INSTALLATION, OPERATION AND SERVICE MANUAL

VAHU-V/P-EC

SPECIALITY APPLICATION PRODUCTS

Cooke Industries - Phone: +64 9 579 2185 Email: sales@cookeindustries.co.nz Web: www.cookeindustries.co.nz

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.

CESAFETY 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.

WEEEMARK

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

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.

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.

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/ ETL safety approval in the USA and Canada, AHRI 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 THISMANUAL REMAINSWITH THEUNIT.READ THISMANUAL BEFORE PERFORMINGANY OPERATION ON THE UNIT.

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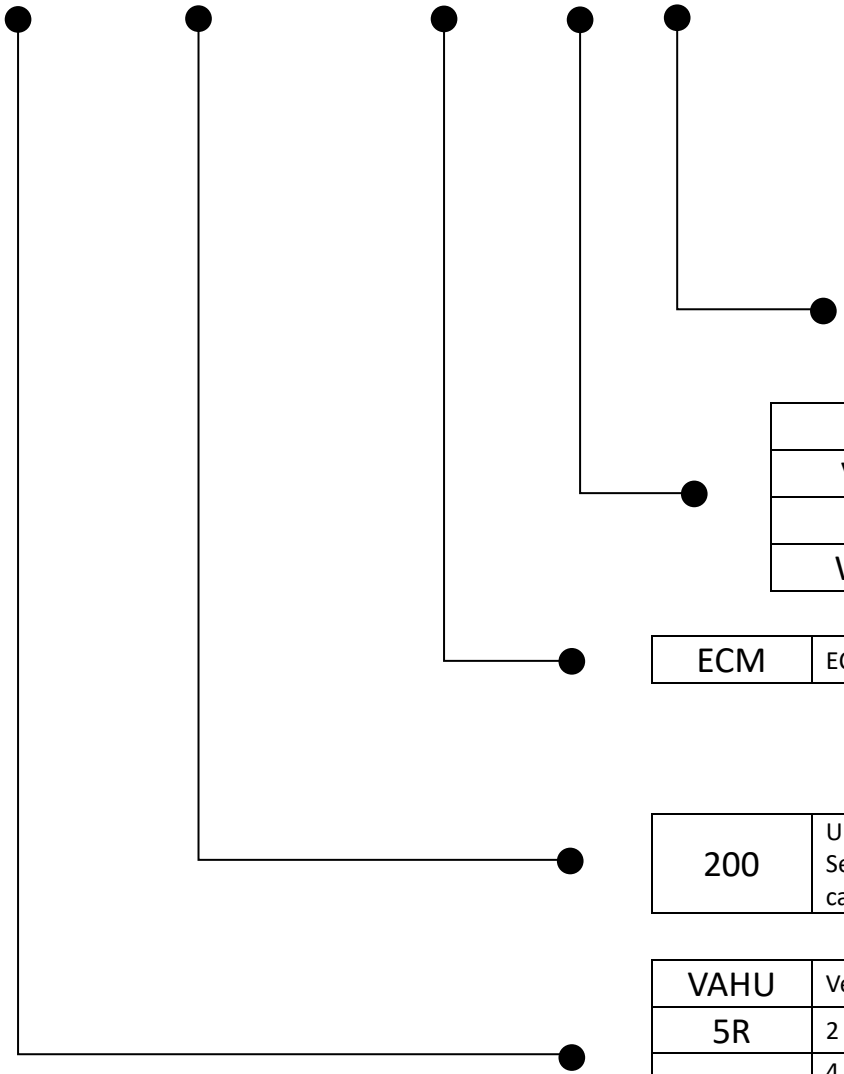
Model Code Nomenclature

VAHU(5R) -200 -ECM -VW -LS



L	Left Side
R	Right Side

P	4-Pipe
V	2-Pipe
I	Intelligent Control
W	Flexible Function Control

ECM	EC motor configuration

200	Unit Sizes. See General Specification Section A for cooling and heating capacities

VAHU	Vertical Air Handling Unit
5R	2 pipes 5 rows
5+2R	4 pipes with 5 rows cooling and 2 rows heating

A. Technical Data

A.1. General Description

VAHU unit is an ideal air handling terminal unit for floor standing installation and suitable for ceiling ducted air distribution. It is constructed of sandwich panels to achieve low noise level during operation. VAHU air handling unit is shipped completely assembled and motor wiring is introduced into the control box to reduce on-site installation time and manpower. Every unit is thoroughly inspected and tested to clear up potential problems during startup. The unit contains side panels that provide easy access to fans, motors and filters.

FRAMEWORK
A frameless structure is used. The panel is integrated folding steel structure and tested to ensure that there is no air leakage.

CASING
Casing is double skinned and basically consists of two panels with internal insulation. Each panel is 1" thick. The inner and outer panels are made of plane galvanized steel and pre-coated galvanized steel. The insulation consists of a high-pressure PU foam sandwiched in between to reinforce the panel.

FILTER
Filter is washable, double-layer acrylic nylon with aluminum frame. G4 (Merv 8) or F8 (Merv 14) filter is optional.

COOLING COIL
The Cooling Coil is standard Cu/Al 3/8" OD. The manifolds are made of steel with threaded connections. The Cooling Coil is provided with manual Air-Vent valve. The aluminum fins are pre-coated for protection by hydrophilic blue fin process. Coils are tested at 30 bar (435 PSI) and recommended operating at no more than 20 bar (300 PSI).

DRAIN PAN
The drain pan extends the full length and width of the coil and is sloped for positive drainage and includes 3/4" male pipe threaded galvanized drain connector.

FAN SECTION
Fans are mainly constructed of housing, impeller, mounting feet, and DC motor. The housing is made of hot-dip galvanized steel. The side panel includes inlet cones whose inlet conditions are designed for optimum aerodynamics. The scroll is fixed on the side panel by spot welding. The wheel is made of hot-dip galvanized steel. The forward curved blades feature an advanced aerodynamic design for maximum efficiency and minimum noise level. The impeller is fixed on the center plate and on the end ring with riveting compression. The impeller is designed for maximum strength and can withstand continuous operation with maximum power. All impellers and motor are fully balanced according to ANSI/AMCA-204 standard.
The mounting feet are made of galvanized steel sheet with unique technical to ensure adequate strength.
VAHU fans are equipped with YZWWSL external rotor BLDC motor. The motor consists of motor body and BLDC driver, controlled by 0~10VDC or Modbus RS485. This new designed motor significantly reduces motor torque fluctuation, vibration and noise resulting in high efficiency, reliability and long-life operation.

CONTROL SYSTEM (W4 /W5type)
A 0~10VDC motor modulating signal is received from thermostat which is powered by R and C or by indoor room terminals Vsp and GND. If the input signal is greater than 2VDC, the unit is turned on. If the control signal is lower than 1.5VDC, the unit is turned off. Motor speed changes from 2~9.5VDC input signal. Motor RPM can be set from 300~1500. The unit is equipped with a 40VA 240~24VAC transformer as standard which supplies 24VAC power input to thermostat and other devices. The transformer is approved by ETL.

Microprocessor controls (EC-S8 type)
The main design features include:
- 2-pipe, 2-pipe with booster electric heat, 2-pipe with primary electric heat, 4-pipe with 6 way valve installed.
- Cool, Heat, Auto, Dehumidifier and Fan modes.
- Sleep, Auto-Fan, Daily Timer, Auto-Restart with memory functions.
- User friendly remote control handset.
- Heat and cool temperature protections and safety cut out.
- 2-way and 3-way on/off or modulating valve control.
- Wired wall pad controller (optional)
- Manual control panel in cabinet.
- Auxiliary switch for cooling and heating signal.
- Occupancy (remote on/off) contacts / economy mode contacts.
- Open Modbus communication protocol.

Variable water flow system
The water flow through the fan coil is controlled by a temperature difference between the flow and return pipework – referred to as Δt, to ensure the correct heat transfer from the water to the air. Constant Δt keep the unit running efficiency and consequently the whole life running costs of the system.

A.2. General Specifications

A.2.1. 2-pipe systems

VAHU(5R)-V-ECM 5-row coil 2-pipe with EC motor(s)

VAHU(5R)-[Size]-V~-ECM					200	300	400	600	800
Unit configuration		Configuration			2 pipes				
		Number of Fan Blowers			1			2	
		Power supply (V/Ph/Hz)			220~240/1/50				
Performance Data	Air	Air flow	H	m^3/hr	2222	3160	4093	6321	8186
			M		1912	2703	3495	5407	6990
			L		1361	1916	2475	3833	4950
		ESP	H	Pa	120				
			M						
			L						
	Cooling	Total Cooling Capacity	H	kW	14.6	20.7	26.3	38.5	50.5
			M		13	18.3	23.3	34.1	44.6
			L		10.1	14	17.8	26	34.1
		Sensible Cooling Capacity	H		10.2	14.5	18.4	27.2	35.5
			M		9.02	12.7	16.1	23.8	31
			L		6.86	9.56	12.2	18	23.4
	Heating	Heating capacity	H	kW	14.61	20.67	26.32	38.43	50.49
			M		13.01	18.31	23.24	34.04	44.58
			L		10.05	13.98	17.75	25.99	34.04
		Max. EH capacity		kW	4.5	6	7.5	9	9
	Sound	Sound Pressure Level (Outlet)		dB(A)	73/68/64	78/73/69	80/75/71	81/76/72	83/78/73
		Sound Pressure Level (Inlet + Radiated)			70/65/61	75/70/66	77/72/68	78/73/69	80/75/70
		Sound Power Level (Outlet)			82/77/73	87/82/78	89/84/80	90/85/81	92/87/82
		Sound Power Level (Inlet + Radiated)			79/74/70	84/79/75	86/81/77	87/82/78	89/84/79
	Electrical	Max. power Input	H	W	412	850	1015	1700	2030
			M		375	650	850	1300	1530
			L		320	350	500	700	1000
		Max. Current		A	1.83	3.69	4.45	7.38	8.9
	Hydraulic	Cooling Water Flow Rate	H	L/h	2506	3545	4515	6592	8660
			M		2232	3140	3986	5839	7647
			L		1724	2397	3043	4457	5838
		Cooling Pressure Drop	H	kPa	54.0	64.9	38.0	38.3	73.6
			M		43.8	52.1	30.4	30.8	58.8
			L		27.5	32.1	18.7	18.9	36.2
		Heating Water Flow Rate @H/M/L		L/h	Same as "Cooling Water Flow Rate"				
		Heating Pressure Drop	H	kPa	48.6	58.4	34.2	34.4	66.2
			M		39.4	46.9	27.4	27.7	52.9
			L		24.8	28.9	16.8	17.0	32.6
		Water Content		L	7.52	9.84	12.16	14.47	17.94
Construction and Packing Data		Water Connections	In	inch	1 1/4”				
			Out						
		Condensate Drainage Connection		inch	1”				
		Dimensions	L	mm	850	1050	1250	1550	1880
			W		670				
			H		1510				

Remarks:

a. Cooling conditions:
- Return air temperature: 27°C DB/ 19°C WB.
- Inlet/ outlet water temperature: 7°C/ 12°C.

b. Heating conditions:
- Return air temperature: 20 °C.
- Inlet water temperature: 45°C.

Water flow same to cooling mode.

4-pipe Systems

VAHU(5R+2)-P-ECM 4-row cooling coil and 2-row heating coil 4-pipe with EC motor(s)

VAHU(5R+2)-[Size]-P~-ECM					200	300	400	600	800
Unit configuration		Configuration			4 pipes				
		Number of Fan Blowers			1			2	
		Power supply (V/Ph/Hz)			220~240/1/50				
Performance Data	Air	Air flow	H	m^3/hr	2222	3160	4093	6321	8186
			M		1960	2738	3528	5475	7055
			L		1417	1957	2513	3913	5026
		ESP	H	Pa	100				
			M						
			L						
	Cooling	Total Cooling Capacity	H	kW	14.62	20.7	26.3	38.5	50.5
			M		13.22	18.5	23.5	34.3	45
			L		10.28	14.3	18	26.6	34.5
		Sensible Cooling Capacity	H		10.2	14.5	18.4	27.2	35.5
			M		9.18	12.8	16.3	24	31.3
			L		7.02	9.8	12.3	18.4	23.7
	Heating	Heating capacity	H	kW	14.02	22.33	25.53	37.06	47.84
			M		12.68	19.94	22.73	33.09	42.61
			L		9.86	15.47	17.42	25.67	32.66
	Sound	Sound Pressure Level (Outlet)		dB(A)	73/68/64	78/73/69	80/75/71	81/76/72	83/78/73
		Sound Pressure Level (Inlet + Radiated)			70/65/61	75/70/66	77/72/68	78/73/69	80/75/70
		Sound Power Level (Outlet)			82/77/73	87/82/78	89/84/80	90/85/81	92/87/82
		Sound Power Level (Inlet + Radiated)			79/74/70	84/79/75	86/81/77	87/82/78	89/84/79
	Electrical	Max. Power Input		W	412	850	1015	1700	2030
					375	650	850	1300	1530
					320	350	500	700	1000
		Max. Current		A	1.83	3.69	4.45	7.38	8.9
	Hydraulic	Cooling Water Flow Rate	H	L/h	2506	3545	4515	6592	8660
			M		2266	3166	4021	5886	7713
			L		1762	2456	3082	4566	5911
		Cooling Pressure Drop	H	kPa	54.0	64.9	38.0	38.3	73.6
			M		45.0	52.9	30.9	31.2	59.7
			L		28.6	33.5	19.1	19.8	37.0
		Heating Water Flow Rate	H	L/h	1202	1914	2188	3176	4101
			M		1086	1709	1948	2836	3652
			L		845	1326	1493	2200	2799
		Heating Pressure Drop	H	kPa	10.0	23.1	41.3	41.8	78.9
			M		8.3	18.8	33.5	34.1	64.0
			L		5.3	11.9	20.8	21.6	39.7
		Cooling Water Content		L	7.52	9.84	12.16	14.47	17.94
		Heating Water Content			3.76	4.92	6.08	7.24	8.97
Construction and Packing Data		Cooling Water Connections	In	inch	1 1/4"				
			Out						
		Heating Water Connections	In		1"				
			Out						
		Condensate Drainage Connection		inch	1"				
		Dimensions	L	mm	850	1050	1250	1550	1880
			W		670				
			H		1510				

Remarks:

a. Cooling conditions:
Air temperature: 27 °C DB /19 °C WB.
Water inlet/outlet: 7/12 °C.

b. Heating conditions:
Air temperature: 20 °C.
Water inlet/outlet temperature: 65/55 °C.

A.3. Coil Data

A.3.1. 2-Pipe Systems 5-Row

Model	Fin height (mm)	Fin Length (mm)	Fins per Inch	No. of Rows	Fin width (mm)	No. of Circuits	Tube Ø (mm)
VAHU(5R)-200	600	570	12.7	5	108.3	8	9.52
VAHU(5R)-300	600	770				10	
VAHU(5R)-400	600	970				15	
VAHU(5R)-600	600	1270				20	
VAHU(5R)-800	600	1600				20	

A.3.2. 4-Pipe System 2-Row for heating

Model	Fin height (mm)	Fin Length (mm)	Fins per Inch	No. of Rows	Fin width (mm)	No. of Circuits	Tube Ø (mm)
VAHU(2R)-200	600	570	12.7	2	43.3	6	9.52
VAHU(2R)-300	600	770				6	
VAHU(2R)-400	600	970				6	
VAHU(2R)-600	600	1270				8	
VAHU(2R)-800	600	1600				8	

A.4. Sound Data

Model		VAHU-200-ECM							
Speed		800 RPM	900 RPM	1000 RPM	1100 RPM	1200 RPM	1300 RPM	1400 RPM	1500 RPM
Sound Power dB(A)		**53.6**	**57.3**	**64.4**	**68.7**	**71.3**	**70.7**	**70.5**	**71.3**
A-weighted Sound Power in 1/3 Octave-bands under ESP:120Pa	20.0	14.4	9.1	13.0	12.5	23.7	15.0	17.2	14.4
	25.0	13.0	12.9	12.5	14.4	19.2	15.4	15.0	16.1
	31.5	14.0	10.8	21.0	23.1	25.3	19.6	20.4	22.9
	40.0	17.3	23.7	21.2	24.6	27.8	25.7	27.4	23.9
	50.0	26.9	30.7	32.0	31.0	40.2	33.5	37.5	30.2
	63.0	29.8	34.2	38.0	41.2	44.7	40.6	42.6	41.6
	80.0	33.2	40.0	40.8	43.5	43.0	45.3	45.3	47.1
	100.0	31.2	37.0	39.5	42.8	46.4	45.2	45.0	41.4
	125.0	31.1	36.1	42.1	42.6	45.4	45.1	46.1	46.5
	160.0	39.7	39.7	45.2	47.5	49.9	50.5	50.0	48.8
	200.0	40.5	42.4	50.7	53.7	54.9	54.3	56.5	55.3
	250.0	39.1	42.7	50.0	54.8	57.0	57.2	56.0	55.5
	315.0	44.7	43.4	51.7	57.6	62.2	60.2	58.2	59.8
	400.0	41.3	43.6	49.3	55.2	57.1	55.8	55.2	56.6
	500.0	43.8	44.8	49.9	56.1	58.2	56.6	57.3	56.9
	630.0	48.4	50.3	55.2	60.5	61.4	61.1	60.9	61.5
	800.0	46.2	46.4	53.1	57.7	59.7	59.7	59.5	60.5
	1000.0	45.9	46.9	54.4	58.1	61.5	61.1	61.0	61.4
	1250.0	44.6	46.2	54.2	57.9	62.1	60.5	60.4	61.9
	1600.0	42.6	46.2	54.4	57.5	60.0	59.6	59.2	61.2
	2000.0	42.6	45.7	53.2	57.1	59.9	59.5	59.0	60.2
	2500.0	40.9	44.3	53.7	57.6	60.5	60.0	59.5	60.3
	3150.0	37.9	41.9	52.1	56.8	60.0	59.2	59.5	59.5
	4000.0	35.1	38.3	48.6	53.9	57.5	56.8	56.8	57.2
	5000.0	29.2	32.8	43.5	48.5	52.7	51.8	51.5	53.2
	6300.0	26.2	31.6	41.9	46.7	51.0	50.5	50.1	50.9
	8000.0	21.6	27.6	36.8	42.5	46.7	46.0	45.9	46.4
	10000.0	16.4	23.8	30.8	35.9	39.9	39.2	39.4	39.9
	12500.0	12.0	19.7	25.8	29.7	34.2	33.3	33.2	34.1
	16000.0	16.7	21.7	19.8	22.6	25.9	25.3	24.9	27.3

