



DAIKIN

**Marine Type
Packaged Air Conditioners**

Refrigerant R22

**Marine Type
Packaged Air Conditioner**

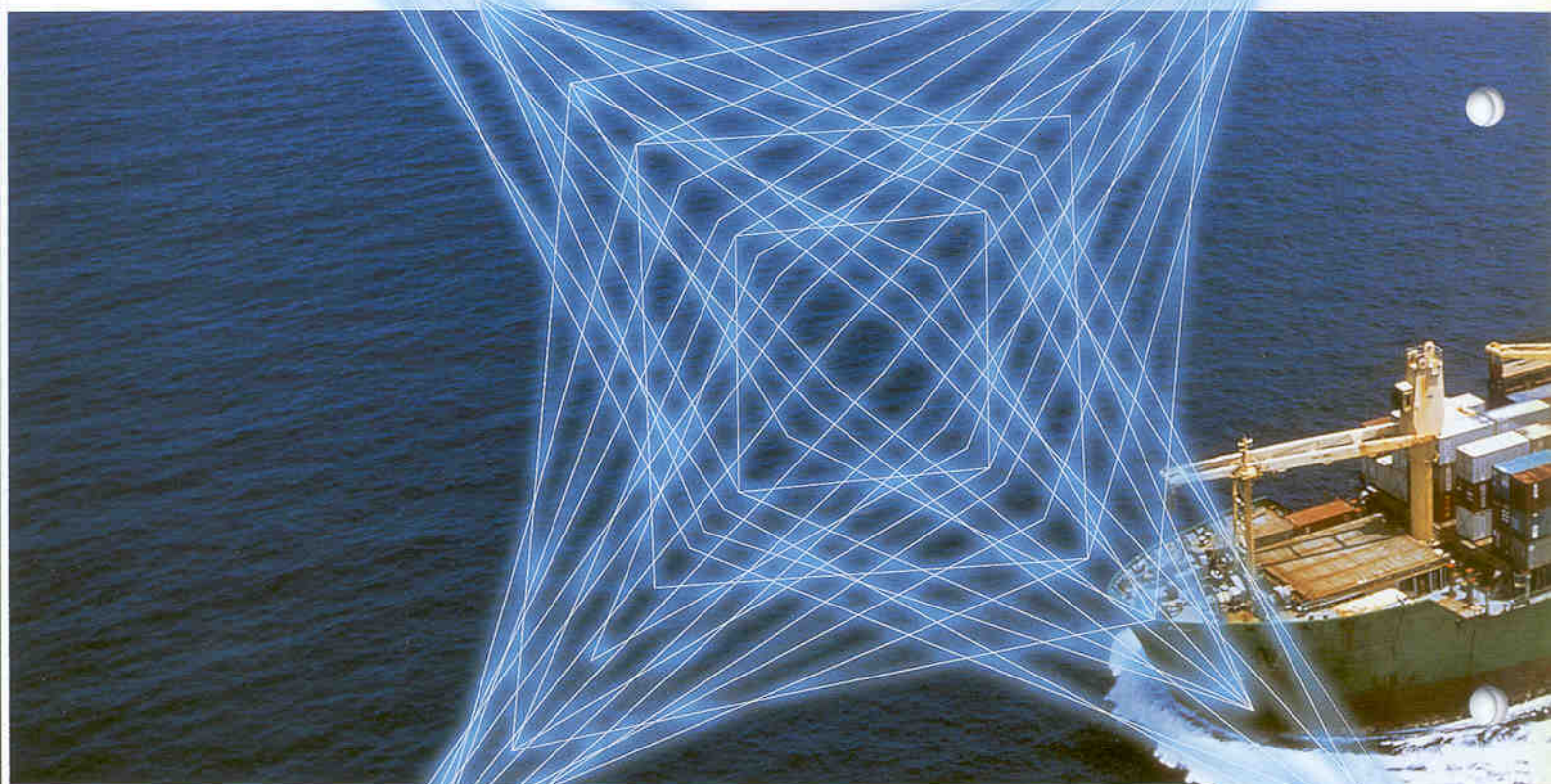


US15H / US20H

DAIKIN INDUSTRIES, LTD.

Combining experienced marine engineering and reliable air conditioning technology, Daikin's Marine Type Packaged Air Conditioners produce comfortable, high grade atmosphere in ships.

Daikin's air conditioning technologies provide comfort suitable for various environments including vast space of factories, sales shops, offices and residences. Marine Type Packaged Air Conditioners, US series, are designed special for ships applying technologies used for those various environments to ship environment. You can enjoy reliability and performances of Packaged Air Conditioners backed with the technologies giving the largest share to Daikin in this field of business.



On adoption of international system of units (SI) for performance indication of marine type packaged air conditioners

■ Parameters indication units

The unit of cooling capacity is changed from [Kcal/h] to [kW].

● Marine type packaged air conditioners' cooling capacity (kW) adopts R40 series numbers stipulated in JIS standard numbers (JIS Z8601).
<Example(50/60 Hz)>

	Conventional		New
US5HP	13,500/15,000 Kcal/h	→	15.0/17.0 kW

■ Capacity indication unit

Refrigerant pressure changes from [kgf/cm²] to [MPa] (mega-Pascal).
Water pressure loss changes from [mAq] to [kPa] (kilo-Pascal).
Air static pressure changes from [mmAq] to [Pa] (Pascal).

For ships from small merchant to export, varieties of product series are available which meet a wide range of required capacities and power sources used over the world.



Model	Power source	50Hz 3 phase				60Hz 3 phase			
		200V	380V	400V	415V	200V	220V	400V	440V
US2GE			●	●	●			●	●
US3GE			●	●	●			●	●
US5GE			●	●	●			●	●
US8GE			●	●	●			●	●
US10GE			●	●	●			●	●
US15H			●	●	●			●	●
US20H			●	●	●			●	●
US2GETG		●				●	●		
US3GETG		●				●	●		
US5GETG		●				●	●		
US8GETG		●				●	●		
US10GETG		●				●	●		

● Conversion of coolant pressure kgf/cm² — MPa

Conventional (kgf/cm ²)	1	5	10	15	20	25	30
New (MPa)	0.098	0.490	0.981	1.471	1.961	2.452	2.942

Refrigerant pressure
Rough estimation for kgf/cm² to MPa conversion: about 1/10 of a kgf/cm² value gives the MPa value.

