



ECO L/M STAT SLIMLINE SERIES

INSTALLATION, OPERATION & SERVICE MANUAL

PDWSL - V / P - AECM MOTOR
V - 2pipe / P -4pipe



INVESTING IN QUALITY, RELIABILITY & PERFORMANCE

ISO 9001 QUALITY



Management Service

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

World Leading Design and Technology

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

ETL SAFETY STANDARDS



All products conform to UL standard for Safety for Heating and Cooling Equipment UL1995 4th Edition, October 14, 2011;

All products conform to CSA standard for Safety for Heating and Cooling Equipment CSA C22.2 No.236-11, 4th Edition, October 14 2011.

The Highest Standards of Manufacturing

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

WEEE MARK



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

Quality Controlled from Start to Finish

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

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

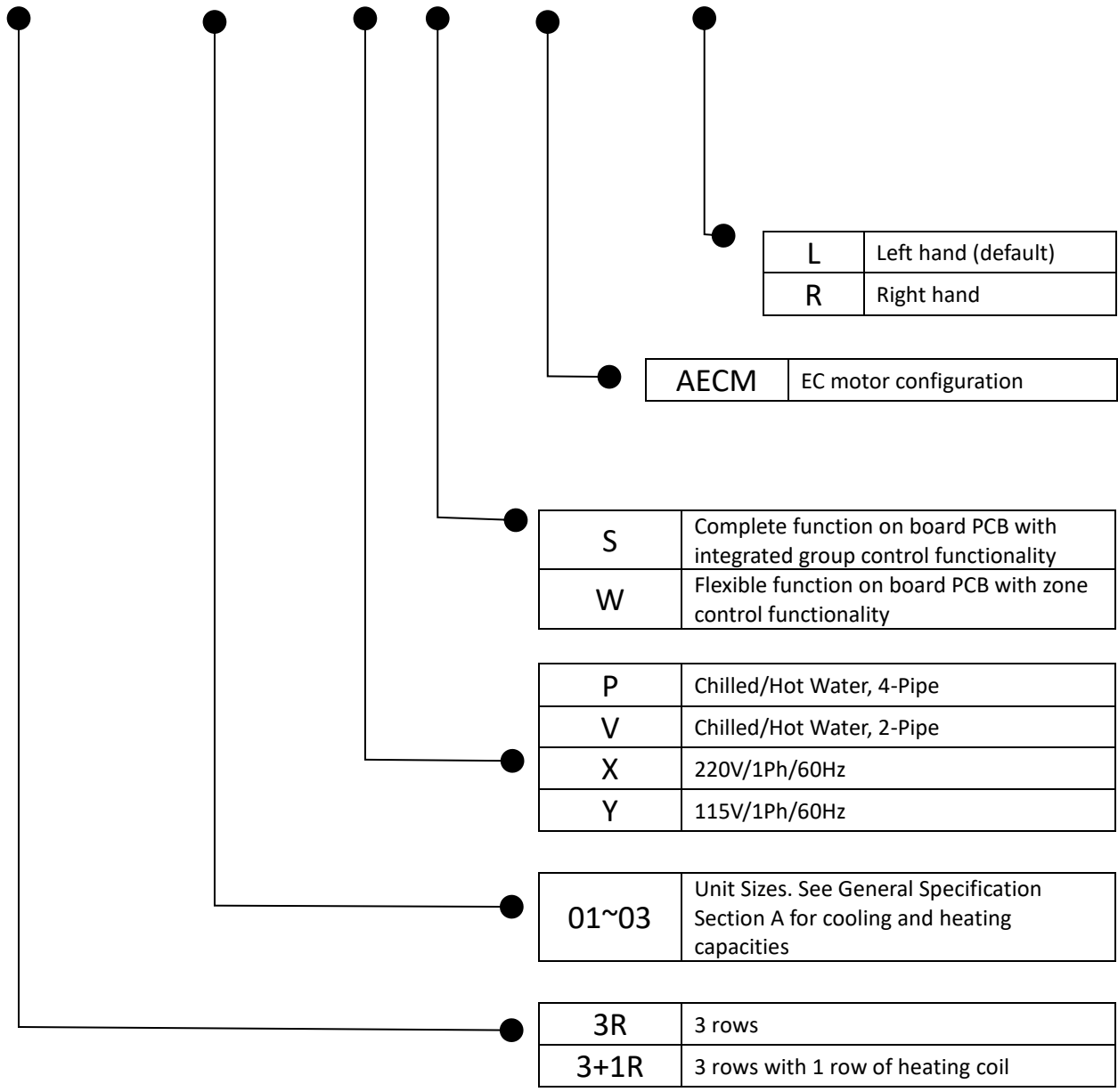
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Model Code Nomenclature

PDWSL(3R) - 01 - VY W AECM L



L	Left hand (default)
R	Right hand

AECM	EC motor configuration
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S	Complete function on board PCB with integrated group control functionality
W	Flexible function on board PCB with zone control functionality

P	Chilled/Hot Water, 4-Pipe
V	Chilled/Hot Water, 2-Pipe
X	220V/1Ph/60Hz
Y	115V/1Ph/60Hz

01~03	Unit Sizes. See General Specification Section A for cooling and heating capacities
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3R	3 rows
3+1R	3 rows with 1 row of heating coil

A. Technical Data

A.1. General Descriptions

The Slim Duct Fan Coil is designed to meet and exceed the demanding requirements for efficiency and quiet operation.

STRUCTURE

The structure is made from heavy gauge galvanized steel panels with couplings for the connection of ducting and a gravity drain pan with insulation for condensation. Fire resistant insulation is optional for internal case to provide both thermal and acoustic insulation. Insulation is also fitted on the top of coil.

Condensate Pans-Positive sloped drain pans are steel with powder finish, coated with self-extinguishing closed cell expanded polyethylene with thermal properties.

Coils-Constructed with seamless copper tubes and headers. The tubes are mechanically expanded into corrugated aluminum fin material for a permanent primary to secondary surface bond. Coils are tested at 435 PSI and recommended for operation at 232 PSI. Coils include manual air vent and water purge valves.

Fan Wheels-Housing-are double inlet forward curved centrifugal type. Wheels are statically and dynamically balanced for smooth, quiet operation. The housing is constructed from heavy gauge galvanized steel with die-formed inlet cones.

EC motor-The unit is using EC motor include driven controls PCB, a constant torque, permanent magnet, brushless DC motor with preliminary 3-speed setting that allow for precise air balancing. The driven PCB need cooperate with thermostat.

Air filter- is easily removable and washable and is made from self-extinguishing acrylic with an efficiency of class Merv 2-4.

Complete Function Control (S type)

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

Flexible Function Control (W type)

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

A.2. General Specifications

A.2.1. 2-pipe Systems

PDWSL(3R)-V-AECM Hydronic Ducted Unit 3-row coil 2-pipe with EC Motor

PDWSL(3R)-[Size]-V~AECM				1	2	3			
Unit Configuration				Configuration			2-pipe		
				Number Of Fan Blowers			2	3	4
				Power Supply		(V/Ph/Hz)	115 / 1 / 60 220 / 1 / 60		
				Operation Control			~S: Complete function on board PCB with integrated group control functionality. ~W: Flexible function on board PCB with zone control functionality.		
Performance Data	Air	Air Flow	H	CFM	500	800	1041		
			M		382	559	782		
			L		147	235	335		
		ESP	H	in.wg	0.05	0.05	0.05		
			M		0.05	0.05	0.05		
			L		0.05	0.05	0.05		
	Cooling	Total Cooling Capacity	H	Btu/hr	13400	22540	28862		
			M		10982	17152	23411		
			L		5151	8665	12009		
		Sensible Cooling Capacity	H	Btu/hr	9359	15528	20006		
			M		7548	11608	15965		
			L		3522	5844	8090		
	Heating	Heating Capacity	H	Btu/hr	20832	35040	44867		
			M		17072	26664	36394		
			L		8008	13470	18669		
		Max. Electric Heater Capacity @ 220V		kW	1	2	3		
	Max. Electric Heater Capacity @ 115V		0.5		1	1.5			
	Sound	Sound	Sound Pressure Level (Outlet)		dB(A)	46/37/19		49/40/25	50/41/26
			Sound Pressure Level (Inlet + Radiated)			49/40/25		52/43/28	53/44/29
			Sound Power Level (Outlet)			55/46/31		58/49/34	59/50/35
			Sound Power Level (Inlet + Radiated)			58/49/34		61/52/37	62/53/38
	Electrical	Fan Motor Power	H	W	50	82	100		
			M		23	40	43		
			L		11	15	17		
		Fan Motor Running Current @ 220V		H	A	0.43	0.71	0.87	
	Fan Motor Running Current @ 115V		H	0.86		1.42	1.74		
	Hydraulic	Cooling Water Flow Rate	H	GPM	2.65	4.45	5.7		
			M		2.17	3.39	4.62		
L			1.02		1.71	2.37			
Cooling Pressure Drop		H	ft.wg	0.39	0.63	0.4			
		M		0.28	0.4	0.28			
		L		0.08	0.12	0.09			
Heating Water Flow Rate		H	GPM	2.65	4.45	5.7			
		M		2.17	3.39	4.62			
		L		1.02	1.71	2.37			
Heating Pressure Drop		H	ft.wg	0.35	0.57	0.36			
	M	0.25		0.36	0.25				
	L	0.07		0.11	0.08				
Water Content			gal	0.208	0.35	0.475			
Construction and Packing Data	Water Connections	Type		SOCKET (NPT Threaded)					
		In	in	NPT 3/4"					
	Out	1"							
	Condensate Drainage Connection			1"					
	Dimensions	L	in	31 1/2	48 5/8	61 13/16			
		W		19 7/8					
H		7 7/8							
Net Weight			lbs	44	62	77			

Test Conditions:

- | | |
|---|---|
| <ul style="list-style-type: none"> 1: Cooling conditions (2-pipe or 4-pipe) - Return air temperature: DB 80°F/WB 67°F. - Inlet/ outlet water temperature: 45/55°F. | <ul style="list-style-type: none"> 2: Heating conditions (2-pipe) - Return air temperature: 70F. - Inlet water temperature: 140F. - Water flow-rate: Same as cooling mode |
|---|---|

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

A.2.2. 4-pipe Systems

PDWSL(3R+1)-V-AECM Hydronic Ducted Unit 3+1R coil 4-pipe with EC Motor

PDWSL(3+1R)-[Size]-P~-AECM				1	2	3			
Unit Configuration				Configuration			4-pipe		
				Number Of Fan Blowers			2	3	4
				Power Supply		(V/Ph/Hz)	115 / 1 / 60 220 / 1 / 60		
				Operation Control			~S: Complete function on board PCB with integrated group control functionality. ~W: Flexible function on board PCB with zone control functionality.		
Performance Data	Air	Air Flow	H	CFM	500	800	1041		
			M		382	559	782		
			L		147	235	335		
		ESP	H	in.wg	0.05	0.05	0.05		
			M		0.05	0.05	0.05		
			L		0.05	0.05	0.05		
	Cooling	Total Cooling Capacity	H	Btu/hr	13400	22540	28862		
			M		10982	17152	23411		
			L		5151	8665	12009		
		Sensible Cooling Capacity	H	Btu/hr	9359	15528	20006		
			M		7548	11608	15965		
			L		3522	5844	8090		
	Heating	Heating Capacity	H	Btu/hr	11533	18600	24733		
			M		9500	14367	20133		
			L		4733	7633	10833		
	Sound	Sound Pressure Level (Outlet)		dB(A)	46/37/19				
		Sound Pressure Level (Inlet + Radiated)			49/40/25				
		Sound Power Level (Outlet)			55/46/31				
		Sound Power Level (Inlet + Radiated)			58/49/34				
	Electrical	Fan Motor Power	H	W	50				
			M		23				
			L		11				
		Fan Motor Running Current @ 220V		H	A	0.43			
	Fan Motor Running Current @ 115V		H	0.86					
Hydraulic	Cooling Water Flow Rate	H	GPM	2.65					
		M		2.17					
		L		1.02					
	Cooling Pressure Drop	H	ft.wg	0.39					
		M		0.28					
		L		0.08					
	Heating Water Flow Rate	H	GPM	1.089					
		M		0.898					
		L		0.447					
	Heating Pressure Drop	H	ft.wg	0.56					
M		0.4							
L		0.12							
Cooling Water Content				gal					
Heating Water Content				gal					
Construction and Packing Data	Cooling Water Connections	Type		SOCKET (NPT Threaded)					
		In	in	NPT 3/4"					
	Out	in		NPT 1/2"					
	Heating Water Connections		In	in	NPT 1/2"				
			Out		in	1"			
	Condensate Drainage Connection					in			
	Dimensions	L	in	31 1/2					
W		48 5/8							
H		61 13/16							
Net Weight				lbs					
				44					
				62					
				77					

Test Conditions:

- 1: Cooling conditions (2-pipe or 4-pipe)
- Return air temperature: DB 80°F/WB 67°F.
- Inlet/outlet water temperature: 45/55°F.
- 2: Heating conditions (4-pipe)
- Return air temperature: 70F.
- Inlet water temperature: 149/131F.