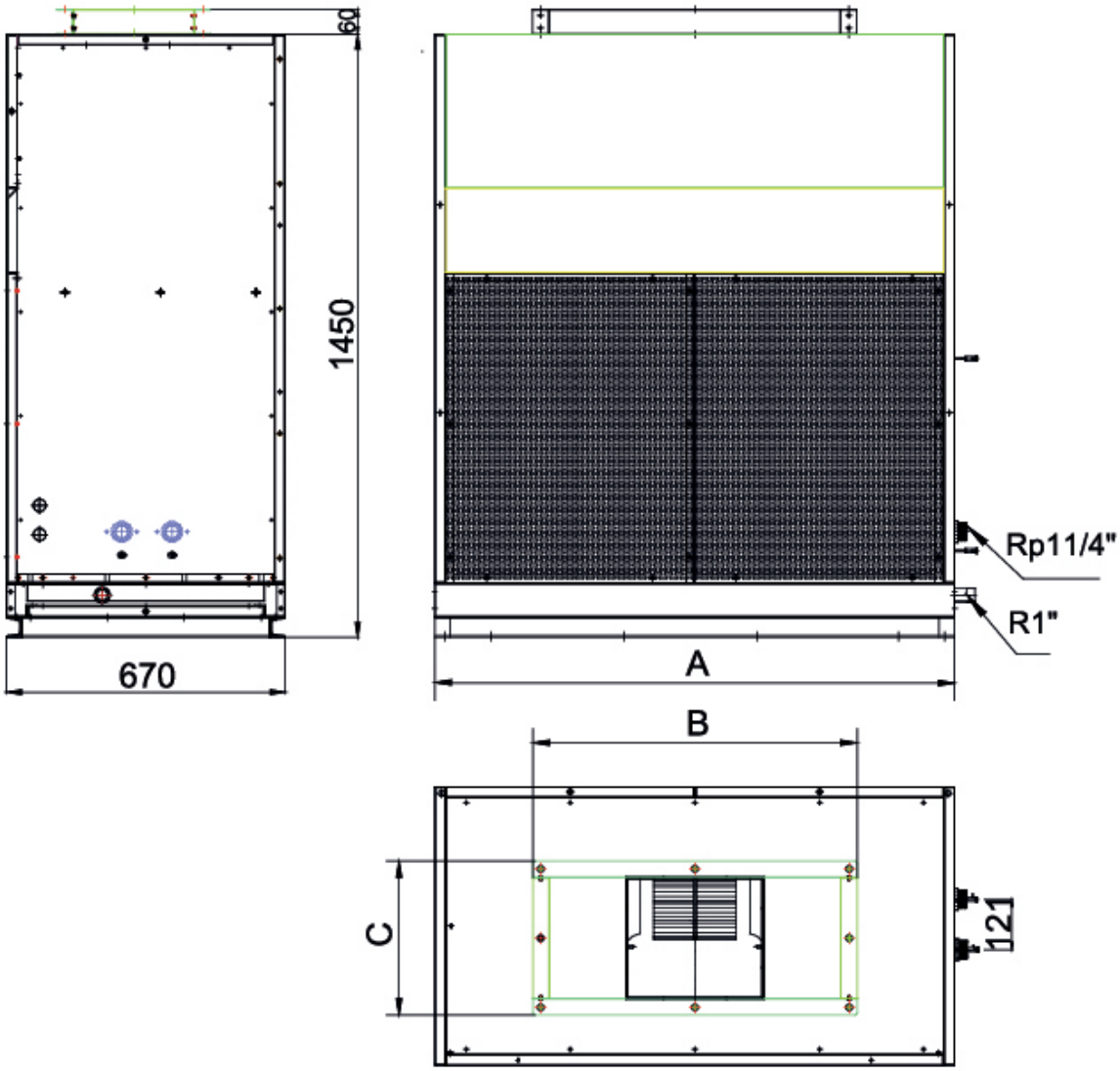
Model		VAHU-300-ECM							
Speed		800 RPM	900 RPM	1000 RPM	1100 RPM	1200 RPM	1300 RPM	1350 RPM	1400 RPM
Sound Power dB(A)		**56.6**	**59.9**	**67.7**	**72.6**	**75.2**	**74.2**	**74.1**	**74.3**
A-weighted Sound Power in 1/3 Octave-bands under ESP:120Pa	20.0	18.4	15.1	25.9	27.9	19.2	29.0	32.7	32.7
	25.0	9.9	16.8	19.6	19.6	22.0	24.1	23.4	23.4
	31.5	19.0	17.7	21.8	27.5	24.8	27.9	30.2	30.2
	40.0	21.0	23.3	27.2	28.6	31.4	29.7	32.8	32.8
	50.0	26.4	33.8	31.1	32.8	32.1	35.4	41.5	41.5
	63.0	30.9	32.6	37.7	40.5	41.0	42.1	41.2	41.2
	80.0	37.3	39.6	43.9	44.7	47.6	45.2	49.3	49.3
	100.0	35.6	41.8	44.0	49.3	52.4	50.9	53.5	53.5
	125.0	39.9	42.2	49.8	52.7	54.6	53.4	55.4	55.4
	160.0	40.6	44.6	48.6	54.6	57.8	55.6	54.6	54.6
	200.0	44.0	45.3	52.5	60.0	59.6	61.1	61.2	61.2
	250.0	44.5	49.1	53.5	58.2	59.5	60.3	58.6	58.6
	315.0	46.0	50.0	53.9	59.8	61.3	59.8	60.9	60.9
	400.0	45.2	48.3	52.8	58.3	59.8	59.8	59.5	59.5
	500.0	44.1	47.6	53.3	57.9	59.7	59.3	59.8	59.8
	630.0	44.5	48.7	55.7	59.8	62.2	60.9	61.3	61.3
	800.0	51.3	50.4	58.6	63.2	66.1	64.0	64.9	64.9
	1000.0	45.6	49.3	58.5	62.7	65.8	64.2	64.2	64.2
	1250.0	43.7	48.8	58.4	62.5	66.2	64.7	65.0	65.0
	1600.0	43.9	49.3	57.7	61.9	65.1	64.0	64.0	64.0
	2000.0	42.4	47.0	56.4	61.0	63.9	62.6	62.8	62.8
	2500.0	40.7	45.7	56.3	61.2	63.5	62.6	63.1	63.1
	3150.0	39.0	43.9	55.5	59.9	63.9	62.2	62.3	62.3
	4000.0	35.7	40.4	53.9	58.7	62.3	60.9	60.8	60.8
	5000.0	31.3	36.7	50.2	55.7	59.4	57.7	57.8	57.8
	6300.0	25.6	31.4	45.3	51.1	54.7	53.4	53.4	53.4
	8000.0	19.9	26.5	40.4	46.9	50.8	49.3	49.1	49.1
	10000.0	14.4	20.2	34.6	41.9	46.3	44.2	44.2	44.2
	12500.0	10.5	14.0	27.8	35.1	39.9	37.6	37.9	37.9
	16000.0	20.2	20.3	22.4	26.9	31.2	29.4	29.3	29.3

Model		VAHU-400-ECM							
Speed		800 RPM	900 RPM	1000 RPM	1100 RPM	1200 RPM	1300 RPM	1350 RPM	1400 RPM
Sound Power dB(A)		**62.1**	**65.4**	**73.2**	**78.1**	**80.7**	**79.7**	**79.6**	**79.8**
A-weighted Sound Power in 1/3 Octave-bands under ESP:120Pa	20.0	23.9	20.6	31.4	33.4	24.7	34.5	38.2	38.2
	25.0	15.4	22.3	25.1	25.1	27.5	29.6	28.9	28.9
	31.5	24.5	23.2	27.3	33.0	30.3	33.4	35.7	35.7
	40.0	26.5	28.8	32.7	34.1	36.9	35.2	38.3	38.3
	50.0	31.9	39.3	36.6	38.3	37.6	40.9	47.0	47.0
	63.0	36.4	38.1	43.2	46.0	46.5	47.6	46.7	46.7
	80.0	42.8	45.1	49.4	50.2	53.1	50.7	54.8	54.8
	100.0	41.1	47.3	49.5	54.8	57.9	56.4	59.0	59.0
	125.0	45.4	47.7	55.3	58.2	60.1	58.9	60.9	60.9
	160.0	46.1	50.1	54.1	60.1	63.3	61.1	60.1	60.1
	200.0	49.5	50.8	58.0	65.5	65.1	66.6	66.7	66.7
	250.0	50.0	54.6	59.0	63.7	65.0	65.8	64.1	64.1
	315.0	51.5	55.5	59.4	65.3	66.8	65.3	66.4	66.4
	400.0	50.7	53.8	58.3	63.8	65.3	65.3	65.0	65.0
	500.0	49.6	53.1	58.8	63.4	65.2	64.8	65.3	65.3
	630.0	50.0	54.2	61.2	65.3	67.7	66.4	66.8	66.8
	800.0	56.8	55.9	64.1	68.7	71.6	69.5	70.4	70.4
	1000.0	51.1	54.8	64.0	68.2	71.3	69.7	69.7	69.7
	1250.0	49.2	54.3	63.9	68.0	71.7	70.2	70.5	70.5
	1600.0	49.4	54.8	63.2	67.4	70.6	69.5	69.5	69.5
	2000.0	47.9	52.5	61.9	66.5	69.4	68.1	68.3	68.3
	2500.0	46.2	51.2	61.8	66.7	69.0	68.1	68.6	68.6
	3150.0	44.5	49.4	61.0	65.4	69.4	67.7	67.8	67.8
	4000.0	41.2	45.9	59.4	64.2	67.8	66.4	66.3	66.3
	5000.0	36.8	42.2	55.7	61.2	64.9	63.2	63.3	63.3
	6300.0	31.1	36.9	50.8	56.6	60.2	58.9	58.9	58.9
	8000.0	25.4	32.0	45.9	52.4	56.3	54.8	54.6	54.6
	10000.0	19.9	25.7	40.1	47.4	51.8	49.7	49.7	49.7
	12500.0	16.0	19.5	33.3	40.6	45.4	43.1	43.4	43.4
	16000.0	25.7	25.8	27.9	32.4	36.7	34.9	34.8	34.8

Model		VAHU-600-ECM							
Speed		800 RPM	900 RPM	1000 RPM	1100 RPM	1200 RPM	1300 RPM	1350 RPM	1400 RPM
Sound Power dB(A)		**60.6**	**63.9**	**71.7**	**76.6**	**79.2**	**78.2**	**78.1**	**78.3**
A-weighted Sound Power in 1/3 Octave-bands under ESP:120Pa	20.0	22.4	19.1	29.9	31.9	23.2	33.0	36.7	36.7
	25.0	13.9	20.8	23.6	23.6	26.0	28.1	27.4	27.4
	31.5	23.0	21.7	25.8	31.5	28.8	31.9	34.2	34.2
	40.0	25.0	27.3	31.2	32.6	35.4	33.7	36.8	36.8
	50.0	30.4	37.8	35.1	36.8	36.1	39.4	45.5	45.5
	63.0	34.9	36.6	41.7	44.5	45.0	46.1	45.2	45.2
	80.0	41.3	43.6	47.9	48.7	51.6	49.2	53.3	53.3
	100.0	39.6	45.8	48.0	53.3	56.4	54.9	57.5	57.5
	125.0	43.9	46.2	53.8	56.7	58.6	57.4	59.4	59.4
	160.0	44.6	48.6	52.6	58.6	61.8	59.6	58.6	58.6
	200.0	48.0	49.3	56.5	64.0	63.6	65.1	65.2	65.2
	250.0	48.5	53.1	57.5	62.2	63.5	64.3	62.6	62.6
	315.0	50.0	54.0	57.9	63.8	65.3	63.8	64.9	64.9
	400.0	49.2	52.3	56.8	62.3	63.8	63.8	63.5	63.5
	500.0	48.1	51.6	57.3	61.9	63.7	63.3	63.8	63.8
	630.0	48.5	52.7	59.7	63.8	66.2	64.9	65.3	65.3
	800.0	55.3	54.4	62.6	67.2	70.1	68.0	68.9	68.9
	1000.0	49.6	53.3	62.5	66.7	69.8	68.2	68.2	68.2
	1250.0	47.7	52.8	62.4	66.5	70.2	68.7	69.0	69.0
	1600.0	47.9	53.3	61.7	65.9	69.1	68.0	68.0	68.0
	2000.0	46.4	51.0	60.4	65.0	67.9	66.6	66.8	66.8
	2500.0	44.7	49.7	60.3	65.2	67.5	66.6	67.1	67.1
	3150.0	43.0	47.9	59.5	63.9	67.9	66.2	66.3	66.3
	4000.0	39.7	44.4	57.9	62.7	66.3	64.9	64.8	64.8
	5000.0	35.3	40.7	54.2	59.7	63.4	61.7	61.8	61.8
	6300.0	29.6	35.4	49.3	55.1	58.7	57.4	57.4	57.4
	8000.0	23.9	30.5	44.4	50.9	54.8	53.3	53.1	53.1
	10000.0	18.4	24.2	38.6	45.9	50.3	48.2	48.2	48.2
	12500.0	14.5	18.0	31.8	39.1	43.9	41.6	41.9	41.9
	16000.0	24.2	24.3	26.4	30.9	35.2	33.4	33.3	33.3

Model		VAHU-800-ECM							
Speed		800RPM	900RPM	1000RPM	1100RPM	1200RPM	1300RPM	1350RPM	1400RPM
Sound Power dB(A)		**65.1**	**68.4**	**76.2**	**81.1**	**83.7**	**82.7**	**82.6**	**82.8**
A-weighted Sound Power in 1/3 Octave-bands under ESP:120Pa	20.0	26.9	23.6	34.4	36.4	27.7	37.5	41.2	41.2
	25.0	18.4	25.3	28.1	28.1	30.5	32.6	31.9	31.9
	31.5	27.5	26.2	30.3	36.0	33.3	36.4	38.7	38.7
	40.0	29.5	31.8	35.7	37.1	39.9	38.2	41.3	41.3
	50.0	34.9	42.3	39.6	41.3	40.6	43.9	50.0	50.0
	63.0	39.4	41.1	46.2	49.0	49.5	50.6	49.7	49.7
	80.0	45.8	48.1	52.4	53.2	56.1	53.7	57.8	57.8
	100.0	44.1	50.3	52.5	57.8	60.9	59.4	62.0	62.0
	125.0	48.4	50.7	58.3	61.2	63.1	61.9	63.9	63.9
	160.0	49.1	53.1	57.1	63.1	66.3	64.1	63.1	63.1
	200.0	52.5	53.8	61.0	68.5	68.1	69.6	69.7	69.7
	250.0	53.0	57.6	62.0	66.7	68.0	68.8	67.1	67.1
	315.0	54.5	58.5	62.4	68.3	69.8	68.3	69.4	69.4
	400.0	53.7	56.8	61.3	66.8	68.3	68.3	68.0	68.0
	500.0	52.6	56.1	61.8	66.4	68.2	67.8	68.3	68.3
	630.0	53.0	57.2	64.2	68.3	70.7	69.4	69.8	69.8
	800.0	59.8	58.9	67.1	71.7	74.6	72.5	73.4	73.4
	1000.0	54.1	57.8	67.0	71.2	74.3	72.7	72.7	72.7
	1250.0	52.2	57.3	66.9	71.0	74.7	73.2	73.5	73.5
	1600.0	52.4	57.8	66.2	70.4	73.6	72.5	72.5	72.5
	2000.0	50.9	55.5	64.9	69.5	72.4	71.1	71.3	71.3
	2500.0	49.2	54.2	64.8	69.7	72.0	71.1	71.6	71.6
	3150.0	47.5	52.4	64.0	68.4	72.4	70.7	70.8	70.8
	4000.0	44.2	48.9	62.4	67.2	70.8	69.4	69.3	69.3
	5000.0	39.8	45.2	58.7	64.2	67.9	66.2	66.3	66.3
	6300.0	34.1	39.9	53.8	59.6	63.2	61.9	61.9	61.9
	8000.0	28.4	35.0	48.9	55.4	59.3	57.8	57.6	57.6
	10000.0	22.9	28.7	43.1	50.4	54.8	52.7	52.7	52.7
	12500.0	19.0	22.5	36.3	43.6	48.4	46.1	46.4	46.4
	16000.0	28.7	28.8	30.9	35.4	39.7	37.9	37.8	37.8

A.5. Dimension Drawings



Model	A	B	C	Qty. Of Fan
200	850	540	342	1
300	1050	680	342	1
400	1250	780	371	1
600	1550	1200	342	2
800	1880	1350	421	2

B. Installation

B.1. Safety Precautions

- When installing, performing maintenance or servicing 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.
- This unit must be connected to a protective earthing system . DO NOT remove the grounded connection while power is being supplied to the fan coil unit.
- When installing, performing maintenance or servicing fan coil units observe the precautions stated in this manual as well as those stated on the labels attached to the unit.
- 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.
- 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 only be switched off by using the ON-OFF button on the control interface.
- During connections, select pipe pliers according to pipe diameter to avoid damaging units over forced.
- Untreated frozen water and cooling water may cause dirt accumulation and corrosion. Suggest using treated water. Suggested working water pressure is below 1.6 Mpa.
- When units are in cooling mode, suggested freezing water degree is ≥7℃; When units are in heating mode, suggested hot water degree is ≤ 60 ℃.
- Condensate water pipe, water connection pipe, water connectors and solenoid valve body must remain heat to avoid condensation.

