# RAYPAK® MVB™

FOR SUPERIOR EFFICIENCY
IN SMALL SPACES

GAS | COMPACT | UP TO 88.4% EFFICIENCY[1] THERMAL EFFICIENCY | FLEXIBLE FLUEING | TOUCHSCREEN WITH BMS

## Raypak® MVB™ – Modulating Vertical Burner – is a vertically fired, full modulation capable gas water heater designed for both domestic hot water and hydronic heating applications, sometimes simultaneous.

### EFFICIENCY

Up to 88.4%[1] thermal efficiency in a non-condensing platform provides good practical efficiency in high temperature circuits. Incorporates unique integral evaporator system which collects and re-evaporates condensate which may form under certain conditions, eliminating the need for a boiler condensate drain. Can operate as low as 49°C without additional bypasses.

### SMALL FOOTPRINT

With less than 2.4m² of installed space per heater fitting into tight spaces is a breeze. Fits through a standard 800mm doorway for replacement ease.[2]

### FLEXIBLE FLUEING

A variety of small diameter flueing options including traditional vertical flueing, horizontal, room sealed and outdoor with exceptional flue run lengths provide installation flexibility. Flue versatility is further enhanced by the self-tuning combustion system which compensates for unusual flue configurations.

[1] Part load, 86.2% full load.
[2] Contact Rheem for Minimum door height.

5 YEAR HEAT EXCHANGER WARRANTY
1 YEAR PARTS & LABOUR WARRANTY
Lead Free AS 3498 Lic WMK26028

*Conditions apply: For full terms and conditions please contact Rheem or visit www.rheem.com.au/rheem/help/Warranties

### CONTROL INTERFACE WITH BMS

7" colour touchscreen user interface provides instant visual information. The modulating VERSA IC Controller merges safety, ignition and temperature control and freeze protection, plus system monitoring, alarm and diagnostics with VFC remote alarm, and BMS interface all in one Integrated Control Platform.

The MVB™ is factory configured for Modbus RTU BMS communication (with extension capability).

BMS gateways include:

- Modbus RS485 is included as standard supply.
- BACnet MS/TP, BACnet IP, or Modbus TCP interface is available via optional gateway (ordered separately).

# ADDITIONAL FEATURES AND BENEFITS

## CONTROL

- Air: Gas ratio burner control can provide up to 14% minimum fire rate and up to 4 heaters can be internally cascade connected, with equal runtime auto rotation, to provide up to 3.5% minimum fire rate for optimum temperature control.
- MVB™ automatically self-tunes to accommodate the widest range of gas supply pressures. The high quality integrated blower-gas valve is self-correcting and allows smooth operation with fluctuating gas supply pressures
- Can operate up to 3,000m altitude (De-rate after 1,500m)
- 0-10V DC BMS Interface (control setpoint or direct drive unit on/off)
- Built-in outdoor reset functionality forhydronic heating
- Can simultaneously operate building pump (hydronic circuits), water heater primary pump and DHW pump in hybrid Heating/DHW circuits

## COMMERCIAL TO THE CORE

- Quality components including Ebm and Amatek fan, Dungs gas valve, bronze headers and copper finned tube, structural steel base, stainless steel combustion chamber, heavy gauge galvanized steel cabinet with UV-resistant Polytuf powder coat finish passes >1000 hour salt spray test
- 7 models in the range from 527MJ/h to 1990MJ/h (126kW to 476kW)

MASTER FOLLOWERS

**WATER SUPPLY AND RELIEF VALVE SETTINGS**

| Operation Type | W Models (DHW) | | | H Model (HHW) |
|---|---|---|---|---|
| Tank Series | 610 Series | RT Series | RW Series | All tanks[7] |
| Relief Valve Setting (kPa) | 1000 | 850 | 560 | 415 |
| Expansion Control Valve (ECV)[4] Setting (kPa) | 850 | 700 | 450 | N/A |
| Maximum Supply Pressure | | | | |
| without ECV[4] fitted (kPa) | 800 | 680 | 440 | 330 |
| With ECV[4] fitted (kPa) | 680 | 550 | 360 | N/A |
| Minimum Supply Pressure | | | | |
| System Water Temperature up to 65°C (kPa) | | 70 (7m) | | 70 (7m) |
| System Water Temperature above to 65°C (kPa) | | 120 (2m) | | 120 (2m) |