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

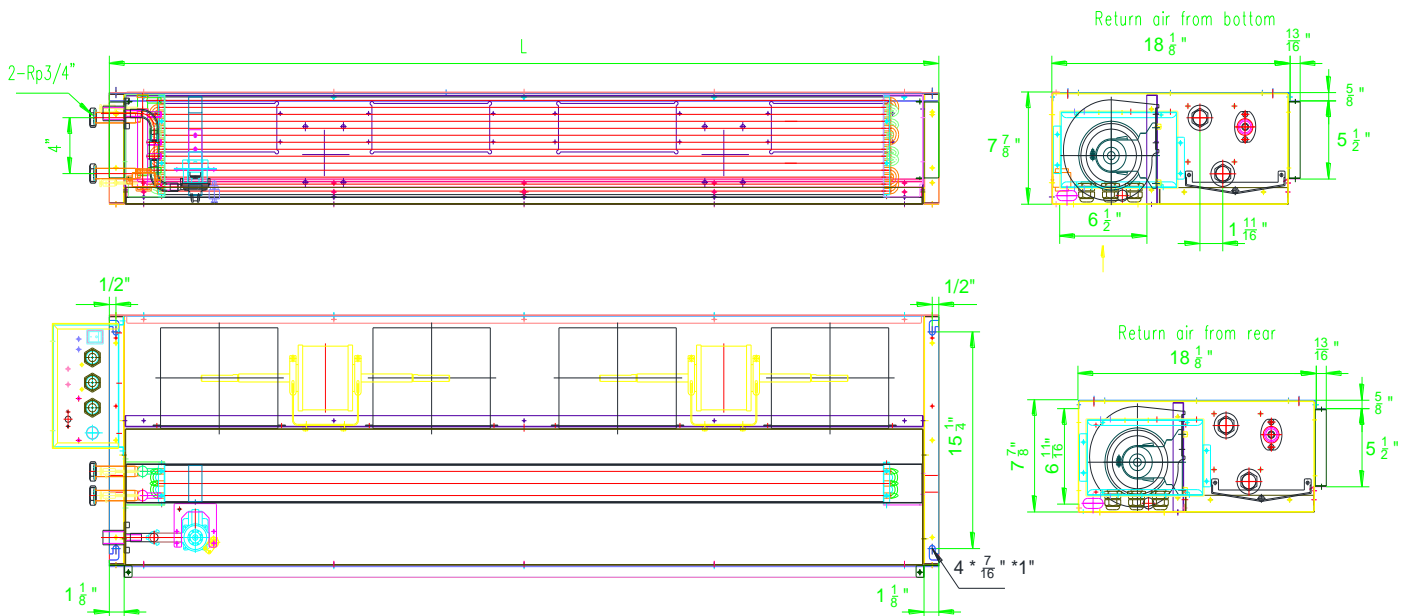
A.3. Sound Data

Model		PDWSL-01									
speed		600RPM(Low)	700RPM	800RPM	900RPM	1000RPM(Medium)	1100RPM	1200RPM	1250RPM	1300RPM(High)	1400RPM
Motor Power(W)		8.8	11.2	14.4	18.5	23.3	29.1	36.5	41.6	44.8	55.4
Sound Power dB(A)		32.0	34.7	39.0	43.9	47.2	50.2	53.3	54.6	56.0	58.1
Sound Power in 1/3 Octave-bands under ESP:12Pa (dB)	20 Hz	13.8	10.6	16.2	20.2	18.7	18.7	25.3	20.0	24.6	17.0
	25 Hz	12.9	7.6	17.5	12.4	16.0	17.0	15.6	10.9	14.3	24.4
	31.5 Hz	12.6	13.8	11.6	17.4	15.3	11.6	11.5	14.5	15.9	16.8
	40 Hz	10.6	12.3	11.9	10.8	10.7	9.4	17.1	13.3	12.3	13.6
	50 Hz	15.0	11.9	13.1	13.5	15.5	12.3	14.8	14.1	12.9	14.6
	63 Hz	12.4	10.4	10.6	15.1	13.5	16.4	16.7	26.5	24.1	23.3
	80 Hz	6.1	5.4	8.2	14.0	10.4	15.9	19.2	19.8	23.5	24.3
	100 Hz	7.7	10.6	12.8	16.0	18.1	20.7	24.6	25.0	26.4	27.0
	125 Hz	10.0	14.2	13.4	18.1	23.7	23.6	28.2	31.5	30.3	31.1
	160 Hz	16.3	15.0	23.8	26.6	32.8	33.0	33.0	36.2	36.8	37.3
	200 Hz	17.3	19.3	24.5	27.1	29.7	34.0	36.3	39.0	38.3	41.5
	250 Hz	18.1	18.4	22.8	29.2	29.8	32.1	36.1	37.8	37.0	42.1
	315 Hz	21.3	23.8	28.6	31.6	34.4	37.4	41.2	41.5	45.9	45.5
	400 Hz	22.6	26.9	31.4	34.4	38.5	39.5	42.0	44.3	44.1	49.2
	500 Hz	23.8	26.7	31.9	36.5	38.8	42.1	44.1	45.6	45.5	49.0
	630 Hz	19.1	23.3	29.3	34.5	36.1	40.7	42.3	43.9	44.5	46.6
	800 Hz	17.1	21.4	26.9	32.2	35.2	38.4	40.0	42.8	43.3	45.6
	1000 Hz	18.8	22.8	30.2	34.6	39.3	41.8	44.5	45.6	46.9	48.5
	1250 Hz	18.5	21.7	29.5	34.2	38.6	41.7	46.3	47.1	48.3	50.2
	1600 Hz	14.2	17.3	23.7	29.6	33.4	37.6	41.3	43.4	43.2	46.0
2000 Hz	14.8	16.6	23.1	30.3	33.8	38.3	42.7	43.4	44.7	46.7	
2500 Hz	17.3	19.5	21.7	27.0	30.2	34.8	38.4	40.0	40.3	43.8	
3150 Hz	15.5	15.8	17.8	22.8	25.7	30.9	34.2	36.3	37.1	40.2	
4000 Hz	15.7	15.7	16.8	20.3	22.8	27.6	31.4	33.3	34.7	37.7	
5000 Hz	15.6	15.8	16.1	18.6	20.1	24.7	29.1	31.5	32.5	35.5	
6300 Hz	15.2	15.6	15.5	16.9	18.2	22.2	26.1	28.3	29.1	32.1	
8000 Hz	15.4	16.1	16.8	18.5	19.3	21.5	23.9	26.1	26.8	29.4	
10000 Hz	12.4	12.6	12.4	13.5	13.5	16.8	19.8	22.3	23.0	25.9	
12500 Hz	9.6	9.5	9.6	10.1	9.9	11.8	14.2	16.1	17.1	19.5	
16000 Hz	9.7	19.9	11.5	11.9	12.4	14.0	15.5	15.4	16.8	17.4	

Model		PDWSL-02										
speed		500RPM	600RPM(Low)	700RPM	800RPM	900RPM	1000RPM(Medium)	1100RPM	1200RPM	1250RPM	1300RPM(High)	1400RPM
Motor Power(W)		11.3	14.2	17.7	23.2	29.4	37.8	47.5	59.3	66.6	73.3	90.6
Sound Power dB(A)		30.8	34.7	39.2	45.9	47.0	49.6	52.8	55.2	56.7	58.2	60.0
Sound Power in 1/3 Octave-bands under ESP:12Pa (dB)	20 Hz	17.3	12.3	18.0	15.0	17.8	13.5	18.0	16.7	14.3	21.1	13.2
	25 Hz	22.1	15.7	9.4	18.9	14.1	12.7	17.9	10.9	11.6	13.9	21.6
	31.5 Hz	14.5	16.5	15.2	14.2	15.6	19.6	18.6	11.3	15.1	16.8	14.7
	40 Hz	11.3	12.1	11.0	8.7	10.2	9.6	10.9	11.2	14.4	21.4	18.3
	50 Hz	12.5	11.1	12.8	14.5	11.9	13.5	12.3	14.7	14.0	15.1	29.6
	63 Hz	15.8	9.8	11.7	15.1	12.0	18.3	16.9	15.5	19.9	20.7	22.1
	80 Hz	8.9	9.3	11.0	11.6	16.2	19.4	22.5	20.8	25.1	26.2	26.9
	100 Hz	10.4	10.3	14.1	19.3	20.5	25.1	27.2	27.5	28.5	29.2	30.4
	125 Hz	12.8	13.9	15.5	18.8	25.0	27.7	28.9	28.5	32.5	33.4	35.5
	160 Hz	14.6	19.8	21.5	23.6	28.1	31.4	33.9	34.1	39.4	39.0	42.4
	200 Hz	18.9	21.5	26.3	28.9	31.2	33.2	36.7	40.2	38.6	40.7	44.0
	250 Hz	17.0	22.0	23.9	27.3	31.4	35.7	35.9	38.1	36.8	39.9	42.4
	315 Hz	19.6	28.0	29.9	43.4	35.1	37.9	42.2	44.1	49.4	49.7	47.3
	400 Hz	21.6	28.5	34.7	38.3	38.1	39.7	42.6	45.5	46.9	48.8	54.5
	500 Hz	18.6	26.8	29.8	34.4	42.0	43.4	44.8	45.7	47.7	48.7	50.2
	630 Hz	13.8	21.9	25.8	30.9	35.5	38.7	44.4	44.2	45.7	46.5	47.3
	800 Hz	14.2	20.0	23.9	28.2	33.0	37.2	40.1	41.6	43.0	45.3	48.1
	1000 Hz	15.0	24.9	26.5	33.6	36.2	40.6	44.0	47.0	49.3	50.2	51.2
	1250 Hz	16.6	20.2	24.3	31.2	35.9	39.4	43.9	45.9	47.5	48.5	50.4
	1600 Hz	13.6	16.9	20.7	26.4	31.8	36.1	39.7	43.4	44.1	45.3	48.2
2000 Hz	15.1	16.9	19.2	24.9	30.6	35.7	39.1	43.2	43.7	45.6	48.5	
2500 Hz	16.3	18.2	20.0	22.7	27.7	32.8	36.0	40.0	41.2	42.8	46.1	
3150 Hz	16.4	16.7	17.6	19.6	24.1	29.2	33.2	37.7	38.6	40.3	43.4	
4000 Hz	15.8	15.8	16.5	17.1	20.3	25.0	29.4	33.1	34.6	36.8	39.5	
5000 Hz	15.5	15.7	16.0	16.4	18.4	22.7	27.0	30.9	32.0	34.6	37.4	
6300 Hz	15.2	15.5	15.5	15.9	17.2	19.7	23.2	27.4	28.6	30.9	34.0	
8000 Hz	15.0	15.4	16.7	17.6	19.0	21.0	22.2	25.5	27.0	29.2	31.5	
10000 Hz	12.5	12.6	12.8	12.7	13.1	14.8	16.5	19.8	21.1	24.2	26.7	
12500 Hz	9.7	9.7	9.7	10.0	10.2	11.7	12.1	14.7	15.8	18.6	21.4	
16000 Hz	7.8	9.3	10.4	11.6	12.5	14.9	16.4	18.0	18.2	18.7	20.1	

Model	PDWSL-03											
speed	500RPM	600RPM (Low)	700RPM	800RPM	900RPM	1000RPM (Medium)	1100RPM	1200RPM	1250RPM	1300RPM	1400RPM (High)	
Motor Power(W)	11.6	14.7	20.1	27.2	33.1	43.2	56.4	71.2	81.8	89.6	109.7	
Sound Power dB(A)	31.0	34.9	41.3	44.4	46.9	50.5	53.3	56.0	57.6	58.8	61.0	
Sound Power in 1/3 Octave-bands under ESP:12Pa (dB)	20 Hz	15.1	13.0	10.9	11.0	14.7	14.9	18.8	19.3	20.3	23.6	19.8
	25 Hz	8.5	9.9	14.9	14.2	16.9	15.4	19.8	10.9	13.1	19.5	17.4
	31.5 Hz	15.8	15.2	13.9	15.5	14.9	14.3	14.1	17.0	15.8	13.0	14.7
	40 Hz	7.2	10.8	13.6	12.9	9.2	9.0	9.5	16.2	16.0	14.1	18.8
	50 Hz	12.3	11.9	14.4	13.1	14.5	14.1	14.9	15.4	16.9	16.5	25.8
	63 Hz	11.2	11.5	11.2	9.8	16.8	20.5	15.4	22.0	22.3	21.1	27.4
	80 Hz	3.9	7.0	13.4	15.3	16.7	20.2	21.2	22.4	28.4	26.6	27.3
	100 Hz	8.2	7.9	10.8	17.9	15.9	23.2	23.8	26.1	26.8	26.2	32.2
	125 Hz	11.7	13.8	19.6	22.1	23.5	27.6	28.4	31.1	32.5	34.3	37.7
	160 Hz	18.7	21.4	25.6	27.2	30.7	34.1	34.4	38.4	41.8	41.6	44.7
	200 Hz	18.9	21.1	25.3	29.2	31.6	35.6	35.4	39.8	41.8	40.0	43.6
	250 Hz	18.7	23.5	25.8	29.3	33.5	36.6	37.7	38.0	39.2	41.5	44.4
	315 Hz	20.0	26.2	31.2	34.0	35.6	38.8	41.6	44.1	45.8	47.6	48.0
	400 Hz	22.2	27.0	37.2	38.5	39.4	41.4	45.6	47.4	46.5	49.4	53.0
	500 Hz	20.8	27.5	32.2	38.0	41.1	43.1	44.6	48.1	48.6	50.6	52.6
	630 Hz	14.0	21.0	27.6	32.2	35.5	39.1	43.7	45.7	47.3	47.2	48.6
	800 Hz	14.5	19.3	26.0	31.6	34.6	38.0	41.1	43.8	45.1	47.0	49.3
	1000 Hz	16.7	24.4	29.4	35.1	37.2	42.4	45.2	47.6	50.2	51.6	53.1
	1250 Hz	14.6	17.4	24.4	31.7	35.1	39.7	43.1	45.7	49.2	48.3	50.4
	1600 Hz	14.2	16.7	24.4	30.0	34.4	37.6	42.3	45.1	44.8	48.5	51.0
2000 Hz	14.6	16.0	21.3	28.4	31.7	36.8	41.1	44.3	44.2	47.5	49.4	
2500 Hz	16.3	17.5	19.4	23.9	27.2	32.4	36.9	39.7	42.2	43.5	45.5	
3150 Hz	15.8	15.9	17.1	20.2	23.3	28.4	32.8	37.1	39.2	40.2	42.9	
4000 Hz	15.6	15.9	16.4	17.9	20.4	24.4	28.8	33.1	36.0	37.5	39.6	
5000 Hz	15.7	15.5	15.8	16.5	18.0	21.3	25.5	30.2	33.5	34.5	36.9	
6300 Hz	15.2	15.6	15.6	16.0	17.1	19.5	23.0	26.7	30.1	31.6	33.4	
8000 Hz	14.6	15.5	15.8	16.4	18.2	20.0	22.5	25.5	28.3	29.7	31.4	
10000 Hz	12.5	12.8	12.6	12.7	13.0	13.9	16.0	20.2	23.0	25.0	26.8	
12500 Hz	9.8	10.0	9.9	10.2	10.2	11.0	12.0	15.2	17.6	19.5	21.1	
16000 Hz	16.0	17.5	18.4	18.4	19.2	20.1	20.2	19.9	21.8	20.2	20.6	

