POLARAIR

AHRI

COMPLETE
FANCOIL RANGE
ECO TECHNICAL CATALOGUE

HVAC Solutions

YOUR SATISFACTION, OUR OBJECTIVE

HVAC SOLUTIONS

Your Satisfaction, Our Objective

Global HVAC Solutions specializes in developing and producing professional HVAC solutions to worldwide markets.

With over 25 years in the international HVAC business, working together with manufacturers and distributors in their markets,   has the experience and the knowledge to support our partners around the world in finding the right solution that satisfies their specific needs.

Our headquarters is based in Hong Kong, and we offer worldwide support with offices in China, Europe and North America, allowing personalized, efficient, and same time zone attention.

We are conscious that our customers are the most valuable part of our business. Therefore, we focus on giving the service and the product quality that exceeds your expectations, with integrity, professionalism, and a teamwork approach.

We also provide the specialized knowledge and relationships to overcome the challenges that many times foreign companies face operating in an unfamiliar environments, always focused on getting you the results you want, delivered on time and to your technical specification.

Our professional, worldwide, multilingual, and customer oriented team are trained to understand your requirements and provide the best solution for your specific need.

POLAR AIR

l experience building products for and working together with some of the most well-known manufacturers and distributors in the world has developed our own brand Polar Air into a strong and powerful name, recognized worldwide, which has become a standard for high quality of the HVAC product solutions named after it.

Polar Air is represented in the world by carefully selected business partners, for whom customers are the most valuable part of their business, and who are focused on giving them the service and quality levels that exceeds customer expectations.

Fan Coil solutions

Hydronic Fan Coil Unit range (FCU), is the result of over 20 years' experience designing and manufacturing fan coils for, and together with, the main hot and cold water machine manufacturers from the most demanding markets.

Our FCU range counts with CE and ETL approvals and has been certified by Europe's independent certification company, Eurovent, confirming the performance of our products, developed to meet the strictest international standards.

All our FCU ranges offer:

• **Universal integrated control** system with two different configurations:

Total Control Configuration for complete system control including master-slave and Modbus protocol for BMS communication.

Flexi Control Configuration for unit control from an external thermostat with additional control of drain pump, louvers and zonal control of product operations.

• **Energy efficient EC motors** or AC motors options.

• **Designs to reduce costs of stock**, distribution, maintenance and installation.

• **Fancoils suitable for all markets** including 220V/1ph/50Hz, 230V/1ph/60Hz, and 115V/1ph/60Hz.

• **Innovative accessories** to give more product flexibility:

Auxiliary heating coils and auxiliary electric heaters for on-site installation.

4x2 switching valve kit to convert 2 pipe units into a 4 pipe system.

We thank you for your time and your interest.
Please explore the following pages to learn more about our Fancoil product solutions.

ECO UNIVERSAL SERIES
EC MOTOR UNIVERSAL FAN COILS

MODELS

PFWB AECM
Universal Fan Coils with EC Motor 220V/60Hz, specified under AHRI standards.

PFWB Y-AECM
Universal Fan Coils with EC Motor 115V/60Hz, cETLus approved and specified under AHRI standards.

PFWBC AECM
Universal Fan Coils with EC Motor 220V/60Hz, specified under AHRI standards, with Decorative Cabinet.

PFWBC Y-AECM
Universal Fan Coils with EC Motor 115V/60Hz, cETLus approved and specified under AHRI standards, with Decorative Cabinet.

ECO UNIVERSAL SERIES
EC MOTOR **UNIVERSAL** FANCOILS

MODEL PFWB-AECM
MODEL PFWB-Y-AECM
MODEL PFWBC-AECM
MODEL PFWBC-Y-AECM

ECO UNIVERSAL SERIES
EC MOTOR **UNIVERSAL** FAN COILS

PFWB AECM
PFWB Y-AECM
PFWBC AECM
PFWBC Y-AECM

Product Presentation

ECO Universal Series has been designed to meet the functional and technical requirements of the most demanding markets. These units are offered in a complete product range with 3 row, 3+1 row and 4 row configurations. Flexible pipe connections allow on site left or right tie-in. Auxiliary Heaters can be installed in the field or shop.

The ECO Universal Series Fan Coils have a discrete slim, modern and elegant design, and are available uncased (ECO Universal NC Series) for in the wall installation or with Decorative Cabinet (ECO Universal EXP Series) for external (exposed) horizontal under ceiling or vertical floor standing installations.

The ECO Universal EXP Series comes in a RAL9010 white color decorative metal casing and has integrated control options for Thermostat, Wall Pad, or Infrared Remote Control.

Product Range

The ECO Universal Series are available with 115V/60Hz (PFWB(C)-Y-AECM - cETLus approved) or 220V/60Hz (PFWB(C)-AECM) EC motors. The units can be provided with 24V thermostats and 24V valves in the following capacities:

• **9 sizes of 2-pipe models 3 row from 6000BTU (1.8 Kw) to 33100BTU (9.8 kW) cooling capacity.**

• **4 pipe models available with auxiliary heating coil (3+1 row configuration).**

• **9 sizes of 2-pipe 4 row models from 6800BTU (2kW) to 39900BTU (11.7kW) cooling capacity (non-standard configuration).**

Product Features

• **Energy Efficiency.** The ECO Universal Series Fan Coils incorporate a DC motor with step-less speed modulation using an integrated EC motor driver.

Energy saving or unit power input at set H/M/L speeds is reduced by 30 - 50% when compared to traditional on/off AC motors. Moreover, in Energy Saving Auto – Mode (ESM), as airflow is continuously varied (step-less progression) between 15% and 100% of the maximum high speed airflow, energy saving will be 50 – 70% while precisely meeting the required cooling and heating loads of the space.

This innovation eliminates the need for the motor to turn off and on periodically to maintain the desired temperature of the environment, leading to total energy savings of up to 50% on an installation/project basis. Modulation of airflow to meet heating and cooling requirements of the space will also result in reducing temperature fluctuations within the space, as well as reducing fan noise.

The motor is driven by a 0 – 5 VDC signal originating from an inverter board integrated into the unit onboard controller, which utilizes PID logic in order to modulate motor RPMs in Energy Saving Auto - Mode (ESM).

• **Flexibility**. The ECO Universal Series Fan Coils have been designed to maximize product flexibility on site, and in stock offering:

•Easy to remove front cover for ease of maintenance.

•Interchangeable Left / Right hand connections.

•Horizontal or vertical return air intake positions.

•Auxiliary Electric Heater and Auxiliary 1 row Heating Coil suitable for On-site or In-stock installation.

Standard Configuration

The ECO Universal Series offers as standard Nylon net filters and Interchangeable left/ right-side coil connections.

Control Options

The ECO Universal Series offers the following control possibilities to satisfy specific applications.

• **Total Control Board (S type)** – Field Programmable using easy to set dipswitches and controlled via Infra-Red handset and/or Wired Wall pad. It includes a 24V signal for modulating valve controls and It offers the following control options: Continuous with modulation or On/Off fan, 2 or 4 Pipe configuration, with or without valves, with or without electrical heater, preheat configuration and complete diagnostics. It also allows control of up to 32 Secondary units via a single Main Unit with IR Handset or Wall Pad controller, and up to 2048 units via BMS (Building Management System) with Modbus platform.

• **Flexi Control Board (W type)** – Flexible function control for External Thermostat applications including a 24V signal for modulating valve controls, with control of Drain Pump, Louvers, Zone Control product operations, and limited LED diagnostics.

ISO 9001
QUALITY ASSURED FIRM

CE

HVAC Solutions

Universal Uncased/Cabinet Fan Coil

INSTALLATION OPERATION AND SERVICE MANUAL

(AMERICAS VERSION)

MPFWBC-V/P~AECM SERIES

V ~ 2 pipe

P ~ 4 pipe (Optional 1 row coil)

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Heating, Air-conditioning & Refrigeration Distributors International

INVESTING IN QUALITY, RELIABILITY & PERFORMANCE.

ISO 9001 QUALITY

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

CE SAFETY STANDARDS

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.

WEEE MARK

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

World Leading Design and Technology

Equipped with the latest CAD/CAM computer aided design and manufacturing technology, our factories produce over 2,000,000 air conditioning units each year, all conforming to the highest international standards of quality and 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, originating 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.

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 full CE certification and ISO 9001, several products have UL/CSA (NRTL) safety approval plus ARI Certification in the USA, ROHS compliance for Europe, giving you the confidence of knowing our company is the right choice when selecting air conditioning equipment.

ALWAYS MAKE SURE THIS MANUAL REMAINS WITH THE WATER UNIVERSAL UNCASED/CABINET FAN COIL. READ THIS MANUAL BEFORE PERFORMING ANY OPERATION ON THE WATER UNIVERSAL UNCASED/CABINET FAN COIL.
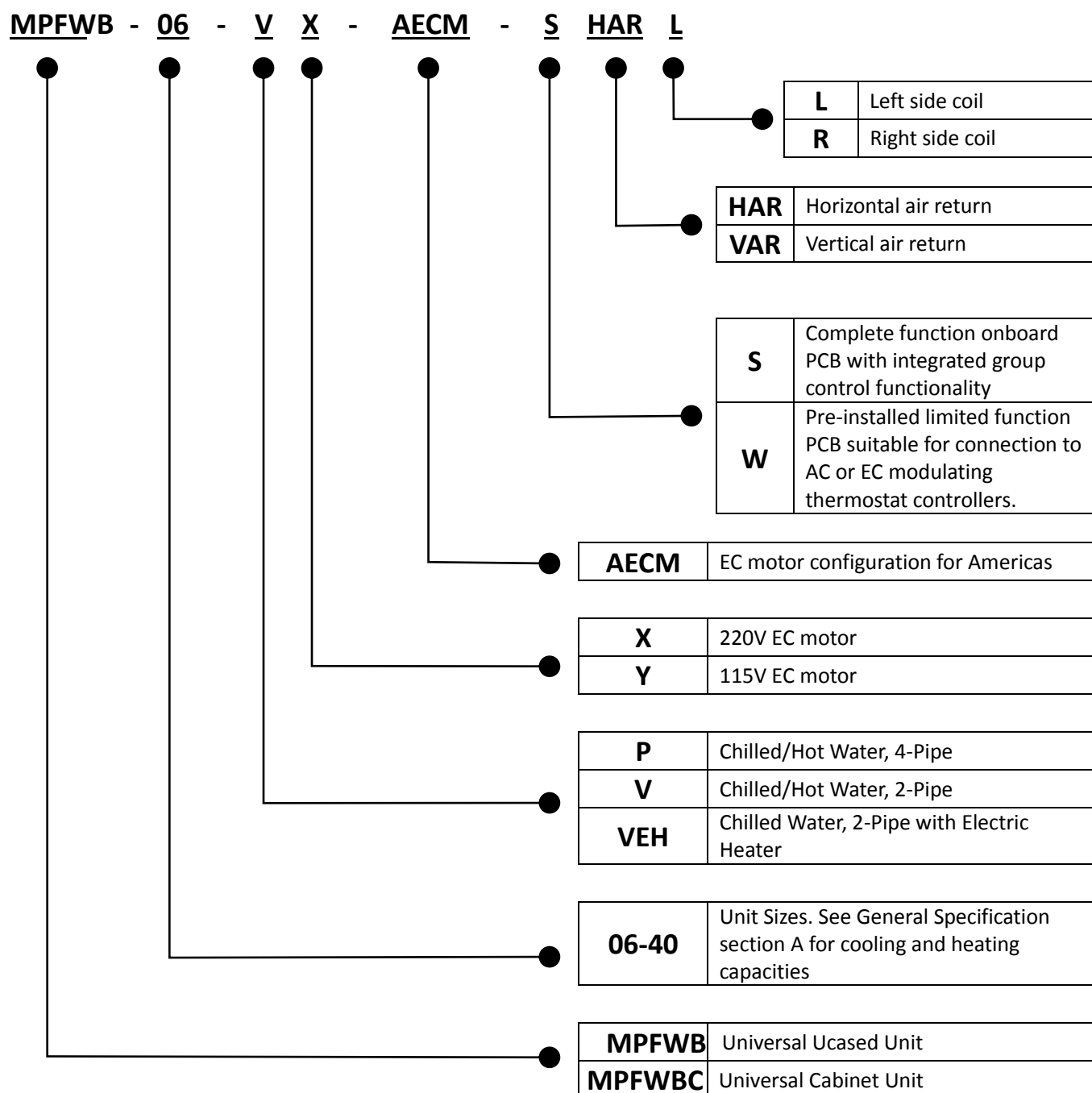
Table of Content

Model Code Nomenclature

MPFWB - 06 - V X - AECM - S HAR L

L	Left side coil
R	Right side coil

HAR	Horizontal air return
VAR	Vertical air return

S	Complete function onboard PCB with integrated group control functionality
W	Pre-installed limited function PCB suitable for connection to AC or EC modulating thermostat controllers.

AECM	EC motor configuration for Americas

X	220V EC motor
Y	115V EC motor

P	Chilled/Hot Water, 4-Pipe
V	Chilled/Hot Water, 2-Pipe
VEH	Chilled Water, 2-Pipe with Electric Heater

06-40	Unit Sizes. See General Specification section A for cooling and heating capacities

MPFWB	Universal Ucased Unit
MPFWBC	Universal Cabinet Unit

A. Technical Data

A.1.　　　General Description

BEARING STRUCTURE

Bearing structure made of large thickness galvanized sheet-steel with holes for fixing to wall/ceiling and Thermal-acoustic internal insulation.

CABINET

Cabinet made of thick steel-sheet to make it resistant to rust, corrosion, chemical agents, solvents, aliphatic and alcohols. The cabinet is with thermo acoustic internal insulation and holes to hang unit.

AIR DELIVERY GRILL

Air delivery grill by fixed finis, adjustable on two positions (air flow can be reversed by rotating grill by 180°). Made of gray ABS (similar to RAL9010), supplied with small side doors for easy access to control planet.

HEAT EXCHANGER

Highly efficient coil which copper pipes and aluminum fins fixed by mechanical expansion. Coil connections provided with anti torsion system, hand air vent valves, hand water drain valves.
Coils tested at the pressure of 435 PSI, intended to work with water at 218 PSI pressure.

FAN SECTION

Fan section including 1 or 2 centrifugals fans with double air inlet metal blades (forward curved fins) directly coupled to the electric motor. Fan section statically and dynamically balanced. Extensive diameter fans (= high air flow and high static pressure) and few revolutions (= low noise level). Electric motor has 3 speeds, provided with heat protection (Xlixon), running capacitor permanently switched on, Class B, electric cables protected by double insulation. Fan section is easy to remove.

AIR FILTER

Air filter easy to remove, made of a metal frame holding filtering section which can be regenerated by water wash, blowing and suction.

A.2. Unit Appearance
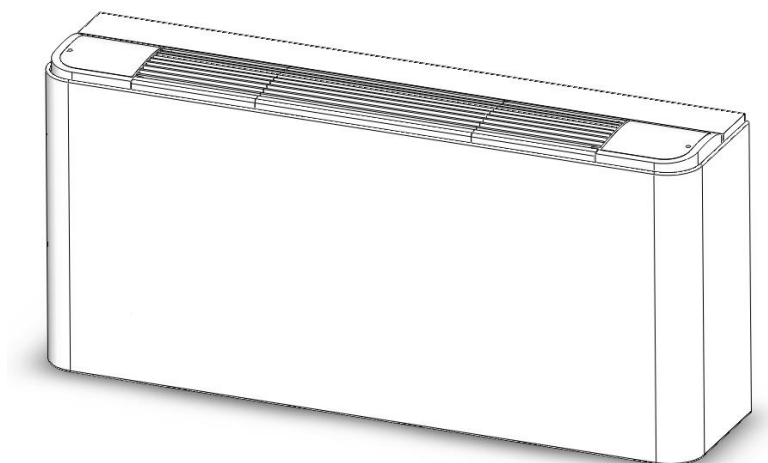
PFWBC-VAR

PFWBC-HAR

PFWB

A.3.General Specification

A.3.1.　　　2-Pipe Systems

Product range: PFWB/PFWBC-ECM Universal Uncased/Cabinet Fan Coil with EC Motor

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PROUD MEMBER

PFWB(3R)-V~-ECM Universal Uncased Unit 3-row coil 2-pipe with EC Motor (Americas Version)/
PFWBC(3R)-V~-ECM Universal Cabinet Unit 3-row coil 2-pipe with EC Motor (Americas Version)

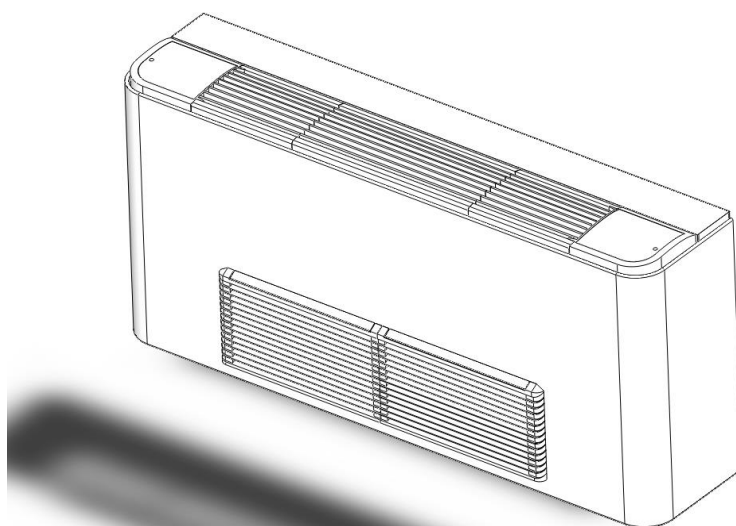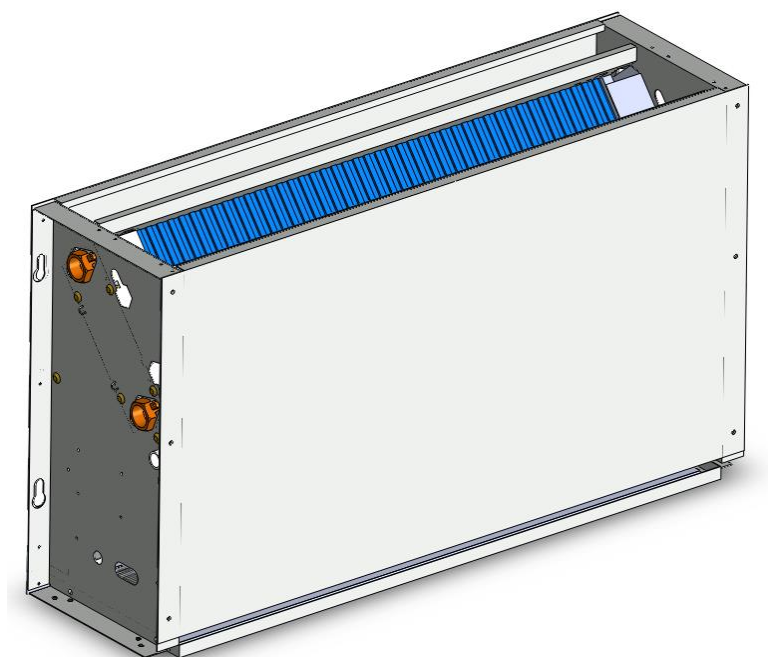|		PFWB(C)(3R)-[Size]-V~-ECM				06	09	12	15	18
Unit Configuration		Configuration				2-pipe				
		Number Of Fan Blowers				Single	Twin			
		Operation Control				~S: Complete function onboard PCB with integrated group control functionality, incl. 1 pc return air sensor and 2 pcs temperature sensors. ~W: Limited function onboard PCB with drain-pump, louver and zone control functionality, incl. 1 pc coil temperature sensors.				
Performance Data	Air	Total Air Flow^e	H	3	CFM	218	329	429	518	676
			M	2		182	282	353	426	571
			L	1		129	224	294	368	471
	Cooling	Cooling Capacity^e	H	3	BTU/Hr	6054	8592	10923	13631	17032
			M	2		5303	7707	9581	13963	15147
			L	1		4070	6432	8266	12385	13025
		Sensible Cooling Capacity^e	H	3		4169	5926	7604	9384	11742
			M	2		3638	5300	6594	9494	10411
			L	1		2771	4402	57.6	8392	8919
	Heating	Heating Capacity^e	H	3	BTU/Hr	9297	13204	17040	20889	23129
			M	2		8102	11798	14758	21112	23142
			L	1		6155	9781	12753	19634	19794
		Max. Electric Heater Capacity				3400	5100	6800	6800	6800
	Sound	Sound Pressure Level (Outlet)			dB(A)	38/36/34	39/37/35	42/40/38	43/41/39	45/43/41
		Sound Power Level (Outlet)^e				50/58/56	51/49/47	54/52/50	55/53/51	57/55/53
	Hydraulic	Cooling Water Flow Rate		3	GPM	1.206	1.709	2.176	2.714	3.389
				2		1.055	1.537	1.896	2.779	3.016
				1		0.811	1.278	1.644	2.463	2.592
		Cooling Pressure Drop^e		3	Ft.wg	2.753	5.348	3.159	5.348	8.192
				2		2.205	4.446	2.505	5.574	6.680
				1		1.406	3.250	1.968	4.536	5.145
		Heating Water Flow Rate @3/2/1			GPM	Same as "Cooling Water Flow Rate"				
		Heating Pressure Drop^e		3	Ft.wg	2.157	4.242	2.482	4.220	6.522
				2		1.713	3.498	1.954	4.400	5.303
				1		1.083	2.550	1.530	3.565	4.062
		Water Content			Gal	0.17	0.19	0.25	0.31	0.33
Construction and Packing Data		Water Connections	Type			Socket (Threaded Female)				
			In		in	3/4				
			Out							
		Condensate Drainage Connection								
		Dimensions	L		in	33.78	35.75	41.65	47.56	49.53
			W			9.84				
			H			19.45				
		Net Weight			lbs	49	53	57	66	71

a. Cooling mode (2-pipe/ 4-pipe):

- Return air temperature: 80.0F DB/ 67.0F 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 2-pipe cooling.

