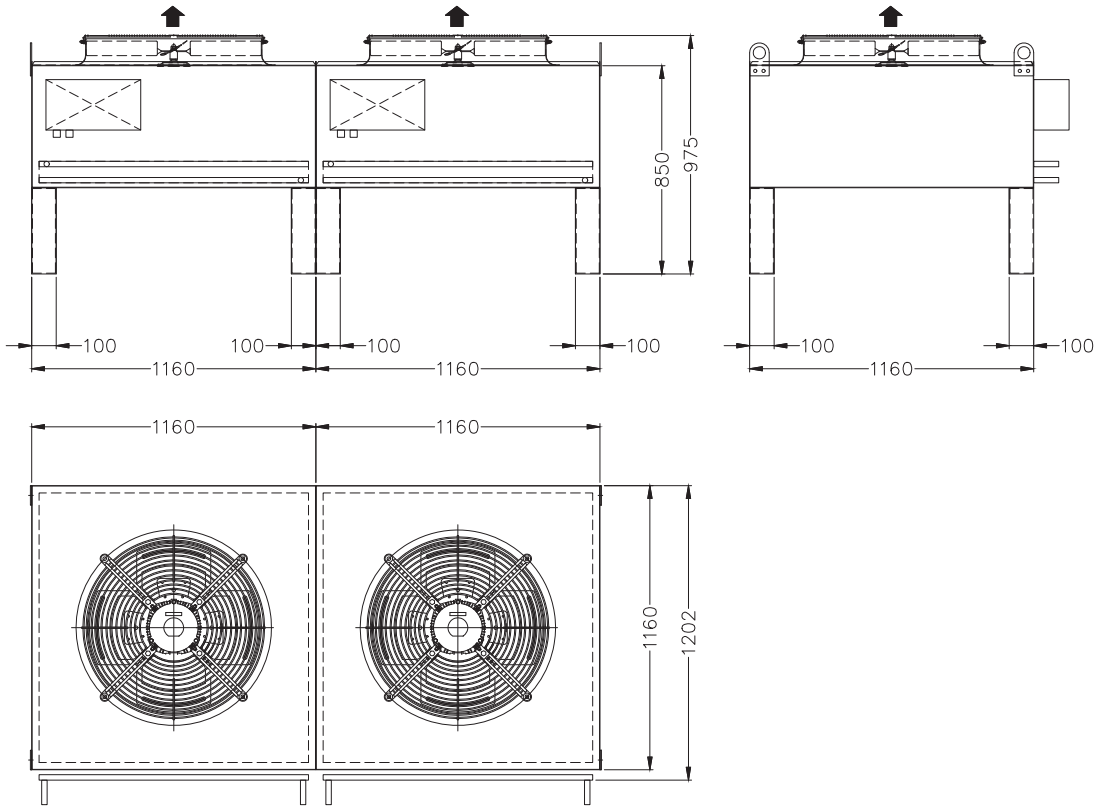
Overall Drawings 6RT~10RT Air Cooled Unit Condenser

6RT,8RT,10RT air cooled condenser dimension



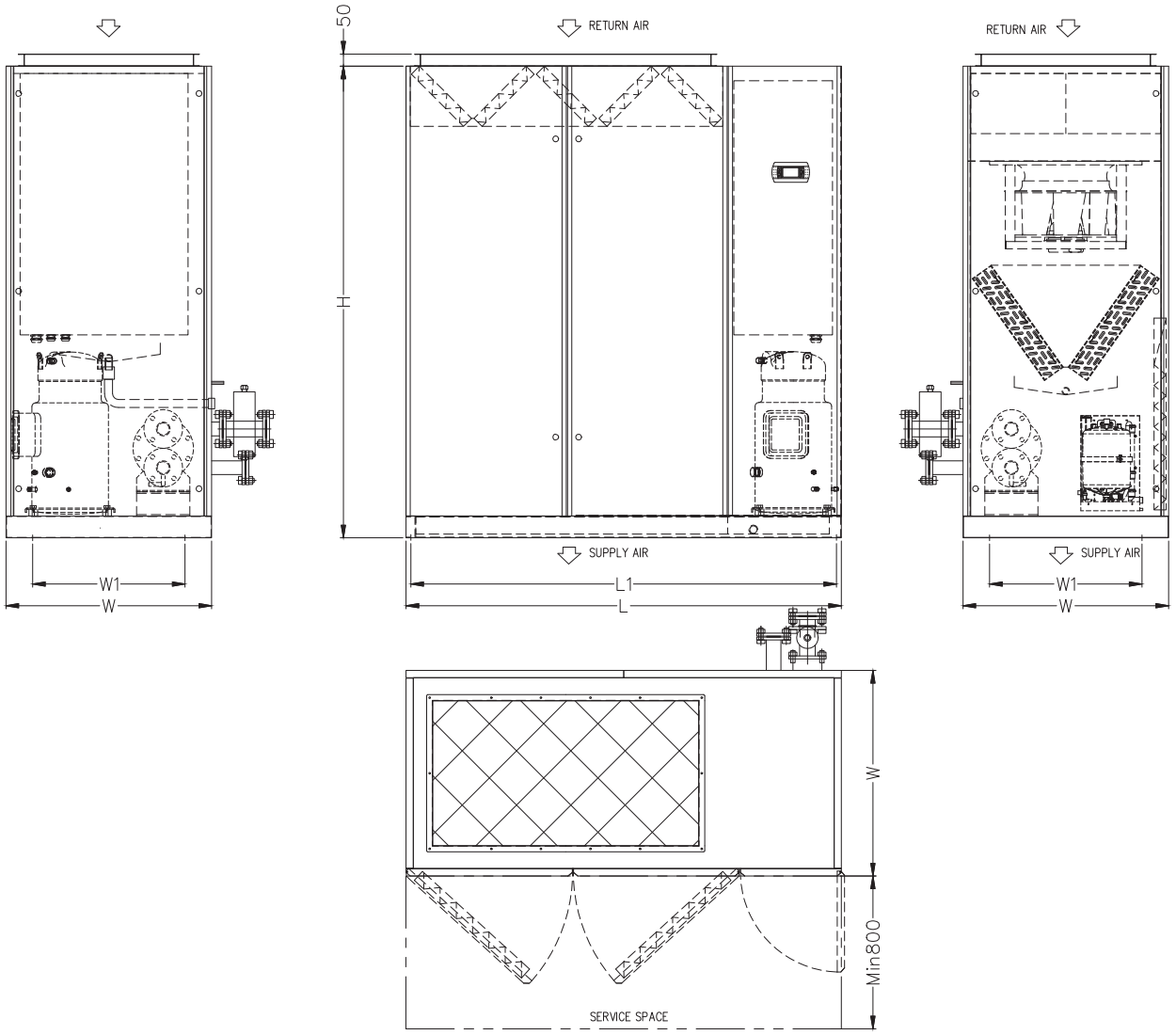
Overall Drawings 12RT~20RT Air Cooled Unit Condenser

