

Tender Specification

Reading Borough Council Requirements for Heat Pump Installation

4/22/2021

Mitsubishi Electric Contacts

Specification AM Mitsubishi Electric:

NAME: Will Rossiter
EMAIL: william.rossiter@meuk.mee.com
CONTACT NUMBER: 07384 877119

Contractor AM:

NAME: Jeharsh Patel
EMAIL: jeharsh.patel@meuk.mee.com
CONTACT NUMBER: 07525 765173

This document is provided in good faith and offers guidance as to the requirements regarding Mitsubishi Electric Ecodan heat pump systems.

All systems should be designed, installed, commissioned and serviced in accordance with industry good practice guidelines.

Please refer to literature available on the Mitsubishi Electric [Document Library](#) for complete information.

CONTENTS

1.1	General Requirements, Conditions and Procedures
1.2	Scope of Works
1.3	Programme of Works
1.4	Site Survey
1.5	Detailed Description of Works
1.5.1	Design Responsibility
1.5.2	New Domestic Hot Water Installation
1.5.3	Domestic Hot Water Cylinder Product Specification
1.5.4	New Air Source Heat Pumps Installation
1.5.5	Ecodan System Schematics
1.6	Ecodan Technical Specification
1.6.1	Maintained Capacity in tested conditions
1.6.2	Air Source Heat Pump - Dimensions
1.6.3	Air Source Heat Pump - Compressor
1.6.4	Paint and Protection
1.6.5	Flow Temperature Controller (FTC)
1.6.6	Set Up and monitoring using the integrated SD card
1.6.7	Wireless Room controller & WIFI ready option.
1.6.8	Energy Monitoring – Options
1.7	Design & Installation of Air Source Heat Pump Installations
1.7.1	Pipework Installation
1.8	Commissioning, Service requirements & Post install Support
1.8.1	Service requirements:
1.8.2	Post install Support
1.8.3	Recycling
1.9	Building Works
2.0	Plant Handling
2.1	Mechanical Service Simple Users Guide
2.2	Mechanical Service Handbook and as Fitted Drawings
2.3	Schedule of Equipment
2.4	Summary
3.0	Useful Contact Information

1. General Requirements

1.1. Conditions and Procedures

- 1.1.1. The work shall comprise the whole of the labour, all the materials necessary to form a complete installation including testing, adjustments and commissioning of all systems installed. The complete installation shall include all equipment, accessories, controls, supports and ancillaries implicitly or explicitly required either by the specification and drawings, or in accordance with accepted current practice, and procedures, which after assembly, testing and commissioning will enable that section of the Works to function correctly and to achieve the specified performance.
- 1.1.2. Neither the specification nor drawings shall take precedence. Any apparent discrepancy between the specification and drawings shall be drawn to the attention of the Employer's Representative before or with the tender submission. Otherwise the Contractor shall be deemed to have made the maximum allowance within his tender.
- 1.1.3. All work carried out under the contract shall be executed in the manner set out in the specification or where not so set out, to the complete satisfaction of the Engineer.
- 1.1.4. All work shall conform to the best principles of modern practice and shall be carried out by fully competent tradesmen of appropriate grades.
- 1.1.5. The Contractor is deemed to have visited site prior to commencement of his works and satisfied themselves as to local conditions, accessibility, nature and layout of the site and all other matters which might affect their tender in any way. The Contractor shall be responsible for all site measurements and preparation of the schedules of materials necessary for the purpose of proper execution of the works. No claims on the grounds of insufficient knowledge will be entertained.
- 1.1.6. The Contractor shall (where necessary) undertake all negotiations with utility suppliers, local authorities and any other regulatory bodies and obtain all necessary approvals for the proposed Works.

1.2. Scope of Works

- 1.2.1. It is proposed to provide new space heating and domestic hot water systems for 200 dwellings which are made up of a mix of house types using the Ecodan Air Source Heat pump and pre plumbed cylinder with controls.
- 1.2.2. The following brief description of work is intended to give the Contractor an indication of the major mechanical works required; it is not intended to be comprehensive in every detail:
 - 1.2.2.1. Provision and design of a new air source heat pump (ASHP) Ecodan system to each dwelling to provide heating and hot water generation to current MCS standards – MIS 3005.
 - 1.2.2.2. Supply and installation of the Mitsubishi Electric pre plumbed hot water service cylinder.
 - 1.2.2.3. Allow for co-ordinating the Contract works with the works of other Contractors or personnel directly employed by the Employer which may be on site during the period of the contract.
 - 1.2.2.4. New heating controls will be the Mitsubishi Electric Wireless Thermostat and receiver.

- 1.2.2.5. Undertake full commissioning of new heating and hot water installation and controls.
- 1.2.2.6. Include for testing, commissioning and setting to work all new installations including the appropriate tuition to the clients' representative on how to operate the new mechanical installation in each dwelling.
- 1.2.2.7. Provision of Operating and Maintenance Manuals and Record Drawings as required under the Microgeneration Certification Scheme.
- 1.2.2.8. Provision of a Mechanical Services Simple Users Guide.
- 1.2.2.9. All builders work attendance shall be carried out by the contractor.

1.3. Programme of Works

- 1.3.1. The detailed programme of works shall take account of any items which are on extended delivery or which may be required early in the construction programme. Notification of orders will be given with a weeks' notice to the contractors preferred procurement channels.

1.4. Site Survey

- 1.4.1. The contractor shall carry out a thorough site survey and take full account of the existing known below ground infrastructure services that border the curtilage of the site and make due allowance for protecting these services as necessary for the duration of the works.
- 1.4.2. Any information which materialises as part of the site survey which may in any way affect the proposed works shall be brought to the attention of the project manager without delay.
- 1.4.3. Should any existing infrastructure services be damaged by the contractor as a result of them not carrying out their site survey, the contractor shall be required to carry out all temporary and permanent repairs without delay and at their own cost.
- 1.4.4. Where site survey works extended beyond the compound of the new site, extreme caution shall be exercised in order to protect staff – Consult HSE for full details.

1.5. Detailed Description of Works

- a. Information resulting from the site survey and general discussion during the preliminary phases of the project will be used by the contractor to produce detailed working drawings / MCS Designs for approval. These working drawings / designs shall relate to all proposed mechanical installations and shall be of sufficient detail to clearly identify the particular details of each installation. The drawings / designs shall include proposed siting of the external heat pump, domestic hot water cylinder, and pipe work routes. The contractor shall obtain the clients approval for these working drawings / designs prior to commencement of work. This shall include any revisions to the proposed schedule of preferred equipment.

- b. The Contractor shall include for supplying, installing, testing and commissioning, all mechanical engineering services including site infrastructure as necessary to complete the project. The following paragraphs provide a narrative on the proposed services to be installed.
- c. In summary the mechanical services are as follows:
 - 1. New Domestic Hot Water Services
 - 2. New Air Source Heat Pump Installation
 - 3. New Heating Installation
 - 4. Automatic Controls
- d. The various elements of work required are summarised as follows:
- e. It should be noted that the dwellings on which the above work is to be carried out on will be occupied by the end users during the time of installation. A duty of care to facilitate normal living conditions where possible for the homeowners.

1.5.1. Design Responsibility

The Contractor shall include in the works and be responsible for the design of the following, but not limited to:

- a. Heat loss calculations – Full Room by Room required & to be approved by client prior to install.
- b. Selection of plant, equipment, components and materials to meet the specification and performance requirements.
- c. Supply and installation of any acoustic and vibration provisions under permitted development and stabilisation of the external unit for good practice respectively.
- d. Adequate provision for movement of pipework due to thermal expansion and contraction, hydraulic pressures and building movement.
- e. Adequate Chemical cleaning, Flushing, addition of Strainers and water treatment regimes.
- f. Routing and selection of pipework both internal and external to the building.
- g. Adequate thermal insulation using the appropriate weather resistant products for external pipework and through wall installations.
- h. Additional control if and where required.
- i. Selection of all brackets, supports and fixings etc. and any other items required to adequately complete the works.

1.5.2. New Domestic Hot Water Installation

1.5.2.1. The hot water generation to the various hot water outlets within each dwelling shall be via either the PUZ-WM50VHA or PUZ-WM60VAA Ecodan ASHP system serving a Ecodan domestic hot water cylinder depending on proposed location dimensions and suitability – models EHPT15-17X-UKHLDW Slimline / EHPT15-30X-UKHDW

1.5.2.2. The domestic hot water cylinder must be installed in a suitable place which meets the recommended installation footprint for servicing. Minimum

required water volumes for each property should be recognised in the contractor's designs.

- 1.5.2.3.** The domestic hot water cylinders must be of the unvented/pressurised type and supplied with full mains pressure unvented safety equipment in accordance with G3 regulations and be installed fully in accordance with G3 regulations. All G3 equipment must be positioned in accessible positions for ease of future maintenance.
- 1.5.2.4.** The Ecodan domestic hot water cylinder is to include two tank thermistors in dry pockets to facilitate optimal DHW control.
- 1.5.2.5.** Full account shall be taken of accommodating thermal expansion and the final connections to all items of equipment shall be complete with isolating valves.
- 1.5.2.6.** Pipework within the dwellings shall where possible be concealed and routed in ceiling voids and service ducts where provided to serve sanitary ware and appliances. Pipes routed in floor screed shall be avoided.
- 1.5.2.7.** All pipework shall rise towards outlets/ appliances/ equipment and fall to low points where drain cocks shall be provided. Automatic air vents must be installed at the highest point in the primary flow and return LTHW pipe work. After removing the air, automatic air vent must be closed.
- 1.5.2.8.** Hot and cold connections to sanitary ware and appliances should be connected where practical to existing pipe work currently being supplied from existing cylinder and services. This pipe work should be re-pressure tested in accordance with the rest of this specification. Where existing pipe work is in need of replacement due to degradation this should be replaced. Any existing pipe work lacking insulation should be fully insulated by the installing contractor to WRAS regulations.
- 1.5.2.9.** The complete installation shall comply in all respects with the current edition of the water regulations.
- 1.5.2.10.** Similar to the mains water installation, the complete hot water installation shall be witnessed pressure tested and chlorinated complete with the provision of an appropriate certificate.
- 1.5.2.11.** Generally, tubes, pipes and fittings including jointing method, supports, expansion, contraction, anchor points, air venting and drainage points shall comply with the DEO Specification 036:1997.
- 1.5.2.12.** For this particular project the hot water supply shall be run in copper tube to BS EN 1057 – Type X (Previously BS2871 - Table X).
- 1.5.2.13.** All valves and cocks, including isolating valves, stop cocks, drain cocks etc. shall be clearly marked with metal ring tags and be as detailed in DEO Spec 036:1997 unless otherwise indicated on the contract drawings.
- 1.5.2.14.** All new thermal insulation shall be in accordance with TIMSA and the Building Regulations Part L2 2010 Conservation of Fuel and power. Any

new hot and cold water service shall be cleaned, chlorinated and commissioned all in accordance with CIBSE code W.