● Conversion of water pressure loss mAq — kPa

Conventional (mAq)	1	2.5	5	7.5	10	12.5	15	17.5	20
New (kPa)	9.8	24.5	49.0	73.5	98	123	147	172	196

Water pressure loss
Rough estimation for mAq to kPa conversion: about × 10 of a mAq value gives the kPa value.

● Conversion of air static pressure mmAq — Pa

Conventional (mmAq)	1	5	10	15	20	25	30	40	50
New (Pa)	9.8	49	98	147	196	245	294	392	490

Static pressure of air
Rough estimation for mmAq to Pa conversion: about × 10 of a mmAq value gives the Pa value.

A line up completed with reputable scroll compressors.

Grease-fed bearing of long life in salty air

Rubber vibration isolator for fan assembly of superior anti-vibration

Totally enclosed external fan type motor strong to salty air

Air filter

Evaporator strong to salty air
Double resin coating of hydrophilic treatment and clear acrylic resin

Condenser
Shell and fin tube resistant to seawater
• Cooling tube/Al-brass tube
• Tube plate/Naval-clad steel
• Water cover/cast iron (with sacrificial anode)

Pressure gauge facilitating daily inspection

Expansion valve of a wide working range

One-side drain discharge system durable for severe ship motion
Resistible to a inclination of $\pm 15^\circ$ and a rolling of $\pm 22^\circ$

Inlet cable connector for ship-wires

Totally enclosed scroll compressor of high reliability and high efficiency with rubber vibration isolators

Other corrosion resistance specification
Fan housing, fan motor base, casing, and drain pan ... acrylic powder coated

Mechanism of scroll compressor
Refrigerant
Suction inlet
Movable scroll
Fixed scroll
Discharge port
Suction stroke
Discharge stroke
Compression stroke
Compression chamber

■ Application examples for Daikin US series

Product name	Engine control room	Steering room	Whole zone air conditioning	Zone air conditioning	Product name	Engine control room	Steering room	Whole zone air conditioning	Zone air conditioning
US2GE					US2GETG				
US3GE					US3GETG				
US5GE					US5GETG				
US8GE					US8GETG				
US10GE					US10GETG				
US15H									
US20H									

※ For independent cabins in domestic merchant and fishing boats, available is the air conditioner "Cabin Partner"; and for ship-wide air conditioning in large ships, "Deck Unit". (Please refer to the separate catalogs.)

■ Wide operation range

The US products can easily operate with a wide range of water temperature (10 to 38°C) according to the working conditions proper to ships including air conditioning with cold seawater temperature and air cooling with higher clean water employing a central cooling system.



New engineering and design create highly sensitive environment in ships.

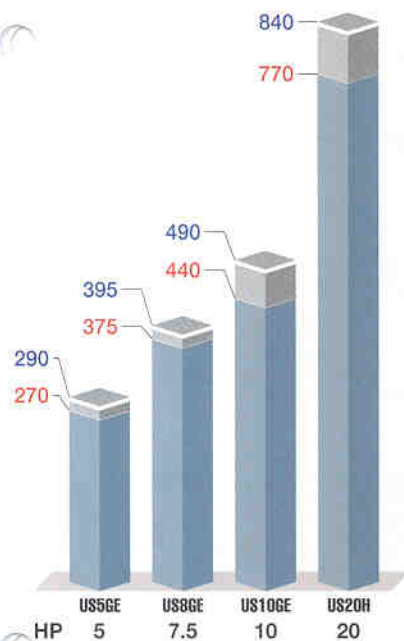
■ Light Weight new design

Lighter weight while keeping the conventional performances. No effect on cruising speed of ships such as passenger ferry boats.

■ Comparison with the conventional (the Company's 400V class machines)

Machine weight (kg)

Conventional unit
New unit



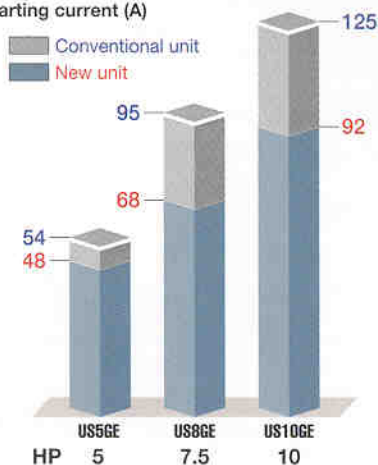
■ Saving more energy

Scroll compressors with newest technology are mounted on all machines. This saves more energy of starting current and power consumption.

■ Comparison with the conventional (the Company's 3φ 400V 60Hz machines)

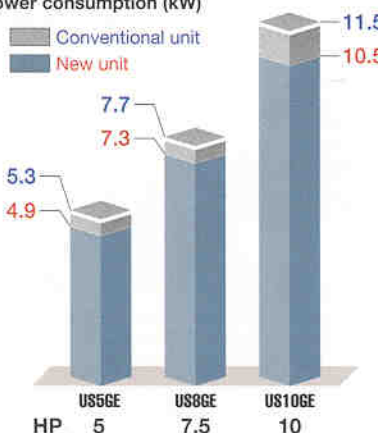
Starting current (A)

Conventional unit
New unit



Power consumption (kW)

Conventional unit
New unit

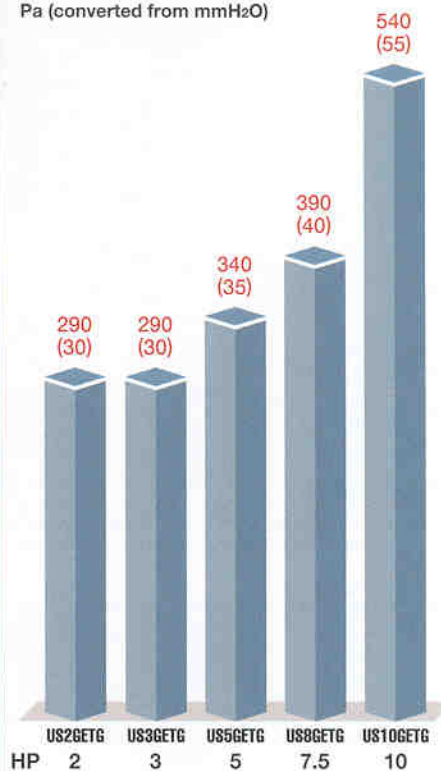


■ Duct of simpler design

Duct can be easily designed because high performance fans are built in as the standard, which are suitable for duct plans for domestic ships.

