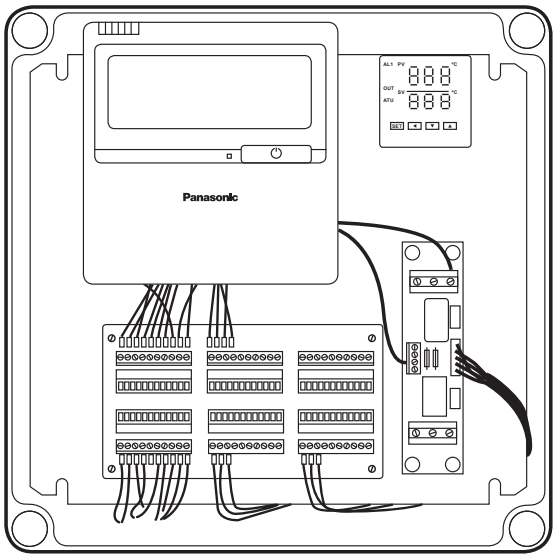
Panasonic

Air Handling Unit Kit

Installation Instructions



heating & cooling solutions

ECO i | ECO G | PAC i

Air Handling Unit Kit

Installation Instructions

Original Installation Instructions (English)

February 2016

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Table of contents

1 General information and safety instructions

1.1 Introduction

This document contains the installation instructions for the Panasonic AHU Kits.

AHU Kits connect Panasonic ECOi, ECO G and PACi outdoor units to third-party air handling unit systems, using the same refrigerant circuit as the VRF system.

Application examples for Panasonic AHU Kits are hotels, offices, server rooms or all large buildings where air quality control such as humidity control and fresh air is needed.

Where information in this document does not apply to all three VRF system ranges, but only to either ECOi, ECO G or PACi systems, this will be indicated by the relevant product range logos:

The AHU Kits are supplied in three different product versions, “light”, “medium” or “advanced”, and can be selected based on the required functionality. The following products are covered in this documentation:

Product version	ECOi ECOG	PACi
Light	PAW-160MAH2L PAW-280MAH2L PAW-560MAH2L	PAW-280PAH2L
Medium	PAW-160MAH2M PAW-280MAH2M PAW-560MAH2M	PAW-280PAH2M
Advanced	PAW-160MAH2 PAW-280MAH2 PAW-560MAH2	PAW-280PAH2

The installation should be performed only by qualified electricians in strict accordance with the installation instructions and especially with the safety instructions given in this document.

The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction. Children being supervised are not to play with the appliance.

Important: Validity of this document

Due to the ongoing development and innovation of Panasonic products, this document and all the information contained herein is preliminary (as at February 2016). It may not reflect the current status of the relevant products. Preliminary or missing information will be updated and added on an ongoing basis and published at the discretion of Panasonic.

1.2 Structure and meaning of notices and symbols

Safety notices

WARNING

This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

This indicates a hazardous situation which, if not avoided, could result in property damage.

Other notices

Important

This indicates other important information or references to other useful sources of technical data and descriptions.

1.3 Safety instructions

WARNING

The following precautions need to be followed strictly, in order to avoid hazardous situations, which could result in death or serious injury.

Electric shock or fire may result from inadequate or incorrect installation or wiring procedures.

- ► System installation must only be performed by an experienced electrician.
- ► Arrange installation at the dealer where the system was purchased or use a professional installer.
- ► System installation must be performed in strict accordance to the installation procedures described in this document.

Damage to the circuit breakers may result from incorrect electrical wiring, insufficient electrical circuit capacity or use with other electrical devices.

- ► Always use a dedicated branch circuit for electrical wiring.
- ► Strictly avoid using other electrical devices within the same electrical circuit.
- ► Make sure the electrical circuit used has sufficient capacity.

Overheating or fire may result if connections or attachments are not secure.

- ► Use the specified cables (type and wiring diameter) for the electrical connections, and securely connect the cables.
- ► Run and fasten the cables securely so that external forces or pressure placed on the cables will not be transmitted to the connection terminals.

Suffocation can result if refrigerant gas leaks and exceeds the limit density in a small room.

- ► Installation of the refrigerant piping must only be performed by an experienced, qualified installer to minimize the risk of leaks.
- ► Install so that even if refrigerant gas leaks into the room, it will not exceed the limit density of 0.44 kg/m^3, in accordance with the local regulatioins for facility air conditioning equipment.
- ► If the refrigerant gas concentration does exceed the limit density, do one of the following:
  - install an opening in a neighbouring room
  - or install ventilation equipment triggered by gas leak detection sensors
  - or install an automatic pump-down system provided by the manufacturer of the equipment

Poisonous gas can result if refrigerant gas comes into contact with fire.

- ► After installation of refrigerant pipes, perform a dry nitrogen gas sealing test to check that there are no leaks.
- ► Ventilate the work area if refrigerant gas leaks during installation.

► Prevent the refrigerant gas from coming into contact with a fan heater, stove, range, or other source of fire.

Incorrect installation can result in falling equipment causing damage, injuries or other accidents.

► Install in a location that is fully strong enough to support the weight of the equipment.

► Perform installation that is secure enough to withstand earthquakes, whirlwinds, storms and other strong winds.

Frostbite injuries may result from coming into direct contact with the refrigerant gas.

► When handling refrigerant gas, be careful not to touch the refrigerant gas directly.

CAUTION

The following precautions need to be followed strictly, in order to avoid hazardous situations, which could result in minor or moderate injury.

Electric shock, shock and fires may result from incomplete grounding of the equipment or failure to install an earth leakage breaker.

► Be sure to ground equipment properly.

► Do not attach ground wires to gas pipes, water pipes, lightning arresters, or telephone ground lines.

► Always install an earth leakage breaker.

Ignition of flammable gas or inflammable materials may result from installing the system in locations where flammable gas can generate, enter, build up, or leak.

► Do not install the system in locations where flammable gas can occur in any way.

► Do not install in locations where volatile inflammable materials are handled.

1.4 Warranty policy

We can be held responsible for the quality and performance of the AHU Kit we supply.

However, we cannot be held responsible for the performances, operations and machine controls of your complete AHU system which incorporates our AHU Kit, nor for the components used in the refrigerant cycle of your AHU system (including, but not limited to, compressors, high-pressure switches, check valves, strainers, expansion valves, solenoid valves, 4-way valves, capillary tubes, accumulator tanks, and heat exchanger tubes), nor for any damages and defects caused in the process of installing our AHU Kit, by the system design and/or during assembly of your AHU system.

We do not publish the certificate to show conformity to the EMC and the product safety requirements applicable to your complete AHU system.

2 Ventilation theory and air handling units

2.1 Purpose of air-conditioning

The purpose of air-conditioning is to provide comfortable indoor air conditions for the room occupants and to provide energy saving potentials for the owner.

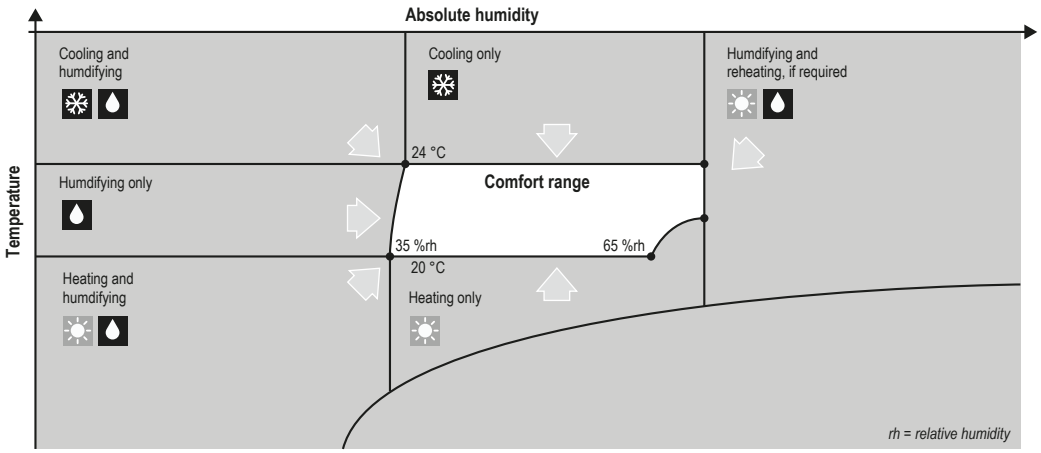
Comfort

If room occupants feel “comfortable“ in a given room, depends mainly on the following two factors:

- air temperature
- relative air humidity

However, optimum working or living conditions do not only exist at a specific setpoint of room temperature and room humidity, but also within a certain band width of the setpoint.

A temperature setpoint of 22 °C and a relative humidity setpoint of 45 % with variations of ±2 °C and ±15 %rh respectively are typical levels used for office spaces. Also, at high temperatures, maximum limitation of absolute humidity should be provided to avoid “muggy” conditions. Typically, this limit value lies at about 10 g/kg (H_2O).



Energy savings

Besides the advantages in terms of indoor air quality, air conditioning offers also an energy saving potential. For example, while uncontrolled ventilation through open windows leads to large amounts of heat being lost to the outside during the heating season or gained from the outside during the cooling season, air conditioning systems provide possibilities to utilize the extra “free” energy in heat recovery modules so that overall operating costs will be reduced.

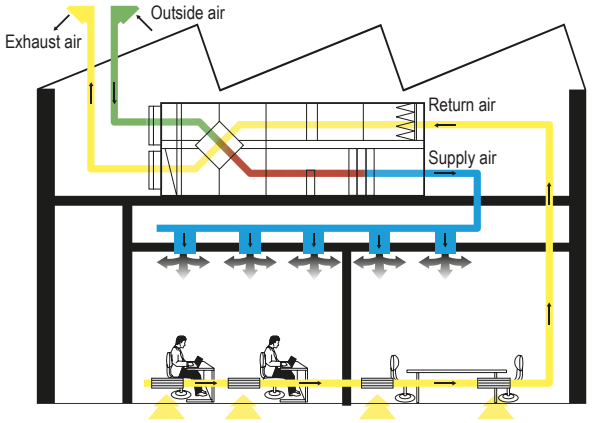
The larger the area of the comfort range, the better the energy saving opportunities.

2.2 Mechanical ventilation systems

Main components of mechanical ventilation systems

The main components of a mechanical ventilation system are the following:

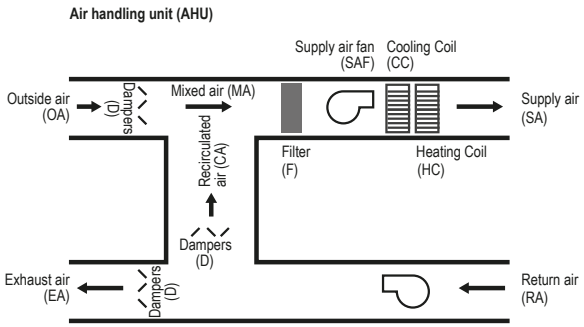
- Air handling unit (AHU)
- Air ducts
- Air distribution elements



2.3 Air handling units

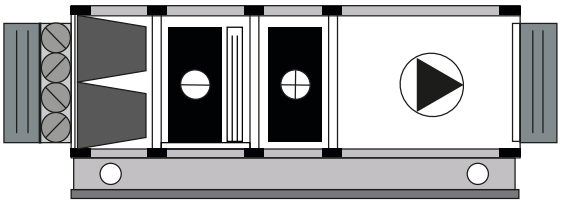
Main components of air handling units

The main components of an air handling unit are shown in the following graphic.

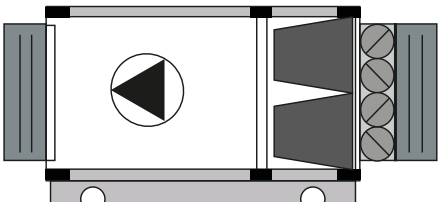


Main types of air handling units

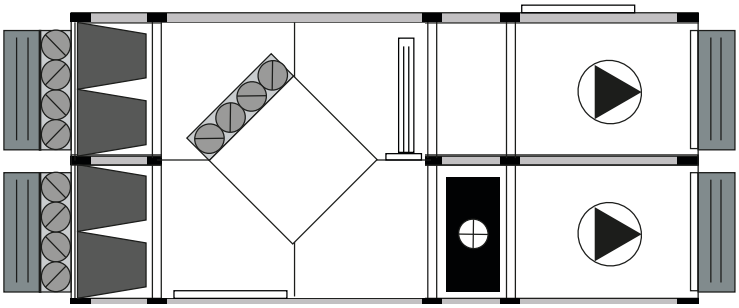
Supply type



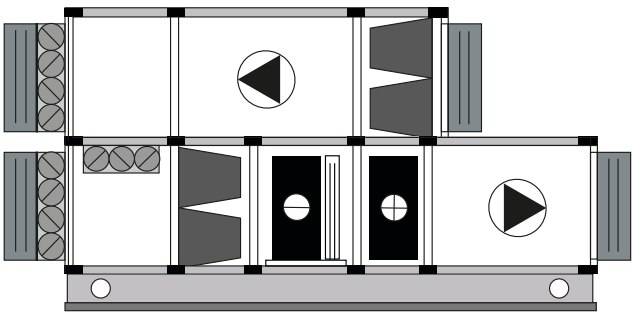
Exhaust type



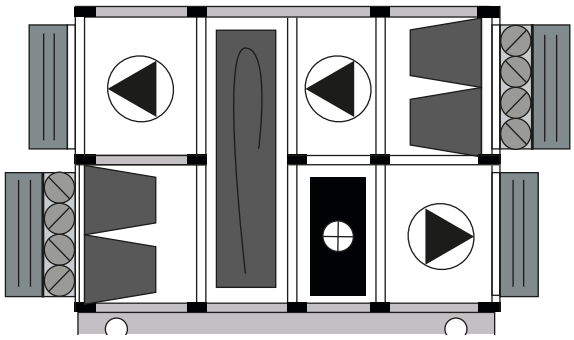
Supply/Exhaust type with cross-flow heat exchanger



Supply/Exhaust type with mixing chamber



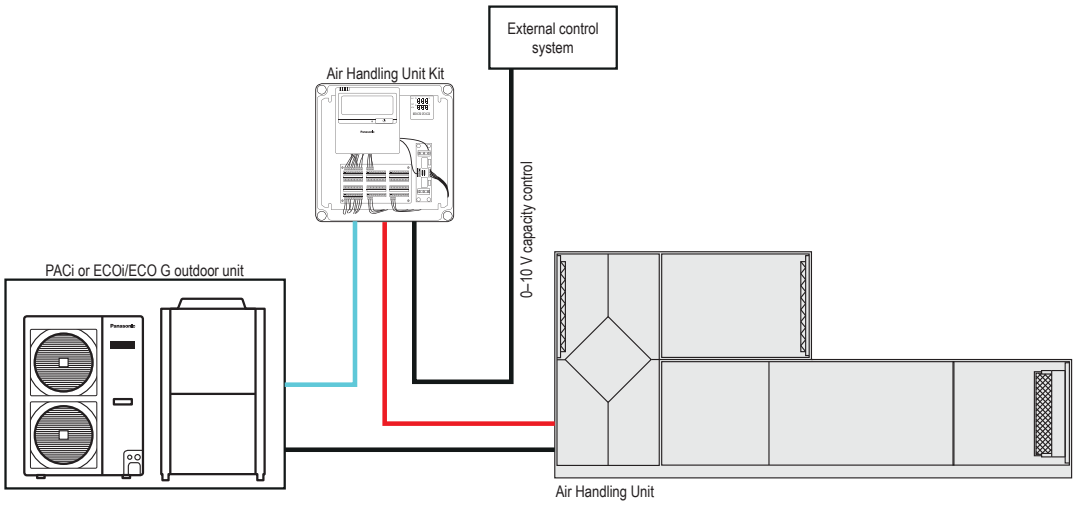
Supply exhaust type with rotary heat exchanger



Connecting AHU systems via the AHU Kit to ECOi/ECO G or PACi outdoor units

The following graphic shows an example for connecting a third-party air handling unit via the Panasonic AHU Kit to Panasonic ECOi/ECO G or PACi outdoor units.

Demand control on the outdoor unit manged by external 0–10 V signal



1 This schematic layout applies to the advanced and medium AHU Kit versions only, because they feature an in-built CZ-CAPBC2 interface handling the 0–10 V control. This enables two control alternatives:

- Capacity control through external BMS via 0–10 V signal
- Capacity control through in-built supply air or ambient temperature sensor (only available with advanced version)

2 As the “light” version of the AHU Kit does not include an in-built CZ-CAPBC2 interface for handling the 0–10 V control, this schematic layout does not apply to the “light” AHU Kit version.

3 Product description

3.1 General description

The Panasonic AHU Kits offer a wealth of connectivity possibilities so that they can be easily integrated into many systems.

The new AHU Kit has been developed to better meet customer demand:

- Three versions available depending on the required functionality (light, medium or advanced version)
- IP65 enclosure providing the possibility for outdoor installation
- 0–10 V demand control (included on the CZ-CAPBC2 interface)*
- Easy control by BMS

* Only available with all ECOi units and with PACi Elite units from 6 kW up to 25 kW.

Features and benefits

Depending on the AHU Kit version, the devices offer the following features and benefits:

Features and benefits	Version		
	Light	Medium	Advanced
Connectable with P-LINK system.	X	X	X
Fan control signal from the PCB can be used for controlling the air volume of an external fan (High/Mid/Low and LL for Th-OFF) (Need to change the fan control circuit wiring at field.)	X	X	X
Defrost operation signal, Thermo-ON/OFF states output	X	X	X
Drain pump control (Drain-pump and the float switch to be field-supplied)	X	X	X
Basic humidifier control output (Humidifier to be field-supplied)	X	X	X
Alarm and operation output	X	X	X
The system is controlled by the air intake (or room return air) temperature in the same way as a standard indoor unit. Selectable modes: Automatic / Cooling / Heating / Fan / Dry (equivalent to Cooling).	X	X	X
Easy integration into BMS or AHU control systems using demand control: 40 to 115 % (5 % steps) of nominal current by 0–10 V input signal	–	X	X
Temperature set point adjustment by external control system using 0–10 V or 0–140 Ohm signal	–	X	X
Room supply air temperature can be controlled by the additional thermostat, its supply air temperature sensor and the 0–10 V input signal for enhanced comfort and efficiency	–	–	X
Target temperature setting based on ambient temperature with CZ-CAPBC2 interface using 0–10 V signal	–	–	X

3.2 Scope of supply

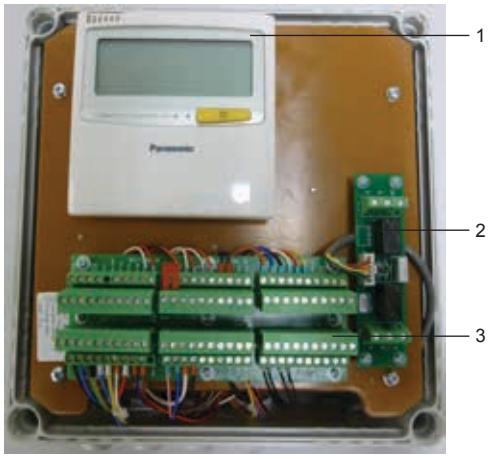
The scope of supply of the AHU Kits depends on the product version (light, medium or advanced) and on the relevant VRF system range. The following table shows an overview of the different scopes of supply.

Scope of supply		Version					
		Light		Medium		Advanced	
		ECO i / ECO G PAW-160MAH2L PAW-280MAH2L PAW-560MAH2L	PAC i PAW-280PAH2L	ECO i / ECO G PAW-160MAH2M PAW-280MAH2M PAW-560MAH2M	PAC i PAW-280PAH2M	ECO i / ECO G PAW-160MAH2 PAW-280MAH2 PAW-560MAH2	PAC i PAW-280PAH2
IP65 case		X	X	X	X	X	X
Control unit including transformer		X	X	X	X	X	X
Relays		X	X	X	X	X	X
Terminal boards		X	X	X	X	X	X
Remote controller (CZ-RTC2 / CZ-RTC4*)		X	X	X	X	X	X
PCB for T10 connection (PAW-T10)		X	X	–	–	X	X
Expansion valve		X	–	X	–	X	–
PCBs for the expansion and RAP / SVK valves		X	–	X	–	X	–
Refrigerant temperature sensors	E1 + E3	X	–	X	–	X	–
	E1 + E2	–	X	–	X	–	X
Air intake and air outlet temperature sensors	TA	X	X	X	X	X	X
	BL	X	–	X	–	X	–
CZ-CAPBC2 interface for 0-10 V control (ACC-SP1A)		–	–	X	X	X	X
Thermostat (TR-16 / TR-17*) including an additional temperature sensor to be used either for room supply air or ambient air temperature		–	–	–	–	X	X

* Depending on AHU Kit generation.

The heat exchanger, fan and fan motor must be field-supplied.

Exterior view of AHU Kits and some of their compoments



Light version: PAW-280PAH2L*

1 Remote controller (CZ-RTC2 / CZ-RTC4)
2 External signal control PCB (PAW-T10)
3 Terminal board with 6 connectors

* Shown as an example and with transparent front cover removed.

PACi accessories

PAC i

Thermistor x2
(Refrigerant: E1, E2)

Thermistor
(Air: TA)

Medium version: PAW-280PAH2M*

1 Remote controller (CZ-RTC2 / CZ-RTC4)
2 Terminal board with 6 connectors
3 CZ-CAPBC2 interface (on rear side)

* Shown as an example and with transparent front cover removed.

PACi accessories


Thermistor x2
(Refrigerant: E1, E2)


Thermistor
(Air: TA)

Advanced version: PAW-560MAH2*

1 Remote controller (CZ-RTC2 / CZ-RTC4)
2 Thermostat (TR-16/TR-17)
3 External signal control PCB (PAW-T10)
4 Terminal board with 6 connectors
5 CZ-CAPBC2 interface (on rear side)

* AHU Kit shown with transparent front cover removed.

ECOi / ECO G accessories


Thermistor x2
(Refrigerant: E1, E3)


Thermistor x2
(Air: TA, BL)


Expansion
valve

Control functions provided as standard by integral components

CZ-RTC2 / CZ-RTC4 Timer remote controller

- Operation-ON/OFF
- Mode selection
- Temperature setting
- Parameter settings

TR-16 / TR-17 Additional Thermostat (advanced version only)

- Target temperature setting based on ambient temperature with proportional integral logic*
- Demand control based on room supply air temperature to enhance comfort and efficiency*

* Only one of these two options can be chosen at a time.

CZ-CAPBC2 Mini seri-para I/O unit (medium and advanced versions only)

- Easy integration in external AHU control systems and BMS
- Demand control: 40 to 115 % (5 % steps) of nominal current by 0–10 V input signal[1]
  - » Medium version: Terminal M2-2; M2-3. Advanced version: Terminal M2-1; M2-2.
- Target temperature setting by 0–10 V or 0–140 Ω input signal[1]
  - » Medium and advanced versions: Terminal M2-3; M2-4.
- Suction air temperature (TA sensor) output by 4–20 mA signal
  - » Medium version: Terminal PT9; PT10. Advanced version: Terminal M2-1; M2-2.
- Mode select and/or ON/OFF control[2]
  - » Medium and advanced versions: Terminal DI1; DI2; DI3; COM.
- Fan operation control[2]
  - » Medium and advanced versions: Terminal DI1; DI2; DI3; COM.
- Operation status output/ Alarm output
  - » Medium and advanced versions: Terminal COM; DO1 / COM; DO2.
- Thermostat ON/OFF control[2]
  - » Medium and advanced versions: Terminal DI1; DI2; DI3; COM.

1 Demand control by external BMS cannot be combined with the demand control or target temperature setting accomplished by the thermostat. However, if simultaneous demand control and target temperature setting is needed, this can only be achieved by using a second (optional) CZ-CAPBC2 interface.
2 Mode select and/or ON/OFF control cannot be combined with fan operation control nor Thermostat ON/OFF control. However if simultaneous control of 2 options is needed, this can be achieved by using a second (optional) CZ-CAPBC2 interface. All 3 options cannot be used at the same time.