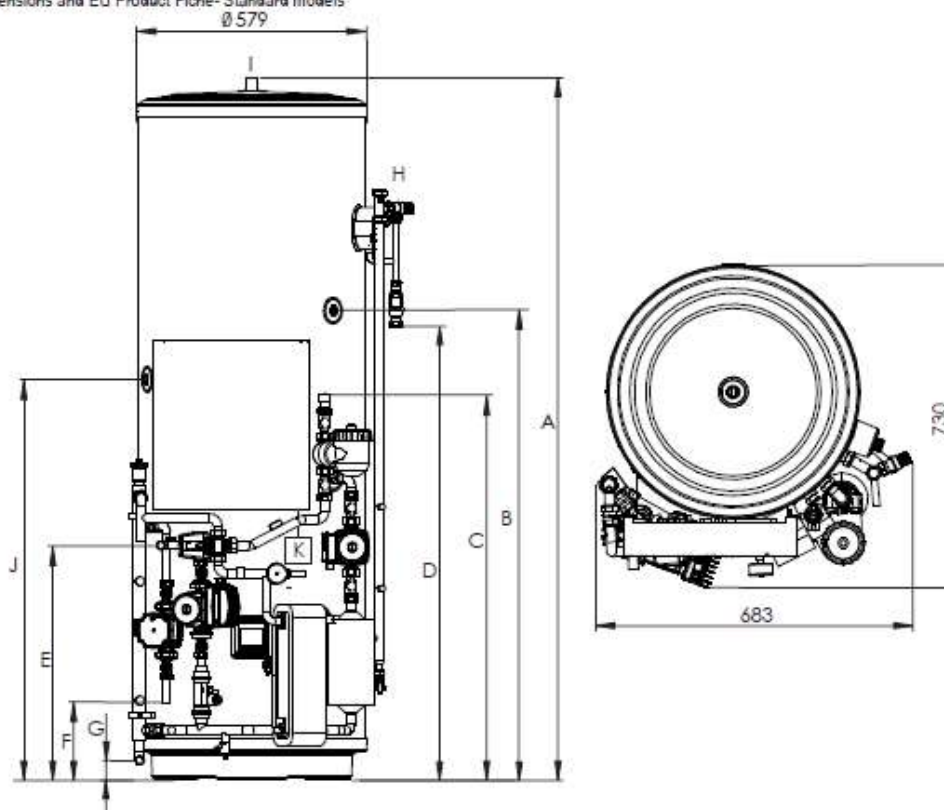
1.5.3. Domestic Hot Water Cylinder Product Specification

Pre-Plumbed Cylinder Specifications

UNIT		STANDARD					
Nominal hot water capacity (litres)		150	170	210	250	300	
Water		Primary flow rate (H) WM 50/60/85/112/140	14/17/24/32/40 l/min				
		Pump	Primary - Grundfos UMPGEO OR UPMXL GEO, Heating - Grundfos UPM3, DHW - Grundfos UPSO 15-60 CIL2				
		Connection size Heating/DHW (mm)	22				
		DHW Expansion vessel (litres)	12	18	18	24	24
		Charge pressure (MPa (bar))	0.35 (3.5)				
Safety devices	Primary circuit	Control thermistor (°C)	80				
		Pressue Relief Valve (MPa (bar))	0.3 (3.0) Contained within outdoor unit				
	DHW circuit	Control thermistor (°C)	75				
		Over-temperature cut-out (°C)	80 +/- 5				
		Temp/Pressure Relief Valve (°C/MPa (bar))	90 / 1.0 (10.0)				
		Expansion valve (MPa (bar))	0.8 (8.0)				
		Dimensions (mm)	Width	683	683	683	683
Depth	730		730	730	730	730	
Height	1130		1256	1508	1760	2074	
Weight empty/full (kg)		56 / 206	62 / 232	69 / 279	77 / 327	87 / 387	
Materials	Vessel	Duplex stainless steel					
	Insulation	Type	Expanded polyurethane (PU)				
		Nominal thickness (mm)	60				
		Standing heat loss (kWh/24h)	1.15	1.23	1.53	1.80	2.09
		Ozone Depletion Potential	zero				
		Global Warming Potential	3.1				
Electrical data	Control Board (optionally powered by outdoor unit)	Electrical supply	220 - 240 V ~, 50Hz				
		Phase	single				
		Fuse rating - MCB Size (A)	16				
	Immersion heater	Electrical supply	220 - 240 V ~, 50Hz				
		Phase	single				
		Rating (kW at 240V)	3				
		Max current (A)	13				
		Fuse rating - MCB Size (A)	16				
Mechanical zones		DHW and 1 heating zone *					
Optional wireless room thermostat and wireless receiver		PAR-WT50-E controller & PAR-WR51-E receiver					

Pre-Plumbed Cylinder Pipework configuration

Fig 2a - Dimensions and EU Product Fiche- Standard models



KEY

- A OVERALL HEIGHT
- B SECONDARY RETURN TAPPING
- C HEAT PUMP FLOW CONNECTION (22mm O/D COPPER)
- D TUNDISH OUTLET CONNECTION (22mm COMPRESSION)
- E HEAT PUMP RETURN CONNECTION (22mm O/D COPPER)
- F HEATING CIRCUIT FLOW CONNECTION (22mm O/D COPPER)
- G HEATING CIRCUIT RETURN CONNECTION (22mm O/D COPPER)
- H COLD WATER INLET CONNECTION (22mm COMPRESSION)
- I HOT WATER OUTLET CONNECTION (22mm COMPRESSION / 3/4" BSP M)
- J THWSA SENSOR POCKET
- K WI-FI ADAPTOR (INCLUDED, INSTALLER TO LOCATE AND MOUNT)

CAPACITY	150	170	210	250	300
A	1130	1256	1508	1760	2074
B	-	-	1050	1175	1385
C	990	990	990	990	990
D	505	630	880	1136	1450
E	585	585	585	585	585
F	195	195	195	195	195
G	50	50	50	50	50
J	675	815	925	1005	1193
K	Installer to locate and mount				

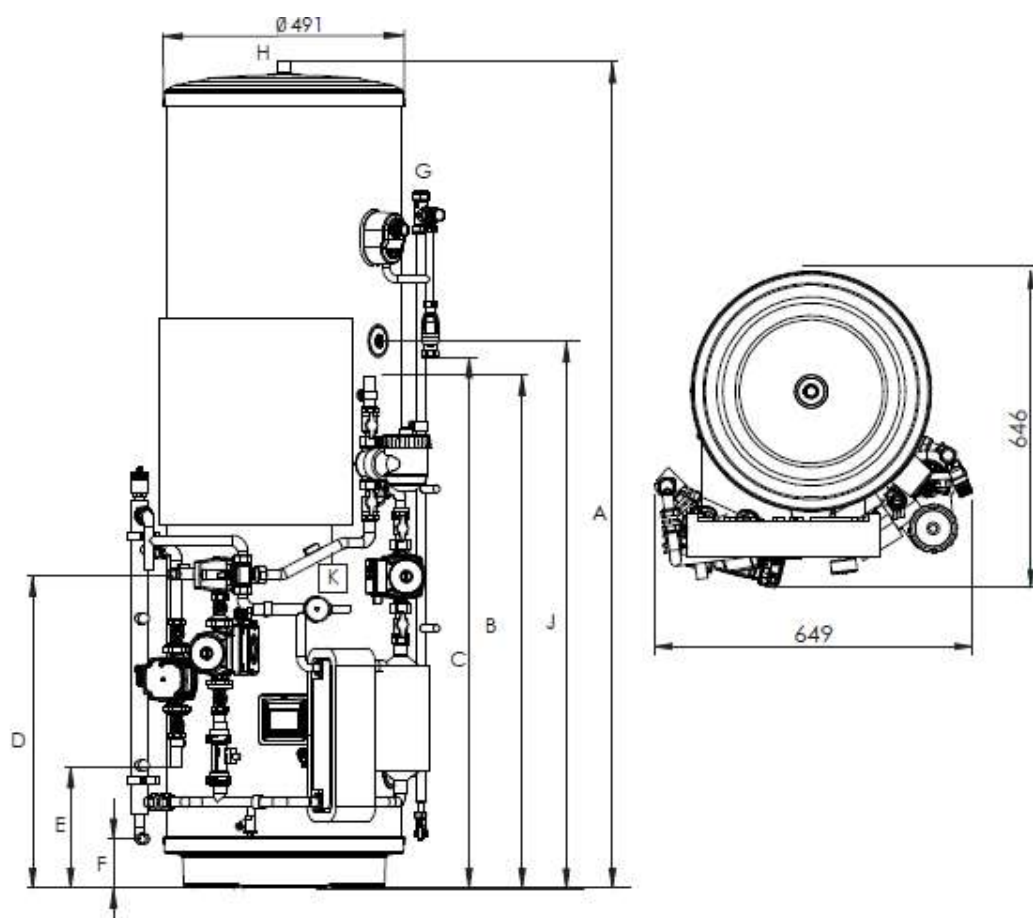
MODEL	150 Standard	170 Standard	210 Standard	250 Standard	300 Standard
Energy efficiency class	B	B	C	C	C
Standing loss in W	47.9	51.2	63.7	75.0	87.1
Storage volume V in Litres	150	170	210	250	300

Technical parameters in accordance with European Commission regulations 814/2013 and 812/2013

Pre-Plumbed Slimline Cylinder Specifications

UNIT		SLIMLINE		
Nominal hot water capacity (litres)		150	170	
Water	Primary flow rate (H)WM50/60/85	14/17/24 l/min		
	Pump	Primary - Grundfos UMPGEO, Heating - Grundfos UPM3, DHW - Grundfos UPSO 15-60 CIL2		
	Connection size Heating/DHW (mm)	22		
	DHW Expansion vessel (litres)	12	18	
	Charge pressure (MPa (bar))	0.35 (3.5)		
Safety devices	Primary circuit	Control thermistor (°C)	80	
		Pressue Relief Valve (MPa (bar))	0.3 (3.0) Contained within outdoor unit	
	DHW circuit	Control thermistor (°C)	75	
		Over-temperature cut-out (°C)	80 +/- 5	
		Temp/Pressure Relief Valve (°C/MPa (bar))	90 / 1.0 (10.0)	
		Expansion valve (MPa (bar))	0.8 (8.0)	
Dimensions (mm)	Width	649	649	
	Depth	646	646	
	Height	1515	1689	
Weight empty/full (kg)		54 / 204	60 / 230	
Materials	Vessel	Duplex stainless steel		
	Insulation	Type	Expanded polyurethane (PU)	
		Nominal thickness (mm)	50	
		Standing heat loss (kWh/24h)	1.40	1.59
		Ozone Depletion Potential	zero	
		Global Warming Potential	3.1	
Electrical data	Control Board (optional)	Electrical supply	220 - 240 V ~, 50Hz	
		Phase	single	
		Fuse rating - MCB Size (A)	16	
	Immersion heater	Electrical supply	220 - 240 V ~, 50Hz	
		Phase	single	
		Rating (kW at 240V)	3	
		Max current (A)	13	
		Fuse rating - MCB Size (A)	16	
Mechanical zones		DHW and 1 heating zone*		
Optional wireless room thermostat and wireless receiver		PAR-WT50-E controller & PAR-WR51-E receiver		