A.4. Dimension Drawings



Model	L (Length)
PDWSL-01	31 1/2
PDWSL-02	45 5/8
PDWSL-03	61 13/16

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

B. Installation

B.1. Safety Precautions

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

CAUTIONS

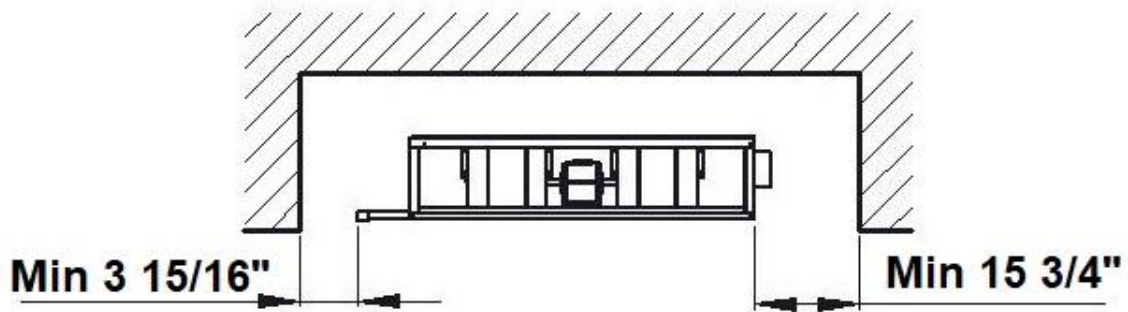
Before any service or maintenance operations turn off the mains electrical supply.

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

B.2. Location

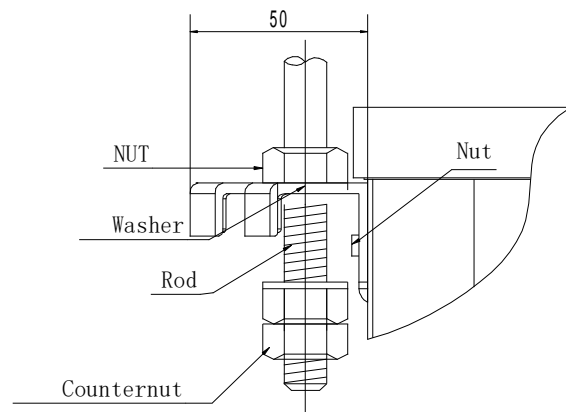
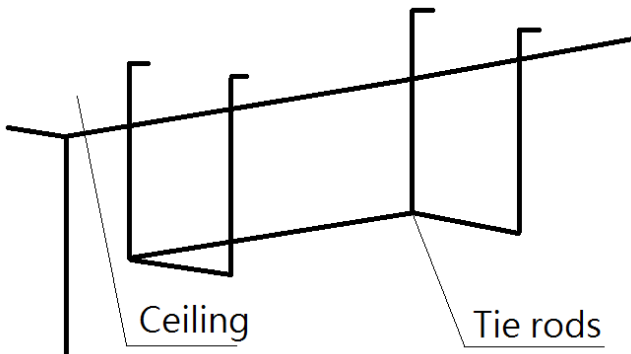
Before installing and running the unit, please check the following:

1. There must be enough space for unit installation and maintenance. Please refer to below figure for the unit's outlines and dimensions and for the minimum distance between the unit and the obstacle/ any obstructions/ its surroundings.
2. Please ensure there is enough space for piping connections and electrical wiring.
3. Check whether the hanging rods can support the weight of the unit (see specification table for weight of the unit).
4. The unit must be installed horizontally to ensure proper operation and condensate draining.
5. The external static pressure of the ducting must be within the unit's static pressure range.
6. Confirm that the unit has been switched OFF before installing or servicing the unit.



B.3. Concealed Ceiling Installation

1. The unit is designed to be installed in a concealed ceiling. Installation and maintenance should be performed by qualified personnel who are familiar with local codes and regulations, and are experienced with this type of appliance.
2. Please refer to the pictures below for installation procedures.



B.4. Insulation

1. The insulation design and materials should be complying with local and national codes and regulations.
2. Chilled water pipes and all parts on the pipes should be insulated.
3. It is also necessary to insulate the air duct.

B.5. Air Duct Connection

1. Circulatory air pressure drop should be within External Static Pressure.
2. Galvanized steel air ducts are suitable.
3. Make sure there is no leak of air.
4. Air duct should be fire-proof, refer to concerned country national and local regulations.

B.6. Pipe Connection

1. Using suitable fittings as water pipe connections with reference to the outline and dimensions.
2. The water inlet is on the bottom while outlet on top.
3. The connection must be concealed with rubberized fabric to avoid leakage.
4. Drain pipe can be PVC or steel.
5. Tightening torque should not be too high when connecting water pipes, in order to avoid brass deformation or water-leakage by torsion split.
6. The suggested slope of the drain pipe is at least 1:50.

Caution

When connecting pipe to fan coil unit, do not bend or reposition the coil header for alignment purposes. This could cause a tubing fracture resulting in a water leak when water pressure is applied to the system.

B.7. Electrical Connection

1. Wiring connection must be done according to the wiring diagram on the unit.
2. The unit must be GROUNDED well.
3. An appropriate strain relief device must be used to attach the power wires to the terminal box.
4. A 13/16" hole is designed on the terminal box for field installation of the strain relief device.
5. Field wiring must be complied with the national security regulations.
6. A main switch or other means for disconnection, having a contact separation in all poles, must be incorporated in the fixed wiring in accordance with the relevant local and national legislation.

C. Maintenance

C.1. General Maintenance

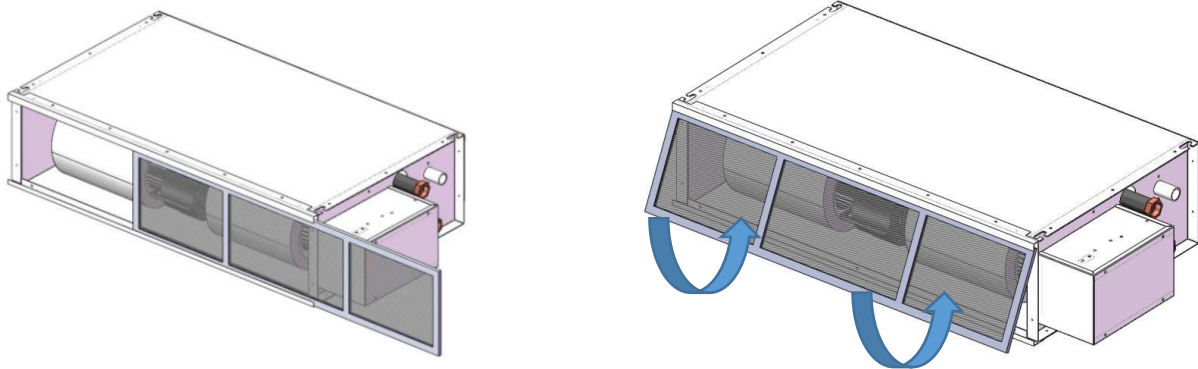
1. Installation and maintenance should be performed by qualified personnel who are familiar with local codes and regulations, and are also experienced with this type of appliance.
2. Confirm that the unit has been switched OFF before installing or servicing the unit.
3. A good general maintenance plan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

C.2. Regular Maintenance

1. Inspect and clean condensate drain pan to avoid 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 buildup of mineral deposits.

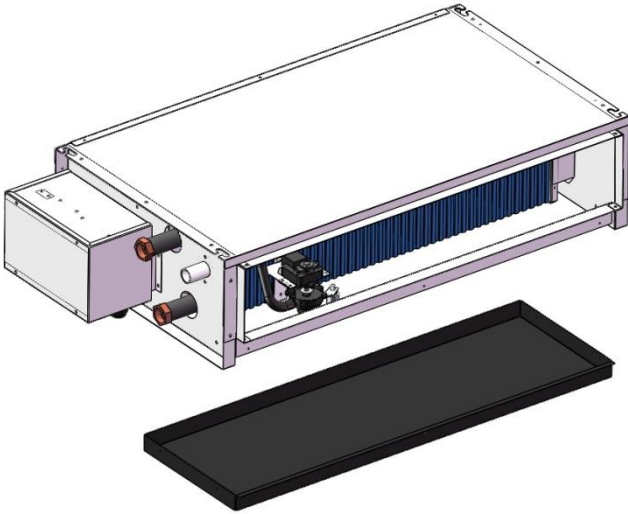
C.3. Filter Cleaning

1. Remove the filter from the bottom or side.
2. Clean the filter with a brush, or with water.
3. Put back the filter by sliding it back into the groove.

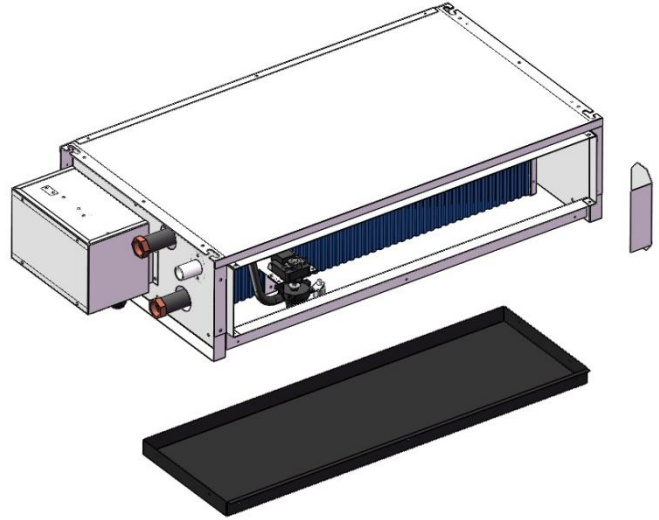


C.4. Coil and Fan Motor Assembly Maintenance

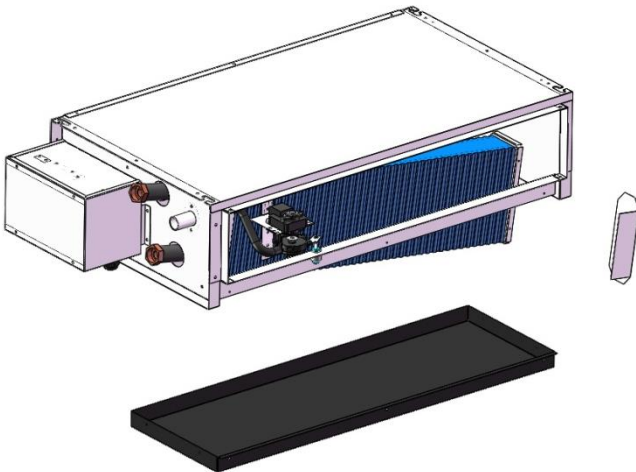
- 1. Remove 4 screws from the both side panels to pull down the drain pan.



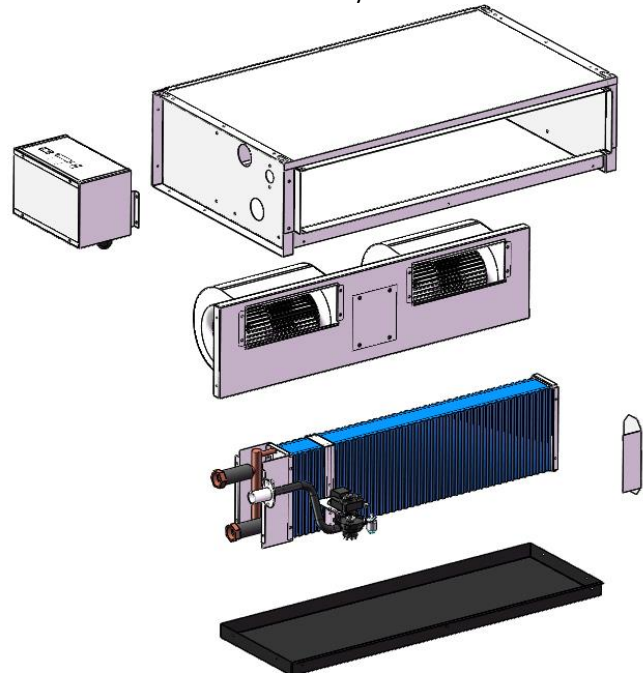
- 2. Remove coil connection plate at opposite side of water connection



- 3. Tilt and remove the coil assembly.



- 4. Remove control box and screws on both side panel to remove fan motor assembly.



