RMF-CA100 Thermostat Interface

INSTALLATION / INSTRUCTION MANUAL

READ PRIOR TO INSTALLING/OPERATING DEVICE. KEEP THIS MANUAL FOR FUTURE REFERENCE

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RMF-CA100 Thermostat Interface (1)

RMF-CA100 Instruction Manual (1)

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1.2 – Optional Parts

PAC-SE41TS-E Remote Sensor – Part is recommended for applications with a large delta-t (Δt) between the 3rd party thermostat sensing location and the return air thermistor (TH1).

Please review troubleshooting section below prior to installation of PAC-SE41TS-E Remote Sensor.

2.1 – Safety Precautions

WARNING - INCORRECT HANDLING CAN RESULT IN ELECTRICAL INJURY, DEVICE MALFUNCTION AND DAMAGE

- Do not expose the device to, or immerse the device in, water. Doing so could lead to electrical shock to a person, device malfunction or device damage.
- Do not install the device in a bathroom, kitchen, or any room where high humidity or steam could form. Condensation could develop

on or around the device and cause electrical shock to a person, device malfunction and device damage.

- Do not install the device in a location where a gas leak could occur.
- Do not expose the device to heat or radiation including direct sunlight or install the device in a location where the temperature could be greater than 40°C (104°F) or less than 0°C (32°F). This could result in device deformation or device malfunction.
- Always ensure the device is installed in an area without exposure to high frequency noise.
- Power generators, inverters, and high-frequency or radio communication equipment may interfere with the operation of this device.
- All electrical work should be performed by a qualified technician and in accordance with applicable laws and instructions outlined in this manual.
- Use standard wiring with the proper current capacity to avoid current leak, excessive heat, and fire.
- Use only specified cables and wiring; securely connect each so that the terminals do not bear any weight.
- Include slack in the power supply wiring. Tension in the wiring may cause it to excessively heat up and break, which could result in a fire.
- Improperly connected or short-circuited cables or wiring may produce heat and cause device malfunction, device damage, and fire.
- Capacity shortage to the power supply circuit or improper installation may result in electrical shock or fire.
- Do not modify or alter this device or cable in any manner whatsoever.

3.1 – Installation

- Make all connections with 18 AWG thermostat wire.
- Wire connection terminals support 20-30VAC.
- High/Medium /Low fan signals (G1,G2,G3) are optional, and may not be available on all thermostat models.
- Thermostat may be configured for use with a conventional system.

Note: Auxiliary heat control is not controlled by the RMF-CA100. Auxiliary heat control remains with Mitsubishi Electric CN24 connector on compatible indoor units.

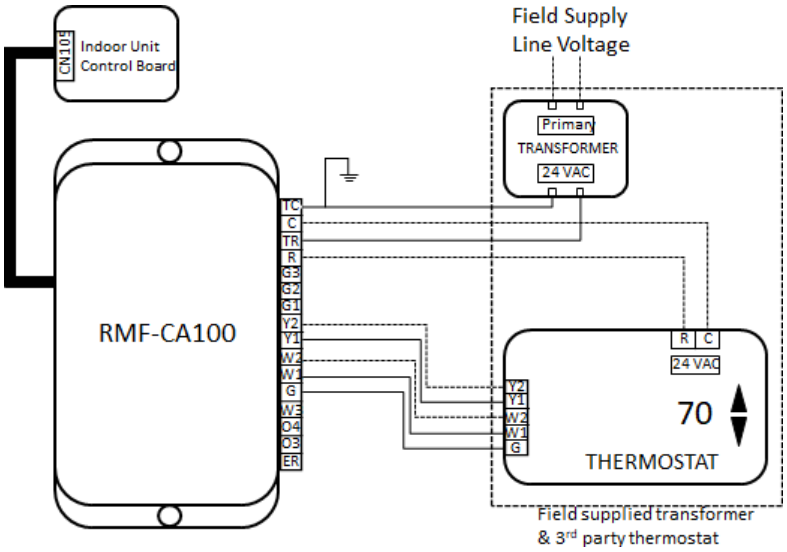
3.2 – Configuration Options

Two-stage Heat/ Cool Operation

DIP switch SW1-1 set to OFF (default position) - Configuration for dual stage heat / cool mode using thermostat signals W1, W2, Y1, Y2, and fan signal (G). G1, G2 and G3 are available but not required. (*W2 and Y2 illustrated with dotted lines in the wiring diagram below*)

