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**ECO SLIMLINE  
DECORATIVE SERIES**  
INSTALLATION, OPERATION &  
SERVICE MANUAL

PFWSL - V - EC MOTOR

V - 2pipe / P - 4pipe

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## INVESTING IN QUALITY, RELIABILITY & PERFORMANCE

### ISO 9001 QUALITY



Management Service

Every product is manufactured to meet the stringent requirements of the internationally recognized ISO 9001 standard for quality assurance in design, development and production.

### World Leading Design and Technology

Equipped with the latest air-conditioning test rooms and manufacturing technology, we produce over 50,000 fan coil units each year, all conforming to the highest international standards of quality and safety.

### CE SAFETY STANDARDS



Product Service

All products conform to the Certificate Europe directives (Machinery Safety, Electromagnetic Compatibility and Low Voltage), as required throughout the European Community, to guarantee correct standards of safety.

### The Highest Standards of Manufacturing

In order to guarantee the very highest standards and performance, we manage every stage in the manufacturing of our products. Throughout the production process we maintain strict control, starting with our extensive resources in research and development through to the design and manufacture of almost every individual component, from molded plastics to the assembly of units and controllers.

### WEEE MARK



All products conform to the "WEEE" directive to guarantee correct standards of environmental solutions.

### Quality Controlled from Start to Finish

Our highly trained staff and strict quality control methods enable us to produce products with an exceptional reputation for reliability and efficiency, maintained over many years. As well as CE certification and ISO 9001, several products ranges have UL / ETL safety approval in the USA and Canada, Eurovent performance and sound certification as well as ROHS compliance for Europe, giving you the confidence of knowing our company is the right choice when selecting fan coil units.

ALWAYS MAKE SURE THIS MANUAL REMAINS WITH THE UNIT. READ THIS MANUAL BEFORE PERFORMING ANY OPERATION ON THE UNIT.

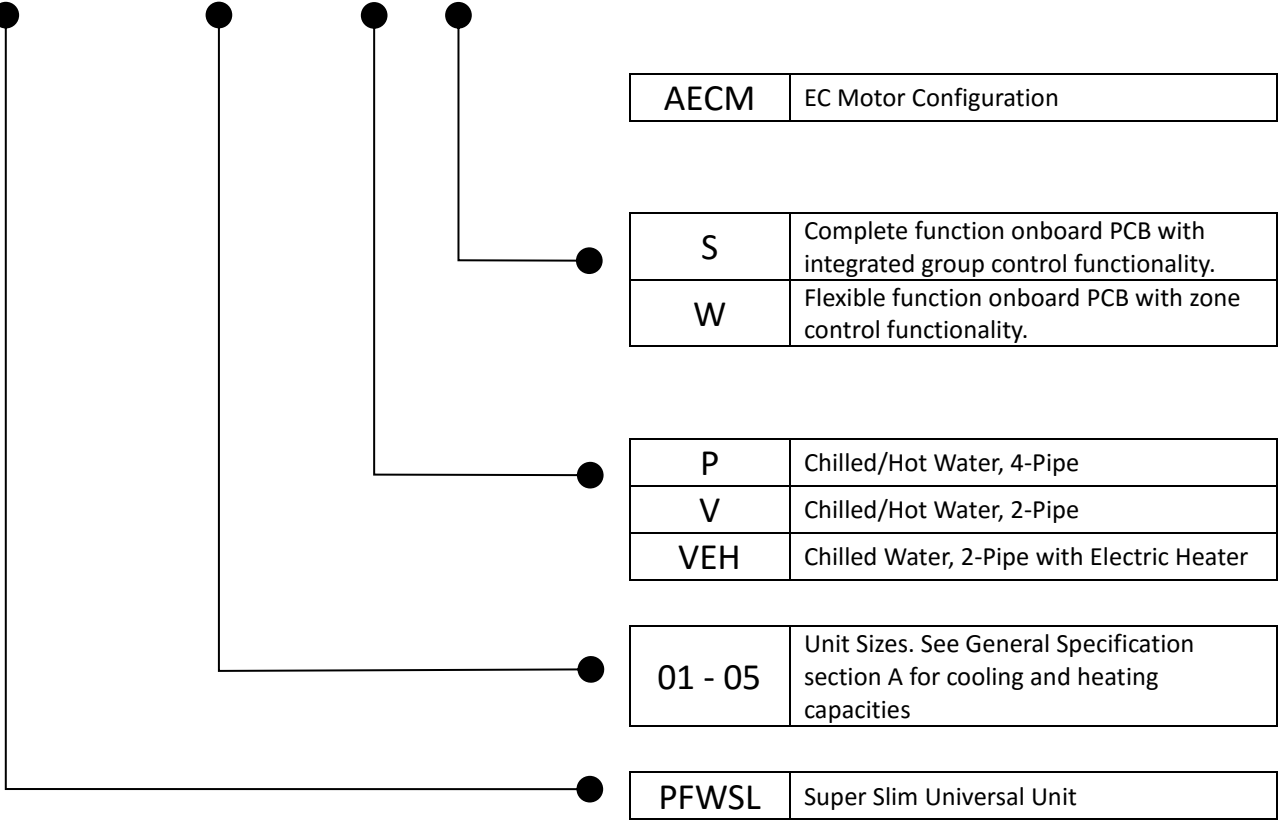
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# Model Code Nomenclature

PFWSL - 01 - V S - AECM



## A. Technical Data

### A.1. General Description

The product represents all-in-one solution for cooling, heating and dehumidification. It achieves high energy saving levels as it can be combined with low-temperature heat generators such as heat pump, condensing boilers and solar collectors. With its sophisticated temperature regulator, it guarantees thermal comfort in every season. It heats and cools extremely quickly and once the desired temperature is reached it maintains it accurately and silently.

#### **STRUCTURE**

The bearing structure is made of galvanized sheet-steel with holes for attaching the structure to the wall/ceiling. The “V” type drain pan is used in the unit which ensure the unit can be installed vertically and horizontally. Fire resistant insulation is fitted internally to provide both thermal and acoustic insulation.

#### **FASCIA**

The RAL9010 fascia is made of steel-sheet with electrostatic coating which is resistant to rust, corrosion, chemical agents, solvents, aliphatic compounds and alcohols.

#### **AIR DELIVERY GRILLE**

The air delivery grill is made from ABS, which color is RAL9010.

#### **HEAT EXCHANGER**

The heat exchanger is a highly efficient coil in which copper pipes and aluminum fins are fixed by mechanical expansion. Coil connections are provided with an anti-torsion system, hand air vent and water purge valves. Coils are tested at the pressure of 25 bar and recommended for operating at 8 bar.

#### **Blower and Motor**

The unit incorporates only specially designed and tested EC motors, allowing the blower wheel to provide optimum performance in airflow-efficiency and quiet operation.

#### **AIR FILTER**

The air filter is made of ABS with Nylon filter. It is easy to removing and cleaning, which can be cleaned by rinsing with water or by gently vacuuming it.

#### **Microprocessor controls (S type)**

The PCB (printed circuit board) Modbus microprocessor controls functionality of the indoor fan motor, water valves (ON/OFF) and electric heater (optional), to maintain room conditions at a user-defined set point. Temperature settings, fan speeds and other control functions can be changed by either infrared handset or wired wall pad controller.

#### **Electro-mechanical controls (W type)**

It is suitable for connecting with an external 24VAC thermostat which sends H/M/L control signal to EC motor. The PCB includes zone control application, simple error diagnostic and electric heater control (optional).



## A.2. General Specification

### A.2.1. 2-Pipe Systems

**Product range:** PFWSL-Y-ECM Super Slim Universal Fan Coil with EC Motor

PFWSL-Y-V~-ECM Super Slim Universal Unit 2-pipe with EC Motor

		PFWSL-[Size]-Y-V~-AECM			1	2	3	4	5
<b>Unit Configuration</b>		Configuration			2-pipe				
		Number Of Fan Blowers			1		2		
		Power Supply		(V/Ph/Hz)	115/1/60				
		Operation Control			~S: Complete function onboard PCB with integrated group control functionality. ~W: Flexible function onboard PCB with zone control functionality.				
Performance Data	Air	Air Flow	H	CFM	118	188	271	339	381
			M		94	148	216	267	291
			L		58	91	146	218	251
	Cooling	Cooling Capacity	H	BTU/Hr	3310	5800	8326	10305	11977
			M		2798	4709	6893	8530	9656
			L		1945	3173	5118	7268	8599
		Sensible Cooling Capacity	H		2457	4095	5903	7370	8496
			M		2047	3344	4879	6074	6824
			L		1399	2252	3583	5152	6039
	Heating	Heating Capacity	H	BTU/Hr	4197	6893	9998	12488	14331
			M		3515	5698	8292	10271	11499
			L		2388	3822	6005	8701	10168
		Max. Electric Heater Capacity @ 115V		kW	0.75	1	1.5	2	
	Sound	Sound Power Level		dB(A)	42/35/33	44/41/35	47/43/37	47/44/38	50/46/40
		Sound Pressure Level			33/26/24	35/32/26	38/34/28	38/35/29	41/37/31
	Electrical	Fan Motor Power	H	W	12	14	24	18	24
			M		8	10	15	13	15
			L		5	6	9	8	9
	Fan Motor Running Current @ 115V_H			A	0.11	0.127	0.218	0.164	0.218
	Hydraulic	Cooling Water Flow Rate	H	GPM	0.74	1.25	1.84	2.29	2.65
M			0.62		1.04	1.53	1.89	1.26	
L			0.43		0.7	1.13	1.61	1.9	
Cooling Pressure Drop		H	Ft. Hd.	1	3.3	7.8	4.5	6.7	
		M		0.5	2.4	5.6	3.2	4.6	
		L		0.3	1.2	3.4	2.4	3.8	
Hot Water Flow Rate @H/M/L			GPM	Same As Cooling Water Flow Rate					
Hot Water Pressure Drop		H	Ft. Hd.	0.8	2.6	6.4	3.6	5.5	
		M		0.6	1.9	4.4	2.6	3.7	
		L		0.3	1	2.7	2	3	
Water Content			Gallon	0.11	0.19	0.27	0.34	0.42	
Construction and Packing Data	Water	Type		Socket (Female NPT)					
		In	Inch	3/4					
	Out	5/8							
	Condensate Drainage Connection				29 1/8	37	44 7/8	52 3/4	60 5/8
	Dimensions	L	Inch	5 1/8					
		W		22 13/16					
Net Weight			Lbs	41.9	48.5	55.1	61.7	68.3	

**a. Cooling mode (2-pipe):**

- Return air temperature: 80F DB/ 67F WB.
- Inlet/ Outlet water temperature: 45F/ 55F.

**b. Heating mode (2-pipe):**

- Return air temperature: 70F.
- Inlet water temperature: 140F.
- Water flow-rate: same as cooling mode

(All dimensions are approximate within 1/16 of an inch of those indicated.)

## A.2.2. 4-Pipe Systems

**Product range:** PFWSL-Y-P~-ECM Super Slim Universal Unit 4-pipe with EC Motor  
 PFWSL-Y-P~-ECM Super Slim Universal Unit 4-pipe with EC Motor

				PFWSL-[Size]-Y-P~-AECM		1	2	3	4	5	
Unit Configuration				Configuration		4-pipe					
				Number Of Fan Blowers		1			2		
				Power Supply	(V/Ph/Hz)		115/1/60				
				Operation Control		~S: Complete function onboard PCB with integrated group control functionality. ~W: Flexible function onboard PCB with zone control functionality.					
Performance Data	Air	Air Flow	H	CFM	118	188	271	339	381		
			M		94	148	216	267	291		
			L		59	91	146	218	251		
	Cooling	Total Cooling Capacity	H	BTU/Hr	3351	5630	8087	10032	11635		
			M		2812	4675	6722	8292	9383		
			L		1928	3149	4913	7029	8292		
		Sensible Cooling Capacity	H		2409	3992	5698	7131	8223		
			M		2010	3282	4743	5869	6585		
			L		1368	2200	3446	4948	5801		
	Heating	Heating Capacity	H	BTU/Hr	4504	7370	10646	13341	15389		
			M		3822	6176	8974	11158	12557		
			L		2668	4265	6654	9554	11226		
	Sound	Sound Power Level		dB(A)	42/35/33	44/41/35	47/43/37	47/44/38	50/46/40		
		Sound Pressure Level			33/26/24	35/32/26	38/34/28	38/35/29	41/37/31		
	Electrical	Fan Motor Power	H	W	12	14	24	18	24		
			M		8	10	15	13	15		
			L		5	6	9	8	9		
	Fan Motor Running Current @115V H		A		0.21	0.24	0.42	0.31	0.42		
	Hydraulic	Cooling Water Flow Rate	H	GPM	0.74	1.25	1.79	2.22	2.58		
			M		0.62	1.03	1.49	1.84	2.08		
L			0.43		0.7	1.09	1.56	1.84			
Cooling Pressure Drop		H	Ft. Hd.	2.1	7.1	7.6	4.4	6.7			
		M		1.1	5.1	5.6	3.2	4.7			
		L		0.7	1.6	3.3	2.4	3.8			
Hot Water Flow Rate		H	GPM	0.5	0.82	1.18	1.48	1.71			
		M		0.42	0.69	1	1.24	1.39			
		L		0.3	0.47	0.74	1.06	1.24			
Heating Pressure Drop		H	Ft. Hd.	1.2	3.9	9.3	5.5	8.2			
	M	0.9		2.8	6.9	4	5.8				
	L	0.5		1.5	4.1	3	4.7				
Water Content		Gallons		0.06	0.1	0.14	0.18	0.22			
Construction and Packing Data				Water Connection		Threaded Female NPT					
				Chilled Water	In	Inch	1/2				
					Out						
				Hot water	In		5/8				
					Out						
				Condensate Drainage Connection							
Dimensions	L	Inch	29 1/8	37	44 7/8		52 3/4	60 5/8			
	W		5 1/8								
	H		22 13/16								
Net Weight		Lbs		41.9	48.5	55.1	61.7	68.3			

**a. Cooling mode (4-pipe)**

- Return air temperature: 80F DB/ 67F WB.
- Inlet/ Outlet water temperature: 45F/ 55F.

**b. Heating mode (4-pipe):**

- Return air temperature: 68F.
- Inlet water temperature: 158F.
- Outlet water temperature: 140F.

(All dimensions are approximate within 1/16 of an inch of those indicated.)



### A.3. Coil Data

#### A.3.1. 2-Pipe Systems

Model	Fin height	Fin Length	Fins per Inch	No. of Rows	Fin width	No. of Circuits	Tube $\emptyset$
PFWSL-01	11-13/16	11-7/8	15.0	2	1-3/4	2	3/8
PFWSL-02		19-3/4				2	
PFWSL-03		27-5/8				2	
PFWSL-04		35-1/2				3	
PFWSL-05		43-3/8				3	

#### A.3.2. 4-Pipe Systems

##### Cooling Coil

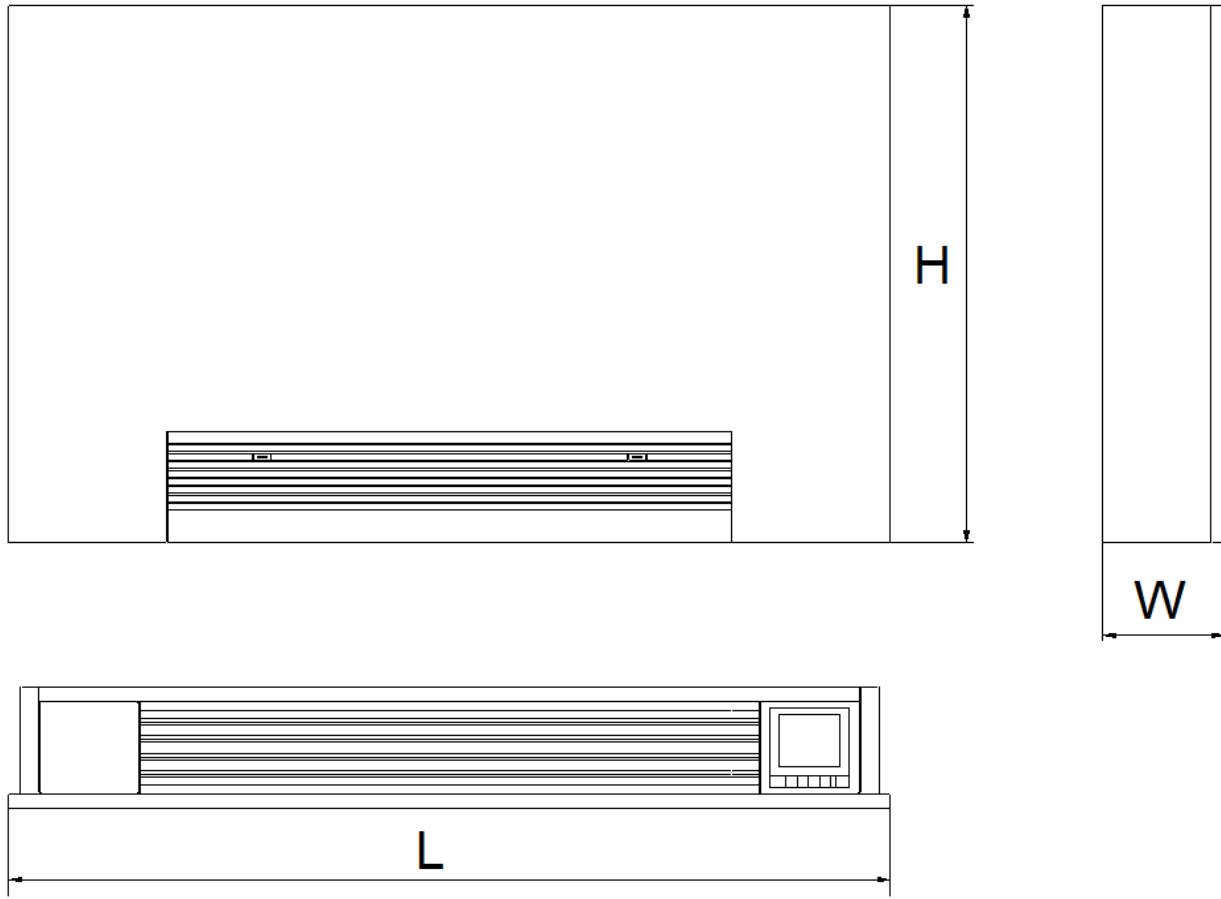
Model	Fin height	Fin Length	Fins per Inch	No. of Rows	Fin width	No. of Circuits	Tube $\emptyset$
PFWSL-01	11-9/16	11-7/8	16.5	2	1	2	1/4
PFWSL-02		19-3/4				2	
PFWSL-03		27-5/8				3	
PFWSL-04		35-1/2				4	
PFWSL-05		43-3/8				4	

##### Heating Coil

Model	Fin height	Fin Length	Fins per Inch	No. of Rows	Fin width	No. of Circuits	Tube $\emptyset$
PFWSL-01	11-9/16	11-7/8	16.5	1	1/2	1	1/4
PFWSL-02		19-3/4				1	
PFWSL-03		27-5/8				1	
PFWSL-04		35-1/2				2	
PFWSL-05		43-3/8				2	

