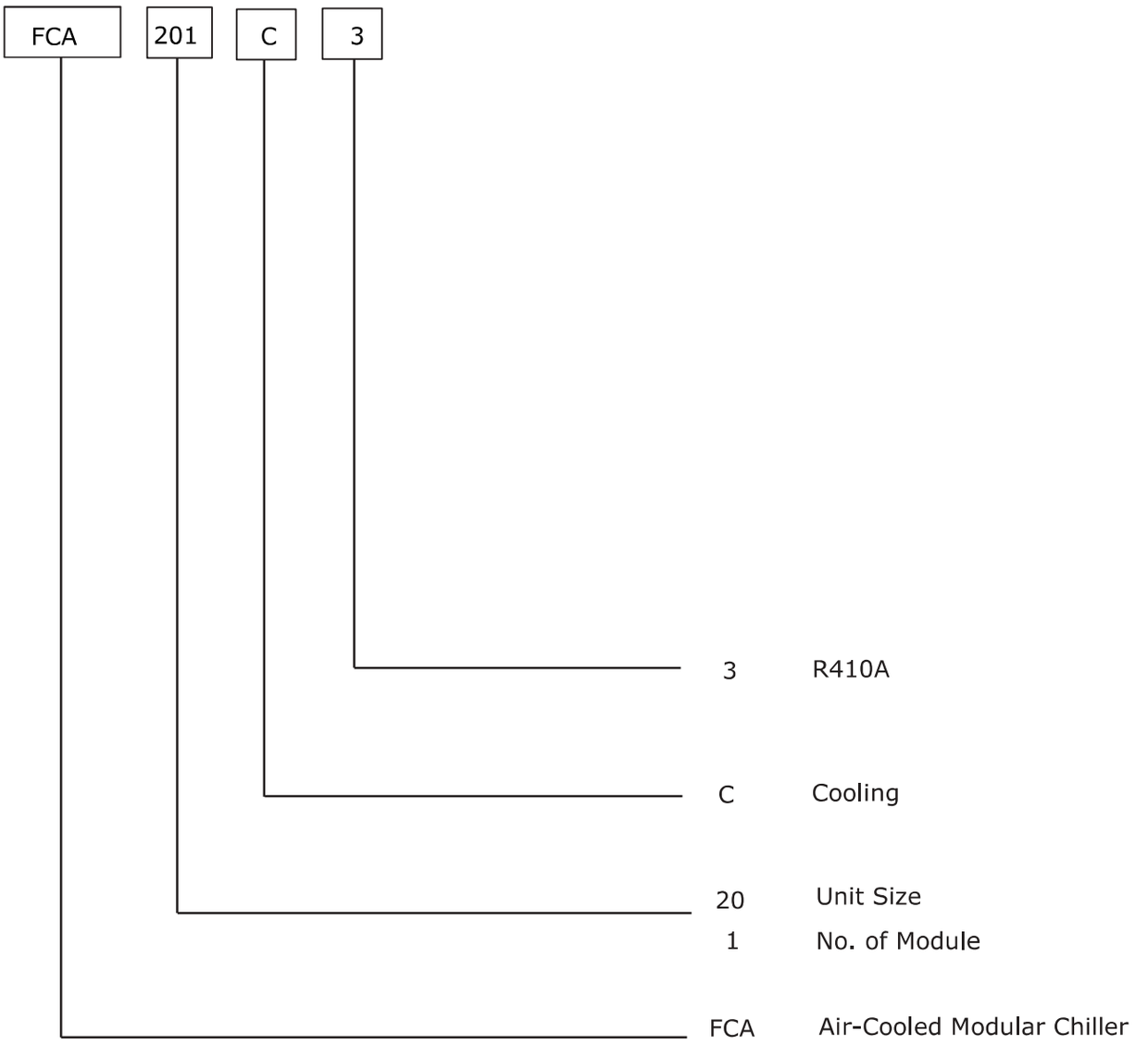
SAKURA®

Air Cooled Chiller

R410A
Eco-friendly Refrigerant

Product Nomenclature

Air-Cooled Modular Chiller



Features

Simple Installation

Compact and small footprint design of modular chillers minimizes the space needed for installation. The modular design reduces the cost of transportation and allows expansion of capacity when the needs arise in future, thus, reduce the initial investment.

High Performance Condenser

FCA's condenser is made of seamless inner groove copper tube which mechanically expanded and bonded to hydrophilic aluminum fins that offers high heat transfer properties.

Safety Protection

The modular chillers have built in protections for all sub-system, i.e. refrigerant system, electrical system and water system. Various overload protection devices, phase protector, temperature sensor, pressure switch, flow switch, etc., have been installed to protect the system if it experiences any failure of components or abnormal external factors. With these safety measures, the system is able to deliver high performance and at the same time ensure safe operation at all time.

Easy Maintenance

Wired LCD controller equipped with various operating mode, timer setting, temperatures display and self-diagnosis by error code. Through the precise and intelligent control algorithm, the load will be distributed evenly to all the modular chillers, thus greatly reduce the commissioning and troubleshooting time and prolong the service life of the compressors.

Flexibility & Energy Saving

Various combinations of modular chillers provide great flexibility of matching the exact load demand of applications. Up to 8 units of modular chillers can be combined to provide the necessary capacity and allow future expansion through easy add-on features. Besides, the modular system is able to adhere to different load profile precisely and deliver highest performance at all load condition.

Zero ODP

Air cooled modular chillers with R410A refrigerant and microchannel condenser strike a perfect match in delivering high efficient products. Furthermore, the equipment are manufactured in as ISO14000 certified facility which complies to international standard for environmental management.