Single-stage Heat/Cool Operation (Simulated VRF)

DIP switch SW1-1 set to ON; when W2 or Y2 left unconnected and/or unavailable - Configuration for single stage operation – simulates multiple stage operation using temperature differential based on W1/Y1 call and runtime.



RMF-CA100 Connector Pin Layout		
Pin	Signal	Description
1	TC	Common (In) Transformer
2	C	Common (Out) To Thermostat
3	TR	24 VAC Transformer
4	R	24 VAC to Thermostat
5	G3	High Fan
6	G2	Medium Fan
7	G1	Low Fan
8	Y2	Stage 2 Cooling
9	Y1	Stage 1 Cooling
10	W2	Stage 2 Heat
11	W1	Stage 1 Heat
12	G	Fan
13	W3	NOT SUPPORTED
14	O4	
15	O3	
16	ER	NOT SUPPORTED

DIP Switch Bank 1 (SW1)

#	Input	Description (dip-switch position represented as **black** [■] – default OFF)
1	SW1-1	If **ON,** do not connect thermostat wire to W2 or Y2 terminals of RMF-CA100; W1 and Y1 **MUST** be used.

Dual Stage Operation (DEFAULT)	**Simulated VRF (Single Stage Heat/Cool) Operation**
	

2	SW1-2	Unused **N/A**
3	SW1-3	Fan speed is defined by *SW1-3* and *SW1-4* in stage 1 operation when **G1, G2 and G3** are inactive:
4	SW1-4	

Low (DEFAULT)	**Medium**	**High**	**Quiet**
			

5	SW1-5	Simulated VRF capacity increase time-delay when SW1-1 ON is defined below:
6	SW1-6	

20 Minute (DEFAULT)	**10 Minute**	**15 Minute**	**25 Minute**
			

4.1 – System Configuration

- Choose a place where to install the RMF-CA100. The device provides four mounting holes to mechanically affix the case to a solid surface. Double-sided tape may be used to affix the device. When using tape, ensure that the tape is approved for use within the anticipated operating temperature ranges.
- Install the transformer, as necessary, per building code and manufacturer's installation instructions.
- Connect the RMF-CA100 cable to the connector CN105 on the indoor unit control board.
- Connect RMF-CA100 terminals using 18 AWG wire.

Device Configuration

Initial settings can be configured via the dipswitches on the circuit board, SW1. The circuit board can be accessed by unfastening the four screws on the back of the case.

Additional request codes not addressed by the thermostat interface may be configured by temporarily connecting an MA remote controller.

Grouping

The connection of more than one RMF-CA100 to a single thermostat is not supported.

Temperature Sensing

The RMF-CA100 relies upon both the dry-contact thermostat and the indoor unit's thermistors to monitor room temperature. The thermostat senses room temperature and establishes set temp. The Mitsubishi Electric indoor unit's return air thermistor is used for cooling and heating calculation.

4.2 – PAA System Configuration

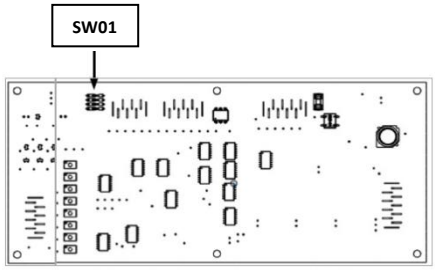
The RMF-CA100 Thermostat Interface must be installed in the PAA unit control box if a third-party 24VAC thermostat is used to control the PAA unit.

