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 hydronic heating and domestic hot water applications, and can even do both simultaneously.

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.

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.

CONTROL INTERFACE WITH BMS

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

The MVB is factory configured for Modbus RTU BMS communication (with extension capability). Supplied BMS gateways include:

- Modbus communication port - Standard
- BACnet MS/TP, BACnet IP, N2 Metasys or Modbus TCP, LONWorks - Optional

ADDITIONAL FEATURES AND BENEFITS

MASTER FOLLOWERS

CONTROL

- Air: Gas ratio burner control can provide up to 7:1 turndown on each heater (14% minimum fire rate) and up to 4 heaters can be internally cascade connected, with equal runtime auto rotation, to provide up to 28:1 system turndown (3.5% minimum fire rate) for optimum temperature control in hydronic circuits
- 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 for hydronic 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)

CASE STUDIES

DEL SOL MEDICAL CENTRE
EL PASO, TEXAS, USA

Del Sol Medical Center, El Paso Texas, installed 12 x MVB H7-2003 (912000NH) water heaters indoor in December of 2011 to provide central heating.

DISTRICT HEATING
CHINA

6 x MVB H7-4003 (4000MJ/hr) water heaters each (12 total) are being used to provide district heating to two separate districts in China.

NEKTAR BUILDING
OAKLAND, CALIFORNIA, USA

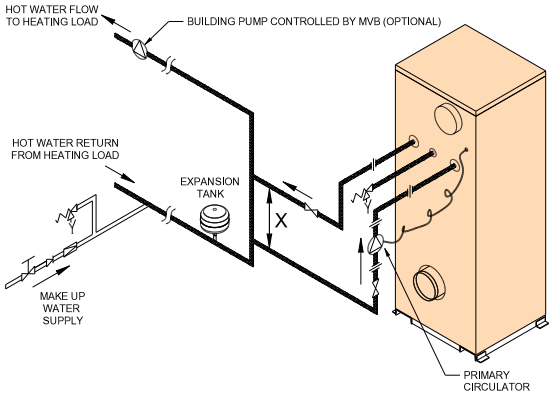
The Nektar Building in Oakland, California installed 2 x MVB H7-4003 (4000MJ/hr) water heaters as an efficiency upgrade and to meet the new emissions requirements in the bay area in 2013 to provide central heating.