PAW-T10 PCB to connect to T10 connector (light and advanced versions only)

- Dry contact PCB for easy control of the unit
- Operation ON/OFF input signal
  - » PAW-T10 terminal I(1); I(2).
- Remote control prohibition
  - » PAW-T10 terminal I(3); I(4).
- Operation ON status output signal, maximum 230 V / 5 A (NO/NC)
  - » PAW-T10 terminal NC O(5); NO O(6); Potential for both O(7).
- Alarm status output signal, maximum 230 V / 5 A (NO/NC)
  - » PAW-T10 terminal NC O(8); NO O(9); Potential for both O(10).

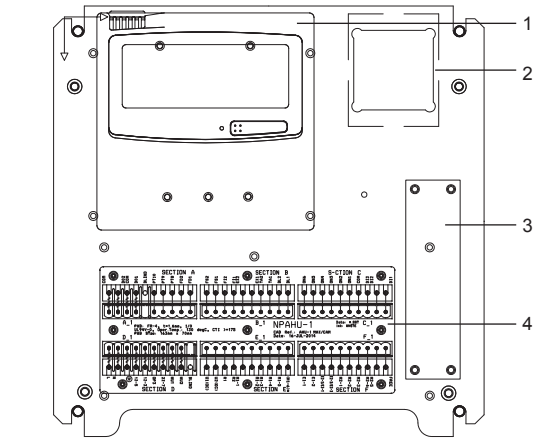
PAW-OCT, DC12 V outlet, OPTION terminal

- Output signal for Cooling/Heating/Fan status
  - » Terminal ON4; ON5; ON6; Potential ON1.
- Output signal for Defrost operation indication
  - » Terminal ON2; Potential ON1.
- Output signal for Thermostat-ON status
  - » Terminal ON3; Potential ON1.

Additional contacts available

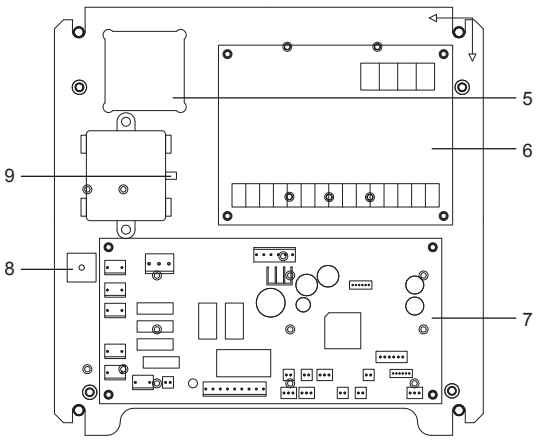
- External humidifier control (ON/OFF) 230 V AC 3 A
  - » Terminal HU1; HU2.
- External fan control (ON/OFF) 12 V DC
  - » Terminal FD1; FD2.
- External filter status signal potential free
  - » Terminal FI1; FI2.
- External float switch signal potential free
  - » Terminal FS1; FS2.
- External leakage detection sensor or TH. OFF contact potential free (possible usage for external blow out temperature control)
  - » Terminal EX1; EX2

Mounting boards



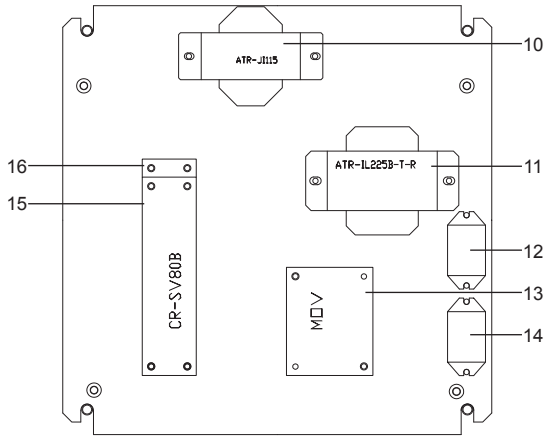
Upper mounting board – front side

1 Remote controller (CZ-RTC2 / CZ-RTC4)
2 Thermostat (TR-16 / TR-17)[1]
3 External signal control PCB (PAW-T10)[1]
4 Terminal board with 6 connectors (labelled Section A to Section F) each with 20 contacts[2]



Upper mounting board – rear side

5 Pocket for thermostat
6 CZ-CAPBC2 interface for 0-10 V control (PCB name: ACC-SP1A)[1]
7 Main control board (PCB name: CR-UXRP71B-P)
8 Terminal for upper mounting board
9 EMC filter[1]



Lower mounting board

10 Auxiliary transformer[1]
11 Transformer
12 Relay
13 Single motorized valve PCB[1]
14 Relay
15 Single RAP valve control PCB[3]
16 Double RAP valve control PCB[3]

1 Not available in all versions.
2 For details see “5.4 Terminal block layout”.
3 Depending on the model used, the single RAP valve control PCB (15) or double RAP valve control PCB (16) is mounted in this position.

3.3 System lineup

System lineup – ECOi systems

Capacity HP	Capacity kW	Outdoor unit combination			AHU Kit combination		
5	16	all ECOi outdoor units			PAW-160MAH2(L/M)[1]	–	–
10	28	all ECOi 2-pipe outdoor units			PAW-280MAH2(L/M)[2]	–	–
20	56	U-20ME1E81	–	–	PAW-560MAH2(L/M)[3]	–	–
30	84	U-16ME1E81	U-14ME1E81	–	PAW-560MAH2(L/M)[4]	PAW-280MAH2(L/M)	–
40	112	U-20ME1E81	U-20ME1E81	–	PAW-560MAH2(L/M)[4]	PAW-560MAH2(L/M)	–
50	140	U-18ME1E81	U-16ME1E81	U-16ME1E81	PAW-560MAH2(L/M)[4]	PAW-560MAH2(L/M)	PAW-280MAH2(L/M)
60	168	U-20ME1E81	U-20ME1E81	U-20ME1E81	PAW-560MAH2(L/M)[4]	PAW-560MAH2(L/M)	PAW-560MAH2(L/M)

1 PAW-160MAH2(L/M):
- PAW-160MAH2(L/M) can be installed in combination with all ECOi 2-pipe and 3-pipe outdoor units like any other standard indoor unit.
- Mixed installation with standard indoor units is possible. However, in this case one additional RAP valve (CZ-P160RVK2) must be installed in the unit connection pipe, unless the unit is exclusively used in cooling only operation.

2 PAW-280MAH2(L/M):
- PAW-280MAH2(L/M) can be installed in combination with all ECOi 2-pipe outdoor units like any other standard indoor unit.
- Mixed installation with standard indoor units is possible. However, in this case two additional RAP valves (2 x CZ-P160RVK2) must be installed in the unit connection pipe, unless the unit is exclusively used in cooling only operation.
- Connection to ECOi 3-way systems is not allowed.

3 PAW-560MAH2(L/M):
- Mixed installation with standard indoor units is not allowed.
- Connection to ECOi 3-way systems is not allowed.

4 In case of a multiple AHU Kit combination within one refrigerant system, those kits must share the same AHU housing including fan, and they have to be “group-wired” and operate as a single group. In this case you have to disconnect the included remote controllers and CZ-CAPBC2 boards (ACC-SP1A PCB) except for one each. It is irrelevant which one is retained, there is no preference. The external connections need to be done only on the unit with the connected CZ-CAPBC2 board.
Note: In this particular case it is even possible to combine a single advanced or medium version with one or two light versions, and still have full functions of the advanced or medium version respectively.

System lineup – ECO G systems

Capacity HP	Capacity kW	Outdoor unit	AHU Kit
5	16	all ECO G outdoor units	PAW-160MAH2(L/M)[1]
10	28	all ECO G outdoor units	PAW-280MAH2(L/M)[2]
20	56	U-20GE2E5 or U-25GE2E5 or U-30GE2E5	PAW-560MAH2(L/M)[3]

1 PAW-160MAH2(L/M):
- PAW-160MAH2(L/M) can be installed in combination with all ECO G outdoor units like any other standard indoor unit.
- Mixed installation with standard indoor units is possible. However, in this case one additional RAP valve (CZ-P160RVK2) must be installed in the unit connection pipe, unless the unit is exclusively used in cooling only operation or in a 3-way system with heat recovery box.

2 PAW-280MAH2(L/M):
- PAW-280MAH2(L/M) can be installed in combination with all ECO G outdoor units like any other standard indoor unit.
- Mixed installation with standard indoor units is possible. However, in this case two additional RAP valves (2 x CZ-P160RVK2) must be installed in the unit connection pipe, unless the unit is exclusively used in cooling only operation or in a 3-way system with heat recovery box.

3 PAW-560MAH2(L/M):
- Mixed Installation with standard indoor units is possible. However, in this case further restrictions will apply. For details, please contact your local Panasonic service partner.
- Connection to ECO G 3-way systems is not allowed.

System lineup – PACi systems

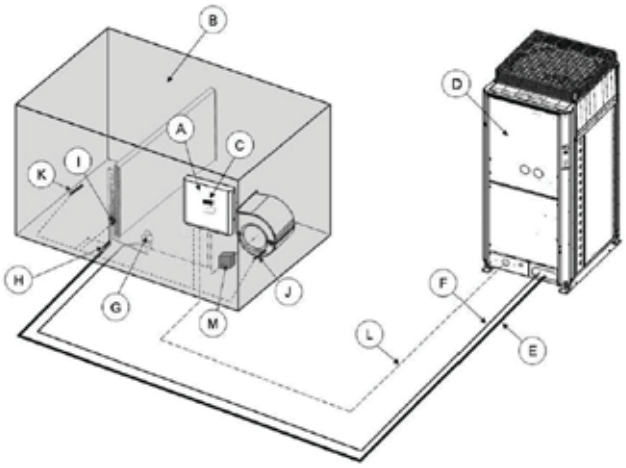
Capacity (kW)	Outdoor unit[1]				AHU Kit
	PACi Standard		PACi Elite		
	Single-phase units	Three-phase units	Single-phase units	Three-phase units	
5.0	–	–	U-50PE1E5	–	PAW-280PAH2(L/M)[2]
6.0	U-60PEY1E5	–	U-60PE1E5A	–	
7.1	U-71PEY1E5	–	U-71PE1E5A	U-71PE1E8A	
10.0	U-100PEY1E5	U-100PEY1E8	U-100PE1E5A	U-100PE1E8A	
12.5	U-125PEY1E5	U-125PEY1E8	U-125PE1E5A	U-125PE1E8A	
14.0	–	U-140PEY1E8	U-140PE1E5A	U-140PE1E8A	
20.0	–	–	–	U-200PE1E8	
25.0	–	–	–	U-250PE1E8	

1 With PACi systems, only 1-to-1 installations are allowed (1 x PACi outdoor unit + 1 x PAW-280PAH2(L/M)). Combinations with more than 1 outdoor unit or more than 1 AHU Kit are not possible.
2 Mixed installation with standard indoor units is not allowed.

3.4 System Overview

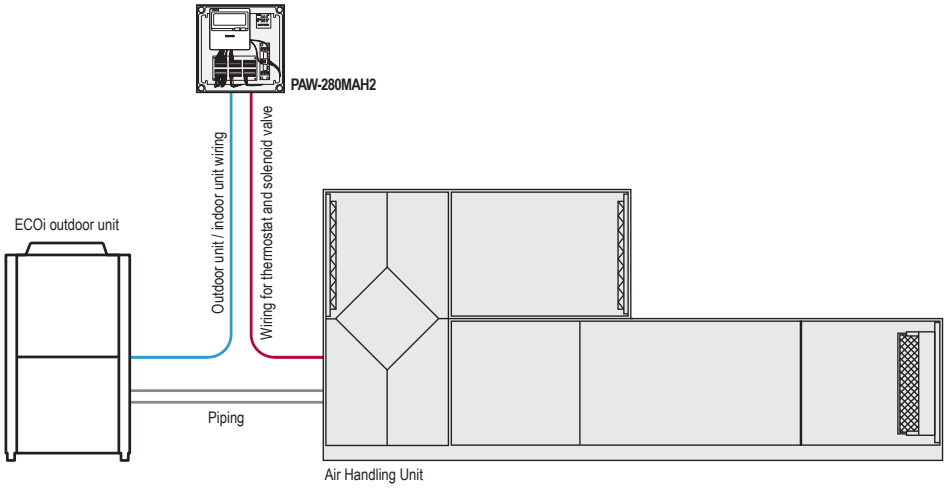
System Overview – ECOi systems

Single-connection system

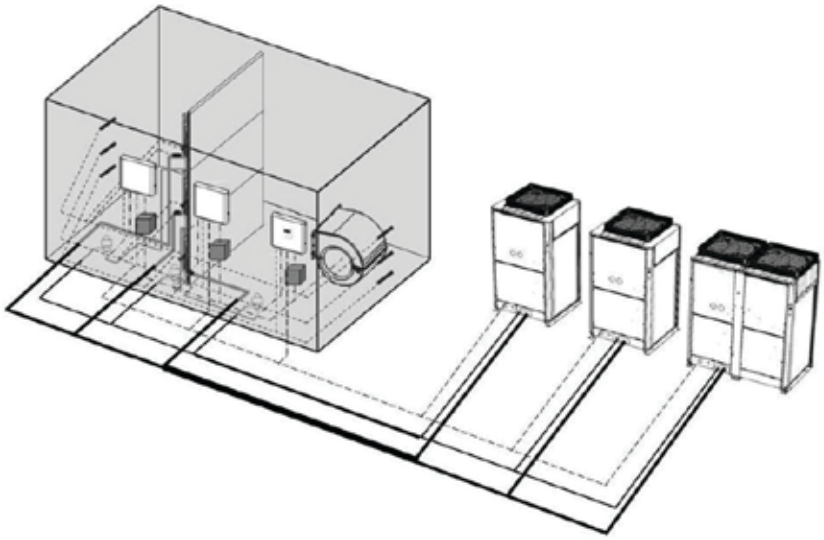


A	AHU Kit enclosure (complete)	H	Thermistor for liquid pipe
B	AHU system (field supplied)	I	Thermistor for gas pipe
C	Remote controller (integrated in AHU Kit enclosure)	J	Thermistor for suction air
D	Outdoor unit	K	Thermistor for discharge air
E	Liquid piping (field supplied)	L	Inter-unit wiring
F	Gas piping (field supplied)	M	Magnetic relay for operating the blower (field supplied)
G	Electronic expansion valve		

System example for ECOi single-connection system



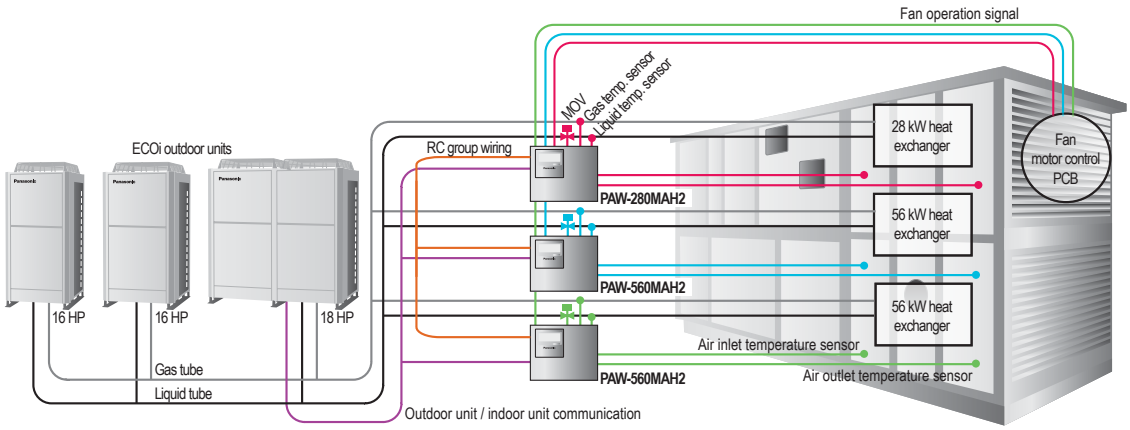
Multi-connection system



Note:
The following restrictions apply only if PAW-560MAH2(L) is used alone or in combination with other AHU Kits. For all other AHU Kits and AHU Kit combinations without PAW-560MAH2(L) no such restrictions apply.

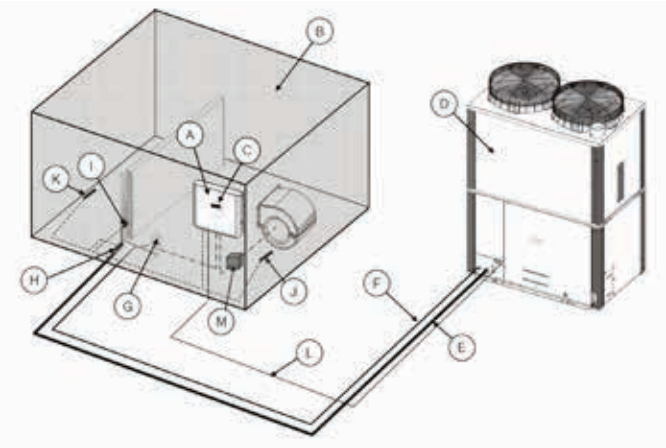
1 All AHU heat exchangers belonging to the same refrigerant circuit have to be installed in the same chassis equipped with one single fan motor.
2 One AHU Kit and correspondingly one magnetic relay is required for each heat exchanger. All AHU Kits have to be wired to the fan motor.
3 All AHU Kits shall be connected and controlled by group control wiring of remote controller.
4 In case of a multiple AHU Kit combination within one refrigerant system, those kits must share the same AHU housing including fan, and they have to be “group-wired” and operate as a single group. In this case you have to disconnect the included remote controllers and CZ-CAPBC2 boards (ACC-SP1A PCB) except for one each. It is irrelevant which one is retained, there is no preference. The external connections need to be done only on the unit with the connected CZ-CAPBC2 board.
Note: In this particular case it is even possible to combine a single advanced or medium version with one or two light versions, and still have full functions of the advanced or medium version respectively.

System example for ECOi multi-connection system (140 kW capacity)



ECO G System Overview – ECO G systems

Single-connection[1] or multiple-connection[2] systems

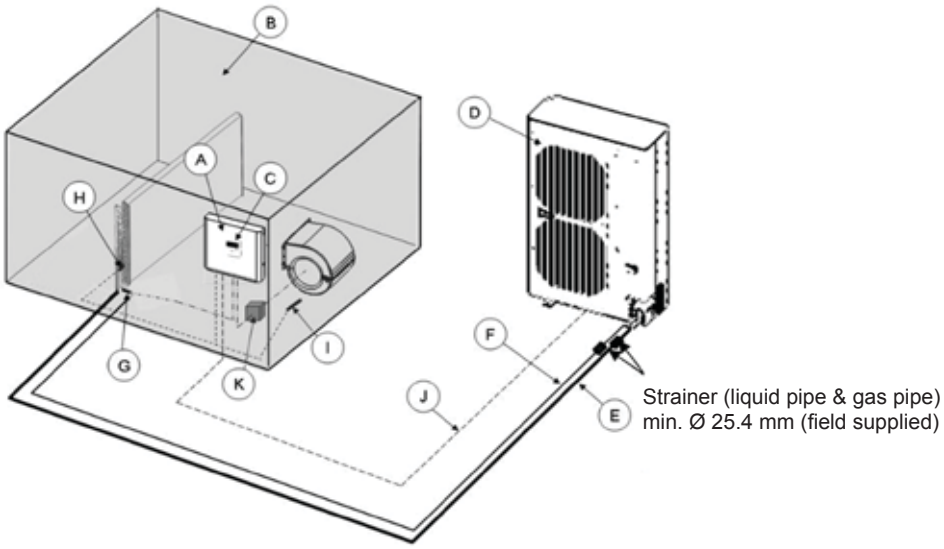


A	AHU Kit enclosure (complete)	H	Thermistor for liquid pipe (E1)
B	AHU system (field supplied)	I	Thermistor for gas pipe (E3)
C	Remote controller (integrated in AHU Kit enclosure)	J	Thermistor for suction air (TA)
D	Outdoor unit	K	Thermistor for discharge air (BL)
E	Liquid piping (field supplied)	L	Inter-unit wiring
F	Gas piping (field supplied)	M	Magnetic relay for operating the blower (field supplied)
G	Electronic expansion valve		

1 Single-connection system shown here as an example.
2 Multi-connection systems are possible in combination with PAW-160MAH2(L/M) or PAW-280MAH2(L/M). In case of multi-connections with PAW-560MAH2(L/M) further restrictions will apply. For details, please contact your local Panasonic service partner.

PACi System Overview – PACi systems

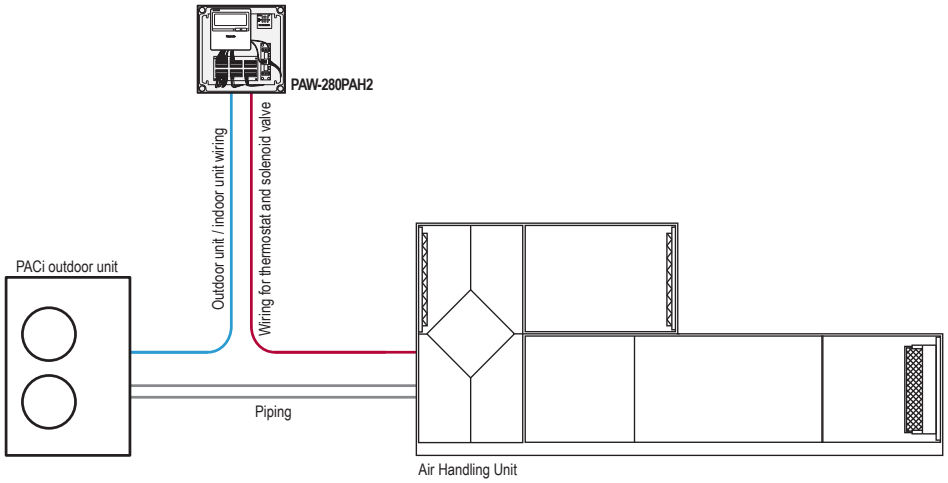
Single-connection[1] system only



A	AHU Kit enclosure (complete)
B	AHU system (field supplied)
C	Remote controller (integrated in AHU Kit enclosure)
D	Outdoor unit
E	Liquid piping (field supplied)
F	Gas piping (field supplied)
G	Thermistor for liquid pipe (E1)
H	Thermistor for heat exchanger pipe middle (E2)
I	Thermistor for suction air (TA)
J	Inter-unit wiring
K	Magnetic relay for operating the blower (field supplied)

1 With all PACi outdoor units only 1-to-1 installations are allowed.

System example for PACi single-connection system

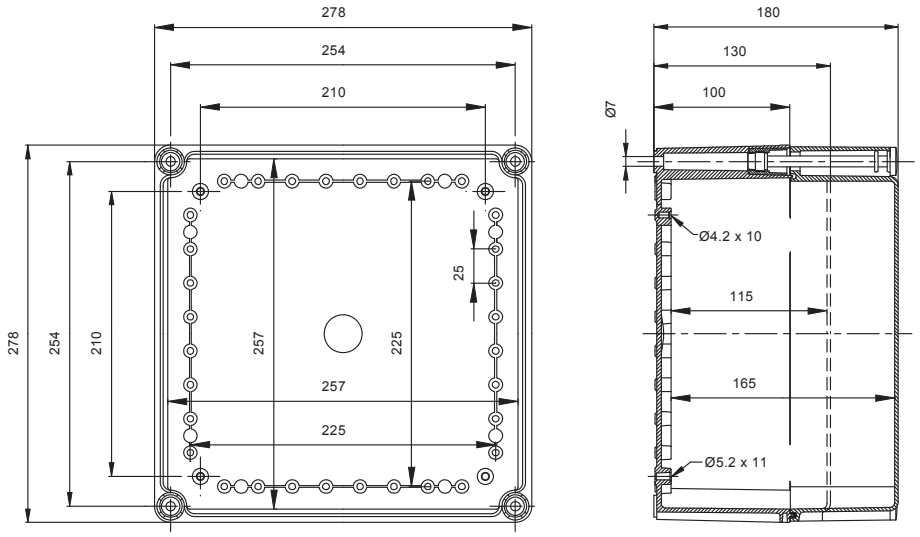


3.5 Technical data

Technical data – AHU Kit

All AHU Kit models			
Power source		V / ph / Hz	220 ... 240 / 1 / 50
Rated current consumption		A	0.1
Rated power consumption (max.)		W	18.0
Dimensions (enclosure)	H x W x D	mm	278 x 278 x 180
Net weight	Advanced / Medium	kg	4.25
	Light		3.98
Protection class			IP65
Thermostat (Fitted on advanced versions only: PAW-160/280/560MAH2 and PAW-250PAH2)			
Dimensions	W x H x D	mm	48 x 48 x 90 (approximately)
Required void space		mm	85 mm (approximately)
Mounting cut-out	W x H	mm	44 x 44 (DIN 1/16)
Display height		mm	10 (approximately)
Temperature range	measuring / indicating	°C	–50 ... +580 / –50 ... +580
Temperature increments	measuring / indicating	°C	0.1 / 1
Sampling period		sec	< 3
Output signal	factory setting / alternative setting	V	0 ... 10 / 2 ... 10
Input signal			Pt100, 2-/3-wire
Control voltage		V / ph / Hz	85 ... 265 / 1 / 50/60
Ambient temperature (max.)		°C	45
Ambient air humidity (max. in hostile environments)		% RH	85
Quiescent current consumption		W	< 3

Dimensions – AHU Kit



Front view (transparent cover removed)

Side view

Important

Apart from the technical data and limitations given in the following tables, the technical data and limitations of the relevant outdoor units, local wiring and piping design regulations and approved best practices need to be observed in installation procedures.