*(All dimensions are approximate within 1/16 of an inch of those indicated.)*

#### A.4. Dimensions

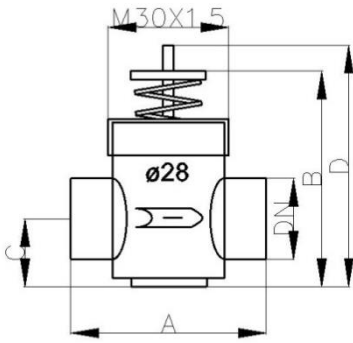


MODEL	PFWSL-01	PFWSL-02	PFWSL-03	PFWSL-04	PFWSL-05
L	29 1/8	37	44 7/8	52 3/4	60 5/8
H	22 13/16	22 13/16	22 13/16	22 13/16	22 13/16
W	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8

*(All dimensions are approximate within 1/16 of an inch of those indicated.)*

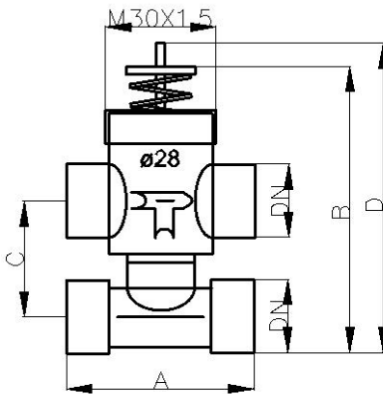
## A.5. Valve Information (Optional)

### 2-Way 3/4" Valve Body



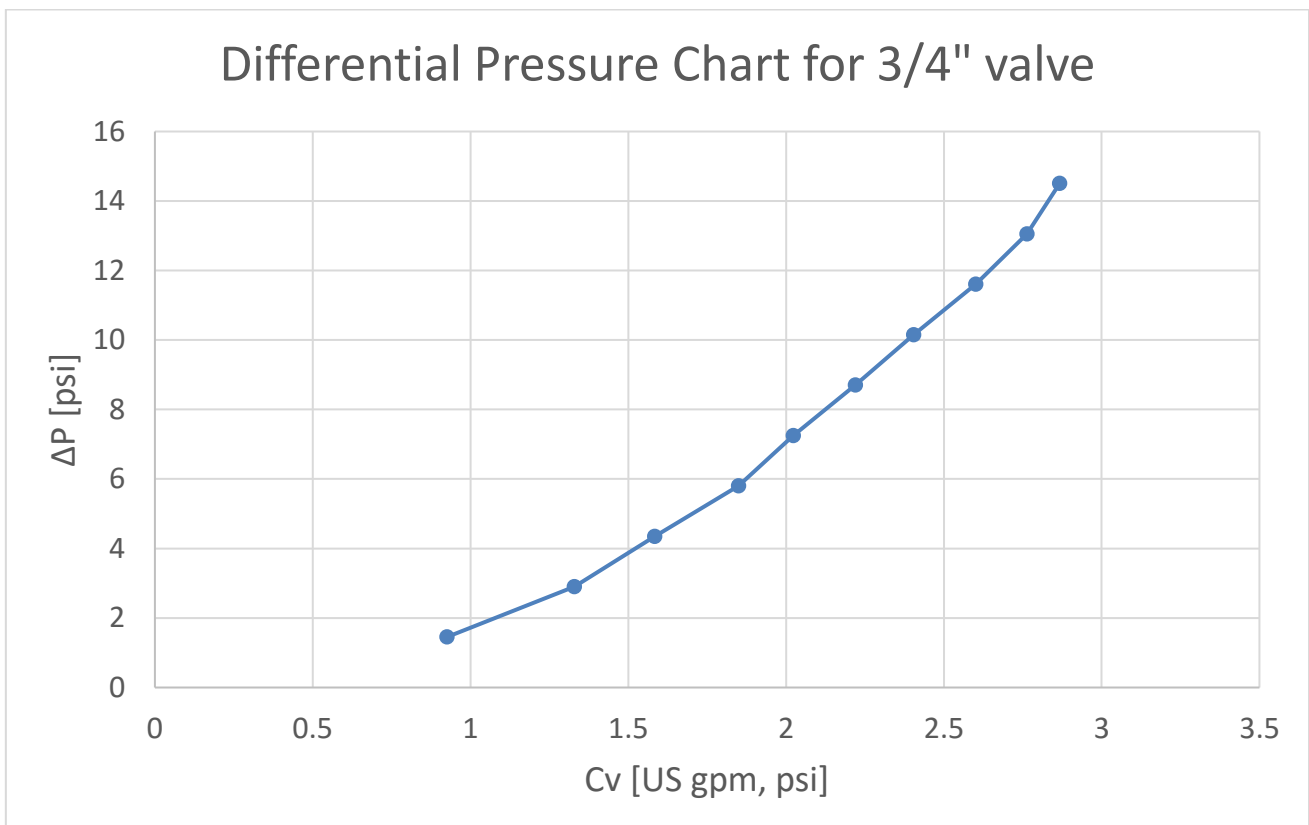
Valve Code (valve body + ON/ OFF thermoelectric actuator)	Valve Body Dimensions (mm)				
	DN	A	B	C	D
SGS14HFCA-23010101	D20 (G3/4")	2-3/16	1-7/8	7/8	2-1/2

### 3-Way 3/4" Valve Body

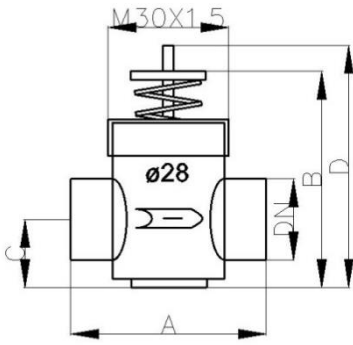


Valve Code (valve body + ON/ OFF thermoelectric actuator)	Valve Body Dimensions (mm)				
	DN	A	B	C	D
SGS14HFCA-23010102	D20 (G3/4")	2-3/16	3-7/16	2	4-1/16

(All dimensions are approximate within 1/16 of an inch of those indicated)

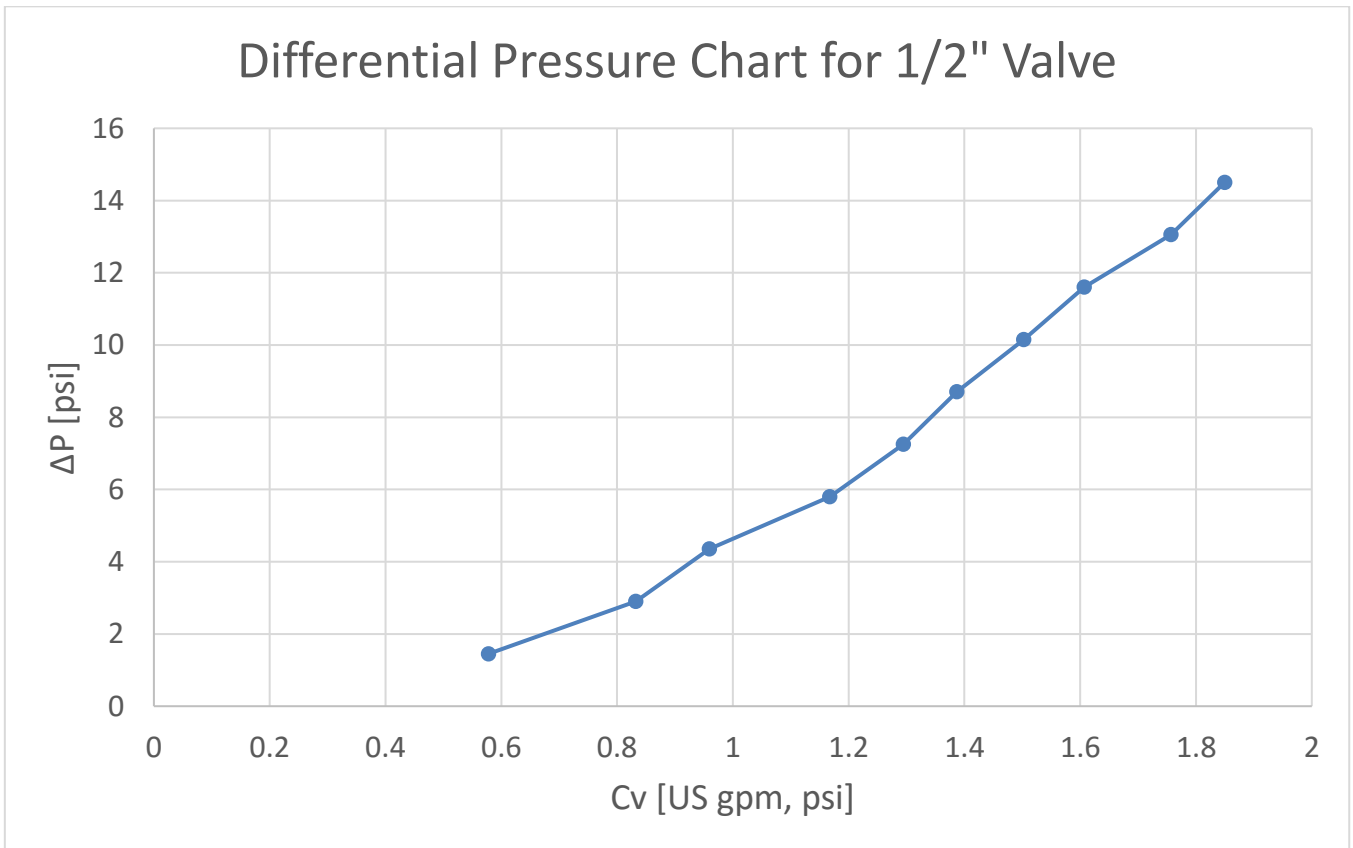


### 2-Way 1/2" Valve Body



Valve Code (valve body + ON/ OFF thermoelectric actuator)	Valve Body Dimensions (mm)				
	DN	A	B	C	D
SGS14HFCA-23020101	D15 (G1/2")	2-1/16	1-7/8	3/4	2-1/2

(All dimensions are approximate within 1/16 of an inch of those indicated)



## B. Installation

### B.1. Safety Precautions

- When installing, performing maintenance or servicing Polar Air fan coil units observe the precautions stated in this manual as well as those stated on the labels attached to the unit.
- Ensure all local and national safety codes, laws, regulations, as well as general electrical and mechanical safety guidelines are followed for installation, maintenance and service.
- The appliance is for indoor use only.
- Ensure the correct power supply is provided.
- If the power supply cord is damaged, it must be replaced by qualified personnel.
- Installing and servicing fan coil unit should be performed by qualified service personnel only.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or persons lacking in experience and knowledge of the appliance, unless they have been given supervision or instruction concerning it.
- User of this appliance is responsible for his/her own safety.
- Warranty shall be voided if installation instructions and safety precaution stated in this manual are not observed.
- The unit should only be switched off by using the ON-OFF button on the control interface.

#### **CAUTIONS**

*Before any service or maintenance operations turn off the mains electrical supply.*

*DO NOT turn OFF the main power supply when the unit is operating. Turn off the unit BEFORE turning off the main power*

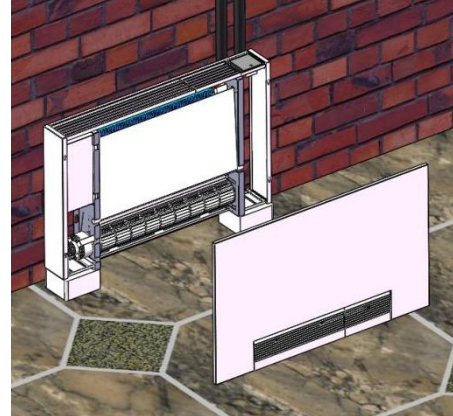
## B.2. Installation and Location

The unit location should be established by the installation designer, services engineer or by a technically competent person before installation. It should take into account the technical requirements as well as the relevant current laws and regulations. The fan coil should be installed by a qualified company, also in accordance with the relevant laws and regulations of the country of installation.

The fan coils are designed for exposed installation. All the models are designed to be floor free standing, wall mounted or suspended from the ceiling. Installation should allow the treated air to circulate freely throughout the room and leave sufficient space to access the unit, in order to carry out maintenance or servicing operations.

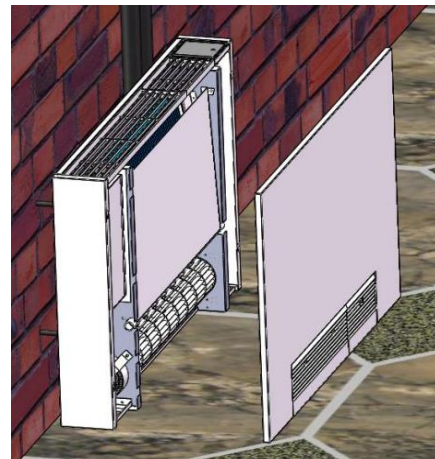
### FOR FLOOR FREE STANDING

1. Open the top left and right covers to loosen the 8 screws.
2. Lift and remove the front panel.
3. Install the unit on the wall with ABS supporting feet.
4. Complete the hydraulic connection and check for leakage.
5. Complete the electrical connection as shown in the wiring diagrams.
6. Remount the front panel, return air grille and filter.



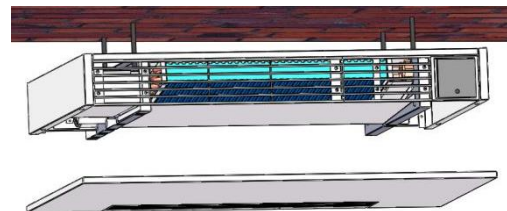
### FOR WALL-MOUNTED WITH BOTTOM RETURN

1. Open the top left and right covers to loosen the 8 screws
2. Lift and remove the front panel.
3. Keep a minimum clearance of 3-1/8" from the floor.
4. Secure the mounting brackets to the wall, then suspend the unit by the mounting brackets, as shown in figure.
5. Complete the hydraulic connection and check for leakage.
6. Complete the electrical connection as shown in the wiring diagrams.
7. Remount the front panel, return air grille and filter.



### FOR CEILING-MOUNTED

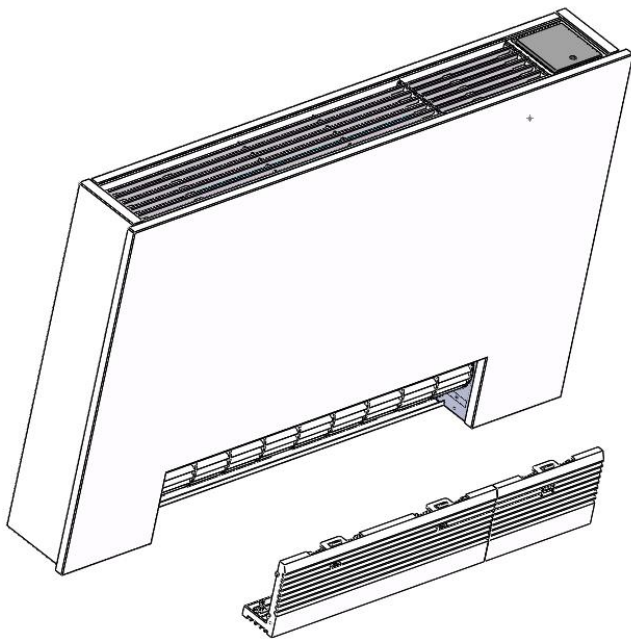
1. Open the top left and right covers to loosen the 8 screws.
2. Lift and remove the cover.
3. Secure the mounting brackets to the ceiling, then suspend the unit by the mounting brackets. To correctly position flanges and brackets, see the dimensional data.
4. Complete the hydraulic connection and check for leakage.
5. Complete the electrical connection as shown in the wiring diagrams. Make electrical connection as shown in the wiring diagrams.
6. Remount the front panel, return air grille and filter.



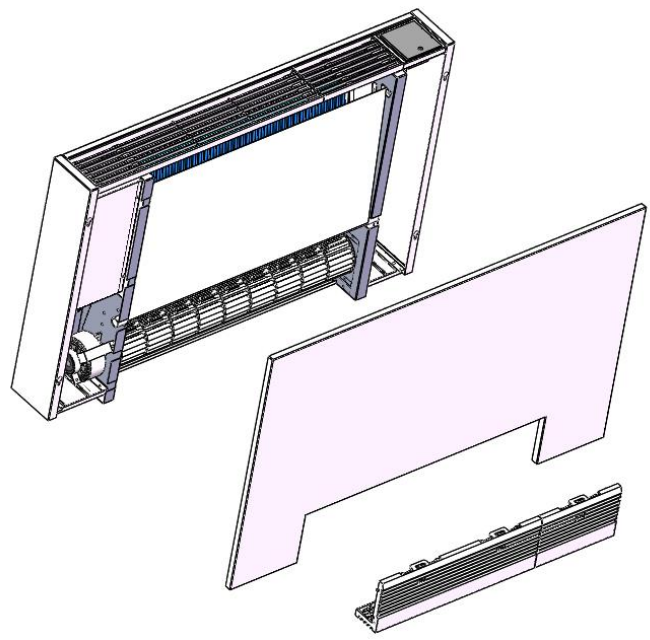
*(All dimensions are approximate within 1/16 of an inch of those indicated)*

### B.3. Front Panel Removal

Step 1: Unlock grill and remove the filter.

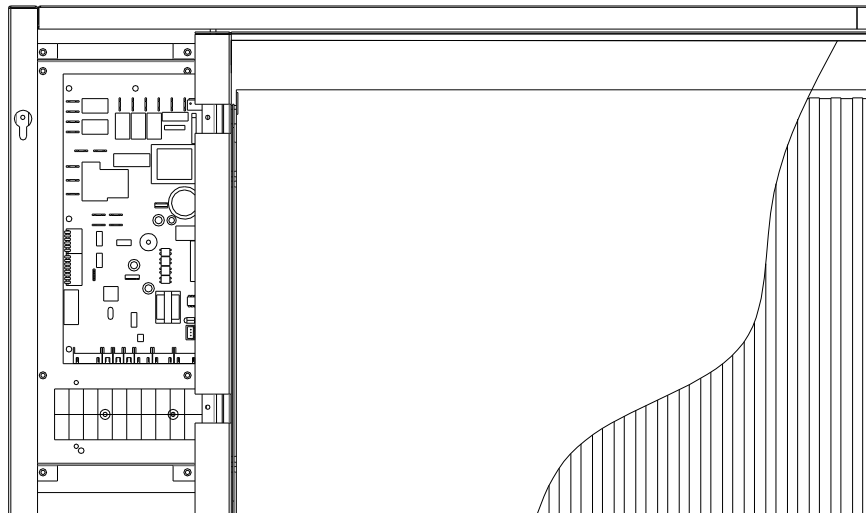


Step 2: Lift the front panel and remove it.



### B.4. Electrical Connection

The fan coil comes fully wired and only requires connecting to the mains electricity supply and to any room controls. Remove the front panel, then control box is shown below. Connect the wires according to wiring diagram.