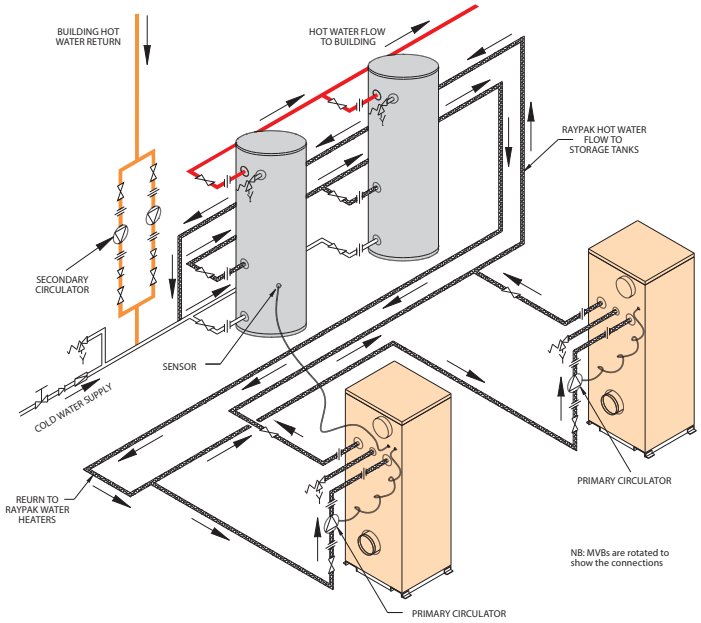
APPLICATIONS

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

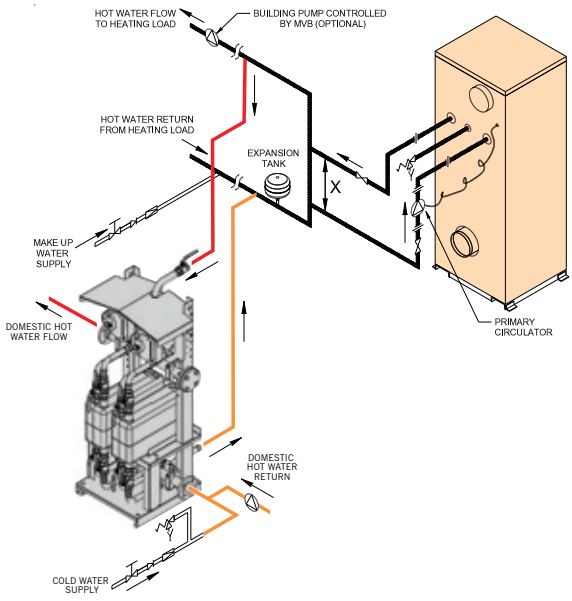
MVB is WaterMark certified for use in DHW applications.

- 'W' models suitable for up to 71°C
- 'H' models suitable for higher temperatures
- Cascading and rotating options for improved lifetime

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



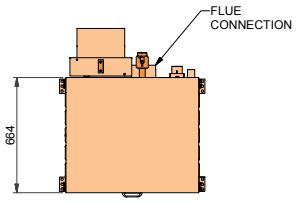
LEGEND

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

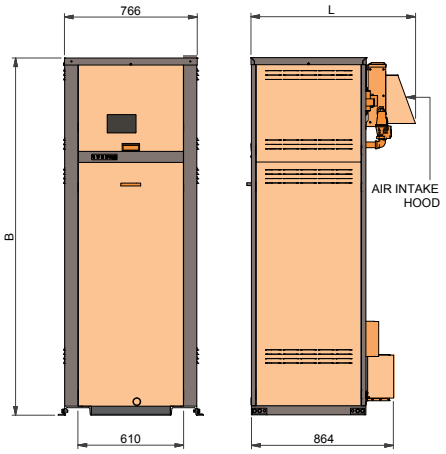
TECHNICAL DATA

MODELS			910500	910750	911000	911250	911500	911750	912000
Natural & Propane	Input Output	MJ/h kW	527 126	791 189	1054 252	1319 316	1582 379	1846 442	1990 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[1]			R1	R1	R1¼	R1¼	R1¼	R2	R2
H[1]			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[2]	6.25	6.25	6.25	6.25	6.25	8.5	8.5
Min Buffer Tank Capacity		L	217	326	434	544	653	761	820
Max Storage Tank Capacity		L	6511	9767	13022	16329	19585	22840	24597
Litres Recovery Per Hour @ (Nat/Prop)	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
	75	°C rise	1447	2170	2894	3629	4352	5076	5466
	80	°C rise	1356	2035	2713	3402	4080	4758	5124
	85	°C rise	1277	1915	2553	3202	3840	4478	4823
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

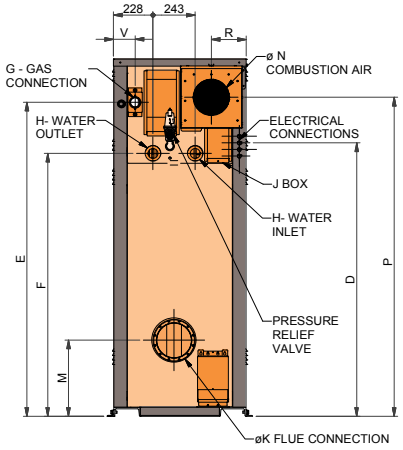
[1] Water and gas connections on the MVB are NPT threaded and will not seal against ISO 7 (BSP) threads. The NPT/BSP adaptors supplied must be fitted in order to make further connections to the system.
[2] Excluding pumps.