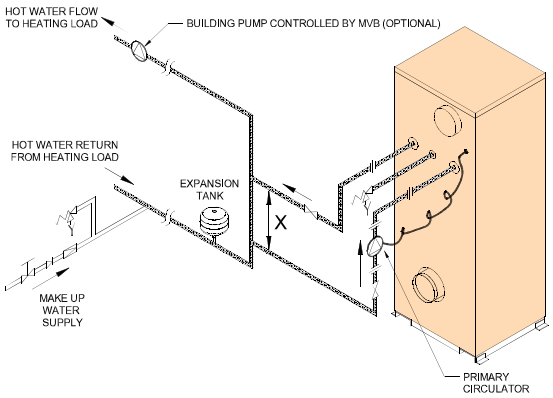
[3] Contact Rheem for applications requiring water temperature greater than 71°C.
[4] Expansion control valve is not suppliedwith the water heater.
[5] H models used for high temperature DHW applications follow pressure limitations of W models.
[6] Lock band with screw required.

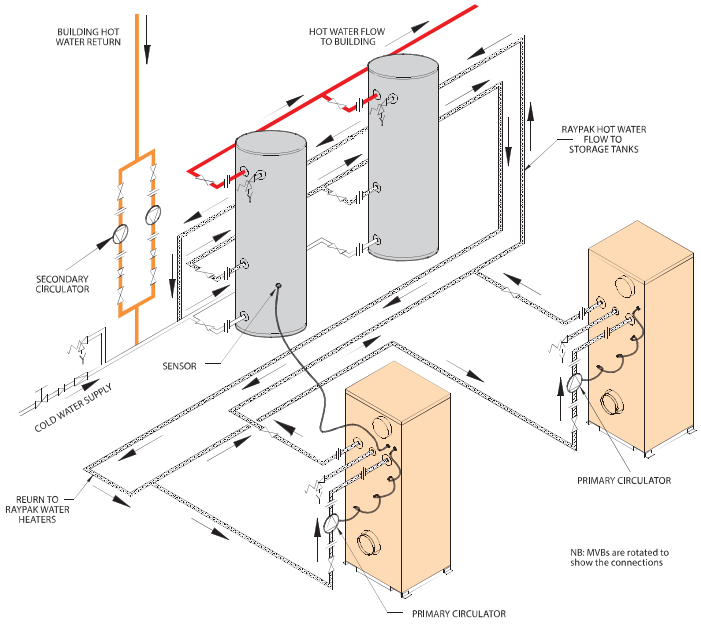
# APPLICATIONS

## HYDRONIC HEATING APPLICATION

MVB™ ('H' models) are ideal for hydronic heating due to the air:gas ratio control and up to 28:1 turndown (in cascade).

- Primary circuit and, optionally, building pump can be controlled
- Outdoor reset for optional temperature control is available
- Cascade up to 4 units for better control and improved lifetime



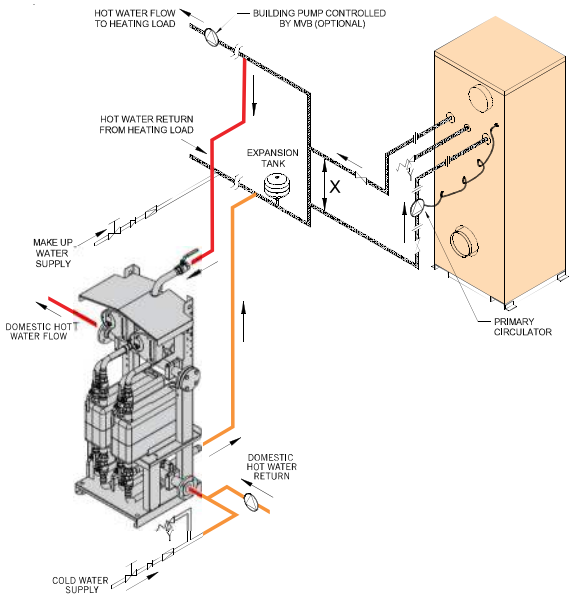




## DOMESTIC HOT WATER APPLICATION

MVB™ is WaterMark certified for use in DHW applications.