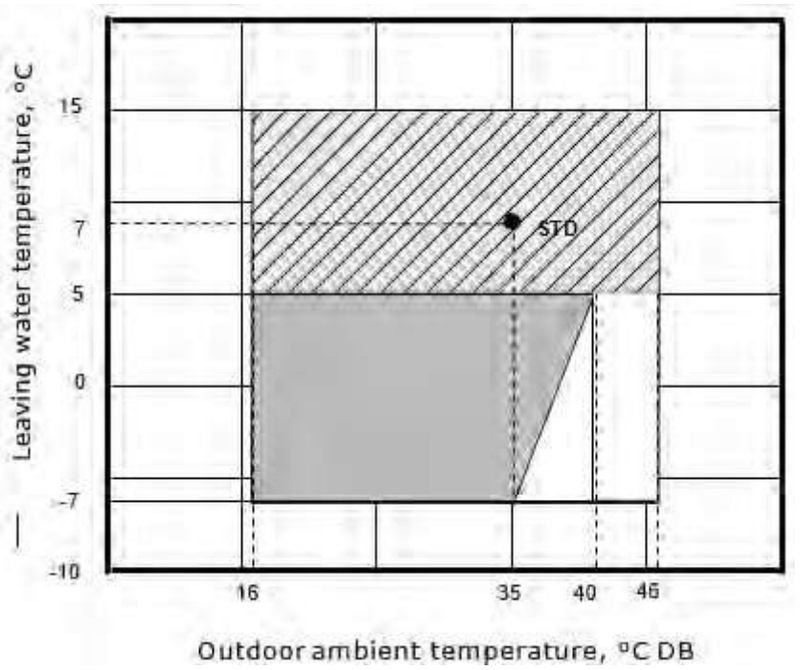
Engineering Specifications

General Data- FCA – (R410A) – 50Hz

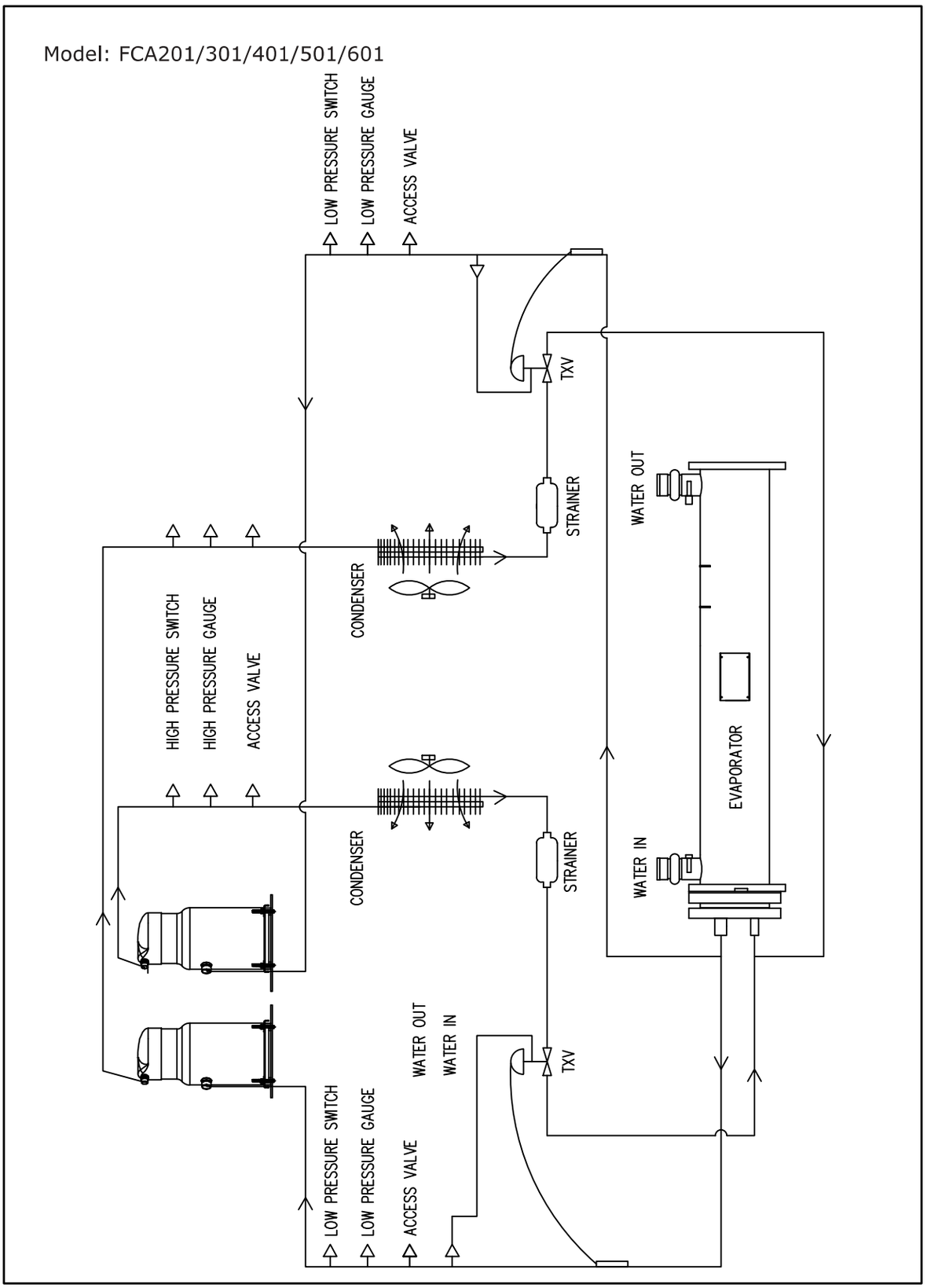
Model			FCA	201	301	401	501	601
Nominal Cooling Capacity			kW	66.0	100.0	132.0	166.0	198.0
			RT	18.8	28.4	37.5	47.2	56.3
Nominal Input Power			kW	22.1	36.4	46.6	59.8	73.6
Nominal Running Current			A	40.3	62.2	80.7	104.3	125.8
Power Source			V/Ph/Hz	380-415 /3/50				
Operation Control				LCD Wired Micro-Computer				
Compressor	Type			Hermetic Scroll				
	Quantity			2	2	2	2	2
Stage of Capacity Control				0-50-100%	0-50-100%	0-50-100%	0-50-100%	0-50-100%
Refrigerant	Type			R410A				
	Number of Refrigerant Circuit			2	2	2	2	2
	Expansion Device			TXV				
	Charging Mass		kg	7 x 2	9 x 2	13 x 2	14x 2	16 x 2
Condenser	Type			Fin and Tube Heat Exchanger				
	Quantity			2	2	4	6	6
	Input Power(Each Fan)		kW	0.9	0.9	0.9	0.9	0.9
	Rotational Speed		RPM	920	920	920	920	920
	Diameter		mm	710	710	710	710	710
Evaporator	Type			Direct Expansion Shell and Tube Evaporator				
	Water Flow Rate		m^3/h	11.4	17.2	22.7	28.6	34.1
			gpm	50.0	75.8	100.1	125.9	150.1
	Water Pressure Drop		kPa	19	25	33	39	46
			ft.wg	6.4	8.4	11.0	13.0	15.4
	Water Pipe		DN	DN65	DN65	DN80	DN80	DN100
Dimension	Length		mm	2206		2500	3180	
	Width		mm	1073		1750	1750	
	Height		mm	2226		2136	2136	
Unit Weight			kg	661	920	1290	1550	1580
Operation Weight			kg	731	1000	1380	1650	1700

Note:
1. Products are tested in accordance to GB/T18430-2007.
2. Cooling capacity is based on 12°C entering and 7°C leaving water temperature; 35°C ambient temperature.
3. Power supply is 380-415V/50Hz with allowable voltage fluctuation of ±10%
4. The manufacturer reserves the rights to make changes to the above specifications without prior notice.

