MITSUBISHI ELECTRIC
Changes for the Better

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Air to water CO_2 Heat Pump System

Ecodan QUHZ
(EHPT20Q-VM2EA / QUHZ-W40VA)

DATA BOOK

ecodan
Renewable Heating Technology

Contents

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1.1 Outdoor unit specifications

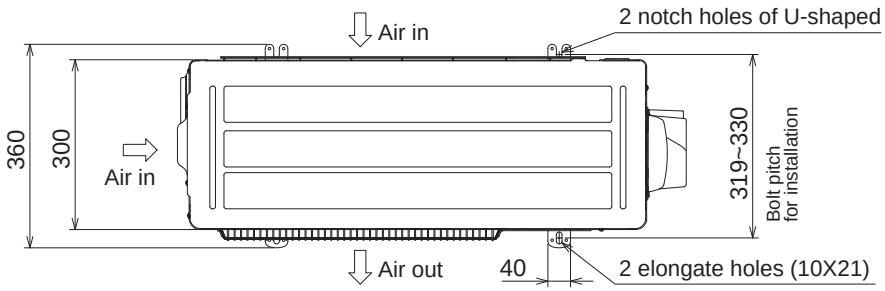
Outdoor unit specifications			
Service ref.			QUHZ-W40VA
Running current	Heating(A7/W35)	A	4.7
	DHW(A7/W65)	A	6.8
Power factor	Heating(A7/W35)	%	80
	DHW(A7/W65)	%	85
Max.current		A	12
Outer casing			Galvanized plate
External finish			Munsell 2.5Y 7/1
Refrigerant control			Liner expansion valve
Compressor			Hermetic single rotaly
	Model		KXB045FJK
	Motor output	kW	1.3
	Start type		Inverter
	Protection devices		HP switch Discharge thermo
	Oil(Model)	L	0.47 (PAG)
Heat exchanger	Air		Plate fin coil
	Water		Twisted & spiral Gas cooler
Fan	Fan(drive)×No.		Propeller fan ×1
	Fan motor output	kW	0.050
	Air flow	m^3/min	34
		(CFM)	1,200
Defrost method			Hot gas
Noise level(SPL/PWL)	Heating(A7/W55)	dB	43/53
Dimensions	Width	mm(in)	809+70 (31‐7/8+2‐3/4)
	Depth	mm(in)	300+20 (11‐13/16+13/16)
	Height	mm(in)	715 (28‐1/8)
Weight		kg(lb)	57 (125.7)
Refrigerant			R744
	Quantity	kg(lb)	1.15 (2.54)
Guaranteed operating range (Outdoor)	Heating	℃	-15 to +35
	DHW	℃	-15 to +35
Outlet water temp. (Max)	Heating	℃	+60
	DHW	℃	+72
Nominal return water temperature range	Heating	℃	+9 to +55
	DHW	℃	+9 to +55
Water flow rate range (Heating)		L/min	3 to 8

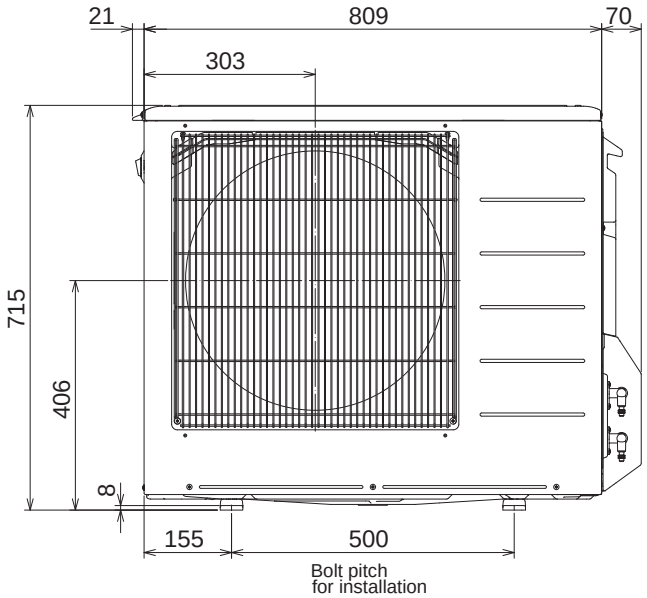
Nominal operating condition	
Heating(A7/W35/Δ10)	
Outside air temperature(Dry-bulb)	+7℃
Outside air temperature(Wet-bulb)	+6℃
Water temperature(inlet/outlet)	+25/+35℃
Heating(A2/W35/Δ10)	
Outside air temperature(Dry-bulb)	+2℃
Outside air temperature(Wet-bulb)	+1℃
Water temperature(inlet/outlet)	+25/+35℃
DHW(A7/W65/Δ50)	
Outside air temperature(Dry-bulb)	+7℃
Outside air temperature(Wet-bulb)	+6℃
Water temperature(inlet/outlet)	+15/+65℃

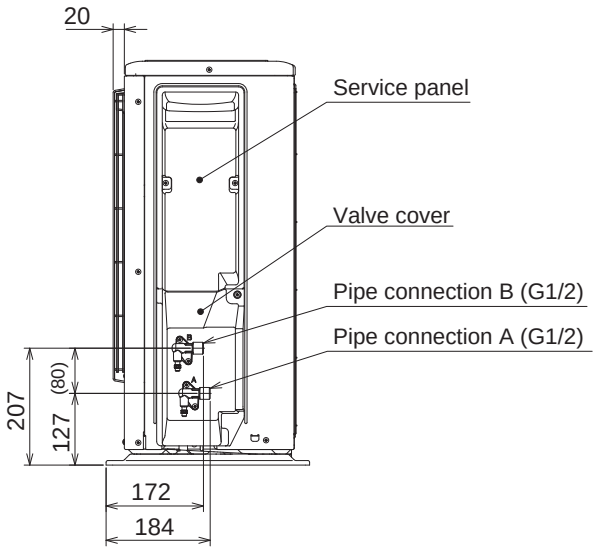
1.2 Capacity

Power supply (Phase,Voltage,Frequency)			1φ,230V,50Hz
Nominal water flow rate(Heating mode)		L/min	5.7
Heating (A7/W35/Δ10)	Capacity	kW	4
	COP		4.2
	Power input	kW	0.96
Heating (A2/W35/Δ10)	Capacity	kW	4
	COP		3.1
	Power input	kW	1.30
Nominal water flow rate(DHW mode)		L/min	1.4
DHW (A7/W65/Δ50)	Capacity	kW	5
	COP		3.7
	Power input	kW	1.35

<Unit: mm>

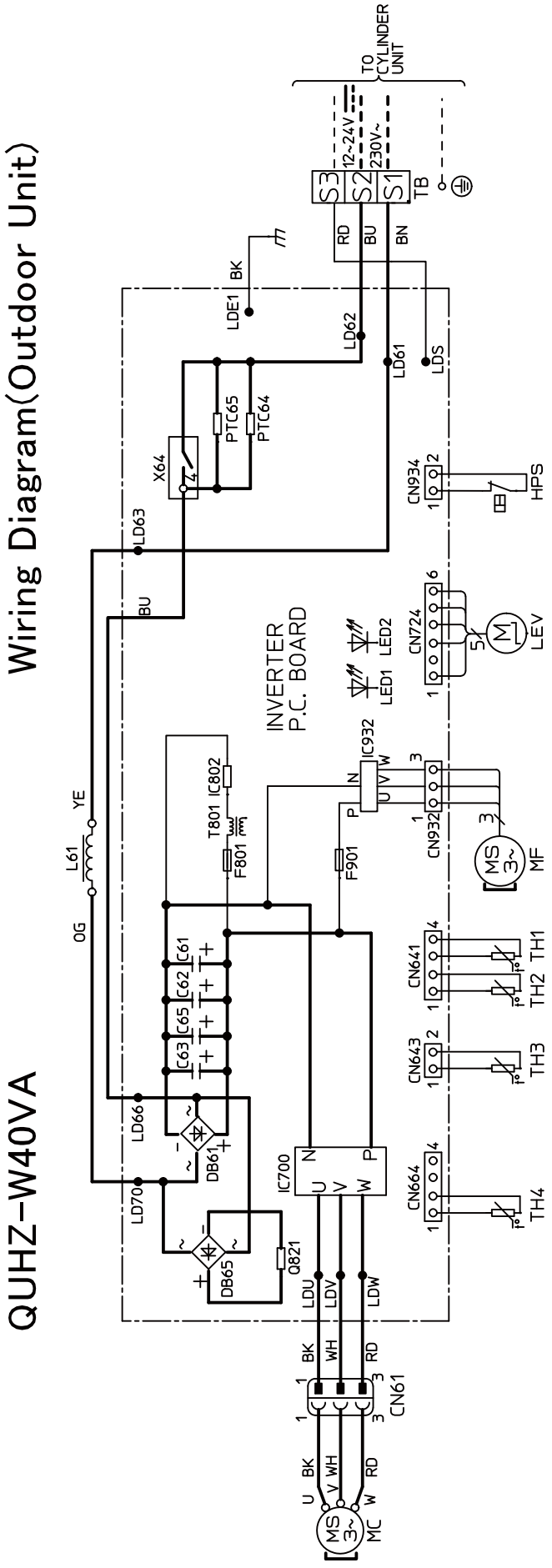

Air in
2 notch holes of U-shaped
360
300
Air in
319~330
Bolt pitch
for installation
Air out
40
2 elongate holes (10X21)


21
809
70
303
715
406
8
155
500
Bolt pitch
for installation

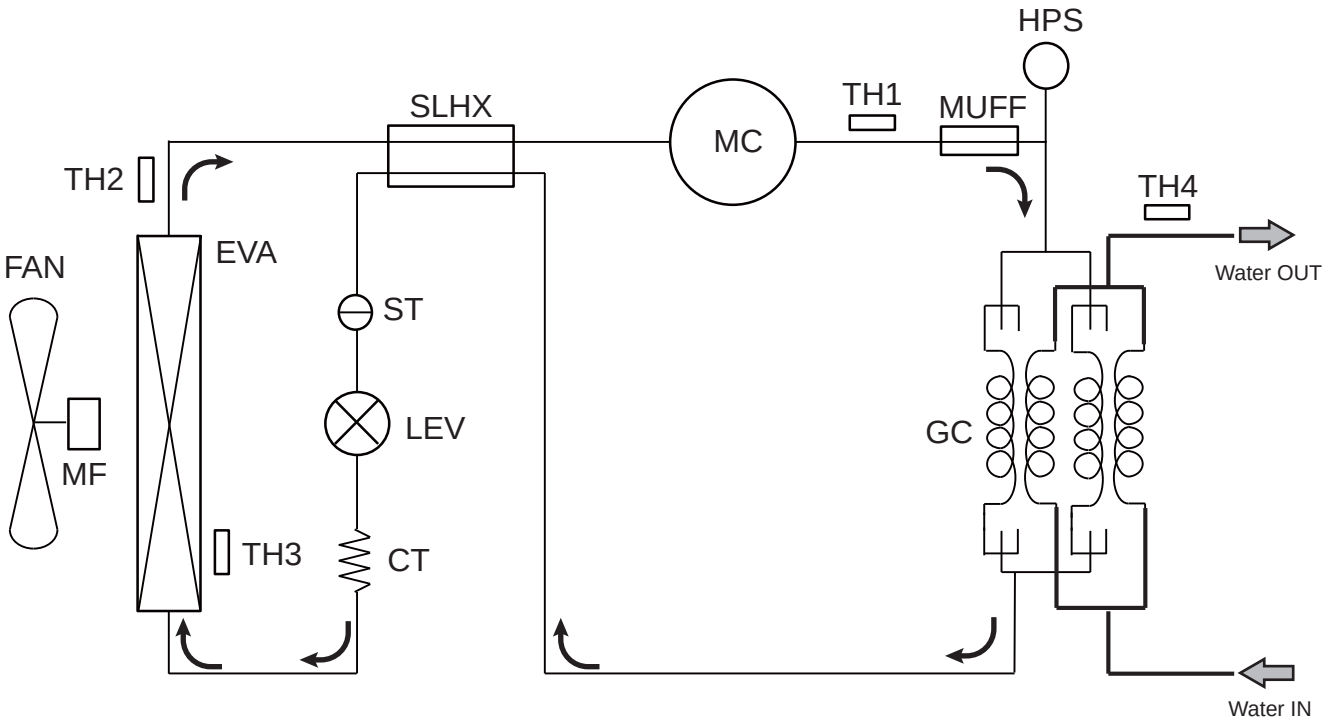

20
Service panel
Valve cover
Pipe connection B (G1/2)
Pipe connection A (G1/2)
207
(80)
127
172
184

QUHZ-W40VA

Wiring Diagram(Outdoor Unit)

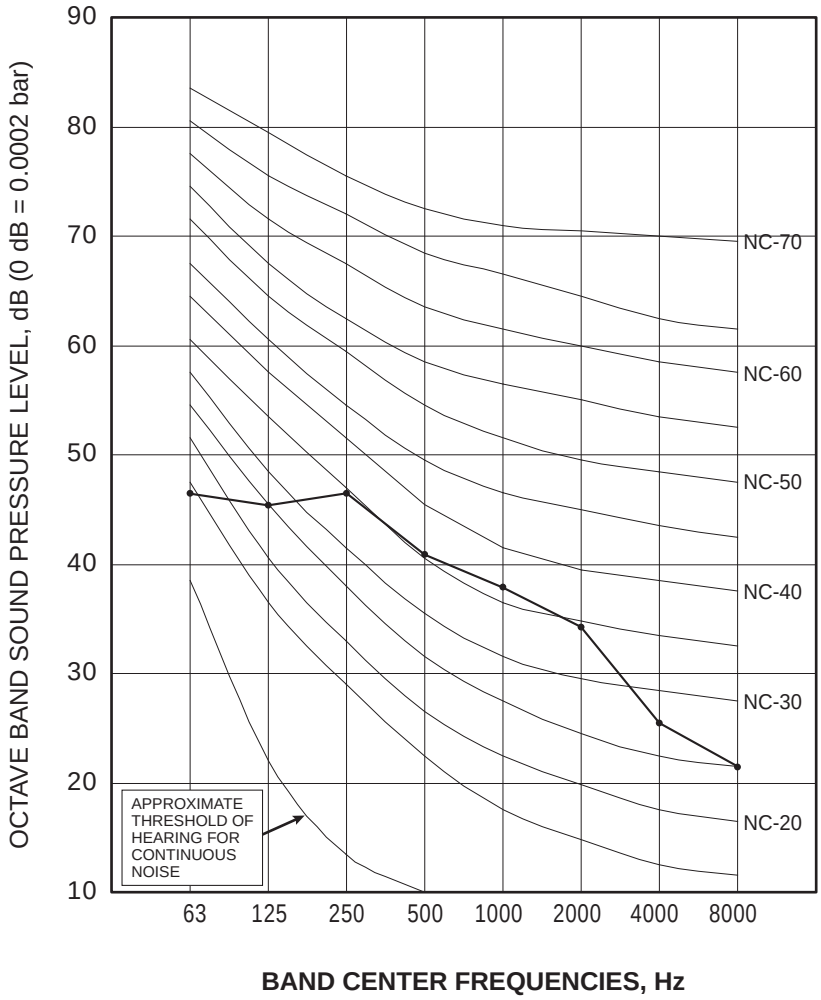


SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C61,C62, C63,C65	SMOOTHING CAPACITOR	L61	REACTOR	TH4	HOT WATER TEMP. THERMISTOR
DB61,DB65	DIODE MODULE	MC	COMPRESSOR	HPS	HIGH PRESSURE SWITCH
F801,F901	FUSE(T3.15AL250V)	MF	FAN MOTOR	TB	TERMINAL BLOCK
IC700,IC932	POWER MODULE	PTC64,PTC65	CIRCUIT PROTECTION	T801	TRANSFORMER
IC802	POWER DEVICE	TH1	DISCHARGE TEMP.THERMISTOR	X64	RELAY
Q821	SWITCHING POWER TRANSISTOR	TH2	DEFROST THERMISTOR	LED1/LED2	LED
LEV	LINEAR EXPANSION VALVE	TH3	AMBIENT TEMP. THERMISTOR		



Symbol	Part name	Detail
MC	Compressor	DC inverter single rotary compressor(Mitsubishi Electric Corporation)
HPS	High pressure switch	For protection(OFF:15MPa)
MUFF	Muffler	For noise reduction
GC	Gascooler	Heat exchanger (2pass)
SLHX	Suction line heat exchanger	
ST	Strainer	#100
LEV	Linear expansion valve	
CT	Capillary tube	
EVA	Evaporator	
TH1	Discharge temperature thermistor	For LEV Control and compressor protection
TH2	Defrost thermistor	For defrost control
TH3	Ambient temperature thermistor	For fan control and for compressor frequency control
TH4	Hot water temperature thermistor	For DHW pump control
MF	Fan motor	
FAN	Propeller Fan	

5.1 Sound pressure level

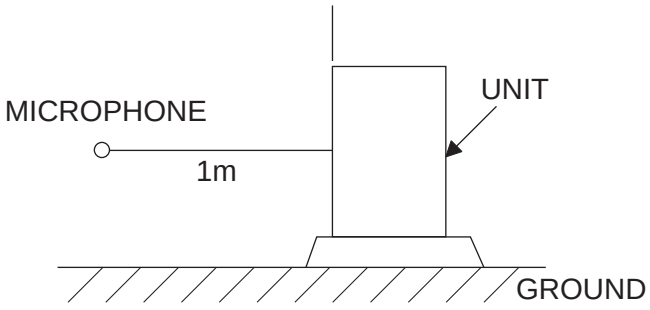


NOTCH	SPL(dB)	LINE
HEATING	43	●——●

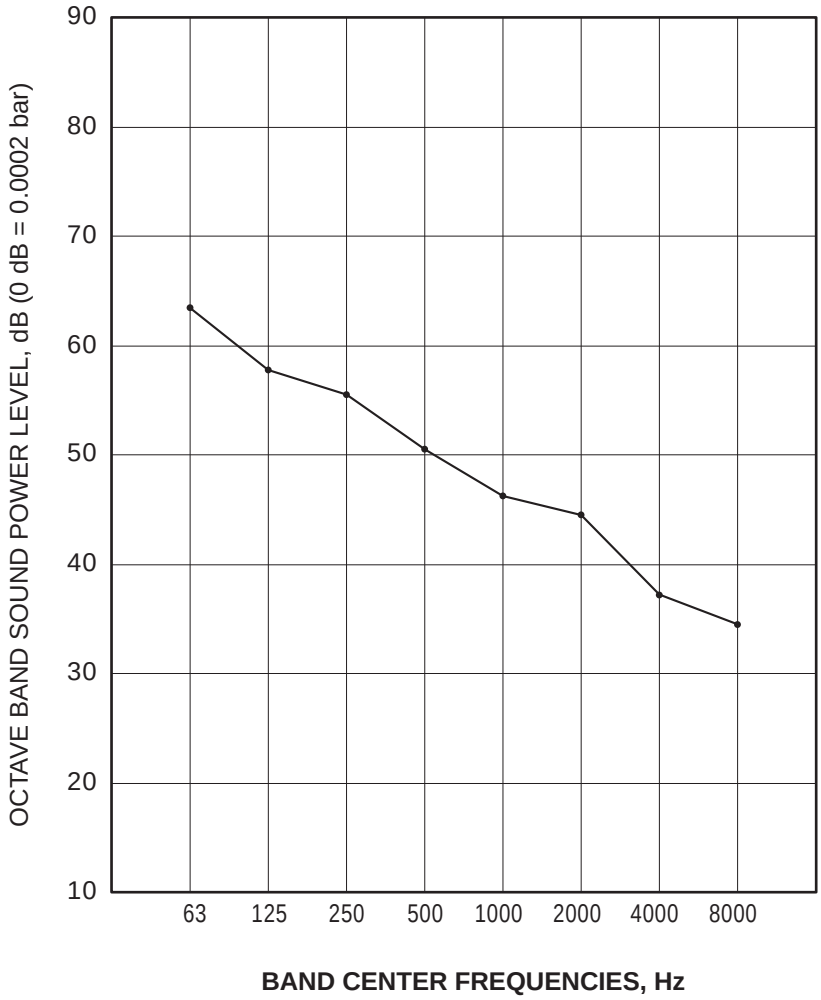
A7/W55

FORM NAME	BAND CENTER FREQUENCIES, Hz								OA
	63	125	250	500	1000	2000	4000	8000	
QUHZ-W40VA	46.4	45.3	46.4	40.9	35.6	33.0	25.5	21.4	43

<dB>



5.2 Sound power level



NOTCH	PWL(dB)	LINE
HEATING	53	

A7/W55

FORM NAME	BAND CENTER FREQUENCIES, Hz								OA
	63	125	250	500	1000	2000	4000	8000	
QUHZ-W40VA	63.3	57.8	55.4	50.5	46.2	44.3	37.2	35.4	53

<dB>

6-1. TROUBLESHOOTING

- When an error occurs on the cylinder unit and the outdoor unit, an error code blinks on the remote controller. The last 16 occurring errors can be recorded as the error history, and these errors can be checked on the remote control screen of the cylinder unit.
- When an error occurs on the outdoor unit and the unit stops abnormally, the LEDs on the outdoor control board blink.
- The LEDs on the outdoor control board blink while protection control is functioning temporarily while the outdoor unit is operating.
  If the LEDs on the outdoor control board light red and green, the board is normal.

The following table summarizes the service remedy procedure.
Check Unit conditions at service, Main controller display and the LEDs on the outdoor control board, then proceed to the corresponding actions to be taken for service (summary).

Unit conditions at service	Check code	Check the LEDs on the outdoor control board.	Actions to be taken for service (summary)
The trouble is reoccurring.	Displayed	Blinking -> Error display	Judge the trouble location according to 6-3, and perform the required action.
	Not displayed	Blinking -> Error display	Judge the trouble location according to 6-3, and perform the required action.
		Lit -> Normal display Off -> Error display	Judge the trouble location according to 6-3, and perform the required action.
The trouble is not reoccurring.	Logged		(1) Probable causes are temporary such as actuation of the coolant circuit protection interlock, defective wiring connections and noise. Check the symptoms again. Check the installation environment, wiring, piping, and weather conditions when the problem occurred.
			(2) Judge the trouble location according to 6-3, and perform the required action.
			(3) If no symptoms are apparent, run the unit again. Continuing running the unit for a while. and then check the LED indications on the outdoor control board while the outdoor unit is running.
			(4) No abnormality in electric parts and control boards, etc.
	Not logged		(1) Check for abnormal symptoms again.
			(2) Perform troubleshooting to identify the cause of the problem.
			(3) If no symptoms are apparent, run the unit again. Continuing running the unit for a while. and then check the LED indications on the outdoor control board while the outdoor unit is running.
			(4) No abnormality in electric parts and control boards, etc.

6-2. CHECK POINT UNDER TEST RUN

- After installing the outdoor unit, check again for any water leakage from pipes, incorrect electrical wiring (reversed polarities) and defective contacts.
- Using a 500 V ohmmeter, measure the insulation resistance across the ground of the outdoor unit and the power supply terminals (S1, S2, S3) to check that the resistance is 1.0 MΩ or more.
- Read the Instruction Manual before operation. (In particular, Safety Precautions)

6-3. SELF-DIAGNOSIS ACTION TABLE

Outdoor unit emergency stop

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
None	Out	Out	*< Caution > Pay attention to electric shock since the condensers [C61/C62/C63/C65] are sometimes high voltage (300 V or more). *The LEDs (red, green) light when the condenser is normal.	(1) Power is not being supplied to the outdoor unit a) Earth leakage circuit breaker of the cylinder unit is turned off b) Defective power line not connected or terminal contact c) Power transmission line not connected or defective terminal contact	(1) Check the following items a) Earth leakage circuit breaker b) Power line connections c) Power transmission line connections
				(2) Power is not being supplied to the outdoor inverter p.c. board a) Loose terminal block (TB) power terminal [S1/S2/S3] b) Loose reactor (L61) terminal c) Loose relay (X64) terminal	(2) Check the following items a) Terminal block (TB) power terminal [S1/S2/S3] connections b) Reactor (L61) connections c) Relay (X64) connections
				(3) Defective outdoor inverter p.c. board	(3) Replace the outdoor inverter p.c. board
	3 times	Lit	Excessive ambient temperature ●Detection method: THERMO_ASSY AMB (TH3) detects 50°C or higher	(1) Environment is outside the possible operating temperature of the outdoor unit	(1) Improve the installation environment
				(2) Defective THERMO_ASSY AMB (TH3)	(2) Replace the THERMO_ASSY AMB (TH3)
	2 times	Out	Overcurrent abnormality ●Detection method: Overcurrent detected by secondary current	(1) Defective outdoor inverter p.c. board	(1) Replace outdoor inverter p.c. board
				(2) Overcurrent due to LEV malfunction a) Loose LEV coil b) Loose connector [CN724] c) LEV coil disconnection d) LEV unit malfunction	(2) Check the LEV coil. (See "6-4. HOW TO CHECK THE PARTS.") a) Install the LEV coil b) Connect the connector c) Replace the LEV coil d) Replace the outdoor unit
				(3) Compressor malfunction (locked, out-of-phase, phase interruption)	(3) Replace the outdoor unit
				(4) Power waveform distortion, noise	(4) Check to see if the power waveform is normal
	4 times	Out	Disconnection of Outdoor inverter p.c. board temp. thermistor ●Detection method: Disconnection or short circuit detected ●Disconnection: Disconnection continued for 1 second from 1 minute onwards after start of compressor operation ●Short circuit: Short circuit continued for 1 second at all times ●Connector: None Board mounting	(1) Defective board temperature thermistor on outdoor inverter p.c. board (2) Defective microcomputer on outdoor inverter p.c. board	(1)(2) Replace outdoor inverter p.c. board
	6 times	Out	Primary current abnormality ●Detection method: Defective primary current sensor detected for 1 second	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
None	5 times	5 times	Short circuit or disconnection of hot water temp. thermistor（TH4） ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 1 second 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 1 second at all times ●Connector: CN664	(1) Defective connector (CN664) connection (2) Defective (TH4) a) Thermistor (TH4) disconnection b) Thermistor (TH4) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN664) (2) Check the resistance value and temperature of thermistor (TH4). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH4) b) Replace thermistor (TH4) (3) Replace the outdoor inverter p.c. board
	8 times	8 times	Short circuit or disconnection of discharge temp. thermistor(TH1) ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 1 second 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 1 second at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH1) a) Thermistor (TH1) disconnection b) Thermistor (TH1) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH1). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH1) b) Replace thermistor (TH1) (3) Replace the outdoor inverter p.c. board
	9 times	9 times	Short circuit or disconnection of defrost temp. thermistor(TH2） ●Detection method: Disconnection or short circuit detected ●Disconnection: -47°C or less continued for 1 second at start of compressor operation ●Short circuit: 153°C or more continued for 1 second at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH2) a) Thermistor (TH2) disconnection b) Thermistor (TH2) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH2). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH2) b) Replace thermistor (TH2) (3) Replace the outdoor inverter p.c. board
	10 times	10 times	Short circuit or disconnection of ambient temp. thermistor(TH3) ●Detection method: Disconnection or short circuit detected ●Disconnection: -44°C or less detected for 1 second at start of compressor operation ●Short circuit: 153°C or less continued for 1 second at all times ●Connector: CN643	(1) Defective connector (CN643) connection (2) Defective (TH3) a) Thermistor (TH3) disconnection b) Thermistor (TH3) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN643) (2) Check the resistance value and temperature of the thermistor (TH3). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH3) b) Replace thermistor (TH3) (3) Replace the outdoor inverter p.c. board
	Lit	6 times	Abnormality of DC voltage ●Detection method: Detection of bus voltage abnormality	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
	Lit	7 times	Overheat of Inverter p.c. board temperature ●Detection method: Board temperature thermistor at 80°C or more detected for 1 second	(1) Defective fan motor (2) Defective outdoor inverter p.c. board	(1) Defective fan motor (2) Replace outdoor inverter p.c. board

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
None	Lit	8 times	Abnormality of compressor phase current ●Detection method: Detection of compressor current abnormality	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
	Lit	9 times	Fan cutoff ●Detection method: Detection of fan motor abnormality	(1) Obstacle contacting propeller fan (2) Defective fan motor a) Fan motor wiring disconnection b) Fan motor locked (3) Defective outdoor inverter p.c. board	(1) Remove obstacle (2) Replace fan motor (See "6-4. HOW TO CHECK THE PARTS.") (3) Replace outdoor inverter p.c. board
U1	4 times	4 times	Excessive high pressure ●Detection method: Operation(*) of high pressure switch (HPS) detected. *Operating pressure: 15 MPa, contact type: N.C., connector: CN934 ●Error cancellation method: This error is canceled by turning the earth leakage circuit breaker of the Cylinder Unit to "OFF". To restart the outdoor inverter, first check that the LEDs (red/green) of the outdoor inverter P.C. board are out, (this takes approx. 1 minute), turn the earth leakage circuit breaker to "ON" again.	(1) Water is not being circulated in the outdoor unit water circuit a) Cylinder unit not filled with water b) Air trapped in water pipes c) Water leakage, crushing or blockage of water pipes d) Isolating valve in water pipes closed e) Pump valve in cylinder unit closed f) Water pipe freezing g) Outdoor unit gas cooler blockage (2) Pump1 in the cylinder unit not operating a) Defective pump1 b) Defective cylinder unit board (3) Defective LEV control caused by erroneous detection of discharge temperature a) Discharge temperature thermistor (TH1) loose from discharge pipe b) Defective discharge temperature thermistor (TH1) (4) Defective LEV coil a) Loose LEV coil b) Loose connector [CN724] c) LEV coil disconnection (5) High pressure switch malfunction or erroneous detection a) Loose connector [CN934], defective contact b) Loose high pressure switch terminal, defective contact c) Lead wire disconnection (6) Defective outdoor inverter p.c. board (7) Defective coolant circuit parts a) Defective high pressure switch b) Defective LEV	Check the following items. To cancel this error, turn the earth leakage circuit breaker of the Cylinder Unit to "OFF" and then back "ON" again. (1) Check the water circuit, and correct any abnormal locations a) Fill with water b) Bleed air c) Correct or replace the water piping d) Repair the isolating valve e) Repair the pump valve f) Melt frozen sections g) Replace the outdoor unit (2) Check pump1 in the cylinder unit. a) Replace pump1 b) Replace cylinder unit board (3) Check the discharge temperature thermistor a) Install the discharge temperature thermistor (TH1) to the discharge piping b) Measure the resistance value of the discharge temperature thermistor (TH1). (See "6-4. HOW TO CHECK THE PARTS.") Replace the discharge temperature thermistor (4) Check the LEV level. (See "6-4. HOW TO CHECK THE PARTS.") a) Install LEV coil b) Connect connector (CN724) c) Replace LEV coil (5) Check high pressure switch, and repair malfunctions a) Connect connector (CN934) b) Repair connections c) Replace lead wire (6) Replace outdoor inverter p.c. board (7) Replace outdoor unit