Product range: PFWB/PFWBC-ECM Universal Uncased/Cabinet Fan Coil with EC Motor

HARDI
PROUD MEMBER

PFWB(3R)-V~-ECM Universal Uncased Unit 3-row coil 2-pipe with EC Motor (Americas Version)/
PFWBC(3R)-V~-ECM Universal Cabinet Unit 3-row coil 2-pipe with EC Motor (Americas Version)

PFWB(C)(3R)-[Size]-V~-ECM					24	30	36	40
Unit Configuration		Configuration			2-pipe			
		Number Of Fan Blowers			Four			
		Operation Control			~S: Complete function onboard PCB with integrated group control functionality, incl. 1 pc return air sensor and 2 pcs temperature sensors. ~W: Limited function onboard PCB with drain-pump, louver and zone control functionality, incl. 1 pc coil temperature sensors.			
Performance Data	Air	Total Air Flow^e	H	3	CFM	882	1029	1265	1341
			M	2		765	941	1118	1235
			L	1		647	800	882	1106
	Cooling	Cooling Capacity^e	H	3	BTU/Hr	22601	26526	30582	33183
			M	2		20461	24978	28126	31450
			L	1		17992	22057	23493	28915
		Sensible Cooling Capacity^e	H	3		15555	18173	21317	22988
			M	2		14046	17088	19556	21755
			L	1		12310	15045	16250	19955
	Heating	Heating Capacity^e	H	3	BTU/Hr	34584	40273	47728	51294
			M	2		31201	37847	43753	48520
			L	1		27313	33285	36295	44472
		Max. Electric Heater Capacity				10200	10200	10200	10200
	Sound	Sound Pressure Level (Outlet)			dB(A)	47/45/43	48/46/44	50/48/46	52/50/48
		Sound Power Level (Outlet)^e				59/57/55	60/58/56	63/61/59	65/63/61
	Hydraulic	Cooling Water Flow Rate		3	GPM	4.502	5.285	6.089	6.606
				2		4.071	4.976	5.600	6.261
				1		3.583	4.394	4.681	5.758
		Cooling Pressure Drop^e		3	Ft.wg	7.718	11.216	5.168	6.431
				2		6.499	10.110	4.468	5.867
				1		5.213	8.146	3.272	5.077
		Heating Water Flow Rate @3/2/1			GPM	Same as "Cooling Water Flow Rate"			
		Heating Pressure Drop^e		3	Ft.wg	6.161	8.981	4.107	5.145
				2		5.168	8.079	3.543	4.671
				1		4.130	6.477	2.573	4.017
		Water Content			gal	0.46	0.52	0.58	0.64
Construction and Packing Data		Water Connections	Type			Socket (Threaded Female)			
			In		in	3/4			
			Out						
		Condensate Drainage Connection							
		Dimensions	L		in	63.31	69.21	75.12	81.02
			W			9.84			
			H			19.45			
		Net Weight			lbs	95	104	108	119

a. Cooling mode (2-pipe/ 4-pipe):

- **Return air temperature: 80.0F DB/ 67.0F 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 2-pipe cooling.**

Product range: PFWB/PFWBC-ECM Universal Uncased/Cabinet Fan Coil with EC Motor

HARDI
PROUD MEMBER

PFWB(4R)-V~-ECM Universal Uncased Unit 4-row coil 2-pipe with EC Motor (Americas Version)/
PFWBC(4R)-V~-ECM Universal Cabinet Unit 4-row coil 2-pipe with EC Motor (Americas Version)

Non-standard configuration

PFWB(C)(4R)-[Size]-V~-ECM						06	09	12	15	18
Unit Configuration		Configuration				2-pipe				
		Number Of Fan Blowers				Single	Twin			
		Operation Control				~S: Complete function onboard PCB with integrated group control functionality, incl. 1 pc return air sensor and 2 pcs temperature sensors. ~W: Limited function onboard PCB with drain-pump, louver and zone control functionality, incl. 1 pc coil temperature sensors.				
Performance Data	Air	Total Air Flow	H	3	CFM	209	316	412	497	649
			M	2		175	271	339	409	548
			L	1		124	215	282	353	452
	Cooling	Cooling Capacity	H	3	BTU/Hr	6820	9766	12668	15735	19768
			M	2		5968	8739	10963	13629	17517
			L	1		4545	7242	9472	12090	14985
		Sensible Cooling Capacity	H	3		4660	6690	8701	10697	13468
			M	2		4060	5966	7495	9230	11895
			L	1		3066	4916	6447	8160	10132
	Heating	Heating Capacity	H	3	BTU/Hr	10412	14937	19465	23755	29906
			M	2		9056	13303	16739	20463	26377
			L	1		6813	10936	14370	18066	22428
		Max. Electric Heater Capacity				1	1.5	2	2	2
	Sound	Sound Pressure Level (Outlet)			dB(A)	38/36/34	39/37/35	42/40/38	43/41/39	45/43/41
		Sound Power Level (Outlet)				50/58/56	51/49/47	54/52/50	55/53/51	57/55/53
	Hydraulic	Cooling Water Flow Rate		3	GPM	1.357	1.946	2.520	3.131	3.935
				2		1.192	1.738	2.183	2.714	3.490
				1		0.905	1.443	1.888	2.405	2.987
		Cooling Pressure Drop		3	Ft.wg	1.516	2.979	2.505	4.175	6.454
				2		1.210	2.460	1.957	3.272	5.235
				1		0.485	1.785	1.525	2.663	4.017
		Heating Water Flow Rate @3/2/1			GPM	Same as "Cooling Water Flow Rate"				
		Heating Pressure Drop		3	Ft.wg	1.171	2.324	1.959	3.295	5.123
				2		0.930	1.916	1.521	2.550	4.152
				1		0.582	1.381	1.180	2.076	3.159
		Water Content			gal	0.23	0.26	0.3	0.42	0.44
Construction and Packing Data		Water Connections	Type			Socket (Threaded Female)				
			In		in	3/4				
			Out							
		Condensate Drainage Connection								
		Dimensions	L		in	33.78	35.75	41.65	47.56	49.53
			W			9.84				
			H			19.45				
		Net Weight			lbs	49	53	57	66	71

a. Cooling mode (2-pipe):

- Return air temperature: 80.0F DB/ 67.0F 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 2-pipe cooling.

Product range: PFWB/PFWBC-ECM Universal Uncased/Cabinet Fan Coil with EC Motor

PFWB(4R)-V~-ECM Universal Uncased Unit 4-row coil 2-pipe with EC Motor (Americas Version)/
PFWBC(4R)-V~-ECM Universal Cabinet Unit 4-row coil 2-pipe with EC Motor (Americas Version)

HARDI
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Non-standard configuration

PFWB(C)(4R)-[Size]-V~-ECM					24	30	36	40
Unit Configuration		Configuration			2-pipe			
		Number Of Fan Blowers			Four			
		Operation Control			~S: Complete function onboard PCB with integrated group control functionality, incl. 1 pc return air sensor and 2 pcs temperature sensors. ~W: Limited function onboard PCB with drain-pump, louver and zone control functionality, incl. 1 pc coil temperature sensors.			
Performance Data	Air	Total Air Flow	H	3	1440	1680	2064	2189
			M	2	1248	1536	1824	2016
			L	1	1056	1306	1440	1
	Cooling	Cooling Capacity	H	3	25848	30357	36950	39911
			M	2	23329	28503	33826	37697
			L	1	20419	25085	28052	34559
		Sensible Cooling Capacity	H	3	17676	20553	25093	26985
			M	2	15905	19368	22919	25453
			L	1	13867	16986	18915	23284
	Heating	Heating Capacity	H	3	39373	45856	55546	59545
			M	2	35387	42952	50685	56130
			L	1	30805	37615	41745	51300
		Max. Electric Heater Capacity			10200	10200	10200	10200
	Sound	Sound Pressure Level (Outlet)		dB(A)	47/45/43	48/46/44	50/48/46	52/50/48
		Sound Power Level (Outlet)			59/57/55	60/58/56	63/61/59	65/63/61
	Hydraulic	Cooling Water Flow Rate		3	5.148	6.046	7.324	7.970
				2	4.645	5.679	6.735	7.539
			GPM	1	4.064	4.997	5.586	6.878
		Cooling Pressure Drop		3	4.310	6.251	9.568	11.847
				2	3.611	5.596	8.214	10.742
			Ft.wg	1	2.866	4.491	5.958	9.230
		Heating Water Flow Rate @3/2/1		GPM	Same as "Cooling Water Flow Rate"			
		Heating Pressure Drop		3	3.408	4.965	7.650	9.500
				2	2.843	4.446	6.544	8.598
			Ft.wg	1	2.252	3.543	4.716	7.357
		Water Content		gal	0.61	0.69	0.77	0.85
Construction and Packing Data		Water Connections	Type		Socket (Threaded Female)			
			In		19.05 [3/4]			
			Out	in				
		Condensate Drainage Connection						
		Dimensions	L		63.31	69.21	75.12	81.02
			W	in	9.84			
			H		19.45			
		Net Weight		lbs	95	104	108	119

a. Cooling mode (2-pipe):

- Return air temperature: 80.0F DB/ 67.0F 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 2-pipe cooling.

A.3.2.   4-Pipe Systems

Product range: PFWB/PFWBC-ECM Universal Uncased/Cabinet Fan Coil with EC Motor

PFWB(3+1R)-P~-ECM Universal Uncased Unit with EC Motor - Auxiliary Heating Coil (1 row) (Americas Version)/
PFWBC(3+1R)-P~-ECM Universal Cabinet Unit with EC Motor - Auxiliary Heating Coil (1 row) (Americas Version)

Non-standard configuration

		PFWB(C)(3+1R)-[Size]-P~-ECM				06	09	12	15	18
Performance Data	Heating	Heating Capacity	H	3	BTU/Hr	5774	8007	10616	13085	16085
			M	2		5108	7236	9324	11458	14408
			L	1		4015	6163	8189	10340	12532
	Hydraulic	Heating Water Flow Rate @3/2/1		3	GPM	0.287	0.398	0.528	0.652	0.804
				2		0.254	0.360	0.465	0.571	0.717
				1		0.200	0.305	0.408	0.513	0.624
		Heating Pressure Drop		3	Ft.wg	0.363	0.682	0.132	0.220	3.317
				2		0.293	0.573	1.054	1.747	2.731
				1		0.195	0.429	0.839	1.451	2.135
		Water Content	Hot Water		gal	0.06	0.07	0.08	0.1	0.11

		PFWB(C)(3+1R)-[Size]-P~-ECM				24	30	36	40
Performance Data	Heating	Heating Capacity	H	3	BTU/Hr	20816	24264	29151	31459
			M	2		18968	222926	26924	29887
			L	1		16855	20451	22776	27642
	Hydraulic	Heating Water Flow Rate @3/2/1		3	GPM	1.034	1.206	1.450	1.565
				2		0.948	1.142	1.343	1.486
				1		0.840	1.020	1.134	1.379
		Heating Pressure Drop		3	Ft.wg	0.984	1.417	2.135	2.640
				2		0.837	1.282	1.857	2.415
				1		0.682	1.052	1.386	2.108
		Water Content	Hot Water		gal	0.15	0.17	0.19	0.21

a. Heating mode (4-pipe):

- Return air temperature: 70F.

- Inlet/ outlet water temperature: 180F / 140F.

SK2013 SON-002-TechMnl PFWB(C)-V/P-EC-001(Americas)

A.4.Coil Data

A.4.1. 2-Pipe Systems

COIL DATA (2 PIPE SYSTEM 3 ROW)

Model	Fin height (inch)	Fin Length (inch)	Fins per Inch	No. of Rows	Fin width (inch)	No. of Circuits	Tube Ø (inch)
PFWB(C)-06		17.36				2	
PFWB(C)-09		19.33				2	
PFWB(C)-12		25.24				3	
PFWB(C)-15		31.14				3	
PFWB(C)-18	7.87	33.11	12.7	3	2.6	3	0.37
PFWB(C)-24		45.71				6	
PFWB(C)-30		51.61				6	
PFWB(C)-36		57.56				6	
PFWB(C)-40		63.43				6	

COIL DATA (2 PIPE SYSTEM 4 ROW)

Model	Fin height (inch)	Fin Length (inch)	Fins per Inch	No. of Rows	Fin width (inch)	No. of Circuits	Tube Ø (inch)
PFWB(C)-06		17.36				3	
PFWB(C)-09		19.33				3	
PFWB(C)-12		25.24				4	
PFWB(C)-15		31.14				4	
PFWB(C)-18	7.87	33.11	12.7	4	3.46	4	0.37
PFWB(C)-24		45.71				6	
PFWB(C)-30		51.61				6	
PFWB(C)-36		57.56				6	
PFWB(C)-40		63.43				6	

A.4.2. 4-Pipe Systems

HEATING COIL DATA (4 PIPE SYSTEM WITH 1 ROW REMOVABLE HEATING COIL)

Model	Fin height (inch)	Fin Length (inch)	Fins per Inch	No. of Rows	Fin width (inch)	No. of Circuits	Tube Ø (inch)
PFWB(C)-06		17.36					
PFWB(C)-09		19.33					
PFWB(C)-12		25.24				1	
PFWB(C)-15		31.14					
PFWB(C)-18	7.87	33.11	12.7	1	0.87		0.37
PFWB(C)-24		45.71					
PFWB(C)-30		51.61				2	
PFWB(C)-36		57.56					
PFWB(C)-40		63.43					

A.5. Dimensional Drawings

Dimensional Drawings: PFWB series
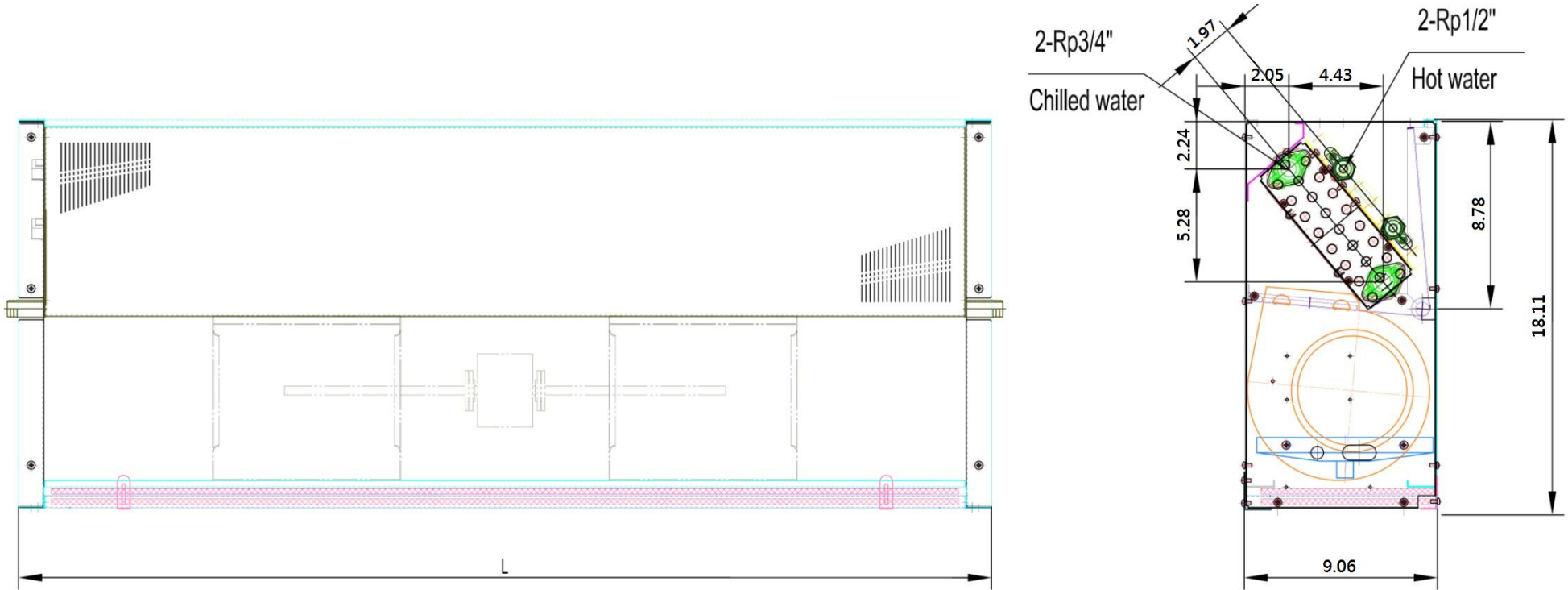
Model	06	09	12	15	18	24	30	36	40
L	23.54	25.91	31.81	37.72	39.69	53.46	59.37	65.28	71.18

(All dimensions shown in inch)

Dimensional Drawings: PFWBC series
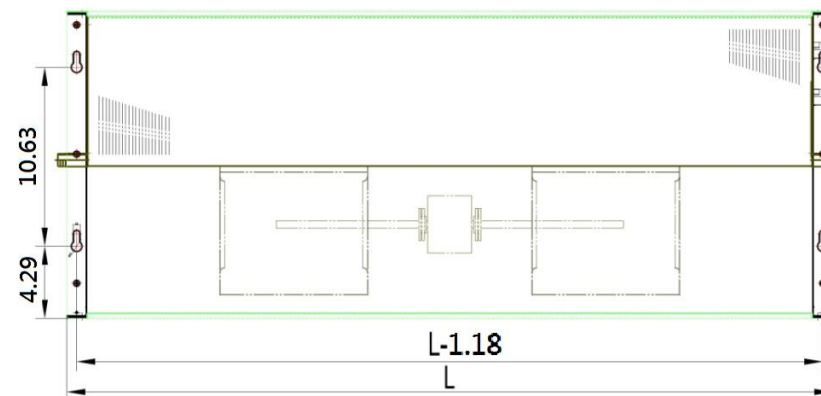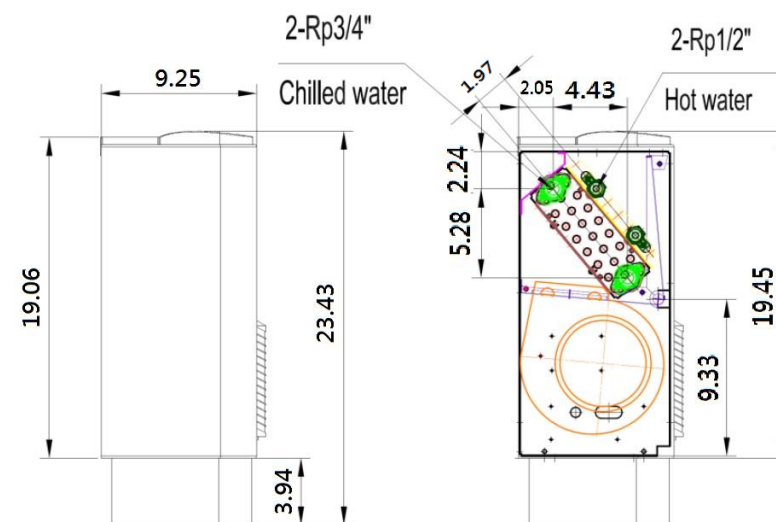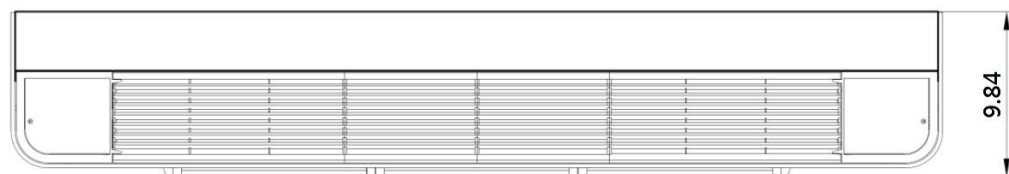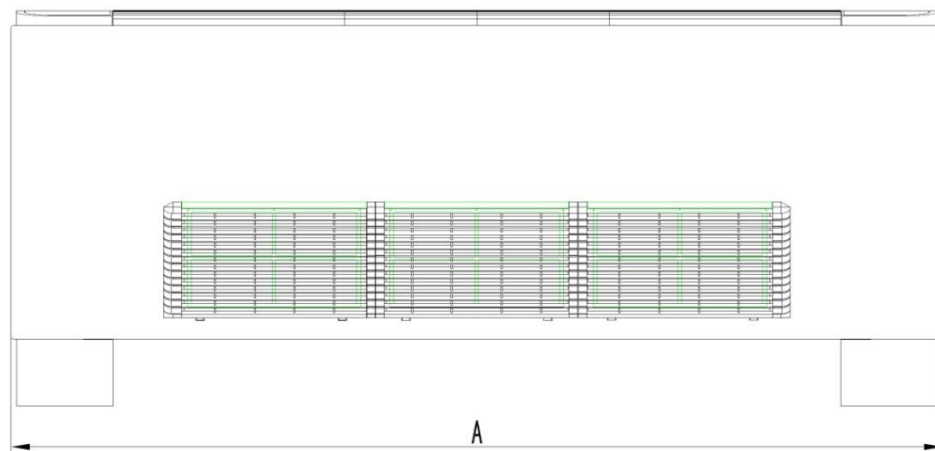
Model	06	09	12	15	18	24	30	36	40
L	23.54	25.91	31.81	37.72	39.69	53.46	59.37	65.28	71.18
A	33.78	35.75	41.65	47.56	49.53	63.31	69.21	75.12	81.02

(All dimensions shown in inch)