12RT,15TRT,20RT air cooled condenser dimension



Overall Drawings Water Cooled Unit, Down-Flow Type

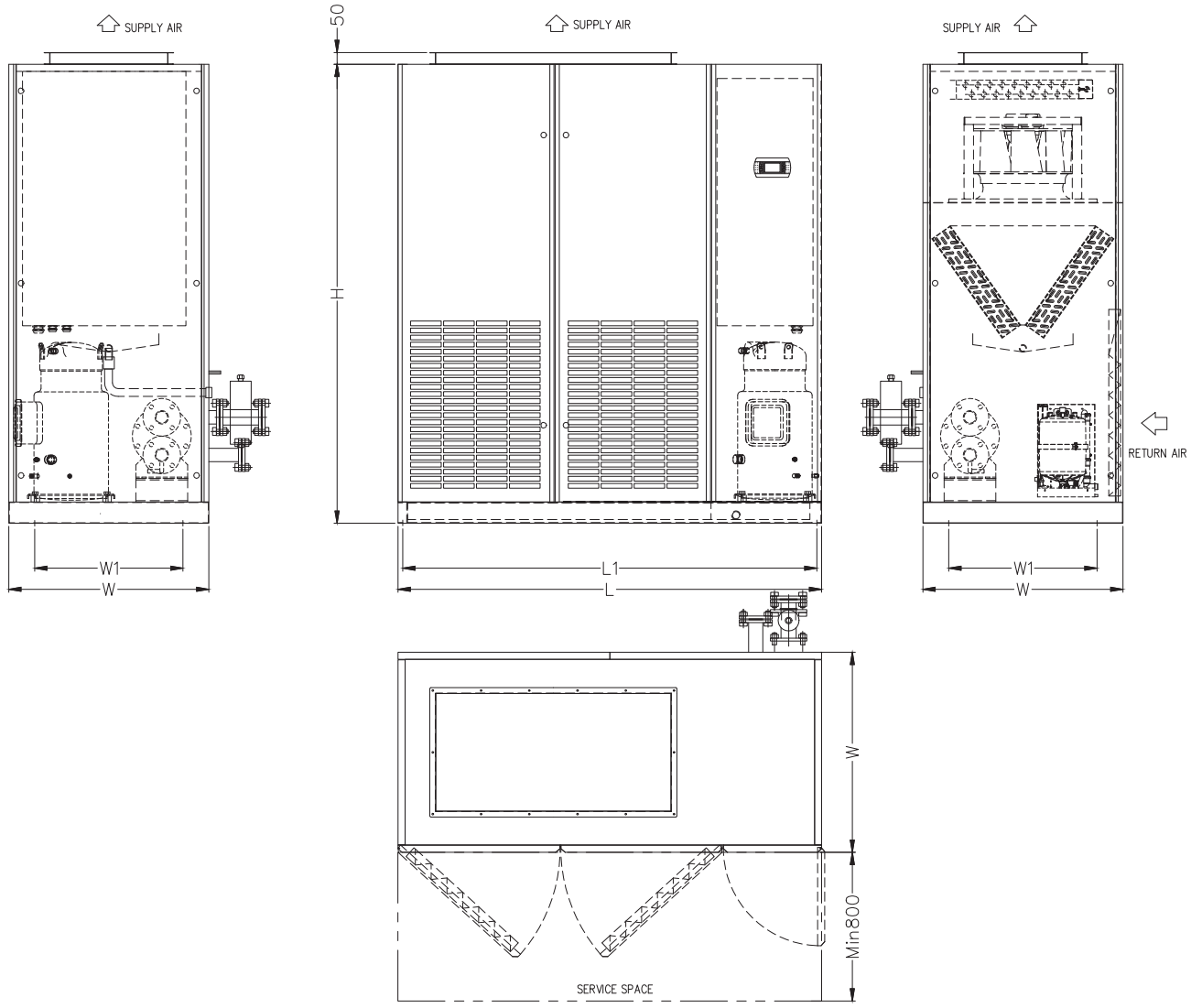
Water cooled down-flow units dimension



Dimension	L	W	H	L1	W1
MCPU-06	1400	890	1950	1350	790
MCPU-08	1850	890	1950	1800	790
MCPU-10	1850	890	1950	1800	790
MCPU-12	1850	890	1950	1800	790
MCPU-15	2500	890	1950	2000	790
MCPU-20	2500	890	1950	2000	790

Overall Drawings Water Cooled Unit, Up-Flow Type

Water cooled up-flow units dimension



Dimension	L	W	H	L1	W1
MCPU-06	1400	890	1950	1350	790
MCPU-08	1850	890	1950	1800	790
MCPU-10	1850	890	1950	1800	790
MCPU-12	1850	890	1950	1800	790
MCPU-15	2500	890	1950	2000	790
MCPU-20	2500	890	1950	2000	790

MGO COOLING SYSTEM

Cooling Unit - Big Capacity

MGO Cooling Unit

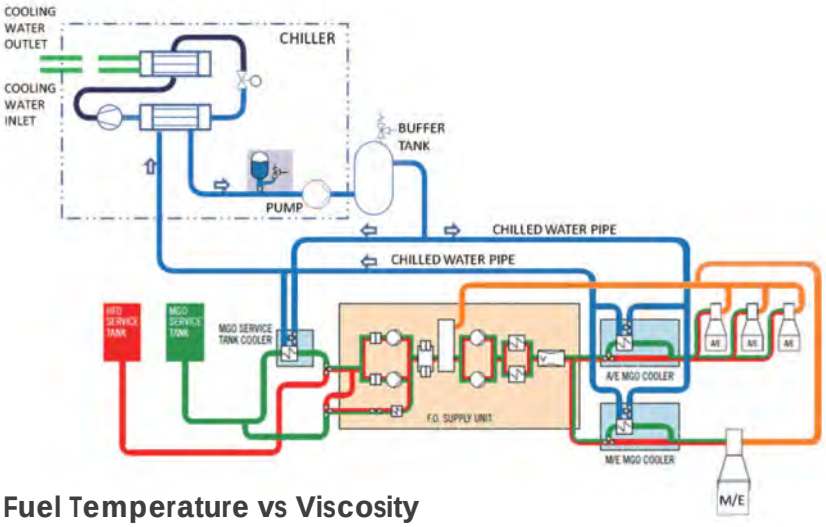
Introduction

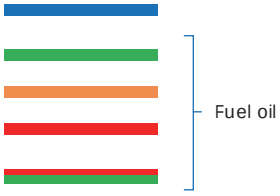
Because of the lower viscosity of Marine Gas Oil, the lubrication requirements of the engine manufacturer may not meet. In most marine diesel engines, the viscosity of the fuel needs to be at least 2.0 cSt. At normal temperature, the viscosity of MGO varies between 1-2cSt, which means that sufficient engine lubrication can no longer be guaranteed. The viscosity can be improved with additives, but this is relatively costly. However, there is a much more affordable way of ensuring proper lubrication and sufficient viscosity.

BlueConnect MGO Cooling System

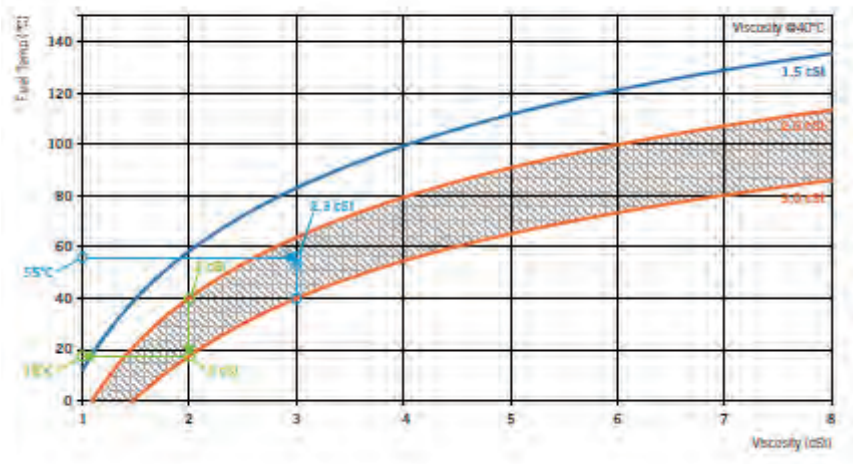
BlueConnect MGO cooling system comprise with one or more MGO chiller unit, one chilled water pump unit with expansion tank, one chilled water buffer tank, one and more plate exchanger MGO coolers units and control panel. MGO chiller, Water pump and MGO cooler can separate supplied, also can be installed on one common skid before delivery for easy installation by shipyard, which called Combined MGO Cooling Unit (CMCU), The MGO cooling system chills Marine Gas Oil even blow 20 degrees Celsius, so that the viscosity and lubricity can meet the requirements of the engine manufacturers.

Mgo Units and Operating Principle





Fuel Temperature vs Viscosity



Depending on installation the viscosity of MGO should be min.2-3 cSt when entering the engines.

Example 1

When MGO 2 cSt @40℃ is used and 3 cSt viscosity is required the temperature is to be appraximately 18℃.

Example 2

MGO with viscosity of 3 cSt @40℃ is entering the engines at 55℃. According to curves the viscosuty is then between 2 and 3 cSt;appraximately 2.3cSt.

MGO Chiller Unit

The chiller unit fitted with

- Marine type anti-corrosion paint and coating.
- Semi-hermetic reciprocating compressor or screw compressor.
- Ecological HFC refrigerant R404A, R407C,R134a all available.
- Mechanically cleanable shell and tube type evaporators and condensers.
- One or two refrigerant circuits are available.
- All units are equipped with PLC controller to optimize the efficiency of refrigerant circuit.
- Fresh water cooled and sea water cooled condensers are available.
- PLC touch screen can quick display of units running status, alarm, refrigerant and water pressure and temperature.
- Multiple compressor concept for optimized part-load efficiency and minimized starting current.
- The control is fully automatic. The leaving water temperature is continuously monitored to detect load and flow changes. This combination provides the most precise temperature control available.
- AC 440~480V/3PH/60Hz, AC 380V/3PH/50Hz, multiple power feeding is available.
- Class certificate can be provide as option.

Easy installation

- The unit is supplied as a complete package for easy installation. There are no extra controls, times, starter or other items to install.
- The chiller units are supplied with a full refrigerant charge, and conveniently located power supply and water inlet and outlet connections.
- The units have a single power point and one main disconnect/isolator switch. The hydraulic connection are simple and facilitated by the use of flange or Victaulic connections for the evaporator and condenser.

Simple to service

- Mechanically-cleanable evaporator and condenser
- Compressors which require minimum routine service or maintenance.
- Easily accessed suction and discharge pressure and temperature information via a display module.
- All main components inlet and outlet such as compressors suction and discharge, evaporator, condenser, electronic expansion valve, dry filter, pressure and temperature sensor, etc. fitted with service valves for easy connect/disconnect these devices.

