



aquanex  
nex gen R32

HEAT PUMP WATER HEATER

# MWS Potable Hot Water



**temperzone**  
climate innovations



Single-Pass Design,  
A Revolution In  
Commercial Potable  
Hot Water Systems

Heating Capacity  
27 kW – 98 kW



# Innovative Heat Pump Water Heater Solution

The future is here, Aquanex Single-Pass system design is revolutionising the way heat pump water heaters are applied to commercial potable hot water systems. Through adapting an integrated whole system design ethos Aquanex solutions deliver convenience that is more cost effective, efficient and extremely reliable technology.

Single-Pass units are designed for commercial potable hot water delivering 62°C water to stratified storage tanks. Single-Pass units contribute significantly to real-time hot water demand, and therefore can be used to reduce required storage capacity which increases the cost effectiveness of the heat pump system.



**Designed  
for Better  
Performance**

Aquanex Single-Pass systems heat water to over 62°C in a Single-Pass. Single-Pass / single temperature rise technology is ideal for commercial markets where meeting the peak demand for hot water is the key driver of system specification. Functioning like an instantaneous heater, the products deliver a constant leaving water temperature to top of storage tanks as it draws from bottom of storage tanks. This provides a stratified / layered temperature from top to bottom of storage tank being heated.

**Cost  
Effectiveness**

Aquanex Single-Pass systems are designed to significantly reduce the installed system cost compared to other water heating alternatives. Single-Pass systems contribute to real-time hot water demand and therefore can be used to reduce required storage capacity which substantially reduces the installed cost of the hot water system and greatly reduces system running cost.


**Durable,  
Low Maintenance**

Aquanex Single-Pass systems are low maintenance, with low service requirements. Our inhouse developed UC8 controller, controls the internal inline BLDC pump to produce the required leaving water temperature (62 °C) with set speed compressors installed.




Features


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**Single-Pass Design**  
Delivering 62°C water directly to water storage to contribute to real time hot water demand




**ThermoShell®**  
ThermoShell® heat exchanger design for long life performance




**BLDC Water Pump**  
Control the delivered capacity by efficiently controlling the water flow rate




**Low GWP Refrigerant**  
R32 refrigerant has a significantly lower GWP than R410A




**Electronic Expansion Valve**  
Electronic expansion valves for greater control and efficiency




**Multi-speed Fans**  
Multi speed condenser fans for better efficiency and control




**Marine Grade Powder Coating**  
Polyester powder coated with highly corrosion resistant pre-coating for long life durability




**Intelligent Unit Controller**  
Ensures the unit runs at its optimum efficiency and provides system operation data




**Low Ambient Temperature Operation**  
Operates down to -10°C ambient temperature



**Durable Compact Design**  
Robust high quality commercial construction.




**Epoxy Coated Coils**  
Corrosion resistant epoxy coated coils for long life coil protection



**BMS**  
Modbus compatible via RS485 (or TCP/IP option)

Heat Pump Water Heater  
(27 kW – 98 kW)

R32

 **ThermoShell®**  
technology



# Lower Global Warming Potential Water Heating

Leading the way in providing low GWP commercial R32 water heating solutions.

**Lower global warming potential**

Due to a smaller refrigerant charge and a reduced refrigerant GWP of 677, these R32 refrigerant systems represent a 75-80% reduction in overall GWP per kW of heating when compared to R410A systems (GWP 2088)\*.

**Reducing future costs**

As higher GWP refrigerants face increasing cost due to emissions tax levies the specification of R32 systems will represent a significant reduction in the future costs associated with owning and maintaining these systems.

- R410A System
- R32 System



\*AR4 Standard

# General Operating Principles

Heat-pump water heaters are the most environmentally responsible and efficient water heating technology available on the market today, providing all season heating performance.