A.6. Valve Information

A.6.1. 2-Way 3/4" Valve Body
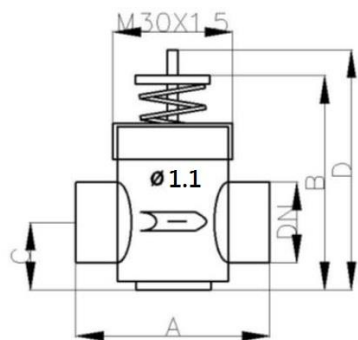
Valve Dimensions (inch)				
DN	A	B	C	D
D20 (G3/4")	2.2	1.85	0.87	2.48

A.6.2. 3-Way 3/4" Valve Body
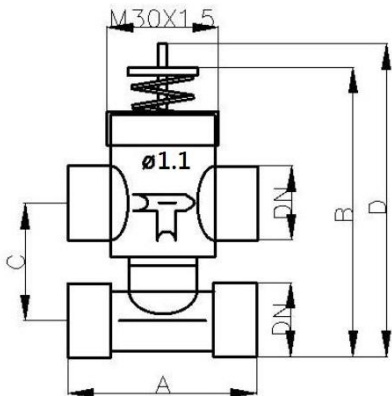
Valve Dimensions (inch)				
DN	A	B	C	D
D20 (G3/4")	2.2	3.46	1.97	4.09

Differential Pressure Chart

DN 3/4" KV 2.5
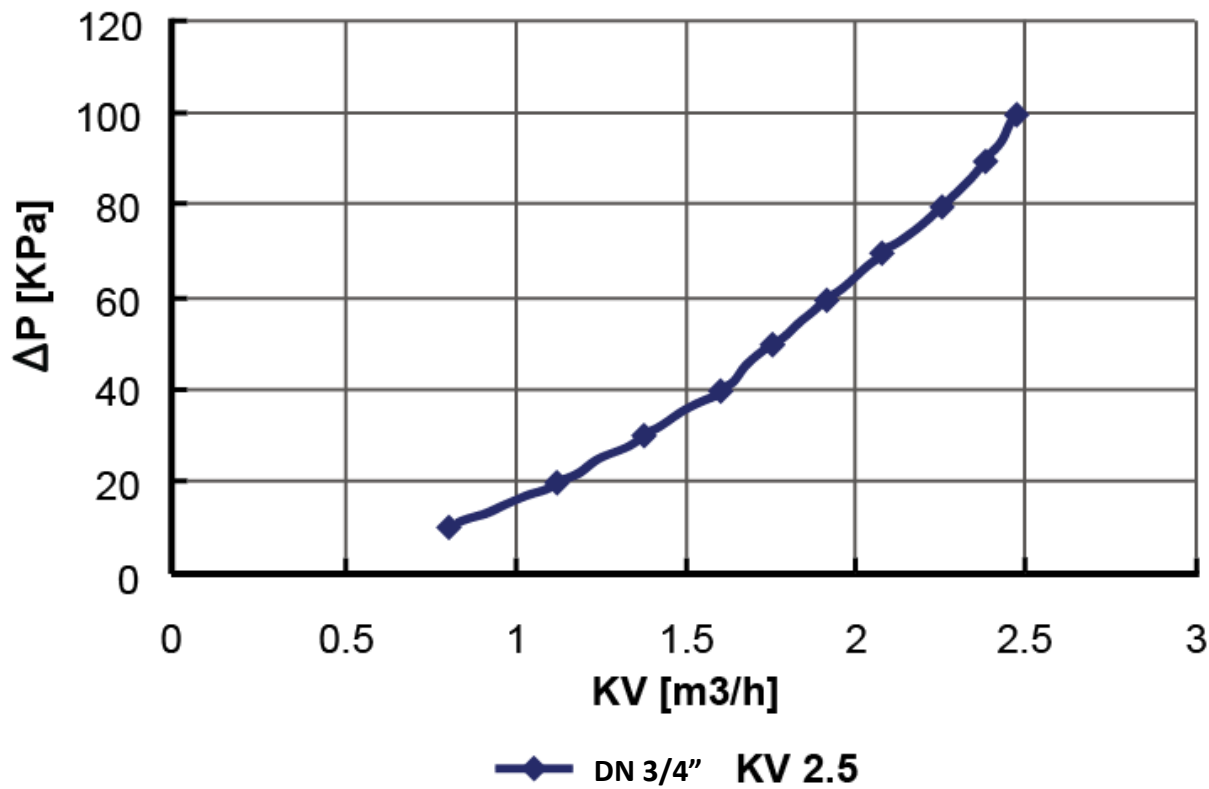
A.6.3.   2-Way 1/2" Valve Body
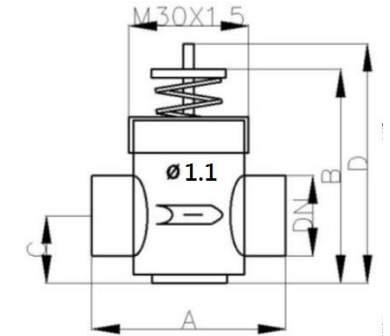
Valve Dimensions (inch)				
DN	A	B	C	D
D15 (G1/2")	2.05	1.85	0.77	2.48

A.6.4.   3-Way 1/2" Valve Body
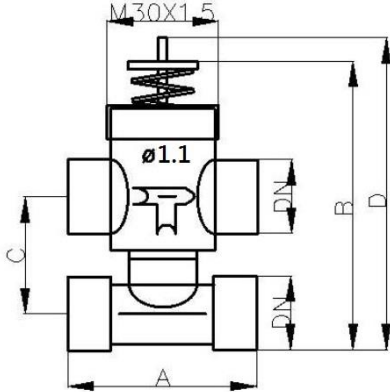
Valve Dimensions (inch)				
DN	A	B	C	D
D15 (G1/2")	2.05	2.76	1.57	3.39

Differential Pressure Chart
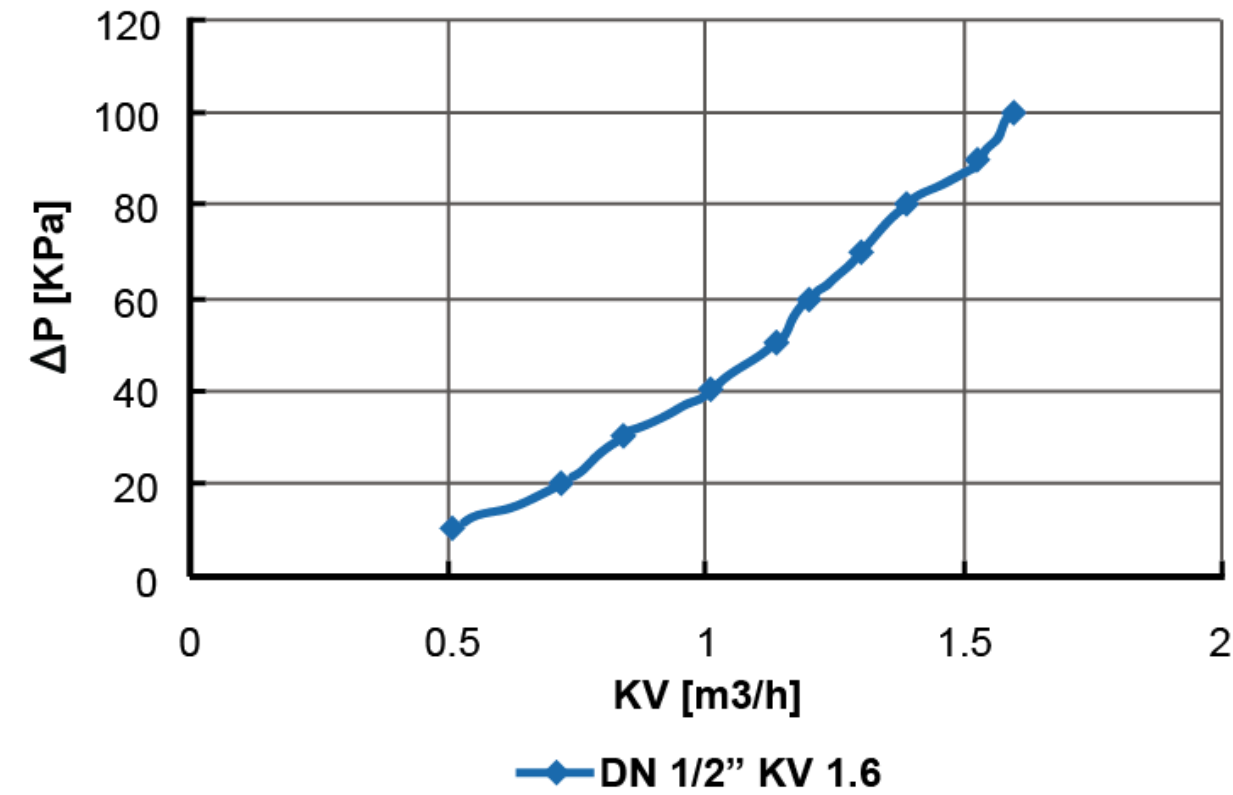
B. Safety Precautions

- When installing or performing maintenance or servicing the air conditioning equipment, observe the precautions stated in this manual, in addition to those stated in the labels attached around 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 mains supply, with respect to the rating label on the unit, is used.

- Power supply shall be incorporated in the fixed wiring and have an air gap in contact separation of at least 0.12 inch in each active phase of conductors.

- If the supply cord is damaged, it must be replaced by qualified persons.

- Installing and servicing air conditioning equipment should be done by qualified service personnel only.

- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning.

- Children should be supervised to ensure they do not play with the appliance.

- 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.

- Never cut off the mains supply when unit is under operation. The unit should be switched off by using only the ON-OFF button on the control interface.

WARNING

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

B.1.   Installation

INSTALLATION OF FAN COIL DUCTED UNIT

B.1.1.   Installation Procedure

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 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 for floor free standing or wall mounted or ceiling suspension. Installation should allow the treated air to circulate freely throughout the room and leave sufficient space for access, in order to carry out maintenance or servicing operations.
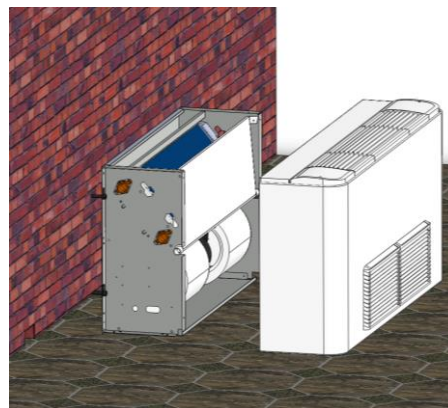
FOR FLOOR FREE STANDING

1. Remove the left and right cover by loosening the screws.
2. Install the unit on the floor.
3. Make hydraulic connection and leakage checking.
4. Make electrical connection as shown in the wiring diagrams.
5. Remount the cover.

FOR WALL-MOUNTED

1. Remove the left or right cover by loosening the screws.
2. Keep a minimum clearance of 3.15 inch from the floor.
3. Secure the mounting brackets to the wall, then suspend the unit to mounting brackets, as shown in figure.
4. Make hydraulic connection and leakage checking
5. Make electrical connection as shown in the wiring diagrams.
6. Remount the cover.

FOR CEILING-MOUNTED

1. Remove the left or right cover by loosening the screws.

2. Secure the mounting brackets to the ceiling, then suspend the unit to mounting brackets. To correctly position flanges and brackets, see the dimensional data.

3. Make hydraulic connection and leakage checking.
4. Make electrical connection as shown in the wiring diagrams.
5. Remount the cover.
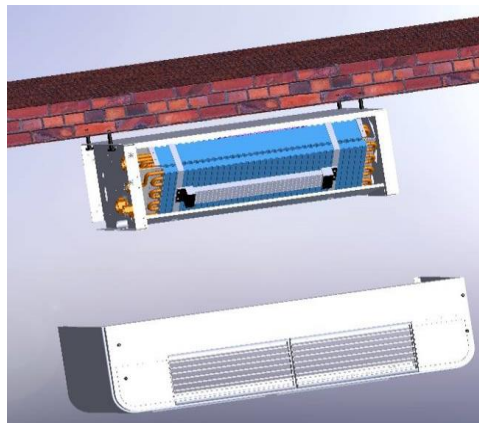
If it is necessary to remove the front panel, please refer to below procedure

Note: Open the top cover1 and 2 as shown above. Loosen eight 8 screws inside. The cabinet can be easily removed.
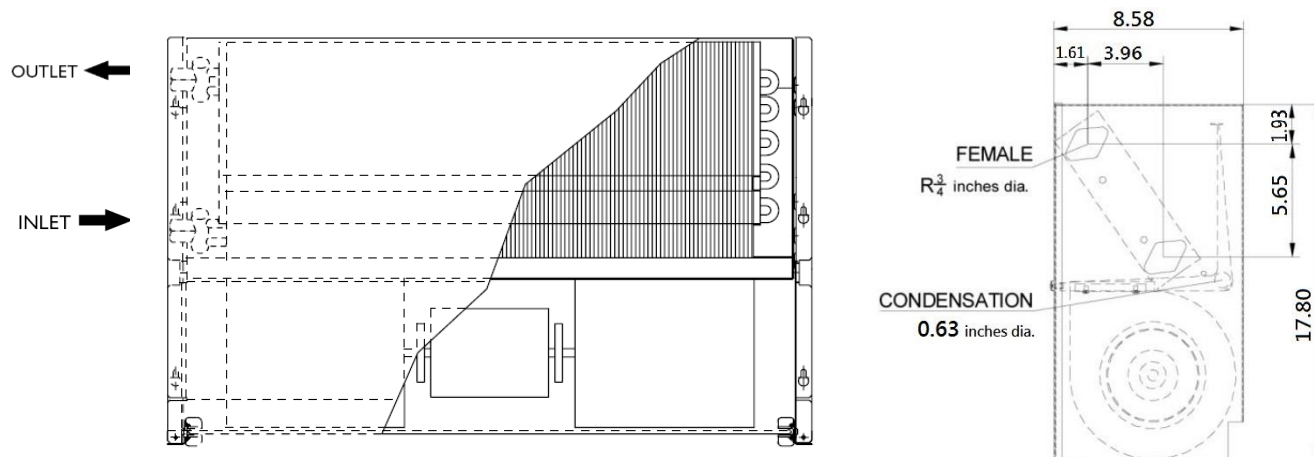

8 Screws

Top cover 2

Top cover 1
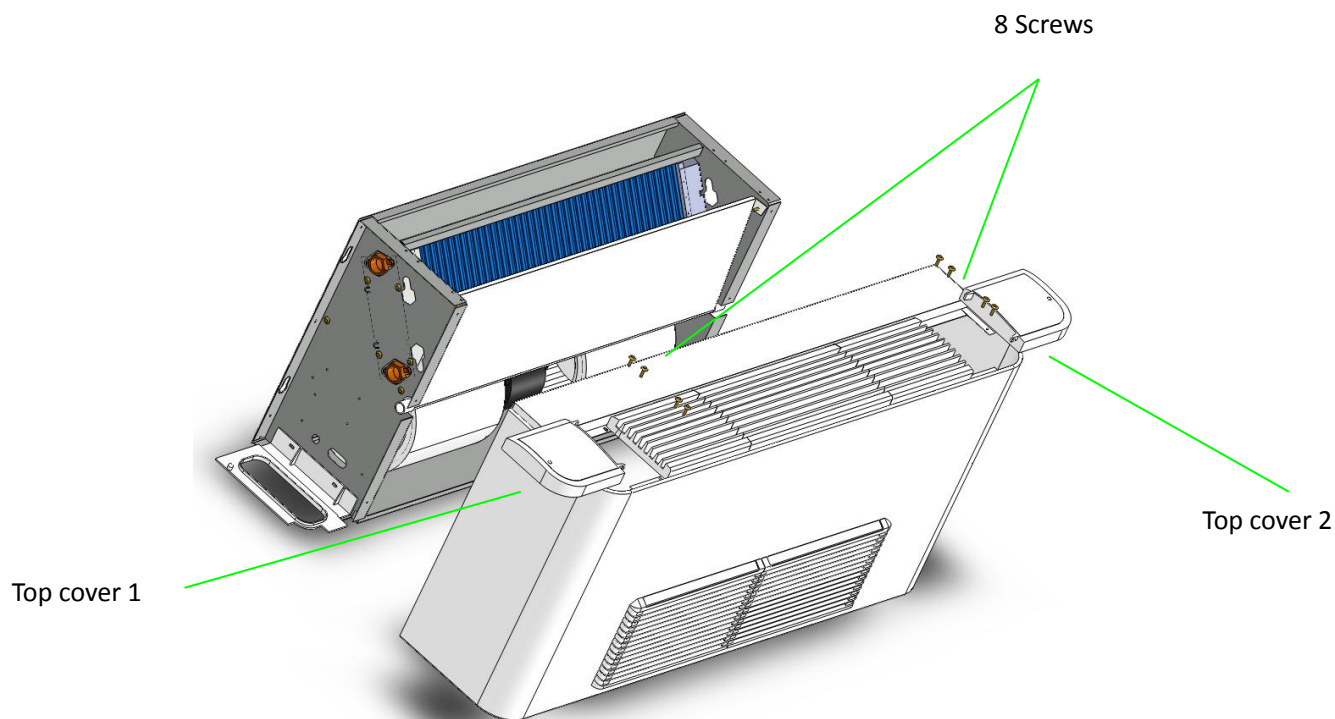
B.1.2. Piping Connections

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 water connections diagram

1. Fan	2. Heat exchanger	3. Manual bleeds	4. Joint	5 Ball on/off valve
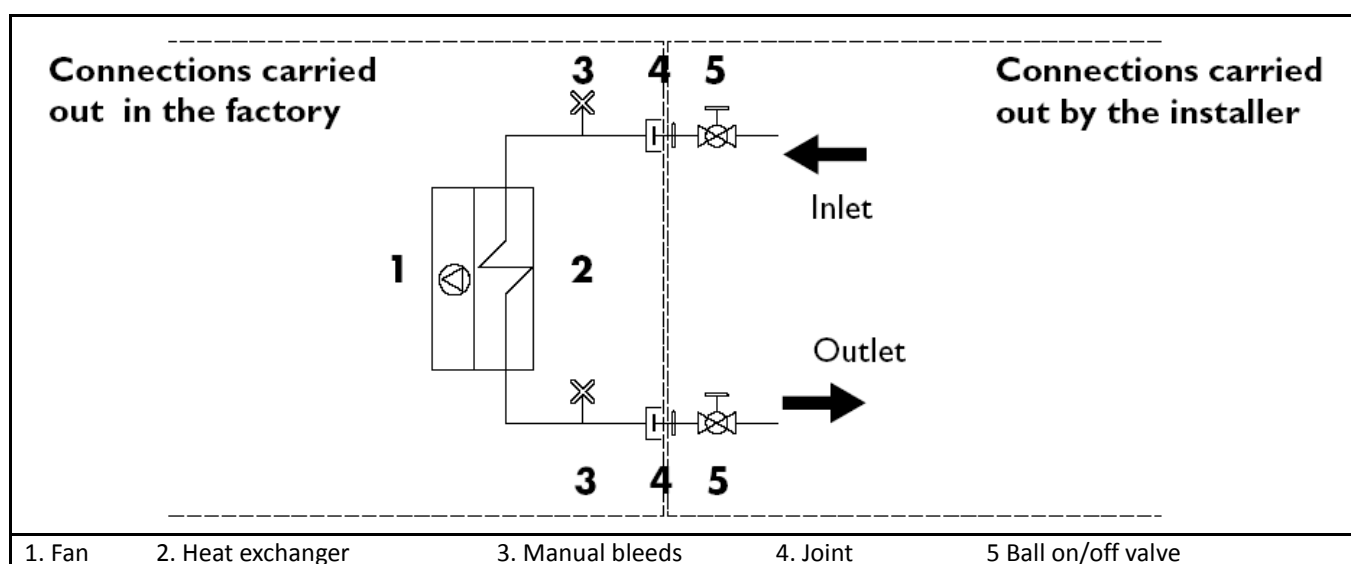
Fix the connections by tightening
the fan coil fitting with the wrench
against wrench system.
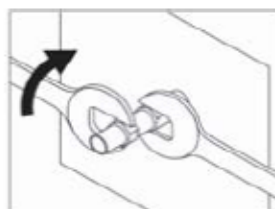
CONDESATE DRAINAGE

For use in air-conditioning systems, the fan coils are fitted with a condensate-collecting tray to which a drainpipe is connected. This pipe should lead to a suitable drain. Connect an insulated drainage pipe (inside ⌀ 0.63 inch.) to the through fitting 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.

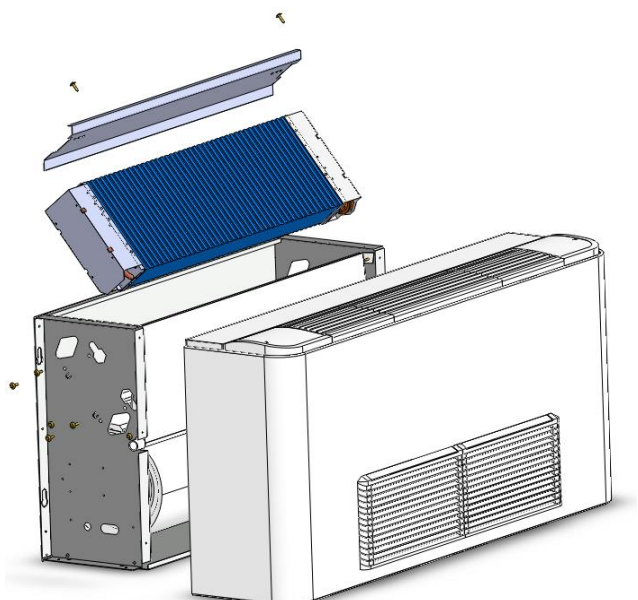B.1.3.   How to interchange Left / Right hand connection:

Step 1: Remove the front panel.