- Suitable for DWH applications up to 71°C[3]
- Cascading and rotating options for improved lifetime

**FOR INQUIRIES REGARDING WATER HEATING APPLICATIONS EXCEEDING 71°C, PLEASE CONTACT RHEEM AUSTRALIA FOR ASSISTANCE.**




## HYDRONIC HEATING AND DOMESTIC HOT WATER APPLICATION

Building heating and potable domestic hot water can be achieved as a combined system by using the MVB™ with Crossflow® or a hot water calorifier.

- Connect Crossflow® primary flow and return to the building flow and return
- Storage may or may not be required depending on the amount of available energy

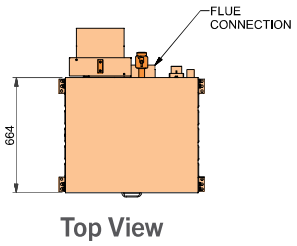
**LEGEND**

STOP VALVE
NON RETURN VALVE
PRESSURE LIMITING VALVE
EXPANSION CONTROL VALVE
GATE OR BALL VALVE
CIRCULATOR
UNION
TUNDISH
DIRECTION OF FLOW
X MAXIMUM DISTANCE NOT TO EXCEED 4X PIPE DIAMETER OR 300mm, WHICHEVER IS LESS

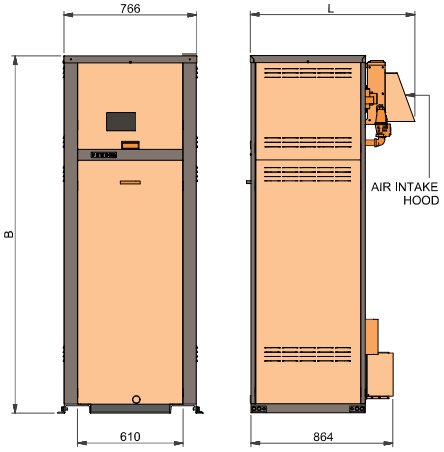
# TECHNICAL DATA

| MODELS | | | 910500 | 910750 | 911000 | 911250 | 911500 | 911750 | 912000 |
|---|---|---|---|---|---|---|---|---|---|
| Natural Gas | Input<br>Output | MJ/h<br>kW | 527<br>126 | 791<br>189 | 1054<br>252 | 1319<br>316 | 1582<br>379 | 1846<br>442 | 1990<br>476 |
| **Dimensions** | | | | | | | | | |
| B | | mm | 1092 | 1245 | 1397 | 1549 | 1702 | 1905 | 2057 |
| D | | mm | 813 | 965 | 1118 | 1270 | 1422 | 1575 | 1727 |
| E | | mm | 889 | 1041 | 1194 | 1346 | 1499 | 1651 | 1803 |
| F | | mm | 603 | 756 | 908 | 1060 | 1213 | 1365 | 1518 |
| G[7] | | | R1 | R1 | R1¼ | R1¼ | R1¼ | R2 | R2 |
| H[7] | | | R2 | R2 | R2½ | R2½ | R2½ | R2½ | R2½ |
| K | | mm | | 150 | | | 200 | | |
| L | | mm | | 924 | | | 954 | | |
| M | | mm | | 368 | | | 451 | | |
| N | | mm | | 150 | | | 200 | | |
| P | | mm | 889 | 1041 | 1232 | 1346 | 1499 | 1727 | 1880 |
| R | | mm | 152 | 152 | 152 | 152 | 152 | 229 | 229 |
| V | | mm | 51 | 51 | 51 | 51 | 51 | 127 | 127 |
| Weight | | kg | 272 | 299 | 326 | 354 | 381 | 426 | 454 |
| Relief Valve Connection | | | RC¾ | RC¾ | RC¾ | RC¾ | RC¾ | RC¾ | RC¾ |