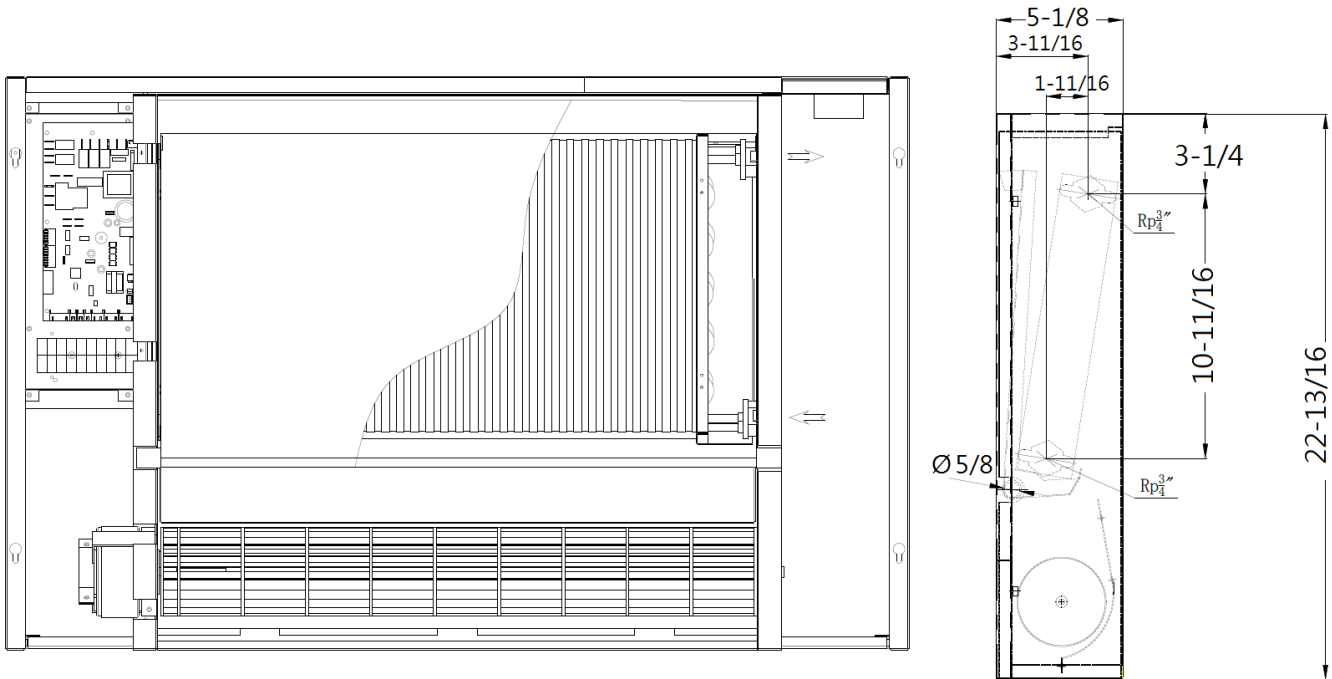


## B.5. Piping Connections

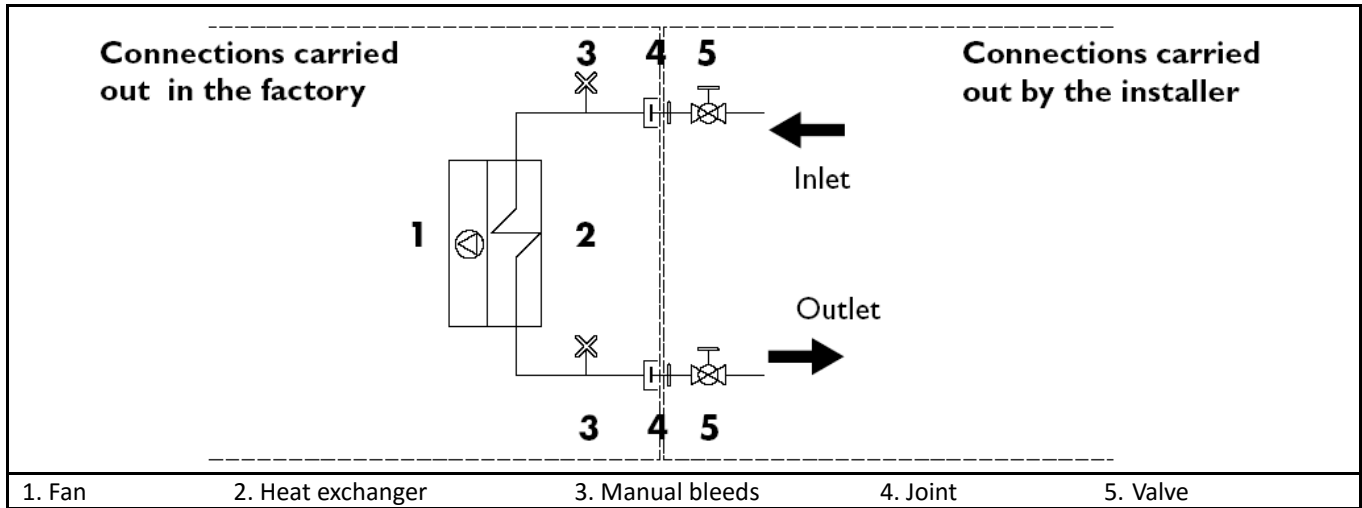
The fan coils have been designed and made for installation in heating and air-conditioning systems. The characteristics of the water fittings are given below:

### Main pipes connection

The position of the water fittings may be reversed from left to right during installation.



Installation diagram of water connections



### CONDENSATE DRAINAGE

For use in air-conditioning systems, the fan coils are fitted with a condensate-collecting tray to which a drainpipe can be connected. Connect an insulated drainage pipe (inside  $\text{Ø} 5/8$ ") to the hole of the tray and direct it towards a suitable drain

#### Notes:

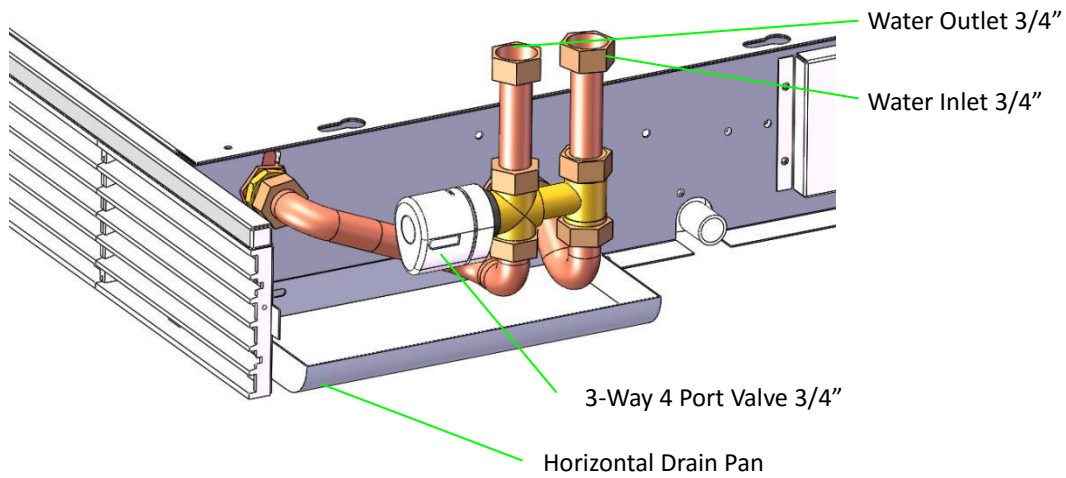
- i. Check that the condensation flows out regularly into the tray.
- ii. The drainage pipe should have a 2% slope towards the drain.
- iii. Check all the joints for leaks.
- iv. Apply heat-insulating material to the joints.



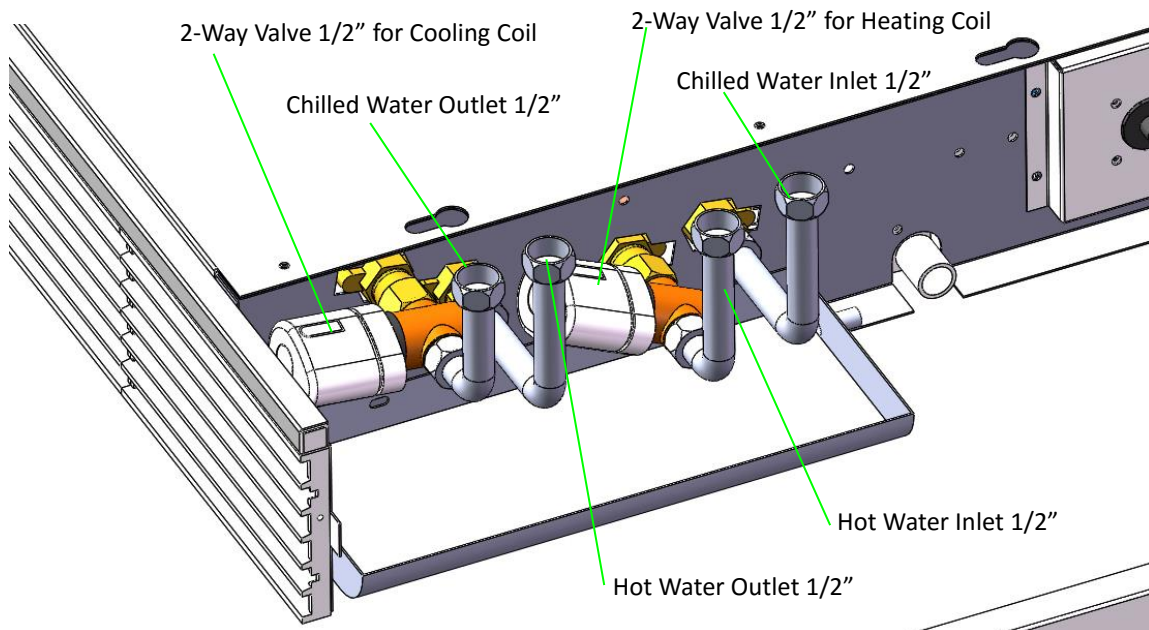
## B.6. Valve and External Drain Pan Installation

### Horizontal type

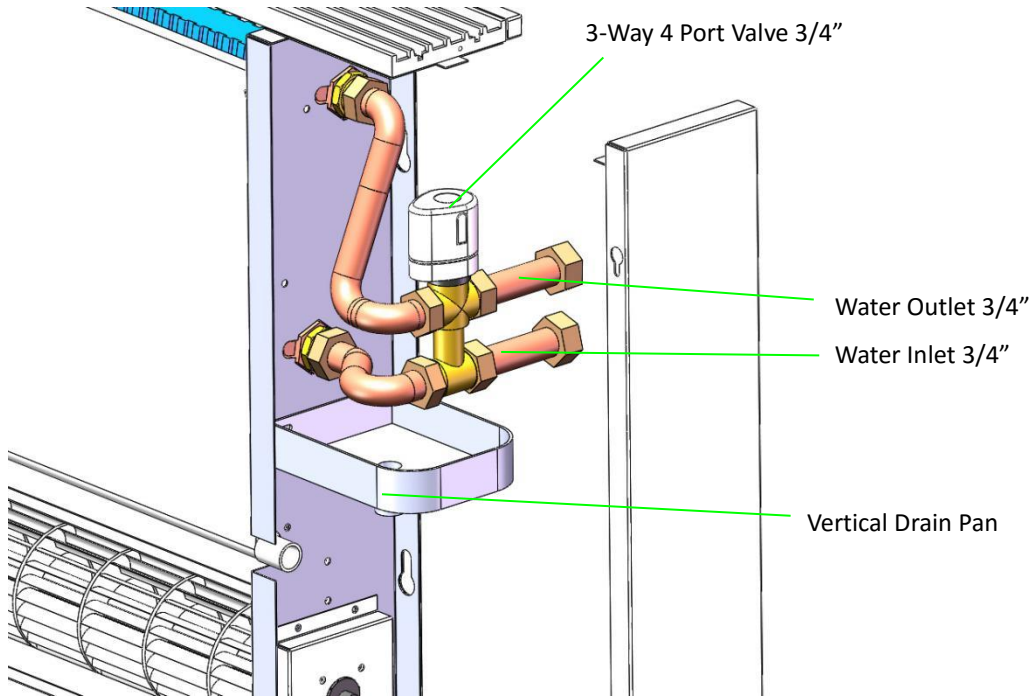
#### Piping for 2-Pipe System



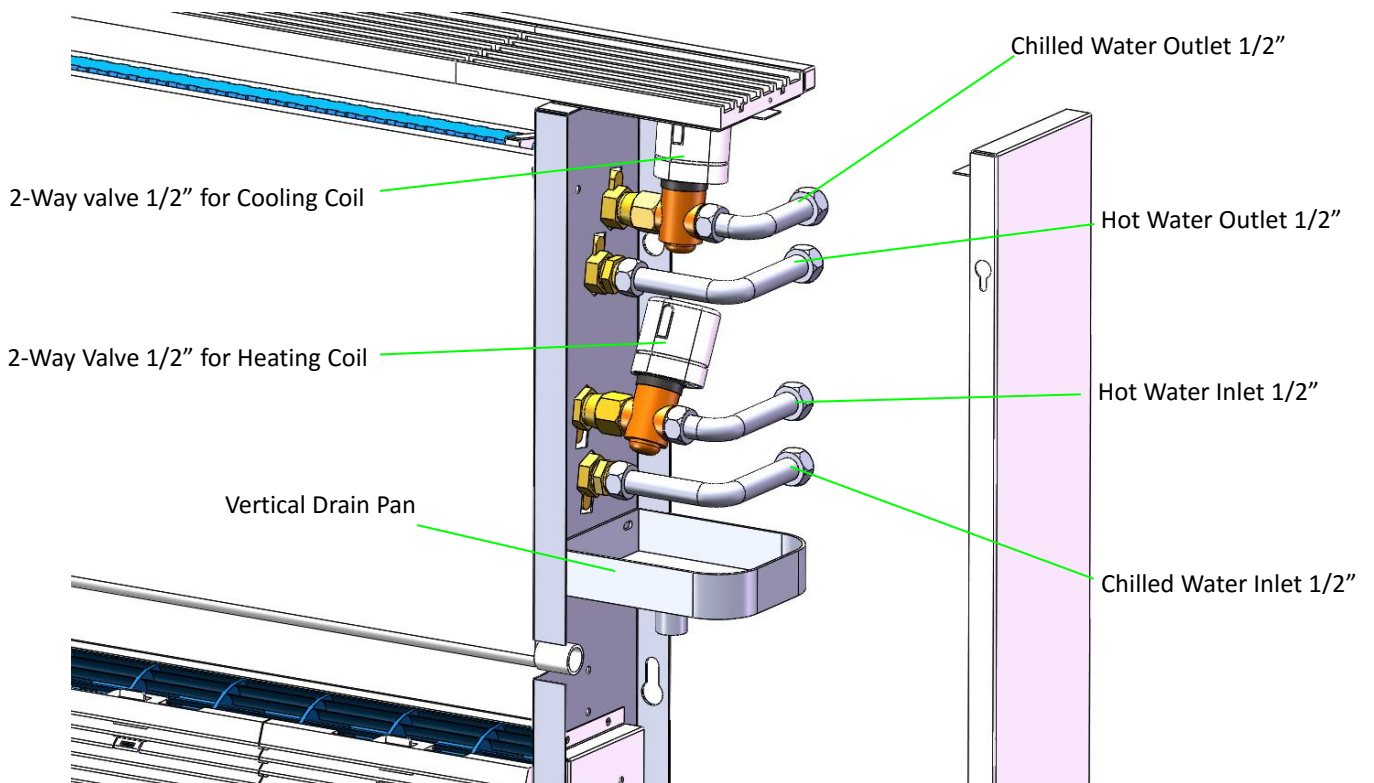
#### Piping for 4-Pipe System



**Vertical type**  
**Piping for 2-Pipe System**



**Piping for 4-Pipe System**



**IMPORTANT**

Gravity drainage may be converted into forced drainage by attaching the condensate drain pump available as an accessory.

## C. Maintenance

### C.1. General Maintenance

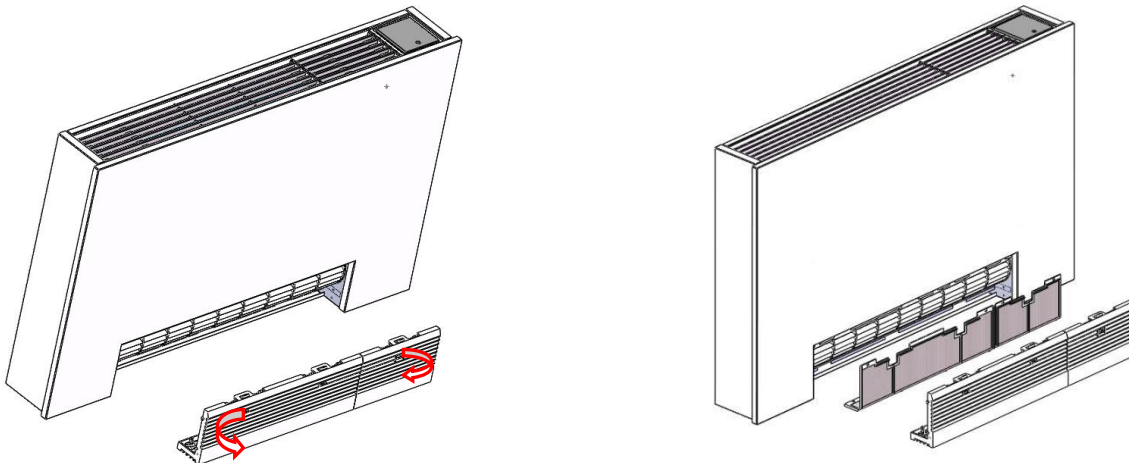
1. Installation and maintenance should be performed by qualified personnel who are familiar with local codes and regulations, and are experienced with this type of appliance.
2. Confirm the unit has been switched OFF before installing or service.
3. Prevent damage and unexpected shutting down of the fan coil unit.
4. Check the cleanliness of the filter and replace or clean as required monthly.
5. Clean the coils with compressed air or water to remove dust, dirt or lint. They can be brushed with a soft brush or vacuumed with a vacuum cleaner.
6. If the water coil is not being used during the winter season, it should be drained or an anti-freezing solution should be added to the water circuit to avoid freezing.

### C.2. Regular Maintenance

1. Inspect and clean the condensate drain pan to avoid any clogging of drainage by dirt, dust, etc. Inspect drainage piping to ensure the proper condensate flow.
2. Check and clean the coil. Clean the coils with a low-pressure water jet or low pressure air.
3. Clean and tighten all the wiring connections.
4. Drain out the water in the system and check for buildup of mineral deposits.