**How does a heat pump water heater work?**

A heat pump water heater extracts energy from the air by boiling refrigerant based heat-transfer fluid. The refrigerant vapour is compressed which greatly increases its temperature. The high temperature refrigerant is passed through a heat exchanger where the energy is transferred from the refrigerant to the water causing the refrigerant to condense. The refrigerant is returned to a low energy state where it can repeat the cycle. Because a heat pump water heater uses electricity only to transfer energy from one place to another, it does so much more efficiently than converting the electricity directly to heat.

**How efficient are heat pump water heaters?**

Compared to electric element and gas water heaters, heat pump water heaters are much more efficient. Gas water heaters convert gas energy into heat through combustion, this process is typically only 70-80% efficient. Electric element heaters are 100% efficient converting one purchased unit of electricity into one unit of heat. Heat pump water heaters are generally 300-400% efficient converting one purchased unit of electricity into 3-4 units of heat. The graph below compares the relative energy efficiency of each the technologies.

**Energy Efficiency Comparison**

Comparative energy input and output for various heating technologies.



# Innovative Single-Pass Design

Designed to resolve the inefficiencies presented by current market products, Temperzone In-line heat pump water heater innovation improves the effectiveness and efficiency of integrated systems.

**Aquanex  
Single-Pass  
System Design**

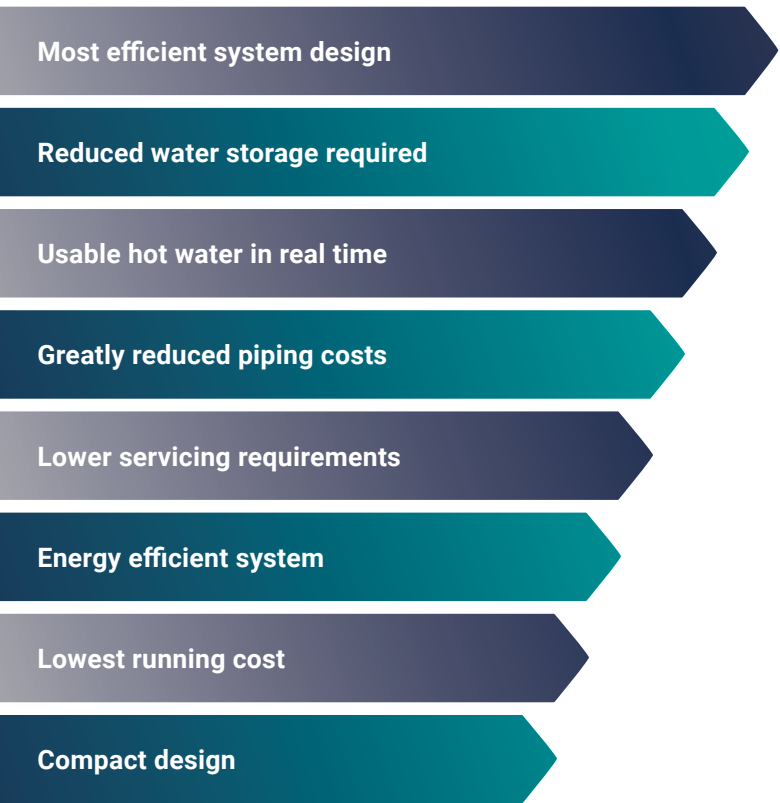
Temperzone’s Single-Pass system is at the heart of what makes this product unique when it comes to energy efficiency and heating efficiency. Temperzone Single-Pass Systems are far superior to the multi-pass alternative.

- Significantly more efficient
- Significantly reduced storage capacity requirements. Our units produce up to 1000 L/hr of 62°C hot water continuously once operating.
- Greatly reduced piping costs. Flow rates between the tank and water heater are 10-15% of the equivalent multi-pass alternative. Piping is typically sized in 20 mm or 25 mm piping rather than up to 50 mm. Unlike multi-pass systems this also allows for retrofitting to existing hot water tanks and systems.

