

# Q-ton

Air to Water

A new generation,  
energy-efficient, sanitary hot water solution for  
commercial applications

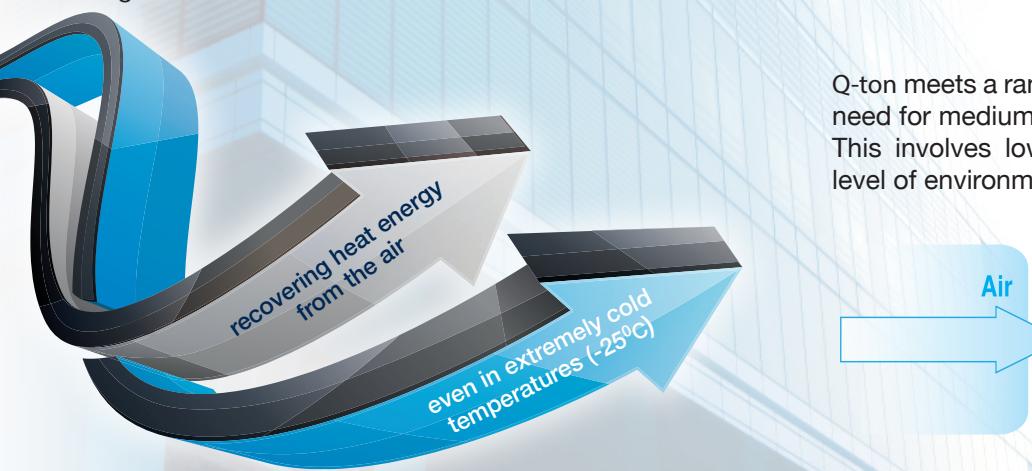


Using CO<sub>2</sub> gas as a natural refrigerant

# The Q-ton story

The high efficiency Q-ton is an air-to-water heat pump using CO<sub>2</sub> gas as a refrigerant, which can be used in a variety of applications for the supply of sanitary hot water. Q-ton has been featured as the world's first two-stage compressor (combining rotary and scroll technology). It maintains high efficiency and significantly improves performance at cold outside air temperatures.

MHI's design team launched this innovative unique air source heat pump to allow maximum efficiency, with minimal carbon footprint all controlled from a comprehensive touch screen panel. Currently with the increasing pressure of the use of low GWP (Global Warming Potential) refrigerant, we believe CO<sub>2</sub> heat pump is the way forward to comply with future regulations as well as market trends.



## We've always been solution focused

For improved energy and carbon reduction performances, it is necessary to manage the heat source as well as the heat storage capacity. Q-ton assures this is compatible with on-site hot water requirements. For example a single remote panel can control a unit with the heating capacity of 30kW and up to 16 coupled units (a total of 480kW) for better functionality. This enables the Q-ton to be specified in a vast array of new build or retrofit applications of all sizes.

With an industry-beating coefficient of performance

### WORLD'S FIRST ROTARY & SCROLL COMPRESSOR

Unique Patented Technology

Gas injection  
2nd Stage - SCROLL

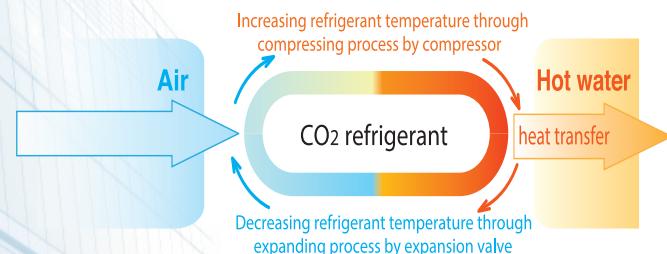
#### TWO STAGE COMPRESSOR

- The combination of the two stages exhibits significantly improved performance from low to high ambient temperatures.
- Gas injection into the medium pressure chamber for heating capacity increase.