| Indoor Sound Pressure at 3m | | dBA | 63 | 63 | 63 | 63 | 63 | 69 | 69 |
| Outdoor Sound Pressure at 3m | | dBA | 55 | 55 | 55 | 55 | 55 | 62 | 62 |
| Electrical Rating 240V 50Hz | | Amps[8] | 6.25 | 6.25 | 6.25 | 6.25 | 6.25 | 8.5 | 8.5 |
| Min Buffer Tank Capacity | | L | 650 | 920 | 1300 | 1570 | 1840 | 2320 | 2600 |
| Max Storage Tank Capacity | | L | 6511 | 9767 | 13022 | 16329 | 19585 | 22840 | 24597 |
| Litres Recovery Per Hour @ (Natural Gas) | 30 | °C rise | 3617 | 5426 | 7234 | 9072 | 10880 | 12689 | 13665 |
| | 40 | °C rise | 2713 | 4069 | 5426 | 6804 | 8160 | 9517 | 10249 |
| | 50 | °C rise | 2170 | 3256 | 4341 | 5443 | 6528 | 7613 | 8199 |
| | 60 | °C rise | 1809 | 2713 | 3617 | 4536 | 5440 | 6344 | 6833 |
| | 65 | °C rise | 1669 | 2504 | 3339 | 4187 | 5022 | 5856 | 6307 |
| | 70 | °C rise | 1550 | 2325 | 3100 | 3888 | 4663 | 5438 | 5856 |
| **Flow Rate and Pressure Drop** | | | | | | | | | |
| Temperature Rise (°C) | 10 | L/s | 3.13 | 4.62 | 6.18 | 7.23 | - | - | - |
| | | dP (kPa) | 11.05 | 25.15 | 44 | 56.7 | - | - | - |
| | 15 | L/s | 2 | 3 | 4 | 5 | 6 | 7 | - |
| | | dP (kPa) | 5 | 10.8 | 21.1 | 35.6 | 56.3 | 82.9 | - |
| | 20 | L/s | - | 2.26 | 3 | 3.77 | 4.5 | 5.28 | 5.7 |
| | | dP (kPa) | - | 7.1 | 12.7 | 25.8 | 33.8 | 44.7 | 60.4 |
| Min Flow | | L/s | 1.6 | 2.11 | 2.88 | 3.58 | 4.29 | 4.99 | 5.7 |
| | | dP (kPa) | 3.35 | 5.79 | 11.58 | 19.81 | 30.48 | 42.67 | 60.35 |
| | | dT Deg C | 19.4 | 21.7 | 21.7 | 21.7 | 21.7 | 21.7 | 21.7 |
| Max Flow | | L/s | 6.4 | 6.4 | 7.23 | 7.23 | 7.23 | 7.23 | 7.42 |
| | | dP (kPa) | 34.44 | 42.06 | 56.69 | 67.67 | 77.72 | 82.91 | 97.54 |
| | | dT Deg C | 5 | 7.2 | 8.3 | 10.6 | 12.8 | 15 | 16.7 |

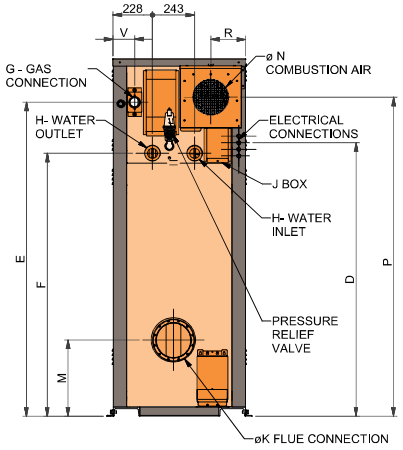
[7] Water and gas connections on the MVB™ are NPT threaded and will not seal against ISO 7 (BSP) threads. The NPT/BSP adaptors supplied must be fitted in order to make further connections to the system.
[8] Excluding pumps.



