EDITION 3.0
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Revere® CO_2 Heat Pumps

Flowenergy
HEATING & VENTILATION SOLUTIONS

Revere® CO_2 Air to Water Heat Pumps

A Sustainable Technology

Consumers worldwide are increasingly pursuing sustainable, cost effective alternatives to traditional fossil fuelled equipment for their hot water and space heating requirements. Using natural CO_2 as the refrigerant and achieving a high coefficient of performance (COP), CO_2 heat pumps offer both ecological and financial benefits.

The unique capacity of the Revere® CO_2 Heat Pump to produce 90°C hot water makes it suitable for use in a wide range of industrial, commercial and residential projects, including food processing plants, dairies, shopping centres, apartments, hotels, restaurants, hospitals, aged care, recreational and educational facilities. Revere® can also be adopted with a high level of safety as the absence of combustion reduces the risk of fire.

Instead of the more conventional ammonia or haloalkane (R134A) refrigerant gases, Revere® CO_2 Heat Pumps use supercritical carbon dioxide as the refrigerant.

The technology offers a means of energy conservation and reduces the emission of greenhouse gas.

From the energy output side, the operational characteristics of the heat pump are different to conventional systems (such as electric/gas/oil boilers or electric heaters). With conventional systems, 1kW input of energy provides less than 1 kW of output energy or heat. With a CO_2 heat pump system, every 1kW of input energy consumed produces an average of 3.9 x the input as output energy or heat by extracting heat from the outside air.

Summary

Producing 90°C hot water with an average COP of 3.9, makes Revere® CO_2 Heat Pumps an ideal energy efficient domestic hot water and space heating system for industrial, commercial and residential applications. This ability to convert 1kW of input energy into 3.9kW of output energy represents an ongoing economical and sustainable water heating solution.

Revere® CO_2 Heat Pump Features & Advantages

Heats up to 90°C - Due to its innovative design, the Revere® CO_2 Heat Pump can produce hot water up to 90°C at low and high ambient temperatures (-20°C to 43°C)

Flexible - The same system can be simultaneously used for Space Heating & Domestic Hot Water

Ultra quiet operation – 60dBa

No combustion - reduces fire risk

Suitable for up to 60°C ΔT (flow 90°C, return 30°C)

Suits Australian conditions – accommodates ambient operating temperatures from -5°C to 43°C (Special unit available for -15°C or -20°C)

Safe - Non-flammable CO_2 refrigerant

Programmable – can be set to operate during off peak times to benefit from low cost power

30% Space Saving due to Y Frame design (CHP-80)

Versatile - Suitable for a wide range of purposes, from small facilities to large buildings where hot water or heating is required.

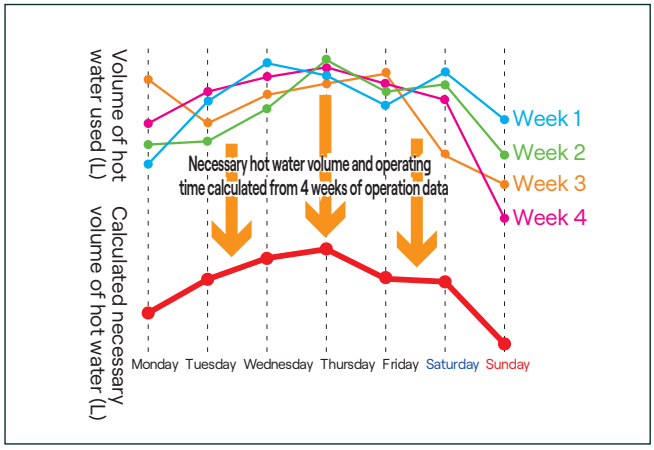
Eco friendly - The Revere® CO_2 Heat Pump uses natural CO_2 refrigerant. This refrigerant has a global warming potential (GWP) of about 1/1700 that of R410 and zero ozone-depleting potential (ODP).

Energy efficient - Under optimal conditions, Revere® CO_2 Heat Pumps achieve an exceptional coefficient of performance (up to 4.2) which equates to higher energy efficiency. Compared to the traditional electric hot water heater, the CO_2 hot water heat pump can save up to 75% heating energy. Further energy cost savings can be achieved through operation during off peak hours, subject to off-peak electrical power supply.

Anti-freeze/Cold Area Units - the heat pump is fitted with a defrost solenoid valve which will open when the evaporator ices up. The hot gas will then flow through the evaporator and melts the ice. Water cannot be stored during defrosting.

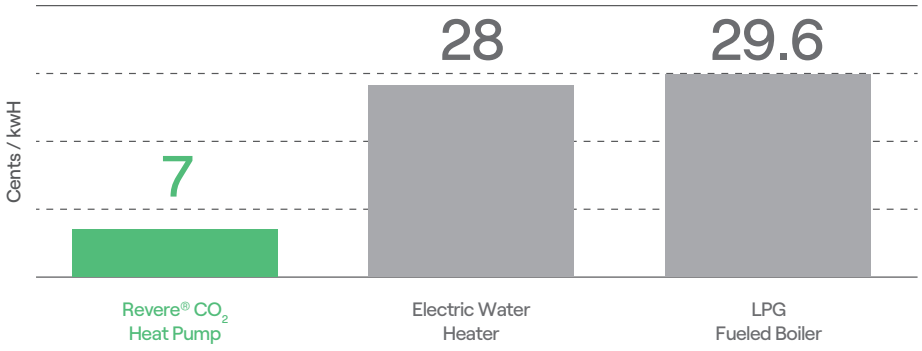
One pass heating - It is suitable for heating water from low to high temperatures (large temperature difference) in one pass.

