Panasonic

Air Handling Unit Kit

Installation Instructions

PAW-160MAH3M
PAW-280MAH3M
PAW-560MAH3M

PAW-280PAH3M-1

heating & cooling solutions

ECO i | ECO G | PAC i | PAC i NX

Notes:

Air Handling Unit Kit

Installation Instructions

Original Installation Instructions (English)

July 2023

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1 General information and safety notes

1.1 General information

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

Intended use

The intended use of AHU Kits is to connect Panasonic ECOi, ECO G, PACi and PACi NX outdoor units to third-party air handling unit systems, using the same refrigerant circuit as the outdoor unit.

While the outdoor units of the Mini ECOi LE1/LE2, ECOi ME2/MF3 and ECO G GE3/GF3 systems use R410A as refrigerant, the outdoor units of the Mini ECOi LZ2, PACi NX and PACi systems are operated with R32 refrigerant.

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 four system ranges, but only to either ECOi, ECO G, PACi or PACi NX systems, this will be indicated by the relevant product range logos:

The intended use of the AHU Kits requires adherence to the information and instructions contained in this Manual, especially the safety notes and warning messages.

Any other use is considered improper and can lead to significant damage.

Panasonic assumes no liability for any damage resulting from improper use.

Products covered

The AHU Kits are supplied in different capacities. The following products are covered in this documentation:

ECOi / Mini ECOi / ECO G	PACi / PACi NX
PAW-160MAH3M	PAW-280PAH3M-1
PAW-280MAH3M	
PAW-560MAH3M[1]	

1 Not compatible with Mini ECOi systems.

Target groups

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 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.

Information for using this manual

Various notices, symbols and text representations used in this Manual are briefly explained below.

Safety-related information

Safety-related information, including product safety labels, safety notes and warning messages, warns the user about dangers and provides instructions for the safe and proper use of the product. In this manual, the following layout and symbols are used for warning messages:

WARNING

This signal word warns of a potentially hazardous situation which can lead to death or severe injury.

► Follow the instructions given in the warning messages in order to prevent this.

CAUTION

This signal word warns of a potentially hazardous situation which can result in slight or moderate injury.

► Follow the instructions given in the warning messages in order to prevent this.

ATTENTION

This signal word warns of a situation which can result in material damage occurring.

► Follow the instructions given in the warning messages in order to prevent this.

Additional warning symbols

Warning of electric shock

Further information

Important

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

1.2 Safety notes

To avoid possible harm to persons or damage to products, read and follow these safety notes.

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 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 minimise the risk of leaks.
- ► Install so that even if refrigerant gas leaks into the installation space, it will not exceed the practical limit density of 0.44 kg/m³ for R410A and 0.061 kg/m³ for R32, in accordance with the local regulations for facility air conditioning equipment. However, for further limits and calculations to be done, see → *1.3 Instructions for the safe handling of R32, p. 9*
- ► If the refrigerant gas concentration does exceed the density limit, 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 shut off and/or 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 ignition.

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, tornadoes, 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 circuit breaker (ELCB) or residual current device (RCD).

- ► 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 circuit breaker or residual current device with a maximum disconnection time of 30 ms.

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.

1.3 Instructions for the safe handling of R32

As R32 is a flammable refrigerant, additional precautions, installation and handling instructions need to be observed.

WARNING

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

A fire or explosion hazard and the generation of poisonous gas may result if R32 refrigerant gas comes into contact with open flames.

- ► The air conditioning appliance with direct expansion (DX) coil shall be installed, operated and stored in a space without continuously operating ignition sources (e.g. open flames, an operating gas appliance or an operating electric heater).
- ► If DX coil appliance is not installed in a separate refrigeration machinery room as specified in EN378, calculate the maximum allowed density limit of the relevant installation space as detailed below (see → *1.3.1 Calculating the density limit, p. 10*).
- ► The DX coil appliance shall be installed, operated and stored in a well ventilated space with a ceiling height of at least 2.5 m and a floor area larger than [A_{min}] m² so that it complies with the required density limit (see → *1.3.1 Calculating the density limit, p. 10*).
- ► Pay particular attention to prevent refrigerant leakages during installation, maintenance and repair work (see → *1.3.2 Preventing leakages, p. 17*).
- ► If a leak is suspected, do the following:
  - > remove or extinguish all naked flames immediately
  - > ventilate the room immediately
  - ● use a calibrated electronic leak dectector to detect any leaks (see → *1.3.3 Detecting leaks, p. 17*). A halide torch (or any other detector using a naked flame) shall not be used.
- ► Repair any leaks diligently (see → *1.3.4 Repairing leaks, p. 17*), before refilling the refrigerant system with refrigerant and checking for any leaks again.

ATTENTION

For full details on the required precautions for the installation and maintenance of an R32 unit, always refer to the Installation Guide of the relevant Mini ECOi LZ2, PACi or PACi NX unit.

1.3.1 Calculating the density limit

As R32 is a mildly flammable refrigerant (ASHRAE flammability class A2L), the requirements for the installation space of the DX coil appliance must comply with the applicable regulations and standards, such as IEC60335-2-40 and EN378.

Depending on perspective, the density limit determines either the minimum floor area "A_{min}" (specified in square metres (m²)) required for a given refrigerant charge amount (specified in kilogrammes (kg)), or vice versa the allowed maximum refrigerant charge "m_{max}" for the DX coil appliance (specified in kilogrammes (kg)) in relation to the floor area of the available installation space (specified in square metres (m²)). The charge limits for R32 installations (based on IEC60335-2-40, 6th edition) also depend on the mounting position of the DX coil.

While there are no floor area limitations for refrigerant charges of less than 1.23 kg, the minimum floor area [A_{min}] for larger refrigerant charge amounts can be calculated by the following formula:

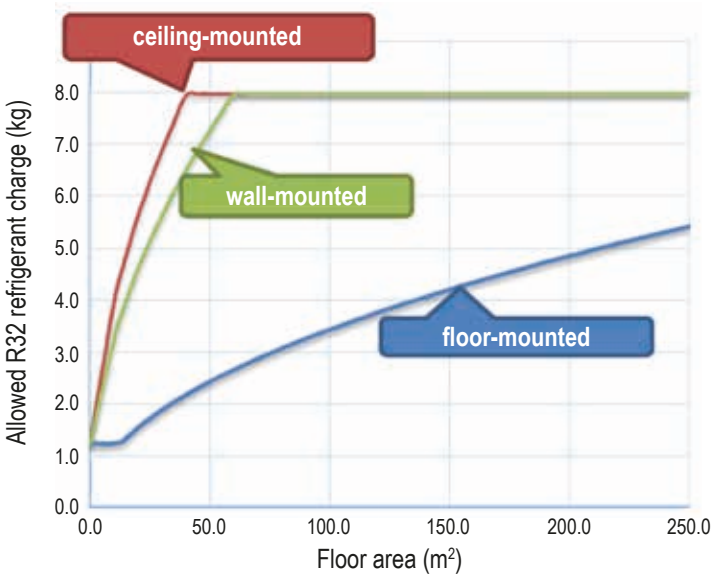
$$A_{min} = \left[\frac{m_c}{2.5 \times LFL^{5/4} \times h_0} \right]^2$$

A_{min}= minimum floor area (m^2)

m_c= refrigerant charge (kg)

h_0= height factor (mounting position):
- 0.6 for floor-mounted
- 1.8 for wall-mounted
- 1.0 for window-mounted
- 2.2 for ceiling mounted

LFL= R32 Lower Flammability Limit (0.307 kg/m^3)



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Note

The refrigerant charge amount ([m_c]) must be calculated by the following formula:

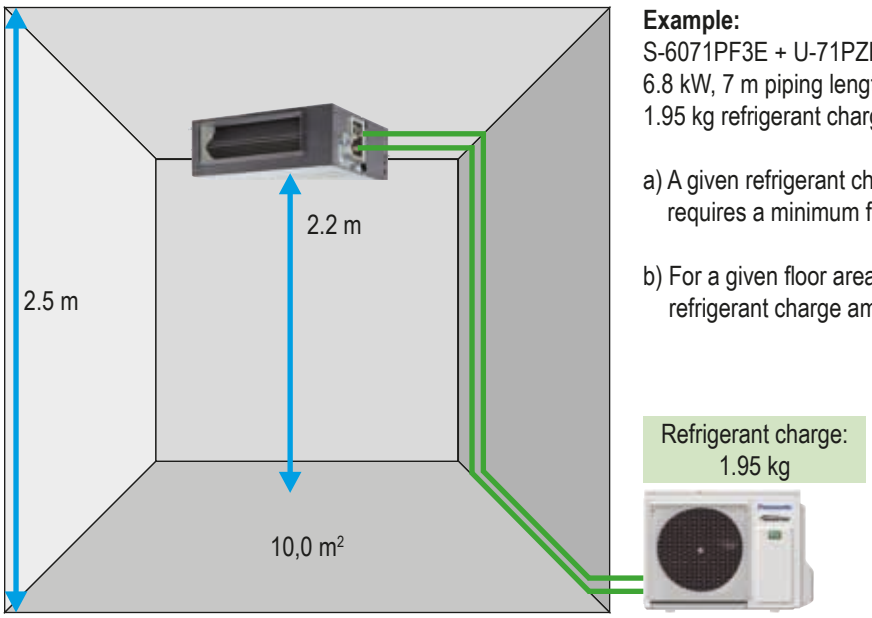
[m_c] = [1] + [2] = [1] + ([3] * ([4] – [5]))

where:
[1]: refrigerant charged at shipment
[2]: refrigerant charge amount in the field [1]
[3]: additional charge per 1 m
[4]: total pipe length
[5]: max. charge-less pipe length

1) If the total pipe length is within the maximum value of the charge-less pipe length, refrigerant charge in the field is unnecessary.

Calculating examples

Using the above formula, it is possible to calculate
a) the minimum floor area for a given refrigerant charge, or
b) the maximum refrigerant charge allowed for a given floor area.



Example:
S-6071PF3E + U-71PZH3E5
6.8 kW, 7 m piping length
1.95 kg refrigerant charge

a) A given refrigerant charge amount of 1.95 kg requires a minimum floor area of 2.41 m2.

b) For a given floor area of 10 m^2 the maximum refrigerant charge amount is 3.97 kg.

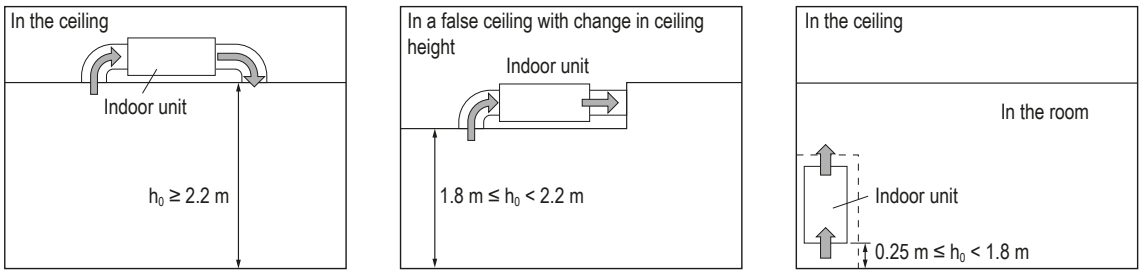
Density limit diagrams

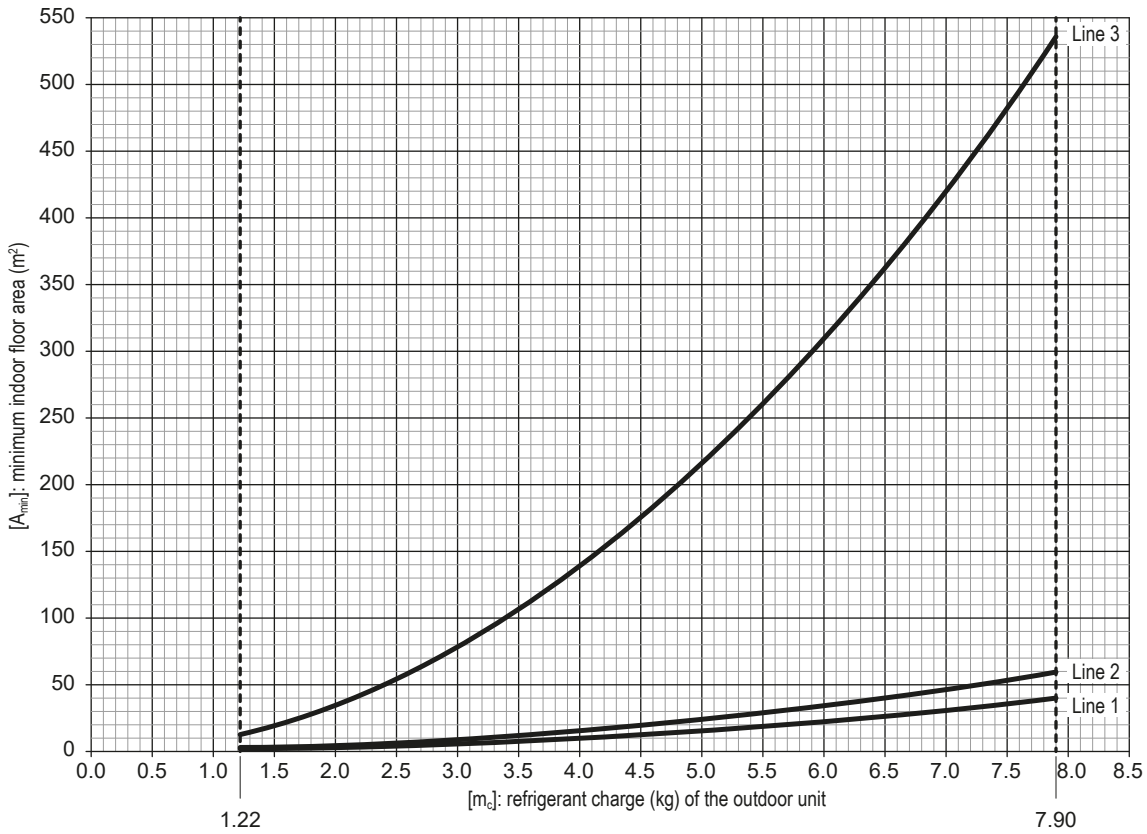
The following diagrams roughly demonstrate the relation between the amount of refrigerant charged for the relevant R32 PACi or PACi NX outdoor units ([m_c]) and the required minimum installation space floor area.

AHU units

For the AHU units, the density limit diagram shows three different “Density Limit Lines”, where each line applies to a different indoor / AHU unit installation height and installation orientation (horizontal/ vertical) as follows:

Installation height of indoor unit (h_0)	Indoor unit type	Density limit line
$h_0 \geq 2.2$ m	AHU unit (horizontal installation)	Line 1
1.8 m ≤ h_0 < 2.2 m	AHU unit (horizontal installation)	Line 2
h_0 < 1.8 m	AHU unit (vertical installation)	Line 3





[m_c]	[A_{min}]		
	Line 1	Line 2	Line 3
1.22	2.5	3.0	12.8
1.3	2.6	3.2	14.5
1.4	2.8	3.4	16.8
1.5	3.0	3.7	19.3
1.6	3.2	3.9	22.0
1.7	3.4	4.2	24.8
1.8	3.6	4.4	27.8
1.9	3.8	4.6	31.0
2.0	4.0	4.9	34.3
2.1	4.2	5.1	37.8
2.2	4.4	5.4	41.5
2.3	4.6	5.6	45.4
2.4	4.8	5.8	49.4
2.5	5.0	6.1	53.6
2.6	5.2	6.5	58.0
2.7	5.4	7.0	62.6
2.8	5.6	7.5	67.3
2.9	5.8	8.1	72.2
3.0	6.0	8.6	77.2
3.1	6.2	9.2	82.5
3.2	6.6	9.8	87.9
3.3	7.0	10.4	93.4
3.4	7.4	11.1	99.2

[m_c]	[A_{min}]		
	Line 1	Line 2	Line 3
3.5	7.9	11.7	105.1
3.6	8.3	12.4	111.2
3.7	8.8	13.1	117.5
3.8	9.3	13.8	123.9
3.9	9.8	14.6	130.5
4.0	10.3	15.3	137.3
4.1	10.8	16.1	144.2
4.2	11.3	16.9	151.4
4.3	11.9	17.7	158.7
4.4	12.4	18.5	166.1
4.5	13.0	19.4	173.8
4.6	13.6	20.2	181.6
4.7	14.1	21.1	189.5
4.8	14.8	22.0	197.7
4.9	15.4	22.9	206.0
5.0	16.0	23.9	214.5
5.1	16.7	24.8	223.2
5.2	17.3	25.8	232.0
5.3	18.0	26.8	241.0
5.4	18.7	27.9	250.2
5.5	19.4	28.9	259.6
5.6	20.1	29.9	269.1
5.7	20.8	31.0	278.8

[m_c]	[A_{min}]		
	Line 1	Line 2	Line 3
5.8	21.5	32.1	288.6
5.9	22.3	33.2	298.7
6.0	23.0	34.4	308.9
6.1	23.8	35.5	319.3
6.2	24.6	36.7	329.8
6.3	25.4	37.9	340.6
6.4	26.2	39.1	351.5
6.5	27.0	40.3	362.5
6.6	27.9	41.6	373.8
6.7	28.7	42.8	385.2
6.8	29.6	44.1	396.8
6.9	30.4	45.4	408.5
7.0	31.3	46.8	420.4
7.1	32.2	48.1	432.5
7.2	33.1	49.5	444.8
7.3	34.1	50.9	457.3
7.4	35.0	52.3	469.9
7.5	35.9	53.7	482.7
7.6	36.9	55.1	495.6
7.7	37.9	56.6	508.7
7.8	38.9	58.1	522.0
7.9	39.9	59.6	535.5

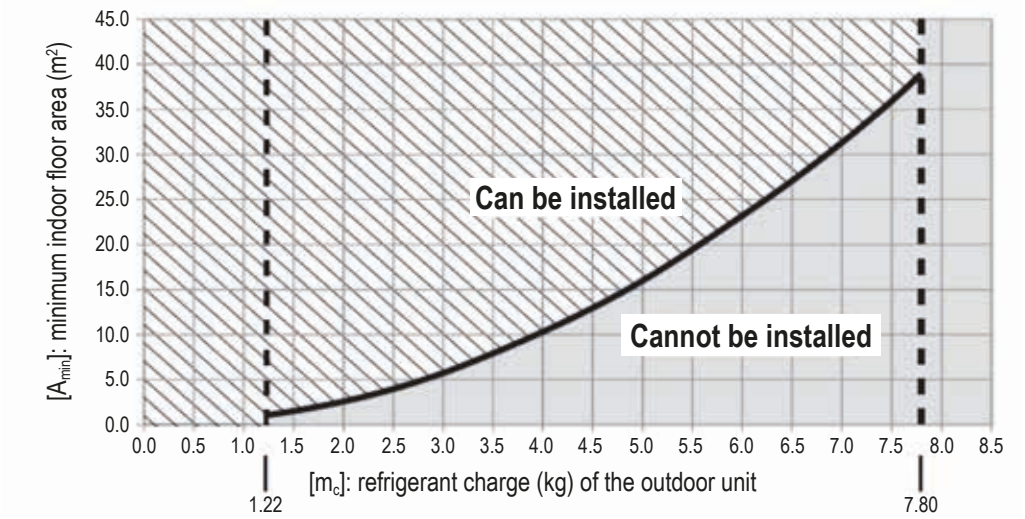
Mini ECOi LZ2 outdoor units

For any higher amount of R32 refrigerant charge up to 12.0 kg, please also refer to the technical data manuals for Mini VRF systems or VRF system indoor units.