**Single-Pass  
Efficiency**

When properly installed, a Single-Pass system layers the 62°C water on top of the cold water using a process of thermal stratification. This thermal layering is surprisingly stable, and will maintain the separation of the hot and cold layers over several days. This process is at the heart of the Single-Pass system performance, where the cold water is heated to 62°C in a ‘Single-Pass’. Single-Pass design efficiency of the water heating system allows for retrofitting to existing hot water tanks and systems.

**Main benefits  
of Aquanex  
Single-Pass  
Systems**



**Reduced Storage  
Capacity**

This layering of the hot water has a distinct advantage when it comes to meeting high peak hot water demands. Every hour of operation results in up to 1000L of additional hot water capacity. A system with 2000L of storage can deliver 4000L of hot water over a 2 hour period in the morning. This feature saves both capital costs in extra storage capacity, and running costs in maintaining the storage losses of excess tank capacity - capacity only required to meet the largest load a few days a year.

**Reduced Piping  
Costs**

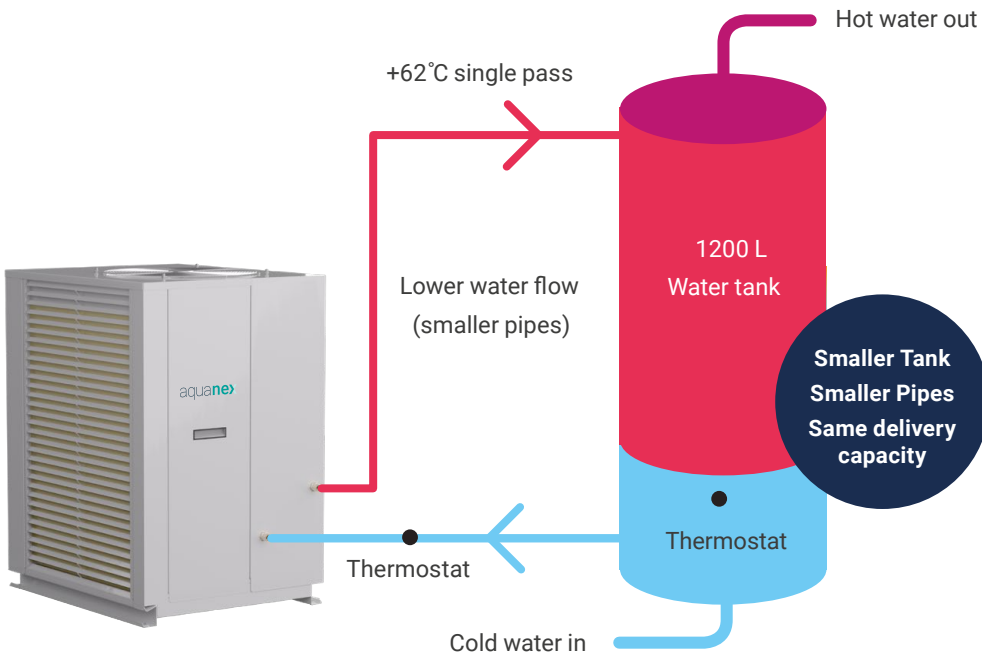
The Single-Pass design works off a large temperature rise between the cold water into the heat pump and the hot water out. A multi-pass system on the other hand has to circulate the water many times between the heat exchanger and the tank, with only a 4-6°C rise in temperature each time. The flow rates between the two designs are almost an order of magnitude different, which is reflected in the pipe sizes required.

# Single-Pass Superior Cost Effectiveness

Aquanex Single-Pass systems are designed to significantly reduce the installed system cost compared to other water heating alternatives while delivering optimum performance.

**Temperzone's Single-Pass Potable Hot Water System with ThermoShell® Technology**

Compact Single-Pass Outdoor unit featuring ThermoShell® Technology. A Single-Pass system supplies hot water directly to the tank and it is ready for use straight away, allowing a reduction in storage capacity to meet peak demand load.