Reduces storage requirements - Since this hot water heat pump can heat water up to 90°C, the size of the storage tank can be reduced.



Energy Saving Function - This function is an energy-saving function that learns operation patterns from the four previous weeks to prevent unnecessary heating and temperature decreases in stored water through natural heat loss. The use of this function based on operation data stops the unit from boiling water unnecessarily.

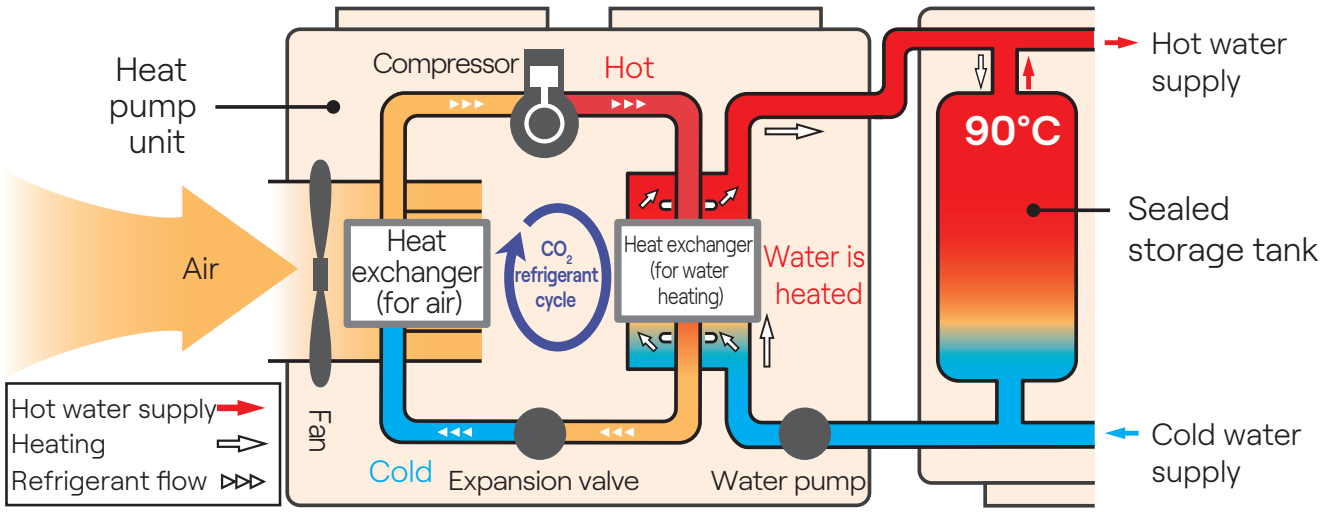
Running Cost Comparison



Revere® offers Significantly lower running costs & CO_2 emissions

How It Works

The Revere® CO_2 Hot water heat pump is an energy efficient electric heat pump that uses heat extracted from the air to heat water for industrial, commercial and residential applications. A hot water heat pump removes energy from a low temperature source (ambient air or waste water) and moves it to a high temperature hot water tank.



Advantages of using CO_2 as a refrigerant

This heat pump uses CO_2 as a refrigerant. CO_2 is a natural refrigerant and has an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of 1. CO_2 refrigerant is a non HFC refrigerant. Traditional HFC refrigeration systems affect climate change in two distinct ways: direct and indirect contribution. Direct contribution results from the release of refrigerants into the atmosphere. Indirect contribution refers to the energy used to operate traditional refrigeration equipment. The less energy required to operate the equipment, the lower the impact on the environment.

Refrigerant Characteristics

Refrigerant	HFC		Natural Refrigerant
	R410A	R407C	R744(CO_2)
Ozone depletion potential	0	0	0
Global warming potential	1975	1653	1
Combustible	No	No	No
Toxicity	Low	Low	Low

General Performance Data of a Standard Unit

CHP-5R

CHP-15HF

CHP-26H4

CHP-35H

CHP-080Y2

Product Code	Power Supply	Total power input@ 25°C ambient(kW)	Heating output @ 25°C ambient (kW)	Average COP*	Dimension L x W x H(mm)
CHP-5R**	Single phase 240V/50Hz	2.3	5.5	3.9	675 x 825 (+70) x 300
CHP-15F	3 phase 415V/50Hz	3.13	15	4.0	900 x 450 x 1850
CHP-26H4	3 phase 415V/50Hz	6.7	29.3	3.9	1300 x 890 x 1705
CHP-35H	3 phase 415V/50Hz	8.13	36.5	3.9	1152 x 910 x 1620
CHP-080Y2	3 phase 415V/50Hz	18.8	78.4	3.9	1790 x 1010 x 2000

* Average COP based on constant hot water supply at 65°C and ambient temperature range of -7°C to 43°C.
** Hot water temperature for model CHP-5R is fixed at 63°C.

Designed for Space and Energy Efficiency

With a heating performance of 80 kW, the CHP-080Y2 was developed to reduce high hot water supply costs and large space requirements that inevitably occur in facilities requiring a large hot water supply.