Operating Range Cooling



System Schematic Diagram



Controller Features and Algorithm

1. Introduction

1.1 Specification

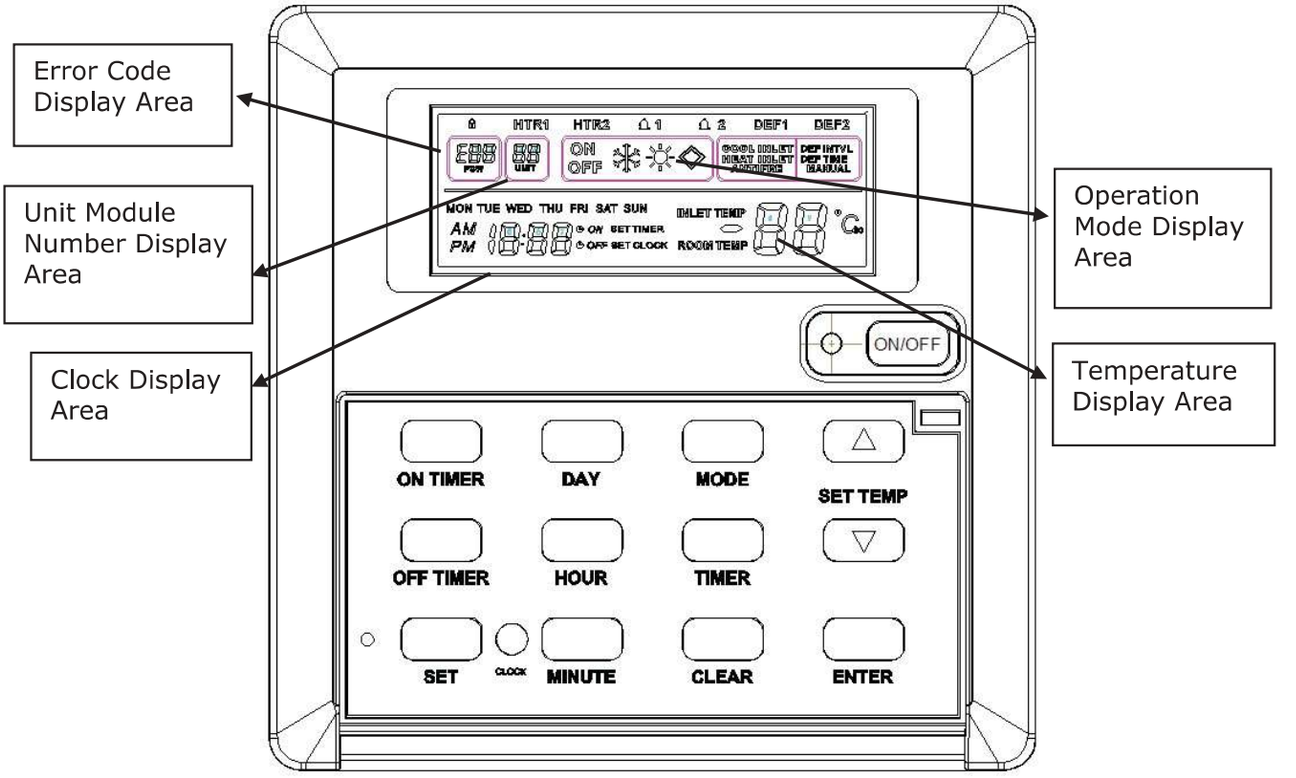
Model: GSWP01A wired controller (to be used with GSWM01A printed circuit board).

1.2 Product Specification

The device has a dual color (red and green) LED, a LCD screen, 12V DC power supply, and an input/output connecting port.

1.3 Main Features

a) Blue back lid LCD display.
b) Stand alone or modular control capable.
c) Real time clock.
d) ON / OFF timer setting (Monday – Sunday)
e) In / out water temperature display.
f) Multiple operating parameters setting.
g) Manual defrost capable.
h) Key-lock function.



1.4 Description of Controller Buttons

Button	Description	Button	Description
ON TIMER	Unit ON timer setting	MODE	Mode Setting
OFF TIMER	Unit OFF timer setting	TIMER	Timer setting
SET	Data setting	CLEAR	Delete / exit
CLOCK	Time setting	SET TEMP	Temperature setting
DAY	Day setting (Mon – Sun)	ENTER	Enter data/info
HOUR	Hour setting	ON/OFF	Unit on/off
MINUTE	Minute setting	▲/▼	+ / - value

1.5 LCD Indicators

Indicator	**Indicator on**	**Indicator off**	**Indicator**	**Indicator on**	**Indicator off**
ON	System on		1	Comp.1 ON	Comp. 1 oil preheat
OFF	System off		2	Comp.2 ON	Comp. 2 oil preheat
❄	Cooling Mode		**UNIT**	Unit (module number)	

2. Functional Description

2.1 Default Setting

Whenever the unit is turned on, the default setting as follow:
Mode: Cooling

2.2 Unit On/ Off

Unit may be turned on and off by:

(1) Timer setting

(2) "ON/OFF" button (manual)

(Note: LED colour display RED – unit OFF, GREEN – unit ON)

2.3 Day & Time Setting

Press "CLOCK" button once, the LCD will show [SET CLOCK] blinking, day and time may be set by pressing buttons "DAY", "HOUR", "MINUTE". If no input within 5 seconds, system will automatically exit the day and time setting mode.

2.4 ON / OFF Timer Setting

The system has ON TIME and OFF TIME setting (Monday – Sunday).
Press and hold " ON TIMER " (or "OFF TIMER") button for 5 seconds, the buzzer will beep once (long beep) and system will enter into ON TIMER (or OFF TIMER) setting, the clock display will show "--:--", and the LCD will show [SET TIME] and [ON] (or [OFF]) blinking, use "DAY", "HOUR" and "MINUTE" buttons to set the unit ON TIME (or OFF TIME), followed by press and hold " ON TIMER " (or "OFF TIMER") button to confirm setting, or press "CLEAR" button to cancel and exit unit ON/OFF TIME setting.
Whenever the [ON] and/or [OFF] indicator(s) shown on LCD, the ON TIMER and/or OFF TIMER is/are enabled. To cancel the ON/OFF TIMER setting, press and hold "CLEAR" button until the [ON] and/or [OFF] indicator(s) disappeared on LCD.