How to Install:

- Make sure power supply is off.
- Use M3-0.5 x 12mm socket cap head screws and 3 mm nuts, or equivalent (field supplied), to attach the RMF-CA100 to the top of the protruding metal bracket in the control box (see image below).
- Connect RMF-CA100 to CN105 connector on the control board.
- Connect PAA unit accessory cable (included in box) to the CNH02 connection on the relay board in the PAA control box.
- Connect the opposite end of the PAA unit accessory cable to the corresponding connections on the RMF-CA100 Interface.

Supplied accessory cable connections to the RMF-CA100 interface	
Wire color	**Signal**
Green	G: fan
White	W1: first stage of heating
Brown	W2: second stage of heating
Yellow	Y1: first stage of cooling
Blue	Y2: second stage of cooling
Black	C: 24 VAC

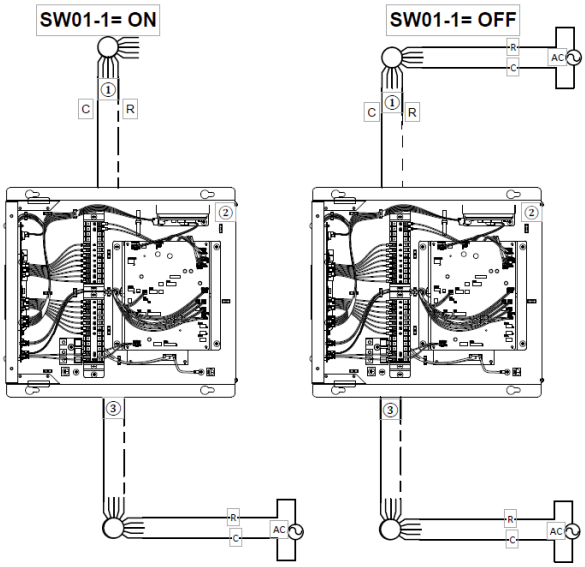
- Connect the thermostat's wire to TB-B (terminals 13A to 19A) on the terminal block in the control box.
- DIP Switch SW01 on the relay board as indicated in the image has 4 switches that change the configuration.



SW01-1	Result
OFF	Electronically disconnects the R line from the furnace to the auxiliary control equipment and allows the auxiliary equipment to provide its own power.
ON (Default)	Electronically routes the R line from the furnace through the PAA unit control box to the thermostat terminals if connections with the PAA unit control box provides operating power to the thermostat in Emergency and Normal operation modes.

Caution: Risk of electrical short if external 24VAC is supplied to RMF-CA100 and SW01-1 is not switched to OFF

Thermostat Wiring Example:



5.1 – Operator Instructions

Operate the third-party thermostat per the manufacturer's instructions. During normal operation, the connection of Mitsubishi Electric remote controllers (e.g. MA/ME) is not supported, as they will interfere with the correct operation of the RMF-CA100.

Notes:

- The indoor unit will limit the internal temperature control set point based on the indoor unit specification.
- Fan signals **G1, G2, G3**, when energized, take precedence over ***SW1-3&4***.
- Only fan speeds available on the IDU can be set by the Thermostat Interface.
- The G signal is used only for operating the IDU in ventilation mode when no cooling or heating signals is energized.
- When all cooling and signals are disabled, energizing G will place the IDU into ventilation mode.

Display:

The RMF-CA100 has 2-line/16-character LCD display and 4 buttons to navigate the menus. There are four buttons on the RMF-CA100: UP, DOWN, OK & MENU

Using these buttons will allow navigating through menus and system configuration.

Main Screen:

This screen will display the current **OPERATION MODE** and the current **FAN SPEED**.

The default screen will display the **MODE** on line 1 and will display the **FAN** speed on line 2.

Screen example:

Mode display is dependent on the current state of operation (defined in MENU section below).