The structure of the Y-shaped frame reduces power consumption and allows units to be installed close together. The heating performance can be switched between three modes in order to adjust the energy to suit how you use hot water, and performance does not decrease* in temperatures down to -15°C.

This flexible system is suitable for a wide range of facilities that use large volumes of hot water, and is durable enough to provide a steady hot water supply for a long time.

* Energy-saving mode only

Product Quick Check

Type	**CO_2 Heat Pump**	Fuel Type	**Electricity**	Max Pressure	**490 kPa**
Range	**5-80kW**	Outdoor option	**Yes**	Zero Nox	**Yes**
Efficiency	**Average COP 3.9**	Cascadable	**Yes**	Building J Code 2018 compliant	**Yes**

Performance Data

Product Code	Constant Supply Hot Water at 65°C				
	Heating Ability kW A / B / C*	Storage Capacity L/h A / B / C*	Supply Water → Hot Water °C A / B / C*	Power Consumption Kw A / B / C*	Average COP
CHP-5R	4.5**	79**	17-63**	2.3**	3.9
CHP-15F	15 / 15 / 15	230 / 269 / 315	9→65 / 17→65 / 24→65	3.6 / 3.4 / 3.13	4.0
CHP-26H4	24.0 / 26.3 / 29.3	369 / 471 / 615	9→65 / 17→65 / 24→65	6.20 / 6.55 / 6.70	3.9
CHP-35H	36.5 / 35.5 / 35	560 / 636 / 765	9→65 / 17→65 / 24→65	9.67 / 8.95 / 8.13	3.9
CHP-080Y2	61.1 / 65.6 / 66.4	938 / 1175 / 1392	9→65 / 17→65 / 24→65	16.1 / 16.1 / 14.9	3.9

Product Code	Constant Supply Hot Water at 90°C				
	Heating Ability kW A / B / C*	Storage Capacity L/h A / B / C*	Supply Water → Hot Water °C A / B / C*	Power Consumption Kw A / B / C*	Average COP
CHP-15F	15 / 15 / 15	159 / 177 / 177	9→90 / 17→90 / 24→90	4.68 / 4.48 / 4.16	3.4
CHP-26H4	24.5 / 25.5 / 27.0	260 / 300 / 352	9→90 / 17→90 / 24→90	7.40 / 7.50 / 7.80	3.4
CHP-35H	35.5 / 35.5 / 36.5	376 / 428 / 475	9→90 / 17→90 / 24→90	11.3 / 11.0 / 10.4	3.4
CHP-080Y2	58.9 / 63.9 / 62.7	625 / 752 / 817	9→90 / 17→90 / 24→90	18.3 / 19.3 / 17.8	3.6

* Ambient Temperatures - **A: DB7°C / WB6°C (Winter) - B: DB16°C / WB12°C (Intermediate) - C: DB25°C / WB21°C (Summer)**
** Ambient temperature of 20°C

Specifications

Product Code		CHP-5R	CHP-15F	CHP-26H4	CHP-35H	CHP-080Y2
Power Supply		Single phase 240V 50Hz	3 phase 415V 50Hz			
Maximum Current	A	9.6	12	26	40	51
Power Consumption	kW	2.3	4.8	7.5	8.95	24
Operating Current	A	8	10	13	15	35
Voltage	V	240	415	415	415	415
Circuit Breaker Size	A	20	20	50	50	63
Design Pressure at Refrigerant Side	MPa	Low pressure side 9 / High pressure side 14	Low pressure side 8 / High pressure side 13.2	Low pressure side 7.5 / High pressure side 14		
Compressor Type		Rotary compressor	Horizontal scroll compressor	Semi-hermetic reciprocating compressor		
Compressor Motor Type		Hermetic motor compressor	Three-phase induction motor		Inverter drive three-phase induction motor	
Compressor Rated Output	kW	1.1	1.9kW x 2	8.4	11.2	15.8
Crankcase Heater	W	N/A	N/A	100	140	
Fan	W	Propeller Fan 70	Propeller fan (47Wx2)	Propeller fan (110Wx2)	Propeller fan (300Wx2)	
Pump	W	30	30	Seal-less, AC200V - 100W	Seal-less, DC282V - 140W	
Air heat exchanger		Forced cooling cross fin				
Protection Devices		High pressure switch High·low pressure sensor Fuse (fan & pump) Over current relay (compressor)	High pressure switch High·low pressure sensor Fuse (fan & pump) Compressor motor excessive temp. protection Compressor rupture disk Over current relay (compressor)		High pressure switch High·low pressure sensor Compressor over heat cut out device Compressor pressure relief valve Over current relay (fan) Over current protection	
Supply hot water heat exchanger		Forced circulation double-piping type				
Refrigerant / filling volume	kg	CO_2 (R744) / 0.74	CO_2 (R744) / 2 x 1.18	CO_2 (R744) / 6.8	CO_2 (R744) / 7.0	CO_2 (R744) / 11.3