PLC controller function

PLC Controller ensure intelligent leaving water temperature control and optimizes energy requirements.

- The PI control algorithm with permanent compensa..tion for the heat exchanger entering or leaving temperature, anticipates load variations, guarantees leaving water temperature stability and prevent unnecessary compressor cycling.
- Electronic expansion valves (EXV) allows a significant energy efficiency improvement at part load conditions, and faultless chiller operation in a wider temperature range.
- Equalization of compressor operating hours.
- PLC Controller monitor all chiller safety parameters.
- The fault history function and the fault codes facilitate immediate location of faults and in certain cases the conditions causing the alarm.
- Easy to operate the chillers via PLC Touch screen, all running status and parameters can displayed on the schematic chiller diagram. The user immediately knows all operating parameter: refrigerant pressures, temperatures, entering and leaving water temperatures, EXV opening ratio, and compressors ruing hours, etc.
- Remote control and alarm output connections.

Main Components Description

General

Factory assembled, single-piece, water-cooled liquid chiller contained within the unit shall be all factory wiring, piping, controls, refrigerant charge, required prior to field start-up.

Compressor

- Semi-hermetic reciprocating compressor or screw compressor with internal muffler, capacity regulation solenoid valves, oil pressure/level switch, oil sight glass, check valves, safety device.
- Each compressor shall be equipped with one suction shout-off valve and one discharge shut-off valve.
- Capacity control shall be provided by regulation solenoid valves.
- Motor cooling shall be provided by direct liquid injection and protected by internal overload thermistor.
- Lube oil system shall include internal filter.

Evaporator

- Unit shall be equipped with a single evaporator. Shall be tested and stamped in accordance with applicable.
- Shall be mechanically cleanable shell-and-tube type with removable heads.
- Tubes shall be internally-enhanced, seamless-copper type, and shall be rolled into tube sheets.
- Shall be equipped with flanges or Victaulic water connections.
- Shall have an evaporator drain and vent. Design shall incorporate 2 independent refrigerant circuits.
- Shall incorporate a refrigerant level control system.
- Class certificate can be provided as option.

Condenser

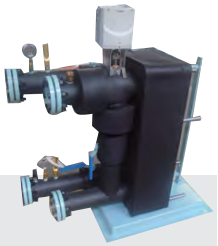
- Unit shall be equipped with a single or twin condenser.
- Shall be tested and stamped in accordance with

applicable.
- Shall be mechanically cleanable shell-and-tube type with removable heads.
- Tubes shall be internally-enhanced, seamless-copper type for fresh water-cooled condensers, for sea water cooled condensers, the tubes shall be B10 Cu/Ni material, B30 Cu/Ni tubes are available, and shall be rolled into tube sheets, for sea water cooled condensers, the SUS316L, Aluminum-bronze, Sacrificial anode end cover are available.
- Shall be equipped with Flange or Victaulic water connections.
- Design shall incorporate 2 independent refrigerant circuits.
- Fitted with safety valves, purge valves.
- Fitted with refrigerant liquid level sight glass.
- Class certificate can be provide as option.

MGO Cooler

MGO Cooler fitted with

- MGO/chilled water plate heat-exchanger.
- Three-way motorized oil temperature control valve, automatically control oil temperature via chiller unit PLC controller.
- Oil temperature sensors.
- Oil pressure gauge.
- Oil temperature thermometer.
- Class certificate can be provide as option.



Electronic Expansion Valve

The electronic expansion valves (EXV) have a high resolution and control accuracy function for refrigerant flow control. EXV include one refrigerant valve and one magnetic actuator, the opening ratio can be controlled by chiller PLC controller to guarantee compressor suction gas degree of superheat within the allow range of set point value.

Refrigeration Circuits

Refrigeration system components shall include high and low pressure sensors, discharge and suction line, liquid line shut-off valves, filter driers, moisture indicating sight glass, electronic expansion valves, refrigerant economizers (option), and complete operating charge of refrigerant and compressor oil.

Safeties

Unit shall be equipped with all necessary components, and in conjunction with the control system shall provide the unit with protection against the following:

- Loss of refrigerant charge
- Reverse rotation
- Low chilled fluid temperature
- Low oil level/pressure
- Current imbalance
- Thermal overload
- High pressure
- Low refrigerant pressure
- Electrical overload
- Loss of phase
- Temperature sensor error alarm

Finish

Electrical cabinet colour: RAL7035
Compressor /heat exchanger colour: RAL5002

Installation responsibilities chart for mgo cooling system

Unit/System	BlueConnect supplied BlueConnect-installed on the Unit	BlueConnect supplied Field-installed	Blueconnect supplied Field-installed as Option	Field-supplied Field-installed
Chiller Unit	PLC Control panel	Orifice for sea water cooled pipe	Unit vibration isolation	Unit skid
	Refrigerant low/high pressure sensor			Refrigerant relief line
	Compressor oil pressure switch			
	Refrigerant low/high pressure gauge			
	Compressor oil pressure/lever gauge			
	Chilled water in/out water temperature sensor			
	Chilled water out pressure gauge			
	Chilled water in/out thermometer			
	Chilled water flow switch			
	Cooling water in/out water temperature sensor			
	Cooling water out pressure gauge			
	Cooling water in/out thermometer			
	Cooling water pressure switch			
	Refrigerant relief valves			
	Refrigerant			
	Compressor vibration isolation			
Chilled and Cooling Water Piping		* Chilled water pump	Chilled water in/out water flexible hose	Cooling water pump
		*Expansion vessel	Cooling water in/out flexible hose	Isolation valves
		Air vent		Water strainers
				Glycol water
				Vent line
*MGO Cooler	Water/oil heat-exchanger			Water drain
	MGO in/out temperature sensor			
	MGO in/out thermometer			
	Chilled water 3-way valve			
Buffer Tank	Water relief valve			Skid
	Water filling valve			Filling water line
	Insulation			
Electrical	Circuit breaker		Remote control	Power supply
	PLC controller			Signal output wiring
	Compressor starter			Chilled water pump starter
	Chilled water pump starter for combined unit			Cooling water pump starter
				Remote control wiring if required

Note: *Together with chiller unit on one common skid for combined unit.

Combined unit physical data semi-hermetic reciprocating compressor

Model		CMCU -012	CMCU -013	CMCU -016	CMCU -020	CMCU -024	CMCU -028	CMCU -035	CMCU -042
Cooling Capacity	kW	41	47	56	73	84	99	121	147
Compressors		Semi-hermetic reciprocating compressor							
QTT.of Compressor		1	1	1	1	1	1	1	1
Power Input	kW	13.1	15.0	17.7	23.3	27.0	33.5	39.9	49.5
Capacity Control Steps		0~50~100%						0~33%~66% 100%	
Evaporator		Horizontal shell and tube type							
Water Flow	m^3/h	7.0	8.1	9.6	12.5	14.3	17.0	20.8	25.3
Inlet/Outlet	in	1-1/4	1-1/4	1-1/2	1-1/2	2	2-1/2	2-1/2	3
Condenser		Horizontal shell and tube type, fresh or sea water cooled							
Sea/fresh Water Flow	m^3/h	9.3	10.7	12.7	16.5	19.0	22.8	27.6	33.8
Inlet/Outlet	in	1-1/4	1-1/4	1-1/2	1-1/2	2	2-1/2	2-1/2	3
Refrigerant		R404A							
Water Pump									
Water Flow	m^3/h	7.0	8.1	9.6	12.5	14.3	17.0	20.8	25.3
Power Input	kW	1.5/1.73	1.5/1.73	1.5/1.73	1.5/1.73	1.5/1.73	2.2/2.53	2.2/2.53	2.2/2.53
Electrical Data									
Power Source		AC380~415V 3PH 50Hz AC440V~480V 3PH 60Hz							
Control Power		AC 220/230V 1PH 50/60Hz							
Unit Power Input	kW	14.8	16.7	19.4	25.0	28.7	36.0	42.4	52.0
MGO Cooler		Plate heat-exchanger							
Oil Inlet/outlet Temp	℃	45/18	45/18	45/18	45/18	45/18	45/18	45/18	45/18
MGO Flow	m^3/h	2.9	3.4	4.0	5.2	6.0	7.1	8.7	10.5

Standard condition: Evaporator entering /leaving water temperature 12℃/7℃, fresh water cooled condenser entering /leaving water temperature 36℃/41℃, evaporator and condenser fouling factor=0.000044m2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m2k/w.