2.5 Key-lock Function

Pressing "ON TIMER" and "ENTER" simultaneously will enable/disable key-lock. A symbol " " will be shown on the LCD, indicates that all buttons being locked, only "ON/OFF" button is operational.

2.6 Error Code Enquiry for Each Module

To check each Module error code, press and hold " ▲ " button for 5 seconds, the error code display area will show the error code and the buzzer will beep, meanwhile the unit module number display area will show which module is having that error code shown. Example: E01 02, meaning module #2 has error code E01. To check the error code for other modules, press " ▲ " and " ▼ " buttons to select different module. To exit, press "CLEAR" button.
(Note: Refer error code description section for each error code description)

2.7 Temperature Enquiry for Each Module
To check for each module different ambient/water temperature, press and hold " ▼ " button for 5 seconds, the error code display area will show the module number and the buzzer will beep, meanwhile the unit module number display will show the respective module' s different ambient/water temperature sub menu (6 sub-menu as listed in table). Example: 02 01, meaning module #2, sub-menu #1 (ambient temperature) is currently shown in the temperature display on LCD. To select different sub-menu (1 to 6), press " ▲ " and " ▼ " buttons. To exit, press "CLEAR" button.

Sub Menu #	Temperature Display
1	Ambient temperature
2	N/A
3	N/A
4	Chilled Water Return Temperature (TH4)
5	Chilled Water Supply Temperature (TH5)
6	N/A
7	Overall Chilled Water Return Temperature (TH7)
8	Overall Chilled Water Supply Temperature (TH8)

2.8 Operational Data Inquiry

Press and hold "SET" button for 5 seconds, this will enable operational data inquiry, unit module number display area will show the 9 subs menu as listed in the following table, while the temperature display area will show the correspondent sub menu's operational data. Press" SET" button to select different sub menu (1 to 9). To exit, press "CLEAR" button.

Sub menu#	Operational Data	Unit	Acceptable Operational Range and Default Value
1	Chilled Water Temperature Setting	℃	Chilled Water Setting: Supply – 5 to 30, default: 7 ℃ Return – 7 to 30, default: 12 ℃
2	N/A	N/A	N/A
3	Compressor Minimum Running Time	Minutes	1 to 10, default: 5 minutes
4	Compressor Minimum Idle Time	Minutes	1 to 10, default: 4 minutes
5	Compressor Load Time Interval	Minutes	2 to 10, default: 3 minutes
6	Compressor Unload Time Interval	Minutes	1 to 5, default: 1 minutes
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	Temperature Differential Setting	℃	1-5 ℃, default: 2 ℃

2.9 Operational Data Setting

Press and hold "ENTER" button for 5 seconds, this will enable operational data setting, [PSW] and [UNIT] display will show "----", use " ▲ " and " ▼ " buttons to select number 1 to 9, as to enter the 4 digits password (password: 1688), then press "ENTER" button. The unit module number display area will show the 9 sub menu as listed in the following table, while the temperature display area will show the correspondent sub menu's operational data. To change the operational value of each sub menu, follow these instructions:

(a) Press "SET" button to select different sub menu (1 to 9).
(b) Press " ▲ " and " ▼ " buttons to change the operational value setting.
(c) Press "ENTER" button to save the operational value and exit setting, or press "CLEAR" button to cancel and exit setting.

Sub menu#	Operational Data	Unit	Acceptable Operational Range and Default Value
1	Chilled Water Temperature Setting	℃	Chilled Water Setting: Supply – 5 to 30 Return – 7 to 30
2	N/A	N/A	N/A
3	Compressor Minimum Running Time	Minutes	1 to 10
4	Compressor Minimum Idle Time	Minutes	1 to 10
5	Compressor Load Time Interval	Minutes	2 to 10
6	Compressor Unload Time Interval	Minutes	1 to 5
7	N/A	N/A	N/A
8	N/A	N/A	N/A
9	N/A	N/A	N/A
10	Temperature Differential Setting	℃	1-5 ℃, default: 2 ℃

2.10 Error Code Description

Error Code	Description
E01	N/A
E02	Wired controller offline
E03	Chilled water flow switch disconnected
E04	N/A
E05	N/A
E06	N/A
E07	TH4 - chilled water return sensor open or short circuit
E08	TH5 - chilled water supply sensor open or short circuit
E09	N/A
E0A	N/A
E0B	N/A
E0C	Modular unit(s) offline
E0D	Compressor 1 high pressure
EOE	Compressor 2 high pressure
E0F	Compressor 1 low pressure
E10	Compressor 2 low pressure
E11	System 1 overload protect
E12	System 2 overload protect
E13	N/A
E14	N/A
E15	Phase sequence error
E16	Anti-freeze protection
E17	Compressor 1 overload protect
E18	Compressor 2 overload protect
E19	N/A
E1A	N/A
E1B	N/A
E1C	TH7- overall chilled water return sensor open or short circuit
E1D	TH8- overall chilled water supply sensor open or short circuit

3. Modbus Protocol Specification- Optional
For WP01V_BMS V1.0

3.1 Communication protocol

The way of start communication：After the order is sent from master to slaver(WP01V_BMS), the communication is started。

3.2 The structure of Communication data

（a）Interface Communication style：RS485-2W
mode：RTU（Remote Terminal Unit）
Synchronization mode
Connector type：Blue Color Connector Mark **A B**

（b）The bit rate：9600[bps]

（c）The format of each datum:
Start bit: 1[bit]
Data bit: 8[bit]
Stop bit: 1[bit]

（d）Coil, input mode, remain record, input record definition

（e）Every one idu WP01V_BMS need a modbus unique ID, range from 1-16; Id 0 is use for broadcast Id