Pre-Plumbed Slimline Cylinder Pipework Configuration



KEY

- A OVERALL HEIGHT
- B HEAT PUMP FLOW CONNECTION (22mm O/D COPPER)
- C TUNDISH OUTLET CONNECTION (22mm COMPRESSION)
- D HEAT PUMP RETURN CONNECTION (22mm O/D COPPER)
- E HEATING CIRCUIT FLOW CONNECTION (22mm O/D COPPER)
- F HEATING CIRCUIT RETURN CONNECTION (22mm O/D COPPER)
- G COLD WATER INLET CONNECTION (22mm COMPRESSION)
- H HOT WATER OUTLET CONNECTION (22mm COMPRESSION / 3/4" BSP M)
- J THW5A SENSOR POCKET
- K WI-FI ADAPTOR (INCLUDED, INSTALLER TO LOCATE AND MOUNT)

CAPACITY	150	170
A	1515	1689
B	1043	1043
C	909	1083
D	640	640
E	246	246
F	101	101
J	943	1117
K	Installer to locate and mount	

MODEL	150 Slimline	170 Slimline
Energy efficiency class	C	C
Standing loss in W	58.3	66.3
Storage volume V in Litres	150	170
Technical parameters in accordance with European Commission regulations 814/2013 and 812/2013		

https://library.mitsubishielectric.co.uk/pdf/book/Ecodan_EHPT15-17-21-25-30X-UKHL-SDWManual7763811#page-9

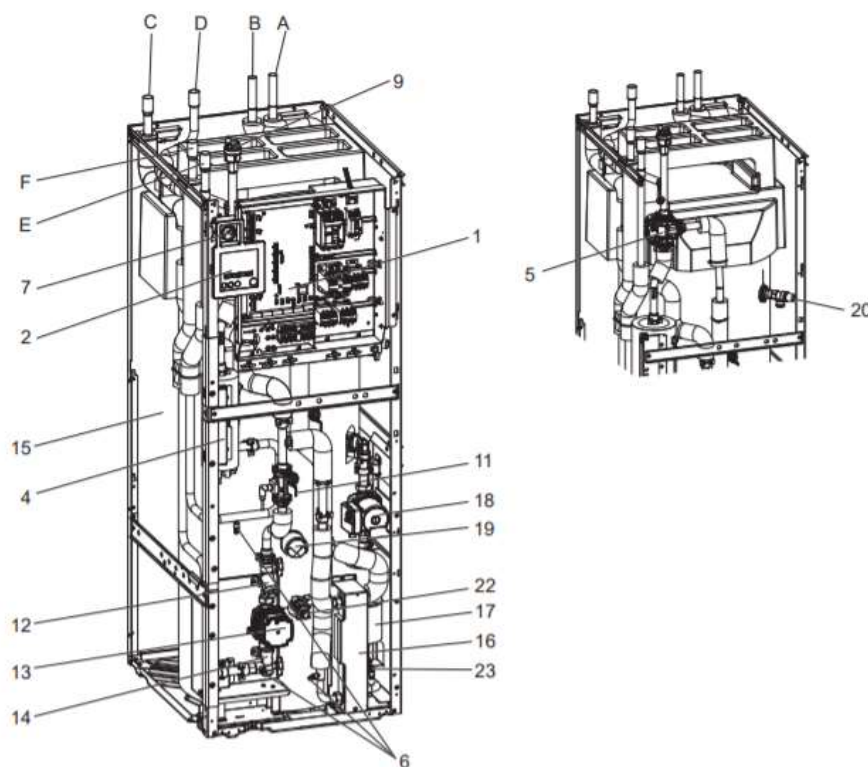
Packaged Cylinder Specifications

Model name				EHPT20X-MHEDW		
Nominal domestic hot water volume				200 L		
Overall unit dimensions (Height × Width × Depth)				1600 × 595 × 680 mm		
Weight (empty)				90 kg		
Weight (full)				296 kg		
Water volume of heating circuit in the unit *1				3.7 L		
Unvented expansion vessel (Primary heating)		Nominal volume		—		
		Charge pressure		—		
Safety device	Primary circuit	Control thermistor		1 - 80°C		
		Pressure relief valve		0.3 MPa (3bar)		
		Flow sensor		Min. flow 5.0 L/min (See table 4.3.1 about water flow rate range)		
	Booster heater	BH manual reset thermostat		—		
		BH thermal Cut Off		—		
	DHW tank	Control thermistor		75°C		
		IH manual reset thermostat		—		
		Temperature/ Pressure relief valve		90°C / 0.7 MPa (7 bar)		
Connections		Water	Primary circuit)		ø28 mm	
			DHW circuit		ø22 mm	
		Refrigerant (R32/ R410A)	Liquid		—	
			Gas		—	
Operating range		Heating	Room temperature		10 - 30°C	
			Flow temperature		20 - 60°C	
		Cooling	Room temperature		—	
			Flow temperature		—	
Guaranteed operating range *2		Ambient		0 - 35°C (≦ 80 %RH)		
		Outdoor temperature	Heating		See outdoor unit spec table.	
			Cooling		—	
DHW tank performance		Maximum allowable hot water temperature		70°C		
		Declared load profile		L		
		Average climate	Water heater energy efficiency class		A+	
		Time to reheat 70% of DHW tank to 65°C *4		24.8 min		
		Time to raise DHW tank temp. 15 - 65°C *4		29.5 min		
Electrical data		Control board (Including 4 pumps)	Power supply (Phase, voltage, frequency)		~N, 230 V, 50 Hz	
			Input		0.30 kW	
			Current		1.95 A	
			Breaker		10 A	
		Booster heater	Power supply (Phase, voltage, frequency)		—	
			Capacity		—	
			Current		—	
			Breaker		—	
		Immersion heater *3	Power supply (Phase, voltage, frequency)		~N, 230 V, 50 Hz	
			Capacity		3 kW	
			Current		13 A	
			Breaker		16 A	
Sound power level (PWL)				40 dB(A)		

Packaged Cylinder Pipework Configuration

■ Component Parts

<EHPT20X-MHEDW>
(Packaged model system)



<Figure 3.1>

Note:

For installation of all EHPT20X-MHEDW models, make sure to install a suitably sized primary-side expansion vessel and an additional PRV to prevent the expansion vessel from burst in the field. (See figure 3.2 and 4.3.2 for further guidance)

No.	Part name
A	DHW outlet pipe
B	Cold water inlet pipe
C	Water pipe (Space heating/cooling return connection)
D	Water pipe (Space heating/cooling flow connection)
E	Water pipe (Flow from heat pump connection)
F	Water pipe (Return to heat pump connection)
G	Refrigerant pipe (Gas)
H	Refrigerant pipe (Liquid)
1	Control and electrical box
2	Main remote controller
3	Plate heat exchanger (Refrigerant - Water)
4	Booster heater 1,2
5	3-way valve
6	Drain cock (Primary circuit)
7	Manometer
8	Pressure relief valve (3bar)
9	Automatic air vent
10	Expansion vessel (Primary circuit) (Local supply)
11	Flow sensor
12	Strainer valve
13	Water circulation pump 1 (Primary circuit)
14	Pump valve
15	DHW tank
16	Plate heat exchanger (Water - Water)
17	Scale trap
18	Water circulation pump (Sanitary circuit)
19	Immersion heater
20	Temperature and pressure relief valve
21	Pressure relief valve (10bar) (DHW Tank)
22	Drain cock (DHW tank)
23	Drain cock (Sanitary circuit)
24	Flow water temp. thermistor (THW1)
25	Return water temp. thermistor (THW2)
26	DHW tank upper water temp. thermistor (THW5A)
27	DHW tank lower water temp. thermistor (THW5B)
28	Refrigerant liquid temp. thermistor (TH2)
29	Pressure sensor
30	Drain pan
31	Outdoor unit
32	Drain pipe (Local supply)
33	Back flow prevention device (Local supply)
34	Isolating valve (Local supply)
35	Magnetic filter (Local supply) (Recommended)
36	Strainer (Local supply)
37	Additional PRV (Local supply)
38	Inlet control group *1
39	Filling loop (Ball valves, check valves and flexible hose) *1
40	Potable expansion vessel *1

https://library.mitsubishielectric.co.uk/pdf/book/Ecodan_EHPT20X-MHEDW_Installation_Manual_RG79F364L03#page-1

1.5.4. New Air Source Heat Pumps Installation

1.5.4.1. The Contractor shall provide all interconnecting cabling to suit the installation. See system schematics from 1.5.5 to but not including 1.6.