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
U2	1 times	Lit	Overheat discharge temperature ●Detection method: THERMO_ASSY DIS detects 130°C or higher	(1) Water is not being circulated in the outdoor unit water circuit a) Cylinder unit not filled with water b) Air trapped in water pipes c) Water leakage, crushing or blockage of water pipes d) Isolating valve in water pipes closed e) Pump valve in cylinder unit closed f) Water pipe freezing g) Outdoor unit gas cooler blockage	(1) Check the water circuit, and correct any abnormal locations a) Fill with water b) Bleed air c) Correct or replace the water piping d) Repair the isolating valve e) Repair the pump valve f) Melt frozen sections g) Replace the outdoor unit
				(2) Pump1 in the cylinder unit not operating a) Defective pump1 b) Defective cylinder unit board	(2) Check pump1 in the cylinder unit. a) Replace pump1 b) Replace cylinder unit board
				(3) Erroneous detection caused by defective discharge temperature thermistor (TH1)	(3) Measure the resistance value of the discharge temperature thermistor (TH1). (See "6-4. HOW TO CHECK THE PARTS.") Replace the discharge temperature thermistor (TH1)
				(4) Defective LEV coil a) Loose LEV coil b) Loose connector (CN724) c) LEV coil disconnection	(4) Check LEV coil. (See "6-4. HOW TO CHECK THE PARTS.") a) Install LEV coil b) Connect connector (CN724) c) Replace LEV coil
				(5) Defective coolant circuit part a) Defective LEV b) Insufficient coolant caused by coolant leakage	(5) Replace outdoor unit
	6 times	Lit	Refrigerant zero abnormality ●Detection method: Detected by secondary current value at startup operation	(1) Refrigerant leakage on refrigerant circuit a) Evaporator breakage b) Evaporator corrosion c) Refrigerant piping damage d) Refrigerant piping corrosion e) Gas cooler damage f) Gas cooler corrosion (2) Defective compressor compression	(1)-(2) Replace outdoor unit
U3	8 times	8 times	Short circuit or disconnection of discharge temp.thermistor (TH1) ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 2 minutes 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 2 minutes at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH1) a) Thermistor (TH1) disconnection b) Thermistor (TH1) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH1). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH1) b) Replace thermistor (TH1) (3) Replace the outdoor inverter p.c. board

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
U4	9 times	9 times	Short circuit or disconnection of defrost temp. thermistor (TH2) ●Detection method: Disconnection or short circuit detected ●Disconnection: -47°C or less continued for 2 minutes at start of compressor operation ●Short circuit: 153°C or more continued for 2 minutes at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH2) a) Thermistor (TH2) disconnection b) Thermistor (TH2) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH2). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH2) b) Replace thermistor (TH2) (3) Replace the outdoor inverter p.c. board
	10 times	10 times	Short circuit or disconnection of ambient temp. thermistor (TH3) ●Detection method: Disconnection or short circuit detected ●Disconnection: -44°C or less detected for 2 minutes at start of compressor operation ●Short circuit: 153°C or less continued for 2 minutes at all times ●Connector: CN643	(1) Defective connector (CN643) connection (2) Defective (TH3) a) Thermistor (TH3) disconnection b) Thermistor (TH3) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN643) (2) Check the resistance value and temperature of the thermistor (TH3). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH3) b) Replace thermistor (TH3) (3) Replace the outdoor inverter p.c. board
	4 times	Out	Disconnection of Outdoor inverter p.c. board temp. thermistor ●Detection method: Disconnection or short circuit detected ●Disconnection: Disconnection continued for 2 minutes from 1 minute onwards after start of compressor operation ●Short circuit: Short circuit continued for 2 minutes at all times ●Connector: None Board mounting	(1) Defective board temperature thermistor	(1) Replace the outdoor inverter p.c. board
	5 times	5 times	Short circuit or disconnection of hot water temp. thermistor (TH4) ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 2 minutes 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 2 minutes at all times ●Connector: CN664	(1) Defective connector (CN664) connection (2) Defective (TH4) a) Thermistor (TH4) disconnection b) Thermistor (TH4) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN664) (2) Check the resistance value and temperature of thermistor (TH4). (See "6-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH4) b) Replace thermistor (TH4) (3) Replace the outdoor inverter p.c. board

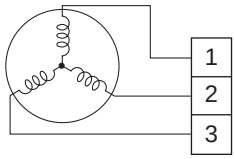
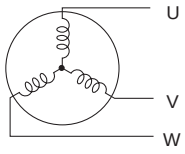
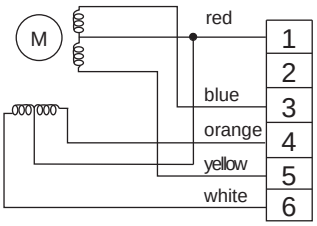
Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
UP	2 times	Out	Overcurrent abnormality ●Detection method: Overcurrent detected by secondary current	(1) Defective compressor lead wire relay connector connection a) Defective compressor relay connector connection b) Defective compressor terminal connection	(1) Check the continuity of the compressor and lead wires. a) Connect compressor relay connector* b) Connect compressor terminal* (*Before correcting the problem, turn the circuit breaker off.)
				(2) Defective outdoor inverter p.c. board a) Defective Q821 b) Defective IC700 c) Defective overcurrent detection circuit	(2) Replace outdoor inverter p.c. board
				(3) Defective LEV coil a) Loose LEV coil b) Loose connector [CN724] c) LEV coil disconnection	(3) Check LEV coil (See "6-4. HOW TO CHECK THE PARTS.") a) Install LEV coil b) Connect connector (CN724) c) Replace LEV coil
				(4) Defective LEV unit a) LEV locked b) Blocked with foreign matter	(4)-(5) Replace outdoor unit
				(5) Defective compressor a) Compressor motor coil short circuit, disconnection b) Compressor locked	
				(6) Power waveform distortion, noise	(6) Check to see if the power waveform is normal
		Out	Service mode end display ●Detection method: Service mode* continued for 20 minutes *The service mode is entered when the outdoor unit is run with the compressor relay connector [CN61] disconnected. This mode is used when measuring the compressor drive voltage of the outdoor inverter p.c. board.	(1) Compressor relay connector disconnected	(1) Turn the earth leakage circuit breaker of the Cylinder Unit to "OFF" before connecting the compressor relay connector of the outdoor unit.
				(2) Defective outdoor inverter p.c. board	(2) Replace the outdoor inverter p.c. board
	6 times	Out	Abnormality of circuit to detect AC current ●Detection method: Defective primary current detection sensor detected continuously for 2 minutes	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
EC	2 times	2 times	Start time exceeded ●Detection method: Inability to receive communication detected on outdoor unit microcomputer	(1) Defective power transmission line connection	(1) Correct power transmission line connection
				(2) Defective outdoor inverter p.c. board	(2) Replace outdoor inverter p.c. board
				(3) Defective cylinder unit control board	(3) Defective cylinder unit control board
				(4) Noise	(4) Move power signal line away from noise source

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
E6/E7/ E8/E9	2 times	2 times	Communication abnormality between cylinder unit and outdoor unit ●Detection method: Reception malfunction detected on cylinder unit microcomputer and outdoor unit microcomputer	(1) Defective power transmission line between cylinder unit and outdoor unit a) Not connected b) Disconnection c) Defective contact (2) Defective cylinder unit board (3) Defective outdoor inverter p.c. board	(1) Check the power transmission line between cylinder unit and outdoor unit a) Connect power transmission line b) Replace power transmission line c) Correct power transmission line connection (2) Replace cylinder unit board (3) Replace outdoor inverter p.c. board
FC	Continuous blinking	Continuous blinking	Abnormality in outdoor unit control system ●Detection method: Detected on outdoor unit microcomputer	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
Fd	11 times	11 times	Detection of abnormal AC voltage ●Detection method: Input voltage to outdoor unit 70 V or less *When the earth leakage circuit breaker of the Cylinder Unit is turned to "OFF", the LEDs (red, green) on the outdoor inverter p.c. board go out. This, however, takes about 1 minute. While the LEDs on the outdoor inverter p.c. board are lit, do not turn the earth leakage circuit breaker back on. Doing so might cause this abnormality to be detected again.	(1) Low power supply voltage a) Inappropriate power supply used b) Defective power transmission line c) Defective power transmission line connection (2) Erroneous operation of earth leakage circuit breaker* (3) Defective outdoor inverter p.c. board	(1) Check the power supply voltage a) Use a power supply having the appropriate voltage b) Replace the power transmission line c) Correct the power transmission line connection (2) Perform a reset (3) Replace the outdoor inverter p.c. board

Outdoor unit emergency stop

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
None	Lit	1 times	Discharge temperature high temperature protection operation in progress	-	-
	Lit	3 times	Ambient air protection operation in progress	-	-
	Lit	5 times	Primary current protection in operation (compressor speed reduced)	-	-
	Lit	6 times	Primary current protection in operation (compressor speed does not increase)	-	-
	Lit	7 times	Secondary stall control in progress	-	-
	Lit	8 times	Fan protection stopped (Compressor does not stop)	Propeller fan drive obstruction a) Strong winds outside	- (automatic recovery performed)
	Lit	10 times	PAM control stop in progress	(1) Transient power supply waveform distortion, noise (2) Persistent power supply waveform distortion, noise (3) Defective outdoor inverter p.c. board	(1) - (automatic recovery performed) (2) Check power supply waveform (3) Replace outdoor inverter p.c. board
	Lit	11 times	Primary voltage detection error protection	(1) Transient power supply waveform distortion, noise (2) Persistent power supply waveform distortion, noise (3) Defective outdoor inverter p.c. board	(1) - (automatic recovery performed) (2) Check to see if the power waveform is normal (3) Replace outdoor inverter p.c. board
	Lit	12 times	Service mode* *The service mode is entered when the outdoor unit is run with the compressor relay connector disconnected.	(1) Compressor relay connector disconnected (2) Defective outdoor inverter p.c. board	(1) Turn the earth leakage circuit breaker of the Cylinder Unit to "OFF" before connecting the compressor relay connector of the outdoor unit. (2) Replace the outdoor inverter p.c. board

6-4. HOW TO CHECK THE PARTS

<table>
<tr><th>Parts name</th><th>Check points</th></tr>
<tr><td>TH1 : Discharge temp.
TH2 : Defrost temp.
TH3 : Ambient temp.
TH4 : Hot water temp.</td><td>Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature of 10 to 30°C)
<table>
<tr><th></th><th>Normal</th><th>Abnormal</th></tr>
<tr><td>TH1
TH4</td><td>150 to 362 kΩ</td><td>Open or short</td></tr>
<tr><td>TH2
TH3</td><td>7.5 to 21 kΩ</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Fan motor (MF)
 
</td><td>Measure the resistance between the contacts of CN932 with a tester.
(At the ambient temperature of 20°C)
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>37.0 ± 1.33 Ω</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Compressor
(MC)
 
</td><td>Measure the resistance between the terminals with a tester.
(At the ambient temperature of 20°C)
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>12.8 ± 0.07 Ω</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Linear expansion valve
(LEV)
 
</td><td>Disconnect the connector then measure the resistance with a tester.
(Winding temperature 20°C)
<table>
<tr><th colspan="4">Normal</th><th>Abnormal</th></tr>
<tr><td>red - blue</td><td>red - orange</td><td>red - yellow</td><td>red - white</td><td rowspan="2">Open or short</td></tr>
<tr><td colspan="4">46 ± 4 Ω</td></tr>
</table></td></tr>
<tr><td>High pressure switch
(HPS)</td><td>Disconnect the connector then measure the resistance with a tester.
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>Short</td><td>Open</td></tr>
</table></td></tr>
</table>

7.1. Choosing the outdoor unit installation location

- Avoid locations where the unit is exposed to direct sunlight or other sources of heat.
- Select a location where noise emitted by the unit does not disturb neighbours.
- Select a location where easy wiring and pipe access to the power source is available.
- Avoid locations where combustible gases may leak, be produced, flow, or accumulate.
- Note that condensate water may be produced by the unit during operation.
- Select a level location that can bear the weight and vibration of the unit.
- Avoid locations where the unit is exposed to oil, steam, or sulfuric gas.
- Make sure to hold the handles to transport the unit. Do not hold the base of the unit, as there is a risk that hands or fingers may be pinched and injured.

7.2. Outline dimensions (Outdoor unit)

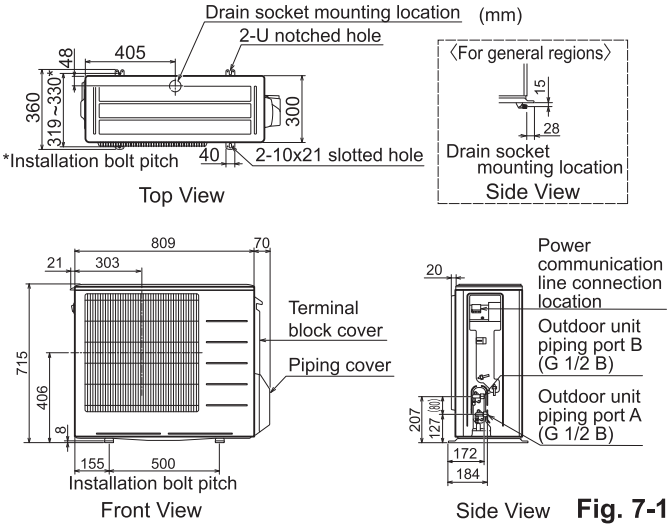


Fig. 7-1

7.3. Windy location installation

When installing the outdoor unit on a rooftop or other location where the unit is exposed to strong wind, do not face the air outlet of the unit directly into the prevailing wind direction.
Strong wind entering the air outlet may impede the normal airflow and it may result in a malfunction.

- Installation is not possible when there are obstructions on three of the four sides.
- If the obstruction at the front (discharge side) enables ventilation (such as a wire mesh), installation is possible for the conditions “When there is no obstruction at the front (discharge side)”. If the obstruction at the front does not enable ventilation (such as the outer wall of a building), install for the conditions “When there is an obstruction at the front (discharge side).

■ **When there is no obstruction at the front (discharge side)** (Top view)
The area above the unit must be open (clearance of at least 1 m or more).

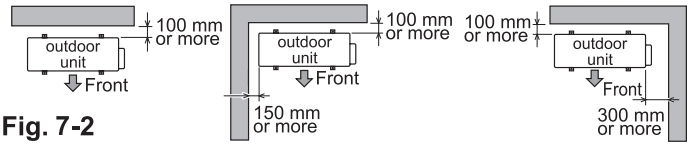


Fig. 7-2

■ **When there is no obstruction at the back (suction side)** (Top view)
The upward direction must be open (at least 1 m or more is available).

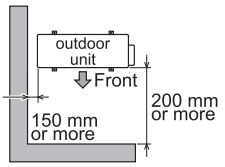


Fig. 7-3

■ **When there is an obstruction at the front** (discharge side)

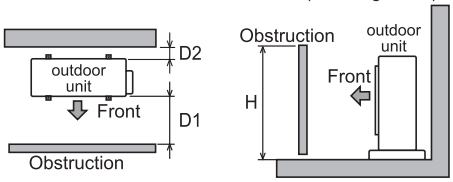


Fig. 7-4

The required clearance (D1 and D2) varies depending on the obstruction height (H). If wind guides are mounted, see the table below.
Note that the operating noise levels may increase for certain installation conditions.

Obstruction height (H)	Required clearance (D1/D2)	
	Without wind guides	With wind guides
1200 mm or less	200 mm or more/100 mm or more	185 mm or more/30 mm or more
More than 1200 mm	300 mm or more/100 mm or more	350 mm or more/30 mm or more

*If discharge air is blown against a wall, the wall can become dirty.
*If the area is poorly ventilated and the discharged air becomes sucked in again, heating performance can be reduced by about 10%. Mounting of wind guides (product sold separately) can improve heating performance in certain cases.

Contents

EHPT20Q-VM2EA

Model name			EHPT20Q-VM2EA
Modes			Space heating & DHW
Nominal thermal store tank volume			200 L
Overall unit dimensions			1600 × 595 × 680 mm (Height × Width × Depth)
Weight (empty)			77 kg
Weight (full)			283 kg
Primary expansion vessel (Accessory item)	Nominal volume		18 L
	Charge pressure		1.0 bar (100 kPa)
Safety device	Water circuit (Thermal store tank)	Control thermistor (THW1)	42 - 72°C
		Control thermistor (THW3)	80 °C
		Pressure relief valve (2 No. devices)	3.0 bar (300 kPa)
		Flow sensor	Min. flow 1.3 L/min
		Manual reset thermostat	90 °C
	Booster heater	Manual reset thermostat	90 °C
		Thermal Cut-out (for dry run prevention)	121 °C
Primary circuit circulating pump	Thermal store and space heating		Grundfos Solar PML 25-145 180
	Hot water supply		Grundfos Solar PML 25-145 180
Connections	Primary circuit		ϕ 22.0
	Secondary (potable) circuit		ϕ 22.0
Target temperature range	Space heating	Flow temperature *1	25 - 60 °C
		Room temperature	10 - 30 °C
	DHW supply maximum temperature		40 - 70 °C
Guaranteed operating range	Ambient *2		0 - 35 °C（80%RH)
	Outdoor temperature		- 15 - 35 °C
Electrical data	Control board	Power supply (Phase, voltage, frequency)	230V N～ 50 Hz
		Current	12.8 A
		Breaker (Local supply)	20 A
	Booster heater	Power supply (Phase, voltage, frequency)	230V N～ 50 Hz
		Capacity	2 kW
		Current	8.7 A
		Breaker	16 A
Sound power level			40 dB(A)
Maximum secondary (potable) water supply pressure			10 bar (1 MPa)
Maximum primary working pressure			2.5 bar (250 kPa)
Minimum primary working pressure			1.0 bar (100 kPa)

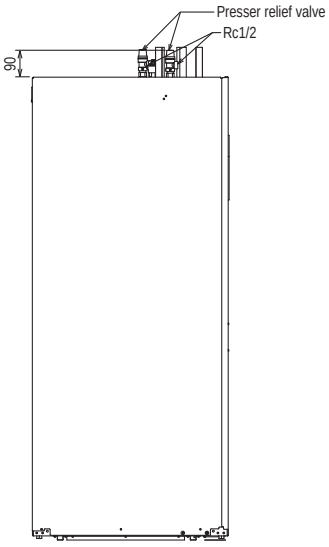
*1 Depending on the ambient conditions, it may not reach the set temperature.
*2 The cylinder's environment MUST be frost-free.

Thermal store heat loss

Note: These data are measured based on Product assessment against NSF-WRc Ltd test and acceptance criteria with regards to the Building Regulation 2000 (England and Wales) Approved Document G (2010).

Standing loss of the thermal store (24hrs)	1.63 kWh

<Unit: mm>



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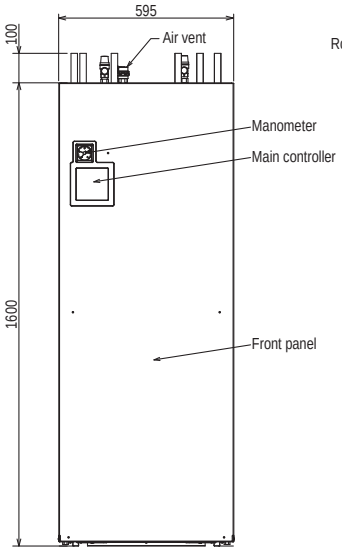
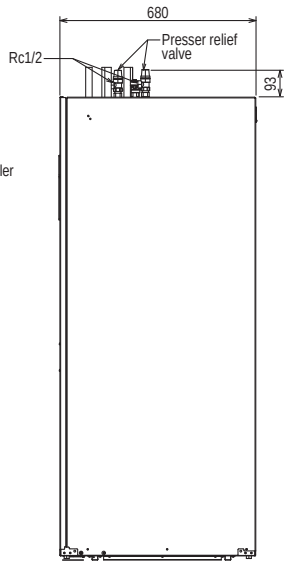
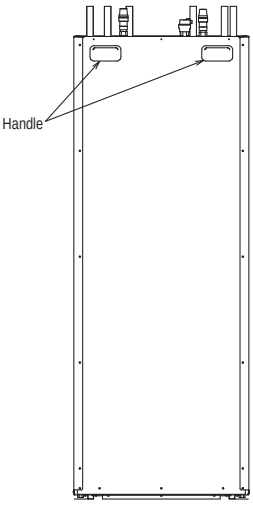


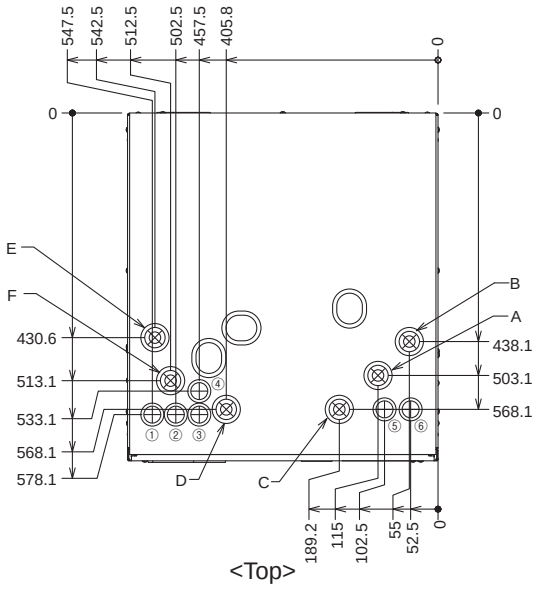
<Front>



<Right side>



<Back side>

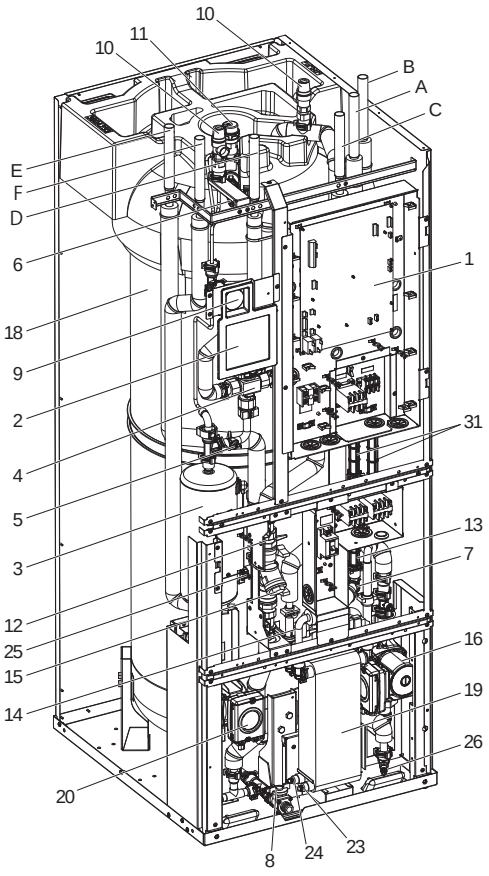


<Top>

Letter	Pipe and cable description	Connection size/type	Pipe or cable length (Max.)
A	DHW outlet connection	22 mm/Compression	—
B	Cold water inlet connection	22 mm/Compression	—
C	Space heating return connection	22 mm/Compression	65 m
D	Space heating flow connection	22 mm/Compression	65 m
E	Flow from heat pump connection (No plate heat exchanger)	22 mm/Compression	15 m
F	Return to heat pump connection (No plate heat exchanger)	22 mm/Compression	15 m
①	Booster heater inlet (Power cable 230 V)	Run booster heater cable	—
②	Main power inlet (Power cable 230 V)	Run power cable	—
③	Cylinder unit - outdoor unit cable (Power cable 230V)	Run cylinder unit -outdoor unit cable	15 m
④	Output cable inlet	Run output cable	—
⑤	Signal input cable inlet	Run signal input cables and remote sensor wires	—
⑥	Wireless receiver and Wi-Fi interface cable inlet	Run wireless receiver cable and ecodan Wi-Fi interface (option) cable	—

Component Parts

EHPT20Q-VM2EA

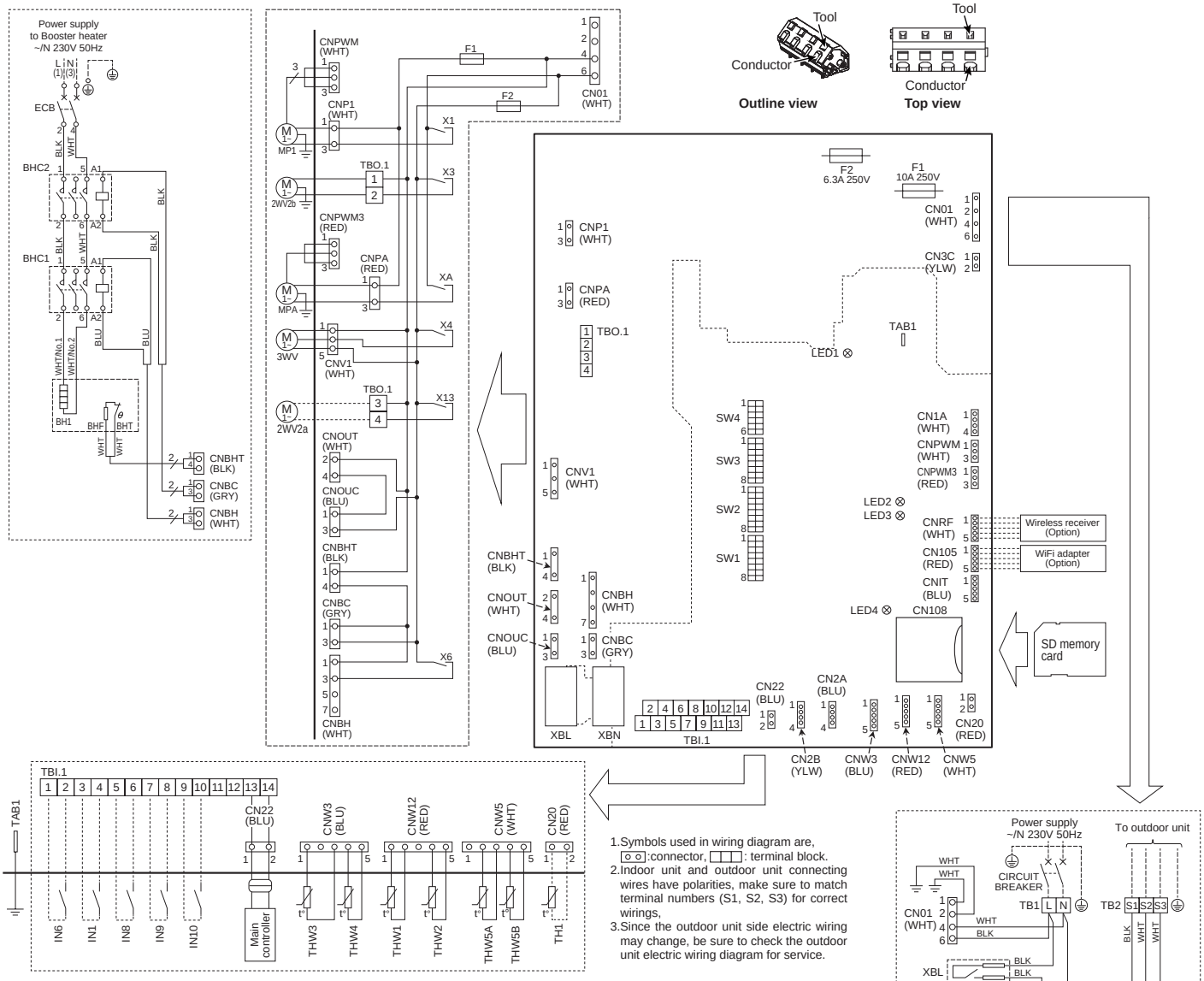


<Figure 2.1>

<Note>
Make sure to correctly install the Mitsubishi Electric Accessory Parts (e.g. Primary expansion vessel, Tundish and Filling loop) in the field. (See Page B-7, 11 and 13.)

No.	Part name	EHPT20Q-VM2EA
A	DHW outlet pipe	✔
B	Cold water inlet pipe	✔
C	Water pipe (Space heating return connection)	✔
D	Water pipe (Space heating flow connection)	✔
E	Water pipe (Flow from heat pump connection)	✔
F	Water pipe (Return to heat pump connection)	✔
1	Control and electrical box	✔
2	Main controller	✔
3	Booster heater with thermostat	✔
4	3-way valve	✔
5	Manual thermostat	✔
6	Manual air vent (above tank)	✔
7	Manual air vent (above pump A)	✔
8	Drain valve (Primary circuit)	✔
9	Manometer	✔
10	Primary pressure relief valve (3bar)	✔
11	Automatic air vent	✔
12	Flow sensor 1 (For space heating)	✔
13	Flow sensor A (Secondary (Potable) circuit)	✔
14	Flow sensor B (Primary circuit)	✔
15	Strainer valve	✔
16	Water circulation pump A (For hot water supply to plate heat exchanger)	✔
17	Pump valve	✔
18	Primary thermal store tank	✔
19	Plate heat exchanger (Water - Water)	✔
20	Water circulation pump 1 (For thermal store and space heating)	✔
21	THW1 (Flow water temp. thermistor)	✔
22	THW2 (Return water temp. thermistor)	✔
23	Drain cock (HEX) (Secondary (Potable) circuit)	✔
24	Drain cock (HEX) (Primary circuit)	✔
25	Drain cock (Booster heater)	✔
26	Drain cock (For pump A)	✔
27	THW5A (Stored water temp. thermistor (upper))	✔
28	THW5B (Stored water temp. thermistor (lower))	✔
29	THW3 (Flow water temp. thermistor 2 (to tank))	✔
30	THW4 (DHW supply temp. thermistor)	✔
31	Electrical isolation pipe	✔
32	Primary expansion vessel (Accessory item)	—
33	Drain pipe (Local supply)	—
34	Tundish (Accessory item)	—
35	Isolating valve (Local supply)	—
36	Magnetic filter (Local supply) (Recommended)	—
37	Strainer (Local supply)	—
38	Filling loop (Ball valves, check valves and flexible hose) (Accessory item)	—
39	Thermo mix valve (recommended) (Local supply)	—

<Table 2.2>



Symbol	Name
TB1	Terminal block <Power supply>
TB2	Terminal block <Outdoor unit>
ECB	Earth leakage circuit breaker for booster heater
MP1	Water circulation pump 1 (Thermal store & space heating)
MPA	Water circulation pump A (Hot water supply)
3WV	3-way valve
2WV2a	2-way valve (For Zone 1)(Local supply)
2WV2b	2-way valve (For Zone 2)(Local supply)
BHT	Thermostat for booster heater
BHF	Thermal fuse for booster heater
BH1	Booster heater 1
BHC1	Contactor for booster heater
BHC2	Contactor for booster heater protection
OUT	Thermostat for outdoor unit
OUC	Contactor for outdoor unit

Symbol	Name
TH1	Thermistor (Room temp.)(Option)
THW1	Thermistor (Flow water temp.)
THW2	Thermistor (Return water temp.)
THW3	Thermistor (Flow water (to tank) temp.)
THW4	Thermistor (DHW supply temp.)
THW5A	Thermistor (Stored water (upper) temp.)
THW5B	Thermistor (Stored water (lower) temp.)
IN1	Room thermostat 1 (Local supply)
IN6	Room thermostat 2 (Local supply)
IN8	Electric energy meter 1 (Local supply)
IN9	Electric energy meter 2 (Local supply)
IN10	Heat meter (Local supply)

INDOOR CONTROLLER (FTC)	
TBO.1	Terminal block <Outputs>
TBI.1	Terminal block <Signal Inputs>
F1	Fuse (T10AL250V)
F2	Fuse (T6.3AL250V)
SW1-4	DIP switch *See Table 3
X1-13	Relay
XBL	Relay for outdoor unit
XBN	Relay for outdoor unit
LED1	Power supply
LED2	Power supply (Main controller)
LED3	Communication (Outdoor unit)
LED4	Reading or writing data to SD card
CNPWM	Pump speed control signal for MP1
CNPWM3	Pump speed control signal for MPA
CN108	SD card connector
Flow sensor 1	For space heating
Flow sensor A	Potable side
Flow sensor B	Primary side

Table 1 Signal Inputs

Name	Terminal block	Connector	Item	OFF (Open)	ON (Short)
IN1	TBI.1 3-4	—	Room thermostat 1 input	Refer to SW2-1 in<Table 3 DIP Switch Functions>.	
IN6	TBI.1 1-2	—	Room thermostat 2 input	Refer to SW3-1 in<Table 3 DIP Switch Functions>.	
IN8	TBI.1 5-6	—	Electric energy meter 1	Refer to installation manual.	
IN9	TBI.1 7-8	—	Electric energy meter 2		
IN10	TBI.1 9-10	—	Heat meter		

Table 2 Outputs

Name	Terminal block	Connector	Item	OFF	ON
OUT1	—	CNP1	Water circulation pump1 output (Space heating & DHW)	OFF	ON
OUT3	TBO.1 1-2	—	2-way valve 2b output *1	OFF	ON
OUT4	—	CNV1	3-way valve output	Heating	DHW
OUT6	—	CNBH 1-3	Booster heater output	OFF	ON
OUT13	TBO.1 3-4	—	2-way valve 2a output *1	OFF	ON
OUTA	—	CNPA	Water circulation pump A output	OFF	ON
OUTB	—	—	Relay for outdoor unit	OFF	ON

Do not connect to the terminals that are indicated as "—" in the "Terminal block" field.
*1. For 2-zone valve ON/OFF control.

