A2W – W2W HEAT PUMP TRAINING
MODULE 1

19/07/2023

HEATING COOLING WATER HEATING

Outline – Module 1

- Principal of Heat Pump
- Nomenclature
- Product Range
- Overview
- Difference Between A2W-W2W
- Types of System and Installation Diagram
- Key Components & Features
- Performance

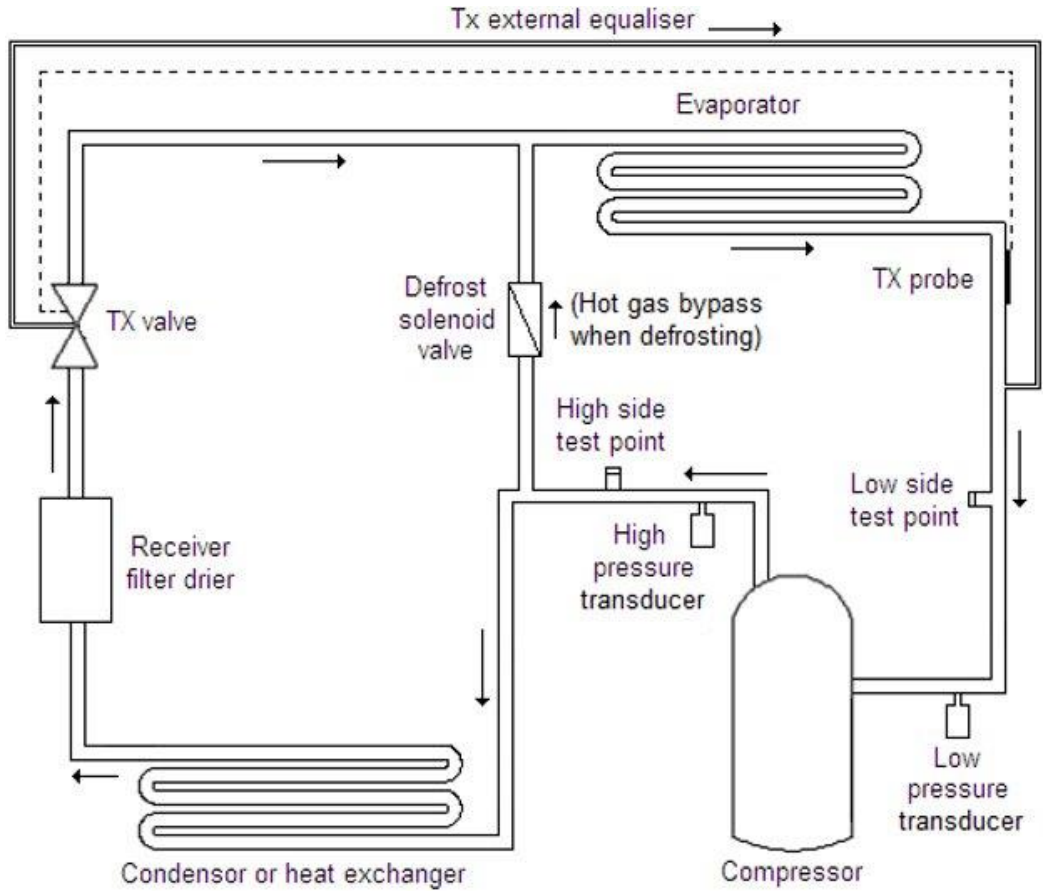
WELCOME

TO A NEW LEVEL OF INNOVATION

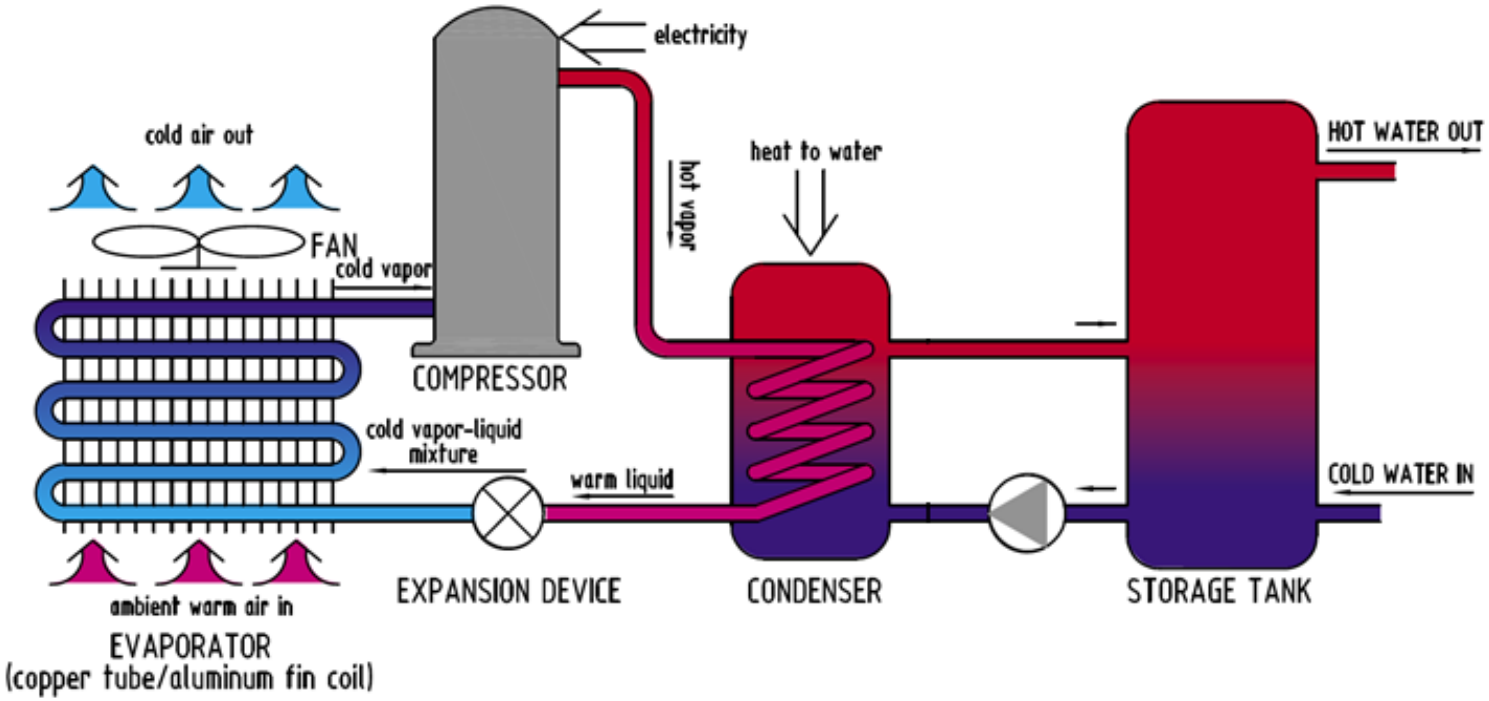
Principle of HP Technology

What is a Heat Pump ?

- Similar to air conditioner
- Uses vapour compression cycle to transfer low grade heat energy into hot water.
- The energy source is free and due to the vapour compression cycle only the energy used to drive electrical equipment is consumed, making heat pumps extremely energy efficient.



Compression Cycle & Heat Pump



1: Compressor
2: Hot water HEX
3: Filter/drier.
4: Expansion device
5: Evaporator
6: Fan
7: HEX water in
8: HEX water out

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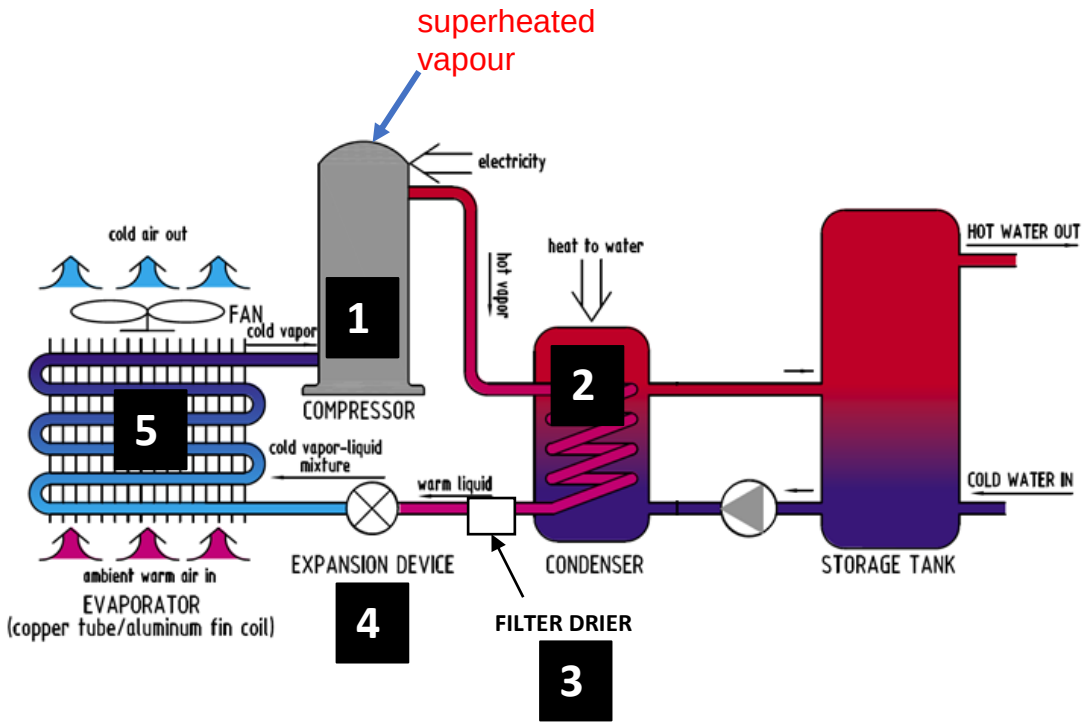
Compression Cycle & Heat Pump

The five main components of the sealed refrigeration system are the compressor **(1)**, hot water heat exchanger **(2)**, receiver filter/drier **(3)**, expansion device (TXV or EEV) **(4)**, and evaporator **(5)**.

Refrigerant enters the compressor **(1)** as a low pressure superheated vapour. The compressor increases the pressure of the refrigerant vapour by decreasing its volume, as well as increasing its temperature due to the addition of the heat of compression.