Chiller unit physical data screw compressor

Model		WSC 035	WSC 045	WSC 050	WSC 060	WSC 070	WSC 080	WSC 090	WSC 100
Cooling Capacity	kW	124.5	156.3	182	207	240	280	318	342
Compressors	Screw Compressor								
Capacity Control		PLC	PLC	PLC	PLC	PLC	PLC	PLC	PLC
Capacity Control Steps	0~25%~50%~75%~100%								
Evaporator	Horizontal shell and tube type								
Water Flow	m^3/h	21.4	26.9	31.3	35.6	41.2	48.1	54.6	58.8
Water Connection	Flanges or victaulic connections								
Inlet/Outlet	in	3	3	3	4	4	4	5	5
Condenser	Horizontal shell and tube type, fresh or sea water cooled								
Sea/fresh Water Flow	m^3/h	28.1	35.2	41.0	46.5	53.8	62.7	71.3	76.6
Water Connection	Flanges or victaulic connections								
Inlet/outlet	in	3	3	3	4	4	4	5	5
Electrical Data 460v/60hz									
Power Source	AC380~415V 3PH 50Hz AC440V~480V 3PH 60Hz								
Control Power	AC 220/230V 1PH 50/60Hz								
Power Input	kW	39.1	48.6	56.5	63.8	73.1	84.8	97.1	103.9

Standard condition: Evaporator entering /leaving water temperature 12℃/7℃, fresh water cooled condenser entering /leaving water temperature 36℃/41℃, evaporator and condenser fouling factor=0.000044m2k/w. Sea water cooled condenser entering /leaving water temperature 32℃/37℃, condenser fouling factor=0.000086m2k/w.

SILENT PACKAGE AIR CONDITIONER

Description

Marine Silent Package Air Conditioner is designed with consideration of the special conditions on silent ships and offshore installation.

The units to be classified as plenum chamber type and duct connection type according to air supply connection, and, sea water, fresh water units and air cooled split type package air conditioner as per condenser cooling medium.

Ecological HFC refrigerant R404A, R407C, R134a, R410A are available.

The power source of the unit can be AC 440~480V/3PH/60Hz, AC380~415V/3PH/50Hz

Standard cooling capacity range from 2RT to 6RT.

Special Design, Maximum Noise Level is 52dB(A), Minimum Noise 48dB(A)

Material

Casing:	Galvanized steel with powder coating for indoor unit.
	Stainless steel SUS316L for outdoor unit of split air conditioner.
Insulation:	Rubber sponge insulation material.
Cooling coil:	Copper Tube Aluminium/Copper fins with stainless steel frame.
Reheat coil:	Stainless steel SUS304, tube and fins.
Drip tray:	Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation.

Compressor

Low noise scroll type hermetic compressor with noise insulation cover.

Fitted with crankcase oil heater and internal suction accumulator for long-life running.

Condenser

Cleanable shell and tube, copper tube type condensers with tube plate is used for fresh water. Copper/nickel tube, carbon steel coved with Cu/Ni coating tube plate is used for sea water.

Evaporator

Multi-pass crossed fin tube type coil is standard.

Copper tube aluminium fin and copper tube copper fins are available as option, for galley air conditioner with 100% fresh air, copper tube copper fins cooling coil is standard.

Fan

Low noise motor direct drive centrifugal fan for plenum chamber type units, belt drive centrifugal fan for duct connection type units.

Fan mountings with vibration dampers and belt tensioning mechanism base ensure low level noise and vibration.

Controller and Electrical Panel

Micro-computerized Air conditioner Controller with its sensors place at the front of the unit ensures correct temperature control, compressor control, fan motor controller, electrical heater control, and the unit operation mode change, fault alarm. Room temperature, compressor, fan, heater running status, alarm signals to be indicated on the controller displayer.

Electrical panel includes automatic circuit breaker for convenience service. The compressor safety device include high and low pressure switch, low water pressure switch, anti-phase protection and compressor built-in overload protection device. A solenoid valve in the liquid line and filter dryer as well as fitting to plug in pressure gauges.

Option Equipment

—Fresh air intake damper with counter flanges.
—Flexible connections and counter flanges for air intake and outlet.
—Stainless steel casing.
—Copper tube/copper fins evaporator coil for the units without 100% fresh air ratio.
—Flexible connections and counter flanges for cooling water inlet and outlet.
—Cooling water thermometer.
—Sea water flow temperature control valve.
—Other refrigerants such as R134a, R410A.

Silent Packaged Air Conditioner Model Nomenclature

SPU — 5 F P A 6 H S I

Edition Code :
I - First edition Ⅱ、Ⅲ、Ⅳ、V- the last edition

Special Design :
S - Stainless frame construction; O- Others

Heater type:
H - With electric heater Space - Without electric heater

Power Source type:
5 - 380~415V / 3PH / 50Hz 6 - 440~480V / 3PH / 60Hz

Refrigerant type:
A - R404A, B - R407C, C - R134a, D - R410A

Air outlet type :
D - Duct connection type P - Plenum chamber type

Cooling water type:
F - Fresh water S - Sea water

Normal Cooling Capacity in [RT]:
5 - 5RT

Product Code:
SPU - Silent marine Package AC Unit

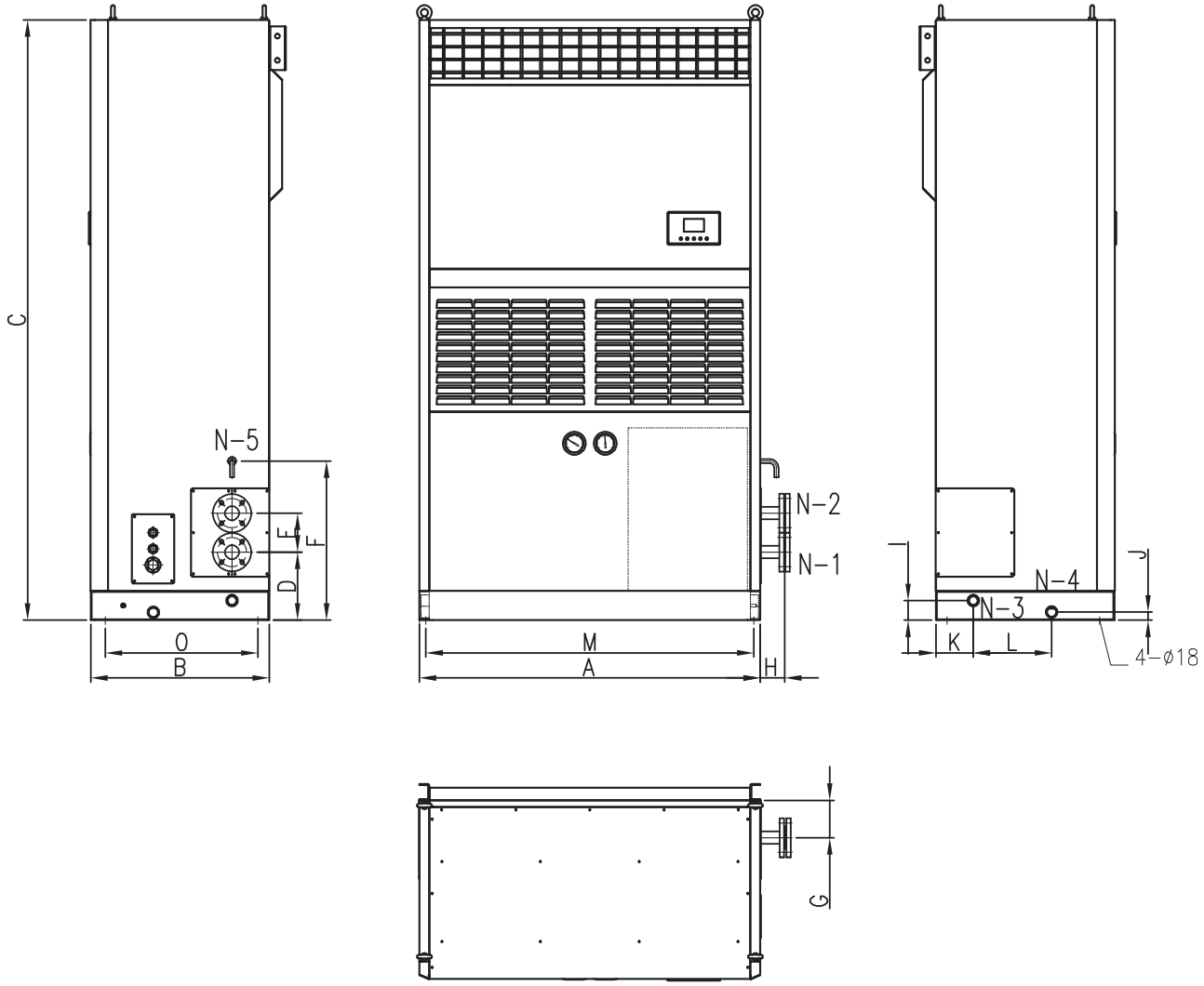
Water cooled plenum chamber type (low noise unit)