D. Control Specifications: Complete Function PCB S Type

Abbreviations

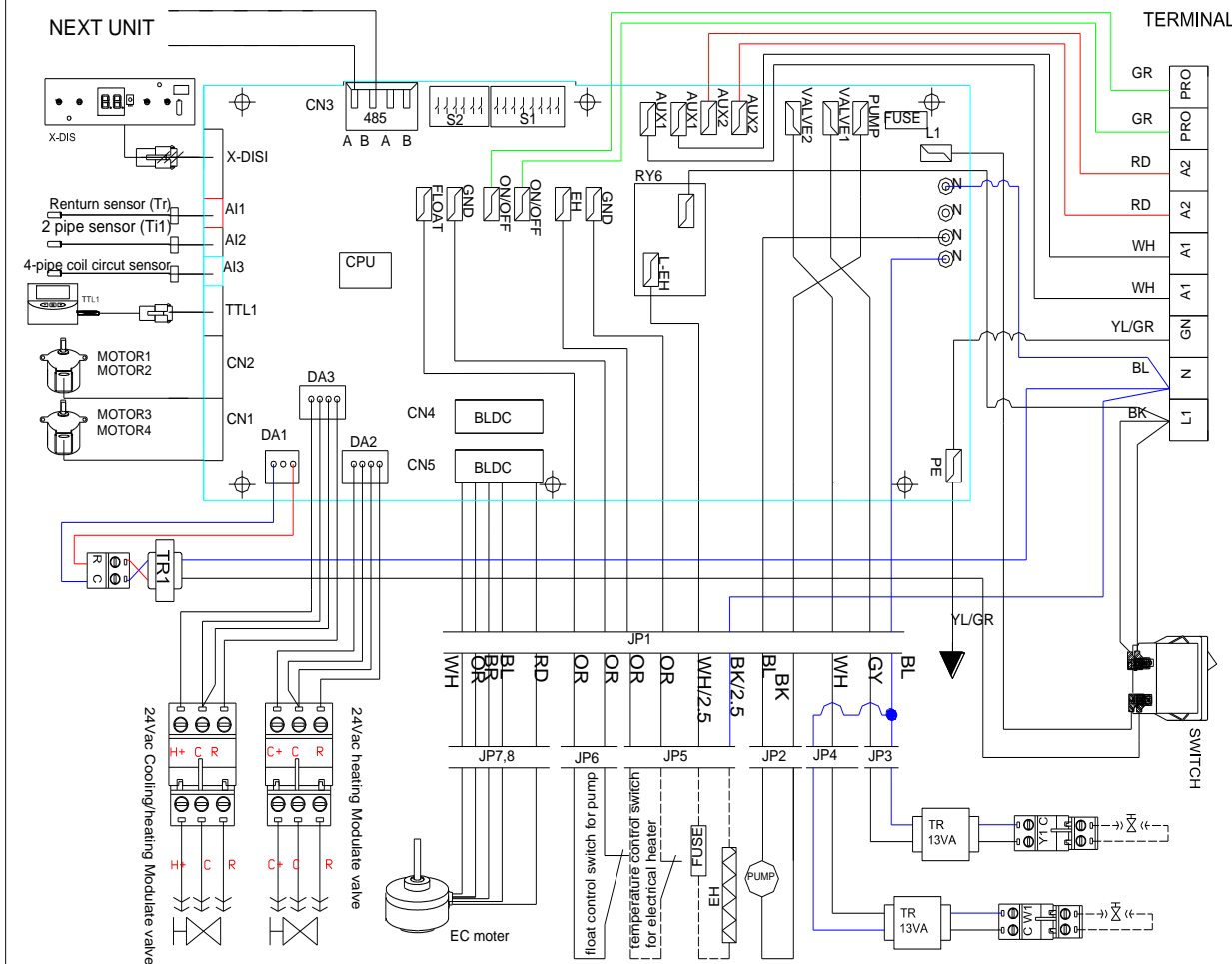
Ts = Setting temperature	AUX1 = Hot water free contact
Tr = Room air temperature	AUX2 = Chilled water free contact
Ti1 = Chilled water coil temperature	MTV1 = Chilled water valve
Ti2 = Hot water coil temperature	MTV2 = Hot water valve

D.1. I/O Port Definitions

I/O	Code	2-Pipe	4-Pipe
Analogue Input	Return air sensor	AI1	Return air temperature (Tr)
	2-pipe coil circuit sensor	AI2	Chilled / hot water coil circuit (Ti1)
	Hot water Sensor	AI3	N/A
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). Float switch on/off control.
	Electrical heater safety switch	EH	Voltage-free (NC). The contact is closed before the EH is turned on.
Power input	Phase	L	Power supply: 220V1Ph/60Hz 115V/1Ph/60Hz
	Neutral	N	
	Earth	PE1	
Voltage output	Fan 1	CN4	Fan 1 driver and motor connection port.
	Fan2	CN5	Fan 2 driver and motor connection port.
	Valve1	MTV1	2-pipe coil circuit valve output – chilled / hot water valve. Voltage output (L)
	Valve2	MTV2	Reserved
	Water pump	PUMP	Condensate Drain Pump output.
	Voltage of electrical heater (Live)	L-EH	Voltage output (L), maximum 30A. [See wiring diagram, cross check with supplier].
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 < 30 m.
	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 < 30 m.
	Serial BUS port	CN1	Master-slave network serial connection OR MODBUS / local PC host network serial connection.
	Modulating valve 1	DA2	Connection to DC modulating valve on 2-pipe coil circuit - chilled / hot water.
	Modulating valve 2	DA3	N/A

D.2. Wiring Diagram For S Type Control

NA-AEC-S1-unit wiring scheme



IPA-S1
IPA19-DL-NA-EC-S1

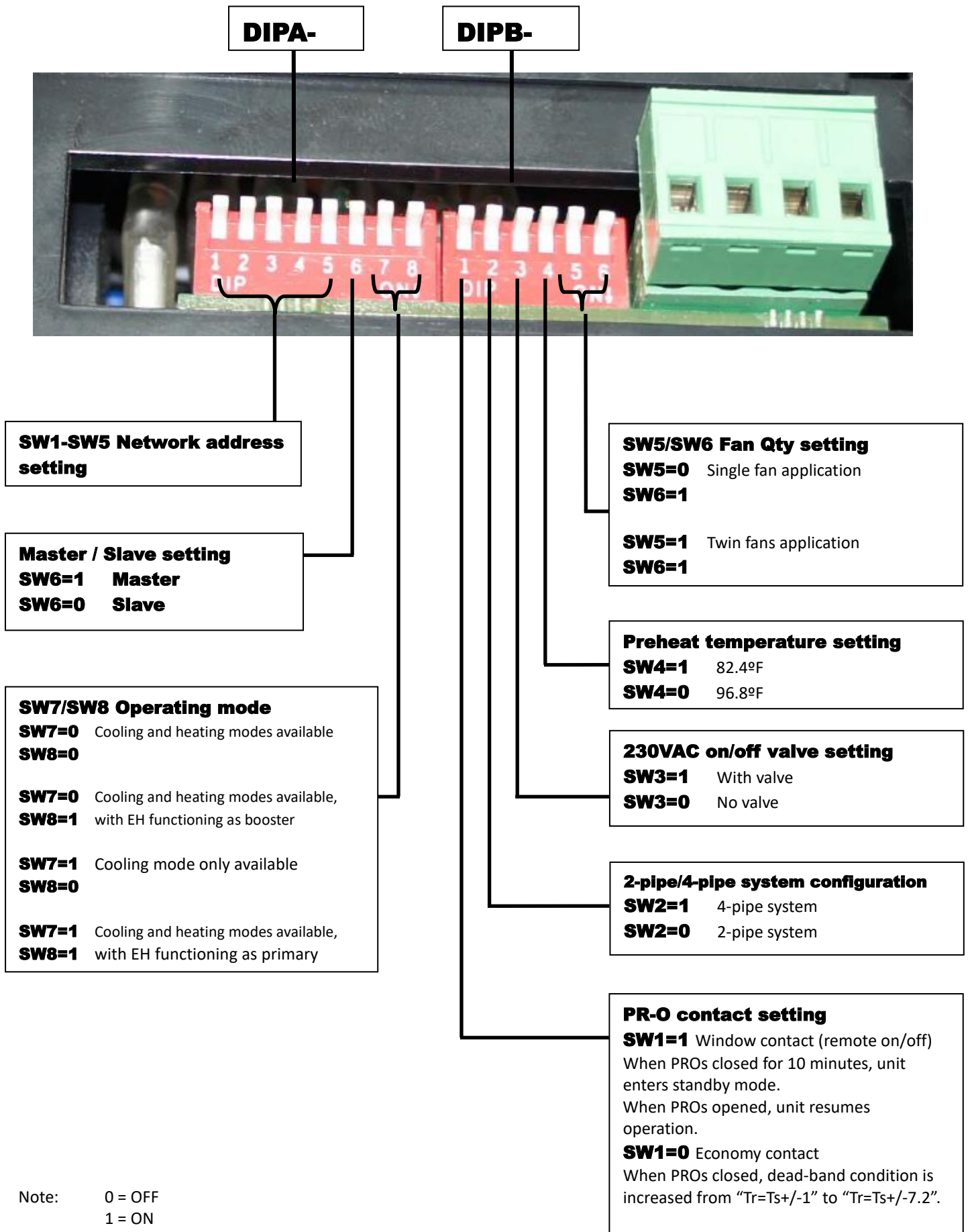
SW1-5: set the unit address
SW6: set unit type: master or slave

Mode Configuration
 SW7=0;SW8=0; unit operates in cooling/heating
 SW7=0;SW8=1; unit operates in cooling/heating with 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 contact setting;
 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/N ----115/220Vac 60Hz Power supply,
 VALVE1(Y1): 24V on/off valve output (2pipe :cooling/heating ; (4pipe:cooling)
 VALVE2(W1): 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 temoaturesensor 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)

D.3. Configuration Settings



Note: 0 = OFF
1 = ON

AIR CONDITIONER 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 air conditioner.

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 air conditioner 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 air conditioner 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 Logic For 2-Pipe System

D.4.1. With Valve Configuration

COOL MODE

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

LOW TEMPERATURE PROTECTION OF INDOOR COIL

- If $T_{i1} \leq 35.6^\circ\text{F}$ for 2 minutes, MTV1 and AUX2 are turned off. If indoor fan is set for low speed, it will run at medium speed. If it is set at medium or high speed, it will keep running at the same speed.
- If $T_{i1} \geq 41^\circ\text{F}$ for 2 minutes, MTV1 and AUX2 are turned on. Indoor fan runs at set speed.

FAN MODE

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

HEAT MODE

Heat mode without electrical heater

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

Heat mode with electrical heater as booster

- MTV2 and AUX2 are always off.
- If $T_r \leq T_s - 1.8^\circ\text{F}$ (or -7.2°F if economy contact is activated), heat operation is activated, MTV1 and AUX1 are turned on. Indoor fan runs at the set speed.
- If $T_r > T_s$, heat operation is terminated, MTV1 and AUX1 are turned off. Indoor fan runs at 200rpm
- If $T_{i1} < 104^\circ\text{F}$, the electrical heater is turned on. If $104^\circ\text{F} \leq T_{i1} < 113^\circ\text{F}$, the electrical heater is kept original state. If $T_{i1} \geq 113^\circ\text{F}$, the electrical heater is turned off.
- The range of T_s is $61\text{--}86^\circ\text{F}$
- Indoor fan speed can be adjusted for low, medium, high and auto.
- MTV1 will delay for 30 seconds before it is turned on.
- MTV1 will delay for 120 seconds before it is turned off.

Heat mode with electrical heater as primary heat source

- MTV1, MTV2, and AUX2 are always off
- If $T_{i2} \leq 86^\circ\text{F}$ (or T_{i2} is damaged or disconnected), AND if $T_r \leq T_s - 1.8^\circ\text{F}$ (or -7.2°F if economy contact is activated), heat operation is activated, electrical heater and AUX1 are turned on. Indoor fan runs at set speed.
- If $T_r > T_s$, heat operation is terminated, Electrical heater and AUX 1 are turned off. Indoor fan runs at 200rpm.
- The range of T_s is $61\text{--}86^\circ\text{F}$
- Indoor fan speed can be adjusted for low, medium, high and auto.

Over-heat protection of indoor coil in heat mode

- If $T_{i1} \geq 167^\circ\text{F}$, MTV1, AUX2 and EH are turned off, indoor fan runs at high speed, even in standby mode.
- If $T_{i1} < 158^\circ\text{F}$, unit will keep at original state.
- 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-HEATPre-heat without electrical heater

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

Pre-heat with electrical heater

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

POST-HEATPost-heat without electrical heater

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

Post-heat with electrical heater

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

Over-heat protection of indoor coil in post-heat

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

DEHUMIDIFICATION MODE

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

AUTOMODEAuto cool/heat/heat with electric heater as booster

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

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

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

- Electric heater, AUX1, MTV1 and MTV2 are always off.
- If $T_r \geq T_s + 1.8$ °F (or +7.2°F if economy contact is activated), cool operation is activated, AUX2 is on. Indoor fan runs at set speed.
- If $T_r < T_s$, cool operation is terminated, AUX2 is off. Indoor fan is turned off.
- The range of T_s is 61-86 °F
- 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

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

FAN MODE

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

HEAT MODE

Heat mode without electrical heater

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

Heat mode with electrical heater as booster

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

PRE-HEAT

Pre-heat with electrical heater

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

POST-HEAT

Post-heat with and without electrical heater

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

Over heat protection of indoor coil in post-heat

- If $T_{i1} \geq 167$ °F, AUX1 is turned off, indoor fan remains on and runs at high speed.
- If $T_{i1} < 158$ °F, AUX1 is turned on, indoor fan remains and runs at set speed.
- 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

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

AUTOMODE Not available.