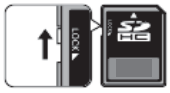
Using SD memory card

The cylinder unit is equipped with an SD memory card interface in FTC.
Using an SD memory card can simplify main controller settings and can store operating logs. *1

Note: Before inserting or ejecting an SD memory card, confirm that the power supply earth cable is securely connected and prevent the FTC from being applied with static electricity (e.g. touch a case body etc.). Otherwise, it may cause a failure of the FTC due to the static electricity.

<Handling precautions>

(1) Use an SD memory card that complies with the SD standards. Check that the SD memory card has a logo on it as those shown on lower right figure.
(2) SD memory cards to the SD standards include SD, SDHC, miniSD, micro SD, and microSDHC memory cards. The capacities are available up to 32 GB. Choose that with a maximum allowable temperature of 55ºC.
(3) When the SD memory card is a miniSD, miniSDHC, microSD, or micro SDHC memory card, use an SD memory card converter adapter.
(4) Before writing to the SD memory card, release the write-protect switch.



(5) Before inserting or ejecting an SD memory card, make sure to power OFF the system. If an SD memory card is inserted or ejected with the system powered ON, the stored data could be corrupted or the SD memory card be damaged.
*An SD memory card is live for a short duration after the system is powered off. Before insertion or ejection wait until the LED lamps on the FTC control board are all off.
(6) The read and write operations have been verified using the following SD memory cards, however, these operations are not always guaranteed as the specifications of these SD memory cards could change.

Manufacturer	Model	Tested in
Silicon Power	SP004GBSDH004V10	Jan. 2015

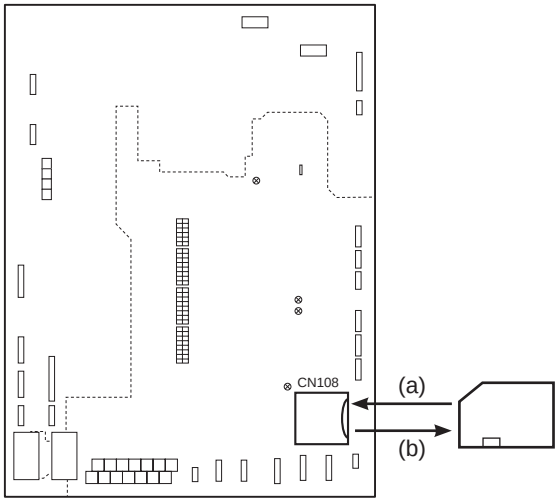
Before using a new SD memory card (including the card that comes with the unit), always check that the SD memory card can be safely read and written to by the FTC controller.

<How to check read and write operations>

a) Check for correct wiring of power supply to the system. For more details, refer to section 5.5.
(Do NOT power on the system at this point.)
b) Insert an SD memory card.
c) Power on the system.
d) The LED4 lamp lights up if the read and write operations are successfully completed. If the LED4 lamp continues blinking or does not light up, the SD memory card cannot be read or written to by the FTC controller.

(7) Make sure to follow the instruction and the requirement of the SD memory card's manufacturer.
(8) Format the SD memory card if determined unreadable in step (6). This could make it readable.
Download an SD card formatter from the following site.
SD Association homepage: https://www.sdcard.org/home/
(9) FTC supports FAT file system but not NTFS file system.
(10) Mitsubishi Electric is not liable for any damages, in whole or in part, including failure of writing to an SD memory card, and corruption and loss of the saved data, or the like. Back up saved data as necessary.
(11) Do not touch any electronic parts on the FTC control board when inserting or ejecting an SD memory card, or else the control board could fail.

(a) For insertion, push on the SD memory card until it clicks into place.
(b) For ejection, push on the SD memory card until it clicks.
Note: To avoid cutting fingers, do not touch sharp edges of the SD memory card connector (CN108) on the FTC control board.



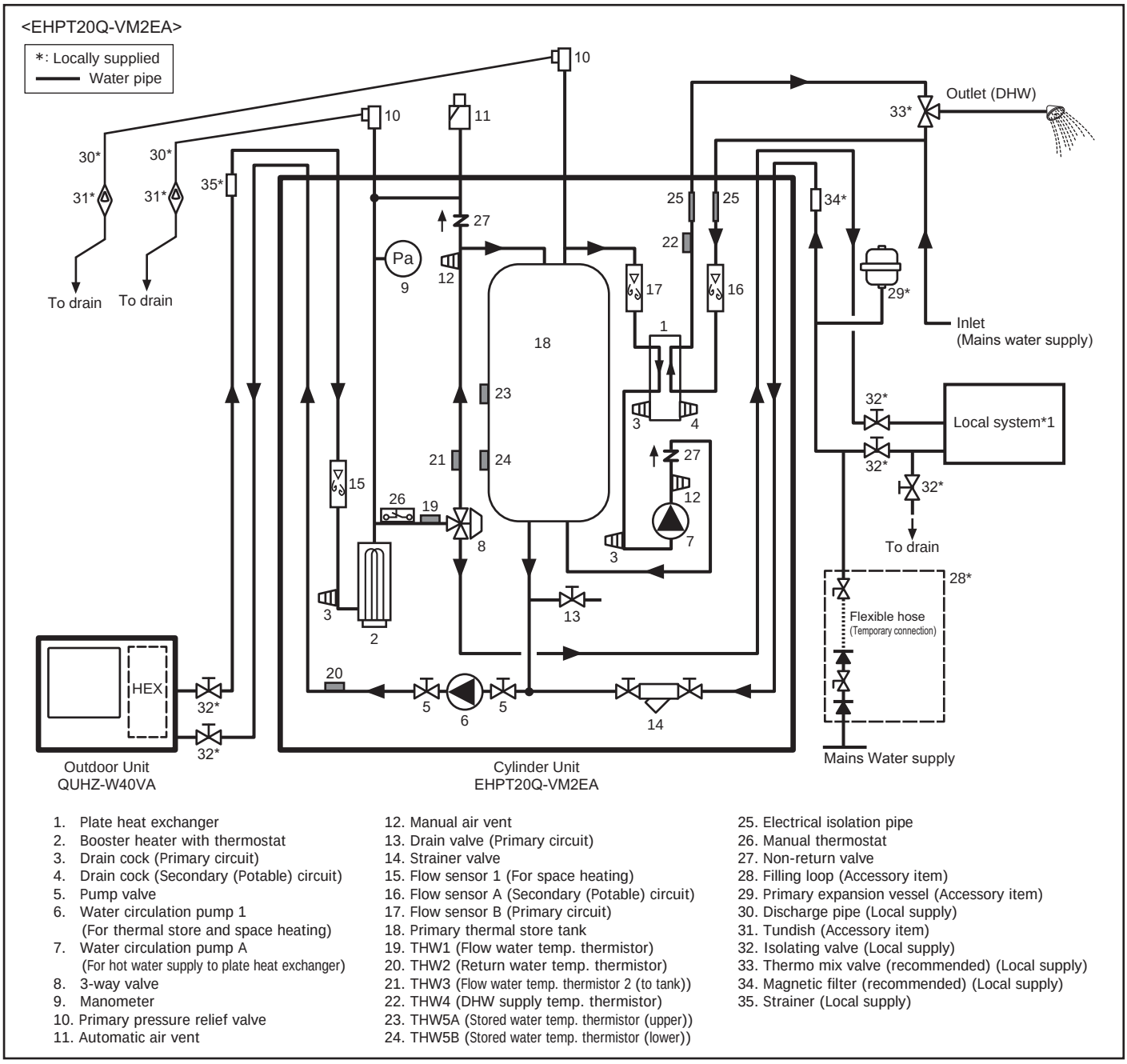
Logos
Capacities
2 GB to 32 GB *2
SD speed classes
All

• The SD Logo is a trademark of SD-3C, LLC.
The miniSD logo is a trademark of SD-3C, LLC.
The microSD logo is a trademark of SD-3C, LLC.

*1 To edit main controller settings or to check operating data, an Ecodan service tool (for use with PC) is required.
*2 A 2-GB SD memory card stores up to 30 days of operation logs.

Water circuit diagram

*1 Refer to the following section [Local system].



1. Plate heat exchanger
2. Booster heater with thermostat
3. Drain cock (Primary circuit)
4. Drain cock (Secondary (Potable) circuit)
5. Pump valve
6. Water circulation pump 1 (For thermal store and space heating)
7. Water circulation pump A (For hot water supply to plate heat exchanger)
8. 3-way valve
9. Manometer
10. Primary pressure relief valve
11. Automatic air vent
12. Manual air vent
13. Drain valve (Primary circuit)
14. Strainer valve
15. Flow sensor 1 (For space heating)
16. Flow sensor A (Secondary (Potable) circuit)
17. Flow sensor B (Primary circuit)
18. Primary thermal store tank
19. THW1 (Flow water temp. thermistor)
20. THW2 (Return water temp. thermistor)
21. THW3 (Flow water temp. thermistor 2 (to tank))
22. THW4 (DHW supply temp. thermistor)
23. THW5A (Stored water temp. thermistor (upper))
24. THW5B (Stored water temp. thermistor (lower))
25. Electrical isolation pipe
26. Manual thermostat
27. Non-return valve
28. Filling loop (Accessory item)
29. Primary expansion vessel (Accessory item)
30. Discharge pipe (Local supply)
31. Tundish (Accessory item)
32. Isolating valve (Local supply)
33. Thermo mix valve (recommended) (Local supply)
34. Magnetic filter (recommended) (Local supply)
35. Strainer (Local supply)

<Figure 4.1>

Note:
- To enable draining of the cylinder unit, an isolating valve should be positioned on both the inlet and outlet pipework.
- Within the building, be sure to install a maintainable strainer (Item 35) on the inlet pipework to the cylinder unit. Similarly, on the return pipework from space heating circuit, it is also recommended to install a maintainable magnetic filter (Item 34).
- Suitable drain pipework should be attached to all pressure relief valves in accordance with national regulations.
- When using components made from different metals or connecting pipes made of different metals insulate the joints to prevent any corrosive reaction taking place which may damage the pipework.
- Filling loop´s flexible hose must be removed following the filling procedure. Item provided with unit as loose accessory.
- Install primary expansion vessel to the return circuit of space heating and ensure clear water passage between cylinder unit and primary expansion vessel.

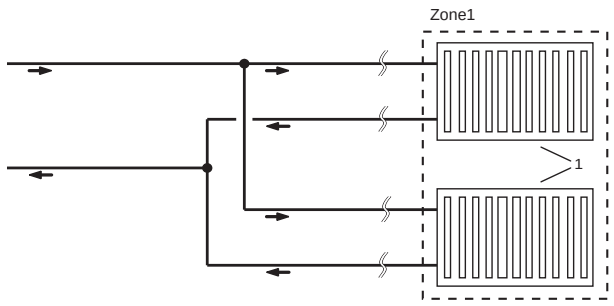
Model name	EHPT20Q-VM2EA
Maximum secondary (potable) water supply pressure	10 bar (1 MPa)
Primary expansion vessel charge pressure	1.0 bar (100 kPa)
Primary pressure relief valves set pressure (2 No. devices)	3.0 bar (300 kPa)
Booster heater specification	2 kW, 230 V
Primary thermal store capacity (Tank capacity)	200 L
Mass of the unit when full	283 kg
Maximum primary working pressure	2.5 bar (250 kPa)
Minimum primary working pressure	1.0 bar (100 kPa)

<Table 4.1>

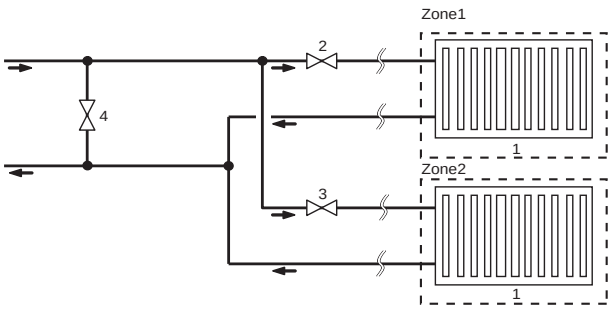
Note: Maximum primary water supply pressure is 10 bar (1 MPa). At commissioning stage, please adjust water pressure within primary circuit to 1 bar (100 kPa).

Local system

1-zone temperature control



1-zone temperature control (2-zone valve ON/OFF control)



1. Heat emitters (e.g. radiator, fan coil unit) (local supply)
2. Zone1 2-way valve (local supply)
3. Zone2 2-way valve (local supply)
4. Auto-bypass valve (local supply)

Energy monitoring

End user can monitor accumulated*1 'Consumed electrical energy' and 'Delivered energy' in each operation mode*2 on the main controller.
*1 Monthly and Year to date
*2 - DHW operation
- Space heating

Refer to "6.6 Main controller" for how to check the energy, and "6.1 DIP switch functions" for the details on DIP-SW setting.
Either one of the following two method is used for monitoring.
Note: The method 1 should be used as a guide. If greater accuracy is required, then method 2 should be used.

1. Calculation internally
Electricity consumption is calculated internally based on the energy consumption of outdoor unit, electric booster heater, pump1 and other auxiliaries.
Produced heat is calculated internally by multiplying delta T (Flow and Return temp.) and flow rate measured by the factory fitted sensors.
Set the electric booster heater capacity and water pump(s) input according to indoor unit model. (Refer to the menu tree in "6.6 Main controller")

	Booster heater	Pump1*1
Default	2kW	***(factory fitted pump)
EHPT20Q-VM2EA	2kW	***

*1 "***" displayed in the energy monitor setting mode means the factory fitted pump is connected as pump 1 so that the input is automatically calculated.
When anti-freeze solution (propylene glycol) is used for primary water circuit, set the produced energy adjustment if necessary.
For further detail of above, refer to "6.6 Main controller".
Note: Consumed electric energy of pump A is automatically calculated by the system.

2. Actual measurement by external meter (locally supplied)
FTC has external input terminals for 2 'Electric energy meters' and a 'Heat meter'.
If two 'Electric energy meters' are connected, the 2 recorded values will be combined at the FTC and shown on the main controller.
(e.g. Meter 1 for main power line, Meter 2 for booster heater power line)
Refer to the [Signal inputs] section in "6.2 Connecting inputs/outputs" for more information on connectable electric energy meter and heat meter.

<Preparation before the installation and service>

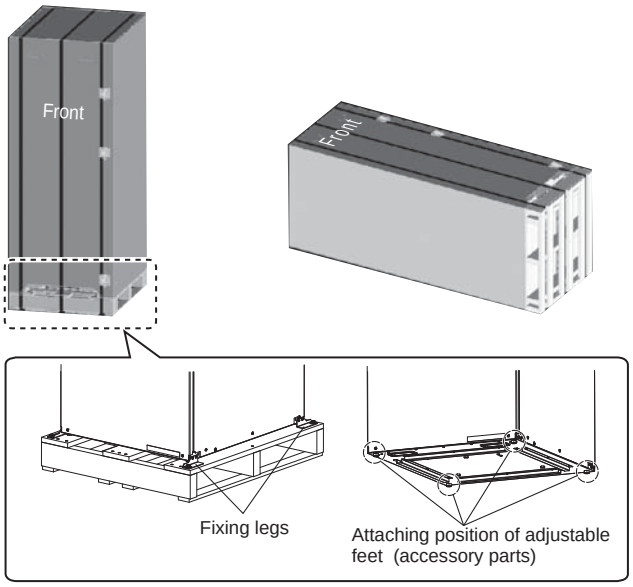
- Prepare the proper tools.
- Prepare the proper protection.
- Allow parts to cool before attempting any maintenance.
- Provide adequate ventilation.
- After stopping the operation of the system, turn off the power-supply breaker and remove the power plug.
- Discharge the capacitor before commencing work involving the electrical parts.

<Precautions during service>

- Do not perform work involving electrical parts with wet hands.
- Do not pour water or liquid into the electrical parts.
- Do not touch the refrigerant.
- Do not touch the hot or cold surfaces in the refrigerant cycle.
- When the repair or the inspection of the circuit needs to be carried out without turning off the power, exercise great caution not to touch any live parts.
- Do not attach any external pump to the system.

5.1 Location

Transportation and Handling



<Figure 5.1.1>

Cylinder unit is delivered on a wooden pallet base with cardboard protection.

Care should be taken when transporting the cylinder unit that the casing is not damaged by impact. Do not remove the protective packaging until cylinder unit has reached its final location. This will help protect the structure and control panel.

- The cylinder unit can be transported either vertically or horizontally. If transported horizontally the panel marked 'Front' must be facing **UPWARDS**<Figure 5.1.1>.
- The cylinder unit should ALWAYS be moved by a minimum of 2 people.
- When you carry a cylinder unit, please use the handle of the unit upper part.
- Before using, make sure they are securely attached.
- Please carefully remove fixing legs, wooden base and any other packaging.

Suitable Location

Before installation the cylinder unit should be stored in a frost-free weatherproof location. Units must **NOT** be stacked.

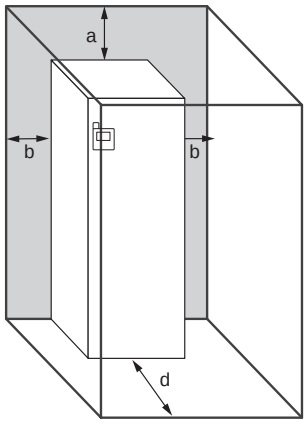
- The cylinder unit should be installed indoors in a frost free weather proof location.
- Install the cylinder unit where it is not exposed to water/excessive moisture.
- Install the cylinder unit only where the difference in height between the cylinder unit and the outdoor unit is less than 5 m.
- The cylinder unit should be positioned on a level surface capable of supporting it´s filled weight. (Adjustable feet (accessory parts) can be used to ensure unit is level) (see Figure 5.1.1)
- When using the adjustable feet, ensure that the floor is strong enough.
- When fitted, the adjustable feet should only be extended and used to level and stabilise the unit. And weight load should be evenly spread.
- Care should be taken that minimum distances around and in front of the unit for service access are observed <Figure 5.1.2>.
- Secure the cylinder unit to prevent it from potentially being knocked over.

Service access diagrams

Service access	
Parameter	Dimension (mm)
a	300
b	150
c (distance behind unit not visible in Figure 5.1.2)	10
d	500

<Table 5.1.1>

Sufficient space MUST be left for the provision of discharge pipework as detailed in National and Local Building Regulations.



<Figure 5.1.2>
Service access

The cylinder unit must be located indoors and in a frost-free environment, for example in a utility room, to minimise heat loss from stored water.

Room Thermostat

If fitting a new room thermostat for this system;

- Position it out of direct sunlight and draughts
- Position it on an internal wall
- Position it away from internal heat sources
- Position it in a room without a TRV on the radiator/heat emitter.

Note: Do not position the thermostat excessively close to the external wall. The thermostat may detect the temperature of the wall, which could affect appropriate control of the room temperature.

- Position it approx. 1.5 m from floor level

Repositioning

If you need to move the cylinder unit to a new position FULLY DRAIN the cylinder unit before moving to avoid damage to the unit. Also, take care to protect building fabrics (floor and wall finishes).

5.2 Water Quality and System Preparation

General

- The water in both primary and secondary (potable) circuit should be clean and with pH value of 6.5-8.0.
- The followings are the maximum values;
  Calcium: 100mg/L, Ca hardness: 250mg/L
  Chlorine: 100mg/L, Copper: 0.3mg/L
  Iron/Manganese: 0.5mg/L
- Other constituents should be to European Directive 98/83 EC standards.
- In known hard water areas, to prevent/minimise scaling, it is beneficial to restrict the routine stored water temperature (DHW supply max. temp.) to 65°C or less.

Anti-Freeze

Suitable anti-freeze MUST be used in ALL installations.
Anti-freeze solution MUST be propylene glycol with a toxicity rating of Class 1 as listed in Clinical Toxicology of Commercial Products, 5th Edition.

Note:

1. Ethylene glycol anti-freeze is TOXIC. Therefore it MUST NOT be used in the primary water circuit in case of any cross-contamination of the secondary (potable) circuit.
2. For 2-zone valve ON/OFF control, propylene glycol solution MUST be used.

New Installation (primary water circuit)

- Before connecting outdoor unit, thoroughly cleanse pipework of building debris, solder etc using a suitable chemical cleansing agent.
- Flush the system to remove chemical cleanser.
- Add a combined inhibitor and anti-freeze solution to prevent damage to the pipework and system components.

Existing Installation (primary water circuit)

- Before connecting outdoor unit the existing heating circuit MUST be chemically cleansed to remove existing dirt and debris from the heating circuit.
- Flush the system to remove chemical cleanser.
- Add a combined inhibitor and anti-freeze solution to prevent damage to the pipework and system components.

When using chemical cleansers and inhibitors always follow manufacturer's instructions and ensure the product is appropriate for the materials used in the water circuit

How to access Internal Components and Control and Electrical Box

<A> Opening the front panel
1. Remove the five screws.
2. Slide front panel downwards slightly and open carefully.
3. Disconnect the relay connector connecting main controller cable and the control board cable using the quick-connector.

<B> Accessing the back of control and electrical box
The control and electrical box has four holding screws and is hinged on the right hand side.
1. Remove the holding screws on the control and electrical box.
2. The control and electrical box can then be swung opened / closed on the right hand hinges.

Note:

After servicing, re-assemble and re-secure all cables using straps provided. Reconnect main controller cable to its relay connector. Replace front panel and re-secure screws at base.

Minimum amount of water required in the space heating circuit

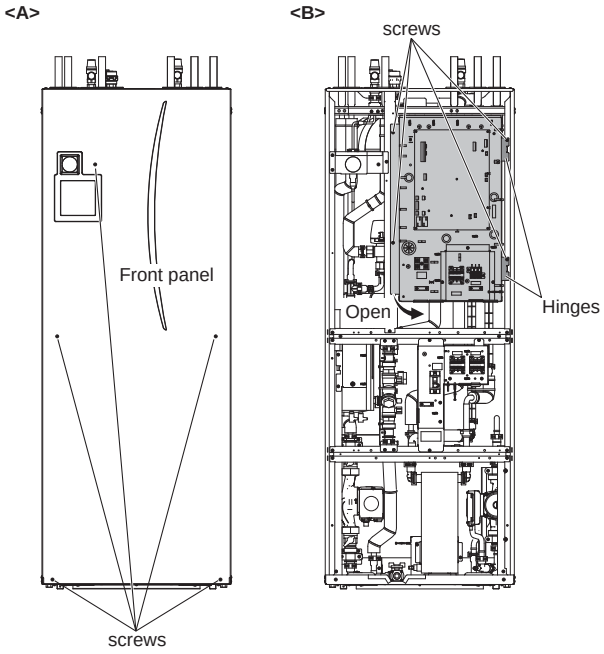
32 L

Note: The volume of heat emitters and external pipes should be included.

Reference:

Minimum water quantity [L]		
Primary circuit	Thermal store tank	200 L
	Space heating circuit	32 L
Secondary (potable) circuit		2 L

<Table 5.2.1>



<Figure 5.2.1>

5.3 Water Pipework

Hot Water Pipework

The cylinder unit is UNVENTED. When installing unvented indirect hot water systems building regulations part G3 (England and Wales), P3 (Scotland) and P5 (Northern Ireland) should be adhered to. If outside of the UK please adhere to your own country' s regulations for unvented hot water systems.

Connect the flow for the DHW to pipe A (Figure 2.1).
The function of the following safety components of the system should be checked on installation for any abnormalities;

- Pressure relief valve (Primary circuit)
- Primary expansion vessel pre-charge / gas charge pressure (Accessory item)

The instruction on the following pages regarding safe discharge of hot water from Safety devices should be followed carefully.

- The pipework will become very hot, so should be insulated to prevent burns.
- When connecting pipework, ensure that no foreign objects such as dirt or debris enter the pipe.

Cold Water Pipework

Cold water to the suitable standard (see section 5.2) should be introduced to the system by connecting pipe B (Figure 2.1) using appropriate fittings.

Negative pressure prevention

To prevent negative pressure effecting water circuit, installer should install pipework or use appropriate devices.

Hydraulic filter work

Install a hydraulic filter or strainer (local supply) at the water intake ("Pipe E" in Fig.2.1)

Pipework Connections

Connections to the cylinder unit should be made using the 22 mm compression as appropriate.
Do not over-tighten compression fittings as this will lead to deformation of the olivering and potential leaks.

Note: To weld the pipes in the field, ensure the pipes on the cylinder unit are cooled using wet towel etc.

Insulation of Pipework

- All exposed water pipework should be insulated to prevent unnecessary heat loss and condensation. To prevent condensate entering the cylinder unit, the pipework and connections at the top of the cylinder unit should be carefully insulated.
- Cold and hot water pipework should not be run close together where possible, to avoid unwanted heat transfer.
- Pipework between outdoor heat pump unit and cylinder unit should be insulated with suitable pipe insulation material with a thermal conductivity of ≤ 0.04 W/m · K.

Filling the System (Primary Circuit)

Note: Make sure to turn OFF the booster heater power supply before filling the system

1. Check all connections including factory fitted ones are tight.
2. Insulate pipework between cylinder unit and outdoor unit.
3. Open the automatic air vent to enable automatic air bleeding function.
4. Thoroughly clean and flush, system of all debris. (see section 5.2 for instruction.)
5. Fill primary heating circuit with water and suitable anti-freeze as necessary.
   Always use a new filling loop with double check valve when filling the primary circuit to avoid back flow contamination of water supply.
   Do not use an old filling loop.
   Do Not turn ON the system until the system is fully charged of water.

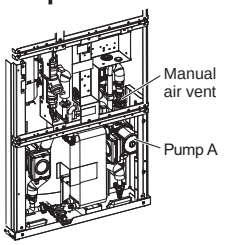
- Open the two manual air vents after filling the system (refer to the following section) .
- Anti-freeze should always be used for packaged model systems (see section 5.2 for instruction). Corrosion inhibitor should be used in both split model and packaged model systems.
- When connecting metal pipes of different materials insulate the joints to prevent a corrosive reaction taking place which will damage the pipework.

6. Check for leakages. If leakage is found, retighten the nut onto the connections.
7. Pressurise system to 1 bar with all the water in thermal store tank cold.
   (If the system is pressurised with the water in thermal store tank hot, air inclusion in pump may be caused by the pressure drop of the system that occurs if the hot water gets cold.)
8. Release all trapped air using air vents during and following heating period.
9. Top up with water as necessary. (If pressure is below 1 bar)

Note: • Automatic air vents MUST be installed at the highest point of the primary system. The slightest amount of air in the system can reduce efficiencies and even cause the cylinder unit to fault.
• Confirm the following if the air cannot be discharged.
• Air discharging of radiators
• Air discharging from isolating valves
(If necessary, turn on the pump 1 using Manual operation (refer to page B-26).)

IMPORTANT<Air discharging of pump A>

1. Attach the accessory rubber hose to the manual air vent above pump A to prevent water from dripping on to the pump during the air bleeding operation.
2. Open the drain cock of the manual air vent and discharge the air.
3. Open a tap and confirm that hot water is supplied after approximately 30 minutes from the beginning of thermal store operation.



Note: If the air is not sufficiently discharged, hot water is not supplied and an error occurs. Continue to discharge the air until smooth delivery of hot water.

Sizing Primary Expansion Vessels

Primary expansion vessel volume MUST fit the local system water volume.
To size an expansion vessel for the heating circuit the following formula and graph can be used.

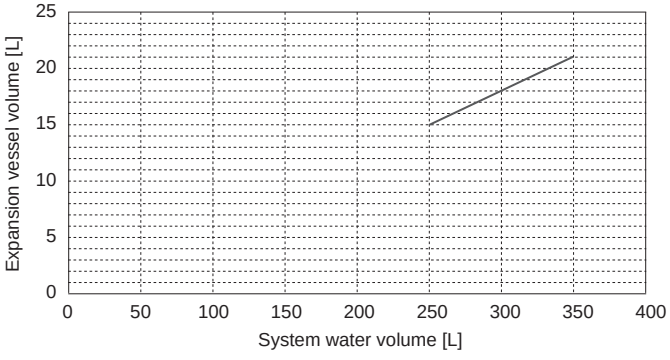
$$V = \frac{\varepsilon \times G}{1 - \frac{P_1 + 0.098}{P_2 + 0.098}}$$

Where;
V : Necessary expansion vessel volume [L]
ε : Water expansion coefficient
G : Total volume of water in the system [L]
P_1 : Expansion vessel setting pressure [MPa]
P_2 : Max pressure during operation [MPa]

Graph to the right is for the following values

ε : at 70 °C = 0.0229
P_1 : 0.1 MPa
P_2 : 0.3 MPa
*A 30% safety margin has been added.

Primary expansion vessel sizing



<Figure 5.3.1>

Flow rate setting

Circulation flow rate of EHPT20Q-VM2EA unit is determined by settings of "Flow rate setting" and "pump speed".

1. Primary circuit for thermal store and space heating

In the space heating operation,circulation flow rate can be selected by main controller setting.(refer to page B-27) Pump 1 automatically operates to adjust the flow rate to the setting. Auto setting automatically selects a flow rate appropriate for effective operation.