1st Stage - ROTARY



Q-ton meets a range of disparate demands including the need for medium to large sanitary hot water generation. This involves low electricity consumption and a high level of environmental friendliness.



of 4.3, it is the ideal system for serving hot water requirements in commercial buildings like hotels, apartment blocks, restaurants, fitness centres, universities, hospitals, care homes, laundries and food industries.

Systems can be set up to meet specific requirements and a touch screen controller makes the system simple to operate while the user-friendly graphic display enables to monitor hot water production and availability.

#### Litres / Day

Leisure Centres / Restaurants

Care Homes / Universities

Hotels / Spas

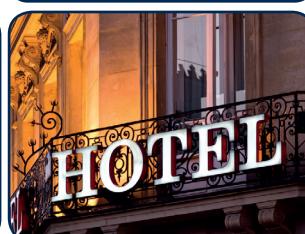
Apartment Blocks

3,000

5,000

10,000

15,000



# Why Q-ton?

Q-ton delivers outstanding performance and environmental benefits to a varied number of applications. Q-ton is exceptionally energy efficient which results in big reductions in both power and carbon emissions.

Q-ton uses safe and highly efficient CO<sub>2</sub> as a refrigerant which is environmentally friendly as it is a natural gas and does not contain harmful

ecological impacts compared to other products using standard refrigerants.

Furthermore the Q-ton uses a constant hot water supply from 60°C to 90°C and maintains the full capacity at a very low ambient temperature. Therefore there is no requirement for external heating source and as a result this saves valuable installation time and costs.

## High Performance

- 60°C to 90°C water supply even with outside temperatures as low as -25°C
- The ability to maintain 100% capacity down to -7°C

## High Efficiency

- The industry's highest coefficient of performance (4.3 in intermediate season)\*
- Massive reductions in both running costs and CO<sub>2</sub> emissions

## Environmentally Responsible

- GWP (Global Warming Potential) = 1
- ODP (Ozone Depletion Potential) = 0

## Easy Operation

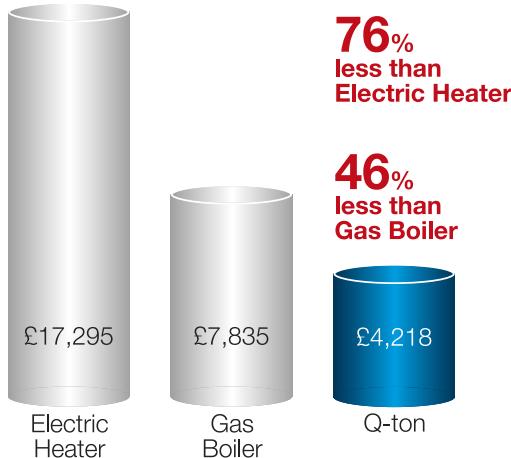
- Advanced, but simple to operate touch screen panel with LCD
- User-friendly schedule setting and one-touch fill up operation

## Long-term Reliability

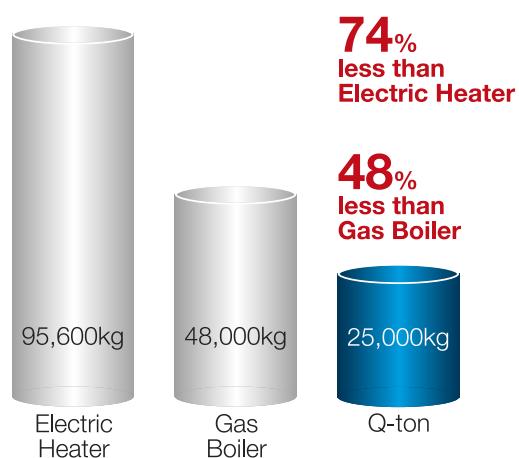
- High quality robust technology
- Long life expectancy

\* Intermediate season conditions: Air on at 16°C, Water on at 17°C, Water off at 65°C

### Annual running cost



### Annual CO<sub>2</sub> emission



Operation conditions: senior care home, 80 people, 8,000 L/day, 17°C conversion.  
The above figures have not been issued from a real site and should be considered as an indication only.