D.5. Control Logic For 4-Pipe System

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

COOL MODE

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

LOW TEMPERATURE PROTECTION OF INDOOR COIL

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

FAN MODE

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

HEAT MODE

Without Electrical Heater

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

With Electrical Heater as Booster

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

PRE-HEAT

Without Electrical Heater

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

With Electrical Heater

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

POST HEAT

Without Electrical Heater

- a) If $Ti2 \geq 100\text{ }^\circ\text{F}$, when MTV2 and AUX 1 are off, indoor fan continues to run at set speed.
- b) If $97\text{ }^\circ\text{F} \leq Ti2 \leq 100\text{ }^\circ\text{F}$, when MTV2 and AUX1 are off. Indoor fan keeps original state.
- c) If $Ti2 < 97\text{ }^\circ\text{F}$, MTV2 and AUX1 are off. Indoor fan runs at 200 rpm.
- d) If indoor coil temperature coil is damaged, post-heat time is set for 3 minutes with indoor fan running at set speed.

With Electrical Heater

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

OVER HEAT PROTECTION OF INDOOR COIL

- a) If $Ti2 \geq 167\text{ }^\circ\text{F}$, MTV2 and AUX1 are turned off, indoor fan remains on and runs at high speed.
- b) If $Ti2 < 158\text{ }^\circ\text{F}$, MTV2 and AUX1 are turned on, indoor fan remains on and runs at set speed.
- c) If indoor coil temperature sensor is damaged, the protection mode will become obsolete and the unit will work as the Pre-heat and Post-heat set times.

DEHUMIDIFICATION MODE

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

AUTOMODE

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

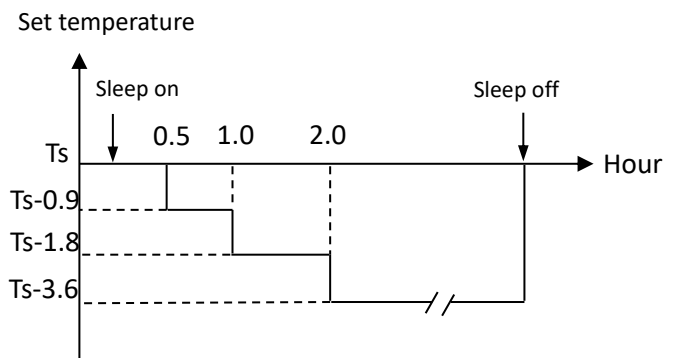
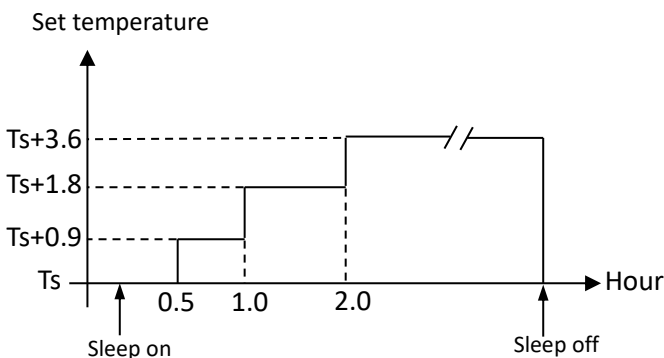
Note: AUTO COOL or AUTO HEAT operations are the same as COOL or HEAT mode respectively.

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 2.6 $^\circ\text{F}$ 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 $^\circ\text{F}$ 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% to 100%.

D.8. Modulating Valve Control Under Energy Saving Mode

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

D.9. Buzzer

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

D.10. Auto Restart

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

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

- This is a tact switch to select Cool→Heat→Off operation mode.
- In COOL mode, the set temperature of the system is 75 °F with auto fan speed. There are no timer and sleep modes.
- In HEAT mode, the set temperature of the system is 75 °F with auto fan speed. 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.12. Drain Pump (Optional)

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.

CAUTION

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

D.13. Float Switch

Float-switch opens before unit is turned on

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

Float switch is opened, when unit is turned on

- If the float switch is opened continuously ≥ 5 seconds, then the drain pump will work and MTV1 will remain off.
- After 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, then MTV1 will remain off. The indoor fan runs at set speed and the system reports an error.

Float switch is opened, when unit is turned off

- If the float switch is opened, then the drain pump will work.
- After 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, then the system reports an error.

D.14. Electric Heater Safety Switch

- Before EH is turned on, EH safety switch must be closed and EC motor RPM must be more than Modbus 310000 setting.
- When EH is running, EH safety switch is opened for ≥ 1 second or EC motor RPM is lower than Modbus 310000 setting, EH will be turned off immediately and report an error and fan speed will change to high speed.
- Once the contact is closed ≥ 180 seconds, the error will be reset and the heater will start again.
- When EH safety switch is opened ≥ 3 times within 60 minutes, the heater is not allowed to start anymore.
- Turn off the unit to reset the fault, provided that the switch has returned to the closed position.

D.15. Low Temperature Protection of Indoor Coil in Winter

This is frost protection for when the unit is off to prevent water in the coil and room from freezing.

If Unit with SW2=0 (2-pipe system), it is in Standby Mode.

If $T_r \leq 35.6$ °F for 2 minutes, MTV1 is turned on, AUX1 is closed, DA2 is 10VDC. If $T_{i1} < 41$ °F for 2 minutes, EH (if present) is turned on. Indoor fan is turned on at low speed.

If $T_r \geq 41$ °F for 2 minutes, MTV1 is turned off, AUX1 is open, DA2 is 0 Vdc. EH (if present) is turned off. Indoor fan is turned off.

If Unit with SW2=1(4-pipe system), it is in Standby Mode.

If $T_r \leq 35.6$ °F for 2 minutes, MTV2 is turned on, AUX1 is closed, DA3 is 10Vdc. If $T_{i2} < 41$ °F for 2 minutes, EH (if present) is turned on. Indoor fan is turned on at low speed.

If $T_r \geq 41$ °F for 2 minutes, MTV2 is turned off, AUX1 is open, DA3 is 0Vdc. EH (if present) is turned off. Indoor fan is turned off.

D.16. LED Indication and Error Description

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



Complete Function PCB		
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	<i>Only for unit with EH.</i> EH protection switch is opened.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 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 °F.	Check the water temperature.
Indoor coil over heat protection	Green LED blink 6 times, stop 3 sec	Water temperature is higher than 158 °F.	Check the water temperature
Water pump failure	Green LED blink 7 times, stop 3 sec	Float switch is opened.	<ol style="list-style-type: none"> 1. Check the condensate water pipe connected or not. 2. Check the pump functioned or not.
EC motor failure(CN4)	Green LED blink 9 times, stop 3 sec	No EC motor feedback	<ol style="list-style-type: none"> 1. Check DIPB-SW5 and SW6 setting. 2. Check the EC motor.
EC motor failure(CN5)	Green LED blink 10 times, stop 3 sec	No EC motor feedback	<ol style="list-style-type: none"> 1. Check DIPB-SW5 and SW6 setting. 2. Check the EC motor.
Anti-frozen protection	Green LED blinks 11 times, stops for 3s	When unit is standby, Tr<35.6°F	Turn on unit to keep Tr higher than 41°F

D.17. Master – Slave Network

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

Master Unit Function

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

Slave Unit Function

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

D.17.1. Master Unit Control Settings

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

Using Remote Control Handset to Set Master Control Unit:

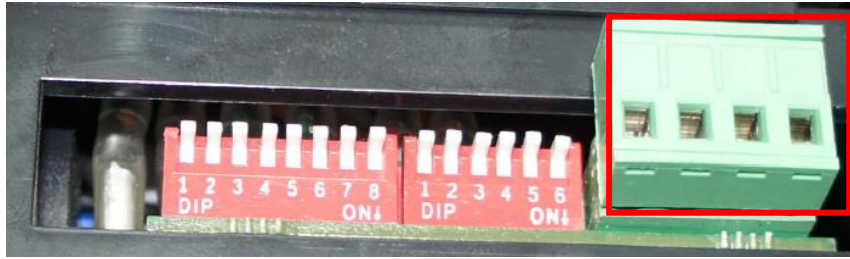
1. Connect all the units' PCBs according to the wire color and type of connector.
2. Select the master unit by setting DIPA-S1 SW6 to ON (=1) in the PCB.
3. Ensure the DIPA-S1 SW6 is set to OFF (=0) in the PCB on each slave unit.
4. Switch on the units by connecting the main power supply.
5. Using the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

Using Wall pad to Set Master Control Unit:

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

D.17.2. Master – Slave Network Setup

- 1) Disconnect the communication plug from the SK-NCGH-001-ECM



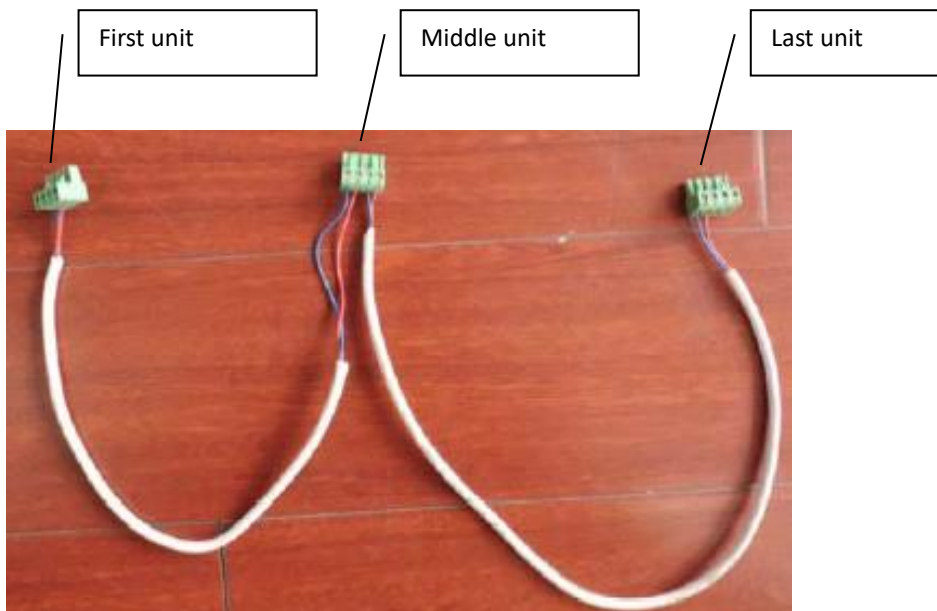
- 2) Communication plug

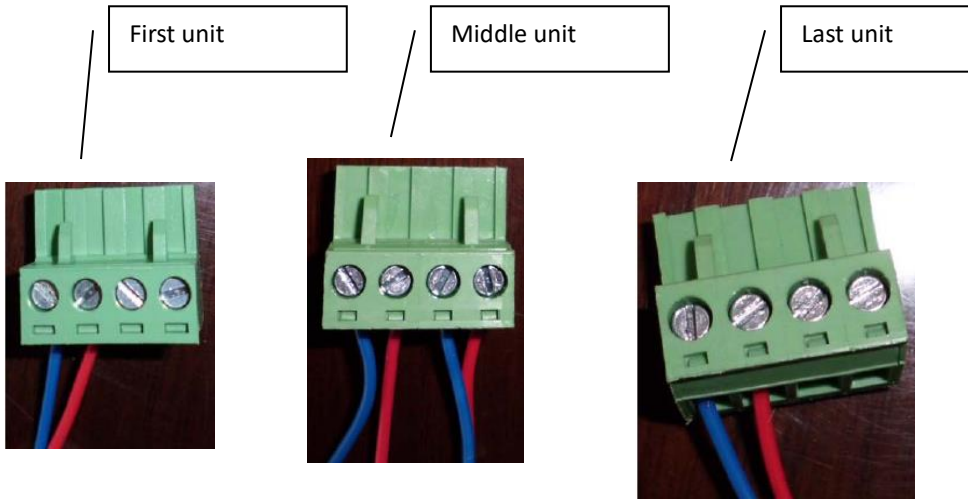
A, B, A, B is printed on the main PCB. When you connect the wires, please ensure connection of A to A and B to B.



- 3) Connection wire

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

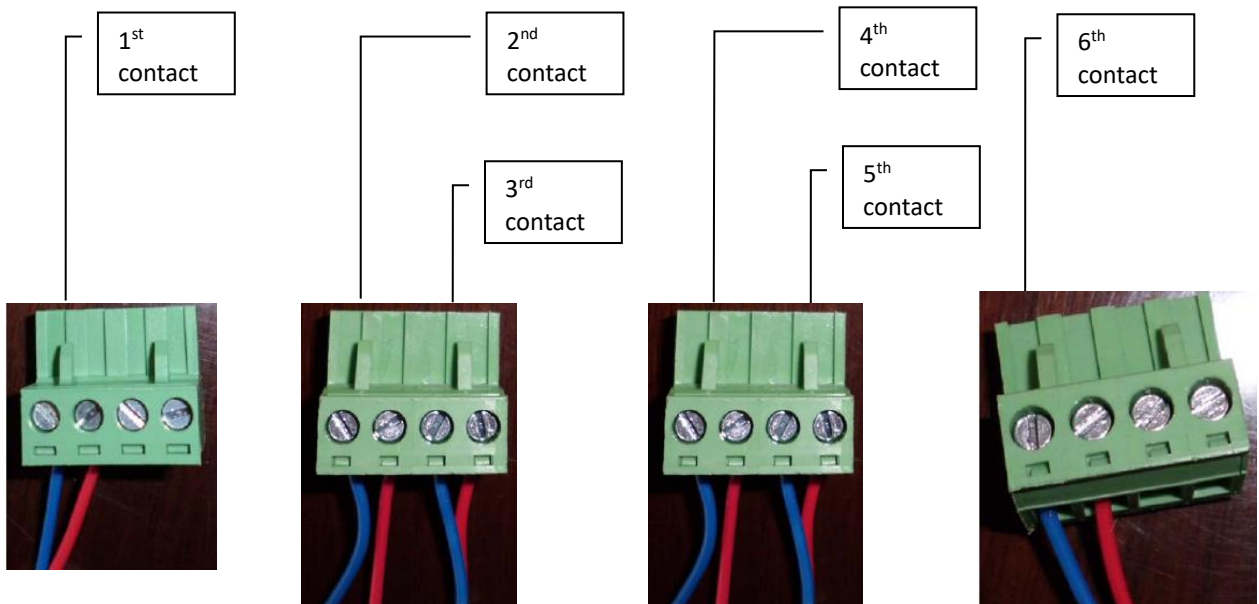




3.3) Wire connection check

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.