Step 2: Remove 2 screws on the coil's metal plate.

Step 3: Remove 8 screws on the both side, then take out coil

Step 2

Step 3
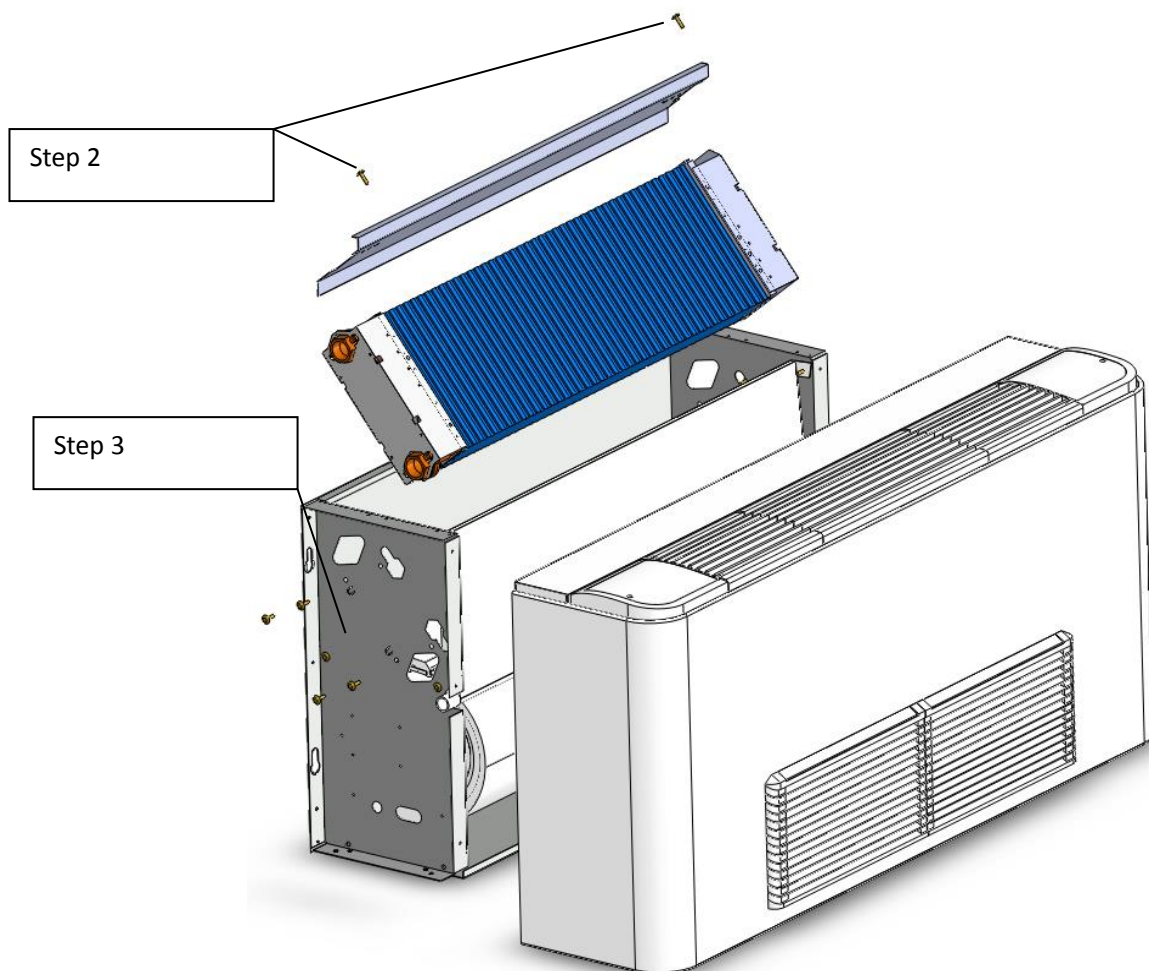
Step 4: Change the coil direction and put the assembly back into the casing.

B.1.4.   Electrical Connection

The fan coil comes fully wired and only requires:
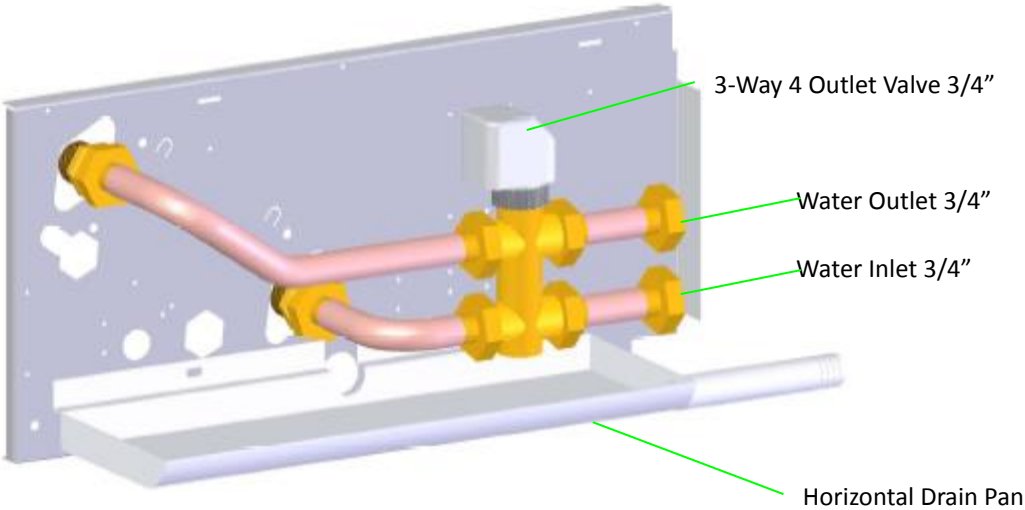Connecting to the mains electricity supply and to any room control.

It is also recommended to check that:
1) The characteristics of the mains electricity supply are suitable for the input indicated in the table below, which (with maximum values) should serve for sizing both the circuit breakers and the power cables (any other appliances working in parallel should also be taken into consideration).
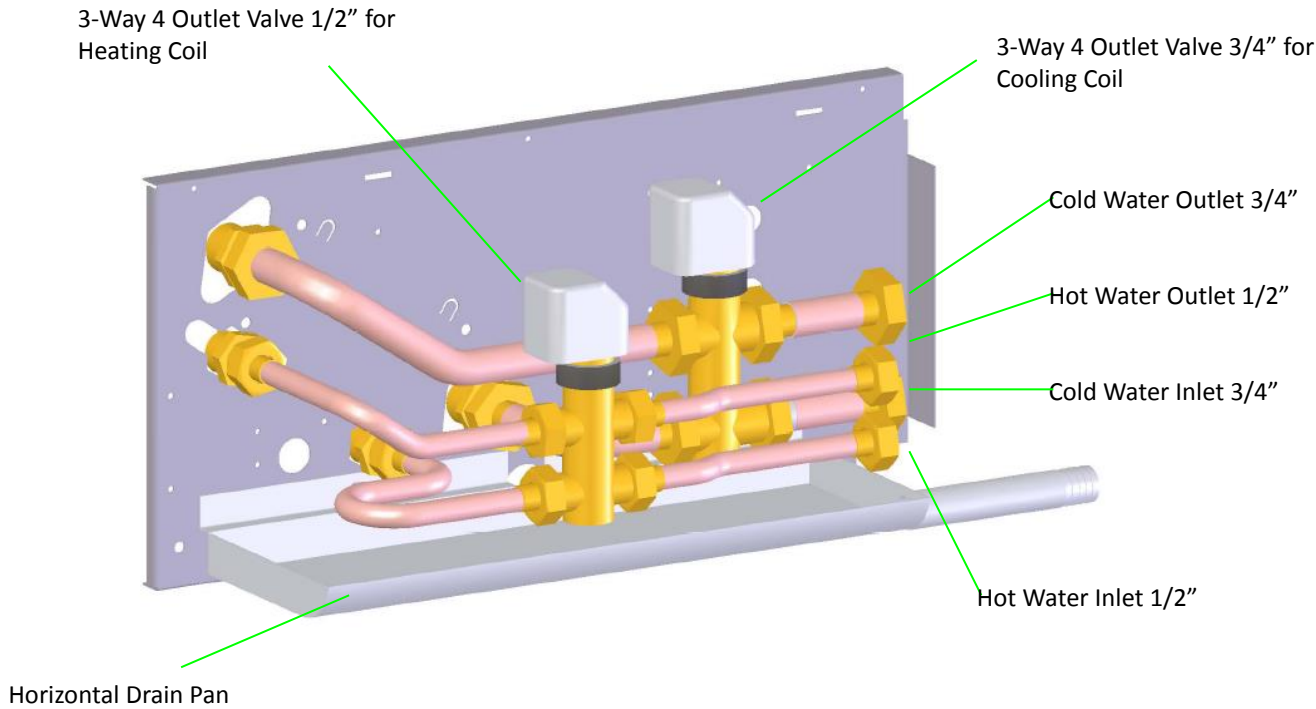2) The supply voltage corresponds to the rated value +/- 10%.

B.1.5.   Valve and Externak drain pan Installation

Horizontal type

Piping for 2-Pipe System

3-Way 4 Outlet Valve 3/4"

Water Outlet 3/4"

Water Inlet 3/4"

Horizontal Drain Pan

Piping for 4-Pipe System

3-Way 4 Outlet Valve 1/2" for
Heating Coil

3-Way 4 Outlet Valve 3/4" for
Cooling Coil

Cold Water Outlet 3/4"

Hot Water Outlet 1/2"

Cold Water Inlet 3/4"

Hot Water Inlet 1/2"

Horizontal Drain Pan

Vertical type

Piping for 2-Pipe System

3-Way 4 Outlet Valve 3/4"

Vertical Drain Pan

Water Outlet 3/4"

Water Inlet 3/4"

Piping for 4-Pipe System

3-Way 4 Outlet Valve 1/2" for
Heating Coil

3-Way 4 Outlet Valve 3/4" for
Cooling Coil

Vertical Drain Pan

Hot Water Outlet 1/2"   Hot Water Inlet 1/2"

Cold Water Outlet 3/4"

Cold Water Inlet 3/4"
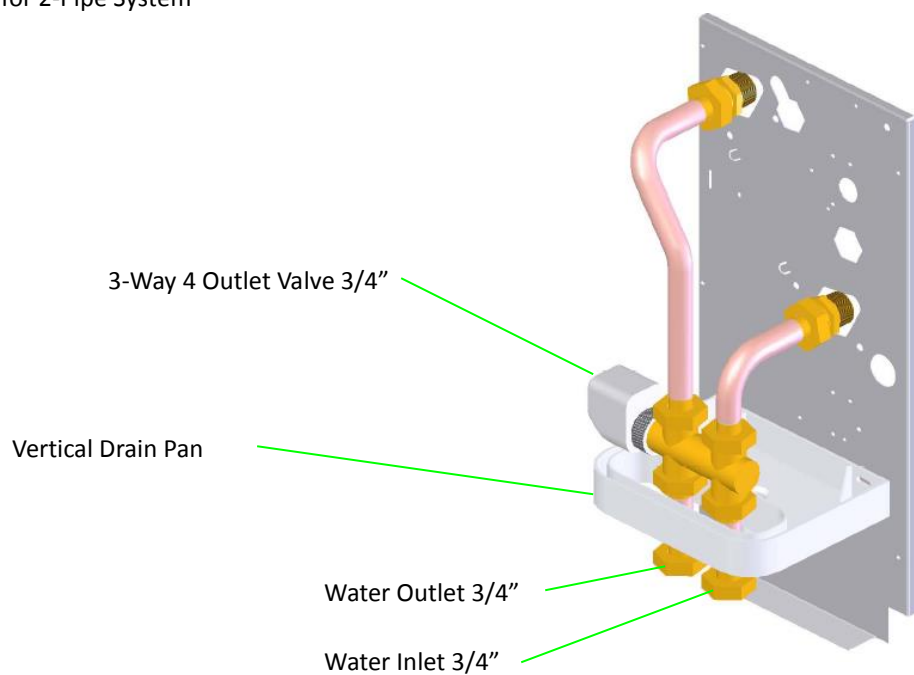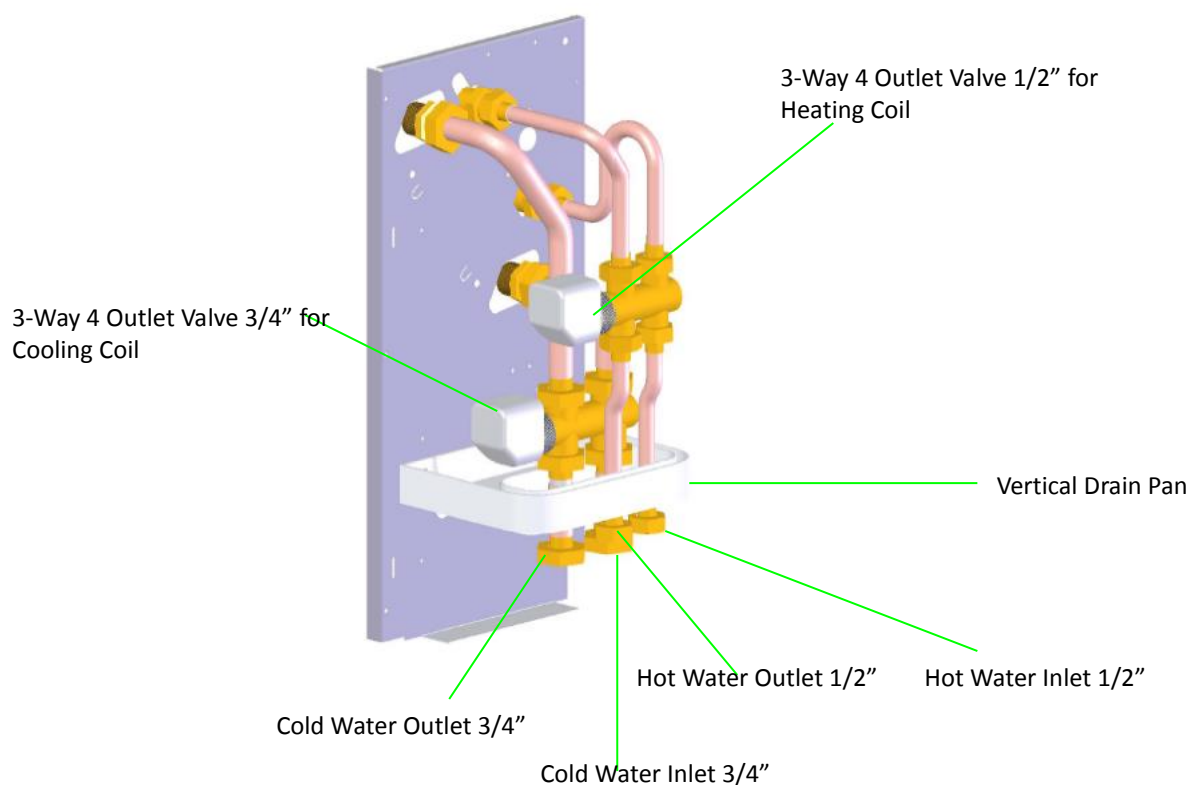
IMPORTANT
Gravity drainage may be converted into forced drainage by fitting the condensate drain pump available as an accessory.

B.2. Maintenance

### B.2.1. General Maintenance

1. Installation and maintenance should be performed by qualified persons who are familiar with local codes and regulations, and experienced with this type of appliance.
2. Confirm that the unit has been switched OFF before installing or servicing the unit.
3. A good general maintenance plan will avoid losses and unexpected shutting down of the equipment.
4. Dirty filters reduce air flow as well as unit performance. Thus changing or cleaning the filters is very important. Check the cleanliness of filter and replace or clean as required monthly.
5. Coils should be cleaned from dust, dirt or lint with compressed air or water. They can be brushed with a soft brush or vacuum cleaner.
6. Water coil not used during winter season should be drained, or anti-freezing solution should be added to the water circuit to avoid freezing.

B.2.2. Monthly Maintenance

1. Inspect and clean condensate drain pan to avoiding 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 low pressure water jet or low pressure air.
3. Clean and tighten all the wiring connections.
4. Drain out the system water and check for build up of mineral deposits.

B.2.3. Filter Installation & Cleaning

1. Insert the top edge of the filter into the top of the casing as shown below.
2. Push up the bottom of the filter and fit it into the casing.
3. Reverse the procedure to remove the filter
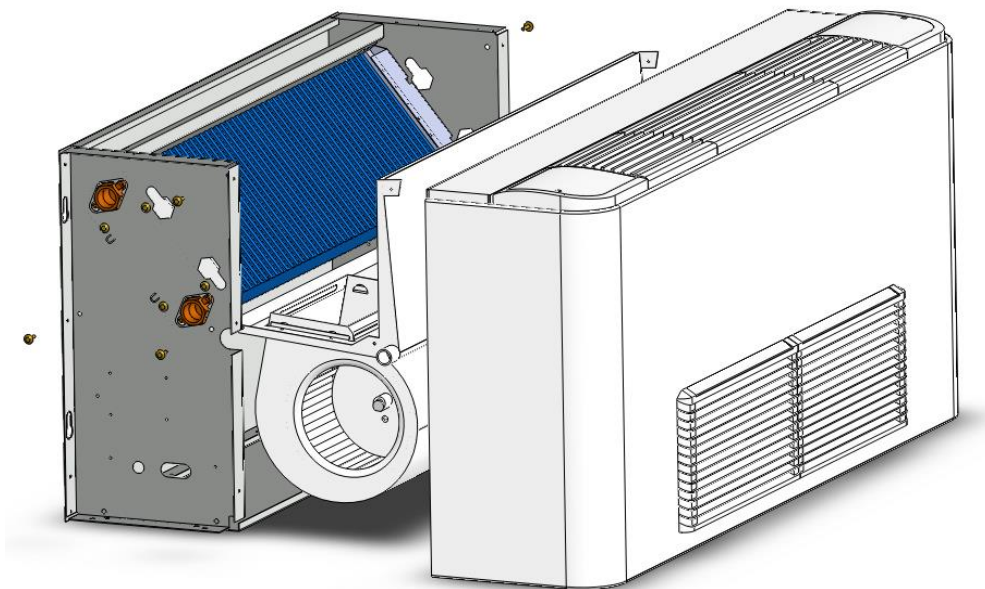4. Clean the filter with a brush, or with warm water.
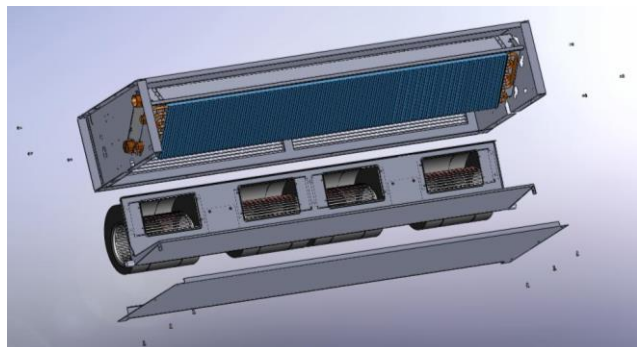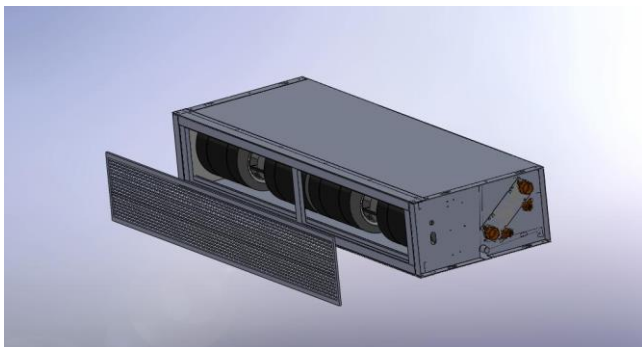
B.2.4.   Fan-Motor Assembly Maintenance

Step 1: Remove the front panel.

Step 2: Loosen 6 screws on the both side, then remove fan deck.

Step 3: Put the fan motor assembly into the cabinet.

C. Control Specifications: SKUSA-NCPDW-001-AECM

Used in all PFWB(C) [V/P] **S** unit configurations.

Complete function integrated controller, compatible with IR handset controller, wired wall-pad, serial networking for master-slave and MODBUS applications.