Top View



Front View Side View



Rear View

## MVB™ MODEL NUMBERS

| 91 | 0500 | B | N | W | K |
|---|---|---|---|---|---|
| Commercial MVB™ | Approx. Thermal input (MJ/h) | Header Material<br>B = Bronze | Gas Type<br>N = Nat gas | Heater Configuration<br>H = Hydronic<br>W = Domestic Hot Water | K = Installation Kit |

## GAS SUPPLY PRESSURE

| Gas Type | Natural |
|---|---|
| Minimum at Full Load (kPa) | 1.13 |
| Maximum (kPa) | 2.6 |

## THERMOSTAT SETTINGS[5]

| | W Model | H Model |
|---|---|---|
| Max | 71°C[3] | 82°C[3] |
| Factory Set | 51.5°C | Mode setting dependent |
| Min | 10°C | 10°C |

## CLEARANCES

| Heater Side | Minimum From Combustible Surfaces (mm) | Minimum Service Clearance (mm) |
|---|---|---|
| Floor[9] | 0 | 0 |
| Rear | 300 | 600 |
| Right Side[3] | 25 | 500 |
| Left Side | 25 | 500 |
| Top | 0 | 350 |
| Front | Open | 900 |

[4] Do not install on carpeting. NOTE: Local codes may require increased clearances.
[3] Contact Rheem for applications requiring water temperature greater than 71°C.

# VERSATILE APPLICATIONS FOR FLUEING

## FLUEING

The MVB™ is a high efficiency, fan forced water heater. The flue must be of minimum 316 grade stainless steel sealed against positive flue pressure. The Rheem supplied flue components meet this requirement and are easily fitted together with gaskets and over-centre clamp rings.

The flue must be installed with fall toward the heater where condensate can be collected. The condensate drain section must be connected and drained to the sewer waste or outside. A condensate trap must be installed and filled with water to prevent spillage of products of combustion.

## HOW TO SIZE

The overall dimension of each flue piece is shown in the drawings. Allow approximately 35mm for insertion of each flue piece.

Determine the lineal distance and number of 45° and/or 90° elbow between the MVB™ outlet and flue terminal in accordance with the table. Note, the bottom edge of a vertical flue terminal must be 500mm away from the nearest structure in accordance with AS/ NZS 5601.1.

Flashing is required to be installed where a vertical flue section penetrates the roof line (not supplied).

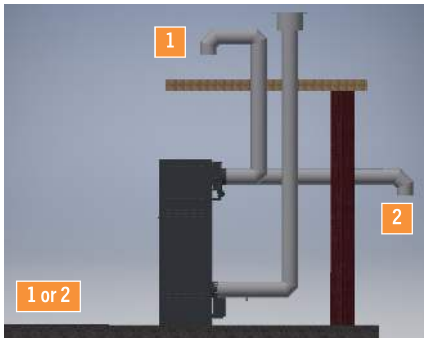
Flue penetrations through walls and ceilings must be sealed in accordance with local fire regulations.

**FLUE SIZING**

| MVB™ Model | Flue Material | Flue Size (mm) | Max Flue Length[6] (m) | Combustion Air Intake Pipe Material | Max Air Inlet Length[10] (m) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Ø 150mm | Ø 200mm | Ø 250mm |
| 910500 | 316L Stainless Steel minimum | 150 | 23 | Stainless Steel, Galvanized Steel, PVC, ABS, CPVC | 14 | 30 | N/A |
| 910750 | | | | | | | |
| 911000 | | | | | | | |
| 911250 | 316L Stainless Steel minimum | 200 | 23 | Stainless Steel, Galvanized Steel, PVC, ABS, CPVC | N/A | 14 | 26 |
| 911500 | | | | | | | |
| 911750 | | | | | | | |
| 912000 | | | | | | | |

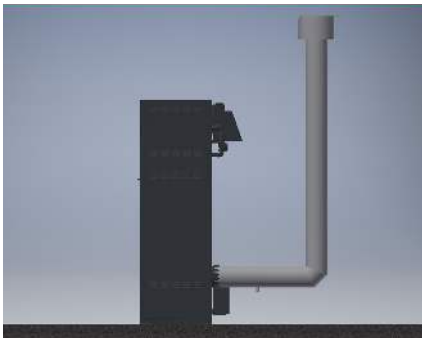
[10] Subtract 3m for every elbow. Max 4 x elbows. Flue terminal not considered as part of the overall length of the flue system.