PACi outdoor units

[m_c]	Refrigerant charge amount (i.e. total of refrigerant at shipment and refrigerant charge amount in the field), specified in kilogrammes (kg)
[m_{max}]	Maximum refrigerant charge amount, specified in kilogrammes (kg)
[m_c] ≤ 1.22	Can be installed
1.22 < [m_c] ≤ [m_{max}]	Installation possible within the hatched range
[m_c] > [m_{max}]	Cannot be installed

U-200PZH2E8, U-250PZH2E8



	Elite	
	U-200PZH2E8	U-250PZH2E8
[m_{max}] (kg)	**7.80**	

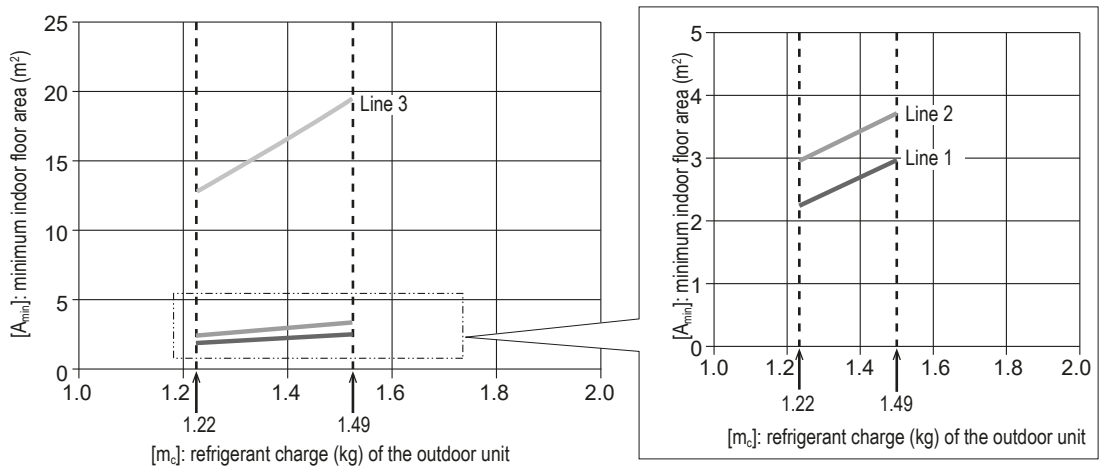
PACi NX outdoor units

For PACi NX outdoor units, the density limit diagrams show three different “Density Limit Lines”, where each line applies to a different indoor unit installation height as follows:

Installation height of indoor unit (h_0)	Indoor unit type	Density limit line
$h_0 \geq 2.2$ m	AHU unit	Line 1
1.8 m $\leq h_0 <$ 2.2 m	AHU unit	Line 2
$h_0 <$ 1.8 m	AHU unit	Line 3

U-36PZ3E5, U-50PZ3E5, U-60PZ3E5A, U-71PZ3E5A

[m_c]	Refrigerant charge amount (i.e. total of refrigerant at shipment and refrigerant charge amount in the field), specified in kilogrammes (kg)
[m_{max}]	Maximum refrigerant charge amount, specified in kilogrammes (kg)
[m_c] ≤ 1.22	Can be installed
1.22 < [m_c] ≤ [m_{max}]	Installation possible above the “Density Limit Line” for the relevant indoor/outdoor unit combination (see diagrams and tables below)
[m_c] > [m_{max}]	Cannot be installed



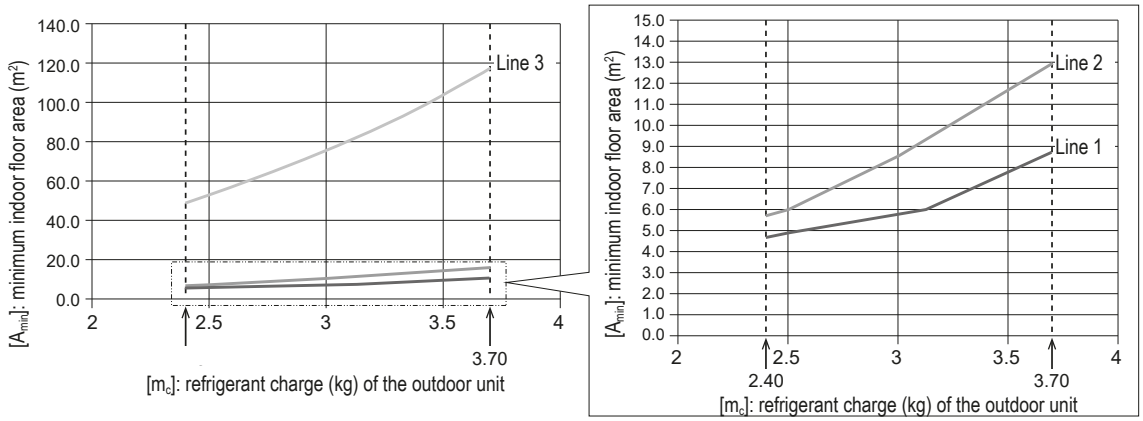
	Standard			
	U-36PZ3E5	U-50PZ3E5	U-60PZ3E5A	U-71PZ3E5A
[m_{max}] (kg)	**0.95**	**1.33**	**1.30**	**1.49**

Calculating example

Conditions	**Outdoor unit: U-71PZ3E5A** Total pipe length: 40 m Max. charge-less pipe length: 30 m	 Refrigerant charged at shipment: 1.32 kg Refrigerant charge in the field: 0,017 kg/m
Calculation	[m_c] = [1] + [2] = [1] + ([3] * ([4] – [5])) [m_c] = 1.32 kg + (0.017 kg * (40 m – 30 m)) **[m_c] = 1.49 kg**	

U-100PZ3E5, U-100PZ3E8, U-125PZ3E5, U-125PZ3E8, U-140PZ3E5, U-140PZ3E8

[m_c]	Refrigerant charge amount, specified in kilogrammes (kg)
[m_{max}]	Maximum refrigerant charge amount, specified in kilogrammes (kg)
2.40 ≤ [m_c] ≤ [m_{max}]	Installation possible above the “Density Limit Line” for the relevant indoor/outdoor unit combination (see diagrams and tables below)
[m_c] > [m_{max}]	Cannot be installed

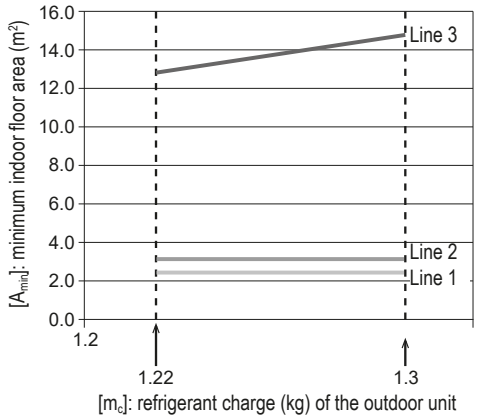


	Standard		
	U-100PZ3E5 U-100PZ3E8	U-125PZ3E5 U-125PZ3E8	U-140PZ3E5 U-140PZ3E8
[m_{max}] (kg)	**3.30**	**3.70**	

1

U-36PZH3E5, U-50PZH3E5, U-60PZH3E5

$[m_c]$	Refrigerant charge amount, specified in kilogrammes (kg)
$[m_{max}]$	Maximum refrigerant charge amount, specified in kilogrammes (kg)
$[m_c] \leq 1.22$	Can be installed
$1.22 < [m_c] \leq [m_{max}]$	Installation possible above the “Density Limit Line” for the relevant indoor/outdoor unit combination (see diagrams and tables below)
$[m_c] > [m_{max}]$	Cannot be installed

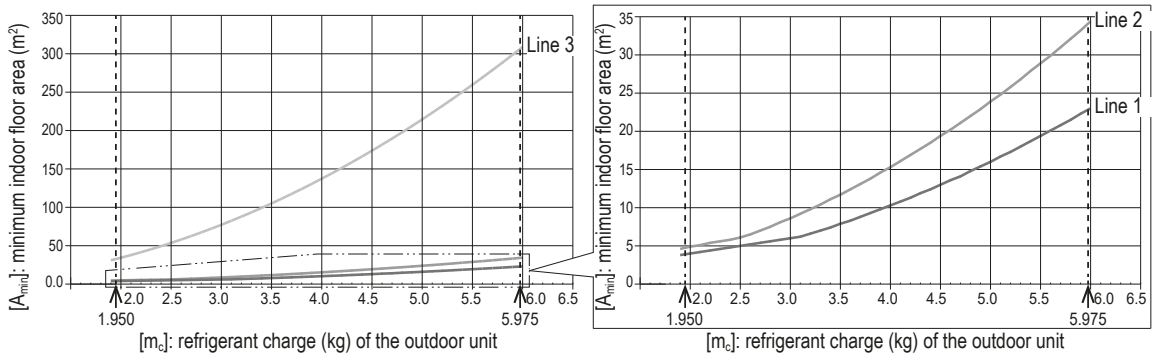


	Elite	
	U-36PZH3E5 U-50PZH3E5	U-60PZH3E5
$[m_{max}]$ (kg)	**1.28**	**1.30**

U-71PZH4E5, U-71PZH4E8, U-100PZH4E5, U-100PZH4E8, U-125PZH4E5, U-125PZH4E8, U-140PZH4E5, U-140PZH4E8

Installation height of indoor unit (h_0)	Indoor unit type	Density limit line
$h_0 \geq 2.2$ m	AHU unit (horizontal installation)	Line 1
1.8 m ≤ h_0 < 2.2 m	AHU unit (horizontal installation)	Line 2
h_0 < 1.8 m	AHU unit (vertical installation)	Line 3

$[m_c]$	Refrigerant charge amount, specified in kilogrammes (kg)
$[m_{max}]$	Maximum refrigerant charge amount, specified in kilogrammes (kg)
$1.950 < [m_c] \leq [m_{max}]$	Installation possible above the “Density Limit Line” for the relevant indoor/outdoor unit combination (see diagrams and tables below)
$[m_c] > [m_{max}]$	Can not be installed



	Elite			
	U-71PZH4E5 U-71PZH4E8	U-100PZH4E5 U-100PZH4E8	U-125PZH4E5 U-125PZH4E8	U-140PZH4E5 U-140PZH4E8
[m_{max}] (kg)	**2.850**	**5.975**		

1.3.2 Preventing leakages

- Do not let air enter the refrigeration cycle, because this will increase the risk of explosion and injury due to high pressure inside the refrigerant cycle.
- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing and apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Do not leak refrigerant while working on the refrigerant tubes during installation, maintenance or repair.
- Check carefully for leaks (see → *1.3.3 Detecting leaks, p. 17*) before starting the test run.

1.3.3 Detecting leaks

- If a leak is suspected, remove or extinguish all naked flames and ventilate the space immediately.
- To search for and detect any refrigerant leaks, never use potential sources of ignition like e.g. a halide torch or any other detector using a naked flame.
- Leak detection fluids are suitable for use with most refrigerants, but the use of detergents containing chlorine shall be avoided, as the chlorine may react with the refrigerant and corrode the copper pipework.
- Preferably, use an electronic leak dectector, which is suitable for R32, to check for leaks.
- Make sure that the electronic detector has an adequate sensitivity and that it has been calibrated in a refrigerant-free area.
- Set the leak detector to a percentage of the lower flammable limit (LFL) of the relevant refrigerant, and calibrate the detector to the refrigerant used (R32) so that the appropriate percentage of refrigerant gas (max. 25 %) is confirmed.

1.3.4 Repairing leaks

If a leakage of refrigerant is found, which requires brazing, do the following:

- Recover all refrigerant from the system, or isolate all refrigerant by means of shut-off valves in a part of the system remote from the leak.
- Purge the system with oxygen-free nitrogen (OFN) both, before and during the brazing process.
- Re-fill the system with refrigerant and check for any remaining leaks (see → *1.3.3 Detecting leaks, p. 17*).
- Repeat this procedure until no more leaks are detected.

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.

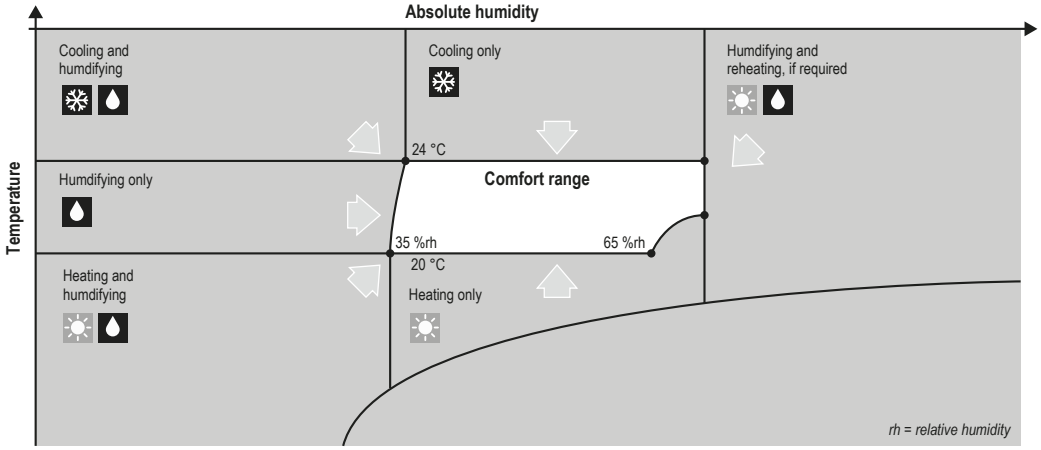
Comfort

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 utilise the extra “free” energy in heat recovery modules so that overall operating costs will be reduced.

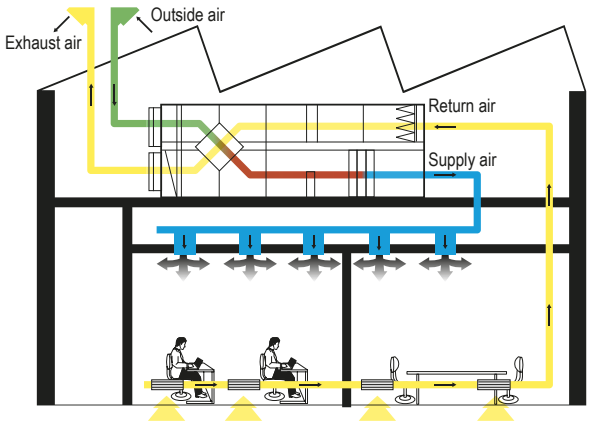
The larger the area of the comfort range, the better the energy saving opportunities.

2.2 Mechanical ventilation systems

Main components of mechanical ventilation systems

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

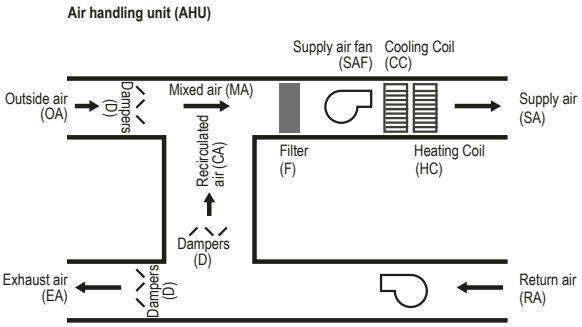
- Air handling unit (AHU)
- Air ducts
- Air distribution elements



2.3 Air handling units

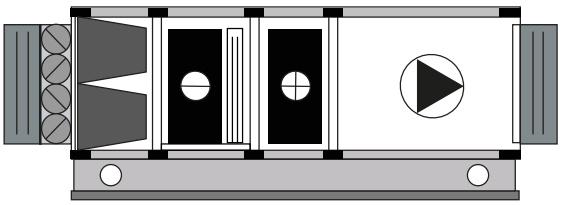
Main components of air handling units

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

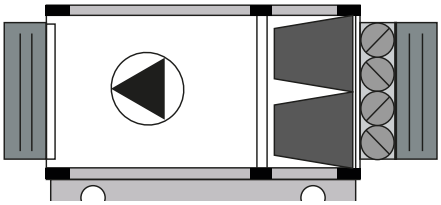


Main types of air handling units

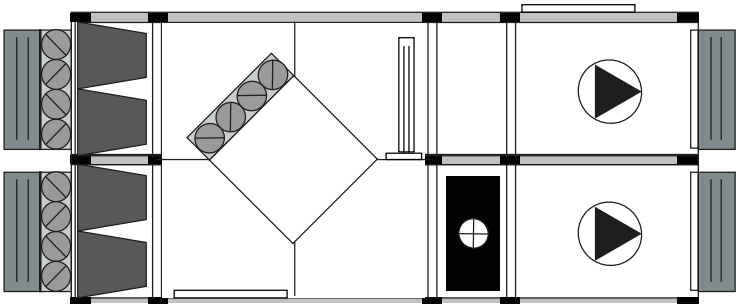
Supply type



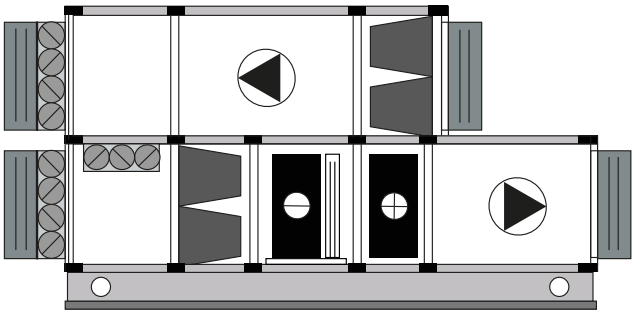
Exhaust type



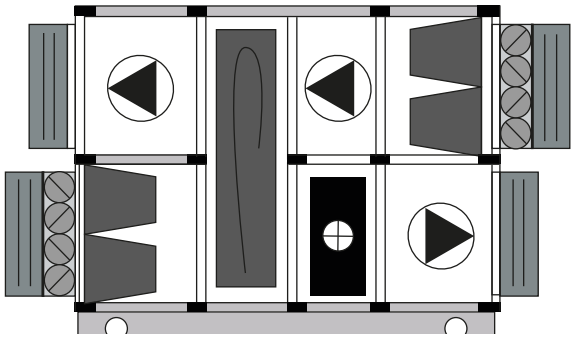
Supply/Exhaust type with cross-flow heat exchanger



Supply/Exhaust type with mixing chamber



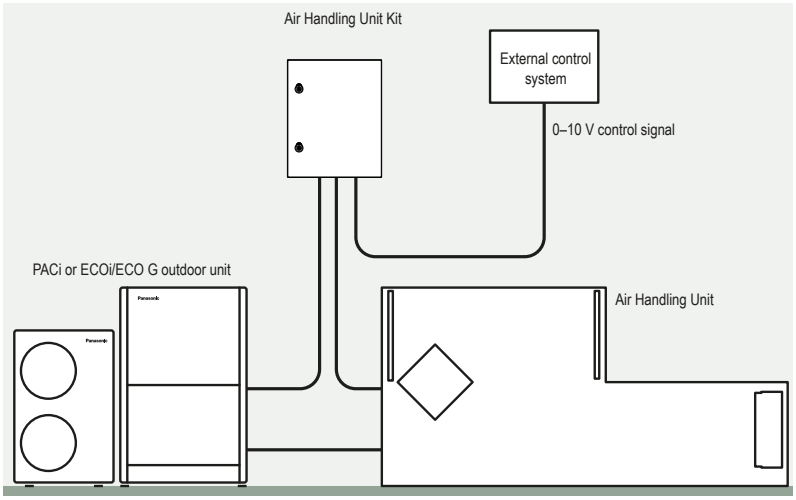
Supply exhaust type with rotary heat exchanger



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.

Air handling unit control by external 0–10 V signal



1 This schematic layout shows an example for the MAH3/PAH3 AHU Kit generation, which feature an in-built CZ-CAPBC2 interface handling the 0–10 V control. This enables various control alternatives:
   - Capacity control through external BMS via 0–10 V signal (only supported by ECOi, Mini ECOi and PACi, but not by ECO G outdoor units)
   - Temperature setpoint control

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 AHU Kits are part of an on-going development process aiming at constant improvement of the product to better meet customer demand. The new MAH3/PAH3 generation of AHU Kits has been developed to provide an extensive range of functionality while simplifying the model line-up. The MAH3 generation models (PAW-160/280/560MAH3M) are compatible with ECOi, Mini ECOi and ECO G outdoor units, while the PAH3 generation model (PAW-280PAH3M-1) is compatible with PACi NX und PACi outdoor units.

- Durable IP65 metal enclosure providing the possibility for outdoor installation
- 0–10 V demand control* (included on the CZ-CAPBC2 interface)
- CONEX Bluetooth® remote controller built-in (CZ-RTC6BL) allowing control with Panasonic H&C Control App via Bluetooth®
- Easy control by BMS

* Only available with all ECOi, Mini ECOi, PACi Elite and PACi NX units, but not with ECO G units.

Features and benefits

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

Features and benefits	MAH3	PAH3
Connectable with S-LINK system.	X	X
Connectable with MD protocol system	–	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	–
Defrost operation signal, Thermo-ON/OFF states output	X	X
Drain pump control (Drain-pump and the float switch to be field-supplied)	X	–[1]
Basic humidifier control output (Humidifier to be field-supplied)	X	–
Alarm and operation output	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
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
Outdoor unit quiet mode operation	–	X[2]

1 Only float switch signal available, but no drain pump control signal.
2 Only possible in combination with U-71PZH4E5/8, U-100/125/140PZH4E5/8, U-100/125/140PZ3E5/8 and after setting the proper parameters.

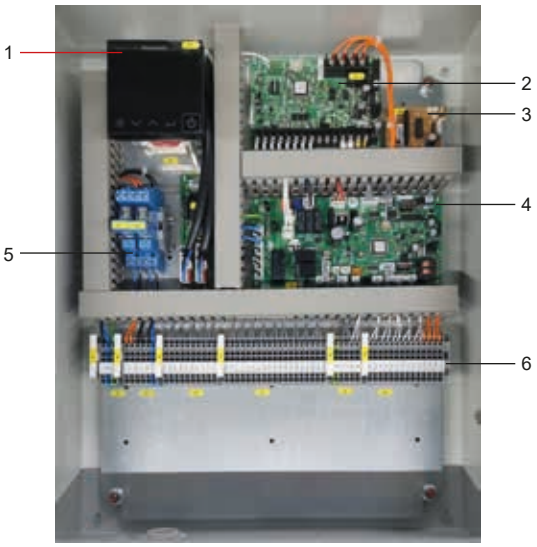
3.2 Scope of supply

The scope of supply of the AHU Kits for the MAH3/PAH3 product generation depends on the relevant system range. The following table shows an overview of the different scopes of supply.