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

D.18. 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: 1 degree F.

Supported Functions:

Function Code	Function Description
01(01H)	Read Coils
02(02H)	Read Discrete Inputs
03(03H)	Read Holding Registers
04(04H)	Read Input Registers
05(05H)	Write Single Coil
06(06H)	Write Single Register
15(0FH)	Write Multiple Coils
16(10H)	Write Multiple Registers
255(FFH)	Extended Commands which 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 to 100015		

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	
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 degree F (actual*10 format)
Address setting	300004	R	Set by dip-switch, reading only
Reset	300005	W	=0x33 reset error
Week	300006	W	Calibration wired wall pad and set timer function
Hour	300007	W	Calibration wired wall pad and set timer function
Minute	300008	W	Calibration wired wall pad and set timer function
Second	300009	W	Calibration wired wall pad and set timer function
Hours in Timer on	300010	R/W	Timer ON
Minute in Timer on	300011	R/W	Timer ON
Hours in Timer off	300012	R/W	Timer OFF
Minute in Timer off	300013	R/W	Timer OFF
Icon of Timer ON or OFF	300014	R/W	BIT0 = Icon of Timer ON BIT1 = Icon of Timer OFF 1 = enable 0 = disable
Minimum Valve opening Position	300015	R/W	Default 25% (2.5vdc)
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 = Anti-frozen error 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	
DA2 signal	400014	R	
DA3 signal	400015	R	

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

E. Control Specifications: Flexible Function PCB W Type

E.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.

E.2. I/O Port Definitions

I/O Port		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	G2	24VAC input signals from wired thermostat	
	Medium fan speed	G1		
	Low fan speed	G0		
	Phase	L1	220V/1Ph/60Hz 115V/1Ph/60Hz	
	Neutral	N		
	Earth	PE		
Signal Input	Modulating signal	AI2	EC motor control signal input (standard 0~5VDC; optional 0~10VDC)	
Digital input	Programming interface	TTL	Low voltage digital signal input for board programming	
	Float switch	FLOAT	Alarm Contact (NC)	
Voltage output	Water pump	PUMP	Voltage output (L)	
	EC motor	CN1, CN2	5-wire connection EC motor output	
Digital output	LED display	X-DIS	Low-voltage output	

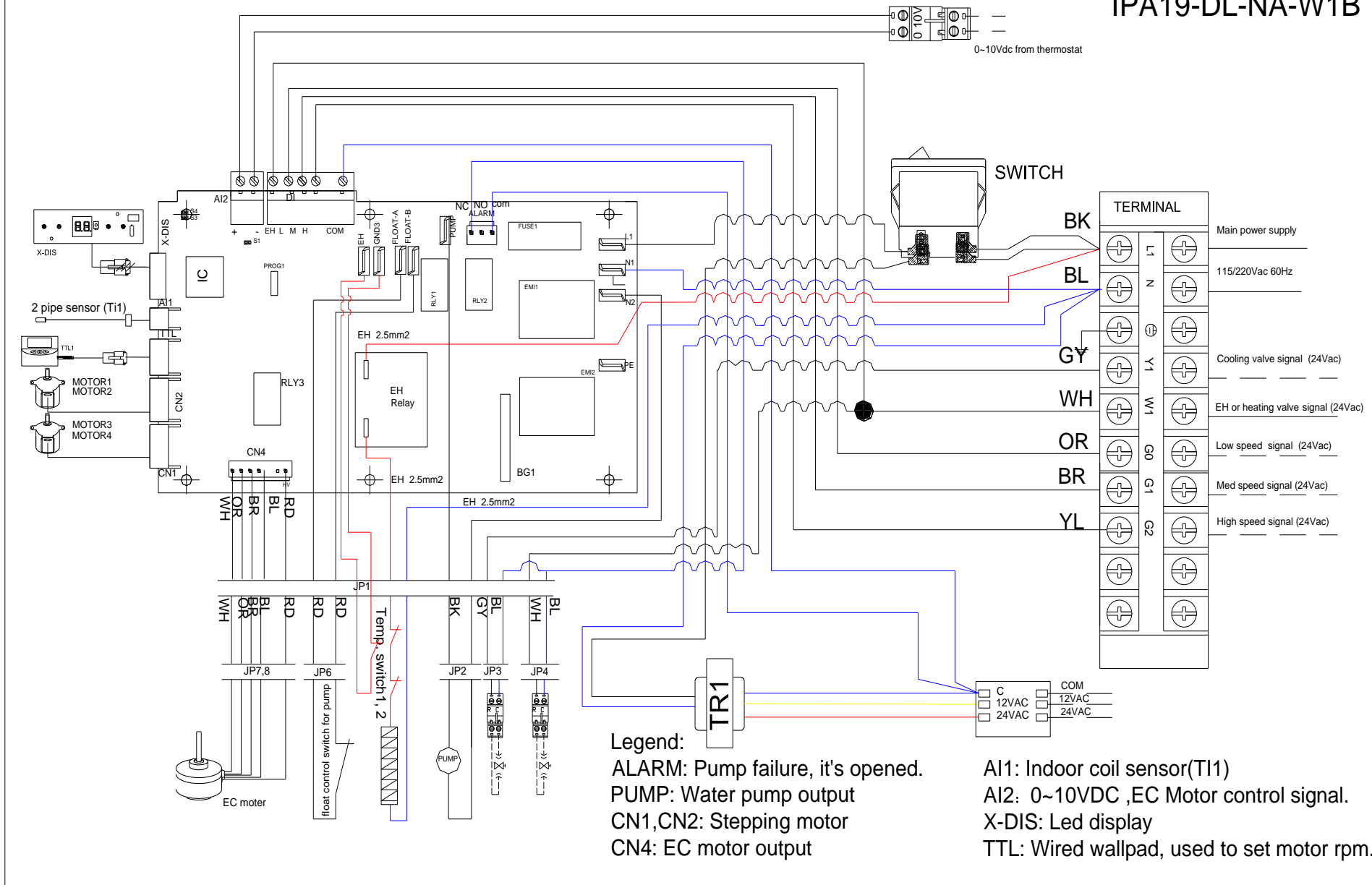
The PCB can be configured for different modulating signal inputs. Refer to jumper configuration table below.

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

E.3. Wiring Diagram for W Type Control

NA-EC-W1B unit wiring scheme

IPA19-DL-NA-W1B



E.4. Control Logic Specification for W Type Control

E.4.1. Unit Power ON/OFF

- The unit is turned ON when any of the fan speed inputs (G0/G1/G2) is ON or motor signal input is more than 2Vdc.
- The unit is turned OFF only if all of the fan speed inputs (G0/G1/G2) are OFF and motor signal input is less than 2Vdc.

E.4.2. Alarm Protection and Error Display

- If float switch is opened for 5 minutes or EC motor is failed, NC alarm contact will be opened and NO alarm contact will be closed.
- If float switch is opened for 10 minutes or EC motor is failed, LED display reports a condensate management failure (see table on the next page).

E.4.3. Drain Pump Management

- When the unit is turned ON: If $Ti1 < 57.2^{\circ}F$, the drain pump is turned ON. If $57.2^{\circ}F \leq Ti < 60.8^{\circ}F$, the drain pump keeps original state. If $Ti1 \geq 60.8^{\circ}F$, the drain pump is turned OFF.
- When the unit turns OFF and the drain pump is ON: The drain pump remains ON for 5 minutes, then turns OFF.
- At any time: If the float switch contact is opened, the drain pump is turned ON. If the float switch contact is opened and then closed, the drain pump remains ON for 5 minutes, then turns OFF.

E.4.4. Modulating Signal Input

- The standard configuration is for 0~5VDC motor control signal input.
- The optional configuration is for 0~10VDC motor control signal input. Changing the control signal input, the S1 jumper must be closed.

E.4.5. Electrical Heater Operation

- When unit is powered, providing EH signal will close the EH relay and EC motor runs higher than 300 RPM.
- EH relay is opened at once when EC motor fail to function or lower than 300 RPM.

E.4.6. Low Temperature Protection of Indoor Coil in Winter

This is frost protection when the unit is off to prevent water in the coil and room from freezing.

When unit is in Standby Mode, if $Ti1 \leq 35.6^{\circ}F$ for 2 minutes, it reports error code and the buzzer beeps.

E.5. LED Indication and Error Description (Optional)

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

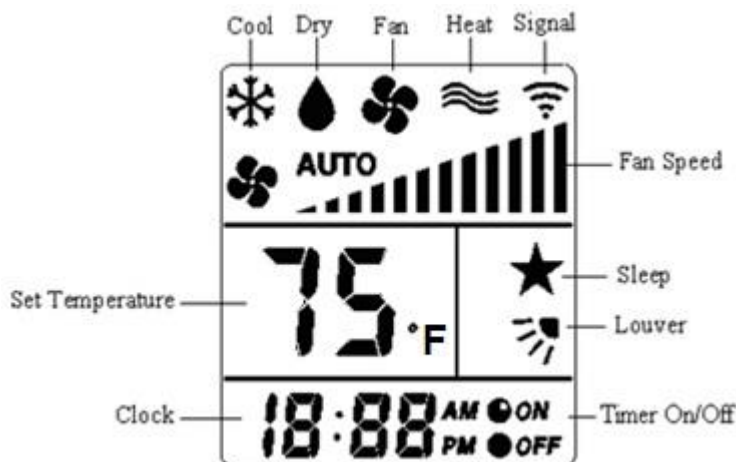
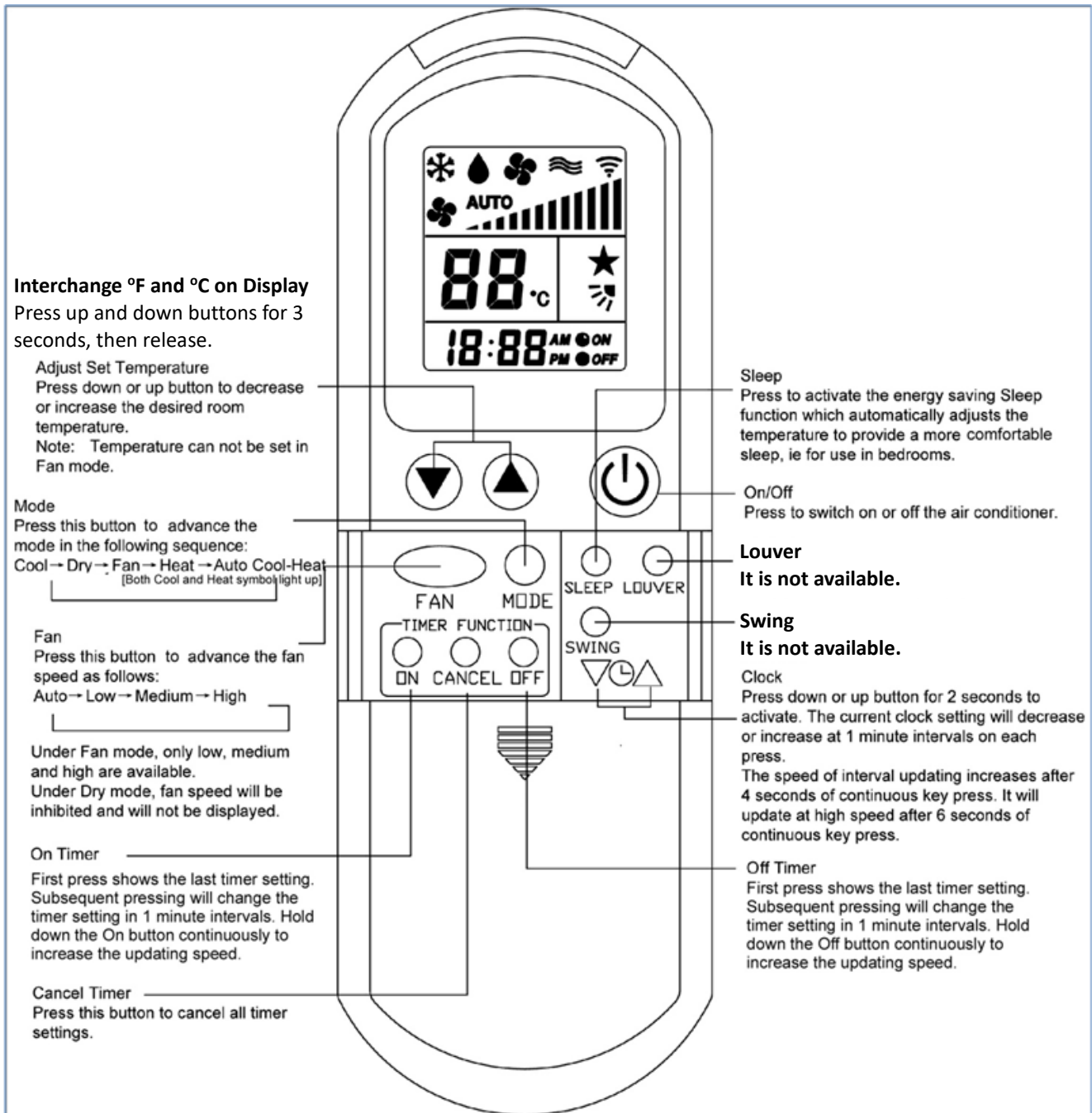