### Room Sealed Vertical Flueing

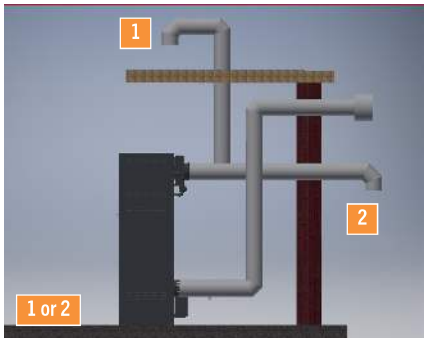



### Room Sourced Vertical Flueing

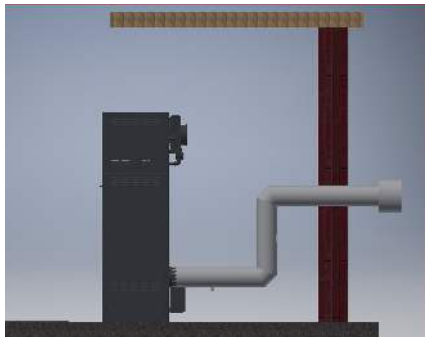
### Outdoor Flueing



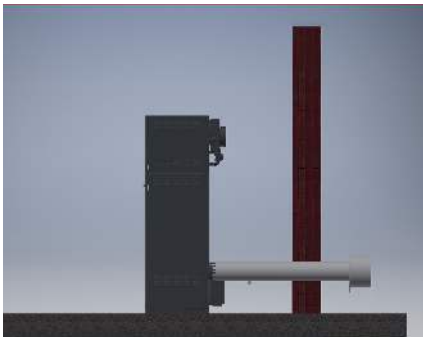
### Room Sealed Horizontal Through-the-Wall Flueing




### Room Sourced Horizontal Through-the-Wall Flueing



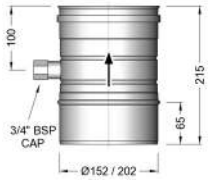
### Alternative Outdoor Through-the-Wall Flueing



# FLUEING AND ACCESSORIES

The MVB™ is supported by a range of stainless steel flue components suitable for positive pressure condensing operation. Ø150mm suits 910500, 910750 and 911000. Ø200mm suits 911250, 911500, 911750 and 912000.

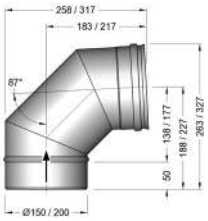
The following parts are available:




