

MAGNUS[®]

powerhouse water heaters

Heat Pump Water Heaters

Single-Pass Potable
Hot Water Systems



MAGNUS

Single-Pass design, a revolution in commercial potable hot water systems.

The future is here, MAGNUS 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 MAGNUS solutions deliver convenience that is more cost effective, efficient and extremely reliable.



NEW ZEALAND
DESIGNED AND
MANUFACTURED



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powerhouse water heaters



Single-Pass delivers the highest return on investment and the shortest payback period of any water heater product or technology.

For excellence in energy efficiency no other surpasses Temperzone's Single-Pass systems - the most energy efficient water heater on the market.



Designed for Better Performance

MAGNUS Single-Pass systems heat water to over 62°C in a Single-Pass. Single-Pass 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 hot water system, MAGNUS is the most efficient system for meeting hot water demand in both high and low demand periods.



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Designed for Cost Effectiveness

MAGNUS 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.

Designed for Durable, Low Maintenance

MAGNUS In-line systems are low maintenance, with low service requirements. Its ThermoShell® heat exchanger, unlike traditional heat exchangers, are fouling resistant. Also, the advanced unit controller combined with application specific design uniquely enables the compressor to constantly operate within its design limits improving unit life.

General operating principles of heat pump water heaters

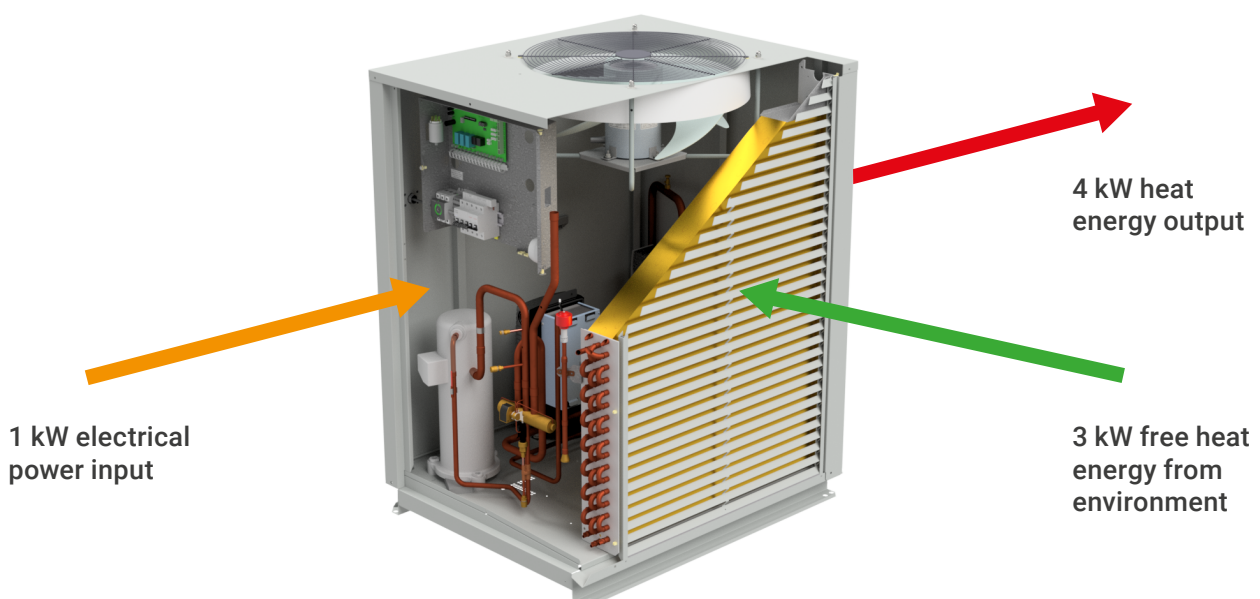
Heat-pump water heaters are the most environmentally responsible and efficient water heating technology available on the market today, providing all season heating performance.

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 it 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.