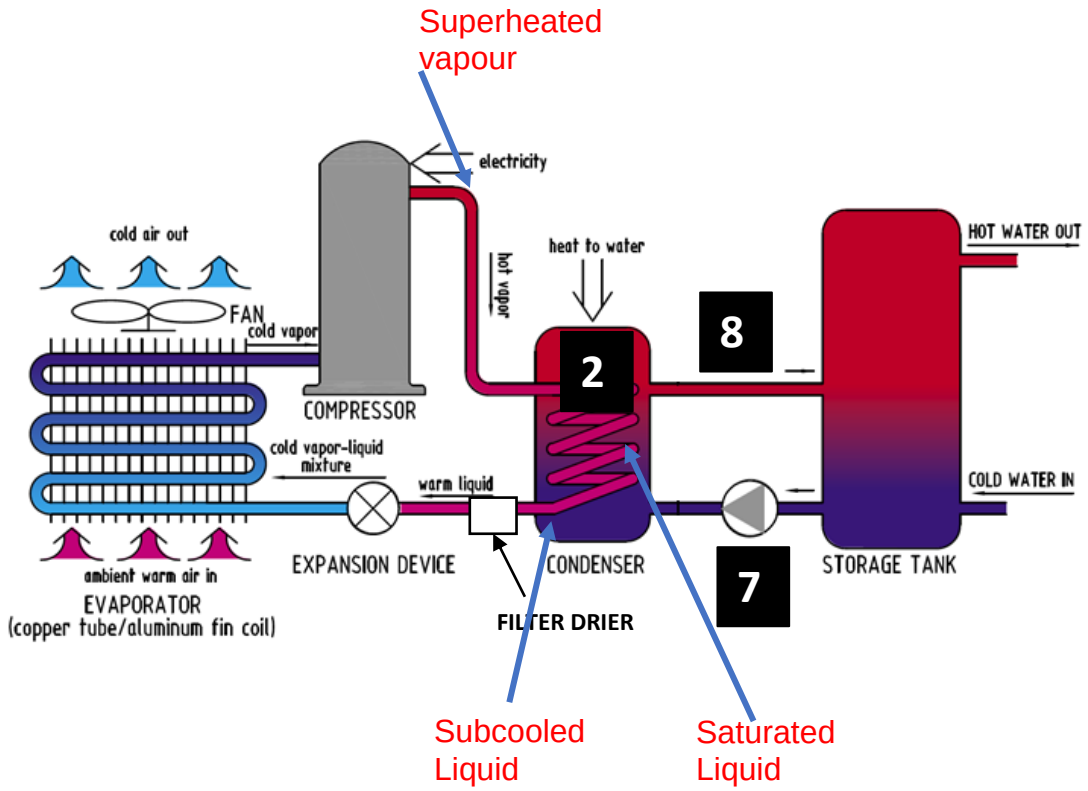


Compression Cycle & Heat Pump

The high pressure, high temperature superheated refrigerant vapour flows to the hot water heat exchanger **(2)**, where it gives off its heat.

This heat is absorbed by the water from the storage tank(s) which is being circulated through a separate chamber in the hot water heat exchanger **(7/8).**

As the refrigerant gives off its heat and becomes cooler, it condenses (changes state) to a saturated liquid. Cooling of the saturated liquid refrigerant continues such that it becomes sub cooled, meaning it is cooled to a temperature below its saturation point.

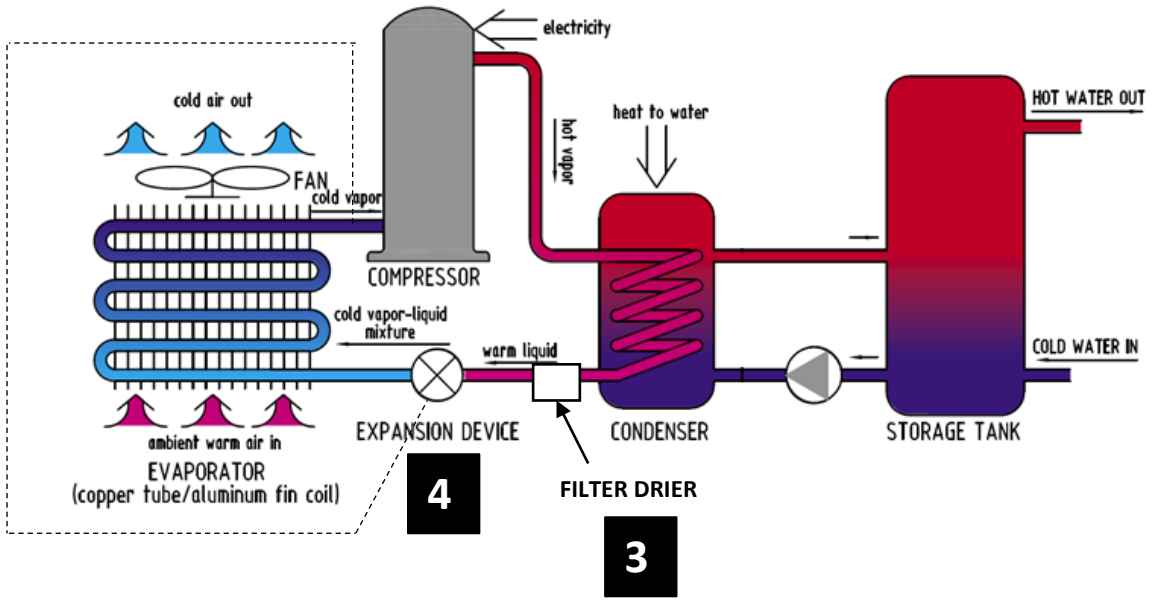


Compression Cycle & Heat Pump

The liquid refrigerant then moves through the receiver filter/drier **(3)** which traps impurities and removes moisture.

The liquid refrigerant then moves through the TXV or EEV **(4)**, where it is expanded to a lower pressure by moving through the valve's orifice. The expansion process also lowers the temperature of the refrigerant, to a point below that of the surrounding ambient air.

The TXV/EEV senses the temperature of the suction line at the evaporator outlet. The valve thermostatically meters the flow of expanding refrigerant in response to the temperature of the suction line.

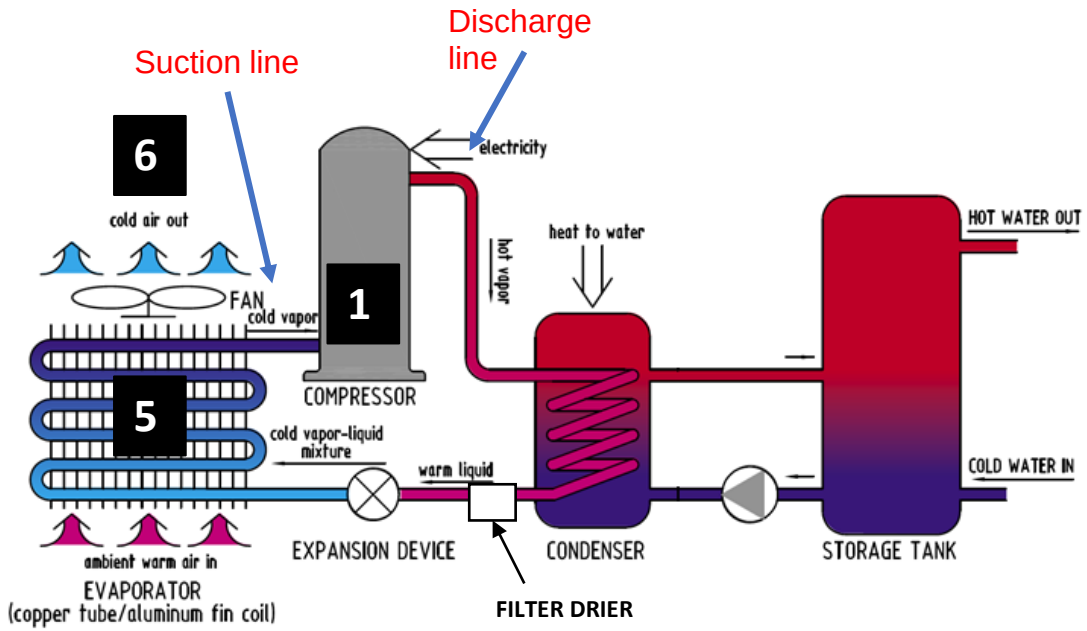


Compression Cycle & Heat Pump

Following expansion, the low pressure, low temperature refrigerant moves into the evaporator **(5)** where it absorbs heat from the surrounding ambient air, which is drawn across the evaporator by the fans **(6)**.

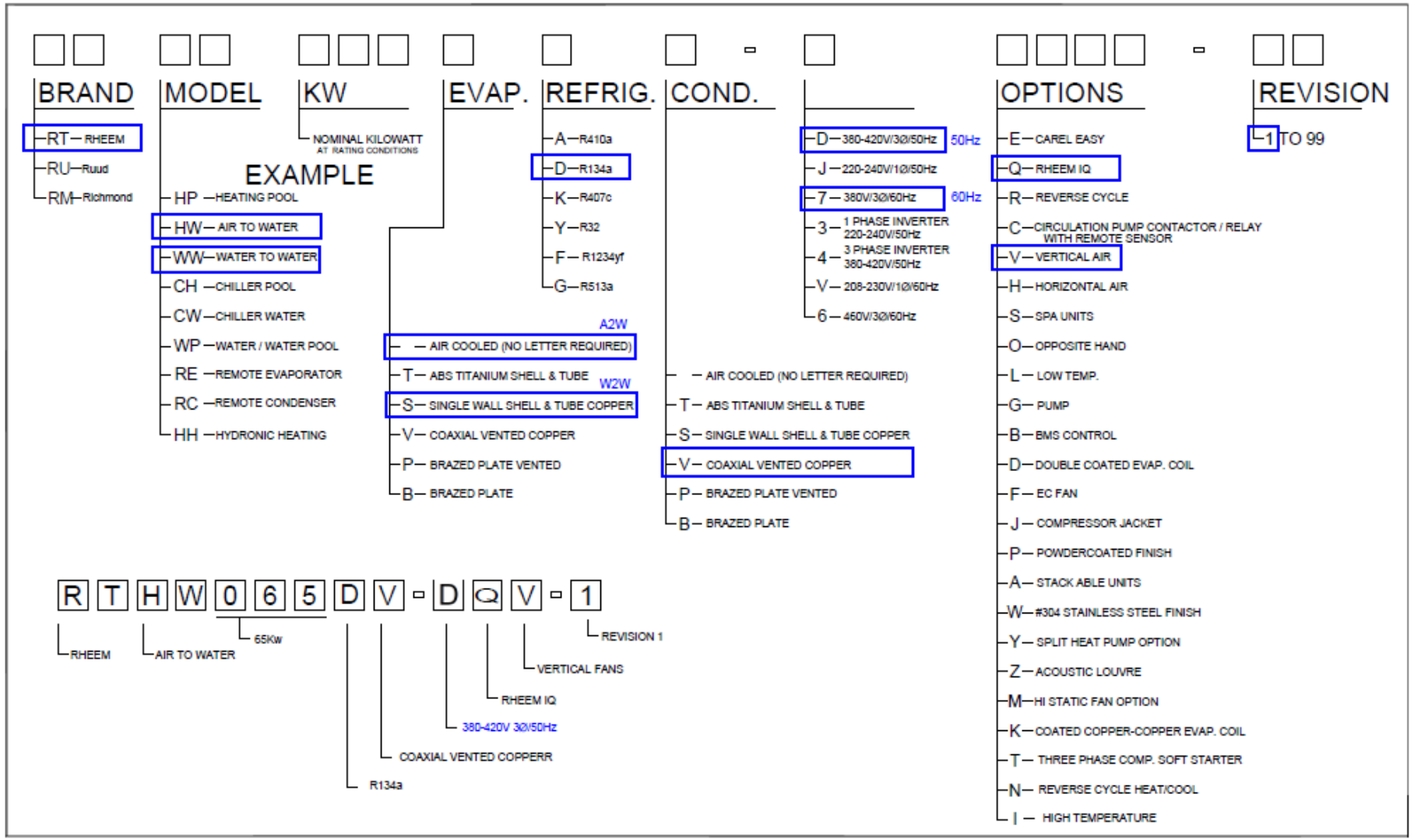
As the refrigerant absorbs heat and becomes warmer, it evaporates (changes state) to a saturated vapour. Heating of the saturated refrigerant vapour continues such that it becomes superheated, meaning it is heated to a temperature above its saturation point.