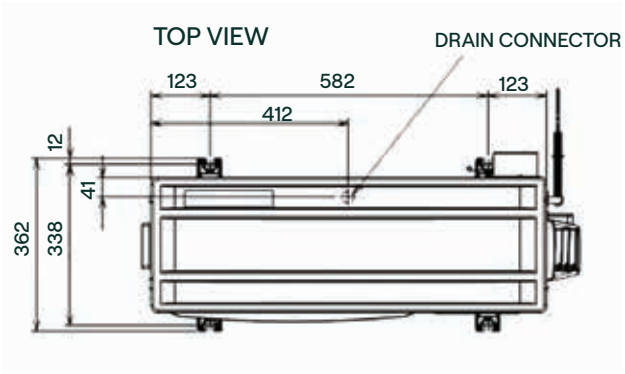
Dimensional Data

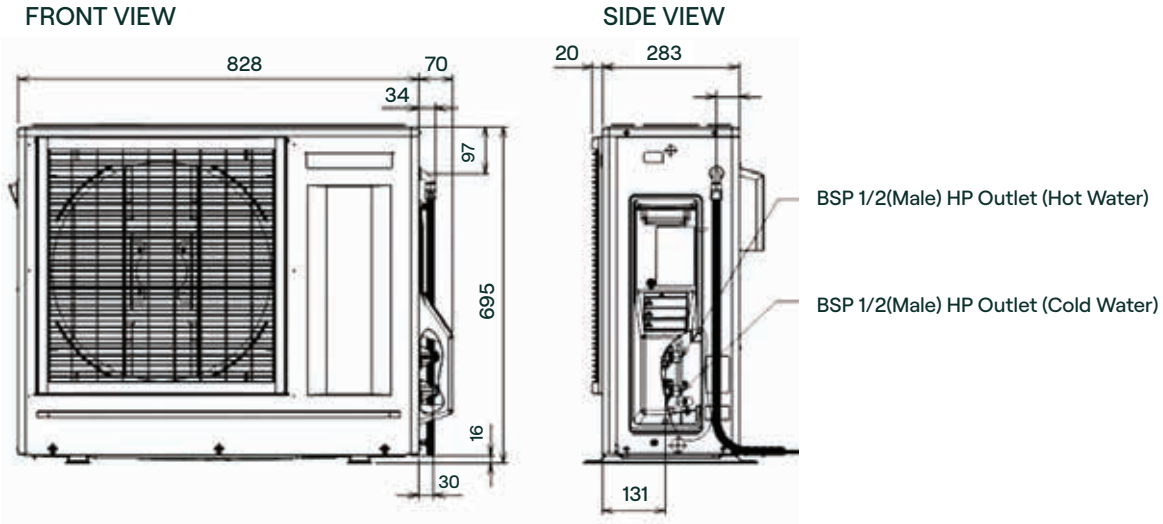
Product Code	Dimensions (H x W x D mm)	Product mass/Operating weight (kg)
CHP-5R	675 x 825 (+70) x 300	49
CHP-15F	1850 x 900 x 450	174 / 177
CHP-26H4	1705 x 1300 x 890	480 / 500
CHP-35H	1152 x 910 x 1620	530 / 535
CHP-080Y2	2000 x 1790 x 1010	690 / 710