Technical data and limitations – ECOi and ECO G systems

HP			5	10	20
Model			PAW-160MAH2(L/M)	PAW-280MAH2(L/M)	PAW-560MAH2(L/M)
Nominal cooling capacity		kW	14.0	28.0	56.0
Nominal heating capacity		kW	16.0	31.5	63.0
Air volume flow (Cooling)	Min	m^3/h	1,140	3,500	7,000
	Max	m^3/h	2,600	5,000	10,000
AHU DX coil heat exchanger volume	Min	dm^3	1.7	2.8	5.6
	Max	dm^3	2.8	5.4	10.7
Bypass factor			0.9 (recommended)	0.9 (recommended)	0.9 (recommended)
Piping length	Min / Max	m	10 / 100	10 / 100	10 / 100
Max. branch pipe length		m	12	12	12
Max. branch pipe length difference after first branch		m	10	10	10
Elevation difference (in/out)	Max	m	10	10	10
Piping connections	Liquid pipe	Inch (mm)	3/8 (9.52)	3/8 (9.52)	5/8 (15.88)
	Gas pipe	Inch (mm)	5/8 (15.88)	7/8 (22.22)	1 1/8 (28.58)
Intake temperature of AHU Kit	Cooling (Min / Max)	°C	18 / 32 °C DB (13 / 23 °C WB)	18 / 32 °C DB (13 / 23 °C WB)	18 / 32 °C DB (13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB

HP			30[1]	40[1]	50[1]	60[1]
Model			PAW-280MAH2(L/M) + PAW-560MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-280MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-560MAH2(L/M)
Nominal cooling capacity		kW	84.0	112.0	140.0	168.0
Nominal heating capacity		kW	95.0	127.0	155.0	189.0
Air volume flow (Cooling)	Min	m^3/h	10,500	14,000	17,500	21,000
	Max	m^3/h	15,000	20,000	25,000	30,000
AHU DX coil heat exchanger volume	Min	dm^3	8.4	11.2	14.0	32.1
	Max	dm^3	16.1	21.4	26.8	16.8
Bypass factor			0.9 (recommended)	0.9 (recommended)	0.9 (recommended)	0.9 (recommended)
Piping length	Min / Max	m	10 / 100	10 / 100	10 / 100	10 / 100
Max. branch pipe length		m	12	12	12	12
Maxi.branch pipe length difference after first branch		m	10	10	10	10
Elevation difference (in/out)	Max	m	10	10	10	10
Piping connections	Liquid pipe	Inch (mm)	3/4 (19.05)	3/4 (19.05)	3/4 (19.05)	3/4 (19.05)
	Gas pipe	Inch (mm)	1 1/4 (31.75)	1 1/2 (38.15)	1 1/2 (38.15)	1 1/2 (38.15)
Intake temperature of AHU Kit	Cooling (Min / Max)	°C	18 / 32 °C DB (13 / 23 °C WB)	18 / 32 °C DB (13 / 23 °C WB)	18 / 32 °C DB (13 / 23 °C WB)	18 / 32 °C DB (13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB

1 Not applicable for ECO G systems.

Technical data and limitations – PACi systems

AHU Kit			PAW-280PAH2(L/M)			
Outdoor unit	PACi Standard	1-phase	U-60PEY1E5	U-71PEY1E5	U-100PEY1E5	U-125PEY1E5
Nominal cooling capacity		kW	6.0	7.1	10.0	12.5
Nominal heating capacity		kW	7.0	8.0	11.2	14.0
Air volume flow (Cooling)	Min (factory)	m^3/h	540	540	840	1,140
	Max (factory)	m^3/h	960	960	1,980	2,100
Air volume flow (Cool.), subject to restrictions[1]	Max	m^3/h	1,450	1,600	2,400	2,500
AHU DX coil heat exchanger volume	Min (factory)	dm^3	1.3	1.3	1.5	1.5
	Max (factory)	dm^3	1.4	1.4	1.9	1.9
AHU DX coil heat exchanger volume, subject to restrictions[2]	Max	dm^3	1.8	2.0	2.8	2.75
	Additional ref. charge	kg/dm^3	0.9	0.9	0.9	0.9
	Max. additional refrigerant charge	kg	0.36	0.54	0.81	0.76
	Max. pipe length	m	40	35	30	30
	Max. ambient temp. for pump down	°C	n/a	n/a	35	25
Heat exchanger front area	Min	m^2	–	–	0.43	0.43
	Max	m^2	–	–	0.51	0.51
Piping length	Min / Max	m	3 / 40	3 / 35	5 / 30	5 / 30
Precharged length	Max	m	20	20	15	15
Additional refrigerant charge		g/m	40	40	50	50
Piping connections	Liquid pipe	Inch (mm)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)
	Gas pipe	Inch (mm)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)
Intake temperature of AHU Kit[1]	Cooling (Min / Max)	°C	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB
			(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB

AHU Kit			PAW-280PAH2(L/M)		
Outdoor unit	PACi Standard	3-phase	U-100PEY1E8	U-125PEY1E8	U-140PEY1E8
Nominal cooling capacity		kW	10.0	12.5	14.0
Nominal heating capacity		kW	11.2	14.0	16.0
Air volume flow (Cooling)	Min (factory)	m^3/h	840	1,140	1,140
	Max (factory)	m^3/h	1,980	2,100	2,160
Air volume flow (Cool.), subject to restrictions[1]	Max	m^3/h	2,400	2,500	2,600
AHU DX coil heat exchanger volume	Min (factory)	dm^3	1.5	1.5	1.5
	Max (factory)	dm^3	1.9	1.9	1.9
AHU DX coil heat exchanger volume, subject to restrictions[2]	Max	dm^3	2.8	2.75	2.8
	Additional ref. charge	kg/dm^3	0.9	0.9	0.9
	Max. additional refrigerant charge	kg	0.81	0.76	0.81
	Max. pipe length	m	30	30	30
	Max. ambient temp. for pump down	°C	35	25	n/a
Heat exchanger front area	Min	m^2	0.43	0.43	0.43
	Max	m^2	0.51	0.51	0.51
Piping length	Min / Max	m	5 / 30	5 / 30	5 / 30
Precharged length	Max	m	15	15	15
Additional refrigerant charge		g/m	50	50	50
Piping connections	Liquid pipe	Inch (mm)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)
	Gas pipe	Inch (mm)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)
Intake temperature of AHU Kit[1]	Cooling (Min / Max)	°C	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB
			(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB

To be continued on next page.

Technical data and limitations – PACi systems (cont.)

AHU Kit			PAW-280PAH2(L/M)					
Outdoor unit	PACi Elite	1-phase	U-50PE1E5	U-60PE1E5A	U-71PE1E5A	U-100PE1E5A	U-125PE1E5A	U-140PE1E5A
Nominal cooling capacity		kW	5.0	6.0	7.1	10.0	12.5	14.0
Nominal heating capacity		kW	5.6	7.0	8.0	11.2	14.0	16.0
Air volume flow (Cooling)	Min (factory)	m^3/h	480	540	720	840	1,140	1,140
	Max (factory)	m^3/h	780	960	1,500	1,980	2,100	2,160
Air volume flow (Cool.), subject to restrictions[1]	Max	m^3/h	1,080	1,600	1,800	2,400	2,600	2,700
AHU DX coil heat exchanger volume	Min (factory)	dm^3	–	–	–	1.7	1.7	1.7
	Max (factory)	dm^3	1.3	1.4	1.8	2.1	2.1	2.1
AHU DX coil heat exchanger volume, subject to restrictions[2]	Max	dm^3	1.5	1.8	2.2	3.0	3.0	3.0
	Additional ref. charge	kg/dm^3	0.9	0.9	0.9	0.9	0.9	0.9
	Max. additional refrigerant charge	kg	0.18	0.36	0.36	0.81	0.81	0.81
	Max. pipe length	m	30	40	40	30	30	30
	Max. ambient temp. for pump down	°C	n/a	35	35	25	25	25
Heat exchanger front area	Min	m^2	–	–	–	0.43	0.43	0.43
	Max	m^2	–	–	–	0.51	0.51	0.51
Piping length	Min / Max	m	3 / 30	5 / 40	5 / 40	5 / 30	5 / 30	5 / 30
Precharged length	Max	m	20	20	20	20	20	20
Additional refrigerant charge		g/m	20	50	50	50	50	50
Piping connections	Liquid pipe	Inch (mm)	1/4" (6,35)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)
	Gas pipe	Inch (mm)	1/2" (12,7)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)
Intake temperature of AHU Kit[1]	Cooling (Min / Max)	°C	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB
			(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB

AHU Kit			PAW-280PAH2(L/M)			
Outdoor unit	PACi Elite	3-phase	U-71PE1E8A	U-100PE1E8A	U-125PE1E8A	U-140PE1E8A
Nominal cooling capacity		kW	7.1	10.0	12.5	14.0
Nominal heating capacity		kW	8.0	11.2	14.0	16.0
Air volume flow (Cooling)	Min (factory)	m^3/h	720	840	1,140	1,140
	Max (factory)	m^3/h	1,500	1,980	2,100	2,160
Air volume flow (Cool.), subject to restrictions[1]	Max	m^3/h	1,800	2,400	2,600	2,700
AHU DX coil heat exchanger volume	Min (factory)	dm^3	–	1.7	1.7	1.7
	Max (factory)	dm^3	1.8	2.1	2.1	2.1
AHU DX coil heat exchanger volume, subject to restrictions[2]	Max	dm^3	2.2	3.0	3.0	3.0
	Additional ref. charge	kg/dm^3	0.9	0.9	0.9	0.9
	Max. additional refrigerant charge	kg	0.36	0.81	0.81	0.81
	Max. pipe length	m	40	30	30	30
	Max. ambient temp. for pump down	°C	35	25	25	25
Heat exchanger front area	Min	m^2	–	0.43	0.43	0.43
	Max	m^2	–	0.51	0.51	0.51
Piping length	Min / Max	m	5 / 40	5 / 30	5 / 30	5 / 30
Precharged length	Max	m	20	20	20	20
Additional refrigerant charge		g/m	50	50	50	50
Piping connections	Liquid pipe	Inch (mm)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)	3/8" (9,52)
	Gas pipe	Inch (mm)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)	5/8" (15,88)
Intake temperature of AHU Kit[1]	Cooling (Min / Max)	°C	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB	18 / 32 °C DB
			(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)	(13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB	-10 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB	-20 / 15 °C WB

To be continued on next page.

Technical data and limitations – PACi systems (cont.)

AHU Kit			PAW-280PAH2(L/M)	
Outdoor unit	PACi Elite	3-phase	U-200PE1E8	U-250PE1E8
Nominal cooling capacity		kW	20.0	25.0
Nominal heating capacity		kW	22.4	28.0
Air volume flow (Cooling)	Min (factory)	m^3/h	1,680	2,280
	Max (factory)	m^3/h	3,960	4,440
Air volume flow (Cool.), subject to restrictions[1]	Max	m^3/h	4,300	5,400
AHU DX coil heat exchanger volume	Min (factory)	dm^3	2.3	2.7
	Max (factory)	dm^3	4.3	4.3
AHU DX coil heat exchanger volume, subject to restrictions[2]	Max	dm^3	5.7	7.1
	Additional ref. charge	kg/dm^3	0.9	0.9
	Max. additional refrigerant charge	kg	1.25	2.51
	Max. pipe length	m	n/a	n/a
	Max. ambient temp. for pump down	°C	n/a	n/a
Heat exchanger front area	Min	m^2	0.54	0.66
	Max	m^2	1.0	1.0
Piping length	Min / Max	m	5 / 70	5 / 70
Precharged length	Max	m	30	30
Additional refrigerant charge		g/m	40	80
Piping connections	Liquid pipe	Inch (mm)	3/8" (9,52)	1/2" (12,7)
	Gas pipe	Inch (mm)	1" (25,4)	1" (25,4)
Intake temperature of AHU Kit[1]	Cooling (Min / Max)	°C	18 / 32 °C DB	18 / 32 °C DB
			(13 / 23 °C WB)	(13 / 23 °C WB)
	Heating (Min / Max)	°C	16 / 30 °C DB	16 / 30 °C DB
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C	-15 / 43 °C DB	-15 / 43 °C DB
	Heating (Min / Max)	°C	-20 / 15 °C WB	-20 / 15 °C WB

1 This (higher) maximum allowed air volume is subject to a restriction of the "Intake temperature of AHU Kit" to 30 °C DB (instead of 32 °C DB). Without this restriction, only the (lower) factory-set maximum air volume is allowed.

2 This (higher) maximum AHU DX coil heat exchanger volume is subject to the following restrictions:
- an additional refrigerant charge on top of the additional refrigerant charge, which needed, when pipe length exceeds the maximum allowed with standard shipment charge (see calculation example below)
- AND a reduced maximum pipe length
- AND an ambient air temperature limit above which no pump down must be performed

Calculation example for total additional refrigerant charge

Unit: U-60PE1E5
Pipe length: 40 meter
AHU DX coil (supplied by AHU manufacturer): 1,7 dm^3
Refrigerant charge at shipment fitted for pipe length within 30 m
Pipes additional refrigerant charge: 0,05 kg/m
AHU DX coil additional refrigerant charge: 0,9 kg/dm^3
Refrigerant charge at shipment fitted for AHU DX coil volume within 1,4 dm^3

Total additional refrigerant charge calculation
((1.7 dm^3 – 1.4 dm^3) x 0.9 kg/dm^3) + (10 m x 0.05 kg/m) = 0.27 kg + 0.50 kg = 0.77 kg

Calculation example for number of passes in the heat exchanger

The minimum number of passes in the AHU heat exchanger is restricted. The limit is calculated by the formula:

Minimum number of passes
= Number of steps × Distance between tube sheets × Number of rows × 1.5×10^{-4}
The calculated value must then be rounded up to the next integer number.

Example
Number of steps: 12

Distance between tube sheets: 1,000 mm
Number of row: 3

Minimum number of passes = 12 × 3 × 1.5 × 10^{-4} = 5.4
This value must be rounded up to 6.

This means that the minimum number of passes is 6 passes.

NOTICE

Nuisance tripping of high-pressure switch

The outdoor unit is equipped with a high-pressure switch, which stops the operation of the air-conditioning unit for protection when the set high-pressure limit is exceeded. Nuisance tripping of the high-pressure switch may occur in heating mode if the heat exchanger pipe thermistor (E2) is not properly positioned or if the limit is not properly set.

► Position the heat exchanger pipe thermistor (E2) correctly and set the limit properly in accordance with the instructions given in this document.

4 Installation

4.1 Installation of AHU Kit

WARNING

Electric shock from live power supply cords

Electric shock may result from contact with live power supply cords.

- ► Wiring installation must only be performed by a qualified electrician.
- ► Before starting to work on any machines or devices, always switch off the power supply and lock it in switched-off position.

NOTICE

Damage to the AHU Kit enclosure and to the thermistor and/or expansion valve wires

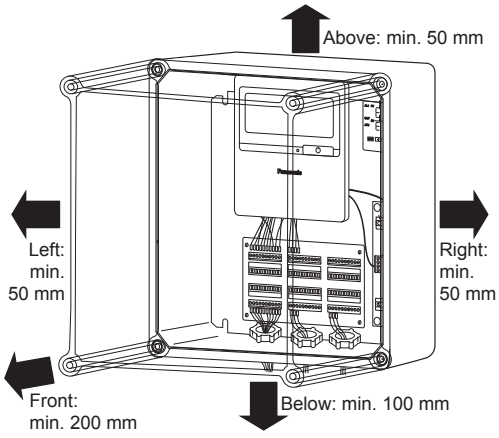
Exposing the AHU Kit enclosure to direct sunlight can cause overheating and material damage and should therefore be avoided.

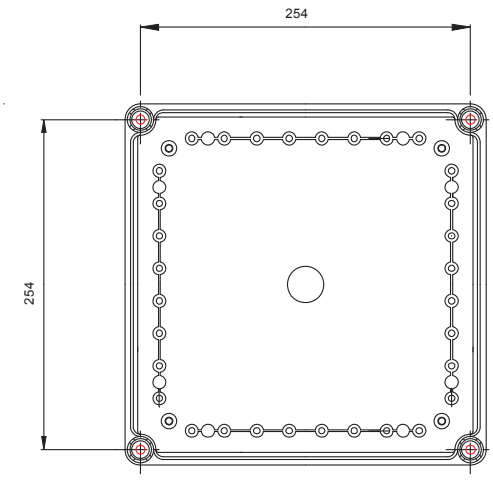
Exposing the wires of thermistors or, in case of the ECOi and ECO G systems, of the expansion valve to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

- ► Attach the AHU Kit either directly to the Air Handling Unit or to a wall nearby and make sure that it is not exposed to direct sunlight.
- ► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

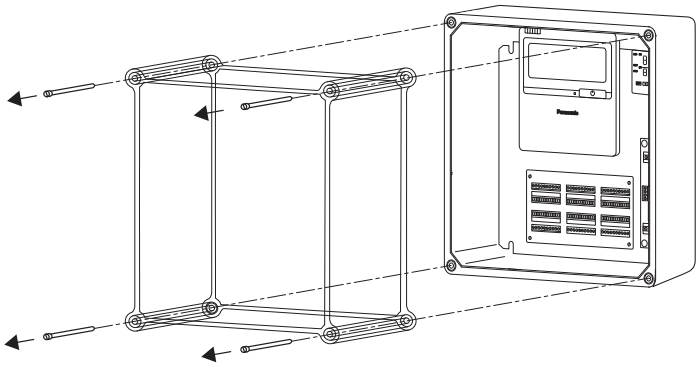
Mount the AHU Kit according to the following instructions. Please note that screws and other fixing materials, which may be required, are not included in the kit.

1. Choose an installation location observing the minimum allowed distances to any adjacent objects on all sides of the enclosure as shown below (left).
2. Prepare the 4 holes at the installation location, using the dimensions as shown below (right). The distance between the centre points of the holes must be 254 mm.

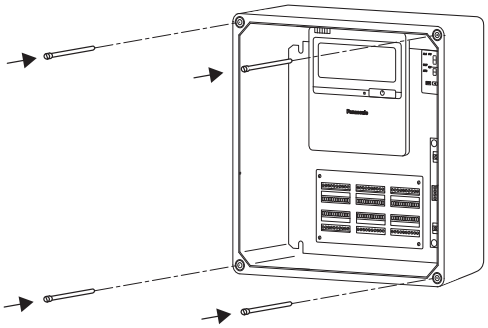




3. Loosen the 4 screws in the corners of the enclosure and remove the cover from the enclosure.



4. Mount the backside of the enclosure to the wall or surface using field-supplied fixing screws inserted through the previously prepared holes at each corner.



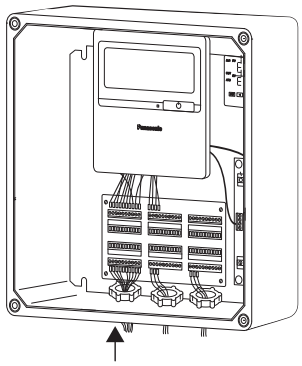
NOTICE

Signal errors through noise from live power supply cords

Power supply cords can generate noise, which may cause signal errors, if they are run in close vicinity to any low-voltage control wiring.

- ► Keep 230 V AC power supply wiring apart from the low-voltage control wiring for sensors etc.
- ► Route 230 V AC power supply wiring through different cable glands than the low-voltage control wiring.

5. Insert the wiring preferably from below the enclosure through the screwed cable glands and connect the wires to each of the 6 connectors as required.

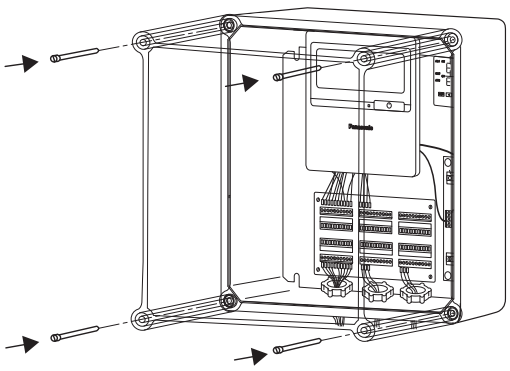


After having finished wiring and applying power to the AHU Kit, auto-addressing can be performed and the parameters of the thermostat (advanced version only) can be set.

Important

Please note that the connectors can be plugged out for easy installation. As connectors A and D are intended for connecting the 230 V AC power supply wiring, they have special blind ports, which prevent them from being plugged back into the low-voltage connectors B, C, E or F.

6. Place the cover back on the enclosure and fix it with the 4 screws at the corners.



4.2 Installation of refrigerant piping

When installing the refrigerant piping, the following limitations and restrictions need to be observed:

- Maximum actual and equivalent piping length
- Maximum branch pipe length to AHU Kit
- Maximum branch pipe length difference (between longest and shortest piping from the first branch)
- Dimensions of connecting pipes to heat exchanger of AHU system
- Precharged pipe length of outdoor unit
- Additional refrigerant charging amount for longer pipe runs
- Other technical data and limitations of the relevant outdoor units
- Local piping design regulations
- Best practices for piping design

Important

For technical data, limitations and restrictions not mentioned in this document, refer to the technical documentation for the relevant ECOi, ECO G and PACi outdoor units.

4.3 Installation of expansion valve

Installation of expansion valve – ECOi and ECO G systems

NOTICE

Damage to the expansion valve wires

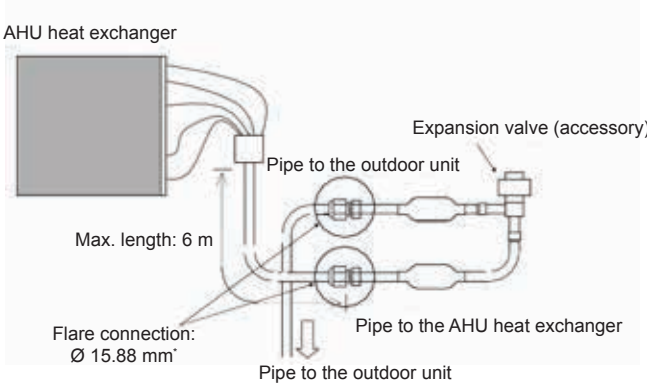
Exposing the wires of the expansion valve to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

► Attach the AHU Kit either directly to the Air Handling Unit or to a wall nearby and make sure that it is not exposed to direct sunlight.