The low pressure superheated vapour then returns to the compressor **(1)** to complete the cycle.

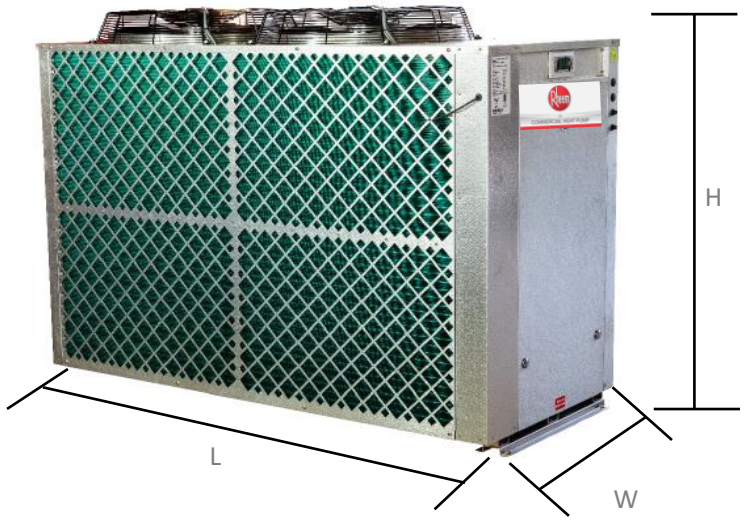


PRODUCT RANGE

Nomenclature – 50Hz



Model Numbers & Dimensions



A2W Standard Model For 50Hz Market		
Air to Water Heat Pump	**Heating Capacity (KW)**	**Dimensions (mm) Length x Width x Height**
RTHW070DV-DQV-1	70.8	2180 x 1002 x 1375
RTHW096DV-DQV-1	94.9	2180 x 1134 x 1438
RTHW124DV-DQV-1	121.8	2380x 1134 x 1476
RTHW153DV-DQV-1	151.4	2540 x 1258 x 1933
RTHW186DV-DQV-1	182.8	3463 x 1963 x 2348
RTHW248DV-DQV-1	243.7	3595 x 1963 x 2288

W2W Standard Model For 50Hz Market		
Water to Water Heat Pump	**Heating Capacity (KW)**	**Dimensions (mm) Length x Width x Height**
RTWW071SDS-DQ-1	71.1	2120 x 805 x 1000
RTWW088SDS-DQ-1	87.8	2120 x 805 x 1000
RTWW116SDS-DQ-1	114.5	2370 x 1150 x 1000
RTWW142SDS-DQ-1	142.3	2370 x 1150 x 1000
RTWW176SDS-DQ-1	175.6	2370 x 1150 x 1000
RTWW213SDS-DQ-1	213.46	2586 x 2240 x 1270

For A2W at 30 °C Ambient Temperature with water out temperature of 45°C (Max: 65°C)

For W2W at 20 °C Cold water in Temperature with water out temperature of 45 °C (Max: 70°C)

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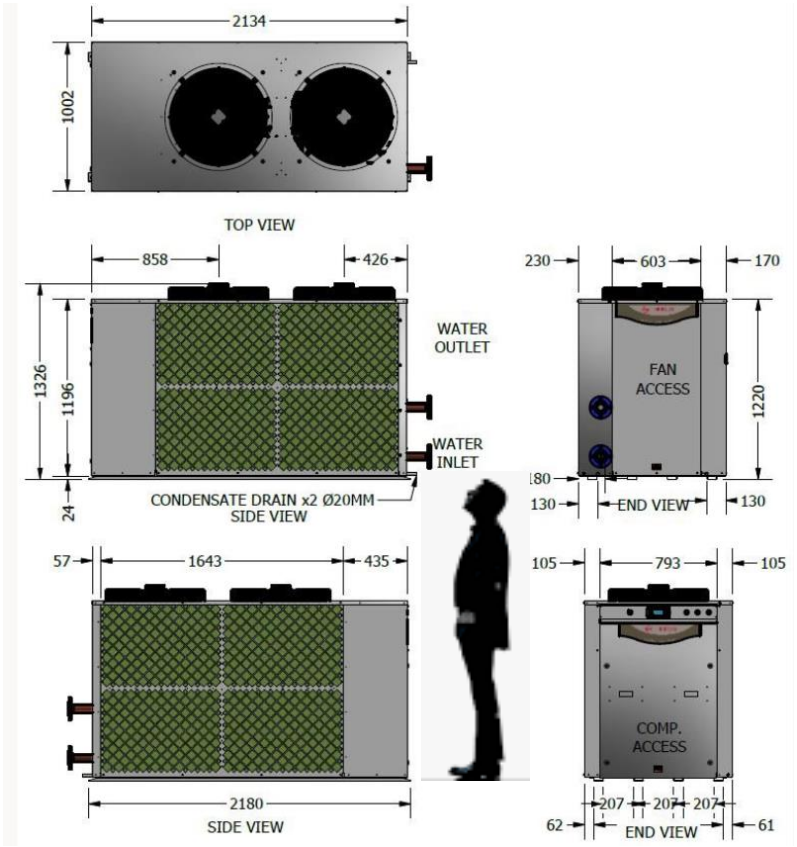
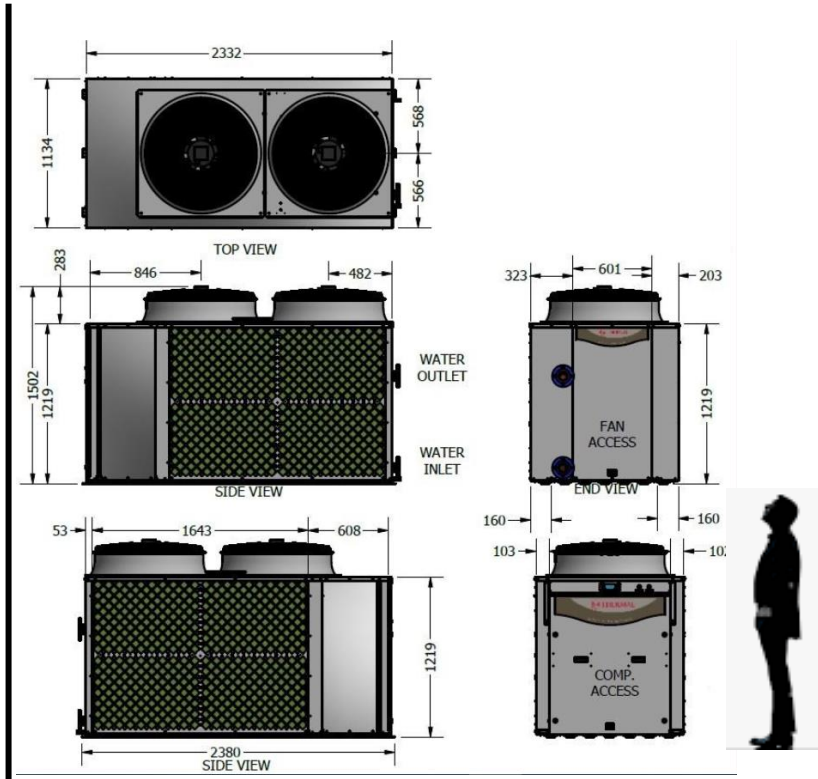
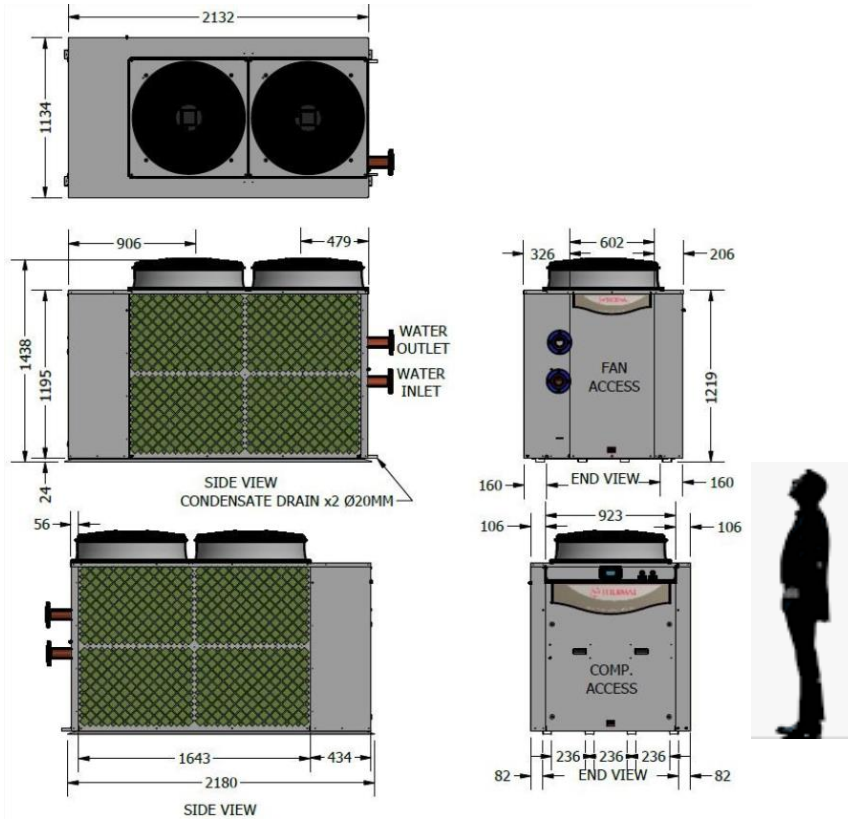
A2W Range