Dimensional Data

CHP-5R

Dimensions

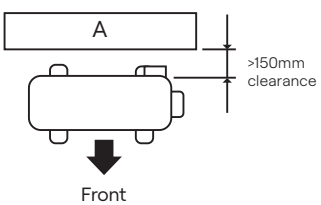




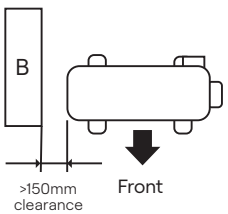
All dimensions displayed in millimeters

Installation Guidelines

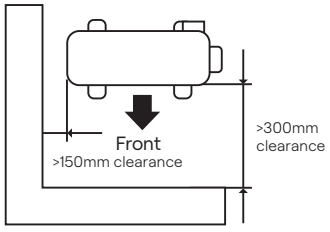
Flat Wall Installation

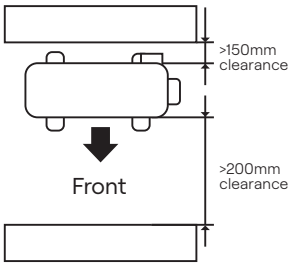


Caution: Water fitting side must have 300mm clearance. 600mm is desireable



Corner Wall Installation

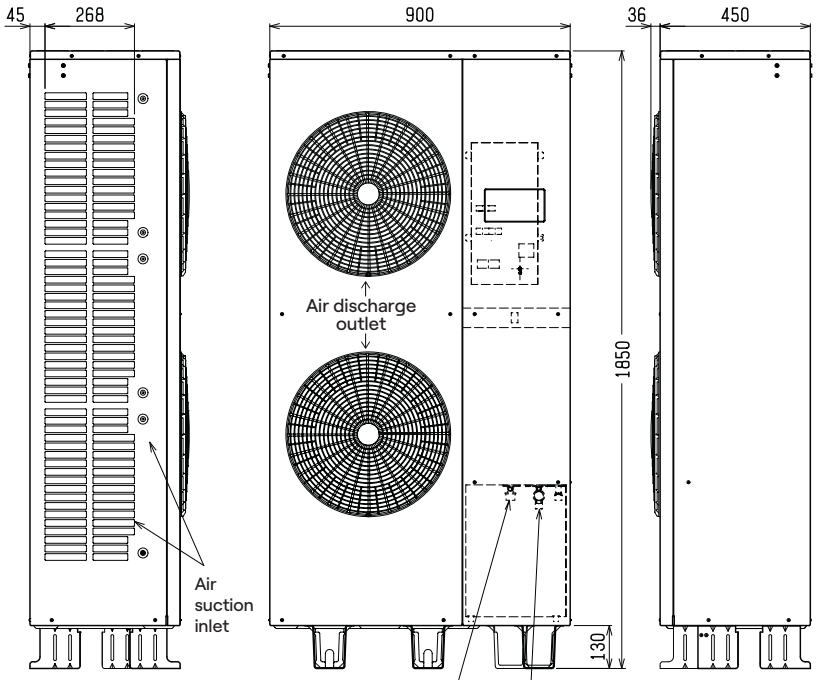




Dimensional Data

CHP-15F

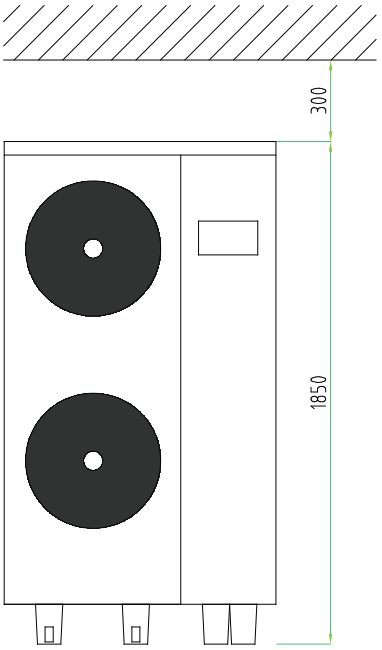
Dimensions



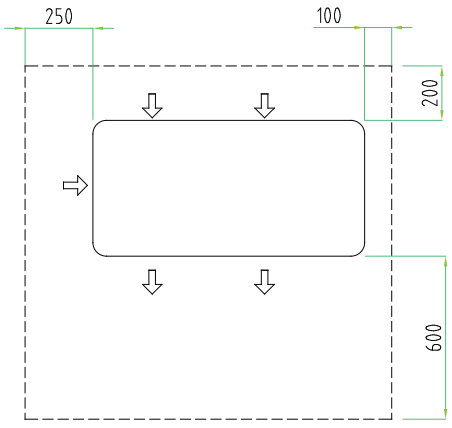
Product mass	174kg
Operating weight	177kg

Installation Guidelines

FRONT VIEW SHOWING TOP SPACE REQUIRED FOR MAINTENANCE



PLAN VIEW SHOWING CLEARANCE SPACES REQUIRED



⇩ ARROW DENOTES AIR INPUT AND OUTPUT DIRECTION

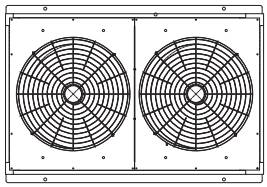
- This unit is suitable for outdoor installation only.
- Please seek advice from our technical support team if clearances specified are not available.

Dimensional Data

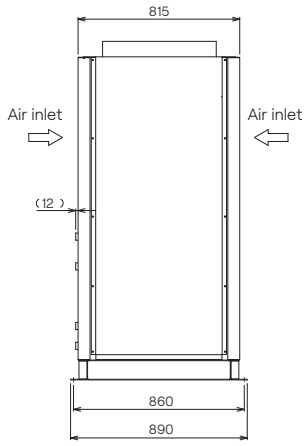
CHP-26H4

Dimensions

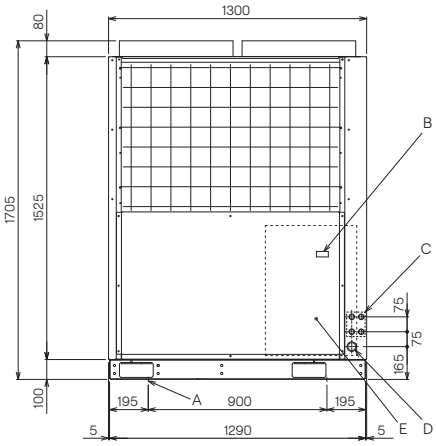
A Anchor bolt fitting holes (4⌀15 holes)
B Operation check window (front)
C External signal connection port (sensor, etc.,⌀ 24 holes)
D Power source port (⌀39 hole)
E Control board position (front)
F Hot water outlet Rc3/4 (20 A, CAC406)
G Supply water inlet Rc3/4 (20 A, CAC406)
H Air heat exchanger room drain Rc1 (25 A, C3604BD)
I Drain outlet Rc3/4 (20 A, CAC406)