1.5.4.2. The manufacturer will have UK based product manufacturing to reduce carbon footprint.

1.5.4.3. The manufacturer must be ISO14001.

1.5.4.4. All air source heat pump related components must be procured by Accredited Ecodan Installers (AEI) or Business Solution Partner (BSP). Please find Home Owner Guarantee Terms and conditions using the

following link: <https://es.mitsubishielectric.co.uk/homeowners/register-ecodan-guarantee>

- 1.5.4.5.** Delivery will be made directly from the manufacturer to site or other specified address.
- 1.5.4.6.** A new air source heat pump (ASHP) system shall be provided to each dwelling.
- 1.5.4.7.** Ecodan ASHP Includes: Outdoor unit, Flexible Connection Pipes, Guarantee Card, Ecodan Commissioning Document and FTC homeowner guide.
- 1.5.4.8.** The Ecodan Pre-Plumbed/Packaged cylinder solution shall include:

INCLUDED COMPONENTS			
Type	Description	Packaged	Pre-plumbed
Electrical	Immersion Heater	●	●
	Wifi ready System Controller	●	●
	Wifi Interface	●	●
	DHW Upper & Lower Water Temperature Thermistor	●	●
	Flow & Return Water Temperature Thermistor	●	●
	BEMS System Controller		
	DHW Water Temperature Thermistor		
Mechanical	Magnetic Filter	●	●
	Insulated Flexible Connection Pipes	●	●
	Flow Sensor	●	●
	Primary Circulating Pump	●	●
	Heating Circulating Pump		●
	DHW Circulating Pump	●	●
	3-Way Motorised Diverter Valve	●	●
	Low Loss Header		●
	Domestic Hot Water Expansion Vessel	●	●
	Primary Expansion Vessel	●	
	DHW Plate Heat Exchanger & Scale Trap	●	●
	Primary System Pressure Gauge	●	●
	Filling Loop	●	●
	Automatic Air-Vent	●	●
	Drain Valve	●	●
	Strainer Valve	●	
	Pressure Reducing Valve	●	●
	Temperature / Pressure Relief Valve	●	●
	Tundish	●	●

1.5.5. Ecodan System Schematics

14

15

16

17

1.5.5.5. Ecodan Packaged Cylinder Schematic – 2 zone

[illegible]

19

1.6. Ecodan Technical Specification

OUTDOOR UNIT		PUZ-WM50VHA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_{s}	129%
	SCOP	3.33
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_{s}	183%
	SCOP	4.58
HEAT PUMP COMBINATION HEATER - Large Profile ^{*1}	ErP Rating	A+
	η_{wh}	135%
HEATING ^{*2} (A-7/W35)	Capacity (kW)	5.0
	Power Input (kW)	1.67
	COP	3.00
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA ^{*3}	Pressure Level at 1m (dBA)	47
	Power Level (dBA) ^{*4}	61
WATER DATA	Pipework Size (mm)	22
	Flow Rate (l/min)	14
	Water Pressure Drop (kPa)	12.0
DIMENSIONS (mm)	Width	950
	Depth	330+30 ^{*7}
	Height	923
WEIGHT (kg)		71
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ^{*5}	4.64 [13]
	Fuse Rating - MCB Sizes (A) ^{*6}	16

^{*1} Combination with E*PT20X Cylinder

^{*2} Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.

^{*3} Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.

^{*4} Sound power level tested to BS EN12102.

^{*5} Under normal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.

^{*6} MCB Sizes BS EN60898-2 & BS EN60947-2.

^{*7} Gable.

η_{s} is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

OUTDOOR UNIT		PUZ-WM60VAA(-BS)	PUZ-WM85VAA(-BS)	PUZ-WM112VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++	A++	A++
	η_{s}	142%	139%	134%
	SCOP	3.30	3.50	3.45
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++	A+++	A+++
	η_{s}	190%	193%	191%
	SCOP	4.62	4.57	4.58
HEAT PUMP COMBINATION HEATER - Large Profile ^{*1}	ErP Rating	A+	A+	A+
	η_{wh}	145%	145%	148%
HEATING ^{*2} (A-7/W35)	Capacity (kW)	6.0	8.5	11.2
	Power Input (kW)	1.88	3.27	3.73
	COP	3.20	2.60	3.00
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35	-20 ~ +35	-25 ~ +35
SOUND DATA ^{*3}	Pressure Level at 1m (dBA)	45	45	45
	Power Level (dBA) ^{*4}	58	58	60
WATER DATA	Pipework Size (mm)	22	28	28
	Flow Rate (l/min)	17	24	32
	Water Pressure Drop (kPa)	8.0	15.0	24.0
DIMENSIONS (mm)	Width	1050	1050	1050
	Depth	480	480	480
	Height	1020	1020	1020
WEIGHT (kg)		98	98	119
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz
	Phase	Single	Single	Single
	Nominal Running Current [MAX] (A) ^{*5}	5.68 [13]	9.1 [22]	10.9 [28]
	Fuse Rating - MCB Sizes (A) ^{*6}	16	25	32

^{*1} Combination with E*PT20X Cylinder

^{*2} Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.

^{*3} Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.

^{*4} Sound power level tested to BS EN12102.

^{*5} Under normal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.

^{*6} MCB Sizes BS EN60898-2 & BS EN60947-2.

OUTDOOR UNIT		PUZ-HWM140VHA(-BS)	PUZ-HWM140YHA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++	A++
	η_{L}	-	-
	SCOP	3.34	3.34
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++	A+++
	η_{L}	-	-
	SCOP	4.45	4.45
HEAT PUMP COMBINATION HEATER - Large Profile ¹	ErP Rating	A+	A+
	η_{wh}	-	-
	Capacity (kW)	14.0	14.0
HEATING ² (A-7/W35)	Power Input (kW)	5.72	5.72
	COP	2.45	2.45
	OPERATING AMBIENT TEMPERATURE (°C DB)	-28 ~ +35	-28 ~ +35
SOUND DATA ³	Pressure Level at 1m (dBA)	53	53
	Power Level (dBA) ⁴	67	67
	Pipework Size (mm)	28	28
WATER DATA	Flow Rate (l/min)	40	40
	Water Pressure Drop (kPa)	-	-
	Width	1020	1020
DIMENSIONS (mm)	Depth	330+30 ⁷	330+30 ⁷
	Height	1350	1350
WEIGHT (kg)		-	-
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz	380-415v, 50Hz
	Phase	Single	3
	Nominal Running Current [MAX] (A) ⁵	- [-]	- [-]
	Fuse Rating - MCB Sizes (A) ⁶	-	-

For information marked with a "*" please consult the databook or speak to your local sales office.

¹ Combination with E*PT20X Cylinder ² Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.

³ Under normal heating conditions at outdoor temp: 7°CDB / 8°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.

⁴ Sound power level tested to BS EN12102. ⁵ Under normal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.

⁶ MCB Sizes BS EN60898-2 & BS EN60947-2. ⁷ Galle.

η_{L} is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

- The Ecodan outdoor unit shall be located external to the dwelling in a suitable location which will cause the least disruption possible to the tenant, neighbours or the public (away from bedroom windows or footpaths etc.). The positions of the heat pump in each individual property should be approved, where possible, by both the client and the tenant prior to fixing and mounting.
- They should be positioned with an unobstructed air flow with the clearance distance and minimum installation area as recommended by the Mitsubishi Electric. Anti-vibration FIX-IT FOOT or equivalent shall be used when mounting the unit. The unit must be securely fixed using four M10 bolts into a Flexi Light slab or alternative. When necessary, and once approved by the client and tenant, the heat pumps may be mounted on purpose made wall brackets, in this instance considerations should be taken with regards to possible vibration nuisance noise in bedrooms etc.
- Provisions must be made for adequate condensate removal from the heat pump. Where possible condensate pipes should be taken to the nearest drain with a continuous fall and should be insulated to help prevent freezing of condensate water. Where a drain is not located in the reasonable vicinity of the heat pump a suitable soak away should be made.
- The ASHP shall be an inverter driven heat pump. The inverter will allow for a soft start and optimise the capacity and efficiency of the heating system. The start-up should not exceed 2 Amps. The heat pump will use the outdoor air as its heat source. The system will be fully optimised to run on R32 refrigerant and be able to provide water outlet temperature (at a minimum of 40°C) at ambient temperatures down to at least -20°C.
- The ASHP shall not exceed a sound pressure level of 47 dBA at 1m.
- The weight of the ASHP and hot water cylinder (empty) should not exceed 143 and 94 kg respectively.
- Maximum current consumed by the ASHP should not exceed 35A for single phase models and 16A for three phase models.

https://library.mitsubishielectric.co.uk/pdf/book/Ecodan_Distribution_NetworkSystem_Operator_Information_Product_Information_Sheet#page-1-2

- The ASHP will have an integrated external temperature sensor and so will not require a separate external sensor.

https://library.mitsubishielectric.co.uk/pdf/directory/heating/sales_literature/product_information_sheets

1.6.1. Maintained Capacity in tested conditions:

1.6.1.1. The system will have no drop off in capacity down to at least -7°C ambient temperature to a maximum of 45°C flow temperature. The manufacturer will be able to provide independently verified evidence of seasonal co efficient of performance relating to existing installations in conjunction with manufacturers laboratory tested figures. The manufacturer must be able to supply a performance data from -20°C to -20°C. The manufacturer will be able to offer a monitoring system to provide both historic and live data for every unit.

PUZ-WM50VHA(-BS)

Water outlet temperature [°C]		25	35	40	45	50	55	60
Ambient temperature [°C]		Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity
Nominal	-20	-	3.5	3.0	-	-	-	-
	-15	-	3.9	3.9	-	-	-	-
	-10	4.5	4.7	4.6	4.5	4.2	4.0	-
	-7	5.0	5.0	5.0	5.0	4.7	4.4	-
	2	5.0	5.0	5.0	5.0	5.0	5.0	4.8
	7	5.0	5.0	5.0	5.0	5.0	5.0	4.9
	12	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	15	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	20	5.0	5.0	5.0	4.9	4.8	4.6	4.5

■ PUZ-WM60VAA(-BS)

Water outlet temperature [°C]		25	35	40	45	50	55	60
Ambient temperature [°C]		Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity
Nominal	-20	-	3.7	3.6	-	-	-	-
	-15	-	5.3	5.2	5.1	-	-	-
	-10	6.0	6.0	6.0	6.0	5.9	5.7	-
	-7	6.0	6.0	6.0	6.0	6.0	6.0	-
	2	6.0	6.0	6.0	6.0	6.0	6.0	5.9
	7	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	12	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	15	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	20	6.0	6.0	6.0	6.0	6.0	6.0	6.0

■ PUZ-WM85VAA(-BS)

PUZ-WM85YAA(-BS)

Water outlet temperature [°C]		25	35	40	45	50	55	60
Ambient temperature [°C]		Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity
Nominal	-20	-	5.0	5.0	-	-	-	-
	-15	-	7.3	7.2	7.1	-	-	-
	-10	8.5	8.5	8.5	8.5	8.1	7.6	-
	-7	8.5	8.5	8.5	8.5	8.3	8.0	-
	2	8.5	8.5	8.5	8.5	8.5	8.5	8.3
	7	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	12	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	15	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	20	8.5	8.5	8.5	8.5	8.5	8.5	8.5

■ PUZ-WM112VAA(-BS)
PUZ-WM112YAA(-BS)

Water outlet temperature [°C]		25	35	40	45	50	55	60
Ambient temperature [°C]		Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity
Nominal	-25	-	6.5	6.2	5.9	-	-	-
	-20	-	7.7	7.4	7.0	-	-	-
	-15	-	8.4	8.0	7.5	7.1	6.7	-
	-10	10.1	10.1	10.1	10.1	9.5	9.0	-
	-7	11.2	11.2	11.2	11.2	10.6	10.0	-
	2	11.2	11.2	11.2	11.2	10.6	10.0	9.4

