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Heating

Heating Only Heat Pumps For Commercial Applications
Ecodan CAHV System

Project Number	PRO-55956
Quote No.	
Project Name	Ox Close School, Spennymoor
System Ref/Prop No.	HTG SYSTEM

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Technical Submission Clarifications:

1. General

i. In periods of low ambient temperature (typically less than 5oC), Mitsubishi Electric recommends that the Air Source Heat Pump runs continuously.
ii. Air Source Heat Pumps will defrost the outdoor unit heat exchanger coil in periods of low ambient temperature such that condensate will be discharged – adequate provision should
iii. All water systems should be designed, installed and commissioned in accordance with industry good practise guidelines; such as, but not limited to: BSRIA Guide BG2/2010 – Water
iv. Air Source Heat Pumps are designed to produce low pressure hot water which may be used in a variety of applications – it is your responsibility to check that the equipment
v. Air Source Heat Pumps perform more efficiently by utilising low water flow temperatures and also making use of weather compensation.
vi. Mitsubishi Electric takes no design responsibility or liability for the system, components, equipment selections or control strategy – it is your responsibility to check the suitability of
vii. It is your responsibility to check that the Equipment selections parameters, as laid out in the Technical Submission document, are as provided by yourselves.
viii. In order to comply with the Mitsubishi Electric warranty requirements all Mitsubishi Electric products must have adequate planned preventative maintenance undertaken in
ix. To meet Mitsubishi Electric's warranty requirements a suitable method of filtration must be provided within the system – please see 'Water Filtration Table' over-leaf for approved
x. The recommended water flowrates must be maintained at all times when the equipment is operating. Particular attention should be paid to any change in pressure drop due to glycol
xi. With all Air Source Heat Pump applications we recommend 30% glycol protection of the low pressure hot water heating circuit to protect against freezing – should glycol anti-freeze
xii. In order for the equipment to be considered a 'renewable' heating product as defined by the European Commission a minimum SCOP of 2.53 must be achieved.
xiii. Where appropriate (domestic installations) Air source Heat Pumps should be designed, installed set to work and commissioned in accordance with the Microgeneration Installation
xiv. The quoted equipment may qualify for the Non-Domestic Renewable Heat Incentive (RHI) Scheme. Non-Domestic RHI tariffs are to be paid on the total energy delivered with a
xv. All Non-Domestic RHI schemes must have an approved MID Class II heat meter installed.

Water Filtration Table

Product			Filtration Method		
			Strainer(inlet to each unit)	Magnetic Filter	Air/Dirt Separator
Ecodan PUHZ Cascade <= 2Units			Recommended	Minimum	N/A
Ecodan PUHZ Cascade > 2Units			Minimum	Recommended if STEEL pipe	Minimum
Ecodan CAHV			Minimum	Recommended if STEEL pipe	Minimum
Ecodan CRHV	Heat Source	Ground/Open Source	Minimum	N/A	N/A
		Recovered Heat/Condenser Loop	Minimum	Recommended if STEEL pipe	Minimum
	Heat Sink		Minimum	Recommended if STEEL pipe	Minimum
WY & WR2 Condenser Loop			Minimum	Recommended if STEEL pipe	Minimum
PWFY BU (High Temp)			Minimum	Recommended if STEEL pipe	Recommended

Minimum – without this filtration method the installation risks not receiving full warranty.

Recommended – this filtration method has recognised benefits for this type of system but its inclusion will not affect warranty.

2. CAHV Specific

i. The minimum turndown on the CAHV unit is 18kW – adequate provision in the overall system design must be provided to ensure suitability of the application to minimise equipment
ii. A minimum primary water circuit temperature of 20oC should be maintained in periods of low ambient temperature to ensure adequate performance of the Air Source Heat Pump

3. Ecodan Specific

i. The FTC4 Cascade controller can only produce low pressure hot water from a single Ecodan when operating in Domestic Hot Water mode – the remaining units in the cascade
ii. The FTC4 boards can only be mounted within 5m of the equipment and are not IP rated or suitable for mounting externally.

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Contents of CAHV P500YA HPB Proposal

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Project Design Conditions

Application -	Hot water (DHW)		
Design Ambient Temperature -	-5 °C		
Required Capacity -	41 kW		
Glycol -	Ethylene		
Concentration -	20 %		
Protection from Freezing Down to -	-5 °C		
Safety Factor Included (20%) -	Yes		
Required Capacity inc Safety Factor -	**41 kW**		
Heating Water Outlet Temperature -	65 °C		
Water Delta T (diff between inlet and outlet) -	5 ΔT		
Heating Water Inlet Temperature -	60 °C		
Capacity of Unit at Design Condition -	43 kW	(Including Defrost - BS EN14511 testing method)	
Capacity of Unit with Glycol Concentration -	41 kW	(Including Defrost - BS EN14511 testing method)	
Number of Units Required to Meet Load -	1 #		
Total Deliverable Capacity by Units -	**41 kW**		
Minimum Deliverable Capacity -	18 kW		
Capacity Modulation Steps -	0.5 kW		
No. of Controllers Req'd for Cascade and Rotate -	1 #	(PAR W21MAA)	
Header Pipe Thermistor -	1 #	(TW TH16)	
Required and Minimum Flow Rate per Unit -	2.1 l/s	(Minimum flow rate on primary side is 2.1l/s)	
CAHV Recommended Water Pipe Size -	54 mm		
Total Required Flow Rate -	2.1 l/s		
Main Header Recommended Pipe Size -	54 mm		
Pressure Drop -	18.9 kPa		
Pressure Drop with Glycol Concentration -	20.3 kPa	(pressure drop and viscosity during start up may be higher due to low water temperature)	
Minimum Circuit size -	360 litres	(to avoid cycling and to allow a reasonable buffer during unit inactivity)	
Volume of water contained within units -	14 litres	(14litres contained within each unit)	

Notes -

Weather Compensation / FTC Yes

Only required if operating DHW and Heating

DHW Outlet Temperature -	65 °C	
Water Delta T -	5 ΔT	DeltaT may not be maintained consistantly
DHW Inlet Temperature -	60 °C	

Electrical Requirements

Maximum Running Current -	52.9 Amps	The electrical specification for a CAHV heat pump states that the maximum load current is 52.9 Amps per phase. Should the installation designer calculate a lower value based on, for example, operating the CAHV below its maximum heat output capacity or water temperature, and consequently design the electrical wiring installation to operate at this lower maximum load current, then the installation designer must assume full responsibility for ensuring that this load current is never exceeded during operation.
Total Maximum Running Current for System -	52.9 Amps	

Failure to meet this requirement may result in the supply breaker, or other disconnection device, removing power from the system when no fault has occurred. Under these circumstances Mitsubishi Electric would not take responsibility for the resulting downtime or any damage that may be caused to the CAHV.

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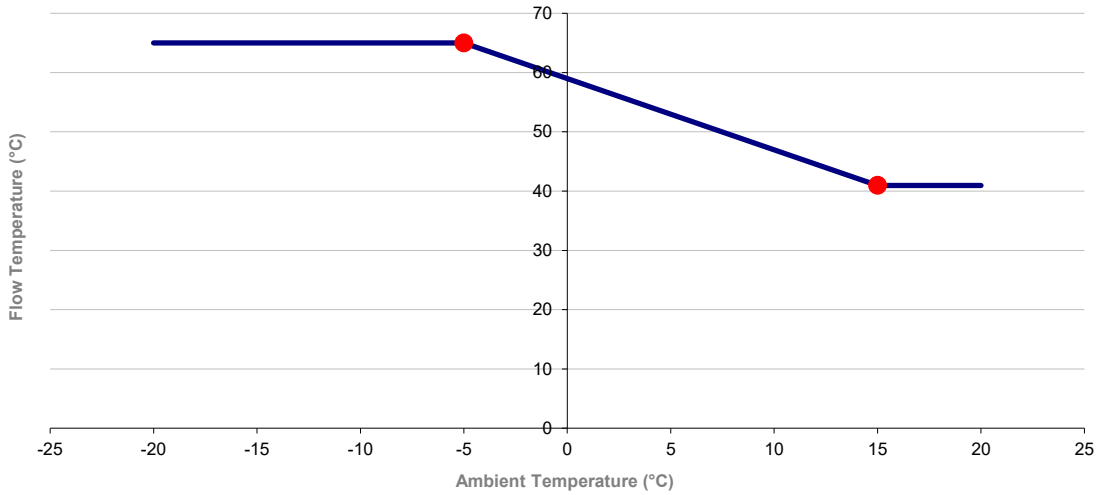
Weather Compensation Curve

Weather Compensation/FTC	Yes	*Changes can be made on design conditions page*
Flow Temperature	65 °C	*Changes can be made on design conditions page*
Design Condition	-5 °C	*Changes can be made on design conditions page*

Weather Compensation Curve Guide



N.B. The weather compensation curve should be calculated during the load calculations. This should only be used as a guide.