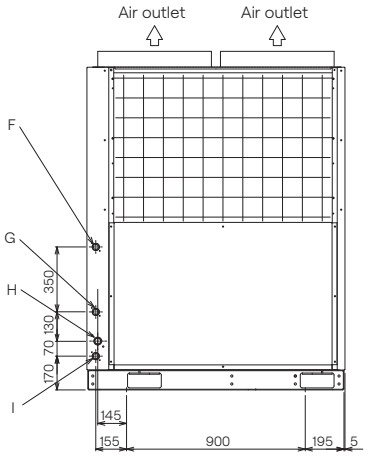
Top view



Left view



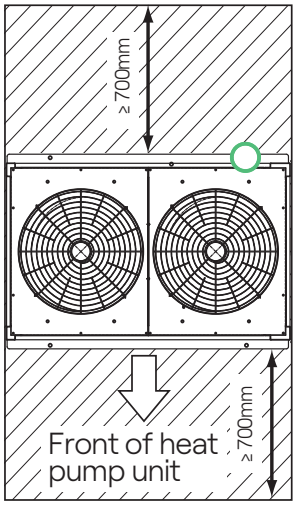
Front view



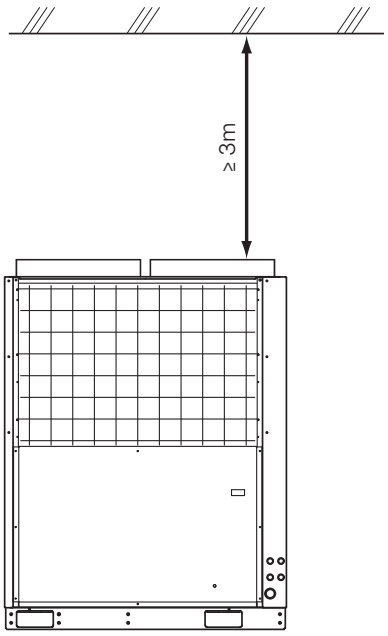
Back view

Installation Guidelines

TOP VIEW OF HEAT PUMP UNIT



FRONT VIEW OF HEAT PUMP UNIT



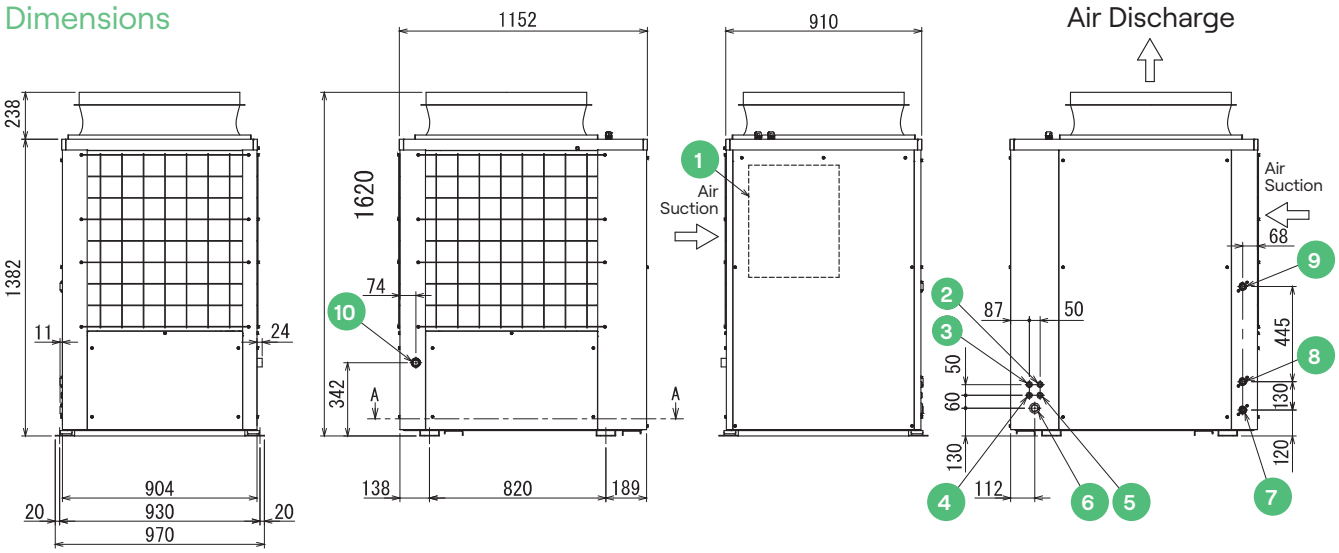
- Install the heat pump unit outdoors, with adequate ventilation
- Install in a location where cold air from the air outlets of the heat pump unit or operating sounds will not disturb neighbours, or take soundproofing measures.
- The diagram shows the space required for maintenance and inspections. It may not be possible to perform maintenance or inspections without the necessary space. Make sure to leave sufficient space when designing the layout.