■ Maximum outside static pressure (200V class machines 60Hz)

Pa (converted from mmH₂O)



■ Excellent durability design

Daikin's recognized durability design meets to vibration, pitching and rolling unique to ships as well as corrosion by seawater and salty air. Resistance to ship motion and vibration is strengthened on every part such as the fan assembly is placed on rubber vibration isolators and grease feeding system is adopted for the fan bearing.

■ Easy transportation and easy installation work

"Bottom frame hanging" construction is adopted for all units, which facilitates hanging works. This allows easy installation.

■ Complete set of spare parts

Units of 2 to 7.5 HP are appended with a complete set of spare parts frequently used to assure safe navigation for a long period. Spare parts for units larger than 10 HP are available as a optional kit. Please select them in an economical way.

■ Abundant modification parts

Parts out of standard to improve versatility of ship air conditioners with are available. Hence, various applications can be assured.

■ Standard specification

[400V class]

Item	Model	US2GE	US3GE	US5GE	US8GE	US10GE	US15H	US20H	
Power source	(50/60Hz)	3 phase 380, 400/400 + 440V					3 phase 380, 400, 415/400, 440V		
※1 Cooling capacity	kW (50/60Hz)	5.6/6.7	9.0/10.0	15.0/17.0	22.4/25.0	30.0/33.5	45.0/50.0	60.0/67.0	
Condenser water flow rate	l/min (50/60Hz)	28/30	42/45	71/77	91/98	120/130	207/225	275/300	
Condenser head loss	kPa (50/60Hz)	11.8/13.7	12.7/14.7	18.6/21.6	11.8/13.7	13.7/15.7	12.3/14.2	12.3/14.2	
※2 Running current	A (50/60Hz)	3.7/3.8	4.6/4.9	7.0/7.2	9.9/10.8	14.5/15.8	20.7/24.5	31.6/34.4	
※3 Rating power consumption	kW (50/60Hz)	1.9/2.4	2.4/3.1	4.0/4.9	5.5/7.3	8.0/10.5	11.6/15.5	17.4/22.8	
Compressor	Type	Hermetic rotary type			Hermetic scroll type				
	Motor output	kW	1.5	2.2	3.75	5.5	7.5	5.5 × 2	7.5 × 2
	Starting method	Direct-on-line							
Evaporator	Cross-finned coil type								
Condenser	Water cooled shell & tube type								
Fan	Type	Dual suction multi-blade fans (Sirocco fan)							
	Motor output	kW	0.4 × 4P	0.4 × 4P	0.4 × 4P	0.75 × 4P	2.2 × 4P	3.7 × 4P	5.5 × 4P
	Driving method	Belt driven							
	Air flow	m/min (50/60Hz)	15/18	22/27	45/50	50/60	67/80	100/120	135/160
	External static pressure	Pa (50/60Hz)	23.5/29.4	37.3/43.1	32.7/39.2	147/235	196/304	392/588	461/686
Air filter	Polyvinyl chloride fiber (Washable with clean water)								
Refrigerant control	Thermal expansion valve								
Thermostat	For cooling (with reverse contact points for heating)								
Capacity control	100 – 0%						100 – 50 – 0%		
Protective devices	For electric wiring	Over-current relay, Reverse phase protector, Thermostat for compressor							
	For refrigeration circuit	High pressure switch, Fusible plug			High pressure switch, Low pressure switch, Fusible plug			High pressure switch, Low pressure switch, Safety valve	
	Casing	Cold rolled steel plate, Melamine resin baked finish, Light blue (Munsell No approx 7.5BG 7/2)							
	Refrigerant	R22							
Refrigeration oil	SUNISO 4GS-D1			SUNISO 4GSD1D-K					
Accessories	As for the details, see page 10					Fuses (200V × 1, 400V × 1)			
Pipe connections	Condenser water inlet/outlet	1B (JIS 5K with companion flange)			1½B (JIS 5K with companion flange)		2B (JIS 5K with companion flange) 2½B (JIS 5K with companion flange)		
	Upper drain pipe	¾B female screw			1B female screw				
	Lower drain pipe	¾B female screw			1B female screw				
	Safety valve pipe	—			—		1½B (with companion flange)		
Wiring	Main power supply inlet	Compatible cable diameter	φ10.5 to 12.5 cable connector		Cable connector (For cable of φ12.5 to 14.5)		Cable connector (For cable of φ14.5 to 16.5)	φ18.5 – 20.5 cable connector φ20.5 – 22.5 cable connector	
	Wire lead-out port for electric heaters	Hole dia. mm (With rubber bush)	φ22 holes	φ28 hole	φ34 hole		φ42 hole	φ48 hole	
	Machine weight	kg	155	165	270	375	440	600	770

Note) "※1" lists cooling power for an evaporator inlet air temperature of 27°C D.B., 19.5°C W.B., and a cooling water inlet temperature of 32°C.