The graph above is generated as a result of the chosen design condition and flow temperature. Weather compensation enables better efficiency and also stops the heating system from cycling on and off, which will achieve a more consistant temperature and better comfort level within the building

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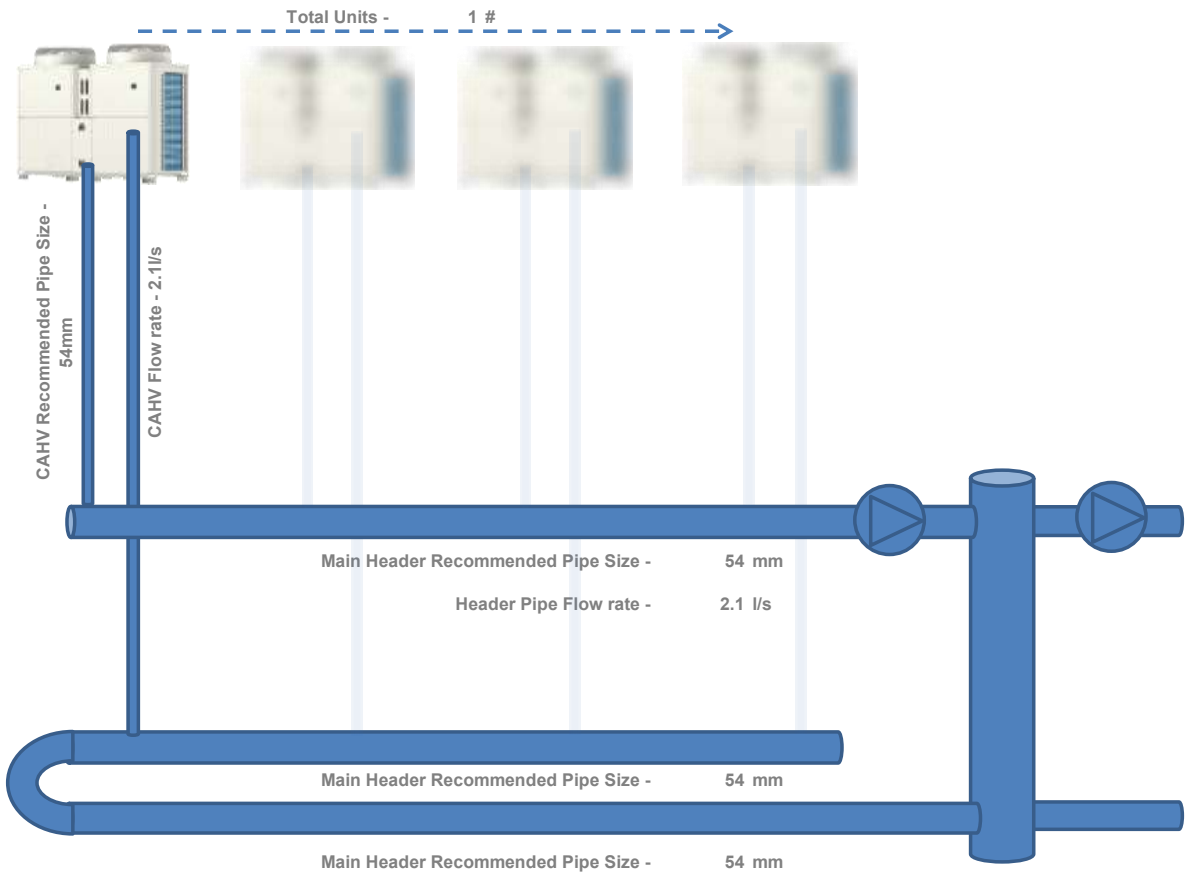
Recommended Pipe Sizes

Flow rate per CAHV Unit	2.1 l/s	*Changes can be made on design conditions page*
Number of Units	1 #	*Changes can be made on design conditions page*
Total flow rate (Main header)	2.1 l/s	*Changes can be made on design conditions page*
Pressure Drop inc Glycol	20.3 kPa	*This does not include onsite installled pipe work*



Pipe work sizing is the responsibility of the installing contractor and consultant. All pipe work sizes are based on CIBSE design conditions

All water systems should be commissioned in accordance with the latest CIBSE Commissioning Code W for Water

All water systems should be cleaned and treated in accordance with BSRIA BG 29/2011 Pre-Commissioning Cleaning of Pipework Systems

All pipe sizes are based on copper to BS EN 1057

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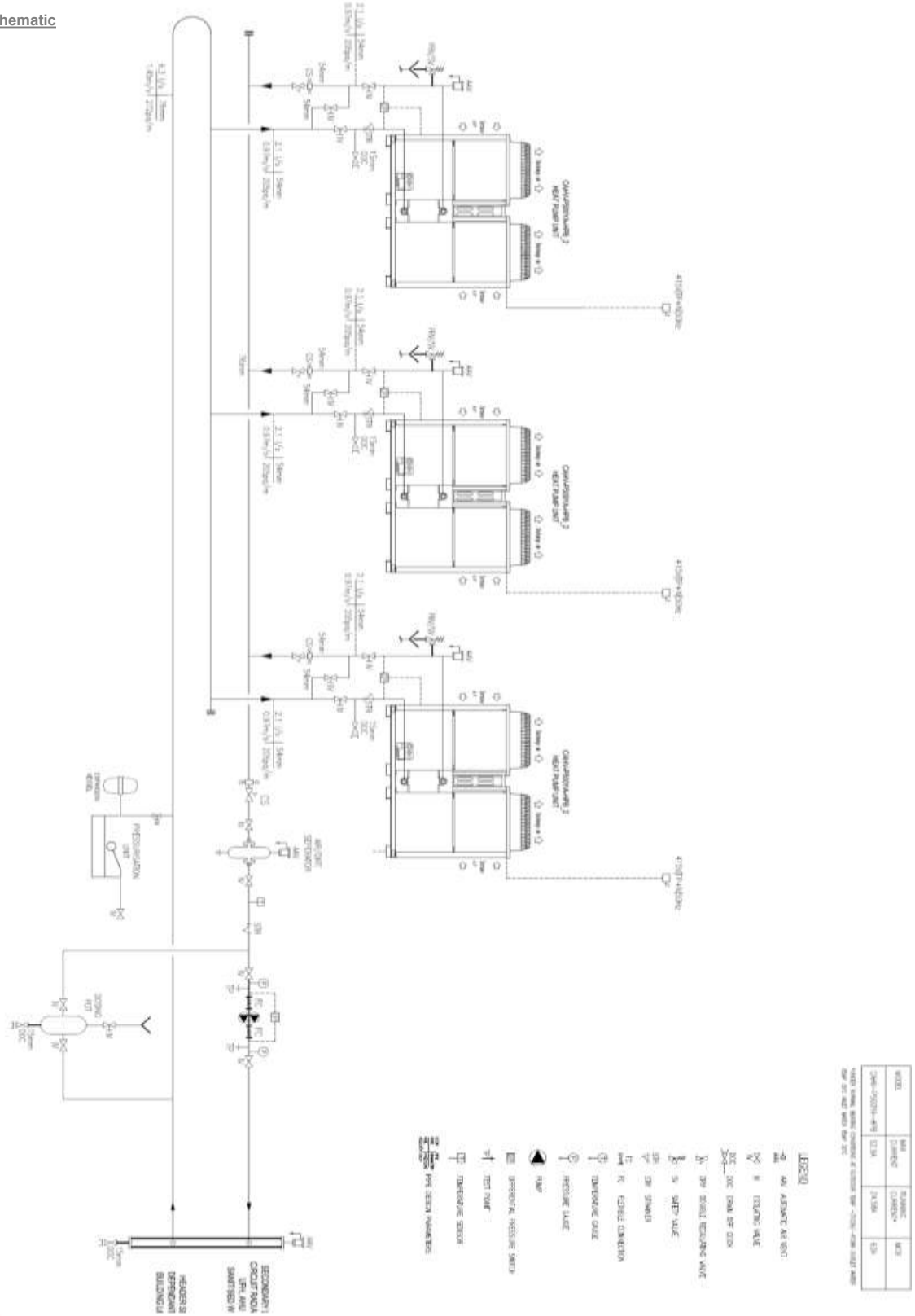
Example Schematic