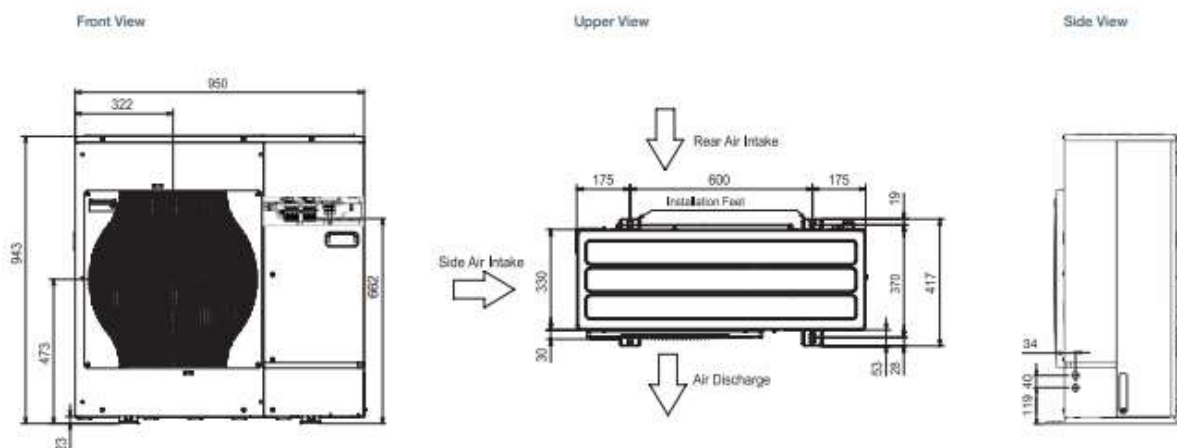
■ PUZ-HWM140VHA(-BS)
PUZ-HWM140YHA(-BS)

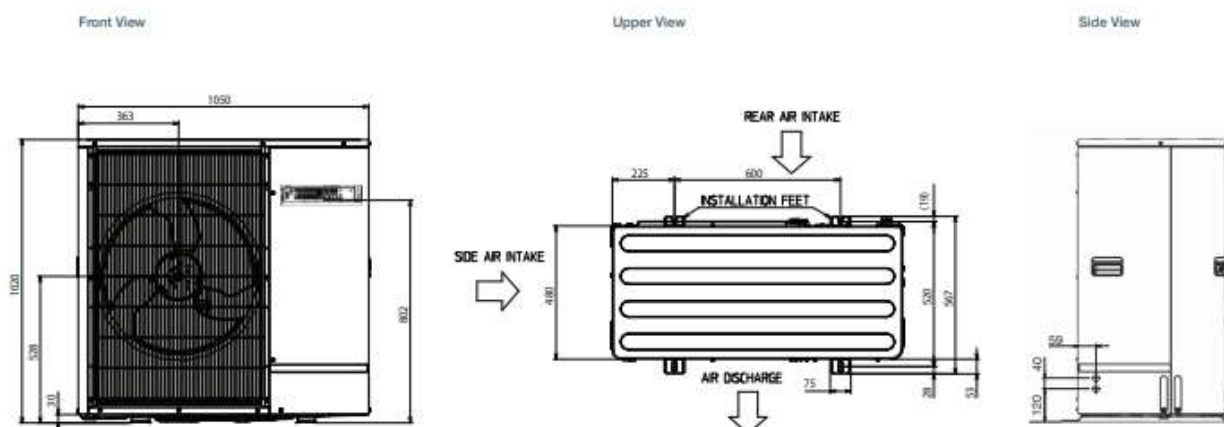
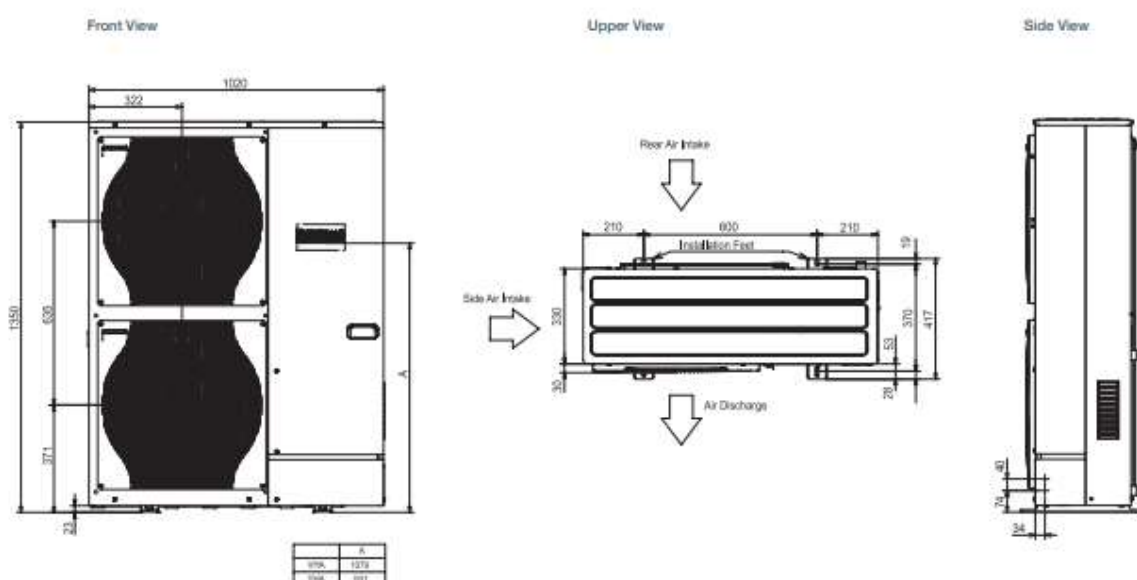
Water outlet temperature [°C]		25	35	40	45	50	55	60
Ambient temperature [°C]		Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity
Nominal	-28	-	9.1	8.8	8.5	-	-	-
	-25	-	10.0	9.7	9.3	-	-	-
	-20	-	10.5	10.2	9.8	-	-	-
	-15	-	11.0	11.0	11.0	11.0	11.0	-
	-10	14.0	14.0	14.0	14.0	14.0	14.0	-
	-7	14.0	14.0	14.0	14.0	14.0	14.0	-
	2	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	7	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	12	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	15	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	20	14.0	14.0	14.0	14.0	14.0	14.0	14.0

1.6.2. Air Source Heat Pump – Dimension

1.6.2.1. The outdoor unit must not exceed a volume of 0.6m³ to meet criteria for permitted development

1.6.2.2. The outdoor unit must also be able to be installed 100mm and 300mm from a door/window for VAA and V/YHA units respectively.

Product Dimensions PUZ-WM50VHA(-BS)


Product Dimensions PUZ-WM60/85/112VAA(-BS)

Product Dimensions PU(H)Z-HW(M)140VHA(2)/YHA(2)(-BS)


<https://library.mitsubishielectric.co.uk/pdf/book/HeatingandVentilationCatalogue2020#page-10>

1.6.3. Air Source Heat Pump - Compressor

1.6.3.1. The refrigerant to water heat exchanger will be plate type allowing for efficient heat transfer.

1.6.3.2. The outdoor unit will have one inverter driven, R32, hermetic twin rotary compressor for the PUZ-WM50VHA / PUZ-WM60VAA / PUZ-WM85VAA. The PUZ-WM112VAA and PUZ-HWM140VHA-YHA model will have one inverter driven, R32, hermetic scroll compressor. With two or three LEV's which are used to control the flow of refrigerant, the heating will be controlled by a four-way valve, which will reverse the cycle of the refrigerant to change the mode of the outdoor units.

1.6.4. Paint and Protection

1.6.4.1. Air Source Heat Pump Unit (ASHP).

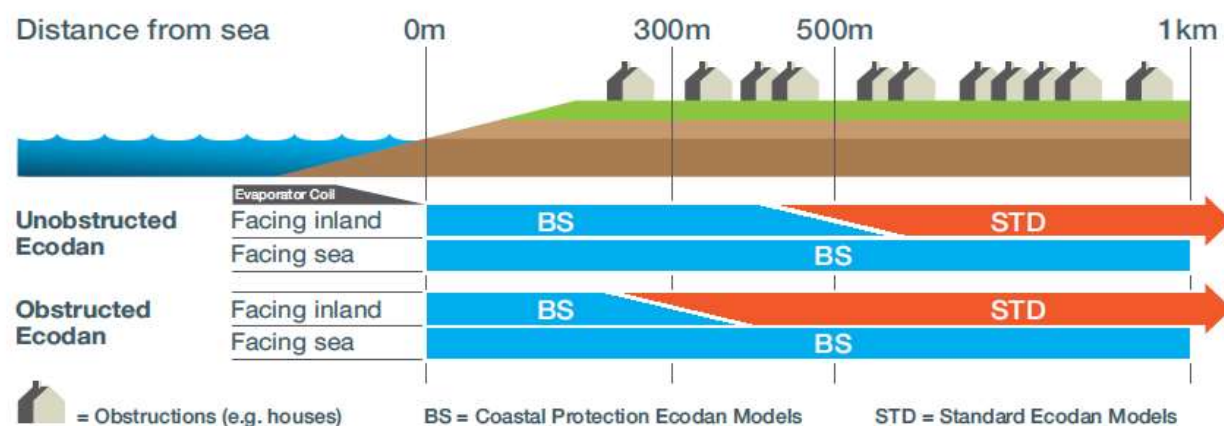
1.6.4.2. The outdoor unit will be constructed with galvanised steel plate and painted with acrylic paint. The paint colours are as follows Munsell N8.75, N2.75. (PUZ-WM50VHA / PUZ-WM60VAA / PUZ-WM85VAA / PUZ-WM112VAA) and Munsell: N8.75, 3Y 7.8/1.1 (PUZ-HWM140VHA-YHA).

1.6.4.3. The ASHP unit will have one air cooled heat exchanger coil constructed from copper tubing with aluminium fins being blue fin coated on all models while also having BS model options. The evaporator must be able to show no rust after 960-hour test when exposed to the below conditions:

- Spray Water Solution: 50 ± 5 g /l sodium chloride solution (NaCl) (pH: 6.5~ 7.2)
- Temperature: 35 ± 2 °C
- Spraying Volume: 1.5 ± 0.5 ml/hr. (per 80 c/m²)

Coastal Protection Models (-BS)

The Ecodan coastal models are designed to protect against the corrosive effects of environments that are in close proximity to the sea. By enhancing the corrosion protection of key components, we can ensure that even in aggressive coastal areas, Ecodan will continue to provide low cost renewable heating for years to come.



Note: 1. If possible avoid siting the Ecodan in direct exposure to sea spray. 2. Ensure rain water is able to fall onto the Ecodan and avoid placement directly under building eaves. 3. Ensure horizontal installation for good drainage. 4. Regular inspections and washing of unit with fresh water is recommended. Any scratches should be repaired as soon as possible.

https://library.mitsubishielectric.co.uk/pdf/book/Ecodan_Coastal_Protection_Models_BS_PI_Sheet#page-1

1.6.5. Flow Temperature Controller (FTC)

1.6.5.1. The Mitsubishi FTC main controller will have the ability to store 7 day schedules for domestic hot water and set back temperatures for space heating. The controller shall be used for commissioning the system by the contractor.