75/60Hz (1 comp),
70/50Hz,
96/50Hz
2 comp

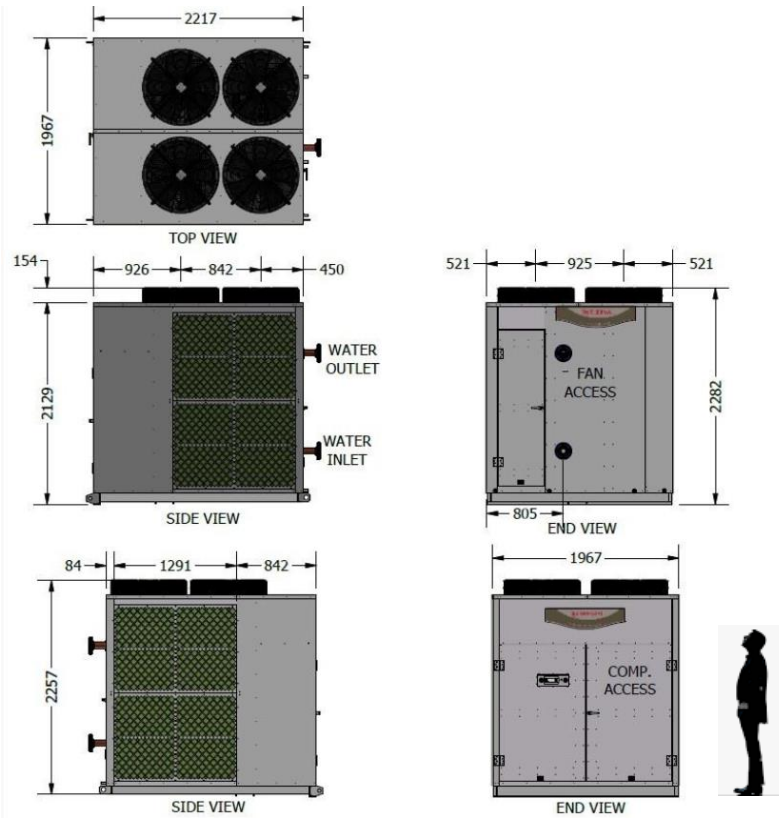


124/50Hz
2 comp

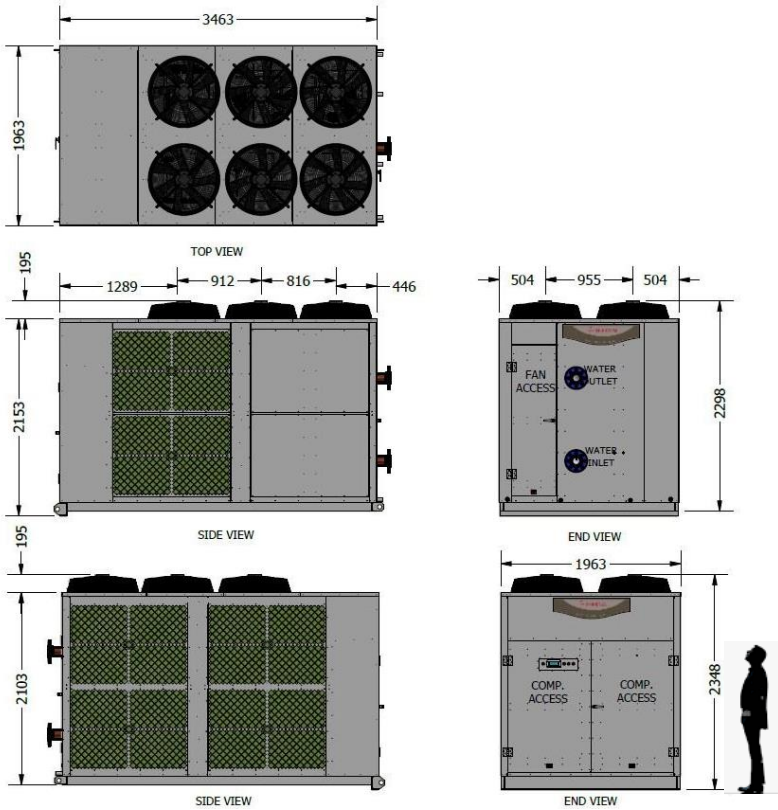


113/60Hz,
153/50Hz,
150/60Hz
2 comp

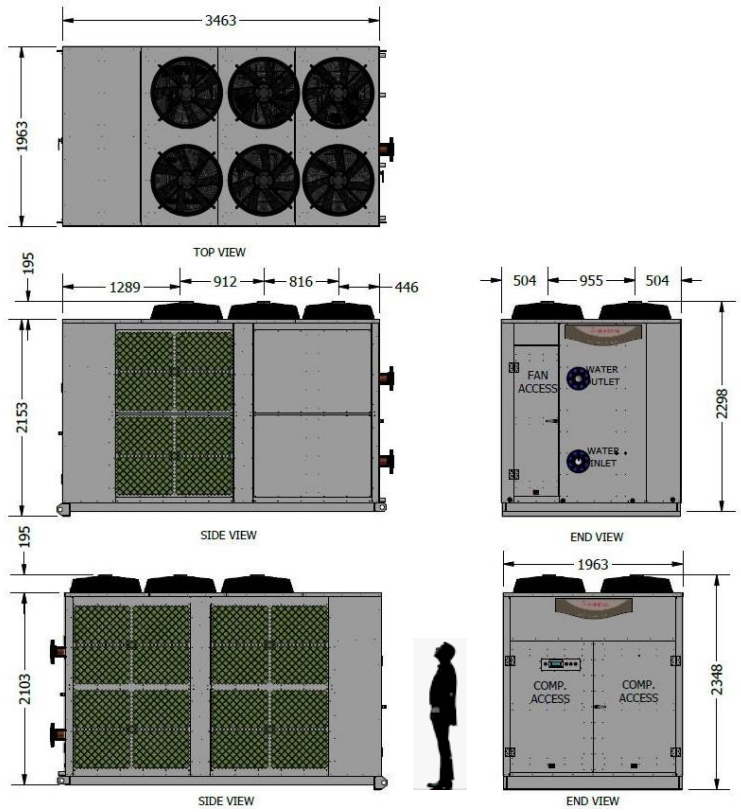
A2W Range



180/60Hz
2 comp

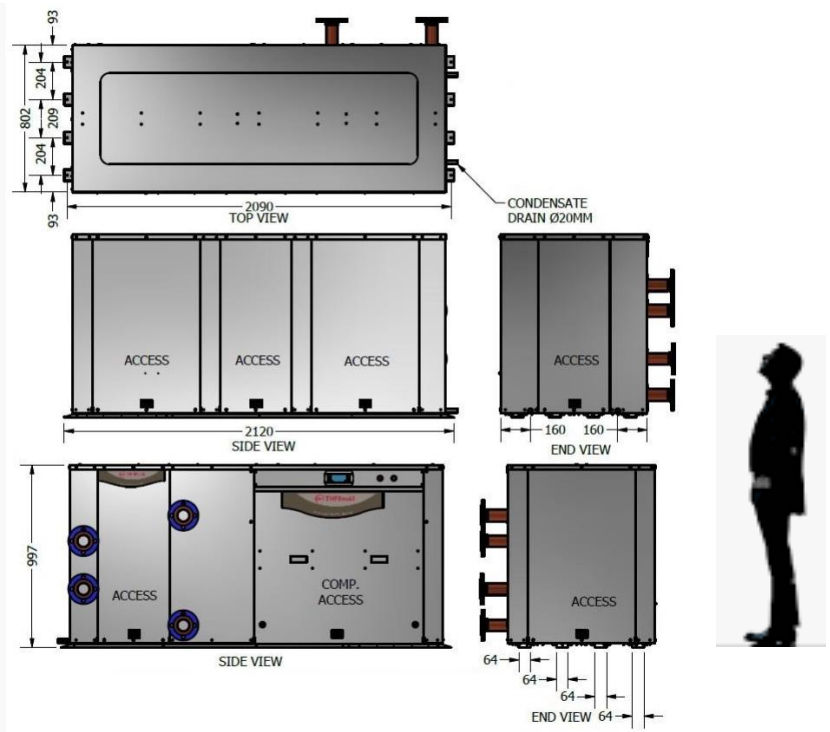


186/50Hz,
220/60Hz
3 comp

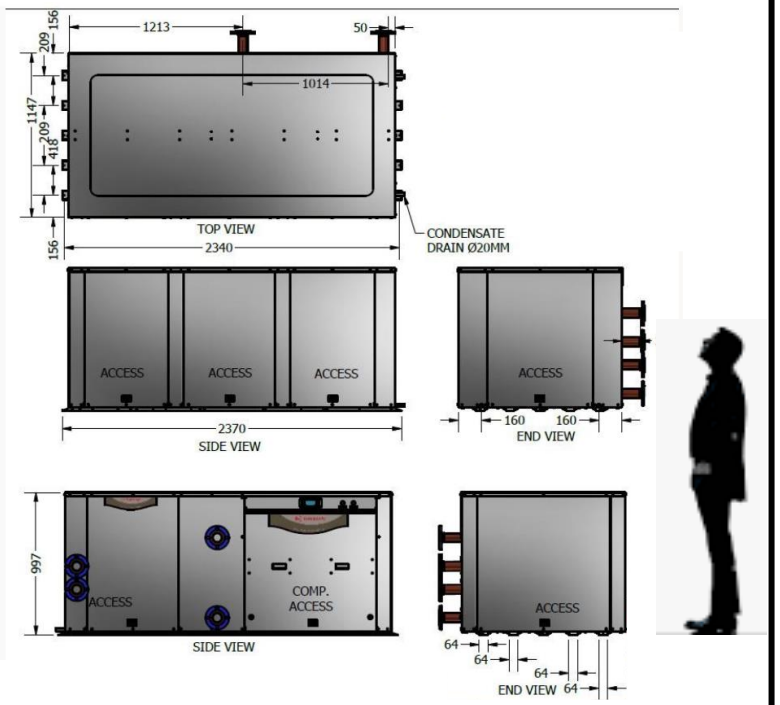


248/50Hz
4 comp

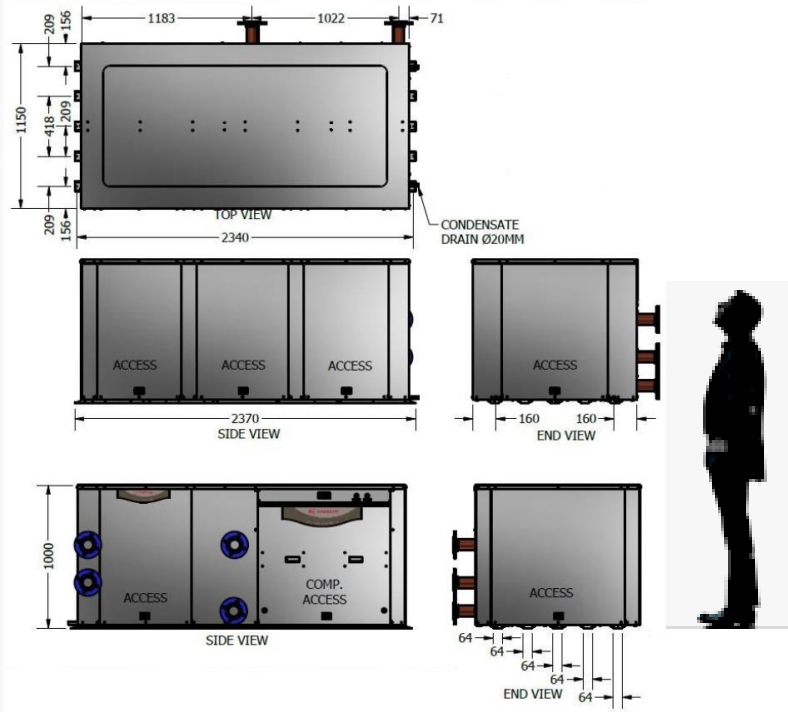
W2W Range



71/50Hz,
70/60Hz,
88/50Hz
1 comp

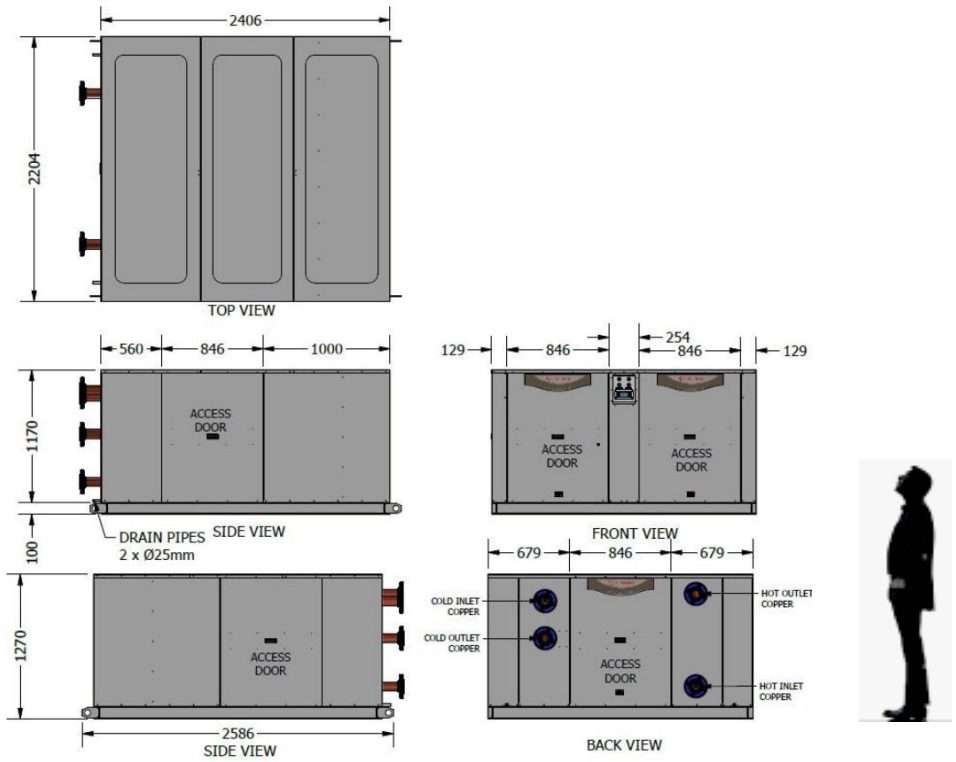


116/50Hz,
106/60Hz,
140/60Hz
142/50Hz
2 comp

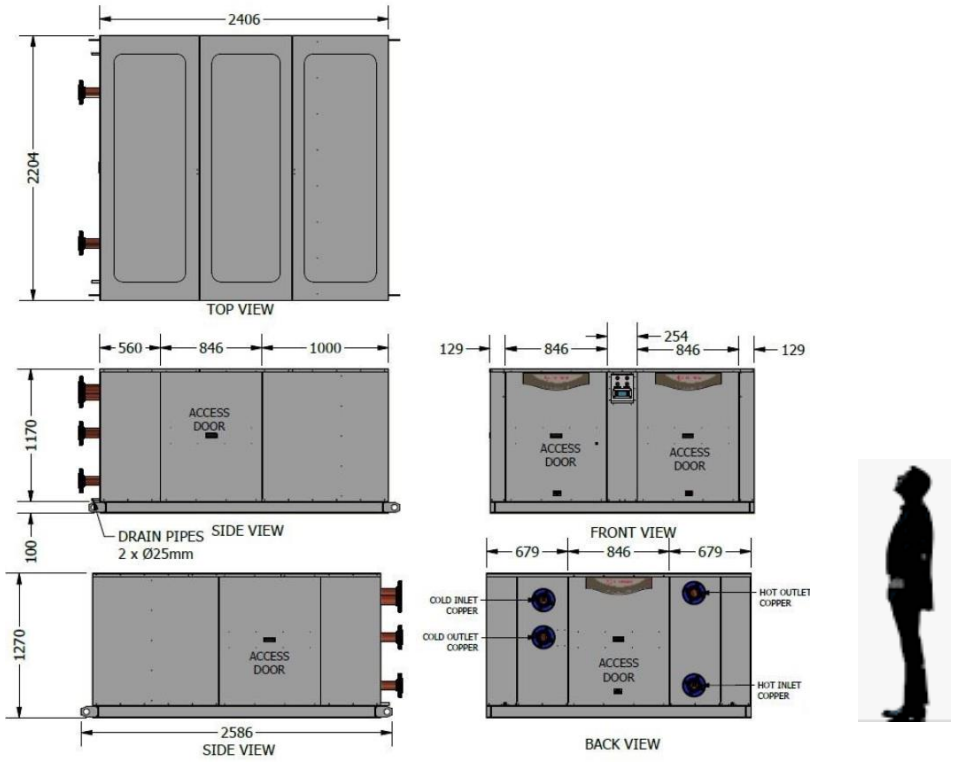


176/50Hz,
175/60Hz,
2 comp

W2W Range



213/50Hz,
210/60Hz,
3 comp



280/60Hz,
4 comp