In the thermal store operation, circulation flow rate is automatically selected to adjust the hot water temperature to the main remote controller setting and pump 1 automatically operates.

In other operations (ex. Freeze stat operation,Emergency mode,Indoor unit only operation), pump 1 operates at a pump speed selected by main controller setting. (See Figure 5.3.2)

Adjust the pump speed setting so that the flow rate in the primary circuit is appropriate for the outdoor unit installed.(see Table 5.3.1)

Outdoor unit	Water flow rate range [L/min]
QUHZ-W40VA	3.0 - 8.0

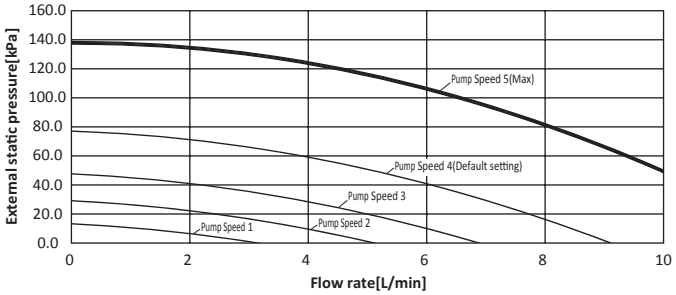
<Table 5.3.1>

* If the water flow rate exceeds 9.0L/min, the flow speed will be greater than 1.5m/s, which could erode the pipes.
* In case of "Compensation curve mode" or "Flow temp. mode" please select "Manual" mode then choose flow rate manually from 3.0 to 8.0 L/min. If "Auto" mode is selected, flow rate will be fixed at "7.0 L/min".

2. Primary circuit for hot water supply

Pump A automatically operates regardless of the flow rate the settings.

Water circulation pump 1 characteristics



<Figure 5.3.2>

***The performance showing Figure 5.3.2 includes pressure drop of both cylinder unit and outdoor unit.**
Before installation, please check if the maximum performance of water circulation pump 1 can accommodate the pressure drop of external heating circuit.

Safety Device Connections

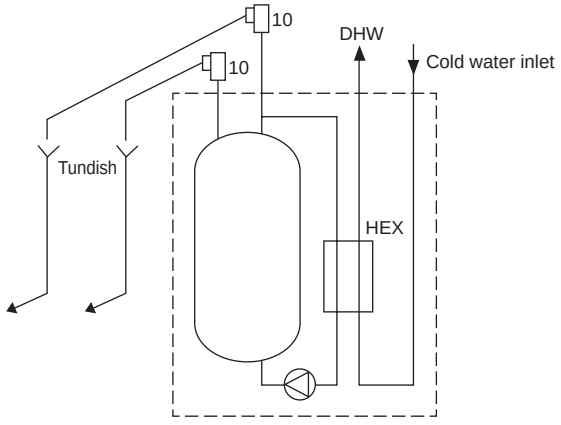
The primary pressure relief valves on the primary side needs appropriate discharge pipework.

Note: ● Do not secure the screws excessively when connecting the Discharge pipe, otherwise this may result in damage to the cylinder unit.
● Pressure relief valve connections should not be used for any other purpose.

*1 In accordance with Building Regulations a tundish MUST be fitted into the pipework within 500 mm of the safety device. Due to the distance between the two safety devices it may be necessary to fit each safety device with its own tundish before you run the pipework together to a safe discharge.(See Figure 5.3.3)

Diagram part No.	Description	Connection size	Connection type
10	Pressure relief valve	G 1/2	Female

<Table 5.3.2>



<Figure 5.3.3>

Always refer to local regulations when installing discharge pipework.
Install discharge pipework in a frost-free environment.
It is necessary to provide appropriate drainage from the pressure relief valve situated on top of the cylinder unit to prevent damage to the unit and the surrounding area from any steam or hot water released. Relief valves MUST NOT be used for any other purpose.

5.4 Safety Device Discharge Arrangements (G3)

The following instructions are a requirement of UK Building Regulations and MUST be adhered to. If you are in any doubt please seek advice from local building planning office.

1. Connect the tundish and route the discharge pipe as shown in Figure 5.4.1.
2. The tundish should be fitted vertically and as close to the safety device as possible and within 500 mm of the device.
3. The tundish should be visible to occupants and positioned away from electrical devices.
4. The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal construction and:

A) Be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9 m long i.e. discharge pipes between 9 m and 18 m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27 m at least 3 sizes larger, and so on. Bends MUST be taken into account in calculating the flow resistance. Refer to Figure 5.4.1, Table 5.4.1 and the worked example. An alternative approach for sizing discharge pipes would be to follow BS 6700: 1987 specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.

B) Have a vertical section of pipe at least 300 mm long, below the tundish before any elbows or bends in the pipework.

C) Be installed with a continuous fall.

D) Have discharges visible at both the tundish and the final point of discharge but where this is not possible or is practically difficult there should be clear visibility at one or other of these locations. Examples of acceptable discharge arrangements are:

i. Ideally below a fixed grating and above the water seal in a trapped gully.

ii. Downward discharges at low level; i.e. up to 100 mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children may play or otherwise come into contact with discharges a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.

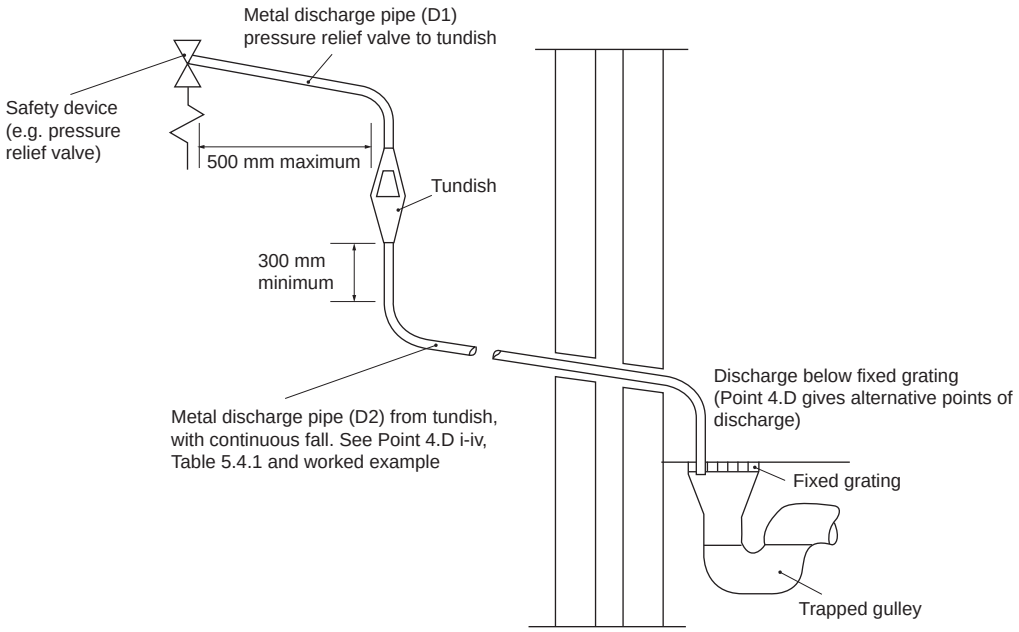
iii. Discharges at high level; e.g. into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3 m from any plastic guttering system that would collect such discharges (tundish visible).

iv. Where a single pipe serves a number of discharges, such as in blocks of flats,the number served should be limited to not more than 6 systems so that any installation discharging can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e.in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

Note: The discharge will consist of scalding water and steam. Asphalt, roofing felt and nonmetallic rainwater goods may be damaged by such discharges.
Discharges MUST be positioned in a frost-free location.

Worked example: The example below is for a G½ pressure relief valve with a discharge pipe (D2) having 4 No. elbows and length of 7 m from the tundish to the point of discharge.

From Table 5.4.1: Maximum resistance allowed for a straight length of 22 mm copper discharge pipe (D2) from a G½ pressure relief valve is: 9.0 m subtract the resistance for 4 No. 22 mm elbows at 0.8 m each = 3.2 m. Therefore the maximum permitted length equates to: 5.8 m. 5.8 m is less than the actual length of 7 m, therefore calculate the next largest size. Maximum resistance allowed for a straight length of 28 mm pipe (D2) from a G½ pressure relief valve equates to: 18 m
Subtract the resistance for 4 No. 28 mm elbows at 1.0 m each = 4 m. Therefore the maximum permitted length equates to: 14 m. As the actual length is 7 m, a 28 mm (D2) copper pipe will be satisfactory.



<Figure 5.4.1>

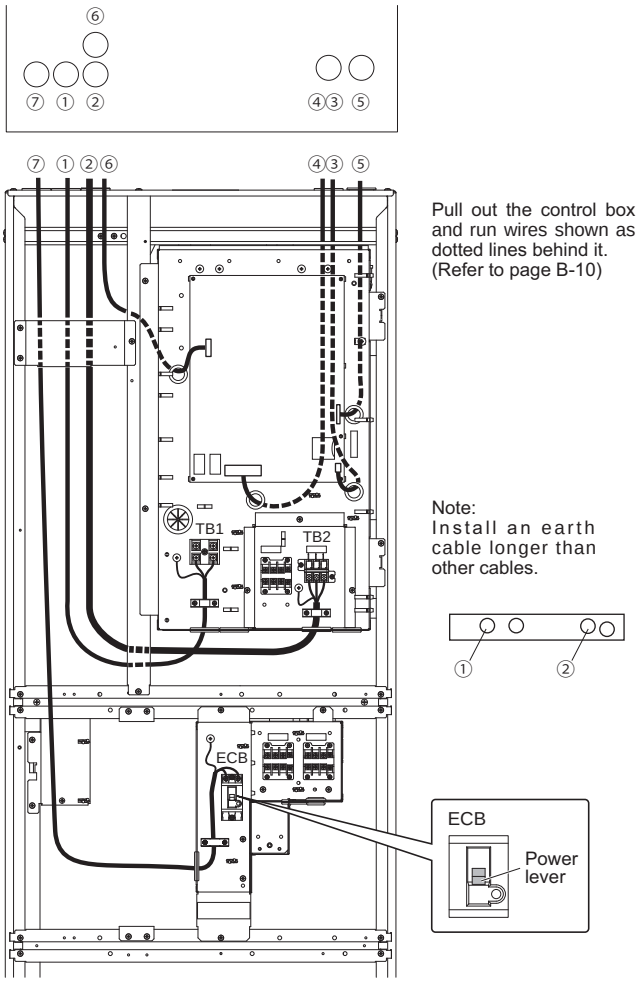
Valve outlet size	Minimum size of discharge pipe D1	Minimum size of discharge pipe D2 from tundish	Maximum resistance allowed, expressed as a length of straight pipe (no elbows or bends)	Resistance created by each elbow or bend
G 1/2	**15 mm**	**22 mm**	**Up to 9 m**	**0.8 m**
		28 mm	**Up to 18 m**	**1.0 m**
		35 mm	**Up to 27 m**	**1.4 m**
G 3/4	22 mm	28 mm	Up to 9 m	1.0 m
		35 mm	Up to 18 m	1.4 m
		42 mm	Up to 27 m	1.7 m
G1	28 mm	35 mm	Up to 9 m	1.4 m
		42 mm	Up to 18 m	1.7 m
		54 mm	Up to 27 m	2.3 m

<Table 5.4.1>

5.5 Electrical Connection

All electrical work should be carried out by a suitably qualified technician. Failure to comply with this could lead to electrocution, fire, and death. It will also invalidate product warranty. All wiring should be according to national wiring regulations.

Breaker abbreviation	Meaning
ECB	Earth leakage circuit breaker for booster heater
TB1	Terminal block 1
TB2	Terminal block 2



<Figure 5.5.1>

⚠ CAUTION

This product contains electrostatic-sensitive components that can be damaged if handled incorrectly. To prevent any electrostatic damage, ensure you are electrically grounded / earthed in order to discharge any possible static electricity build-up.

- **The outdoor unit can only be powered via Cylinder unit.**
- Connections should be made to the terminals as indicated in the figures to the left below.
- The wires (① ～ ⑦) MUST NOT be bundled together with other wires having different number. (Refer to <Figure 5.5.1>)

Ⓐ Locally supplied wiring should be inserted through the inlets situated on the top of the cylinder unit. (Refer to page B-3)

Ⓑ Wiring should be fed down the left hand side of the control and electrical box and clamped in place using clips provided.

Ⓒ The wires should be inserted individually through the cable inlets on the control board (Figure 5.5.1).

③ Remote sensor wire
④ Signal input cable
⑤ Wireless receiver (option) (PAR-WR51R-E) and Wi-Fi interface (option) (PAC-WF010-E) cable
⑥ Output cable

Ⓓ Connect the power cable for the Cylinder unit to TB1. ···①
① Power cable

Ⓔ Connect the outdoor unit – cylinder unit connecting cable to TB2. ···②
② Cylinder unit - Outdoor unit cable

Ⓕ Connect the power cable for the booster heater to ECB. ···⑦
⑦ Power cable for Booster heater

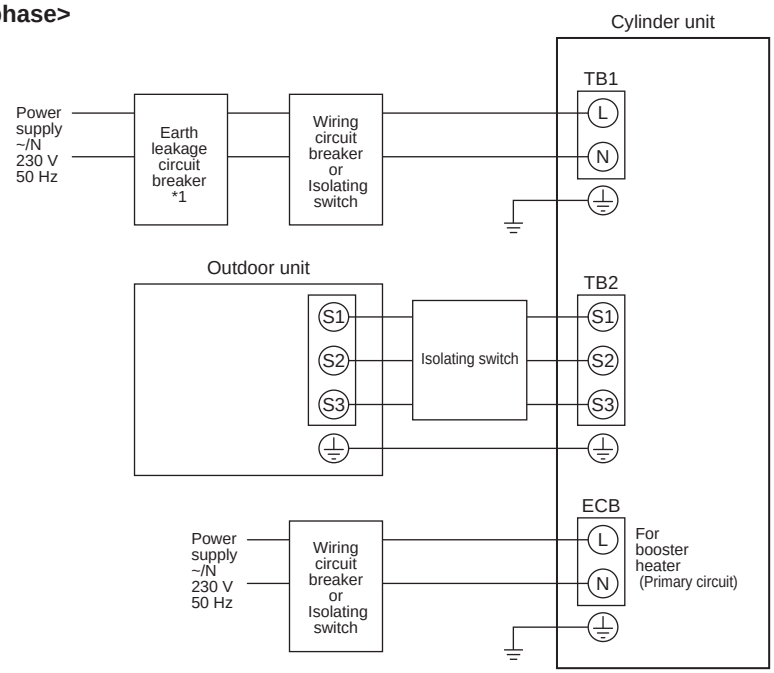
- Make sure that ECB is ON. *1
- On completion of wiring, ensure main controller cable is connected to the relay connector.

Note: *1 When the ECB is turned off, push down the power lever without pressing the test button.

⚠ WARNING

When confirming the operation of the ECB, make sure that the ECB can be turned ON/OFF by the power lever before pressing the test button.
If the ECB cannot be turned ON/OFF by the power lever, stop using the ECB and replace it.

Outdoor unit powered via cylinder unit
<1 phase>



Tightening torque	
TB1	2.0 ~ 2.5 Nm
TB2	2.0 ~ 2.5 Nm
ECB	1.3 ~ 1.7 Nm
earth	2.0 ~ 2.5 Nm

<Figure 5.5.2>
Electrical connections 1 phase

*1. Current sensitivity 10 mA, operating time 0.1 s.
If the installed earth leakage circuit breaker does not have an over-current protection function, install a breaker with that function along the same power line.

Description	Power supply	Capacity	Breaker	Wiring
Booster heater (Primary circuit)	230V N~ 50 Hz	2 kW	16 A *2 *3	3 × 2.5 mm²

Cylinder unit power supply			~/N 230 V 50 Hz
Cylinder unit input capacity Main switch (Breaker)		*2	20 A
Wiring Wiring No. × size (mm²)	Cylinder unit power supply (including earth cable)		3 × Min. 2.5
	Cylinder unit - Outdoor unit (including earth cable)	*4	4 × Min. 2.5
Circuit rating	Cylinder unit L - N	*5	230 V AC
	Cylinder unit - Outdoor unit S1 - S2	*5	230 V AC
	Cylinder unit - Outdoor unit S2 - S3	*5	24 V DC

*2. A breaker with at least 3.0 mm contact separation in each pole shall be provided.
The breaker shall be provided to ensure disconnection of all active phase conductors of the supply.
*3. Use a breaker with an over-current protection function.
*4. Max. 15 m
*5. The values given in the table above are not always measured against the ground value.

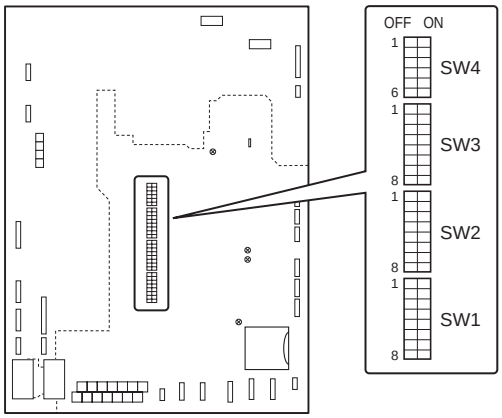
Note: 1. Wiring size MUST comply with the applicable local and national codes.
2. Cylinder unit/outdoor unit connecting cables shall not be lighter than polychloroprene sheathed flexible cable. (Design 60245 IEC 57)
Cylinder unit power supply cables shall not be lighter than polychloroprene sheathed flexible cable. (Design 60227 IEC 53)
3. Install an earth longer than other cables.
4. Please keep enough output capacity of power supply for each heater. The lack of the power supply capacity may possibly cause chattering.

6.1 DIP Switch Functions

Located on the FTC printed circuit board are 4 sets of small white switches known as DIP switches. The DIP switch number is printed on the circuit board next to the relevant switches. The word ON is printed on the circuit board and on the DIP switch block itself. To move the switch you will need to use a pin or the corner of a thin metal ruler or similar.

DIP switch settings are listed below in Table 6.1.1.
Before changing any switch settings, ensure the power supplies to both cylinder unit and outdoor unit are turned OFF.

Before changing the DIP switch setting, confirm that the power supply earth cable is securely connected and prevent the FTC from being applied with static electricity (e.g. touch a case body etc.). Otherwise, it may cause a failure of the FTC due to the static electricity.



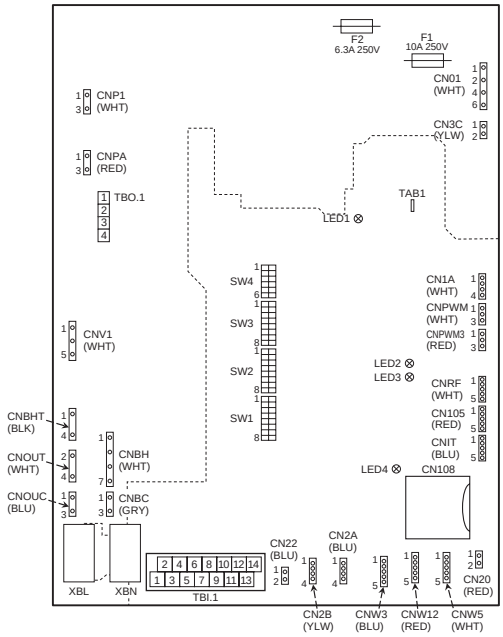
<Figure 6.1.1>

DIP switch		Function	OFF	ON	Default settings: Indoor unit model
SW1	SW1-1	—	—	—	OFF
	SW1-2	—	—	—	OFF
	SW1-3	—	—	—	OFF
	SW1-4	—	—	—	OFF
	SW1-5	—	—	—	OFF
	SW1-6	—	—	—	OFF
	SW1-7	—	—	—	OFF
	SW1-8	Wireless remote controller	WITHOUT Wireless remote controller	WITH Wireless remote controller	OFF
SW2	SW2-1	Room thermostat1 input (IN1) logic change	Zone1 operation stop at thermostat short	Zone1 operation stop at thermostat open	OFF
	SW2-2	—	—	—	OFF
	SW2-3	—	—	—	OFF
	SW2-4	—	—	—	OFF
	SW2-5	Automatic switch to backup heat source operation (When outdoor unit stops by error)	Inactive	Active *1	OFF
	SW2-6	—	—	—	OFF
	SW2-7	—	—	—	OFF
	SW2-8	—	—	—	OFF
SW3	SW3-1	Room thermostat 2 input (IN6) logic change	Zone2 operation stop at thermostat short	Zone2 operation stop at thermostat open	OFF
	SW3-2	—	—	—	OFF
	SW3-3	—	—	—	OFF
	SW3-4	Electric energy meter	WITHOUT Electric energy meter	WITH Electric energy meter	OFF
	SW3-5	—	—	—	OFF
	SW3-6	2-zone valve ON/OFF control	Inactive	Active	OFF
	SW3-7	—	—	—	OFF
	SW3-8	Heat meter	WITHOUT Heat meter	WITH Heat meter	OFF
SW4	SW4-1	—	—	—	OFF
	SW4-2	—	—	—	OFF
	SW4-3	—	—	—	OFF
	SW4-4	Indoor unit only operation (during installation work) *2	Inactive	Active	OFF
	SW4-5	Emergency mode (Heater only operation)	Normal	Emergency mode (Heater only operation)	OFF *3
	SW4-6	—	—	—	OFF

<Table 6.1.1>

Note: *1. For safety reasons, this function is not available for certain errors.
(In that case, system operation MUST be stopped and only the water circulation pump keeps running.)
***2. Space heating and DHW can be operated only in indoor unit, like an electric boiler. (Refer to "6.4 Indoor unit only operation".)**
***3. If emergency mode is no longer required, return the switch to OFF position.**

6.2 Connecting inputs/outputs



<Figure 6.2.1>

When the wires are wired to adjacent terminals use ring terminals and insulate the wires.

Note: Before connecting a wire to the TBI.1, confirm that the power supply earth cable is securely connected and prevent the FTC from being applied with static electricity (e.g. touch a case body etc.). Otherwise, it may cause a failure of the FTC due to the static electricity.

Signal inputs

Name	Terminal block	Connector	Item	OFF (Open)	ON (Short)
IN1	TBI.1 3-4	—	Room thermostat 1 input	Refer to SW2-1 in <6.1 DIP Switch Functions>.	
IN6	TBI.1 1-2	—	Room thermostat 2 input	Refer to SW3-1 in <6.1 DIP Switch Functions>.	
IN8	TBI.1 5-6	—	Electric energy meter 1	*1	
IN9	TBI.1 7-8	—	Electric energy meter 2		
IN10	TBI.1 9-10	—	Heat meter		

*1. Connectable electric energy meter and heat meter

- Pulse type: Voltage free contact for 12VDC detection by FTC (TBI.1 5, 7 and 9 pins have positive voltage.)
- Pulse duration: Minimum ON time: 40ms
  Minimum OFF time: 100ms
- Possible unit of pulse: 0.1 pulse/kwh, 1 pulse/kwh, 10 pulse/kwh, 100 pulse/kwh, 1000 pulse/kwh

Those values can be set by the main controller. (Refer to the menu tree in "6.6 Main Controller".)

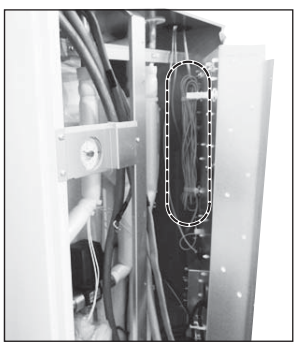
Wiring specification and local supply parts

Item	Name	Model and specifications
Signal input function	Signal input wire	Use sheathed vinyl coated cord or cable. Max. 10 m Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.13 mm² to 1.25 mm² Solid wire: ø0.4 mm to ø1.2 mm
	Switch	Non-voltage “a” contact signals Remote switch: minimum applicable load 12V DC, 1mA

Thermistor inputs

Name	Terminal block	Connector	Item	Optional part model
TH1	—	CN20	Thermistor (Room temp.) (Option)	PAC-SE41TS-E

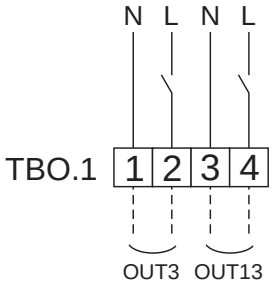
Ensure to wire thermistor wirings away from the power line and/or OUT3 to 13 wirings.
Do not splice the wiring to extend or shorten it, otherwise this could affect correct monitoring of each temperature.
If the wiring is too long, bundle it with a strap to adjust the length in the cylinder unit.(see the photograph on the right)
***1. The maximum length of the thermistor wiring out of the cylinder unit is 5 m.**
When the wires are wired to adjacent terminals, use ring terminals and electrically insulate the wires.



Outputs

Name	Terminal block	Connector	Item	OFF	ON	Signal/Max current	Max. total current
OUT3	TBO.1.1-2	—	2-way valve 2b output *1	OFF	ON	230V AC 0.1A Max.	0.2A
OUT13	TBO.1.3-4	—	2-way valve 2a output *1	OFF	ON	230V AC 0.1A Max.	

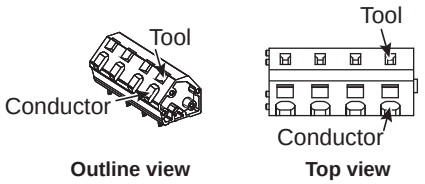
***1 For 2-zone valve ON/OFF control.**



How to use TBO.1

Wiring specification and local supply parts

Item	Name	Model and specifications
External output function	Outputs wire	Use sheathed vinyl coated cord or cable. Max. 30 m Wire type: CV, CVS or equivalent Wire size: Stranded wire 0.25 mm² to 1.5 mm² Solid wire: ø0.57 mm² to ø1.2 mm²



Outline view **Top view**

Connect them using either way as shown above.

<Figure 6.2.2>

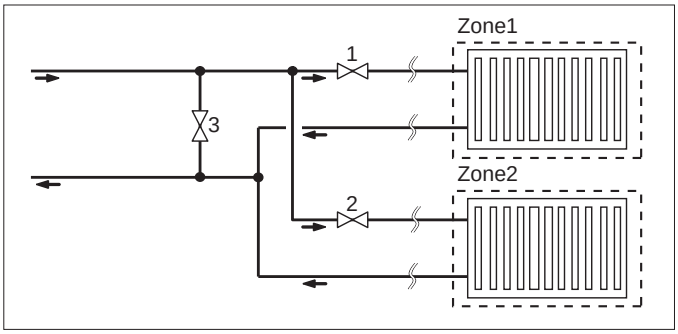
Note:

1. Stranded wire should be processed with insulation-covered bar terminal (DIN46228-4 standard compatible type).

6.3 2-zone valve ON/OFF control

Opening /closing 2-way valve provides a simple 2-Zone control.
Flow temperature is common for Zone1 and 2.

1. Pipework



1. Zone1 2-way valve 2a (local supply)
2. Zone2 2-way valve 2b (local supply)
3. Auto by-pass valve (local supply) *1

*1 For safety protection, it is recommended to install an auto by-pass valve.

Note: Freeze stat function is deactivated whilst this control is ON. Therefore, ensure that anti-freeze solution is used to minimise freezing risk. For anti-freeze instruction, see page B-10.

2. DIP switch

Turn DIP switch 3-6 ON.

3. 2-way valve 2a (for Zone1) / 2-way valve 2b (for Zone2)

Electrically wire 2-way valve 2a and 2b to the appropriate external output terminals. (Refer to "External outputs" in 6.2)

4. Room thermostat connection

Heating operation mode	Zone1	Zone2
Room temp. control (Auto adaptation) *2	●Wireless remote controller (option) ●Room temperature thermistor (option)	●Wireless remote controller (option)
Compensation curve or flow temp. control	●Wireless remote controller (option) *3 ●Room temperature thermostat (local supply)	●Wireless remote controller (option) *3 ●Room temperature thermostat (local supply)

***2 Ensure to install the room thermostat for Zone1 in main room since the Room temp. control for Zone1 is prioritized.**
***3 In this case, the wireless remote controller can be used as a thermostat.**

6.4 Indoor unit only operation (during installation work)

In the case when DHW or heating operation is required prior to connection of the outdoor unit; i.e. during installation work, the booster heater in cylinder unit can feasibly be engaged as the sole heat source (short - term operating condition).
For this scenario, the installer will have to form a temporary pipe loop connection across cylinder's heat pump connections.

1. To start operation
● Check if the indoor unit power supply is OFF, and turn DIP switch 4-4 and 4-5 ON.
● Turn ON the indoor unit power supply.

2. To end operation*
● Turn OFF the indoor unit power supply.
● Turn DIP switch 4-4 and 4-5 OFF.
*When the indoor unit only operation is ended, ensure to check over the settings after outdoor unit is properly connected and ready for use.

Note:
1. Prolonged running of this mode of operation may affect the life of the booster heater.
2. When the indoor unit only operation is engaged, if the Water circulation pump 1 is set on low speed, DHW supply temperature may become higher than the desired water temperature set on the main controller.

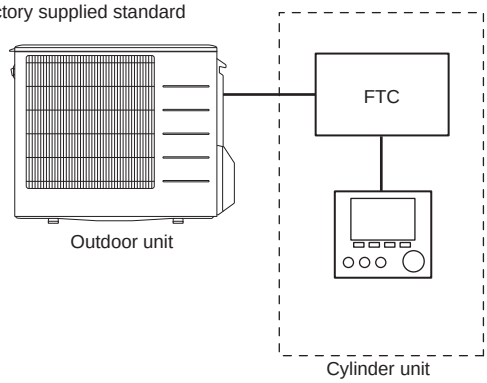
6.5 Remote Controller Options

The cylinder unit comes factory fitted with a main controller. This incorporates a thermistor for temperature monitoring and a graphical user interface to enable set-up, view current status and input scheduling functions. The main controller is also used for servicing purposes.
This facility is accessed via password protected service menus.

To provide the best efficiency Mitsubishi Electric recommends using automatic adaptation function based on room temperature. To use this function a room thermistor needs to be present in a main living area. This can be done in a number of ways the most convenient are detailed below.
Refer to heating section of this manual for instructions on how to set compensation curve, Flow temp. or Room temp. (Auto adaptation).
For instructions on how to set the thermistor input for the FTC please refer to Initial settings section.

The factory setting for space heating mode is set to Room temp. (auto adaptation). If there is no room sensor present in the system, this setting MUST be changed to either Compensation curve mode or Flow temp. mode.

Factory supplied standard



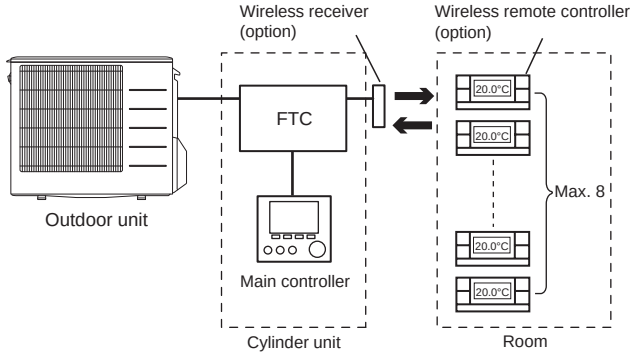
1-zone temperature control

Control option A

This option features the main controller and the Mitsubishi Electric wireless remote controller. The wireless remote controller is used to monitor room temperature and can be used to make changes to the space heating settings, boost DHW and switch to holiday mode without having to directly use the main controller.