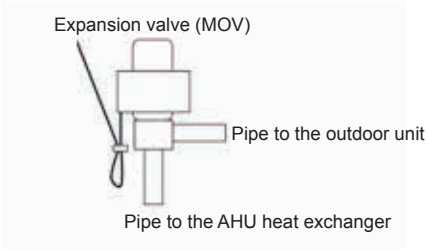
► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

When installing the expansion valve, the following limitations and restrictions need to be observed:

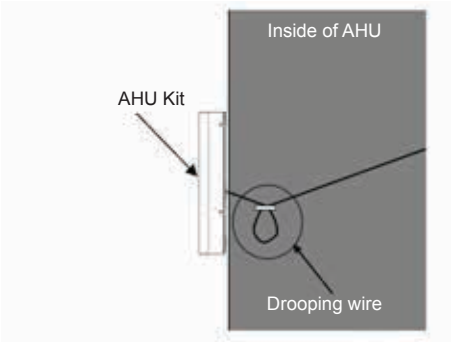
- Wires must not be put out of equipments.
- Wires must not be cut and connector of wires must not be detached.
- The distance from AHU heat exchanger must not exceed 6 m.
- Pipe reducers must be installed in the field where applicable.
  For example, for 10HP ECOi systems, piping size to outdoor unit is Ø 9.52 mm (instead of Ø 15.88 mm*).



- Vertical inclination of expansion valve must be less than ±15°.



- The coil wire must be inserted drooped in the AHU body with the drooping wire being close to the AHU Kit.



Important

If there are multiple heat exchangers in one **ECOi system**, an individual expansion valve must be installed for each heat exchanger.

4.4 Installation of thermistors

NOTICE

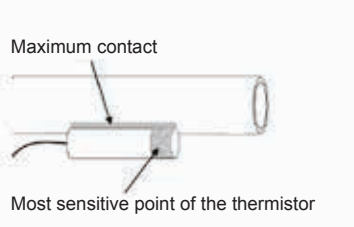
Damage to the thermistor wires

Exposing the wires of thermistors to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

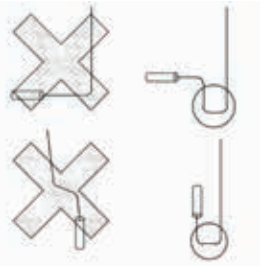
- ► Attach the AHU Kit either directly to the Air Handling Unit or to a wall nearby and make sure that it is not exposed to direct sunlight.
- ► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

When installing the thermistors, the following limitations and restrictions need to be observed:

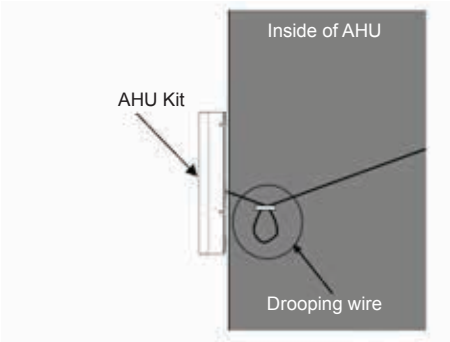
- Wires must not be put out of equipments.
- Wires must not be cut and connector of wires must not be detached.
- Thermistors must be Identified by the tag which is wound to each thermistor.
- The head of the thermistor must be attached exactly onto the pipe, because the head is the most sensitive point of the thermistor.



- The thermistor wire must point downwards from the thermistor to avoid water reaching the thermistor.



- The thermistor wire must be inserted drooped in the AHU body with the drooping wire being close to the AHU Kit.



Important

If there are multiple heat exchangers in one **ECOi system**, an individual thermistor must be installed for each heat exchanger.

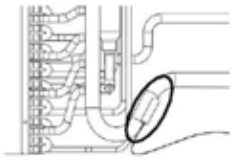
4.4.1 Installation of thermistor on gas pipe

Installation of thermistor on gas pipe – ECOi and ECO G systems

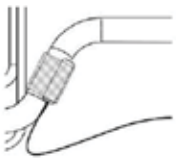
Mount “E3” thermistor to the gas pipe of the AHU heat exchanger according to the following instructions.

For PAW-160MAH2(L/M)

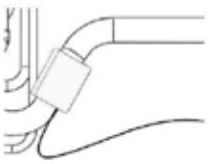
1. Attach the gas pipe thermistor onto the collecting gas pipe in the heat exchanger.



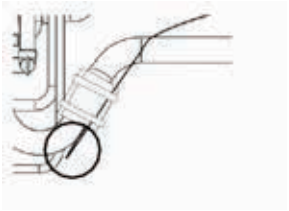
2. Cover the thermistor and pipe with aluminum tape.



3. Cover the aluminum tape with thermal insulation.



4. Fix thermal insulation and wiring with two bands. Then, run the wire downwards in a loop, to avoid putting tension to it.



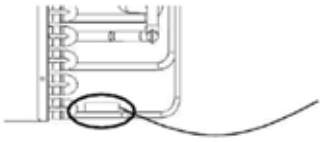
For PAW-280MAH2(L/M) and PAW-560MAH2(L/M)

1. Upon delivery, for PAW-280MAH2(L/M) and PAW-560MAH2(L/M) there is a sensor sleeve soldered to the gas pipe after the expansion valve: Insert the sensor together with some heat sink paste into the sensor sleeve.
2. Fasten the sensor in an appropriate way (e. g. with a little clip) to prevent it from falling out of the sleeve.

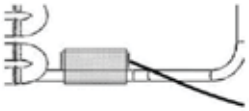
4.4.2 Installation of thermistor on liquid pipe

Mount “E1” thermistor to the liquid pipe of the AHU heat exchanger according to the following instructions.

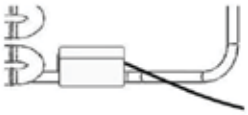
1. Attach the liquid pipe thermistor to the liquid pipe located in the lowest position after the distributor in the heat exchanger.



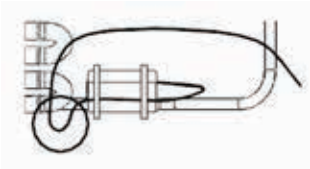
2. Cover the thermistor and pipe with aluminum tape.



3. Cover the aluminum tape with thermal insulation.



4. Fix thermal insulation and wiring with two bands. Then, run the wire downwards in a loop, to avoid putting tension to it.



4.4.3 Installation of thermistor on heat exchanger pipe middle

Installation of thermistor on heat exchanger pipe middle – PACi systems

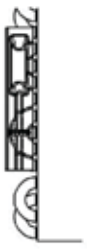
Mount “E2” thermistor to the heat exchanger pipe middle according to the following instructions.

1. Attach the heat exchanger pipe middle thermistor in the middle of each pass-line (pipe) in the heat exchanger.

2. Cover the thermistor and pipe with aluminum tape (field-supplied).

3. Fix thermistor with two bands. Then, run the wire downwards in a loop, to avoid putting tension to it

4. Cover the aluminum tape with thermal insulation. And also cover the sensor (copper portion) with thermal insulation completely.



4.4.4 Installation of thermistor for suction and discharge air stream

Mount the suction and discharge air thermistors according to the following instructions.

1. For ECOi, ECO G and PACi systems, attach the suction air thermistor (TA) to the position where air suction temperature can be measured.
2. In addition to this, for ECOi and ECO G systems attach also the discharge thermistor (BL) to the position where air discharge temperature can be measured.
3. In case of using the additional thermostat (advanced version only) for:
   a. target temperature setting based on ambient temperature, install the 3-wired temperature sensor in a protected location suitable for detecting the proper ambient temperature (avoid direct sunlight and moisture);
   b. demand control based on room supply air temperature install the 3-wired temperature sensor in the blow-out duct of the AHU where the proper air temperature can be measured.

4.5 Matching outdoor unit capacity with AHU Kit capacity

Matching outdoor unit capacity with AHU Kit capacity – PACi systems

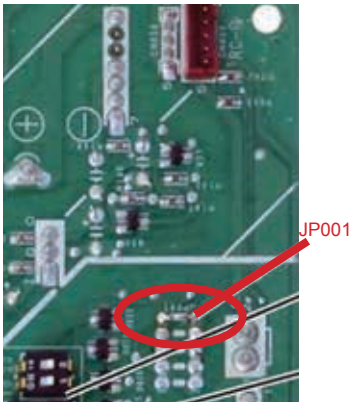
As there is only one fixed-capacity AHU Kit model (PAW-280PAH2(L/M)) available for combination with the complete range of PACi systems, where the outdoor unit capacity is also fixed for each model type, it is necessary to change the settings so that the default capacity check of the PACi outdoor unit is ignored and the outdoor unit capacity can be matched with the AHU Kit capacity.

There are three different methods to achieve this aim.

Method A: Cutting JP001

One possibility is to cut jumper JP001 on the outdoor unit main PCB.

1. On the PACi outdoor unit PCB, cut the wire of jumper JP001 at two positions, and take the cut jumper leads off. Depending on the PACi outdoor unit model, it can be found on the main PCB at one of the following positions:



U-60PEY1E5
U-71PEY1E5

U-50PE1E5

U-100PEY1E5
U-125PEY1E5
U-100PEY1E8
U-125PEY1E8
U-140PEY1E8

U-60PE1E5A
U-71PE1E5A
U-100PE1E5A
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U-140PE1E5A
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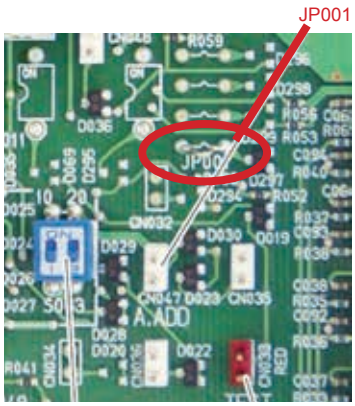
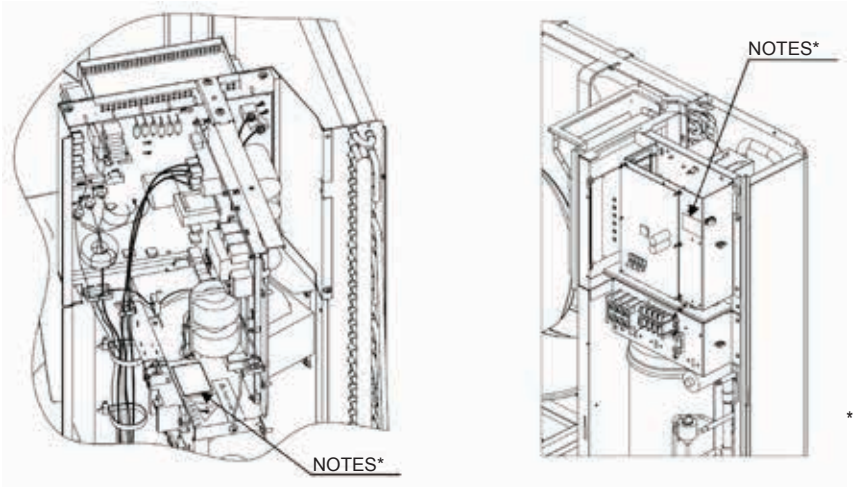
U-125PE1E8A
U-140PE1E8A



U-200PE1E8
U-250PE1E8

2. Place a NOTE label, which indicates that the jumper wire has been cut, in the following designated areas on the outdoor unit.



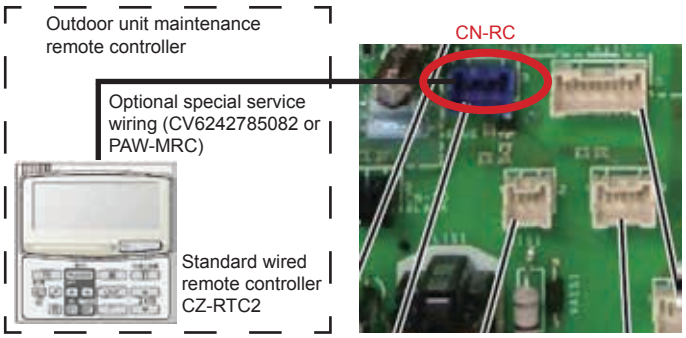
* Position of designated area for NOTES label depends on model type.

Method B: Changing outdoor unit setting to ignore capacity

Another possibility is to change the outdoor unit settings by using a separate standard wired remote controller (CZ-RTC2 or CZ-RTC4).

1. Connect the maintenance remote controller to the main PCB of the PACi outdoor unit. Depending on the PACi outdoor unit model, you have to follow two different procedures and use different accessories.

   a. **PACi outdoor unit models <u>with CN-RC plug</u> on the main PCB**



U-100PEY1E5
U-125PEY1E5
U-100PEY1E8
U-125PEY1E8
U-140PEY1E8

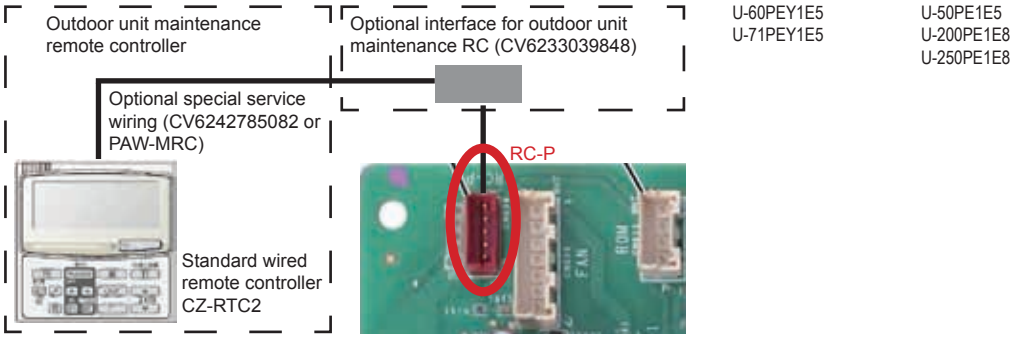
U-60PE1E5A
U-71PE1E5A
U-100PE1E5A
U-125PE1E5A
U-140PE1E5A
U-71PE1E8A
U-100PE1E8A
U-125PE1E8A
U-140PE1E8A

Required accessories:

- Standard wired remote controller (CZ-RTC2 / CZ-RTC4)
- Optional special service wiring (CV6242785082 or PAW-MRC or alternative connector)

For those PACi outdoor unit models, which have a blue 3-pole CN-RC plug on the main PCB, connect the maintenance remote controller to the main PCB of the PACi outdoor unit using the optional special service wiring CV6242785082 or PAW-MRC (as an alternative, you can also use any unused indoor unit connector (E3, PNL, FS, RC) or temporarily disconnect one of those wires from the AHU kit itself).

b. **PACi outdoor unit models <u>without CN-RC plug</u> on the main PCB**



Required accessories:

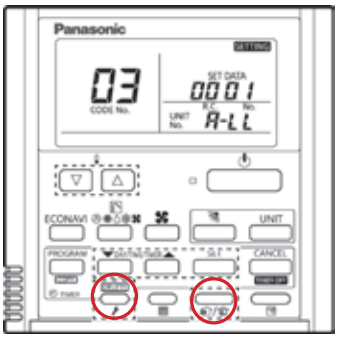
- Standard wired remote controller (CZ-RTC2 / CZ-RTC4)
- Optional special service wiring (CV6242785082 or PAW-MRC)
- Interface for outdoor unit maintenance remote controller (CV6233039848)

For those PACi outdoor unit models, which do not have the CN-RC plug, connect the maintenance remote controller to the optional service interface (CV6233039848) using the optional special service wiring CV6242785082 or PAW-MRC, and then connect the interface to the red 5-pole RC-P connector on the main PCB of the PACi outdoor unit.

2. Verify that the display of the maintenance remote controller is working.
3. Simultaneously press the “Spanner” and “Leave Home” buttons for at least 4 seconds. Depending on which model you are using as maintenance remote controller, CZ-RTC2 or CZ-RTC4, the buttons look differently and are located at different positions:

CZ-RTC2

CZ-RTC4



4. With the Temperature “UP” and “DOWN” buttons (▲▼) scroll to parameter “07”.
5. With the Timer “UP” and “DOWN” buttons (▲▼) change the parameter value from the factory default “000” to “001”.
6. Confirm the new setting by pressing the “SET” button followed by the “Spanner” button.
7. After that, you can disconnect the maintenance remote controller from the outdoor unit PCB.

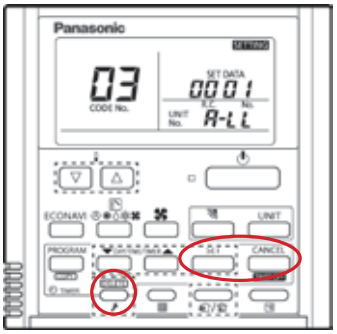
Method C: Adapting AHU capacity to PACi outdoor unit capacity

The last possibility is to adapt the AHU Kit capacity to match the capacity of the currently used PACi outdoor unit. To change the relevant setting, invoke the „Detailed Settings“ mode on the AHU Kit’s integrated remote controller (CZ-RTC2 / CZ-RTC4).

1. Verify that the display of the integrated remote controller is working.
2. Simultaneously press the “Spanner”, “SET” and “CANCEL” buttons, until the display shows parameter code “10”. Depending on which model is integrated, CZ-RTC2 or CZ-RTC4, the buttons look differently and are located at different positions:

CZ-RTC2

CZ-RTC4



3. Press the Temperature “UP” button (▲) just once shortly, in order to scroll to parameter “11”.
4. With the Timer “UP” and “DOWN” buttons (▲▼) modify the parameter value according to the following table:

PACi outdoor unit model		Setting for AHU Kit parameter “11”
	U-50PE1E5	0009
U-60PEY1E5	U-60PE1E5A	0011
U-71PEY1E5	U-71PE1E5A U-71PE1E8A	0012
U-100PEY1E5 U-100PEY1E8	U-100PE1E5A U-100PE1E8A	0015
U-125PEY1E5 U-125PEY1E8	U-125PE1E5A U-125PE1E8A	0017
U-140PEY1E5 U-140PEY1E8	U-140PE1E5A U-140PE1E8A	0018
	U-200PE1E8	0021
	U-250PE1E8	0023

5. Confirm the new setting by pressing the “SET” button followed by the “Spanner” button.

5 Electrical Wiring

5.1 General precautions on wiring

WARNING

Electric shock from live power supply cords

Electric shock may result from contact with live power supply cords.

- ► Wiring installation must only be performed by a qualified electrician.
- ► Before starting to work on any machines or devices, always switch off the power supply and lock it in switched-off position.

CAUTION

The following precautions need to be followed strictly in the context of working on any electrical wiring, in order to avoid hazardous situations, which could result in minor or moderate injury.

- ► Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.
- ► This equipment is not provided with a power supply cord. Circuit breaker must be incorporated in the fixed wiring in accordance with national wiring regulations. The circuit breaker must be approved, suitable for the voltage and current ratings of equipment and have a contact separation in all poles.
- ► To prevent possible hazards from insulation failure, the unit must be grounded.
- ► Each wiring connection must be done in accordance with the wiring system diagram. Wrong wiring may cause the unit to misoperate or become damaged.
- ► Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.
- ► Unauthorized changes in the internal wiring can be very dangerous. The manufacturer will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.
- ► Regulations on wire diameters differ from locality to locality. For field wiring rules, please refer to the relevant local electrical codes before beginning. You must ensure that installation complies with all relevant rules and regulations.
- ► To prevent malfunction of the air conditioner caused by electrical noise, care must be taken when wiring as follows:
  - The remote control wiring and the inter-unit control wiring should be wired apart from the inter-unit power wiring.
  - Use shielded wires for inter-unit control wiring (between units) and ground the shield on both sides.
- ► If the power supply cord of this appliance is damaged, it must be replaced by a repair shop designated by the manufacturer, because special-purpose tools are required.

5.2 Recommended wire lengths and diameters

Important

- The letter coding (A to F) used in the following tables refers to the wiring system diagrams in the next section.
- For information on “(A) Power supply of outdoor unit” refer to the “Installation Instructions“ for the relevant outdoor unit.

Indoor unit

Type	(B) Power supply	Time delay fuse or circuit breaker
AHU Kit	2.5 mm² (AWG#13)	10 – 16 A
	Max. 150 m	

Control wiring

(C) Inter-unit control wiring (between outdoor and indoor units			(D) Remote control wiring	(E) Control wiring for group control[1]	(F) Inter-outdoor-unit control wiring[1]
0.75 mm² (AWG# 18) Use shielded wiring*	or	2.0 mm² (AWG# 14) Use shielded wiring*	0.75 mm² (AWG# 18) Use shielded wiring*	0.75 mm² (AWG# 18) Use shielded wiring*	0.75 mm² (AWG# 18) Use shielded wiring*
Max. 1,000 m		Max. 2,000 m	Max. 500 m	Max. 200 m (total)	Max. 300 m

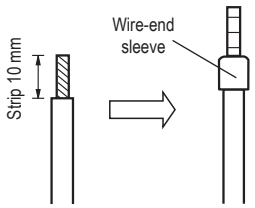
1 “E” and “F” are relevant for ECOi multi connection systems only.

5.3 Connection of wiring to terminals

Connect wiring to the terminals according to the following instructions.

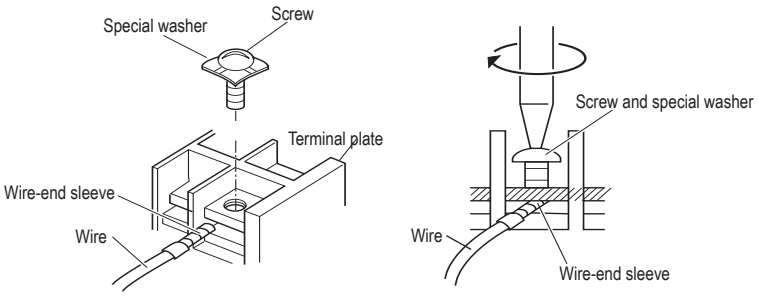
Stranded wire

1. Cut the wire end with cutting pliers, then strip the insulation to expose the stranded wiring about 10 mm and tightly twist the wire ends.



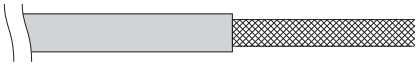
2. Using a flat-blade screwdriver, loosen the terminal screw(s) on the terminal plate.
3. Attach a wire-end sleeve to each stripped wire end using a crimping tool.

4. Place the wire-end sleeve into the socket on the connector and replace and tighten the removed terminal screw using a flat-blade screwdriver.

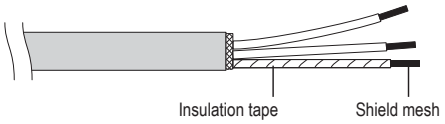


Shielded wire

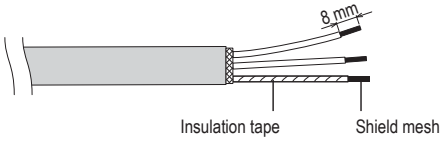
1. Remove cable sheath not to scratch braided shield.



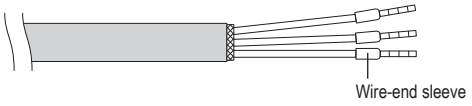
2. Unbraid the braided shield carefully and twist the unbraided shield wires tightly together. Insulate the shield wires by covering them with an insulation tube or wrapping insulation tape around wire.