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
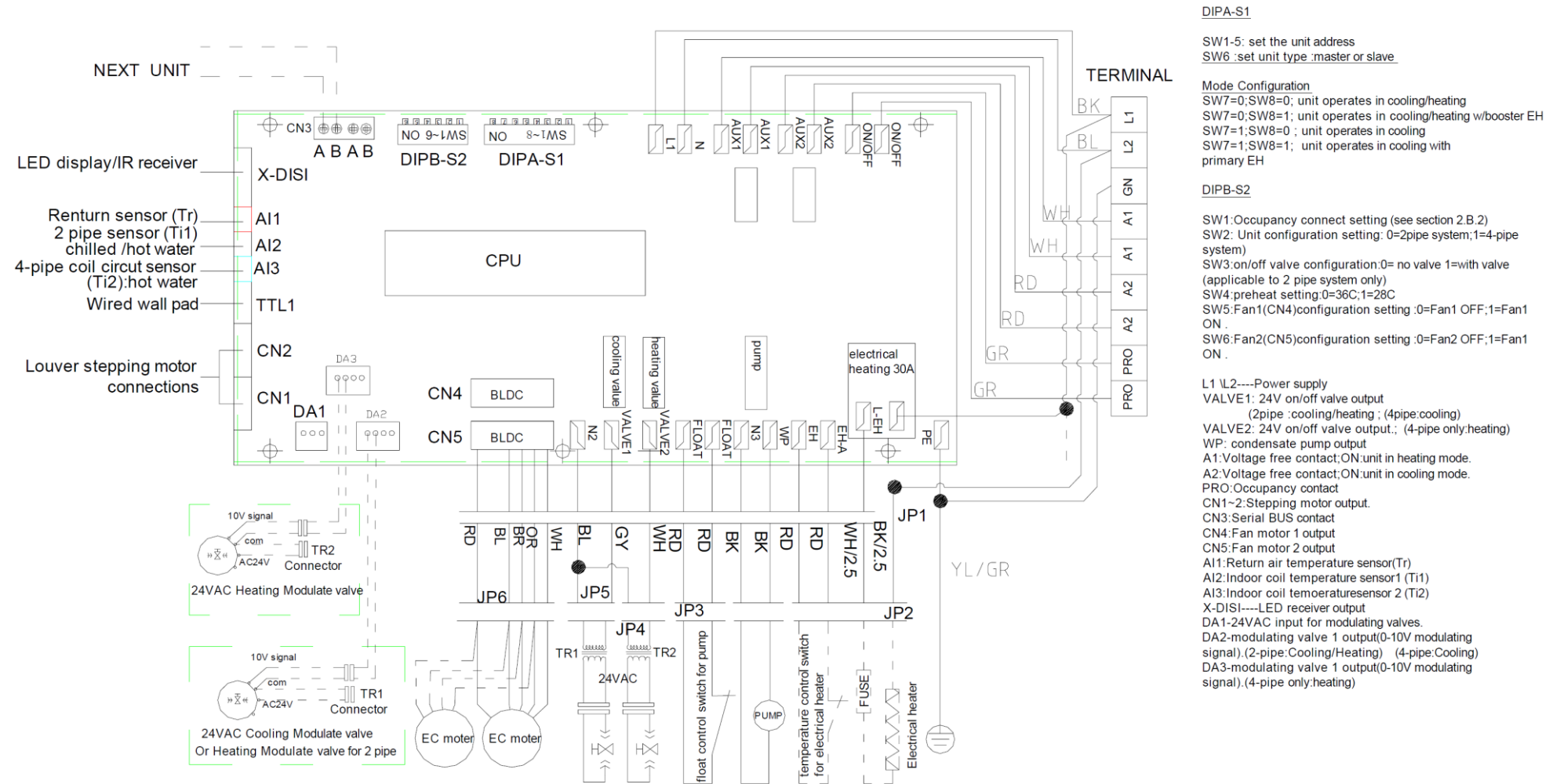MTV2 = Hot water valve

C.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 1	Digital communication port to LED display / IR receiver board.	
	Wired wall pad	TTL1	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: 16.4ft.	
	Neutral	N1	Power supply to the PCB and all the loads connected to the voltage outputs. Max length: 16.4ft.	
	Earth	PE1	Power supply to the PCB and all the loads connected to the voltage outputs. Max length: 16.4ft.	
Voltage output	Fan 1	CN4	Fan 1 driver	
	Fan2	CN5	Fan 2 driver and motor connection port.	
	Valve1	MTV1	2-pipe coil circuit valve output – chilled / hot water valve. Voltage output (L)	2-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	WP	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	CN1-2	Power supply to louver stepping motors Voltage output (L)	

I/O		Code	2-Pipe	4-Pipe
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 < 98.43ft.	
	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 < 98.43ft.	
	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 DC modulating valve on 2-pipe coil circuit - chilled / hot water.	Connection to DC modulating valve on 2-pipe coil circuit - hot water.
	Modulating valve output 1	DA3	N/A	Connection to DC modulating valve on 4-pipe coil circuit - hot water.

D.2. Wiring Diagram

SKUSA-NCPDW-001-AECM, ~S Configuration: Full Control PCB:

Unit wiring scheme

UW2

NEXT UNIT

LED display/IR receiver — X-DISI

CN3   A B A B   DIPB-S2   DIPA-S1

SW1~6 NO   SW1~8 NO

Renturn sensor (Tr) — AI1
2 pipe sensor (Ti1) chilled /hot water — AI2
4-pipe coil circut sensor (Ti2):hot water — AI3
Wired wall pad — TTL1

CPU

CN2
Louver stepping motor connections — CN1

DA3
DA1   DA2

CN4 BLDC
CN5 BLDC

cooling value — VALVE1
heating value — VALVE2
pump
electrical heating 30A

TERMINAL

BK — L1
BL — L2
— GN
WH — A1
WH — A1
RD — A2
RD — A2
GR — PRO
GR — PRO

L1   N   AUX1   AUX1   AUX2   AUX2   ON/OFF   ON/OFF

N2   VALVE1   VALVE2   FLOAT   FLOAT   N3   WP   EH   EH-A   L-EH   PE

JP1

10V signal
com
AC24V TR2 Connector
24VAC Heating Modulate valve

10V signal
com
AC24V TR1 Connector
24VAC Cooling Modulate valve
Or Heating Modulate valve for 2 pipe

RD BL OR/BR WH BL GY RD/WH RD BK BK RD RD WH/2.5 BK/2.5

YL/GR

JP6   JP5   JP4   JP3   JP2

TR1   TR2
24VAC

EC moter   EC moter

float control switch for pump

PUMP

Temperature control switch for electrical heater

FUSE

Electrical heater

DIPA-S1

SW1-5: set the unit address
SW6 :set unit type :master or slave

Mode Configuration
SW7=0;SW8=0; unit operates in cooling/heating
SW7=0;SW8=1; unit operates in cooling/heating w/booster EH
SW7=1;SW8=0 ; unit operates in cooling
SW7=1;SW8=1; unit operates in cooling with primary EH

DIPB-S2

SW1:Occupancy connect setting (see section 2.B.2)
SW2: Unit configuration setting: 0=2pipe system;1=4-pipe system)
SW3:on/off valve configuration:0= no valve 1=with valve (applicable to 2 pipe system only)
SW4:preheat setting:0=36C;1=28C
SW5:Fan1(CN4)configuration setting :0=Fan1 OFF;1=Fan1 ON .
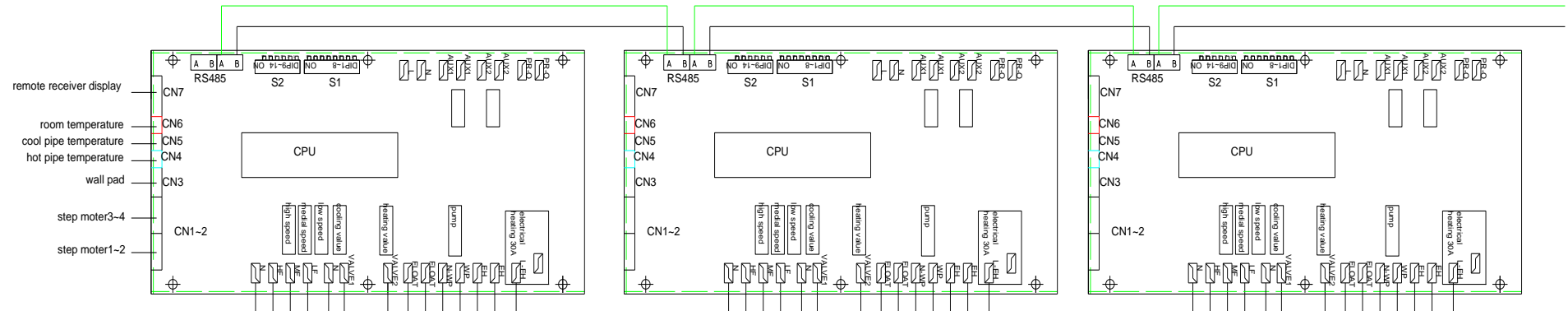SW6:Fan2(CN5)configuration setting :0=Fan2 OFF;1=Fan1 ON .

L1 \L2----Power supply
VALVE1: 24V on/off valve output
      (2pipe :cooling/heating ; (4pipe:cooling)
VALVE2: 24V on/off valve output.; (4-pipe only:heating)
WP: condensate pump output
A1:Voltage free contact;ON:unit in heating mode.
A2:Voltage free contact;ON:unit in cooling mode.
PRO:Occupancy contact
CN1~2:Stepping motor output.
CN3:Serial BUS contact
CN4:Fan motor 1 output
CN5:Fan motor 2 output
AI1:Return air temperature sensor(Tr)
AI2:Indoor coil temperature sensor1 (Ti1)
AI3:Indoor coil temoeraturesensor 2 (Ti2)
X-DISI----LED receiver output
DA1-24VAC input for modulating valves.
DA2-modulating valve 1 output(0-10V modulating signal).(2-pipe:Cooling/Heating)   (4-pipe:Cooling)
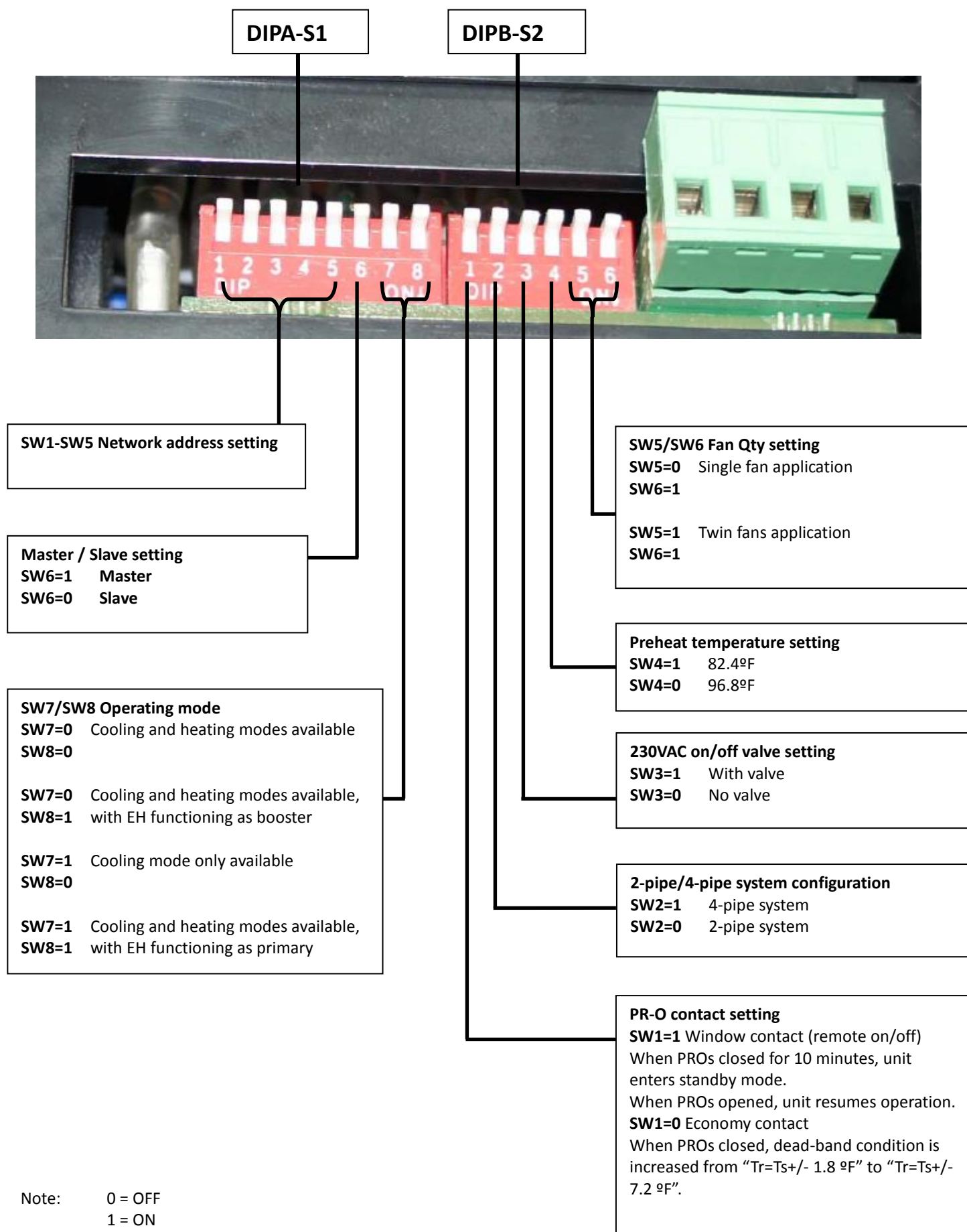DA3-modulating valve 1 output(0-10V modulating signal).(4-pipe only:heating)

Master slave networking wiring diagram:

D.3. Configuration Settings

DIPA-S1

DIPB-S2

SW1-SW5 Network address setting

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

SW5=1 Twin fans application
SW6=1

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

Preheat temperature setting
SW4=1 82.4ºF
SW4=0 96.8ºF

SW7/SW8 Operating mode
SW7=0 Cooling and heating modes available
SW8=0

SW7=0 Cooling and heating modes available,
SW8=1 with EH functioning as booster

SW7=1 Cooling mode only available
SW8=0

SW7=1 Cooling and heating modes available,
SW8=1 with EH functioning as primary

230VAC on/off valve setting
SW3=1 With valve
SW3=0 No 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 ºF" to "Tr=Ts+/-
7.2 ºF".

Note: 0 = OFF
         1 = ON

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 the unit.

AUTO-RESTART

The system uses a 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.

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 unit and no wired wall-pad is installed, the Mode, Fan Speed, Set temperature and Louver/Swing setting 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 unit and wired wall-pad is installed, the Mode, Fan Speed, Set temperature, Louver/Swing setting and Timer ON/OFF weekly program will be the same as 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 $Tr \geq Ts + 1.8$ ºF (or + 7.2 ºF 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 60.8 - 86 ºF
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 $Ti1 \leq 35.6$ ºF 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 $Ti1 \geq 41$ ºF for 2 minutes, MTV1 and AUX2 are turned on. Indoor fun 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 $Tr \leq Ts - 1.8$ ºF (or $- 7.2$ ºF 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 repeatedly runs at 200rpm.
d) The range of Ts is 60.8 - 86 ºF
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 $Tr \leq Ts - 1.8$ ºF (or $- 7.2$ ºF 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 $Ti1 < 104$ ºF, the electrical heater is turned on. If 104 ºF $\leq Ti1 < 113$ ºF, the electrical heater is kept original state. If $Ti1 \geq 113$ ºF, the electrical heater is turned off.
e) The range of Ts is 60.8-86 ºF
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 $Ti2 \leq 86$ ºF (or Ti2 is damaged or disconnected), AND if $Tr \leq Ts - 1.8$ ºF (or $- 7.2$ ºF 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 60.8 - 86 ºF
e) Indoor fan speed can be adjusted for low, medium, high and auto.

Over-heat protection of indoor coil in heat mode

a) If $Ti1 \geq 167$ ºF, MTV1, AUX2 and EH are turned off, indoor fan runs at high speed, even in standby mode.
b) If $Ti1 < 158$ ºF, 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 < 96.8 ºF [or < 82.4 ºF is selected by DIPB-S2 position SW4], MTV1 and AUX1 are on, indoor fan runs at 200rpm.
b) If Ti1 ≥ 100.4 ºF [or ≥ 86 ºF 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 ≥ 300rpm, electrical heater will turn on.

POST-HEAT

Post-heat without electrical heater

a) If Ti1 ≥ 100.4 ºF, MTV1 and AUX 1 are off, indoor fan continues to run at set speed.
b) If 96.8 °F ≤ Ti1 ≤ 100.4 °F, MTV1 and AUX1 are off. Indoor fan keeps original state.
c) If Ti1 < 96.8 ºF, 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 ≥ 167 ºF, MTV1 and AUX1 are off, indoor fan remains on and runs at high speed.
b) If Ti1 < 158 ºF, 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 ≥ 77 ºF, MTV1 and AUX2 will be ON for 3 minutes, and OFF for 4 minutes.
c) If 60.8 ºF ≤ Tr < 77 ºF, MTV1 and AUX2 will be ON for 3 minutes, and OFF for 6 minutes.
d) If Tr < 60.8 ºF, 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

Every time the unit is turned on, MTV1 is on, AUX1, AUX2 and fan are off. MTV2 and heater are always off.

After 120sec, subsequent operation mode is decided according to following program:

a) If the coil temperature sensor (Ti1) ≥ 96.8 °F, MTV1, AUX1 and fan turn on or off according to HEAT mode.

b) If Ti1 < 96.8 °F, MTV1, AUX2 and fan turn on or off according to COOL mode.
Unit remains in AUTO COOL or AUTO HEAT mode throughout the operating cycle until the user changes the mode manually or restarts the unit.

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

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:

a) Ts-Tr ≥ 1.8 °F (or 7.2 ºF if economy contact is activated)
b) MTV1 has stop ≥ 10 min.

If current running mode is auto heat mode, it will change over to auto cool mode when all the following conditions are met:

a) Tr-Ts ≥ 1.8 °F (or 7.2 ºF if economy contact is activated)
b) MTV1 has stop ≥ 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 Tr ≥ Ts + 1.8 ºF (or + 7.2 ºF if economy contact is activated), cool operation is activated, AUX2 is on. Indoor fan runs at set speed.
c) If Tr < Ts, cool operation is terminated, AUX2 is off. Indoor fan is turned off.
d) The range of Ts is 60.8 - 86 ºF.
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 Ti1 ≤ 35.6 ºF 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 Ti1 ≥ 41 ºF 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 $Tr \leq Ts$ - 1.8 ºF (or - 7.2 ºF if economy contact is activated), heat operation is activated, AUX1 is turned on. Indoor fan runs at the set speed.

    c)   If $Tr > Ts$, heat operation is terminated, AUX1 is turned off. Indoor fan runs at 200rpm.

    d)   The range of Ts is 60.8 - 86 ºF.

    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 $Tr \leq Ts$ - 1.8 ºF (or - 7.2 ºF if economy contact is activated), heat operation is activated, AUX1 is turned on. Indoor fan runs at the set speed.

    c)   If $Tr > Ts$, heat operation is terminated, AUX1 is turned off. Indoor fan runs at 200 rpm.

    d)   If $Ti1 < 104$ ºF, the electrical heater is turned on. If 104 ºF $\leq Ti1 < 113$ ºF, the electrical heater is kept original state. If $Ti1 \geq 113$ ºF, the electrical heater is turned off.

    e)   The range of Ts is 60.8 - 86 ºF.

    f)   Indoor fan speed can be adjusted for low, medium, high and auto.

Heat mode without electrical heater

    a)   MTV1, MTV2 and AUX2 are off.

    b)   If $Ti1 < 96.8$ ºF [or 82.4 ºF is selected by DIPB-S2 position SW4], AUX1 is on while indoor fan remains off.

    c)   If $Ti1 \geq 100.4$ ºF [or 86 ºF is selected by DIPB-S2 position SW4], AUX1 is on while indoor fan runs at set speed.

    d)   If indoor coil temperature sensor is damaged, pre-heat time is set for 2 minutes and indoor fan runs at set speed.

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 Ti1 ≥ 167 ºF, AUX1 is turned off, indoor fan remains on and runs at high speed.
      b) If Ti1 < 158 ºF, 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 Tr ≥ 77 ºF, indoor fan and AUX2 will be ON for 3 minutes, and OFF for 4 minutes.
      c) If 60.8 ºF ≤ Tr < 77 ºF, indoor fan and AUX2 will be ON for 3 minutes, and OFF for 6 minutes.
      d) If Tr < 60.8 ºF, 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 allowed.

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 Tr ≥ Ts + 1.8 ºF (or + 7.2 ºF 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 60.8 - 86 ºF.
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 ≤ 35.6 ºF 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 ≥ 41 ºF for 2 minutes, MTV1 and AUX2 are turned on. Indoor fun 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 Tr ≤ Ts – 1.8 ºF (or – 7.2 ºF if economy contact is activated), heat operation is activated, MTV2 and AUX1 are turned on. Indoor fan runs at the set speed.
c) If Tr > Ts, heat operation is terminated, MTV2 and AUX1 are turned off. Indoor fan runs at 200rpm.
d) The range of Ts is 60.8 - 86 ºF.
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 Tr ≤ Ts – 1.8 ºF (or – 7.2 ºF if economy contact is activated), heat operation is activated, MTV2 and AUX1 are turned on. Indoor fan runs at the set speed.
c) If Tr > Ts, heat operation is terminated, MTV2 and AUX1 are turned off. Indoor fan runs at 200rpm.
d) If Ti2 < 104 ºF, the electrical heater is turned on. If 104 ºF ≤ Ti2 < 113 ºF, the electrical heater is kept original state. If Ti2 ≥ 113 ºF, the electrical heater is turned off.
e) The range of Ts is 60.8 - 86 ºF.
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 Ti2 < 96.8 ºF [or 82.4 ºF depends on DIP setting], when MTV2 and AUX1 are on, indoor fan remains off.
b) If Ti2 ≥ 100.4 ºF [or 86 ºF 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 ≥ 300 rpm, electrical heater is turned on.

POST HEAT

Without Electrical Heater

a) If Ti2 ≥ 100.4 ºF, when MTV2 and AUX 1 are off, indoor fan continues to run at set speed.
b) If 96.8 ºF ≤ Ti2 ≤ 100.4 ºF, when MTV2 and AUX1 are off. Indoor fan keeps original state.
c) If Ti2 < 96.8 ºF, 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 Ti2 ≥ 167 ºF, MTV2 and AUX1 are turned off, indoor fan remains on and runs at high speed.
b) If Ti2 < 158 ºF, 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 Tr ≥ 77 ºF, MTV1 and AUX2 will be ON for 3 minutes, and OFF for 4 minutes.
c) If 60.8 ºF ≤ Tr < 77 ºF, MTV1 and AUX2 will be ON for 3 minutes, and OFF for 6 minutes.
d) If Tr < 60.8 ºF, 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. Ts - Tr ≥ 1.8 ºF (or – 7.2 ºF if economy contact is activated)
   ii. MTV1 has stop ≥ 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. Tr - Ts ≥ 1.8 ºF (or + 7.2 ºF if economy contact is activated)
   ii. MTV2 has stop ≥ 10 min.