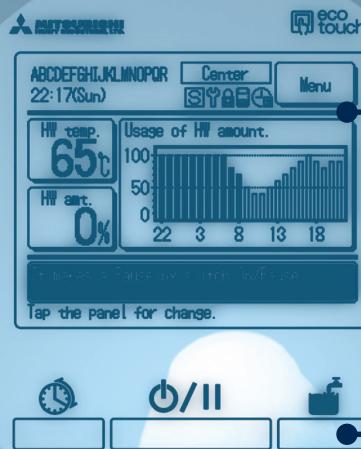
Q-ton will contribute to reduce carbon emissions for any organisation associated with a Carbon Reduction Commitment (CRC) scheme. Further savings are expected as the electricity becomes greener with the decarbonisation of the grid.

# How Q-ton works



## Easy operation

- Advanced touch screen remote controller panel.
- Full dot liquid crystal display.
- Allows finely adjusted operation for energy savings.



PERFORMANCE

**-25°C → 90°C**

90°C water supply even in extremely cold regions with temps as low as -25°C

CAPACITY

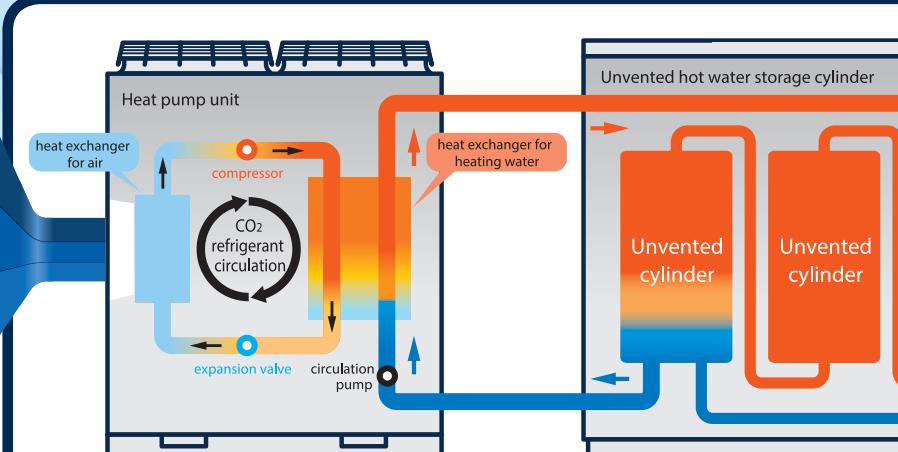
**-7°C → 100**

Keeping 100% capacity down to -7°C

EFFICIENCY

**COP 4.3**

The industry's highest COP level  
COP4.3 (intermediate season)



## Environmental Credentials

Q-ton heat pumps can be configured as stand-alone units or run with up to 16 units in tandem, providing anything from 3,000 to 100,000 litres of safe hot water daily. Whether single or multiple units are used, the Q-ton system is controlled from a single, simple control panel that can be remotely installed for ease of access and operation. Q-ton can be installed as a replacement, addition or whole new system, according to your needs.

Refrigerant such as carbon dioxide (R744) preserves the ozone layer (ODP = 0) and has the lowest Global Warming Potential (GWP = 1). Q-ton fits extremely well with the latest building regulations reaching the "excellent" mark from BREEAM.





### User Friendly

- LCD panel with light tap operation introduced as the industry's first.
- Large 3.8 inch full dot display.
- Back light function.



### Fill Up Operation

Regardless of the setting that has been applied, there is always the functionality to manually refill the tank.