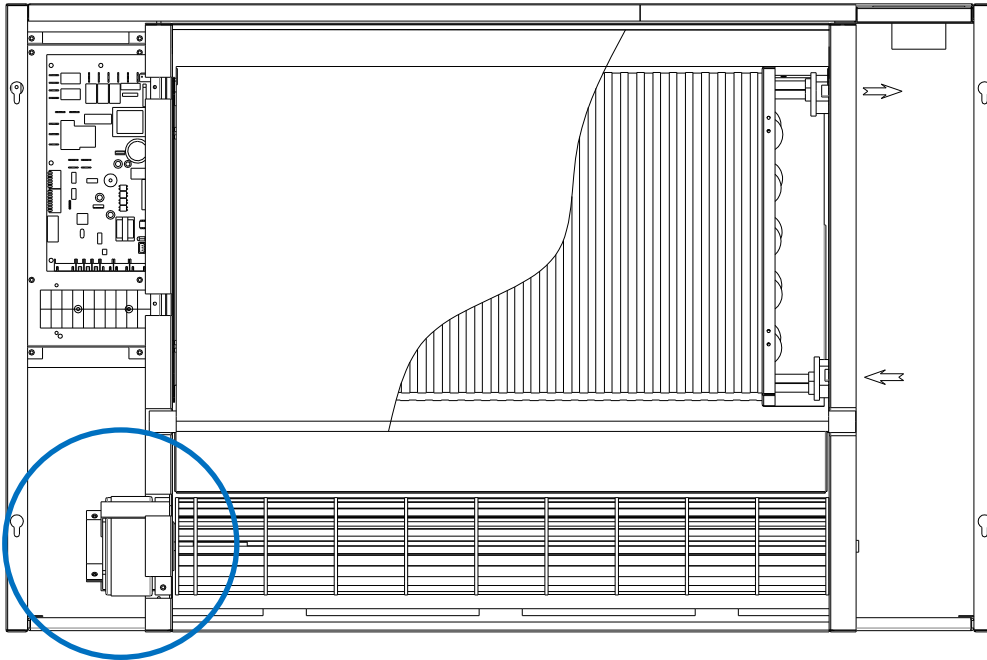
### C.3. Filter Installation & Cleaning

1. Unlock the grille, then remove the filter.
2. Clean the filter with a brush, or with warm water.



## C.4. Fan Motor Assembly Maintenance

Step 1: Remove the front panel.



Step 2: Loosen screws on the mounting brackets. EC motor can be removed.

Step 3: Once finished with maintenance, remount the front panel.

## D. Control Specifications: Complete Function PCB – S Type Con

### Abbreviations

Ts = Setting temperature

Tr = Room air temperature

Ti1 = Chilled water coil temperature

Ti2 = Hot water coil temperature

AUX1 = Hot water free contact

AUX2 = Chilled water free contact

MTV1 = Chilled water valve

MTV2 = Hot water valve

### D.1. I/O Port Definitions

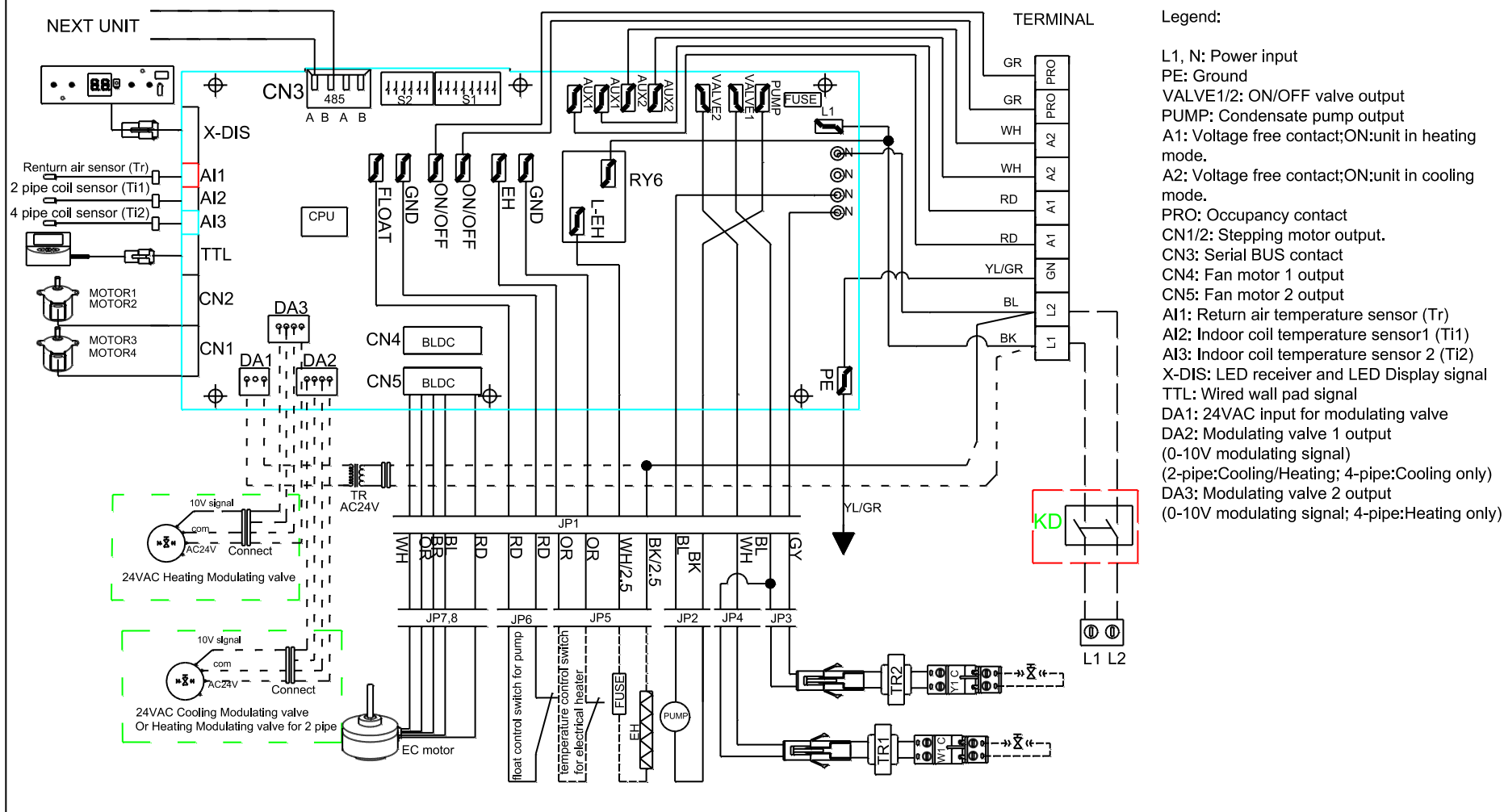
I/O		Code	2-Pipe	4-Pipe
Analogue Input	Return air sensor	AI1	Return air temperature (Tr)	
	2-pipe coil circuit sensor	AI2	Chilled / hot water coil circuit(Ti1)	Chilled water coil circuit(Ti1)
	Hot water sensor	AI3	N/A	Hot water coil circuit (Ti2)
Input	LED display / IR receiver	X-DIS	Digital communication port to LED display / IR receiver board.	
	Wired wall pad	TTL	Digital communication port to wired wall-pad board.	
Digital input	Occupancy contact	ON/OFF	Window contacts: for remote ON/OFF (when DIPB SW1=1). Economy mode contacts: for remote activation of economy mode (when DIPB SW1=0).	
	Float switch	Float	Voltage-free (NC)	
	Electrical heater safety switch	EH	Voltage-free (NC). The contact is closed before the EH is turned on.	
Power input	Phase	L1	Power supply to the PCB and all the loads connected to the voltage outputs. Max length: 16.4 ft	
	Neutral	N		
	Earth	PE		
Voltage output	Fan 1	CN4	Fan 1 driver and motor connection port.	
	Fan2	CN5	Fan 2 driver and motor connection port.	
	Valve1	MTV1	2-pipe coil circuit valve output – chilled / hot water valve. Voltage output (L)	4-pipe coil circuit valve output – chilled water valve. Voltage output (L)
	Valve2	MTV2	Reserved	4-pipe coil circuit valve output – hot water valve. Voltage output (L)
	Water pump	PUMP	Power supply to condensate pump. Voltage output (L)	
	Voltage of electrical heater (Live)	L-EH	Voltage output (L), maximum 30A. [See wiring diagram, cross check with supplier].	
	Stepping motor	CN1, CN2	Power supply to louver stepping motors. Voltage output (L)	
Output	Auxiliary contact 2	AUX2	Cooling mode signal relay (NO). Voltage free contact. To ensure the sensitivity of the connection, please make sure max wiring length < 98.4 ft.	
	Auxiliary contact 1	AUX1	Heating mode signal switch (NO). Voltage free contact. To ensure the sensitivity of the connection, please make sure max wiring length < 98.4 ft.	
	Serial BUS port	CN3	Master-slave network serial connection OR MODBUS / local PC host network serial connection.	
	24VAC power input	DA1	24VAC external power supply (modulating valve applications only).	
	Modulating valve output 1	DA2	Connection to modulating valve on 2-pipe coil circuit - chilled/hot water.	Connection to modulating valve on 4-pipe coil circuit - chilled water.
	Modulating valve output 2	DA3	N/A	Connection to modulating valve on 4-pipe coil circuit - hot water.

## D.2. Wiring Diagrams

### D.2.1. Standard S Type Control PCB

# Unit wiring scheme

AEC-S1.1

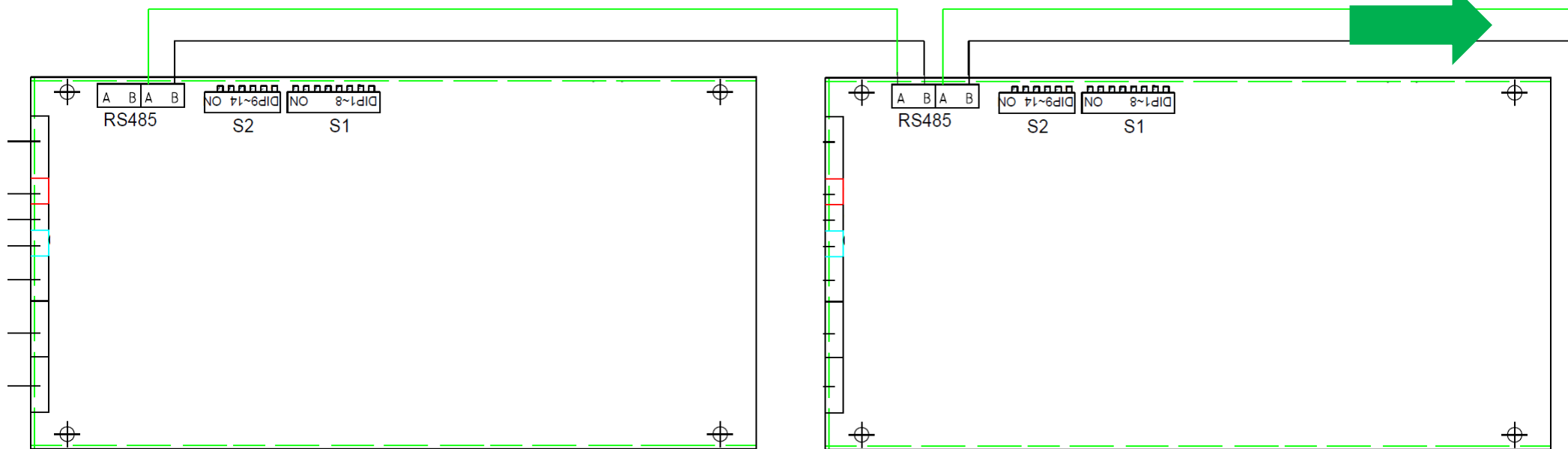


D.2.2. Master-Slave Networking Wiring Diagram

# Master Unit

# Slave Unit

Connect to other slave units





### D.3. Configuration Settings



**SW1-SW5 Network address setting**

**Master / Slave setting**  
**SW6=1** Master  
**SW6=0** Slave

**SW7/SW8 Operating mode**  
**SW7=0** Cooling and heating modes available  
**SW8=0**  
**SW7=0** Cooling and heating modes available, with EH functioning as booster  
**SW8=1**  
**SW7=1** Cooling mode only available  
**SW8=0**  
**SW7=1** Cooling and heating modes available, with EH functioning as primary  
**SW8=1**

**SW5/SW6 Fan Qty setting**  
**SW5=0** Single fan application  
**SW6=1**  
**SW5=1** Twin fans application  
**SW6=1**

**Preheat temperature setting**  
**SW4=1** 82.4°F  
**SW4=0** 96.8°F

**230VAC on/off valve setting**  
**SW3=1** With valve  
**SW3=0** Without valve

**2-pipe/4-pipe system configuration**  
**SW2=1** 4-pipe system  
**SW2=0** 2-pipe system

**PR-O contact setting**  
**SW1=1** Window contact (remote on/off)  
 When PROs closed for 10 minutes, unit enters standby mode.  
 When PROs opened, unit resumes operation.  
**SW1=0** Economy contact  
 When PROs closed, dead-band condition is increased from "Tr=Ts+/-1.8°F" to "Tr=Ts+/-7.2°F".

Note: 0 = OFF  
 1 = ON



## **Fan Coil Unit ON/OFF**

There are 3 ways to turn the system on or off:

- a) By the ON/OFF button on the remote handset or wired wall pad;
- b) By the programmable timer on the handset or wired wall pad.
- c) By the manual control button on fan coil unit.

## **Auto Restart**

The system uses a non-volatile memory to save the present operation parameters when the system is turned off or in case of system failure or cessation of power supply.

The restored parameter data-set depends on the type of user interface.

- a) Handset only user interface:

When the power ON signal is received by the fan coil unit and no wired wall-pad is installed, the Mode, Fan Speed, Set temperature will be the same as the handset setting before the last power OFF.

- b) Wall-pad only OR wall-pad and handset user interface:

When the power ON signal is received by the fan coil unit and a wired wall-pad is installed, the Mode, Fan Speed, Set temperature and Timer ON/OFF weekly program will be the same as the wall pad setting before the last power OFF.

## D.4. Control Logics for 2-Pipe System

### D.4.1. With Valve Configuration

#### COOL MODE

- a) MTV2, AUX1 and electric heater are always off.
- b) If  $Tr \geq Ts + 1.8^{\circ}F$  (or  $+7.2^{\circ}F$  if economy contact is activated), cool operation is activated, MTV1 and AUX2 are turned on. Indoor fan runs at set speed.
- c) If  $Tr < Ts$ , cool operation is terminated, MTV1 and AUX2 are turned off. Indoor fan runs at set speed.
- d) The range of  $Ts$  is  $61-86^{\circ}F$
- e) Indoor fan speed can be adjusted for low, medium, high and auto.
- f) When turned on, MTV1 requires 30 seconds before it is fully open.
- g) When turned off, MTV1 requires 120 seconds before it is fully closed.
- h) When the unit is turned off, indoor fan will delay for 5 seconds before it is turned off.

#### LOW TEMPERATURE PROTECTION OF INDOOR COIL

- a) If  $Ti1 \leq 35.6^{\circ}F$  for 2 minutes, MTV1 and AUX2 are turned off. If indoor fan is set for low speed, it will run at medium speed. If it is set at medium or high speed, it will keep running at the same speed.
- b) If  $Ti1 \geq 41^{\circ}F$  for 2 minutes, MTV1 and AUX2 are turned on. Indoor fan runs at set speed.

#### FAN MODE

- a) Indoor fan runs at the set speed while heater, MTV1, MTV2, AUX1 and AUX2 are turned off.
- b) Indoor fan speed can be adjusted for low, medium and high.

#### HEAT MODE

##### Heat mode without electrical heater

- a) MTV2, AUX2 and electric heater are always off.
- b) If  $Tr \leq Ts - 1.8^{\circ}F$  (or  $-7.2^{\circ}F$  if economy contact is activated), heat operation is activated, MTV1 and AUX1 are turned on. Indoor fan runs at the set speed.
- c) If  $Tr > Ts$ , heat operation is terminated, MTV1 and AUX1 are turned off. Indoor fan runs at 200rpm.
- d) The range of  $Ts$  is  $61-86^{\circ}F$ .
- e) Indoor fan speed can be adjusted for low, medium, high and auto.
- f) MTV1 will delay for 30 seconds before it is turned on.
- g) MTV1 will delay for 120 seconds before it is turned off.

##### Heat mode with electrical heater as booster

- a) MTV2 and AUX2 are always off.
- b) If  $Tr \leq Ts - 1.8^{\circ}F$  (or  $-7.2^{\circ}F$  if economy contact is activated), heat operation is activated, MTV1 and AUX1 are turned on. Indoor fan runs at the set speed.
- c) If  $Tr > Ts$ , heat operation is terminated, MTV1 and AUX1 are turned off. Indoor fan runs at 200rpm
- d) If  $Ti1 < 104^{\circ}F$ , the electrical heater is turned on. If  $104^{\circ}F \leq Ti1 < 113^{\circ}F$ , the electrical heater is kept original state. If  $Ti1 \geq 113^{\circ}F$ , the electrical heater is turned off.
- e) The range of  $Ts$  is  $61-86^{\circ}F$
- f) Indoor fan speed can be adjusted for low, medium, high and auto.
- g) MTV1 will delay for 30 seconds before it is turned on.
- h) MTV1 will delay for 120 seconds before it is turned off.

##### Heat mode with electrical heater as primary heat source

- a) MTV1, MTV2, and AUX2 are always off
- b) If  $Ti2 \leq 86^{\circ}F$  (or  $Ti2$  is damaged or disconnected), AND if  $Tr \leq Ts - 1.8^{\circ}F$  (or  $-7.2^{\circ}F$  if economy contact is activated), heat operation is activated, electrical heater and AUX1 are turned on. Indoor fan runs at set speed.
- c) If  $Tr > Ts$ , heat operation is terminated, Electrical heater and AUX 1 are turned off. Indoor fan runs at 200rpm.
- d) The range of  $Ts$  is  $61 \sim 86^{\circ}F$
- e) Indoor fan speed can be adjusted for low, medium, high and auto.

##### Over-heat protection of indoor coil in heat mode

- a) If  $Ti1 \geq 167^{\circ}F$ , MTV1, AUX2 and EH are turned off, indoor fan runs at high speed, even in standby mode.
- b) If  $Ti1 < 158^{\circ}F$ , unit will keep at original state.
- c) If indoor coil temperature sensor is damaged, the protection mode will be overridden and the Pre-heat and Post-heat set times will be used instead.

## PRE-HEAT

### Pre-heat without electrical heater

- a) If  $Ti1 < 97^{\circ}F$  [or  $< 82^{\circ}F$  is selected by DIPB-S2 position SW4], MTV1 and AUX1 are on, indoor fan runs at 200rpm.
- b) If  $Ti1 \geq 100^{\circ}F$  [or  $\geq 86^{\circ}F$  is selected by DIPB-S2 position SW4], MTV1 and AUX1 are on, indoor fan runs at set speed.
- c) If indoor coil temperature sensor is damaged, pre-heat time is set for 2 minutes and indoor fan runs at set speed.

### Pre-heat with electrical heater

- a) If indoor fan speed  $\geq 300rpm$ , electrical heater will turn on.

## POST-HEAT

### Post-heat without electrical heater

- a) If  $Ti1 \geq 100^{\circ}F$ , MTV1 and AUX 1 are off, indoor fan continues to run at set speed.
- b) If  $96^{\circ}F \leq Ti1 \leq 100^{\circ}F$ , MTV1 and AUX1 are off. Indoor fan keeps original state.
- c) If  $Ti1 < 96^{\circ}F$ , MTV1 and AUX1 are off. Indoor fan runs at 200rpm.
- d) If indoor coil temperature sensor is damaged, post-heat time is set for 3 minutes with indoor fan running at set speed.

### Post-heat with electrical heater

- a) Indoor fan will run at 200rpm before the unit turns off for 20 seconds.