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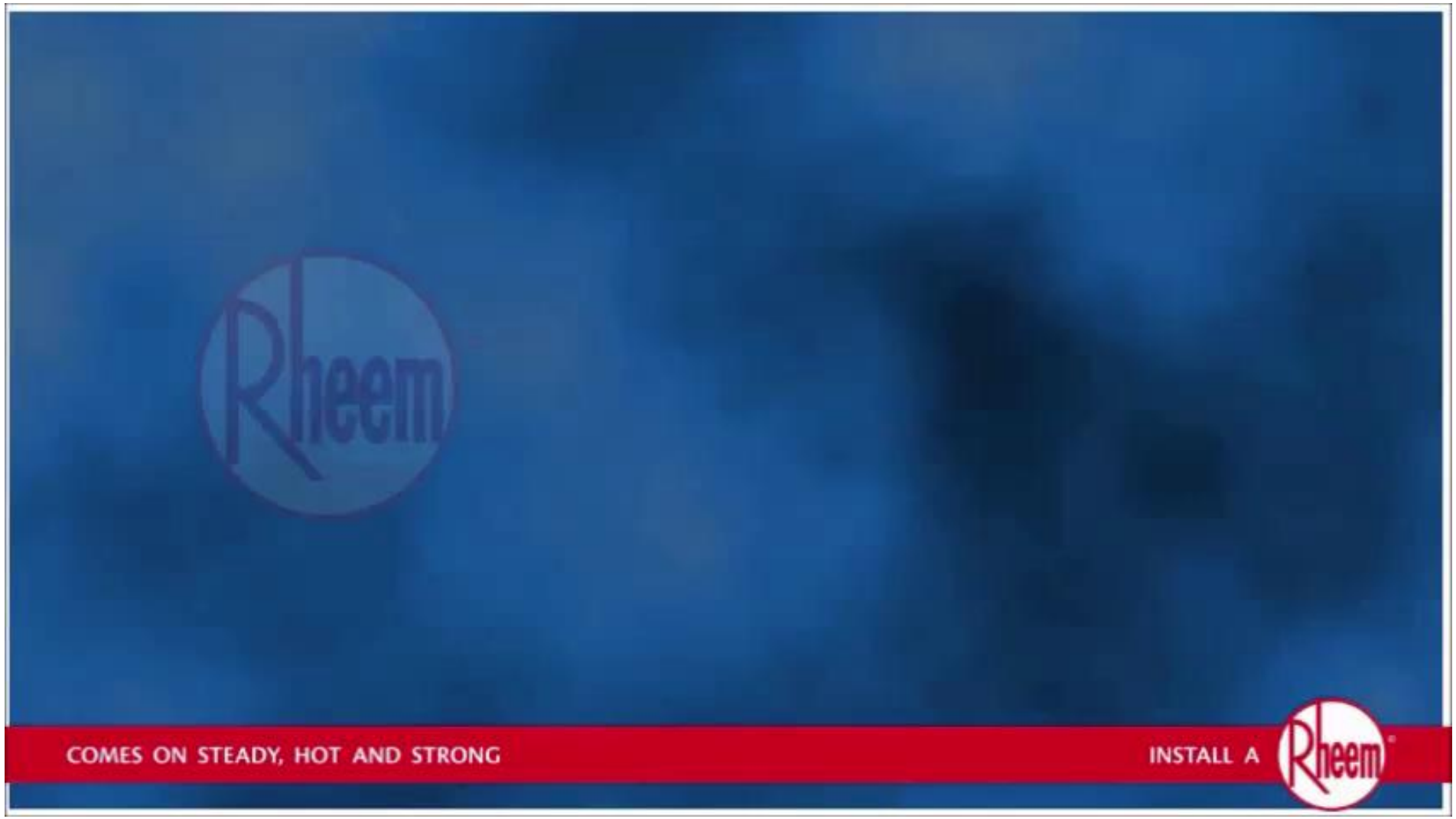
Difference Between A2W/W2W



Difference Between A2W/W2W

Heat pumps capture and then transfer energy stored in the form of heat from air and water into heating energy.

Heat energy in the surrounding air ✓

Waste heat from air conditioning System ✓

Is captured by an evaporator and then boosted by a compressor to a high temperature, at which point it is transferred via a condenser to heat water in a storage tank. This process is highly efficient.

The system saves energy, depending on the COP and operating conditions:

Up to four unit (A2W) or six units (W2W) of heating energy is gained for only one unit of electrical input energy.