If more than one wireless remote controller is used, the most recently requested temperature setting will commonly be applied to all rooms by the central control system regardless of which wireless remote controller was used. No hierarchy exists across these remote controllers.

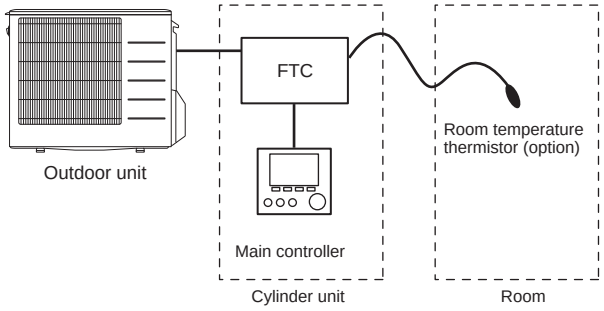
Wire the wireless receiver to FTC by referring to the wireless remote controller instruction manual. **Turn DIP SW1-8 to ON**. Before operation configure the wireless remote controller to transmit and receive data by referring to the wireless remote controller installation manual.



Control option B

This option features the main controller and the Mitsubishi Electric thermistor wired to FTC. The thermistor is used to monitor room temperature but can not make any changes in control operation. Any changes to DHW MUST be made using the main controller mounted on the cylinder unit.

Wire the thermistor to the TH1 connector on FTC.
The number of room temperature thermistors that can be connected to FTC is always one.



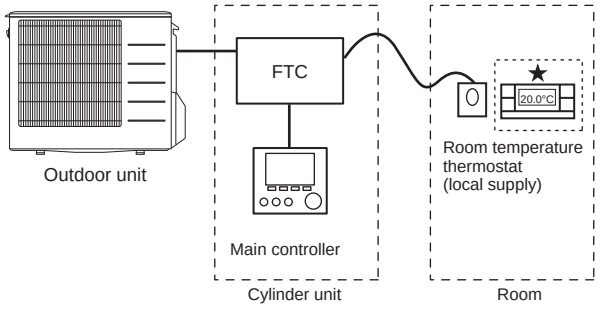
Control option C (Flow temp. or compensation curve only)

This option features the main controller and a locally supplied thermostat wired to FTC.The thermostat is used to set the maximum temperature for heating room. Any changes to DHW MUST be made using main controller mounted on the cylinder unit.

The thermostat is wired to IN1 in TBI.1 on FTC. The number of thermostats that can be connected to FTC is always one.

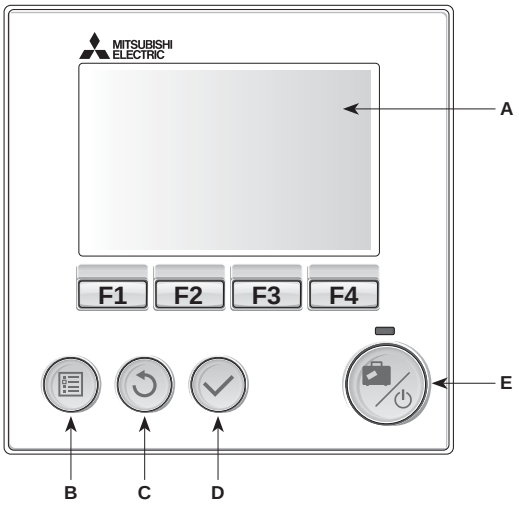
★ **A single wireless remote controller may also be used as a thermostat (rather than a room thermostat).**

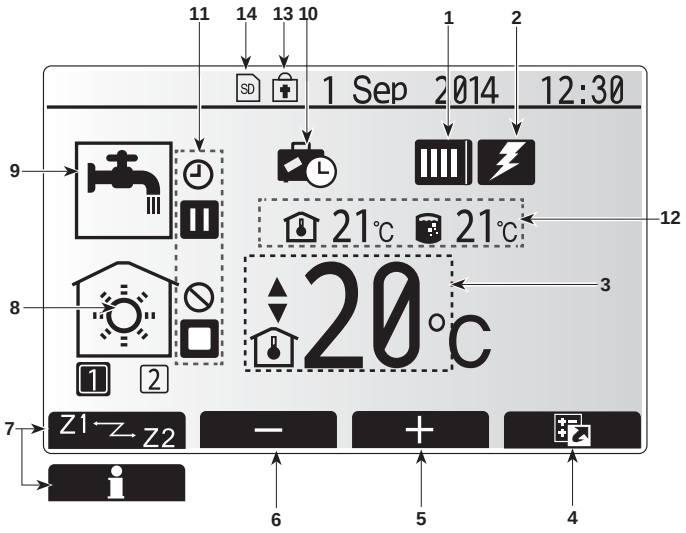
In such a case, the system would also necessitate wireless receiver on cylinder unit to receive the remote controller's signal / feedback.



Note:
2-zone temperature control is not available.
2-zone valve on/off control is available.

6.6 Main Controller





Main screen

<Main controller parts>

Letter	Name	Function
A	Screen	Screen in which all information is displayed
B	Menu	Access to system settings for initial set up and modifications.
C	Back	Return to previous menu.
D	Confirm	Used to select or save. (Enter key)
E	Power/Holiday	If system is switched off pressing once will turn system on. Pressing again when system is switched on will enable Holiday Mode. Holding the button down for 3 secs will turn the system off. (***1**)
F1-4	Function keys	Used to scroll through menu and adjust settings. Function is determined by the menu screen visible on screen A.

***1**
When the system is switched off or the power supply is disconnected, the cylinder unit protection functions (e.g. freeze stat function) will NOT operate. Please beware that without these safety functions enabled the cylinder unit and installation may potentially become exposed to damage.

<Main screen icons>

	Icon	Description	
1	Heat pump		'Heat pump' is running.
			Defrosting.
			Emergency heating.
2	Electric heater	When this icon is displayed the 'Electric heaters' (booster heater) are in use.	
3	Target temperature		Target flow temperature
			Target room temperature
			Compensation curve
4	OPTION	Pressing the function button below this icon will display the option screen.	
5	+	Increase desired temperature.	
6	-	Decrease desired temperature.	
7	Z1 Z2	Pressing the function button below this icon switches between Zone1 and Zone2.	
	Information	Pressing the function button below this icon displays the information screen.	
8	Space heating mode		Heating mode Zone1 or Zone2
9	DHW mode	Domestic hot water heating mode	
10	Holiday mode	When this icon is displayed 'Holiday mode' activated.	
11		Timer is activated.	
		Prohibited	
		Server control is activated.	
		Stand-by	
		Stopped	
		Operating	
12	Current temperature		Current room temperature
			Current water temperature of thermal store tank
13		The Menu button is locked or the switching of the operation modes between DHW and Heating operations are disabled in the Option screen.(***2**)	
14		SD memory card is inserted. Normal operation.	
		SD memory card is inserted. Abnormal operation.	

***2 To lock or unlock the Menu, press the BACK and CONFIRM keys simultaneously for 3 seconds.**

Setting the Main Controller

After the power has been connected to the outdoor and cylinder units (See chapter 5.5) the initial system settings can be entered via the main controller.

1. Check all breakers and other safety devices are correctly installed and turn on power to the system.
2. When the main controller is switched on for the first time, the screen automatically goes to Initial settings menu, Date/Time setting screen.
3. Main controller will automatically start up. Wait approximately one minute whilst the control menus load.
4. When the controller is ready a blank screen with a line running across the top will be displayed.
5. Press button E (Power) (refer to page B-21) to turn on the system. Before turning on the system, perform initial settings as instructed below.

Main Settings Menu

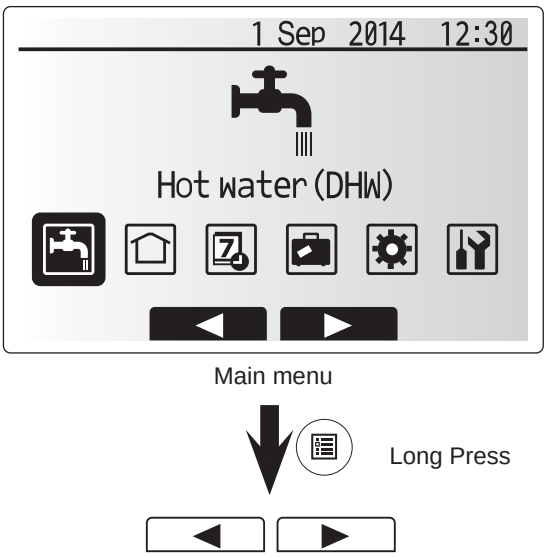
The main settings menu can be accessed by pressing the MENU button. To reduce the risk of untrained end users altering the settings accidentally there are two access levels to the main settings; and the service section menu is password protected.

User Level – Short press
If the MENU button is pressed once for a short time the main settings will be displayed but without the edit function. This will enable the user to view current settings but **NOT** change the parameters.

Installer Level – Long press
If the MENU button is pressed down for 3 secs the main settings will be displayed with all functionality available.

The following items can be viewed and/or edited (dependent on access level).

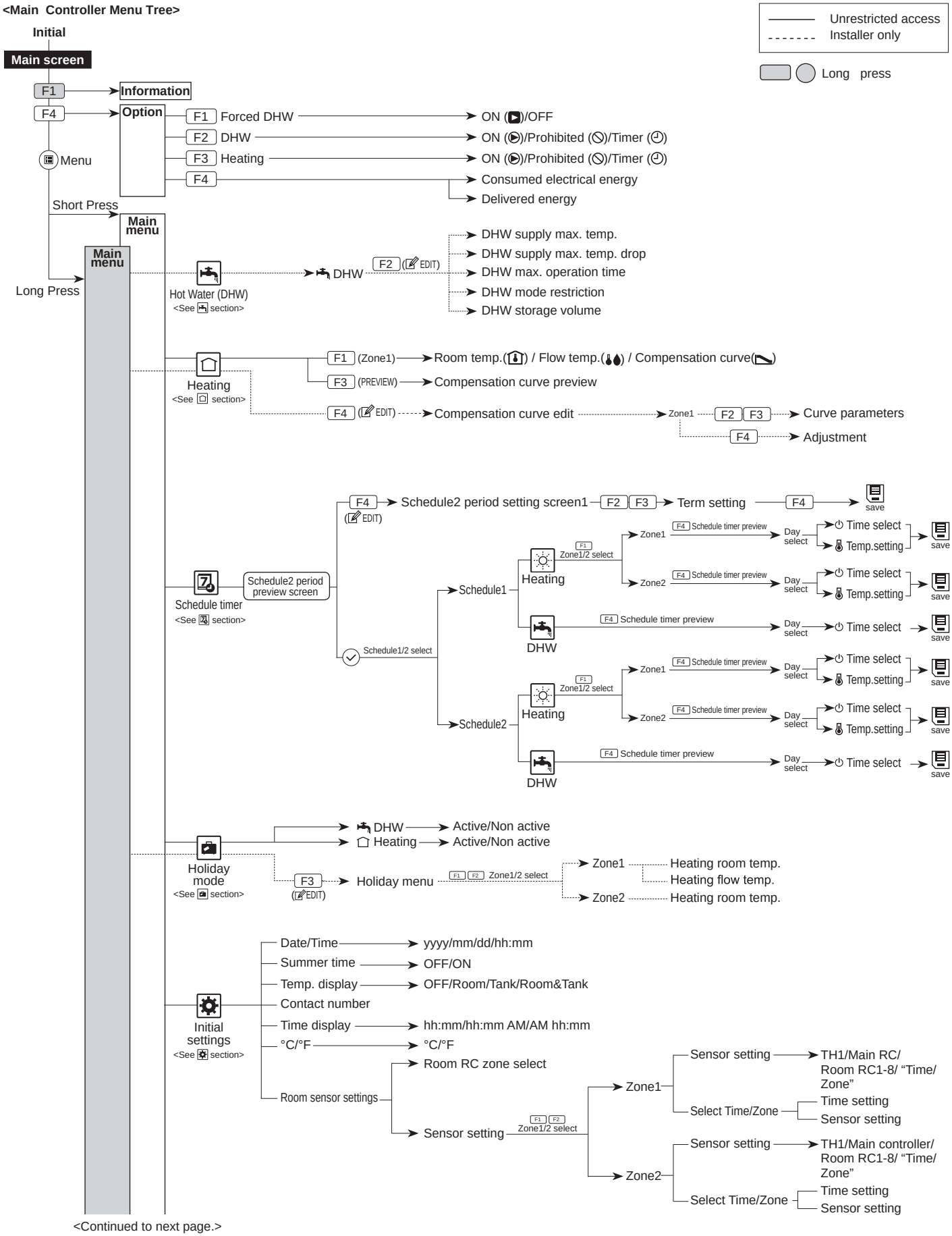
- Domestic Hot water (DHW)
- Heating
- Schedule timer
- Holiday mode
- Initial settings
- Service (Password protected)



General Operation

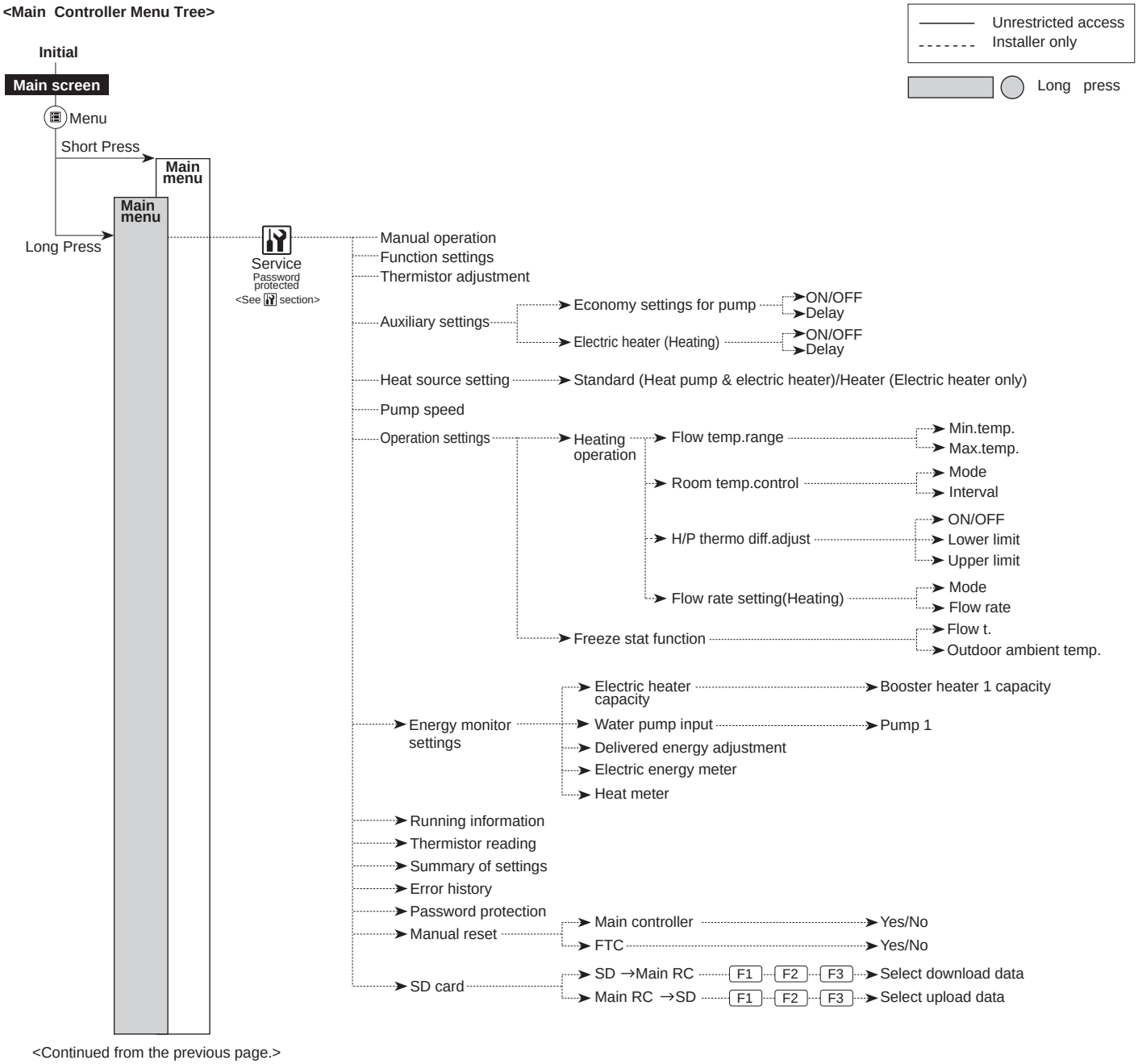
- To find the icon that you wish to set, use the F2 and F3 buttons to move between the icons.
- The highlighted icon will appear as a larger version of the center of the screen.
- Press CONFIRM to select and edit the highlighted mode.
- Follow the <Main Controller Menu Tree> for further setting, using ◄ ► buttons for scrolling or F1 to F4 for selecting.

<Main Controller Menu Tree>



<Continued to next page.>

<Main Controller Menu Tree>



<Continued from the previous page.>

Domestic Hot Water (DHW)

►For further detail about operation, refer to Operation manual.

Heating

►For further detail about operation, refer to Operation manual.

Schedule timer

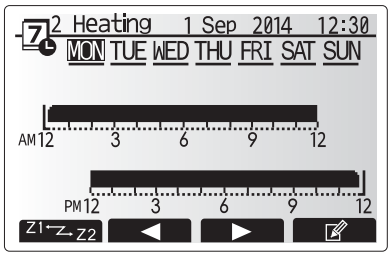
Scheduled timer can be set in two ways, for example; one for summer and the other for winter. (Refer to as "Schedule 1" and "Schedule 2" respectively.) Once the term (months) for the Schedule 1 is specified, rest of the term will be specified as Schedule 2. In each Schedule, an operational pattern of modes (Heating / DHW) can be set. If no operational pattern is set for Schedule2, only the pattern for Schedule 1 will be valid. If Schedule 2 is set to full-year (i.e. March to Feb.), only the operational pattern for Schedule 2 will be valid.

Follow the procedure described in General Operation (Page B-22) for the set up operation.

Setting the schedule timer

The preview screen allows you to view the current settings. In 2-zone heating operation, press F1 to switch between Zone1 and Zone2. Days of the week are displayed across the top of the screen. Where day appears underlined the settings are the same for all those days underlined.
Hours of the day and night are represented as a bar across the main part of the screen. Where the bar is solid black, space heating/DHW (whichever is selected) is allowed.

When scheduling heating, button F1 changes the scheduled variable between time and temperature. This enables a lower temperature to be set for a number of hours e.g. a lower temperature may be required at night when the occupants are sleeping.



Preview screen

- The schedule timer for space heating and DHW are set in the same way. However for DHW only time can be used as scheduling variable.
- A small rubbish bin character is also displayed choosing this icon will delete the last unsaved action.
- It is necessary to use the SAVE function F4 button to save settings. CONFIRM does not act as SAVE for this menu.

Holiday mode

►For further detail about operation, refer to Operation manual.

Initial Settings

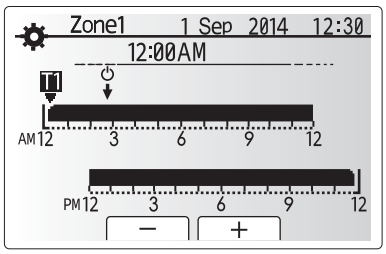
From the Initial settings menu the installer can set the following.

- Date/Time
- Summer time
- Temp. display
- Contact number
- Time display
- ºC/ºF
- Room sensor settings

Follow the procedure described in General Operation for the set up operation.

<Room sensor settings>

For room sensor settings it is important to choose the correct room sensor depending on the heating mode the system will operate in.



Time/Zone schedule setting screen

Menu subtitle	Description
Room RC zone select	When 2-zone valve on/off control is active and wireless remote controllers are available, from Room RC zone select screen, select zone No. to assign to each remote controller.
Sensor setting	From sensor setting screen, select a room sensor to be used for monitoring the room temperature from Zone1 and Zone2 separately.

Control option (page B-20)	Corresponding initial settings room sensor	
	Zone 1	Zone 2
A	Room RC 1-8 (one each for Zone1 and Zone2)	*1
B	TH1	*1
C	*1	*1
When different room sensors are used according to the time schedule	Time/ Zone*2	*1

*1. Not specified (if a locally-supplied room thermostat is used) Room RC 1-8 (one each for Zone1 and Zone2) (if a wireless remote controller is used as a room thermostat)
*2. From sensor setting screen, select Time/Zone to make it possible to use different room sensors according to the time schedule set in the Select Time/ Zone menu. The room sensors can be switched up to 4 times within 24 hours.

Service Menu

The service menu provides functions for use by installer or service engineer. It is NOT intended the home owner alters settings within this menu. It is for this reason password protection is required to prevent unauthorised access to the service settings.

The factory default password is "0000".
Follow the procedure described in General Operation for the set up operation.

The service menu is navigated using the F1 and F2 buttons to scroll through the functions. The menu is split across several screens and is comprised of the following functions;

1. Manual operation
2. Function settings
3. Thermistor adjustment
4. Auxiliary settings
5. Heat source setting
6. Pump speed
7. Operation settings
8. Energy monitor settings
9. Running information
10. Thermistor reading
11. Summary of settings
12. Error history
13. Password protection
14. Manual reset
15. SD card

In this Installation Manual, instructions will be given only for the following functions;

1. Manual operation
2. Auxiliary settings
3. Heat source setting
4. Pump speed
5. Operation settings
6. Energy monitor settings
7. Password protection
8. Manual reset
9. SD card

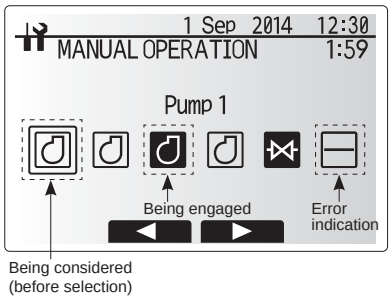
Information on the other functions can be found by consulting the Service Manual.

Many functions can not be set whilst the indoor unit is running. The installer should turn off the unit before trying to set these functions. If the installer attempts to change the settings whilst the unit is running the main controller will display a reminder message prompting the installer to stop operation before continuing. By selecting “Yes” the unit will cease operation.

<Manual operation>

During the filling of the system the water circulation pump and 3-way valve can be manually overridden using manual operation mode.
When manual operation is selected a small timer icon appears in the screen. The function selected will only remain in manual operation for a maximum of 2 hours. This is to prevent accidental permanent override of the FTC.

►Example
Pressing F3 /D button will switch manual operation mode ON for the main 3-way valve. When filling of the thermal store tank is complete the installer should access this menu again and press F3 /D to deactivate manual operation of the part. Alternatively after 2 hours manual operation mode will no longer be active and FTC will resume control of the part.



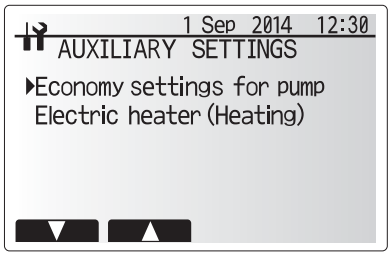
Manual operation menu screen

<Auxiliary settings>

This function is used to set the parameters for any auxiliary parts used in the system

Menu subtitle		Function/ Description
Economy settings for pump		Water pump stops automatically a specified period of time from when operation is finished.
	Delay	Time before pump switches off*1
Electric heater (Heating)		To select "WITH booster heater (ON)" or "WITHOUT booster heater (OFF)" in Heating mode.
	Delay	The minimum time required for the booster heater to turn ON after Heating mode has started.

*1. Decreasing "time before pump switched off" may increase the duration of stand-by in Heating mode.



Auxiliary settings menu screen

<Heat source setting>

The default heat source setting is heat pump and booster heater present in the system to be operational. This is referred to as Standard operation on the menu.

<Operation settings>

Heating operation

This function allows operational setting of flow temperature range from the Ecodan and also the time interval at which the FTC collects and processes data for the auto adaptation mode.

1. Heating operation for auto adaptation mode

Menu subtitle		Function	Range	Unit	Default
Flow temp. range	Minimum temp.	To minimize the loss by frequent ON and OFF in mild outdoor ambient temperature seasons.	25 - 45	ºC	40
	Maximum temp.	To set max. possible flow temperature according to the type of heat emitters.	35 - 60	ºC	50
Room temp. control	Mode	Setting for Room temp. control At Fast mode, target outlet water temperature is set higher than the one set at normal mode. This reduces the time to reach the target room-temperature when the room temperature is relatively low.*	Normal/ Fast	--	Normal
	Interval	Selectable according to the heat emitter type and the materials of floor (i.e. radiators, floor heating-thick, -thin concrete, wood, etc.)	10 ~ 60	mins.	10
Heat pump thermo diff.adjust	On/Off	To minimize the loss by frequent ON and OFF in mild outdoor ambient-temperature seasons.	On/Off	—	On
	Lower limit	Prohibits heat pump operation until the flow temperature drops below the target flow temperature plus lower limit value.	−9 - −1	ºC	−5
	Upper limit	Allows heat pump operation until the flow temperature rises above the target flow temperature plus upper limit value.	+3 - +15	ºC	+9

<Table 6.6.1> Heating operation(Room temp.control table)

Note:

1. The minimum flow temperature that prohibits heat pump operation is 20ºC.
2. The maximum flow temperature that allows heat pump operation equals to the maximum temperature set in the Flow temp. range menu.

* Fast mode is not most efficient and will result in increased running cost when compared to normal mode.

2.Heating operation for auto adaptation, compensation curve, and flow temp. control

Menu subtitle		Function	Range	Unit	Default
Flow rate setting	Mode	Auto mode automatically selects a flow rate from 3 to 7 L/min appropriate for effective operation according to Room temp. control. Manual mode targets Flow rate setting value. ※Select Manual mode except for Room temp. control.	Auto/ Manual	—	Auto
	Flow rate	Select the target circulation flow rate for heating at Manual mode. ※Be aware of the shortage of required flow rate for each heat emitters.	3 - 8	L/min	7

<Table 6.6.2>

Note: Recommended flow rate setting at Manual mode is listed below.

・When the Flow temp. is high (e.g. radiator) recommended flow rate is low
・When the Flow temp. is low (e.g. underfloor heating) recommended flow rate is high.
・Low flow rate setting with low flow temp. may cause frequent ON/OFF operation of pump.

* In case of “Compensation curve mode” or “Flow temp. mode” selected, even if flow rate setting is “Auto” mode,flow rate will be fixed at “7.0 L/min”.

Freeze stat function

Menu subtitle		Function/ Description
Freeze stat function		An operational function to prevent the water circuit from freezing when outdoor ambient temperature drops.
	Flow t.	The target outlet water temperature at water circuit when operating in Freeze stat function.
	Outdoor ambient temp.	Minimum outdoor ambient temperature which freeze stat function will begin to operate, (3 - 20ºC) or choose**. If asterisk (**) is chosen freeze stat function is deactivated. (i.e. primary water freeze risk)"

Note:

1. When the system is turned off, freeze stat function is not enabled.
2. Flow t. is fixed at 20ºC and unchangeable.

<Energy monitor settings>
In this menu, all parameters required to record the consumed electrical energy and the delivered heat energy which is displayed on the main controller can be set.The parameters are an electric booster heater capacity, supply power of water pumps and heat meter pulse.

Follow the procedure described in General Operation for the set up operation.

For Pump 1, *** can be also set besides this setting.
In the case *** is selected, the system acknowledges "factory fitted pump" is selected.
Refer to the section [Energy Monitor] in "page B-8"

<Password protection>
Password protection is available to prevent unauthorised access to the service menu by untrained persons.

Resetting the password
If you forget the password you entered, or have to service a unit somebody else installed, you can reset the password to the factory default of 0000.

1. From the main settings menu scroll down the functions until Service Menu is highlighted.
2. Press CONFIRM.
3. You will be prompted to enter a password.
4. Hold down buttons F3 and F4 together for 3 secs.
5. You will be asked if you wish to continue and reset the password to default setting.
6. To reset press button F3.
7. The password is now reset to 0000.

<Manual reset>
Should you wish to restore the factory settings at any time, you should use the manual reset function. However, please note this will reset ALL functions to the factory default settings.

<SD card>
The use of an SD memory card simplifies the main controller settings in the field.
*Ecodan service tool (for use with PC tool) is necessary for the setting.

Password input screen

Password verify screen

7-1. Troubleshooting

<Summary of self diagnosis based on Error Codes and Service Procedures>

Present and past Error codes are logged and displayed on the main remote controller or control board of the outdoor unit.
Please refer to the table below and subsequent explanations to diagnose and remedy typical problems that may occur in the field.

Unit Condition	Error Code	Action
Reoccurring problem	Displayed	Use table 7-4. "Self diagnosis and action" to identify fault and correct.
	Not Displayed	Use table 7-5. "Troubleshooting by inferior phenomena" to identify fault and correct.
Non reoccurring problem	Logged	1. Check temporary causes of defects such as the operation of safety devices on the refrigerant/water circuit including compressor, poor wiring, electrical noise etc. Re-check the symptom and the installation environment, weather conditions at time of fault etc. 2. Reset Error code logs, Service the unit and restart system.
	Not Logged	1. Recheck the abnormal symptom
		2. Identify cause of problem and take corrective action according to Table 7-5. "Troubleshooting by inferior phenomena"
		3. If no obvious problem can be found continue to operate the unit.

NOTE

Electrical components should only be replaced as a final option. Please follow instructions in Tables 7-4. and 7-5. Error Codes and Inferior Phenomena fully before resorting to replacing parts.

7-2. Test Run

Before a test run

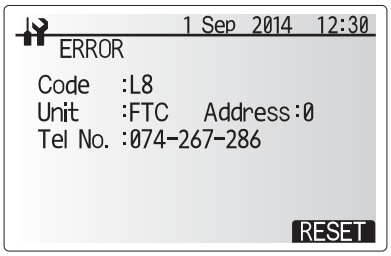
- After installation of outdoor unit, pipework and electrical wiring, recheck that there is no water leakage, loosened connections or miswiring.
- Measure impedance between the ground and the power supply terminal block (L,N) on the outdoor and indoor units with suitable (500V) ohmmeter. Resistance should be ≥ 1.0MΩ .
- Read the Installation and Operation Manuals fully especially the safety requirements before carrying out any test runs.

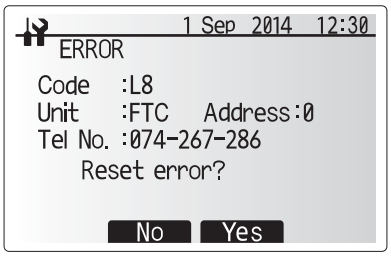
7-3. Malfunction diagnosis method by main remote controller

If during start up or operation a malfunction occurs the error code screen may be displayed on the main remote controller.
The error code screen shows the following; code, unit, ref. address, and telephone number of installer (only if previously entered by the installer)
Please note in the case of some malfunctions an error code is not generated please refer to table 7-5. for more details.