○ Pipe Slot

Dimensional Data

CHP-35H

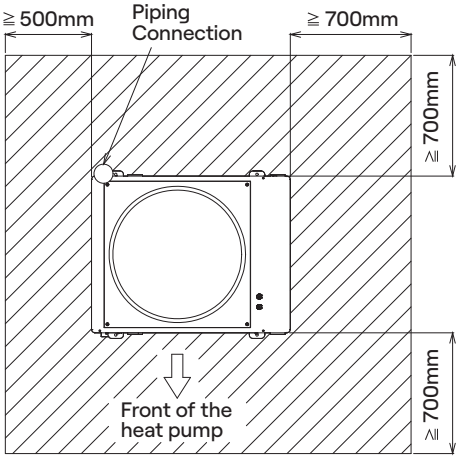
Dimensions



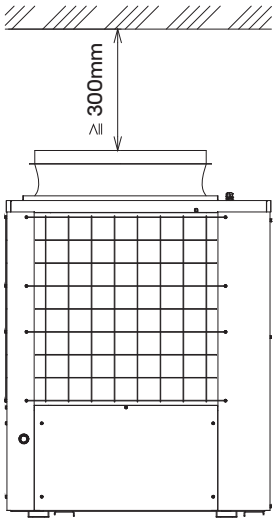
1. Control Panel
2. External Signal Connection (ø 22 Hole)
3. Remote Control Line Connection (ø 22 Hole)
4. Operating Wiring Connection (ø 22 Hole)
5. Distant Control Panel Connection (ø 22 Hole)
6. Power Source Inlet (ø 39 Hole)
7. Heat Pump Unit Drain Outlet Rc3/4 (20A)
8. Supply Water Inlet Rc3/4 (20A)
9. Supply Hot Water Outlet Rc3/4 (20A)
10. Air Heat Exchanger Room Drain Rc1 (25A)

Installation Guidelines

TOP VIEW



FRONT VIEW

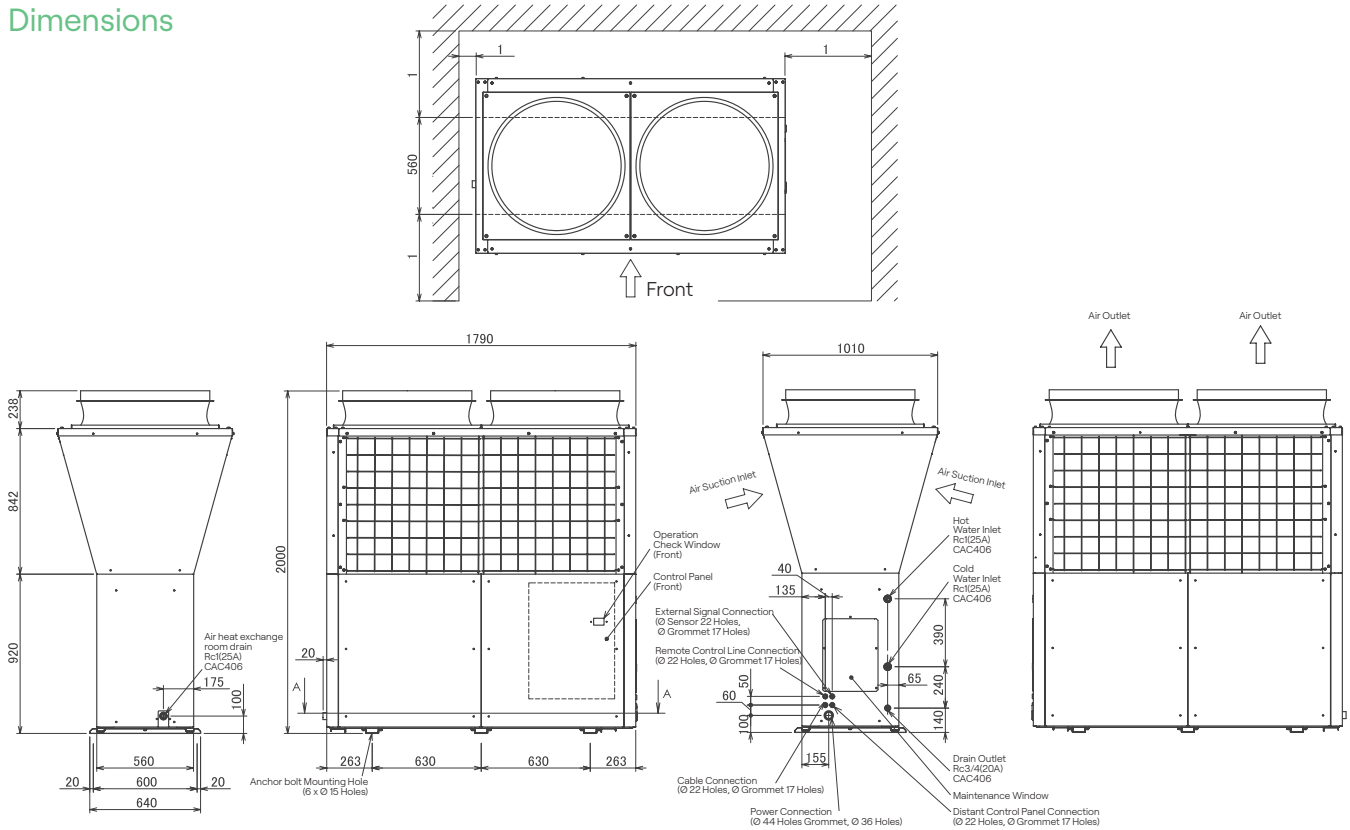


- Select an installation location where cool and hot air from the air outlets of the heat pump unit or operating sounds will not disturb neighbours, or take noise insulation measures.
- The shaded areas in the figures below are required for maintenance and inspection. If enough space is not provided, it may be impossible to carry out maintenance. When designing the installation of the Revere® CHP-35H, ensure the space for maintenance is provided.
- Install the heat pump unit outdoors.