- If the state of operation is stage 1 heating or stage 2 heating, the **MODE** will display **HEAT**.
- If the state of operation is stage 1 cooling or stage 2 cooling, the **MODE** will display **COOL**.
- If the state of operation is Input Error state, the LCD will display **MODE: INPUT-ERR**.
- If the state of operation is No Call state:
  - If 2 hour has not elapsed since exit heat mode (thermal off), the MODE display **HTG HOLD** (heating hold).
  - If **G1** thermo input is **ON**, the LCD display reads **MODE: FAN G1 FAN: LOW**
  - If **G2** thermo input is **ON**, the LCD display reads **MODE: FAN G2 FAN: MED**
  - If **G3** thermo input is **ON**, the LCD display reads **MODE**: **FAN G3 FAN: HIGH**
  - If **G** thermo input is **ON**, and if **G1 G2 & G3** are **OFF**, the LCD display reads **MODE**: **FAN G FAN: LOW**
    - **G fan speed is a mode item and can be changed using the MENU – FAN SPEED submenu**
  - If **G1, G2, G3,** and **G** thermo inputs are off, the LCD display reads **MODE**: **NO CALL FAN: OFF**.
- If the system is operating in test mode the mode displays **HEAT TEST or COOL TEST** depending on selecting operating mode.

Mode Options: Menu Screen

The menu screen displays the different menu options that are available. The menu screen is accessed by pressing the MENU button. To return to the default screen, press the MENU button again. The menu screen will display different configuration options:

- ERROR HISTORY
- MODE SETTINGS
  - MODE OPTIONS
  - FAN SPEED
- TEST SETTINGS

- NO TEST
- HEAT TEST
- COOL TEST

- TIME SETTINGS
  - SET DATE
  - SET TIME
- THERMO INPUT
- FW VERSION

Sub menu options are accessed using the **UP/DOWN** buttons then pressing **OK** once the submenu is selected. To return to the main menu screen, press the MENU button again.

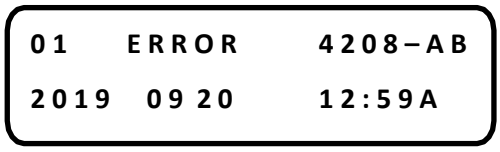
Screen Example:

Operator Instructions: Screens – Error History Screen

The error history screen displays the saved error codes (latest errors displayed first). This screen displays up to 10 errors before overwriting.

UP/DOWN button is used to navigate between saved errors. Each screen displays the error page (one of 10), the error code, and the time/date.

Screen example:



Operator Instructions: Screens – Mode Setting Screen

The mode setting screen is accessed by navigating to the **MODE SETTINGS** menu after pressing the menu button. This allows the operator to configure **MODE** settings.

The **MODE SETTINGS** screen will display all 28 configuration modes and G-fan speed submenu.

Mode settings are displayed to the right of the mode values. This will either be 1, 2, or 3. If the mode is not available by the unit, the mode will not be accepted.

Example – mode 3 is available, mode 4 is not. Mode 3 currently is set to 1, Mode 4 is unavailable, and Mode 5 is set to 3.

Pressing the **OK** button will select a mode to modify. Upon pressing the OK button, the **MODE SETTING** will be selected. Pressing **UP/DOWN** will navigate between mode options 1, 2, or 3. Pressing **OK** will save the selection, and return to navigating **MODE SETTINGS**. Pressing the **MENU** button will cancel the mode selection and return to navigating the **MODE SETTINGS** screen.

To exit the **MODE SETTINGS** screen, press the **MENU** button.

A confirmation screen will appear to save setting. The operator can select **Y or N** via the **UP/DOWN/OK** button.

Operator Instructions: Screens – Test Settings

There are three menu options available in the **TEST SETTINGS** mode. While in **TEST SETTING** mode, pressing **MENU** button returns system to normal operation. After 1 hour in **HEAT TEST** or **COOL TEST** mode the system automatically exits test mode and returns to default screen and returns to normal operation. **THIS SETTING IS COMPLETELY UNIQUE TO RMF-CA100 AND SEPARATE FROM DIAGNOSTIC EQUIPMENT TEST MODES.**

NO TEST: Selecting **NO TEST** returns to default screen.