Scope of supply		MAH3	PAH3
		ECO i ECO G	PAC i PAC i NX
		PAW-160MAH3M PAW-280MAH3M PAW-560MAH3M	PAW-280PAH3M-1
IP65 case		X	X
Control unit including transformer		X	X
Relays		X	X
Terminal boards		X	X
Remote controller (CZ-RTC6BL)		X	X
Compatibility with Panasonic H&C Control App		X	X
Compatibility with Panasonic H&C Diagnosis App		–	X
Expansion valve		X	–
PCBs for the expansion and RAP / SVK valves		X	–
Refrigerant temperature sensors	E1 + E3	X	–
	E1 + E2	–	X
Air intake and air outlet temperature sensors	TA	X	X
	BL	X	–
CZ-CAPBC2 interface for 0-10 V control (ACC-SP1A)		X	X

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

Exterior view of AHU Kits and some of their components



PAW-560MAH3M

1 Remote controller (CZ-RTC6BL)
2 CZ-CAPBC2 interface
3 Single motorised valve PCB
4 Main PCB
5 Fan relay
6 Terminal board

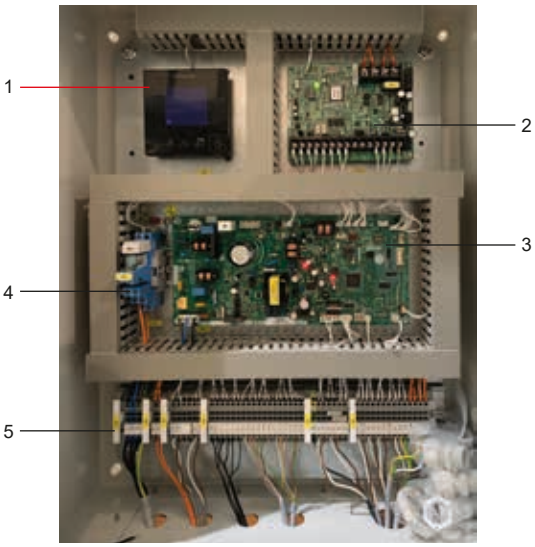
ECOi / ECO G accessories

ECO i ECO G


Thermistor x2 (Refrigerant: E1, E3)


Thermistor x2 (Air: TA, BL)


Expansion valve



PAW-280PAH3M-1

1 Remote controller (CZ-RTC6BL)
2 CZ-CAPBC2 interface
3 Main PCB
4 Fan relay
5 Terminal board

PACi and PACi NX accessories


Thermistor x2
(Refrigerant: E1, E2)


Thermistor
(Air: TA)

Control functions provided as standard by integral components

CZ-RTC6BL remote controller

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

CZ-CAPBC2 Mini seri-para I/O unit

- 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]
  - > Terminals AI1, AI2.
- Target temperature setting by 0–10 V or 0–140 Ω input signal1
  - > Terminals AI1, AI2.
- Suction air temperature (TA sensor) output by 4–20 mA signal
  - > Terminals AO1, AO2.
- Mode select and/or ON/OFF control[2]
  - > Terminals DI1, DI2, DI3, COM.
- Fan operation control[2]
  - > Terminals DI1, DI2, DI3, COM.
- Operation status output/ Alarm output
  - > Terminals COM, DO1 / COM, DO2.
- Thermostat ON/OFF control[2]
  - > Terminals DI1, DI2, DI3, COM.

1 Demand control by external BMS cannot be combined with the demand control or target temperature setting accomplished by the integrated controller. 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-OCT, DC12 V outlet, OPTION terminal

- Output signal for Cooling/Heating/Fan status
  > Terminal OP4; OP5; OP6; Potential OP1.
- Output signal for Defrost operation indication
  > Terminal OP2; Potential OP1.
- Output signal for Thermostat-ON status
  > Terminal OP3; Potential OP1

Additional contacts available

- External humidifier control (ON/OFF) 230 V AC 3 A (not available for PAH3 model)
  > Terminal HU1; HU2.
- External fan control (ON/OFF) 12 V DC (not available for PAH3 model)
  > Terminal FD1; FD2.
- External filter status signal potential free (not available for PAH3 model)
  > 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
- ON/OFF control[1]
  > Terminals T10.1, T10.2
- Fan alarm input, internal potential 230 V AC[2]
  > Terminals OP3, K2
- Fan operation signal, external potential max. 250 V AC 5A
  > Terminals F1, F2

1 Can be configured as pulse or static signal or as fire prevention input signal.
2 Only available with MAH3M models.

OPT terminal contacts (only available for PAH3 model)

- Mode change: Cool/Heat
  > Terminals: OT1 Potential; OT2 Heating; OT3 Cooling.

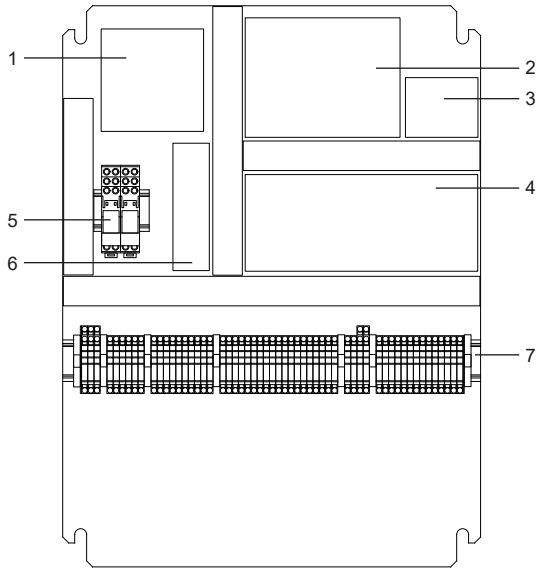
The following two control functions are alternatively configurable by parameter settings on the remote controller:

- Demand level 1, 2, 3
  > Terminals: OT1 Potential; OT4 Demand level 1, OT5 Demand level 2, OT6 Demand level 3.

or

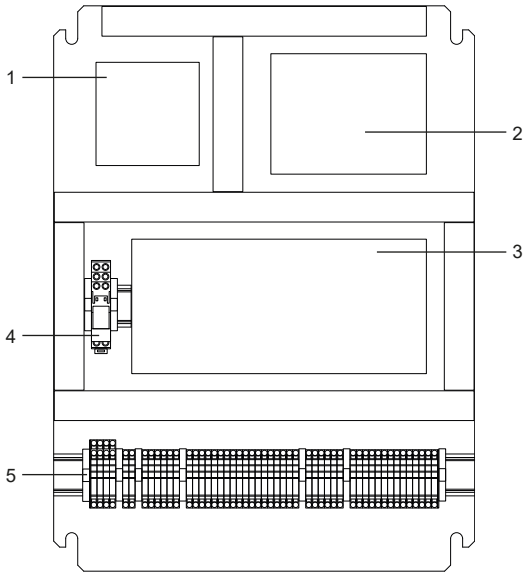
- Quiet mode on outdoor unit (only available for U-71PZH4E5/8; U-100/125/140PZH4E5/8, U-100/125/140PZ3E5/8), Thermostat Off (free cooling)
  > Terminals: OT1 Potential; OT5 Quiet mode; OT6 Thermostat Off

Mounting boards



MAH3 Mounting board

1 Remote controller (CZ-RTC6BL)
2 CZ-CAPBC2 interface
(PCB name: ACC-SP1A)
3 Single motorised valve PCB
(PCB name: PAN.MOVG1)
4 Main control board [1]
(PCB name: PAN.UXRP71B-P)
5 Fan relay
6 RAP valve control PCB
(PCB name: A2 PAN.SV80x)
7 Terminal board



PAH3M-1 Mounting board

1 Remote controller (CZ-RTC6BL)
2 CZ-CAPBC2 interface for 0-10 V control
(PCB name: ACC-SP1A)
3 Main control board
(PCB name: ACXA73-38670)
4 Fan relay
5 Terminal board [1]

1 For details see → *5.3 Terminal board layout, p. 55*.

3.3 System lineup

ECOi System lineup – ECOi systems

Capacity HP	Capacity kW	Outdoor unit combination U-...				AHU Kit combination PAW-...			
5	16	all Mini ECOi/ECOi outdoor units				160MAH3[1]	–	–	–
10	28	all Mini ECOi/ECOi 2-pipe and 3-pipe outdoor units with nominal cooling capacity of at least 8 HP				280MAH3[2]	–	–	–
20	56	20ME2E8	–	–	–	560MAH3M[3]	–	–	–
30	84	16ME2E8	14ME2E8	–	–	560MAHM[4]	280MAH3M	–	–
40	112	20ME2E8	20ME2E8	–	–	560MAH3M[4]	560MAH3M	–	–
50	140	18ME2E8	16ME2E8	16ME2E8	–	560MAH3M[4]	560MAH3M	280MAH3M	–
60	168	20ME2E8	20ME2E8	20ME2E8	–	560MAH3M[4]	560MAH3M	560MAH3M	–
70	196	20ME2E8	20ME2E8	20ME2E8	10ME2E8	560MAH3M[4]	560MAH3M	560MAH3M	280MAH3M
80	224	20ME2E8	20ME2E8	20ME2E8	20ME2E8	560MAH3M[4]	560MAH3M	560MAH3M	560MAH3M

1 PAW-160MAH3M:
- PAW-160MAH3M can be installed in combination with all ECOi outdoor units (including Mini ECOi (2-pipe), ECOi 2-pipe and ECOi 3-pipe units) like any other standard indoor unit.
- Mixed installation with standard indoor units is possible with all ECOi outdoor units (as above). However, in this case one additional RAP valve (CZ-P160RVK2) must be installed in the unit connection pipe, unless the complete system is exclusively used in cooling only operation.

2 PAW-280MAH3M:
- PAW-280MAH3M can be installed in combination with all ECOi outdoor units (including Mini ECOi (2-pipe), ECOi 2-pipe and ECOi 3-pipe units) with a nominal cooling capacity of at least 8 HP like any other standard indoor unit.
- Mixed installation with standard indoor units is possible with all ECOi outdoor units (as above). However, in this case two additional RAP valves (2 x CZ-P160RVK2) must be installed in the unit connection pipe, unless the complete system is exclusively used in cooling only operation.
- When PAW-280MAH3M is installed in combination with an ECOi 3-pipe outdoor unit, either two 16 kW solenoid valve kits or two ports of a 16 kW multi-port heat recovery box respectively (CZ-P...HR3) need to be used in parallel installation for each AHU DX coil.

3 PAW-560MAH3M:
- Mixed installation with standard indoor units is not allowed.
- Connection to ECOi 3-pipe 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 must disconnect the CZ-RTC6BL controller and CZ-CAPBC2 boards (ACC-SP1A PCB) from all but one AHU kit. 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.

ECO G System lineup – ECO G systems

Capacity		Outdoor unit	AHU Kit
HP	kW		
5	16	all ECO G outdoor units	PAW-160MAH3M[1]
10	28	all ECO G 2-way outdoor units	PAW-280MAH3M[2]
20	56	all ECO G 2-way outdoor units	PAW-560MAH3M[3]

1 PAW-160MAH3M:
- Like any other standard indoor unit, PAW-160MAH3M can be installed in combination with all ECO G outdoor units.
- 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 complete system is exclusively used in cooling only operation or in a 3-way system with heat recovery box.

2 PAW-280MAH3M:
- Like any other indoor unit of similar capacity, PAW-280MAH3M can be installed in combination with all ECO G 2-way outdoor units only.
- 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 complete system is exclusively used in cooling only operation. For further restrictions in mixed installations, please refer to the system descriptions in the corresponding ECO G technical data books.
- Connection to ECO G 3-way systems is not allowed.

3 PAW-560MAH3M:
- Like any other indoor unit of similar capacity, PAW-560MAH3M can be installed in combination with all ECO G 2-way outdoor units only.
- Mixed Installation with standard indoor units is not possible.
- Connection to ECO G 3-way systems is not allowed.

PACi System lineup – PACi systems

Capacity (kW)	Refrigerant	Outdoor unit		AHU Kit
		PACi[1]		
		Single-phase units	Three-phase units	
20.0	R32	–	U-200PZH2E8	PAW-280PAH3M-1[2]
25.0	R32	–	U-250PZH2E8	

1 With PACi systems, only 1-to-1 installations are allowed (e.g. 1 x PACi outdoor unit + 1 x PAW-280PAH3M). 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.

PACi NX System lineup – PACi NX systems

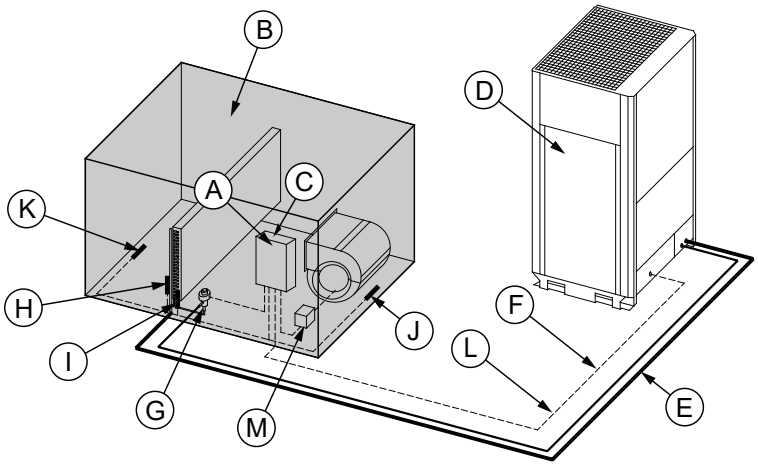
Capacity (kW)	Refrigerant	Outdoor unit				AHU Kit
		PACi NX Standard[1]		PACi NX Elite[1]		
		Single-phase units	Three-phase units	Single-phase units	Three-phase units	
2.5	R32	U-25PZ3E5	–	–	–	PAW-280PAH3M-1[2]
3.6	R32	U-36PZ3E5	–	U-36PZH3E5	–	
5.0	R32	U-50PZ3E5	–	U-50PZH3E5	–	
6.0	R32	U-60PZ3E5A	–	U-60PZH3E5	–	
7.1	R32	U-71PZ3E5A	–	U-71PZH4E5	U-71PZH4E8	
10.0	R32	U-100PZ3E5	U-100PZ3E8	U-100PZH4E5	U-100PZH4E8	
12.5	R32	U-125PZ3E5	U-125PZ3E8	U-125PZH4E5	U-125PZH4E8	
14.0	R32	U-140PZ3E5	U-140PZ3E8	U-140PZH4E5	U-140PZH4E8	

1 With PACi NX systems, only 1-to-1 installations are allowed (e.g. 1 x PACi NX outdoor unit + 1 x PAW-280PAH3M-1). 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

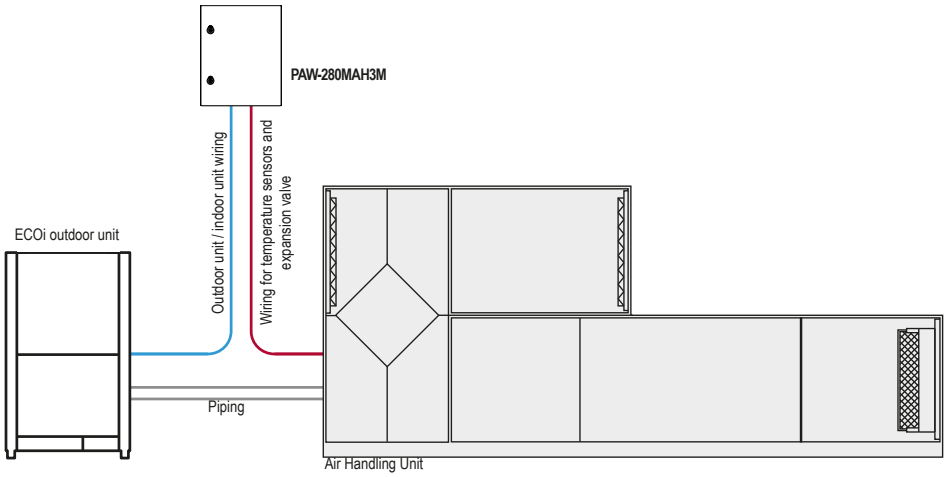
System Overview – ECOi systems

Single-connection system

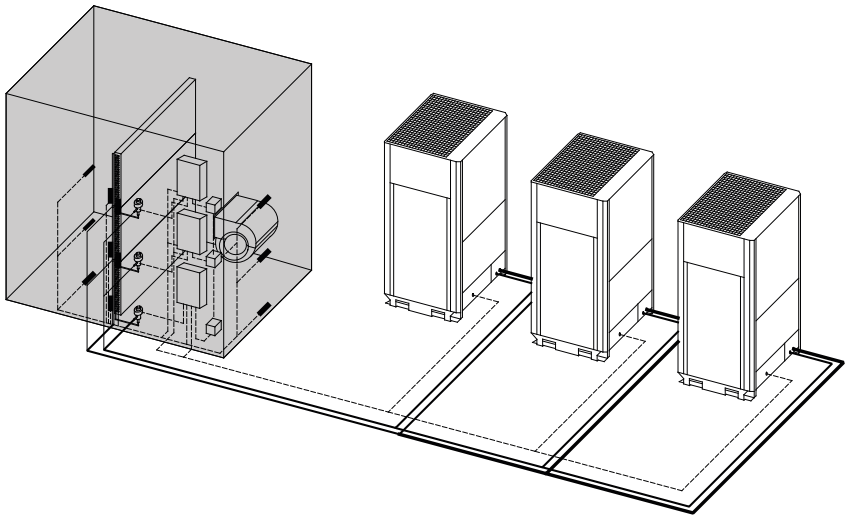


A	AHU Kit enclosure (complete)	H	Thermistor for liquid pipe
B	AHU system (field supplied)	I	Thermistor for gas pipe
C	Remote controller (integrated in AHU Kit enclosure)	J	Thermistor for suction air
D	Outdoor unit	K	Thermistor for discharge air
E	Liquid piping (field supplied)	L	Inter-unit wiring
F	Gas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

System example for ECOi single-connection system



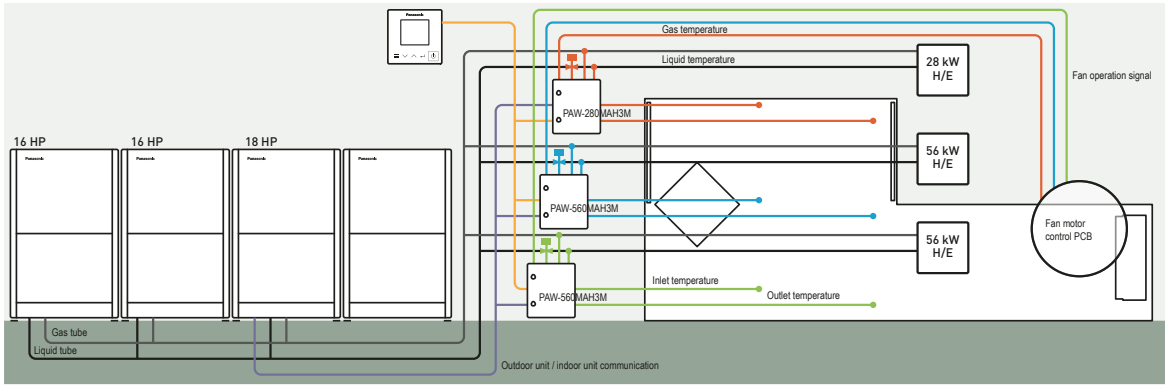
Multi-connection system



Note:
The following restrictions apply only if PAW-560MAH3M is used alone or in combination with other AHU Kits. For all other AHU Kit combinations without PAW-560MAH3M no such restrictions apply.

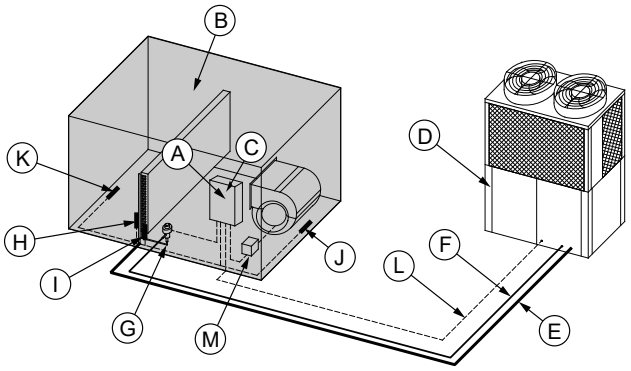
1 All AHU heat exchangers belonging to the same refrigerant circuit have to be installed in the same chassis equipped with one single fan motor.
2 One AHU Kit and correspondingly one magnetic relay is required for each heat exchanger. All AHU Kits have to be wired to the fan motor.
3 All AHU Kits shall be connected and controlled by group control wiring of one 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 must disconnect the CZ-RTC6BL controller and CZ-CAPBC2 boards (ACC-SP1A PCB) from all but one AHU kit. 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.