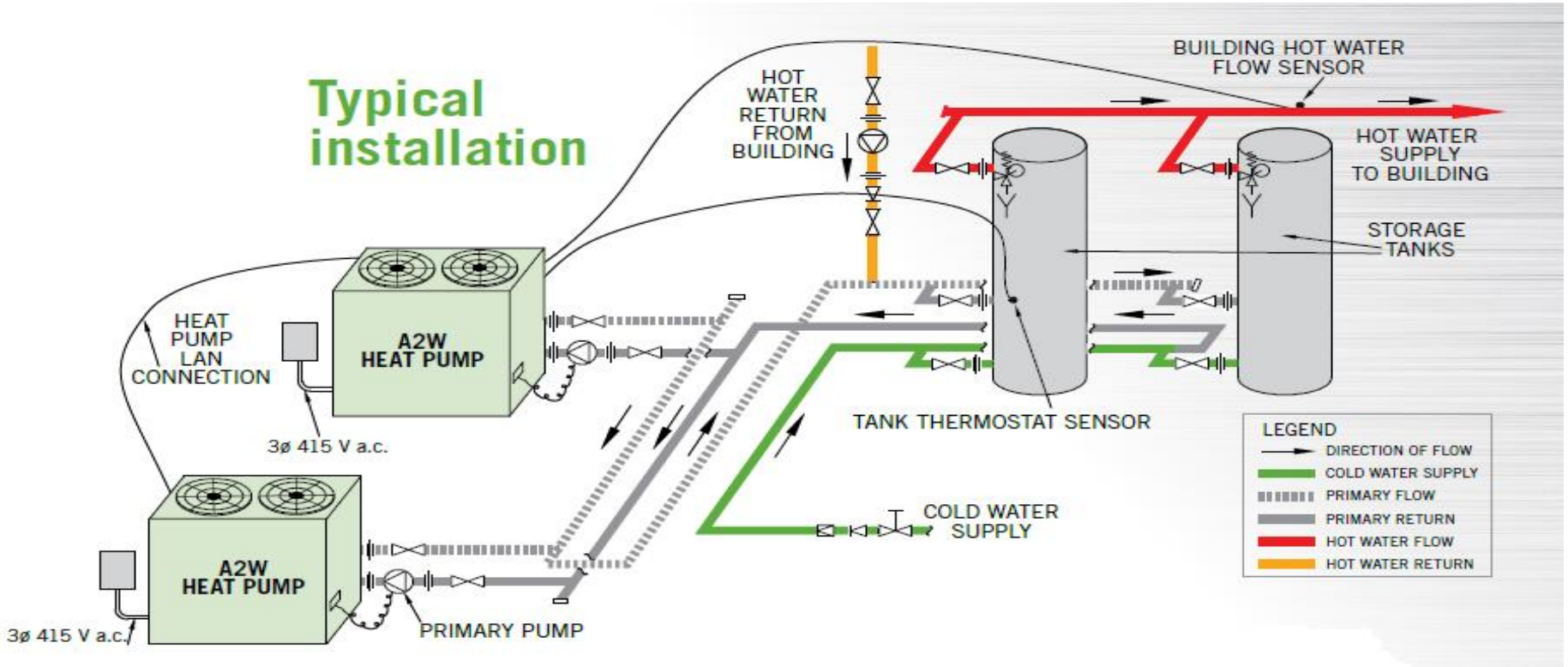
Difference Between A2W/W2W

- A2W heat pump draws energy from the atmosphere (air) over an evaporator coil. Typical air temperatures can be from 5 to 46°C
  - Evaporator **coil** and **fan** used to draw energy
  - Efficiency and recovery improves as air temperature increases
  - Larger and more noise

- W2W heat pumps use a water source of energy. Typically from chiller return water (12°C) or cooling tower (35°C) or natural sources like the ocean or rivers (18-25°C)
  - Evaporator **heat exchanger** and **pump** used to draw energy
  - Efficiency and recovery improves as supply water temperature increases
  - Smaller and quieter

INSTALLATION SCHEMATICS

Types of System & Installation – A2W



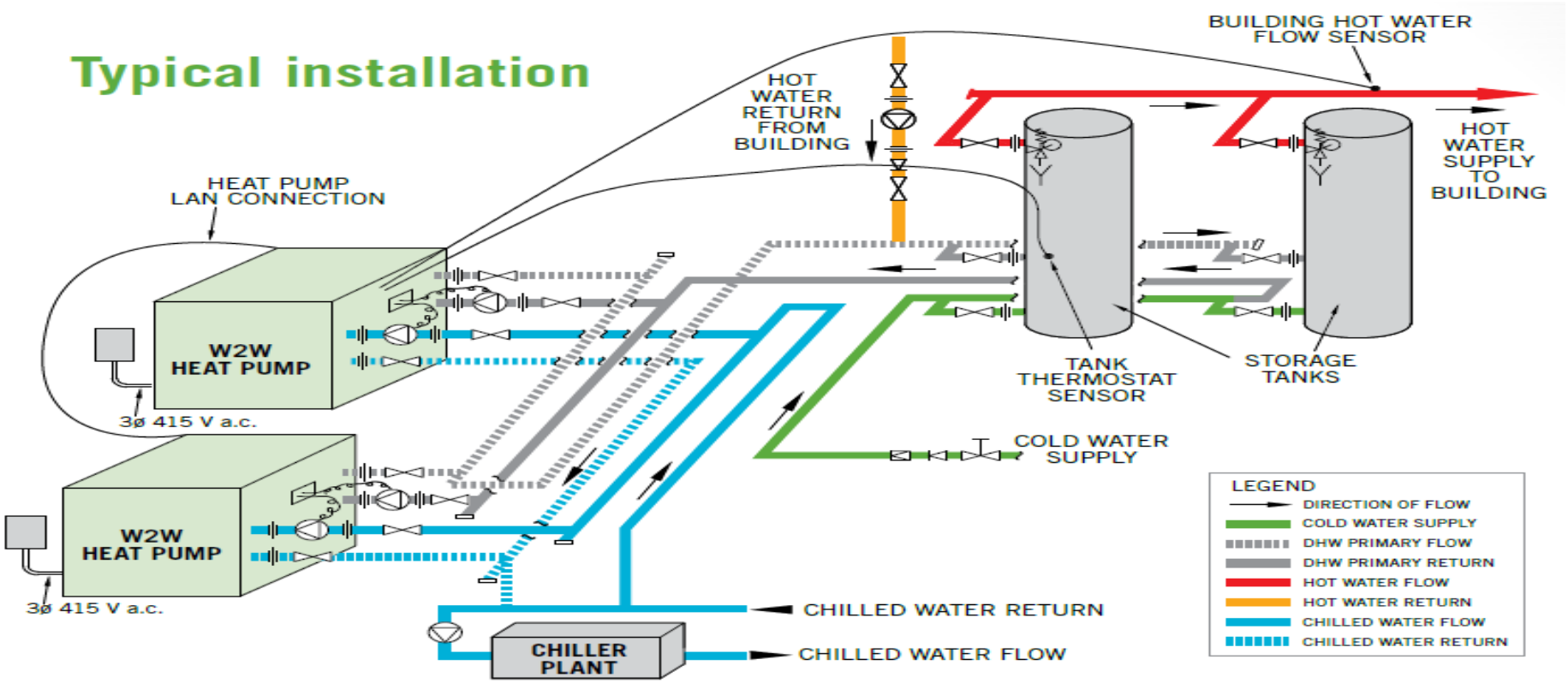
The Rheem Heat Pump transfers heat from the ambient hot air efficiently.

The warmer is air temperatures more efficient is the HP water heating.

The versatile design of Rheem HP translates to heat gain even in low ambient temperatures

HP is Providing the potential for year-round heating across a range of climates.

Types of System & Installation – W2W



The Rheem W2W Heat Pump is a compact and quiet option where a water source is available.

Heat is sourced typically, from chiller return water (12oC) or cooling tower (35oC) or natural sources like the ocean or rivers (18-25oC)

A regular, consistent water source produces a stable high efficiency output, with the potential benefit of providing the dual function of hot water and chilled water supply.

Monobloc Design

- Heat Pump, Pump, Storage
- Tank sensor
- HP is a relatively slow recovery system
- Multi-pass heating
  - Requires more storage than kW
  - Need to design primary pump and pipe sizing
  - Potential in line boost
- W2W requires 2 x pumps
  - Hot water side (potable) and chilled water side (non-potable)

FEATURES & BENEFITS

Key Components and Features

High Performance decarb platform



- 60Hz COP range 5.59 to 3.36
- 50Hz COP range 6.07 to 3.56
- Ambient range of 0C to 52C
- Contribute to CO2 reduction

- 60Hz COP range 6.81 to 4.04
- 50Hz COP range 7.01 to 4.05
- Cold water temp range of 12C to 35C
- Contribute to CO2 reduction

High Efficiency Compressors Refrigerant

- High efficiency Scroll compressors
- Brand: Copeland
- Durable construction suitable for GCC
- R134A Low GDP (1430)

High Quality Construction

- Copper shell in tube HX
- Single or double wall option
- Zinc annealed frame.
- Stucco aluminum casing
- Flange plate water connection
- Lifting lugs on most model

Coating

- Fully dipped and baked coating passes 5000hr salt spray test to ASTM B117 / AS 2331.32
- Rheem cote- dipped evaporator coils 3000hr salt spray test fins fully formed.
- Ble fins coils have raw untreated fins assist with de-watering post de-ice cycle.