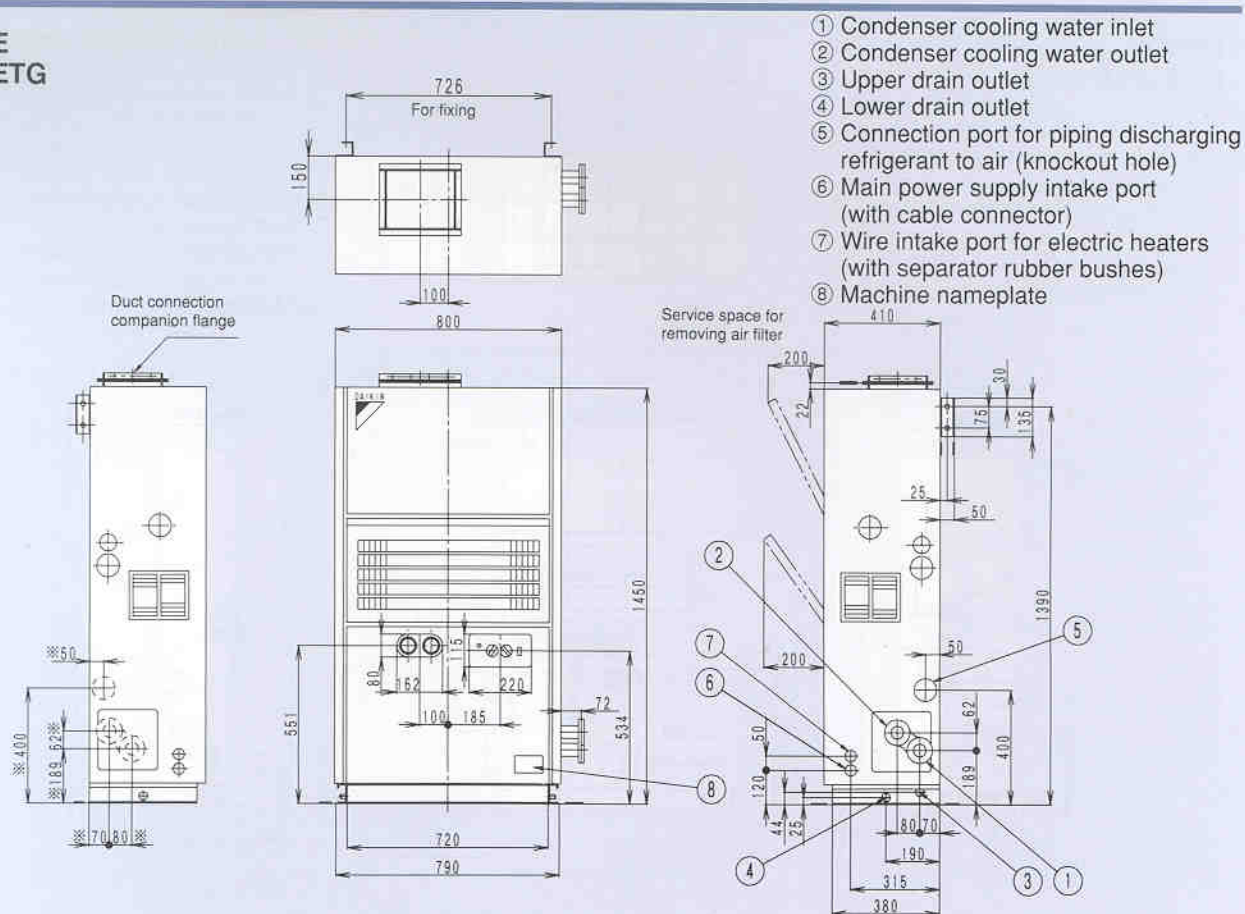
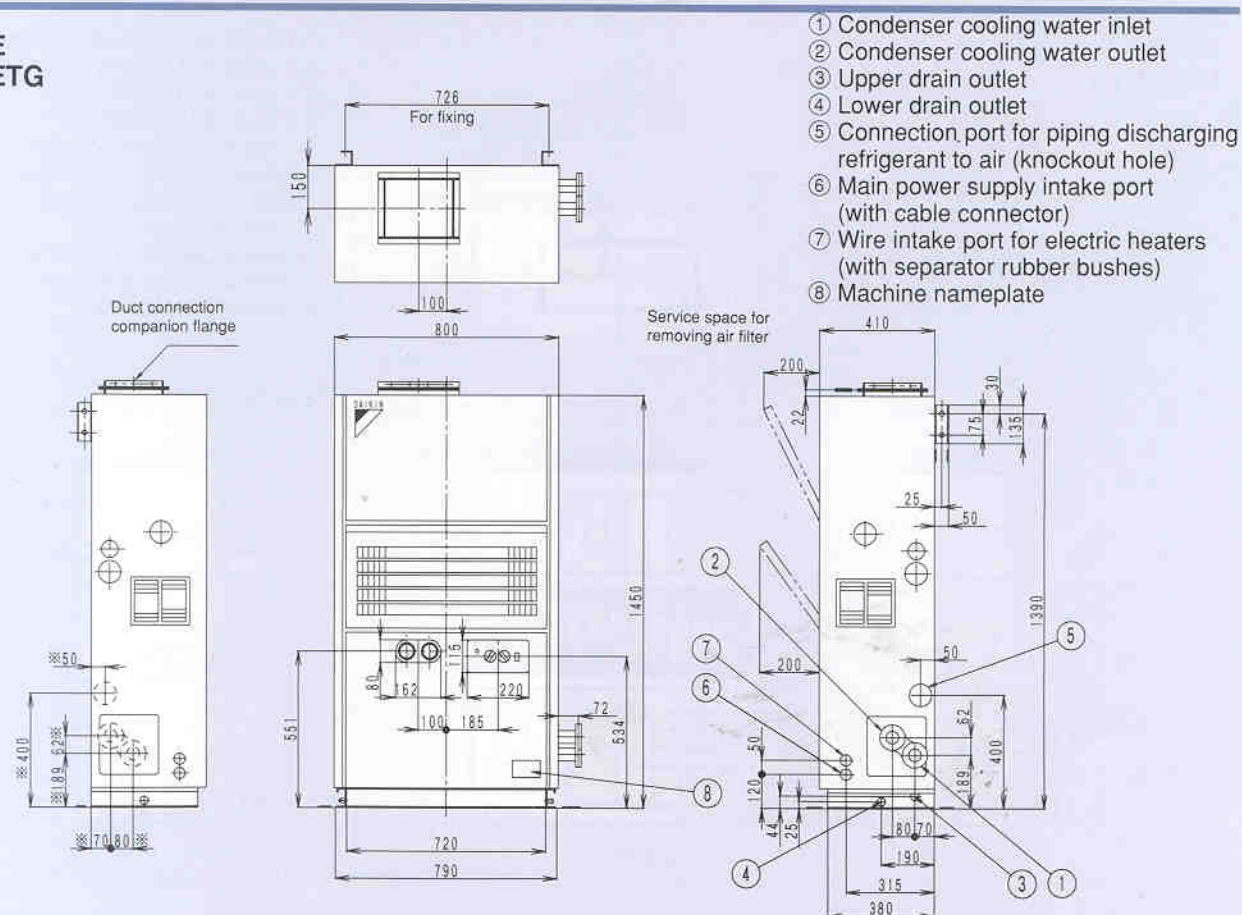
"※2" and "※3" list current and power for a supply of 3-phase, 380/440V (50/60Hz).