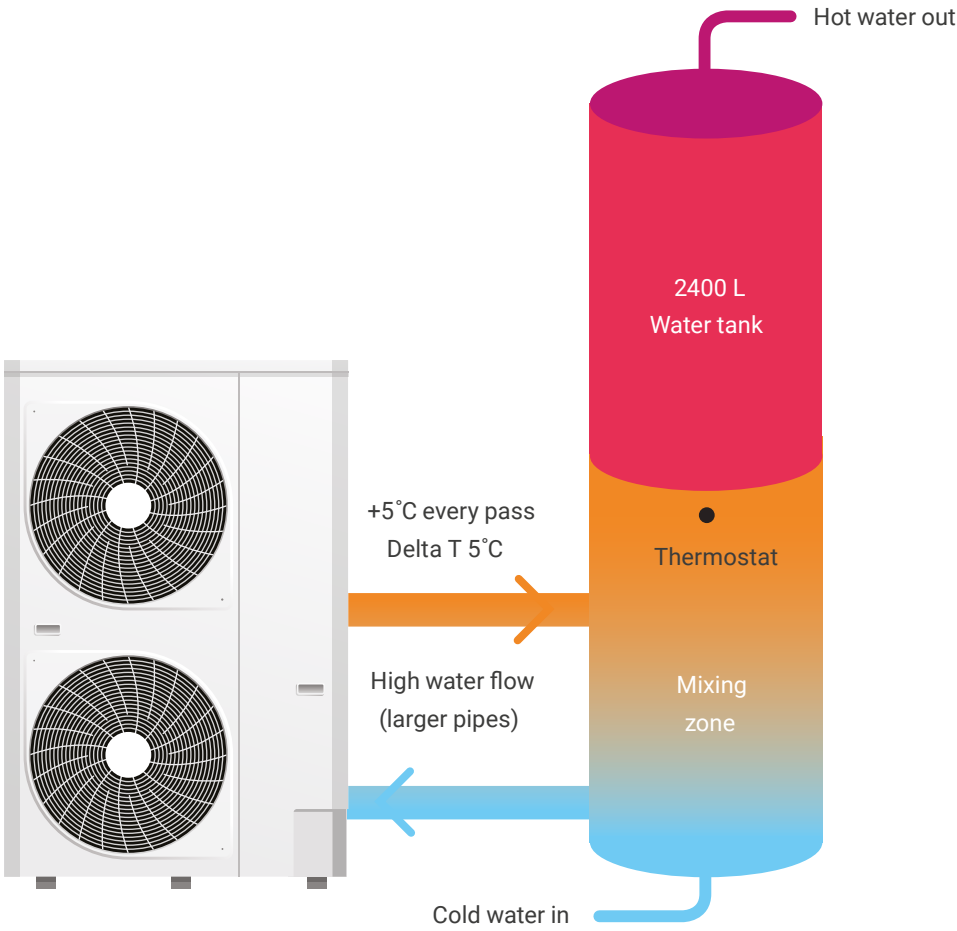


**Single-Pass system capital and running cost savings**

For example, a 35kW Single-Pass system produces 600 L/hr of 62°C water. A 1200 litre capacity tank with a 35kW Single Pass system allows the tank capacity to be extended to a maximum of 2400 litres over a 2 hour peak period with a recovery rate of 600 L/hr. This allows for savings in water heating costs in off peak times and also enables the utilisation of a smaller tank to service peak periods.

**Conventional Multi-Pass Potable Hot Water System with Plate Heat Exchanger**

Multi-Pass Outdoor unit with plate heat exchanger. The Multi-Pass system slowly increases the water temperature of the tank on each pass, this system means you can only use the hot water currently in the tank.



**Multi-Pass system inefficient system design**

For example, a Multi-Pass system storage tank must contain sufficient volume to meet the entire peak usage period (in this example 2400 litres). Whilst the system will begin to reheat the water this hot water is not available until the entire tank reaches a usable temperature.