	Model		SPU-2_P	SPU-3_P	SPU-4_P	SPU-5_P	SPU-6_P
General Parameter	Cooling cpapacity, 60Hz/50Hz	kW	7/6.0	10.5/8.5	14/13.0	17.5/15.0	21/18.5
	Heating capacity, 60Hz/50Hz	kW	3	3.6	6	9	9
	Dimension (L x W x H)	mm	800 x 500 x1850	800 x 550 x1850		1050 x 550 x1850	
	Power source		AC440～480V-3PH-60Hz / AC380～415V-3PH-50Hz				
	Control power		AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz				
	Protecting device		Refrigerant high/low pressure switch, water pressure switch, compressore overload protection, phase absent protection				
	External pressure	Pa	20	30	30	30	30
	Noise	dB(A)	47	47	48	50	52
	Refrigerant		R404A/R407C				
	Weight	kg	220	260	280	350	370
	Casing material/colour		Carbon steel/RAL9003				
Compressor	QTY.		1	1	1	1	1
	Heating capacity, 60hz/50hz		Hermetic scroll				
	Power consumpoition, R404a, 60hz/50hz	kW	1.92/1.64	2.80/2.40	3.91/3.27	4.69/4.06	5.60 / 4.77
	Power consumpoition, R407c, 60hz/50hz	kW	1.91/1.60	2.69/2.19	3.77/3.22	4.53/3.78	5.51/4.70
Condenser	Type		Horiztal shell & tube /shell & coil				
	Fresh water in/out TEMP.	℃	36/40	36/40	36/40	36/40	36/40
	Fresh water flow, 60hz/50hz	m³/h	1.91/1.64	2.85/2.33	3.83/3.48	4.75/4.08	5.69/4.98
	Sea water In/out TEMP.	℃	32/37	32/37	32/37	32/37	32/37
	Sea water flow, 60hz/50hz	m³/h	1.53/1.31	2.28/1.87	3.07/2.79	3.80/3.26	4.55/3.98
	Cooling water connection		DN25 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE	DN32 FLANGE
Evaporator	Type		Copper tube and fins				
	Material		Copper tube al fans with sus304 frame				
Ele.Heater	Heating capacity	kW	3	6	6	9	9
	Type		Electrical heating, tube with fins				
	Material		SUS304 tube with SUS304 frame				
Supply Fan	Air volume	m³/h	1040	1560	2080	2600	3120
	Type		Centrifugal plug fan				
	Motor power, 60Hz/50Hz	kW	0.21/0.18	0.29/0.25	0.29/0.25	0.29/0.25	0.29/0.25
Air Filter	Material(filter/frame)		Nylon+Alalloy				
Temp. Controller			Micro-computerized air conditioner controller				

NOTE:
1.Above technical data based on standard cooling condition: unit return air temperature 27 ℃, humidity 50%.
2.Cooling fresh water inlet temperature 36℃ and cooling sea water inlet temperature 32℃.

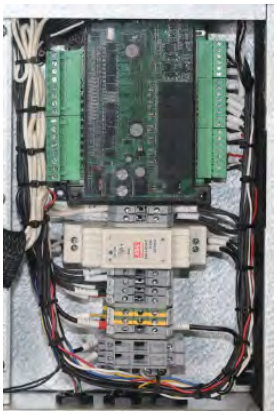
Optional specification

Model	SPU-2_P	SPU-3_P	SPU-4_P	SPU-5_P	SPU-6_P
Fresh water humidifier	●	●	●	●	●
Water flexobal hose	●	●	●	●	●
Sea water fow regulation valve	●	●	●	●	●
Copper tube copper fins evaporator	●	●	●	●	●



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	O	Cooling Water Inlet N-1	Cooling Water Outlet N-2	Drain Water Up N-3	Drain Water Down N-4	Safty Valve Outlet N-5
SPU-2_PL	800	500	1850	172	106	490	115	50	60	25	115	192	760	420	DN25	DN25	G1"	G1"	1/2"
SPU-3_PL	800	550	1850	210	120	490	115	60	60	25	115	242	760	470	DN32	DN32	G1"	G1"	1/2"
SPU-4_PL	800	550	1850	210	120	490	115	60	60	25	115	242	760	470	DN32	DN32	G1"	G1"	1/2"
SPU-5_PL	1050	550	1850	210	120	490	115	75	60	25	115	242	1010	470	DN32	DN32	G1"	G1"	1/2"
SPU-6_PL	1050	550	1850	210	120	490	115	75	60	25	115	242	1010	470	DN32	DN32	G1"	G1"	1/2"

MARINE FAN COIL UNIT



Intelligent controller

Touch screen

Room thermostat

Description

Marine Fan Coil Unit System is designed for controlling the room air conditions in marine and offshore installation.

- Marine type deepened drain pan, made of stainless steel SUS316, with two drain connection on both side.
- As standard, the casing is made of Galvanized sheet, Alu-Zinc steel plate, or galvanized steel coated with powder, Stainless steel are available with better anti-corrosion performance.
- As standard, the cooling and water heating coil for water consist of copper tubes with aluminum or copper fins housed in a stainless sheet steel frame. Other material combinations are available on request.
  - Tubes/fins: Cu/Al, Cu/Cu, Corropaint.
  - The Heresite coating, Epoxy Coating for fins are available.
- The double inlet centrifugal fan with AC motor as a standard, the EC motor fan is available on request for more energy saving.
- The air filter is drawn at the front bottom side out of the unit and can be exchanged with a few handles.
- Three type heater exchanger are available.
  - Single-circuit heater exchanger, cooled by chilled water, heating by electric heater.
  - Single-circuit heater exchanger, cooled by chilled water, heating by hot water, with change over.
  - Dual-circuit heater exchanger, cooling by chilled water, heating by hot water.
- For operation by water, 2-way valves including actuators can be built-in for available.
- The terminal box and electrical heater control box to be built-in the units as standard.
- Vertical dark mounted, horizontal dark mounted fan coil units and vertical open mounted type with power-coating galvanized steel house fan coil units are available.
- For EC Fan Coil Unit with intelligent controller can communicating with ship SCADA system to realize whole ship FCU system and rooms centralized control and monitoring.

Advantages of FCU

- Space saving
- Low energy consumption
- Low sound level
- Easy maintenance

Delivery state

Description	FCU without Housing	FCU C/w Housing	EC FCU
Electrical Heater	O	O	O
Intelligent PLC Control Box			O
EC Fan			X
Junction Box	X	X	X
Room Thermostat	X☆	X☆	X☆
Water Pressure Independent Balance And Control Valve			O/☆
2-way Valve	O/☆	O/☆	O/☆
Return Air Grill	O☆	X	O☆/X
Supply Air Grill	O☆	X	O☆/X
Copper Tube Al Fins Cooling Coil	X	X	X
Copper Tube Copper Fins Cooling Coil	O	O	O
Coil With Ant-corrosion Coating	O	O	O
Air Filter	X☆	X	X
Water Pipe Flexible Hose	O☆	O☆	O☆
Return Air, Supply Air Duct Flexible Connection	O☆	O☆	O☆
Galvanized Steel Casing	X	X	X
Stainless Steel Casing	O	O	O
Marine Type SUS316 Drain Pan	X	X	X
Housing Color Ral9016	-	X	X

X: Standard, built-in the unit
O: Option, built-in the unit
☆: Standard, loose supply
O☆: Option, loose supply
X☆: Standard, loose supply

Model naming principle

Function	Standard Code			Addtional Code							Descrpition
Sample	FCU	-	05	V	P	R	E	2	H	1	
Serial	FCU										Marine AC Fan coil unit
	EFCU										Marine EC Fan coil unit
Capacity			05								Cooling capacity
Installation				H							Horizontal
Type				V							Vertical
Air Outlet Type					P						Free air blow
					D						Duct connection type
Direction						R					Right
						L					Left
Heater							E				Electrical Heater
							W				Hot water
Power Source								3			AC220~230V/1PH/50HZ
								4			AC220~230V/1PH/60HZ
Housing									H		H: with housing
Housing Material*										1	Carbon Steel c/w powder
										2	Stainless steel

Facing to the front of the unit, the water pipes is at right side, means right direction unit, pipes at left side, is right direction unit.

Technical data

Model			FCU-02VP	FCU-04VP	FCU-05VP	FCU-07VP	FCU-10VP	FCU-12VP	FCU-14VP
Air Flow(AC Fan)	H	m^3/h	340	510	780	1020	1360	1700	2040
	M	m^3/h	265	405	535	790	1060	1360	1595
	L	m^3/h	195	305	405	585	790	1020	1180
Air Flow (EC Fan)	Max.	m^3/h	340	510	780	1020	1360	1700	2040
	Min.	m^3/h	100	150	250	300	300	350	400
Cooling Capacity		Kw	2.3	3.5	5.3	7.0	9.3	11.6	13.9
ELE. Heating Capacity		Kw	0.8	1.2	1.5	2.1	3.0	3.0	3.6
Dimension (L*W*H)	Without housing	mm	870*230*670	1180*230*670	1485*230*670	1485*230*670	1600*230*670	1900*230*670	2200*230*670
	C/W housing	mm	950*250*700	1260*250*700	1565*250*700	1565*250*700	1680*250*700	1980*250*700	2280*250*700
Power Source			AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz						
Control Power			AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz						
Power Input		W	35	46	70	95	132	152	180
External Static Pressure		Pa	10	10	10	10	10	10	10
Chilled Water In/Out Temp.		℃	12/7	12/7	12/7	12/7	12/7	12/7	12/7
Chilled Water Flow		m^3/h	0.40	0.60	0.92	1.20	1.60	2.00	2.40
Dry Weight	Without housing	kg	21	28	32	38	48	52	58
	C/w housing	kg	38	51	60	66	78	88	99
Noise		dB(A)	40	42	45	47	47	50	52
Casing Material & Colour			Galvanied steel/RAL9003						

Note: Above data based on design condition: chiller water enter temperature12℃, water leave temperature 7℃, air inlet dry-bulb temperature 27℃, wet-bulb bold 19.5℃.