1.6.5.2. Precise control of any immersion heater fitted will be available directly from the FTC. Immersion heater strategy will be edited in terms of maximum

temperature, frequency, start time and duration of maximum temperature to ensure that the pasteurisation cycle consumes the minimum amount of electricity and to meet with the current legionnaire's prevention guide lines ACoP L8.

1.6.5.3. The system will work on a hot water priority basis. Hot water mode will be controlled either by the time clock built into the main controller or will be started and stopped by detecting a programmed temperature drop in the cylinder, example 10 degrees °C. The installer can program the setup that best suits the end user's needs or the client's requirements.

1.6.5.4. Heating can be controlled in different ways using FTC, there is the option for either timed or constantly on. When running in timed mode it will be possible to program setback periods throughout the course of the day on the FTC main controller. Multiple sensors can be used on a single system with the 'master' sensor being rotated at set times throughout the day. There is also an input on FTC to accept third party non voltage thermostats or signals from underfloor heating wiring centres.

1.6.5.5. The heating water temperatures can be controlled with three options. Option 1 is traditional weather compensation, the installer will input the correct flow temperatures at specific outdoor conditions directly into the main controller, and the FTC will then follow these settings. Option 2 is to run the system at a fixed flow temperature. Option 3 is room compensation and is only available when using a Mitsubishi thermostat. In this mode the FTC will calculate the optimum flow temperature. The calculated room set temperature is now achieved faster with improved accuracy in learning the building heat load saving energy and reducing overheating. Option 2 should only be used in specific circumstances (Commissioning) and should be discussed with MEUK.

1.6.5.6. The Mitsubishi FTC main controller will have the ability to determine the pump speed individually for both DHW and heating between a range of 1 to 5 (default speed 5).

1.6.5.7. The Mitsubishi FTC main controller will have an optional initial set up wizard. This will allow ease of installation as the following below features can be set:

- DHW mode settings incl. legionella settings
- Heating mode settings
- Heating & DHW operating modes/ timers
- Heating & DHW pump speeds
- Heat pump flow rate range
- Heater capacity restriction

1.6.5.8. The system is now capable of quiet mode via activation from the FTC controller. This allows the outdoor unit to be scheduled through the parameters, time and day, to operate at reduced sound power levels.

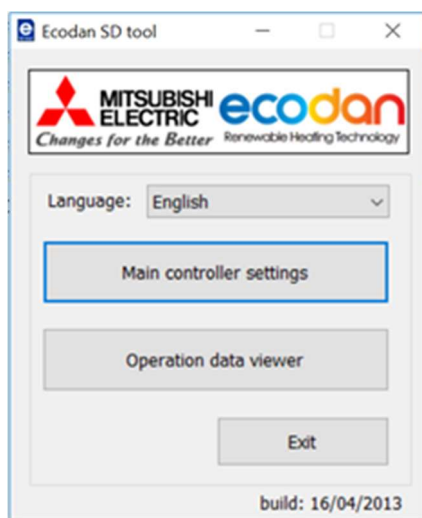
1.6.5.9. The Mitsubishi FTC main controller will be capable of utilising the smart grid. This will allow the use of switch-on commands and recommendation based on the energy provided from the grid.

1.6.5.10. The Mitsubishi FTC main controller is now compatible with Alexa allowing the system to be controlled through various voice commands. These controls include turning on/off the system, increasing the set points of rooms and asking what the temperature set point currently is at.

1.6.6. Set Up and monitoring using the integrated SD card

1.6.6.1. SD card input will be used to assist and record the commissioning for each installation using the supplied SD card commissioning tool. These parameters will be agreed with the client before works begin. It will be made available to MEUK and the Service and Maintenance contractor to fault find on FTC based systems. SD card input will provide the ability to monitor internal and external room temperatures, flow and return temperatures, domestic hot water cylinder temperature, defrost cycles and fault codes. A link to this can be found below with the download being at the bottom of the page.

<https://les.mitsubishielectric.co.uk/installers/tools-and-software-downloads>



1.6.7. Wireless Room controller & WIFI ready option MELCloud

1.6.7.1. The Mitsubishi Electric wireless room Controller PAR-WT50R-E wireless controller with the PAR-WT51R-E receiver will have the ability to measure and record actual room temperature which when combined with other sensor readings shall allow the system to calculate the minimum required flow temperature when set up in room compensation mode. The PAR-WT50R-E controller shall be supplied loose and it should not be installed within the cylinder cupboard.



1.6.7.2. All domestic electrical work shall be completed by a Part P qualified engineer. Low voltage control wiring shall not be run next to power cables. A minimum space of 100mm between both control and power cables shall apply, these can be run together if sleeved – please referee to part P.

1.6.7.3. The Mitsubishi Electric WIFI Adapter MAC-567IF – Now supplied as standard for Ecodan systems which allows the system to be WIFI ready as a free non contract addition. Benefits once linked to a broadband signal are below

1.6.7.4. The system must be capable of remote diagnosis and support for Melconsole.

WI-FI INTERFACE		MAC-567IF
DESCRIPTION		Wi-Fi Interface
CONNECT TO		Indoor Unit
MAX NUMBER OF UNITS		1
COMPATIBILITY		Ecodan FTC6
POWER SUPPLY		From indoor unit
DIMENSIONS (WXDXH) MM		79 x 18.5 x 44
CONTROL	On/Off	✓
	Mode	✓
	Heating Setpoint	✓
	Hot Water Boost	✓
	2-Zone Control	✓
	Holiday Mode	✓
	Timer	✓
	Frost Protection	✓
MONITOR	On/Off	✓
	Mode	✓
	Heating Setpoint	✓
	Tank Temperature	✓
	Tank Target Temperature	✓
	Outside Temperature	✓
	Fault Codes	✓
	Consumed Electrical Energy	✓
	Produced Heat Energy	✓

SYSTEM DIAGRAM



1.6.8. Energy Monitoring – Options

1.6.8.1. Mitsubishi Electric Energy Monitoring – EMP1 as standard with the system unless otherwise stated. Complies with MCS metering requirements for RHI payments (metering for performance) and as such no additional electrical meters are required. System must be MMSP ready and compliant.

PACK	5kW	6kW	8.5kW	11.2kW	14kW
EMP1	✓	✓	✓	✓	✓
EMP2	✓	✓	✓	✓	✓
EMP3-M-1Ph	✓	✓	✓	✓	✓ VHA
EMP3-M-3Ph					✓ VHA
EMP3-Q-1Ph					
EMPH-M-1Ph	✓	✓	✓	✓	✓

1.7. Design & Installation of Air Source Heat Pump Installations

- a) Design and installation must comply fully in accordance with the Microgeneration Certification Scheme by and MCS certified installer, this should include but not restricted too, room by room heat loss calculations, radiator sizing, run cost estimates and MCS020 heat pump noise level calculations.
- b) Heat emitters should adhere to room by room calculations and be designed to a maximum of 45°C flow at design conditions. The system should incorporate individual thermostatic control with the ability to provide set-back temperatures.
- c) Mitsubishi Electric I-Life2 Fan assisted radiators should be considered where traditional radiators are not practical due to them being too large or heavy for available areas.

http://library.mitsubishielectric.co.uk/pdf/book/i_Life2_80_170_Product_Brochure

- d) The installer must be approved Ecodan installers (AEI & BSP) that have previously attended either, the Mitsubishi Heat pump Design & Application course and the Installation and Commissioning training courses
- e) Installers will also require Part P Electrical Safety, City and Guilds certificate 6084 and unvented hot water certificate 6019.
- f) The system must be designed to meet the recommended minimum space heating circuit volume provided by the manufacturer.
- g) ASHP must be able to be installed 100mm & 300mm off a wall from the behind and 100mm & 200mm from a door/window, VAA and V/YHA respectively.

https://library.mitsubishielectric.co.uk/pdf/book/Ecodan_PUZ-HWM140V-YHA_Installation_Manual_RH79D007H02UK#page-7

https://library.mitsubishielectric.co.uk/pdf/book/EcodanPUZ-WM50-60-85-112VH-AA_Installation_Manual_BH79D849H02UK#page-18-19

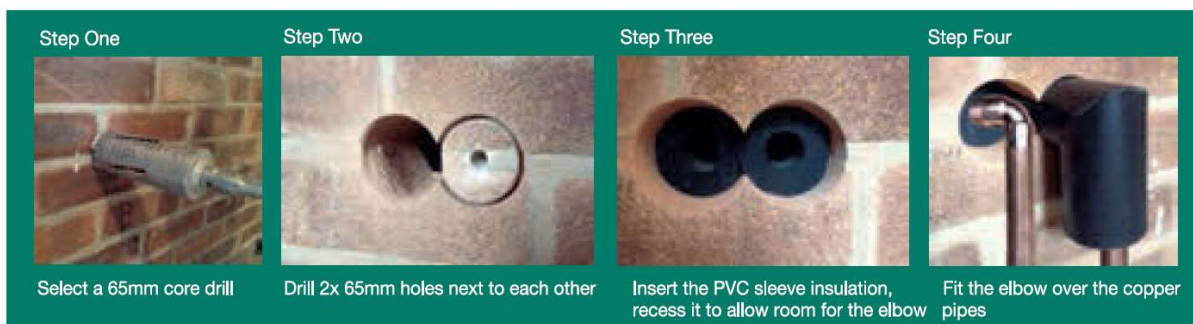
1.7.1. Pipework Installation

- 1.7.1.1.** All external pipe work shall be insulated to ensure minimal thermal heat loss and maximum weather protection using high density weather resistant pipe insulation (Armaflex or equivalent). Underground pipework shall be of a pre-insulated rigid plastic type (Rehau or equivalent). All external fittings, components and pipework shall be insulated. A through wall insulated PVC sleeve kit is highly recommended.

1.7.1.2.

Through Wall Insulation Kit

Running pipe work from an externally mounted air source heat pump or biomass boiler into a property requires the pipe work to be run through the exterior wall. The hot pipe work will be affected by cold bridging and heat loss if it is not insulated correctly. MIS 3005 requires external pipe work to be adequately insulated. This kit provides both thermal insulation within the wall and comes complete with an elbow section to cover the external copper pipe connection.



Indoor hot pipework shall be insulated in polythene insulation (Climaflex) or equivalent. All insulation joints shall be sealed using approved methods.

Under no circumstances should any external pipe work or fittings should be exposed without insulation on the systems. All external pipe work will be insulated and then enclosed in adequate casing to prevent damage from corrosion, UV light and wildlife (Inaba Denko or equal and approved).