### Schedule Setting

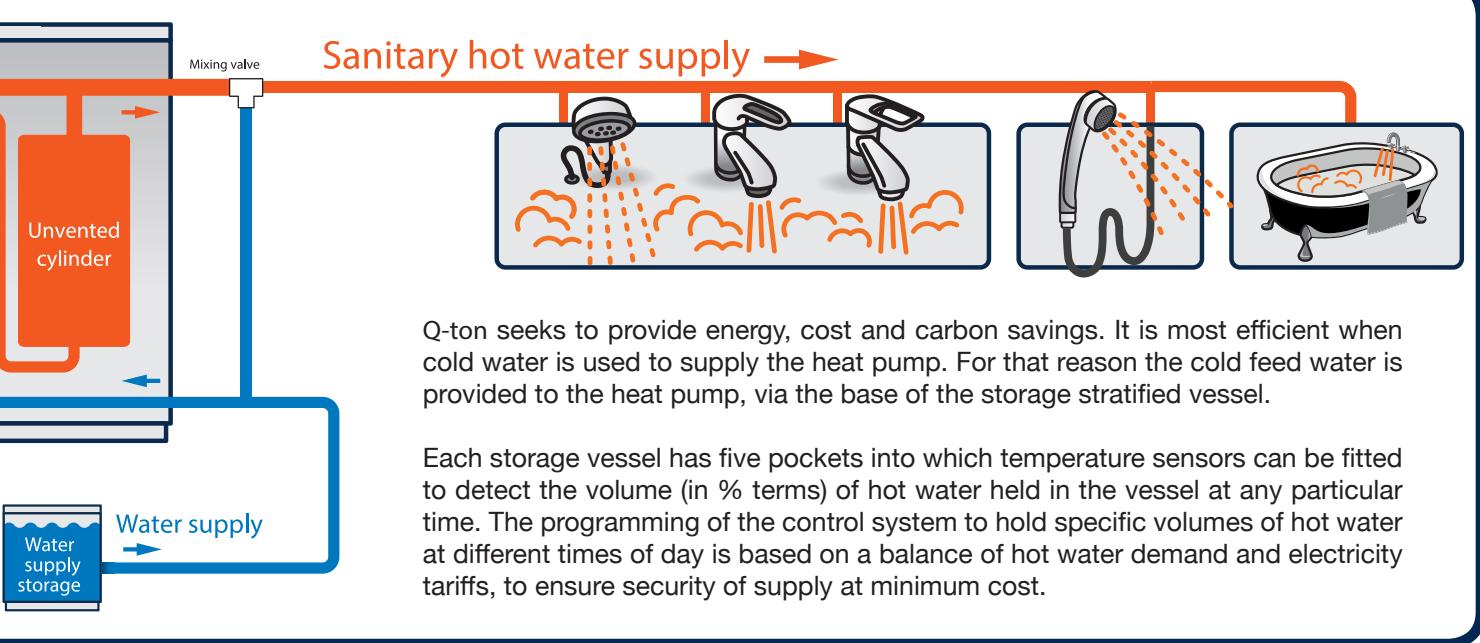
Set a schedule such as a weekly operation pattern, day off or a peak-cut timer.

Q-ton absorbs 'free' heat from outdoor air and amplifies it to generate hot water swiftly and efficiently. It generates hot water up to 90°C without the requirement for an additional electric immersion heater.

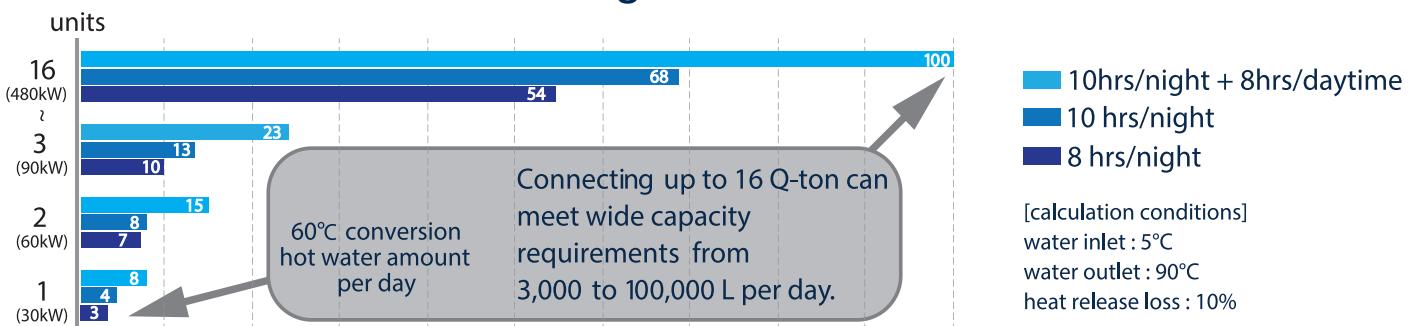
The Q-ton heat pump uses a coil of cold refrigerant that absorbs 'free' heat from the outside air and a 2-stage compressor that puts the refrigerant under high pressure in order to raise its temperature. An on-board heat exchanger uses heat from the refrigerant to generate the sanitary hot water.