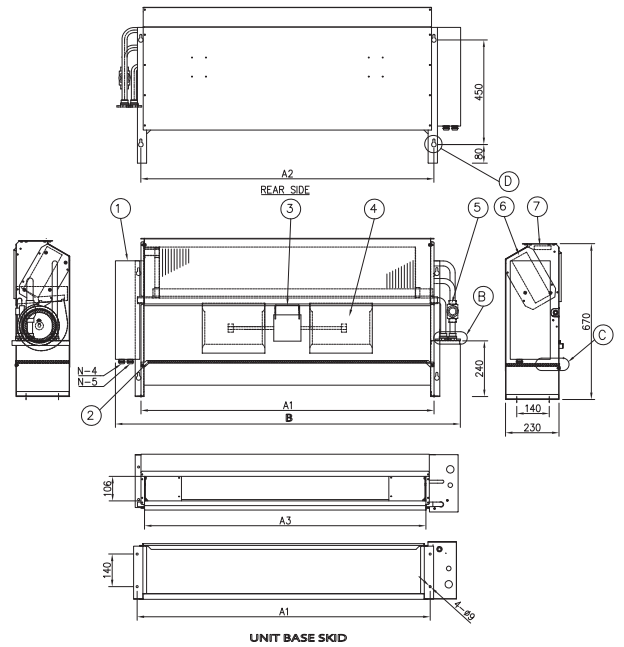
Horizontal Fan Coil Unit technical data

MODEL			FCU-02HP	FCU-04HP	FCU-05HP	FCU-07HP	FCU-10HP	FCU-12HP	FCU-14HP
Air Flow(AC Fan)	H	m^3/h	340	510	780	1020	1360	1700	2040
	M	m^3/h	265	405	535	790	1060	1360	1595
	L	m^3/h	195	305	405	585	790	1020	1180
Air Flow (EC Fan)	Max.	m^3/h	340	510	780	1020	1360	1700	2040
	Min.	m^3/h	100	150	250	300	300	350	400
Cooling Capacity		Kw	2.3	3.5	5.3	7.0	9.3	11.6	13.9
ELE. Heating Capacity		Kw	0.8	1.2	1.5	2.1	3.0	3.0	3.6
Dimension (L*W*H)		mm	870*580*275	1180*580*275	1485*580*275	1485*580*275	1600*580*275	1900*580*275	2200*580*275
Power Source			AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz						
Control Power			AC220～230V-1PH-60Hz / AC220～230V-1PH-50Hz						
Power Input		W	35	46	70	95	132	152	180
External Static Pressure		Pa	50	50	50	50	50	50	50
Chilled Water In/Out Temp.		℃	12/7	12/7	12/7	12/7	12/7	12/7	12/7
Chilled Water Flow		m^3/h	0.40	0.60	0.92	1.20	1.60	2.00	2.40
Dry Weight		kg	21	28	32	38	48	52	58
Nioise		dB(A)	43	45	47	48	49	55	56
Casing Material & Colour			Galvanized steel						

Note: Above data based on design condition: chiller water enter temperature12℃, water leave temperature 7℃, air inlet dry-bulb temperature 27℃, wet-bulb bold 19.5℃.

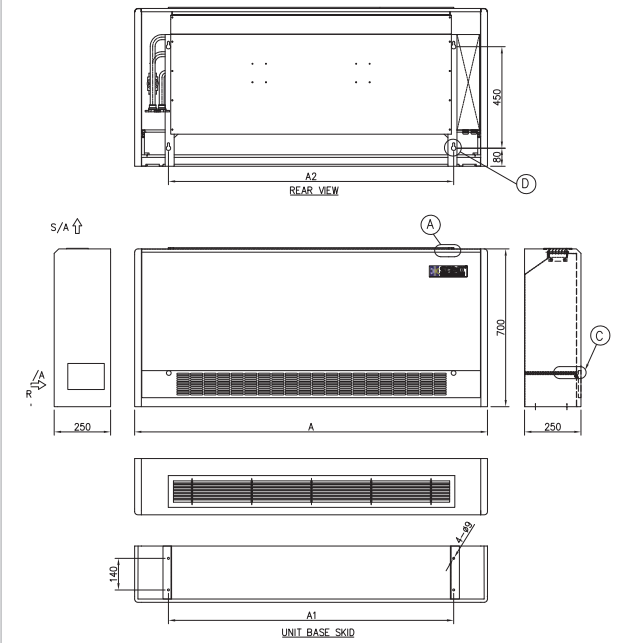
Installation plan and overall drawing overal dimension

FCU without housing



No.	DESCRIPTION	QTY.	TYPE	REMARK
N-5	CABLE GRAND	1	M20	
N-4	CABLE GLAND	1	M20	POWER INLET
N-3	DRAIN	1	G3/4	
N-2	WATER OUTLET	1	G3/4	
N-1	WATER INLET	1	G3/4	
7	ELECTRIC HEATER	1		
6	COOLING COIL	1		
5	2-WAY VALVE	1		
4	FAN MOTOR	1		
3	FAN	1		
2	AIR FILTER	1		
1	ELECTRICAL BOX	1		

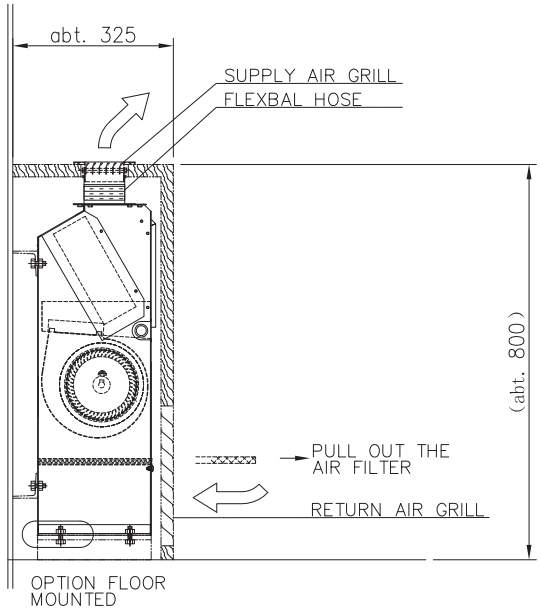
FCU with housing



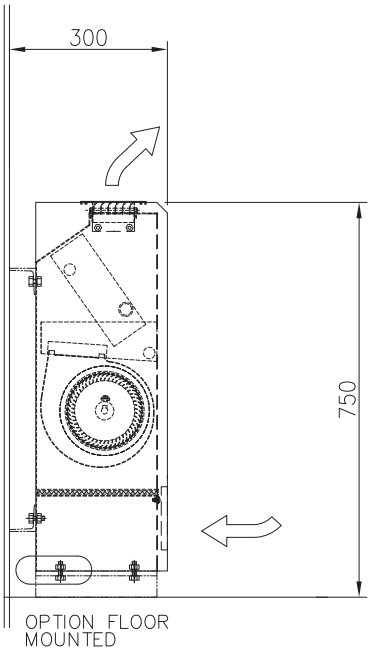
Model	A	B	A1	A2	A3
FCU-03VP	950	870	650	650	610
FCU-05VP	1260	1180	950	950	910
FCU-08VP	1565	1480	1265	1265	1225
FCU-10VP	1565	1480	1265	1265	1225
FCU-14VP	1680	1600	1380	1380	1340
FCU-17VP	1980	1900	1680	1680	1640
FCU-20VP	2280	2200	1980	1980	1940