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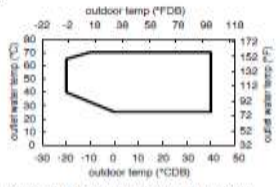
Model			CAHV-P500YA-HPB (-BS)
Power Source			3-phase 415v, 50Hz
Capacity *1 A7/W45		kW	45
	Power input	kW	12.9
	Current input (MAX)	A	19.94 (52.9)
	COP (kW / kW)		3.49
Capacity *2 A7/W35		kW	45
	Power input	kW	10.9
	Current input (MAX)	A	17.6 (52.9)
	COP (kW / kW)		4.13
Capacity *3 A-3/W35		kW	43
	Power input	kW	15.2
	Current input (MAX)	A	24.58 (52.9)
	COP (kW / kW)		2.8
Maximum current input *4		A	52.90
Water pressure drop *1			18kPa
Temp. range	Outlet water temp *5		25~70°C 77~158°F
	Outdoor temp *5	D.B	-20~40°C -4~104°F
Circulating water volume range			7.5 m³/h - 15.0m³/h
Sound Pressure level (measured in anechoic room) *1 at 1m *6		dB (A)	59
Sound Pressure level (measured in anechoic room) *1 at 10m *6		dB (A)	51
Diameter of water pipe	Inlet	mm (in)	38.1 (Rc 1 1/2") screw
	Outlet	mm (in)	38.1 (Rc 1 1/2") screw
External finish			Acrylic painted steel plate <MUNSELL 5Y 8/1 or similar>
External dimension H × W × D		mm in.	1,710 (without legs 1,650) × 1,978 × 759 67.3 (without legs 65.0) × 77.9 × 29.9
Net weight		kg (lb)	526 (1,160)
Accessories			Y strainer Rc 1 1/2
Design Pressure	R407C	MPa	3.85
	Water	MPa	1.0
Drawing	Wiring		KC94G268X01
	External		KC94G195X01
Heat exchanger	Water side		stainless steal plate and copper brazing
	Air side		Plate fin and copper tube
Compressor	Type		Inverter scroll hermetic compressor
	Manufacture		MITSUBISHI ELECTRIC CORPORATION
	Starting method		Inverter
	Motor output	kW	7.5 × 2
	Case heater	kW	0.045 × 2
	Lubricant		MEL32
FAN	Air flow rate	m³/min	185 × 2
		L/s	3,083 × 2
		cfm	6,532 × 2
	External static press *7		0Pa, 60Pa (0mmH$_2$O/6.1mmH$_2$O)
	Type × Quantity		Propeller fan × 2
	Control, Driving mechanism		Inverter-control, Direct-driven by motor
	Motor output	kW	0.46 × 2
HIC circuit (HIC:Heat inter-Changer)			Copper pipe
Protection	High pressure protection		High pres.Sensor & High pres.Switch at 3.85MPa
	Inverter circuit		Over-heat protection, Over current protection
	Compressor		Over-heat protection
	Fan motor		Thermal switch
Defrosting method			Auto-defrost mode (Reversed refrigerant circle)
Refrigerant	Type × original charge		R407C × 5.5(kg) × 2
	Control		LEV and HIC circuit

*1 Under Normal heating conditions at outdoor temp. 7°CDB/6°CWB/ outlet water temp 45°C, inlet water temp 40°C.
*2 Under Normal heating conditions at outdoor temp. 7°CDB/6°CWB/ outlet water temp 35°C, inlet water temp 30°C. as tested to BS EN14511. Power factor 86%.
*3 Under Heating conditions at outdoor temp. -3°CDB/-2°CWB, outlet water temp 35°C.
*4 MCB fuse size and all electrical work should be completed in line with IEE regulations.
*6 Sound power level 70.7dB(A) tested to BS EN12102
*7 Dip SW on the unit control board needs to be changed.
* Due to continuing improvement, the above specifications may be subject to change without notice.
* Please don't use the steel material for the water piping material.
* Please always make water circulate or pull out the circulation water completely when not using it.
* Please do not use groundwater and well water.
* Install the unit in an environment where the wet bulb temp. will not exceed 32°C.
* The water circuit must use the closed circuit.

*5



Outdoor temp -20°CDB/ Outlet water temp 40~65°C
(Outdoor temp -4°FDB/ Outlet water temp 104°F~149°F)
Outdoor temp -10°CDB/ Outlet water temp 33°C~70°C
(Outdoor temp 14°FDB/ Outlet water temp 91°F~158°F)
Outdoor temp 0°CDB/ Outlet water temp 25°C~70°C
(Outdoor temp 32°FDB/ Outlet water temp 77°F~158°F)

Unit converter
kcal = kW x 860
BTU/h = kW x 3,412
cfm = m³/min x 35.31
lb = kg/0.4536

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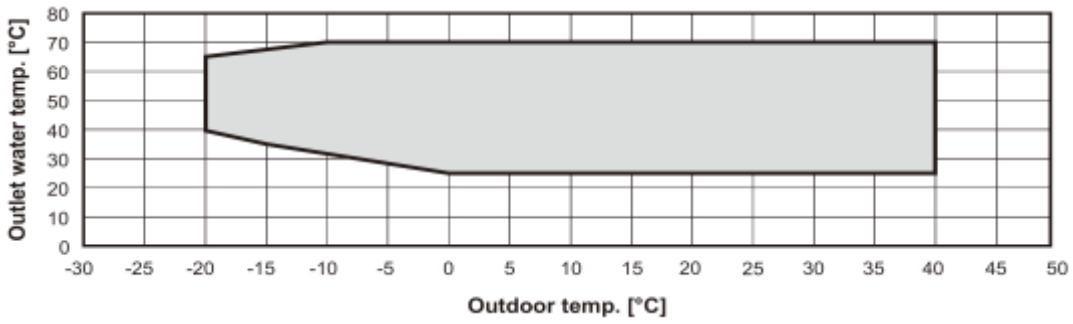
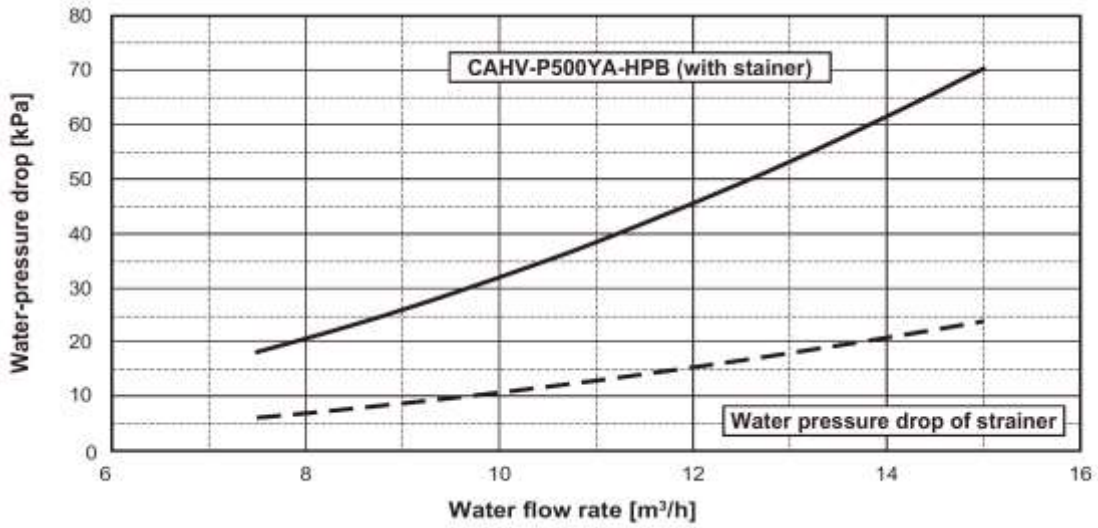
Operating Characteristics

Temperature Range



Water Pressure Drop



NB. Assumes no glycol in the system (please see design conditions for project pressure drop)