WP01V_BMS **SW1-4 Set Modbus Slaver ID**

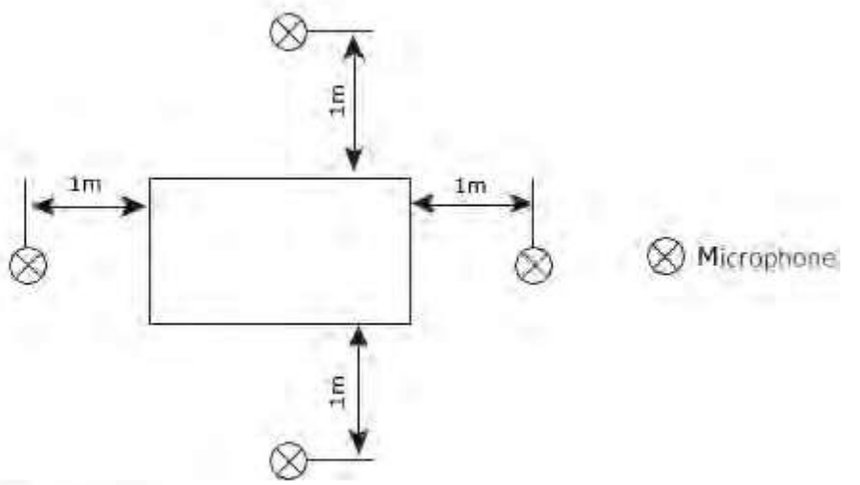
SW-1	**SW-2**	**SW-3**	**SW-4**	Modbus ID
0	0	0	0	1
1	0	0	0	2
0	1	0	0	3
1	1	0	0	4
0	0	1	0	5
1	0	1	0	6
0	1	1	0	7
1	1	1	0	8
0	0	0	1	9
1	0	0	1	10
0	1	0	1	11
1	1	0	1	12
0	0	1	1	13
1	0	1	1	14
0	1	1	1	15
1	1	1	1	16

（f）Modbus Table Description 03 Function

Address	Description
Address 0	On/Off R/W 0=Off 1=On
Address 1	Error Code R Bit7-0: Error Fault Code Bit15-8: Which one error 0: Main Unit 1: module 1 2: module 2 .....
Address 2	Status Bit & Output Bit R Bit15: 0.Water Cool Type 1.Fan Cool Type Bit14: 0.Control Outlet Water Temperature 1.Control Inlet Water Temperature Bit13: 0.Run Cool Mode 1.Run Heat Mode Bit6: 0.FAN No2 Stop 1.FAN No2 Running Bit5: 0.FAN No1 Stop 1.FAN No1 Running Bit4: 0.Cooling Tower Fan Stop 1.Cooling Tower Fan Running Bit3: 0.Cooling Pump Stop 1.Cooling Pump Running Bit2: 0.Freeze Pump Stop 1.Freeze Pump Running Bit1: 0.Compressor2 Stop 1.Compressor2 Running Bit0: 0.Compressor1 Stop 1.Compressor1 Running
Address 3	Reserve R
Address 4	Reserve R
Address 5	Chilled Set Temp R E.g. 235=23.5C 190=19.0C
Address 6	Ambient Temp R E.g. 235=23.5C 190=19.0C
Address 7	Chilled Water Inlet Temp R E.g. 235=23.5C 190=19.0C
Address 8	Chilled Water Outlet Temp R E.g. 235=23.5C 190=19.0C
Address 9	Reserve R

Sound Data

Sound Pressure Test Setup



Test standard : JB/T 4330 – 1999

Sound Pressure Level

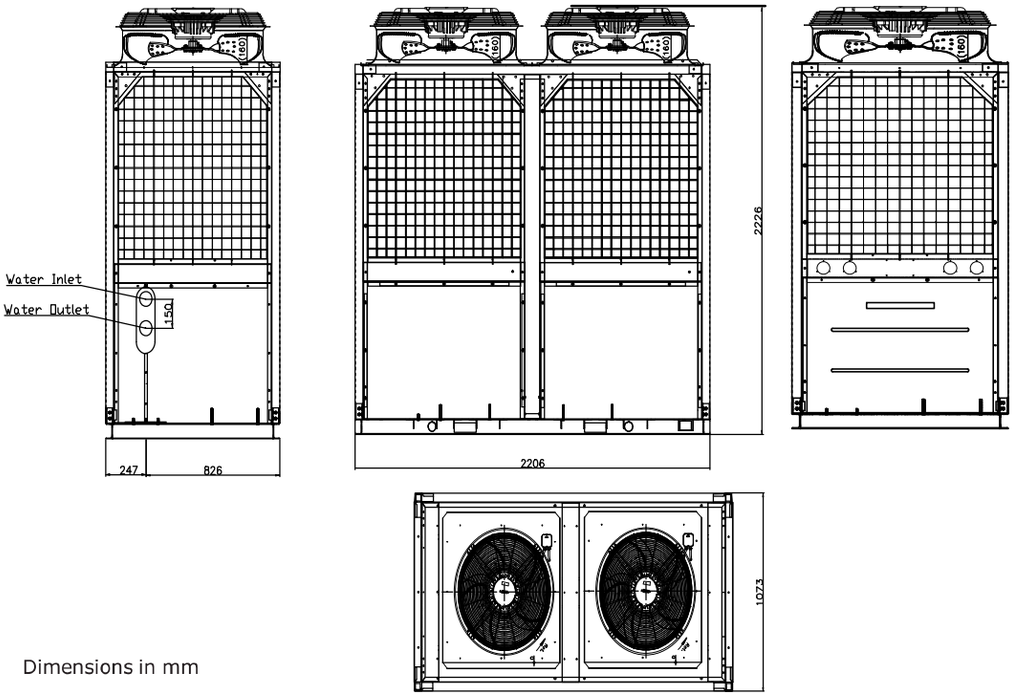
Model	1/1 Octave Sound Pressure Level (dB, ref 20μPa)							Overall (dBA)	Noise Criteria
	125Hz	250 Hz	500 Hz	1kHz	2khz	4kHz	8kHz		
FCA201	66	64	65	62	58	55	49	67	62
FCA301	75	70	66	66	61	56	53	70	65
FCA401	73	70	67	65	61	57	53	70	63
FCAC501	75	72	68	66	63	58	55	71	65
FCA601	78	75	73	70	67	61	57	75	68

Sound Power Level

Model	1/1 Octave Sound Pressure Level (dB, ref 1pW)							Overall (dBA)
	125Hz	250 Hz	500 Hz	1kHz	2khz	4kHz	8kHz	
FCA201	80	78	79	76	72	69	63	81
FCA301	89	84	80	80	75	70	67	84
FCA401	90	85	81	81	76	71	68	85
FCA501	92	87	83	83	78	73	70	88
FCA601	95	89	85	85	80	75	73	90