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. Operating Limits

Power supplies

Volt	Phase	Hz
230	1	50
220	1	60

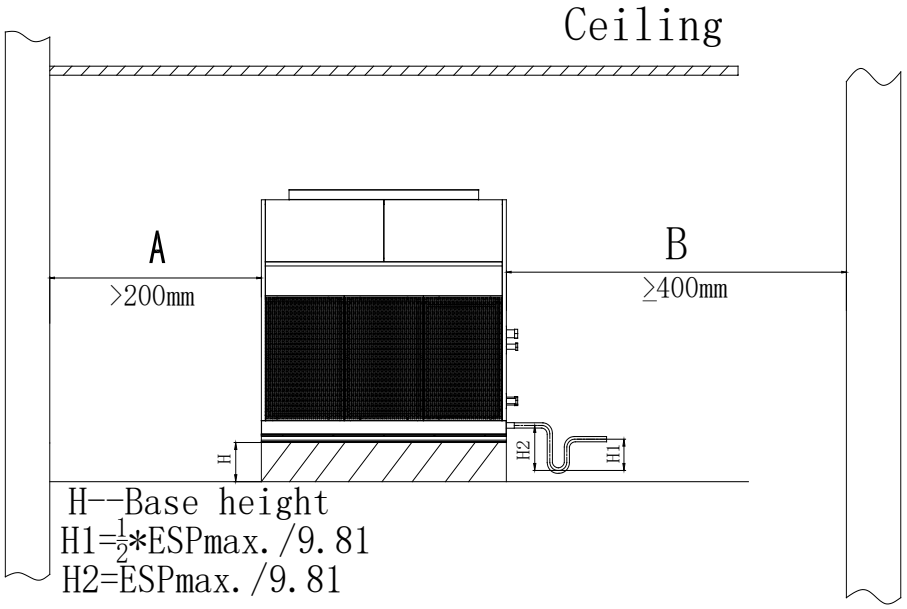
Water circuit

Minimum entering water temperature	+2°C
Maximum entering water temperature	+80°C
Water side recommended maximum pressure	1600 kPa

B.3. Location

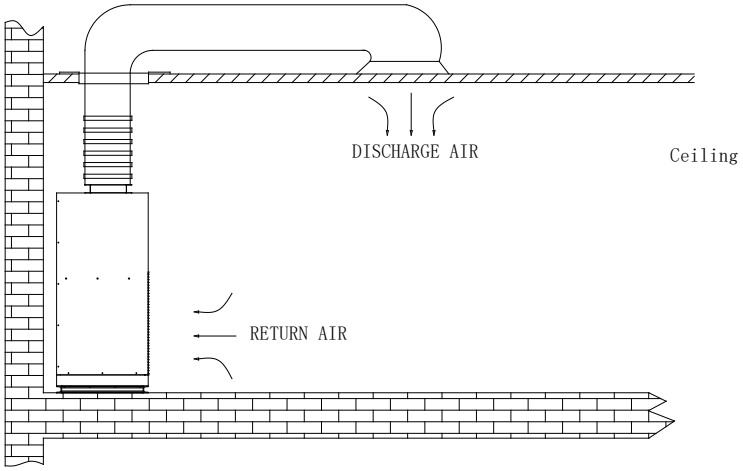
Before installing and running the unit, please check the following:

1. There must be enough space for the unit installation and maintenance. Please refer to the below figures 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.4. Recommended Installation

1. The unit is designed to be installed in the basement. 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.



CAUTIONS

Air duct should be fire-proof. Please refer to concerned country national and local regulation.
Circulatory air pressure drop should be approximately equal to the External Static Pressure.

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 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.

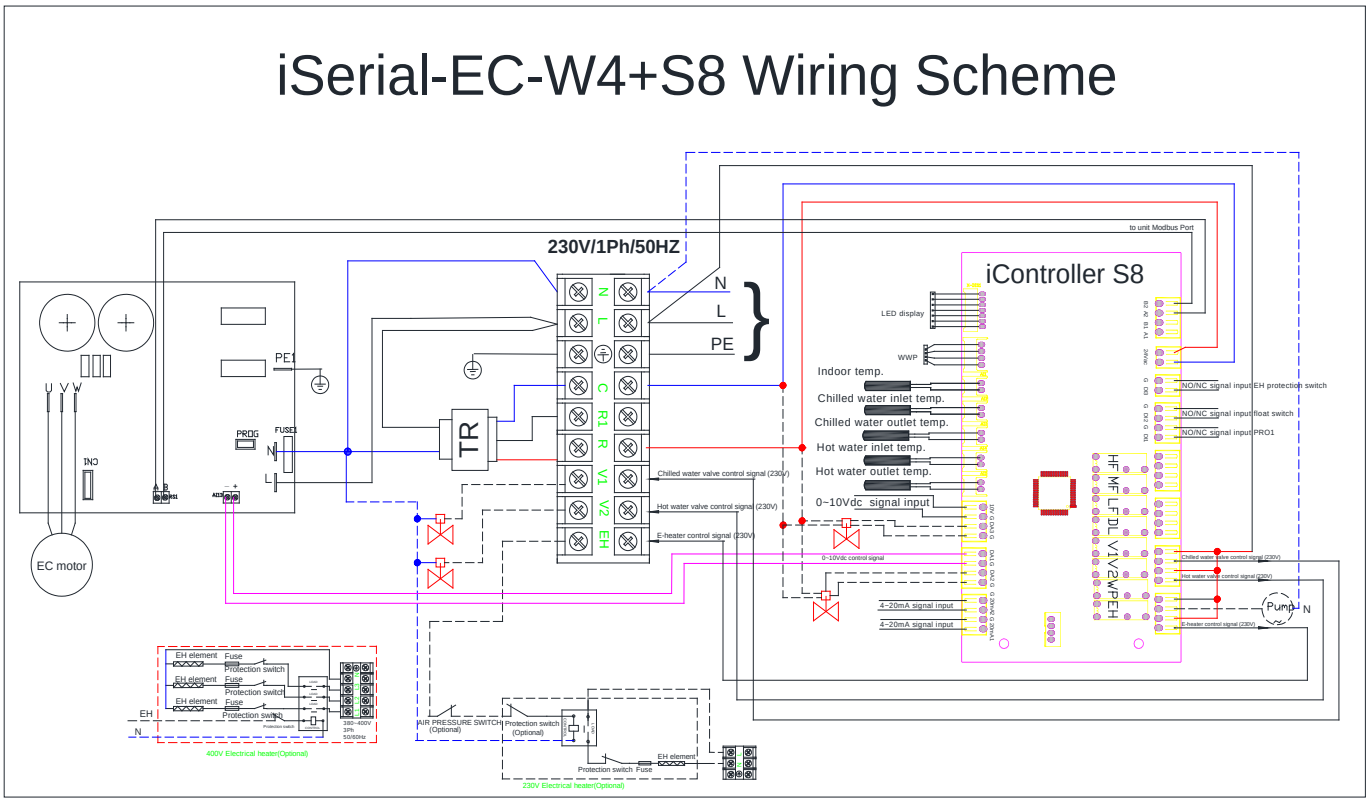
B.7. Electrical Connection

1. Wiring connection must be done according to the wiring diagram on the unit. “Blue wire is N”
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 safety regulations.

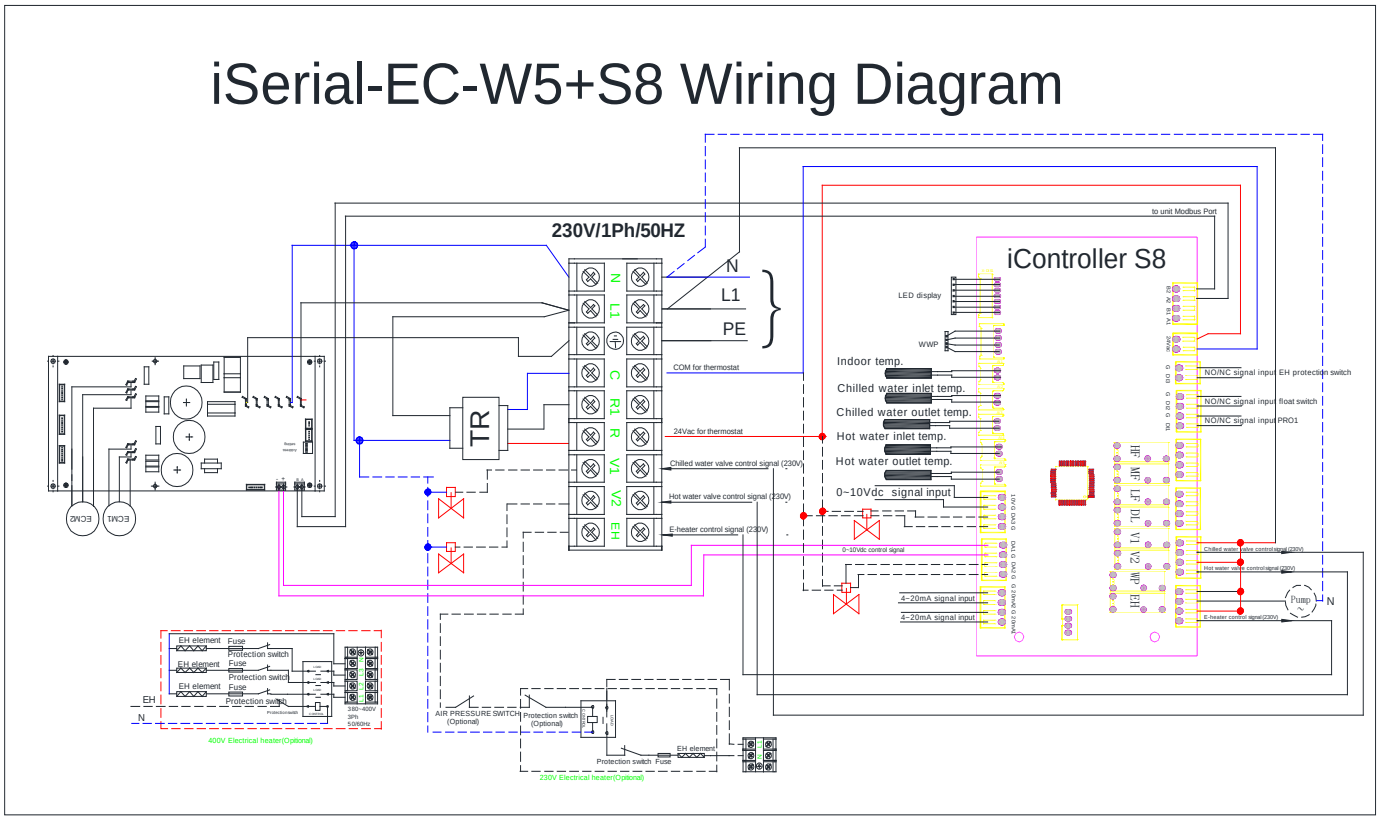
A main switch or other means for disconnection, having a contact separation in all poles, must be incorporated in

6. the fixed wiring in accordance with the relevant local and national legislation.

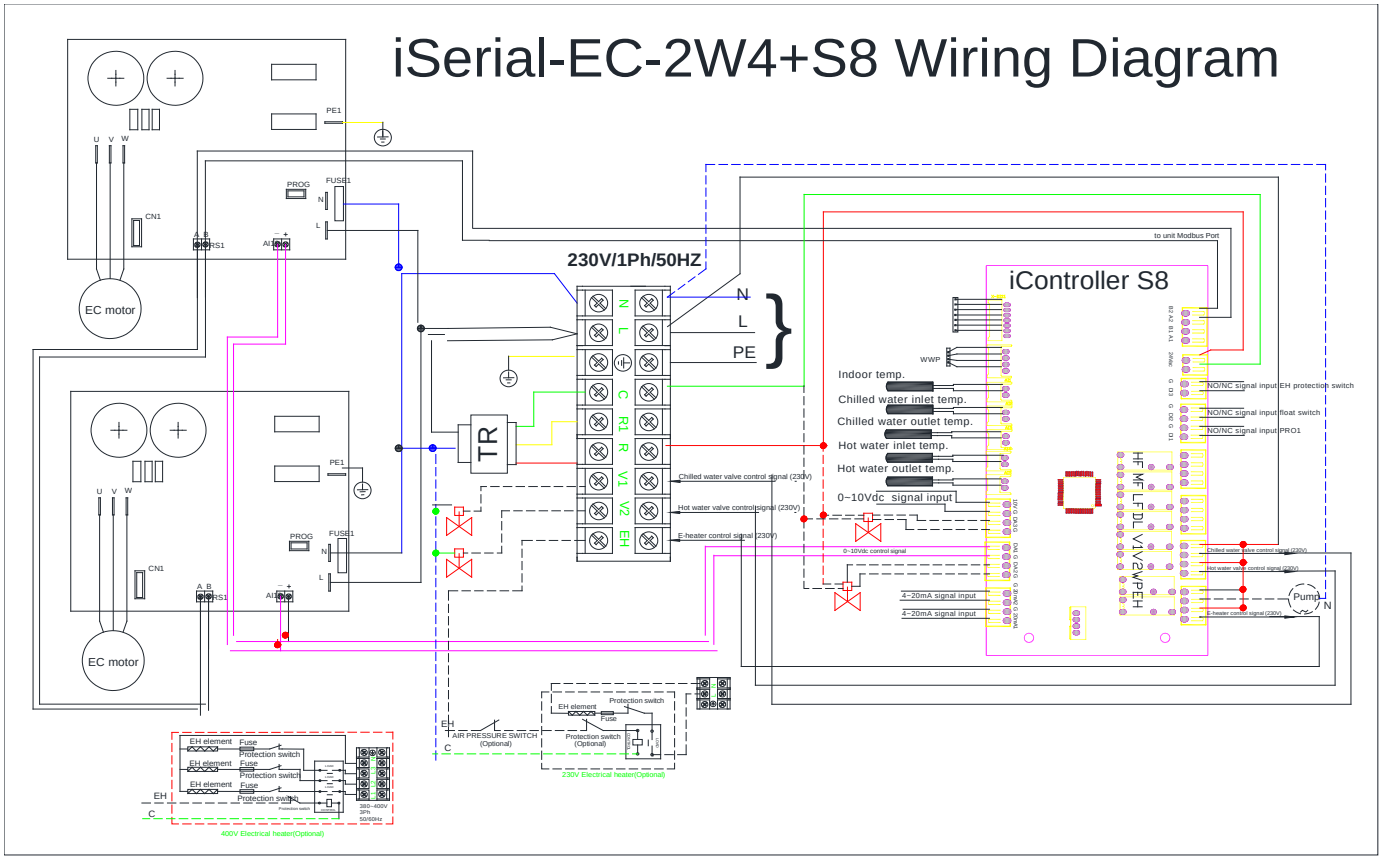
B.7.1. Complete function controller wiring diagram for VAHU-200-300-400-EC-I