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



System Overview – ECO G systems

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

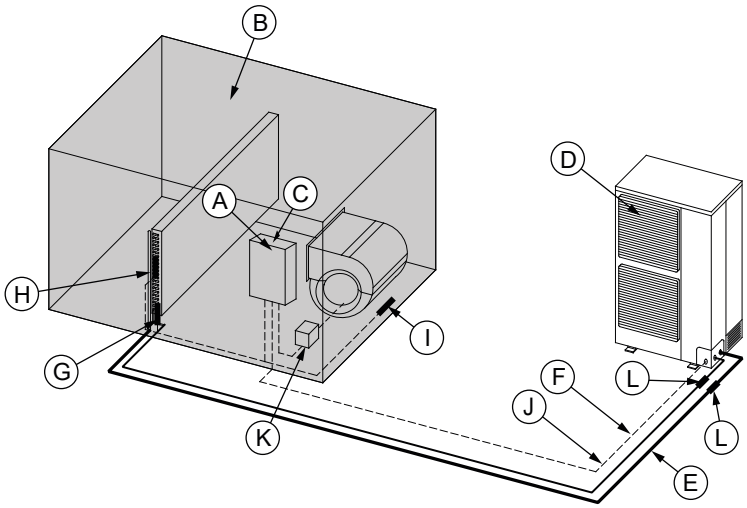


A	AHU Kit enclosure (complete)	H	Thermistor for liquid pipe (E1)
B	AHU system (field supplied)	I	Thermistor for gas pipe (E3)
C	Remote controller (integrated in AHU Kit enclosure)	J	Thermistor for suction air (TA)
D	Outdoor unit	K	Thermistor for discharge air (BL)
E	Liquid piping (field supplied)	L	Inter-unit 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-160MAH3M or PAW-280MAH3M. In case of multi-connections with PAW-560MAH3M further restrictions will apply. For details, please contact your local Panasonic service partner.

System Overview – PACi and PACi NX systems

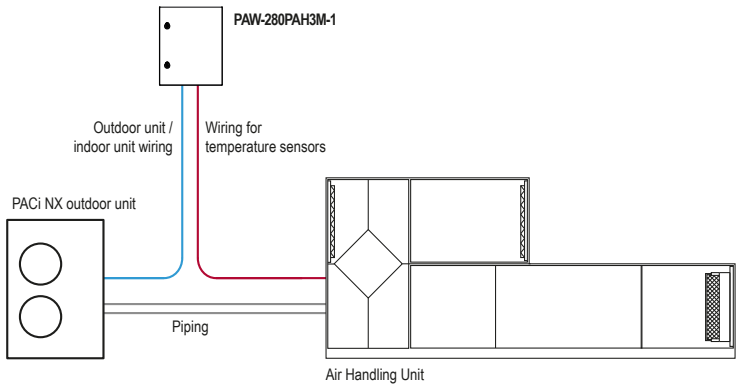
Single-connection[1] system only



A	AHU Kit enclosure (complete)	G	Thermistor for liquid pipe (E1)
B	AHU system (field supplied)	H	Thermistor for heat exchanger pipe middle (E2)
C	Remote controller (integrated in AHU Kit enclosure)	I	Thermistor for suction air (TA)
D	Outdoor unit	J	Inter-unit wiring
E	Liquid piping (field supplied)	K	Magnetic relay for operating the blower (field supplied)
F	Gas piping (field supplied)	L	Strainer (liquid pipe & gas pipe) min. Ø 25.4 mm (field supplied)

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

System example for PACi and PACi NX single-connection system



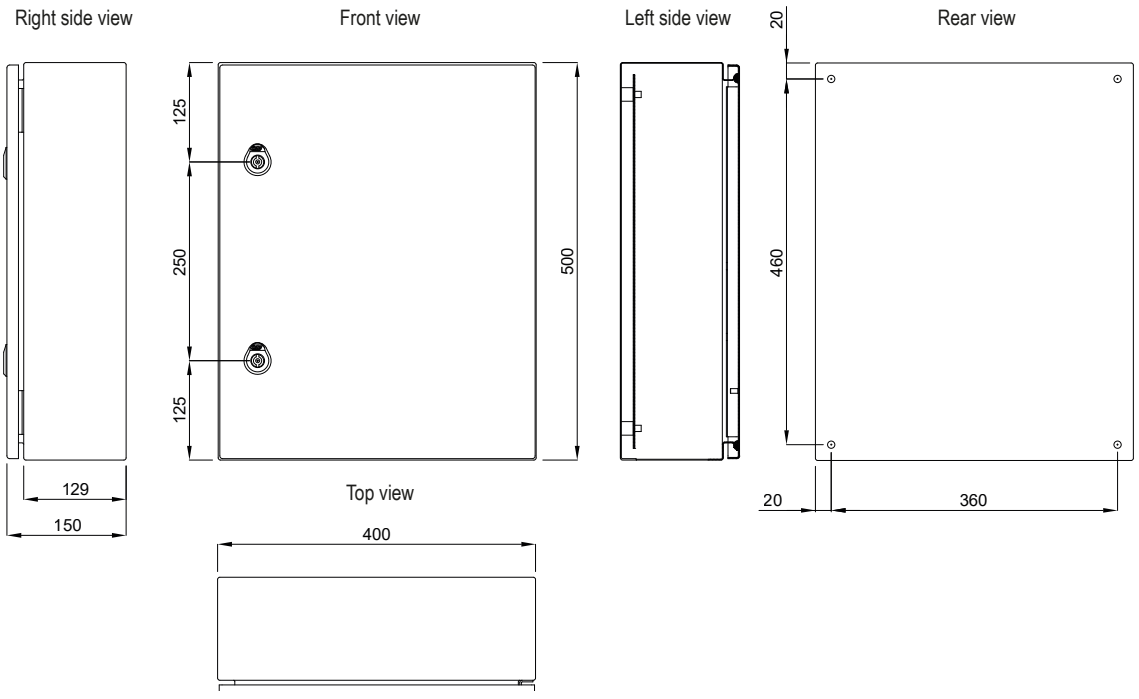
3.5 Technical data

Technical data – AHU Kit

			MAH3 / PAH3 generation
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	500 x 400 x 150
Net weight (without valves)		kg	11.5
Ambient temperature (max.)		°C	45
Protection class			IP65

Dimensions – AHU Kit

MAH3 / PAH3 generation



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 – R410A

AHU Kit HP			5	10	20	30[1]	40[1]
AHU Kit model			**PAW-160MAH3M**	**PAW-280MAH3M**	**PAW-560MAH3M**	**PAW-280MAH3M + PAW-560MAH3M**	**PAW-560MAH3M + PAW-560MAH3M**
Nominal cooling capacity		kW	14.0	28.0	56.0	84.0	112.0
Nominal heating capacity		kW	16.0	31.5	63.0	95.0	127.0
Air volume flow (Cooling)	Min	m^3/h	1,140	3,500	7,000	10,500	14,000
	Max	m^3/h	2,600	5,000	10,000	15,000	20,000
AHU DX coil heat exchanger volume	Min	dm^3	1.7	2.8	5.6	8.4	11.2
	Max	dm^3	2.8	5.4	10.7	16.1	21.4
Bypass factor			0.9 (recommended)	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	10 / 100
Max. branch pipe length		m	12	12	12	12	12
Max. branch pipe length difference after first branch		m	10	10	10	10	10
Elevation difference (in/out)	Max	m	10	10	10	10	10
Piping connections	Liquid pipe	Inch (mm)	3/8 (9.52)	3/8 (9.52)	5/8 (15.88)	3/4 (19.05)	3/4 (19.05)
	Gas pipe	Inch (mm)	5/8 (15.88)	7/8 (22.22)	1 1/8 (28.58)	1 1/4 (31.75)	1 1/2 (38.15)
Intake temperature of AHU Kit	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32
		°C WB	13 / 23	13 / 23	13 / 23	13 / 23	13 / 23
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C DB	-10 / 43	-10 / 43	-10 / 43	-10 / 43	-10 / 43
	Heating (Min / Max)	°C WB	-20 / 15	-20 / 15	-20 / 15	-20 / 15	-20 / 15

AHU Kit HP			50[1]	60[1]	70[1]	80[1]
AHU Kit model			**PAW-560MAH3M + PAW-560MAH3M + PAW-280MAH3M**	**PAW-560MAH3M + PAW-560MAH3M + PAW-560MAH3M**	**PAW-560MAH3M + PAW-560MAH3M + PAW-560MAH3M + PAW-280MAH3M**	**PAW-560MAH3M + PAW-560MAH3M + PAW-560MAH3M + PAW-560MAH3M**
Nominal cooling capacity		kW	140.0	168.0	196.0	224.0
Nominal heating capacity		kW	155.0	189.0	219.0	252.0
Air volume flow (Cooling)	Min	m^3/h	17,500	21,000	24,000	28,000
	Max	m^3/h	25,000	30,000	35,000	40,000
AHU DX coil heat exchanger volume	Min	dm^3	14.0	16.8	19.6	22.4
	Max	dm^3	26.8	32.1	37.5	42.8
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
Max. 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)	7/8 (22.22)	7/8 (22.22)
	Gas pipe	Inch (mm)	1 1/2 (38.15)	1 1/2 (38.15)	1 5/8 (41.28)	1 3/4 (44.45)
Intake temperature of AHU Kit	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 32	18 / 32
		°C WB	13 / 23	13 / 23	13 / 23	13 / 23
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C DB	-10 / 43	-10 / 43	-10 / 43	-10 / 43
	Heating (Min / Max)	°C WB	-20 / 15	-20 / 15	-20 / 15	-20 / 15

1 Not applicable for ECO G systems.

PACi Technical data and limitations – PACi systems – R32

AHU Kit model			PAW-280PAH3M-1	
Outdoor unit – PACi Elite			U-200PZH2E8	U-250PZH2E8
Nominal cooling capacity		kW	19.5	23.2
Nominal heating capacity		kW	22.4	28.0
Piping connections	Liquid pipe	Inch (mm)	3/8 (9,52)	1/2 (12,7)
	Gas pipe	Inch (mm)	1 (25,4)	1 (25,4)
Piping length	Min / Max	m	5 / 90	5 / 60
Precharged length (R32)	Max	m	30	30
Additional refrigerant charge (R32) due to extended piping length		kg/m	0.060	0.080
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C DB	-15 / 46	-15 / 46
	Heating (Min / Max)	°C WB	-20 / 24	-20 / 24
AHU unit under "standard conditions"				
Air volume flow	Cooling (Min / Max)	m³/h	2,160 / 4,320	2,280 / 5,040
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32
		°C WB	n/a	n/a
	Heating (Min / Max)	°C DB	16 / 30	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	2.3 / 4.3	2.7 / 4.3
Heat exchanger face area	Min / Max	m²	0,54 / 1.0	0.66 / 1.0
AHU unit under "special conditions A"[2]				
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	2,160 / 4,600	2,280 / 5,400
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 30	18 / 30
		°C WB	n/a	n/a
	Heating (Min / Max)	°C DB	16 / 30	16 / 30
AHU unit under "special conditions B"[3]				
AHU DX coil heat exchanger volume, subject to restrictions[3]	Min / Max	dm³	2.3 / 5.7	2.7 / 7.1
Additional refrigerant charge (R32) due to larger heat exchanger volume		kg/dm³	0.83	0.83
Max. additional refrigerant charge (R32)		kg	1.16	2.32
Max. pipe length		m	90	60
Max. ambient temp. for pump down		°C	n/a	n/a

	Air volume flow m³/h															
Outdoor unit	2,160	2,280	2,300	2,400	2,500	2,600	2,700	2,900	3,000	3,500	4,000	4,320	4,440	4,600	5,040	5,400
U-200PZH2E8																
U-250PZH2E8																

Maximum allowed air volume flow under "Standard conditions"

Higher maximum allowed air volume flow under "Special conditions A"[2]:
Maximum allowed air intake temperature at AHU DX coil heat exchanger in cooling mode is restriced to 30 °C DB.

1 Air intake temperature entering the AHU DX coil heat exchanger
2 Special conditions A: Using an AHU unit with a higher maximum allowed air volume flow is subject to a restriction of the "Air intake temperature" to 30 °C DB (instead of 32 °C WB under standard conditions).
3 Special conditions B: Using an AHU DX coil heat exchanger with a larger volume is subject to the following restrictions:
- an additional refrigerant charge (R32), which is required irrespective of an additional refrigerant charge which might be needed due to an extended piping length (see calculation example below)
- AND a reduced maximum pipe length
- AND an ambient air temperature limit above which it may not be possible to pump down the complete refrigerant charge (including all additional refrigerant) into the outdoor unit.

Note: The AHU DX coil must be designed according to Panasonic specification.

Calculation example for total additional refrigerant charge (R32)

Unit: U-200PZH2E8
Pipe length: 40 metres
AHU DX coil volume (supplied by AHU manufacturer): 4.5 dm³
Refrigerant charge at shipment fitted for pipe length within 30 m
Pipes additional refrigerant charge: 0.060 kg/m
AHU DX coil additional refrigerant charge: 0.83 kg/dm³
Refrigerant charge at shipment is sufficient for AHU DX coil volume up to 4.3 dm³

Total additional refrigerant charge calculation
((4.5 dm3 – 4.3 dm³) x 0.83 kg/dm³) + (10 m x 0.060 kg/m) = 0.166 kg + 0.60 kg = 0.766 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 = $12 \times 1{,}000 \times 3 \times 1.5 \times 10^{-4} = 5.4$
This value must be rounded up to 6.

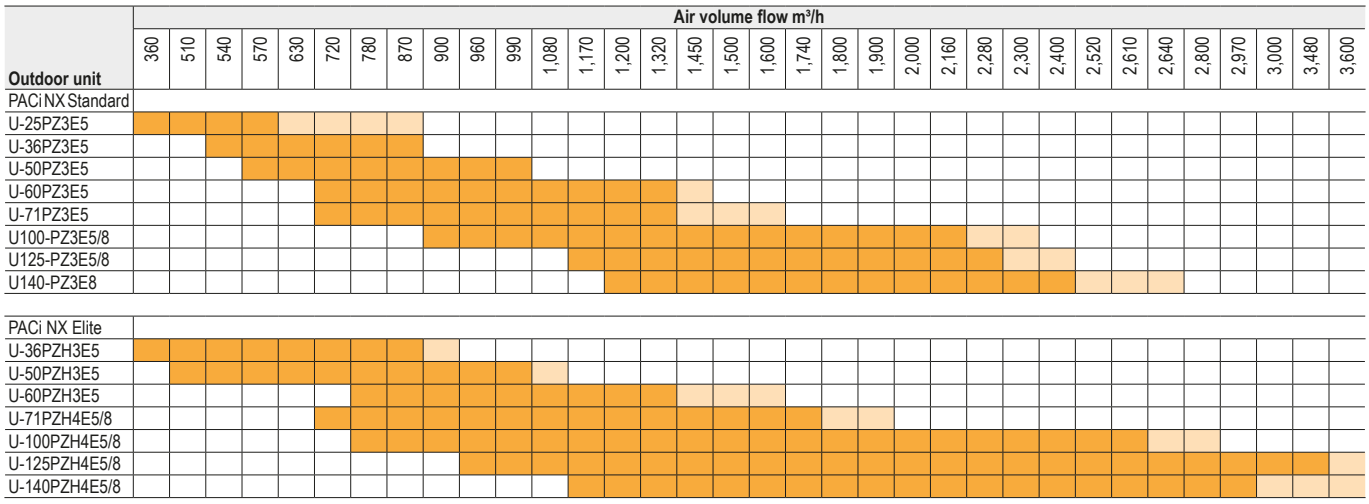
This means that the minimum number of passes is 6 passes.

PACi NX Technical data and limitations – PACi NX systems – R32

AHU Kit model			PAW-280PAH3M-1							
Outdoor unit – PACi NX Standard			U-25PZ3E5	U-36PZ3E5	U-50PZ3E5	U-60PZ3E5A	U-71PZ3E5A	U-100PZ3E5/8	U-125PZ3E5/8	U-140PZ3E5/8
Nominal cooling capacity		kW	2.5	3.6	5.0	6.0	7.1	10.0	12.5	14.0
Nominal heating capacity		kW	3.2	3.6	5.0	6.0	7.1	10.0	12.5	14.0
Piping connections	Liquid pipe	Inch (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)
	Gas pipe	Inch (mm)	1/2 (12.70)	1/2 (12.70)	1/2 (12.70)	1/2 (12.70)	5/8 (15.88)	5/8 (15.88)	5/8 (15.88)	5/8 (15.88)
Piping length	Min / Max	m	3 / 15	3 / 15	3 / 20	3 / 40	3 / 40	5 / 50	5 / 50	5 / 50
Precharged length (R32)	Max	m	7.5	7.5	7.5	30	30	30	30	30
Additional refrigerant charge (R32) due to extended piping length		kg/m	0.01	0.01	0.015	0.015	0.017	0.045	0.045	0.045
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C DB	-10 / +43	-10 / +43	-10 / +43	-10 / +43	-10 / +43	-10 / +43	-10 / +43	-10 / +43
	Heating (Min / Max)	°C WB	-15 / +24	-15 / +24	-15 / +24	-15 / +24	-15 / +24	-15 / +24	-15 / +24	-15 / +24
AHU unit under "standard conditions"										
Air volume flow	Cooling (Min / Max)	m³/h	360 / 570	540 / 870	630 / 990	780 / 1,320	780 / 1,320	900 / 2,160	1,140 / 2,280	1,200 / 2,400
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32
		°C WB	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	1.0 / 1.12	1.00 / 1.121	1.00 / 1.121	1.3 / 1.4	1.3 / 1.4	1.7 / 1.9	1.7 / 1.9	1.7 / 1.9
Heat exchanger face area	Min / Max	m²	– / –	– / –	– / –	0.43 / 0.51	0.43 / 0.51	0.43 / 0.51	0.43 / 0.51	0.43 / 0.51
AHU unit under "special conditions A"[2]										
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	360 / 870	540 / 870	630 / 1,000	780 / 1,450	780 / 1,600	900 / 2,300	1,140 / 2,520	1,200 / 2,640
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30
		°C WB	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30
AHU unit under "special conditions B"[3]										
AHU DX coil heat exchanger volume, subject to restrictions[3]	Min / Max	dm³	1.0 / 1.2	1.0 / 1.2	1.0 / 1.2	1.3 / 1.6	1.3 / 1.6	1.7 / 2.6	1.7 / 2.6	1.7 / 2.8
Additional refrigerant charge (R32) due to larger heat exchanger volume		kg/dm³	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Max. additional refrigerant charge (R32)		kg	0.07	0.07	0.07	0.17	0.17	0.58	0.58	0.74
Max. pipe length		m	7.5	7.5	15	25	30	35	35	35
Max. ambient temp. for pump down		°C DB	n/a	n/a	30	30	30	30	30	30

Continued on the following page. See footnotes overleaf.

AHU Kit model			PAW-280PAH3M-1						
Outdoor unit – PACi NX Elite			**U-36PZH3E5**	**U-50PZH3E5**	**U-60PZH3E5**	**U-71PZH4E5/8**	**U-100PZH4E5/8**	**U-125PZH4E5/8**	**U-140PZH4E5/8**
Nominal cooling capacity		kW	3,6	5	6	7.1	10	12.5	14
Nominal heating capacity		kW	3,6	5	6	7.5	10.8	13.5	15.5
Piping connections	Liquid pipe	Inch (mm)	1/4 (6,35)	1/4 (6,35)	1/4 (6,35)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)
	Gas pipe	Inch (mm)	1/2 (12,70)	1/2 (12,70)	1/2 (12,70)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)
Piping length	Min / Max	m	3 / 40	3 / 40	3 / 40	5 / 60	5 / 100	5 / 100	5 / 100
Precharged length (R32)	Max	m	30	30	30	30	30	30	30
Additional refrigerant charge (R32) due to extended piping length		kg/m	0.015	0.015	0.015	0.03	0.04 (< 85 m); 0.025 (85...100 m)	0.04 (< 85 m); 0.025 (85...100 m)	0.04 (< 85 m); 0.025 (85...100 m)
Ambient temperature (outdoor unit)	Cooling (Min / Max)	°C DB	-15 / +46	-15 / +46	-15 / +46	-15 / +52	-15 / +52	-15 / +52	-15 / +52
	Heating (Min / Max)	°C WB	-20 / +24	-20 / +24	-20 / +24	-20 / +24	-20 / +24	-20 / +24	-20 / +24
AHU unit under "standard conditions"									
Air volume flow	Cooling (Min / Max)	m³/h	360 / 870	510 / 990	780 / 1,320	720 / 1,740	780 / 2,610	960 / 3,480	1,170 / 2,970
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32
		°C WB	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	1.0 / 1.3	1.0 / 1.3	1.1 / 1.4	0.26 / 0.41	1.7 / 2.1	1.7 / 2.1	1.7 / 2.1
Heat exchanger face area	Min / Max	m²	– / –	– / –	– / –	– / –	0.4 / 0.6	0.4 / 0.8	0.4 / 0.8
AHU unit under "special conditions A"[2]									
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	360 / 900	630 / 1,080	780 / 1,600	720 / 1,900	780 / 2,800	960 / 3,600	1,170 / 3,600
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30
		°C WB	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25	14 / 25
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30
AHU unit under "special conditions B"[3]									
AHU DX coil heat exchanger volume, subject to restrictions[3]	Min / Max	dm³	1.0 / 1.5	1.0 / 1.5	1.1 / 1.8	1.2 / 2.5	1.7 / 3.4	1.7 / 3.4	1.7 / 3.4
Additional refrigerant charge (R32) due to larger heat exchanger volume		kg/dm³	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Max. additional refrigerant charge (R32)		kg	0.17	0.17	0.33	0.58	1.08	1.08	1.08
Max. pipe length		m	25	25	18	40	75	75	75
Max. ambient temp. for pump down		°C DB	n/a	n/a	30	30	30	30	30



Maximum allowed air volume flow under "Standard conditions"

Higher maximum allowed air volume flow under "Special conditions A[2]":
Maximum allowed air intake temperature at AHU DX coil heat exchanger in cooling mode is restriced to 30 °C DB.