Flexible Function PCB		
Fan speed setting	LED indication	Condition
High speed	Red LED On	Normal
Medial speed	Yellow LED On	Normal
Low speed	Green LED On	Normal

For all units - Green LED blinks			
Item	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	Check the EC motor
Anti-frozen protection	Green LED blinks 11 times, stops for 3s	When unit is standby, $Ti1 < 35.6^{\circ}F$.	Turn on unit to keep Ti high than $41^{\circ}F$

F. Accessories

F.1. Remote Handset for S Type Control



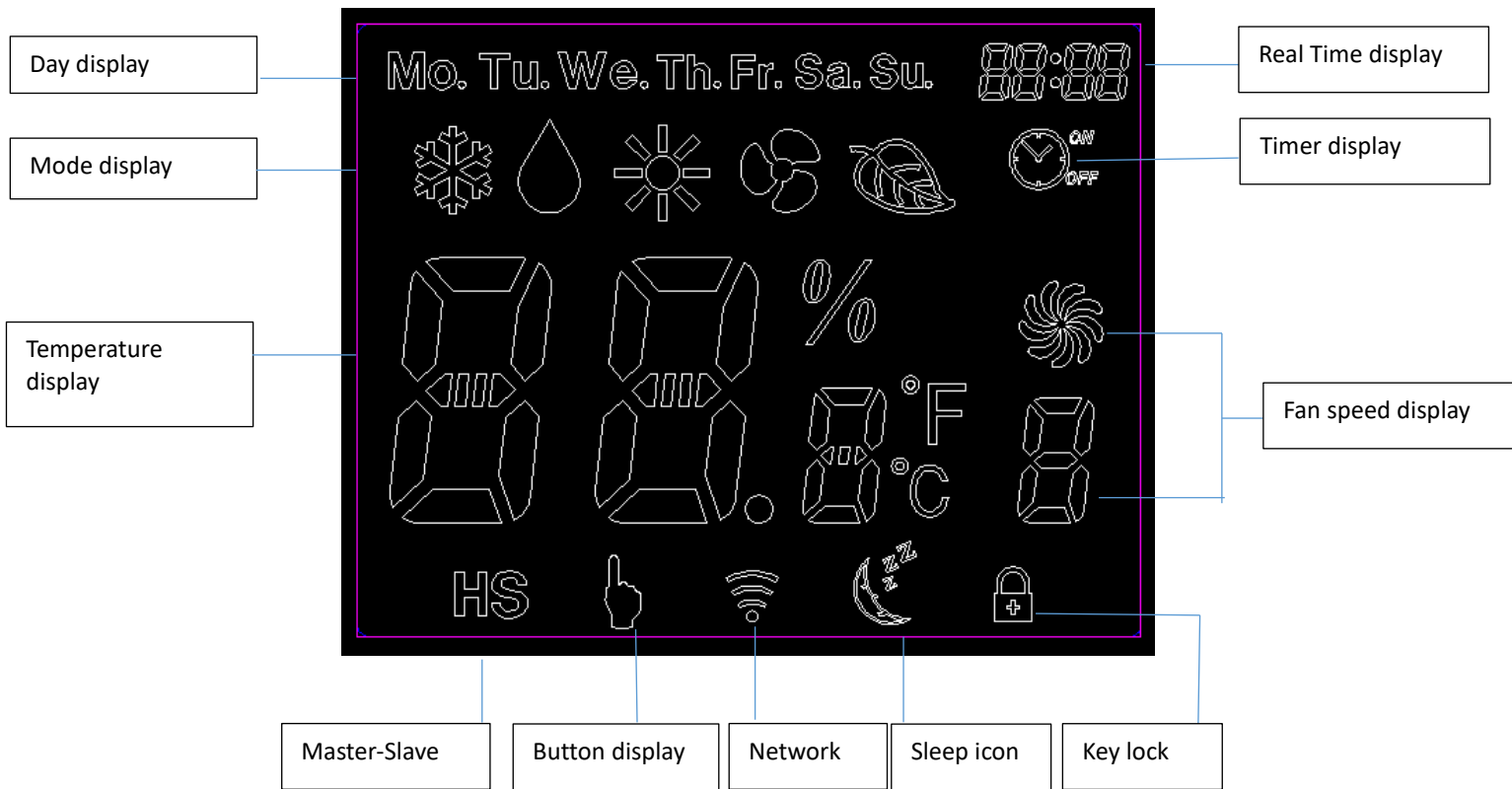
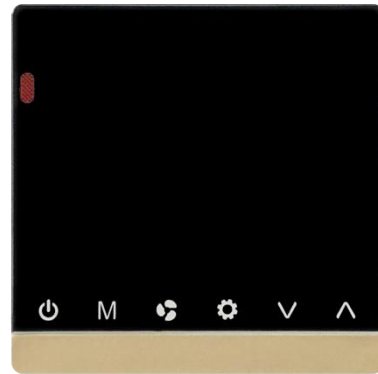
Attention

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







“Louver” and “Swing” are not applicable.


AHRI version uses degree F setting.

F.2. Wired Wall Pad for S Type Control



1. Buttons function


Button						
Name	ONOFF	MODE	FAN	SET	DOWN	UP
Function	Switch on or off the unit	Switch between modes	Change Fan Speed	Switch interfaces	Modify parameters	Modify parameters

Press  to change function setting: (CNT stands for pressing times)

- (1) CNT=0 : No function
- (2) CNT=1 : Real time setting
- (3) CNT=2 : Timer On/Off setting
- (4) CNT=3 : Sleep or swing settings
- (5) CNT=4 : Network control (Single control) mode setting
- (6) CNT=5 : Global control
- (7) CNT=6 : Parameters checking






2. Real time setting


“:” blinks for every second when real time is shown. Press  once to enter Real Time setting interface. When “:” is on, then press  or  to adjust the current time. Press  to adjust date. Press  to adjust hour or minute.

Press  to confirm settings and exit. If no operation within 6 seconds, it will automatically exit and the setting will not be saved.



3. Time On/Off setting



If the master unit is in global control mode and the ON/OFF timer setting is selected, the master unit will command the whole network to be ON or OFF. Otherwise, the ON/OFF timer affects the local unit only. The system supports ON/OFF timer settings for each day of the week.


Press  twice to enter Timer setting interface and timer icon is on. When “ON” blinks, press  to set timer date (from Monday to Sunday). Press  to set hour and minute of timer-on or timer-off alternately. “ON” blinks when timer is set to on and “OFF” blinks when timer is set to off. Press  or  to set timer on/off time.


Press  to confirm settings and exit. If no operation within 6 seconds, it will automatically exit and the setting will not be saved. Timer on/off icon is on when timer on/off is set on that day.

4. Swing or Sleep setting



Press  three times to enter Swing or Sleep setting interface and key lock icon blinks. Press  to turn the sleep function on or off. Sleep icon is on or off when sleep function is turned on or off.


Press  to turn on or off the swing function.  is on when swing function is on.

Press  to select room sensor in the wall pad or in the unit. If “□” is shown in the area of fan speed display, the sensor in the wall pad is activated. If “F” is shown in the area of fan speed display, the sensor in the unit is activated.

Press  to confirm settings and exit. If no operation within 6 seconds, it will automatically exit and the setting will not be saved.

5. Temperature setting

Press  or  to set temperature. Set point temperature is shown on temperature display area.

Press  to confirm settings and exit. If no operation within 6 seconds, it will automatically exit and the setting will not be saved.


When DIP SW1=ON, set point temperature is fixed. In cooling mode, set point temperature is 24°C. In heating mode, set point temperature is 21°C.

When DIP SW1=OFF, temperature can be set from 16°C to 30°C.



When DIP SW2=ON, set point temperature is shown on temperature display area.

When DIP SW2=OFF, room temperature is shown on temperature display area.


6. Mode setting

Press  to set COOL, HEAT, FAN or DRY mode alternatively.


7. Key Lock

Press  and  to set key lock function. Key lock icon is on or off when key lock function is set to on or off.



8. Fan speed setting

Press  to set LOW, MEDIUM, HIGH or AUTO speed.


9. ON/OFF setting



Press  to turn on or off the unit.


10. Temperature unit setting


Press  and  at the same time to change temperature unit between Celsius and Fahrenheit.












11. Network control (Only master unit can control slave units)


Press  four times to set network control and "Network" icon is on. The slave unit number is blinking in real time display area.

Press  or  to select slave unit which is online. The offline slave unit number is not shown.


Press  to select parameters: ON/OFF unit, temperature, mode, fan speed, swing and sleep.


Press  to set the selected parameter.


- 1) ON/OFF unit: Press  button once, "H" blinks in master-slave display area, then press  to turn on unit ("H" blinks) or turn OFF unit ("S" blinks).
- 2) Temperature: Press  twice, temperature blinks in temperature display area, then press  or  to set temperature.
- 3) Mode: Press  three times, Mode icon blinks in mode display area, then press  to select mode.
- 4) FAN SPEED: Press  four times, fan speed icon blinks in fan speed display area, then press  to set fan speed.
- 5) Sleep: Press  five times, sleep icon blinks then press  to set sleep mode.


Press  to confirm settings and exit. If no operation within 6 seconds, it will automatically exit and the setting will not be saved.

12. Global control setting


Press  five times to set global control and "NETWORK" icon blinks.






1) Press , timer on/off icon blinks and all slave units' timer on/off function setting are cancelled.

2) Press , all slave units time are set to the same as master units.

Press , master unit sends commands to all online slave units. "NETWORK" icon is off. If timer on/off function is set on mater unit, "NETWORK" icon blinks until Timer on/off disappears.

13. Parameter checking

Press  six times to enter parameter checking interface. Local unit parameter is shown in temperature display area. Unit number is shown in real time hour area and parameter number is shown in real time minute area. For example, 2:03 stands for

No.2 unit and No.3 parameter. Press  and  to select the specific parameter. Press  and  to select unit number. Press  to exit parameter checking interface.

Parameters shown below:

Temp. area	Time area
C0	Return air temperature
C1	Indoor coil 1 temperature
C2	DIP switch setting
C3	Indoor coil 2 temperature

14. Error codes

When unit error is detected, unit number blinks on real time hour area and Error code blinks on real time minute area. The Error codes display alternately if more than one error is detected.

If there is no slave unit online, only error code is shown in real time minute area.





Error code table:

Error reason	Error code
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
Water pump faulty	E7
Local communication error	EC0

15. EC motor RPM setting (Not available in AC motor unit)

DIP SW3 is used to set EC motor RPM.

When DIP SW3=ON, wired wall pad enters setting interface. D1/D2/D3 is shown in temperature display area and EC motor RPM is shown in real time display area.

Press  and  to select motor speed (D1, D2 or D3). Press  or  to set EC motor RPM. After 3 seconds, the setting is valid.

When DIP SW3=OFF, wired wall pad resumes normal operation

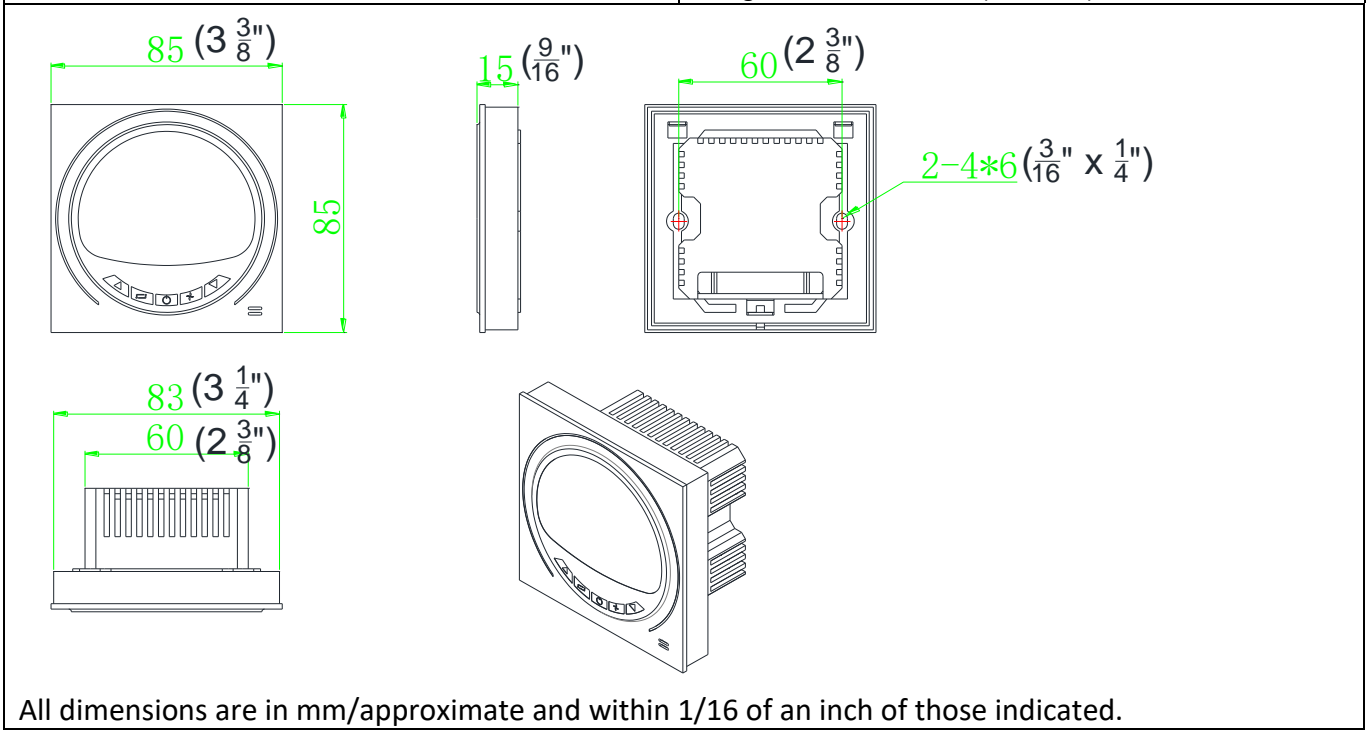
F.3. EC Thermostat for W Type Control

F.3.1. Functions and Dimensions



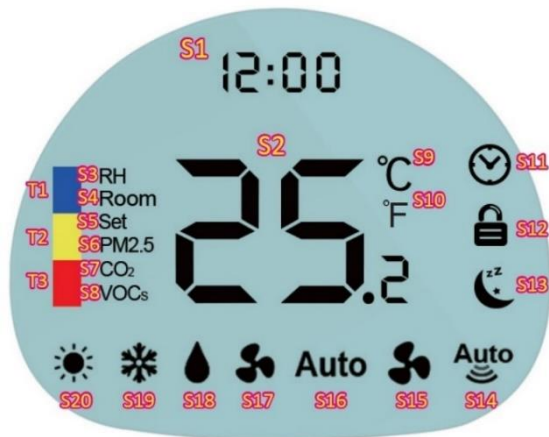
AC/EC thermostat is used to control fan coil unit (AC version/EC version, 2-pipe/4-pipe), or 2-pipe fan coil unit plus floor heating or floor radiated system. The thermostat can control on/off or modulating valve and communicate with chiller and boiler or heat pump.