3. Remove insulation of signal wire.



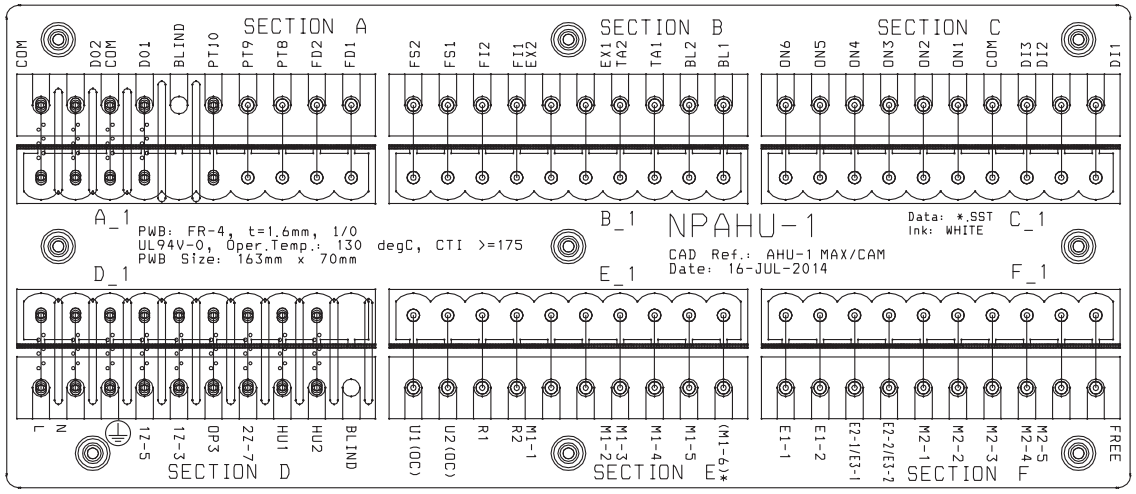
4. Attach wire-end sleeves to the signal wires and the shield wires insulated in step 2 using a crimping tool.



5. Connect the shield for the inter-unit control wiring to ground.

5.4 Terminal board layout

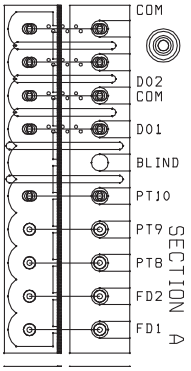
Terminal layout – Main control board (CR-UXRP71B-P)



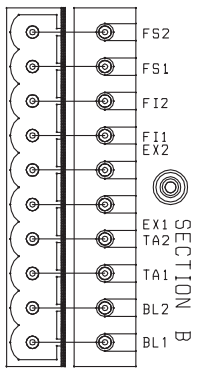
= Input or Output necessary to connect.

= Input or Output can be connected if required.

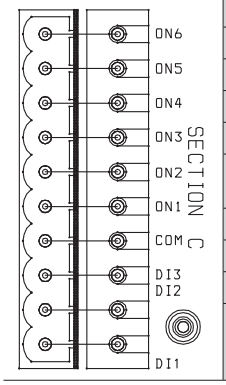
Section A

Connections	No..	Name	In / Out	Allocation	Function	Description
	10	COM	O	Alarm Signal	Alarm Signal	External Potential: max. 230 V AC / 3 A
	9	DO2	O	Alarm Signal		
	8	COM	O	Operation Signal	Operation Signal	External Potential: max. 230 V AC / 3 A
	7	D01	O	Operation Signal		
	6	Blind	Unused			
	5	PT10	I / O	Advanced: **Red** wire / Medium: **White** wire	Advanced version: Connection of PT-100 temperature sensor of thermostat TR-16/TR-17 Medium version: Connection of analogue output temp. signal	Take care of wiring colours! **Note**: For advanced version connect only, in case thermostat TR-16/TR-17 is being used. For medium version: PT10 = negative pole ("–") and PT9 = positive pole ("+")
	4	PT9	I / O	Advanced: **Red** wire / Medium **Red** wire		
	3	PT8	I	Advanced: **White** wire / Medium: not used		
	2	FD2	O	Fan Signal	Control of an additional external fan or additional external air handling unit	Internal potential: 12 V DC
	1	FD1	O	Potential for FD2		

Section B

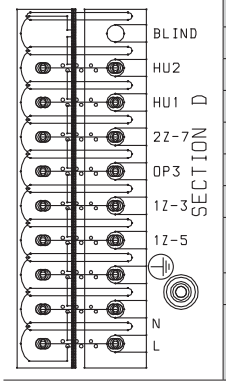
Connections	No..	Name	In / Out	Allocation	Function	Description
	10	FS2	I	Float switch	Float switch (ex factory bridged)	Internal Potential: 12 V DC
	9	FS1	I	Potential for FS2		
	8	FI2	I	Filter contact	Filter contact	Internal Potential: 5 V DC **Note**: For activating filter input, verify in Detailed Settings that code 2A is set to "0000"
	7	FI1	I	Potential for FI2		
	6	EX2	I	EXCT-Contact	EXCT-Contact (external thermostat off switch)	Internal Potential: 5 V DC
	5	EX1	I	Potential for EXCT		
	4	TA2	I	No polarity	Suction Temperature Sensor TA (included) (Room Temperature Sensor)	
	3	TA1	I	No polarity		
	2	BL2	I	No polarity	Discharge Temperature Sensor BL (included only with PAW-xxxMAH2(L/M))	
	1	BL1	I	No polarity		

Section C



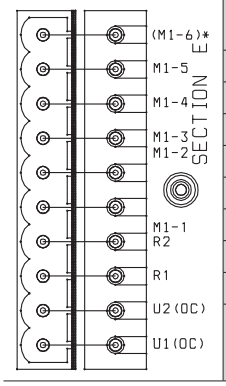
No..	Name	In / Out	Allocation	Function	Comment
10	ON6	O	Recirculat. Operation	Status Outputs	Internal Potential: 12 V DC
9	ON5	O	Heating Operation		
8	ON4	O	Cooling Operation		
7	ON3	O	Thermostat ON		
6	ON2	O	Defrost Operation		
5	ON1	O	Potential for ON2 to ON6 (12 V DC)		
4	COM	I	Potential for DI1 to DI3	Digital Inputs (Functionality refer to the installation instruction of the additional interface CZ-CAPBC2 / ACC-SP1A)	2 types of usage: a) Potential-free: Keep S3 of CZ-CAPBC 2/ ACC-SP1A on "NON VOLTAGE". b) 12 to 24 V DC, 10 mA external: Change S3 of CZ-CAPBC2 / ACC-SP1A to "VOLTAGE".
3	DI3	I	Digital Input 3		
2	DI2	I	Digital Input 2		
1	DI1	I	Digital Input 1		

Section D



No..	Name	In / Out	Allocation	Function	Comment
10	BLIND		Unused		
9	HU2	O	No polarity	Humidifier	Internal Potential: 230 V AC / max. 3 A
8	HU1	O	No polarity		
7	2Z-7	I	Potential for OP3	Fan Alarm Input	Internal Potential: 230 V AC
6	OP3	I	Fan Alarm		
5	1Z-3	O	No polarity	Fan Start – Stop Signal	External Potential: max. 230 V AC / 5 A
4	1Z-5	O	No polarity		
3	⏚	I	Protective earth	Protective Earth Conductor	
2	N	I	Neutral	Neutral Terminal	
1	L	I	Live	Live Terminal	External Potential: 230 V AC, max. 1 A

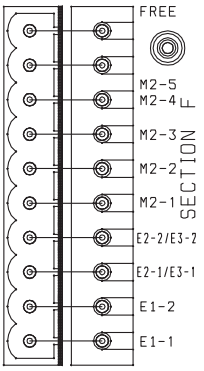
Section E



No..	Name	In / Out	Allocation	Function	Comment
10	M1-6	I	WHT	Expansion valve (only ECOi and ECO G)	Required only for PAW-160MAH2(L/M) and PAW-280MAH2(L/M)
9	M1-5	I	GRY		
8	M1-4	I	BLK		
7	M1-3	I	YEL		
6	M1-3	I	RED		
5	M1-1	I	ORG		
4	R2	I	No polarity	Terminal for Group Wiring (RC connection)	Internal Potential: 16 V DC
3	R1	I	No polarity		
2	U2 (OC)	I	No polarity	Communication bus wiring	
1	U1 (OC)	I	No polarity		

To be continued on next page.

Section F



No..	Name	In / Out	Allocation	Function	Comments
10	M2-6 (FREE)	I	GRY	Advanced & Medium: Activation of demand control	Remove bridge for use of demand control
9	M2-5	I	ORG	Advanced & Medium: Activation of demand control	Remove bridge for use of demand control
8	M2-4	I	WHT	Advanced & Medium: Analogue input Demand	Advanced & Medium: (–10 V DC) via R01 for demand control
7	M2-3	I	RED	Advanced & Medium: Analogue input Demand	Advanced & Medium: (+10 V DC)
6	M2-2	I/O	RED	Advanced: Analogue output Medium: Analogue Input Demand	Advanced: Internal potential (+10 V DC) TR-16/TR-17 via bridge / Medium: (–10 V DC)
5	M2-1	O	WHT	Advanced: Analogue output	Advanced only: Internal potential 10 V DC from TR-16/TR-17 via R01
4	E2-2 / E3-2	I	No polarity	Sensor E2 (PACi) or Sensor E3 (ECOi) respectively	
3	E2-1 / E3-1	I	No polarity		
2	E1-2	I	No polarity	Sensor E1	
1	E1-1	I	No polarity		

Terminal layout – PAW-T10 (for advanced and medium versions only)

PAW-T10 PCB

Connections	No..	In / Out	Allocation	Function	Comments
	1	I(1)	Potential for I(2)	External Start / Stop	
	2	I(2)	ON / OFF		
	3	I(3)	Lock RC	Lock (Contact closed) or Unlock (Contact open) remote controller respectively	
	4	I(4)	Potential for I(3)		
	5	O(5)	Operation Signal NC	Operation Signal as normally open or normally closed contact	External Potential: max. 250 V AC / 5 A
	6	O(6)	Operation Signal NO		
	7	O(7)	Potential for O(5) und O(6)		
	8	O(8)	Alarm Signal NC	Alarm Signal as normally open or normally closed contact	External Potential: max. 250 V AC / 5 A
	9	O(9)	Alarm Signal NO		
	10	O(10)	Potential for O(8) und O(9)		

Important

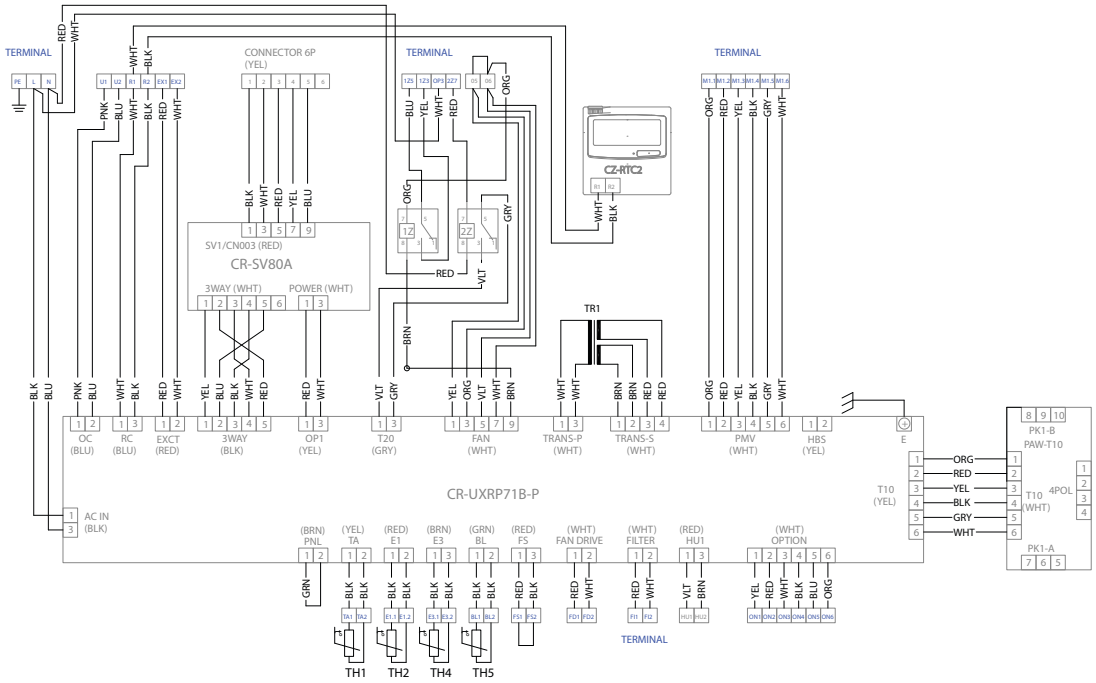
For details about the connection and functions of the PAW-T10 PCB, please refer to the separate installation instructions for PAW-T10.

Notes

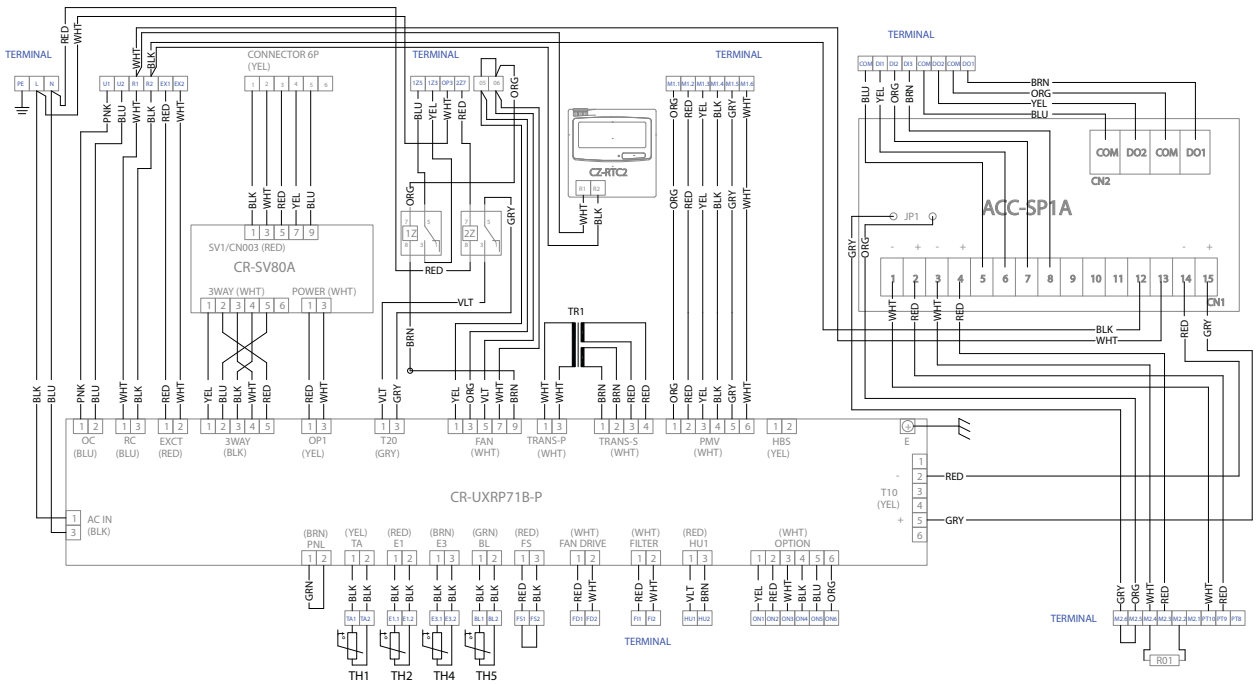
5.5 Wiring layout

Wiring layout – ECOi and ECO G systems

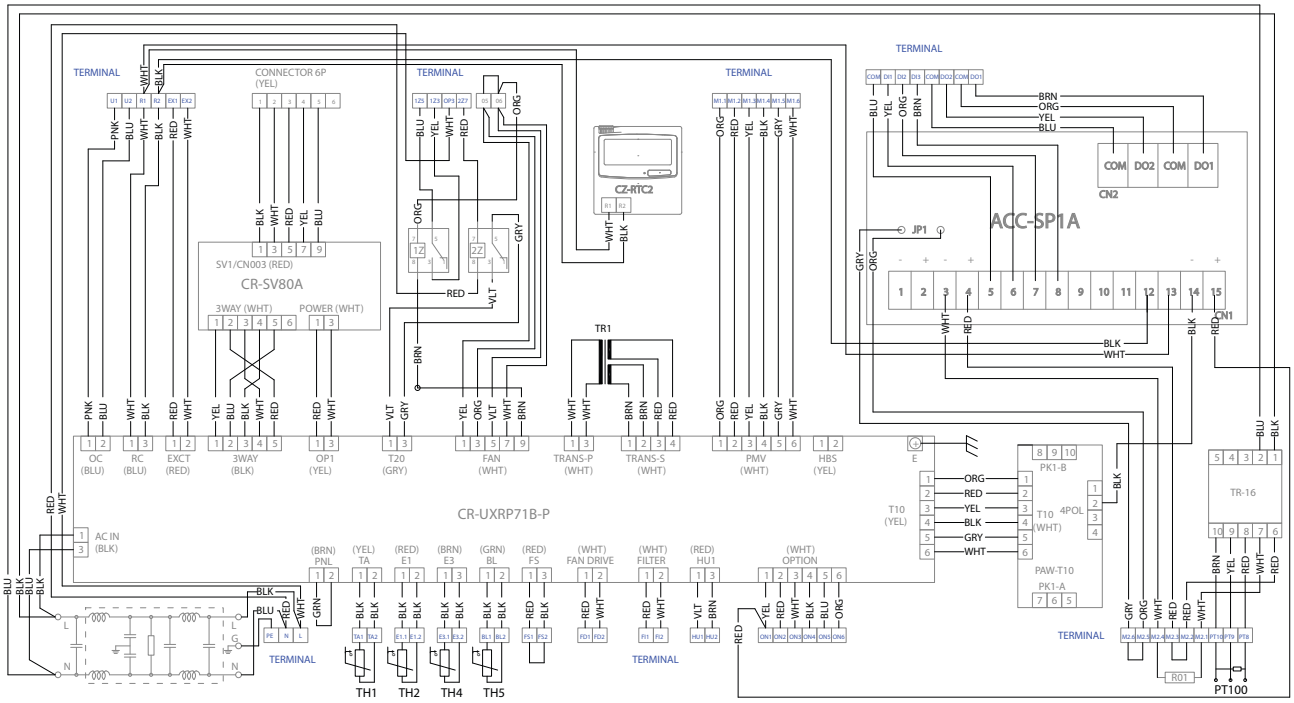
PAW-160MAH2L



PAW-160MAH2M



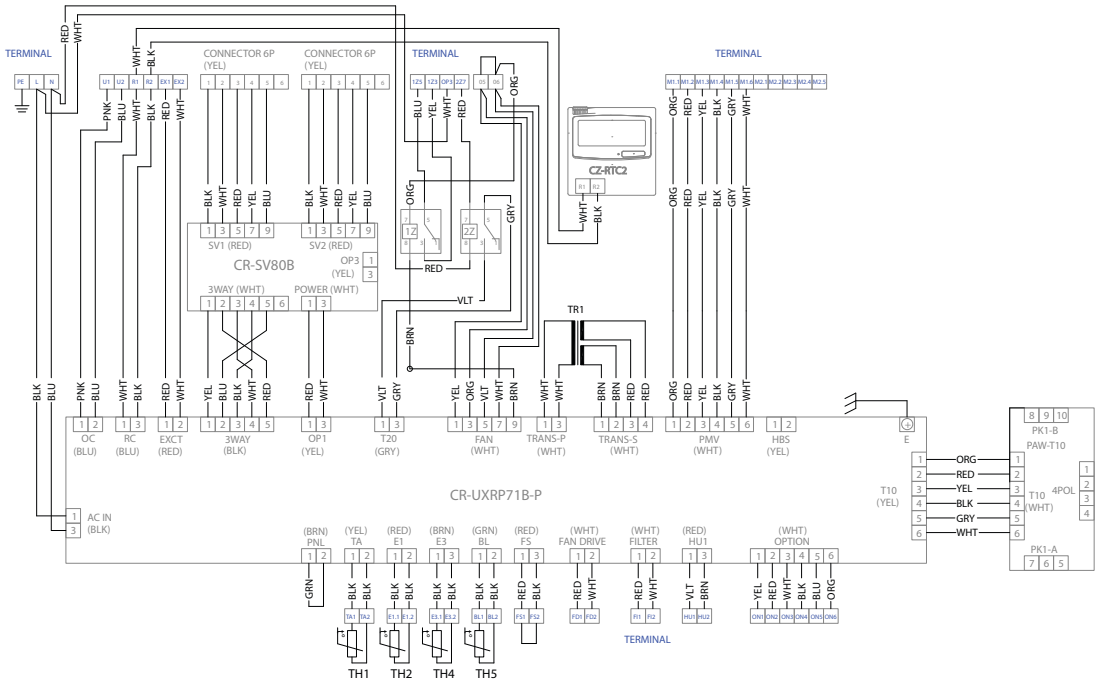
PAW-160MAH2



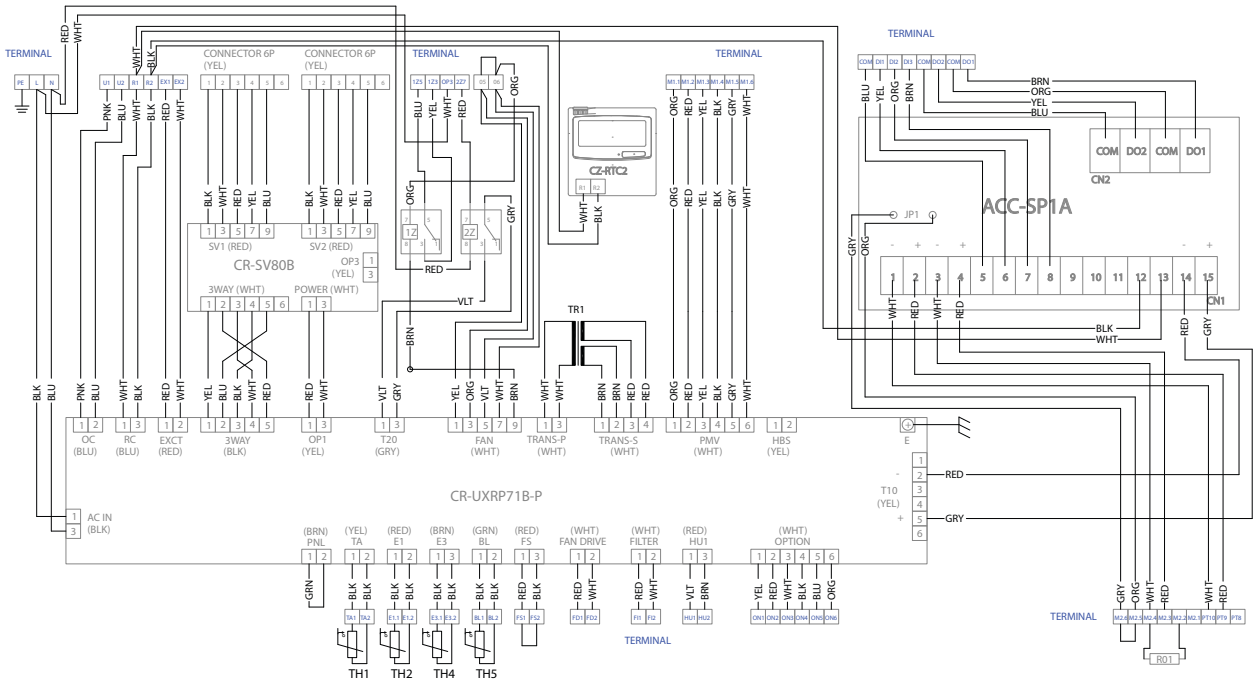
Legend

		Version		
		Light	Medium	Advanced
		PAW-160MAH2L	PAW-160MAH2M	PAW-160MAH2
TH1	Air intake temperature sensor TA	X	X	X
TH2	Indoor coil thermistor E1	X	X	X
TH4	Indoor coil thermistor E3	X	X	X
TH5	Air outlet temperature sensor BL	X	X	X
CZ-RTC2	Remote controller	X	X	X
CR-SV80A	RAP valve control PCB	X	X	X
CR-UXRP71B-P	Main PCB	X	X	X
1Z / 2Z	Auxiliary power relay	X	X	X
TR1	Power transformer	X	X	X
PAW-T10	External signal control PCB	X	–	X
ACC-SP1A	External signal control PCB	–	X	X
R01	Resistor	–	X	X
TR-16 / TR-17	Thermostat	–	–	X
PT100	Supply air temperature sensor	–	–	X