To reset

1. To reset the main remote controller press F4 button (Reset).
2. Then press F3 (Yes) to confirm.





7-4. Self diagnosis and action

Check if DIP SW is set correctly. (Refer to Section 6-1.)

Error code	Title and display conditions	Possible Cause	Diagnosis and action
L3	**Circulation water temperature overheat protection** <DHW/Heating/FS/OS> Error code displayed when THW1 detects a temp. ≥ 80ºC for 10 consecutive seconds or THW2 detects a temp. ≥ 80ºC for 10 consecutive seconds or THW3 detects a temp. ≥ 80ºC for 10 consecutive seconds. DHW : Domestic hot water mode Heating : Heating mode FS : Freeze stat OS : Operation stop TH1A/B : Room temp. thermistor THW1 : Flow water temp. thermistor THW2 : Return water temp. thermistor THW3 : Flow water temp. thermistor 2 (to tank) THW4 : DHW supply temp. thermistor THW5A : Stored water temp. thermistor (upper) THW5B : Stored water temp. thermistor (lower)	1. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit. 2. Valve operation fault 3. 2-way valve (local supply) actuator fault 4. 3-way valve actuator fault 5. Booster heater relay (CNBH) operating fault 6. Power supply voltage increase 7. THW1 or THW2 has become detached from its holder. 8. THW1 or THW2 or THW3 fault 9. FTC board failure	1. Check circulation pump (See service manual 10-6. for how to check). Open air vent to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range during heating operation. Refer to service manual Procedure 5 in “11. DISASSEMBLY PROCEDURE.” 2. Check valves on primary water circuit are installed level. 3. Electrically test to determine fault 4. 1) Electrically test to determine fault. 2) Operate 3-way valve manually using the main remote controller. (Refer to <Manual operation> in page B-26). 3) Replace 3-way valve coil. 4) Replace 3-way valve. (Refer to service manual Procedure 6 in “11. DISASSEMBLY PROCEDURE.”) 5. Electrically test the relays (CNBH) to determine fault. See service manual 10-6. for how to check. 6. Check the supply voltage. 7. Visually inspect location and reattach as necessary. 8. Check resistance of thermistor against table in section 10-6 (service manual). Compare FTC detected temperature to hand held detector. 9. Replace board.
L4	**Tank water temperature overheat protection** <DHW/Heating/FS/OS> Error code display when THW5A detects a temp. ≥ 95ºC for 10 consecutive seconds.	1. 3-way valve actuator fault 2. THW5A fault 3. FTC board failure	1. 1) Electrically test to determine fault. 2) Operate 3-way valve manually using the main remote controller. (Refer to <Manual operation> in page B-26). 3) Replace 3-way valve coil. 4) Replace 3-way valve. (Refer to service manual Procedure 6 in “11. DISASSEMBLY PROCEDURE.”) 2. Check resistance of thermistor against table in section 10-6 (service manual). Compare FTC detected temperature to hand held detector. 3. Replace board.

<table>
<tr><th>Error code</th><th>Title and display conditions</th><th>Possible Cause</th><th>Diagnosis and action</th></tr>
<tr><td>P1/L5</td><td>Indoor unit temperature thermistor failure
* The thermistors subject to failure can be checked in “Request code: 567” in “Running information

<DHW/Heating/LP/FS/OS>
Error code displayed when thermistor is at open or short (see table).</td><td>1. Connector/terminal wire has become detached or loose wiring.
2. Thermistor fault
3. FTC board failure
4. The thermistor on the wireless remote controller or the main remote controller may be defective. (when Room temp. is chosen for the Heating opera tion and when Main remote controller or Room RC 1-8 is chosen for the Room Sensor setting in the Initial setting)</td><td>1. Visually check the terminals and connections and reattaches appropriate.
2. Check resistance of thermistor against table in section 10-6 (service manual). Compare FTC detected temperature to hand held detector.
3. Replace board.
4. Replace wireless remote controller or main remote controller.</td></tr>
<tr><td>L6</td><td>Circulation water freeze protection
<DHW/Heating/FS/OS>
Error code displayed when THW1 detects a temp. ≤ 1ºC for 10 consecutive seconds or THW2 detects a temp. ≤ 3ºC for 10 consecutive seconds.

<u>Exception</u>
Error code will not be displayed if;
FS function is disabled,
For 10 minutes after water circulation pump1 is switched on.</td><td>1. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit
2. Valve operation fault
3. 2-way valve (local supply) actuator fault
4. 3-way valve actuator fault
5. THW1 or THW2 has become detached from its holder.
6. THW1 or THW2 fault
7. FTC board failure</td><td>1. Check circulation pump (See service manual 10-6. for how to check).
Open air vent to remove trapped air.
Check the strainer for blockages.
Check the primary water circuit for leaks.
Check that the flow amount is within the recommended range during heating operation.
Refer to service manual Procedure 5 in “11. DISASSEMBLY PROCEDURE.”
2. Check valves on primary water circuit are installed level.
3. Electrically to determine fault
4. 1) Electrically test to determine fault.
2) Operate 3-way valve manually using the main remote controller. (Refer to <Manual operation> in page B-26).
3) Replace 3-way valve coil.
4) Replace 3-way valve.
(Refer to service manual Procedure 6 in “11. DISASSEMBLY PROCEDURE.”)
5. Visually inspect location and reattach as necessary.
6. Check resistance of thermistor against table in section 10-6 (service manual). Compare FTC detected temperature to hand held detector.
7. Replace board.</td></tr>
<tr><td>L8</td><td>Heating operation error
* “3” is displayed in “Request code: 567” in “Running information”.
<Heating/FS>
If a), b) and c) occur, L8 is displayed;
a) No change on THW1
(under 1°C for 20 minutes from unit starts operation)
b) No change on THW1
(under 1°C for 10 minutes from booster heater starts operation)
c) THW1 - THW2 < -5°C
(for 10 minutes continuously)</td><td>1. THW1 has become detached from its holder.
2. Booster heater fault
3. THW1 or THW2 fault
4. FTC board failure</td><td>1. Visually inspect location and reattach as necessary.
2. Electrically test to determine fault.
See service manual10-6. for how to check.
3. Check resistance of thermistor against table in section 10-6 (service manual). Compare FTC detected temperature to hand held detector.
4. Replace board.</td></tr>
</table>

Error code	Thermistor		Open detection	Short detection
	Symbol	Name		
P1	TH1A/TH1B	Room temperature thermisitor	-39ºC or below	88.5ºC or above
L5	THW1	Flow water temperature thermisitor	-39ºC or below	111ºC or above
	THW2	Return water temperture thermisitor	-39ºC or below	111ºC or above
	THW3	Flow water temp. thermisitor (to tank)	-39ºC or below	111ºC or above
	THW4	DHW supply temp. thermistor	-39ºC or below	111ºC or above
	THW5A	Stored water temp. thermistor (upper)	-39ºC or below	111ºC or above
	THW5B	Stored water temp. thermistor (lower)	-39ºC or below	111ºC or above

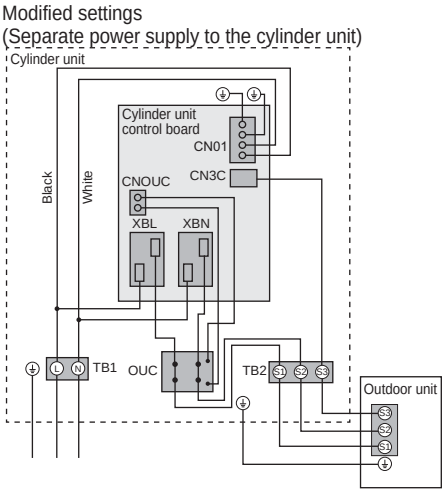
Error code	Title and display conditions	Possible Cause	Diagnosis and action
L9	**Low primary circuit (Heat source side) flow rate detected by flow sensor** * "4" is displayed in "Request code: 569" in "Running information". <Heating> Error code displayed when flow sensor detects low flow rate for 10 seconds.	1. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit. 2. Valve operation fault 3. 2-way valve (local supply) actuator fault 4. Connector wire has become detached or loose wiring. 5. Flow sensor 1 fault 6. FTC board failure	1. Check circulation pump (See service manual 10-6. for how to check). Open air vent to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range during heating operation. Refer to service manual Procedure 5 in "11. DISASSEMBLY PROCEDURE." 2. Check valves on primary water circuit are installed level. 3. Electrically test to determine fault 4. Visually check the CN1A connector and reattach if necessary. 5. Electrically test to determine fault. See service manual 10-6. for how to check. 6. Replace board.
	Low primary circuit (Heat source side) flow rate detected by flow sensor * "5" is displayed in "Request code: 569" in "Running information". <DHM/Heating/LP/LS> Error code displayed when flow sensor detects low flow rate for 10 seconds. Exception While hot water is not supplied.	1. Reduced flow in primary water circuit Due to 1 or more of the following; Faulty pump, insufficient air purge, blocked strainer, leak in water circuit. 2. Valve operation fault 3. 2-way valve (local supply) actuator fault 4. Connector wire has become detached or loose wiring. 5. Flow sensor B fault 6. FTC board failure	1. Check circulation pump (See service manual 10-6. for how to check). Open air vent to remove trapped air. Check the strainer for blockages. Check the primary water circuit for leaks. Check that the flow amount is within the recommended range during heating operation. Refer to service manual Procedure 5 in "11. DISASSEMBLY PROCEDURE." 2. Check valves on primary water circuit are installed level. 3. Electrically test to determine fault 4. Visually check the CN2B connector and reattach if necessary. 5. Electrically test to determine fault. See service manual 10-6. for how to check. 6. Replace board.
LF	Flow sensor failure "*" is displayed in "Request code : 575" in "Running information". * … 1 : Flow sensor 1 2 : Flow sensor A 3 : Flow sensor B		Check flow sensor cable for damage or loose connections.
LP	DHW supply temperature overheat protection <HW/HT/FS/OS> Error code displayed when THW4 detects a temp ≧ 70℃ for 5 concecutive seconds. Exception Error code will not be displayed if; While there is no hot water supply, For 30 seconds after hot water supply start, DHW supply max. temp. is set to more than 61℃, For 24 hours after DHW supply max. temp. is changed from more than 61℃ to less than 60℃.	1. Thermal store tank water tempareture is high (THW5A≧70℃) 2. THW4 fault 3. FTC board failure	1. Refer to L3/L4. 2. Check resistance of thermistor against table in section 10-6 (service manual). 3. Replace board.
LU	Water circulation pump failure "*" is displayed in "Request code:576" in "Running information". * … 1: Water circulation pump 1 2: Water circulation pump A <HW/HT/FS/OS> Error code displayed when PWM feedback signal is set to 83～92% for 10 concecutive seconds. Exception Water circulation pump is OFF.	1. Power supply voltage increase 2. Connector/terminal wire has become detached or loose wiring 3. Water circulation pump is locked 4. Water circulation pump reaching the end of life 5. Water circulation pump fault 6. FTC board failure	1. Check the supply voltage. 2. Visually check the terminals and connectors and reattaches appropriate. 3. to 5. Turn the power to the indoor unit OFF and then ON. Power to both the indoor unit and outdoor unit should be switched OFF then ON. If the LU code is still displayed the water circulation pump should be replaced. 6. Replace board.

Error code	Title and display conditions	Possible Cause	Diagnosis and action
P1	Indoor unit temperature thermistor (TH1) failure	Refer to error codes (P1/L5).	
P2	Indoor unit temperature thermistor (TH2) failure	Refer to error codes (P1/L5).	
E0/E4	**Main remote controller communication failure (Reception error)** Error code E0 is displayed if main remote controller does not receive any signal from the indoor unit for ref. address "0" for 3 minutes. Error code E4 is displayed if indoor unit does not receive any data from the main remote controller for 3 mins or indoor unit does not receive any signal from the main remote controller for 2 minutes.	1. Contact failure with transmission cable 2. Wiring procedure not observed. (Cable length/cable diameter/number of indoor units/number of main remote controllers) 3. Fault on the indoor unit FTC board section controlling Ref. address "0" 4. Fault with the main remote controller circuit board 5. Electrical noise causes interference with transmission/reception of data for main remote controller.	1. Check that main remote controller cable is not extended. 2. Check main remote controller and FTC common wiring max cable length 500 m. Only use 2 core cable. Only connect 1 main remote controller to 1 FTC indoor unit board. 3. to 5. If the problem is not solved by the above measures then: Turn the power to the indoor unit OFF and then ON. Power to both the indoor unit and outdoor unit should be switched OFF then ON. If the E0/E4 code is still displayed the FTC and/ or the main remote controller circuit board should be replaced.
E3/E5	**Main remote controller communication failure (Transmission error)** Error code E3 is displayed if the main remote controller can not find an empty transmission path and thus fails to transmit for 6 secs or the data received by the main remote controller is different to what was sent (by the main remote controller) 30 consecutive times. Error code E5 is displayed if the FTC can not find an empty transmission path for 3 minutes and thus cannot transmit or the data sent by the FTC is different to what was expected 30 consecutive times.	1. 2 or more main remote controllers have been connected to the FTC. 2. Fault with main remote controller transmission/receiving circuit board 3. Fault with the main remote controller circuit board 4. Electrical noise causes interference with transmission/reception of data for main remote controller.	1. Only connect 1 main remote controller to 1 FTC indoor unit board. 2. to 4. Turn the power to the indoor unit OFF and then ON. Power to both the indoor unit and outdoor unit should be switched OFF then ON. If the E3/E5 code is still displayed the FTC and/or the main remote controller circuit board should be replaced.
E6	**Indoor/outdoor communication failure (Reception error)** Error code E6 is displayed if after the power is switched ON to the indoor unit, the FTC board does not receive any signal or the signal received is not complete for 5 seconds, or after a period of operation the FTC board does not receive any signal or the signal received is not complete for 3 minutes.	1. Contact failure/short circuit/miswiring 2. Fault with outdoor unit transmission/ receiving circuit board 3. Fault with FTC transmission/receiving circuit board 4. Electrical noise causes interference with FTC-Outdoor unit transmission cable.	* Check the LED display on the outdoor unit circuit board. Refer to the outdoor unit service manual. 1. Check the connections on the indoor and outdoor unit have not become loose and that the connecting cable is not damaged. Check that there is not false wiring. 2. to 4. Turn the power to the indoor unit OFF and then ON. Power to both the indoor unit and outdoor units should be switched OFF then ON. If the E6 code is still displayed the FTC and/ or the outdoor unit circuit board should be replaced.
E7	**Indoor/outdoor communication failure (Transmission error)** Error code E7 is displayed if despite the FTC board sending signal "0", signal "1" is received 30 consecutive times.	1. Fault with FTC transmission/receiving circuit board 2. Electrical noise causes interference with power supply. 3. Electrical noise causes interference with FTC-outdoor unit transmission cable.	1. to 3. Turn the power to the indoor unit OFF and then ON. Power to both the indoor unit and outdoor unit should be switched OFF then ON. If the E7 code is still displayed the FTC circuit board should be replaced.
E1/E2	**Main remote controller control board failure** Error code E1 displayed if main remote controller can not access it is non volatile (non power dependent) memory. Error code E2 is displayed when there is a fault with the main remote controller's internal clock.	1. Fault with the main remote controller circuit board	1. Replace main remote controller circuit board.

Error code	Title and display conditions	Possible Cause	Diagnosis and action
J0	**Indoor unit/wireless receiver communication failure** Error code J0 is displayed when the FTC can not receive data from the wireless receiver for 1 minute.	1. Connection fault with wireless receiver-FTC connection 2. Fault with FTC receiving circuit board 3. Fault with wireless receiver's transmission circuit board 4. Electrical noise causes interference with wireless receiver communication cable.	1. Check the connections to the wireless receiver and FTC have not become loose and that the connecting cable is not damaged. 2. to 4. Turn the power to the indoor unit OFF and then ON. Power to both the indoor unit and outdoor unit should be switched OFF then ON. If the J0 code is still displayed the FTC and/or the wireless receiver circuit board should be replaced.
J1 to J8	**Wireless remote controller/wireless receiver communication failure (Reception error)** Error code displayed if wireless receiver receives no/incomplete data from the wireless remote controller for 15 consecutive minutes. The digit after the J refers to the address of the wireless remote controller that has the error. E.g. Error code "J3" refers to a communication fault between the wireless receiver and wireless remote control with address 3.	1. Battery on wireless remote controller maybe flat 2. The wireless remote controller is out of range of the wireless receiver. 3. Fault with wireless remote controller transmission circuit board 4. Fault with wireless receiver's reception circuit board	1 Check and replace the battery if necessary the wireless remote controller battery. 2. to 4. Reposition the wireless remote controller closer to the receiver and perform a communication test. For procedure refer to wireless remote controller installation manual. If "OK" is displayed then the cause of the J1 to J8 error was the controller was out of range of the receiver. The wireless remote controller should be installed within range of the receiver. If "Err" is displayed replace wireless remote controller with a new controller and perform the pairing procedure. If after this procedure the "Err" code is still displayed the fault is with the receiver unit (attached to the indoor unit). The receiver unit should be replaced with a new part and the original remote controller can be reconnected. If "OK" is displayed then the fault is with the remote controller and this should be replaced.

Note: To cancel error codes please switch system off (press button F4 (RESET) on main remote controller).

7-5. Troubleshooting by inferior phenomena

No.	Fault symptom	Possible cause	Explanation - Solution
1	Main remote controller display is blank.	1. There is no power supply to main remote controller.	1. Check LED2 on FTC. (See 3. WIRING DIAGRAM.) (i) When LED2 is lit. Check for damage or contact failure of the main remote controller wiring. (ii) When LED2 is blinking. Refer to No. 5 below. (iii) When LED2 is not lit. Refer to No. 4 below.
		2. Power is supplied to main remote controller, however, the display on the main remote controller does not appear.	2. Check the following: • Disconnection between the main remote controller cable and the FTC control board • Failure of the main remote controller if “Please Wait” is not displayed. • Refer to No. 2 below if “Please Wait” is displayed.
2	“Please Wait” remains displayed on the main remote controller.	1. "Please Wait" is displayed for up to 3 minutes. 2. Communication failure between the main remote controller and FTC. 3. Communication failure between FTC and outdoor unit.	1. Normal operation 2, 3. Main remote controller start up checks/procedure. (i) If “0%” or “50-99%” is displayed below "Please Wait" there is a communication error between the main remote controller and the FTC control board. • Check wiring connections on the main remote controller. • Replace the main remote controller or the FTC control board. (ii) If “1-49%” is displayed there is a communication error between the outdoor unit's and FTC's control boards. • Check the wiring connections on the outdoor unit control board and the FTC control board. (Ensure S3 is securely wired with no damage. (See page B-15.) • Replace the outdoor unit's and/or the FTC's control boards.
3	The main screen appears with a press of the “ON” button, but disappears in a second.	The main remote controller operations do not work for a while after the settings are changed in the service menu. This is because the system takes time to apply the changes.	Normal operation The cylinder unit is applying updated settings made in the service menu. Normal operation will start shortly.
4	LED2 on FTC is off. (See 3. WIRING DIAGRAM.)	When LED1 on FTC is also off. (See 3. WIRING DIAGRAM.)	
		1. FTC is not supplied with 220 to 240V AC.	1. Check the voltage across the L and N terminals on the indoor power supply terminal block 1. (See page B-15.) • When the voltage is not 220 to 240V AC, check for faulty wiring to power supply. • When the voltage is 220 to 240V AC, go to 2. below.
		2. There are problems in the method of connecting the connectors.	2. Check for faulty wiring between the connectors. • When the connectors are wired incorrectly re-wire them correctly referring to below. (See page B-15 and a wiring diagram on the control and electrical box cover.)  • If there is no problem with the wiring, go to 3. below.
		3. FTC failure.	3. Check the FTC control board. • Check the fuse on FTC control board. • Check for faulty wiring. • If there is no problem with the wiring, the FTC control board is faulty

No.	Fault symptom	Possible cause	Explanation - Solution
5	LED2 on FTC is blinking. (See 3. WIRING DIAGRAM)	When LED1 is also blinking on FTC . Faulty wiring between FTC and outdoor unit	Check for faulty wiring between FTC and outdoor unit.
		When LED1 on FTC is lit.	
		1. Faulty wiring in main remote controller Multiple indoor units have been wired to a single outdoor unit.	1. Check for faulty wiring in main remote controller. The number of indoor units that can be wired to a single outdoor unit is one. Additional indoor units must be wired individually to a single outdoor unit.
		2. Short-circuited wiring in main remote controller	2.,3. Remove main remote controller wires and check LED2 on FTC. (See 3. WIRING DIAGRAM.) • If LED2 is blinking check for short circuits in the main remote controller wiring. • If LED2 is lit, wire the main remote controller again and: - if LED2 is blinking, the main remote controller is faulty; - if LED2 is lit, faulty wiring of the main remote controller has been corrected.
		3. Main remote controller failure	
6	LED4 on FTC is off. (See 3. WIRING DIAGRAM)	1. SD memory card is NOT inserted into the memory card slot with correct orientation.	1. Correctly insert SD memory card in place until a click is heard.
		2. Not an SD standards compliant memory card.	2. Use an SD standards compliant memory card. (Refer to installation manual, "5.6 Using SD memory card".)
	LED4 on FTC is blinking. (See 3. WIRING DIAGRAM)	1. Full of data.	1. Move or delete data, or replace SD memory card with a new one.
		2. Write-protected.	2. Release the write-protect switch.
		3. NOT formatted.	3. Refer to installation manual, "5.6 Using SD memory card".
		4. Formatted in NTFS file system.	4. FTC is Not compatible with NTFS file system. Use an SD memory card formattedin FAT file system.
7	No water at hot tap.	1. Cold main off	1. Check and open stop cock.
		2. Strainer (local supply) blocked.	2. Isolate water supply and clean strainer.
8	Cold water at tap.	1. Hot water run out.	1. Ensure DHW mode is operating and wait for thermal store tank to re-heat.
		2. Prohibit, schedule timer or holiday mode selected.	2. Check settings and change as appropriate.
		3. Heat pump not working.	3. Check heat pump – consult outdoor unit service manual.
		4. Booster heater cut-out tripped.	4. Check booster heater thermostat and press reset button if safe. Reset button is located on the side of booster heater, covered with black rubber cap. See service manual 4. PART NAMES AND FUNCTIONS to find out its position.
		5. The earth leakage circuit breaker for booster heater breaker (ECB1) tripped.	5. Check the cause and reset if safe.
		6. The booster heater thermal cut-out has tripped and cannot be reset using the manual reset button.	6. Check resistance across the thermal cut-out, if open then the connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer.
		7. 3-way valve fault	7. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in page B-26.) If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve coil. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to service manual 11. DISASSEMBLY PROCEDURE.)
		8. Air inclusion in pump A	8. Open the air vent above pump A.
		9. System or power OFF	9. Turn on the power / system.
		10. Flow sensor fault	10. If “0” is displayed in “Request code : 541” in “Running information” replace flow sensor A.
		11. Supply flow rate is low	11. Increase the supply amount.
9	Water heating takes longer.	1. Heat pump not working.	1. Check heat pump – consult outdoor unit service manual.
		2. Booster heater cut-out tripped.	2. Check booster heater thermostat and press reset button if safe. Reset button is located on the side of booster heater, covered with black rubber cap. See service manual 4. PART NAMES AND FUNCTIONS to find out its position.
		3. Booster heater breaker (ECB1) tripped.	3. Check the cause and reset if safe.
		4. The booster heater thermal cut-out has tripped and cannot be reset using the manual reset button.	4. Check resistance across the thermal cut-out, if open then connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer.
		5. Flow rate of the primary circuit may be reduced.	5. Check the following items • Check for trapped air in water pump 1 (primary circuit). • Check water pump (primary circuit) for malfunction. (Refer to section 10-6 service manual.) • Check the pipe for blockage.
		6. 3-way valve failure	6. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in page B-26.) If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve motor. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to service manual 11. DISASSEMBLY PROCEDURE.)

No.	Fault symptom	Possible cause	Explanation - Solution
10	Temperature of DHW tank water dropped.	When DHW operation is not running, the DHW tank emits heat and the water temperature decreases to a certain level. If water in the DHW tank is reheated frequently because of a significant drop in water temperature, check for the following.	
		1. Insulation material coming loose or off.	1. Fix insulation.
		2. 3-way valve failure	2. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in page B-26.) If the valve does not still function, go to (ii) below. (ii) Replace 3-way valve motor. If the valve does not still function, go to (iii) below. (iii) Replace 3-way valve. (Refer to service manual 11. DISASSEMBLY PROCEDURE.)
11	Hot or warm water from cold tap.	Heat of hot water pipe is transferred to cold water pipe.	Insulate/re-route pipework.
12	Water leakage	1. Poorly sealed connections of water circuit components	1. Tighten connections as required.
		2. Water circuit components reaching the end of life	2. Refer to PARTS CATALOG for expected part lifetimes and replace them as necessary.
13	Heating system does not reach the set temperature.	1. Prohibit, schedule timer or holiday mode selected.	1. Check settings and change as appropriate.
		2. The temperature sensor is located in a room that has a different temperature relative to that of the rest of the house.	2. Relocate the temperature sensor to a more suitable room.
		3. Heat pump not working.	3. Check heat pump – consult outdoor unit service manual.
		4. Booster heater cut-out tripped.	4. Check booster heater thermostat and press reset button if safe. Reset button is located on the side of booster heater, covered with black rubber cap. (See service manual 4. PART NAMES AND FUNCTIONS for position.)
		5. Booster heater breaker (ECB1) tripped.	5. Check the cause of the trip and reset if safe.
		6. The booster heater thermal cut-out tripped and can not be reset using the manual reset button.	6. Check resistance across the thermal cut-out, if open then the connection is broken and the booster heater will have to be replaced. Contact your Mitsubishi Electric dealer.
		7. Incorrectly sized heat emitter.	7. Check the heat emitter surface area is adequate Increase size if necessary.
		8. 3-way valve failure	8. Check plumbing/wiring to 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in page B-26). If the 3-way valve does not function, go to (ii) below. (ii) Replace 3-way valve motor. If the 3-way valve coil is replaced but the 3-way valve does not function go to (iii) below. (iii) Replace 3-way valve. (Refer to service manual 11. DISASSEMBLY PROCEDURE.)
		9. Battery problem (*wireless control only)	9. Check the battery power and replace if flat.
14	In 2-zone value ON/OFF control, only Zone2 does not reach the set temperature.	1. When Zone1 and Zone2 are both in heating mode, the hot water temperature in Zone2 does not exceed that in Zone1.	1. Normal action no action necessary.
		2. Faulty wiring of 2-way valve	2. Refer to installation manual, "5.3 2-zone valve ON/OFF control".
		3. Faulty installation of 2-way valve	3. Check for correct installation. (Refer to the manual included with each motorized mixing valve.)
		4. Incorrect setting of Running time	4. Check for correct setting of Running time.
		5. 2-way valve failure	5. Inspect 2-way valve. (Refer to the manual included with each 2-way valve.)

No.	Fault symptom	Possible cause	Explanation - Solution
15	After DHW operation room temperature rises slightly.	At the end of the DHW mode operation the 3-way valve diverts hot water away from the DHW circuit into space heating circuit. This is done to prevent the cylinder unit components from overheating. The amount of hot water directed into the space heating circuit varies according to the type of the system and of the pipe run between the plate heat exchanger and the cylinder unit.	Normal operation no action necessary.
16	The room temperature rises during DHW operation.	3-way valve failure	Check the 3-way valve. (i) Manually override 3-way valve using the main remote controller. (Refer to <Manual operation> in page B-26). If the 3-way valve does not function, go to (ii) below. (ii) Replace 3-way valve coil. If the 3-way valve coil is replaced but the 3-way valve does not function go to (iii) below. (iii) Replace 3-way valve. (Refer to service manual 11. DISASSEMBLY PROCEDURE.)
17	Water discharges from pressure relief valve. (Primary circuit)	1. If continual – pressure relief valve could bite foreign objects and the valve seat may be damaged. 2. If intermittent – expansion vessel charge may have reduced/bladder perished. 3. Heating circuit is closed and pump is running.	1. Turn the handle on the pressure relief valve several turns. If leakage persists, replace the pressure relief valve with a new one. 2. Check pressure in expansion vessel. Recharge to 1 bar if necessary. If bladder perished replace expansion vessel with a new one. 2. Open the heating circuit.
18	Noisy water circulation pump	Air in water circulation pump.	Use manual and automatic air vents to remove air from system. Top up water if necessary to achieve 1 bar on primary circuit.
19	Noise during hot water draw off typically worse in the morning.	1. Loose airing cupboard pipework. 2. Air in water circulation pump A.	1. Install extra pipe fastening clips. 2. Use manual and automatic air vents to remove air from system. Top up water if necessary to achieve 1 bar on primary circuit.
20	Mechanical noise heard coming from the cylinder unit.	1. Heaters switching on/off. 2. 3-way valve changing position between DHW and heating mode.	Normal operation no action necessary.
21	Water circulation pump runs for a short time unexpectedly.	Water circulation pump jam prevention mechanism (routine) to inhibit the build-up of scale.	Normal operation no action necessary.
22	Milky/Cloudy water (Sanitary circuit)	Oxygenated water	Water from any pressurised system will release oxygen bubbles when water is running. The bubbles will settle out.
23	Heating mode has been on standby for a long time (does not start operation smoothly.)	The time of “Delay” set in “Economy settings for pump” is too short. (Go to “Service menu” → “Auxiliary settings” → “Economy settings for pump”).	Increase the time of “Delay” in “Economy settings for pump” .
24	The cylinder unit that was running in the heating mode before power failure is running in the DHW mode after power recovery.	The cylinder unit is designed to run in an operation mode with a higher priority (i.e. DHW mode in this case) at power recovery.	• Normal operation. • After the DHW max. operation time has elapsed or the DHW supply max.temperature has been reached, the DHW mode switches to the other mode (e.g. Heating mode).

<table>
<tr><th>No.</th><th>Fault symptom</th><th>Possible cause</th><th>Explanation - Solution</th></tr>
<tr><td>25</td><td>The energy monitor value seems not correct.