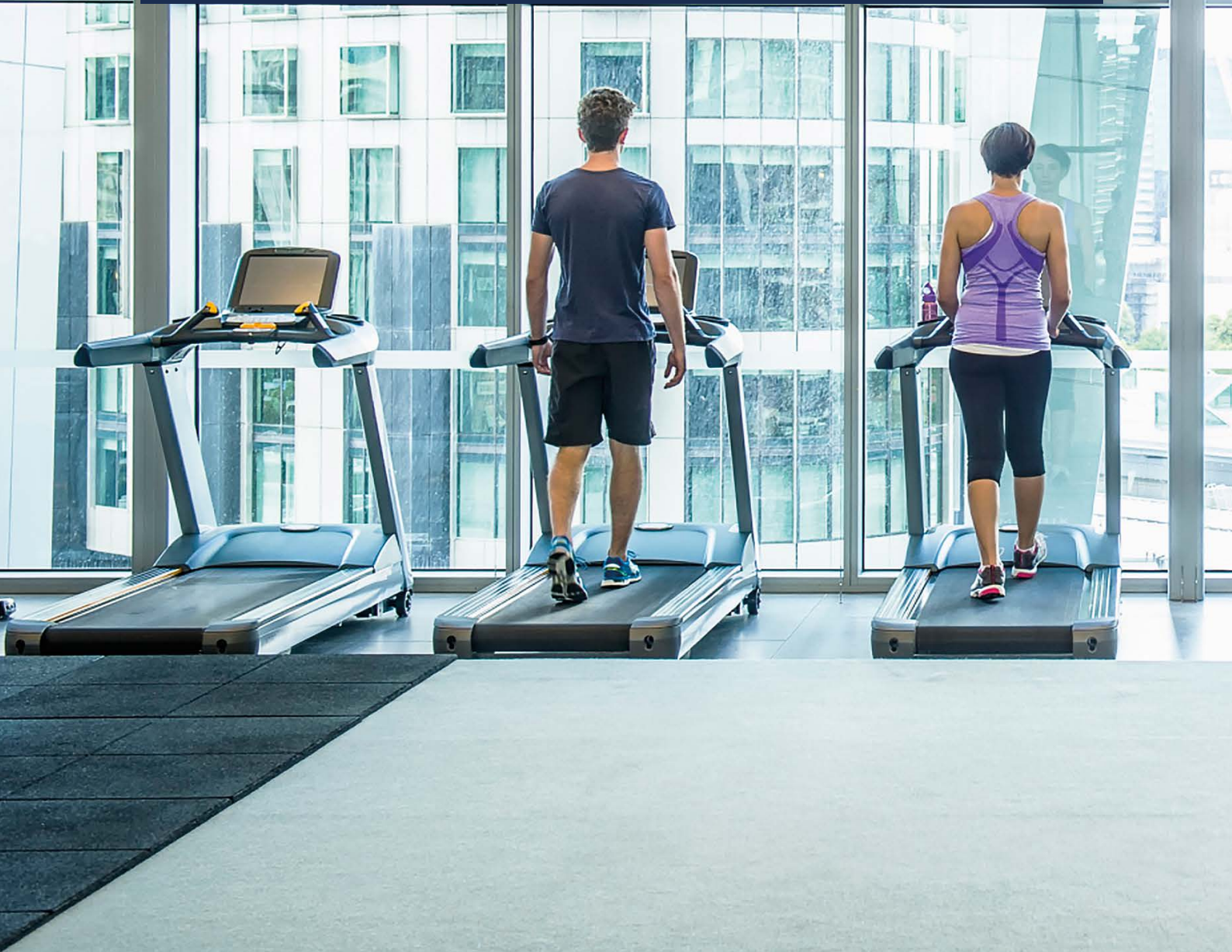
How efficient are heat pump water heaters?

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 on the opposite page compares the relative energy efficiency of each the technologies.