HEAT TEST: Firmware ignores thermostat inputs and commands HVAC to enter **HEAT OPERATION MODE** with **FAN SPEED** set to **HIGH**, SET TEMP to 27°C

COOL TEST: Firmware ignores thermostat inputs and commands HVAC to enter **COOL OPERATION MODE** with **FAN SPEED** set to **HIGH**, SET TEMP to 16°C

Screens – Time Screen

The time screen is accessed by navigating to the **TIME MODE** submenu from the main menu. The time screen is used to set the Date and

For each submenu, the **UP/DOWN** buttons are used to navigate between settings, the **OK** button is used to select the setting, and the **MENU**

button is used to exit.

A confirmation screen will appear to save setting. The operator can select **Y** or **N** via the UP/DOWN/OK button.

Selecting N, discards the changes.

Selecting Y, saves the settings, then sends the operation commands out to the HVAC unit.

Operator Instructions: Screens – Thermo Input

THERMO INPUT screen displays state of six thermostat inputs: **W1, W2, Y1, Y2, G, G1, G2, G3. This option is designed to assist in troubleshooting and confirming signals are being received by the RMF-CA100 interface.**

0 = No signal received. 1 = Receiving signal. The following is an example of the Thermal Input screen when all the inputs are inactive.

RESIDENTIAL DUCTED AIRHANDLING UNIT FUNCTION SETTINGS (PVA/SVZ/SEZ/PEAD)			
Definition	**Mode**	**Setting #**	**Setting Description**
Power Failure Auto Restart	1	1	Disabled
		2*	Enabled
Static Settings	08 & 10		See Static Pressure Settings Below
Heater Control *1	11	1*	No Heater Present
		2	Heater Present
Optional Humidifier *2	13	1	Not Supported
		2	Supported
Frost Prevention Temp	15	1*	2°C (36°F)
		2	3°C (37°F)
Humidifier Control *2	16	1*	With Compressor Only
		2	In Heat Mode
Heater Control *3	23	1*	Set Temp-2.5°C ON
		2	Set Temp-2.5°C ON & Enable Heater During Defrost/Error
Heater Control *2	23	1*	Disabled Heater During Defrost/Error
		2	Enabled Heater During Defrost/Error
Heating Height Offset 4°C	24	1*	Available (ON) 4°C (7.2°F) UP
		2	Not Available (OFF)
Fan Speed Thermal-Off (Heating)	25	1*	Extra Low
		2	Stop
		3	3rd Party Thermostat Setting
ERV Control *2	26	1*	IDU STOP, Fan speed STOP, and CN2C is OFF
		2	CNER input ON, Fan speed & CN2C is ON
Fan Speed Thermal-Off (Cooling)	27	1*	3rd Party Thermostat Setting
		2	Stop
Abnormal Pipe Temperature Detection (P8)	28	1*	Available (ON)
		2	Not Available (OFF)

***1 – Enabled from factory on SEZ indoor unit.**
***2 – Supported on PVA, SVZ & PEAD indoor units.**
***3 – Supported on SEZ indoor unit only.**
*** – Factory default**

External Static Pressure Setting for SEZ

External Static Pressure	Setting No. of Mode 08	Setting No. of Mode 10
0.02 in. WG [5Pa]	1	2
0.06 in. WG [15Pa]	1	1
0.14 in. WG [35Pa]	2	1
0.20 in. WG [50Pa]	3	1

PVA & SVZ - Vertical, Horizontal Left, Horizontal Right External Static Pressure Setting.

External Static Pressure	Setting No. of Mode 08	Setting No. of Mode 10
0.30 in. WG [75Pa]	1	1
	2	1
0.80 in. WG [200Pa]	3	1

External Static Pressure Setting for PEAD

External Static Pressure	Setting No. of Mode 08	Setting No. of Mode 10
0.14 in. WG [35Pa]	2	1
0.20 in. WG [50Pa]	3	1
0.28 in. WG [70Pa]	1	2
0.40 in. WG [100Pa]	2	2
0.60 in. WG [150Pa]	3	2

PVA & SVZ - Downflow External Static Pressure Setting

External Static Pressure	Setting No. of Mode 08	Setting No. of Mode 10
0.30 in. WG [75Pa]	1	2
0.50 in. WG [125Pa]	2	2
0.80 in. WG [200Pa]	3	2