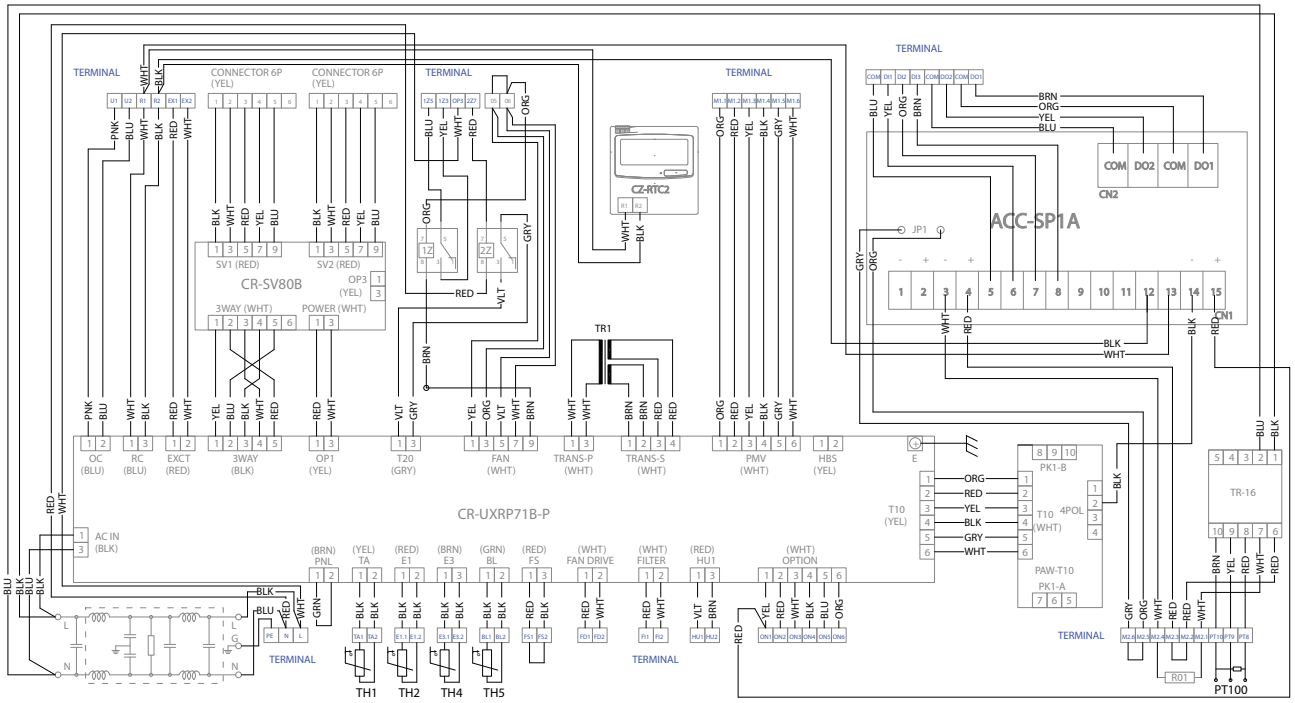
PAW-280MAH2L



PAW-280MAH2M



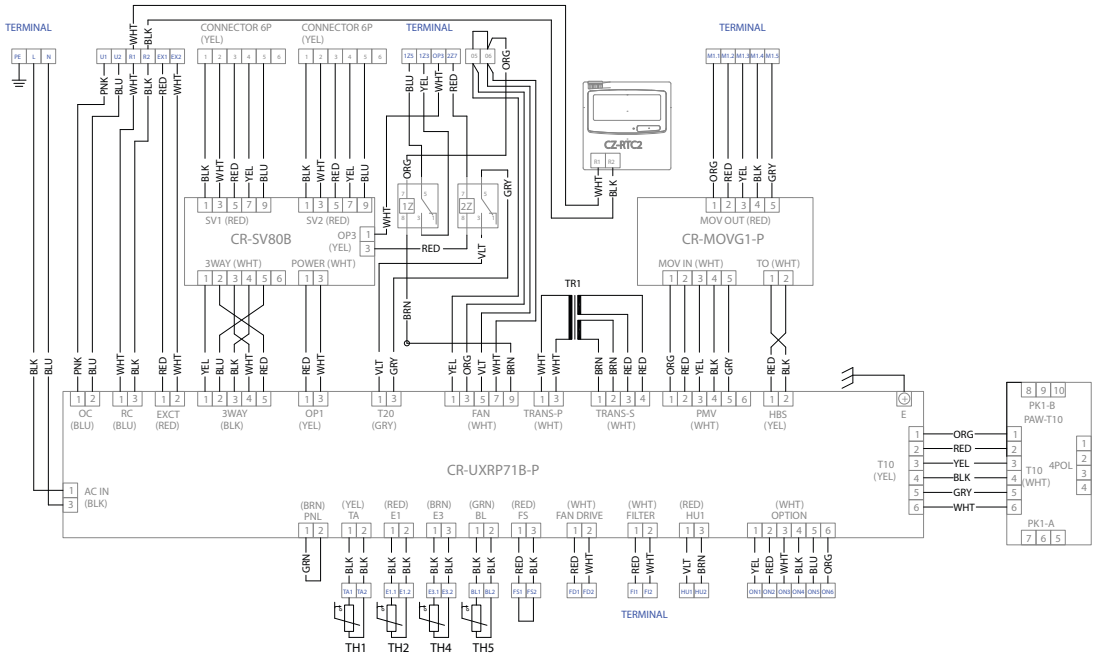
PAW-280MAH2



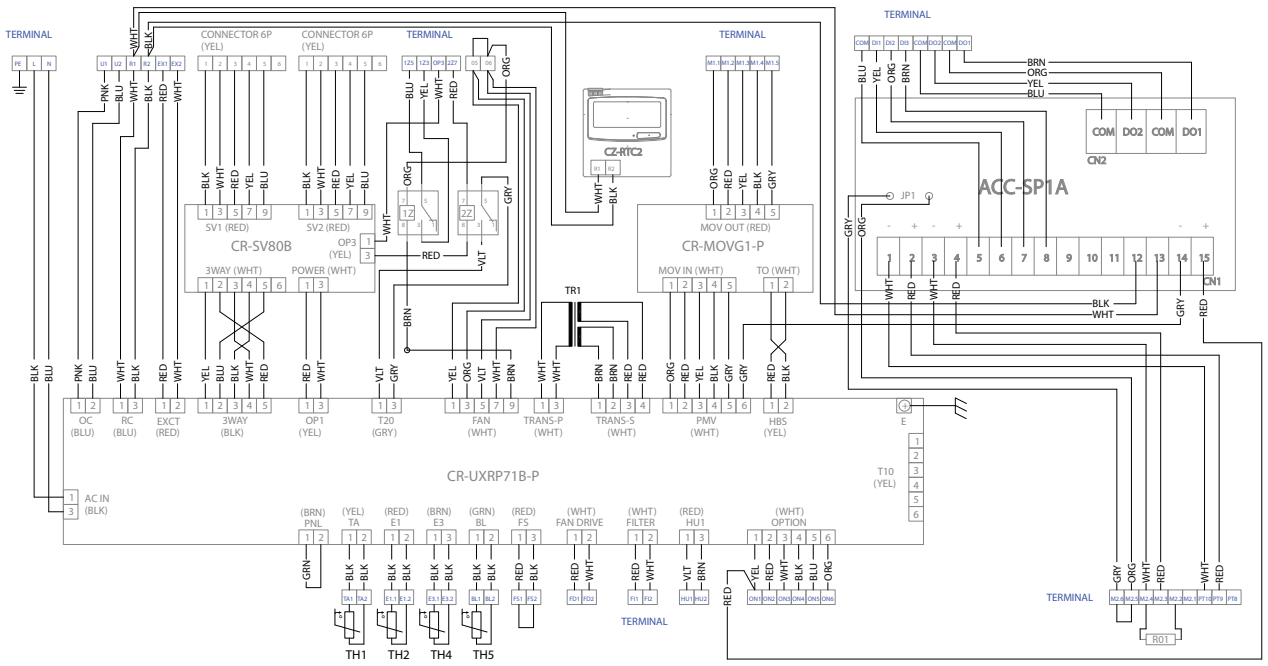
Legend

		Version		
		Light PAW-280MAH2L	Medium PAW-280MAH2M	Advanced PAW-280MAH2
TH1	Air intake temperature sensor TA	X	X	X
TH2	Indoor coil thermistor E1	X	X	X
TH4	Indoor coil thermistor E3	X	X	X
TH5	Air outlet temperature sensor BL	X	X	X
CZ-RTC2	Remote controller	X	X	X
CR-SV80B	RAP valve control PCB	X	X	X
CR-UXRP71B-P	Main PCB	X	X	X
1Z / 2Z	Auxiliary power relay	X	X	X
TR1	Power transformer	X	X	X
PAW-T10	External signal control PCB	X	–	X
ACC-SP1A	External signal control PCB	–	X	X
R01	Resistor	–	X	X
TR-16 / TR-17	Thermostat	–	–	X
PT100	Supply air temperature sensor	–	–	X

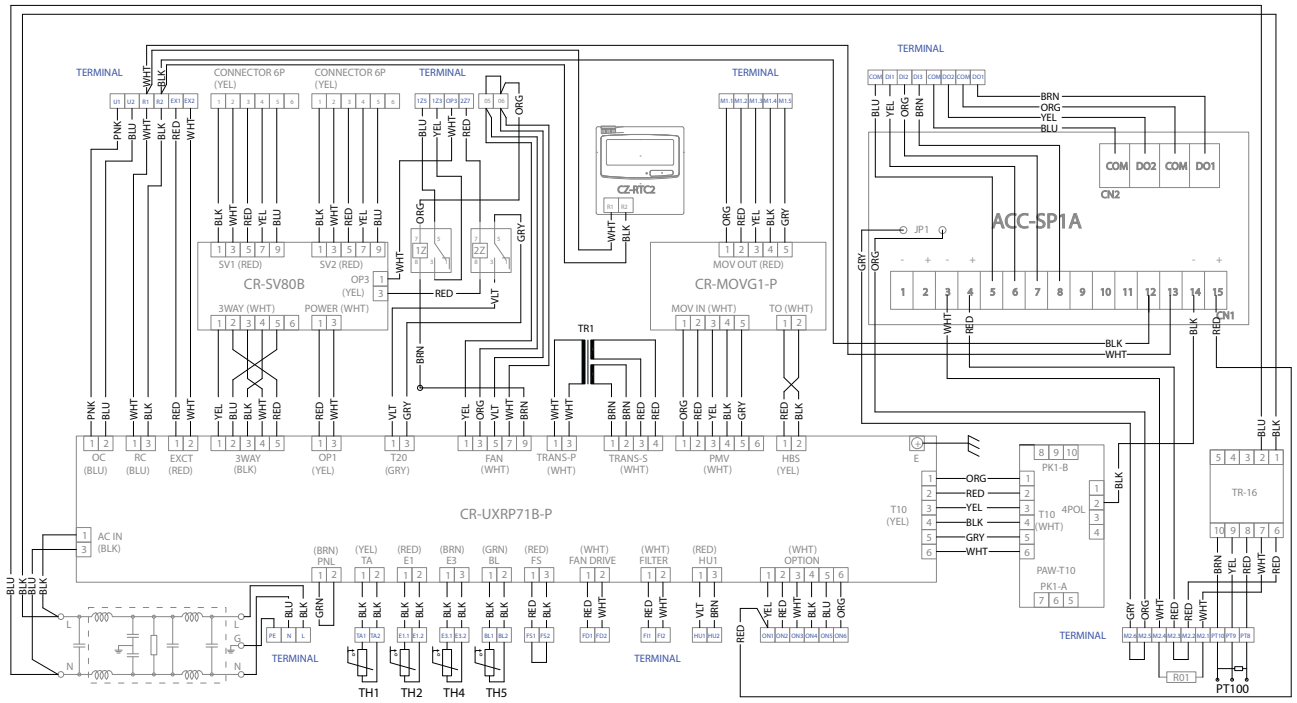
PAW-560MAH2L



PAW-560MAH2M



PAW-560MAH2

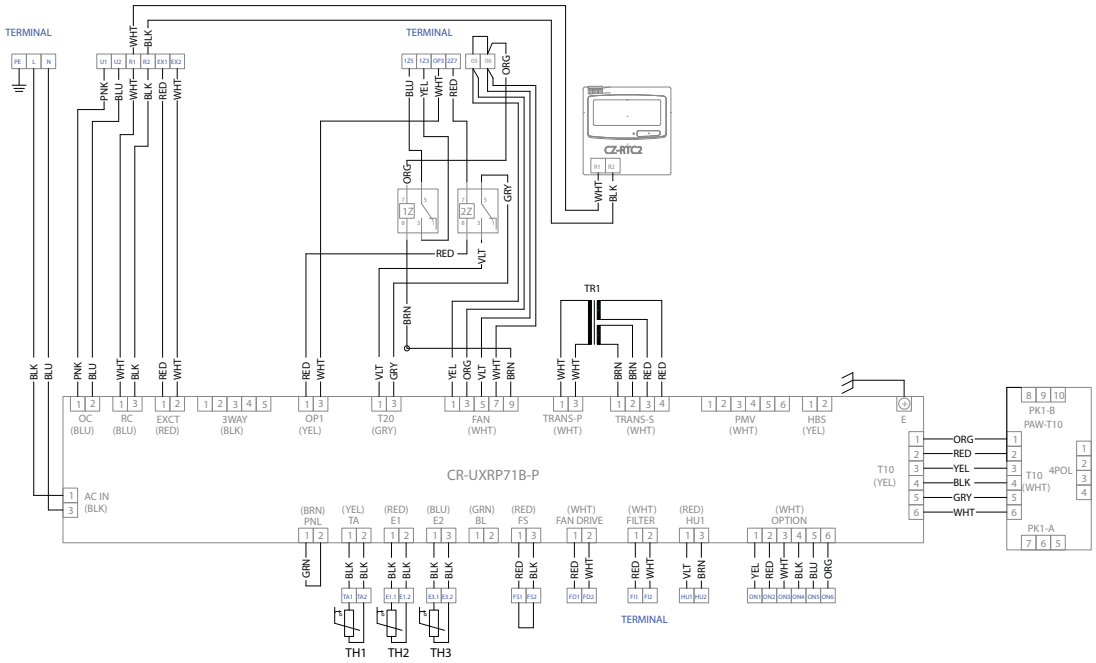


Legend

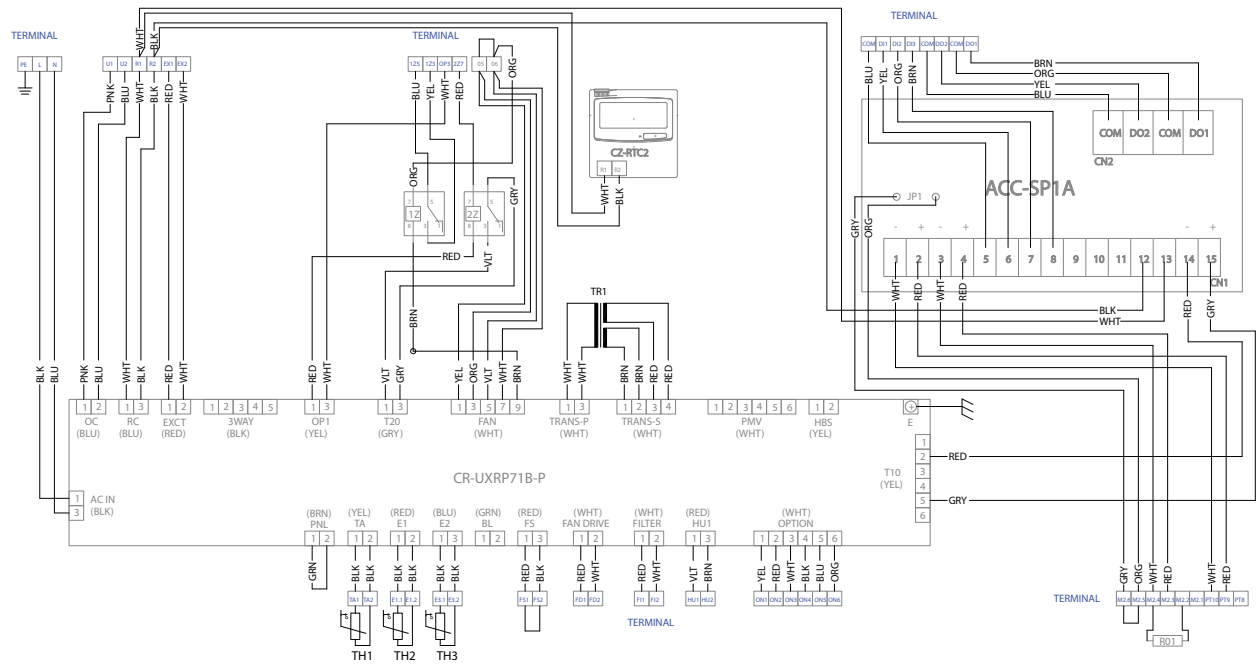
		Version		
		Light PAW-560MAH2L	Medium PAW-560MAH2M	Advanced PAW-560MAH2
TH1	Air intake temperature sensor TA	X	X	X
TH2	Indoor coil thermistor E1	X	X	X
TH4	Indoor coil thermistor E3	X	X	X
TH5	Air outlet temperature sensor BL	X	X	X
CZ-RTC2	Remote controller	X	X	X
CR-SV80B	RAP valve control PCB	X	X	X
CR-UXRP71B-P	Main PCB	X	X	X
1Z / 2Z	Auxiliary power relay	X	X	X
TR1	Power transformer	X	X	X
CR-MOVG1-P	Motorized valve PCB	X	X	X
PAW-T10	External signal control PCB	X	–	X
ACC-SP1A	External signal control PCB	–	X	X
R01	Resistor	–	X	X
TR-16 / TR-17	Thermostat	–	–	X
PT100	Supply air temperature sensor	–	–	X

PACi Wiring layout – PACi systems

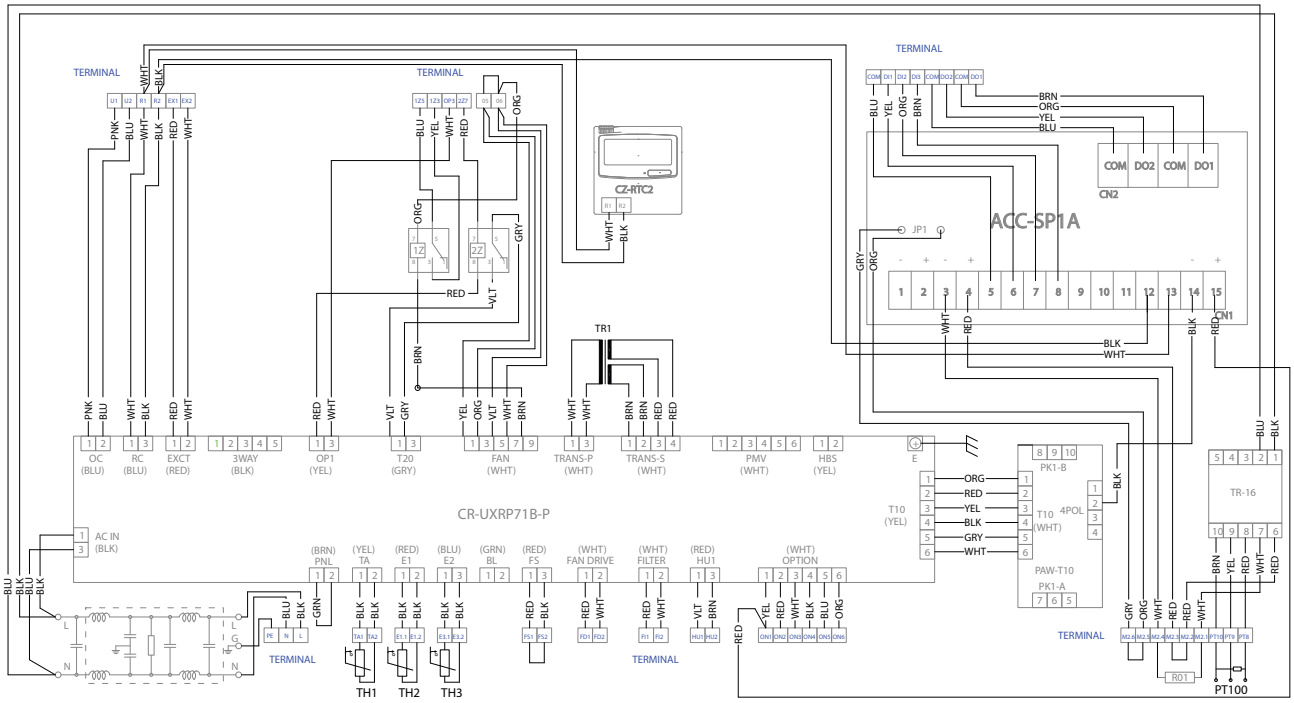
PAW-280PAH2L



PAW-280PAH2M



PAW-280PAH2

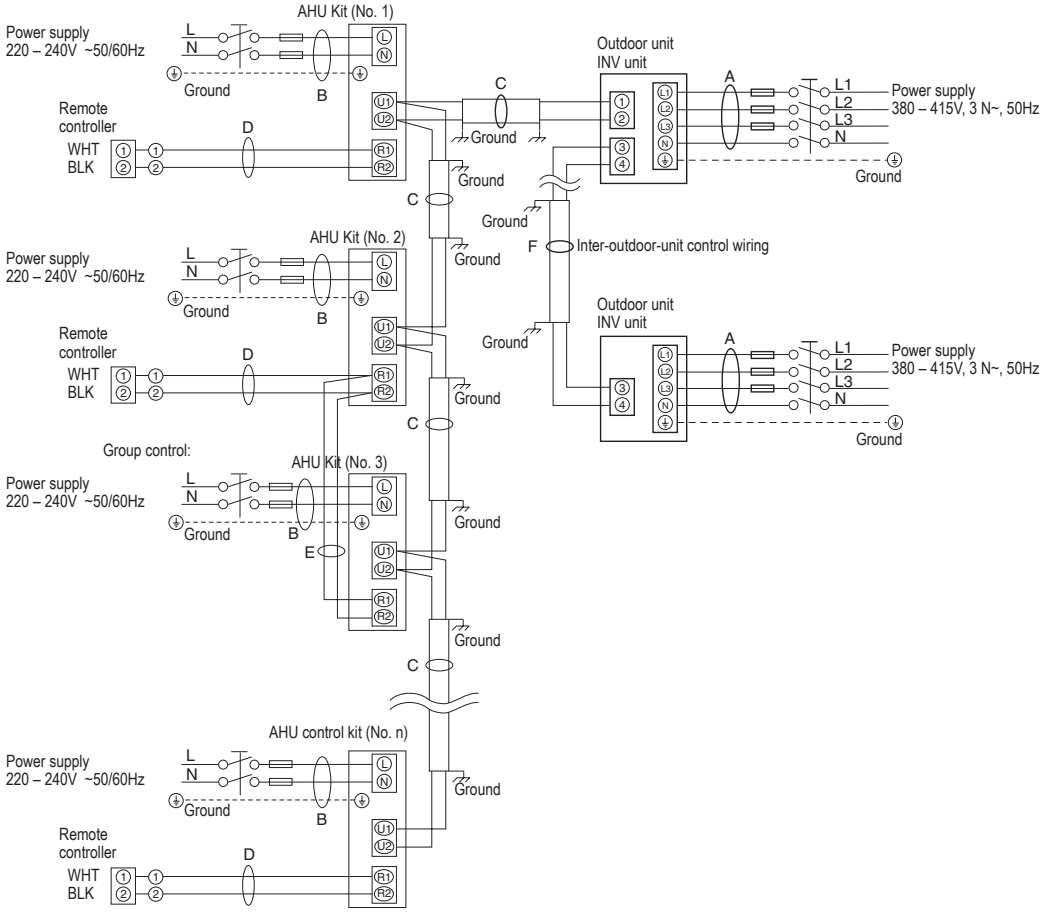


Legend

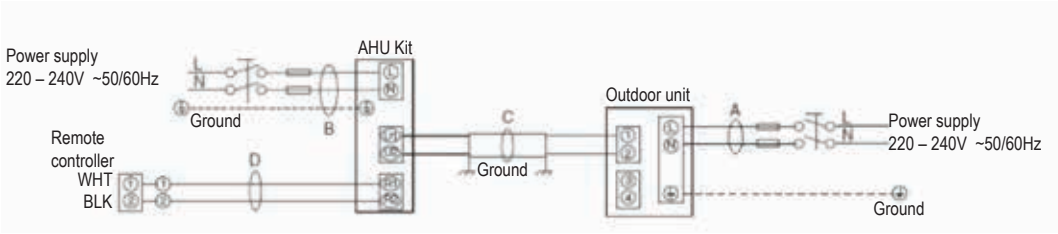
		Version		
		Light PAW-280PAH2L	Medium PAW-280PAH2M	Advanced PAW-280PAH2
TH1	Air intake temperature sensor TA	X	X	X
TH2	Indoor coil thermistor E1	X	X	X
TH3	Indoor coil thermistor E2	X	X	X
CZ-RTC2	Remote controller	X	X	X
CR-UXRP71B-P	Main PCB	X	X	X
1Z / 2Z	Auxiliary power relay	X	X	X
TR1	Power transformer	X	X	X
PAW-T10	External signal control PCB	X	–	X
ACC-SP1A	External signal control PCB	–	X	X
R01	Resistor	–	X	X
TR-16 / TR-17	Thermostat	–	–	X
PT100	Supply air temperature sensor	–	–	X