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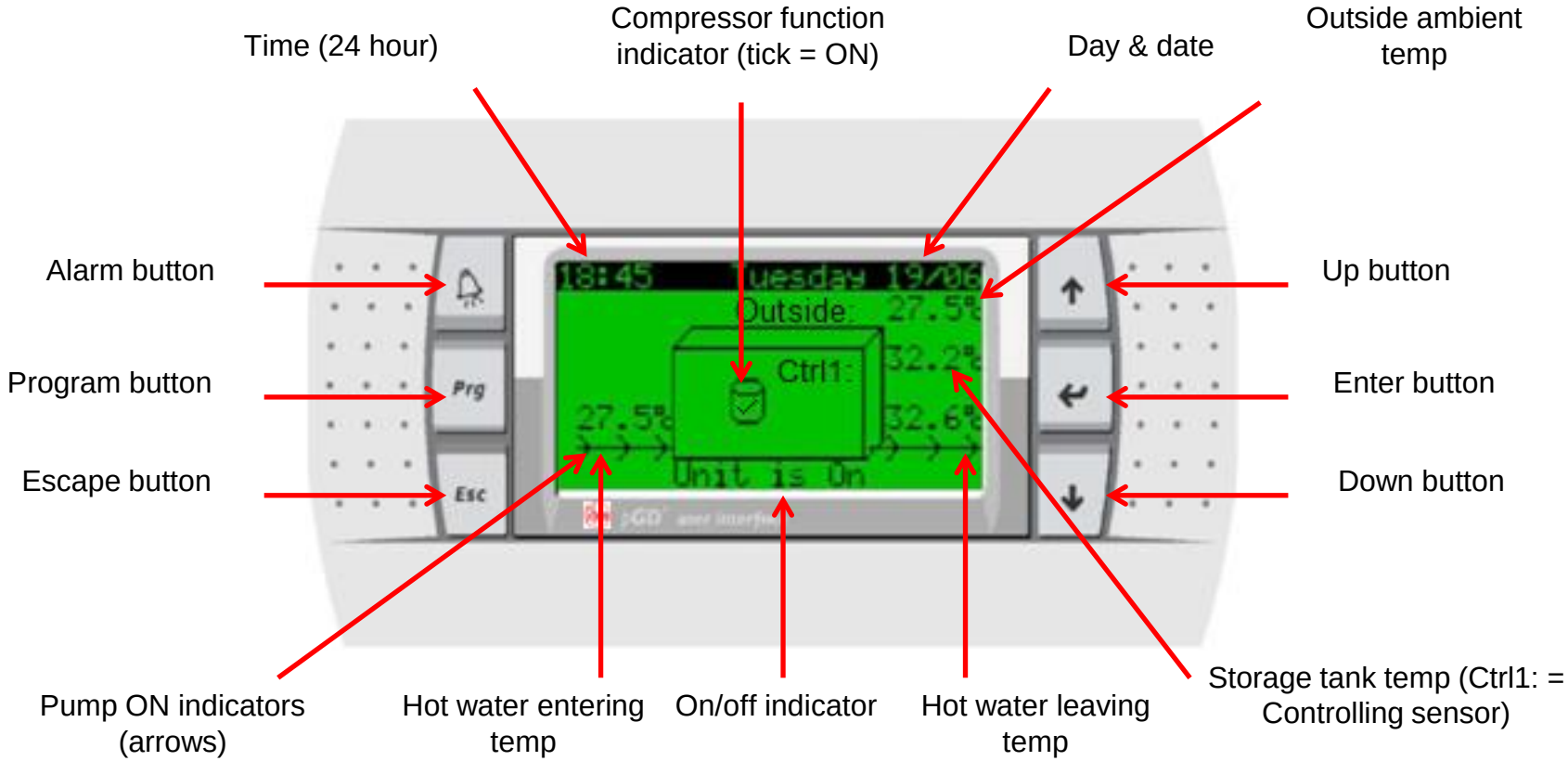
IQ Controller

IQ Controller :

- Temperature control.
- Advance operation controls bot water and refrigerant side control using temperature and pressure sensors transducers optimize efficiency based on outside temp .
- Safety and serviceability.
- Saving Electricity costs.
- Saving pump cost.
- User integration features via BMS BAC net Modbus.



SYSTEM PERFORMANCE

Performance Information of A2W

AIR-TO-WATER HEAT PUMP SPECIFICATIONS	
Model No.	RTHW070
Brand	Rheem

ELECTRICAL INPUT		
Voltage/Phase	380 - 415 Volts / 3 Phase / 50 Hz	
Full Load Amps	40.2 Amps	
Locked Rotor (Amps Per Phase)	118.0 Amps	
Min. Circuit Breaker Size	50.0 Amps	
Refrigerant	R134a	
Nominal Heating Capacity	70.83 kW	
Power Input	14.00 kW	
COP	5.06 COP	
Noise Level	69 dBa @ 3 m	
Rated Load Amps @ 12°C SST / 51°C SCT	27.0 Amps	
TECHNICAL DATA		
	Compressor	**Fan**
SAP Number	20018	21171
Type	Scroll	Axial 630
Number Per Unit	2	2
FLA (Full Load Amps, each)	19.0 Amps	1.1 Amps
Voltage / Phase	380 - 415 / 3	380 - 415 / 3
Pole/RPM	2/2,900	6/890
Air Flow	N/A	4700 L/s
External Static Pressure	N/A	32 Pa
HEAT EXCHANGER (Water Side)		
Type of Water Tube	Single Wall	Double Wall
Design	Shell and Tube	Co-axial Vented
Flow Rate Excl. By Pass	2.82 L/s	
Max. Outlet Water Temp	65°C / 70°C*	
Design Pressure Drop	50 kPa	
Max. Operating Pressure	2,450 kPa	
GENERAL INFORMATION		
Water Connections	65mm Table E Flange	
Drain	20mm Aluminium	
Defrost	Reverse Cycle De-ice	
Cabinet Construction	1.2mm Stucco Aluminium	
Approx. Shipping Weight	400 kg	
Size L x W x H	2180mm x 1002mm x 1375mm	

UNIT CLEARANCES		
Direction	Description	Minimum Clearance Required
1	Evaporator Coil	1000mm
2	Water Connections	500mm
3	Evaporator Coil	1000mm
4	Compressor Access	850mm
5	Top – Fan Discharge	3500mm

COP TABLE

Water Out °C	Ambient Temperature °C						
	0 °C	5 °C	10 °C	15 °C	20 °C	25 °C	27 °C
45 °C	42.21 kW 3.05 COP	47.84 kW 3.43 COP	53.66 kW 3.84 COP	58.23 kW 4.18 COP	63.04 kW 4.53 COP	66.41 kW 4.76 COP	68.15 kW 4.88 COP
50 °C	41.00 kW 2.70 COP	46.54 kW 3.02 COP	52.17 kW 3.38 COP	56.53 kW 3.67 COP	61.07 kW 3.97 COP	64.22 kW 4.19 COP	65.85 kW 4.29 COP
55 °C	39.89 kW 2.46 COP	45.35 kW 2.74 COP	50.82 kW 3.05 COP	55.01 kW 3.31 COP	59.33 kW 3.58 COP	62.31 kW 3.77 COP	63.84 kW 3.87 COP
60 °C	38.63 kW 2.24 COP	44.01 kW 2.49 COP	49.32 kW 2.77 COP	53.32 kW 2.99 COP	57.42 kW 3.23 COP	60.22 kW 3.40 COP	61.66 kW 3.48 COP
65 °C	N/A	42.10 kW 2.22 COP	47.19 kW 2.45 COP	50.97 kW 2.64 COP	54.78 kW 2.84 COP	57.36 kW 2.98 COP	58.67 kW 3.06 COP
70 °C	N/A	N/A	N/A	N/A	51.82 kW 2.50 COP	54.18 kW 2.62 COP	55.36 kW 2.68 COP

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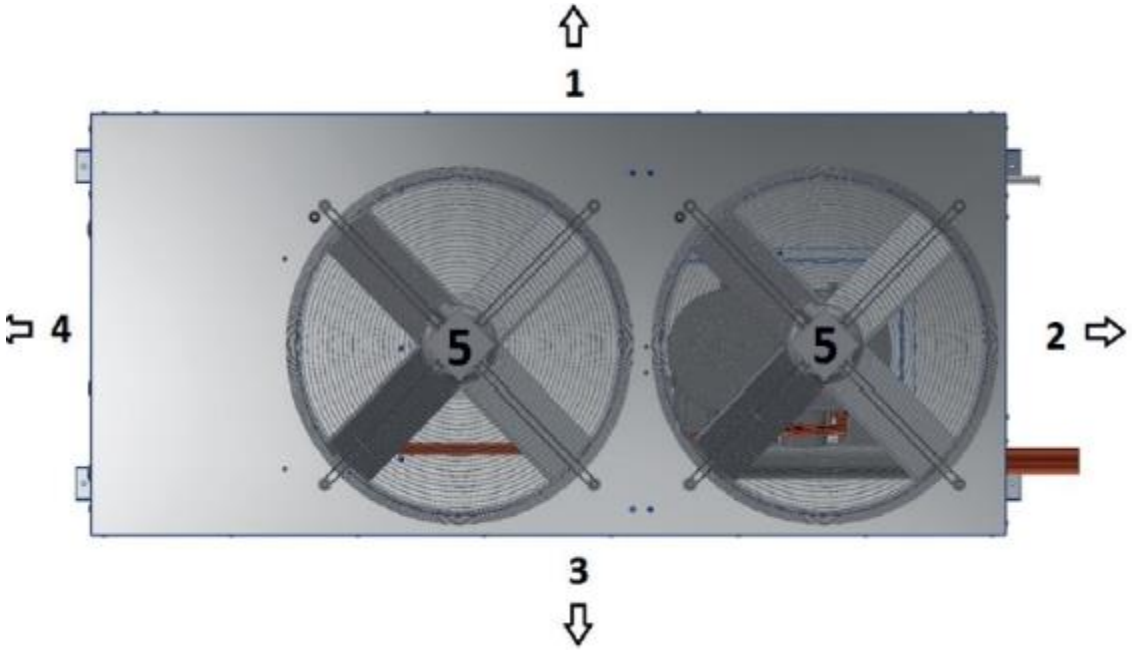
Performance Information of A2W



When the units are placed sde by side, allow 2000mm distance between evaporator coils.

Rating Conditions: 30°C ambient, 60% RH, 39°C Water in, 45°C Water out

* Max outlet temperature when ambient is above 10°C

Performance Information of A2W

COP TABLE

Water Out °C	Ambient Temperature °C							
	0 °C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C	35 °C
45 °C	53.45 kW 2.76 COP	60.97 kW 3.14 COP	69.33 kW 3.57 COP	76.24 kW 3.92 COP	83.78 kW 4.29 COP	89.19 kW 4.56 COP	94.92 kW 4.84 COP	97.92 kW 4.98 COP
50 °C	52.37 kW 2.46 COP	59.64 kW 2.79 COP	67.68 kW 3.17 COP	74.31 kW 3.47 COP	81.53 kW 3.80 COP	86.70 kW 4.04 COP	92.18 kW 4.29 COP	95.04 kW 4.42 COP
55 °C	51.53 kW 2.23 COP	58.61 kW 2.54 COP	66.40 kW 2.87 COP	72.80 kW 3.15 COP	79.75 kW 3.44 COP	84.73 kW 3.66 COP	90.01 kW 3.88 COP	92.76 kW 4.00 COP
60 °C	50.74 kW 2.03 COP	57.62 kW 2.30 COP	65.15 kW 2.60 COP	71.32 kW 2.85 COP	78.01 kW 3.12 COP	82.80 kW 3.31 COP	87.87 kW 3.51 COP	90.51 kW 3.61 COP
65 °C	N/A	56.46 kW 2.04 COP	63.67 kW 2.30 COP	69.55 kW 2.52 COP	75.91 kW 2.75 COP	80.46 kW 2.91 COP	85.27 kW 3.09 COP	87.78 kW 3.18 COP
70 °C	N/A	N/A	N/A	N/A	73.92 kW 2.42 COP	78.23 kW 2.56 COP	82.77 kW 2.71 COP	85.15 kW 2.79 COP