Installation plan vertical wall/ floor mounted

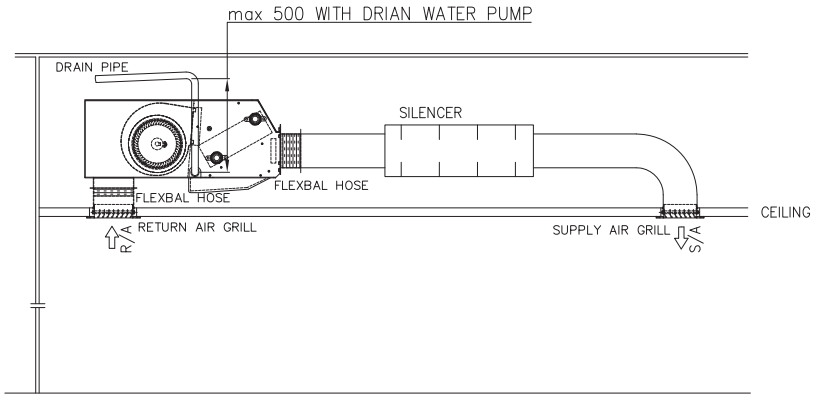
FCU without housing



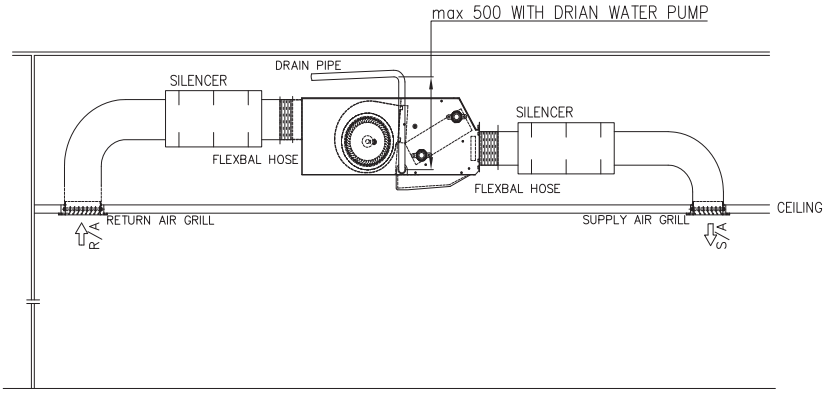
FCU with housing



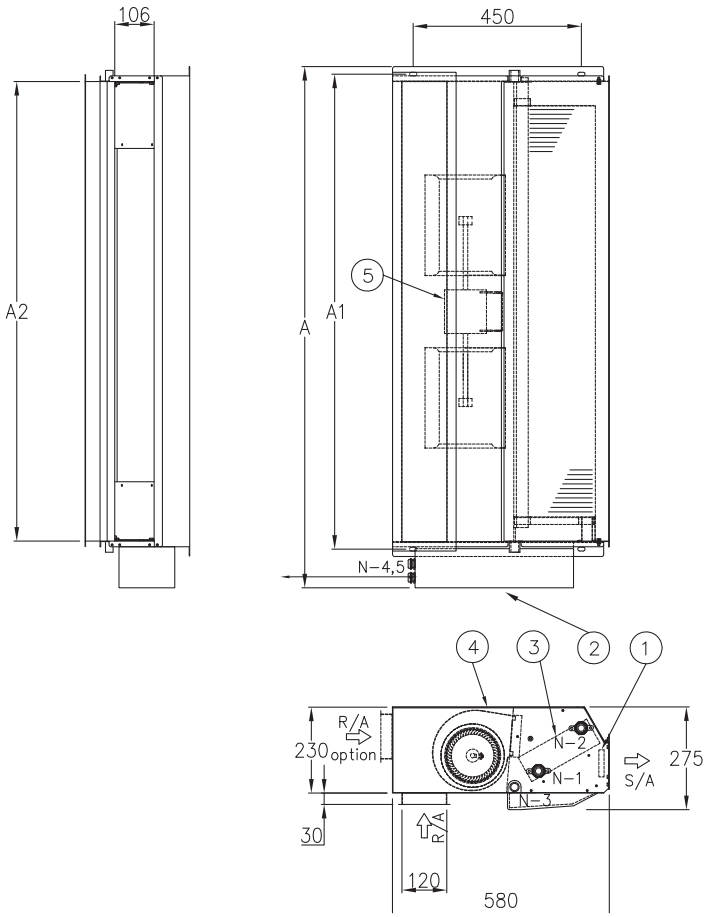
Horizontal FCU instalation plan A



Horizontal FCU instalation plan B



Overall dimension of horizontal FCU



No.	Description	QTY.	Type	Remark
N-5	Cable grand	1	M20	
N-4	Cable gland	1	M20	Power inlet
N-3	Drain	1	G3/4	
N-2	Water outlet	1	G3/4	
N-1	Water inlet	1	G3/4	
7		1		
6		1		
5		1		
4	Fan motor	1		
3	Cooling coil	1		
2	Control box	1		
1	Electrical heater	1		

Model	A	A1	A2
FCU-03HP	950	650	610
FCU-05HP	1260	950	910
FCU-08HP	1565	1265	1225
FCU-10HP	1565	1265	1225
FCU-14HP	1680	1380	1340
FCU-17HP	1980	1680	1640
FCU-20HP	2280	1980	1940

INTEGRATED CABIN AIR CONDITIONER

Description

Integrated Cabin Air Conditioner (ICAC) is specially designed for cabin air conditions in passenger and cruise ships, and it can also be used in other corresponding facilities, e.g. in offices.

System consists of central fresh air handling unit, from which the pre-cooled fresh air is brought, CFCU cabin fan coil units, supply air device and central intelligent control system.

ICAC unit comprise with recirculation air filter, cooling coil, EC fan, pressure independent balancing control valve, control box, and necessary electrical heater.

Advenatages

- Installation space saving, can be installed inside toilet service space to save cabin space.
- Low energy consumption by use of EC fan and advanced control.
- Low sound level
- Easy maintenance
- Excellent control system

Design Data

Material

Casing:	Galvanized Steel
Insulation:	Mineral wool
Cooling coil:	Copper tube copper fins with stainless steel frame
Reheat coil:	Stainless steel SUS304, tube and fins
Drip tray:	Stainless steel SUS304 with rounded corners for easy cleaning, insulated to prevent condensation

Power source

220V/230V-1PH-50/60Hz

Safety switch

Auto reset: 75±5℃

Manual reset: 105±5℃

Technical data

Model	Cooling Capacity (W)	Air Flow, Max (m^3/h) Return Air	Fresh Air	Chilled Water Flow (m^3/h)	Heating Capacity (W)	Fan Motor Power, Max. (W)	External Static Pressure (Pa)	Dry Weight (Kg)
ICAC-15CVH	1500	340	100	0.23	800	85	200	27
ICAC-20CVH	2000	450	100	0.34	1000	134	220	32
ICAC-25CVH	2500	550	100	0.38	1200	175	250	36

Above data based on:

Chilled water inlet/outlet temperature: 6/12℃

Return air temperature /humidity: 24℃/50%

Principle of the System

The fresh air is fully cooled or reheated in the air handling unit, for energy saving, the AHU can be provided with rotating heat exchanger. To save electric energy, the air for passageways and outside cabins may be slightly re-heated by a hot water coil or electrical coil. The air will be distributed in the spiral duct air piping system at high/medium velocity.

In ICAC re-circulated air, filtered, cooled or heated by cooling/heating coil, mix up with fresh air to maintain the individual climate specified.

From the room served, the air is exhausted via the toilet, mixed with the air exhausted from passageways and utilised space for energy recovery or discharged.

The room temperature is controlled by speed variation EC fan in sequence with re-heating coil of the fan coil units.

In case variable water flow is used, an automatic 2-way pressure independent & control valve will control the room temperature in sequence with the re-heater coil and the fan.

With the accurate regulating system, the cabin system provides one Central Control Module (optional) realize cabin system performs control, room temperature control, safety functions and communication with the user panel.