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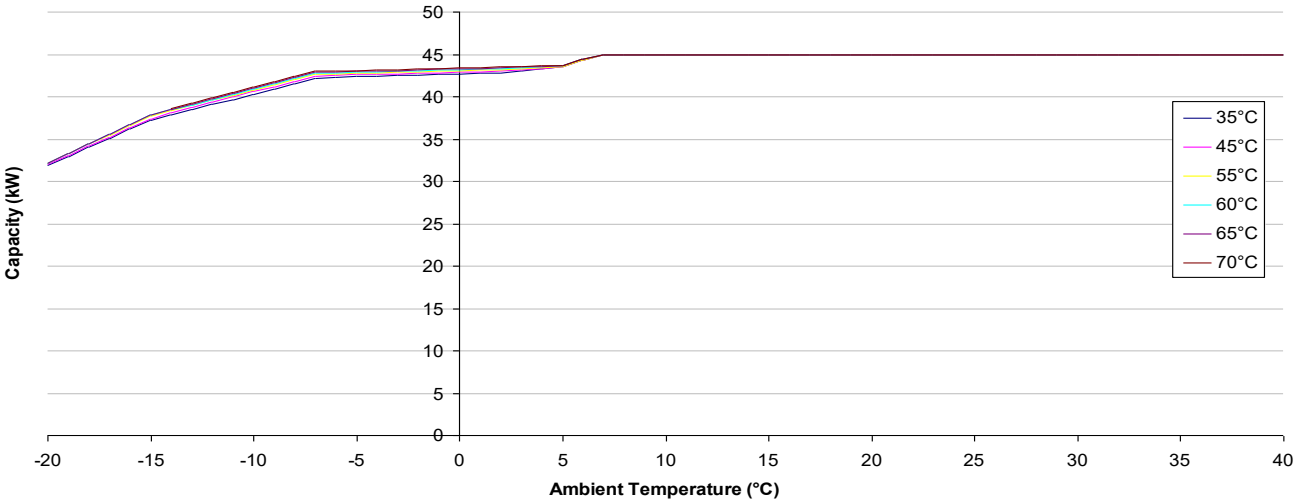
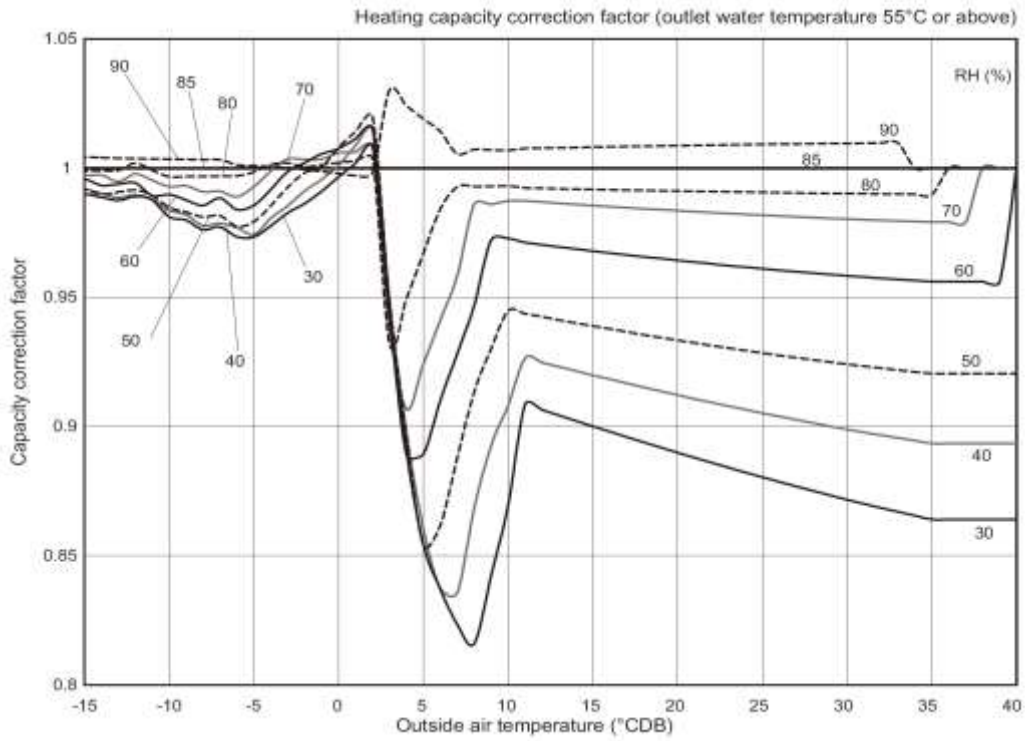
Capacity



Humidity Effect on Capacity



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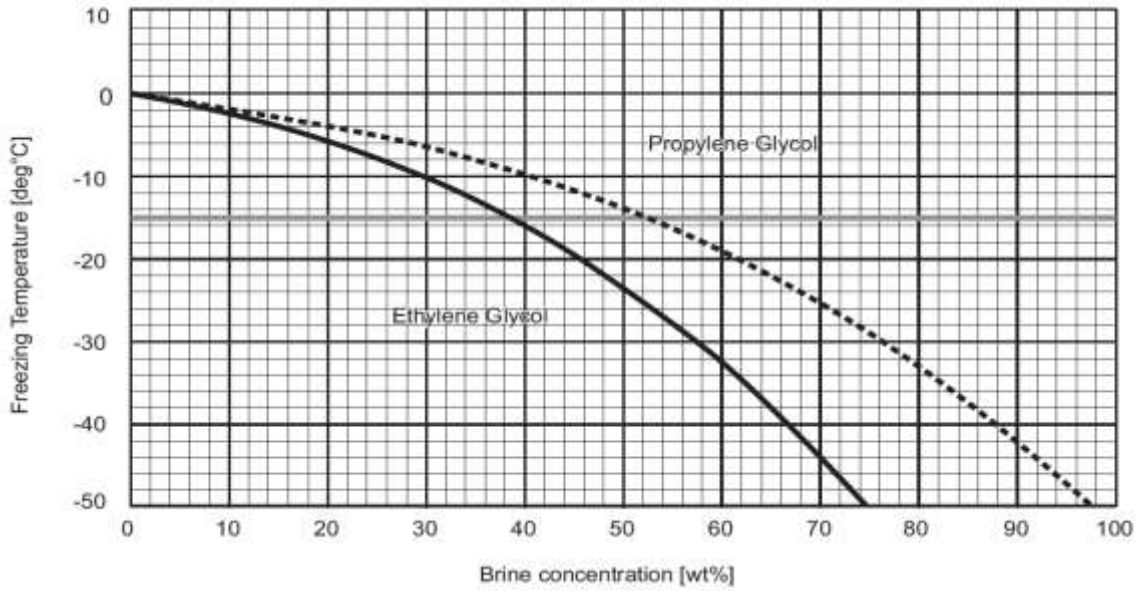
Freezing Protection

Glycol Protection Concentration



Note;
The graph was referred from chemical company data.
But Freezing Temperature condition will be slightly different based on each company.
Please confirm detail data to the chemical company directly.
It is recommended to set the brine concentration to a percentage that will keep the freezing temperature at -15deg°C or less.

NB - An emergency output is also available on the unit to enable a secondary heat source or trace heating in case of extreme temperatures

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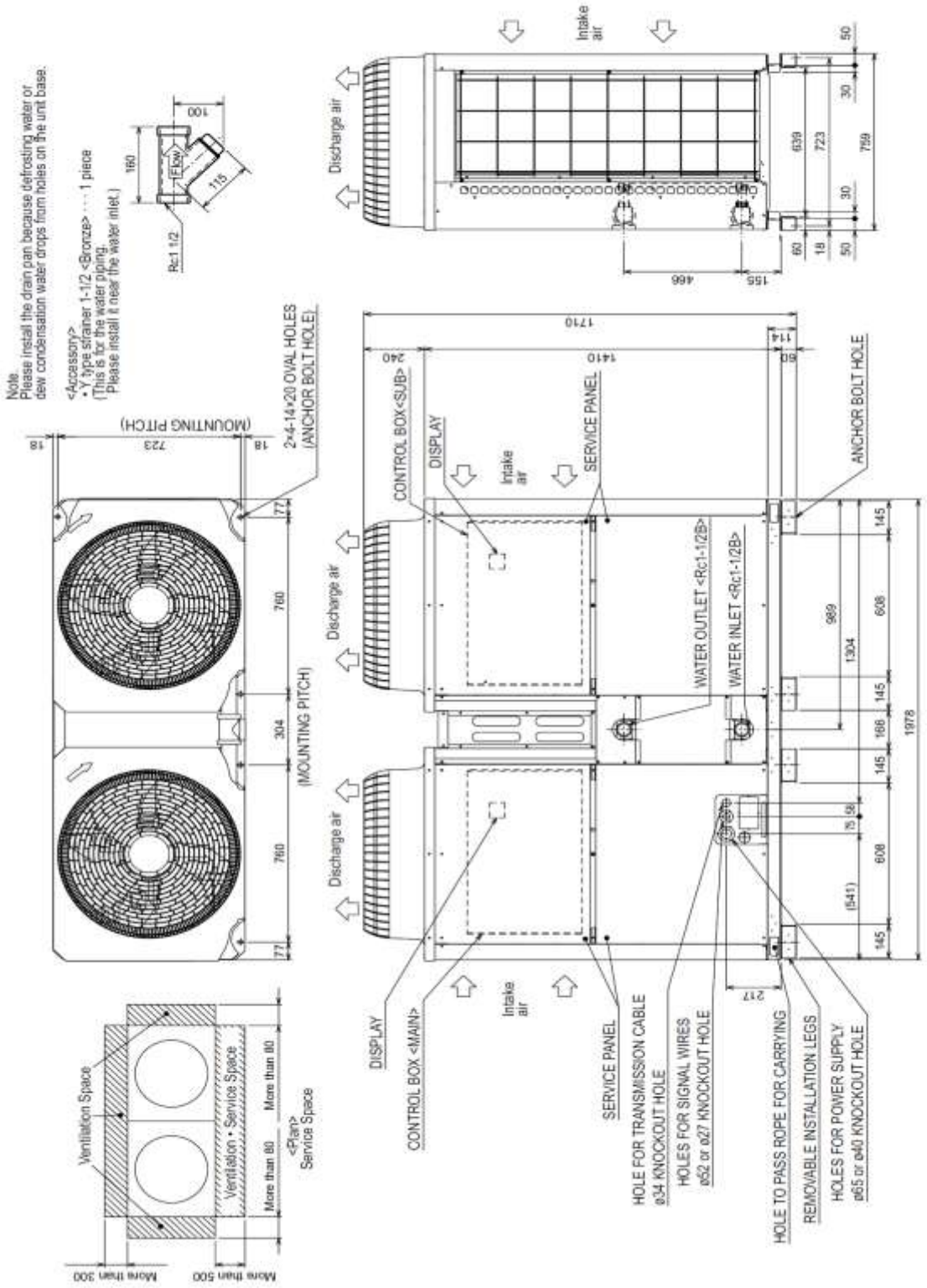
Unit: mm



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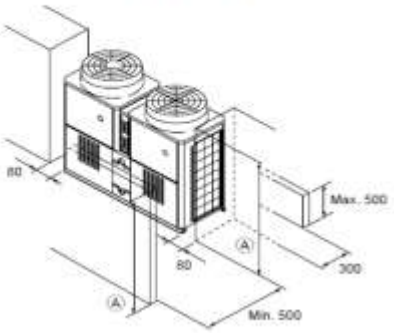
Installation Requirements

(2)-1. Single unit installation

Secure enough space around the unit as shown in the figures below.