[200V class]

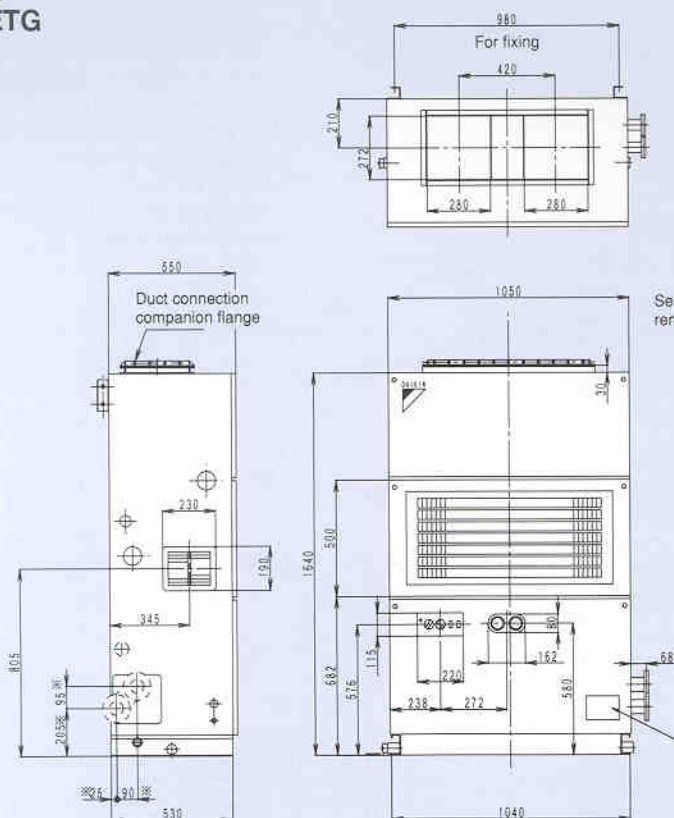
Item	Model	US2GETG	US3GETG	US5GETG	US8GETG	US10GETG	
Power source	(50/60Hz)	3 phase 200/200, 220V					
※1 Cooling capacity	kW (50/60Hz)	5.6/6.7	9.0/10.0	15.0/17.0	22.4/25.0	30.0/33.5	
Condenser water flow rate	ℓ/min (50/60Hz)	28/30	42/45	71/77	91/98	120/130	
Condenser head loss	kPa (50/60Hz)	11.8/13.7	12.7/14.7	18.6/21.6	11.8/13.7	13.7/15.7	
※2 Running current	A (50/60Hz)	7.1/7.6	8.7/9.8	14.0/15.4	22.7/25.1	27.5/31.6	
※3 Rating power consumption	kW (50/60Hz)	1.9/2.4	2.4/3.1	4.2/5.3	6.6/8.3	7.9/10.5	
Compressor	Type	Hermetic rotary type		Hermetic scroll type			
	Motor output	kW	1.5	2.2	3.75	5.5	7.5
	Starting method	Direct-on-line					
Evaporator	Cross-finned coil type						
Condenser	Water cooled shell & tube type						
Fan	Type	Dual suction multi-blade fans (Sirocco fan)					
	Motor output	kW	0.4 × 4P	0.4 × 4P	0.75 × 4P	1.5 × 4P	2.2 × 4P
	Driving method	Belt driven					
	Air flow	m ³ /min (50/60Hz)	15/18	22/27	42/50	50/60	67/80
	External static pressure	Pa (50/60Hz)	108/147	142/186	176/245	245/343	314/481
Air filter	Polyvinyl chloride fiber (Washable with clean water)						
Refrigerant control	Thermal expansion valve						
Thermostat	For cooling (with reverse contact points for heating)						
Capacity control	100 – 0%						
Protective devices	For electric wiring	Over-current relay, Reverse phase protector, Thermostat for compressor					
	For refrigeration circuit	High pressure switch, Fusible plug			High pressure switch, Low pressure switch, Fusible plug		
	Casing	Cold rolled steel plate, Melamine resin baked finish, Light blue (Munsell No approx 7.5BG 7/2)					
	Refrigerant	R22					
	Refrigeration oil	SUNISO 4GSD1			SUNISO 4GSD1D-K		
Accessories	As for the details, see page 10					Fuse (For 200V × 2)	
Pipe connections	Condenser water inlet/outlet	1B (JIS 5K with companion flange)			1½B (JIS 5K with companion flange)		2B (JIS 5K with companion flange)
	Upper drain pipe	¾B female screw			1B female screw		
	Lower drain pipe	¾B female screw			1B female screw		
	Safety valve pipe	—			—		
Wiring	Main power supply inlet	Compatible cable diameter	φ10.5 to 12.5 cable connector		φ14.5 to 16.5 cable connector	φ16.5 to 18.5 cable connector	
	Wire lead-out port for electric heaters	Hole dia. mm (With rubber bush)	φ28 hole	φ34 hole		φ42 hole	
	Machine weight	kg	155	165	270	375	440

Note) "※1" lists cooling power for an evaporator inlet air temperature of 27°C D.B., 19.5°C W.B., and a cooling water inlet temperature of 32°C.