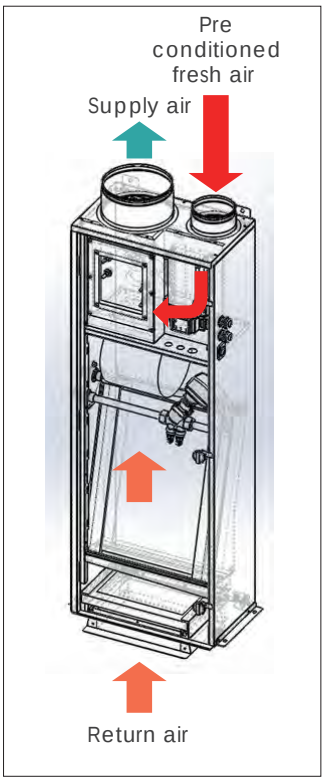


Fig. 1 Flow diagram of ICAC

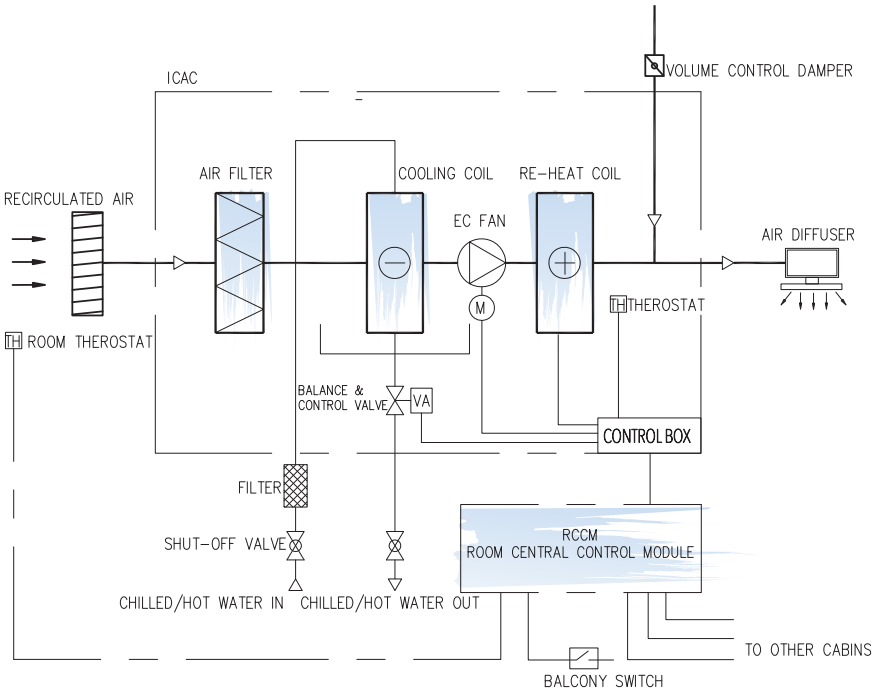
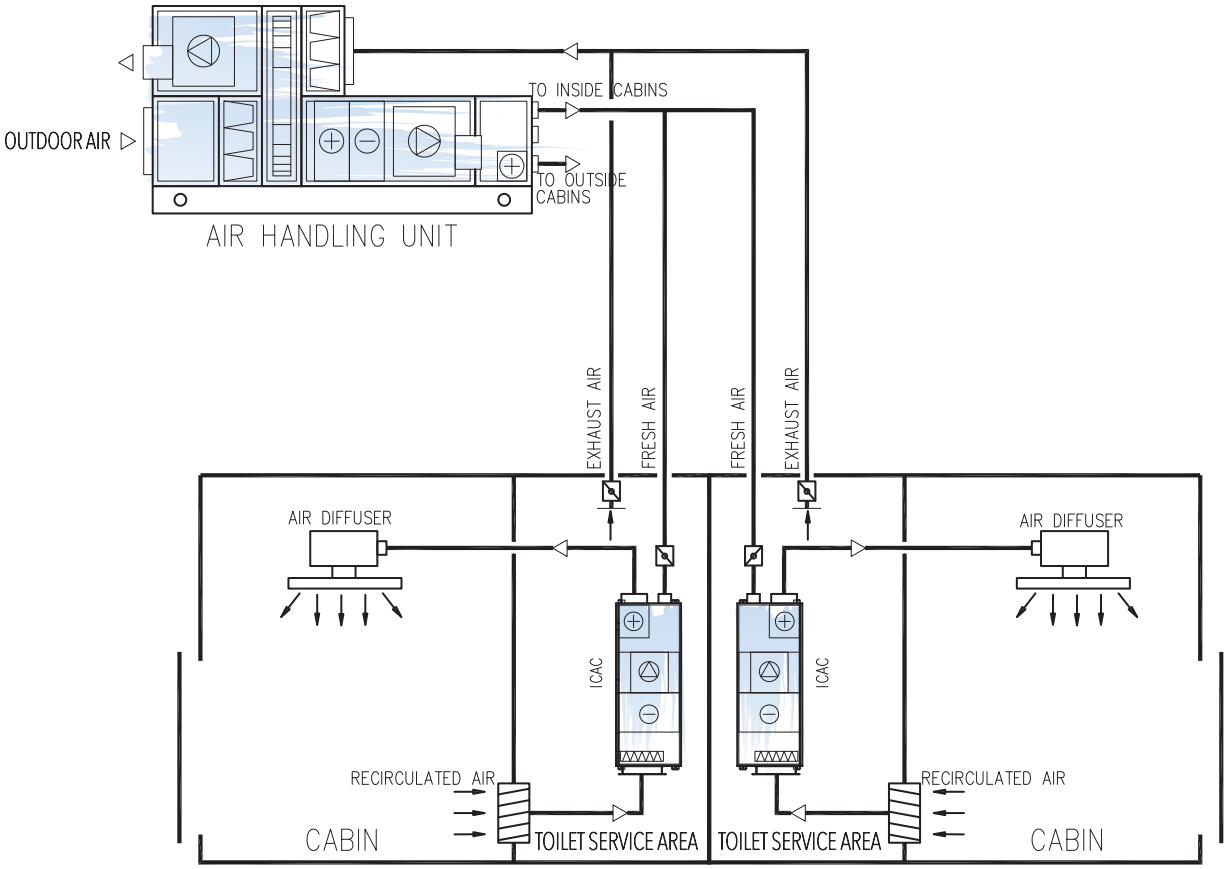
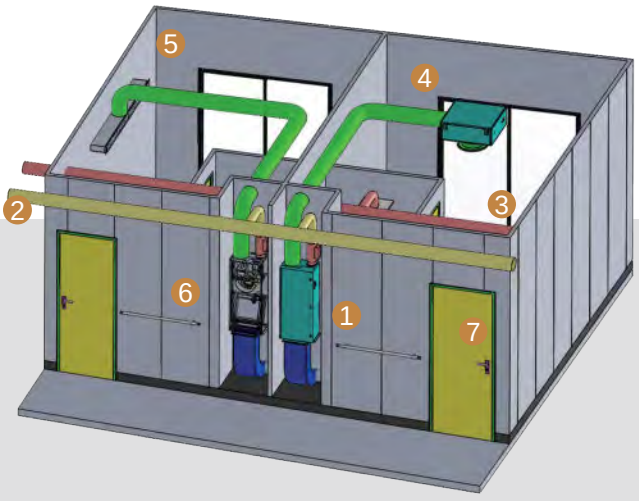


Fig. 2 The principle of the cabin air conditioner system, vertical ICAC

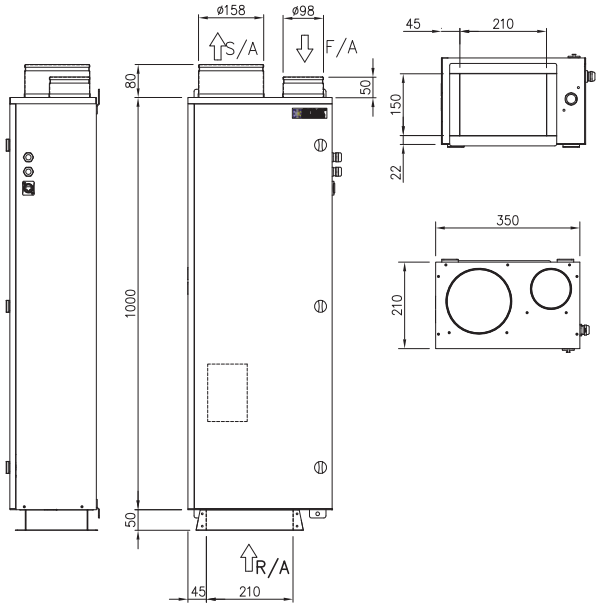




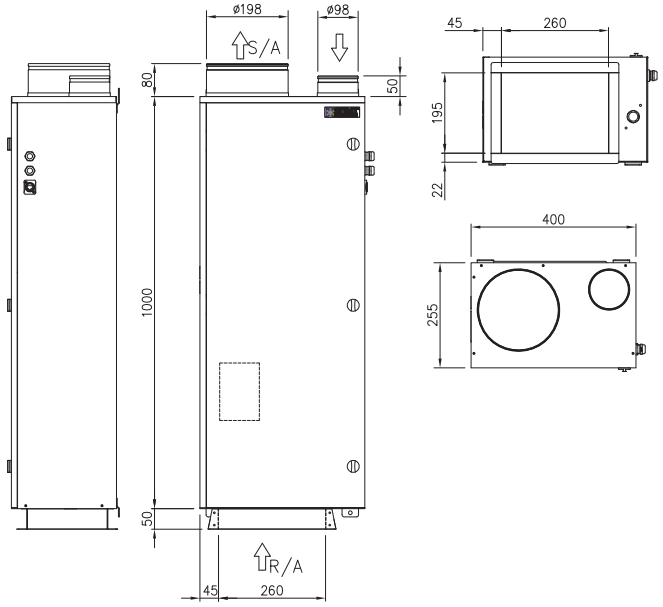
1. Integrated Cabin Air Conditioner
2. Fresh air duct
3. Exhaust air duct
4. Supply air diffuser, ceiling mounted
5. Supply air diffuser, stripe air outlet
6. Cabin FCU automation
7. Key card

Fig. 3 Arrangement drawing of ICAC

ICAC-15



ICAC-20, ICAC-25



Typical duct arrangement plan