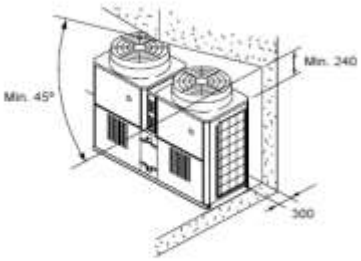
<Unit: mm>

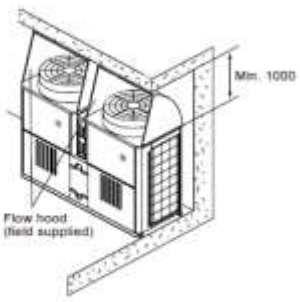
(2)-1-1. Walls around the unit do not exceed the height limit.



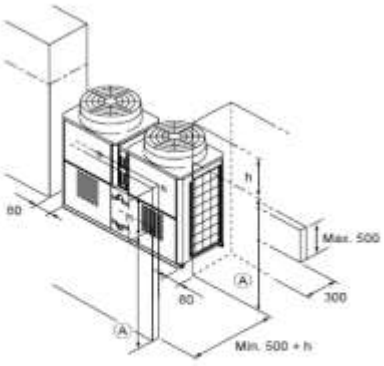
Ⓐ Walls are lower than the unit's height.

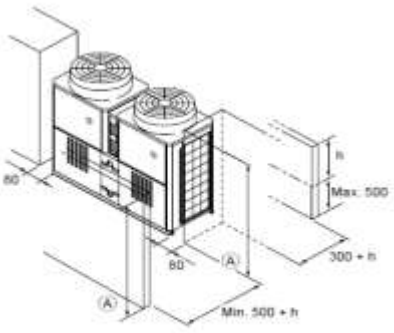
(2)-1-2. There is a wall above the unit.

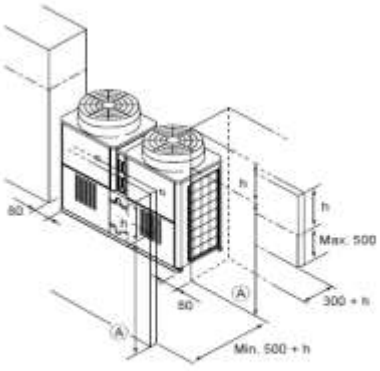




(2)-1-3. One or more of the walls around the unit are taller than the maximum allowable height <h>.







Ⓐ Walls are lower than the unit's height.

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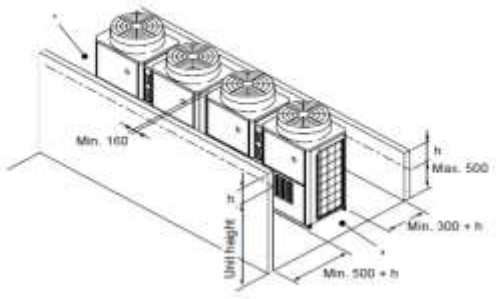
Installation Requirements

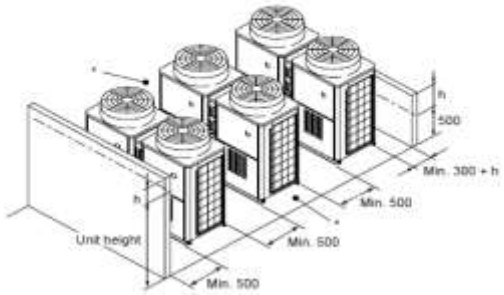
<Unit: mm>

(2)-2-1. Side-by-side installation

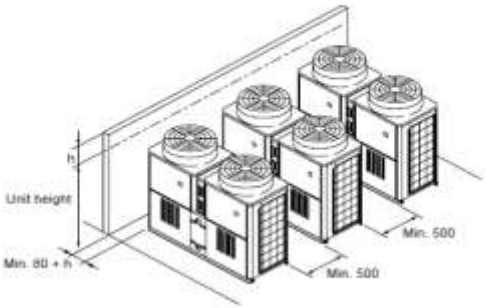


(2)-2-2. Face-to-face installation

- There are walls in the back and the front of a given group of units.

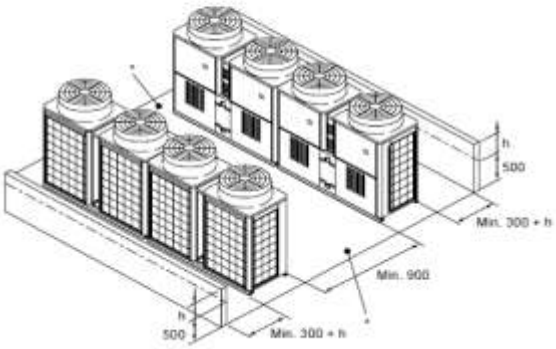


- There is a wall on one side.

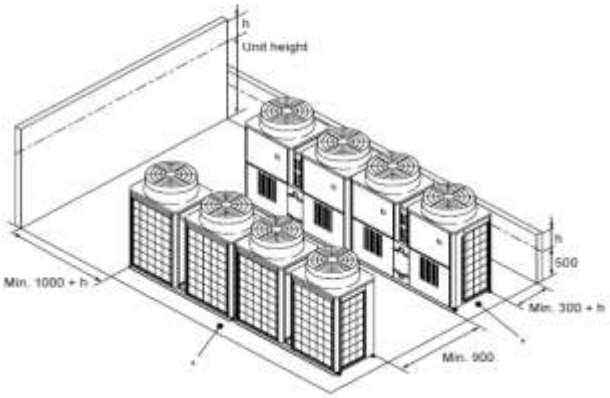


(2)-2-3. Combination of face-to-face and side-by-side installations

- There are walls in the back and the front of a given group of units.



- There is a wall on one side and either the front or the back of a given group of unit.



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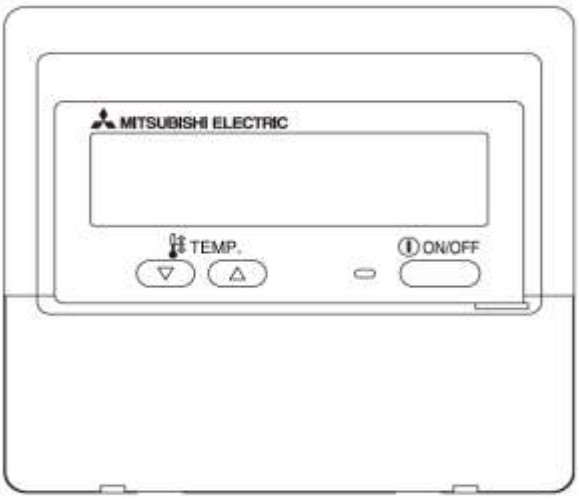
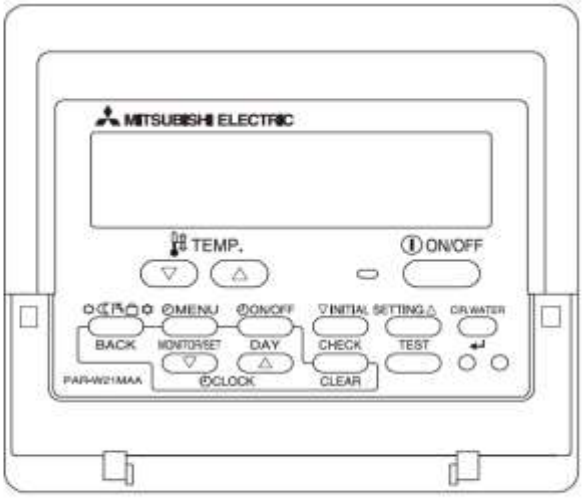
Controller - PAR W21MAA



Panel closed



Panel open

For purposes of this explanation, all parts of the display are shown as lit. During actual operation, only the relevant items will be lit.

Day-of-Week
Shows the current day of the week.

Time/Timer Display
Shows the current time, unless the simple or Auto Off timer is set.
If the simple or Auto Off timer is set, shows the time remaining.

"Locked" indicator
Indicates that remote controller buttons have been locked.

Identifies the current operation
Shows the operating mode, etc.
* Multilanguage display is supported.