5.6 Wiring system diagrams

Wiring system diagram – ECOi systems

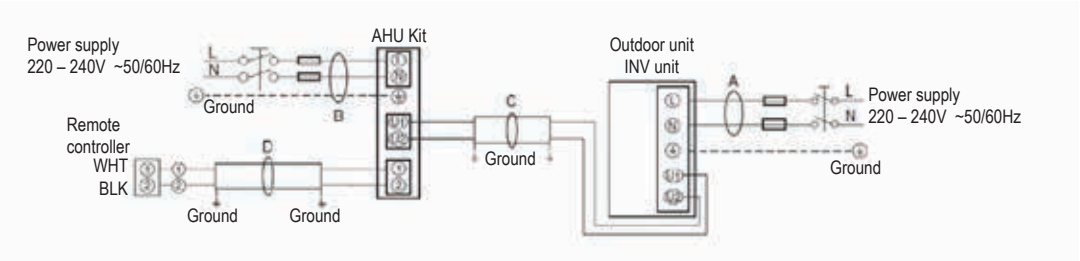


Wiring system diagram – ECO G systems

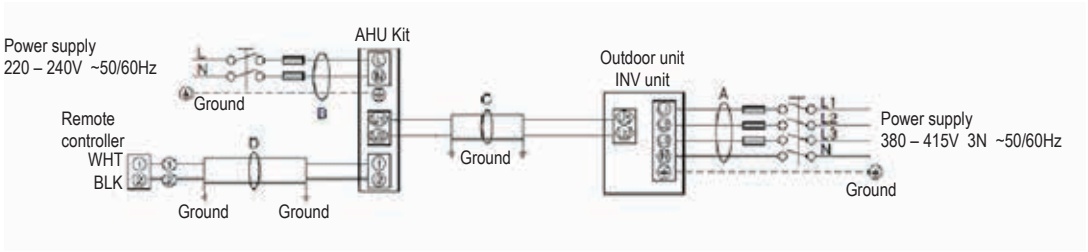


Wiring system diagram – PACi systems

For single-phase outdoor units

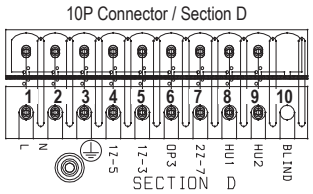


For three-phase outdoor units



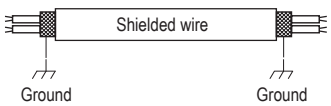
Notes on wiring system diagrams – All systems

1. Refer to “5.2 Recommended wire lengths and diameters” for the explanation of “A”, “B”, “C”, “D”, “E” and “F” in the above diagrams.
2. The connection diagram below shows the power supply connector (Section D) of the AHU Kit’s terminal board (actual appearance may differ slightly).



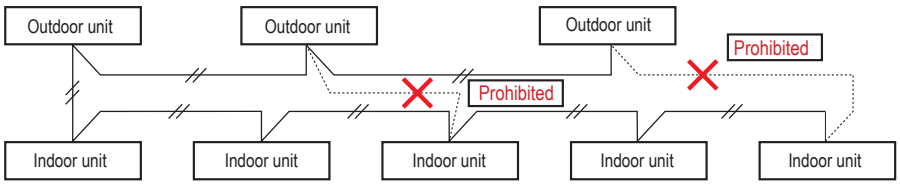
1	L	Power supply	6	OP3	Blower protection
2	N	Neutral conductor	7	2Z-7	Blower protection
3	⏚	Protective earthing	8	HU1	Humidifier
4	IZ-5	Blower out	9	HU2	Humidifier
5	IZ-3	Blower out	10		Blind

3. Refrigerant Circuit (R.C.) address should be set on the outdoor unit before turning the power on.
4. Regarding R.C. address setting, refer to the installation instructions supplied with the remote controller unit. Auto address setting can be executed by remote controller automatically. Refer to the installation instructions supplied with the remote controller unit.
5. Use shielded wires for inter-unit control wiring (C) with shielded woven mesh grounded on both sides, otherwise misoperation from noise may occur.

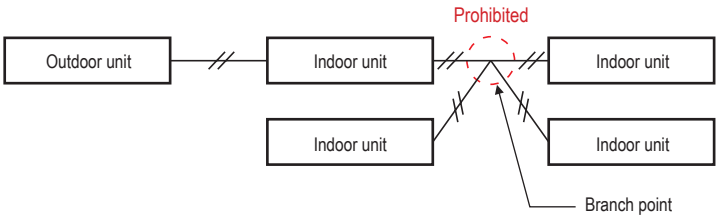


Connect wiring as shown in the section “Wiring System Diagram”.

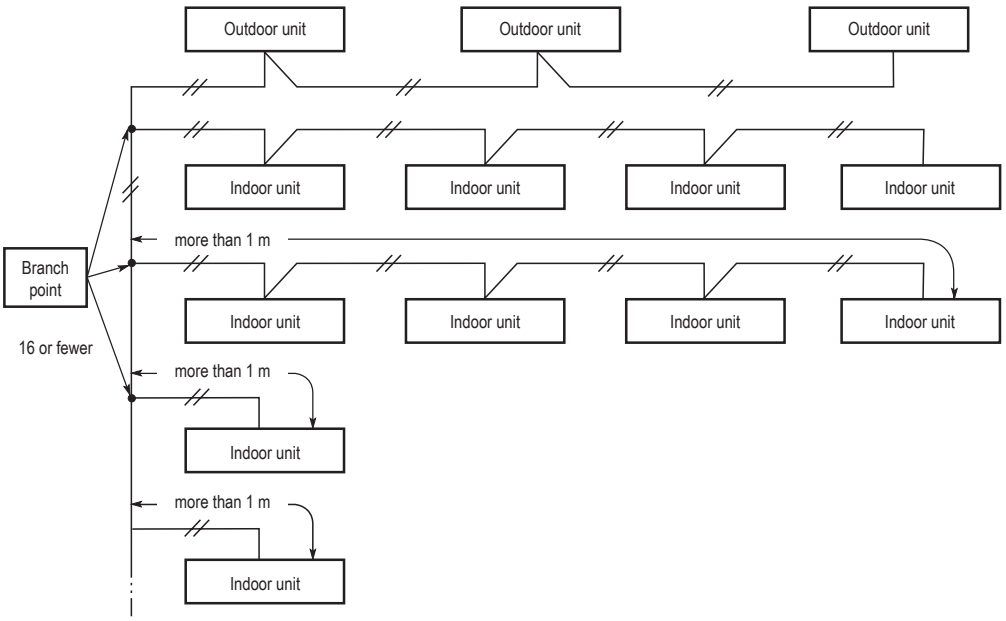
6. Use the standard power supply cables for Europe (such as H05RN-F or H07RN-F which conform to CENELEC(HAR) rating specifications) or use the cables based on IEC standard (245 IEC57, 245 IEC66).
7. When linking the outdoor units in a network, disconnect the terminal extended from the short plug from all but one of the outdoor units. (When shipping: in shorted condition.)
   For a system without link (no wiring connection between outdoor units), do not remove the short plug.
8. Do not install the inter-unit control wiring in a way that forms a loop.



9. Do not install inter-unit control wiring such as star branch wiring. Star branch wiring causes faulty address setting.



10. If branching the inter-unit control wiring, the number of branch points should be 16 or fewer. (Branches that are less than 1m are not included in the total branch number.)



11. In case of a multiple AHU Kit combination within one refrigerant system, those kits must share the same AHU housing including fan, and they have to be “group-wired” and operate as a single group. In this case you have to disconnect the included remote controllers and CZ-CAPBC2 boards (ACC-SP1A PCB) except for one each. It is irrelevant which one is retained, there is no preference. The external connections need to be done only on the unit with the connected CZ-CAPBC2 board.
Note: In this particular case it is even possible to combine a single advanced or medium version with one or two light versions, and still have full functions of the advanced or medium version respectively.

NOTICE

Overheating of terminals with resulting unit malfunction or even fire due to loose wiring

Loose wiring may cause the terminal to overheat resulting in unit malfunction or a fire hazard.

- ► When connecting each power wire to the terminal, follow the instructions on how to connect wiring to the terminal (see next section) and fasten the wire securely with the terminal screw.
- ► Check and ensure that all wiring is tightly connected.

5.7 Connection of external signal lines

NOTICE

Freeze-up of the heat exchanger coil due to insufficient air volume flow

In systems using an AHU Kit, situations may occur where the outdoor unit is operating while the AHU fan is not. This may lead to insufficient air volume flow, causing the heat exchanger coil to freeze up and entailing further damage to the system.

- ► Connect the external signal lines in such a way that enables outdoor unit operation only while the AHU fan is operating to safeguard sufficient air volume flow.

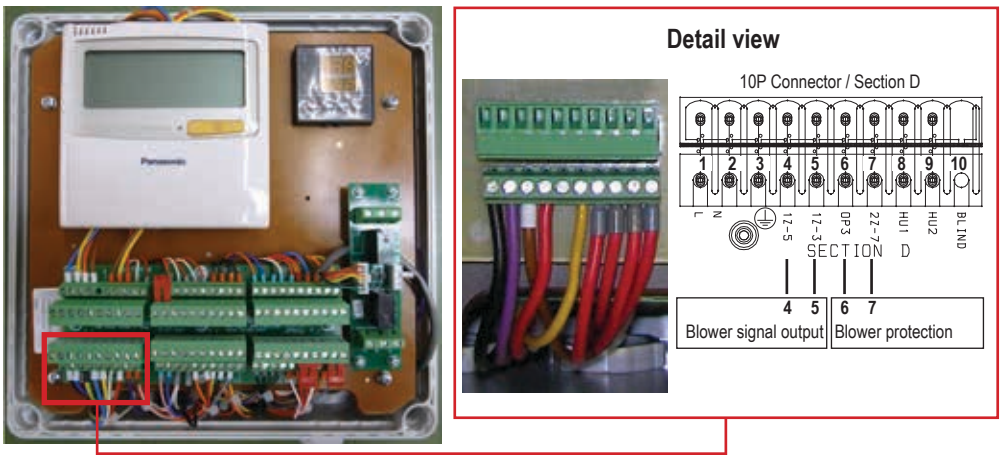
Depending on how AHU fan control is performed, there are several possibilities for connecting the external signal lines, in order to prevent the heat exchanger coil from freezing up due to insufficient air volume flow.

Two suitable methods will be explained in the following sections. All wiring diagrams are just examples. It is not necessary to build the electric circuit with 230 V AC. Any other suitable lower voltage being available on site may be used as well.

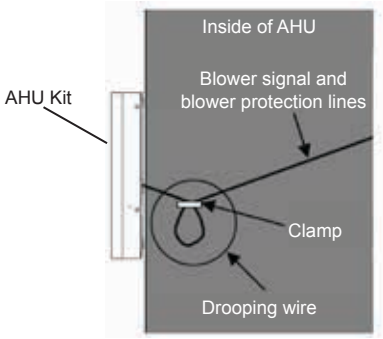
Method A: For standard fan control

For systems with standard fan control, the external signal lines can simply be connected to the contacts provided by the AHU Kit. The following installation requirements must be observed:

- Blower signal output: terminals D4 (IZ-5) and D5 (IZ-3).
  Blower protection input: terminals D6 (OP3) and D7 (2Z-7).

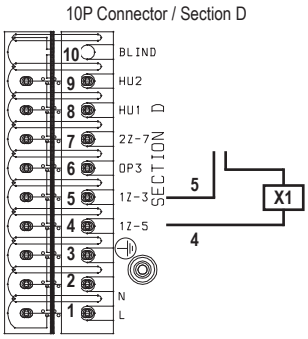


- Blower signal and blower protection lines must be routed through left wiring port below the terminal board.
- The external signal lines must be inserted drooped in the AHU body and protected by a clamp with the drooping wire being close to the AHU Kit to avoid water reaching the AHU Kit.



Blower signal output

This fan control is usually at ON position at the time of operating, but becomes OFF in defrosting.



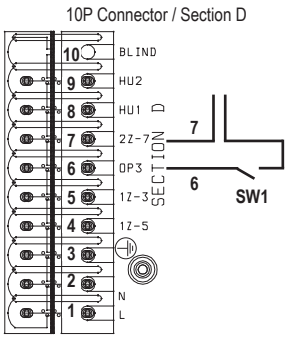
Minimum applicable load: 5 V DC, 1 mA
Maximum applicable load: 230 V AC, 2 A

X1: Relay (field supplied)

If uninterrupted fan operation is needed and cold draft air is avoided for example by some internal bypass etc., the defrost signal (contacts C5 (ON1) and C6 (ON2)) can be used with an additional field supplied relay.

Blower protection input

If a switch opens, an alarm “P01” appears on a remote controller display, and operation stops.

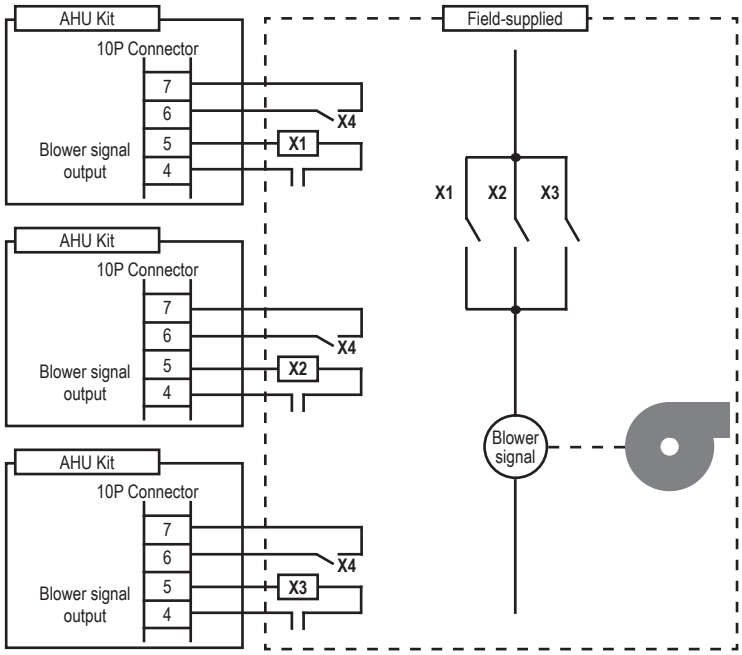


SW1: operation command (field supplied)
220 ~ 240 V AC, 0.1 A

Important:
In Section D, the contact between terminals D6 (OP3) and D7 (2Z-7) must be closed, because otherwise the AHU Kit cannot work.

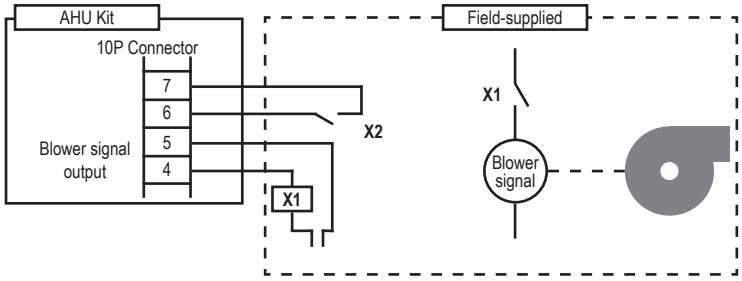
Electric circuit example – ECOi systems

Multi-connection systems with 3 AHU Kits



Electric circuit example – PACi systems

Single-connection system



Method B: For multi-step or inverter mode fan control by external BMS

When the AHU fan is controlled by an external building management system in a multi-step or inverter mode (e.g. based on a room CO_2 sensor or a room supply pressure control or similar), the simple on/off contact method (as in Method A) may not be satisfactory. In such cases, it is strongly recommended to install a field-supplied differential pressure switch and/or air flow switch in the AHU duct(s), in order to enable outdoor unit operation only when sufficient air volume flow is present.

The following diagram shows just one wiring example of several possibilities.

For the PAW-T10 contacts used in this wiring system to work properly, the following requirements must be observed:

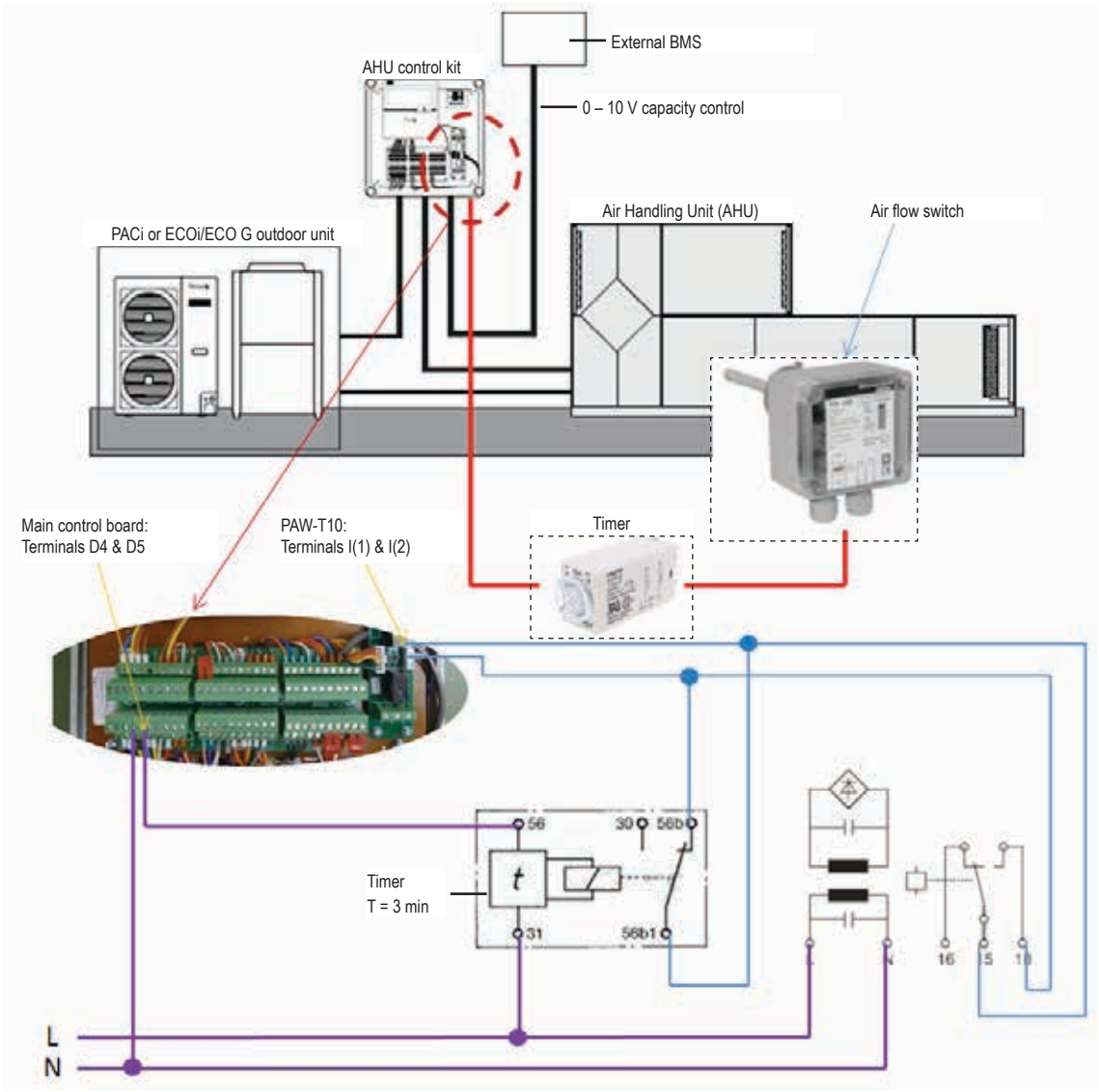
- On the AHU Kits's integrated remote controller, invoke the "Detailed Settings" mode and set parameter "2E" to "0001". (For details on the "Detailed Settings" mode, see the operating instructions of the relevant remote controller model or the ECOi/ECO G or PACi service manuals.)
- Make sure that jumper JP1 on the indoor unit PCB remains closed/intact.

As an alternative to using PAW-T10 terminals 1 and 2, it is also possible to use for example contacts 1 to 4 in Section C of the main control board ("COM" and "DI1" to "DI3"). For correct use of these contacts see "5.4 Terminal board layout" in this manual.

The wiring system shown in the diagram provides the following control functions:

- During the first 3 minutes after unit has been switched to "ON" (either by BMS or by local remote controller), the delay timer relay will keep the PAW-T10 contacts closed and operation is permitted.
- After the AHU fan has been started and while the air volume flow is sufficient, the air flow switch will keep the PAW-T10 contacts closed so that operation continues.
- Once the set delay time has elapsed, the timer contact will be opened, but the PAW-T10 contacts will stay closed due to the air flow switch relay.
- When the air volume flow drops below the lower limit, the air flow switch will open the PAW-T10 contacts and the outdoor unit will stop operation. At the same time the remote controller in the AHU unit will be locked to prevent unintentional operation.
- The minimum air volume flow should be set on the air flow switch according to the required minimum air volume flow of each AHU Kit model.

Electric circuit example including a timer and air flow switch



6 Test Run

After installation and before operation of the system, perform a test run according to the Test Run section in the Installation Instructions of the relevant outdoor unit.

If alarm messages are indicated on the outdoor unit PCB (by blinking LEDs) or on the wired remote controller, refer to the Alarm Messages section in the Installation Instructions for the relevant outdoor unit.

7 Control

7.1 Remote controller

The standard Panasonic wired remote controller CZ-RTC2 / CZ-RTC4 is an integral part of the AHU Kit. All control and setting operations for the ECOi, ECO G or PACi system can be performed on this remote controller.

Important

The relevant control operations are described in the “Operating Instructions” manual for the CZ-RTC2 / CZ-RTC4 remote controller. It is supplied with the AHU Kit or can be downloaded from the “Service” section at www.panasonicproclub.com.

7.2 Thermostat

The advanced version of the AHU Kit features a thermostat (temperature controller), which can optionally be set and parametrized separately if using the controller is required.

Important

The thermostat is not included in the „light“ or “medium” version of the AHU Kit.