Note:
There could be some discrepancies between the actual and the calculated values.
If you seek for accuracy, please make sure to connect power meter(s) and heat meter to FTC board. Both should be locally supplied.</td><td>1. Incorrect setting of the energy monitor</td><td>1. Check the setting by following the procedure below.
(1) Check if the DIP switch is set as the table below.
Consumed electric energy
<table><tr><td>SW3-4</td><td>Electric energy meter (Local supply)</td></tr><tr><td>OFF</td><td>Without</td></tr><tr><td>ON</td><td>With</td></tr></table>
Delivered heat energy
<table><tr><td>SW3-8</td><td>Heat meter (Local supply)</td></tr><tr><td>OFF</td><td>Without</td></tr><tr><td>ON</td><td>With</td></tr></table>
(2) In the case external electric energy meter and/or heat meter is not used, check if the setting for electric heater and water pump 1 input is correct by referring to <Energy monitor setting> in page B-8.
(3) In the case external electric energy meter and/or heat meter is used, check if the unit of output pulse on external meter matches with the one set at the main remote controller by referring to <Energy monitor setting> in page B-8 .</td></tr>
<tr><td></td><td></td><td>2. Non-connectable type of external meter (local supply) is connected.</td><td>2. Check if the external meter (local supply) is connectable type by referring to <Energy monitor setting>" in page B-8.</td></tr>
<tr><td></td><td></td><td>3. External meter (local supply) failure</td><td>3. Check if signal is sent to IN8 to IN10 properly. (Refer to section 3. WIRING DIAGRAM)
Replace the external heat meter if defective.</td></tr>
<tr><td></td><td></td><td>4. FTC board failure</td><td>4. Check the FTC control board.
• Check for faulty wiring.
• If no problem found with the wiring, the FTC control board is faulty. Replace the board.</td></tr>
</table>

Annual Maintenance

It is essential that the cylinder unit is serviced at least once a year by a qualified individual. Any spare parts required should be purchased from Mitsubishi Electric.
NEVER bypass safety devices or operate the unit without them being fully operational.

<Annual maintenance points>
Use the Annual Maintenance Log Book as a guide to carrying out the necessary checks on the cylinder unit and outdoor unit.

Memo

Contents

1 Performance data

1-1. Heating performance data (QUHZ-W40VA、EHPT20Q-VM2EA)

■ Maximum

Maximum		OUTLET＝35℃				OUTLET＝40℃				OUTLET＝45℃			
		Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]
Ambient temperature[℃]	−15	4.57	2.25	3.0	13.2	4.70	2.28	3.0	17.5	4.57	2.05	3.0	23.1
	−7	4.63	3.13	3.0	12.9	5.56	2.74	3.0	13.4	5.41	2.46	3.0	19.1
	2	4.63	3.56	3.0	12.9	5.79	3.42	3.0	12.3	5.65	3.07	3.0	18.0
	7	5.23	4.96	3.0	10.0	6.28	4.70	3.0	10.0	7.33	4.39	3.0	10.0
	12	5.23	5.90	3.0	10.0	6.28	5.35	3.0	10.0	6.81	4.96	3.0	12.5
	15	5.23	6.04	3.0	10.0	6.28	5.57	3.0	10.0	6.73	5.35	3.0	12.9
	−15	4.68	2.40	4.0	18.2	4.54	2.21	4.0	23.7	4.33	1.93	4.0	29.5
	−7	5.46	2.80	4.0	15.4	5.31	2.59	4.0	21.0	5.07	2.27	4.0	26.8
	2	5.94	3.50	4.0	13.7	5.68	3.23	4.0	19.6	5.52	2.89	4.0	25.2
	7	6.98	4.86	4.0	10.0	7.42	4.74	4.0	13.4	7.15	4.22	4.0	19.4
	12	6.98	5.95	4.0	10.0	6.85	5.34	4.0	15.4	6.56	4.70	4.0	21.5
	15	6.98	5.95	4.0	10.0	6.77	5.76	4.0	15.7	6.48	5.07	4.0	21.8
	−15	4.49	2.39	5.0	22.1	4.38	2.14	5.0	27.4	4.07	1.82	5.0	33.3
	−7	5.16	2.72	5.0	20.2	5.05	2.44	5.0	25.5	4.70	2.09	5.0	31.5
	2	5.89	3.39	5.0	18.1	5.57	3.05	5.0	24.0	5.38	2.70	5.0	29.6
	7	7.49	4.88	5.0	13.5	7.16	4.46	5.0	19.5	6.87	3.94	5.0	25.3
	12	7.03	5.74	5.0	14.8	6.68	5.16	5.0	20.9	6.31	4.44	5.0	26.9
	15	6.95	6.19	5.0	15.1	6.60	5.56	5.0	21.1	6.23	4.79	5.0	27.1
	−15	4.29	2.38	6.0	24.8	4.23	2.07	6.0	29.9	3.81	1.71	6.0	35.9
	−7	4.86	2.64	6.0	23.4	4.78	2.31	6.0	28.6	4.34	1.91	6.0	34.6
	2	5.83	3.28	6.0	21.1	5.46	2.87	6.0	27.0	5.25	2.53	6.0	32.5
	7	7.23	4.68	6.0	17.7	6.92	4.20	6.0	23.5	6.59	3.68	6.0	29.3
	12	6.88	5.69	6.0	18.6	6.50	4.97	6.0	24.5	6.06	4.18	6.0	30.5
	15	6.80	6.13	6.0	18.8	6.42	5.36	6.0	24.7	5.99	4.51	6.0	30.7
	−15	4.09	2.37	7.0	26.6	4.06	2.00	7.0	31.7	3.55	1.60	7.0	37.7
	−7	4.54	2.57	7.0	25.7	4.52	2.17	7.0	30.8	3.96	1.74	7.0	36.9
	2	5.78	3.18	7.0	23.2	5.34	2.69	7.0	29.1	5.12	2.35	7.0	34.5
	7	6.97	4.48	7.0	20.7	6.67	3.94	7.0	26.4	6.31	3.41	7.0	32.1
	12	6.73	5.62	7.0	21.2	6.32	4.78	7.0	27.1	5.82	3.93	7.0	33.1
	15	6.65	6.06	7.0	21.4	6.25	5.15	7.0	27.2	5.75	4.23	7.0	33.2
	−15	3.88	2.36	8.0	28.0	3.90	1.94	8.0	33.0	3.29	1.50	8.0	39.1
	−7	4.22	2.49	8.0	27.4	4.24	2.03	8.0	32.4	3.57	1.56	8.0	38.6
	2	5.72	3.06	8.0	24.8	5.23	2.51	8.0	30.6	4.98	2.17	8.0	36.1
	7	6.71	4.27	8.0	23.0	6.41	3.67	8.0	28.5	6.04	3.14	8.0	34.2
	12	6.57	5.54	8.0	23.2	6.15	4.58	8.0	29.0	5.57	3.67	8.0	35.0
	15	6.49	5.96	8.0	23.4	6.07	4.93	8.0	29.1	5.50	3.95	8.0	35.1

Maximum		OUTLET＝50℃				OUTLET＝55℃				OUTLET＝60℃			
		Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]
Ambient temperature[℃]	−15	4.45	1.86	3.0	28.7	3.90	1.68	3.0	36.4	3.78	1.56	3.0	41.9
	−7	5.27	2.23	3.0	24.8	4.65	2.02	3.0	32.8	4.51	1.88	3.0	38.4
	2	5.50	2.79	3.0	23.7	5.37	2.52	3.0	29.3	4.72	2.00	3.0	37.5
	7	7.19	4.09	3.0	15.7	6.98	3.70	3.0	21.6	6.79	3.32	3.0	27.6
	12	6.56	4.48	3.0	18.6	6.27	4.11	3.0	25.1	5.92	3.63	3.0	31.7
	15	6.48	4.83	3.0	19.0	6.19	4.43	3.0	25.4	5.85	3.91	3.0	32.0
	−15	4.18	1.73	4.0	35.0	3.74	1.57	4.0	41.6	3.63	1.45	4.0	47.0
	−7	4.90	2.04	4.0	32.4	4.40	1.85	4.0	39.2	4.27	1.71	4.0	44.7
	2	5.38	2.61	4.0	30.7	5.22	2.34	4.0	36.3	4.68	1.91	4.0	43.2
	7	6.92	3.82	4.0	25.2	6.61	3.41	4.0	31.3	6.33	3.02	4.0	37.3
	12	6.31	4.22	4.0	27.4	5.94	3.82	4.0	33.7	5.52	3.30	4.0	40.2
	15	6.24	4.56	4.0	27.7	5.87	4.12	4.0	34.0	5.45	3.57	4.0	40.5
	−15	3.89	1.60	5.0	38.8	3.58	1.46	5.0	44.7	3.47	1.34	5.0	50.0
	−7	4.51	1.84	5.0	37.1	4.14	1.67	5.0	43.1	4.03	1.54	5.0	48.5
	2	5.26	2.43	5.0	34.9	5.06	2.16	5.0	40.5	4.64	1.81	5.0	46.7
	7	6.65	3.56	5.0	30.9	6.24	3.11	5.0	37.1	5.88	2.72	5.0	43.1
	12	6.06	3.97	5.0	32.6	5.62	3.53	5.0	38.9	5.11	2.98	5.0	45.3
	15	5.99	4.28	5.0	32.8	5.55	3.81	5.0	39.1	5.05	3.22	5.0	45.5
	−15	3.61	1.48	6.0	41.4	3.41	1.35	6.0	46.8	3.32	1.24	6.0	52.1
	−7	4.12	1.66	6.0	40.2	3.89	1.51	6.0	45.7	3.78	1.39	6.0	51.0
	2	5.14	2.26	6.0	37.7	4.90	1.99	6.0	43.3	4.60	1.71	6.0	49.0
	7	6.39	3.30	6.0	34.7	5.87	2.83	6.0	41.0	5.44	2.44	6.0	47.0
	12	5.81	3.72	6.0	36.1	5.30	3.25	6.0	42.3	4.72	2.67	6.0	48.7
	15	5.74	4.01	6.0	36.3	5.24	3.50	6.0	42.5	4.66	2.88	6.0	48.9
	−15	3.33	1.36	7.0	43.2	3.24	1.24	7.0	48.4	3.17	1.14	7.0	53.5
	−7	3.71	1.48	7.0	42.4	3.62	1.35	7.0	47.6	3.53	1.23	7.0	52.8
	2	5.02	2.09	7.0	39.7	4.73	1.81	7.0	45.3	4.56	1.62	7.0	50.7
	7	6.13	3.05	7.0	37.4	5.50	2.55	7.0	43.7	4.99	2.16	7.0	49.8
	12	5.57	3.47	7.0	38.6	4.98	2.97	7.0	44.8	4.32	2.36	7.0	51.1
	15	5.50	3.74	7.0	38.7	4.92	3.20	7.0	44.9	4.27	2.55	7.0	51.3
	−15	3.18	1.32	8.0	44.3	3.07	1.14	8.0	49.5	3.01	1.03	8.0	54.6
	−7	3.46	1.37	8.0	43.8	3.35	1.18	8.0	49.0	3.28	1.07	8.0	54.1
	2	4.77	1.91	8.0	41.4	4.57	1.64	8.0	46.8	4.52	1.52	8.0	51.9
	7	5.59	2.71	8.0	40.0	5.13	2.27	8.0	45.8	4.55	1.88	8.0	51.9
	12	5.12	3.18	8.0	40.8	4.66	2.69	8.0	46.6	3.92	2.06	8.0	53.0
	15	5.05	3.42	8.0	40.9	4.61	2.90	8.0	46.7	3.88	2.22	8.0	53.1

<Note> These data are measured based on EN14511. i.e. These data include energy consumption of cylinder unit.
Gray highlighted data means integrated data including defrost operation.
Space heating capacity depends on the difference of water temperature (⊿T) between inlet and outlet of the outdoor unit.
In order to secure enough heating performance, please choose emitters which can provide big ⊿T.
Minimum inlet water temperature is defined as 10℃ and maximum inlet water temperature is defined as 55℃ in this data sheet.

1 Performance data

Nominal

Nominal		OUTLET=35℃				OUTLET=40℃				OUTLET=45℃			
		Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]
Ambient temperature[℃]	−15	3.65	2.76	3.0	17.6	3.65	2.35	3.0	22.6	3.65	2.01	3.0	27.6
	−7	3.65	3.28	3.0	17.6	3.65	2.80	3.0	22.6	3.65	2.40	3.0	27.6
	2	3.65	3.77	3.0	17.6	3.65	3.37	3.0	22.6	3.65	2.91	3.0	27.6
	7	4.00	4.44	3.0	15.9	4.00	4.11	3.0	20.9	4.00	3.71	3.0	25.9
	12	4.00	5.14	3.0	15.9	4.00	4.75	3.0	20.9	4.00	4.29	3.0	25.9
	15	4.00	5.68	3.0	15.9	4.00	5.26	3.0	20.9	4.00	4.75	3.0	25.9
	−15	3.65	2.70	4.0	21.9	3.65	2.27	4.0	26.9	3.65	1.96	4.0	31.9
	−7	3.65	3.21	4.0	21.9	3.65	2.69	4.0	26.9	3.65	2.32	4.0	31.9
	2	3.65	3.64	4.0	21.9	3.65	3.18	4.0	26.9	3.65	2.76	4.0	31.9
	7	4.00	4.35	4.0	20.7	4.00	3.96	4.0	25.7	4.00	3.52	4.0	30.7
	12	4.00	5.00	4.0	20.7	4.00	4.55	4.0	25.7	4.00	4.05	4.0	30.7
	15	4.00	5.61	4.0	20.7	4.00	5.11	4.0	25.7	4.00	4.54	4.0	30.7
	−15	3.64	2.65	5.0	24.6	3.64	2.18	5.0	29.6	3.64	1.91	5.0	34.6
	−7	3.64	3.13	5.0	24.6	3.64	2.58	5.0	29.6	3.64	2.25	5.0	34.6
	2	3.64	3.52	5.0	24.6	3.64	2.98	5.0	29.6	3.64	2.61	5.0	34.6
	7	4.00	4.24	5.0	23.5	4.00	3.81	5.0	28.5	4.00	3.32	5.0	33.5
	12	4.00	4.84	5.0	23.5	4.00	4.35	5.0	28.5	4.00	3.80	5.0	33.5
	15	4.00	5.52	5.0	23.5	4.00	4.95	5.0	28.5	4.00	4.32	5.0	33.5
	−15	3.63	2.60	6.0	26.3	3.63	2.11	6.0	31.3	3.63	1.86	6.0	36.3
	−7	3.63	3.05	6.0	26.3	3.63	2.48	6.0	31.3	3.63	2.18	6.0	36.3
	2	3.63	3.40	6.0	26.3	3.63	2.80	6.0	31.3	3.63	2.47	6.0	36.3
	7	4.00	4.13	6.0	25.4	4.00	3.65	6.0	30.4	4.00	3.13	6.0	35.4
	12	4.00	4.68	6.0	25.4	4.00	4.15	6.0	30.4	4.00	3.56	6.0	35.4
	15	4.00	5.41	6.0	25.4	4.00	4.79	6.0	30.4	4.00	4.11	6.0	35.4
	−15	3.63	2.55	7.0	27.6	3.63	2.03	7.0	32.6	3.55	1.81	7.0	37.7
	−7	3.63	2.98	7.0	27.6	3.63	2.37	7.0	32.6	3.63	2.12	7.0	37.6
	2	3.63	3.28	7.0	27.6	3.63	2.62	7.0	32.6	3.63	2.34	7.0	37.6
	7	4.00	4.01	7.0	26.8	4.00	3.50	7.0	31.8	4.00	2.94	7.0	36.8
	12	4.00	4.51	7.0	26.8	4.00	3.94	7.0	31.8	4.00	3.31	7.0	36.8
	15	4.00	5.29	7.0	26.8	4.00	4.62	7.0	31.8	4.00	3.89	7.0	36.8
	−15	3.62	2.49	8.0	28.5	3.62	1.95	8.0	33.5	3.29	1.50	8.0	39.1
	−7	3.62	2.90	8.0	28.5	3.62	2.27	8.0	33.5	3.57	2.05	8.0	38.6
	2	3.62	3.17	8.0	28.5	3.62	2.44	8.0	33.5	3.62	2.20	8.0	38.5
	7	4.00	3.89	8.0	27.8	4.00	3.34	8.0	32.8	4.00	2.74	8.0	37.8
	12	4.00	4.34	8.0	27.8	4.00	3.72	8.0	32.8	4.00	3.07	8.0	37.8
	15	4.00	5.16	8.0	27.8	4.00	4.44	8.0	32.8	4.00	3.67	8.0	37.8

Nominal		OUTLET=50℃				OUTLET=55℃				OUTLET=60℃			
		Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]
Ambient temperature[℃]	−15	3.65	1.78	3.0	32.6	3.65	1.56	3.0	37.6	3.65	1.30	3.0	42.6
	−7	3.65	2.12	3.0	32.6	3.65	1.86	3.0	37.6	3.65	1.55	3.0	42.6
	2	3.65	2.52	3.0	32.6	3.65	2.14	3.0	37.6	3.65	1.76	3.0	42.6
	7	4.00	3.36	3.0	30.9	4.00	3.01	3.0	35.9	4.00	2.56	3.0	40.9
	12	4.00	3.89	3.0	30.9	4.00	3.49	3.0	35.9	4.00	2.96	3.0	40.9
	15	4.00	4.31	3.0	30.9	4.00	3.86	3.0	35.9	4.00	3.28	3.0	40.9
	−15	3.65	1.71	4.0	36.9	3.65	1.54	4.0	41.9	3.63	1.29	4.0	47.0
	−7	3.65	2.03	4.0	36.9	3.65	1.83	4.0	41.9	3.65	1.53	4.0	46.9
	2	3.65	2.34	4.0	36.9	3.65	2.05	4.0	41.9	3.65	1.69	4.0	46.9
	7	4.00	3.14	4.0	35.7	4.00	2.79	4.0	40.7	4.00	2.36	4.0	45.7
	12	4.00	3.61	4.0	35.7	4.00	3.21	4.0	40.7	4.00	2.72	4.0	45.7
	15	4.00	4.05	4.0	35.7	4.00	3.60	4.0	40.7	4.00	3.05	4.0	45.7
	−15	3.64	1.64	5.0	39.6	3.58	1.52	5.0	44.7	3.47	1.27	5.0	50.0
	−7	3.64	1.93	5.0	39.6	3.64	1.79	5.0	44.6	3.64	1.50	5.0	49.6
	2	3.64	2.16	5.0	39.6	3.64	1.96	5.0	44.6	3.64	1.63	5.0	49.6
	7	4.00	2.91	5.0	38.5	4.00	2.56	5.0	43.5	4.00	2.16	5.0	48.5
	12	4.00	3.33	5.0	38.5	4.00	2.93	5.0	43.5	4.00	2.48	5.0	48.5
	15	4.00	3.79	5.0	38.5	4.00	3.33	5.0	43.5	4.00	2.82	5.0	48.5
	−15	3.61	1.57	6.0	41.4	3.41	1.35	6.0	46.8	3.32	1.24	6.0	52.1
	−7	3.63	1.84	6.0	41.3	3.63	1.76	6.0	46.3	3.63	1.47	6.0	51.3
	2	3.63	1.99	6.0	41.3	3.63	1.88	6.0	46.3	3.63	1.56	6.0	51.3
	7	4.00	2.69	6.0	40.4	4.00	2.34	6.0	45.4	4.00	1.97	6.0	50.4
	12	4.00	3.06	6.0	40.4	4.00	2.66	6.0	45.4	4.00	2.24	6.0	50.4
	15	4.00	3.53	6.0	40.4	4.00	3.08	6.0	45.4	4.00	2.59	6.0	50.4
	−15	3.33	1.36	7.0	43.2	3.24	1.24	7.0	48.4	3.17	1.14	7.0	53.5
	−7	3.63	1.75	7.0	42.6	3.62	1.73	7.0	47.6	3.53	1.45	7.0	52.8
	2	3.63	1.82	7.0	42.6	3.63	1.80	7.0	47.6	3.63	1.50	7.0	52.6
	7	4.00	2.47	7.0	41.8	4.00	2.12	7.0	46.8	4.00	1.78	7.0	51.8
	12	4.00	2.78	7.0	41.8	4.00	2.39	7.0	46.8	4.00	2.01	7.0	51.8
	15	4.00	3.28	7.0	41.8	4.00	2.82	7.0	46.8	4.00	2.37	7.0	51.8
	−15	3.18	1.32	8.0	44.3	3.07	1.14	8.0	49.5	3.01	1.03	8.0	54.6
	−7	3.46	1.88	8.0	43.8	3.35	1.18	8.0	49.0	3.28	1.07	8.0	54.1
	2	3.62	1.95	8.0	43.5	3.62	1.71	8.0	48.5	3.62	1.44	8.0	53.5
	7	4.00	2.33	8.0	42.8	4.00	1.91	8.0	47.8	4.00	1.59	8.0	52.8
	12	4.00	2.60	8.0	42.8	4.00	2.13	8.0	47.8	4.00	1.78	8.0	52.8
	15	4.00	3.12	8.0	42.8	4.00	2.56	8.0	47.8	4.00	2.15	8.0	52.8

Minimum

Minimum		OUTLET＝35℃				OUTLET＝40℃				OUTLET＝45℃			
		Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]
Ambient temperature[℃]	−15	1.57	2.05	3.0	27.5	1.39	1.74	3.0	33.4	1.01	1.25	3.0	40.2
	−7	2.46	2.94	3.0	23.2	2.17	2.50	3.0	29.6	1.59	1.80	3.0	37.4
	2	2.39	3.90	3.0	23.6	1.11	1.72	3.0	34.7	1.06	1.53	3.0	39.9
	7	2.89	4.48	3.0	21.2	2.66	4.02	3.0	27.3	2.35	3.32	3.0	33.8
	12	3.71	5.76	3.0	17.3	3.41	5.16	3.0	23.7	3.02	4.27	3.0	30.6
	15	4.43	6.85	3.0	13.8	4.08	6.14	3.0	20.5	3.61	5.07	3.0	27.8
	−15	1.52	1.93	4.0	29.5	1.32	1.62	4.0	35.3	0.99	1.20	4.0	41.4
	−7	2.39	2.83	4.0	26.5	2.06	2.37	4.0	32.6	1.56	1.76	4.0	39.4
	2	2.30	3.76	4.0	26.7	1.09	1.66	4.0	36.1	1.06	1.49	4.0	41.2
	7	2.79	4.33	4.0	25.0	2.33	3.50	4.0	31.7	2.06	2.90	4.0	37.6
	12	3.49	5.45	4.0	22.5	2.94	4.44	4.0	29.5	2.60	3.67	4.0	35.7
	15	4.18	6.48	4.0	20.0	3.52	5.28	4.0	27.4	3.11	4.36	4.0	33.8
	−15	1.47	1.81	5.0	30.8	1.24	1.49	5.0	36.4	0.97	1.15	5.0	42.2
	−7	2.31	2.71	5.0	28.4	1.95	2.23	5.0	34.4	1.52	1.72	5.0	40.6
	2	2.22	3.60	5.0	28.7	1.08	1.59	5.0	36.9	1.05	1.43	5.0	42.0
	7	2.68	4.16	5.0	27.3	2.00	2.98	5.0	34.3	1.76	2.46	5.0	39.9
	12	3.28	5.12	5.0	25.6	2.48	3.71	5.0	32.9	2.19	3.06	5.0	38.7
	15	3.93	6.09	5.0	23.7	2.96	4.41	5.0	31.5	2.62	3.64	5.0	37.5
	−15	1.42	1.70	6.0	31.6	1.17	1.37	6.0	37.2	0.94	1.10	6.0	42.7
	−7	2.23	2.59	6.0	29.7	1.84	2.10	6.0	35.6	1.49	1.68	6.0	41.4
	2	2.13	3.43	6.0	29.9	1.06	1.53	6.0	37.5	1.04	1.38	6.0	42.5
	7	2.58	3.99	6.0	28.8	1.67	2.49	6.0	36.0	1.48	2.05	6.0	41.5
	12	3.07	4.80	6.0	27.7	2.02	3.02	6.0	35.2	1.78	2.49	6.0	40.7
	15	3.68	5.70	6.0	26.2	2.42	3.59	6.0	34.2	2.14	2.96	6.0	39.9
	−15	1.37	1.58	7.0	32.2	1.09	1.25	7.0	37.8	0.92	1.05	7.0	43.1
	−7	2.15	2.47	7.0	30.6	1.73	1.96	7.0	36.5	1.46	1.63	7.0	42.0
	2	2.04	3.26	7.0	30.8	1.04	1.46	7.0	37.9	1.03	1.32	7.0	42.9
	7	2.48	3.81	7.0	29.9	1.35	1.99	7.0	37.2	1.19	1.64	7.0	42.6
	12	2.86	4.46	7.0	29.1	1.56	2.33	7.0	36.8	1.37	1.92	7.0	42.2
	15	3.43	5.30	7.0	28.0	1.87	2.78	7.0	36.2	1.65	2.29	7.0	41.6
	−15	1.31	1.46	8.0	32.7	1.02	1.13	8.0	38.2	0.89	0.99	8.0	43.4
	−7	2.07	2.34	8.0	31.3	1.62	1.82	8.0	37.1	1.42	1.58	8.0	42.5
	2	1.94	3.08	8.0	31.5	1.02	1.39	8.0	38.2	1.02	1.27	8.0	43.2
	7	2.37	3.61	8.0	30.8	1.02	1.51	8.0	38.2	0.90	1.24	8.0	43.4
	12	2.65	4.11	8.0	30.3	1.10	1.66	8.0	38.0	0.97	1.36	8.0	43.3
	15	3.17	4.89	8.0	29.3	1.32	1.97	8.0	37.6	1.16	1.62	8.0	42.9

Minimum		OUTLET＝50℃				OUTLET＝55℃				OUTLET＝60℃			
		Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]	Capacity [kW]	COP	Flow Rate [L/min]	Inlet temp. [℃]
Ambient temperature[℃]	−15	0.90	1.03	3.0	45.7	0.78	0.84	3.0	51.3	1.05	0.78	3.0	55.0
	−7	1.42	1.48	3.0	43.2	1.23	1.21	3.0	49.1	1.19	1.11	3.0	54.3
	2	1.02	1.35	3.0	45.1	0.96	1.20	3.0	50.4	1.05	1.09	3.0	55.0
	7	1.38	1.83	3.0	43.4	1.23	1.52	3.0	49.1	1.16	1.33	3.0	54.5
	12	1.77	2.35	3.0	41.6	1.58	1.96	3.0	47.4	1.49	1.70	3.0	52.9
	15	2.11	2.79	3.0	39.9	1.89	2.33	3.0	45.9	1.78	2.03	3.0	51.5
	−15	0.91	1.01	4.0	46.8	0.80	0.84	4.0	52.1	1.40	0.79	4.0	55.0
	−7	1.42	1.48	4.0	44.9	1.25	1.24	4.0	50.5	1.40	1.15	4.0	55.0
	2	1.01	1.31	4.0	46.4	0.96	1.17	4.0	51.6	1.40	1.07	4.0	55.0
	7	1.31	1.73	4.0	45.3	1.18	1.46	4.0	50.8	1.40	1.28	4.0	55.0
	12	1.65	2.18	4.0	44.1	1.48	1.83	4.0	49.7	1.40	1.60	4.0	55.0
	15	1.97	2.59	4.0	42.9	1.78	2.18	4.0	48.6	1.67	1.90	4.0	54.0
	−15	0.91	0.99	5.0	47.4	0.81	0.84	5.0	52.7	1.74	0.80	5.0	55.0
	−7	1.43	1.49	5.0	45.9	1.28	1.27	5.0	51.3	1.74	1.18	5.0	55.0
	2	1.00	1.27	5.0	47.1	0.95	1.14	5.0	52.3	1.74	1.05	5.0	55.0
	7	1.25	1.63	5.0	46.4	1.13	1.39	5.0	51.8	1.74	1.24	5.0	55.0
	12	1.53	2.01	5.0	45.6	1.38	1.71	5.0	51.0	1.74	1.51	5.0	55.0
	15	1.83	2.39	5.0	44.8	1.66	2.03	5.0	50.2	1.74	1.79	5.0	55.0
	−15	0.91	0.97	6.0	47.8	0.83	0.84	6.0	53.0	2.09	0.80	6.0	55.0
	−7	1.44	1.48	6.0	46.6	1.31	1.29	6.0	51.9	2.09	1.21	6.0	55.0
	2	1.00	1.23	6.0	47.6	0.95	1.10	6.0	52.7	2.09	1.03	6.0	55.0
	7	1.18	1.53	6.0	47.2	1.08	1.32	6.0	52.4	2.09	1.19	6.0	55.0
	12	1.41	1.85	6.0	46.6	1.28	1.58	6.0	51.9	2.09	1.42	6.0	55.0
	15	1.69	2.19	6.0	46.0	1.54	1.88	6.0	51.3	2.09	1.68	6.0	55.0
	−15	0.91	0.94	7.0	48.1	0.84	0.83	7.0	53.3	2.44	0.80	7.0	55.0
	−7	1.44	1.48	7.0	47.0	1.33	1.30	7.0	52.3	2.44	1.24	7.0	55.0
	2	0.99	1.18	7.0	48.0	0.94	1.07	7.0	53.1	2.44	1.00	7.0	55.0
	7	1.11	1.43	7.0	47.7	1.02	1.24	7.0	52.9	2.44	1.13	7.0	55.0
	12	1.29	1.68	7.0	47.4	1.18	1.46	7.0	52.6	2.44	1.32	7.0	55.0
	15	1.55	1.99	7.0	46.8	1.42	1.73	7.0	52.1	2.44	1.56	7.0	55.0
	−15	0.87	0.91	8.0	48.4	0.85	0.83	8.0	53.5	2.79	0.80	8.0	55.0
	−7	1.39	1.45	8.0	47.5	1.36	1.32	8.0	52.6	2.79	1.26	8.0	55.0
	2	0.98	1.15	8.0	48.3	0.93	1.03	8.0	53.3	2.79	0.97	8.0	55.0
	7	0.93	1.20	8.0	48.3	0.97	1.17	8.0	53.3	2.79	1.07	8.0	55.0
	12	1.02	1.35	8.0	48.2	1.08	1.33	8.0	53.1	2.79	1.22	8.0	55.0
	15	1.23	1.60	8.0	47.8	1.30	1.58	8.0	52.7	2.79	1.44	8.0	55.0

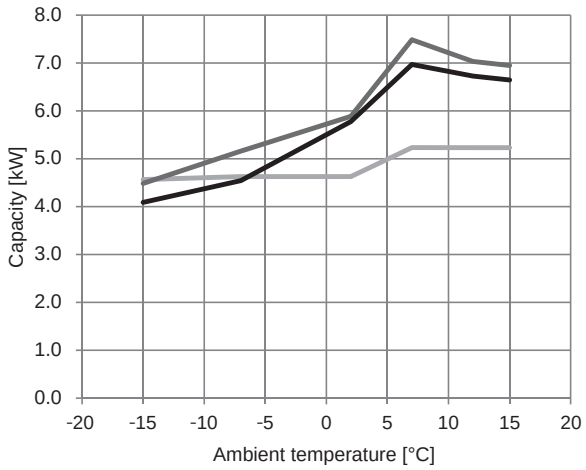
1-2. Part load chart

These data are measured based on EN14511. i.e. These data include energy consumption of cylinder unit.
Space heating capacity depends on the difference of water temperature between inlet and outlet of the outdoor unit.