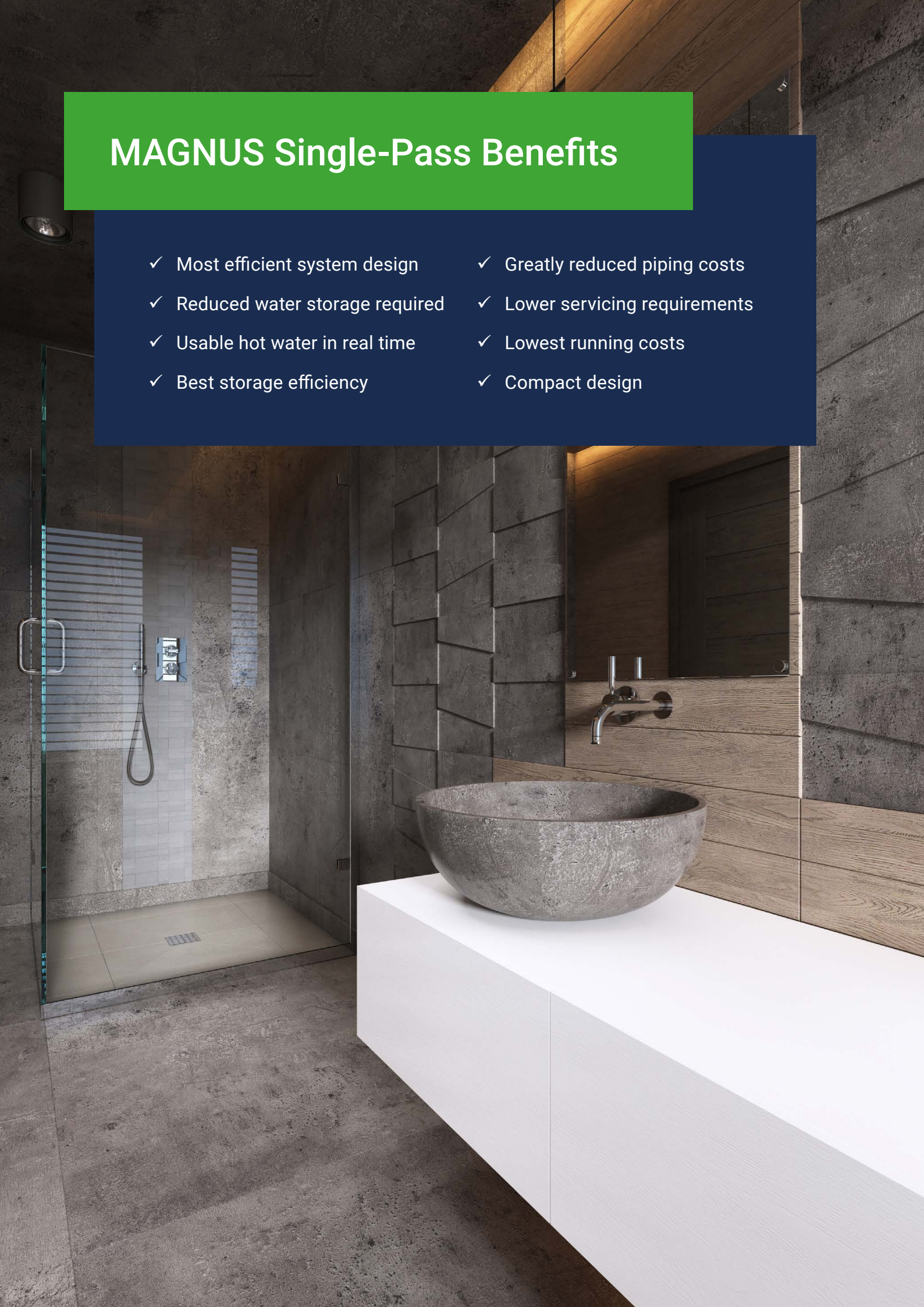
Energy Efficiency Comparison

Table showing a relative comparison of general energy input and output of each technology.