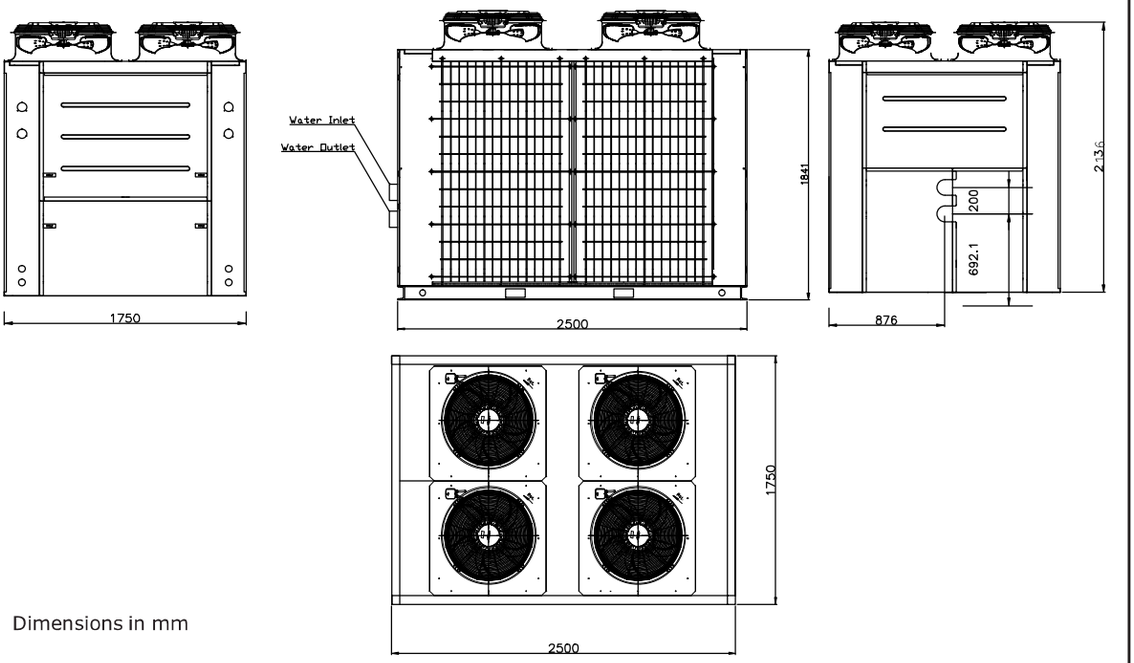
Dimensions

Model:FCA201/301



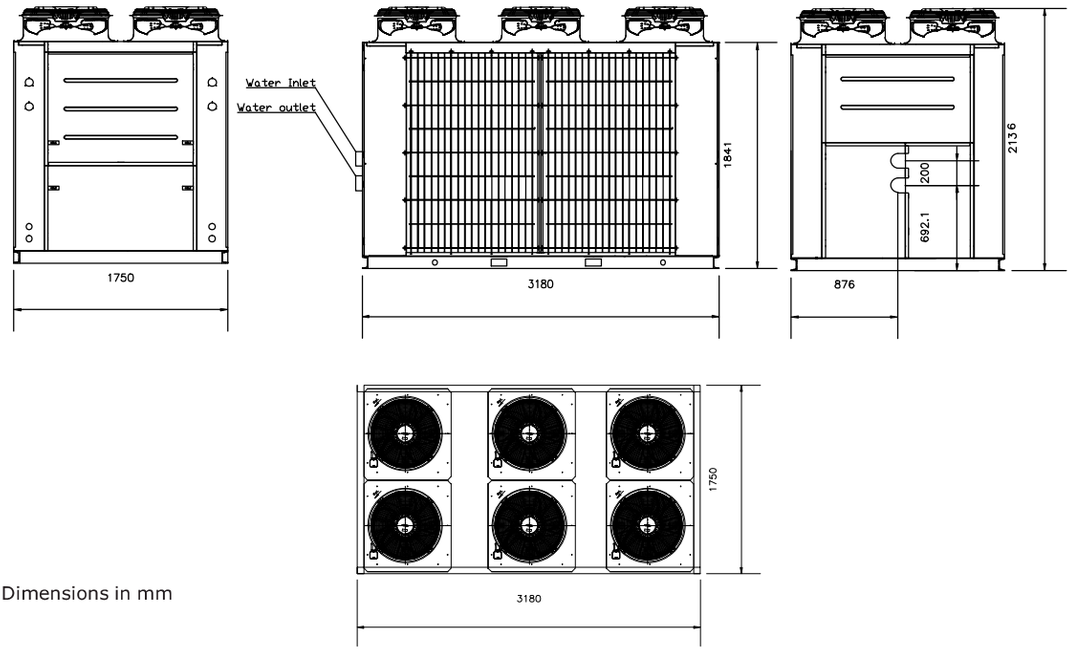
Dimensions in mm

Model:FCA401



Dimensions in mm

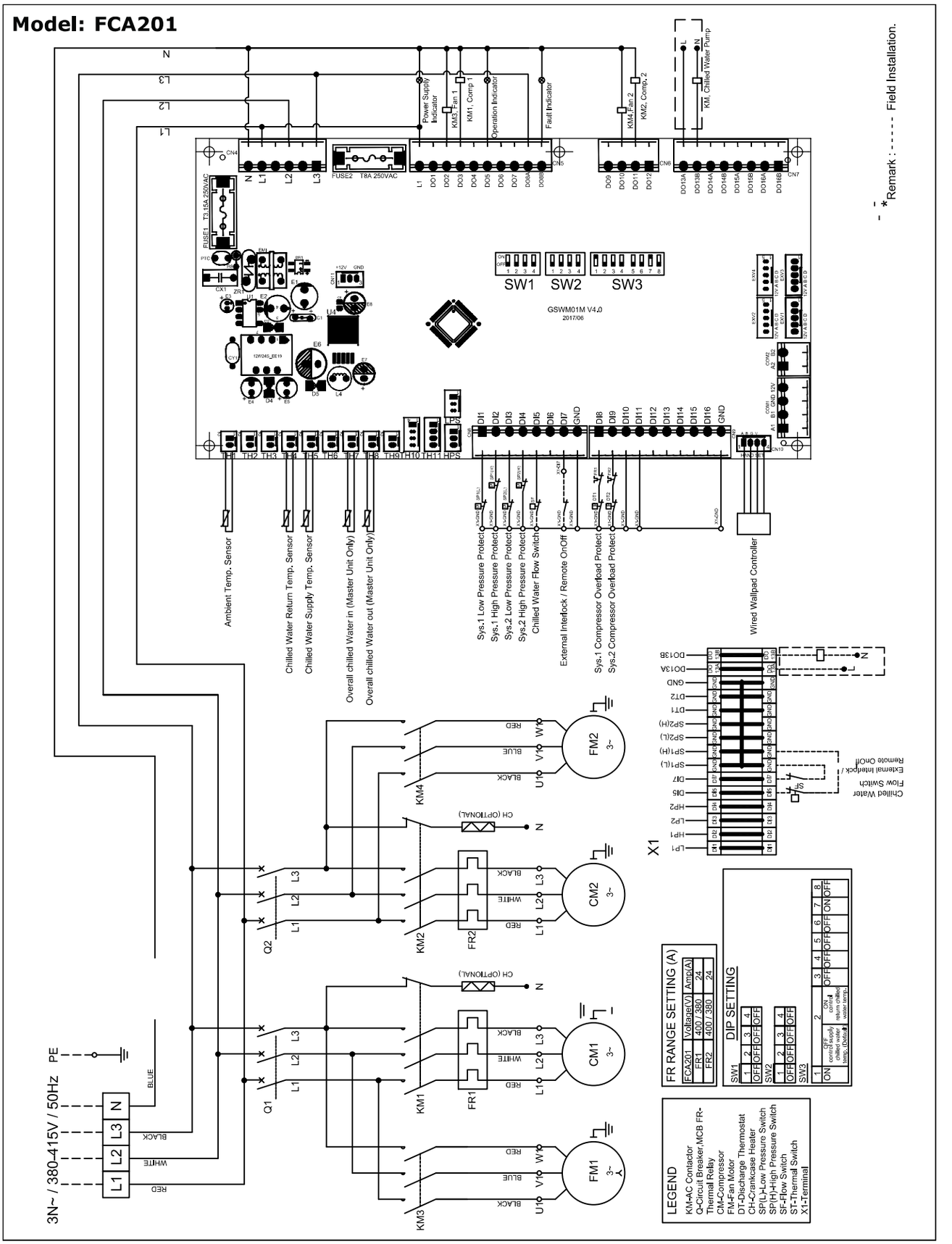
Model:FCA501/601

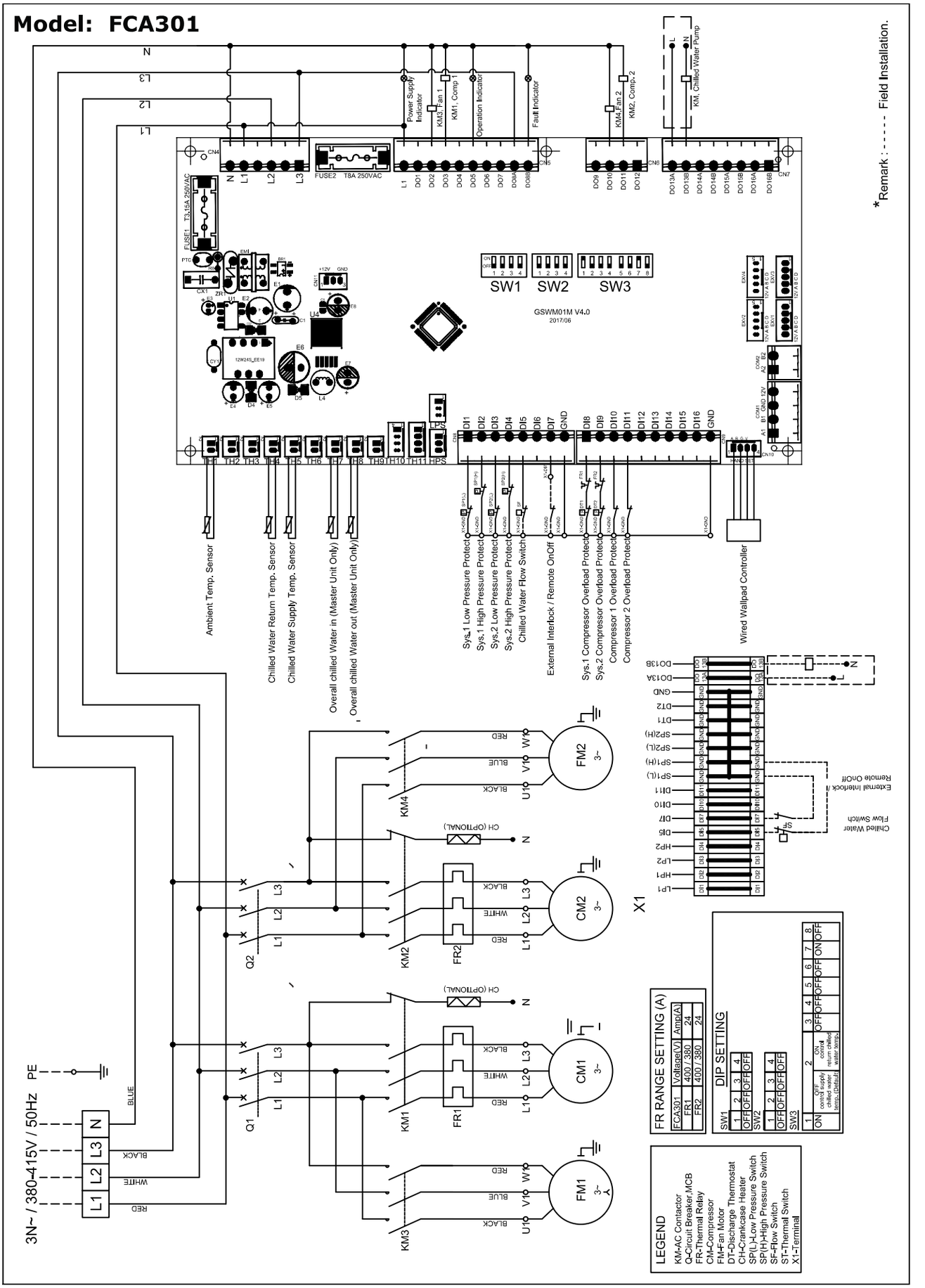


Dimensions in mm

Wiring Diagrams

Model: FCA201




Model: FCA301
*Remark : ----- Field Installation.
GSWM01M V4.0
2017/06
SW1 SW2 SW3
Ambient Temp. Sensor
Chilled Water Return Temp. Sensor
Chilled Water Supply Temp. Sensor
Overall chilled Water in (Master Unit Only)
Overall chilled Water out (Master Unit Only)
Sys.1 Low Pressure Protector
Sys.1 High Pressure Protector
Sys.2 Low Pressure Protector
Sys.2 High Pressure Protector
Chilled Water Flow Switch
External Interlock / Remote OnOff
Sys.1 Compressor Overload Protector
Sys.2 Compressor Overload Protector
Compressor 1 Overload Protector
Compressor 2 Overload Protector
Wired Wallpad Controller
Power Supply Indicator
KM3, Fan 1
KM1, Comp 1
Operation Indicator
Fault Indicator
KM4, Fan 2
KM2, Comp. 2
KM, Chilled Water Pump
3N~ / 380-415V / 50Hz PE
FM1
FM2
CM1
CM2
CH (OPTIONAL)
Chilled Water Flow Switch
External Interlock / Remote OnOff
FR RANGE SETTING (A)
DIP SETTING
LEGEND
KM-AC Contactor
Q-Circuit Breaker,MCB
FR-Thermal Relay
CM-Compressor
FM-Fan Motor
DT-Discharge Thermostat
CH-Crankcase Heater
SP(L)-Low Pressure Switch
SP(H)-High Pressure Switch
SF-Flow Switch
ST-Thermal Switch
X1-Terminal