### Over-heat protection of indoor coil in post-heat

- a) If  $Ti1 \geq 167^{\circ}F$ , MTV1 and AUX1 are off, indoor fan remains on and runs at high speed.
- b) If  $Ti1 < 158^{\circ}F$ , MTV1 and AUX1 are on, indoor fan remains on and runs at set speed.
- c) If indoor coil temperature sensor is damaged, the protection mode will become obsolete and the unit will work according to the Pre-heat and Post-heat program.

## DEHUMIDIFICATION MODE

- a) MTV2, AUX1 and heater are always off.
- b) If  $Tr \geq 77^{\circ}F$ , MTV1 and AUX2 will be ON for 3 minutes, and OFF for 4 minutes.
- c) If  $61^{\circ}F \leq Tr < 77^{\circ}F$ , MTV1 and AUX2 will be ON for 3 minutes, and OFF for 6 minutes.
- d) If  $Tr < 61^{\circ}F$ , MTV1 and AUX2 will be turned off for 4 minutes.
- e) At the end of the above dehumidification cycle, system will decide the next dehumidification control option. Indoor fan will run at low speed throughout the dehumidification process.

## AUTOMODE

### Auto cool/heat/heat with electric heater as booster

- a) Every time the unit is turned on, MTV1 is on, AUX1, AUX2 and fan are off. MTV2 and heater are always off.
- b) After 120sec, subsequent operation mode is decided according to following program:
  - i. If the coil temperature sensor ( $Ti1$ )  $\geq 97^{\circ}F$ , MTV1, AUX1 and fan turn on or off according to HEAT mode.
  - ii. If  $Ti1 < 97^{\circ}F$ , MTV1, AUX2 and fan turn on or off according to COOL mode.
- c) Unit remains in AUTO COOL or AUTO HEAT mode throughout the operating cycle until the user changes the mode manually or restarts the unit.
- d) Should there be failure of  $Ti1$  sensor, auto mode is not allowed.

### Auto heat with electric heater as primary heat source / all configuration auto changeover

- a) If current running mode is auto cool mode, the control logic will change over to auto heat mode when all the following conditions are met:
  - i.  $Ts - Tr \geq 1.8^{\circ}F$  (or  $7.2^{\circ}F$  if economy contact is activated)
  - ii. MTV1 has stop  $\geq 10$  min.
- b) If current running mode is auto heat mode, it will change over to auto cool mode when all the following conditions are met:
  - i.  $Tr - Ts \geq 1.8^{\circ}F$  (or  $7.2^{\circ}F$  if economy contact is activated)
  - ii. MTV1 has stop  $\geq 10$  min.

Note: Auto cool or auto heat operation are the same as cool or heat mode respectively.

## D.4.2. Without Valve Configuration

### COOL MODE

- a) Electric heater, AUX1, MTV1 and MTV2 are always off.
- b) If  $T_r \geq T_s + 1.8 \text{ }^\circ\text{F}$  (or  $+7.2 \text{ }^\circ\text{F}$  if economy contact is activated), cool operation is activated, AUX2 is on. Indoor fan runs at set speed.
- c) If  $T_r < T_s$ , cool operation is terminated, AUX2 is off. Indoor fan is turned off.
- d) The range of  $T_s$  is 61-86  $^\circ\text{F}$
- e) Indoor fan speed can be adjusted for low, medium, high and auto.

Note: When the unit is turned off, indoor fan will delay for 5 seconds before it is turned off.

### LOW TEMPERATURE PROTECTION OF INDOOR COIL

- a) If  $T_{i1} \leq 36 \text{ }^\circ\text{F}$  for 2 minutes, AUX2 is off. If low speed is selected via user interface, indoor fan runs at medium speed. If medium or high speed is selected via user interface, indoor fan runs at set speed.
- b) If  $T_{i1} \geq 41 \text{ }^\circ\text{F}$  for 2 minutes, AUX2 is on. Indoor fan runs at set speed.

### FAN MODE

- a) Indoor fan runs at the set speed while heater, AUX1, AUX2, MTV1 and MTV2 are turned off.
- b) Indoor fan speed can be adjusted for low, medium and high.

### HEAT MODE

#### Heat mode without electrical heater

- a) MTV1, MTV2, AUX2 and heater always off.
- b) If  $T_r \leq T_s - 1.8 \text{ }^\circ\text{F}$  (or  $-7.2 \text{ }^\circ\text{F}$  if economy contact is activated), heat operation is activated, AUX1 is turned on. Indoor fan runs at the set speed.
- c) If  $T_r > T_s$ , heat operation is terminated, AUX1 is turned off. Indoor fan runs at 200rpm.
- d) The range of  $T_s$  is 61-86  $^\circ\text{F}$ .
- e) Indoor fan speed can be adjusted for low, medium, high and auto.

#### Heat mode with electrical heater as booster

- a) MTV1, MTV2 and AUX2 are always off.
- b) If  $T_r \leq T_s - 1.8 \text{ }^\circ\text{F}$  (or  $-7.2 \text{ }^\circ\text{F}$  if economy contact is activated), heat operation is activated, AUX1 is turned on. Indoor fan runs at the set speed.
- c) If  $T_r > T_s$ , heat operation is terminated, AUX1 is turned off. Indoor fan runs at 200 rpm.
- d) If  $T_{i1} < 104 \text{ }^\circ\text{F}$ , the electrical heater is turned on. If  $104 \leq T_{i1} < 113 \text{ }^\circ\text{F}$ , the electrical heater is kept original state. If  $T_{i1} \geq 113 \text{ }^\circ\text{F}$ , the electrical heater is turned off.
- e) The range of  $T_s$  is 61-86  $^\circ\text{F}$ .
- f) Indoor fan speed can be adjusted for low, medium, high and auto.

### PRE-HEAT

#### Pre-heat with electrical heater

- a) Indoor fan will turn on after the electrical heater is turned on for 10 sec.

### POST-HEAT

#### Post-heat with and without electrical heater

- a) AUX1 is off. Electrical heater is turned off.
- b) Indoor fan will turn off after the unit is turned off for 20sec.

#### Over heat protection of indoor coil in post-heat

- a) If  $T_{i1} \geq 167 \text{ }^\circ\text{F}$ , AUX1 is turned off, indoor fan remains on and runs at high speed.
- b) If  $T_{i1} < 158 \text{ }^\circ\text{F}$ , AUX1 is turned on, indoor fan remains and runs at set speed.
- c) If indoor coil temperature sensor is damaged, the protection mode will become obsolete and the unit will work as the Pre-heat and Post-heat program.

### DEHUMIDIFICATION MODE

- a) MTV1, MTV2, AUX1 and heater always off.
- b) If  $T_r \geq 77 \text{ }^\circ\text{F}$ , indoor fan and AUX2 will be ON for 3 minutes, and OFF for 4 minutes.
- c) If  $61 \text{ }^\circ\text{F} \leq T_r < 77 \text{ }^\circ\text{F}$ , indoor fan and AUX2 will be ON for 3 minutes, and OFF for 6 minutes.
- d) If  $T_r < 61 \text{ }^\circ\text{F}$ , indoor fan and AUX2 will be turned off for 4 minutes.
- e) At the end of the above dehumidification cycle, system will decide the next dehumidification control option. Indoor fan will run at low speed throughout the dehumidification process

**AUTOMODE:** *Not available.*

## D.5. Control Logics For 4-Pipe System

Note: 4-pipe system must always be equipped with 2 valves.

### COOL MODE

- a) MTV2, AUX1 and Electrical Heater always off.
- b) If  $T_r \geq T_s + 1.8 \text{ }^\circ\text{F}$  (or  $+7.2 \text{ }^\circ\text{F}$  if economy contact is activated), cool operation is activated, MTV1 and AUX2 are turned on. Indoor fan runs at set speed.
- c) If  $T_r < T_s$ , cool operation is terminated, MTV1 and AUX2 are turned off. Indoor fan runs at set speed.
- d) The range of  $T_s$  is 61-86  $^\circ\text{F}$
- e) Indoor fan speed can be adjusted for low, medium, high and auto.
- f) When turned on, MTV1 requires 30 seconds before it is fully open.
- g) When turned off, MTV1 requires 120 seconds before it is fully closed.
- h) When the unit is turned off, indoor fan will delay for 5 seconds before it is turned off.

### LOW TEMPERATURE PROTECTION OF INDOOR COIL

- a) If  $T_{i1} \leq 36 \text{ }^\circ\text{F}$  for 2 minutes, MTV1 and AUX2 are turned off. If indoor fan is set for low speed, it will run at medium speed. If it is set at medium or high speed, it will keep running at the same speed.
- b) If  $T_{i1} \geq 41 \text{ }^\circ\text{F}$  for 2 minutes, MTV1 and AUX2 are turned on. Indoor fan runs at set speed.

### FAN MODE

- a) Indoor fan runs at the set speed while heater, MTV1, MTV2, AUX1 and AUX2 are turned off.
- b) Indoor fan speed can be adjusted for low, medium and high.

### HEAT MODE

#### Without Electrical Heater

- a) MTV1, AUX2 and heater always off.
- b) If  $T_r \leq T_s - 1.8 \text{ }^\circ\text{F}$  (or  $-7.2 \text{ }^\circ\text{F}$  if economy contact is activated), heat operation is activated, MTV2 and AUX1 are turned on. Indoor fan runs at the set speed.
- c) If  $T_r > T_s$ , heat operation is terminated, MTV2 and AUX1 are turned off. Indoor fan runs at 200rpm.
- d) The range of  $T_s$  is 61-86  $^\circ\text{F}$ .
- e) Indoor fan speed can be adjusted for low, medium, high and auto.
- f) MTV2 will delay for 30 seconds before it is turned on.
- g) MTV2 will delay for 120 seconds before it is turned off.

#### With Electrical Heater as Booster

- a) MTV1 and AUX2 are always off.
- b) If  $T_r \leq T_s - 1.8 \text{ }^\circ\text{F}$  (or  $-7.2 \text{ }^\circ\text{F}$  if economy contact is activated), heat operation is activated, MTV2 and AUX1 are turned on. Indoor fan runs at the set speed.
- c) If  $T_r > T_s$ , heat operation is terminated, MTV2 and AUX1 are turned off. Indoor fan runs at 200rpm.
- d) If  $T_{i2} < 104 \text{ }^\circ\text{F}$ , the electrical heater is turned on. If  $104 \text{ }^\circ\text{F} \leq T_{i2} < 113 \text{ }^\circ\text{F}$ , the electrical heater is kept original state. If  $T_{i2} \geq 113 \text{ }^\circ\text{F}$ , the electrical heater is turned off.
- e) The range of  $T_s$  is 61-86  $^\circ\text{F}$
- f) Indoor fan speed can be adjusted for low, medium, high and auto.
- g) MTV2 will delay for 30 seconds before it is turned on.
- h) MTV2 will delay for 120 seconds before it is turned off.

### PRE-HEAT

#### Without Electrical Heater

- a) If  $T_{i2} < 97 \text{ }^\circ\text{F}$  [or  $82 \text{ }^\circ\text{F}$  depends on DIP setting], when MTV2 and AUX1 are on, indoor fan remains off.
- b) If  $T_{i2} \geq 100 \text{ }^\circ\text{F}$  [or  $86 \text{ }^\circ\text{F}$  depends on DIP setting], when MTV2 and AUX1 are on, indoor fan runs at set speed.
- c) If indoor coil temperature sensor is damaged, pre-heat time is set for 2 minutes and indoor fan runs at set speed.

#### With Electrical Heater

- a) If indoor fan speed  $\geq 300 \text{ rpm}$ , electrical heater is turned on

## **POST HEAT**

### Without Electrical Heater

- a) If  $T_{i2} \geq 100$  °F, when MTV2 and AUX 1 are off, indoor fan continues to run at set speed.
- b) If  $97$  °F  $\leq T_{i2} \leq 100$  °F, when MTV2 and AUX1 are off. Indoor fan keeps original state.
- c) If  $T_{i2} < 97$ °F, MTV2 and AUX1 are off. Indoor fan runs at 200 rpm.
- d) If indoor coil temperature coil is damaged, post-heat time is set for 3 minutes with indoor fan running at set speed.

### With Electrical Heater

- a) Indoor fan will turn off after the unit off for 20 seconds.

### OVER HEAT PROTECTION OF INDOOR COIL

- a) If  $T_{i2} \geq 167$  °F, MTV2 and AUX1 are turned off, indoor fan remains on and runs at high speed.
- b) If  $T_{i2} < 158$  °F, MTV2 and AUX1 are turned on, indoor fan remains on and runs at set speed.
- c) If indoor coil temperature sensor is damaged, the protection mode will become obsolete and the unit will work as the Pre-heat and Post-heat set times.

## **DEHUMIDIFICATION MODE**

- a) MTV2, AUX1 and heater always off.
- b) If  $T_r \geq 77$  °F, MTV1 and AUX2 will be ON for 3 minutes, and OFF for 4 minutes.
- c) If  $61$  °F  $\leq T_r < 77$  °F, MTV1 and AUX2 will be ON for 3 minutes, and OFF for 6 minutes.
- d) If  $T_r < 61$  °F, MTV1 and AUX2 will be turned off for 4 minutes.
- e) At the end of the above dehumidification cycle, system will decide the next dehumidification control option. Indoor fan will run at low speed throughout the dehumidification process.

## **AUTOMODE**

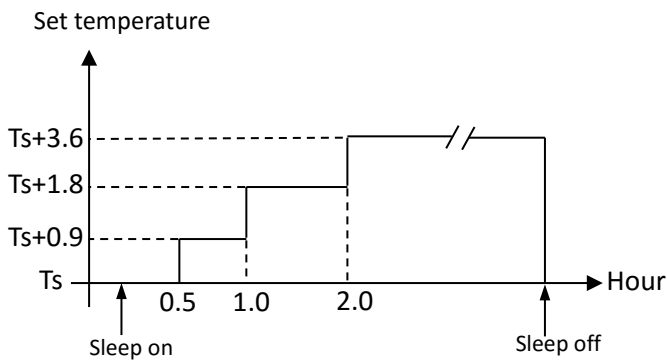
- a) If current running mode is AUTO COOL mode, it will change over to AUTO HEAT mode upon satisfy all the conditions below:
  - i.  $T_s - T_r \geq 1.8$ °F (or -7.2 °F if economy contact is activated)
  - ii. MTV1 has stop  $\geq 10$  min.
- b) If current running mode is AUTO HEAT mode, it will change over to AUTO COOL mode upon satisfy all the conditions below:
  - i.  $T_r - T_s \geq 1.8$ °F (or +7.2 °F if economy contact is activated)
  - ii. MTV2 has stop  $\geq 10$  min.

Note: AUTO COOL or AUTO HEAT operations are the same as COOL or HEAT mode respectively.

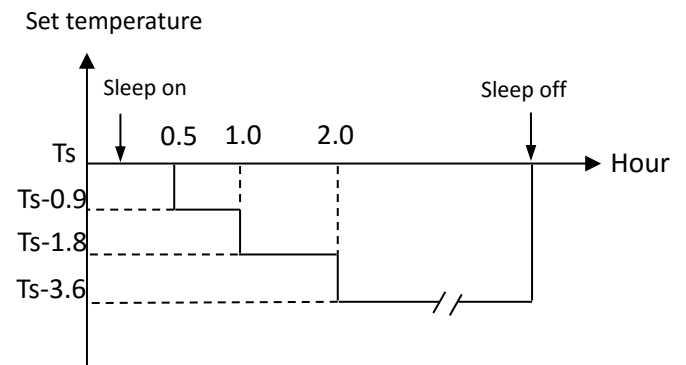
## D.6. Sleep Mode

- The sleep mode can only be set when the unit is in cool mode or heat mode.
- If the sleep mode is activated when the unit is in cool mode, then the indoor fan will run at low speed and  $T_s$  will increase by  $3.6^{\circ}\text{F}$  over 2 hours.
- If the sleep mode is activated when the unit is in heat mode, then the indoor fan will run at set speed and  $T_s$  will decrease by  $3.6^{\circ}\text{F}$  over 2 hours.
- Changing the mode of operation will cancel the sleep mode.

The cool mode sleep profile is:



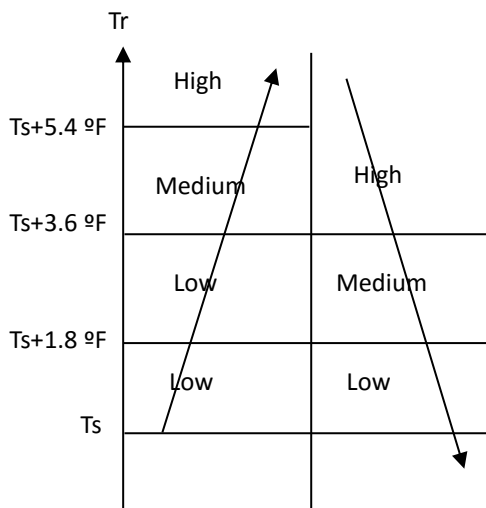
The heat mode sleep profile is:



## D.7. Auto Fan Speed

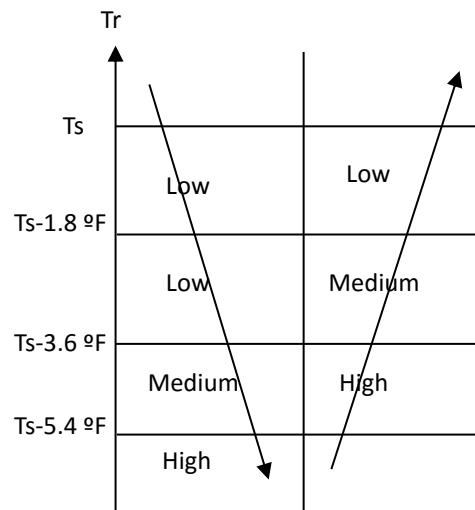
Fan speed cannot change until it has run for more than 30 seconds.

Fan speed is regulated according to the profile below.



Fan speed cannot change until it has run for more than 30 seconds.

Fan speed is regulated according to the profile below.



After 30 seconds the fan speed is modulated according to the difference between the room temperature and the set temperature. The controller adjusts the motor signal input from 0 to 5VDC by PID calculation every 10 seconds. The air flow is adjusted from 15% to 100%.

## D.8. Modulating Valve Control Under Energy Saving Mode

If the modulating valve is used, the water flow is adjusted from 0 to 100% according to the room temperature and set temperature. The controller adjusts the modulating valve signal input from 0 to 10VDC by PID calculation every 10 seconds.

## D.9. Buzzer

If a command is received by the fan coil unit, the master unit will respond with 2 beeps for each setting, while the slave unit will respond with 1 beep.

## D.10. Auto Restart

The system uses non-volatile memory to save the present operation parameters when system is turned off or in case of system failure or cessation of power supply. Operation parameters are mode, set temperature, swing louver's position, and the fan speed. When power supply resumes or the system is switched on again, the same operations as previously set will function.

## D.11. On/Off Switch On The Front Panel

- a) This is a TACT switch to select Cool→Heat→Off operation mode.
- b) In COOL mode, the set temperature of the system is 75 °F with auto fan speed. There are no timer and sleep modes.
- c) In HEAT mode, the set temperature of the system is 75 °F with auto fan speed. There are no timer and sleep modes.
- d) Master unit that does not use a wall pad will globally broadcast.