1.7.1.3.



ASHP External Trunking

Pipework and insulation running from an air source heat pump should be protected. Our range of trunking comes in a 140mm width with an ivory or black option and accommodates both the insulated flow and return pipework along with any associated cabling.

Features:

- Easy to install
- 140mm width accommodates both the insulated flow and return pipework and other associated cabling
- Provides a professional and neat finish
- Made from high grade fade resistant PVC
- Available in Ivory and Black
- Protection from the elements, accidental damage and pest damage

1.7.1.4. Insulated flexible pipes comprise of a pair of pipes which are used to outdoor unit to the primary hydraulic (water) pipework.

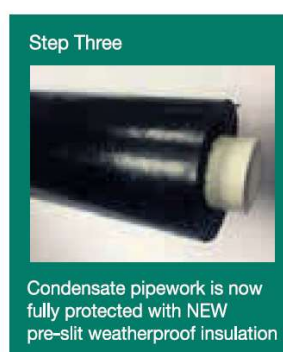
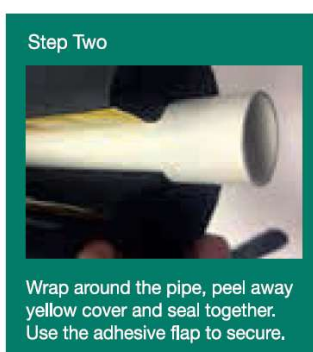
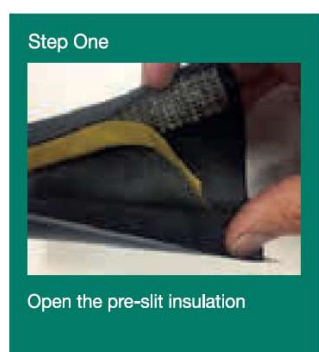
This product can be used to simplify outdoor unit installation due especially in tight spaces behind the outdoor unit. This product should be used to connect to the ASHP only.



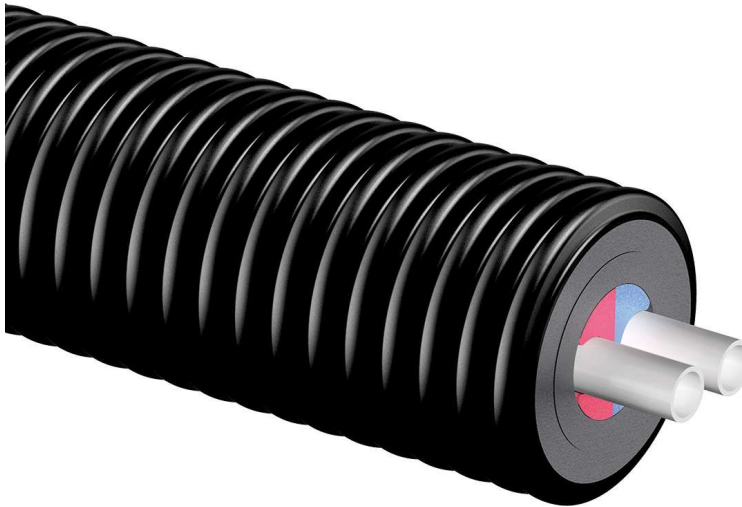
P1.7.1.5.

Pre-Slit & Seal Weatherproof Insulation

Our new pre-slit & seal PVC coated insulation provides outstanding protection against freezing, for external boiler condensate pipe work and external heating pipe work on ASHP & biomass boilers. This new design offers a quick and secure 'tape free' installation, with its peel and seal join and its self-adhesive wrap over flap. Fully compliant with the Boiler Installation Standards BS6798:2014, the tough PVC coating is both weatherproof and UV stable.



- 1.7.1.6.** Pipework that is buried beneath the surface externally or internally should be avoided where possible. When this has been designed into the installation adequate pre insulated pipe in pipe must be used as below, all moisture penetration and debris must be avoided at all times.



- 1.7.1.7.** All field supplied pipe work must be connected to the heat pump by using two 500mm, 28mm bore steel braided flexible rubber lined pipes, one for flow and one for return, supplied with the unit. Pipework between the unit and the hot water tank shall be 22mm, 28mm or 35mm depending on the calculated flow rate required and the pumps available. Provision shall be taken to avoid this pipe work freezing during winter months (25% antifreeze Fernox HP-5C or equivalent).
- 1.7.1.8.** All pipework should be sufficiently clipped and arranged such that the system is self-venting. Pipework to be laid to fall to permit the draining and venting with air vents at high points. After removing the air, automatic air vent must be closed. The draining of drain cocks at all low points. PRV will now be located within outdoor unit which enable it to be externally located as required. The system will be an unvented heating system.
- 1.7.1.9.** Where pipework connects to the heating pump, anti-vibration supports may be required. Where pipework is notched into joists, all notching is to be carried out in accordance with NHBC recommendations and the current edition of BS EN 12828:2003.
- 1.7.1.10.** All copper pipework should be copper tube to BS EN 1057 – Type X (Previously BS2871 - Table X). All copper pipework serving radiators to be 15mm at the last connection 22mm flow & return are recommended diameter and no 10mm pipework should be used. All copper fittings on the hot & cold water services are to be end-feed capillary fittings to BS EN 1254-1 & BS EN 1254-2. Lead free solder must be used. If using existing components, a thorough system flush should be carried out.
- 1.7.1.11.** Upon completion of the new LTHW heating installation, the Contractor shall carry out all appropriate pressure/leak tests in order to confirm the integrity of the installation prior to filling. Account should also be taken of

the need to provide a suitable corrosion inhibitor when refilling the system and all necessary thermal insulation.

- 1.7.1.12.** Full account should be taken of the need to balance the new installation.
- 1.7.1.13.** Generally, tubes, pipes and fittings including jointing methods, supports, expansion and contraction and anchor points, air venting and drainage points, shall comply with the DEO Spec 036:1997 (supersedes M&E3).
- 1.7.1.14.** The support intervals shall be as tabulated in DEO Spec. 036:1997.
- 1.7.1.15.** Thermal insulation shall be provided to all heating pipework as required by DEO Spec 036:1997 standard specification. Thermal insulation is required on all services. Removable insulation valve and flange jackets/blankets to be applied.
- 1.7.1.16.** Measuring devices shall provide flow measurement accuracy to within +/- 5% under the service conditions to be expected.
- 1.7.1.17.** Pressure test fittings shall enable safe, positive quick-coupling and uncoupling of the flexible connections from the differential pressure indicators.
- 1.7.1.18.** All valves and cocks, including isolating valves, stop cocks, drain cocks etc. shall be clearly marked with metal ring tags and be as detailed in DEO Spec 036:1997 unless otherwise indicated on the contract drawings.
- 1.7.1.19.** Prior to the installation and ordering of the plant the size and location of the plant i.e. heat pump, cylinder and manifolds must be approved by the client and architect.
- 1.7.1.20.** The Contractor shall provide all interconnecting cabling to suit the installation. See system schematics from 1.5.5 to but not including 1.6.
- 1.7.1.21.** The works shall comprise the supply, delivery, assembly on site, commissioning and setting to work of the new Heating controls.

1.8. Commissioning, Service requirements & Post install Support

- a. As part of the works the Contractor shall carry out a full commission of the new domestic water and heating installations fully in accordance with the MCS standard. The Contractor shall fully flush clean and chemically treat the new and existing systems and provide the necessary certification.
- b. All commissioning forms will be completed and copies issued to all respective parties.
- c. The ASHP will not require a sniff test before servicing the unit.
- d. The manufacturer should provide an Installer Pack that includes:
 - A commissioning check list
 - Details the annual service tasks
 - Service record booklet

https://library.mitsubishielectric.co.uk/pdf/book/Installer_Pack_2020#page-1

- e. The Contractor shall allow for undertaking spot checks in the presence of the Client to demonstrate the accuracy and repeatability of the recorded figures. The Contractor shall undertake the commissioning procedure in accordance with the CIBSE Codes.
- f. All test certificates shall be signed by the Client Witness and be included within the Operating and Maintenance Manual.
- g. At the commissioning stage new batteries should be supplied by the installing contractor for any items of equipment requiring such items. Any batteries supplied with the site equipment should not be used due to time spent in storage causing potential reductions in lifespan.