1 Air intake temperature entering the AHU DX coil heat exchanger
2 Special conditions A: Using an AHU unit with a higher maximum allowed air volume flow is subject to a restriction of the "Air intake temperature" to 30 °C DB (instead of 32 °C WB under standard conditions).
3 Special conditions B: Using an AHU DX coil heat exchanger with a larger volume is subject to the following restrictions:
- an additional refrigerant charge (R32), which is required irrespective of an additional refrigerant charge which might be needed due to an extended piping length (see calculation example below)
- AND a reduced maximum pipe length
- AND an ambient air temperature limit above which it may not be possible to pump down the complete refrigerant charge (including all additional refrigerant) into the outdoor unit.

Note: The AHU DX coil must be designed according to Panasonic specification.

Calculation example for total additional refrigerant charge (R32)

Unit: U-71PZH4E8
Pipe length: 40 metres
AHU DX coil volume (supplied by AHU manufacturer): 2.1 dm³

Refrigerant charge at shipment fitted for pipe length within 30 m
Pipes additional refrigerant charge: 0.03 kg/m
AHU DX coil additional refrigerant charge: 0.83 kg/dm³
Refrigerant charge at shipment is sufficient for AHU DX coil volume up to 1.8 dm³

Total additional refrigerant charge calculation
((2.1 dm³ – 1.8 dm³) x 0.83 kg/dm³) + (10 m x 0.03 kg/m) = 0.249 kg + 0.3 kg = 0.549 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 = $12 \times 1{,}000 \times 3 \times 1.5 \times 10^{-4} = 5.4$
This value must be rounded up to 6.

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

ATTENTION

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.

ATTENTION

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.

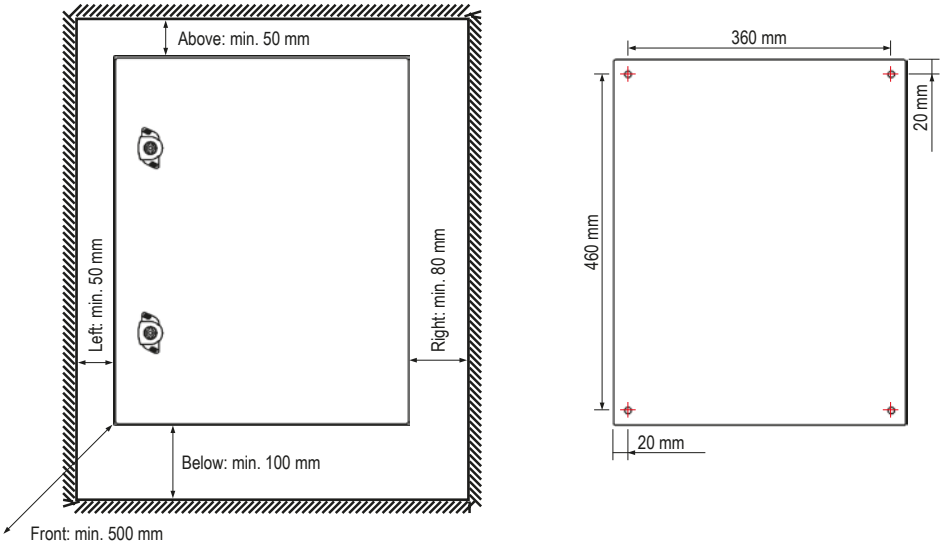
Exposing the wires of thermistors or, in case of the ECOi and ECO G systems, of the expansion valve to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

- ► 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.

4.1.1 MAH3 / PAH3 generation

Mount the MAH3 / PAH3 generation 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 360 x 460 mm (W x H).



3. Open the front-side door of the enclosure as shown below (left), and 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 as shown below (right).

4. Screw the cable glands, which are supplied loose, into the openings at the bottom of the enclosure.

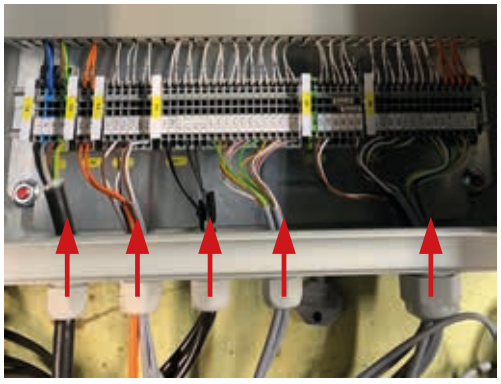
ATTENTION

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 proximity to any extra-low voltage control wiring.

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

5. Insert the wiring from below the enclosure through the screwed cable glands and connect the wires to the terminal block as required.



6. Having finished wiring of the AHU Kit, close the front-side door of the enclosure and proceed with the installation of all other required system components (see → *4.2 Installation of expansion valve, p. 41* and → *4.3 Installation of thermistors, p. 42*). The AHU Kit will then be ready for matching the outdoor unit capacity with AHU Kit capacity (see → *4.4 Matching outdoor unit capacity with AHU Kit capacity, p. 46*).

4.1.2 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
- Instructions for the safe handling of R32 (see → *1.3 Instructions for the safe handling of R32, p. 9*)

Important

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

4.2 Installation of expansion valve

Installation of expansion valve – ECOi and ECO G systems

ATTENTION

Damage to the expansion valve wires

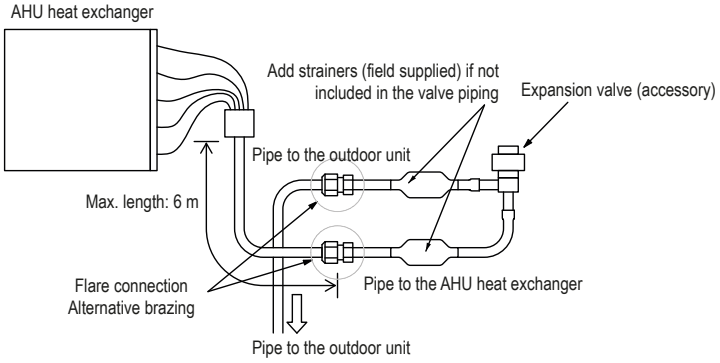
Exposing the wires of the expansion valve to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

► 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.

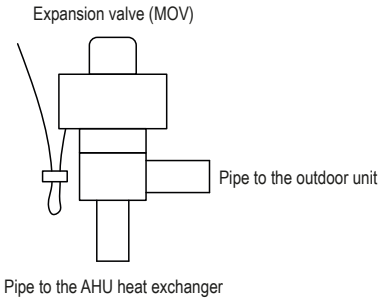
► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

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

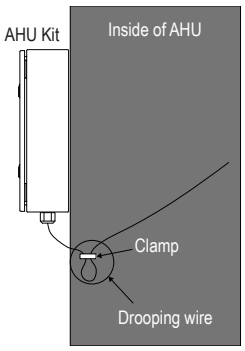
- Wires must not be installed externally. Cable protection such as conduit is required.
- Do not detach connector.
- The distance from AHU heat exchanger must not exceed 6 m.
- Pipe reducers must be installed in the field where applicable.
  For example, for 10HP ECOi systems, piping size to outdoor 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.

4.3 Installation of thermistors

ATTENTION

Damage to the thermistor wires

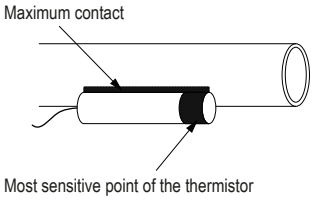
Exposing the wires of thermistors to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

► 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.

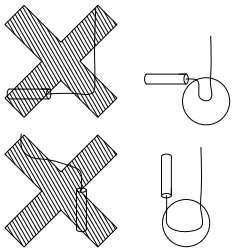
► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

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

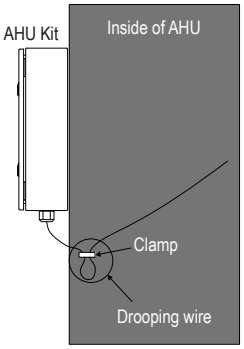
- Wires must not be placed outside of equipment.
- Wires must not be cut and wiring connectors must not be detached.
- Thermistors must be Identified by the tag which is wound to each thermistor.
- The head of the thermistor must be attached exactly onto the pipe, because the head is the most sensitive 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.

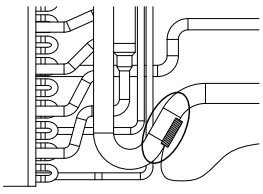
4.3.1 Installation of thermistor on gas pipe

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

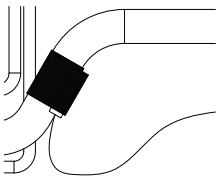
Mount “E3” thermistor to the gas pipe of the AHU heat exchanger according to the following instructions.

For PAW-160MAH3M

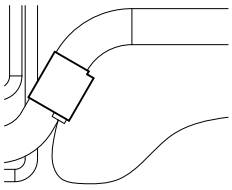
1. Attach the gas pipe thermistor onto the collecting gas pipe in the heat exchanger.



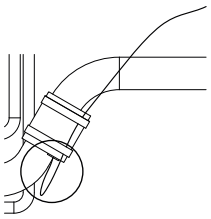
2. Cover the thermistor and pipe with aluminum tape.



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.



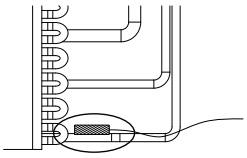
For PAW-280MAH3M and PAW-560MAH3M

1. Upon delivery, for PAW-280MAH3M and PAW-560MAH3M 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.

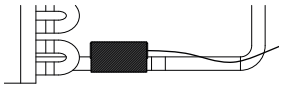
4.3.2 Installation of thermistor on liquid pipe

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

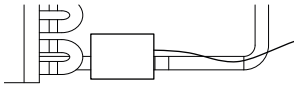
1. Attach the liquid pipe thermistor to the liquid pipe located in the lowest position after the distributor in the heat exchanger.



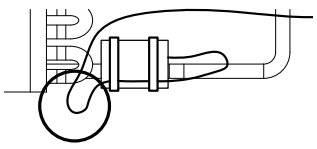
2. Cover the thermistor and pipe with aluminum tape.



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.

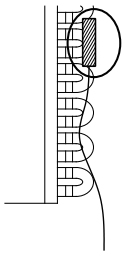


4.3.3 Installation of thermistor on heat exchanger pipe middle

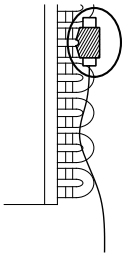
Installation of thermistor on heat exchanger pipe middle – PACi and PACi NX systems

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

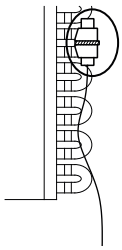
1. Attach the heat exchanger pipe middle thermistor in the middle of each pass-line (pipe) in the heat exchanger.



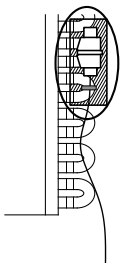
2. Cover the thermistor and pipe with aluminum tape (field-supplied).



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.



4.3.4 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, PACi and PACi NX 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.

4.4 Matching outdoor unit capacity with AHU Kit capacity

Matching outdoor unit capacity with AHU Kit capacity – PACi and PACi NX systems

As the AHU Kit model PAW-280PAH3M-1 has only one fixed capacity and can be combined with the complete range of PACi and PACi NX systems, where outdoor unit capacities vary from 2.5 (PACi NX range) to 25 kW (PACi range), it is necessary to change the settings so that the default capacity check of the PACi or PACi NX outdoor unit is ignored or the outdoor unit capacity is matched with the AHU Kit capacity.

There are four different methods to achieve this aim.

Method A: Cutting JP001 to ignore capacity

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

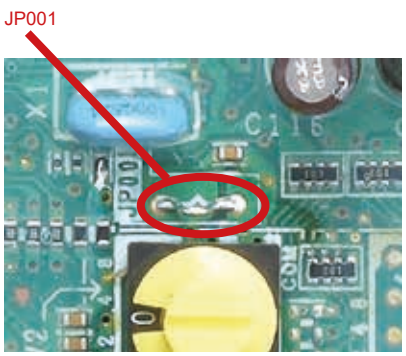
Important

Method A is only applicable to the following combinations of PACi outdoor units and AHU Kits:

- PACi PZH2 outdoor units (R32) and PAH3 AHU Kit model

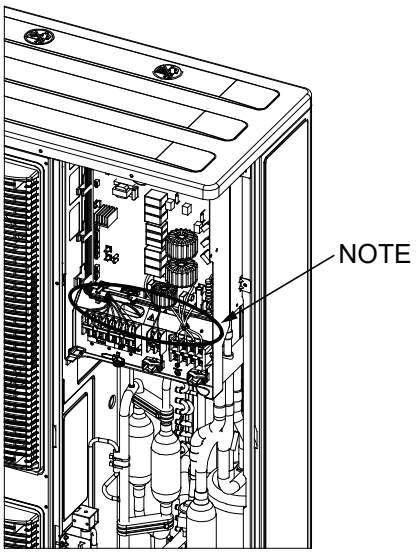
To cut jumper JP001 on the PACi outdoor unit main PCB, complete the following steps:

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:



Elite – R32
U-200PZH2E8
U-250PZH2E8

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



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, which can be obtained from Panasonic as optional service parts.

Important

Method B is only applicable to the following combinations of PACi outdoor units and AHU Kits:

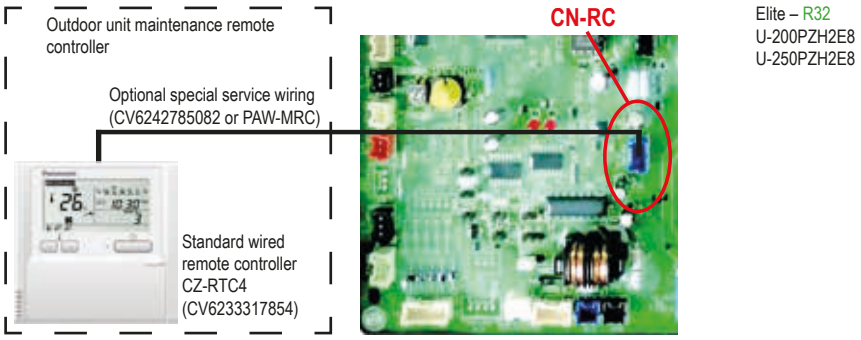
- PACi PZH2 outdoor units (R32) and PAH3 AHU Kit model

Required accessories:

- Optional standard wired remote controller: CZ-RTC2 or CZ-RTC4 (available from Panasonic as optional service parts, CZ-RTC2: CV6233169033 and CZ-RTC4: CV6233317854)
- Optional special service wiring: CV6242785082 or PAW-MRC (available from Panasonic as optional service parts) or alternative connector

To connect the remote controller and subsequently change the relevant settings, complete the following steps:

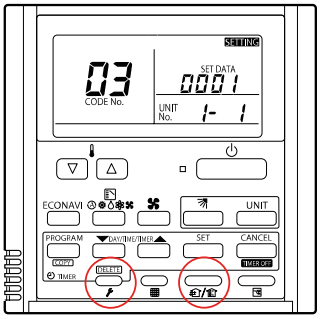
1. Connect the maintenance remote controller to the blue 3-pole CN-RC plug on the main PCB of the PACi outdoor unit using the optional special service wiring CV6242785082 or PAW-MRC (as an alternative, you can also use any unused indoor unit connector (E3, PNL, FS, RC) or temporarily disconnect one of those wires from the AHU kit itself).
   Depending on the PACi outdoor unit model, the CN-RC plug can be found at the following position:



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 third possibility is to adapt the AHU Kit capacity to match the capacity of the currently used PACi or PACi NX outdoor unit.

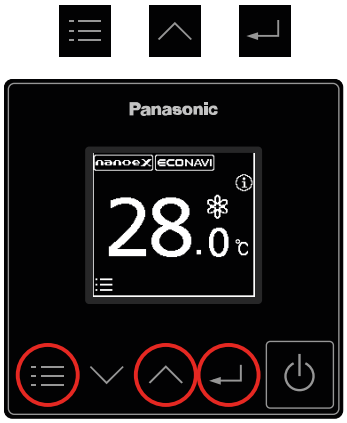
Important

Method C is applicable to the following combinations of PACi outdoor units and AHU Kits:

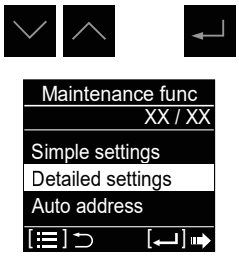
- PACi PZH2 outdoor units (R32) and PAH3 AHU Kit model
- PACi NX PZ3/PZH3/PZH4 outdoor units (R32) and PAH3 AHU Kit model

To change the relevant setting, invoke the “Detailed settings” mode on the AHU Kit’s integrated remote controller (CZ-RTC6BL).

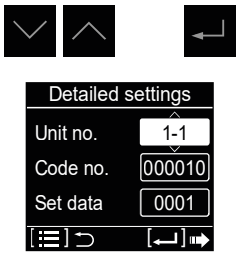
1. Verify that the display of the integrated remote controller is working, then stop the system and power it on again before performing the following steps.
2. Simultaneously press and hold the relevant three-button combination on the remote controller (see below) for at least 4 seconds, until the “Maintenance func” screen appears on the display.
   Note:
   If the system is a combination of a PACi NX outdoor unit (PZ3/PZH3/PZH4) and a PAH3 AHU Kit model, this step has to be performed within 30 seconds after powering on the system while auto-addressing is in progress and the message “Assigning” is shown on the display, otherwise error E16 will occur. In this case, repeat steps 1 and 2 and mind the time limit.



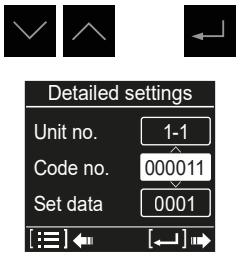
3. On the “Maintenance func” screen, scroll through the menu items with the “UP” and “DOWN” buttons, and select “Detailed settings” by pressing the “ENTER” button when it is highligted in the list.



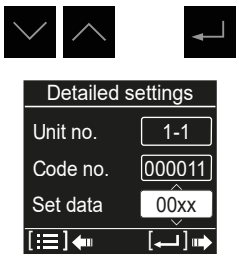
4. On the “Detailed settings” screen, the “Unit No.” option will be highlighted.
   Note: If auto-addressing has been completed before, the relevant unit number will be displayed, or if not, “All” will be displayed instead.
   With the “UP” and “DOWN” buttons, change the value to the unit number of the relevant system, and press the “ENTER” button to confirm the new setting.



5. Highlight the “Code No.“ option using the “DOWN” and “ENTER” buttons. With the “UP” and “DOWN” buttons, select the value “11” (Code No. 11 = Adapting indoor unit capacity), and press the “ENTER” button to confirm this setting.



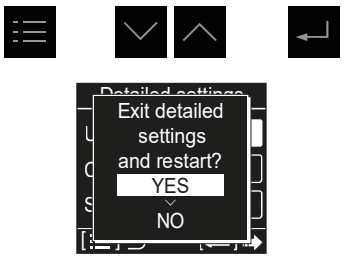
6. Highlight the “Set data“ option using the “DOWN” and “ENTER” buttons. With the “UP” and “DOWN” buttons, change the default value according to the table below and press the “ENTER” button to confirm the new setting and return to the initial “Detailed Settings“ screen (as shown in step 4).