### **NOTE**

*When button pressing is effective, the master unit buzzer will beep twice and the slave unit will beep once.*

## D.12. Electric Heater Safety Switch

- a) Before the electrical heater is turned on, the EH safety switch must be closed and the fan RPM be more than 300RPM. If this contact is opened for  $\geq 1$  second or the fan RPM is less than 300RPM, the heater will be turned off immediately and report an error. Once the contact is returned to the closed position  $\geq 60$  seconds, reset the error and the heater will start again.
- b) When the EH safety switch is opened  $\geq 3$  times within 60 minutes, the heater is not allowed to start anymore. Turn off the unit to reset the fault, provided that the switch has returned to the closed position.



### D.13. LED Display and Error Description

LED receiver in ABS housing with 19-11/16" (SGS14HFCA-01010101) or 70-7/8" (SGS14HFCA-01010102) pre-wiring



Complete Function PCB – S Type Control		
Fan speed setting	LED display	Condition
High speed	Red LED On	Normal
Medium speed	Yellow LED On	Normal
Low speed	Green LED On	Normal

For all units - Green LED			
Error Description	Blink	Reason	Remedy
Electrical heater failure	Green LED blinks 1 times, stops for 3s	<i>Only for unit with EH.</i> EH safety switch is opened.	<ol style="list-style-type: none"> <li>1. Change fan speed to high.</li> <li>2. Replace the damaged EH safety switch.</li> </ol>
Indoor coil sensor 2 failure	Green LED blinks 2 times, stops for 3s	Ti2 sensor unplugged or damaged.	<ol style="list-style-type: none"> <li>1. Check if Ti2 plug is connected or not.</li> <li>2. Check if sensor's resistance is correct or not.</li> </ol>
Return air sensor failure	Green LED blinks 3 times, stops for 3s	Room sensor unplugged or damaged.	<ol style="list-style-type: none"> <li>1. Check if Tr plug is connected or not.</li> <li>2. Check if sensor's resistance is correct or not.</li> </ol>
Indoor coil sensor 1 failure	Green LED blinks 4 times, stops for 3s	Ti1 sensor unplugged or damaged.	<ol style="list-style-type: none"> <li>1. Check if Ti1 plug is connected or not.</li> <li>2. Check if sensor's resistance is correct or not.</li> </ol>
Indoor coil low temperature protection	Green LED blinks 5 times, stops for 3s	Water temperature is lower than 37.4 °F.	Check the water temperature.
Indoor coil over heat protection	Green LED blinks 6 times, stops for 3s	Water temperature is higher than 158 °F.	Check the water temperature
EC motor failure(CN4)	Green LED blinks 9 times, stops 3s	No EC motor feedback	<ol style="list-style-type: none"> <li>1. Check DIPB-SW5 and SW6 setting.</li> <li>2. Check the EC motor.</li> </ol>
EC motor failure(CN5)	Green LED blinks 10 times, stops 3s	No EC motor feedback	<ol style="list-style-type: none"> <li>1. Check DIPB-SW5 and SW6 setting.</li> <li>2. Check the EC motor.</li> </ol>

(All dimensions are approximate within 1/16 of an inch of those indicated)

## D.14. LED Display on Master/Slave Connection

The error message indicating the defect status of all slave units will be shown in LED lights on the master unit.

Master unit LED		
Unit No.	Blink	Remedy
Unit 2 failure	RED LED blinks 2 times, stops for 3s	Check unit 2 communication plug and fix it
Unit 3 failure	RED LED blinks 3 times, stops for 3s	Check unit 3 communication plug and fix it
Unit 4 failure	RED LED blinks 4 times, stops for 3s	Check unit 4 communication plug and fix it
Unit 5 failure	RED LED blinks 5 times, stops for 3s	Check unit 5 communication plug and fix it
Unit 6 failure	RED LED blinks 6 times, stops for 3s	Check unit 6 communication plug and fix it
Unit 7 failure	RED LED blinks 7 times, stops for 3s	Check unit 7 communication plug and fix it
Unit 8 failure	RED LED blinks 8 times, stops for 3s	Check unit 8 communication plug and fix it
Unit 9 failure	RED LED blinks 9 times, stops for 3s	Check unit 9 communication plug and fix it
Unit 10 failure	RED LED blinks 10 times, stops for 3s	Check unit 10 communication plug and fix it
Unit 11 failure	RED LED blinks 11 times, stops for 3s	Check unit 11 communication plug and fix it
Unit 12 failure	RED LED blinks 12 times, stops for 3s	Check unit 12 communication plug and fix it
Unit 13 failure	RED LED blinks 13 times, stops for 3s	Check unit 13 communication plug and fix it
Unit 14 failure	RED LED blinks 14 times, stops for 3s	Check unit 14 communication plug and fix it
Unit 15 failure	RED LED blinks 15 times, stops for 3s	Check unit 15 communication plug and fix it
Unit 16 failure	RED LED blinks 16 times, stops for 3s	Check unit 16 communication plug and fix it
Unit 17 failure	RED LED blinks 17 times, stops for 3s	Check unit 17 communication plug and fix it
Unit 18 failure	RED LED blinks 18 times, stops for 3s	Check unit 18 communication plug and fix it
Unit 19 failure	RED LED blinks 19 times, stops for 3s	Check unit 19 communication plug and fix it
Unit 20 failure	RED LED blinks 20 times, stops for 3s	Check unit 20 communication plug and fix it
Unit 21 failure	RED LED blinks 21 times, stops for 3s	Check unit 21 communication plug and fix it
Unit 22 failure	RED LED blinks 22 times, stops for 3s	Check unit 22 communication plug and fix it
Unit 23 failure	RED LED blinks 23 times, stops for 3s	Check unit 23 communication plug and fix it
Unit 24 failure	RED LED blinks 24 times, stops for 3s	Check unit 24 communication plug and fix it
Unit 25 failure	RED LED blinks 25 times, stops for 3s	Check unit 25 communication plug and fix it
Unit 26 failure	RED LED blinks 26 times, stops for 3s	Check unit 26 communication plug and fix it
Unit 27 failure	RED LED blinks 27 times, stops for 3s	Check unit 27 communication plug and fix it
Unit 28 failure	RED LED blinks 28 times, stops for 3s	Check unit 28 communication plug and fix it
Unit 29 failure	RED LED blinks 29 times, stops for 3s	Check unit 29 communication plug and fix it
Unit 30 failure	RED LED blinks 30 times, stops for 3s	Check unit 30 communication plug and fix it
Unit 31 failure	RED LED blinks 31 times, stops for 3s	Check unit 31 communication plug and fix it
Unit 32 failure	RED LED blinks 32 times, stops for 3s	Check unit 32 communication plug and fix it

## E. Networking System

### E.1. Master-Slave Network

The control PCB can be set either as a master unit or slave unit.

#### Master Unit Function

- a) The master unit sends data regarding its setting to the slave unit.
- b) The master unit settings are unit ON/OFF, Mode, Fan Speed, Timer, Clock, Set Temperature, Louver Function, and Sleep Function for handset operation.
- c) The master unit settings are unit ON/OFF, Mode, Fan Speed, Timer, Clock, Set Temperature, Louver Function, and Sleep Function for wall pad operation.

#### Slave Unit Function

- a) The slave unit receives data regarding its settings from the master unit.
- b) The slave unit is allowed to change to a locally desired setting by local controller as long as there are no subsequent changes to the settings of the master unit.
- c) The slave units can be set individually for timer ON/OFF function by handset or wall pad. The handset cannot override the wall pad timer and clock setting.

#### E.1.1. Master Unit Control Settings

The control PCB can receive data from both wireless Infrared handset and wired wall pad.

##### Using Remote Control Handset to Set Master Control Unit:

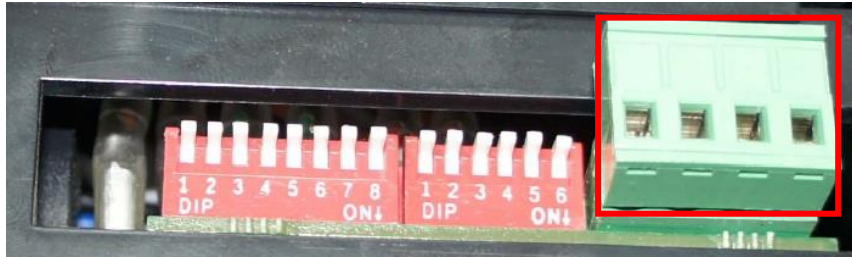
1. Connect all the units PCBs according to the wire color and type of connector.
2. Select the master unit by setting DIPA-S1 SW6 to ON (=1) in the PCB.
3. Ensure the DIPA-S1 SW6 is set to OFF (=0) in the PCB on each slave unit.
4. Switch on the units by connecting the main power supply.
5. Using the handset, set the operation parameters for the master unit which will automatically send the settings to the slave unit.
6. Master unit will beep twice confirming receipt of commands while the slave unit will beep once.

##### Using Wall pad to Set Master Control Unit:

1. Connect all the units PCBs according to the wire color and type of connector.
2. Select the master unit by setting DIPA-S1 SW6 to ON (=1) in the PCB.
3. Ensure the DIPA-S1 SW6 is set to OFF (=0) in the PCB on each slave unit.
4. Provide each slave unit with an addressable code by configuring SW1 – SW5 of DIPA-S1 according to the DIP switch setting table.
5. Switch on the units by connecting the main power supply.
6. Using the wall pad set the operation parameters for the master unit which will send the setting to the slave units by Global-control communication or Addressable communication methods.
7. Master unit will beep twice confirming receipt of commands while the slave unit will beep once.

### E.1.2. Master-Slave Network Setup

- 1) Disconnect the communication plug from the control box



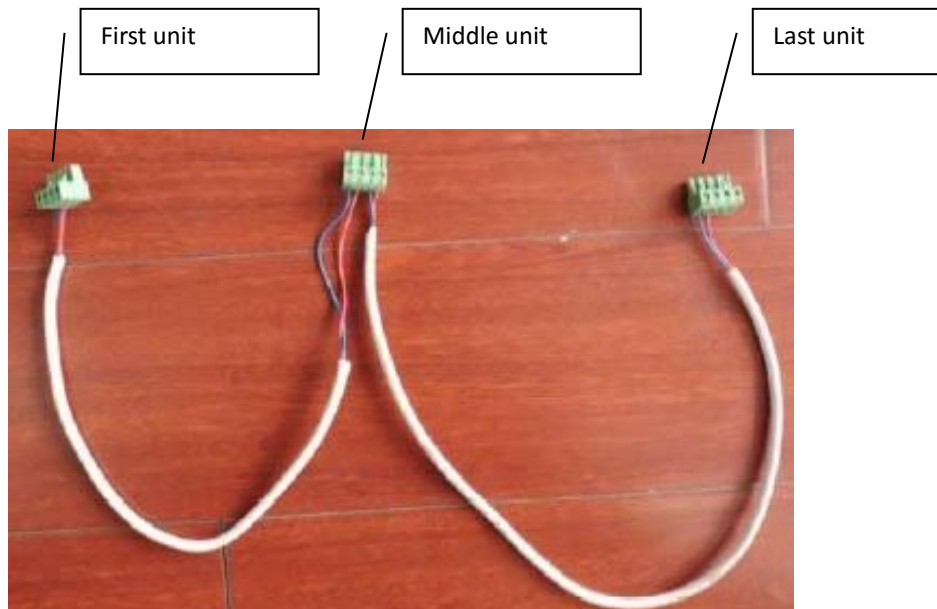
- 2) Communication plug

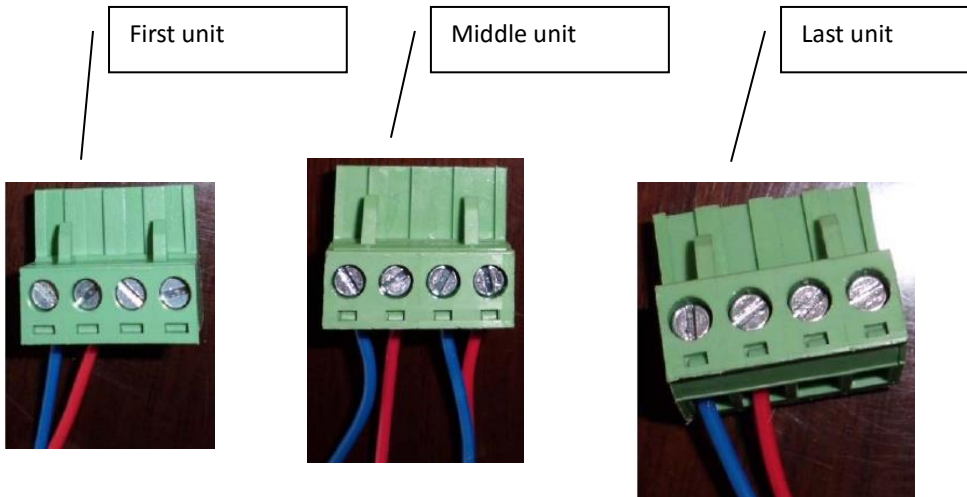
A, B, A, B is printed on the main PCB. When you connect the wires, please ensure connection of A to A and B to B.



- 3) Connection wire

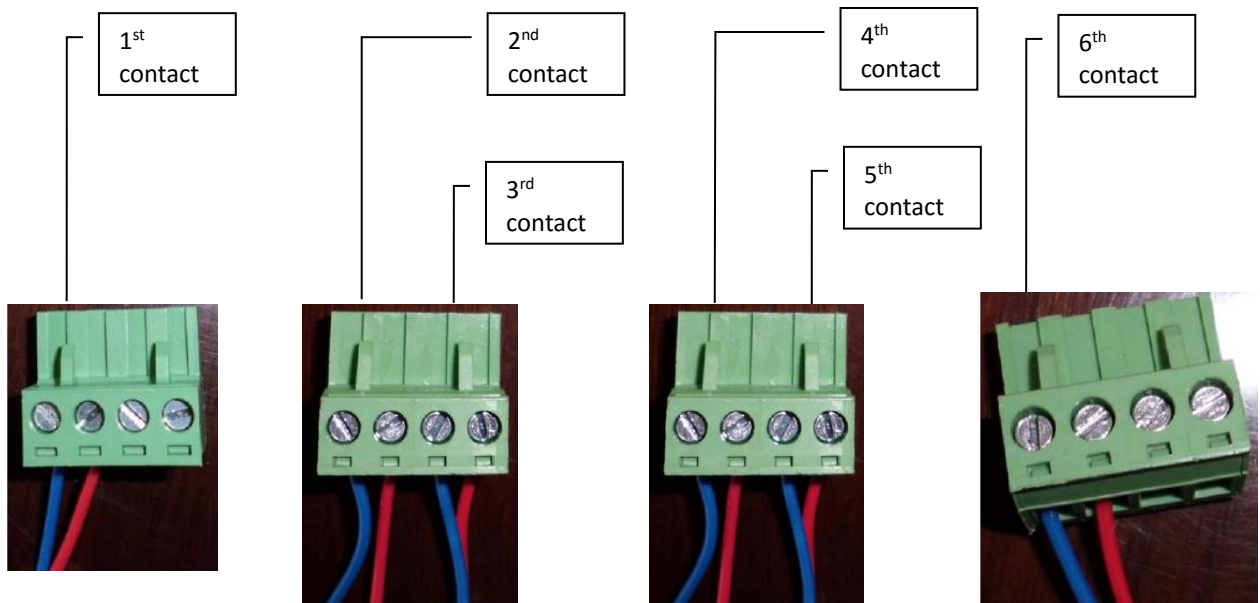
- i. If the total length of wire is more than 1000m, please use shielded wire in order to protect the signal transmission.
- ii. Complete wire connection





### iii. Wire connection check

- After the wire connection is completed, please check that the wire colours correspond.
- Check the wire contact by using a multimeter.



- Check 1 and 2, 3 and 4, 5 and 6 to be sure the connections are correct.
- If the resistance between two wire contacts is too high, please check and reconnect the wire contacts.

### 4) Reconnect the communication plug to the control box

### E.1.3. Master-Slave Communication Method

There are two modes for the master-slave structure.

#### Global Control communication

The master unit will broadcast the settings to all slave units. During normal operation, slave units can receive commands from its wireless handset and wall pad control panel. Upon receiving the master global commands, all slave unit settings will be replaced by the master settings.

#### Addressable communication

The master controller must be the LCD wall pad. Slave unit parameters are set as usual. Upon receiving the control commands from the master unit, the addressed slave unit settings will be replaced by the master settings.

DIPA-S1 address setting: ON=1, OFF=0.

DIPA-S1 SW6	DIPA-S1 SW5	DIPA-S1 SW4	DIPA-S1 SW3	DIPA-S1 SW2	DIPA-S1 SW1	Unit No.	Remark
1	0	0	0	0	0	01	Master
0	0	0	0	0	1	02	Slave
0	0	0	0	1	0	03	Slave
0	0	0	0	1	1	04	Slave
0	0	0	1	0	0	05	Slave
0	0	0	1	0	1	06	Slave
0	0	0	1	1	0	07	Slave
0	0	0	1	1	1	08	Slave
0	0	1	0	0	0	09	Slave
0	0	1	0	0	1	10	Slave
0	0	1	0	1	0	11	Slave
0	0	1	0	1	1	12	Slave
0	0	1	1	0	0	13	Slave
0	0	1	1	0	1	14	Slave
0	0	1	1	1	0	15	Slave
0	0	1	1	1	1	16	Slave
0	1	0	0	0	0	17	Slave
0	1	0	0	0	1	18	Slave
0	1	0	0	1	0	19	Slave
0	1	0	0	1	1	20	Slave
0	1	0	1	0	0	21	Slave
0	1	0	1	0	1	22	Slave
0	1	0	1	1	0	23	Slave
0	1	0	1	1	1	24	Slave
0	1	1	0	0	0	25	Slave
0	1	1	0	0	1	26	Slave
0	1	1	0	1	0	27	Slave
0	1	1	0	1	1	28	Slave
0	1	1	1	0	0	29	Slave
0	1	1	1	0	1	30	Slave
0	1	1	1	1	0	31	Slave
0	1	1	1	1	1	32	Slave

If the master unit is equipped with a wireless handset only, it can only use the Global-Control communication method. If it is equipped with a wall pad, it can use both communication methods.

## E.2. Open Modbus protocol

Transfer Mode: RTU, BAUD Rate: 9600bps, 8 data bit, 1 stop bit, None parity bit

The communications require a delay of 80ms between reading an answer and sending the next command. All temperatures are equal to reading data\*10 accuracy: 0.1 degree F.

### Supported Functions:

Function Code	Function Description
01(01H)	Read Coils
02(02H)	Read Discrete Inputs
03(03H)	Read Holding Registers
04(04H)	Read Input Registers
05(05H)	Write Single Coil
06(06H)	Write Single Register
15(0FH)	Write Multiple Coils
16(10H)	Write Multiple Registers
255(FFH)	Extended Commands which are used to test unit

### Valid Error code table:

Error code	Description	Definition
01 (01H)	Invalid commands	Received commands beyond valid commands
02 (02H)	Invalid data address	Data addresses beyond valid data address
03 (03H)	Invalid data	Data beyond definition range
04 (04H)	Write data not successful	Write data did not succeed

### Coils table:

Description	Address	Type*	Remark
Unit ON/OFF	100000	R/W	
Sleep mode	100001	R/W	
Louver swing	100002	R/W	
Reserved	100003 to 100015		

### Discrete table:

Description	Address	Type*	Remark
MTV1	200000	R	
MTV2	200001	R	
AUX1	200002	R	
AUX2	200003	R	
Condensate pump	200004	N/A	
Electrical heater	200005	R	
Wired wall pad	200006	R	
PRO	200007	R	
Float switch	200008	R	
Reserved	200009	R	
EH safety switch	200010	R	
Unit ON/OFF status	200011	R	Testing purpose only.