### Flue Adaptor with Drain

Ø150mm - AQ94200106

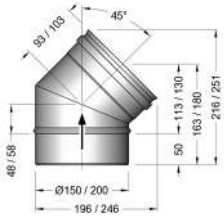
Ø200mm - AQ94200127




### 87° Elbow

Ø150mm - AQ94200108

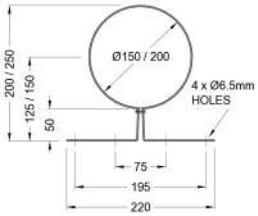
Ø200mm - AQ94200129




### 45° Elbow

Ø150mm - AQ94200109

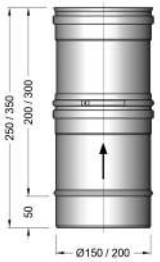
Ø200mm - AQ94200130




### Mounting Band (1 per 1.5m of run)

Ø150mm - AQ94200116

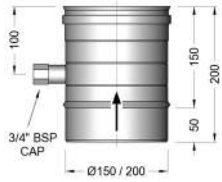
Ø200mm - AQ94200137




### Adjustable Straight

Ø150mm - AQ94200113

Ø200mm - AQ94200134




### Flue Drain (project specific)

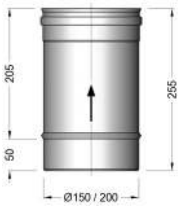
Ø150mm - AQ94200107

Ø200mm - AQ94200128

### Top Stub (vertical discharge)

Ø150mm - AQ94200120

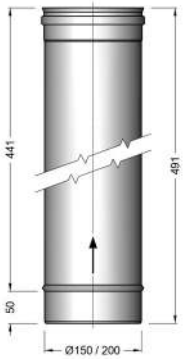
Ø200mm - AQ94200143




### 250mm Straight

Ø150mm - AQ94200112

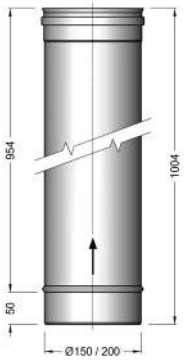
Ø200mm - AQ94200133




### 500mm Straight

Ø150mm - AQ94200111

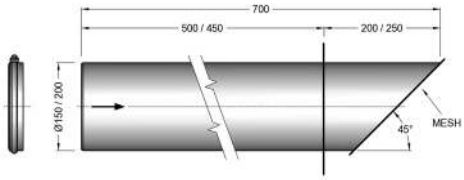
Ø200mm - AQ94200132

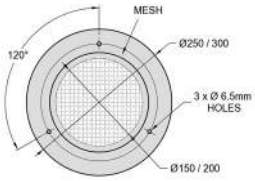



### 1000mm Straight

Ø150mm - AQ94200110

Ø200mm - AQ94200131

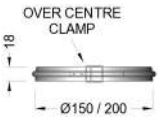



### Horizontal Terminal[6] (can be cut to length)

Ø150mm - AQ94200121

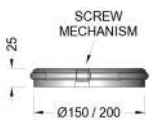
Ø200mm - AQ94200144




### Lock Band with Clamp (1 per flue piece)

Ø150mm - AQ94200114

Ø200mm - AQ94200135



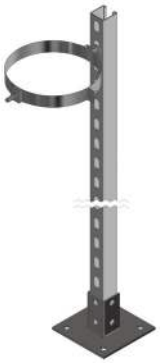

### Lock Band with Screw

Ø150mm - AQ94200115

Ø200mm - AQ94200136

### Lubricating Grease 250g (approx. 1 required per 15 sections of flue)

AQ0080503



### Outdoor Flue Stand Collar

Ø150mm - AQ94200223

Ø200mm - AQ94200224

## ACCESSORIES

| Part Number | Description |
|---|---|
| AQ2415001 | Kit Fitting Adapter 500 – 750 (supplied with MVB™) |
| AQ2415002 | Kit Fitting Adapter 1000 – 1500 (supplied with MVB™) |
| AQ2415003 | Kit Fitting Adapter 1750 – 2000 (supplied with MVB™) |
| AQ0200125 | Interface Module Gateway BACnet. Supplied loose[11] |
| AQ94200225 | Pump Cover Magna 1 |
| 56860243-1 | PUMP GRUNDFOS UPS32-80N |
| AQ0202044 | PUMP GRUNDFOS MAGNA 1 40-120 |
| AQ0202045 | PUMP GRUNDFOS MAGNA 1 65-150 |
| AQ2415025 | Sensor Kit NTC J Curve (supplied with MVB™. An additional sensor kit may be required, application dependent.) |

[11] Suitable for indoor installation.

# PIPE SIZE AND PUMP SELECTION

## MVB™ PIPE SIZE AND PUMP SELECTION CHART FOR DOMESTIC HOT WATER AND HYDRONIC APPLICATIONS ABOVE 71°C[3] (10 DEGREE RISE)

| MVB™ Model | Pump Model | Branch Size (mm) | Minimum Manifold Header Size (mm) / Pump Speed Setting | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 Unit | | 2 Units | | 3 Units | | 4 Units | |
| | | | Pipe Diameter (mm) | Speed | Pipe Diameter (mm) | Speed | Pipe Diameter (mm) | Speed | Pipe Diameter (mm) | Speed |
| 910500 | Magna 1 40-120 | 65 | 65 | PP1 | 100 | PP1 | 125 | CP1 | 125 | PP1 |
| 910750 | Magna 1 40-120 | 80 | 80 | CC3 | 100 | CC3 | 125 | CC3 | 150 | CC3 |
| 911000 | Magna 1 65-150 | 100 | 100 | CC2 | 125 | PP2 | 150 | PP2 | 200 | CC2 |
| 9112500 | Magna 1 65-150 | 100 | 100 | CC3 | 125 | CC3 | 150 | CC3 | 200 | CC3 |
| 911500 | N/A | - | - | - | - | - | - | - | - | - |
| 911750 | N/A | - | - | - | - | - | - | - | - | - |
| 912000 | N/A | - | - | - | - | - | - | - | - | - |