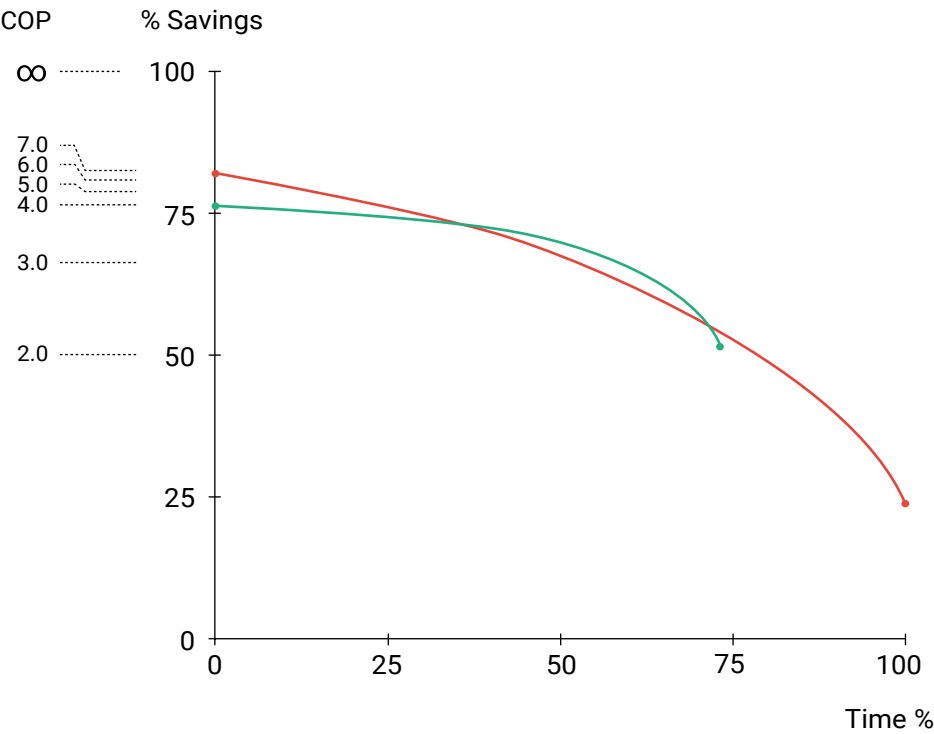


# Single-Pass Superior Performance

A focus on optimising integrated system performance and ground breaking innovative design enables Aquanex Single-Pass systems to be a game changer in efficient hot water delivery.

**Single-Pass system**  
**Lower running costs**  
Single-Pass system takes less time to reach temperature and overall runs more efficiently

**Multi-pass**  
**Higher running costs**  
Multi-pass system takes 30% longer to reach temperature and overall runs with much less efficiently



## Single-Pass Efficiency

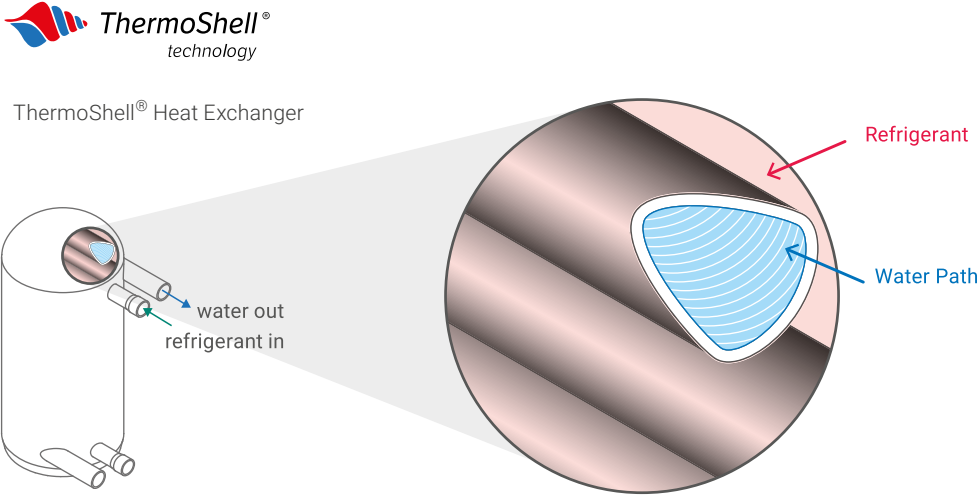
This graph demonstrates the significant differences in Single-Pass efficiency over it's Multi-Pass alternative. A Multi-pass system may start out with a higher COP rating but as the tank gets closer to temperature the COP level drops significantly as it needs more and more energy to bring the last of the water to 62°C. In comparison the Single-pass system is much more stable, able to hold at high levels of efficiency and overall deliver savings.