Hot water can be produced during off peak tariff electricity which is then stored in a tank for daytime use. Q-ton efficiently produces high-volume hot water using just ambient air heat and a small amount of electricity.

Q-ton is usually used for direct boiler replacement as it controls the water supply and storage temperature as well as the output capacity.

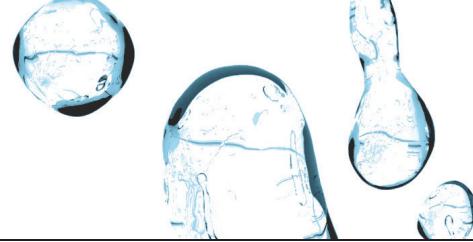


### Q-ton Sizing Guidance



Connect up to **16 units** with **1 remote control**

# Specifications



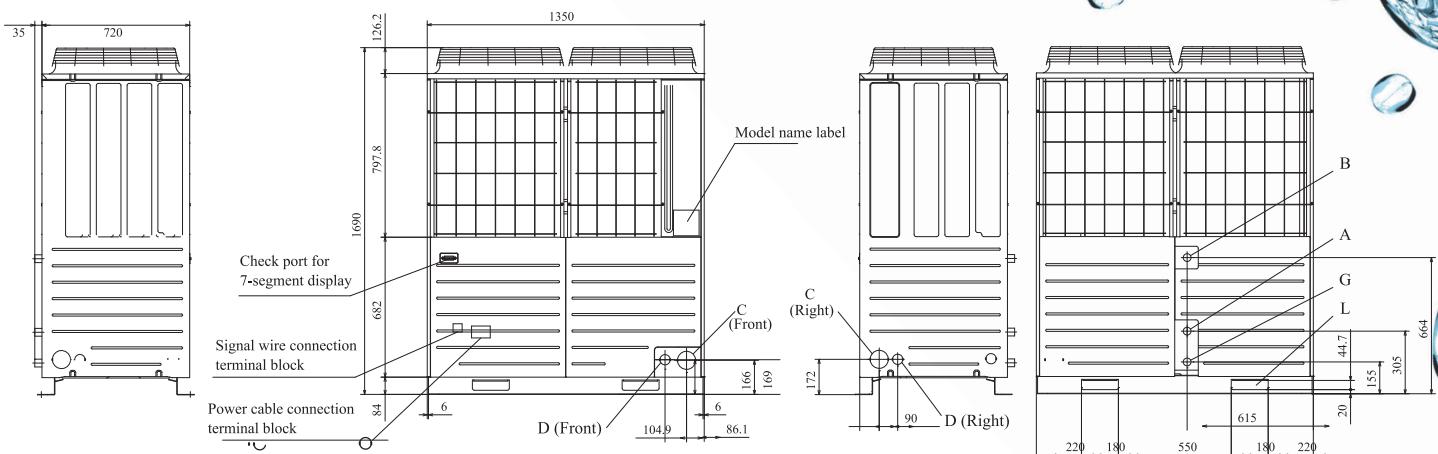
Item	Model	ESA30E-25
Power supply		3-phase 380V ±5%, 400V ±5%, 415V ±5% 50Hz
Operation to top up (In intermediate season) <sup>*1</sup>	Heating capacity	kW 30
	Water amount	Liter/min 8.97
	Power consumption	kW 6.98
	COP	— 4.3
Operation to top up (In cold region) <sup>*2</sup>	Heating capacity	kW 30
	Water amount	Liter/min 5.06
	Power consumption	kW 10.73
	COP	— 2.8
Operating sound <sup>*3</sup>	dB(A)	58
Outside dimension	Height	mm 1,690
	Width	mm 1,350
	Depth	mm 720 + 35 (Water pipe connection)
Current	Max	A 21
	Starting	A 5
Unit weight	kg	375 (During operation 385)
Color		Stucco white (4.2Y7.5/1.1 approx.)
Compressor	Type × Pcs	Hermetic inverter compressor × 1
	Nominal output	kW 6.4
Refrigerant	Type	R744 (CO2)
	Charged amount	kg 8.5
Refrigerant oil	Type	MA68
	Charged volume	cc 1200
Crankcase heater	W	20
Anti-freezing heater	for water pipe	W 48 × 3
	for drain pan	W 40 × 2
	for drain hose	W 40 × 2 + 48
Heat exchanger, Air side		Copper pipe straight fin type
Heat exchanger, Water side(Gas cooler)		Copper pipe coil type
Fan	Type	Axial flow type (direct coupled motor) × 2
	Output × Pcs	W 386 × 2
	Air volume	m³/min 260
Water pump	Type × output	Non-self-suction spiral type inverter pump × 100W
	Materials contacting to water	Bronze, SCS13
	Actual pump head	m (kPa) 5m (49kPa) @ 17Liter/min
Usage temp range	Outdoor air temp	°C -25 to +43
	Feed water inlet temp	°C 5-63
	Hot water outlet temp	°C 60-90
Water pressure range	kPa	500 or lower
Defrost		Hot gas type