MAGNUS Single-Pass Benefits

- ✓ Most efficient system design
- ✓ Reduced water storage required
- ✓ Usable hot water in real time
- ✓ Best storage efficiency
- ✓ Greatly reduced piping costs
- ✓ Lower servicing requirements
- ✓ Lowest running costs
- ✓ Compact design



MAGNUS Single-Pass design, a new era in commercial potable water heating

Designed to resolve the inefficiencies of current market products, MAGNUS Single-Pass heat pump water heater innovation improves the effectiveness and efficiency of commercial hot water systems.

MAGNUS 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.



Temperzone's ThermoShell Single-Pass systems enable the delivery of a unique and revolutionary product previously not available to the commercial market.

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'. Laboratory testing shows that the Single-Pass design achieves an additional 15-20% increase in efficiency of the water heating system compared with a Multi-pass system.



Temperzone's Single-Pass systems achieve an additional 15-20% increase in efficiency over multi-pass systems.

Main Benefits of Single-Pass Systems

- ✓ Reduction in storage required
- ✓ Reduction in piping required
- ✓ Lowest running costs
- ✓ Low service / maintenance requirements
- ✓ Low carbon emission system

MAGNUS Single-Pass

Superior cost effectiveness

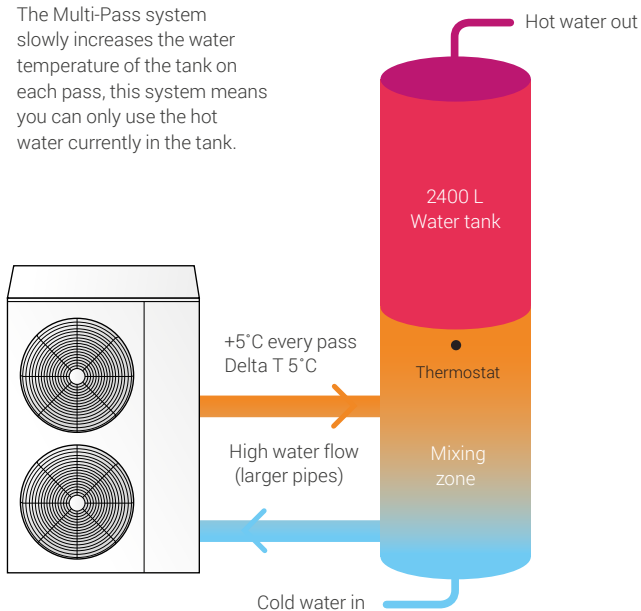
MAGNUS Single-Pass systems are designed to significantly reduce the installed system cost compared to other water heating alternatives while delivering optimum performance.

Single-Pass system capital and running cost savings

Conventional Multi-Pass Potable Hot Water System

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.

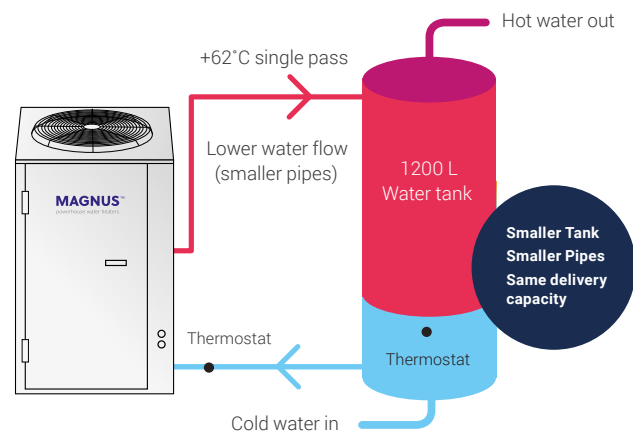


E.g. A Multi-Pass system storage tank must contain sufficient volume to meet the entire peak usage period (in this example 2400 litres). Whilst the system will begin to reheat the water this hot water is not available until the entire tank reaches a usable temperature.