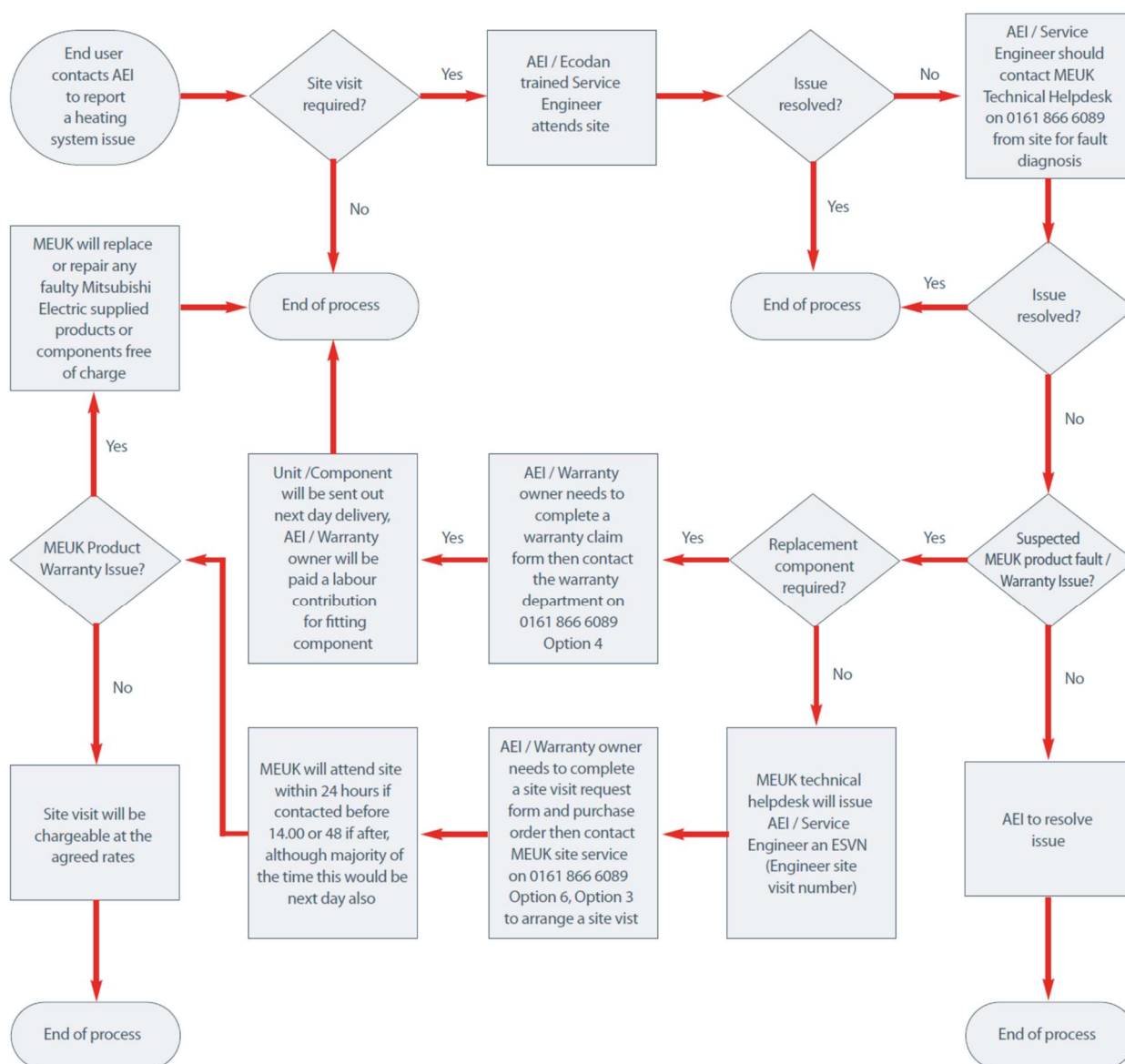
Electrical Works

- a. All mains electrical works must comply with current regulations (currently 18th edition) and carried out by a suitably qualified person in accordance with the manufacturer's recommendations. Any external wiring must have mechanical protection. Local isolation should be supplied for each appliance within 1.5M of the appliance. External isolators should be IP65 rated and all should be protected by a 30mA RCD. The breaker should also meet the standards of BS EN60898-2 & BS EN60947-2.
- b. Please refer to 1.5.5 Ecodan Wiring and Plumbing Schematic – Single Zone.

1.8.1. Service requirements:

- 1.8.1.6.** Shall include the below requirements for the outdoor and interconnecting pipework and also include all unvented checks to adhere to current regulation when working on unvented hot water systems.

1.8.2. Post install Support



MELSMART
TECHNICAL SERVICES

1.8.2.6. MELConsole:

- Remote Maintenance & Technical Support
- One phone call to our Technical Helpdesk provides instant remote access to full monitoring and fault diagnostics, meaning that issues with your heating can often be resolved over the phone. MELConsole is a service of the MELCloud App, the cloud-based solution for controlling Ecodan heating systems, either locally or remotely
- Key Features and Benefits
 - Solve your heating and hot water issues faster
 - One phone call can often remove the need for a site visit

- Cut down on wasted travel time and cost
- Remote monitoring and fault diagnostics by phone
- Ideal solution for private homeowners, landlords and social housing providers

1.8.2.7. Contacts:

- MELSmart Customer Services & Support team can be contacted by calling 0161 866 6089
- Option 1: Air Conditioning Technical
- Option 2: Spares
- Option 3: Warranty
- Option 4: Heating Technical
- Option 5: Returns
- Option 6: Product Training & Site Services

1.8.2.8. Service Packages:

- Service and Maintenance packages offering peace of mind for owners and landlords anywhere in the UK*3 that their Ecodan system will be annually serviced and in the unlikely event of a failure it will be quickly and professionally repaired by a Mitsubishi Electric engineer.
- *3 Excludes Northern Ireland, additional charges may be applied for remote and inaccessible locations
- Options:
 - Option 1: Annual Heat Pump Service
 - Option 2: Annual Heat Pump and Cylinder Service
 - Option 3: 3 Diamond Maintenance Cover – Annual System Service plus all breakdown parts and labour.

1.8.3. Recycling

Mitsubishi Electric have worked with Environcom Recycling to develop an end of life recycling system for heating equipment that is being replaced by the Ecodan® heat pump.

Collections of heating units such as boilers must be from one location and in minimum quantities of 10 or more. All other terms and conditions are listed in the link below.

To make a booking for a collection, please either call 0844 736 0071 or email customer.service@environcom.co.uk, with the details of your collection stating clearly that you are a Mitsubishi Electric customer.

In the event of any issues with the collection or special requirements then please contact Alison Powell via phone 01384 896660 or 07983 534652 or email Alison.Powell@environcom.co.uk

1.9. Building Works

1.9.1. As part of the works the Contractor should note that there shall be an element of builders work to be undertaken to facilitate the installation mechanical services. The following list which is not exhaustive identifies the main areas of builders work to be considered:

- a) Provision of access panels (approx. size 300 x 300mm) within new boxing to allow access to isolation and commissioning valves.
- b) Installation of boxing to contain vertical drops and horizontal pipework runs between radiators.
- c) Installation of new high level boxing to contain new services.
- d) Provision of all access equipment and scaffold.
- e) Providing holes through building fabric including sleeves and fire rating where new services are being installed.
- f) Provision of a suitable mounting base capable of bearing the load of the heat pump in question
- g) Provision of adequate condensate soak away where required

2. Plant Handling

- a. The Contractor shall offload and position all the new plant and mechanical equipment and make due allowance for all necessary builder's work, cranes, plinths, scaffolding and out of hours working.

2.1. Mechanical Service Simple Users Guide

- a. The Contractor shall prepare a simple users guide which shall take the form of a hard backed loose-leaf folder which shall detail simply the following:
 - 1. Controlling the ASHP installation.
 - 2. Re-programming ASHP controls.
 - 3. Procedure for setting the ASHP time clock.
 - 4. Procedure for setting the programmable thermostat that controls the heating.

2.2. Mechanical Service Handbook and as Fitted Drawings

2.2.1. (All for Inclusion Within the Operating and Maintenance Manual)

The Contractor shall prepare an operating and maintenance handbook which shall be contained in A4 size, plastic covered, loose leaf, and four ring binders with suitably labelled hard covers and indexing. Drawings needed to illustrate or locate items mentioned in the handbook, where larger than A4, are to be folded and accommodated in the binders so that they may be unfolded without being detached from the rings.

2.2.2. Description of Installation

A description of the installation under the various sub-headings, e.g. heating, domestic water, ventilation, etc.

2.2.3. Operating Instructions

A description, in layman's terms, of the operation of the installation covering those aspects which the occupants would normally be concerned with.

2.2.4. Maintenance

The operating and maintenance handbook must include:

- a. A full description of each of the systems installed, written to ensure that the Client's staff fully understand the scope of the facilities provided.
- b. A description of the mode of operation of all the systems including services capacity and restrictions.
- c. Diagrammatic drawings of each system indicating principal items of plant, equipment, etc.
- d. Legend for all colour coded services.
- e. Schedules (system by system) of plant, equipment, radiators, etc., stating their locations, duties and performance figures. Each item must have a unique number cross referenced to the as fitted record drawings, diagrammatic drawings and schedules.
- f. The name, address and telephone number of the manufacturer of every item of plant and equipment together with catalogue list numbers.
- g. Manufacturers technical literature for all items of plant and equipment, assembled specifically for this project, excluding irrelevant matter and including detailed drawings, electrical circuit details and operating and maintenance instructions.
- h. A copy of all Test Certificates for the installations and plant, equipment, etc. used in the installations.
- i. A copy of all manufacturers' guarantees, warranties and maintenance agreements offered by subcontractors and manufacturers.
- j. Starting up, operating and shutting down instructions for all equipment and systems installed.
- k. Control sequences for all systems installed.
- l. Schedules of all fixed and variable equipment settings established during commissioning.
- m. Procedures for seasonal changeovers.
- n. Recommendations as to the preventative maintenance frequency and procedures to be adopted to ensure the most efficient operation of the systems.
- o. Lubrication schedule for all lubricated items.
- p. A list of normal consumable items.
- q. A list of recommended spares to be kept in stock by the client, being those items subject to wear or deterioration and which may involve the client in extended deliveries when replacements are required at some future date.
- r. Procedures for fault finding.
- s. Emergency procedures, including telephone numbers for emergency services.

2.2.5. During the course of the works, the Contractor shall keep on site a set of original drawings upon which shall be recorded any variations or deviations from the original services layouts, together with the precise (dimensioned) locations of any external underground services.

2.2.6. The aforementioned drawings shall be available for inspection by the Main Contractor or their representative when requested.

2.2.7. At Practical Completion, the Contractor shall supply one complete set of “As Fitted” record drawings incorporating all of the aforementioned variations and deviations and supplementary record of readings.

2.2.8. The Contractor should be aware that the production of written instructions on the operation of the plant and services installed by them is a legal requirement under the Health and Safety Regulations and failure to produce same would place them under an obligation to run and operate the plant at their own expense until such time as the proper written instructions are produced.

2.3. Schedule of Equipment

2.3.1. For estimation purposes only. All final designs and sizing are to be carried out by the installing contractor using the Mitsubishi Electric online room by room MCS compliant sizing tool.

<https://ecodanselectiontool.mitsubishielectric.co.uk/>

2.4. Summary

- a) PUZ – (PUZ-WM50VHA / PUZ-WM60VAA / PUZ-WM85VAA / PUZ-WM112VAA / PUZ-HWM140VHA-YHA) monobloc air to water heat pump providing hot water up to 60 degrees and zone 1 & 2 heating up to 60 degrees.
- b) The Air source heat pump will have a sound power level ranging between (PUZ-WM60VAA) 58 to (PUZ-HWM140VHA-YHA) 67 dBA. The sound pressure level will not exceed 53 dBA at 1m.
- c) For hot water the ASHP will use pre-plumbed cylinders and packaged cylinders containing a 3kW immersion heater for legionella prevention or use a third party cylinder which also must contain an immersion heater.
- d) System must be metering for performance complaint. This is also sufficient to be used for domestic RHI. The system must be MMSP ready.
- e) The ASHP will be able operate down to at least -20 degrees’ ambient temperature.
- f) The ASHP will be able to maintain their full capacity down to at least -7 degrees’ ambient temperature.
- g) The ASHP will have the ability to adjust heating flow temperature based on ambient temperature and required indoor temperature for maximum efficiency.
- h) The ASHP will be Wi-Fi ready, provided as standard, enabling remote access to control and diagnostics. This is a free non-contractual service.
- i) Installed unit volume needs to be less than 0.6m³.
- j) ASHP must be able to be installed 100mm & 300mm off a wall from the behind and 100mm & 200mm from a door/window, VAA and V/YHA respectively.
- k) User guides will be provided in physical format and can also be [found online](#). Handover to residents will also be provided.

3. Useful Contact Information; Mitsubishi Electric

Regional Account Manager: Will Rossiter – 07384 877110

Contractor Account Manager: Jeharsh Patel – 07525 765173

Pre Sales Technical:

01707 278666

Option 3

After Sales:

0161 8666089