Vibration and sound proofing devices		Compressor: placed on anti-vibration rubber and wrapped with sound insulation
Protection devices		High pressure switch, over current protection, power transistor overheat protection and anomalous high pressure protection
Pipe size	Feed water inlet	Rc3/4 (Copper 20A)
	Hot water outlet	Rc3/4 (Copper 20A)
	Drain water outlet	Rc3/4 (Copper 20A)
Electric wiring	Earth leakage breaker	30A, 30mA, 0.1sec
	Power cable size	□14 × 4 (Length 40m)
	Moulded-case circuit breaker	Rated current: 30A, switch capacity: 30A
	Grounding wire size	M6
	Remote controller wire size	0.3mm² × 2cores shielding wire (MVVS)
Design pressure	MPa	High pressure: 14.0, Low pressure: 8.5
IP code		IP24

(Note)

1. Performance of operation to top up in intermediate season shows the capacity measured under the conditions that outdoor air temp is 16°C DB/12°C WB, water inlet temp is 17°C and hot water outlet temp is 65°C.
2. Performance of operation to top up in cold region shows the capacity measured under the conditions that outdoor air temp is -7°C DB/-8°C WB, water inlet temp is 5°C and hot water outlet temp is 90°C excluding heater for anti-freezing water (345W).
3. Operating sound shows a value measured at 1m in front of the unit and 1m above the floor in anechoic room where the sound is resonated a little. Accordingly if the unit is installed on actual site, it is normal that the measured sound there is higher than the value shown above, because it is influenced by surrounding noise and echo in the room.
4. The actual hot water outlet temp may vary ±3°C from target temp according to the change of outdoor air temp and water inlet temp. And then if feed water inlet temp is 30°C or higher and outdoor air temp is 25°C or higher, hot water outlet temp may be controlled not to increase too high.
5. Please use the clean water. The water quality should follow a guideline of JRA-GL. 02:1994.  
If the water quality is out of the standard, it may cause troubles such as scale buildup and/or corrosion.
6. These articles mentioned above may vary without any notice according to the development status.