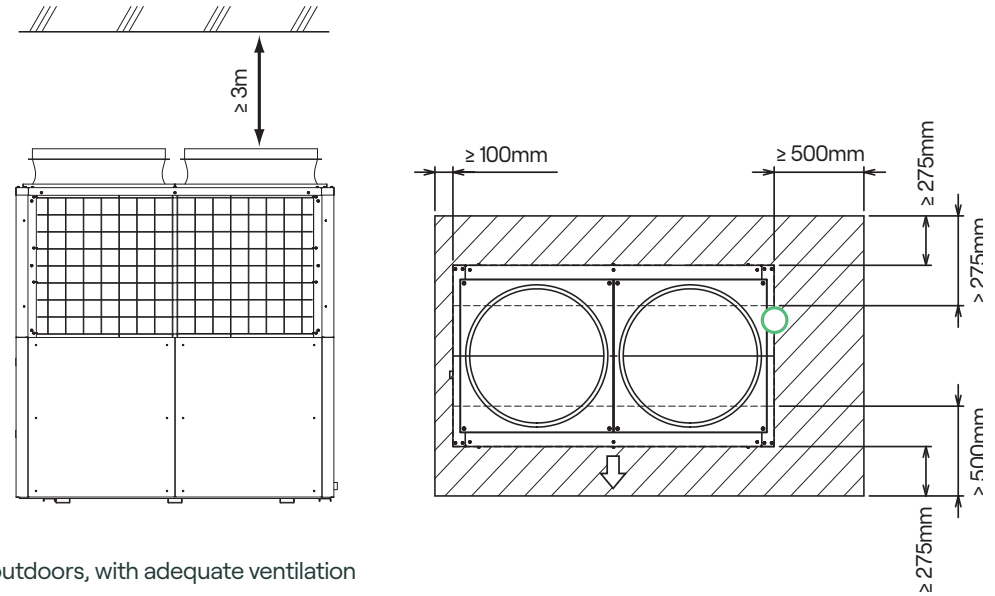
Dimensional Data

CHP-080Y2

Dimensions



Installation Guidelines



- Install the heat pump unit outdoors, with adequate ventilation
- Install in a location where cold air from the air outlets of the heat pump unit or operating sounds will not disturb neighbours, or take soundproofing measures.
- The diagram shows the space required for maintenance and inspections. It may not be possible to perform maintenance or inspections without the necessary space. Make sure to leave sufficient space when designing the layout.

Case Studies

Aged Care Facility, Beaconsfield VIC

2 x 76kW Revere® CO_2 Air to Water Heat Pumps
2 x Thermex Stainless Steel Twin Coil Tanks
1 x Thermex Buffer Tank

This customised hot water heating solution services both the domestic hot water and hydronic heating at this 90 room Beaconsfield Aged Care Facility.

The prefabricated package system also ensured a smooth changeover with no inconvenience to residents or staff.

Apartment Complex, Hobart TAS

1 x 76kW Revere® CO_2 Air to Water Heat Pump
2 x Thermex Stainless Steel Twin Coil Tanks
1 x Thermex Buffer Tank

This system provides hydronic heating and a central hot water supply for the 30 apartments that make up this beautiful seven-story community housing project. The project achieved independence of fossil fuels and an effective heating system powered entirely by renewable energy.

Luxury Apartment Complex, Hawthorn East VIC

2 x 26kW Revere® CO_2 Air to Water Heat Pumps
2 x Thermex Stainless Steel Twin Coil Tanks

With world class amenities and luxury Italian detailing, this 10 storey project includes penthouses with private rooftop gardens, a range of 1, 2 & 3 bedroom apartments and a fully appointed 24hr gym. This DHWS offers the ultimate in energy efficiency.

Commercial Office Project, Melbourne VIC

2 x 15kW Revere® CO_2 Air to Water Heat Pumps
6 x Revere® R32 Air to Water Heat Pumps
9 x Thermex Stainless Steel Twin Coil Tanks

The sustainability initiatives implemented for this project have resulted in significantly enhanced energy efficiency and cost savings. The highly efficient, fully electrified hot water heating systems provide domestic hot water for 3 levels and the End of Trip facilities.

Case Studies

Apartment Complex, Docklands VIC

1 x 15kW Revere® CO_2 Air to Water Heat Pump
2 x Thermex Stainless Steel Twin Coil Tanks
5 x Meridian Condensing Water Heaters
1 x Thermex Buffer Tank

Designed to run as efficiently, sustainably, and economically as possible, this new hybrid solution replaced two atmospheric 500kW boilers and provides domestic hot water to 175 apartments over 32 levels.

Apartment Complex, Fairfield VIC

2 x 15kW Revere® CO_2 Air to Water Heat Pumps
1 x Buffer Tank
2 x Twin Coil Stainless Steel Tanks

This project achieves remarkable sustainability goals with energy efficient CO2 heat pumps for the heating and hot water. With a GWP of 1, CO2 Heat pumps are 1800 times more environmentally friendly than a standard heat pump with R410A refrigerant.

University Bike Arrival Station, Clayton VIC

1 x 15kW Revere® CO_2 Air to Water Heat Pump
2 x 750L Twin Coil Watermark Stainless Steel Tanks

This prefabricated skid frame package system provides domestic hot water for 28 showers and hot water for hydronic heating.

Industrial Application, Williamstown VIC

2 x 15kW Revere® CO_2 Air to Water Heat Pumps
2 x 400L Twin Coil Watermark Stainless Steel Tanks

This prefabricated skid frame package system provides 90°C hot water for industrial process applications.

Flowenergy
HEATING & VENTILATION SOLUTIONS

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