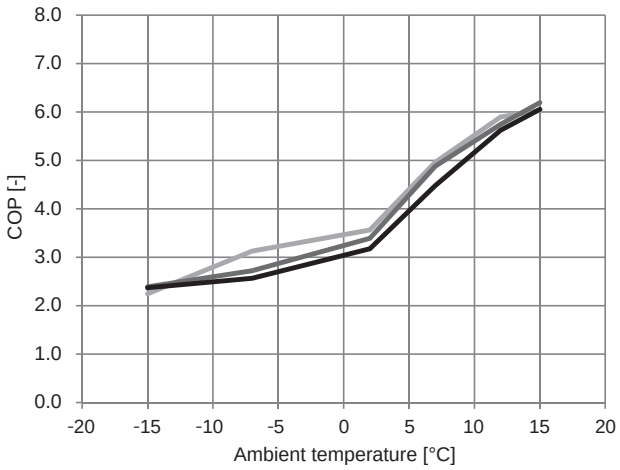
(1) Capacity-MAX

■ Water outlet temperature 35°C

Capacity-Ambient temperature

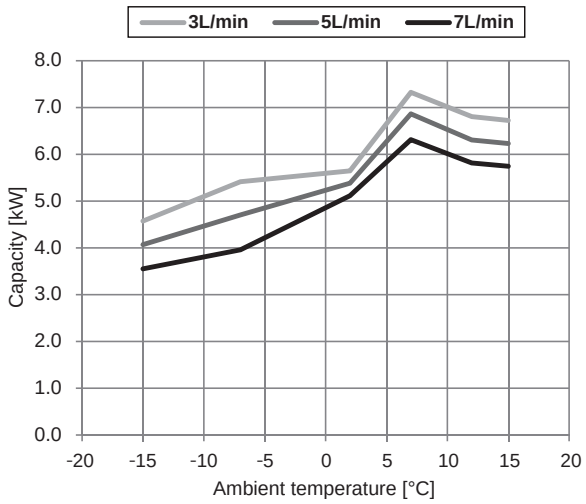


COP-Ambient temperature

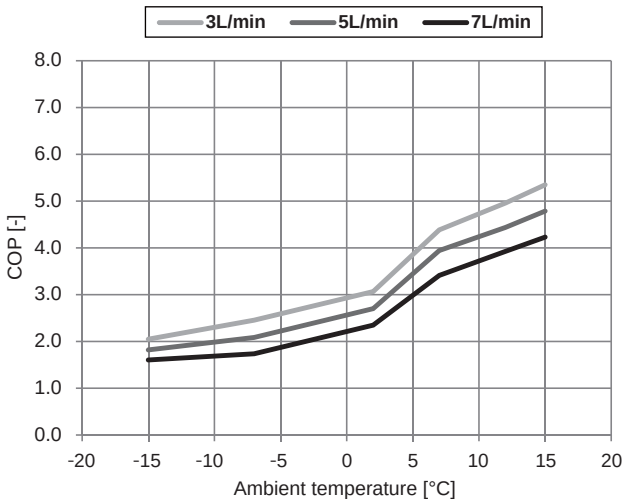


■ Water outlet temperature 45°C

Capacity-Ambient temperature

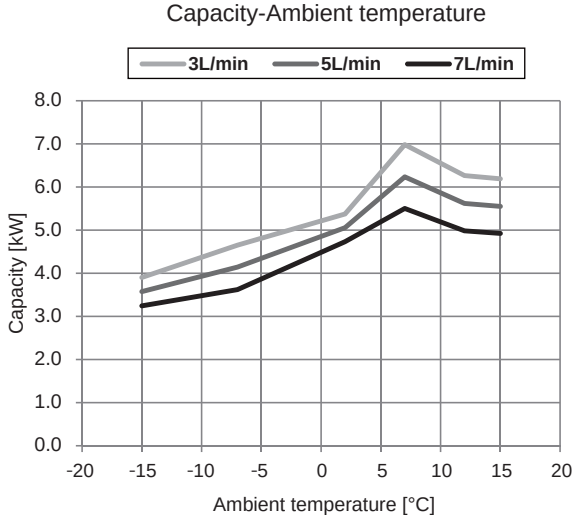


COP-Ambient temperature

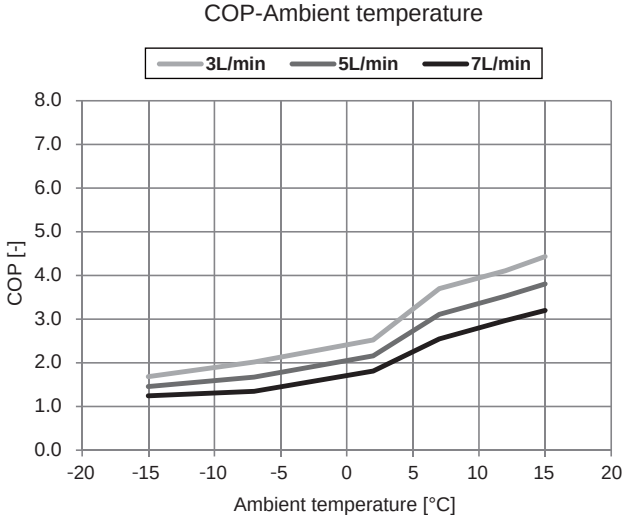


■ Water outlet temperature 55°C

Capacity-Ambient temperature



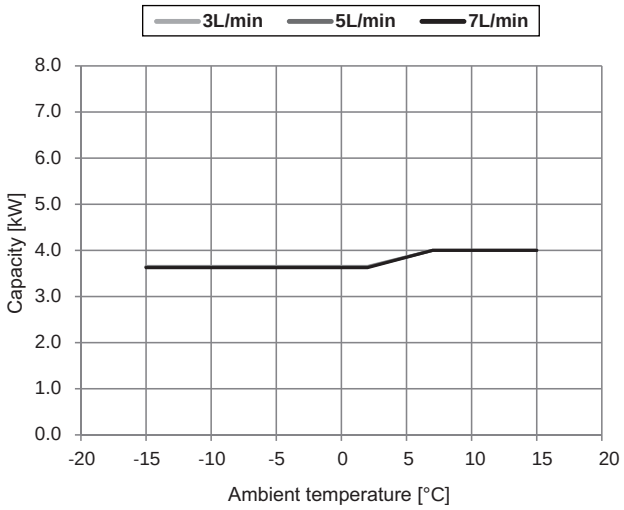
COP-Ambient temperature



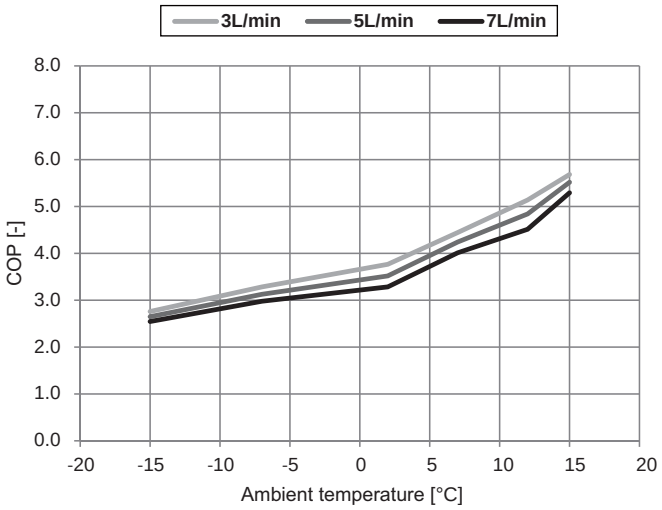
(2) Capacity-Nominal

■ Water outlet temperature 35°C

Capacity-Ambient temperature

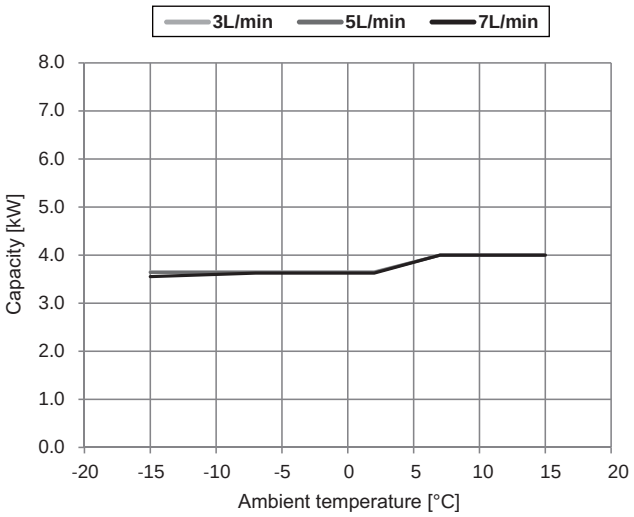


COP-Ambient temperature

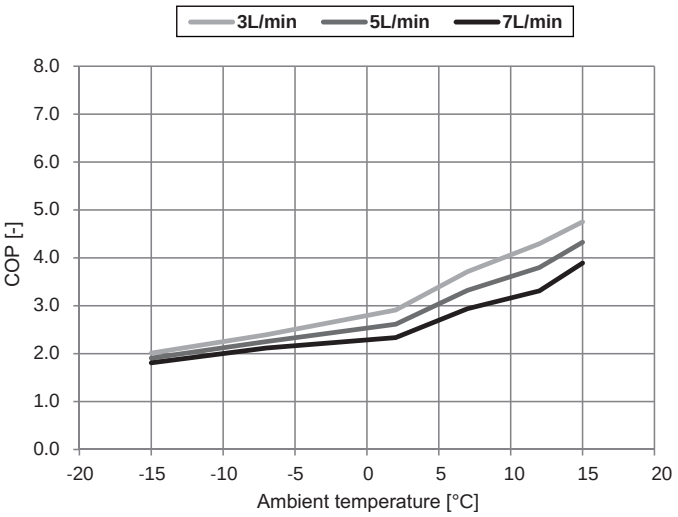


■ Water outlet temperature 45°C

Capacity-Ambient temperature

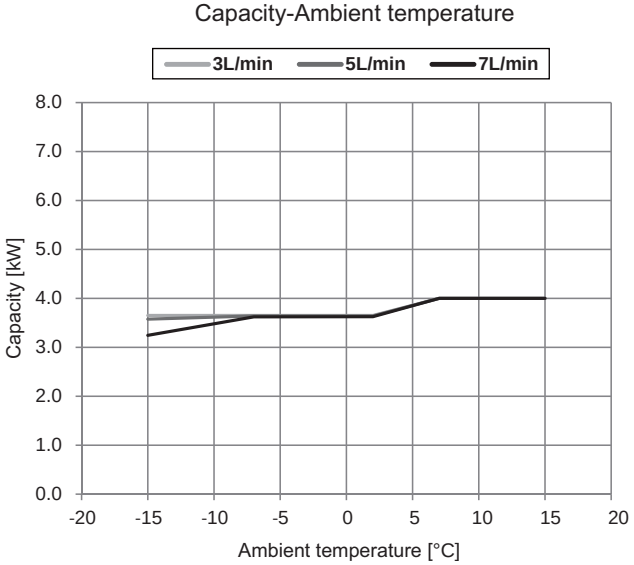


COP-Ambient temperature

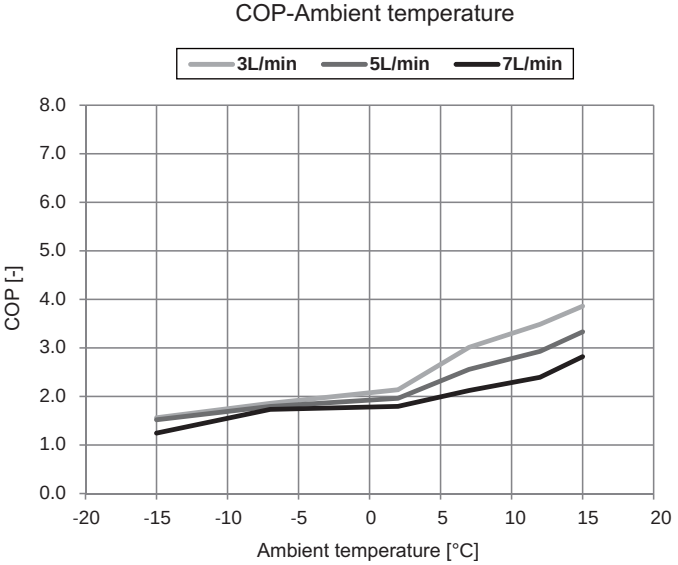


■ Water outlet temperature 55°C

Capacity-Ambient temperature



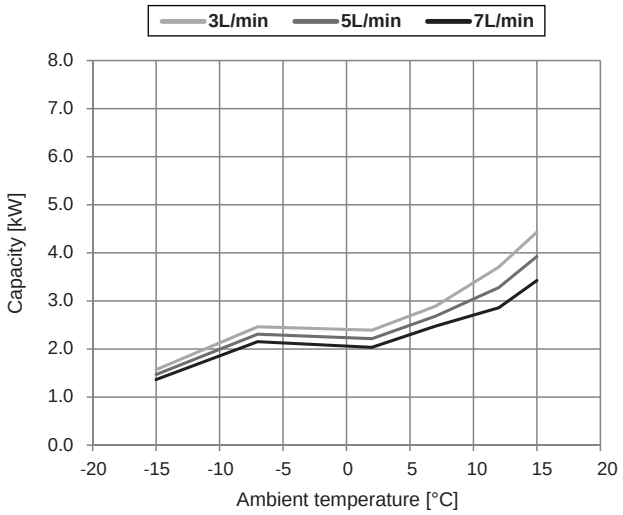
COP-Ambient temperature



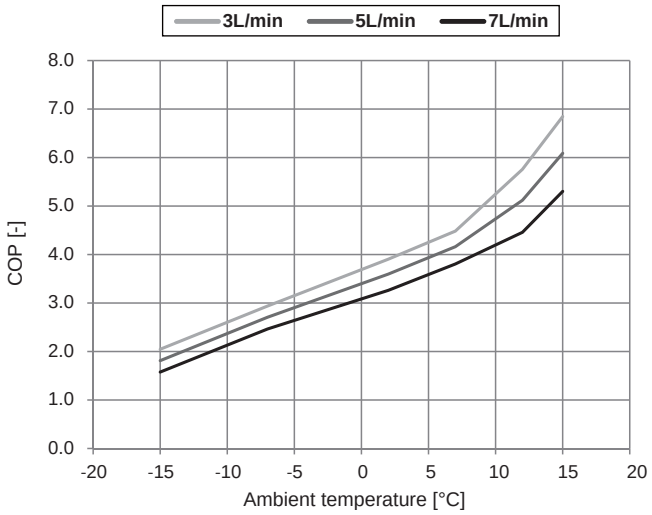
(3) Capacity-Minimum

Water outlet temperature 35°C

Capacity-Ambient temperature

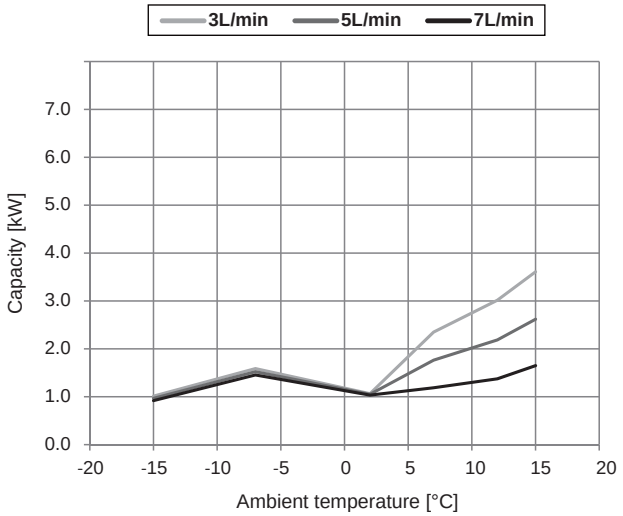


COP-Ambient temperature

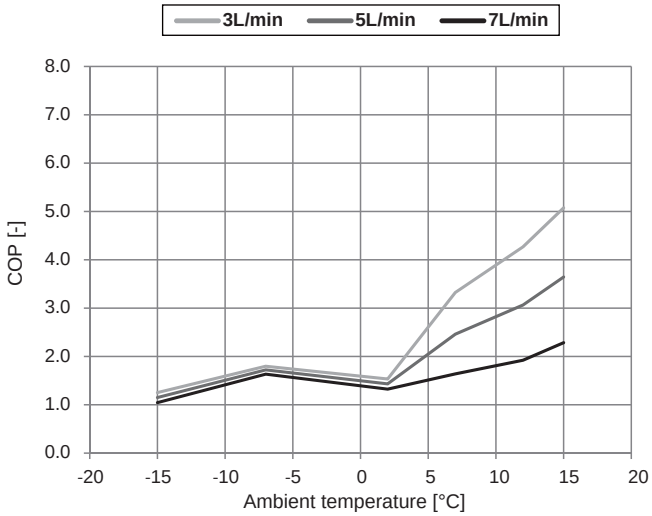


Water outlet temperature 45°C

Capacity-Ambient temperature

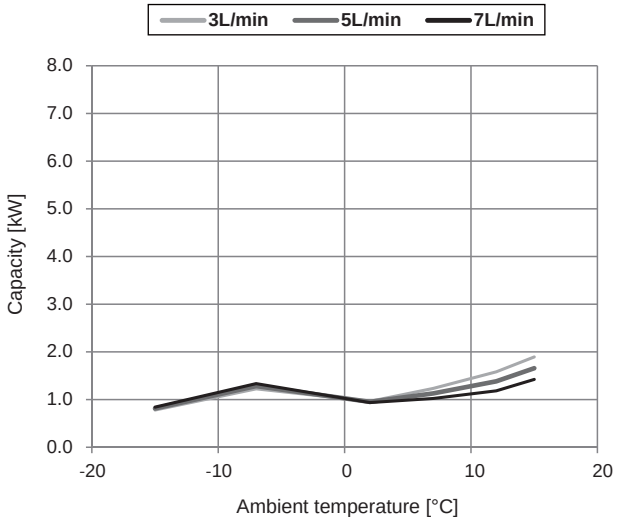


COP-Ambient temperature

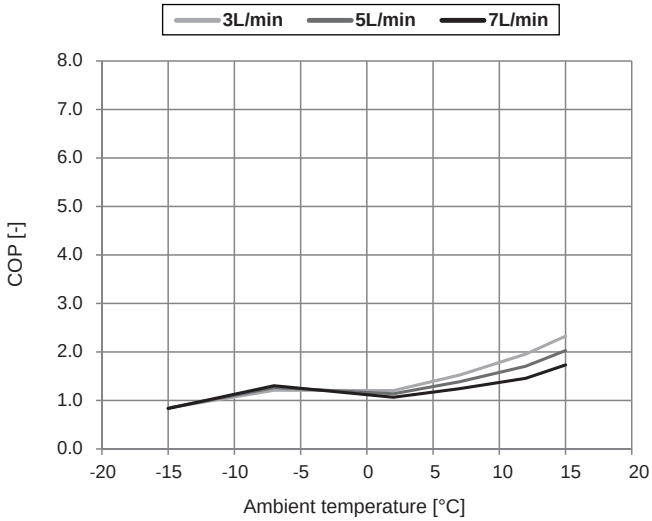


Water outlet temperature 55°C

Capacity-Ambient temperature



COP-Ambient temperature

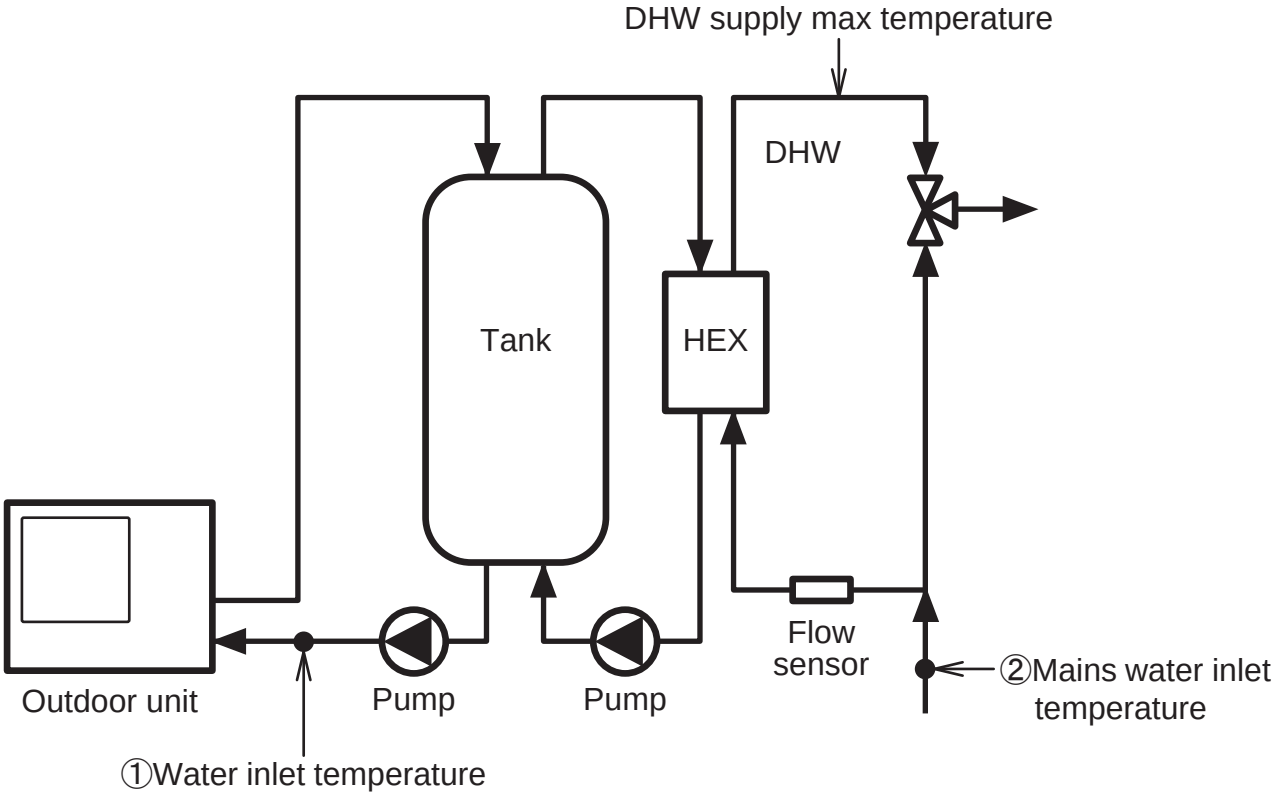


1-3. Hot water performance data

DHW supply max temperature		55 ºC		60 ºC		65 ºC		70 ºC	
Ambient temp.		Cap [kW]	COP	Cap [kW]	COP	Cap [kW]	COP	Cap [kW]	COP
Energy save	-15	3.08	1.76	2.99	1.67	2.87	1.56	2.67	1.44
	-7	3.82	2.22	3.84	2.13	3.80	2.03	3.67	1.89
	2	3.91	2.83	3.94	2.70	3.89	2.57	3.75	2.41
	7	4.73	3.69	4.73	3.51	4.61	3.31	4.32	3.05
	12	5.33	4.27	5.32	4.09	5.15	3.90	4.53	3.53
	15	5.02	4.44	4.96	4.22	4.65	3.94	3.99	3.47
Normal	-15	2.88	1.60	2.81	1.52	2.71	1.44	2.54	1.29
	-7	3.76	2.08	3.78	2.01	3.75	1.92	3.59	1.79
	2	3.80	2.67	3.84	2.56	3.78	2.43	3.62	2.27
	7	4.12	3.20	4.13	3.05	4.02	2.86	3.76	2.63
	12	4.55	3.87	4.46	3.63	4.22	3.36	3.79	3.01
	15	4.14	3.91	4.00	3.63	3.76	3.32	3.33	2.94

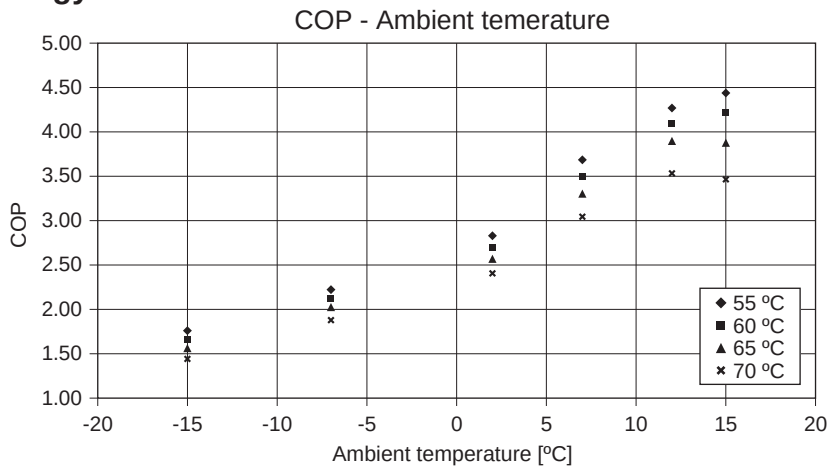
Note: These data are measured based on EN14511. i.e. These data include energy consumption of cylinder unit.
The data of ambient temp. of under 2 ºC includes defrost operation.

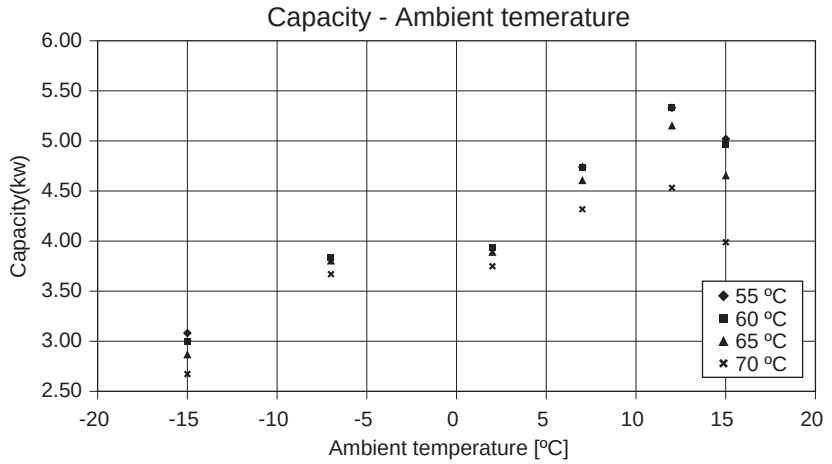
Energy save mode : ① Water inlet temperature is 20 ºC
② Mains water inlet temperature is 10 ºC
Normal mode : ① Water inlet temperature is 30 ºC *
② Mains water inlet temperature is 10 ºC
* Average value in consideration of the period at the end of water heating.



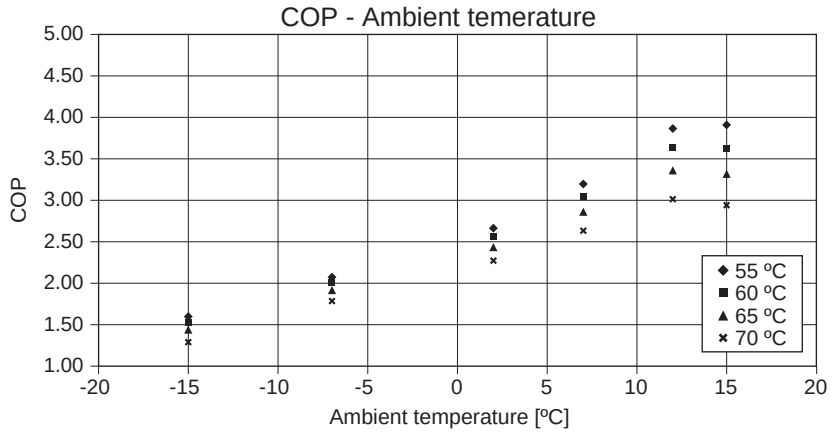
1 Performance data

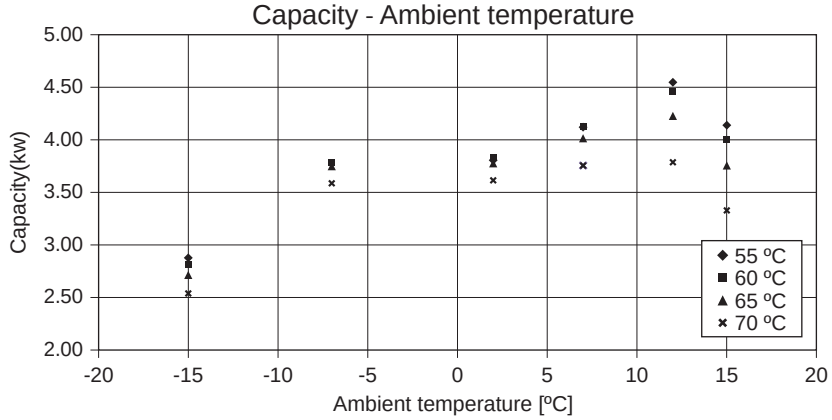
Energy save mode



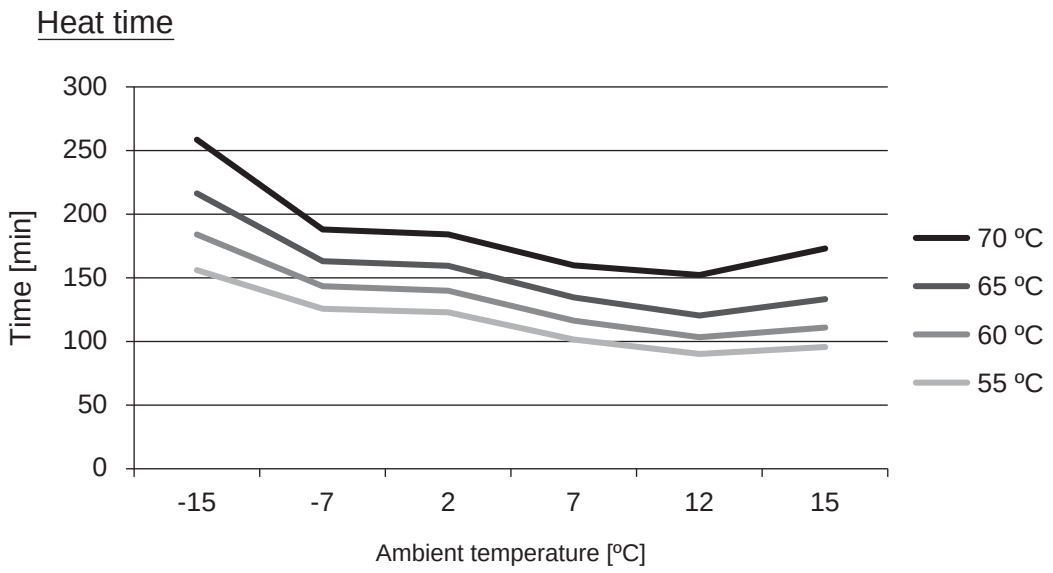


Normal mode





1-4. Heat time data (DHW mode)



	Ambient temperature [ºC]					
DHW supply max temp.	-15	-7	2	7	12	15
55 ºC	156 min	126 min	123 min	102 min	90 min	96 min
60 ºC	184 min	143 min	140 min	116 min	103 min	111 min
65 ºC	216 min	163 min	159 min	135 min	120 min	133 min
70 ºC	258 min	188 min	184 min	160 min	152 min	173 min

●Mitsubishi's thermal store tank (200L)
●Time to raise thermal store tank temperature from 20 ºC to outlet temp.

Memo

for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

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KYGM041A(2016.08) MEE