# ThermoShell® Technology

Heat pump water heaters have at their core a refrigerant-to-water heat exchanger and its performance is critical to the overall performance of the system.

## ThermoShell® Technology Heat Exchangers

Temperzone's ThermoShell® heat exchanger is designed to operate extremely efficiently under low water flow rates. This enables Temperzone In-line systems, which require lower water flow rates, to provide superior performance.



## BLDC Variable Speed Pumps

Highly efficient optional variable speed pumps effectively control the heating capacity of the system by varying the water flow rate. The smart pump has a EC motor that reduces energy use by around 50%.



# Reliability & Durability

- 1

Highly corrosion resistant epoxy coated coils to suit harsh climate conditions
- 2

Marine grade pretreatment and polyester powder coated galvanized steel, inside and out
- 3

Advanced integrated controls with full safety design integration
- 4

Long life ThermoShell® heat exchanger
- 5

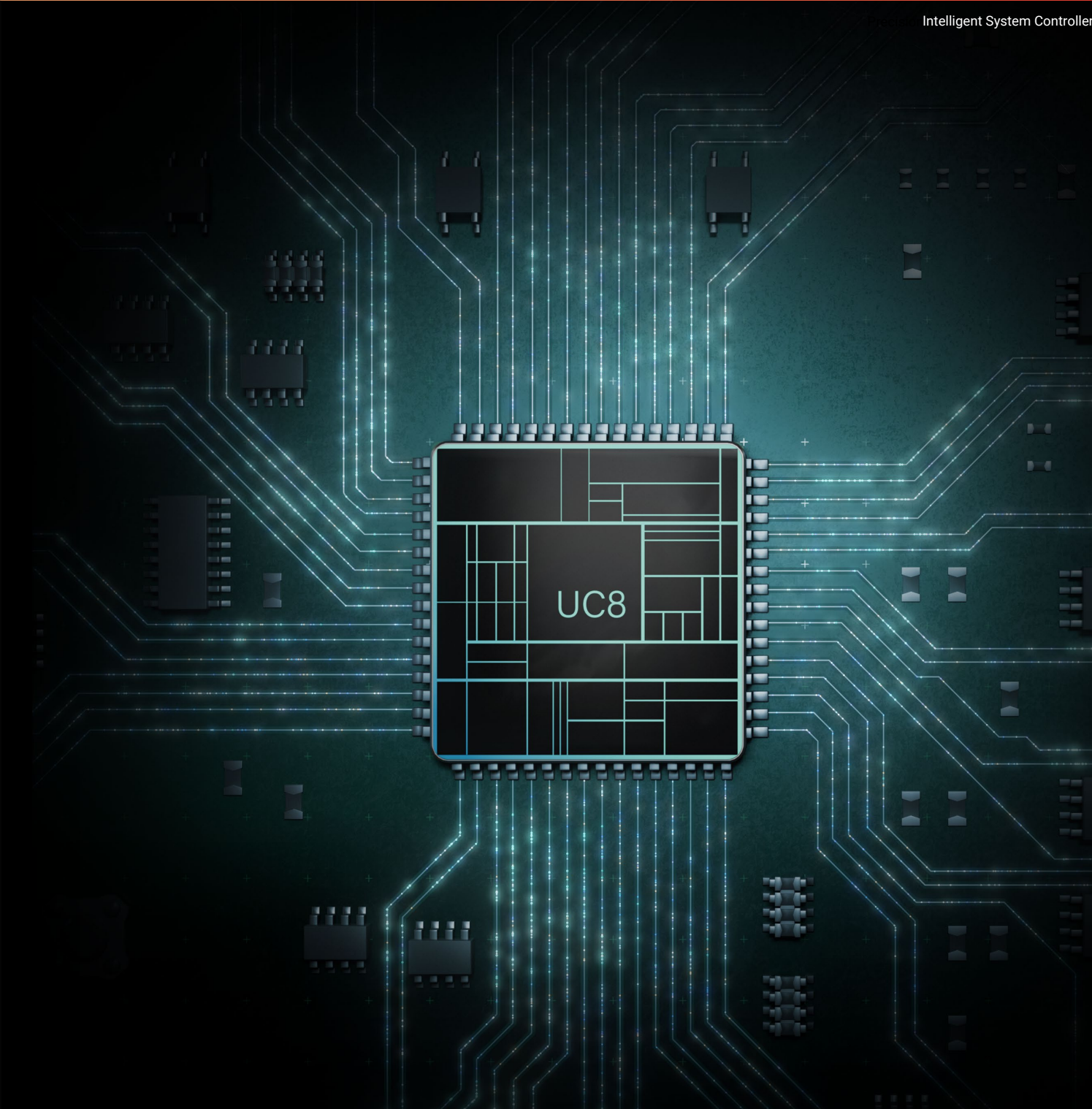
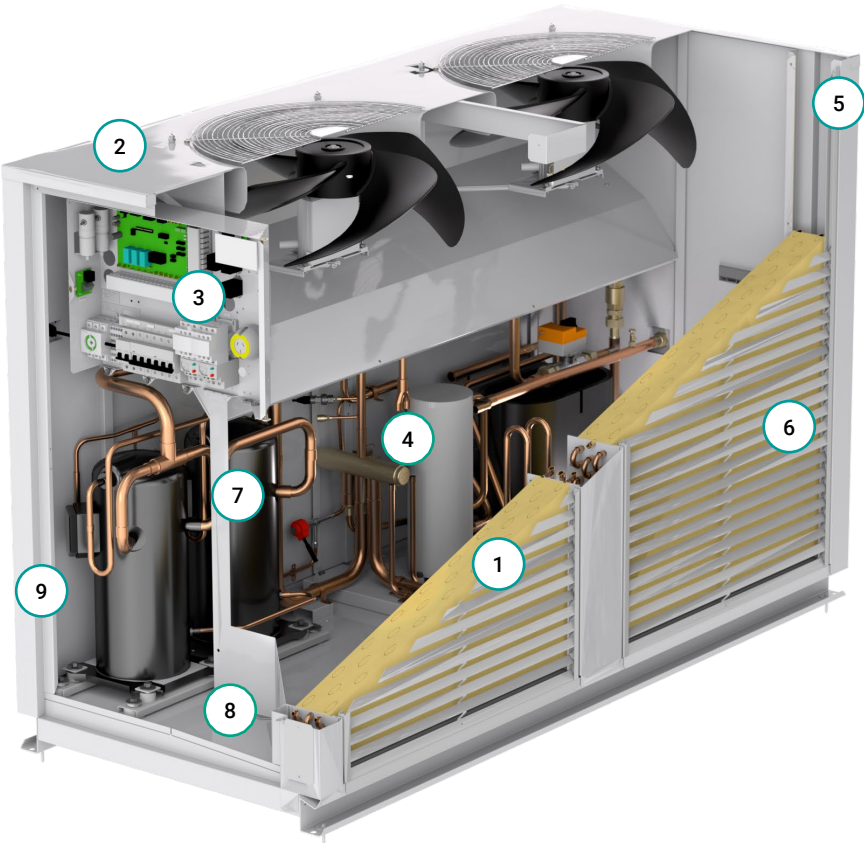
SKT coated screws provide a higher corrosion resistance than 316 stainless steel
- 6