Temperzone's Single-Pass ThermoShell Potable Hot Water System

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



E.g. 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.



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.

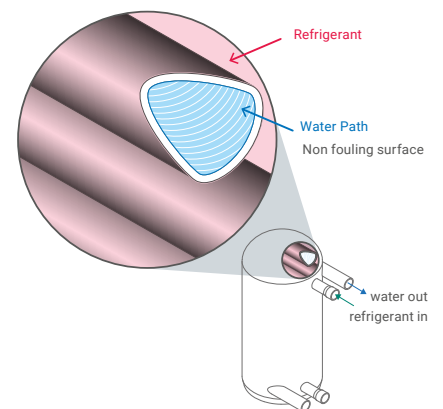
Reduced piping costs

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.

ThermoShell® Technology Heat Exchangers

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

Alternative heat exchanger designs are highly prone to fouling over time which reduces performance and greatly shortens the life of the system. Temperzone's ThermoShell® eliminates this fouling risk and guarantees the same performance year after year.



 **ThermoShell®**
technology

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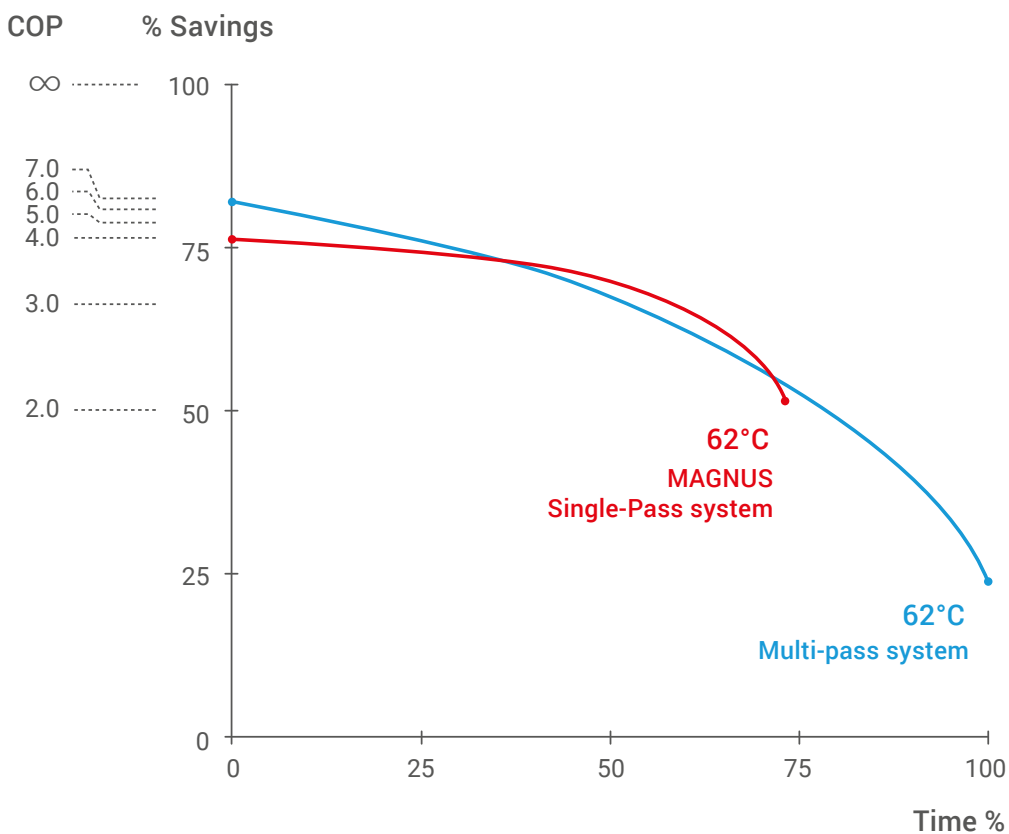
MAGNUS Single-Pass

Superior heat pump performance

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

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 significant savings!