B.7.2. Complete function controller wiring diagram for VAHU-600-EC-I

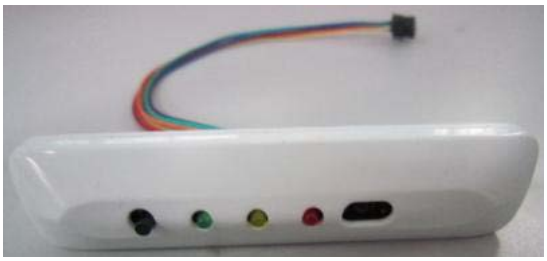


B.7.3. Complete function controller wiring diagram for VAHU-800-EC-I



C. User Interface

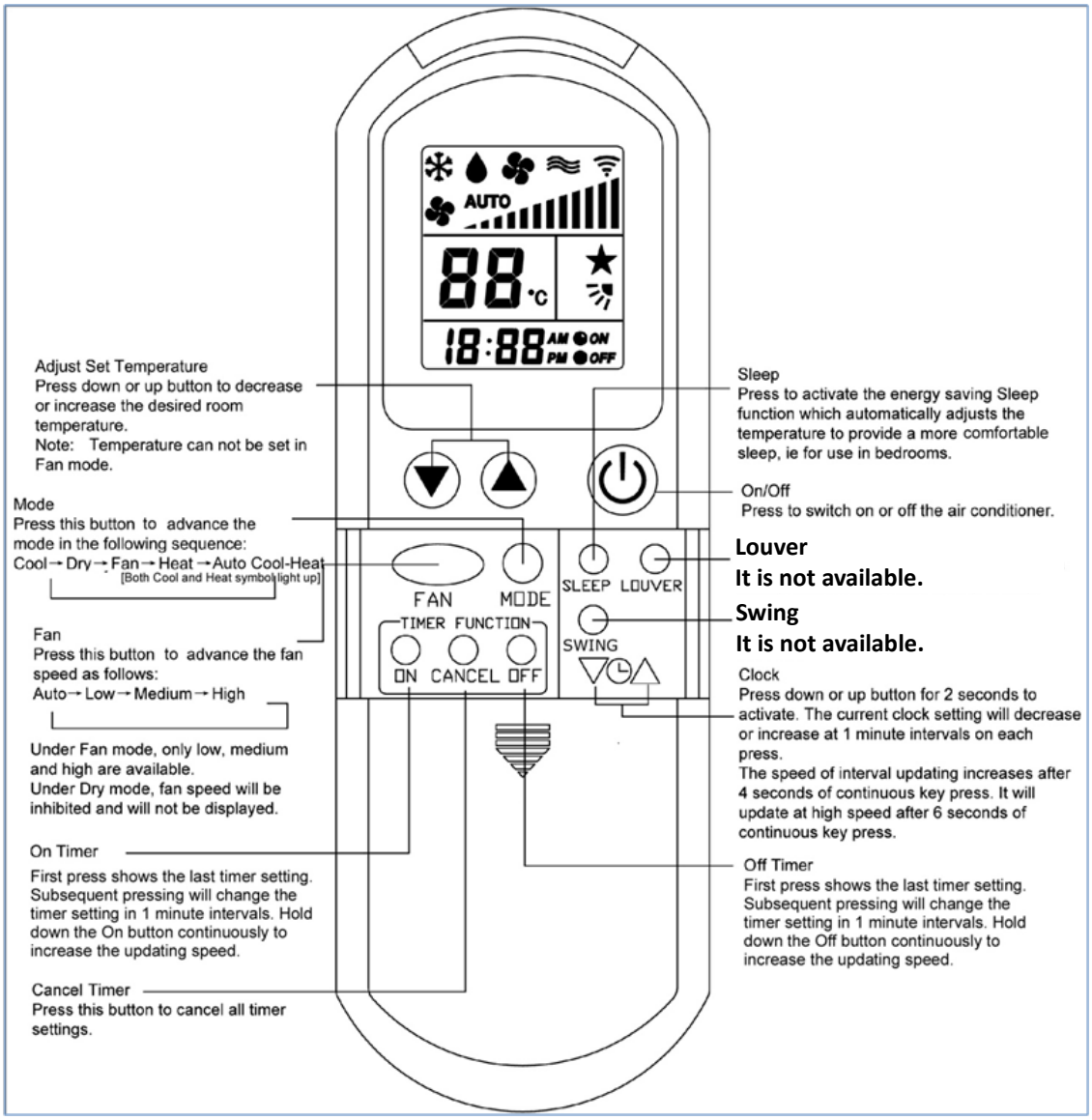
C.1 LED Display and Error Description

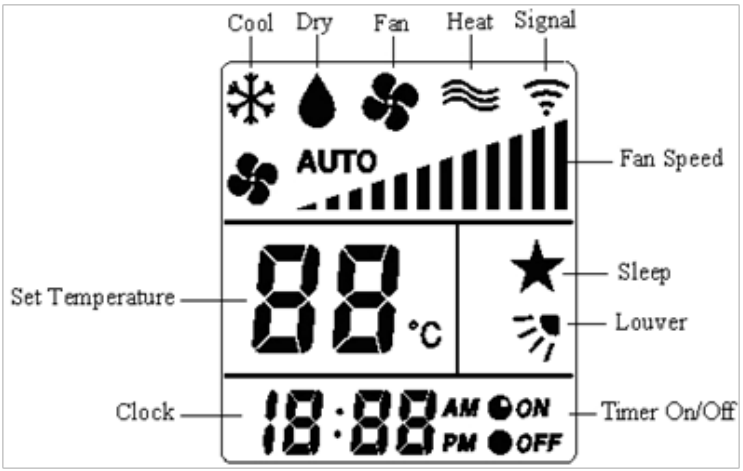


Complete Function PCB – I Control Type		
Fan speed setting	LED indication	Condition
High speed	Red LED On	Normal
Medium speed	Yellow LED On	Normal
Low speed	Green LED On	Normal

For all units - Green LED			
Error Description	Blink	Reason	Remedy
Return air sensor failure	Green LED blinks 1 times, stops for 3s	Room sensor unplugged or damaged.	1. Check if Tr plug is connected or not. 2. Check if sensor's resistance is correct or not.
Indoor coil sensor 1 failure	Green LED blinks 2 times, stops for 3s	Ti1 sensor unplugged or damaged.	1. Check if Ti1 plug is connected or not. 2. Check if sensor's resistance is correct or not.
Indoor coil sensor ^{2} failure	Green LED blinks 3 times, stops for 3s	Ti2 sensor unplugged or damaged.	1. Check if Ti2 plug is connected or not. 2. Check if sensor's resistance is correct or not.
Water pump failure	Green LED blinks 4 times, stops for 3s	Float switch is opened.	1. Check if the condensate water pipe is connected or not. 2. Check if the pump is functioning or not.
Indoor coil low temperature protection	Green LED blinks 5 times, stops for 3s	Water temperature is lower than 3°C.	Check the water temperature.
Indoor coil over heat protection	Green LED blinks 6 times, stops for 3s	Water temperature is higher than 70°C.	Check the water temperature
Filter Switch (S6 PCB)	Green LED blinks 7 times, stops for 3s	Filter switch is opened.	1. Check if filter block or not 2. replace the new filter
Electric Heater failure	Green LED blinks 8 times, stops for 3s	Only for unit with EH. EH safety switch is opened.	1. Change fan speed to high. 2. Replace the damaged EH safety switch.
EC motor failure(CN4)	Green LED blinks 9 times, stops 3s	No EC motor feedback	1. Check Modbus setting. 2. Check the EC motor.
EC motor failure(CN5)	Green LED blinks 10 times, stops 3s	No EC motor feedback	1. Check Modbus setting. 2. Check the EC motor.
Anti-frozen protection	Green LED blinks 12 times, stops for 3s	When unit is standby, Tr<2$^{\circ C}$.	1. Turn on unit to keep Tr high than 5°C

C.2 Remote Handset





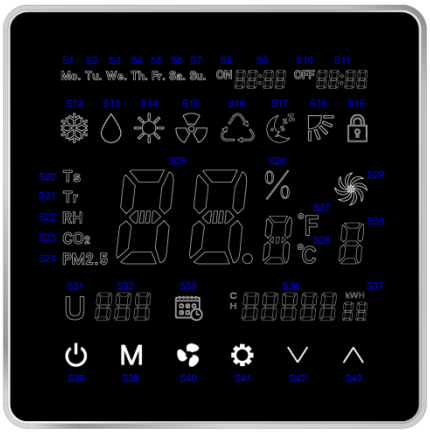
Attention

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

"Swing"& "Louver" functions are not applicable.
European version only uses degree C setting.

C.3 Wall Pad

C.3.1 LED display



Code	Legend	Code	Legend	Code	Legend
S1	Monday	S14	Heating Mode	S27	Fahrenheit degree
S2	Tuesday	S15	Ventilation Mode	S28	Celsius degree
S3	Wednesday	S16	Auto Mode	S29	Fan
S4	Thursday	S17	Sleep mode	S30	0-Auto; 1-Low； 2-Medium; 3-High
S5	Friday	S18	Swing mode	S31	Unit address
S6	Saturday	S19	LED lock	S32	Unit No. / Error code
S7	Sunday	S20	Setting Temperature	S33	Weekly timer
S8	Timer-ON	S21	Room Temperature	S34	C-cooling
S9	Timer-ON time Normally：Real time	S22	RH (if need)	S35	H-heating
S10	Timer-OFF	S23	CO2 density (if need)	S36	Energy consumption
S11	Timer-OFF time	S24	PM2.5 density (if need)	S37	Energy consumption cycle
S12	Cooling Mode	S25	Data Display		
S13	Dehumidification	S26	RH percentage		
S38	On/Off Button	S40	Fan speed setting	S42	Up
S39	Mode setting	S41	Parameter setting	S43	Down

C.3.2 Operation guide

S38	On/OFF Button	Press  to turn on. Press it again to turn off.
S39	Mode button	With wall pad on, press  to select Cooling, Dehumidification, Heating, Ventilation or Auto sequentially.or Auto sequentially.
S40	Fan Speed Button	Press  S30 to change from 0 to3. 0=Auto speed, 1=Low speed, 2=Medium speed, 3=High speed.
S41	Parameter Setting Button	Long press  for 5 seconds to set today's day of week. Press  or  to change from Monday to Sunday.
		Long press  for 5 seconds then short press it once to set current time. Press  or  to change current time.
		Long press  for 5 seconds then short press it twice to set Timer ON. to set day Press  of week from Monday to Sunday. Press  or  to change Timer ON time. Press  to turn Timer ON on or off and S8 appears or disappears.
		Long press  for 5 seconds then short press it 3 times to set Timer OFF time. to set day of Press  week from Monday to Sunday. Press  or  to change Timer OFF time. Press  to turn Timer OFF on or off and S10 appears or disappears.
		Long press  for 5 seconds then short press it 4 times to set group control and U31 appears. The function is reserved.
		Long press  for 5 seconds then short press it 5 times to set unit address and U32 appears. Press  or  to change unit address.
		Long press  for 5 seconds then short press it 6 times to set unit parameters (Professional Engineer) U00 and 0000 appear. 0000 is password for below parameters reading or writing. Password Setting: Press  to select number position and Press  or  to increase or decrease number. 1111 is a default password for below parameter reading. 8888 is a default password for below parameter reading and setting. Press  to read U001~U031 parameters. Press  to set U001~U031 parameters and Press  or  to increase or decrease parameter setting. S31/S32 displays "U001", which is used to set unit type. 0=iAIR …… Mode: Ventilation T, RH, CO2, PM2.5 are displayed. 1=iFCU …… Mode: S12, S13, S14, S15, S16, S21 or S20 is displayed. 2=iAHU …… Mode: S12, S13, S14, S15, S16, S21 or S20 is displayed. 3=iAHU with air cleaner …… Mode: S12, S13, S14, S15, S16, T, RH, CO2, PM2.5 are displayed. S31/S32 displays "U002", which is used to set unit of temperature degree. 0=Celsius degree. 1=Fahrenheit degree.

S31/S32 displays “U003”, which is used to select display temperature on LCD.
1=Setting temperature.
0=Room temperature.

S31/S32 displays “U004”, which is used to set setting temperature range.
0=Setting temperature is from 16~30°C.
1=Cooling setting temperature 24°C, Heating setting temperature 21°C.

S31/S32 displays “U005”, which is used to set setting temperature band.
1~9°C.

S31/S32 displays “U006-U009”, which are reserved to set parameters with optional accessory to measure PM2.5 and CO2 values.

S31/S32 displays “U010~U011”, which are reserved.

S31/S32 displays “U012”, which is used to set setting RH point.
30~70, default: 50

S31/S32 displays “U013”, which is used to set setting RH band.
10~30, default: 10

S31/S32 displays “U014”, which is used to set unit address.
1~255, default: 1

S31/S32 displays “U015”,which is used to set unit ESP.
0~100%, default: 40%，

S31/S32 displays “U016”, which is reserved.

S31/S32 displays“U017”, which is used to set software. (please refer to different PCB)
0=2-pipe with valve
1=2-pipe without valve
2=4-pipe with std valve
3=4-pipe with 6-way valve

S31/S32 displays “U018”, which is reserved.

S31/S32 displays “U019”, which is used to set DA1 function
When U001=2,3
U019=0, fan control signal is based on Tr, Ts PID calculation
U019=1, fan control signal is based on ESP PID calculation

S31/S32 displays “U020”, which is used to calibrate the sensor on the wired wall pad.
-5~5, default: -3

S31/S32 displays “U021”, which is used to set EH function
U021= 0, without EH.
U021= 1, EH as booster.
U021=2, EH as primary.

S31/S32 displays “U022”, which is used to select Tr sensor.
0=the sensor in the WWP.
1=the sensor in the PCB.

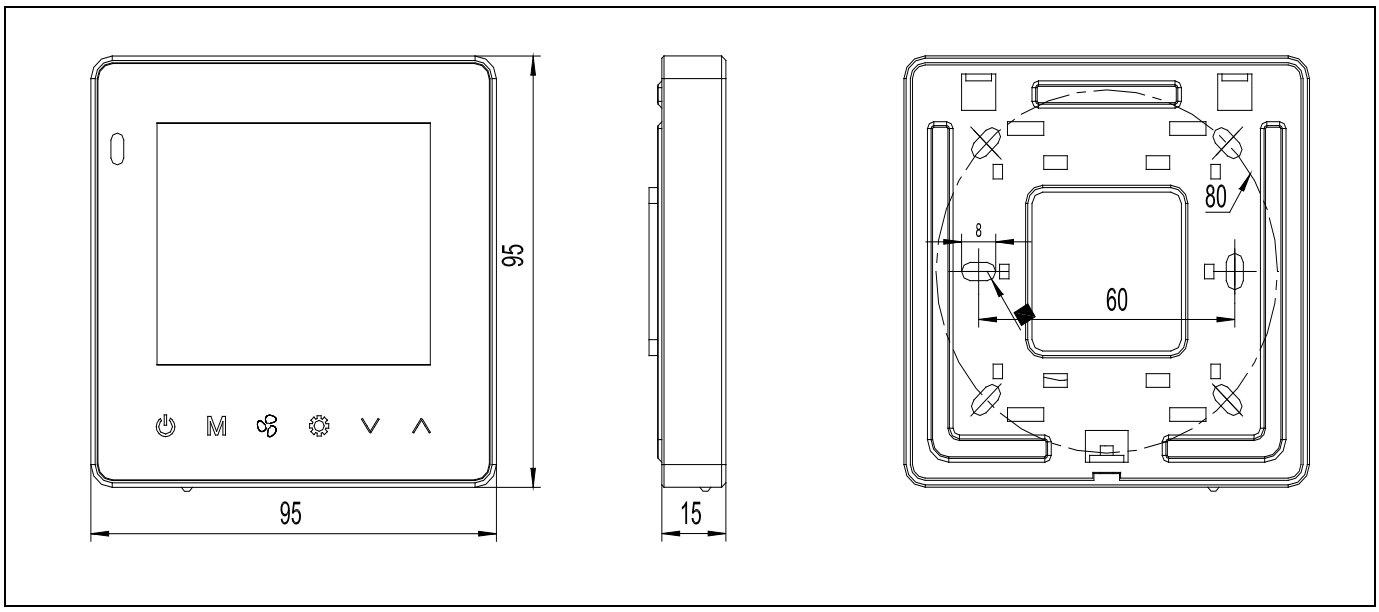
S31/S32 displays “U023”, which is used to display cooling and heating energy consumption.
0=S34/S35/S36/S37 disappears
1=S34/S35/S36/S37 appears
In cooling and dehumidification mode, cooling energy consumption is shown.
In heating mode, heating energy consumption is shown.

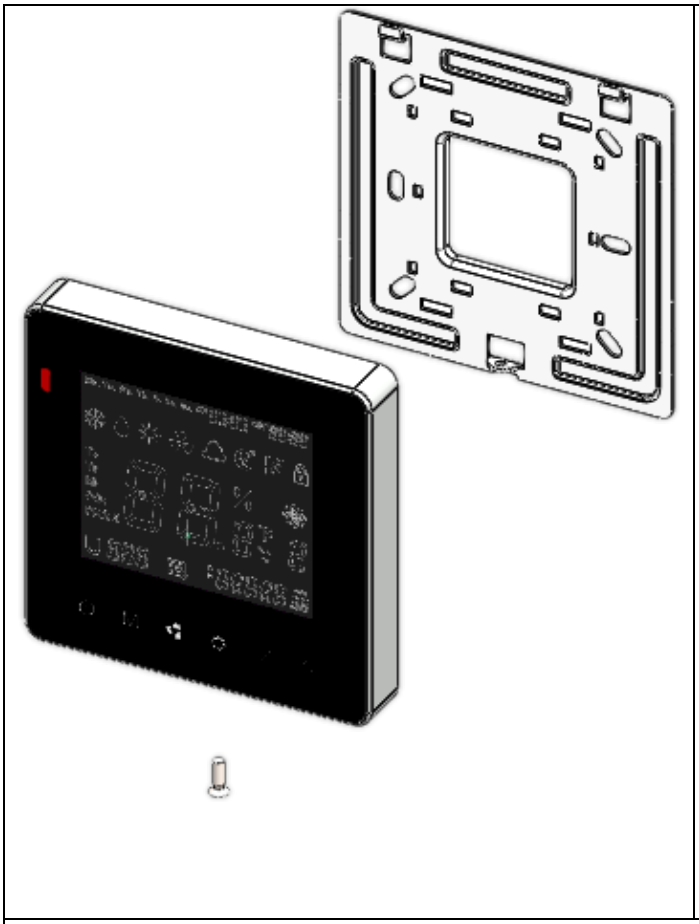
		2=Motor running time is shown. S31/S32 displays “U024”, which is used to set low speed RPM or control signal. S31/S32 displays “U025”, which is used to set medium speed RPM or control signal. S31/S32 displays “U026”, which is used to set high speed RPM or control signal. S31/S32 displays “U027”, which is used to set Delta T OF Ti1/Ti2. S31/S32 displays “U028”, which is used to set Delta T OF Ti3/Ti4. S31/S32 displays “U029”, which is used to read unit type. S31/S32 displays “U030”, which is used to read unit model. S31/S32 displays “U031”, which is used to read unit manufacturing date.
S32	Error code	S32：E** blinks 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 overheat protection Bit6 =Filter switch Bit7 = Electrical heater failure Bit8 = Motor1 Error Bit9 =Motor2 Error Bit10 = System parameters error Bit11 = Anti-frozen error Bit12 = Ti3 temperature sensor error Bit13 = Ti4 temperature sensor error Bit14 =PM2.5 sensor Bit15 =AQI Error
Combination Button Function		Screen Lock Function Long press ^ for 5 seconds, S19 appears and screen is locked. Long press ^ for 5 seconds again, S19 disappears and screen is unlocked.
		Swings Function Long press v for 5 seconds, S18 appears and swings is ON. Long press v for 5 seconds again, S18 disappears and swings is OFF.
		Sleep Mode Long press  for 5 seconds, S17 appears and sleep mode is ON. Long press  for 5 seconds again, S17 disappears and sleep mode is OFF.