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

D.6.   Sleep Mode

a) The sleep mode can only be set when the unit is in cool mode or heat mode.

b) If the sleep mode is activated when the unit is in cooling, the indoor fan will run at low speed and Ts will increase 3.6 ºF during 2 hours.

c) If the sleep mode is activated when the unit is in heating, the indoor fan will run at set speed and Ts will decrease 3.6 ºF during 2 hours.

d) Changing the mode of operation will cancel the sleep mode.

The cool mode sleep profile is:
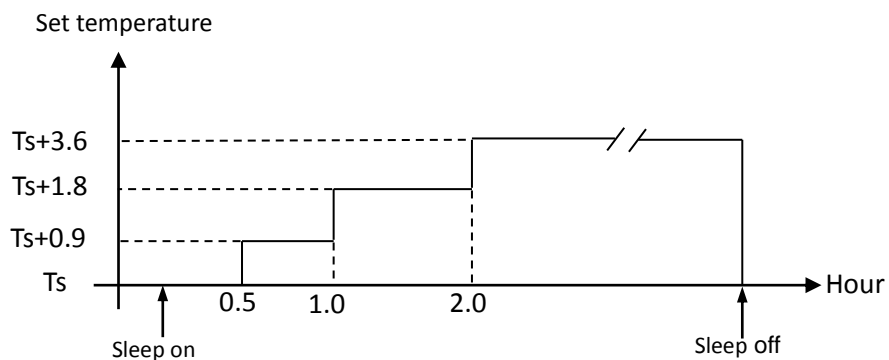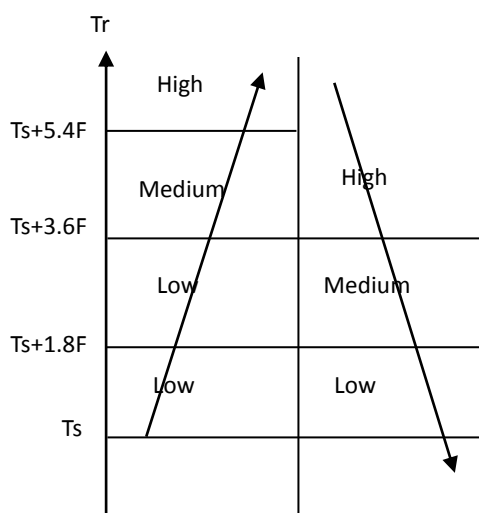

The heat mode sleep profile is:
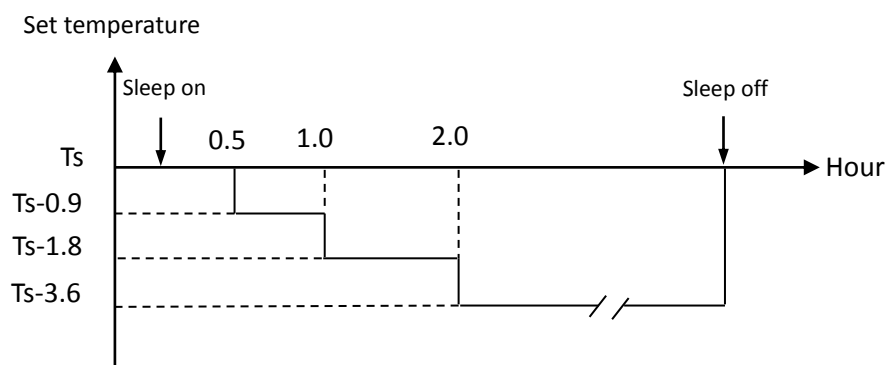
D.7. Auto Fan Speed

COOL MODE

Fan speed cannot change until it has run at this speed for more than 30 seconds.
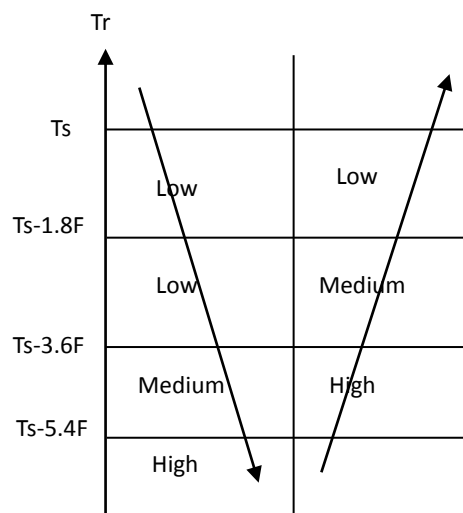
Fan speed is regulated according to the profile below.

HEAT MODE

Fan speed cannot change until it has run at this speed 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 at every 10 seconds interval. The air flow is adjusted from 15% to100%.

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 0-10VDC by PID calculation every 10 seconds interval.

D.9. Swing / Louver

For remote handset with Control Box – I (Integrated Full Control Version)
Whenever indoor fan is running, louver can swing or stop at the desired position.
Louver angle: 0~100 º, opens clockwise with largest angle at 100 º.
Swing angle: 35~100 º, opens clockwise to 68º. Below are the 4 fixed positions which can be set from wireless LCD handset.

Position	Angle against vertical
1	35 º
2	57 º
3	83 º
4	100 º

For wired wall pad with Control Box – I (Integrated Full Control Version)
Louver angle: 0~100 º, opens clockwise, and with biggest angle at 100 º.
Swing angle: 35~100 º, opens clockwise to 68º. User may stop louver at any desired poison between 35~100 º.

D.10. Buzzer

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

D.11. 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.12. On/Off Switch On The Front Panel

- This is a tact switch to select Cool→Heat→Off operation mode.
- In COOL mode, the set temperature of the system is 75.2 ºF with auto fan speed and swing. There are no timer and sleep modes.
- In HEAT mode, the set temperature of the system is 75.2 ºF with auto fan speed and swing. There are no timer and sleep modes.
- Master unit that does not use wall pad will globally broadcast.

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

D.13. Drain Pump

- Drain pump turns ON if thermostat cut in during cooling or dehumidification cooling cycle. It remains on for at least 5 minutes after thermostat cut out. During mode change from cooling to non cooling mode, water pump will on for minimum 5 minutes.

> **WARNING!**
>
> *If the system is turned off at the circuit breaker (or main power supply), the drain pump will not work.*

D.14.   Float Switch

Float-switch opens before turning on.

If float switch (N/C) is opened before the unit is turned on. MTV1 is off. Drain pump and indoor fan will operate. After float switch is closed, MTV1 is on.

Float switch is opened, when unit is on.

If float switch is opened continuously ≥ 5 seconds, drain pump will work and MTV1 remain off. When the float switch is closed, the drain pump will run for an additional 5 minutes.   If the float switch is opened for 10 minutes continuously, MTV1 will remain off. Indoor fan runs at set speed and system reports error.

Float switch is opened, when unit is off.

If the float switch is opened, the drain pump will work. When the float switch is closed, the drain pump will run for an additional 5 minutes. If the float switch is opened for 10 minutes continuously, system reports error.

D.15.   Electric Heater Safety Switch

- Before the electrical heater is turned on, the EH safety switch must be closed. If this contact is opened for ≥ 1 second, heater will be turned off immediately and report error. Once the contact is returned to close position ≥ 60 seconds, reset the error and heater will start again.
- When EH safety switch is opened ≥ 3 times within 60 minutes, heater is not allowed to start anymore. Turn off the unit to reset the fault provided that the switch has returned to closed position.

D.16.   LED Indication and Error Description

SK-DFPS-A-002.3 LED receiver in ABS housing with 19.7 inch pre-wiring

SKUSA-NCPDW-001-AECM		
Fan speed setting	LED indication	Condition
High speed	Red LED On	Normal
Medial 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 blink 1 times, stop 3 sec	*Only for unit with EH.* EH protection switches is opened.	1. Change fan speed to high. 2. Replace the damaged protection switch of EH.
Indoor coil sensor 2 failure	Green LED blink 2 times, stop 3 sec	Ti2 sensor unplugged or damaged.	1. Check Ti2 plug is connected or not. 2. Check sensor's resistance is correct or not.
Return air sensor failure	Green LED blink 3 times, stop 3 sec	Room sensor unplugged or damaged.	1. Check Tr plug is connected or not. 2. Check sensor's resistance is correct or not.
Indoor coil sensor 1 failure	Green LED blink 4 times, stop 3 sec	Ti1 sensor unplugged or damaged.	1. Check Ti1 plug is connected or not. 2. Check sensor's resistance is correct or not.
Indoor coil low temperature protection	Green LED blink 5 times, stop 3 sec	Water temperature is lower than 37.4 ºF.	Check the water temperature.
Indoor coil over heat protection	Green LED blink 6 times, stop 3 sec	Water temperature is higher than 158 ºF.	Check the water temperature
Water pump failure	Green LED blink 7 times, stop 3 sec	Float switch is opened.	1. Check the condensate water pipe connected or not. 2. Check the pump functioned or not.
EC motor failure	Green LED blink 9 times, stop 3 sec	No EC motor feedback	1. Check DIPB-SW5 and SW6 setting. 2. Check the EC motor.

D.17.   LED indication on Master/Slave connection

For master unit indicating defect status of all slave units. Error message can be found in LED lights on master unit.

Master unit LED		
Unit No.	Blink	Remedy
Unit 2 failure	RED LED blink 2 times, stop 3 sec	Check unit 2 communication plug and fix it
Unit 3 failure	RED LED blink 3 times, stop 3 sec	Check unit 3 communication plug and fix it
Unit 4 failure	RED LED blink 4 times, stop 3 sec	Check unit 4 communication plug and fix it
Unit 5 failure	RED LED blink 5 times, stop 3 sec	Check unit 5 communication plug and fix it
Unit 6 failure	RED LED blink 6 times, stop 3 sec	Check unit 6 communication plug and fix it
Unit 7 failure	RED LED blink 7 times, stop 3 sec	Check unit 7 communication plug and fix it
Unit 8 failure	RED LED blink 8 times, stop 3 sec	Check unit 8 communication plug and fix it
Unit 9 failure	RED LED blink 9 times, stop 3 sec	Check unit 9 communication plug and fix it
Unit 10 failure	RED LED blink 10 times, stop 3 sec	Check unit 10 communication plug and fix it
Unit 11 failure	RED LED blink 11 times, stop 3 sec	Check unit 11 communication plug and fix it
Unit 12 failure	RED LED blink 12 times, stop 3 sec	Check unit 12 communication plug and fix it
Unit 13 failure	RED LED blink 13 times, stop 3 sec	Check unit 13 communication plug and fix it
Unit 14 failure	RED LED blink 14 times, stop 3 sec	Check unit 14 communication plug and fix it
Unit 15 failure	RED LED blink 15 times, stop 3 sec	Check unit 15 communication plug and fix it
Unit 16 failure	RED LED blink 16 times, stop 3 sec	Check unit 16 communication plug and fix it
Unit 17 failure	RED LED blink 17 times, stop 3 sec	Check unit 17 communication plug and fix it
Unit 18 failure	RED LED blink 18 times, stop 3 sec	Check unit 18 communication plug and fix it
Unit 19 failure	RED LED blink 19 times, stop 3 sec	Check unit 19 communication plug and fix it
Unit 20 failure	RED LED blink 20 times, stop 3 sec	Check unit 20 communication plug and fix it
Unit 21 failure	RED LED blink 21 times, stop 3 sec	Check unit 21 communication plug and fix it
Unit 22 failure	RED LED blink 22 times, stop 3 sec	Check unit 22 communication plug and fix it
Unit 23 failure	RED LED blink 23 times, stop 3 sec	Check unit 23 communication plug and fix it
Unit 24 failure	RED LED blink 24 times, stop 3 sec	Check unit 24 communication plug and fix it
Unit 25 failure	RED LED blink 25 times, stop 3 sec	Check unit 25 communication plug and fix it
Unit 26 failure	RED LED blink 26 times, stop 3 sec	Check unit 26 communication plug and fix it
Unit 27 failure	RED LED blink 27 times, stop 3 sec	Check unit 27 communication plug and fix it
Unit 28 failure	RED LED blink 28 times, stop 3 sec	Check unit 28 communication plug and fix it
Unit 29 failure	RED LED blink 29 times, stop 3 sec	Check unit 29 communication plug and fix it
Unit 30 failure	RED LED blink 30 times, stop 3 sec	Check unit 30 communication plug and fix it
Unit 31 failure	RED LED blink 31 times, stop 3 sec	Check unit 31 communication plug and fix it
Unit 32 failure	RED LED blink 32 times, stop 3 sec	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 on its setting to the slave unit.
b) The master unit settings are Unit ON/OFF, Mode, Fan Speed, Timer, Clock, Set Temperature, Swing Function, and Sleep Function for handset operation.
c) The master unit settings are Unit ON/OFF, Mode, Fan Speed, Timer, Clock, Set Temperature, Swing Function, and Sleep Function for wall pad operation.

SLAVE UNIT FUNCTION

a) The slave unit receives data on 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 and off function by handset or wall pad. The handset cannot override wall pad timer and clock setting.

E.1.1.   Master – Slave Network Setup

1)   Disconnect the communication plug from the SKUSA-NCPDW-001-AECM
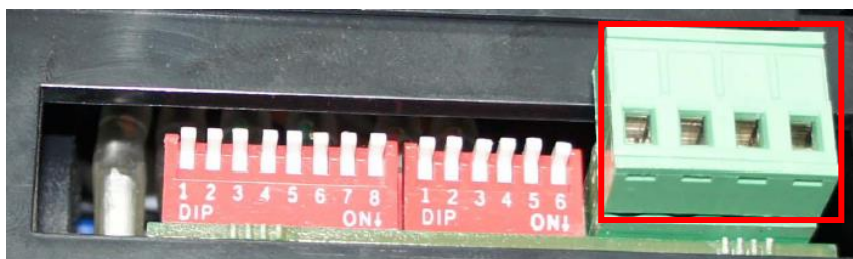
2)   Communication plug
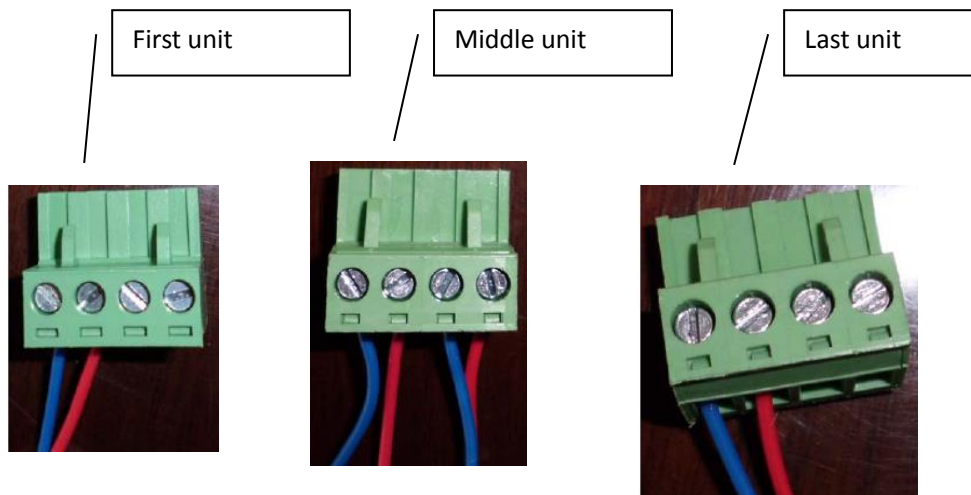
A, B, A, B is printed on the main PCB. When you connect the wires, please ensure connection of A to A and B to B.

3)   Connection wire

3.1)   If the total length of wire is more than 3280.84 ft, please use shielded wire in order to protect the signal transmission.
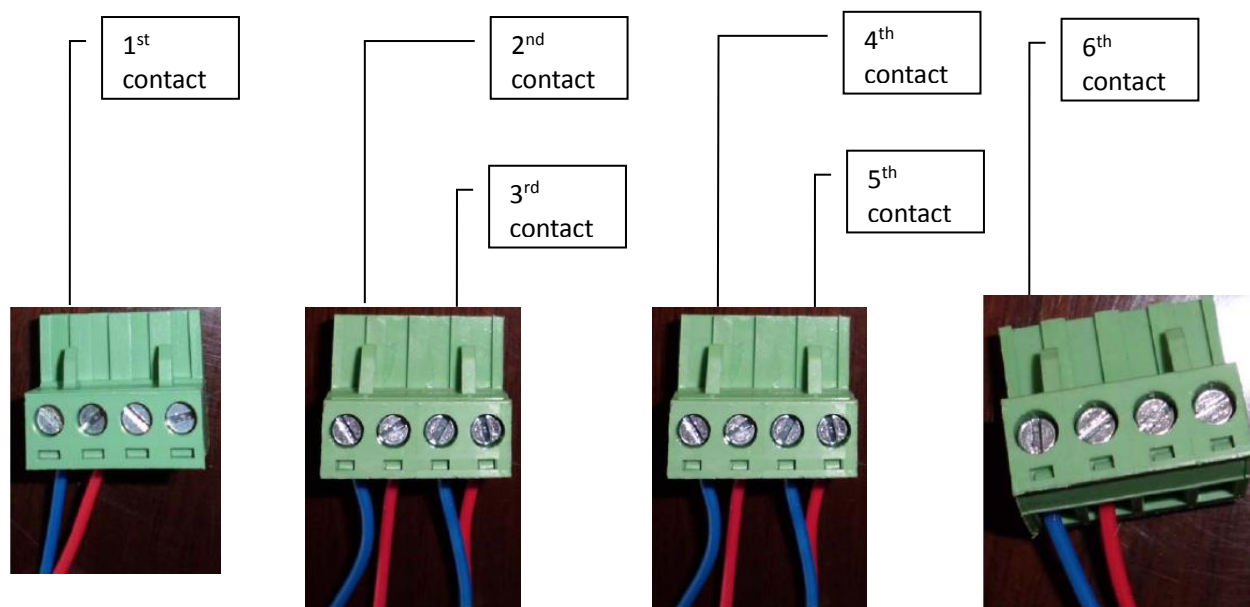
3.2)   Complete wire connection

| First unit | Middle unit | Last unit |
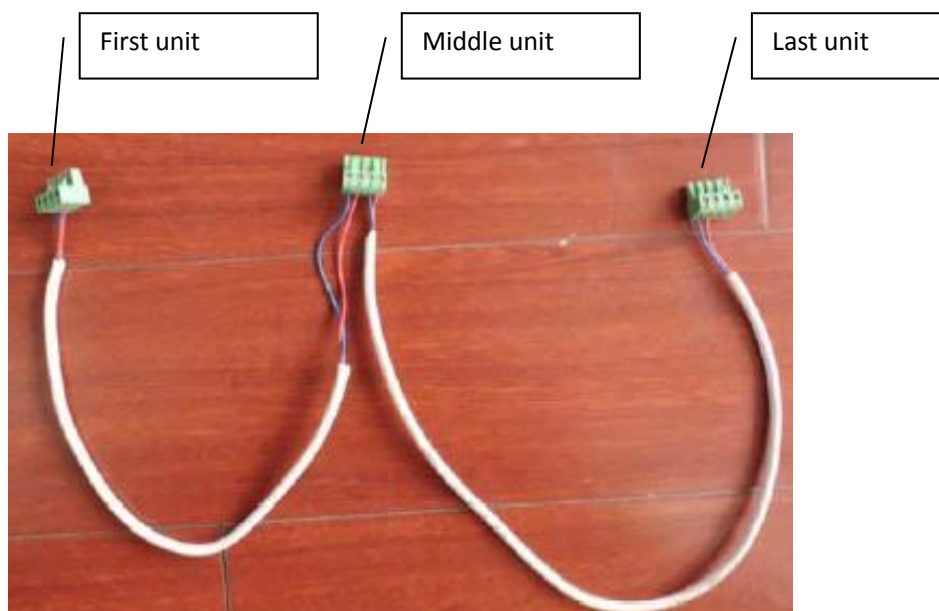
3.3) Wire connection check

3.3.1) After wire connection complete, please check the wire colour is correspondence.

3.3.2) Check the wire contact by using a multimeter.

| 1st contact | 2nd contact | 4th contact | 6th contact |
| | 3rd contact | 5th contact | |

3.3.3) Check 1 and 2, 3 and 4, 5 and 6 to be sure connections correct.

3.3.4) If the resistance between two wire contacts is too high, please check and reconnect the wire contacts.

4) Reconnect the communication plug to control box

Using Remote Control Handset to Set Master Control Unit:

a) Connect all the units PCBs according to the wire color and type of connector.
b) Select the master unit by setting DIPA-S1 SW6 to ON (=1) in the PCB.
c) Ensure the DIPA-S1 SW6 is set to OFF (=0) in the PCB on each slave unit.
d) Switch on the units by connecting the main power supply.
e) Using handset set the operation parameters for the Master unit which will automatically send the settings to the slave unit when pressing the "Network" button for 3 seconds.
f) Master unit will beep twice confirming receipt of commands while Slave unit will beep once.

Using Wall pad to Set Master Control Unit:

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

MASTER-SLAVE CONTROL

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

E.1.2.   Master-Slave Communication Method

There are two modes for Master-slave structure.

Global Control communication
Master 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 reception of master global commands, all slave unit settings will be replaced by the master settings.

Addressable communication
Master controller must be LCD wall pad. Slave unit parameters are set as usual. Upon receiving the control commands from a master, 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 master unit is equipped with wireless handset only, it can only use Global-Control communication method. If it is equipped with 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 between reading an answer and sending the next command of 80ms. All temperature is equal to reading data*10 accuracy: 0.18 ºF.