Top View



Front View Side View



Rear View

MVB MODEL NUMBERS

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

GAS SUPPLY PRESSURE

Gas Type	Natural	Propane
Minimum at Full Load (kPa)	1.13	1.13
Maximum (kPa)	2.6	3.2

THERMOSTAT SETTINGS

	W Model	H Model
Max	71°C	82°C
Factory Set	51.5°C	Mode setting dependant
Min	10°C	10°C

CLEARANCES

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

[3] Do not install on carpeting. NOTE: Local codes may require increased clearances.

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 top of the water heater 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).

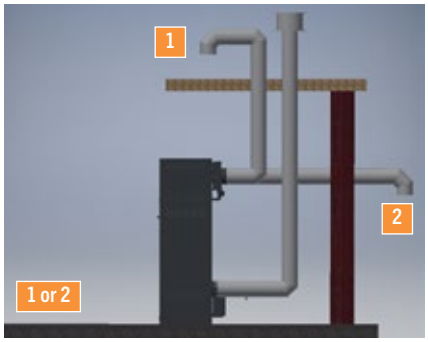
Flue penetrations through walls and ceilings must be sealed in accordance with local fire regulations.

FLUE SIZING

MVB Model	Flue Material	Flue Size (mm)	Max Flue Length[4] (m)	Combustion Air Intake Pipe Material	Max Air Inlet Length[4] (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							

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

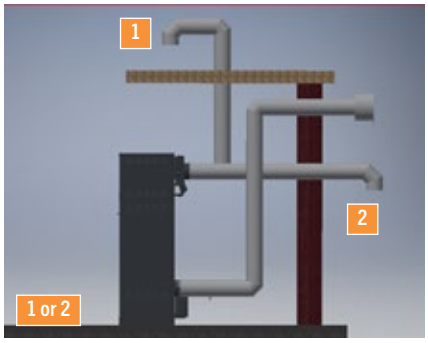
Room Sealed Vertical Flueing



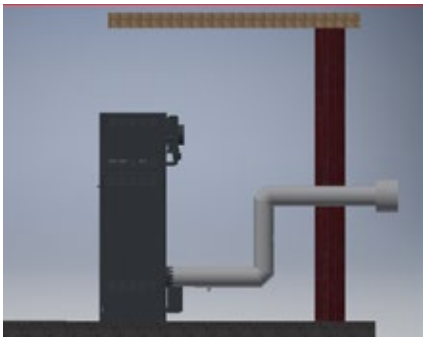
Room Sourced Vertical Flueing

Outdoor Flueing

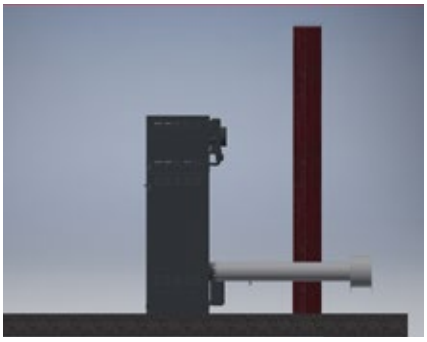
Room Sealed Horizontal Through-the-Wall Flueing



Room Sourced Horizontal Through-the-Wall Flueing



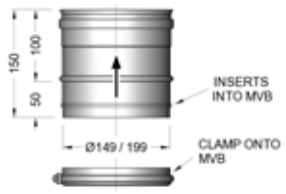
Alternative Outdoor Through-the-Wall Flueing



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.

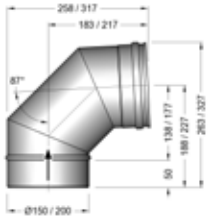
The following parts are available:



Flue Adaptor & Clamp Kit

Ø150mm - AQ94200106

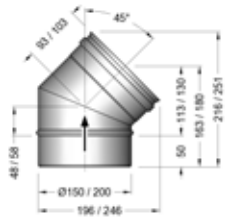
Ø200mm - AQ94200127



87° Elbow

Ø150mm - AQ94200108

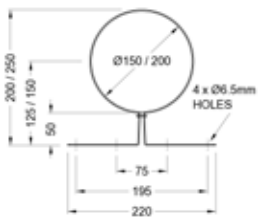
Ø200mm - AQ94200129



45° Elbow

Ø150mm - AQ94200109

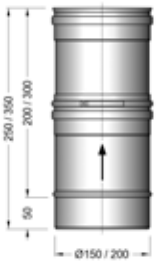
Ø200mm - AQ94200130



Mounting Band (1 per 1.5m of run)