## MVB™ PIPE SIZE AND PUMP SELECTION CHART FOR DOMESTIC HOT WATER AND HYDRONIC APPLICATIONS UP TO 65°C (20 DEGREE RISE)

| MVB™ Model | Pump Model | Branch Size (mm) | Minimum Manifold Header Size (mm) / Pump Speed Setting | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 Unit | | 2 Units | | 3 Units | | 4 Units | |
| | | | Pipe Diameter (mm) | Speed | Pipe Diameter (mm) | Speed | Pipe Diameter (mm) | Speed | Pipe Diameter (mm) | Speed |
| 910500 | UPS32-80N | 50 | 50 | 3 | 65 | 3 | 80 | 3 | 100 | 3 |
| 910750 | UPS32-80N | 65 | 65 | 3 | 80 | 3 | 100 | 3 | 100 | 3 |
| 911000 | Magna 1 40-120 | 65 | 65 | PP1 | 100 | PP1 | 100 | CP1 | 125 | PP1 |
| 911250 | Magna 1 40-120 | 80 | 80 | CC2 | 100 | CC2 | 125 | CC2 | 125 | CC3 |
| 911500 | Magna 1 40-120 | 80 | 80 | CC3 | 100 | CC3 | 125 | CC3 | 150 | CC3 |
| 911750 | Magna 1 65-150 | 100 | 100 | CC2 | 125 | CC2 | 150 | CC2 | 200 | CC2 |
| 912000 | Magna 1 65-150 | 100 | 100 | PP2 | 125 | PP2 | 150 | PP2 | 200 | PP2 |

NOTE: Manifold header sizes are minimum requirements for water heater performance.
Header sizing is based on a total length of 20m of primary flow and return piping and 20 bends, excluding equa-flow manifolds on storage tanks and MVB™, at 1.2m/sec velocity in copper pipe.

## MVB™ PIPE SIZE AND PUMP SELECTION CHART FOR DOMESTIC HOT WATER AND HYDRONIC APPLICATIONS BETWEEN 65°C AND 71°C (15 DEGREE RISE)

| MVB™ Model | Pump Model | Branch Size (mm) | Minimum Manifold Header Size (mm) / Pump Speed Setting | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 Unit | | 2 Units | | 3 Units | | 4 Units | |
| | | | Pipe Dia. (mm) | Speed | Pipe Dia. (mm) | Speed | Pipe Dia. (mm) | Speed | Pipe Dia. (mm) | Speed |
| 910500 | UPS32-80N | 50 | 50 | 3 | 80 | 3 | 100 | 3 | 100 | 3 |
| 910750 | Magna 1 40-120 | 65 | 65 | PP1 | 100 | PP1 | 100 | PP1 | 125 | PP1 |
| 911000 | Magna 1 40-120 | 80 | 80 | PP1 | 100 | CC2 | 125 | PP1 | 150 | PP1 |
| 911250 | Magna 1 40-120 | 80 | 80 | CC3 | 125 | CC3 | 125 | CC3 | 150 | CC3 |
| 911500 | Magna 1 65-150 | 100 | 100 | CC2 | 125 | PP2 | 150 | PP2 | 200 | CC2 |
| 911750 | Magna 1 65-150 | 100 | 100 | CC3 | 125 | CC3 | 150 | CC3 | 200 | CP3 |
| 912000 | Magna 1 65-150 | 100 | 100 | CC3 | 125 | CC3 | 150 | CC3 | 200 | CC3 |

NOTE: Manifold header sizes are minimum requirements for water heater performance.
Header sizing is based on a total length of 20m of primary flow and return piping and 20 bends, excluding equa-flow manifolds on storage tanks and MVB™, at 1.2m/sec velocity in copper pipe.