Settings for Code No. “11” (Adapting AHU Kit capacity to PACi outdoor unit capacity)

Outdoor unit capacity	PACi Outdoor unit model	PACi NX Outdoor unit model		Setting for Code No. “11”
	Elite	Standard	Elite	
U-25...	–	...PZ3E5		0002
U-36...	–	...PZ3E5	...PZH3E5	0005
U-50...	–	...PZ3E5	...PZH3E5	0009
U-60...	–	...PZ3E5A	...PZH3E5	0011
U-71...	–	...PZ3E5A	...PZH4E5 ...PZH4E8	0012
U-100...	–	...PZ3E5 ...PZ3E8	...PZH4E5 ...PZH4E8	0015
U-125...	–	...PZ3E5 ...PZ3E8	...PZH4E5 ...PZH4E8	0017
U-140...	–	...PZ3E5 ...PZ3E8	...PZH4E5 ...PZH4E8	0018
U-200...	...PZH2E8	–	–	0021
U-250...	...PZH2E8	–	–	0023

7. Once the setting procedure is completed, exit the “Detailed settings” mode by pressing the “MENU” button several times. This will invoke a confirmation message (see below). Select “YES” with the “UP” and “DOWN” buttons, and then press the “ENTER” button to finish the “Detailed settings” mode and return to the normal remote controller screen.



PACi NX Method D: Ignoring PACi outdoor unit capacity

The last possibility is to ignore the capacity of the currently used PACi outdoor unit.

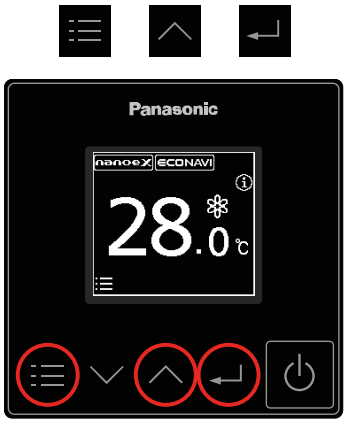
Important

Method D is only applicable to the following combinations of PACi outdoor units and AHU Kits:

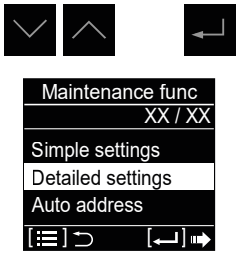
- PACi NX PZ3/PZH3/PZH4 outdoor units (R32) and PAH3 AHU Kit model

To change the relevant setting, invoke the “Detailed settings” mode on the AHU Kit’s integrated remote controller (CZ-RTC6BL).

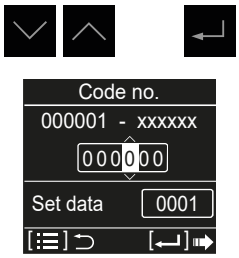
1. Verify that the display of the integrated remote controller is working, then stop the system and power it on again before performing the following steps.
2. Simultaneously press and hold the relevant three-button combination on the remote controller (see below) for at least 4 seconds, until the “Maintenance func” screen appears on the display.
   Note:
   This step has to be performed within 30 seconds after powering on the system while auto-addressing is in progress and the message “Assigning” is shown on the display, otherwise error E16 will occur. In this case, repeat steps 1 and 2 and mind the time limit.



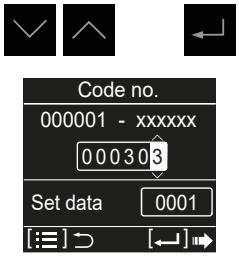
3. On the “Maintenance func” screen, scroll through the menu items with the “UP” and “DOWN” buttons, and select “Detailed settings” by pressing the “ENTER” button when it is highligted in the list.



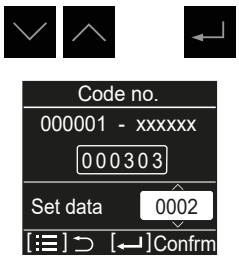
4. On the “Detailed settings” screen, the “Unit No.” option will be highlighted.
   Note: If auto-addressing has been completed before, the relevant unit number will be displayed, or if not, “All” will be displayed instead.
   With the “UP” and “DOWN” buttons, change the value to the unit number of the relevant system, and press the “ENTER” button to confirm the new setting.



5. Press and hold the “ENTER” button for at least 2 seconds, to get directly to the 6-digit “Code no.” option, where you can select the desired code by altering each digit one by one with the “UP” and “DOWN” buttons and pressing the “ENTER” button after each digit. Once the desired code (Code No. 000303) has been set, press the “ENTER” button again to confirm this setting.

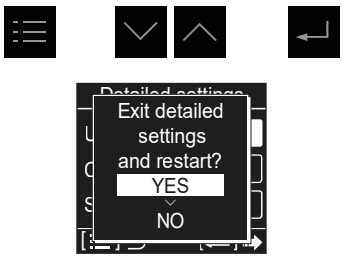


6. After confirming the “Code no.” setting, the “Set data“ option becomes highlighted. With the “UP” and “DOWN” buttons, enter the value “0002” (Set data 0002 = Ignoring indoor unit capacity) and press the “ENTER” button to confirm the new setting.



4

7. Once the setting procedure is completed, exit the “Detailed settings” mode by pressing the “MENU” button several times. This will invoke a confirmation message (see below). Select “YES” with the “UP” and “DOWN” buttons, and then press the “ENTER” button to finish the “Detailed settings” mode and return to the normal remote controller screen.



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, 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. A 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.
- ► Unauthorised 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 unauthorised 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.

Important

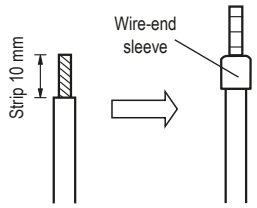
For the recommended wiring lengths and diameters, please see → *5.5 Wiring system diagrams, p. 65*.

5.2 Connection of wiring to terminals

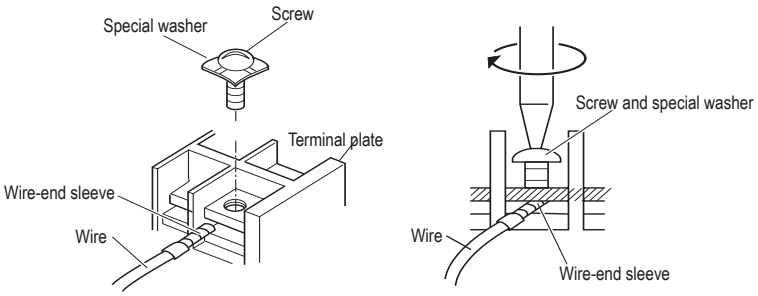
Connect wiring to the terminals according to the following instructions.

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.



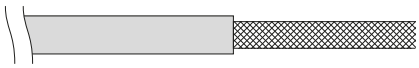
2. Using a flat-blade screwdriver, loosen the terminal screw(s) on the terminal plate.
3. Attach a wire-end sleeve to each stripped wire end using a crimping tool.
4. Place the wire-end sleeve into the socket on the connector and replace and tighten the removed terminal screw using a flat-blade screwdriver.



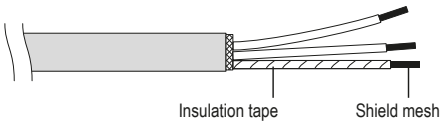
5

Shielded wire

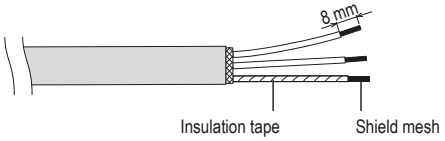
1. Remove cable sheath. Take care not to scratch braided shield.



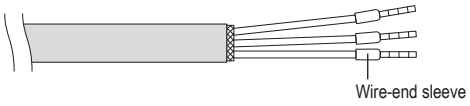
2. Unbraid the braided shield mesh carefully and twist the unbraided shield mesh tightly together. Insulate the shield mesh by covering them with an insulation tube or wrapping insulation tape around wire.



3. Remove insulation of signal wire.



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



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

5.3 Terminal board layout

5.3.1 MAH3 models

Terminal layout – Main terminal board (PAN.UXRP71B-P)

	Terminal No.	Allocation	Function	Description
X1				
L	X1.1	Live	Live Terminal	External Potential: 230 V AC, max. 1 A
N	X1.2	Neutral	Neutral Terminal	
PE	X1.4	Protective earth	Protective Earth Conductor	

	Terminal No.	Allocation	Function	Description
X2				
F1	X2.1	COM for F2	Fan Operation Signal	External Potential: max. 250 VAC 8 A
F2	X2.2	Fan contact		
OP3	X2.3	Fan Alarm	Fan Alarm Signal Input (Unit will only operate if this contact is closed, otherwise error code P01 will be displayed.)	Internal potential 230 VAC
K2	X2.4	Potential for OP3		
HU1	X2.5	Humidifier contact	External Humidifier Control output	Internal potential 230 VAC / max. 3A
HU2	X2.6	COM for HU1		

	Terminal No.	Allocation	Function	Description
X3				
FS1	X3.1	Lower Potential for FS	Float switch (ex factory bridged)	Internal Potential: 12 V DC
FS2	X3.2	Higher Potential for FS		
FD1	X3.3	Higher Potential for ext.Fan	ON/OFF Control output of an additional external fan or additional external air handling unit	Internal potential: 12 V DC
FD2	X3.4	Lower Potential for ext. Fan		
EX1	X3.5	Higher Potential for EXCT	EXCT-Contact input (external thermostat off switch)	Internal Potential: 5 V DC
EX2	X3.6	Lower Potential for EXCT		
FI1	X3.7	Higher Potential for Filter Contact	Filter Contact input (for external filter signal)	Internal Potential: 5 V DC Note: For activating filter input, verify in Detailed Settings that code 2A is set to “0000”
FI2	X3.8	Lower Potential for Filter Contact		
T10.1	X3.9	Higher Potential for T10	AHU ON/OFF external input (Pulse: each pulse change start/stop; Static: closed = ON, open = STOP)	Internal Potential: 5 V DC Note: In Detailed Settings verify that code 2E is set to “0000”. Default pulse signal. For static signal cut JP001 on main PCB.
T10.2	X3.10	Lower Potential for T10		

To be continued on next page.

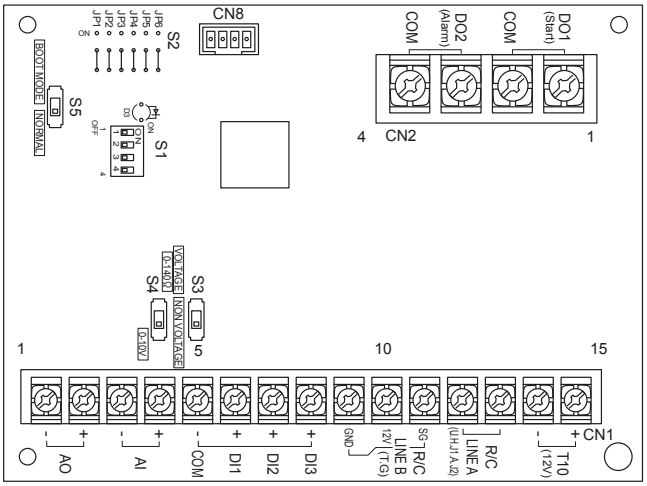
	X4	Terminal No.	Allocation	Function	Description
●	TA1	X4.1	No polarity	Suction Temperature Sensor TA input (included) (Room Temperature Sensor)	Air temperature sensor
●	TA2	X4.2	No polarity		
●	E1.1	X4.3	No polarity	Sensor E1 / TH2 input (included)	Refrigerant temperature sensor
●	E1.2	X4.4	No polarity		
●	E3.1	X4.5	No polarity	Sensor E3 / TH4 input (included)	Refrigerant temperature sensor
●	E3.2	X4.6	No polarity		
●	BL1	X4.7	No polarity	Discharge Temperature Sensor BL Input (included)	Air temperature sensor
●	BL2	X4.8	No polarity		
●	OP1	X4.9	COM for OP2 - OP6 Higher Potential	+ 12 V DC	12 V DC relay required for each signal output, field supplied
●	OP2	X4.10	Lower Potential for Defrost	Defrost signal output	
●	OP3	X4.11	Lower Potential for Thermostat ON	Thermostat ON signal output	
●	OP4	X4.12	Lower Potential for Cool Operation	Cool operation signal output	
●	OP5	X4.13	Lower Potential for Heat Operation	Heat operation signal output	
●	OP6	X4.14	Lower Potential for Fan Mode Operation	Fan mode (free cooling) operation signal output	
●	MO1	X4.15	ORG	Expansion valve output	
●	MO2	X4.16	RED		
●	MO3	X4.17	YEL		
●	MO4	X4.18	BLK		
●	MO5	X4.19	GRY / WHT		

	X5	Terminal No.	Allocation	Function	Description
●	U1	X5.1	No polarity	Communication bus wiring P-link	Required for communication with outdoor unit and centralised controller
●	U2	X5.2	No polarity		
●	R1	X5.3	No polarity	Terminal for Group Wiring (RC connection)	Internal Potential: 16 V DC between R1 & R2
●	R2	X5.4	No polarity		

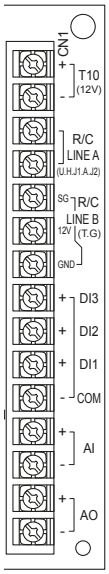
To be continued on next page.

X6	Terminal No.	Allocation	Function	Description
AO1	X6.1	4 – 20 mA Higher potential	Analogue output terminals	Analog output (Room temperature monitor), Indoor temperature monitor output. Output current : 4 to 20 mA. Temperature indication range : 5 to 36 °C, 0.5 °C step
AO2	X6.2	4 – 20 mA Lower potential		
AI1	X6.3	0 to 10 V DC Higher potential	Analogue input terminals for temperature and demand control	Analogue input (+10 V DC) for demand control / temperature control
AI2	X6.4	0 to 10 V DC Lower potential		Analog input Negative potential (–10 V DC) for demand control / temperature setting
T/D1	X6.5	No polarity	Activation of demand control	Insert bridge to activate temperature control (system is set for demand control as standard)
T/D2	X6.6	No polarity		
COM	X6.7	Lower potential for DI1 to DI3	Digital Inputs (For information on functionality refer to section “Terminal layout – CZ-CAPBC2 / ACC-SP1A“ in this document or in the dedicated installation instruction of CZ-CAPBC2)	2 types of usage: a) Potential-free: Keep S3 of CZ-CAPBC2 / ACC-SP1A on “NON VOLTAGE”. b) 12 to 24 V DC, 10 mA external: Change S3 of CZ-CAPBC2 / ACC-SP1A to “VOLTAGE”.
DI1	X6.8	Digital Input 1 Higher potential		
DI2	X6.9	Digital Input 2 Higher potential		
DI3	X6.10	Digital Input 3 Higher potential		
COM	X6.11	COM for DO2	Alarm Signal	External Potential: max. 230 V AC / 3 A
DO2	X6.12	Alarm Signal		
COM	X6.13	COM for DO1	Operation Signal	External Potential: max. 230 V AC / 3 A
DO1	X6.14	Operation Signal		

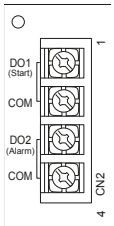
Terminal layout – CZ-CAPBC2 / ACC-SP1A



CZ-CAPBC2 interface, terminal block CN1

Connections	No.	Polarity	Name	Allocation	Function	Description
	15	+	T10 (12V)	By factory default connected	12 V power supply	
	14	–		By factory default connected		
	13		R/C LINE A	By factory default connected	Remote control line A	
	12			By factory default connected		
	11	SG	R/C LINE B	Not used	Remote control line B	
	10	12V		Not used		
	9	GND		Not used		
	8	+	DI3	By factory default connected to terminal contacts	Digital input	
	7	+	DI2	By factory default connected to terminal contacts		
	6	+	DI1	By factory default connected to terminal contacts		
	5	–	COM	By factory default connected to terminal contacts		
	4	+	AI	By factory default connected to terminal contacts	Analog input (Change temperature setting)	
	3	–		By factory default connected to terminal contacts		
	2	+	AO	Advanced version: Not connected to terminal contacts. Medium version: By factory default connected to terminal contacts	Analog output (Room temperature monitor)	
	1	–		Advanced version: Not connected to terminal contacts. Medium version: By factory default connected to terminal contacts		

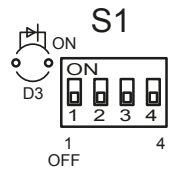
CZ-CAPBC2 interface, terminal block CN2

Connections	No.	Name	Allocation	Function	Description
	1	DO1	By factory default connected to terminal contacts	Digital output 1 (Start output)	
	2	COM	By factory default connected to terminal contacts		
	3	DO2	By factory default connected to terminal contacts	Digital output 2 (Alarm output)	
	4	COM	By factory default connected to terminal contacts		

CZ-CAPBC2 digital input functionality

The CZ-CAPBC2 digital inputs offer the following functionality settings.

Switch S1: Control type setting



– Off ● On

Control type	S1				Control type	S1			
	1	2	3	4		1	2	3	4
0	–	–	–	–	8	–	–	–	●
1	●	–	–	–	9	●	–	–	●
2	–	●	–	–	10[1]	–	●	–	●
3	●	●	–	–	11	●	●	–	●
4	–	–	●	–	12	–	–	●	●
5	●	–	●	–	13	●	–	●	●
6	–	●	●	–	14	–	●	●	●
7	●	●	●	–	15	●	●	●	●

Control type	Input 1 (DI1)		Input 2 (DI2)		Input 3 (DI3)		Voltage of NO contact: static / pulses
	open ► close	close ► open	open ► close	close ► open	open ► close	close ► open	
0	Start Fan low	Indoor units stop when all of Input 1, 2, 3 are open	Start Fan medium	Indoor units stop when all of Input 1, 2, 3 are open	Start Fan high	Indoor units stop when all of Input 1, 2, 3 are open	All inputs: static
1	Start Prohibit R/C Start/Stop	Stop Prohibit R/C Start/Stop	Start Accept R/C Start/Stop	Stop Prohibit R/C Start/Stop	Stop Prohibit R/C Start/Stop	–	Input 1, 2: static Input 3: pulse
2	Start Prohibit R/C Start	Stop Prohibit R/C Start/Stop	Accept R/C Start/Stop	Stop Prohibit R/C Start/Stop	Stop Prohibit R/C Start/Stop	–	Input 1, 2: static Input 3: pulse
3	Start <—> Stop Prohibit R/C Start/Stop	–	Start <—> Stop Accept R/C Start/Stop	–	Stop Prohibit R/C Start/Stop	–	All inputs: pulse
4	Start Prohibit R/C Start/Stop	–	Start Accept R/C Start/Stop	–	Stop Prohibit R/C Start/Stop	–	
5	Start Prohibit R/C Start	–	Accept R/C Start/Stop	–	Stop Prohibit R/C Start/Stop	–	
6	Start Accept R/C Start/Stop	–	Stop Accept R/C Start/Stop	–	–	–	
7	Start <—> Stop Prohibit R/C Start/Stop	–	Start <—> Stop Accept R/C Start/Stop	–	Set thermostat OFF	Release thermostat OFF	Input 1, 2: static Input 3: pulse
8	–	–	–	–	–	–	–
9	Heat	–	Cool	–	Fan	–	All inputs: pulse
10	Heat Start	Indoor units stop when all of Input 1, 2, 3 are open	Cool Start	Indoor units stop when all of Input 1, 2, 3 are open	Fan Start	Indoor units stop when all of Input 1, 2, 3 are open	All inputs: static
11	–	–	–	–	–	–	–
12	–	–	–	–	–	–	–
13	–	–	–	–	–	–	–
14	–	–	–	–	–	–	–
15	Start	Stop	–	–	Set thermostat OFF	Release thermostat OFF	All inputs: static

Notes:

1 Control type No. 10 is the factory default.
2 If digital input signals are to be used for mode change only without using the start/stop function, set switch S1 to control type No. 9.
3 By default, CZ-CAPBC2 digital inputs are set for accepting non-voltage signals from dry contacts.

Switch S3: Digital input configuration setting (voltage/non-voltage signals)

Depending on the BMS digital input (DI) configuration, switch S3 on the CZ-CAPBC2 interface can be set for the digital input terminals to accept either non-voltage signals from dry contacts (factory default: “NON VOLTAGE”) or 12 – 24 V DC signals (“VOLTAGE”).

Set S3 to “VOLTAGE”, if digital inputs are to accept 12 – 24 V DC signals

Keep S3 default setting “NON VOLTAGE”, if digital inputs are to accept non-voltage signals from dry contacts.

Important

For more details about the connection and functions of the CZ-CAPBC2 interface, please refer to the separate installation instructions for CZ-CAPBC2.

5.3.2 PAH3 model

Terminal layout – Main terminal board (ACXA73-38670)

		Terminal No.	Allocation	Function	Description
	X1				
●	L	X1.1	Live	Live Terminal	External Potential: 230 V AC, max. 1 A
●	N	X1.2	Neutral	Neutral Terminal	
●	3	X1.3	Comm	Communication terminal	Internal potential 0 - 75 V DC
●	PE	X1.4	Protective earth	Protective Earth Conductor	

		Terminal No.	Allocation	Function	Description
	X2				
●	F1	X2.1	COM for F2	Fan Operation Signal	External Potential: max. 250 VAC 5 A
●	F2	X2.2	Fan contact		

		Terminal No.	Allocation	Function	Description
	X3				
●	FS1	X3.1	Lower Potential for FS	Float switch (ex factory bridged)	Internal Potential: 12 V DC
●	FS2	X3.2	Higher Potential for FS		
●	T10.1	X3.3	Higher Potential for T10	ON/OFF (operation/stop by external signal)	Internal Potential: 12 V DC Default pulse signal, can be changed to static by cutting JP001 on A1 PCB Can be also used as OFF reminder or fire prevention input by parameter code 00002E (see relevant technical data service manual for details)
●	T10.2	X3.4	Lower Potential for T10		
●	EX1	X3.5	Higher Potential for EXCT	EXCT Contact input (external thermostat off switch)	Internal Potential: 5 V DC
●	EX2	X3.6	Lower Potential for EXCT		

To be continued on next page.