Timer indicators
The indicator comes on if the corresponding timer is set.

"Centrally Controlled" indicator
Indicates that operation of the remote controller has been prohibited by a main controller.

Error indicator
Comes on when error occurs.

Water Temperature Display
Shows the water temperature during water temperature display operation.

(Power On indicator)
Indicates that the power is on.

"Timer Is Off" indicator
Indicates that the timer is off.

Temperature Setting
Shows the target temperature.

Note:
- "PLEASE WAIT" message
  This message is displayed for approximately 3 minutes when power is supplied to the unit or when the unit is recovering from a power failure.
- "NOT AVAILABLE" message
  This message is displayed if a button is pressed to operate a function that the unit does not have, or a function that is not available due to the setting.

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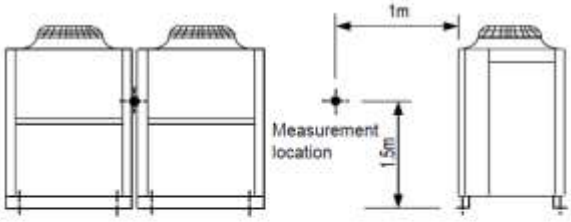
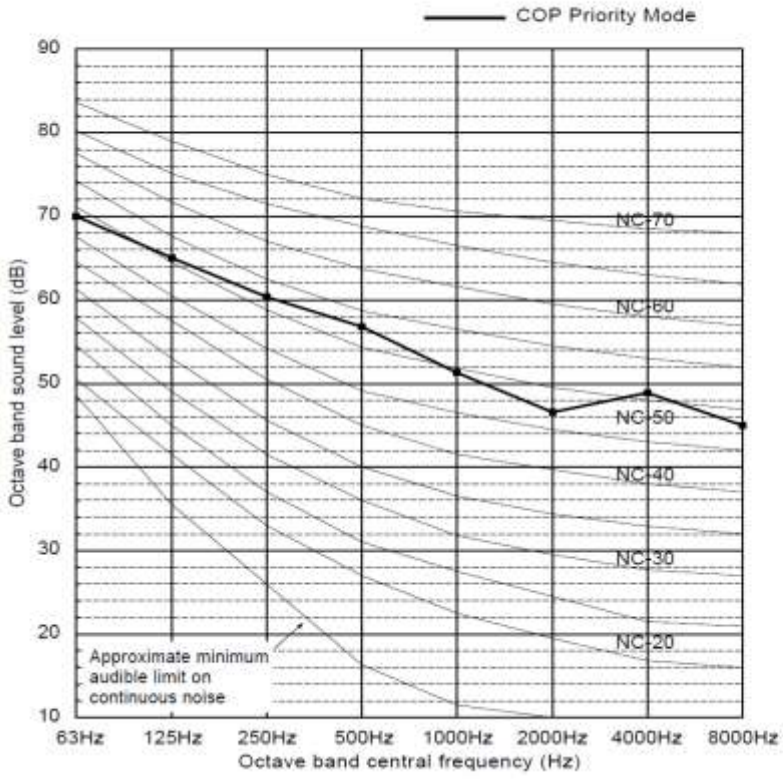
Sound Pressure Information



Sound Pressure Level: 59.0 (COP Priority Mode)

Operation condition... Spring, Autumn: Outdoor temp.: 16°CDB/12°CWB, Inlet water temp.: 40°C, Outlet water temp.: 45°C
Winter: Outdoor temp.: 7°CDB/ 6 °CWB, Inlet water temp.: 65°C, Outlet water temp.: 70°C



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Sound Pressure Information

Acoustic kits

A range of Acoustic Kits designed for noise reduction. An industry first, the kits offer a noise level reduction from standard.

For supply and / or installation and information please contact

Ambient acoustics on 01934 712802

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Accessories

CAHV Wind Hood

CAHV-WH

- Protects the evaporating coil in high wind environments.
- Allows the unit to be installed in exposed roof top locations.
- Protects the unit in locations where there is a risk of snow build up.
- Four hoods supplied, two side and two rear.

CAHV Raised Stand

CAHV-RS

- Gives the unit a solid platform to mount and anchor to.
- Raises the unit up and allows the natural flow of cold air beneath it.
- Fully adjustable in height, allowing the installer to choose ideal height for the location.
- Should be installed with anti-vibration pads between the unit and the raised stand.

CAHV Drain Pan and Heater

CAHV-DP

- Neatly directs condensate (naturally occurring water moisture) to a drain away.
- Supplied with optional use resistance heater - the heater can be used where there is risk of freezing due to prolonged cold weather.
- Wired directly into the unit and only activated when the ambient temperature drops below a given point.
- Requires a 240v, 10amp power supply - see installation manual for details.
- Should be installed with anti-vibration pads between the unit and the raised stand.
- Must be purchased with the raised stand.

CAHV Main Pipework Thermistor

TW-TH16

- Pipework mountable probe thermistor - either dry or wet pocket.
- For use in multiple CAHV installations where cascade ability is required.
- Should be installed on the flow/outlet pipework, no more than 20m from the main unit.

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Site Supplied Equipment (These items are not included)

Differential pressure switch (DPS) or flow switch

Pressure Relief Valves

Isolating Valves

Bypass Loops

Commissioning Sets

Automatic Air Vents (AAV's)

Drainage Valves

Pump Sets

Common Flow & Return Water Pipe work

Buffer Vessel

Expansion / Pressurisation Tank

Dosing Pot

Low Loss Header(s)

Magnetic or Cyclonic Filtration Device

Mains Electrical and control wiring

Unit Specification

The outdoor unit will be constructed from steel plate and painted with acrylic paint Munsell 5Y 8/1 and is a packaged type inverter driven air to water heat pump capable of delivering an integrated (with defrost) capacity of 43kW at -5°C ambient temperature.

The single unit heat pump is made up of two scroll compressor hermetically sealed refrigerant circuits utilising R407c. The exchange of heat from refrigerant to water is made through two stainless steel plate heat exchangers linked together in parallel to common flow and return connections. Water temperatures shall be between 25°C and 70°C and the unit is capable of working between ambient temperatures of -20°CDB and +40°CDB.

The plate heat exchangers within a single unit will deliver <20kPa pressure drop at the working flow rate of 2.1l/s and a delta T of 5°C across the primary circuit. An Heat Interchange Circuit (HIC) or flash injection technology is used within the unit to maintain capacity at low ambient temperatures, producing a drop off of 5kW between +10°C and -10°C.

Multiple units can be connected together by a shielded 2 core cable and controlled using the inbuilt supplied control logic. Up to 16 units can be piped together delivering up to 688kW at -5°C. The inbuilt logic will cascade the units on and off based on the load and also deliver an optimised cascade based on compressor frequency and COP. Backup and rotate will allow for even wear of the system whilst also providing backup within a single unit and within a multiple unit installation.

A minimum circuit size of 360litres per unit is required and all pipe work should be installed in accordance with related BS regulations and the Mitsubishi Electric design guide.

The refrigeration process of the CAHV unit will be maintained by pressure and temperature sensors controlling solenoid valves check valves and bypass valves. The heating or defrost mode of the outdoor unit will be controlled by a 4 way valve.

The CAHV unit has a max runing current of 52.9Amps and requires a 380V-415V AC 3 phase & neutral 63A mains supply and have a starting current of no more than 16 Amps. Control will be via a 30V DC signal generated by the outdoor unit. This signal will be sent to other outdoor units in its group via a 2-core non polar screened cable.

Control of the system is via volt free inputs and outputs into the BEMS/BMS. An error signal will alert the BMS and through interrogation of the PAR W21. Flow or return temperatures can also be monitored via the PAR W21.

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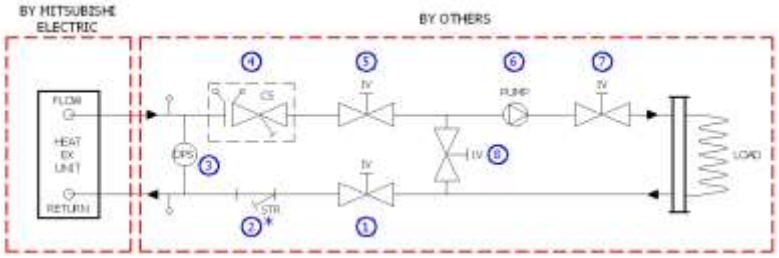
MELSMART TECHNICAL SERVICES

Pre-Commissioning Check List

Note: A copy of this sheet must be supplied to the engineers installing the equipment on site.