Ø150mm - AQ94200116

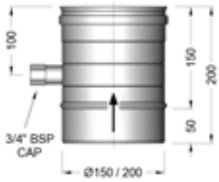
Ø200mm - AQ94200137



Adjustable Straight

Ø150mm - AQ94200113

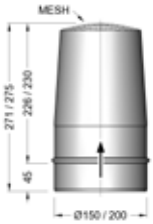
Ø200mm - AQ94200134



Flue Drain/Test Port (1 Per MVB)

Ø150mm - AQ94200107

Ø200mm - AQ94200128



Top Stub (vertical discharge)

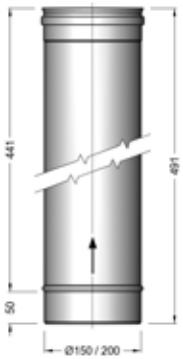
Ø150mm - AQ94200120

Ø200mm - AQ94200143

250mm Straight

Ø150mm - AQ94200112

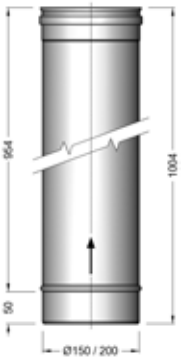
Ø200mm - AQ94200133



500mm Straight

Ø150mm - AQ94200111

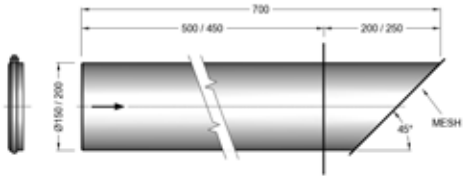
Ø200mm - AQ94200132



1000mm Straight

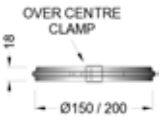
Ø150mm - AQ94200110

Ø200mm - AQ94200131



Horizontal Terminal (can be cut to length)

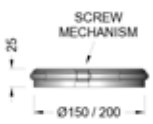
Ø150mm - AQ94200121 Ø200mm - AQ94200144



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

AQ94200300

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/Metasys
AQ0200126	Interface Module Gateway Lonworks
0107867	Outdoor Air Sensor ('H' Models)
AQ0200127	Temperature Controller – Pump-C ('H' models used for DHW >71°C)
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.)

PIPE SIZE AND PUMP SELECTION

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 Dia. (mm)	Speed	Pipe Dia. (mm)	Speed	Pipe Dia. (mm)	Speed	Pipe Dia. (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 MVBs, 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 82°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 MVBs, at 1.2m/sec velocity in copper pipe.

Water Supply and Relief Valve Settings

OPERATION TYPE	W Models (DHW)	H Models[7] (HHW)
Relief Valve Setting (kPa)	1000 (850)[5]	415
Expansion Control Valve (ECV)[6] Setting (kPa)	850 (700)[5]	N/A
Minimum Water Supply Pressure		
System water temperatures up to 65°C (kPa)	70 (7m)	70 (7m)
System water temperatures above 65°C (kPa)	120 (12m)	120 (12m)
Maximum Supply Pressure		
without ECV[6] fitted (kPa)	800 (680)[1]	330
with ECV[6] fitted (kPa)	680 (550)[1]	N/A

[5] Figures in brackets are to be used if an RT stainless steel storage tank is utilised in the system.
[6] Expansion control valve is not supplied with the water heater.
[7] H models used for high temperature DHW applications follow pressure limitations of W models.

*Conditions apply: For full terms and conditions please contact Rheem or see Owner's Guide and Installation Instructions, available at www.rheem.com.au