Lower running costs

Single-Pass system takes less time to reach temperature and overall runs more efficiently

Higher running costs

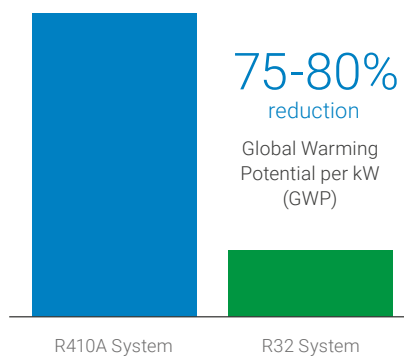
Multi-pass system takes 30% longer to reach temperature and overall runs with much less efficiency

MAGNUS Durability

- ✓ Integrated Controls
- ✓ Epoxy Coated Coils
- ✓ Quiet Operational Design
- ✓ Advanced Powder Coating
- ✓ Commercial Construction
- ✓ Variable Speed Condenser Fans

Low GWP R32 refrigerant

Utilising R32 Refrigerant, MAGNUS Single-Pass units represent a 75-80% reduction of Global Warming Potential (GWP) per kW of cooling when compared to R410a units.



Intelligent unit controller

The electronic controller intelligently monitors the refrigeration conditions to optimise the system efficiency across a wide range of operating conditions. A unique duplex electronic expansion valve control system ensures reliability and performance at the highest possible ambient temperatures: an industry best at 52°C.

Revolutionary compact design

This powerhouse product is efficiently designed and packaged to allow for greater versatility when it comes to positioning and installation.

Digital compressors for operating in a wide range of environments

A highly efficient digital compressor allows additional control of the refrigeration cycle to cope with extreme outdoor conditions.

EC variable speed pump

The smart pump has a permanent magnet, electronically commutated motor (ECM) that reduces energy use by about 50%.

Quiet operating outdoor units

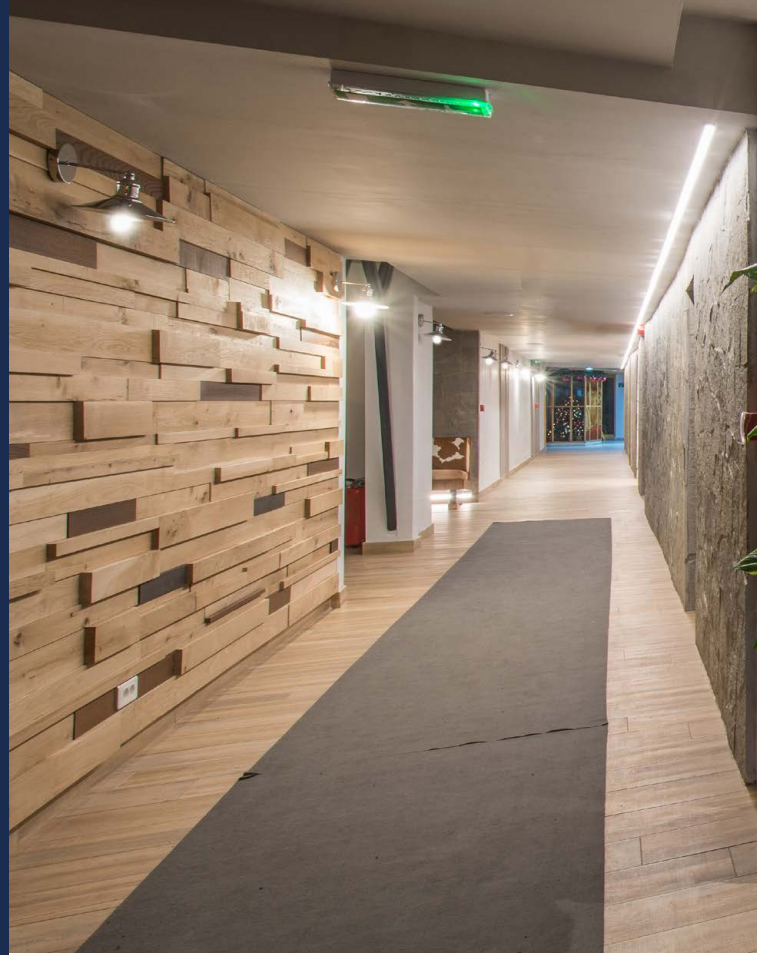
The outdoor units coil design permits low fan speeds and hence low noise levels. The compressor is isolated in a built-in, insulated compartment to minimise noise.