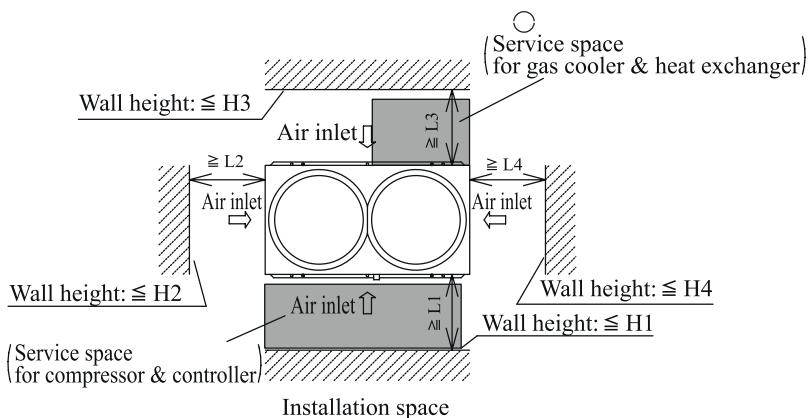
# Dimensions

Model : ESA30E



Symbol	Contents	
A	Feed water inlet port	RC3/4 (Copper tube 20A)
B	Hot water outlet port	RC3/4 (Copper tube 20A)
C	Heat pump unit-Tank unit connecting wire outlet port	φ 88 (or φ100)
D	Power cable inlet port	φ 50 (right, front) Long hole 40x80 (bottom)
G	Drain water pipe outlet port	RC3/4 (Copper tube 20A)
L	Hole for carrying in or hanging	180 × 44.7

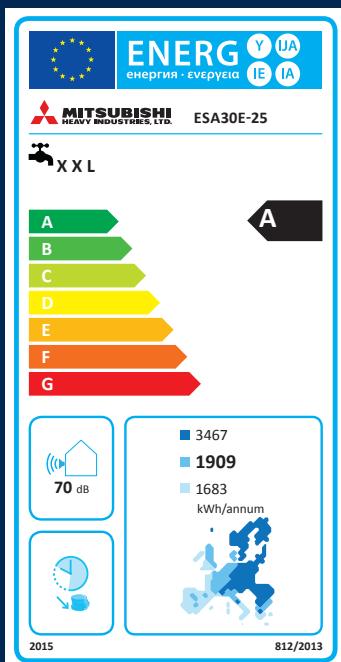
## Installation space (Service space)



Dimension	Installation example	
	1	2
L1	800	800
L2	10	10
L3	800	800
L4	100	500
H1	500	1500
H2	No limit	No limit
H3	1000	1000
H4	No limit	No limit

### Note

- (1) Be sure to fix the unit with anchor bolts
- (2) Be sure to keep space above the unit at least 2m
- (3) the connection of water pipes (Feed water inlet, Hot water outlet, Drain water outlet) should be done on site locally.
- (4) The holes for power cable inlet, and connection wire outlet from heat pump unit to tank unit are half-blanked.  
Therefore please punch out the hole by cutting the residual portion and use it.
- (5) In heavy snow region, please take following measures in order for the air inlet/outlet port and the bottom part of unit not to be covered with snow
  - ① Place the unit on the rack in order to make the bottom of unit higher than the snow surface.
  - ② Install a snow prevention hood on the outlet port of the unit.
  - ③ Install the unit at the space under the eaves or the snow prevention roof.
- (6) If ambient temp becomes below 0°C, it may cause break of water pipes and damage on the unit due to freezing  
Be sure to apply anti-freezing heater to feed water piping , hot water piping and drain water piping in order to prevent from freezing.
- (7) Be sure to keep enough service spaces of more than 800mm in front of the unit service panel for easy inspection of the unit and replacement of components.  
When piping work is done, be sure not to interfere the pipes with the unit service space.  
If the service space cannot be kept, please install the piping below the unit by placing the unit on the rack.



Cert No: MCS HP0230 Technology: Heat Pump

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Our Technologies, Your Tomorrow

#### ISO9001

Our Air Conditioning & Refrigeration Systems Headquarters is an ISO9001 approved factory for residential air conditioners and commercial-use air conditioners (including heat pumps).



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