CITY-MULTI DUCTED AIRHANDLING UNIT FUNCTION SETTINGS (PEFY/PVFY)			
Dipswitch	**Description**		**Remarks**
SW1-9	**Auto restart after power failure**		Activate when unit stopped
	Not effective On Off 9	Effective* On Off 9	
SW1-1	**Indoor temperature detecting**		Activate when unit stopped
	At fan coil* On Off 1	At remote control On Off 1	
SW4-4	**Fresh air intake**		Activate when unit stopped
	Not effective* On Off 4	Effective On Off 4	
SW1-6	**Humidifier control**		Activate when unit stopped *1 Operates during heat thermo on *2 Operates when fan is on and in heat mode
	During heating operation* *1 On Off 6	Always on while in heating mode *2 On Off 6	
SW1-3	**Filter cleaning**		Activate when unit stopped
	Set to 100H On Off 3	Set to 2500H* On Off 3	
SW3-2	**Heater control**		Activate when unit stopped Settings are dependant on individual application
	Heater unavailable* On Off 2	Heater available On Off 2	
SW3-4	**Heater control during defrost and error**		Activate when unit stopped
	Unavailable* On Off 4	Available On Off 4	
SW5	**Main power voltage**		Set SW5 to 240V side when the power supply is 230 volts. When the power supply is 208 volts, set SW5 to 220V side. Set as per site power requirement.
	* 220V 240V	220V 240V	

Note: All dip-switch settings mentioned on this page are found on the indoor unit controller board.

Function 84	Please leave as factory default
Function 85	Please leave as factory default
Function 107 - 2	Please leave as factory default

Function *1	Action *3
108 – 1	Set time delay to 10 mins
108 – 2	Set time delay to 15 mins
108 – 3	Set time delay to 20 mins*2
108 - 4	Set time delay to 25 mins

***1 - Time delay can only be selected with MA controller. If use of a non-MA controller is desired, the time delay must first be selected with the MA controller. Then the non-MA controller can be attached and used.**
***2 - The default time delay setting is 20 minutes.**
***3 - Time delays are approximate.**
*** - Factory default setting**

6.1 – Troubleshooting

This section shall be used for referencing error codes displayed on RMF-CA100 when connected with corresponding units found in tables below.

Always reference product specific manuals for troubleshooting unit errors. For more information on troubleshooting procedures visit www.mitsubishitechinfo.ca

Problem	Checkpoints	Remarks
Blank LED screen on RMF-CA100	○ Check CN105 connector and cable between RMF-CA100 and indoor controller board. ○ Check power supply to indoor unit.	○ LED screen is powered by CN105 via indoor controller board. ○ Power supply voltage should be between 208/230 VAC (+/- 10%).
Unit does not operate (heat, cool, fan mode)	○ Confirm all thermostat wire connections are correct. ○ Check 24VAC between C terminal at RMF-CA100 to corresponding input/mode.	○ Verify input by using thermo input menu on RMF-CA100 interface. Please refer to page 6 of this manual.
Unit does not operate correctly in cooling	○ Verify Y1 and/or Y1/Y2 value is '1' on thermo input menu on RMF-CA100 interface. Please refer to page 6 of this manual. ○ Check TH1/return air temperature value is above/below the highest/lowest set-point available to the applicable unit. ○ Check mode setting 27 is set to 1 (M&P-Series only) ○ Check insulation and air-leaks in ductwork design (conditioned/unconditioned spaces).	○ Reference section above ○ The system will not operate in cooling, if TH1 (return air thermistor) reading below the minimum allowable set-point by the indoor unit. ○ Fan operation during cooling thermal off, may improve accuracy of temperature measured at TH1 (return air thermistor)
Unit does not operate correctly in heating	○ Verify W1 and/or W1/W2 value is '1' on thermo input menu on RMF-CA100 interface. Please refer to page 6 of this manual. ○ Check TH1 (return air thermistor) value is not above/below the highest/lowest set-point available to the applicable unit ○ Check mode setting 25 is set to 1 (M&P-Series only) ○ Check mode setting 24 is set to 2. (M&P-Series only) ○ Check indoor controller board dipswitch SW3-8 is ON (City Multi only) ○ Check insulation and air-leaks in ductwork design (conditioned/unconditioned spaces)	○ The system will continue operating in heating, if TH1 (return air thermistor) reading below the minimum allowable set-point by the indoor unit. ○ Fan operation during heating thermal off, may improve accuracy of temperature measured at TH1 (return air thermistor).