The following are to be checked and a tick provided in the "Completed" box, signed and returned to the fax number below prior to any engineer attending site to carry out the set up and commissioning of the Heating Systems. **Please also give a copy to our engineer on his arrival to site.**



		YES	NO
1	Valves fitted in the circuit for each heat exchanger as drawing.		
	1 Flow Isolating Valve fitted.		
	2 *Strainer fitted (Supplied by Mitsubishi Electric).		
	3 Differential Pressure Switch DPS or Flow Switch fitted.		
	4 Commissioning Set fitted.		
	5 Return Isolating Valve before pump fitted.		
	6 Pump fitted.		
	7 Return Isolating Valve after pump fitted.		
	8 Bypass/flushing loop and Isolating Valve fitted.		
2	System filled and pressurised. Water flushing and treatment fully carried carried out and certificates sent back with this check list for our records.		
3	Required minimum water volume for total system **360 litres**		
4	Required optimum flow rates achieved per unit. **2.1 l/s**		
5	Required optimum flow rates for total system **2.1 l/s**		
6	Glycol added and Document, certificates sent back with this check list for our records. **20 %**		
7	Safety interlocks connected and checked.		
	Water flow switch.		
	Water (DPS) differential pressure switch.		
	Pump interlock.		
8	Water flow / balancing carried out and certificates sent back with this check list for our records.		
9	Commercial Ecodan Outdoor Unit addressing and screened control wiring completed (**1.5mm²**) as per the Mitsubishi Electric specification to CAHV units (refer to the Data Book and manuals)		
10	(Permanent power supply wiring to outdoor unit complete and switched on 24 hours before commissioning date for crankcase heater to warm up oil after electrical supply has been tested.		
11	All control wiring and remote controllers complete and connected But final connection to (RA - RB & MA - MB on outdoor unit board) left disconnected.		
12	The customer must provide safe and suitable access to all equipment		
13	A representative from the installing contractor must be on site at all times otherwise this may result in an abortive visit		

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Pre-Commissioning Check List

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	YES	NO
14 Are our engineers required to carry out a site induction?		
15 Is PPE (Personal Protective Equipment) required on this site? Any specific equipment required for this site?		

IMPORTANT

I hereby certify that all the above adhered to and complete. I agree to pay £500.00 per day should the Engineers day be abortive due to the above not being completed upon his arrival.

Failure to complete and return this form will result in the cancellation of the engineer's visit therefore Mitsubishi Electric require it to be returned 1 week prior to our engineers scheduled visit.

Should you be required to cancel the visit, we would require written notice within at least 3 working days.

Please Fax to Lyn Kidd on 01707 278881 or e-mail lyn.kidd@meuk.mee.com

Project Number	PRO-55956
Quote No.	Not allocated
Project Name	Ox Close School, Spennymoor
System Ref/Prop No.	HTG SYSTEM
Contractor Co. Name	
Name	
Signature	
Date	
Site Contact Name	
Mobile No.	
Required Visit Date	
Site Address	

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Mitsubishi Electric Design Considerations and Disclaimer

In applying Mitsubishi Electric Commercial Heating systems, due consideration must be given to the following –

- Mitsubishi Electric will supply and comission the equipment quoted on the first page or within the quote of this document. The water pipework and electrical connections are to be comissioned by the installing contractor.
- The Ecodan unit requires ambient air in order to operate as efficiently as possible. Therefore, due consideration must be given to where it is situated (please refer to installation manual).
- We supply strainers, as standard, with all Ecodan Commercial Heating Systems. However, depending upon the materials used within the water circuit, additional filtration (such as magnetic or cyclonic) should be considered to in order to protect the units.
- The unit may be damaged if it is operated without water circulating through it. It is therefore essential to interlock unit operation and the water-circulating pump.
- The control package provided is not designed to be a “full system” control solution. Please refer to the attached wiring schematic on how to interface with a third party control system.
- All refrigeration work must be carried out by a suitably qualified engineer and must comply with industry standards and guidelines and the Mitsubishi Electric Ecodan Commercial Heating installation manual.
- Installation and commissioning of the waterside must be carried out by a competent engineer in line with the Mitsubishi Electric Commercial Heating installation manual.
- It is important to ensure that the water quality is within accepted boundaries. Please refer to the installation manual for guidance
- The water circuit must be a closed circuit
- If the ambient temperature around the water circuit is likely to fall below 1degC, it is essential to either install trace heating and/or add brine or glycol to ensure that the system does not freeze and damage the boiler.
- A flow interlock must be provided to ensure that the Ecodan unit does not operate in the event of a loss of water flow

Reminders

- This quotation is given by Mitsubishi Electric in good faith based upon information provided by you or your company.
- We have not undertaken a site survey to support this quotation. Whilst We endeavour to factor into our quotation any special site conditions or user requirements which you may have expressly identified to us previously in writing, this quotation is not a project system design and is not a confirmation of project volumetric or yield analysis. We recommend that you assess final product selection and make the final system design based upon your own volumetric or yield analysis and project knowledge, including any project requirements which might impact on that selection.
- Please check carefully any requirement for a Mitsubishi Electric product to integrate with any third party equipment. We are not responsible for integration capability of our products with any third party equipment unless we have expressly confirmed that this integration is approved in the current Mitsubishi Electric product specification or in a current technical bulletin.

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TERMS AND CONDITIONS OF SALE

1. Terms of Contract

1.1 These Terms and Conditions of Sale shall be incorporated into all contracts of sale made by Mitsubishi Electric Europe B.V., a company registered in the Netherlands and operating through its branch registered in Germany (Ratingen a/da) (hereinafter referred to as "Mitsubishi") for the sale of any goods. Any printed or other terms or conditions used by the person, firm or company placing the order (hereinafter referred to as the "Customer") are excluded. Mitsubishi shall not be bound by any terms or conditions in the Customer's order. If the Customer's order contains any terms and conditions then these Terms and Conditions of Sale shall take precedence over such terms and conditions in the Customer's order which shall be deemed deleted without notice.

1.2 Amendment of any contract can only be made by agreement between the parties and to bind Mitsubishi must be made in writing and signed by an authorised official of Mitsubishi. Any such amendment will entitle Mitsubishi to adjust the price and delivery dates appropriately.

2. Quotations and Acceptance of Orders

No quotation by Mitsubishi shall constitute an offer. Quotations may be withdrawn at any time. Mitsubishi shall be bound by an order only upon issue of Mitsubishi's standard acknowledgement of order form. Mitsubishi shall not be obliged to accept any order and reserves its entire discretion in this respect.

3. Specification

Goods will be supplied in accordance with Mitsubishi's standard specification for the relevant type. Mitsubishi reserves the right to make such improvements to and modifications of such specification as it or its suppliers think desirable in all circumstances.

4. Packaging

The specification for packaging the products shall be entirely at the discretion of Mitsubishi who shall have the right to pack all products in such manner and with such materials and in such quantities as it in its absolute discretion thinks fit and shall not be obliged to comply with any packaging instructions or requests of the Customer.

5. Delivery and Risk

5.1 a) In the case of all UK sales involving delivery within the UK the goods will be delivered by Mitsubishi to the Customer's premises. Goods shall be at the Customer's risk immediately on delivery into the Customer's premises (or into custody on Customer's behalf if sooner) and should be insured accordingly.

b) Unless otherwise agreed, in the case of all non-UK sales involving delivery outside the UK the goods will be delivered FOB the premises or port nominated by Mitsubishi. Risk of loss and damage to the goods shall pass to the Customer upon delivery FOB the place nominated by Mitsubishi. The goods shall, once the risk has passed to the Customer in accordance with this clause, be and remain at the Customer's risk at all times unless and until Mitsubishi has retaken possession of the goods and the Customer shall insure accordingly.

5.2 A delivery schedule should be agreed with Mitsubishi prior to placing the order. While Mitsubishi will endeavour to comply with such or any other agreed time(s) for delivery, Mitsubishi shall not in any circumstances be liable for any failure to do so.

5.3 Mitsubishi reserves the right to charge carriage, insurance and storage in cases where the Customer refuses to accept delivery of goods supplied by Mitsubishi in response to a duly authorised order received from the Customer.

5.4 Goods shall be signed for on receipt. Any alleged shortages, discrepancies or damage must be notified to Mitsubishi within 15 days of receipt of goods by notice in writing addressed to:

Mitsubishi Electric Europe B.V.
Travellers Lane
HATFIELD
Herts
AL10 8XR

For the attention of: Credit Dept.

5.5 The Customer agrees not to re-sell outside the UK any goods supplied by Mitsubishi and covered by the Export of Goods (Control) Order 1989 (or any re-enactment thereof) or the Export Administration Act 1979 (as amended) (or any re-enactment thereof) without obtaining all necessary licences thereunder and agrees not to resell such equipment in the UK to a purchaser, knowingly or being given reasonable grounds to suspect by the purchaser that the purchaser intends to export such equipment without first obtaining such licences or a copy of such licences obtained by the purchaser, and the Customer agrees to impose upon persons purchasing such equipment obligations corresponding to those set out above.

6. Property and Risk

6.1 Mitsubishi shall retain title to the goods until it has received payment in full of all sums due in connection with the Contract or any other account. For these purposes Mitsubishi has only received a payment when the amount of that payment is irrevocably credited to its bank account.

6.2 The Customer shall store goods owned by Mitsubishi in such a way that they are clearly identifiable as Mitsubishi's property and shall maintain records of such goods identifying them as Mitsubishi's property. All goods supplied by Mitsubishi in the Customer's possession shall be presumed to belong to Mitsubishi (unless the Customer can prove otherwise).