	X4	Terminal No.	Allocation	Function	Description
●	TA1	X4.1	No polarity	Suction Temperature Sensor TA input (included) (Room Temperature Sensor)	Air temperature sensor
●	TA2	X4.2	No polarity		
●	E1.1	X4.3	No polarity	Sensor E1 / TH2	Refrigerant temperature sensor
●	E1.2	X4.4	No polarity		
●	E2.1	X4.5	No polarity	Sensor E2 / TH3	Refrigerant temperature sensor
●	E2.2	X4.6	No polarity		
●	OP1	X4.7	COM for OP2 - OP6 Higher Potential	+ 12 V DC	12 V DC relay required for each signal output, field supplied
●	OP2	X4.8	Lower Potential for Defrost	Defrost signal output	
●	OP3	X4.9	Lower Potential for Thermostat ON	Thermostat ON signal output	
●	OP4	X4.10	Lower Potential for Cool Operation	Cool operation signal output	
●	OP5	X4.11	Lower Potential for Heat Operation	Heat operation signal output	
●	OP6	X4.12	Lower Potential for Fan Mode Operation	Fan mode (free cooling) operation signal output	
●	OT1	X4.13	COM for OT2 - OT6 Lower Potential	- 2.5 … 5.0 V DC	Internal Potential 2.5 – 5.0 V DC 0.5mA Current [1]
●	OT2	X4.14	Heat input Higher Potential	Heat mode input	
●	OT3	X4.15	Cool input Higher Potential	Cool mode input	
●	OT4	X4.16	Demand Input 1 Higher Potential	LV1 demand control input	Demand control, QUIET and EXCT inputs must be set using indoor unit detailed settings, parameter code 0002EE, please see relevant technical data service manual for details. Internal potential 2.5 – 5.0 V DC 0.5mA Current [1]
●	OT5	X4.17	Demand Input 2 Higher Potential	LV2 demand control / QUIET input	
●	OT6	X4.18	Demand Input 3 Higher Potential	LV3 demand control / EXCT (forcibly thermostat off) input	

	X5	Terminal No.	Allocation	Function	Description
●	U1	X5.1	No polarity	Communication bus wiring S-link	Required for centralised controller
●	U2	X5.2	No polarity		
●	R1	X5.3	No polarity	Terminal for Group Wiring (RC connection)	Internal Potential: 16 V DC
●	R2	X5.4	No polarity		
●	R1	X5.5	No polarity	Terminal for Group Wiring (RC connection)	Internal Potential: 16 V DC
●	R2	X5.6	No polarity		

To be continued on next page.

X6	Terminal No.	Allocation	Function	Description
AO1	X6.1	4 – 20 mA Higher potential	Analogue output terminals	Analog output (Room temperature monitor), Indoor temperature monitor output. Output current : 4 to 20 mA. Temperature indication range : 5 to 36 °C, 0.5 °C step
AO2	X6.2	4 – 20 mA Lower potential		
AI1	X6.3	0 to 10 V DC Higher potential	Analogue input terminals for temperature and demand control	Analogue input (+10 V DC) for demand control / temperature control
AI2	X6.4	0 to 10 V DC Lower potential		Analog input Negative potential (–10 V DC) for demand control / temperature setting
T/D1	X6.5	No polarity	Activation of demand control	Insert bridge to activate temperature control (system is set for demand control as standard)
T/D2	X6.6	No polarity		
COM	X6.7	Lower potential for DI1 to DI3	Digital Inputs (For information on functionality refer to section “Terminal layout – CZ-CAPBC2 / ACC-SP1A“ in this document or in the dedicated installation instruction of CZ-CAPBC2)	2 types of usage: a) Potential-free: Keep S3 of CZ-CAPBC2 / ACC-SP1A on “NON VOLTAGE”. b) 12 to 24 V DC, 10 mA external: Change S3 of CZ-CAPBC2 / ACC-SP1A to “VOLTAGE”.
DI1	X6.8	Digital Input 1 Higher potential		
DI2	X6.9	Digital Input 2 Higher potential		
DI3	X6.10	Digital Input 3 Higher potential		
COM	X6.11	COM for DO2	Alarm Signal	External Potential: max. 230 V AC / 3 A
DO2	X6.12	Alarm Signal		
COM	X6.13	COM for DO1	Operation Signal	External Potential: max. 230 V AC / 3 A
DO1	X6.14	Operation Signal		

OT1 to OT6 work only with PACi NX outdoor units.

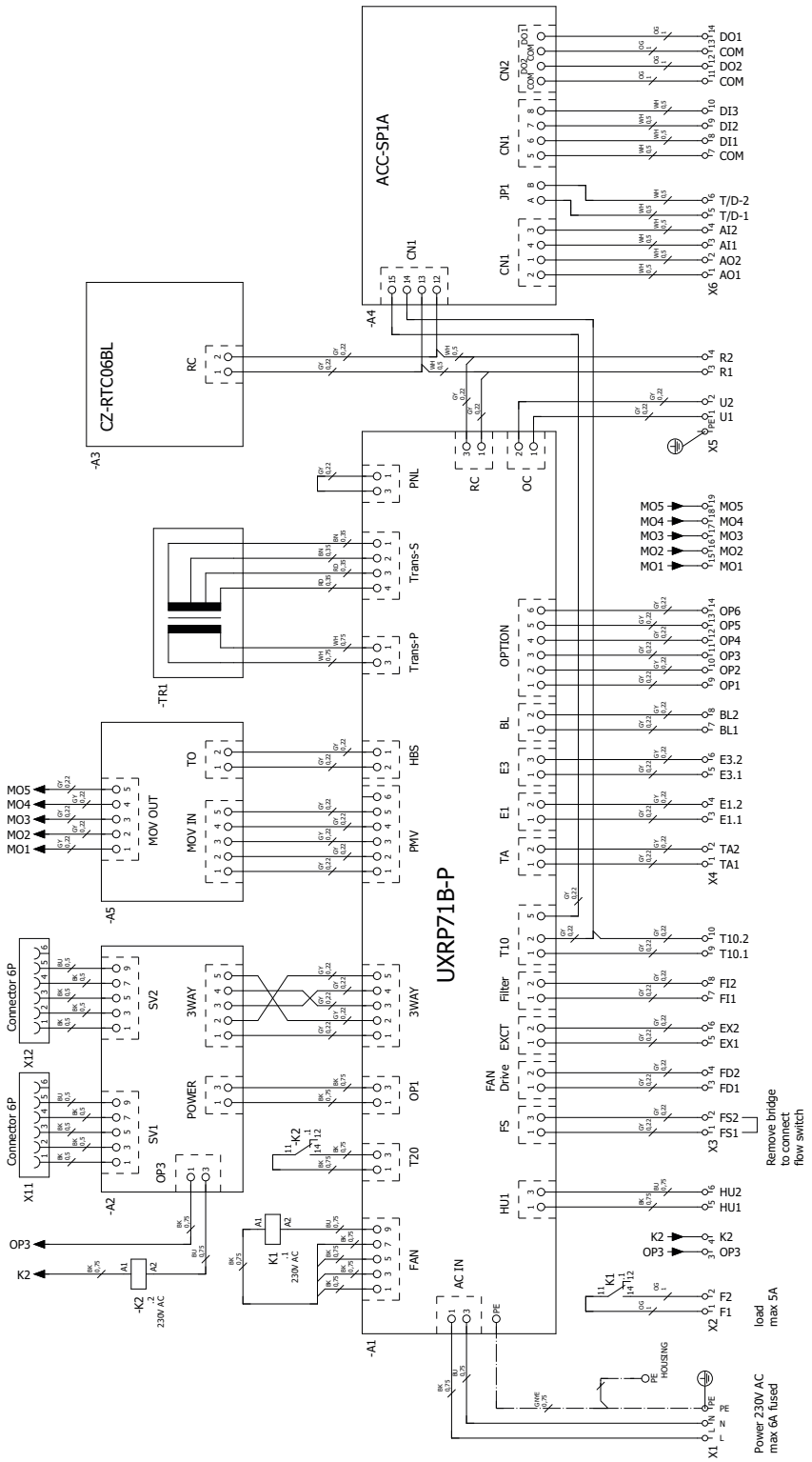
Terminal layout – CZ-CAPBC2 / ACC-SP1A

For information on the terminal layout of CZ-CAPBC2 / ACC-SP1A see → *5.3 Terminal board layout – CZ-CAPBC2 / ACC-SP1A, p. 58*.

5.4 Wiring layout

Wiring layout – MAH3 models

PAW-160MAH3M / PAW-280MAH3M / PAW-560MAH3M for ECO i and ECO G



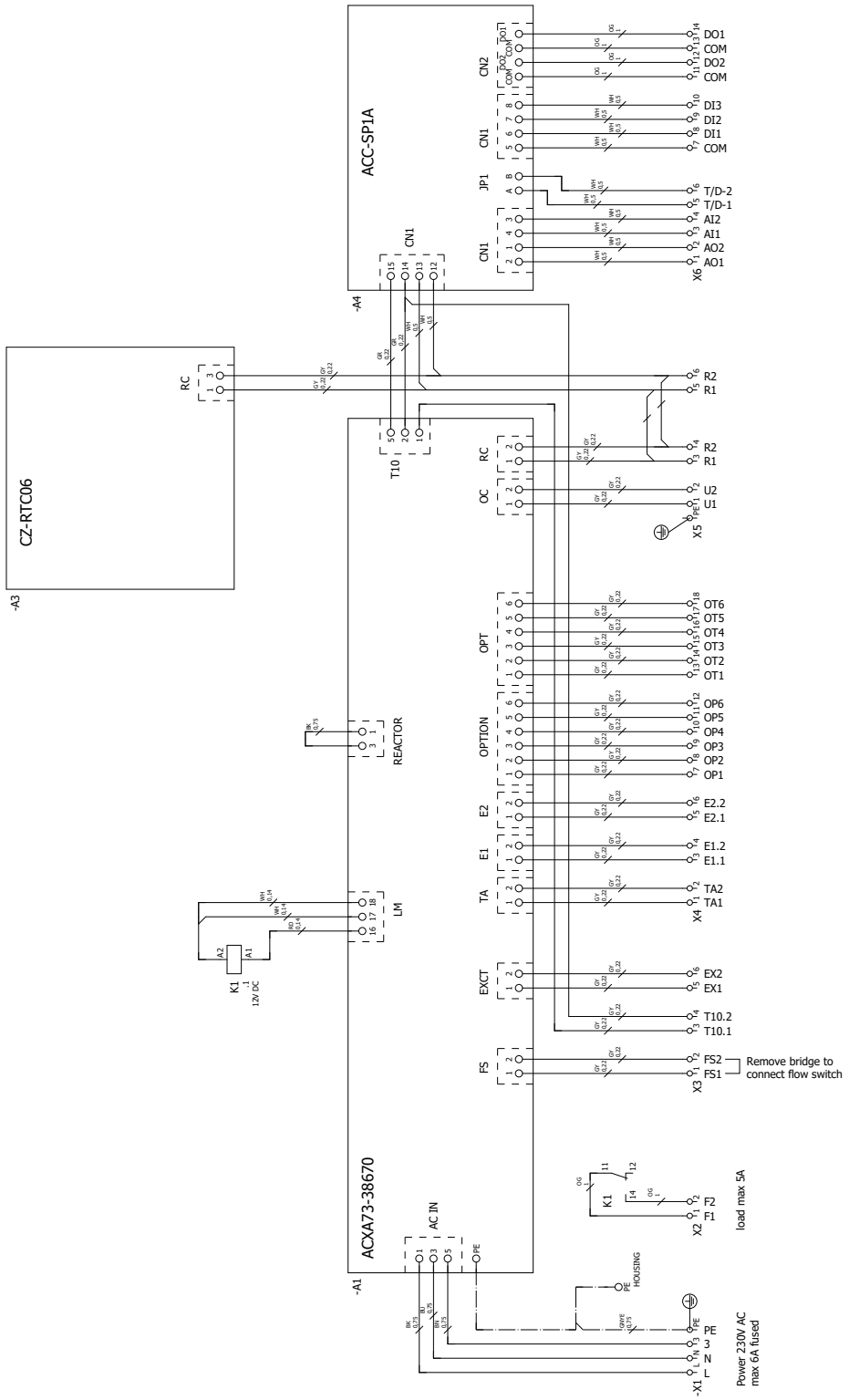
Legend

	MAH3M
TA	Air intake temperature sensor TA
E1	Indoor coil thermistor E1
E3	Indoor coil thermistor E3
BL	Air outlet temperature sensor BL
CZ-RTC6BL	Remote controller
PAN.SV80x	RAP valve control PCB

	MAH3M
PAN.UXRP71B-P	Main PCB
K1 / K2	Auxiliary power relay
ACC-SP1A	External signal control PCB
PAN.MOVG1-P	Single motorised valve PCB

Wiring layout – PAH3 model

PAW-280PAH3M-1 for for PAC i and PAC i NX



PAH3M-1	
ACXA73-38670	Main PCB
K1	Auxiliary power relay
ACC-SP1A	External signal control PCB

Legend

PAH3M-1		
TA	Air intake temperature sensor TA	X
E1	Indoor coil thermistor E1	X
E2	Indoor coil thermistor E2	X
CZ-RTC6	Remote controller CZ-RTC6BL	X

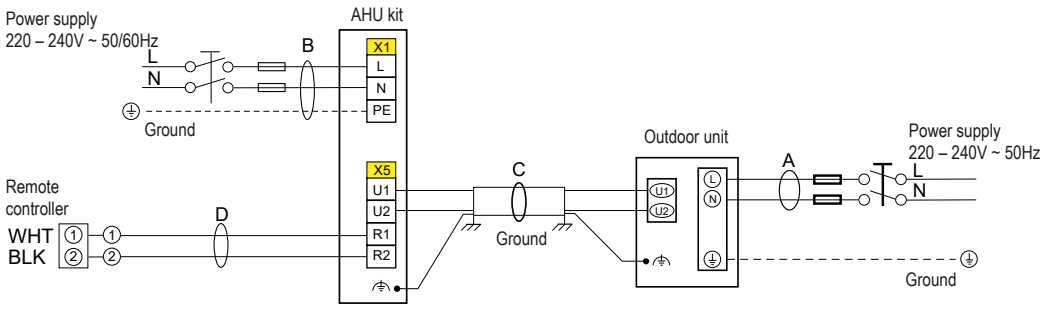
5.5 Wiring system diagrams

Important

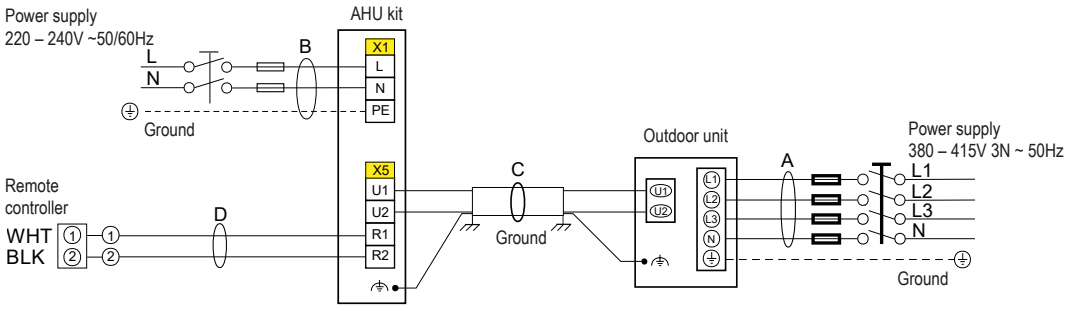
- The letter coding (A to F) used in this section refers only to the wiring system diagrams in this section.
- For information on “(A) Power supply of outdoor unit” refer to the “Installation Instructions“ for the relevant outdoor unit.

ECOi Wiring system diagram – ECOi systems

For single-phase outdoor units – Single-system connection

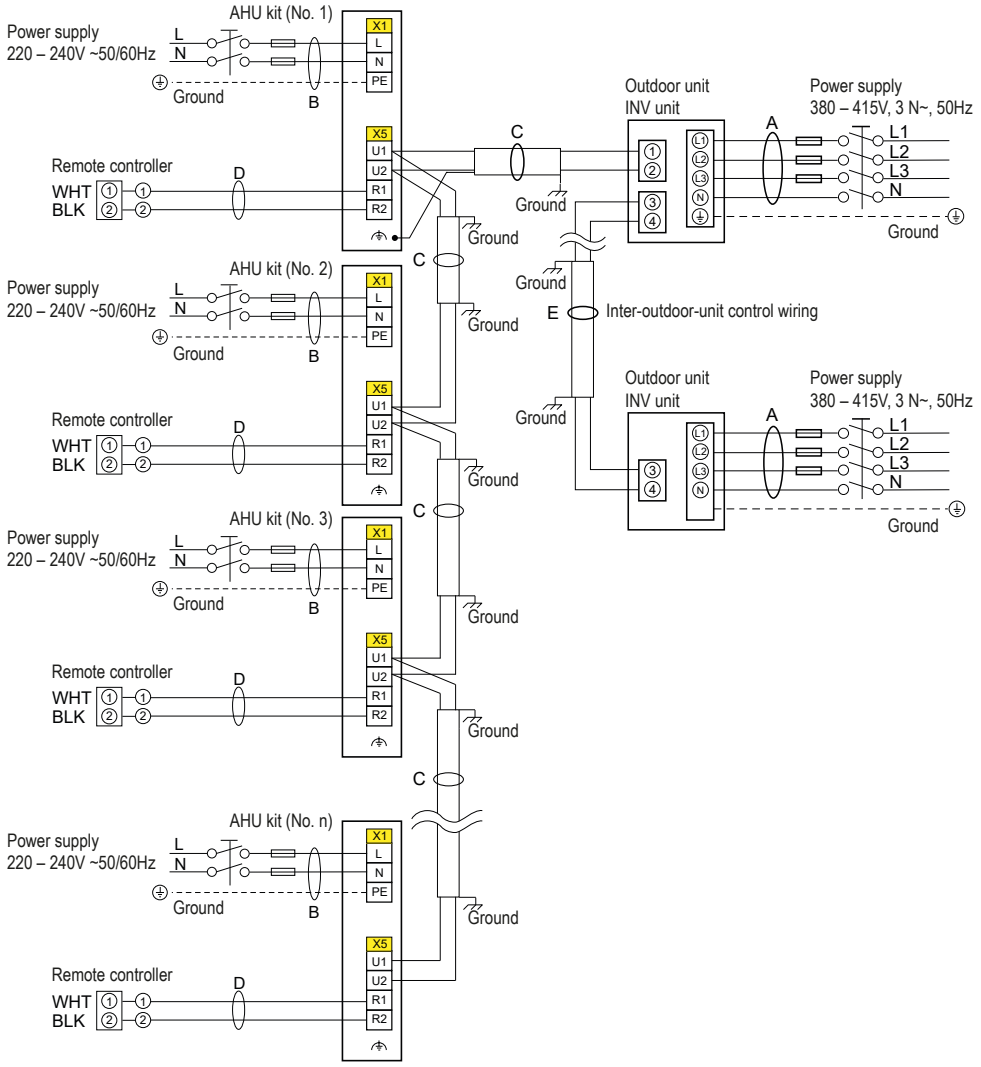


For three-phase outdoor units – Single-system connection



5

For three-phase outdoor units – Multi-system connection



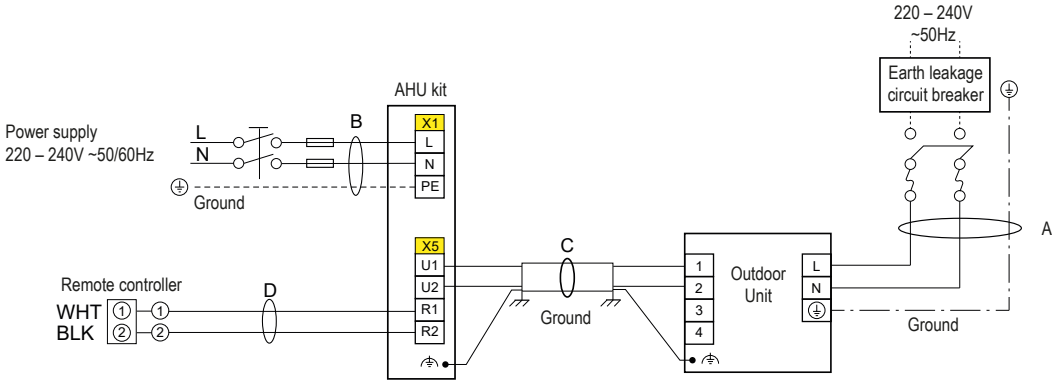
Recommended wire lengths and diameters

AHU Kit		
Type	**(B) Power supply**	**Time delay fuse or circuit breaker**
PAW-160/280/560MAH3M	Min. 0.75 mm²	6 A
	Max. 25 m	

Control wiring					
(C) Inter-unit control wiring (between outdoor unit and AHU Kit)			**(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” is relevant for ECOi multi connection systems.