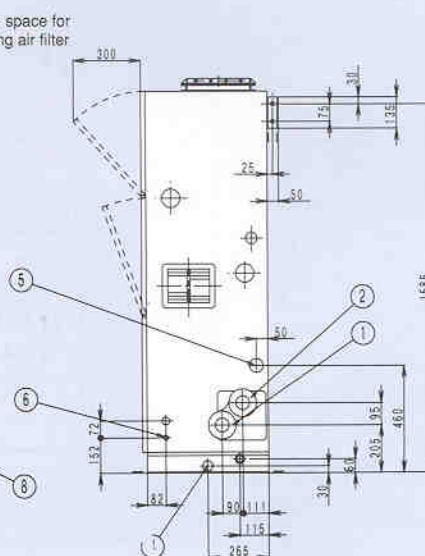
"※2" and "※3" list current and power for a supply of 3-phase, 200/220V (50/60Hz).

US2GE
US2GETGUS3GE
US3GETG

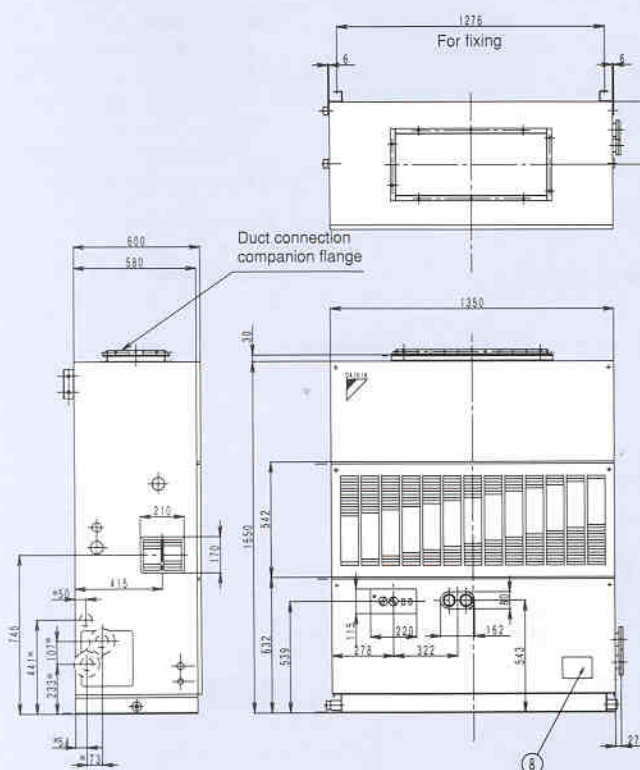
**US5GE
US5GETG**



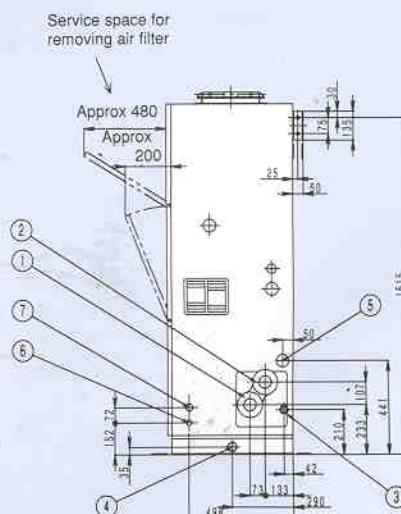
- ① Condenser cooling water inlet
- ② Condenser cooling water outlet
- ③ Upper drain outlet
- ④ Lower drain outlet
- ⑤ Connection port for piping discharging refrigerant to air (knockout hole)
- ⑥ Main power supply intake port (with cable connector)
- ⑦ Wire intake port for electric heaters (with separator rubber bushes)
- ⑧ Machine nameplate