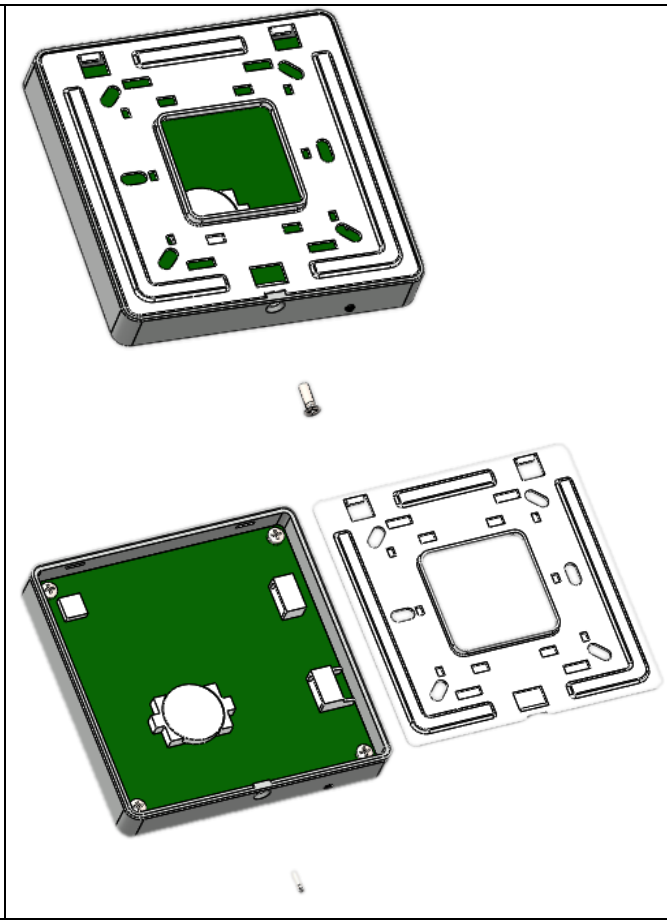
C.3.3 Error Code List

Error Description	Code	Reason	Remedy
Room temperature sensor error	E1	Room sensor unplugged or damaged.	1. Check if Tr plug is connected or not.
			2. Check if sensor's resistance is correct or not.
Indoor coil sensor 1 failure	E2	Ti1 sensor unplugged or damaged.	1. Check if Ti1 plug is connected or not.
			2. Check if sensor's resistance is correct or not.
Indoor coil sensor 2 failure	E3	Ti2 sensor unplugged or damaged.	1. Check if Ti2 plug is connected or not.
			2. Check if sensor's resistance is correct or not.
Float switch error	E4	Float switch is opened.	1. Check if the condensate water pipe is connected or not.
			2. Check if the pump is functioning or not.
Indoor coil low temperature protection	E5	Water temperature is lower than 3°C.	Check the water temperature.
Indoor coil over heat protection	E6	Water temperature is higher than 70°C.	Check the water temperature
Filter switch protection	E7	Filter Switch is open.	Replace or clean filter.
Electric Heater failure	E8	Only for unit with EH.	1. Change fan speed to high.
		EH safety switch is opened.	2. Replace the damaged EH safety switch.
EC motor failure(CN4)	E9	No EC motor feedback	1. Check Modbus setting.
			2. Check the EC motor.
EC motor failure(CN5)	E10	No EC motor feedback	1. Check Modbus setting.
			2. Check the EC motor.
Motor qty setting error (S6 PCB)	E11	Motor Qty setting error	1: check Modbus setting
Anti-frozen protection	E12	When unit is standby, Tr<2°C.	1. Turn on unit to keep Tr high than 5°C
Indoor coil sensor 3 failure (S6 PCB)	E13	Ti3 sensor unplugged or damaged.	1. Check if Ti3 plug is connected or not.
			2. Check if sensor's resistance is correct or not.
Indoor coil sensor 4 failure (S6 PCB)	E14	Ti4 sensor unplugged or damaged.	1. Check if Ti4 plug is connected or not.
			2. Check if sensor's resistance is correct or not.
PM2.5 sensor failure (S6 PCB)	E15	PM2.5 sensor unplugged or damaged.	1. Check if PM2.5 plug is connected or not.
			2. Check if sensor's resistance is correct or not.
AQI sensor failure (S6 PCB)	E16	AQI sensor unplugged or damaged.	1. Check if AQI plug is connected or not.
			2. Check if sensor's resistance is correct or not.
Wired Wall Pad failure	E17	WWP unplugged or not well	1. Check plugs

C.3.4 Dimensions and installation







Use screw driver to remove the screw on the bottom

D. Maintenance

D.1. General Maintenance

1. Installation and maintenance should be performed by qualified personnel 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 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.

D.2. Regular Maintenance

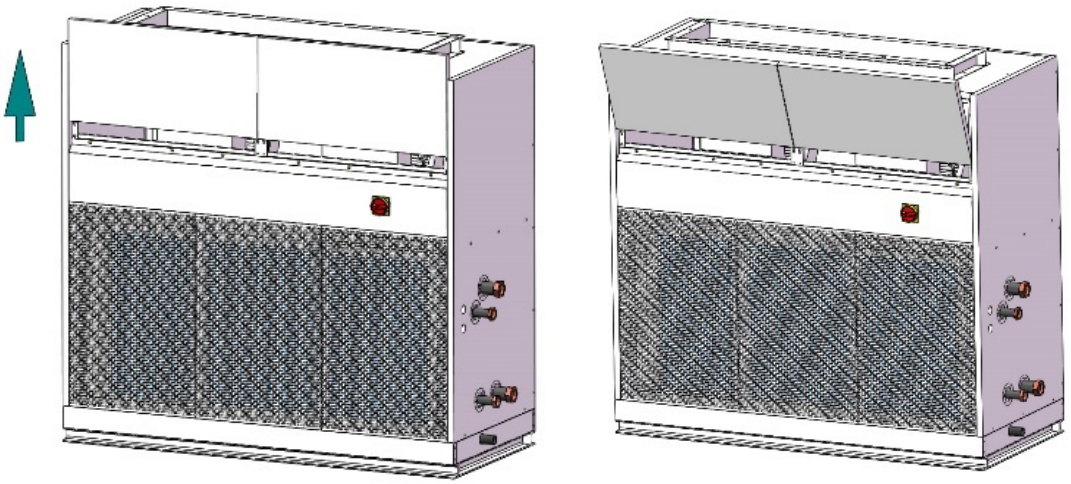
1. Inspect and clean the condensate drain pan to avoid any clogging of the drain by dirt, dust, etc. Inspect drainage piping to ensure the proper condensate flow.
2. Check and clean the coil. Clean the coils with a low-pressure water jet or low-pressure air.
3. Clean and tighten all the wiring connections.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

D.3. Filter Cleaning

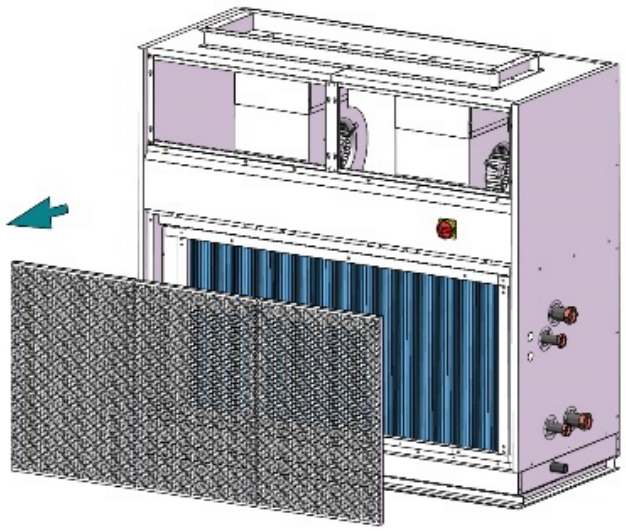
1. Remove the filter from the rear or bottom.
2. Clean the filter with a brush, or with water.
3. Reinstall the filter by sliding it back into the groove.

D.4. Unit Maintenance

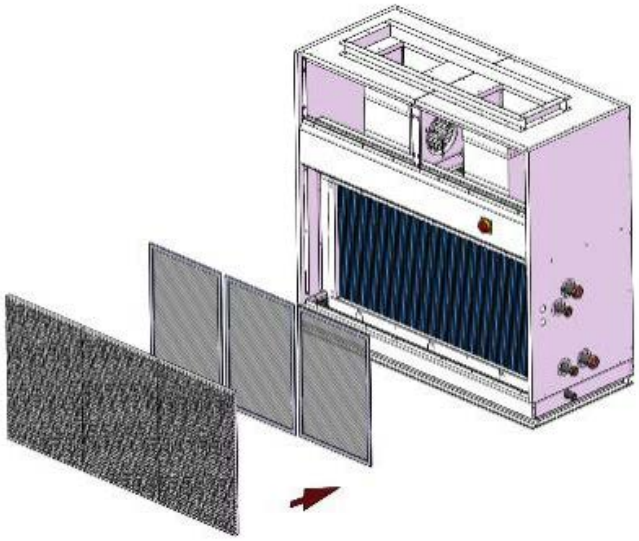
Turn OFF Main switch
Pull the upper front panel and remove them



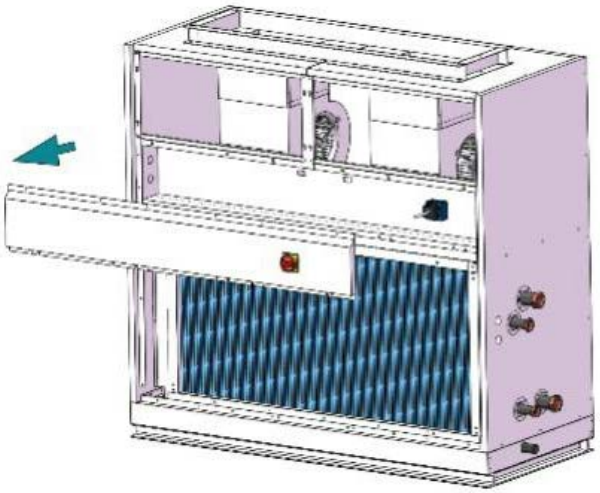
Remove return air grill	Remove the filter

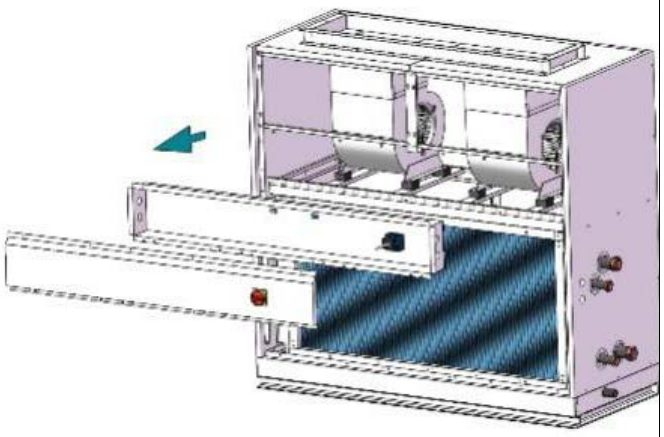


Remove control box cover



Remove control Box





For Fan Maintenance, remove the front panel referring to above steps and then take out the fan and motor.
For Filter Cleaning, clean the filter with a brush or with water and then reinstall the filter.

E. Limited Function Controller -EC-W4/W5

E.1. I/O Port Definitions

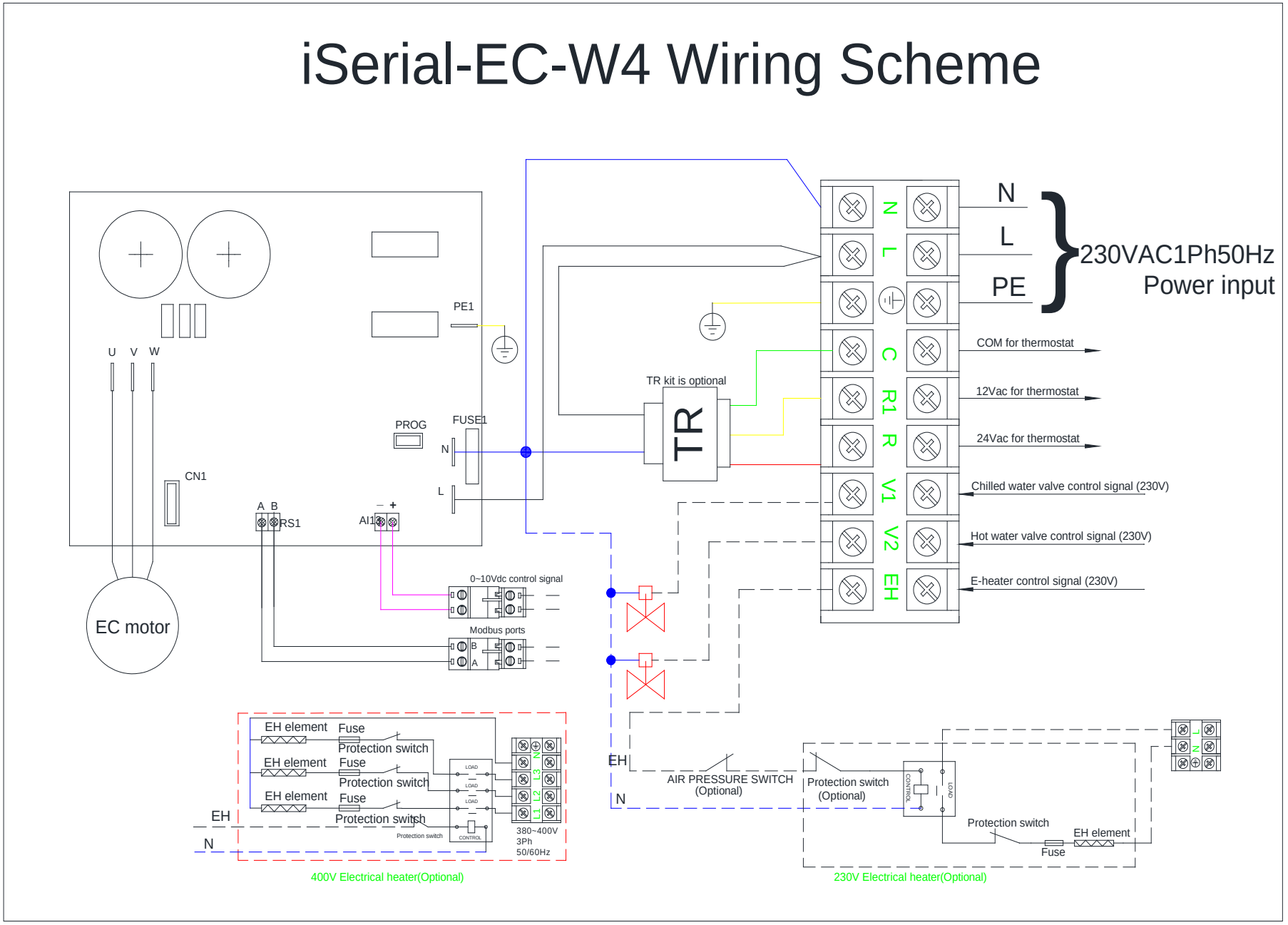
I/O		Code	
Voltage input	Phase	L1	External 230VAC power supply connection to the PCB
	Neutral	N1	
	Earth	GND	
Signal Input	Modulating signal1	+/-	Low voltage modulating signal input (0~10VDC)
Voltage output	DC motor 1	U,V,W	3-wire connection for DC motor1
	DC motor 2	U1,V1,W1	3-wire connection for DC motor2 only for W5
Communication port	Modbus Port	A, B	Modbus Protocol

E.2. Control Logic Specifications

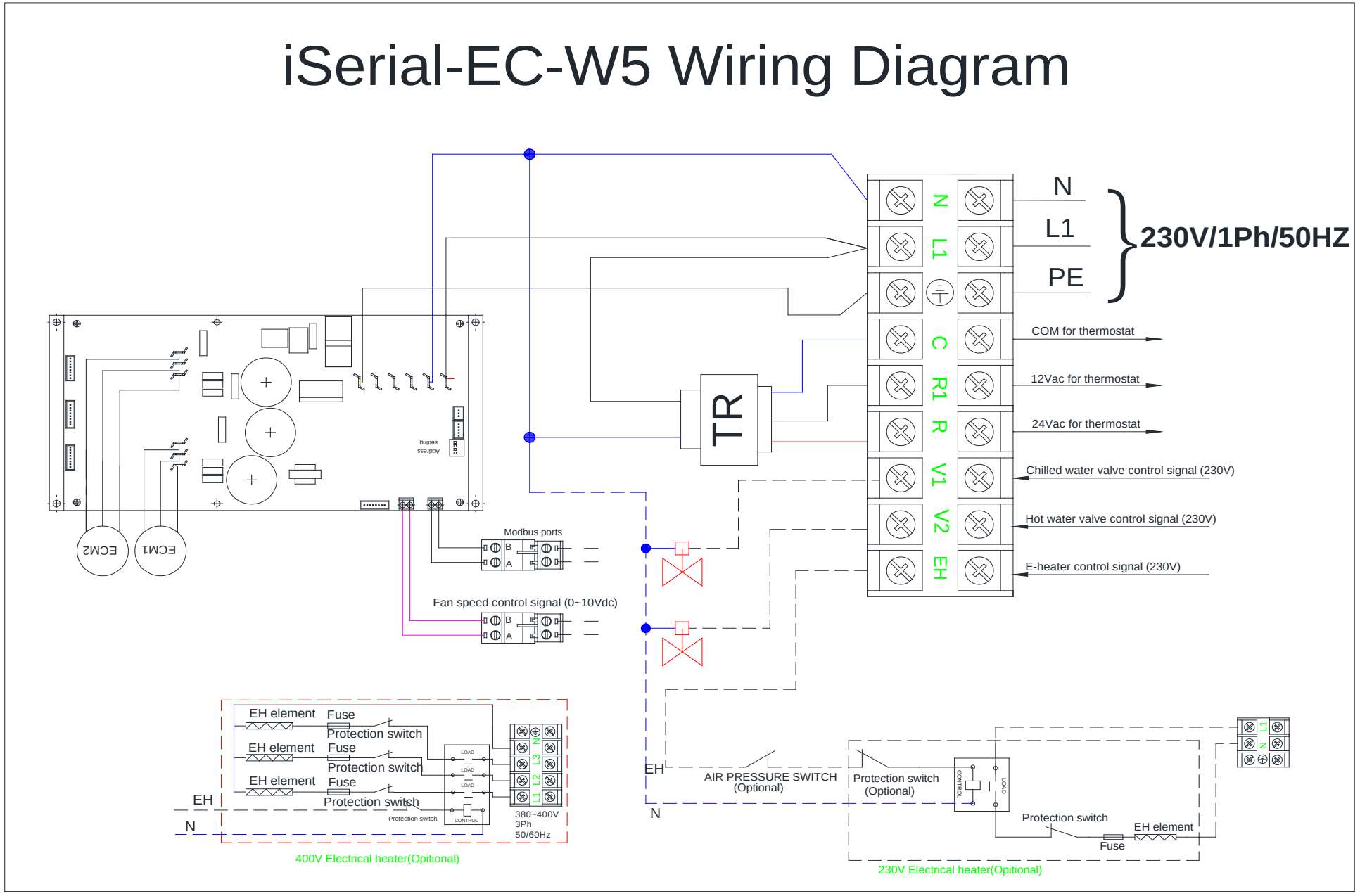
The unit is turned on when modulating signal input is more than 2.0 VDC or Modbus input is more than 0 RPM.