\* R = read only, W = write only, R/W = read and write.

**Holding Register table:**

Description	Address	Type*	Remark
Mode setting	300000	R/W	Cooling mode = 01(H) Humidify mode = 02(H) Fan mode = 04(H) Heating mode = 08(H) Auto mode = 10(H)
Fan speed setting	300001	R/W	Low speed = 04(H) Medium speed = 02(H) High speed = 01(H) Auto fan speed = 07(H)
Louver swing setting	300002	R/W	Position 1 = 01(H) Position 2 = 02(H) Position 3 = 03(H) Position 4 = 04(H) Auto = 0F(H) Stop = 00(H)
Setting temperature	300003	R/W	60.8~86 degree F (actual*10 format)
Address setting	300004	R	Set by dip-switch, reading only
Reset	300005	W	=0x33 reset error
Week	300006	W	Calibration wired wall pad and set timer function
Hour	300007	W	Calibration wired wall pad and set timer function
Minute	300008	W	Calibration wired wall pad and set timer function
Second	300009	W	Calibration wired wall pad and set timer function
Hours in Timer on	300010	R/W	Timer ON
Minute in Timer on	300011	R/W	Timer ON
Hours in Timer off	300012	R/W	Timer OFF
Minute in Timer off	300013	R/W	Timer OFF
Icon of Timer ON or OFF	300014	R/W	BIT0 = Icon of Timer ON BIT1 = Icon of Timer OFF 1 = enable 0 = disable
Super low speed rpm	310000	R/W	200~1500
Low speed rpm	310001	R/W	200~1500
Medium speed rpm	310002	R/W	200~1500
High speed rpm	310003	R/W	200~1500
RPM setting	310004	R/W	0~2000 (used to test , 0 = disable)
Temperature sampling time	310005	R/W	2~100, default:5S
Factor of auto fan speed	310006	R/W	2~150, default:20
Factor of modulating valve	310007	R/W	2~250, default:150

\* R = read only, W = write only, R/W = read and write.



**Input Register table:**

Description	Address	Type*	Remark
Dip switch 1 status	400000	R	
Dip switch 2 status	400001	R	
Room temperature sensor	400002	R	
Ti1 temperature sensor	400003	R	
Ti2 temperature sensor	400004	R	
Error code	400005	R	Bit0 = Room temperature sensor error Bit1 = Ti1 temperature sensor error Bit2 = Ti2 temperature sensor error Bit3 = Float switch error Bit4 = Indoor coil low temperature protection Bit5 = Indoor coil over heat protection Bit6 = Reserved Bit7 = Electrical heater failure Bit8 = Motor1 Error Bit9 = Motor2 Error Bit10 = System parameters error Bit11 = Reserved Bit12 = Reserved Bit13 = Reserved Bit14 = Reserved Bit15 = Reserved
Fan speed status	400006	R	Low = 04(H) Medium = 02(H) High = 01(H)
Mode status	400007	R	Cooling mode = 01(H) Dehumidify mode = 02(H) Fan mode = 04(H) Heating = 08(H)
Setting temperature status	400008	R	Testing only
Room temperature in wall pad status	400009	R	
Room temperature in main PCB status	400010	R	
Unit type	400011	R	4-pipe = 03, 2-pipe = 02 This setting is configured by dip switch
EC motor 1# RPM	400012	R	
EC motor 2# RPM	400013	R	

\* R = read only, W = write only, R/W = read and write.

Remark:

The above protocol address is in Base 0.

## F. Control Specifications: Flexible Function PCB – W Type Control

### F.1. Features

- a) Integrated fan relays for zone control applications.
- b) ON/OFF thermostat input and low-voltage modulating fan speed input flexibility.
- c) Simple error diagnostic and LED error display.

### F.2. I/O Port Definitions

I/O		Code	2-Pipe	4-Pipe
Analogue input	Coil temperature sensor	AI1	Cooling / heating coil sensor (Ti1)	Cooling only coil sensor (Ti1)
Voltage input	High fan speed	H	230VAC input signals from wired thermostat	
	Medium fan speed	M		
	Low fan speed	L		
	Phase	L1	External 230VAC power supply connection to the PCB. Max length: 5 m.	
	Neutral	N1, N2		
	Earth	GND		
Signal Input	Modulating signal	+/-	Low voltage modulating signal input (standard 0~5VDC; optional 0~10VDC)	
Digital input	Programming interface	TTL	Low voltage digital signal input for board programming	
	Float switch	Float	N/A	
Voltage output	Water pump	PUMP	N/A	
	EC motor	CN4	5-wire connection with 230VAC power supply to EC motor and 0-5VDC modulating signal output	
	Stepping motor	CN1, CN2	N/A	
Digital output	LED display	X-DIS	Low-voltage output	
Voltage-free output	Alarm	ALARM	Voltage-free alarm contact: (a) Standard configuration is (NC).	

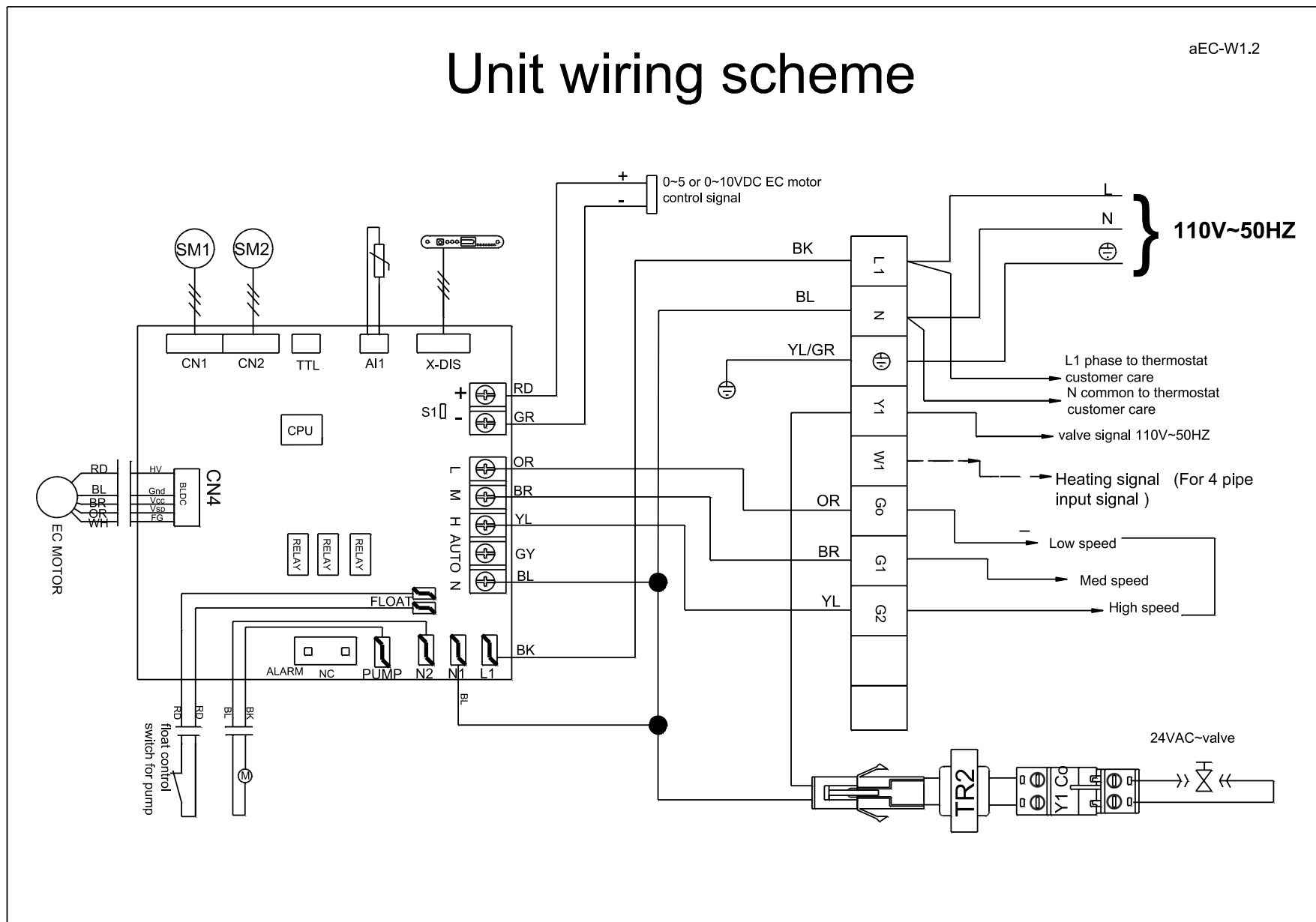
### F.3. Onboard Configuration

The PCB can be configured for different modulating signal inputs. Refer to jumper configuration table below.

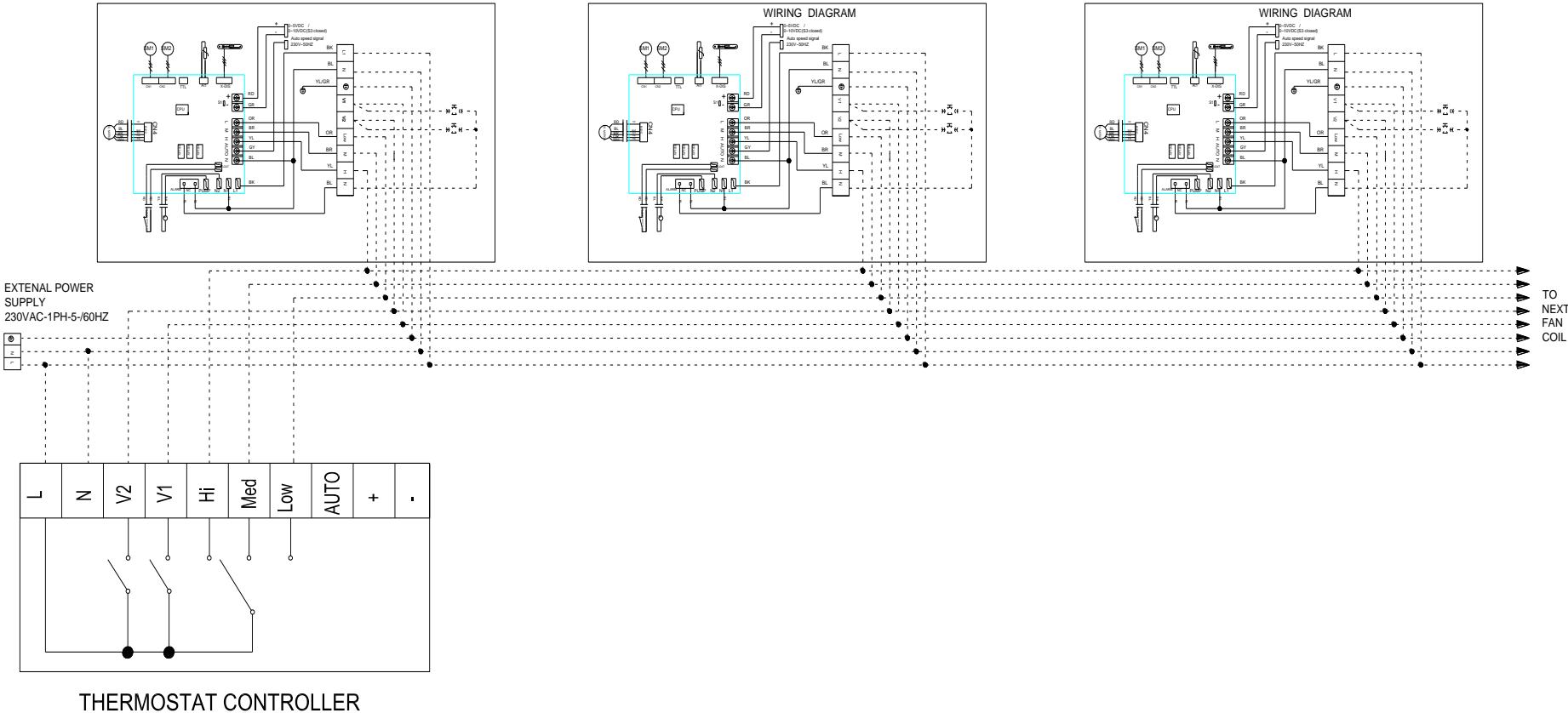
Code	State	Description
S1	Open	PCB configured for 0~5VDC modulating signal input.
S1	Closed	PCB configured for 0~10VDC modulating signal input.

F.4. Wiring Diagrams

F.4.1. Standard W Type Control PCB



F.4.2. Zone Control Wiring Diagram (On/Off Thermostat)



## F.5. Control Logics Specification

### F.5.1. Unit Power On/Off

- a) The unit is turned ON when any of the fan speed inputs (H/M/L) are ON, OR Auto ON/OFF signal input is ON.
- b) The unit is turned OFF only if all of the fan speed inputs (H/M/L) are OFF AND Auto ON/OFF signal input is OFF.

### F.5.2. Alarm Protection and Error Display

- a) If the float switch is open for 5 minutes, then the (NC) voltage-free alarm contact shall be open and the (NO) voltage free alarm contact shall be closed.
- b) If the float switch is open for 10 minutes, the LED display reports a condensate management failure.

### F.5.3. Modulating Signal Input

- a) The standard configuration is for 0~5VDC modulating signal input.
- b) The optional configuration is for 0~10VDC modulating signal. To set the PCB to the optional configuration, the S1 jumper must be closed.

## F.6. LED Display and Error Description

LED receiver in ABS housing with 0.5m (SGS14HFCA-01010101) or 1.8m (SGS14HFCA-01010102) pre-wiring

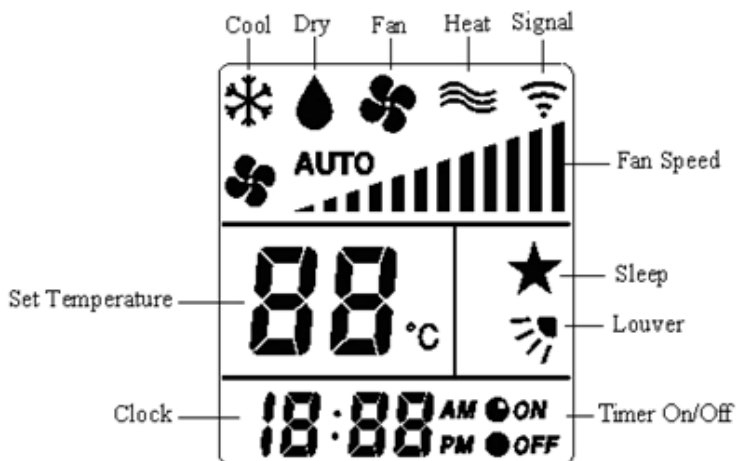
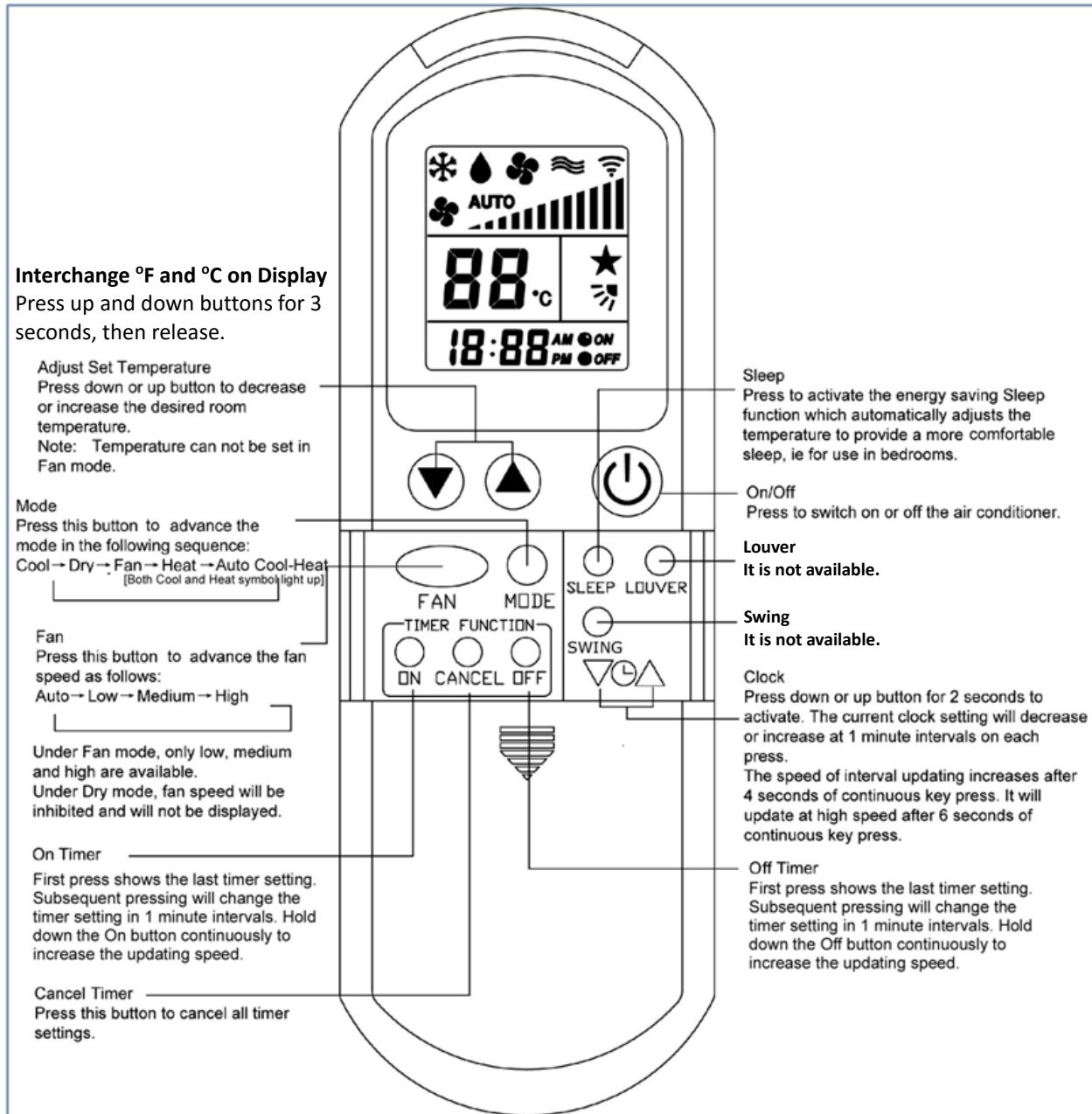


Flexible Function PCB – W Control Type		
Fan speed setting	LED Display	Condition
High speed	Red LED On	Normal
Medium speed	Yellow LED On	Normal
Low speed	Green LED On	Normal

For all units - Green LED Blinks			
Error Description	Blink	Reason	Remedy
Indoor coil sensor 1 failure	Green LED blinks 4 times, stops for 3s	Ti1 sensor connection is not good or damaged.	Check if Ti1 plug is connected or not. Check sensor's resistor is good or not.
Water pump failure	Green LED blinks 7 times, stops for 3s	Float switch is opened.	Check if the condensate water pipe is connected or not. Check if the pump is functioning or not.
EC motor failure	Green LED blinks 9 times, stops for 3s	No EC motor feedback	Check DIPB-SW5 and SW6 setting. Check the EC motor

## G. User Interface

### G.1. Remote Handset for S Type Control



#### Attention

When unit with handset is the master unit, its settings are automatically sent to the slave units; Auto Cool-Heat operation will be applicable in 4-pipe system only.