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 is used to test

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 succeed	Write data 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		
Reserved	100004		
Reserved	100005		
Reserved	100006		
Reserved	100007		
Reserved	100008		
Reserved	100009		
Reserved	100010		
Reserved	100011		
Reserved	100012		
Reserved	100013		
Reserved	100014		
Reserved	100015		

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

Discrete table:

Description	Address	Type*	Remark
MTV1	200000	R	
MTV2	200001	R	
AUX1	200002	R	
AUX2	200003	R	
Condensate pump	200004	R	
Electrical heater	200005	R	
Wired wall pad	200006	R	
PRO	200007	R	
Float switch	200008	R	
Reserved	200009	R	
EH protection switch	200010	R	
Internal actually running and unit Unit ON/OFF	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°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.

F. Control Specifications: SKUSA-NCPDW-002-AECM

Used in all PFWB(C) [V/P] **W** unit configurations.

SKUSA-NCPDW-002-AECM is used to PFWB(C) with electrical heater.

F.1. Features:

a. Condensate management with valve protection and NC alarm contact.

b. Integrated fan relays for zone control applications.

c. ON/OFF thermostat input and low-voltage modulating fan speed input flexibility.

d. Simple error diagnostic and LED error display.

Ti1 = Chilled water coil temperature

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	24VAC input signals from wired thermostat	
	Medium fan speed	M		
	Low fan speed	L		
	Phase	L	External 220VAC or 115VAC power supply connection to the PCB. Max length: 16.4 ft.	
	Neutral	N		
	Earth	GND		
	Auto ON/OFF	AUTO	230VAC input signal from wired thermostat, activates modulating control mode	
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	Voltage-free (NC)	
Voltage output	Water pump	WP	Voltage output (L)	
	EC motor	CN4	5-wire connection with 230VAC power supply to EC motor and 0-5VDC modulating signal output	
	Stepping motor	CN1-2	Low-voltage output	
Digital output	LED display	X-DIS	Low-voltage output	
Voltage-free output	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.
S3	N/A	Reserved
S4	N/A	Reserved

F.4. Wiring Diagrams

F.4.1. SKUSA-NCPDW-002-AECM

ALARM:Pump failure ,it's opened.
PUMP:Water pump output
CN1,CN2:Stepping motor
CN4:EC motor output

Unit wiring scheme

UH1
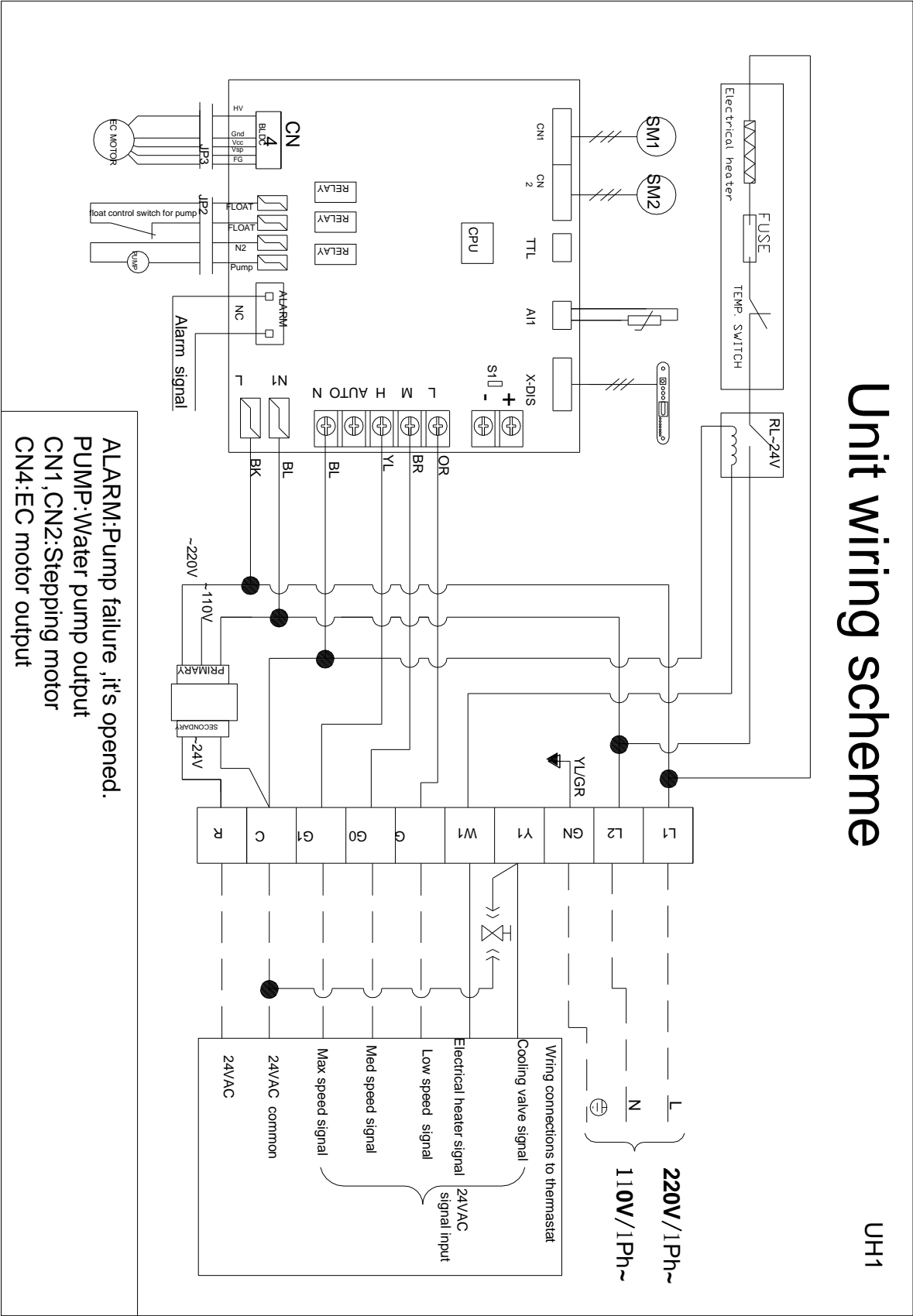
F.4.2.   Zone control wiring diagram 1 (ON/OFF thermostat)

F.4.3. Zone control wiring diagram 2 (modulating signal thermostat)

EXTERNAL
POWER SUPPLY
230VAC - 1PH - 50/60Hz

TO
NEXT
FAN COIL

THERMOSTAT CONTROLLER
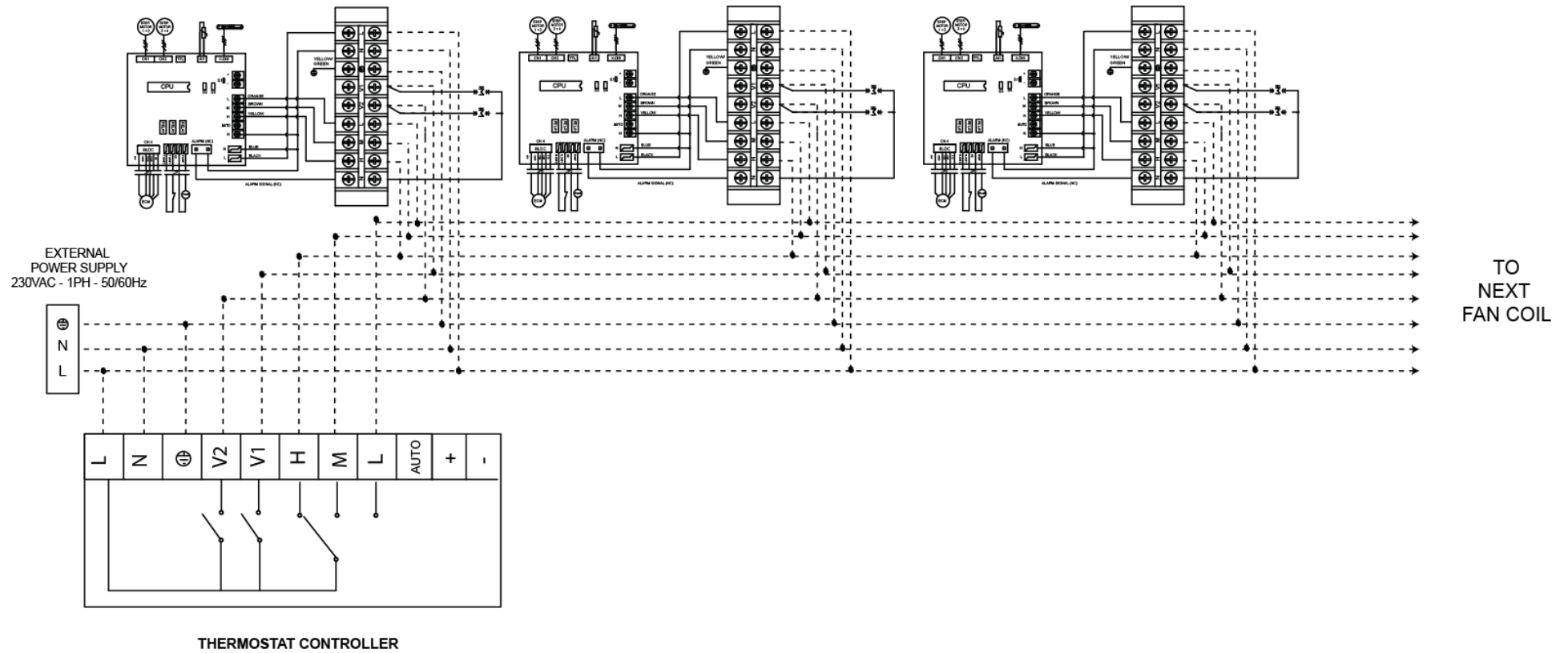
F.5. Control logic specification

F.5.1. Unit power ON/OFF

i. 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.

ii. 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

i. If the float switch is open for 5 minutes, the (NC) voltage-free alarm contact shall be open, the (NO) voltage free alarm contact shall be closed.

ii. If the float switch is open for 10 minutes, the LED display reports a condensate management failure (see table below).

F.5.3. Drain-pump run management

i. When the unit turns ON:

a) if $Ti1 < 59$ ºF, the drain pump turns ON.
b) If $Ti1 \geq 59$ ºF, the drain pump turns OFF.

ii. When the unit turns OFF and the drain pump is ON:
the dain pump will remain ON for 5 minutes, before the drain pump turns OFF.

iii. At any time:

a) if the float switch is OPEN, the drain pump will turn ON.
b) if the float switch is OPEN and then CLOSES, the drain pump will remain ON for 5 minutes, and then turn OFF.

F.5.4. Swing and louver control

i. When the unit is OFF, the louvers are closed (angle at 100º against vertical).

ii. When the unit turns ON, the louvers open (angle at 87º against the horizontal).

iii. When the unit turns OFF, the louver returns to a closed position (100º against the vertical).

F.5.5. Modulating signal input

i. When the "Auto ON/OFF" 230VAC input is ON, the fan motor rpm speed shall be modulated by the "+/-" low voltage modulating signal input.

ii. The standard configuration is for 0~5VDC modulating signal input.

iii. 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 Indication and Error Description

SK-DFPS-A-002.3 LED receiver in ABS housing with 19.7 inch pre-wiring

SKUSA-NCPDW-002-AECM		
Fan speed setting	LED indication	Condition
High speed	Red LED On	Normal
Medial speed	Yellow LED On	Normal
Low speed	Green LED On	Normal

For all units - Green LED			
Error Description	Blink	Reason	Remedy
Indoor coil sensor 1 failure	Green LED blink 4 times, stop 3 sec	Ti1 sensor connection is not good or damaged.	1. Check Ti1 plug is good or not. 2. Check sensor's resistor is good or not.
Water pump failure	Green LED blink 7 times, stop 3 sec	Float switch is opened..	1. Check the condensate water pipe good or not. 2. Check the pump good or not.
EC motor failure	Green LED blink 9 times, stop 3 sec	No EC motor feedback	1. Check DIPB-SW5 and SW6 setting. 2. Check the EC motor

G. User Interface

G.1.   Remote Handset

Adjust Set Temperature
Press down or up button to decrease or increase the desired room temperature.
Note: Temperature can not be set in Fan mode.

Mode
Press this button to advance the mode in the following sequence:
Cool → Dry → Fan → Heat → Auto Cool-Heat
[Both Cool and Heat symbol light up]

Fan
Press this button to advance the fan speed as follows:
Auto → Low → Medium → High

Under Fan mode, only low, medium and high are available.
Under Dry mode, fan speed will be inhibited and will not be displayed.

On Timer
First press shows the last timer setting. Subsequent pressing will change the timer setting in 1 minute intervals. Hold down the On button continuously to increase the updating speed.

Cancel Timer
Press this button to cancel all timer settings.

FAN   MODE
TIMER FUNCTION
ON CANCEL OFF
SLEEP LOUVER
SWING

Sleep
Press to activate the energy saving Sleep function which automatically adjusts the temperature to provide a more comfortable sleep, ie for use in bedrooms.

On/Off
Press to switch on or off the air conditioner.

Louver
Press this button to change louver angle to a fixed position 1,2,3,4, auto sweep or stop.

Swing
Press this button to turn on or off swing function.

Clock
Press down or up button for 2 seconds to activate. The current clock setting will decrease or increase at 1 minute intervals on each press.
The speed of interval updating increases after 4 seconds of continuous key press. It will update at high speed after 6 seconds of continuous key press.

Off Timer
First press shows the last timer setting. Subsequent pressing will change the timer setting in 1 minute intervals. Hold down the Off button continuously to increase the updating speed.

Cool Dry Fan Heat Signal

Fan Speed

Sleep

Louver

Set Temperature

Clock

Timer On/Off

Attention

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

Use "Swing" is not applicable.

G.2. Wired Wall Pad

Temperature display area
Display set or room temperature

Operation display

Fan speed display
AUTO Auto fan
Low
Medium
High

Day display area
Display day of week
SUN Sunday MON Monday TUE Tuesday
WED Wednesday THU Thursday FRI Friday
SAT Saturday

Infra red reception
To receive wireless handset signal

IR

Key lock

Timer display area
Display on/off timer or real time clock, RTC
ON On timer
OFF Off timer
Global control by master in networking mode

COOL FAN DRY HEAT AUTO SLEEP SWING
AUTO
SUN MON TUE WED THU FRI SAT HEATER
ON OFF ERR UNIT

Unit display area
Display Unit address

ERR Error display
UNIT Address display

On/Off button
Press once to start operation
Press again to stop operation

Room temperature setting button

Parameter + and - buttons to browse various parameters

Day button
To select day of week, Sunday to Saturday
Or used in weekly on/off timer
programming to select day of week

Net button for networking control

Time setting button
To adjust the RTC setting or to be used in
timer On/Off programming to adjust timer setting

Timer cancel button
To cancel on/off timer setting in
timer programming mode

DAY + TIME − TIMER CANCEL MODE FAN SLEEP + PARAMETER − SWING FRESH
NET

Swing and Fresh buttons for global control mode setting

Sleep button
Press once to select sleep mode
Press again to cancel sleep mode

Timer button
Press to activate on/off
timer programming mode

Mode button
Press to select cool,
fan, dry, heat or auto
cool-heat operation mode
(for 4-pipe system only)

Fan speed button
Press to select low,
medium or high speed

Attention

- Wall pad will recognize the main board model automatically whether it is 2-pipe or 4-pipe system.
- Auto Cool-Heat operation is applicable in 4-pipe system only.
  When the wall pad is installed wall-pad temperature sensor automatically overrides the default return air sensor (attached to unit return air grille).

G.2.1.   Wall Pad Operation Guidelines

a) **Clock display and setting**

System has an accurate internal real time clock used for time indication and timer ON/OFF function. Real time clock

display area indicates internal time clock which can be set by ▽(TIME) or (+)TIME button.

b) **Day display and setting**

The wall pad has day display function which is used for day indication and timer ON/OFF function. Day display icon

indicates current day. Press (DAY) button to set day.

c) **Timer ON/OFF setting**

If master unit is in global control mode and on/off timer setting is reached, master unit will command the whole network to be on or off. Otherwise timer on/off is effective to the local unit only. The system supports 7 days on/off timer setting.

- Press (TIMER) button once, 🕒 and ON symbol blinking indicates on timer programming mode, day display area indicates the day for setting timer on. If on timer for this day is null, timer display area shows

  ▭ ° ▭ ▭, otherwise the on timer setting will be shown. Press ▽(TIME) or (+)TIME button to change the on

  timer setting. Press (CANCEL) key to cancel the current on timer selected and the timer display area will

  show ▭ ° ▭ ▭. Press (DAY) button to change the day the on timer is to be programmed.
- Press (TIMER) button again, 🕒 and OFF symbol blinking indicates off timer programming mode. The setting method is the same as on timer setting above.
- Press (TIMER) button again, to exit timer on/off setting function.
- Should there be any on or off timer being programmed, 🕒 will light up. Should there be any unexecuted on or off timer for the current day, its corresponding ON or OFF icon will light up.
- Hold down (CANCEL) button for 3 seconds to cancel all timer settings.

d) **Timer set by master unit is as follows:**

- Press (NET) button to enter into networking control mode. Unit area blinking indicates the slave unit under control. Press (+)TIME or ▽(TIME) to select the desired slave unit. Units that are off will be skipped automatically.
- Press (TIMER) button once to enter into on timer programming mode. Press (DAY) button to select the required day of the week. Master unit will then retrieve the setting from the selected slave unit and timer display area will show "rEAd". The on timer setting will be shown upon reading the data successfully.   Press

  ▽(TIME) or (+)TIME button to change the on timer setting.

- Press (TIMER) button again to enter into off timer programming mode. Press (DAY) button to select the required day of the week. Master unit will then retrieve the setting from the selected slave unit and timer display area will show "rEAd". The off timer setting will be shown upon reading the data successfully. Press (TIME −) or (TIME +) button to change the off timer setting.

- Upon completion of changing timer settings for the selected day, press (TIMER) button again to exit timer programming mode. The settings will then upload to the selected slave unit.   The next day of the week settings can be done only upon completion of sending data to the slave units.   (Repeat steps 1~4 if setting is required for the next day of the week).

- In Global control mode:

    - Pressing Master (CANCEL) button for 3 seconds will cancel all timer settings in all slave units.
    - Timer settings will be broadcast to all slave units.

e) Clock synchronization by master unit is as follows:

Press (TIME −) and (TIME +) buttons for 3 seconds to activate clock synchronization to all slave units. Master wall pad will respond with a beeping sound.

f) Key lock

In order to prevent unauthorized access to the system setting, a key lock function is provided to prevent mischief. Hold down ⊟ and ⊞ for 3 seconds to activate key lock, 🔑 symbol lights up. Repeat the same to exit key lock. Only ⏻ button is applicable in key lock mode.

g) Swing

Press (SWING) to activate or deactivate swing function.

h) Sleep

Press (SLEEP) button to activate or deactivate sleep setting. Sleep is valid in cool or heat modes only.

i) Temperature setting

Press ⊟ or ⊞ to enter into temperature setting mode, temperature display area blinks indicating the current set temperature. Press the above buttons to adjust the set temperature.

j) Mode setting

Press (MODE) button to change the operation mode.

k) Fan speed setting

Press (FAN) button to change the fan speed. Only low speed is available for dehumidification mode.

l)   On/Off control

Press ⏻ to start or stop the unit.

m) Networking Master - Slave Control (only master unit wall pad can control other units on the network)

- Press (NET) button to enter into networking control mode. Unit area blinking indicates the slave unit

    under control.   Press TIME(+) or (−)TIME to select the desired slave unit; Units that are off will be bypassed automatically. Parameters that can be controlled are on/off, timer weekly program, set temperature, mode,

    fan speed, swing and sleep. Parameter operation methods are the same as above. Press (NET) button again to exit networking control mode.

- Hold down (SWING) and (FRESH) buttons for 3 seconds to enter into global control mode, ↻ lights up. Repeat the same to exit global control mode. In global control mode, the settings of the master unit will be broadcast to all the slave units.

n)   Unit operation parameters browsing

Hold down (CANCEL) and (FAN) buttons for 3 seconds to enter into operation parameters browsing mode. Unit display area shows the slave unit under browsing. Slave unit selection method is the same as in networking

control above.   Press HUMIDIFY(+) or (−)HUMIDIFY to browse various parameters as follow:

Wall pad display temperature area	Wall pad display time area
C0	Return air temperature displayed
C1	Indoor coil temperature displayed
C2	DIP switch setting displayed
C3	Indoor coil 2 temperature

Press (CANCEL) button to exit.

o)   Error indication

When faulty slave unit is detected, Master unit display area shows the faulty unit address, time area shows the error code and wall pad backlight changes to red color. Should there be multiple units having problems, addresses and error codes will be shown one after another.