MAGNUS

Single-Pass Heat Pump Water Heater

Single-Pass units are designed for commercial potable hot water delivering 62°C water to centralised water heating systems. 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

- Highly efficient, Single-Pass design
- Creates usable hot water in real time
- Reduces storage capacity required
- Can retrofit to existing tanks
- Smaller pipe sizes than Multi-Pass
- Suitable for multi-unit residential, commercial kitchens, laundry etc.
- Legionella control compliant in NZ/AU for potable water heating
- Suitable for meeting large peak hot water demands
- Lower operating cost than natural gas
- Highly corrosion resistant powder coating treatment and epoxy coated coils
- R32 Low GWP refrigerant
- Durable temperzone design and construction
- Non-fouling ThermoShell heat-exchanger
- Extremely compact design
- Quiet operation



Model

Power Supply
Refrigerant
Nominal Heating Capacity kW *
Input Power kW *
COP *
Water Flow Rate l/min. *
Design HEX differential °C
Design Pressure Drop *
Max. Water temp °C
Min./Max. EWT °C (Heating)
Min. Ambient Operating temp. °C
Sound Power (w) dB(A) **
Sound Pressure @ 3m (SPL) dB(A)
Heat Exchanger
Compressor
Running Current A *
Max. Running Current A *
Fans
Pump
Max. Delivery Head of Pump m
Communication Options
Dimensions (W x D x H) (mm)
Net Weight kg



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MWS 250	MWS 500	MWS 1000
3 ph 400 ac 50Hz	3 ph 400V ac 50Hz	3 ph 400V ac 50Hz
R32	R32	R32
20 / 27**	40 / 54**	74 / 98**
7.1 / 6.8**	14.3 / 13.5**	28.0 / 26.4**
2.8 / 4.0**	2.8 / 4.0**	3.63 / 3.71**
6.1 / 9.2**	12.2 / 18.5**	22.6 / 33.4**
47 / 42**	47 / 42**	47 / 42**
1 / 2**	1 / 2**	1 / 2**
65	65	62
2 / 35	2 / 35	2 / 35
-10	-10	-10
72	75	78
56	59	62
ThermoShell™ (x1)	ThermoShell™ (x2)	ThermoShell™ (x4)
Scroll - Liquid Injection (x1)	Scroll - Liquid Injection (tandem)	Fixed Scroll (tandem)
11 / 12 / 11 10 / 11 / 10**	22 / 24 / 22 20 / 22 / 20**	44 / 50 / 44 40 / 48 / 40**
15 / 16 / 15	30 / 32 / 30	60 / 64 / 60 60 / 64 / 60**
3 spd Axial 500mm	3 spd Axial 500mm (x2)	3 spd Axial 500mm (x4)
Integrated BLDC	Integrated BLDC	Integrated BLDC (x2)
8	8	8
BMS / Modbus	BMS / Modbus	BMS / Modbus
934 x 771 x 1199	1768 x 771 x 1199	1863 x 1477 x 1259
175	320	650

* Rating conditions: 7/6°C db/wb outdoor ambient; EWT 15°C; LWT 62°C.

** Rating conditions: 19/16°C db/wb outdoor ambient; EWT 20°C; LWT 62°C.

*** Radiated. BS 848.2 Direct method of measurement (reverberant room).

The manufacturer reserves the right to make changes in specifications at any time without notice or obligation.

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by



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