<ul style="list-style-type: none"> Detect and Display room temperature Room temperature setting Fahrenheit or Celsius degree display Timed sleep AC/EC signal control AC/EC motor 3-speed control Motorized valve control 0~10Vdc Modulating valve control EC motor RPM control Low temperature protection Remote ON/Off RS485 Interface (Modbus) 	<ul style="list-style-type: none"> Set temperature range: 16 - 30°C Accuracy displayed: 0.1°C Accuracy: ±0.5°C Rated Power: 1 W Sensor type: NTC Display: LCD Supply Voltage: 12V±10%, 50Hz/60Hz Fan Output signal: AC 230V (rated 3A) or 24V Valve Output signal: AC 230V (rated 10W) or 24V Input signal: Dry contact (NO) Dimensions: 85×85×23mm (3 3/8" x 3 3/8" x 15/16") Fixing screw width: 60mm (Standard)
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All dimensions are in mm/approximate and within 1/16 of an inch of those indicated.

F.3.2. Display



- S1: Real Time
- S2: Temp Display
- S3: RH
- S4: Room Temp
- S5: Set Temp
- S6: PM2.5 (ug/m3)
- S7: CO2 (ppm)
- S8: VOCs (PPb)
- S9: Degree C
- S10: Degree F
- S11: Timer ON/OFF
- S12: Keypad Lock
- S13: Sleep Mode
- S14: H/M/L/Auto Speed
- S15: Fan
- S16: Auto mode
- S17: Fan mode
- S18: Dehumidification mode
- S19: Cooling mode
- S20: Heating mode
- T1 (Blue): Excellent Air Quality
- T2 (Yellow): Good Air Quality
- T3 (Red): Poor Air Quality

F.3.3. User Operation

Button					
Name	On/Off	Mode	Up	Down	Fan
Function	Switch on or off the unit	Switch between modes	Modify parameters	Modify parameters	Change Fan Speed

Lock Screen: Press and at the same time for 5 seconds until displayed to lock the screen.

Press and for 5 seconds again until disappeared to unlock the screen.

Boot by Timer: When power is off, press for 5 seconds to enter Boot by Timer interface. Range is from 0 to 720 minutes. Time is increased by 30 minutes for every press.

Off by Time: When power is on, press for 5 seconds to enter Off by Timer interface. Range is from 30 to 720 minutes. Time is increased by 30 minutes for every press.

Sleep Mode: When power is on, press for 5 seconds until displayed.

When the module is off, press and hold and for 5 seconds to enter Parameter Setting Mode. Press to select parameters from 1 to 20.

Parameter 1: Unit Type, 4 = FCU Thermostat, Function Keys are Cooling, Heating, Fan Modes. Displays Temperature only. 5 = Floor Heating Thermostat, Function Keys are Cooling, Heating Modes. Displays Temperature only. 6 = Independent Thermostat, Function Keys are Cooling, Heating, Fan Modes. Displays Temperature, RH, CO2, PM2.5 values.

Parameter 2: Temperature Display, 0 = Celsius, 1 = Fahrenheit.

Parameter 3: Sensor Display, 0 = Room temperature value, 1 = Set temperature value.

Parameter 4: Temperature Range Setting, 0 = Range from 16~30°C, 1 = Fixed at 24°C when Cooling and 21°C when Heating.

Parameter 5: Temperature Band, from 1 to 9, default setting = 1.

Parameter 14: Unit Address, from 0 to 31, default setting = 0.

Parameter 15: ESP, from 0 to 100%, default setting = 40%.

Parameter 16: Temperature Sensor Setting, 0 = Enable Internal and External Sensors, Internal Sensor displays room temperature, External Sensor displays water inlet temperature. 1 = Use External Sensor to detect room temperature if connected, use Internal Sensor to detect room temperature if External Sensor is disconnected.

Parameter 17: Unit Configuration, 0 = 2-pipe, 1 = 4-pipe, 2=2-pipe+floor heating, 3=2-pipe+floor cooling + floor heating

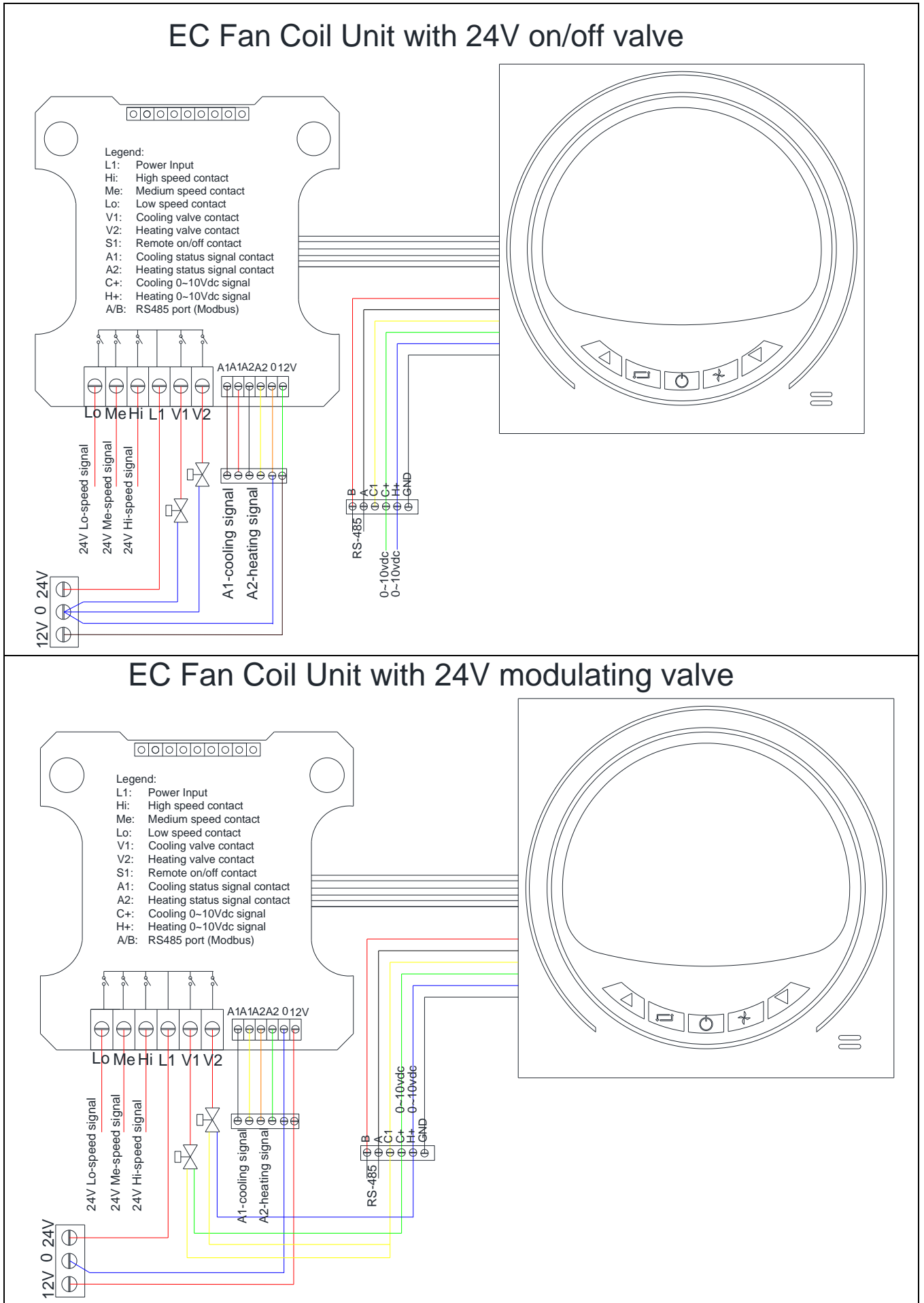
Parameter 18: Fan Control Mode, 0 = DA, in cooling mode, fan is still on when setting temperature is achieved.

1 = DB, in heating mode, fan is off when setting temperature is achieved.

Parameter 19: Thermostat C+ Setting: 0 = Fan control signal, 1 = Modulating valve control signal

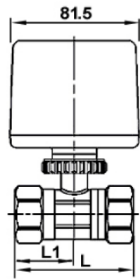
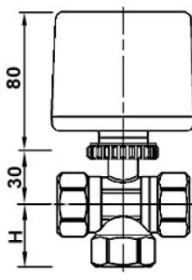
Parameter 20: Reserved.

F.3.4. Wiring Diagrams

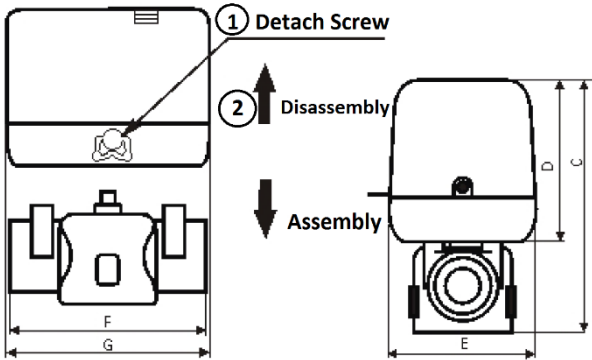


F.4. Valve Information

F.4.1. ON/OFF Valve

Models				
1. 2-way ball valve with 3/4" or 1" connectors and on/off motorized actuator				
2. 3-way ball valve with 3/4" or 1" connectors and on/off motorized actuator				
Specifications				
Medium: Cool/Hot water or 60% glycol			Body: Forged brass, nickel plated	
Structure: Two way or Three way			Ball: Chrome plated brass	
Operating Mode: On/Off			Stem: Brass	
Power Supply: 24VAC			Seats: Fiberglass reinforced Teflon PTFE	
Power Consumption: 6W (during valve position change)			Seal: 2 EPDM O-rings, lubricated	
Running Times: 15 sec.			Pressure Rating: 2MPa	
Pipe Fitting: NPT internal thread			Media Temp. Range: 34°F to 203°F (1°C to 95°C)	
			Max. Differential Pressure: 1MPa	
			Protection Grade: IP65	
Dimensions and Cv Values				
				
		2-way Valve		
		3-way Valve		
Size	Cv Value	L	L1	H
3/4" (DN20)	8.67	2 5/8	1 5/16	1 7/16
1" (DN25)	15.05	3 7/16	1 3/4	1 9/16
All dimensions are approximate within 1/16 of an inch of those indicated.				

F.4.2. Modulating Valve

Models							
1. 3/4" or 1" inch 2-way modulating valve and 24VAC actuator with 0-10VDC input.							
2. 3/4" or 1" inch 3-way modulating valve and 24VAC actuator with 0-10VDC input.							
Specifications							
24V AC power supply				Media Temp. Range: 34°F to 203°F (1°C to 95°C)			
0~10VDC control signal				Rating pressure: 2.0MPa			
Bi-directional modulating proportional control				Max. Differential Pressure: 0.3MPa			
Working media: cool/hot water or with 60% glycol				Opening or closing time: 50 sec. (50Hz) 40 sec. (60Hz)			
				Connection: NPT internal thread			
Dimensions & Kv Values							
							
Size	Type	Cv Valve	C	D	E	F	G
3/4" (DN20)	2-way	5.3	4 1/2	2 7/8	2 5/8	3 1/2	3 9/16
3/4" (DN20)	3-way	5.3	5	2 7/8	2 5/8	3 1/2	3 9/16
1" (DN25)	2-way	5.32	4 5/8	2 7/8	2 5/8	3 11/16	3 9/16
1" (DN25)	3-way	6.59	5 1/2	2 7/8	2 5/8	3 11/16	3 9/16
All dimensions are approximate and within 1/16 of an inch of those indicated.							

G. Sensor Resistance R-T Conversion Table

Resistance : R (77°F) = 10KΩ ± 1%

Beta Constant : B (77/185) = 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	34.02	93.2	6.633	6.794	6.956
33.8	30.35	31.32	32.3	95	6.36	6.517	6.675
35.6	28.85	29.76	30.68	96.8	6.099	6.252	6.407
37.4	27.44	28.29	29.15	98.6	5.85	6	6.151

Resistance : R (77°F) = 10KΩ ± 1%

Beta Constant : B (77/185) = 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				

H. Troubleshooting