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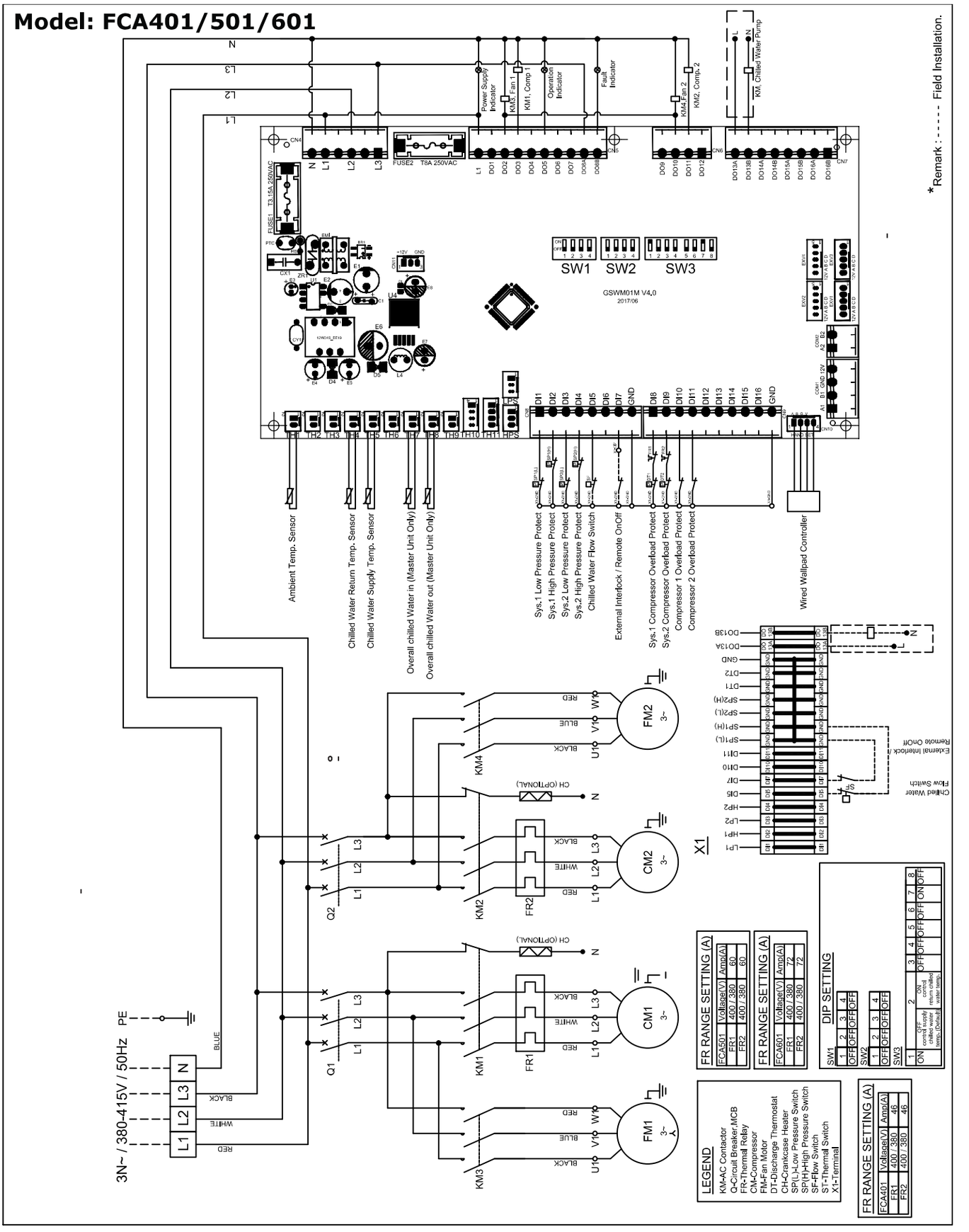
Model: FCA401/501/601



DIP SWITCH Setting – Default

Single Unit Operating (Default)

Setting module unit

SW1	[1]	[2]	[3]	[4]
	OFF	OFF	OFF	OFF

Setting quantity of slave unit (set on master unit only)

SW2	[1]	[2]	[3]	[4]
	OFF	OFF	OFF	OFF

Function Setting

	SW3	
[1]	ON	
[2]	OFF > Control Chilled Water Out Temp. (Default)	ON > Control Chilled Water In Temp.
[3]	OFF	
[4]	OFF	
[5]	OFF	
[6]	OFF	
[7]	ON	
[8]	OFF	

DIP SWITCH Setting – Modular Unit

Modular Units Operating

Setting module unit

SW1	[1]	[2]	[3]	[4]
Master Unit	OFF	OFF	OFF	OFF
Slave Unit No.1	ON	OFF	OFF	OFF
Slave Unit No.2	OFF	ON	OFF	OFF
Slave Unit No.3	ON	ON	OFF	OFF
Slave Unit No.4	OFF	OFF	ON	OFF
Slave Unit No.5	ON	OFF	ON	OFF
Slave Unit No.6	OFF	ON	ON	OFF
Slave Unit No.7	ON	ON	ON	OFF

Setting quantity of slave unit (set on master unit only)

SW2	[1]	[2]	[3]	[4]
No Slave Unit	OFF	OFF	OFF	OFF
1 Slave Unit	ON	OFF	OFF	OFF
2 Slave Units	OFF	ON	OFF	OFF
3 Slave Units	ON	ON	OFF	OFF
4 Slave Units	OFF	OFF	ON	OFF
5 Slave Units	ON	OFF	ON	OFF
6 Slave Units	OFF	ON	ON	OFF
7 Slave Units	ON	ON	ON	OFF

Function Setting

	SW3	
[1]	ON	
[2]	OFF > Control Chilled Water Out Temp. (Default)	ON > Control Chilled Water In Temp.
[3]	OFF	
[4]	OFF	
[5]	OFF	
[6]	OFF	
[7]	ON	
[8]	OFF	

SAKURA®

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