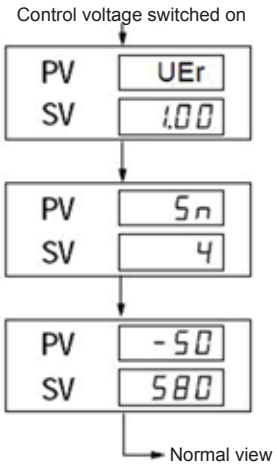
7.2.1 Control and display elements

1 Display “PV”: Process value
2 Display “SV”: Set value
3 Button “Down”
4 Button “Up”
5 Button “Set”
6 Button “Left”
7 LED “Alarm” (ON when Auto-Tuning is active)
8 LED “Out” (ON when Process Value is lower than Set Value)

7.2.2 Operation

Status messages

After the thermostat has been switched on, the PV and SV displays jointly show a set sequence of three status messages before they change to the normal view where the current process value is shown on the PV display and the currently set temperature value is shown on the SV display.



1. Software version view (factory setting)
2. Input specification view (factory setting)
3. Measuring range (factory setting)
   PV = lower limit
   SV = upper limit
4. The two displays finally change to normal view:
   PV = currently measured temperature (process value)
   SV = currently set temperature value

Changing the set temperature value

To change the set temperature value, perform the following steps:

1. During operation, press the SET button.

The SV display is blinking.

2. Change the set value as required, using the ◄, ▼ and ▲ buttons.

The SV display shows the desired temperature value.

3. Confirm the setting by pressing the SET button.

The SV display permanently shows the new set value.

Important

The set temperature value, which is adjustable by the above procedure, can be used in different ways and with different functions depending on how the thermostat is used in the individual application.

For further information see “7.2.3 Initial Settings”.

Changing values in the “Parameter” menu

To change the values of control parameters, perform the following steps:

1. Press and hold the SET button for approximately 3 seconds to enter the “Parameter” menu.

1 x for 3 sec.

The PV display shows “ALI”, while the current setting in the SV display is blinking.
Note: After 30 seconds of idleness, the display automatically returns from parametrization view to normal view.

2. Press the SET button repeatedly to select the parameter to be changed.

repeatedly

The sequence of parameters and their range of valid values are shown in the table below.

3. Once the PV display shows the parameter to be changed and the blinking SV display shows the currently set parameter value, use the ◄, ▼ and ▲ buttons to set a new parameter value

4. Confirm the new setting by pressing the SET button.

1 x briefly

5. If more than one parameter needs to be changed, repeat steps 2 through 4 for each required parameter.
6. Once all parameters are set as required, confirm the complete parametrization by pressing and holding the SET button for approximatedly 3 seconds.

1 x for 3 sec.

✔Parametrization is now complete. The PV and SV displays have returned to showing the current temperature and the set temperature values respectively.

Parameter menu

No.	Parameter code	Parameter name	Setting range	Description
1	ALI	Inactive	–	
2	HY	Hysteresis	0 ... 50	Switching difference relative to the set value, unilateral (i. e. the value is added either below (“heating mode”) or above (“cooling mode”) the set value)
3	P	Proportional band (P)	000 ... 999	Proportional action for the PID-controlled system
4	i	Integral time (I)	0 ... 999 s	Integral action for the PID-controlled system
5	d	Derivative time (D)	0 ... 999 s	Derivative action for the PID-controlled system
6	T	Output switching time (T)	1 ... 100	T represents a time value equivalent to the minimum period of time during which the output maintains in switched status (only active in PID mode).[1]
7	SC	Setpoint calibration (SC)	–50 ... +500 °C	Sensor calibration (subtracts/adds the set temperature value from/to the actual value)
8	AT	Auto-Tuning	0 / 1	0 = OFF / 1 = ON[2]
9	LOC	Password protection for access to menu (LOC)	0 ... 999	LOC = 0, changes to menu A and Auto-Tuning allowed[3] LOC = 1, no changes on parametrization level allowed; changes to set values possible[3] LOC = 2, no changes to any parameters allowed[3]

1 With a higher value, the controller will try to maintain the temperature using a lower cycle frequency with a longer cycle time. In principle, cycle times for mechanical relay outputs should be chosen to be as long as possible, to avoid early wear and tear by high cycle frequencies.
However, when using Solid State Relay outputs (SSR) short cycle times may result in a temperature curve with enhanced linearity, while the cycle frequency has no relevance for the wear-free electronic SSR outputs.

2 AutoTuning must be performed during normal operation with the load applied.
However, during Auto-Tuning mode the system may heat up to temperatures significantly exceeding the set temperature value. Therefore, for sensitive applications the set value should be reduced before the start of the Auto-Tuning mode.
Auto-Tuning is terminated automatically (after max. 9 hours) or aborted prematurely if the following conditions occur:
- Set temperature value is changed
- Actual temperature takes on an abnormal value (out of limits)
- Controller is switched off or power supply is interrupted for at least 20 ms
- Maximum Auto-Tuning duration of 9 hours is exceeded.

3 Blocked parameters can be changed, but changed values cannot be confirmed.

Switching from PID mode to ON/OFF mode

1. To switch from PID mode to ON/OFF mode, the P, I and D parameters (menu items 3 through 5) must be set to the value “0” (zero). For detailed steps see section “Changing values in the ‘Parameter’ menu” above.
2. During ON/OFF mode, if the PID parameter values (menu items 3 through 5) are changed manually or if Auto-Tuning (menu item 8) is activated, PID mode is automatically re-activated.

Auto-Tuning in PID mode

The Auto-Tuning function of the thermostat can automatically determine optimum PID settings for certain load conditions.

To use Auto-Tuning, the following requirements must be met:

- Controller is switched on.
- Load is applied.
- Set temperature value is set to a value which is
  a. as close to the real set temperature as possible
  b. low enough to avoid damage to the system caused by too high temperatures.
- LOC parameter (menu item 9) is set to “0” (zero).

NOTICE

System heat-up to temperatures significantly exceeding the set temperature value

During Auto-Tuning mode the system may heat up to temperatures significantly exceeding the set temperature value and may cause damage to sensitive applications.

► Before starting the Auto-Tuning mode, the set temperature value should be reduced to an uncritical value.

Switching from “heating mode” to “cooling mode”

The thermostat is factory-set to the so called “heating mode”:

- When the actual temperature value (shown on the PV display) is below the set temperature value (shown on the SV display), the controller is trying to reach the set value by activating a heating system which is connected to the control relay output on terminals 6–7. This control method is called “normally open (NO) control output”. If a SSR output is used instead of a mechanical relay output, an equivalent voltage is activated at the ouput.
- When the actual temperature value is above the set temperature value, the output is inactive.

To use the controller in so called “cooling mode“, the output must be negated. This control method is called “normally closed (NC) ouput”:

- When the actual temperature value is above the set temperature value, the output is activated.
- When the actual temperature value is below the set temperature value, the output is inactive.

Important:

On AHU Kit models equipped with thermostat TR-17, the mode can be changed automatically by the remote controller (CZ-RTC2 / CZ-RTC4) or by an external control signal via the terminal contacts (DI1 – DI3).

However, on models equipped with thermostat TR-16, switching modes cannot be achieved automatically. Instead, the intended mode change needs to be done as explained in the following section.

To switch from “heating mode” to “cooling mode”, perform the following steps:

1. Press and hold the SET and ◄ buttons jointly for approximately 5 seconds.

1 x 2 buttons for 5 sec.

The PV display shows “PAS”, while the current setting (“0”) in the SV display is blinking.
Note: After 30 seconds of idleness, the display automatically returns from parametrization view to normal view.

2. Use the ◄, ▼ and ▲ buttons to change the value to “–72” (minus 72).

3. Confirm the new setting by pressing the SET button.


1 x briefly

The PV display now shows “nun”, while the SV display now shows “3”.

4. Press the SET button repeatedly to select the entry “PSL”.


repeatedly

5. Use the ▼ and ▲ buttons to change the value to either “0” (= factory setting) for „heating mode“ or “1” for „cooling mode“.

6. Confirm the complete parametrization by pressing and holding the SET button for approximatedly 3 seconds.


1 x for 3 sec.

✔Parametrization is now complete. The PV and SV displays have returned to showing the current temperature and the set temperature values respectively.

Switching from 0–10 V to 2–10 V output signals

The voltage range for the output signals on terminals 6–7 is factory-set to 0–10 V.

Switching the voltage range from 0–10 V to 2–10 V is possible. However, Panasonic recommends to keep the factory setting.

To switch from 0–10 V to 2–10 V output signals, perform the following steps:

1. Press and hold the SET and ◄ buttons jointly for approximately 5 seconds.


1 x 2 buttons for 5 sec.

The PV display shows “PAS”, while the current setting (“0”) in the SV display is blinking.
Note: After 30 seconds of idleness, the display automatically returns from parametrization view to normal view.

2. Use the ◄, ▼ and ▲ buttons to change the value to “–72” (minus 72).

3. Confirm the new setting by pressing the SET button.


1 x briefly

The PV display now shows “nun”, while the SV display now shows “3”.

4. Press the SET button repeatedly to select the entry “AO”.


repeatedly

5. Use the ▼ and ▲ buttons to change the value to either “1” for “output 2 ... 10V” or “2” (= factory setting) for „output 0 ... 10V“.

6. Confirm the complete parametrization by pressing and holding the SET button for approximatedly 3 seconds.


1 x for 3 sec.

✔Parametrization is now complete. The PV and SV displays have returned to showing the current temperature and the set temperature values respectively.

7.2.3 Initial Settings

Depending on how the thermostat is used in each individual application, its settings must be adjusted for the relevant case.

Case 1: Controlling the room supply air temperature

To set the thermostat for controlling the room supply air temperature, perform the following steps:

1. Open the AHU Kit enclosure (see “4.1 Installation of AHU Kit“ – step 2).
2. On the thermostat, switch to PID mode by entering the “Parameter” menu and setting parameters P, I and D to the values given below (see “7.2.2 Operation – Changing values in the ‘Parameter’ menu”).

AHU situation	P	I	D
Capacity high in respect to lower air volume flow	7	120	3
Capacity low in respect to higher air volume flow	3	180	10

   In case the temperature is not stable during operation, these values may be adjusted manually at a later stage.
3. On the thermostat, switch to cooling or heating mode, depending on the AHU requirements (for AHU Kit models equipped with thermostat TR-16, see “7.2.2 Operation – Switching from ‘heating mode’ to ‘cooling mode’”; for models with TR-17, this procedure is not required).
4. On the thermostat, change the set temperature value (T_{set}) as required (see “7.2.2 Operation – Changing the set temperature value”).
   In this case, the set temperature value represents the desired room supply air temperature.
5. On the AHU kit’s terminal connector of section F, remove the jumper (JP1) between terminals “M2-5” and “M2-6” (FREE), in order to activate the 0-10 V control mode for the thermostat.
6. Close the AHU Kit enclosure again (see “4.1 Installation of AHU Kit“ – step 5).

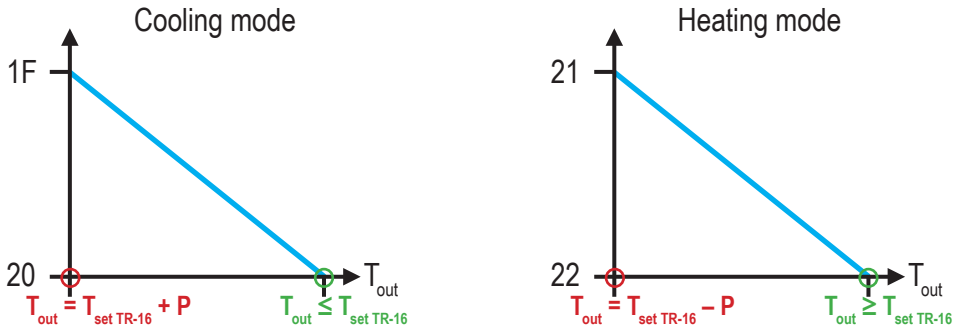
Case 2: Adjusting the temperature setpoint based on ambient air temperature

To set the thermostat for adjusting the temperature setpoint based on ambient air temperature (T_{out}), perform the following steps:

1. Open the AHU Kit enclosure (see “4.1 Installation of AHU Kit“ – step 2).
2. On the thermostat, switch to PID mode by entering the “Parameter” menu and setting parameters P, I and D to the values given below (see “7.2.2 Operation – Changing values in the ‘Parameter’ menu”):
   P ≠ 0 (not zero)
   I = 0 (zero)
   D = 0 (zero)
   The value of parameter P represents the required gradient for the cooling or heating curve in modulating temperature control (see diagrams below) and must not be equal to zero.
3. On the thermostat, switch to cooling or heating mode, depending on the AHU requirements (see “7.2.2 Operation – Switching the controller from ‘heating mode’ to ‘cooling mode’”).
4. On the thermostat, change the set temperature value as required (see “7.2.2 Operation – Changing the set temperature value”).
   In this case, the set temperature value represents the adjusted temperature setpoint based on ambient air temperature ($T_{set\ TR\text{-}16}$), beyond which any cooling or heating operation is stopped (heating or cooling limit temperature).
5. On the remote controller (CZ-RTC2/ CZ-RTC4), set the upper and lower limits for the adjusted temperature setpoint in cooling or heating mode.
   Inbetween the upper and lower limit the setpoint will be adjusted in a linear way (see diagrams below).

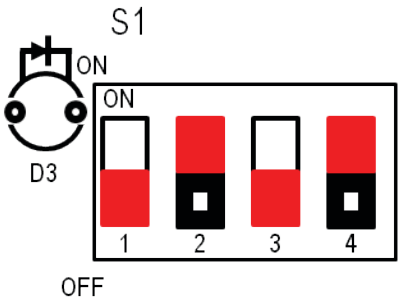
Mode	Parameter name	
	For upper limit	For lower limit
Cooling	Parameter “1F”	Parameter “20”
Heating	Parameter “21”	Parameter “22”

This setting together with the value of parameter P defines the cooling or heating ramp curve as shown in the following diagrams.

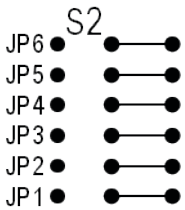


6. Remove the AHU Kit’s upper mounting board.
7. On the CZ-CAPBC2 PCB (ACC-SP1A), located on the rear side of the upper mounting board inside the AHU Kit enclosure, make sure that switches S1 to S4 are set as follows:

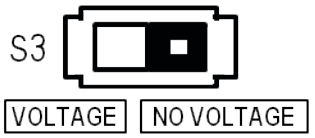
a. S1: Set to “OFF-ON-OFF-ON” (factory default on AHU Kit)



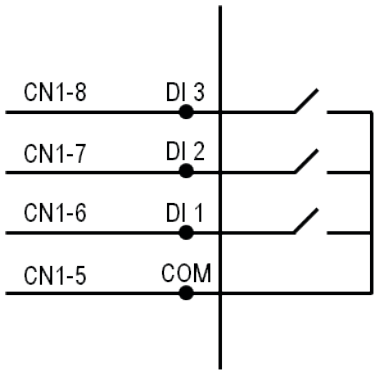
b. S2: All jumpers are intact, i e. no jumper has been cut. Also make sure, that the bridge connector between terminals “M2-5” and “M2-6” (FREE) on the AHU kit’s terminal connector of section F has not been removed.



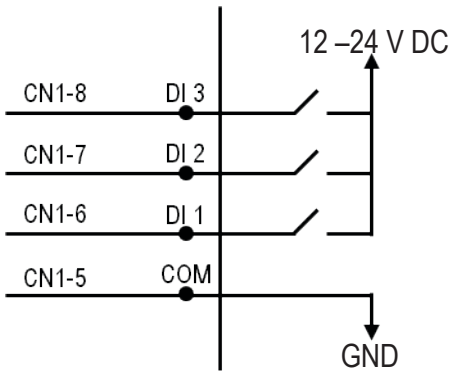
c. S3: Set to “VOLTAGE” or “NO VOLTAGE”, depending on the local digital input (DI) configuration.



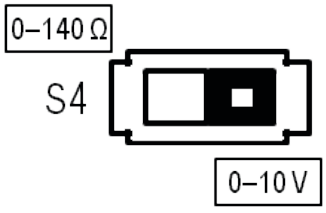
Control via dry contacts (factory default) = “NO VOLTAGE”



Control via 12 – 24 V DC signals = “VOLTAGE”



d. S4: Set to “0–10 V“.

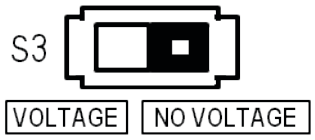


8. Restore and fasten the upper mounting board in its original position, and close the AHU Kit enclosure again (see “4.1 Installation of AHU Kit“ – step 5).

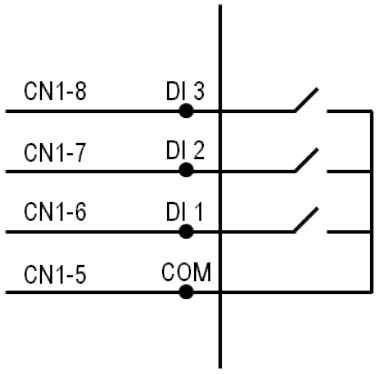
Case 3: 0–10 V demand control by an external BMS (available in medium and advanced version only)

To set the thermostat for 0–10 V demand control by an external building management system (BMS), perfom the following steps:

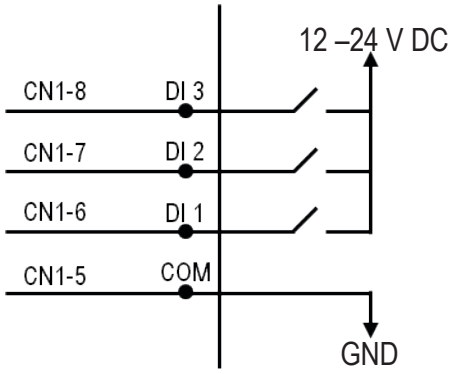
1. Open the AHU Kit enclosure (see “4.1 Installation of AHU Kit“ – step 2).
2. Only in case the setting of switch S3 must be modified, remove the upper mounting board. Otherwise, proceed with step 3.
   a. On the CZ-CAPBC2 PCB (ACC-SP1A), located on the rear side of the upper mounting board, set switch S3 to “VOLTAGE” or “NO VOLTAGE”, depending on the BMS digital input (DI) configuration.



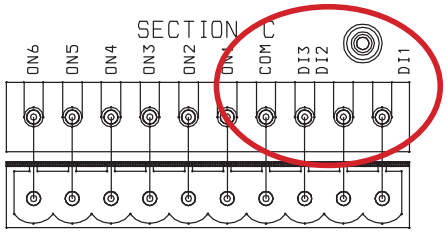
Control via dry contacts (factory default) = “NO VOLTAGE”



Control via 12 – 24 V DC signals = “VOLTAGE”



   b. Restore and fasten the upper mounting board in its original position.
   c. On the terminal connector of Section C, located on the upper mounting board inside the AHU Kit enclosure (see diagram below), connect the digital inputs (DI) as follows:



- Heating start to COM and DI1
- Cooling start to COM and DI2
- Fan mode (free cooling) start to COM and DI3
- All DI contacts open = Stop

3. In order to activate the 0–10 V demand control mode for the external BMS, remove the jumper (JP1) between terminals “M2-5” and “M2-6” (FREE) on the AHU kit’s terminal connector of section F. Make sure that all other jumpers remain intact.
4. For advanced version only:
   On the AHU kit’s terminal connector of section F, disconnect the white wire from terminal “M2-1” and the red wire from terminal “M2-2”.
   For medium version: Proceed with step 5.
5. Within the 0–10 V demand control mode, the relation of voltage versus capacity can be adjusted to the given external BMS control scheme by adapting the wiring on the AHU Kit’s terminal connector of section F as follows (see also “5.4 Terminal board layout”).
   a. For a 0–10 V control scheme with 10 V = maximum capacity
      For advanced version: Connect the positive pole (“+”) to “M2-2” and the negative pole (“–”) to “M2-1”.
      For medium version: Connect the positive pole (“+”) to “M2-3” and the negative pole (“–”) to “M2-2”.
   b. For a 0–10 V control scheme with 10 V = Thermo-Off
      For advanced and medium versions: Connect the positive pole (“+”) to “M2-3” and the negative pole (“–”) to “M2-4”.
6. Close the AHU Kit enclosure again (see “4.1 Installation of AHU Kit“ – step 5).
7. Via the signal wiring from the external BMS, select the 0–10 V demand control functionality as follows:

   a. 0–10 V control scheme with 10 V = maximum capacity

Input Voltage* (V)	0 – 0.55	1.1	1.65	2.2	2.8	3.35	3.9	4.45	5.0	5.55	6.1	6.65	7.2	7.8	8.35	8.9	9.45	10.0[3]
Demand (% of nominal current)	Stop[1]	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	No limit / Full capacity[2]

* If a voltage range (e.g. 0 – 0.55) is indicated, the applied voltage must be within the given limits.
However, if a single value (e.g. 1.0 V) is indicated, the applied voltage must be within +/–0.1 V of the given value to achieve the assigned demand setting.
Examples: “Stop“ can be achieved with any analogue input value greater than 0 V and less than or equal to 0.55 V;
40 % demand can be achieved with any analogue input value greater than or equal to 1.0 V and less than or equal to 1.2 V etc.

1 Stop: AHU system / indoor unit is completely switched off.
2 No Limit: No restrictions applied by BMS to AHU system / indoor unit performance (equivalent to “full-load operation“ of AHU system / indoor unit).
3 Wether the external 10 V signal is effectively allowing the unit to work without limit, depends on the real voltage transmission of the external electronic circuit.
For verification, it is recommended to set the external control to maximum demand and measure the resulting voltage transmission between contacts M2-3 and M2-4 (valid for advanced and medium version). At maximum demand from external control, the voltage between M2-3 (positive pole (+)) and M2-4 (negative pole (–)) should be in the range between 8.9 and 9.4 V.
If the voltage measured is higher than 9.4 V, disconnect the factory-mounted resistor R01 and replace it by a field-supplied resistor of 860 Ohm. If then the voltage is still too high, choose the next smaller size resistor of 680 Ohm.
However, if the voltage measured is lower than 8.9 V, replace resistor R01 by a field-supplied resistor of 1.2 kOhm, or, if then the voltage is still too low, choose a resistor with 1,5 kOhm.

   b. 0–10 V control scheme with 10 V = Thermo-Off

Input Voltage* (V)	0 – 0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5 – 10.0
Demand (% of nominal current)	Stop[1]	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	No limit[2]	Thermo-Off[3]

* If a voltage range (0 – 0.5 or 9.5 – 10.0 V) is indicated, the applied voltage must be within the given limits.
However, if a single value (e.g. 1.0 V) is indicated, the applied voltage must be within +/–0.1 V of the given value to achieve the assigned demand setting.
Examples: “Stop“ can be achieved with any analogue input value greater than 0 V and less than or equal to 0.5 V;
40 % demand can be achieved with any analogue input value greater than or equal to 0.9 V and less than or equal to 1.1 V etc.

1 Stop: AHU system / indoor unit is completely switched off.
2 No Limit: No restrictions applied by BMS to AHU system / indoor unit performance (equivalent to “full-load operation“ of AHU system / indoor unit.
3 Thermo-Off: No cooling / heating operation (compressor is switched off; however, the fans may still be operating). For example, forced Thermostat-Off mode can be used for free cooling.

7.2.4 Error Codes

Error Code	Meaning
HHH	Sensor breakage or polarity inversion. Measured value is above the valid upper limit.
LLL	Sensor short-circuit or polarity inversion. Measured value is below the valid lower limit.

7.2.5 Maintenance and Service

In normal operation, the thermostat is maintenance-free.

To prolong its lifecycle, the following precautions should be observed:

- Protect the electronic components from condensation moisture.
- Avoid touching the buttons with fingernails or other pointed objects to prevent damage or premature wear of the touch-senstive buttons.
- Prevent excessive dust formation on the controller.
- Occasionally clean the front side of the controller with a damp cloth while the controller is switched off.

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