Error code definition:

Error	Error code
Electrical heater faulty	E1
Indoor coil sensor 2 faulty	E2
Return air sensor faulty	E3
Indoor coil sensor 1 faulty	E4
Indoor coil low temperature protection	E5
Indoor coil over heat protection	E6
Float switch alarm	E7
Local communication error	E8

G.2.2.　　　EC unit RPM setting

1) Turn Off the unit.
2) Open wall pad's back cover, two DIP switches are appeared.
3) Turn the DIP switch 1 to "ON" position.
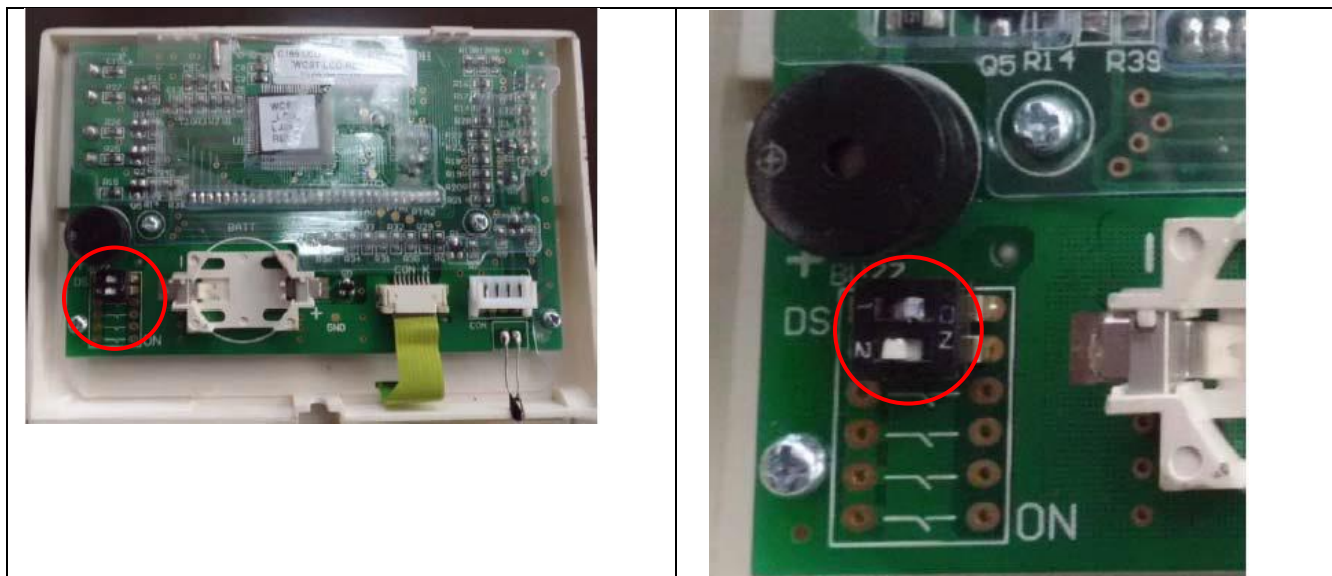
4) Wired wall pad LED will be shown as following;

This is the speed level setting.
d0: low speed
d1: medium speed
d2: high speed
Press PARAMETER + / - button to select speed level.

This is the motor RPM setting.
Press TEMP. + / - button to increase the RPM setting by 10RPM step.

5) To complete the RPM setting, turn the DIP switch 1 to "OFF" position. Wired wall pad resume to normal operation.

H. Sensor Resistance R-T Conversion Table

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)
-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	3402	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

Symptoms	Cause	Remedy
The fan coil does not start up	No voltage	- Check for presence of voltage - Check fuse on board
	Mains switch in the "OFF position	- Place in the "ON" position
	Faulty room control	- Check the room control
	Faulty fan	- Check fan motor
Insufficient output	Filter clogged	- Clean the filter
	Air flow obstructed	- Remove obstacles
	Room control regulation	- Check the room air sensor
	Incorrect water temperature	- Check the water source
	Air present	- Check the air vent
Noise and vibrations	Contact between metal parts	- Check for loosening parts
	Loose screws	- Tighten screws

J. Exploded Diagrams & Sub-assembly Descriptions

J.1. Exploded View

Coil   Case

Fan deck & Drain pan

Cabinet

ABS connection

Filter

PFWBC-VAR

Coil   Case

Fan deck & Drain pan

Cabinet

ABS connection

Filter & Grill

PFWBC-HAR

Coil

Case

Fan deck & Drain pan

Metal panel

Filter
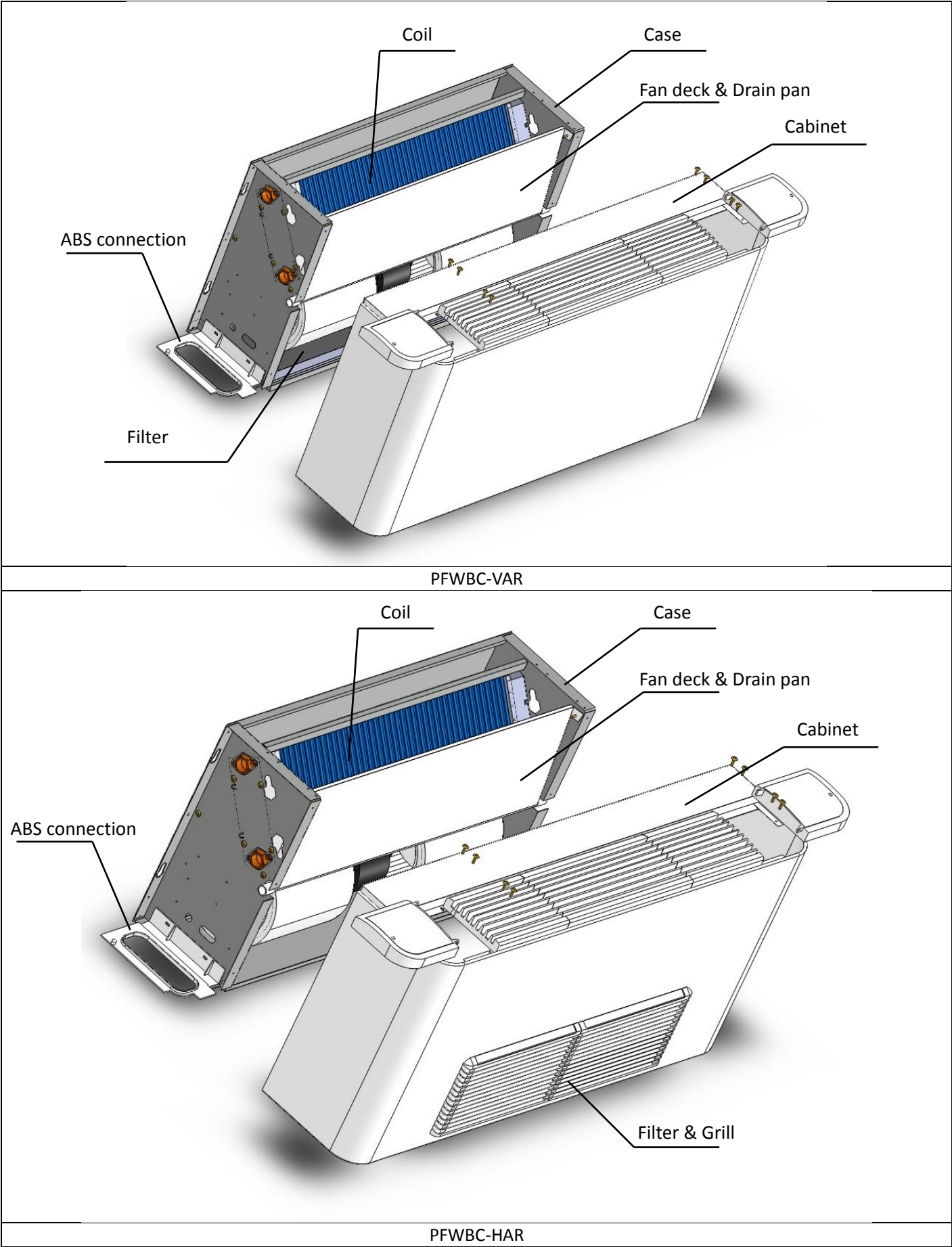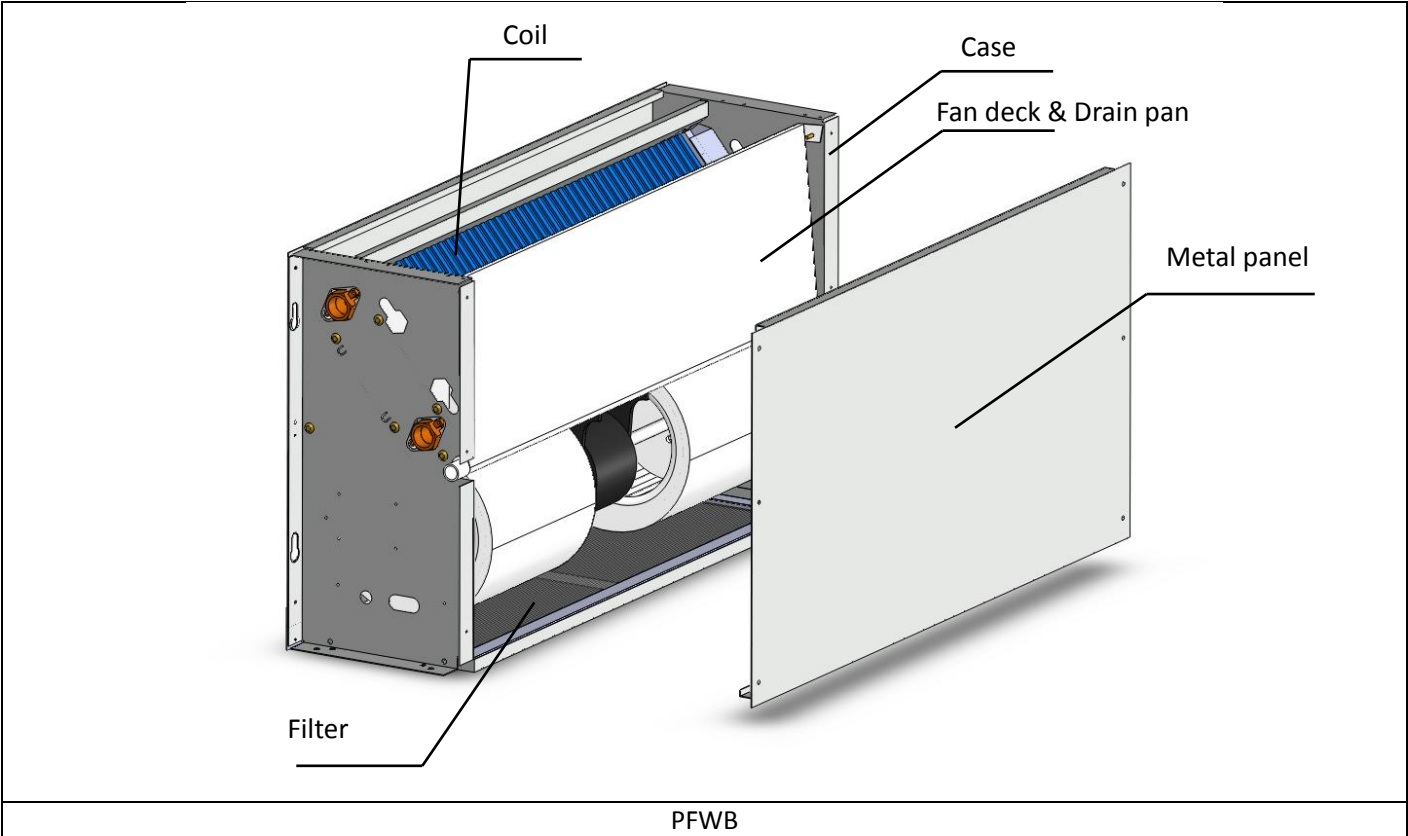
PFWB

J.2. Accessories and configurations

ACCESSORIES / CONFIGURATIONS		
Code	**Description**	**QTY**
Control accessories		
SKUSA-NCPDW-001-AECM-001	Full PCB control box for PDWL/PFWB-06-18 with 1 motor	1
SKUSA-NCPDW-001-AECM-002	Full PCB control box for PDWL/PFWB-24-40 with 2 motors	1
SKUSA-NCPDW-002-AECM-001	Mini PCB control box for PDWL/PFWB-06-18 with 1 motor with electric heater functionality	1
SKUSA-NCPDW-002-AECM-002	Mini PCB control box for PDWL/PFWB-24-40 with 2 motors with electric heater functionality	1
SK-DFPS-A-002.1	Infra-red handset and wall-holder	1
SK-DFPS-A-002.2	Wired wall-pad controller	1
SK-DFPS-A-002.3	LED receiver in ABS housing with 0.5m (19.7') pre-wiring	1
Valve accessories		
SK-DFPS-A-003a	2-way 1/2" valve with thermoelectric actuator	1
SK-DFPS-A-003b	3-way 1/2" valve with thermoelectric actuator	1
SK-DFPS-A-003c	2-way 3/4" valve with thermoelectric actuator	1
SK-DFPS-A-003d	3-way 3/4" valve with thermoelectric actuator	1
SK-DFPS-FS-010a	Stainless steel hose piping connection kit for **SK-DFPS-A-003c** (2-pipe main circuit)	1
SK-DFPS-FS-010b	Stainless steel hose piping connection kit for **SK-DFPS-A-003d** (2-pipe main circuit)	1
SK-DFPS-FS-010c	Copper piping connection kit for **SK-DFPS-A-003a** (4-pipe hot water circuit)	1
SK-DFPS-FS-010e	Copper piping connection kit for **SK-DFPS-A-003b** (4-pipe hot water circuit)	1
Heating coil accessories		
SK-DFPS-DL/FS-009a	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009b	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009c	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009d	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009e	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009f	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009g	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009h	Auxiliary 1-row heating coil	1
SK-DFPS-DL/FS-009i	Auxiliary 1-row heating coil	1
Electrical Heater accessories		
SK-DFPS-FS-005Sa	1 kW (3,400 BTU/H) PTC electric heat module for ~S and ~W configuration (220V)	1
SK-DFPS-FS-005Sb	1.5 kW (5,100 BTU/H) PTC electric heat module for ~S and ~W configuration (220V)	1
SK-DFPS-FS-005Sc	2 kW (6,800 BTU/H) PTC electric heat module for ~S and ~W configuration (220V)	1
SK-DFPS-FS-005Sd	2.5 kW (8,500 BTU/H) PTC electric heat module for ~S and ~W configuration (220V)	1
SK-DFPS-FS-005Se	3 kW (10,200 BTU/H) PTC electric heat module for ~S and ~W configuration (220V)	1
SKUSA-DFPS-FS-005Sa	0.5 kW (1700 BTU/H) PTC electric heat module for ~S and ~W configuration (110V)	1
SKUSA-DFPS-FS-005Sb	0.75 kW (2700 BTU/H) PTC electric heat module for ~S and ~W configuration (110V)	1
SKUSA-DFPS-FS-005Sc	1kW (3400 BTU/H) PTC electric heat module for ~S and ~W configuration(110V)	1
SKUSA-DFPS-FS-005Sd	1.25 kW (4250 BTU/H) PTC electric heat module for ~S and ~W configuration(110V)	1
SKUSA-DFPS-FS-005Se	1.5 kW (5100 BTU/H) PTC electric heat module for ~S and ~W configuration (110V)	1

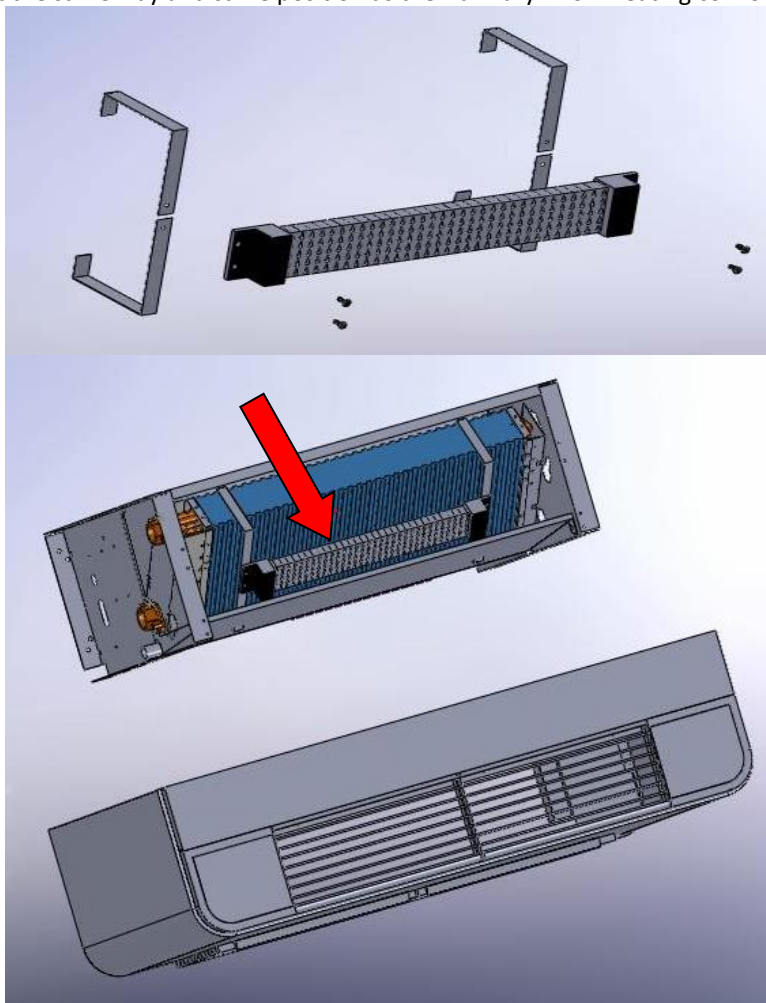| Structure accessories		
SK-DFPS-FS-011a	Painted steel drain pan for suspended ceiling installation or built-in horizontal installation with right-sided coil connections	1
SK-DFPS-FS-011b	Painted steel drain pan for suspended ceiling installation for left-sided coil connections	1
SK-DFPS-FS-012	Painted 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.	1
SK-DFPS-FS-013	ABS supporting feet for floor standing applications	1

K. Module Layout

K.1. Heating coil accessories
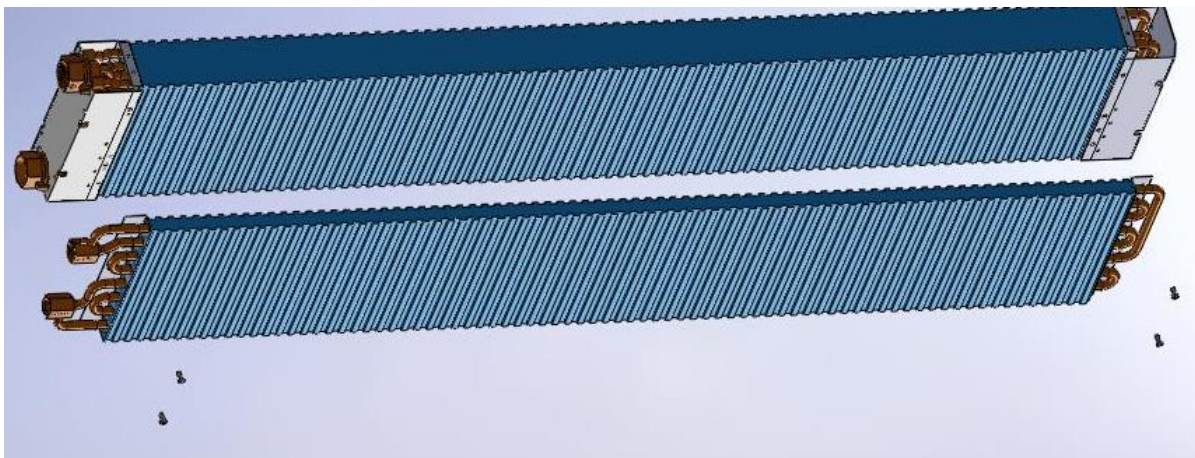
SK-DFPS-DL/FS-009~

K.2. Electrical Heater accessories

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


SK/SKUSA-DFPS-FS-005~

Note: For correct operation of the heaters, airflow should not drop below the values for minimum speed.

K.3.   Auxiliary External Drain Pan

SK-DFPS-FS-011a which is painted steel drain pan for suspended ceiling installation or built-in horizontal installation with right-sided coil connections

SK-DFPS-FS-011b which is painted steel drain pan for suspended ceiling installation or built-in horizontal installation with left-sided coil connections

SK-DFPS-FS-012 which is 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.
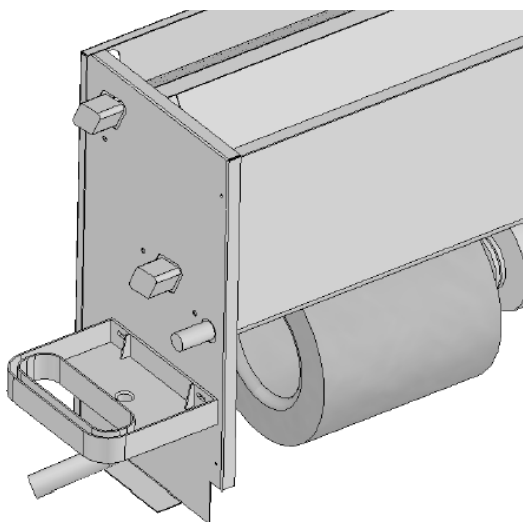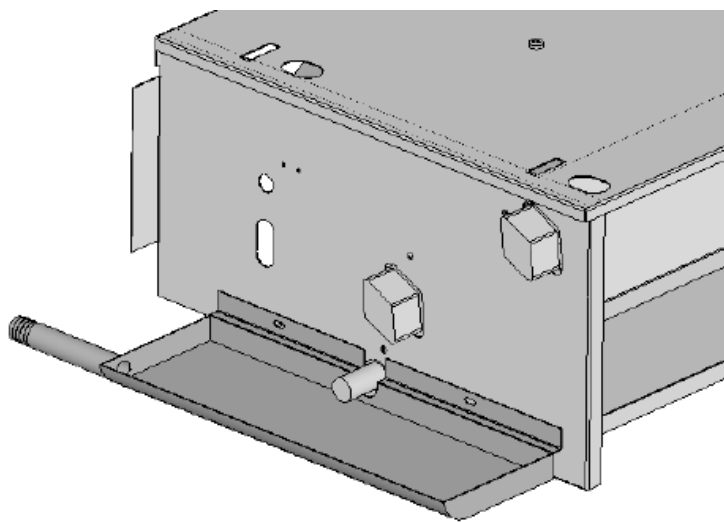
SK-DFPS-FS-011a/b   SK-DFPS-FS-012

K.4.   ABS supporting feet

SK-DFPS-FS-013 ABS supporting feet for floor standing applications.