7.1 – Error Codes

This section shall be used for referencing error codes displayed on RMF-CA100 when connected with corresponding units found in tables below.

Always reference product specific manuals for troubleshooting unit errors. For more information on troubleshooting procedures visit www.mitsubishitechinfo.ca

M and P Series Error Codes		
Communication Error	EE	Communication error between indoor and outdoor units
	E4	Remote controller receiving error
	E6/E7	Indoor / outdoor unit communication error
	E9	Indoor / outdoor unit communication error (Transmitting error) (Outdoor unit)
	Fb	Indoor unit control system error (memory error, etc.)
Thermistor Error	P1	Intake sensor error
	P2/P9	Pipe (Liquid or two-phase pipe) sensor error
	P6	Freezing/Overheating safeguard operation
	P8	Pipe temperature error
Indoor Unit Error	PB	Fan motor error
	P4	Drain sensor error
	P5	Drain pump error
Outdoor Unit Error	UP	Compressor overcurrent interruption
	UF	Compressor overcurrent interruption (When compressor locked)
	U1/Ud	Abnormal high pressure (63H worked) / overheating safeguard operation
	U2	Abnormal high discharging temperature / 49C worked / insufficient refrigerant
	U3/U4	Open / short of outdoor unit thermistors
	U5	Abnormal temperature of heat sink
	U6	Compressor overcurrent interruption / Abnormal of power module
	U7	Abnormality of superheat due to low discharge temperature
	U8	Outdoor unit fan protection stop
	U9/UH	Abnormality such as overvoltage or voltage shortage and abnormal synchronous signal to main circuit / Current sensor error

This section shall be used for referencing error codes displayed on RMF-CA100 when connected with corresponding units found in tables below.

Always reference product specific manuals for troubleshooting unit errors. For more information on troubleshooting procedures visit www.mitsubishitechinfo.ca

City Multi Error Codes		
1000 – Pressure / Temperature	1102	Discharge temperature abnormality
	1301	Low pressure abnormality (OC)
	1302	High pressure abnormality (OC)
	1500	Overcharged refrigerant abnormality
2000 – Water	2500	Leakage (water) abnormality
	2502	Drain pump abnormality
	2503	Drain sensor abnormality
	2600	Water leakage (LC)
	2601	Water-supply cut (LC)
4000 – Power / Inverter	4103	Reverse phase abnormality
	4108	Over-current protection ([P450-P650 model] No.2 Comp)
	4115	Power supply sync signal abnormality
	4116	Fan speed abnormality (motor abnormality) (IC, LC)
5000 – Thermistor / Transducer	5101	Air inlet (TH21:IC)
		Open-air treatment inlet (TH4:LC)
		Discharge (TH1/TH11, TH12:OC)
	5102	Liquid pipe (TH22: IC)
		Open-air treatment pipe (TH2:LC)
	5103	Gas pipe (TH23:IC)
		Open-air treatment gas pipe (TH2:LC)
	5104	Open-air treatment open air (TH1)
		Open-air temperature (TH24)
	5105	Pipe (TH5)
	5106	Ambient temperature (TH6)

	5107	Pipe (TH7)
6000 – Communication	6600	Multiple address abnormality
	6601	Unset polarity
	6602	Transmission processor hardware abnormality
	6603	Transmission circuit bus-busy abnormality
	6606	Communications with transmission processor abnormality
	6607	No ACK abnormality
7000 – System Settings	7100	Total capacity abnormality
	7101	Capacity code abnormality
	7102	Error in the number of connected units