The unit is turned off when modulating signal input is less than 2.0 VDC or Modbus input is 0 RPM.

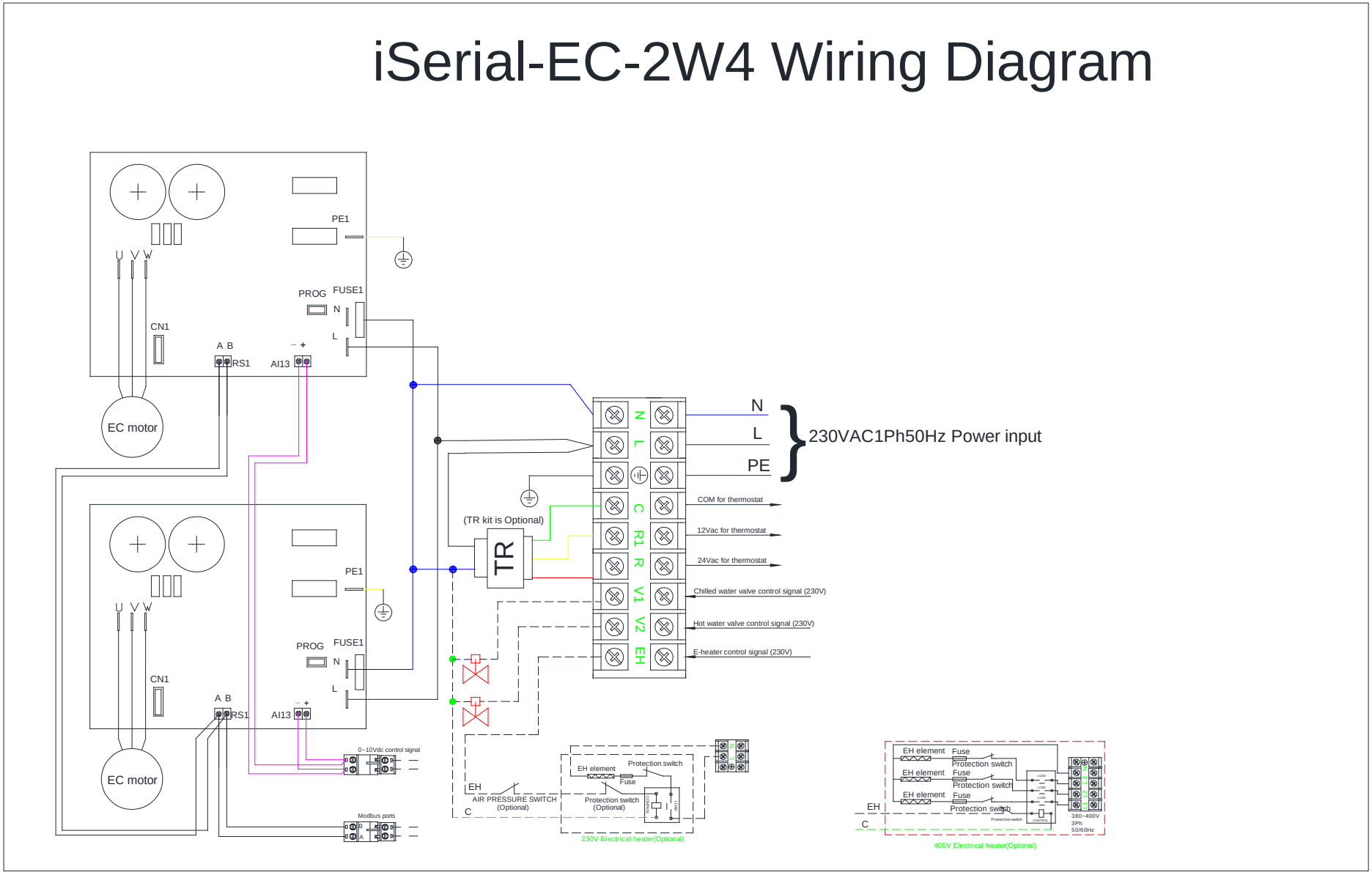
E.2.1. Wiring Diagram for VAHU-200~400-EC-W



E.2.2. Wiring Diagram for VAHU-600-EC-W



E.2.3. Wiring Diagram for VAHU-800-EC-W



E.2.4. EC-W4/W5 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 80 ms. All temperature is equal to reading data*10 accuracy: 0.1 degree C.

Holding Register table

Description	Address	Type*	Remark
Motor1 minimum RPM (U,V,W port)	30000	R/W	200~1500rpm
Motor1 maximum RPM (U,V,W port)	30001	R/W	200~1500rpm
Motor2 minimum RPM (U1,V1,W1 port)	30002	R/W	200~1500rpm
Motor2 maximum RPM (U1,V1,W1 port)	30003	R/W	200~1500rpm
Motor qty setting	30004	R/W	0=EC motor1 working 1=EC motor2 working 2=EC motor 1/2 working W4-only set 0; W5/W6 default:=2
Signal inputs setting for W6	30005	R/W	0=Signal input 1 works; Motor 1/2 works based on signal input1. 1=Signal input2 works; Motor 1 works based on signal input1. Motor 2 works based on signal input2. Default:0
Motor1 RPM writing	30006	R/W	MS30006=0~200, Motor1 works according to signal input1; MS30006=above 200, Motor1 RPM is according to RPM writing.
Motor2 RPM writing	30007	R/W	MS30007=0~200, Motor2 works according to signal input2; MS30007=above 200, Motor2 RPM is according to RPM writing.
Unit Address setting	30008	R	1~15; Set by Dip-switch Default: 55

Input Register table:

Description	Address	Type*	Remark
EC motor1 actual RPM	40000	R	
EC motor2 actual RPM	40001	R	
EC motor1 error	40002	R	
EC motor2 error	40003	R	
Input signal1 (0~10VDC)	40004	R	
Input signal2 (0~10VDC)	40005	R	
Software Version	40017	R	

F. iCONTROLLER-S8 Specification (Optional)

F.1. I/O Port Definitions

I/O		Code	2-Pipe	4-Pipe
Analogue Input	Air Temperature Sensor	AL0	Room air temperature sensor (Tr)	
	Chilled water inlet sensor (Ti1)	AI1	Water inlet temperature sensor (Ti1)	Chilled water inlet temperature sensor (Ti1)
	Chilled water outlet sensor (Ti2)	AI2	Water outlet temperature sensor (Ti2)	Chilled water outlet temperature sensor (Ti2)
	Hot water inlet sensor (Ti3)	AI3	Air inlet temperature sensor (Ti3)	Hot water inlet temperature sensor (Ti3)
	Hot water outlet sensor (Ti4)	AI4	Air outlet temperature sensor (Ti4)	Hot water outlet temperature sensor (Ti4)
	Transducer signal input	0~10VDC	0~10VDC signal input	
		4~20mA 1	4~20mA signal input1	
		4~20mA 2	4~20mA signal input2	
User interface	IR receiver	X-DIS 1	Digital communication port to LED / IR receiver board.	
	Wired wall pad	TTL1	Digital communication port to Wired wall pad board.	
Digital input	Occupancy contact	PRO1	The unit is ON. When occupancy contact is closed for 60s, the unit is turned OFF. When occupancy contact is open for 10s, the unit is turned ON.	
	Float switch	Float	NC signal for condensate water float switch.	
	EH protection	EH	NC signal for EH protection switch.	
Power supply	Working power supply	L	240VAC or 24VDC	
	GND	GND	Grounding	
Digital input	High speed	HF	High speed: Free of voltage contact	
	Medium speed	MF	Medium speed: Free of voltage contact	
	Low speed	LF	Low speed: Free of voltage contact	
	Motorized valve 1	MTV1	ON/OFF motorizes valve	Chilled water valve
	Motorized valve 2	MTV2	Reserved	Hot water valve
	Condensate water pump	WP	Condensate water pump: Free of voltage contact	
	Electrical heater	EH	EH: Free of voltage contact	
	BUS port	A1/B1	Communication with EC fan driver	
	BUS port	A/B	Modbus network serial connection	
	EC fan control signal	DA1	EC fan control signal 0~10VDC,	
	Modulating valve 1	DA2	Modulating valve	Chilled water modulating valve
	Modulating valve 2	DA3	Modulating EH control signal	Hot water modulating valve

F.2. Control logic of Unit type 300029=2

F.2.1. 2-pipe with valve unit control logic (300042=0)

COOL MODE

1) If Tr ≥ Ts +1°C, then cool operation is activated, MTV1 is turned on. Indoor fan runs at set speed.
DA2 is open at 10VDC for 2 min. Then check Ti1:

MS300080=0

When Ti1<=8°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

When 8<Ti1<=10°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 1 PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

When 10<Ti1<=12°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 2 PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

When 12<Ti1<=15° C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 3 PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

When 15<Ti1<=28° C (Modbus 300017 setting), DA2 output is kept at 10VDC.

When Ti1>28° C(Modbus 300017 setting), DA2 output is at minimum (Modbus300016 setting), and report pre-heat alarm.

MS300080=1
DA2 output is based on cooling water flow reading and setting PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

MS300080=2
DA2 output is based on cooling pressure difference setting (MS300084) and 4~20mA input2 reading (MS400007) PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

a) If Tr < Ts-1°C, then cool operation is terminated and MTV1 is turned off. DA2 is 0VDC. Indoor fan runs at set speed.
b) The range of Ts is 16 - 30°C or fixed according to 300032 setting.
c) Indoor fan speed can be adjusted for low, medium, high and auto.

LOW TEMPERATURE PROTECTION OF INDOOR COIL

a) If Ti1 ≤ 2°C for 2 minutes, then MTV1 is turned off and DA2=0VDC. If indoor fan is set for low speed, then it will run at medium speed. If it is set at medium or high speed, then it will keep running at the same speed.
b) If Ti1 ≥ 5°Cfor 2 minutes, then MTV1is turned on. DA2 is calculated by delta T. Indoor fan runs at set speed.

FAN MODE

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

HEAT MODE

Heat mode without electrical heater (300043=0)

If Tr ≤ Ts - 1°C, then heat operation is activated and MTV1 and MTV2 are turned on.
DA2 is open at 10VDC for 2 min. Then check Ti1.

MS300080=0

If Ti1<=28°C (300017 setting), fan is turned on at low speed; DA2 is on at 10VDC.
If 28°C (300017 setting)<Ti1<28（3000017 setting）+4°C, fan and DA2 are kept at original state.
If Ti1 ≥ 28（3000017 setting）+4°C, fan runs at set speed. DA2 output is from minimum setting(300016setting) ~ 10VDC based on Delta Ti and setting. If Ti sensor is damaged, fan runs at set speed.

MS300080=1
DA2 output is based on heating water flow reading and setting PID calculation. The output is minimum output (Modbus 300015 setting)~10VDC.

MS300080=2
DA2 output is based on heating pressure difference setting (MS300085) and 4~20mA input2 reading (MS400007) PID calculation. The output is minimum output (MS300015 setting)~10VDC.

b) If Tr > Ts+1°C, then heat operation is terminated and MTV1 is turned off. DA2 is 0VDC. Indoor fan is turned OFF.
c) The range of Ts is 16 - 30°Cor fixed according to 300032 setting.
d) Indoor fan speed can be adjusted to low, medium, high and auto.

Heat mode with electrical heater as booster(300043=1)

If Tr ≤ Ts - 1°C, then heat operation is activated and MTV1 and MTV2 are turned on. Indoor fan runs at the set speed.
DA3 output is from minimum setting(300016setting) ~ 10VDC based on Delta T3/T4 and setting. DA2 is open at 10VDC for 2 min. Then check Ti1.

MS300080=0
If Ti1<=28°C (300017 setting), EH is closed; DA2 output is 10VDC. DA3 output is from 0 ~ 10VDC based on Delta Ti3/Ti4 and setting.

If 28°C (300017 setting) < Ti1<=28°C (300017 setting) +4°C, EH and DA2 output are kept original state.

If Ti1>28°C (300017 setting)+4°C, EH is opened. DA3 is 0VDC. DA2 output is from minimum setting(300016setting) ~ 10VDC based on Delta Ti1/Ti2 and setting.

MS300080=1
DA2 output is based on heating water flow reading and setting PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

If Ti1<=28°C (300017 setting), EH is closed.
If 28°C (300017 setting)< Ti1<=28°C (300017 setting)+4°C. EH is kept at original state.
If Ti1>28°C (300017 setting)+4°C, EH is open.

MS300080=2
DA2 output is based on heating pressure difference setting (MS300085) and 4~20mA input2 reading (MS400007) PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

If Ti1<=28°C (300017 setting). EH is closed.
If 28°C (300017 setting)< Ti1<=28°C (300017 setting)+4°C, EH is kept original state.
If Ti1>28°C (300017 setting)+4°C, EH is opened.

a) If Tr > Ts+1°C, then heat operation is terminated and MTV1 and MTV2 are turned off. DA2 is 0VDC. Indoor fan runs at auto speed.
b) The range of Ts is 16 - 30°C or fixed according to 300032 setting.
d) Indoor fan speed can be adjusted for low, medium, high and auto.

Heat mode with electrical heater as primary heat source (300043=2)

a) If Ti2 ≤ 35°C (or Ti2 is damaged or disconnected), and if Tr ≤ Ts-1°C (or -4°C if economy contact is closed), heat operation is activated, Indoor fan runs at set speed. EH is turned on. DA3 output is from minimum setting (300016 setting) ~ 10VDC based on Delta T3/T4 and setting.

b) If Tr > Ts+1°C then heat operation is terminated, Electrical heater is off. Indoor fan is turned off after 120 seconds.
c) The range of Ts is 16-30°C or fixed according to 300032 setting.
d) Indoor fan speed can be adjusted for low, medium, high and auto.

Over-heat protection of indoor coil in heat mode

a) If Ti1 ≥ 75°C, then MTV1, DA2, MTV2 and EH are turned off, indoor fan runs at high speed, even in standby mode.
b) If Ti1 < 70°C, then unit will maintain its original state.

If Ti1 temperature sensor is damaged, the protection mode will be overridden.

DEHUMIDIFICATION MODE

a) Ts=24°C.
b) If Tr ≥ 25°Cfor 30S, then MTV1 will be ON for 3 minutes, and then OFF for 4 minutes. DA2 is turned on 3 times of minimum opening. Fan is running at auto speed.
c) If 16°C≤ Tr < 25°C, then MTV1 will be ON for 3 minutes, and then OFF for 6 minutes. DA2 is turned on 2 times of minimum opening. Fan is running at auto speed.
d) If Tr < 16°C, then MTV1 will be turned ON for 4 minutes and then OFF for 10 minutes. DA2 is turned on minimum opening. Fan is running at auto speed.

AUTOMODE

Fan is turned on at medium speed. Check Tr and Ts in 30 seconds.
If Ts>Tr+3°C for 30 seconds, the unit is turned on in heat mode.
If Tr-3°C<Ts<Tr+3°C for 30S, the unit is turned on in fan mode.
If Ts<Tr-3°C , the unit is turned on in cool mode.
If the unit working mode is confirmed, it cannot be changed. After unit is turned OFF for 2 hours, then working mode is reset again.