“Swing” and “Louver” functions are not applicable. European version uses degree C setting.

## G.2. Wired Wall Pad Controller for S Type Control



### Features:


- Communication with remote handset.
- On/Off button to turn unit On or Off.
- Fan speed can be set Hi, Medium, Low and Auto.
- Mode button to set the unit cooling, heating, fan or dehumidify.
- Temperature can be set or cannot be set by dip-switch 1 setting.  
When dip-switch1 is ON, the temperature cannot be set. In the cooling mode, the setting temperature is 24 °C and in heating mode, the setting temperature is 21 °C; When dip-switch is off (factory setting), the temperature can be set from 16~30°C.
- A dry contact to tuned on or off the unit.
- Room temperature and setting temperature display can be selected by dip-switch 2.  
When dip-switch2 is ON, setting temperature is displayed.  
When dip-switch2 is OFF (factory setting), room temperature is displayed.

### G.3. Thermostat for W Type Control



This thermostat adopts digital control technology with large LCD display. It shows the following items: working states (cool, heat or ventilation), the speed of fan coil, room temperature, set-point.


There are following keys on the panel:


On/Off “

#### OPERATION

- On/Off: Press “


Note : The thermostat will turn on directly when the digital input is activated.

- Setting temperature: Press “


If No.3 parameter of Parameter B is 01, you can press “

In auto changeover mode for 2 pipe configuration, the mode will be selected automatically by the water temperature which is measured by the external sensor (if the water temperature is less than or equal to 18°C, the system will work in cooling; if the water temperature is higher than or equal to 22°C, the system will work in heating), the related icon will flash, and it will be confirmed automatically after 5 seconds.

If No.3 parameter of Parameter B is 01. the fan will turn ON when external sensor is higher than or equal to 38°C in heating mode,


- Fan Speed Selection: Press “

Note: (If No.2 parameter of Parameter A is 01)

Check the water temperature: press “

- Digital input control:  
When the dry contact signal is provided, the thermostat will turn off all its outputs.

#### DEFROST (LOW TEMPERATURE PROTECTION)

- Description: when the thermostat turns off and the room temperature is lower than 5°C, it will be turned on automatically in heating mode with “

SK2017 AHRI PFWSL-V/P-AECM-001



**PARAMETER SETTING:**

**Parameter A:**

When thermostat is closed, press “+” and “▲” buttons simultaneously and hold for 3 seconds.

1. The thermostat will display “00 or 01” , use “Δ” or “▽” key to adjust ◦
2. Press “⌂” to enter next parameter setting, Press “Δ” or “▽” key to adjust ◦
3. Repeat the second step above to set other parameter.

No.	Parameter	Default	Function
1 ( the “☺” icon will be showed)	00	00	When the window is open, the dry contact (C1 and Com) is close.
	01		When the window is open, the dry contact (C1 and Com) is open.
2 ( the “❄” icon will be showed)	01	01	Internal sensor and external sensor available, the external sensor is used to test the water temperature
	02		External sensor is used to measure the room temperature. When external sensor is connected, thermostat works on external sensor mode. If external sensor is not connected it will function on the internal sensor.
3 ( the “☀” icon will be showed)	01--32	01	Communication address

**Parameter B:**

When thermostat is closed, press “☺” button and hold for 10 seconds.

1. The thermostat will display “02 or 04” , use “Δ” or “▽” key to adjust ◦
2. Press “⌂” to enter next parameter setting, Press “Δ” or “▽” key to adjust ◦
3. Repeat the second step above to set other parameter.

No.	Parameter	Default	Function
1 ( the “☺” icon will be showed)	02		2 pipe configuration
	04		4 pipe configuration
2 ( the “❄” icon will be showed)	dA		Type DA: With continuous fan cycle
	dB		Type DB: With stop fan cycle
3 ( the “☀” icon will be showed)	00	00	Manual
	01		Manual +Auto changeover

**G.4. Remote handset for Thermostat in W Type Control**

STCD-A01 IR handset

- Battery spec: 2\*AAA batteries
- Casing dimension: 45\*115\*25mm (W\*H\*D)
- Casing material: Fire retardant PC ABS
- IP protection: IP30 according to EN60529
- Indication: LCD display
- Control Parameters: ON/OFF  
TEMP +/-  
Fan speed  
Mode selection  
Sleep ON/OFF



## H. Sensor Resistance R-T Conversion Table

Resistance : R (77°F) = 10KΩ ± 1%

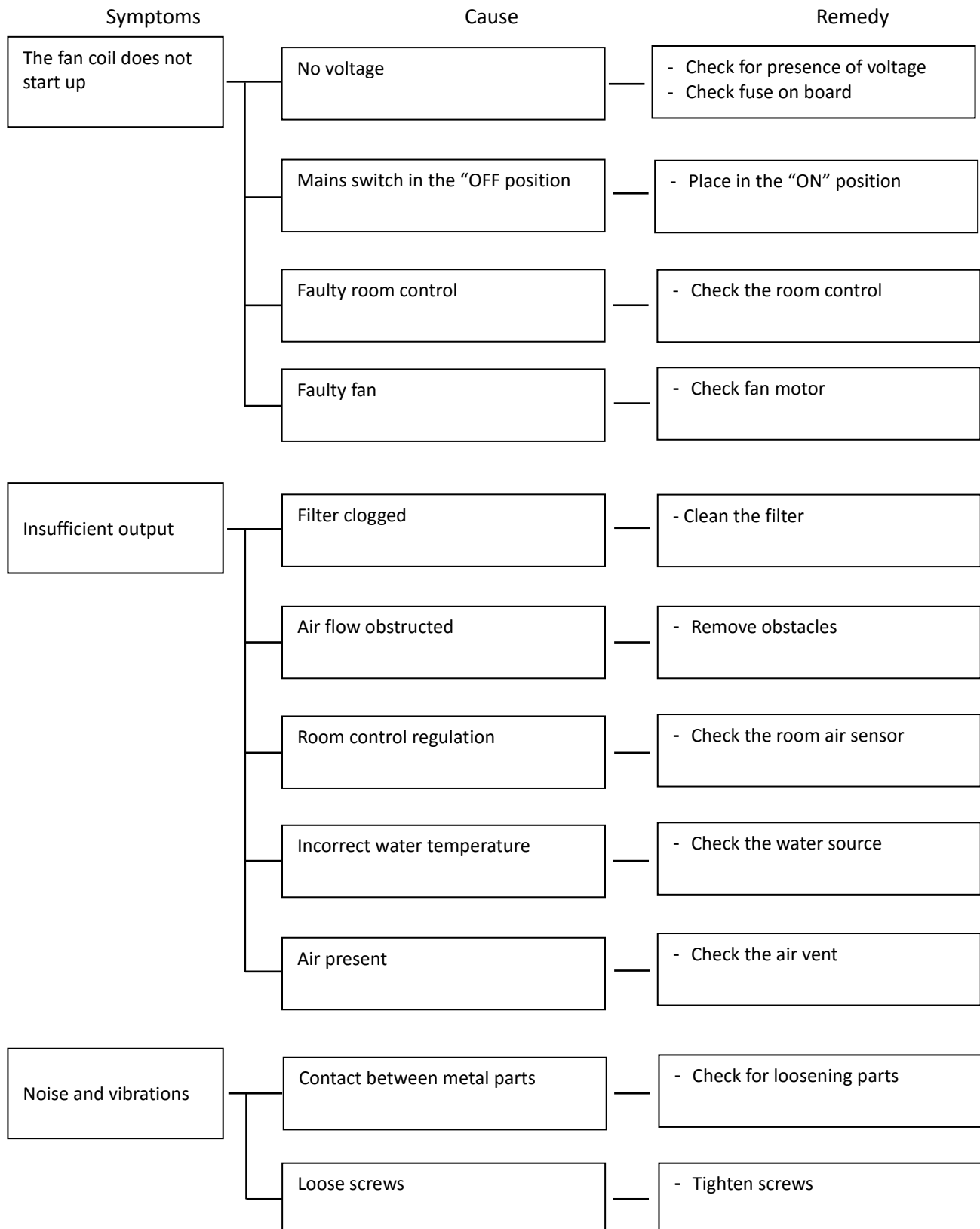
Beta Constant : B (25/85) = 3977 ± 1%

T (°F)	Rmin (KΩ)	Rnom (KΩ)	Rmax (KΩ)	T (°F)	Rmin (KΩ)	Rnom (KΩ)	Rmax (KΩ)
-22	174	182.7	191.8	39.2	26.11	26.9	27.71
-20.2	163.4	171.5	179.9	41	24.85	25.59	26.34
-18.4	153.6	161.1	168.9	42.8	23.65	24.35	25.05
-16.6	144.4	151.3	158.5	44.6	22.52	23.17	23.83
-14.8	135.8	142.2	148.9	46.4	21.45	22.06	22.68
-13	127.8	133.8	140	48.2	20.44	21.01	21.59
-11.2	120.3	125.8	131.6	50	19.48	20.02	20.55
-9.4	113.3	118.4	123.8	51.8	18.58	19.7	19.58
-7.6	106.7	111.5	116.5	53.6	17.71	18.18	18.65
-5.8	100.6	105.1	109.7	55.4	16.9	17.33	17.77
-4	94.9	99.03	103.3	57.2	16.12	16.53	16.94
-2.2	89.51	93.39	97.41	59	15.39	15.77	16.16
-0.4	84.5	88.11	91.85	60.8	14.69	15.05	15.41
1.4	79.8	83.17	86.64	62.6	14.03	14.37	14.7
3.2	75.39	78.53	81.76	64.4	13.41	13.72	14.03
5	71.26	74.18	77.19	66.2	12.81	13.1	13.4
6.8	67.37	70.1	72.9	68	12.24	12.52	12.79
8.6	63.73	66.26	68.88	69.8	11.7	11.96	12.22
10.4	60.3	62.67	65.1	71.6	11.19	11.43	11.67
12.2	57.08	59.28	61.55	73.4	10.71	10.93	11.15
14	54.05	56.1	58.22	75.2	10.24	10.45	10.66
15.8	51.19	53.12	55.08	77	9.8	10	10.2
17.6	48.51	50.3	52.14	78.8	9.374	9.57	9.765
19.4	45.98	47.66	49.37	80.6	8.969	9.16	9.351
21.2	43.61	45.17	46.77	82.4	8.584	8.77	8.957
23	41.36	42.82	44.31	84.2	8.218	8.4	8.582
24.8	39.25	40.61	42	86	7.869	8.047	8.225
26.6	37.26	38.53	39.83	87.8	7.537	7.71	7.885
28.4	35.38	36.56	37.78	89.6	7.221	7.39	7.56
30.2	33.6	34.71	35.85	91.4	6.92	7.085	7.251
32	31.93	32.97	34.02	93.2	6.633	6.794	6.956
33.8	30.35	31.32	32.3	95	6.36	6.517	6.675
35.6	28.85	29.76	30.68	96.8	6.099	6.252	6.407
37.4	27.44	28.29	29.15	98.6	5.85	6	6.151

Resistance : R (77°F) = 10KΩ ± 1%  
 Beta Constant : B (25/85) = 3977 ± 1%

T	Rmin	Rnom	Rmax	T	Rmin	Rnom	Rmax
(°F)	(KΩ)	(KΩ)	(KΩ)	(°F)	(KΩ)	(KΩ)	(KΩ)
100.4	5.614	5.759	5.907	167	1.417	1.474	1.532
102.2	5.387	5.53	5.673	168.8	1.37	1.426	1.482
104	5.172	5.31	5.451	170.6	1.326	1.379	1.434
105.8	4.966	5.101	5.238	172.4	1.282	1.335	1.389
107.6	4.769	4.901	5.034	174.2	1.241	1.292	1.344
109.4	4.582	4.71	4.84	176	1.201	1.25	1.302
111.2	4.402	4.527	4.654	177.8	1.162	1.211	1.261
113	4.231	4.353	4.477	179.6	1.125	1.172	1.221
114.8	4.067	4.186	4.307	181.4	1.089	1.135	1.183
116.6	3.911	4.027	4.144	183.2	1.055	1.1	1.146
118.4	3.761	3.874	3.989	185	1.021	1.065	1.111
120.2	3.618	3.728	3.84	186.8	0.9891	1.032	1.077
122	3.481	3.588	3.697	188.6	0.9582	1	1.044
123.8	3.35	3.454	3.561	190.4	0.9284	0.9697	1.012
125.6	3.225	3.326	3.43	192.2	0.8998	0.9401	0.9818
127.4	3.105	3.204	3.305	194	0.8721	0.9115	0.9522
129.2	2.99	3.086	3.185	195.8	0.8455	0.8839	0.9237
131	2.88	2.974	3.07	197.6	0.8198	0.8573	0.8961
132.8	2.774	2.866	2.959	199.4	0.795	0.8316	0.8696
134.6	2.673	2.762	2.854	201.2	0.7711	0.8069	0.8439
136.4	2.576	2.663	2.752	203	0.748	0.783	0.8192
138.2	2.483	2.568	2.655	204.8	0.7258	0.7599	0.7953
140	2.394	2.477	2.562	206.6	0.7043	0.7376	0.7722
141.8	2.309	2.39	2.472	208.4	0.6836	0.7161	0.7499
143.6	2.227	2.306	2.386	210.2	0.6635	0.6953	0.7283
145.4	2.149	2.225	2.304	212	0.6442	0.6752	0.7075
147.2	2.073	2.148	2.224	213.8	0.6255	0.6558	0.6874
149	2.001	2.074	2.148	215.6	0.6075	0.6371	0.6679
150.8	1.931	2.002	2.075	217.4	0.59	0.619	0.6491
152.6	1.865	1.934	2.005	219.2	0.5732	0.6015	0.631
154.4	1.801	1.868	1.937	221	0.5569	0.5846	0.6134
156.2	1.739	1.805	1.872				
158	1.68	1.744	1.81				
159.8	1.623	1.686	1.75				
161.6	1.569	1.63	1.692				
163.4	1.516	1.576	1.637				
165.2	1.466	1.524	1.583				

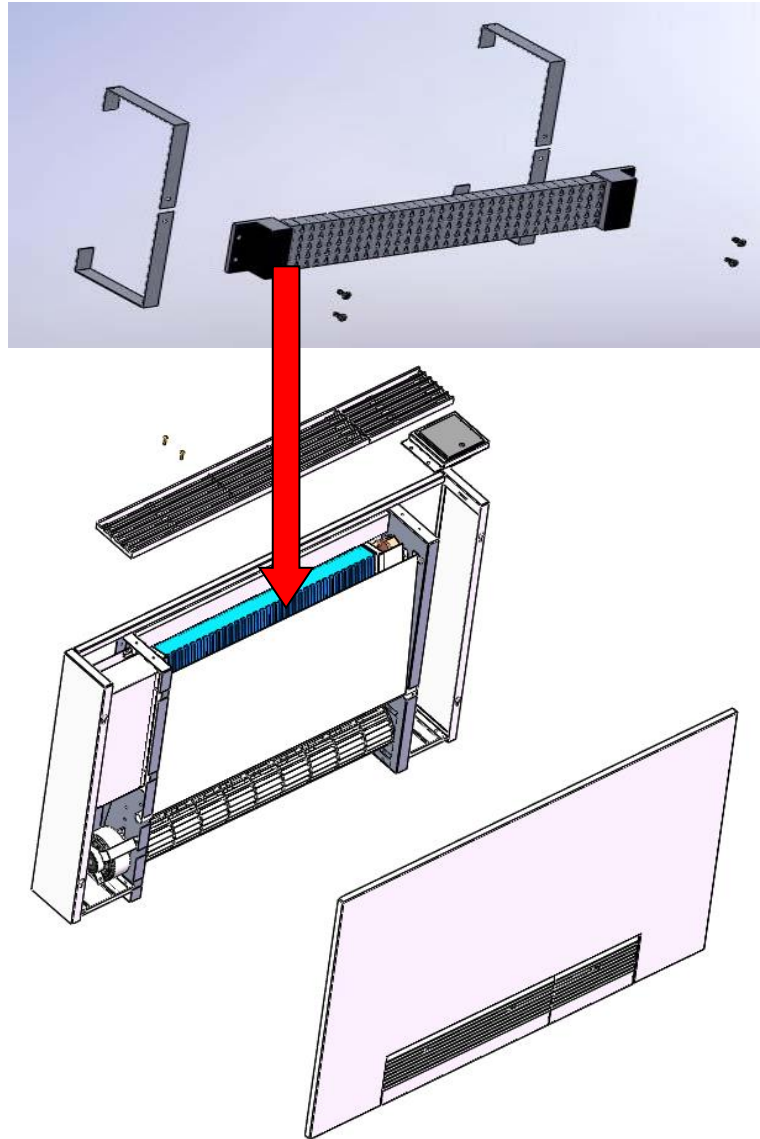
# I. Troubleshooting



## J. Accessories Descriptions

### J.1. Electrical Heater

Electric Heater module is supplied for winter heating as an alternative to the auxiliary hot water coil.  
Electric Heater is installed in the same way and same position as the Auxiliary 1 row heating coil for 4-pipe system.



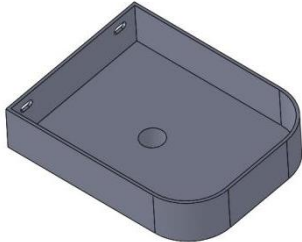
**Note:** Airflow should not drop below the values for minimum speed.

## J.2. Auxiliary External Drain Pan

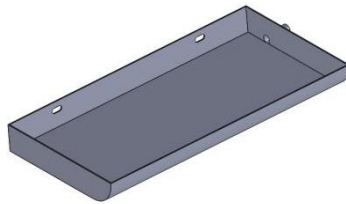
DPANPS-UNSL-RH is a painted steel drain pan for suspended ceiling installation or built-in horizontal installation with right-sided coil connections.

DPANPS-UNSL-LH is a painted steel drain pan for suspended ceiling installation or built-in horizontal installation with left-sided coil connections.

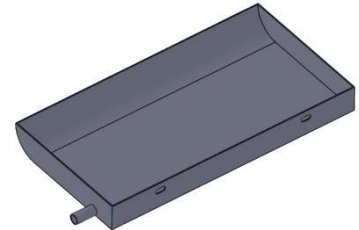
DPANPS-UNSL-RHLH is a painted steel drain pan for floor standing installation, fixed wall installation and built-in vertical installations. Suitable for left-side and right-side unit coil connections.



DPANPS-UNSL-RHLH



DPANPS-UNSL-RH



DPANPS-UNSL-LH

## J.3. ABS Supporting Feet

ABSFT UNISL EXP1 Metal supporting feet for floor standing applications.