6.3 Until title to the goods has passed to the Customer in accordance with Clause 6.1 Mitsubishi shall be entitled to trace the proceeds of sale of any goods owned by Mitsubishi. Such proceeds shall be held by the Customer on trust for Mitsubishi and at Mitsubishi's request will be paid into a separate bank account.

6.4 Customer will not give less than fourteen days notice to Mitsubishi before applying to the Court for appointment of an administrator. Failure to give such notice shall be deemed to be a fundamental breach of the Contract.

6.5 Customer's right to possession of the goods will cease at the earliest of the following dates:

6.5.1 the date of a notice given under Clause 6.4 or the latest date on which such notice should have been given.

6.5.2 the date on which the Customer commits any act or makes any omission which would entitle a receiver to take possession of any asset or would entitle any person to present a petition for winding up or to apply for an administration order in respect of the Customer or any event referred to in Clause 6.6 occurs.

6.6 If the Customer fails to make any payment to Mitsubishi when due, compounds with its creditors, executes an assignment for the benefit of its creditors, commits any act of bankruptcy or, being a company, enters into voluntary or compulsory liquidation or has a receiver, manager, administrator or administrative receiver appointed over all or parts of its assets or takes or suffers any similar action in consequence of a debt or becomes insolvent or if Mitsubishi has reasonable cause to believe that any of these events is likely to occur, Mitsubishi shall have the right, without prejudice to any other remedies:

6.6.1 to enter without prior notice any premises where goods owned by it may be, and to repossess and dispose of any goods owned by it so as to discharge any sums owed to it by the Customer under this or any other contract;

6.6.2 to require the Customer not to resell or part with possession of any goods owned by Mitsubishi until the Customer has paid in full all sums owed by it to Mitsubishi under this or any other contract; and

6.6.3 to withhold delivery of any undelivered goods and also any goods in transit.

6.7 Unless Mitsubishi expressly elects otherwise, any contract between it and the Customer for the supply of goods shall remain in existence notwithstanding any exercise by Mitsubishi of its rights under Clause 6. The Customer shall be responsible for any costs and expenses incurred by Mitsubishi in exercising its rights under this Clause 6.

6.8 Nothing in this Clause 6 shall give the Customer any right to return the goods. Mitsubishi may sue the Customer for the price when due (without prejudice to its other rights hereunder) notwithstanding that the property in the goods may not have passed to the Customer.

7. Price and Payment

7.1 Unless agreed expressly and in writing by Mitsubishi the price of the goods shall be the price ruling in Mitsubishi's current Trade Price List at date of despatch. Mitsubishi has the right to alter the prices contained in the Trade Price Lists at any time without prior notice and it shall notify the Customer of any price variations before despatch of the goods and the Customer shall be entitled upon receiving notification of such variation to cancel the Contract by written notice to Mitsubishi delivered within 7 days of such notification without incurring liability to Mitsubishi.

7.1.1 Unless otherwise agreed in writing all money due to Mitsubishi shall be paid by the end of the month following the date of the invoice. Any sums unpaid shall thereafter bear interest at 2% per calendar month accruing from day to day.

7.1.2 Unless otherwise agreed in writing for sales destined for export outside the UK payment by the Customer shall be made by irrevocable letter of credit, confirmed by a first class London or Scottish clearing bank at least ten days prior to the scheduled delivery date.

7.1.3 Should the Customer make default in any payment or commit any act of bankruptcy or be the subject of a bankruptcy petition or execute an assignment for the benefit of his creditors, or, being a company, enter into voluntary or compulsory liquidation or suffer a Receiver or Administrator to be appointed over all or any part of his or its assets, then without prejudice to any other rights or remedies Mitsubishi may at its option without incurring any liability cancel any undelivered or incompleted portion of the Contract or cancel any other contract with the Customer and stop any goods in transit, and may without prejudice to any other rights demand immediate payment of any outstanding amounts which shall thereupon become due and payable.

8. Guarantee and Exclusions

8.1 The goods will be subject to the standard form of guarantee for the relevant products. Mitsubishi may amend its guarantee from time to time on giving written notice to the Customer and the Customer will utilise such replacement guarantee and no other from the date of notice, including in respect of existing stock of Mitsubishi goods.

8.2 In view of the giving by Mitsubishi of such guarantee it is agreed between Mitsubishi and the Customer that the following are fair and reasonable:

8.2.1 All terms, conditions and warranties which might otherwise be implied into the Contract are excluded, save anything implied by Section 12 of the Sale of Goods Act 1979 (Warranty as to Title) as amended from time to time.

8.2.2 The Customer does not and has not relied upon Mitsubishi's skill or judgement or on any representation made by or on behalf of Mitsubishi in connection with the Contract and/or the goods, unless such representation was contained in any printed specification or technical data published by Mitsubishi, or was given in writing and signed by a director of Mitsubishi.

8.2.3 Mitsubishi shall not in any event be liable in connection with any representation unless the same was contained in any printed specification or technical data published by Mitsubishi, or was given in writing and signed by a director of Mitsubishi.

8.2.4 The guarantee and the remedies expressly set out shall be the full extent of Mitsubishi's liability which will not in any event exceed the cost of repair, replacement or credit, at Mitsubishi's option, of the goods. Mitsubishi shall not in any circumstances be liable for any other loss or damage whatsoever, including any consequential loss or any loss of profit, earnings or revalorisation increased costs howsoever arising in any way in connection with the contract or the goods. This limit shall not apply to breach of the implied warranty of title, negligently caused death or personal injury or liability of Mitsubishi under the Consumer Protection Act 1987 to a person injured by a defective product.

9. Returned Goods

9.1 The Customer shall be responsible for the cost of carriage and insurance in respect of all goods returned by the Customer to Mitsubishi for service or credit which goods shall be at risk of the Customer until actual receipt thereof by Mitsubishi.

9.2 Mitsubishi will not accept returned goods for credit or rectification unless such return has been authorised in writing by the appropriate Department of Mitsubishi or otherwise confirmed in accordance with that Department's returns procedure and the goods are received by Mitsubishi in stock condition and Mitsubishi reserves the right to determine at its sole discretion whether to accept the return of the goods or whether to rectify the goods or whether to issue a credit note in respect thereof.

10. Cancellation

Orders, once accepted, cannot be cancelled without mutual written agreement, in which case the Customer agrees to indemnify Mitsubishi for all loss suffered by it as a result of cancellation.

11. Technical Information and Trademarks

11.1 All technical information, specifications and drawings and any confidential information of any kind coming into the possession of the Customer in connection with any of Mitsubishi's products remain the property of Mitsubishi and shall not be used by the Customer other than for the performance of any contract between Mitsubishi and the Customer. All documents shall be returnable on request.

11.2 All information of a technical nature and particulars of goods and performances given by Mitsubishi are given in good faith, but no responsibility is accepted by Mitsubishi for their accuracy and their supply shall not be used to found liability on Mitsubishi's part.

11.3 The Customer shall not do any act in relation to the goods to which Section 6 of the Trade Marks Act 1938 (as amended) applies, namely the customer shall not:

11.3.1 Apply any trade mark of which Mitsubishi is the proprietor or registered user ("Mitsubishi Trade Mark") to the goods after they have suffered any alteration in their state or condition, get-up or packing;

11.3.2 After, partly remove or partly obliterate any Mitsubishi Trade Mark;

11.3.3 Apply any other trade mark to the goods;

11.3.4 Add any other matter in writing that is likely to injure the reputation of any Mitsubishi Trade Mark.

12. Availability of Goods

Delivery is subject to the availability of the goods and if, owing to non-availability of such goods or any other cause beyond the control of Mitsubishi, Mitsubishi shall be unable to carry out its obligations hereunder it shall be entitled to determine this Contract forthwith by giving notice in writing to the Customer to that effect.

13. Severability

In the event that any of these Conditions or any part of any of them shall be held to be invalid or unenforceable, such invalidity or unenforceability of such condition or part thereof shall not affect the validity and enforceability of all remaining Conditions and parts of Conditions.

14. Proper Law and Jurisdiction

14.1 This Contract shall in all respects be governed by English Law.

14.2 The Customer submits to the non-exclusive jurisdiction of the English Courts, without prejudice to the right of Mitsubishi to bring any action before any other courts having jurisdiction.

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Acceptance Document

This Technical Submission Document combines all of the elements that pertain to this project, including our Terms & Conditions.

I have read and fully understand the full Technical Submission Document and full Terms and Conditions of sale within it.

Any deviation from this specification may mean we cannot commission the system or accept warranty for the said system.

I herby accept this Technical Submission Document as a working document from the signed date below.

On signing this document I will ensure the equipment is installed to all the said parameters within.

Project Number	PRO-55956
Quote No.	Not allocated
Project Name	Ox Close School, Spennymoor
System Ref/Prop No.	HTG SYSTEM
Company Name	
Name	
Signature	
Date	

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