- Input = Heating Capacity/COP. Eg
- At 45°C LWT / 30°C ambient, Input = 94.2/4.84 = **19.46kW**
- At 45°C LWT / 5°C ambient, Input = 60.97/3.14 = **19.42kW**
- At 60°C LWT / 30°C ambient, Input = 87.87/3.51 = **25.03kW**
- At 60°C LWT / 5°C ambient, Input = 57.62/2.30 = **25.05kW**

Both LWT and Ambient Temperature affect output and COP, but LWT affects Input

Performance Information of W2W

WATER-TO-WATER HEAT PUMP SPECIFICATIONS	
Model No.	RTWW071
Brand	Rheem

ELECTRICAL INPUT		
Voltage/Phase	380 - 415 Volts / 3 Phase / 50 Hz	
Full Load / Locked Rotor (Amps Per Phase)	40.2 FLA / 272 LRA	
Min. Circuit Breaker Size	50.0 Amps	
Refrigerant	R134a	
Refrigeration Effect	Heating	Cooling
Nominal Capacity	71.15 kW	56.97 kW
Power Input	14.19 kW	
COP	5.02 COP	4.02 COP
Combined COP	9.03 COP	
Noise Level	61 dBa @ 3 m	
Rated Load Amps @ 10°C SST / 51°C SCT	28.1 Amps	
TECHNICAL DATA		
	Compressor	
Make / Type	Copeland / Scroll 20103	
Number Per Unit	1	
FLA (Full Load Amps, each)	40.2 Amps	
Voltage / Phase	380 - 415 / 3	
Pole/RPM	2/2,900	
HEAT EXCHANGER (Water Side)		
	Hot Side (Condenser)	**Cold Side (Evaporator)**
Type of Water Tube	Single / Double Wall	Single Wall
Design	Shell & Tube / Co-axial	Shell & Tube
Flow Rate Excl. By Pass	2.84 L/s	2.73 L/s
Max. Outlet Water Temp	70°C	N/A
Min. Outlet Water Temp	N/A	7 °C
Design Pressure Drop	50 kPa	
Max. Operating Pressure	2,450 kPa	
GENERAL INFORMATION		
Water Connections	65mm Table E Flange	
Drain	20mm Aluminium	
Cabinet Construction	1.2mm Stucco Aluminium	
Approx. Shipping Weight	400 kg	
Size L x W x H	2120mm x 805mm x 1000mm	

COP TABLE

Hot Water Out °C	Cold Water In °C							
	12 °C	14 °C	16 °C	18 °C	20 °C	25 °C	30 °C	35 °C
45 °C	57.19 kW	60.88 kW	62.82 kW	66.86 kW	71.15 kW	83.07 kW	96.85 kW	102.93 kW
	4.09 COP	4.34 COP	4.47 COP	4.73 COP	5.02 COP	5.78 COP	6.64 COP	7.01 COP
50 °C	56.35 kW	59.90 kW	61.76 kW	65.65 kW	69.77 kW	81.20 kW	94.42 kW	100.26 kW
	3.71 COP	3.93 COP	4.04 COP	4.28 COP	4.54 COP	5.23 COP	6.01 COP	6.35 COP
55 °C	55.38 kW	58.76 kW	60.53 kW	64.21 kW	68.12 kW	78.96 kW	91.48 kW	97.01 kW
	3.27 COP	3.46 COP	3.56 COP	3.77 COP	3.99 COP	4.60 COP	5.29 COP	5.59 COP
60 °C	54.67 kW	57.92 kW	59.61 kW	63.14 kW	66.88 kW	77.24 kW	89.21 kW	94.49 kW
	2.95 COP	3.12 COP	3.21 COP	3.40 COP	3.59 COP	4.13 COP	4.75 COP	5.02 COP
65 °C	53.88 kW	56.95 kW	58.55 kW	61.89 kW	65.42 kW	75.19 kW	86.47 kW	91.46 kW
	2.60 COP	2.75 COP	2.82 COP	2.98 COP	3.15 COP	3.61 COP	4.14 COP	4.38 COP
70 °C	53.19 kW	56.10 kW	57.61 kW	60.75 kW	64.08 kW	73.26 kW	83.86 kW	88.54 kW
	2.29 COP	2.41 COP	2.48 COP	2.61 COP	2.75 COP	3.15 COP	3.60 COP	3.80 COP

Performance Information of W2W

WATER-TO-WATER HEAT PUMP SPECIFICATIONS	
Model No.	RTWW071
Brand	Rheem

ELECTRICAL INPUT		
Voltage/Phase	380 - 415 Volts / 3 Phase / 50 Hz	
Full Load / Locked Rotor (Amps Per Phase)	40.2 FLA / 272 LRA	
Min. Circuit Breaker Size	50.0 Amps	
Refrigerant	R134a	
Refrigeration Effect	Heating	Cooling
Nominal Capacity	71.15 kW	56.97 kW
Power Input	14.19 kW	
COP	5.02 COP	4.02 COP
Combined COP	9.03 COP	
Noise Level	61 dBa @ 3 m	
Rated Load Amps @ 10°C SST / 51°C SCT	28.1 Amps	
TECHNICAL DATA		
	Compressor	
Make / Type	Copeland / Scroll 20103	
Number Per Unit	1	
FLA (Full Load Amps, each)	40.2 Amps	
Voltage / Phase	380 - 415 / 3	
Pole/RPM	2/2,900	
HEAT EXCHANGER (Water Side)		
	Hot Side (Condenser)	**Cold Side (Evaporator)**
Type of Water Tube	Single / Double Wall	Single Wall
Design	Shell & Tube / Co-axial	Shell & Tube
Flow Rate Excl. By Pass	2.84 L/s	2.73 L/s
Max. Outlet Water Temp	70°C	N/A
Min. Outlet Water Temp	N/A	7 °C
Design Pressure Drop	50 kPa	
Max. Operating Pressure	2,450 kPa	
GENERAL INFORMATION		
Water Connections	65mm Table E Flange	
Drain	20mm Aluminium	
Cabinet Construction	1.2mm Stucco Aluminium	
Approx. Shipping Weight	400 kg	
Size L x W x H	2120mm x 805mm x 1000mm	

COP TABLE								
Hot Water Out °C	**Cold Water In °C**							
	12 °C	14 °C	16 °C	18 °C	**20 °C**	25 °C	30 °C	35 °C
45 °C	57.19 kW 4.09 COP	60.88 kW 4.34 COP	62.82 kW 4.47 COP	66.86 kW 4.73 COP	**71.15 kW** **5.02 COP**	83.07 kW 5.78 COP	96.85 kW 6.64 COP	102.93 kW 7.01 COP
50 °C	56.35 kW 3.71 COP	59.90 kW 3.93 COP	61.76 kW 4.04 COP	65.65 kW 4.28 COP	69.77 kW 4.54 COP	81.20 kW 5.23 COP	94.42 kW 6.01 COP	100.26 kW 6.35 COP
55 °C	55.38 kW 3.27 COP	58.76 kW 3.46 COP	60.53 kW 3.56 COP	64.21 kW 3.77 COP	68.12 kW 3.99 COP	78.96 kW 4.60 COP	91.48 kW 5.29 COP	97.01 kW 5.59 COP
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65 °C	53.88 kW 2.60 COP	56.95 kW 2.75 COP	58.55 kW 2.82 COP	61.89 kW 2.98 COP	65.42 kW 3.15 COP	75.19 kW 3.61 COP	86.47 kW 4.14 COP	91.46 kW 4.38 COP
70 °C	53.19 kW 2.29 COP	56.10 kW 2.41 COP	57.61 kW 2.48 COP	60.75 kW 2.61 COP	64.08 kW 2.75 COP	73.26 kW 3.15 COP	83.86 kW 3.60 COP	88.54 kW 3.80 COP

Rating Conditions: Cooling: 20°C EWT, 15°C LWT,
Heating: 39°C EWT, 45°C LWT

Richmond
The Water Heater Experts™

Performance Information of W2W

COP TABLE								
Hot Water Out °C	Cold Water In °C							
	12 °C	14 °C	16 °C	18 °C	20 °C	25 °C	30 °C	35 °C
45 °C	57.19 kW 4.09 COP	60.88 kW 4.34 COP	62.82 kW 4.47 COP	66.86 kW 4.73 COP	71.15 kW 5.02 COP	83.07 kW 5.78 COP	96.85 kW 6.64 COP	102.93 kW 7.01 COP
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70 °C	53.19 kW 2.29 COP	56.10 kW 2.41 COP	57.61 kW 2.48 COP	60.75 kW 2.61 COP	64.08 kW 2.75 COP	73.26 kW 3.15 COP	83.86 kW 3.60 COP	88.54 kW 3.80 COP

- Input = Heating Capacity/COP. Eg
- At 45°C LWT / 30°C condenser, Input = 96.85/6.64 = **14.58kW**
- At 60°C LWT / 30°C condenser, Input = 86.47/4.14 = **20.89kW**

Input is lower than A2W because W2W does not have fan power, and pump power is not included in the capacity measurement

APPLICATIONS

Applications

Domestic Hot Water

Water heating is a significant user of energy and can account for 25% of total household energy consumption giving a clear incentive to convert to a renewable heating technology

High Temperature Hot Water

The specialist focus and research capability of our manufacturing base means that the heat pump can provide high efficiency hot water up to 70°C leaving water temperature (W2W)

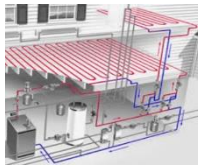
Mechanical Process Water Heating and Chilling

The highly efficient Heat Pump is used to provide electrically generated low-cost hot water in many specialist applications, ranging from hospitals, large office buildings and supermarkets to more diverse uses in manufacturing, mining and primary industry. Mechanical hot water or chilled water is typically supplied to fan coils for space heating or cooling and for process often the hot water is used directly.

Applications

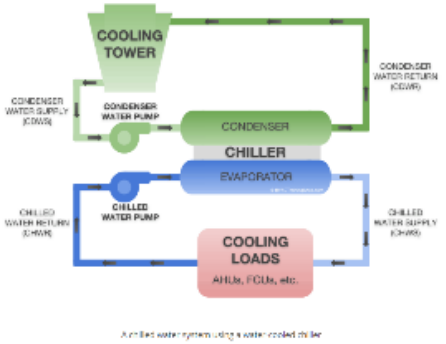
Hydronic Heating

Typically providing hot water at mid-range temperatures for home and building comfort, heating via either a hydronic loop or radiators, this range of high-efficiency heat pumps have also been used in primary industry applications such as piggeries, poultry farming and greenhouses.



Hot Water to Chilled Water

When coupled to a building's chilled water ring main, this Water-to-Water heat pump provides energy efficient water heating whilst simultaneously providing the by-product of a chilled water supply.



THANK YOU!

19/07/2023

HEATING COOLING WATER HEATING