Function of outputs

1) DA1 0~10VDC control signals

DA1 output is set by 300022 when fan is set at high speed.
DA1 output is set by 300021 when fan is set at medium speed.
DA1 output is set by 300020 when fan is set at low speed.
When fan is set auto mode, 300044=0, DA1 output is calculated by Tr/Ts PID calculation.
300044=1, DA1 output is calculated by ESP PID calculation.

2) WP (drain pump) contact

In cooling mode, when MTV1 is turned ON, WP is turned ON. MTV1 is turned OFF or unit working mode is changed, WP will be turned OFF in 5 minutes.

CAUTION

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

3) Float switch (NC signal input)

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 open, 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.

4) PRO1 (NO signal input)

When MS10004=0

The unit is on:

PRO input is closed for 60 seconds, the unit is turned off.

PRO input is open for 60 seconds, the unit is turned on.

When MS10004=1

1) The unit is on or standby. PRO input is open or closed. The unit is kept at original state.

2) The unit is off.

PRO input is closed for 30 seconds, MTV1 is turned on. DA2 is open at double amount of minimum setting (Modbus 300027 setting). Fan is turned on at low speed.

PRO input is opened for 30 seconds. MTV1 is off. DA2 is 0 VDC. Fan is turned off.

3) In period of PRO closed time, if unit receives instruction from remote handset, wired wall pad or Modbus, the unit will work according to the instruction at once.

5) SLEEP MODE

When sleep mode is turned ON:
Setting temperature point will increase 0.5°C every 30 minutes in cooling mode, after 3 hours, the setting point will increase 3°C, the setting point is not increased.

Setting temperature point will decrease 0.5°C every 30 minutes in heating mode, after 3 hours, the setting point will decrease 3°C, the setting point is not decreased.

When sleep mode is turned OFF, the setting point will reset to setting.

6) EH protection switch

- EH protection switch is closed 30 seconds and fan is on, then EH is on.
- When EH is ON, EH protection is open for 1 second, or fan is off, EH will be turned off at once and report alarm.
- When EH protection switch is closed for 180 seconds, EH can be turned on again.
- EH protection switch is opened 3 times in an hour, EH will not be turned on again unless reset main power.

7) 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 is in Standby Mode
If Tr ≦ 2°C for 2 minutes

1. MTV1 is turned on.
2. MTV2 is closed.
3. DA2 is 5VDC.
4. If Ti1 <5°C for 2 minutes EH (if present) is switched on
5. Indoor fan is turned on at low speed.

If Tr ≧ 5°C for 2 minutes

1. MTV2 is off.
2. MTV2 is open.
3. DA2 is set to 0VDC.
4. Electric Heater is turned off.
5. Indoor fan is switched off.

F.2.2. 4-pipe unit control logic (300042=1)

COOL MODE

1）If Tr ≥ Ts +1°C, then cool operation is activated, MTV1 is turned on. Indoor fan runs at set speed.
DA2 is open at 10VDC for 2 min. Then check Ti1.

MS300080=0，
When Ti1<=8°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

When 8<Ti1<=10°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 1 PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.

When 10<Ti1<=12°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 2 PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

When 12<Ti1<=15°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 3 PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

When 15<Ti1<=28°C (Modbus 300017 setting), DA2 output is kept at 10VDC.

When Ti1>28°C(Modbus 300017 setting), DA2 output is at minimum (Modbus300016 setting), and report pre-heat alarm.

MS300080=1
DA2 output is based on cooling water flow reading and setting PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

MS300080=2
DA2 output is based on cooling pressure difference setting (MS300084) and 4~20mA input2 reading (MS400007) PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

a) If Tr < Ts-1°C, then cool operation is terminated and MTV1 and AUX1 are turned off. DA2 is 0VDC. Indoor fan runs at set speed.

b) The range of Ts is 16 - 30°C or fixed according to 300032 setting.

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

LOW TEMPERATURE PROTECTION OF INDOOR COIL

If Ti1 ≤ 2°C for 2 minutes, then MTV1 is turned off.DA2=0VDC. If indoor fan is set for low speed, then it will run at medium speed. If it is set at medium or high speed, then it will keep running at the same speed.

If Ti1 ≥ 5°Cfor 2 minutes, then MTV1 is turned on.DA2 is calculated by delta T. Indoor fan runs at set speed.

FAN MODE

a) Indoor fan runs at the set speed while heater, MTV1, MTV2, AUX1 and AUX1 are turned off.

b) Indoor fan speed can be adjusted to low, medium and high.

HEAT MODE

Heat mode without electrical heater (300043=0)

If Tr ≤ Ts - 1°C, then heat operation is activated and MTV2is turned on.
DA3 is open at 10VDC for 2 min. Then check Ti3.

MS300080=0

If Ti3<=28°C (300017 setting), fan is turned on at low speed; DA3 is on at 10VDC.
If 28°C (300017 setting)<Ti3<28（3000017 setting）+4°C, fan and DA3 are kept original state.
If Ti3 ≥ 28（3000017 setting）+4°C, fan runs at set speed. DA3 output is from minimum setting(300016setting) ~ 10VDC based on Delta T3 and T4 and setting; if Ti sensor is damaged, Fan runs at set speed.

MS300080=1
DA3 output is based on heating water flow reading and setting PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

MS300080=2
DA3 output is based on heating pressure difference setting (MS300085) and 4~20mA input 3 reading (MS400008) PID calculation. The output is minimum output (Modbus300015 setting)~10VDC.

a) If Tr > Ts+1°C then heat operation is terminated and MTV2is turned off. DA3 is 0VDC. Indoor fan is turned on low speed.
b) The range of Ts is 16 - 30°Cor fixed according to 300032 setting.
c) Indoor fan speed can be adjusted to low, medium, high and auto.

Heat mode with electrical heater as booster(300043=1)

a) If Tr ≤ Ts - 1°C, then heat operation is activated and MTV2 is turned on. Indoor fan runs at the set speed. DA3 is open at 10VDC for 2 min. Then check Ti3.

MS300080=0，
If Ti3<=28°C (300017 setting), EH is closed; DA3 output is 10VDC.
If 28°C (300017 setting) < Ti1<=28°C (300017 setting)+4°C, EH and DA3 output are kept original state.
If Ti1>28°C (300017 setting)+4°C, EH is opened. DA3 output is from minimum setting(300016setting) ~ 10VDC based on Delta Ti3/Ti4 and setting.

MS300080=1
DA3 output is based on heating water flow reading and setting PID calculation. The output is minimum output (Modbus300015 setting) ~10VDC.
a) If Ti3<=28°C (300017 setting), EH is closed.
b) If 28°C (300017 setting) < Ti3<=28°C (300017 setting)+4°C, EH is kept at original state.
c) If Ti3>28°C (300017 setting)+4°C, EH is open.

MS300080=2
DA3 output is based on heating pressure difference setting (MS300085) and 4~20mA input 3 reading (MS400008) PID calculation. The output is minimum output (Modbus300015 setting)~10VDC;

If Ti3<=28°C (300017 setting), EH is closed.
If 28°C (300017 setting)< Ti3<=28°C (300017 setting)+4°C, EH is kept at original state.
If Ti3>28°C (300017 setting)+4°C, EH is opened.

b) If Tr > Ts+1°C, then heat operation is terminated and MTV2is turned off. DA3 is 0VDC. Indoor fan runs at auto speed.
c) The range of Ts is 16 - 30°C or fixed according to 300032 setting.
d) Indoor fan speed can be adjusted for low, medium, high and auto.

Over-heat protection of indoor coil in heat mode

a) If Ti3 ≥ 75°C, then MTV2, DA3, AUX2 and EH are turned off, indoor fan runs at high speed, even in standby mode.
b) If Ti3< 70°C, then unit will maintain its original state.
c) If Ti3 temperature sensor is damaged, the protection mode will be overridden.

DEHUMIDIFICATION MODE

a) Ts=24°C.
b) If Tr ≥ 25°Cfor 30 seconds, then MTV1 will be on for 3 minutes, and then off for 4 minutes. DA2 is turned on 3 times of minimum opening. Fan is running at auto speed.

c) If 16°C≤ Tr < 25°C, then MTV1 will be on for 3 minutes, and then off for 6 minutes. DA2 is turned on 2 times of minimum opening. Fan is running at auto speed.
d) If Tr < 16°C, then MTV1 will be turned on for 4 minutes and then off for 10 minutes. DA2 is turned on minimum opening. Fan is running at auto speed.

AUTOMODE

Fan is turned on at medium speed. Check Tr and Ts in 30 seconds.
If Ts>Tr+3°C for 30 seconds, the unit is turned on in heat mode.
If Tr-3°C<Ts<Tr+3°C for 30 seconds, the unit is turned on in fan mode.
If Ts<Tr-3°C, the unit is turned on in cool mode.
If unit is working at heat mode or fan mode, and if Tr-Ts>3.0°C, MTV2, MTV1 and DA3 are off more than 3 minutes, working mode will be changed to cooling mode.
If unit is working at cool mode or fan mode, and if Ts-Tr>3.0°C, MTV2, MTV1 and DA2 are off more than 3 minutes, working mode will be changed to heating mode.

Function of outputs

1) DA1 0~10VDC control signals

DA1 output is set by 310022 when fan is set at high speed.
DA1 output is set by 310021 when fan is set at medium speed.
DA1 output is set by 310020 when fan is set at low speed.
When fan is set auto mode, 300044=0, DA1 output is calculated by Tr/Ts PID calculation.
300044=1, DA1 output is calculated by ESP PID calculation.

2) WP contact (drain pump)

In cooling mode, when MTV1 is turned ON, WP is turned ON. MTV1 is turned off or unit working mode is changed, WP will be turned off in 5 minutes.

CAUTION

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

3) Float switch (NC signal input)

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 open 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 open when unit is turned off

If the float switch is open, 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 open for 10 minutes continuously, then the system reports an error.

4) PRO1 (NO signal input)

The unit is on:

PRO1 input is closed for 60 seconds, the unit is turned off.

PRO1 input is open for 60 seconds, the unit is turned on.

5) SLEEP MODE

When sleep mode is turned ON:

Setting temperature point will increase 0.5°C every 30 min in cooling mode, after 3 hours, the set point will increase by 3°C, then the setting point is not increased.

Setting temperature point will decrease 0.5°C every 30 min in heating mode, after 3 hours, the setting point will decrease by 3°C, then the set point is not decreased.

When sleep mode is turned OFF, the setting point will reset to setting.

6) EH protection switch

a) EH protection switch is closed 30 seconds and the fan is on, then EH is on.
b) When EH is ON, EH protection is open for 1 second, or fan is off, EH will be turned off at once and report alarm.
c) When EH protection switch is closed for 180 seconds, EH can be turned on again.

EH protection switch is open 3 times in 1 hour, EH will not be turned on again except reset main power.

7) 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 4-pipe unit is in Standby Mode

If Tr ≦ 2°C for 2 minutes

a) MTV2is turned on
b) DA3 is 5VDC
c) If Ti1 <5°C for 2 minutes EH (if present) is switched on
d) Indoor fan is turned on at low speed

If Tr ≧ 5°C for 2 minutes

a) MTV2 is off
b) DA3 is set to 0
c) Electric Heater is turned off
d) Indoor fan is switched off

F.2.3. 2-pipe with 6-way valve unit control logic (300042=2)

COOL MODE

If Tr ≥ Ts +1°C, then cool operation is activated, MTV1 is turned on. Indoor fan runs at set speed.
DA2 is open at 0VDC for 2 min. Then check Ti1,

MS300080=0，
When Ti1<=8°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting PID calculation. The output is 4~0VDC.

When 8<Ti1<=10°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 1 PID calculation. The output is 4~0VDC.

When 10<Ti1<=12°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 2 PID calculation. The output is 4~0VDC.

When 12<Ti1<=15°C, DA2 output is based on water temperature difference (Ti1/Ti2) and Modbus parameter 300027 setting minus 3 PID calculation. The output is 4~0VDC.

When 15<Ti1<=28°C (Modbus 300017 setting), DA2 output is kept at 0VDC.

When Ti1>28°C(Modbus 300017 setting), DA2 output is 4VDC, and report pre-heat alarm.

MS300080=1
DA2 output is based on cooling water flow reading and setting PID calculation. The output is minimum output The output is 4~0VDC.

MS300080=2
DA2 output is based on cooling pressure difference setting (MS300084) and 4~20mA input2 reading (MS400007) PID calculation. The output is 4~0VDC.

a) If Tr < Ts-1°C, then cool operation is terminated and MTV1 is turned off. DA2 is 5VDC. Indoor fan runs at set speed.
b) The range of Ts is 16 - 30°C or fixed according to 300032 setting.
c) Indoor fan speed can be adjusted for low, medium, high and auto.

LOW TEMPERATURE PROTECTION OF INDOOR COIL

a) If Ti1 ≤ 2°C for 2 minutes, then MTV1 is turned off.DA2=5VDC. If indoor fan is set for low speed, then it will run at medium speed. If it is set at medium or high speed, then it will keep running at the same speed.

b) If Ti1 ≥ 5°Cfor 2 minutes, then MTV1 is turned on. DA2 is calculated by delta T. Indoor fan runs at set speed.

FAN MODE

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

HEAT MODE

<u>Heat mode without electrical heater (300043=0)</u>

If Tr ≤ Ts - 1°C, then heat operation is activated and MTV2 is turned on.
DA2 is open at 10VDC for 2 min. Then check Ti1:

MS300080=0，

If Ti1<=28°C (300017 setting), fan is turned on at low speed. DA2 is on at 10VDC.
If 28°C (300017 setting)<Ti1<28（3000017 setting）+4°C, fan and DA2 are kept original state.
If Ti1 ≥ 28（3000017 setting）+4°C, fan runs at set speed. DA2 output is from 6 ~ 10VDC based on Delta Ti1/Ti2 and setting.
if Ti sensor is damaged, Fan runs at set speed.

MS300080=1
DA2 output is based on heating water flow reading and setting PID calculation. The output is from 6~10VDC.

MS300080=2
DA2 output is based on heating pressure difference setting (MS300085) and 4~20mA input2 reading (MS400007) PID calculation. The output is from 6~10VDC.

a) If Tr > Ts+1°C, then heat operation is terminated and MTV1 is turned off. DA2 is 5VDC. Indoor fan is turned off.
b) The range of Ts is 16 - 30°Cor fixed according to 300032 setting.
c) Indoor fan speed can be adjusted to low, medium, high and auto.

Heat mode with electrical heater as booster(300043=1)

a) If Tr ≤ Ts - 1°C, then heat operation is activated and MTV2 is turned on. Indoor fan runs at the set speed.
DA3 output is from minimum setting(300016setting) ~ 10VDC based on Delta T3/T4 and setting. DA2 is open at 10VDC for 2 min. Then check Ti1.

MS300080=0，
If Ti1<=28°C (300017 setting), EH is closed; DA2 output is 10VDC. DA3 output is from 0 ~ 10VDC based on Delta Ti3/Ti4 and setting;

If 28°C (300017 setting) < Ti1<=28°C (300017 setting)+4°C, EH and DA2 output are kept at original state.

If Ti1>28°C (300017 setting)+4°C, EH is opened. DA3 is 0VDC. DA2 output is DA2 output is from 6 ~ 10VDCbased on Delta Ti1/Ti2 and setting.

MS300080=1
DA2 output is based on heating water flow reading and setting PID calculation. The output is from 6 ~ 10VDC;

If Ti1<=28°C (300017 setting), EH is closed.
If 28°C (300017 setting)< Ti1<=28°C (300017 setting)+4°C, EH is kept at original state.
If Ti1>28°C (300017 setting)+4°C, EH is open.

MS300080=2
DA2 output is based on heating pressure difference setting (MS300085) and 4~20mA input2 reading (MS400007) PID calculation. The output is from 6 ~ 10VDC.

If Ti1<=28°C (300017 setting), EH is closed.
If 28°C (300017 setting)< Ti1<=28°C (300017 setting)+4°C, EH is kept original state.
If Ti1>28°C (300017 setting)+4°C, EH is opened.

b） If Tr > Ts+1°C, then heat operation is terminated and MTV1 and MTV2 are turned off. DA2 is 5VDC. Indoor fan runs at auto speed.

c)The range of Ts is 16 - 30°C or fixed according to 300032 setting.

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

Heat mode with electrical heater as primary heat source (300043=2)

a) If Ti2 ≤ 35°C (or Ti2 is damaged or disconnected), and if Tr ≤ Ts-1°C(or -4°C if economy contact is closed), heat operation is activated, Indoor fan runs at set speed. EH is turned on. DA3 output is from minimum setting(300016setting) ~ 10VDC based on Delta T3 /T4 and setting.

b) If Tr > Ts+1°C then heat operation is terminated, Electrical heater is OFF. DA3=0VDC. Indoor fan is turn off after 120 seconds.
c) The range of Ts is 16-30°C or fixed according to 300032 setting.
d) Indoor fan speed can be adjusted for low, medium, high and auto.

Over-heat protection of indoor coil in heat mode

a) If Ti1 ≥ 75°C, then MTV1, DA2, MTV2 and EH are turned off, indoor fan runs at high speed.
b) If Ti1 < 70°C, then unit will maintain its original state.
c) If Ti1 temperature sensor is damaged, the protection mode will be override.

DEHUMIDIFICATION MODE

a) MTV1 is turned on; Ts=24°C;
b) If Tr ≥ 25°Cfor 30S, DA2 is 1.5VDC. Fan is running at auto speed.
c) If 16°C≤ Tr < 25°C, DA2 is 2.5VDC. Fan is running at auto speed.
d) If Tr < 16°C, DA2 is 3.5VDC. Fan is running at auto speed.