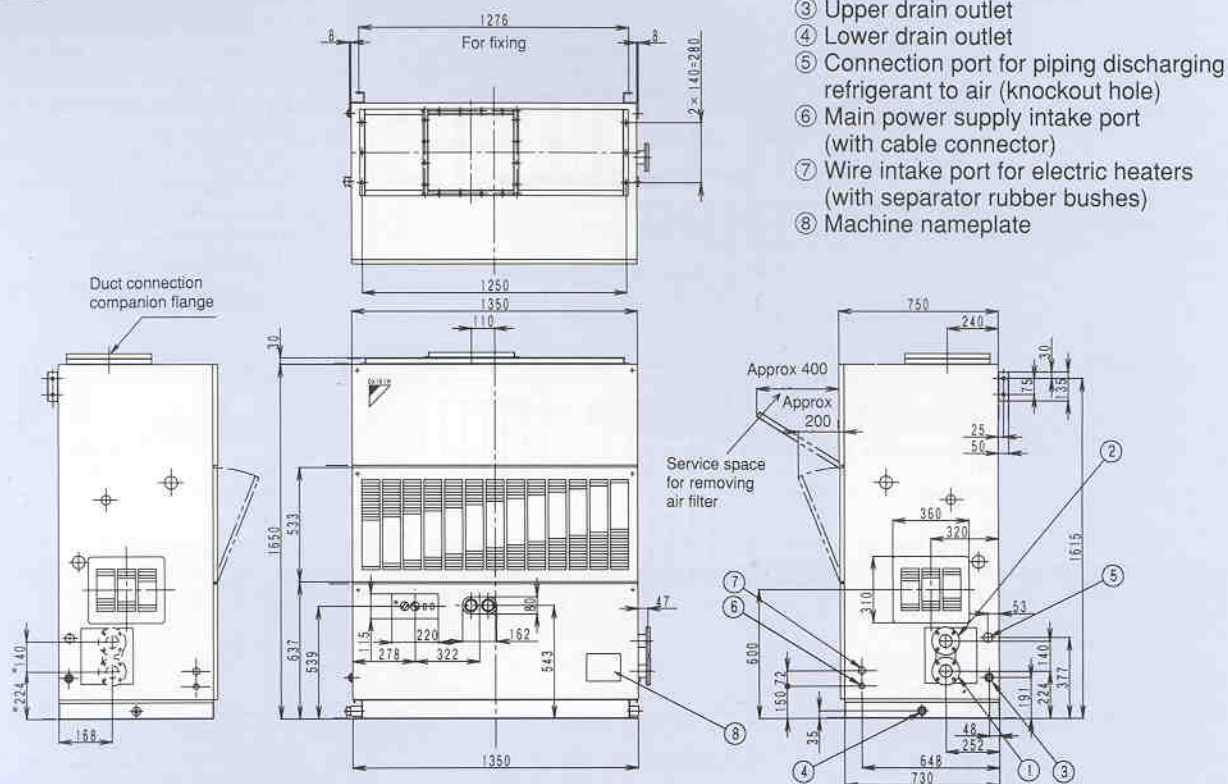
**US8GE
US8GETG**



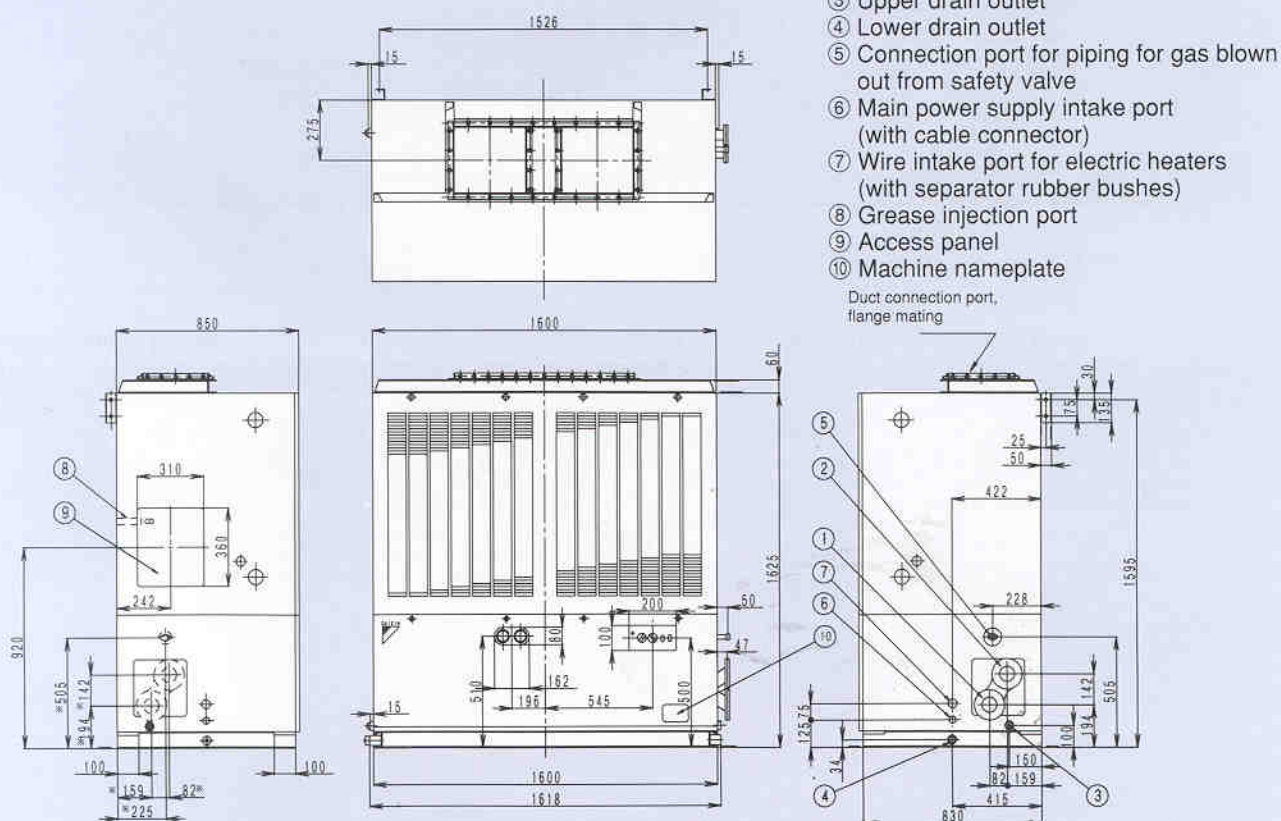
- ① Condenser cooling water inlet
- ② Condenser cooling water outlet
- ③ Upper drain outlet
- ④ Lower drain outlet
- ⑤ Connection port for piping discharging refrigerant to air (knockout hole)
- ⑥ Main power supply intake port (with cable connector)
- ⑦ Wire intake port for electric heaters (with separator rubber bushes)
- ⑧ Machine nameplate



US10GE US10GETG



US15H



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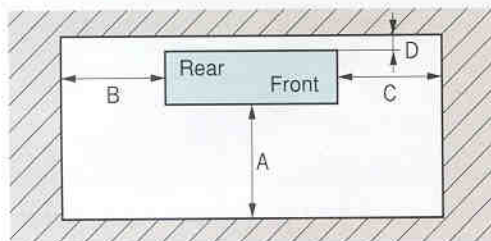
Service space/Specifications of optional accessories/Spare parts

Service space

Leave space around the unit as much as possible for piping connection.

Space in front of the machine is necessary for handling various pressure switches, thermostats and the switch boxes on the control panel and services for cleaning the condenser cooling tubes, etc.

The minimum service space around the machine is as tabulated below.



Item	US2GE(TG)	US3GE(TG)	US5GE(TG)	US8GE(TG)	US10GE(TG)	US15H	US20H
A	600	600	900	900	900	900	900
B	400	400	400	600	600	600※	600※
C	400	400	400	600	600	600	600
D	50	50	50	50	50	50	50

Note: Space marked with ※ should be left, giving access to the fan regardless of piping connection direction.