Commercially constructed compact system design. Louvre guards for added coil protection
- 7

High quality refrigeration components to ensuring long life reliability.
- 8

Draining base preventing water and ice accumulation inside the unit
- 9

Easy service and maintenance access using panels and leak-free doors



## Intelligent unit controller

The electronic controller intelligently monitors safeties, controls de-ice and circulation pump to provide set LWT. A unique duplex electronic expansion valve control system ensures reliability and performance.

## WiFi Service Utility Tool

WiFi Service Utility (WSU) is a portable control interface that plugs directly into the UC8 board on a Temperzone Water Heating Unit. It allows you to monitor a wide range of operational parameters, view fault logs and even take control of the unit. It has its own WiFi network built in and the control and diagnostics are done wirelessly from a smartphone, tablet or notebook PC.

# Aquanex Single-Pass Potable Water Heater



Model	MWS 250	MWS 500	MWS 1000
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Performance

Rating Condition (db / wb) °C	19 / 16	7 / 6	19 / 16	7 / 6	19 / 16	7 / 6
Nominal EWT / LWT °C	20 / 62	15 / 62	20 / 62	15 / 62	20 / 62	15 / 62
Nominal Heating Capacity (kW)	27	20	54	40	98	74
Input Power (kW)	6.8	7.1	13.5	14.3	26.4	28.0
COP Heating	4.0	2.8	4.0	2.8	3.7	2.6
Water Flow Rate (l/min)	9.2	6.1	18.5	12.2	33.4	22.6
Entering Water Pressure Drop (kPa)	14	7	14	7	14	7

Power

Running Current (A)	10 / 11 / 10	11 / 12 / 11	20 / 22 / 20	22 / 24 / 22	40 / 48 / 40	44 / 50 / 44
Max. Running Current	15 / 16 / 15	15 / 16 / 15	30 / 32 / 30	30 / 32 / 30	64 A/ph	64 A/ph
Power Supply <sup>1</sup>	3 Phase 400V a.c 50Hz					

Components

Pump	Integrated BLDC		Integrated BLDC (x2)
Max. Head Delivery of Pump (m)	8	12	
Heat Exchanger	ThermoShell (x1)	ThermoShell (x2)	ThermoShell (x4)
Desuperheater	ThermoShell (x1)	ThermoShell (x1)	ThermoShell (x2)
Fan	3 spd Axial 500mm	3 spd Axial 500mm (x2)	3 spd Axial 500mm (x4)
Refrigerant	R32		
Compressor Technology	Fixed - Liquid Injection (x1)	Fixed - Liquid Injection (x2)	Fixed - Liquid Injection (x2)
Electronic Expansion Valves	1	2	4
Storage Required	Thermally Stratified		

Model	MWS 250	MWS 500	MWS 1000
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Temperature Limits

Min./Max EWT (°C)	2 / 35		
Min. Operating Ambient Air temp (°C)	-10		
Max. Water Temperature (°C)	65		62

Sound Data

Sound Power (SWL) dB(A) <sup>2</sup>	72	75	78
Sound Pressure @ 3m (SPL) dB(A)	56	59	62

Communication

Unit Controller	UC8
Communication Options	BMS / Modbus

Overall Dimensions & Weight

W x D x H (mm)	935 x 804 x 1199	1809 x 804 x 1199	1863 x 1477 x 1259
Net Weight (kg)	189	351	684

Note: <sup>1</sup> Voltage range: 380–440 V  
<sup>2</sup> Radiated, EN 12102-1:2017.  
The manufacturer reserves the right to make changes in specifications at any time without notice or obligation.



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