AUTOMODE

Fan is turned on at medium speed. Check Tr and Ts in 30 seconds.
a) If Ts>Tr+3°C for 30 seconds, the unit is turned on in heat mode.
b) If Tr-3°C<Ts<Tr+3°C for 30 seconds, the unit is turned on in fan mode.
c) If Ts<Tr-3°C, the unit is turned on in cool mode.
d) If the unit working mode is confirmed, it cannot be changed.

Function of outputs

1) DA1 0~10VDC control signals

DA1 output is set by 300022 when fan is set at high speed.
DA1 output is set by 300021 when fan is set at medium speed.
DA1 output is set by 300020 when fan is set at low speed.
When fan is set auto mode, 300044=0, DA1 output is calculated by Tr/Ts PID calculation.
300044=1, DA1 output is calculated by ESP PID calculation.

2) **WP contact**

In cooling mode, when MTV1 is turned ON, WP is turned ON. MTV1 is turned OFF or unit working mode is changed, WP will be turned OFF in 5 minutes.

CAUTION

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

3) Water float switch (NC signal input)

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.

4) PRO1 (NO signal input)

When MS10004=0

The unit is on:

PRO input is closed for 60 seconds, the unit is turned off.

PRO input is open for 60 seconds, the unit is turned on.

When MS10004=1

a) The unit is on or standby, PRO input is open or closed, the unit is kept at original state.

b) The unit is off.

PRO input is closed for 30 seconds, MTV1 is turned on, DA2 is open 10VDC, fan is turned on at low speed.

PRO input is opened for 30S, MTV1 is off, DA2 is 5VDC, Fan is turn off.

In period of PRO closed time, if unit receives instruction from remote handset, wired wall pad or Modbus, the unit will work according to the instruction at once.

5) **SLEEP MODE**

When sleep mode is turned ON:
Set point will increase by 0.5°C every 30 min in cooling mode. After 3 hours, set point will increase by 3°C, then set point is not increased.

Set point will decrease by 0.5°C every 30 min in heating mode. After 3 hours, the set point will decrease by 3°C, the set point is not decreased.

When sleep mode is turned OFF, the setting point will reset to setting.

6) EH protection switch

- EH protection switch is closed 30 seconds and fan is on, EH is on.
- When EH is on, EH protection is open for 1 second, or fan is off. EH will be turned off at once and report alarm.
- When EH protection switch is closed for 180 seconds, EH can be turned on again.
- EH protection switch is open 3 times in 1 hour, EH will not be turned on again unless reset main power.

7) 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 is in Standby Mode

If Tr $\leqq$ 2°C for 2 minutes

1. MTV2 is closed
2. DA2 is 10VDC
3. If Ti1 <5°C for 2 minutes EH (if present) is switched on
4. Indoor fan is turned on at low speed

If Tr $\geqq$ 5°C for 2 minutes

1. MTV2 is open
2. DA2 is set to 5VDC
3. Electric Heater is turned off
4. Indoor fan is switched off

F.3. Open Modbus protocol

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

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

Supported Functions:

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

Valid Error code table:

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

Coils table:

Description	Address	Type*	Remark
ON/OFF	100000	R/W	
Sleeping mode	100001	R/W	
Louver swings	100002	R/W	
Energy Saving Mode	100003	R/W	
PRO function	100004	R/W	

Discrete table:

Description	Address	Type*	Remark
MTV1	200000	R	
MTV2	200001	R	
Reserved	200002	R	
Reserved	200003	R	
Condensate pump	200004	R	
Electrical heater	200005	R	
Wired wall pad	200006	R	
PR-O1	200007	R	
Float switch	200008	R	
Reserved	200009	R	
EH safety switch	200010	R	
Internal test	200011	R	Testing purpose only.
Reserved	200012	R	
Reserved	200013	R	
Reserved	200014	R	
Reserved	200015	R	
Reserved	200016	R	
Reserved	200017	R	
Reserved	200018	R	
Reserved	200019	R	

* 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)
			Position2=02(H)
			Position3=03(H)
			Position4=04(H)
			Auto=0F(H)
			Stop=00(H)
Setting temperature	300003	R/W	16~30 (actual*10 format)
Address setting	300004	R/W	1~255
Reset	300005	W	=0x33 reset error
Week	300006	W	
Hour	300007	W	
Minute	300008	W	
Second	300009	W	
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 outputDA1	300015	R/W	Default 25% (2.5VDC)
Minimum output DA2\DA3	300016	R/W	Default 25% (2.5VDC)
Pre-heat temperature setting	300017	R/W	25~35, default: 28
0~10VDC signal input setting	300018	R/W	Default: 40% （4VDC) or （10.4mA)
Super low speed rpm	300019	R/W	0~10VDC, default:2VDC
Low speed rpm	300020	R/W	1~10VDC, default: 3VDC
Medium speed rpm	300021	R/W	1~10VDC, default: 6VDC
High speed rpm	300022	R/W	1~10VDC, default: 8.5VDC
Signal output setting	300023	R/W	1~10VDC (used to test，0 = disable)
Temperature sampling time	300024	R/W	2~100，default: 5S
Factor of auto fan speed	300025	R/W	2~150，default:20
Factor of modulating valve	300026	R/W	2~250，default:150
Ti1 and Ti2 difference setting	300027	R/W	3~15，default:5
Ti3 and Ti4 difference setting	300028	R/W	3~15 default:10
Controller Hardware type setting	300029	R/W	0=air cleaner (S5) 1=FCU (S1/S2/S3, SWC-S) 2=FCU (S8) or (S8+W5) Default：2
Degree unit setting	300030	R/W	0=degree C 1=degree F
Temperature display setting	300031	R/W	0=Room temperature display on LED 1=Setting temperature display on LED
Setting temperature range	300032	R/W	0=setting temperature range is from 16~30 1=Setting temperature range is fixed. Cooling=24°C Heating=21°C
Temperature band setting	300033	R/W	1~9， default:1

Software type	300046	R/W	0=2-pipe with valve 1=4-pipe with std valve 2=4-pipe with 6-way valve
EH type	300047	R/W	0=without EH, 1=EH as booster; 2=EH as primary
DA1 control signal mode	300048	R/W	0=Tr/Ts 1=ESP
EC motor input ports	3000049	R/W	0=CN4 working； 1=CN5 working 2=CN4+CN5 working default：0
PRO1 input type	300050	R/W	0=NO； 1=NC
Tr sensor setting	300051	R/W	0=sensor on the wired wall pad； 1=sensor on the main PCB； default：0
Reserved	300052	R/W	0~120，default：80
Reserved	300053	R/W	200~999 default：0；
E-heater	300054	R/W	unit：KW*10
Room temp. factor	300055	R/W	90~120， default：103
Water inlet temp. factor	300056	R/W	90~120，default：103
Delt T factor	300057	R/W	90~120，default：102
Product type	300058	R/W	00~99; default：00
Product model	300059	R/W	000~999; default：000
Ex-works data	300060	R/W	0000——9999
Software version	300061	R	10~99 default：10
Hardware version	300062	R	10~99 default：10
EC motor1 Low RPM setting	300063	R/W	200rpm~1500rpm default：500
EC motor1 Maxi RPM setting	300064	R/W	200rpm~1500rpm default：1200
EC motor2 Low RPM setting	300065	R/W	200rpm~1500rpm default：500
EC motor2 Maxi RPM setting	300066	R/W	200rpm~1500rpm default：1200
EC motor qty setting	300067	R/W	0=EC motor1 working 1=EC motor2 working 2=EC motor 1/2 working default:2
In auto mode, temp. Band setting	300068	R/W	1~15，default:5
Reserved	300069	R/W	
Reserved	300070	R/W	
Unit power input at High speed	300071	R/W	W*10
Unit power input at Med. speed	300072	R/W	W*10
Unit power input at Low speed	300073	R/W	W*10
Unit heat capacity at High speed	300074	R/W	KW*10
Unit heat capacity at Med. speed	300075	R/W	KW*10
Unit heat capacity at Low speed	300076	R/W	KW*10
Unit cool capacity at High speed	300077	R/W	KW*10
Unit cool capacity at Med. speed	300078	R/W	KW*10
Unit cool capacity at Low speed	300079	R/W	KW*10
DA2 control mode	3000080	R/W	0=based on delta T； 1=based on water flow； 2=based on signal input2
DA2 Chilled water flow setting	3000081	R/W	0~4000L/h; default: 1020
DA2/DA3 heating water flow setting	3000082	R/W	0~4000L/h; default: 1020
DA3 control signal mode	3000083	R/W	0=based on delta T； 1=based on water flow； 2=based on signal input3;
DA2 4~20mA input 2	3000084	R/W	0~100， Default: 40%
DA2/DA3 4~20mA input 3	3000085	R/W	0~100， Default: 40%
DA2 Maximum opening setting	300086	R/W	0~100， Default: 100%
DA3 Maximum opening setting	300087	R/W	0~100， Default: 100%

Input Register table:

Description	Address	Type*	Remark
Tr temperature sensor	400000	R	
Ti1 temperature sensor	400001	R	
Ti2 temperature sensor	400002	R	
Ti3 temperature sensor	400003	R	
Ti4 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 =Filter switch Bit7 = Electrical heater failure Bit8 = Motor1 Error Bit9 =Motor2 Error Bit10 = System parameters error Bit11 = Anti-frozen error Bit12 = Ti3 temperature sensor error Bit13 = Ti4 temperature sensor error Bit14 =PM2.5 sensor Bit15 =AQI Error
Fan speed status	400006	R	Low = 04(H) Medium = 02(H) High = 01(H)
0~10VDC signal1	400007	R	
4~20mA signal2	400008	R	
EH	400009	R	0= disable, 1=booster, 2=primary
Unit type	400010	R	
DA1	400011	R	
DA2	400012	R	
DA3	400013	R	
Unit status	400017	R	Cooling mode = 01(H) Humidify mode = 02(H) Fan mode = 04(H) Heating mode = 08(H) Unit OFF=32(H)
Temperature in wall pad	400018	R	
Motor running time	400019	R	
Motor running terms	400020	R	0~100，
Cooling Capacity	400021	R	unit：KWh
Cooling capacity terms	400022	R	0~100，
Heating capacity	400023	R	Unit: KWh
Heating capacity terms	400024	R	0~100，
EC motor1 actual RPM	400036	R	
EC motor2 actual RPM	400037	R	
EC motor1 error	400038	R	
EC motor2 error	400039	R	
Input signal (0~10VDC)	400040	R	
Driver Temperature sensor	400041	R	
address	400042	R	
Reserved	400043	R	
water flow1	400044	R	m3/h
Water flow2	400045	R	m3/h
Cooling capacity	400046	R	
Heating capacity	400047	R	
4~20mAsignal input3	400048	R	

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

G. Networking System

G.1.1. Network Setup

1) Disconnect the communication plug from the control box

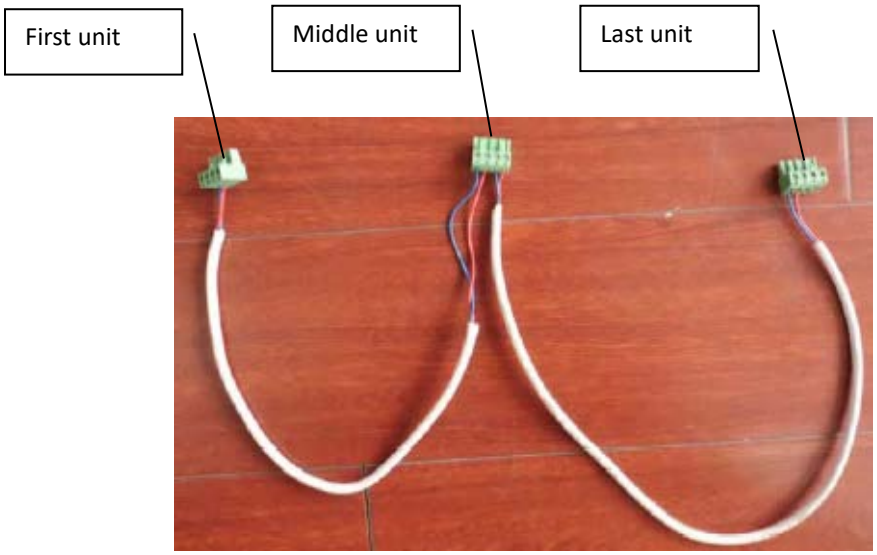
2) Communication plug

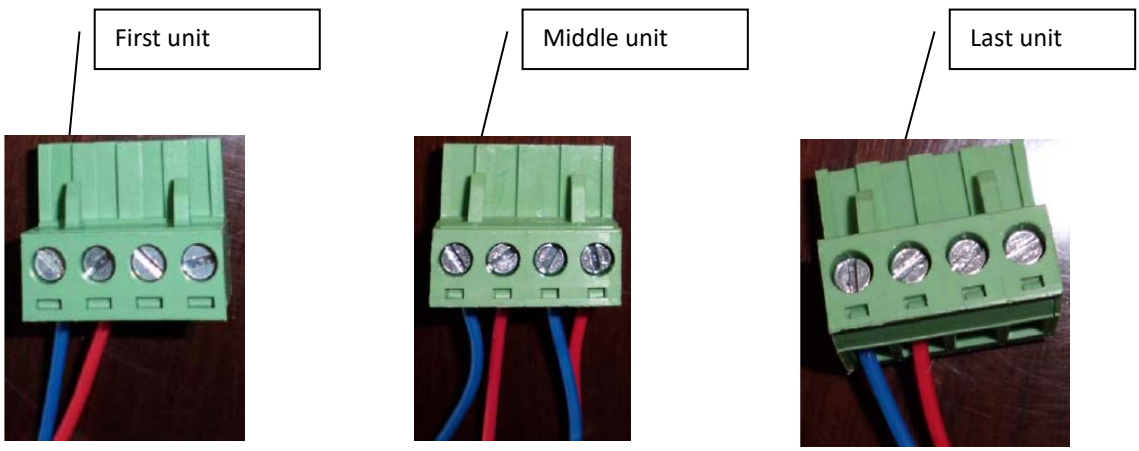
A, B, A, B is printed on the main PCB. When you connect the wires, please ensure connection of A to A and B to B.

3) Connection wire

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

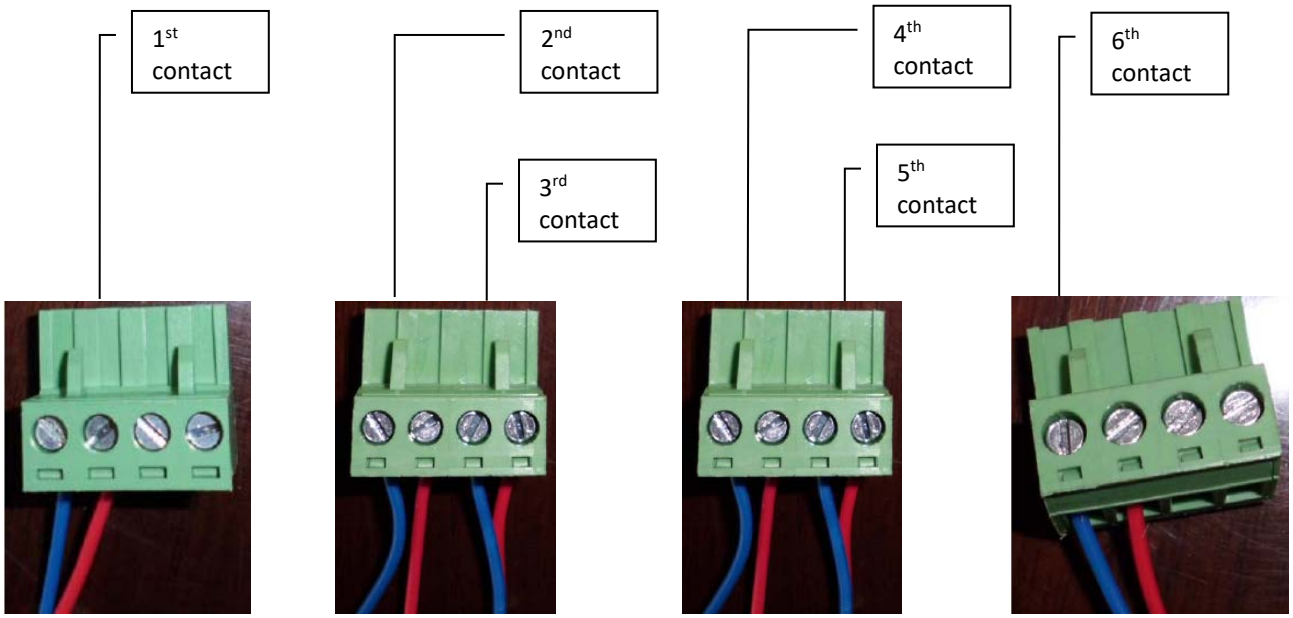




3.3) Wire connection check

3.3.1) After the wire connection is completed, please check that the wire colours correspond.

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 are 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

5) Using wired wall pad or Modbus to set each unit address.

H. Troubleshooting

Symptom	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

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Note: All the information or data in this manual may be changed without notice.

EUROPE
C/ Rio Jucar, Nave 6. Pl El Saladar
Lorqui, Murcia, Spain, 30564
T (+34) 968 046 262

NORTH AMERICA
991 Providence High
Norwood, MA, 02065, USA
T +1 (800) 326 9105

HONG KONG
Office 6, 9th Floor, Block A, 6 on Ping Street
New Trade Plaza, Shatin, Hong Kong,
T (852) 2648-8887

www.polaraircs.com | contact.polarair@polarglobalgroup.com