Specifications of optional accessories

◎: Optional kit, ○: Out-of-standard modification, △: Occasional modification

Model	US2GE	US3GE	US5GE	US8GE	US10GE	US15H	US20H	US2GETG	US3GETG	US5GETG	US8GETG	US10GETG
Plenum chamber	◎	◎	◎	◎	—	—	—	◎	◎	◎	◎	—
Spare parts	Standard accessories							Standard accessories				
Electric heater	Output × Stage kW	6 × 1	9 × 1	7.5 × 2	12 × 2	15 × 2	24 × 2	30 × 2	6 × 1	9 × 1	7.5 × 2	12 × 2
Steam heater	Capacity kcal/h	8,850	13,500	18,900	27,000	36,000	54,000	72,000	8,850	13,500	18,900	27,000
	Pipe connections	1/2B	3/4B	1B	1B	1 1/2B	1 1/2B	1 1/2B	1/2B	3/4B	1B	1B
Hot water heater	Capacity kcal/h	6,800	9,000	18,000	27,000	36,000	54,000	—	6,800	9,000	18,000	27,000
	Pipe connections	1/2B	1B	1 1/4B	1 1/2B	1 1/2B	—	—	1/2	1B	1 1/4B	—
Steam spray	Capacity kcal/h	1.6	1.6	2.6	3.7	4.7	6.8	8.4	1.6	1.6	2.6	3.7
	Pipe connections	1/2B	3/4B	1B	1 1/4B	1 1/2B	1 1/2B	—	1/2	3/4B	1B	1 1/4B
Fresh air intake duct connection	○	○	○	○	○	—	—	○	○	○	○	○
Rear suction duct connection	—	—	—	○	○	—	—	—	—	—	○	○
Side grille of plenum chamber	○	○	○	○	—	—	—	○	○	—	○	—
One stage-up of fan motor	Rated kW	Standard	△	△	Standard	△	△	Standard	△	Standard	Standard	Standard
Two stage-up of fan motor	Rated kW	—	—	1.5	—	—	—	—	—	1.5	—	—
Alteration of fan motor pulley	△	△	△	△	△	△	△	△	△	△	△	△
Alteration of piping direction	△	△	△	△	△	△	△	△	△	△	△	△

Note) 1. Standard pipe connection is right hand.

2. Steam heater capacity is for a suction air temperature of 21°C D.B., the standard air flow for 60Hz and a steam pressure of 4 kg/cm².

3. Hot water heater capacity is for a suction air temperature of 21°C D.B., the standard air flow for 60Hz and a hot water temperature of 80°C.

4. Steam spray capacity is for a steam pressure of 0.035 kg/cm².

Standard spare parts

Item of spare parts kit	US2GE	US3GE	US5GE	US8GE	US2GETG	US3GETG	US5GETG	US8GETG
Fuse	2 sets							
Magnet switch	1 set							
V-belt	1 set							
Water cover packing for condenser	1 set							
Sacrificial anode plate	2 sets			1 set				
Packing for sacrificial anode plate	2 sets			1 set				
Putty for sacrificial anode plate	1 set (Can be used twice)							
Screw for sacrificial anode plate	1 set							

Optional spare parts

Item of spare parts kit	US10GE (TG)	US15 · 20H
	KSPS10GE (TG)	KSPS152 · 202H
Spare parts box	1	
High & low pressure switch	Same q'ty as the unit	
Fuse element	Double q'ties as the unit	
Neon lamp	Same q'ty as the unit	
Safety valve	—	1
Magnet switch (fan, comp.)	Same q'ty as the unit	
V belt	Same q'ty as the unit	
Water cover packing, condenser	Same q'ty as the unit	
Sacrificial anode plate	Double q'ties as the unit	
Packing, sacrificial anode	Double q'ties as the unit	
Putty, sacrificial anode	Same q'ty as the unit	
Screw, sacrificial anode	Same q'ty as the unit	

Other DAIKIN marine type refrigeration & air conditioning units

Marine type deck units

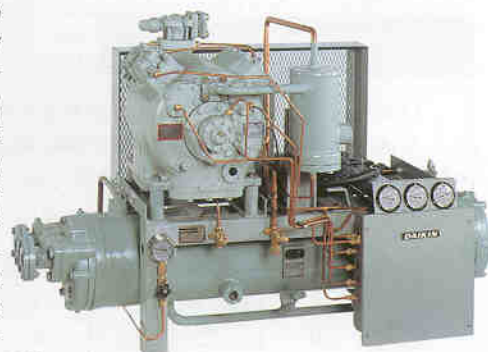
The deck units are large size air conditioning units for maintaining cabins in comfortable conditions. They are constructed extremely compact, light, and free from extensive installation work in consideration with unique conditions on the ship.



USD series

Marine type condensing units for provisions

The marine type condensing units for provisions are constructed extremely compact and light and excel in safety and durability. The most suitable unit can be easily selected within the range in accordance with respective application and size.



RKS series

Marine type packaged air conditioners ("Cabin Partner")

Air-cooled separate type
CAPA08AS • CAPA08AT

The marine type packaged air conditioner, although of a compact size, shows powerful functions to provide delightful atmosphere in the cabin throughout the year.



(Indoor unit)

(Outdoor unit)

Water cooled heat pump type (Models: CAP06A, 08A)



Marine type container refrigeration units

The marine type refrigeration unit for cold and frozen storage does not cause to break ozone since it adopts the newly developed coolant R134.

Products for 20ft and 40ft are available.



Marine type water-cooled heat pump air conditioner

The water cooled heat pump air conditioner special for ships realizes excellent comfort, energy saving, and high speed, light weight design.



Notes for Safety



(Applications of Marine Packaged Air Conditioners)

- Marine Packaged Air Conditioners contained in this catalog are air coolers exclusive for ships.
Do not use those products for special applications such as foods, faunas and floras, precision devices and art works because deterioration of objects can take place.
- When using marine products in buildings on land, check if the specifications conform to each country's standard.

(Operation)

- Peruse the Instruction Manual before use to operate products in the proper way.

(Installation)

- Have products installed by the sales company, the specialized contractor or the ship-builder. If some imperfection is made by Purchaser's own installation, water leaks, electrical shocks or fires can be caused.
- Have humidifiers and auxiliary heaters for air conditioning installed by the sales company, the specialized contractor or the ship-builder. If some imperfection is made by Purchaser's own installation, water leaks, electrical shocks or fires can be caused.

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