ECO G Wiring system diagram – ECO G systems



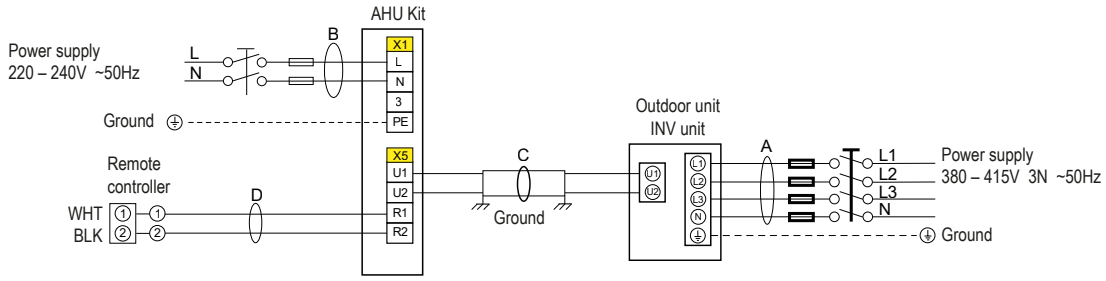
Recommended wire lengths and diameters

AHU Kit			
Type	**(B) Power supply**		**Time delay fuse or circuit breaker**
PAW-160/280/560MAH3M	Min. 0.75 mm²		6 A
	Max. 25 m		

Control wiring				
(C) Inter-unit control wiring (between outdoor unit and AHU Kit)			**(D) Remote control wiring**	**(E) Control wiring for group control**
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
Max. 1,000 m		Max. 2,000 m	Max. 500 m	Max. 200 m (total)

PACi Wiring system diagram – PACi systems and PAH3 generation AHU Kit

For three-phase outdoor units – Single-system connection



Recommended wire lengths and diameters

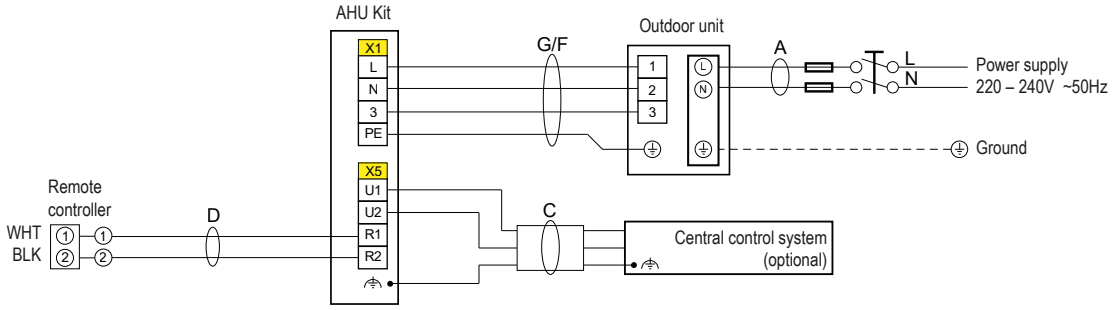
AHU Kit		
Type	**(B) Power supply**	**Circuit breaker [1]**
PAW-280PAH3M-1	Min. 0.75 mm²	6 A
	Max. 25 m	

Control wiring		
(C) Inter-unit control wiring [2] (between outdoor unit and AHU Kit)	**(D) Remote control wiring**	**(E) Control wiring for group control [2]**
Min. 0.75 mm²	0.75 mm² (AWG# 18) Use shielded wiring	0.75 mm² (AWG# 18) Use shielded wiring
Max. 1,000 m	Max. 500 m	Max. 200 m (total)

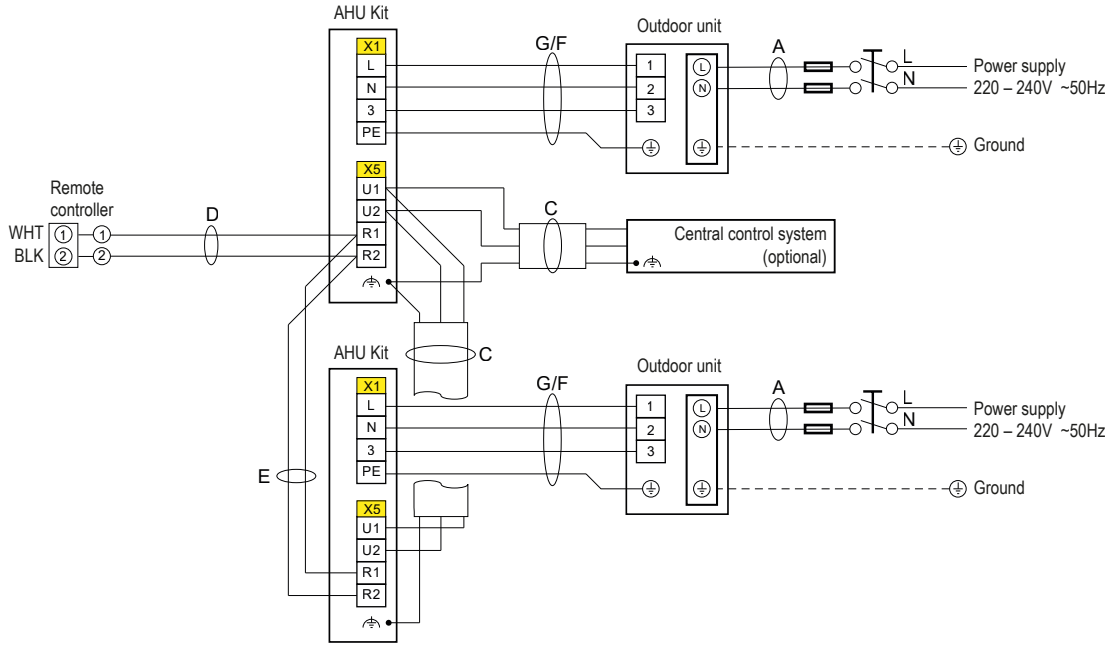
1 The circuit breaker must be incorporated in the fixed wiring in accordance with the wiring regulations.
2 Use a shielded cable for the control wiring.

PACi NX Wiring system diagram – PACi NX systems and PAH3 generation AHU Kit

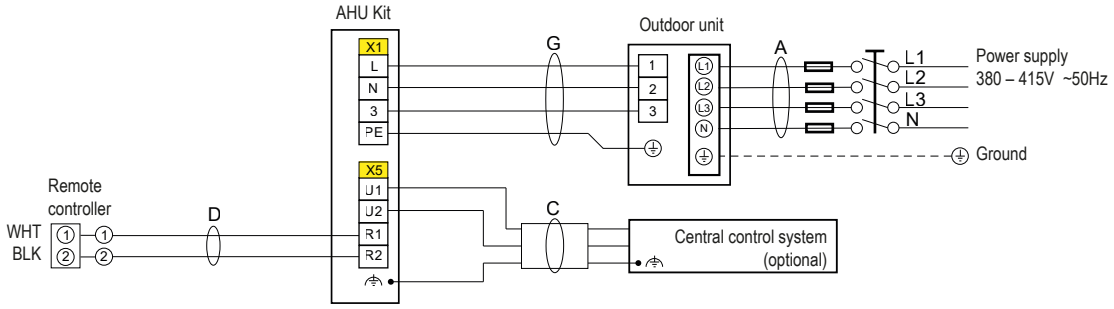
For single-phase outdoor units – Single-system connection



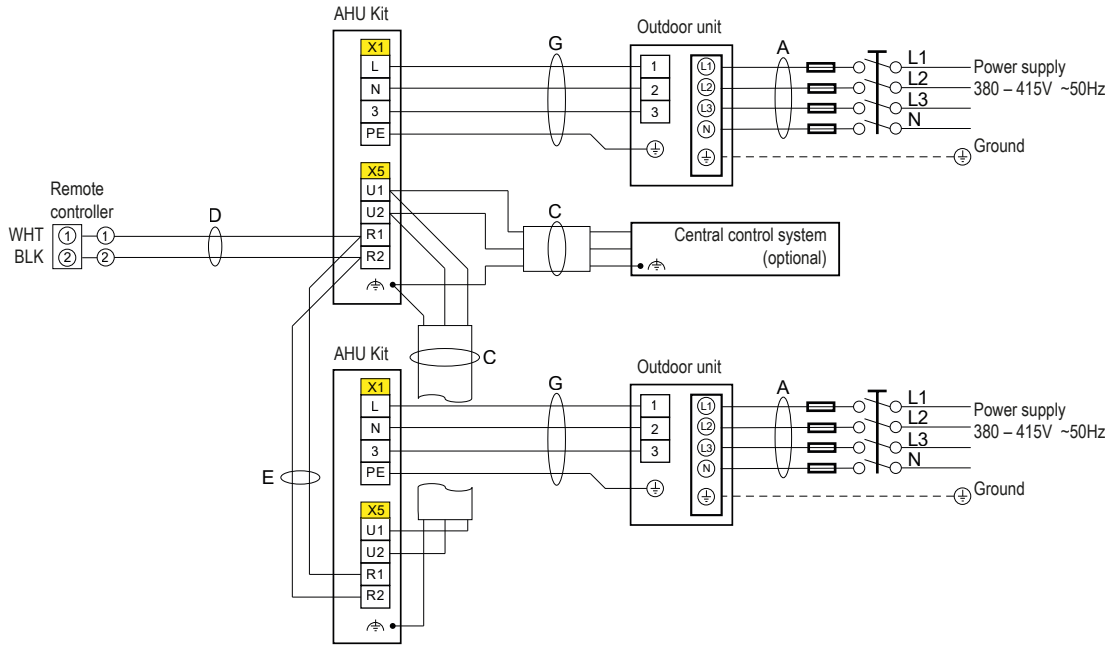
For single-phase outdoor units – Multi-system connection



For three-phase outdoor units – Single-system connection



For three-phase outdoor units – Multi-system connection



5

Recommended wire lengths and diameters

AHU Kit			
Type	**(F / G) Connection cable between outdoor and AHU Kit**		
	(F) Outdoor units: U-36/50PZ3E5, U-60/71PZ3E5A, U-36/50/60PZH3E5	**(G) Outdoor units: U-100/125/140PZ3E5, U-100/125/140PZ3E8**	**(G) Outdoor units: U-71/100/125/140PZH4E5, U-71/100/125/140PZH4E8**
PAW-280PAH3M-1	Min. 1.5 mm² (1)	Min. 2.5 mm² (1)	Min. 2.5 mm²
	Max. 40 m (2)	Max. 50 m (2)	Max. 85 m

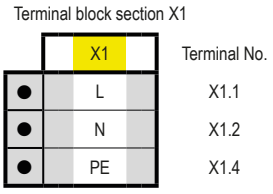
Control wiring		
(C) Inter-unit (between Integrated control system and indoor units) control wiring	**(D) Remote control wiring**	**(E) Remote control wiring for group control**
Min. 0.75 mm² Use shielded wiring (3)	Min. 0.75 mm²	Min. 0.75 mm²
Max. 1,000 m	(D) + (E): Max. 500 m; (E): Max. 200 m The above descriptions can be used for the model CZ-RTC4, CZ-RTC5B and CZ-RTC6 Series. For other remote controllers, refer to the manual of each unit.	

1 Maximum applicable wire for terminal board of indoor unit: 4 mm
2 This maximum length shows a 2 % voltage drop.
3 With ring-type wire terminal

Notes on wiring system diagrams – All systems

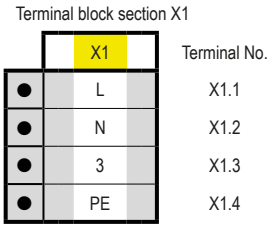
1. Refer to the “Recommended wire lengths and diameters” tables for the explanation of “A”, “B”, “C”, “D”, “E”, “F” and “G” in the above diagrams.
2. The connection diagram below shows the power supply connector of the AHU Kit’s terminal board (actual appearance may differ slightly).

MAH3 generation



X1.1	L	Power supply
X1.2	N	Neutral conductor
X1.4	PE	Protective earthing

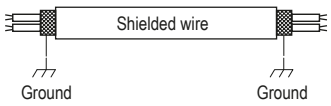
PAH3 generation



X1.1	L	Power supply
X1.2	N	Neutral conductor
X1.3	3	Communication terminal
X1.4	PE	Protective earthing

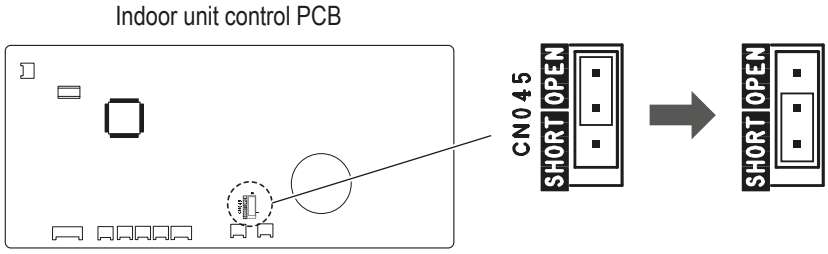
3. Refrigerant Circuit (R.C.) address should be set on the outdoor unit as follows:
   – for ECOi and PACi systems before turning the power on
   – for ECO G and PACi NX systems after turning the power on.
4. Regarding R.C. address setting, refer to the installation instructions supplied with the remote 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) to ECOi, ECO G and PACi PZ2/ PZH2 systems and also to centralised controllers in case of PACi NX systems, with shielded woven mesh grounded on both sides, otherwise misoperation from noise may occur.

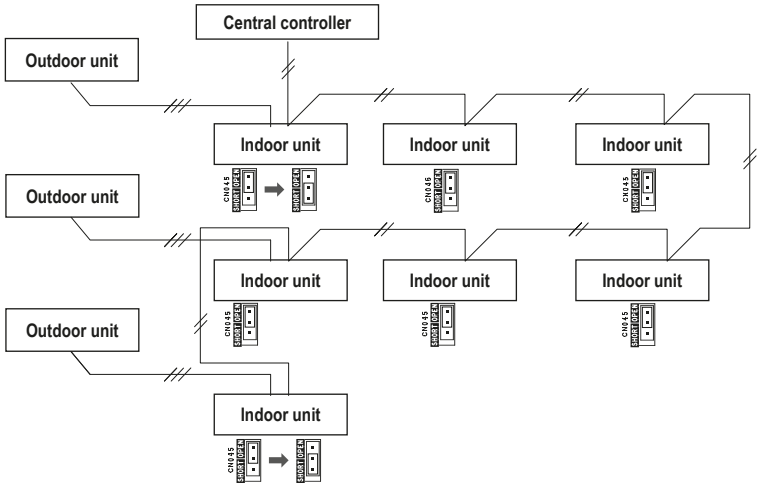


For instructions on how to connect the wiring see → *5.5 Wiring system diagrams, p. 65*.

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 ECOi, ECO G and PACi outdoor units in a network, the following rules for bus terminators must be observed.
   Upon shipment the bus terminator is set to “SHORT”. When linking two outdoor units, open the jumper from the bus terminator for only one of these outdoor units. When linking more than two outdoor units, open the jumper from the bus terminator for all but the first and the last one in the same link wiring network.
   For a system without link (no wiring connection between outdoor units), do not remove the bus terminator bridge.
   When linking PACi NX outdoor units in a network, the installation method of the terminating resistance (bus terminator) depends on the connecting procedure of the inter-unit control wiring in the link as follows.
   - In case that the inter-unit control wiring in the link has only of 3-line connections:
   > Set the terminating resistance on the indoor unit control PCB.
   Upon shipment, the terminating resistance is set to “OPEN” (inoperative). If the shorting socket is replaced as shown below, the terminating resistance is set to “SHORT” (operative).
   Change the setting of the terminating resistance at the nearest indoor unit and farthest indoor unit from the integrated control system to “SHORT” (operative).

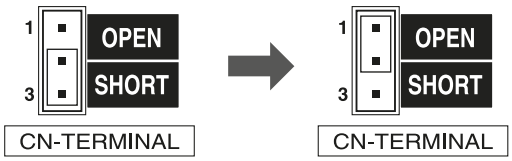


   > Note that setting 3 or more terminating resistances to “SHORT” (operative) is prohibited.

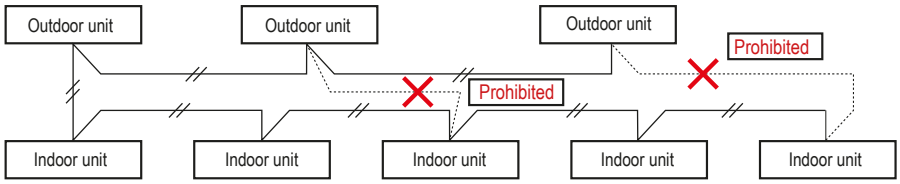


- In case that the inter-unit control wiring in the link has both 3-line and 2-line connections:

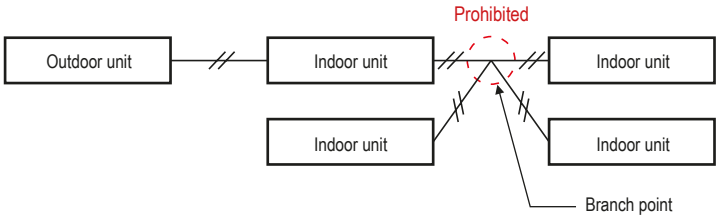
> Set the terminating resistance with the TERMINAL pin (CN-TERMINAL) on the outdoor unit control PCB (note, that the outdoor unit is connected by 2-line connection).
> Upon shipment the terminating resistance is set to “SHORT” (operative).
> Leave one unit in short circuit condition among outdoor units in the link. Change to OPEN for other units. For a system without link (no wiring connection between outdoor units), do not remove the short plug.



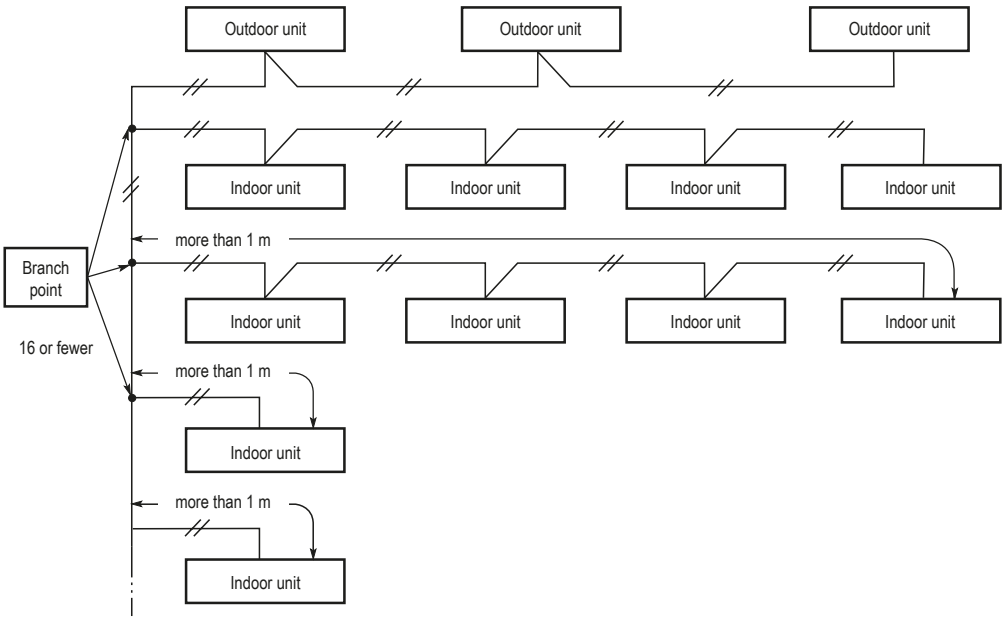
8. Do not install the inter-unit control wiring in a way that forms a loop.



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 1 m 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 must only have one remote controller and one CZ-CAPBC2 board (ACC-SP1A PCB) connected in one AHU kit. 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.

ATTENTION

Loose wiring may cause overheating of terminals resulting in unit malfunction or fire

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 → *5.6 Connection of external signal lines, p. 73*) and fasten the wire securely with the terminal screw.

► Check and ensure that all wiring is tightly connected.

5.6 Connection of external signal lines

ATTENTION

Insufficient airflow may result in heat exchanger coil to freeze up

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 result in further damage to the system.

► Connect the external signal lines in such a way that enable the 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, to prevent the heat exchanger coil from freezing up due to insufficient air volume flow.

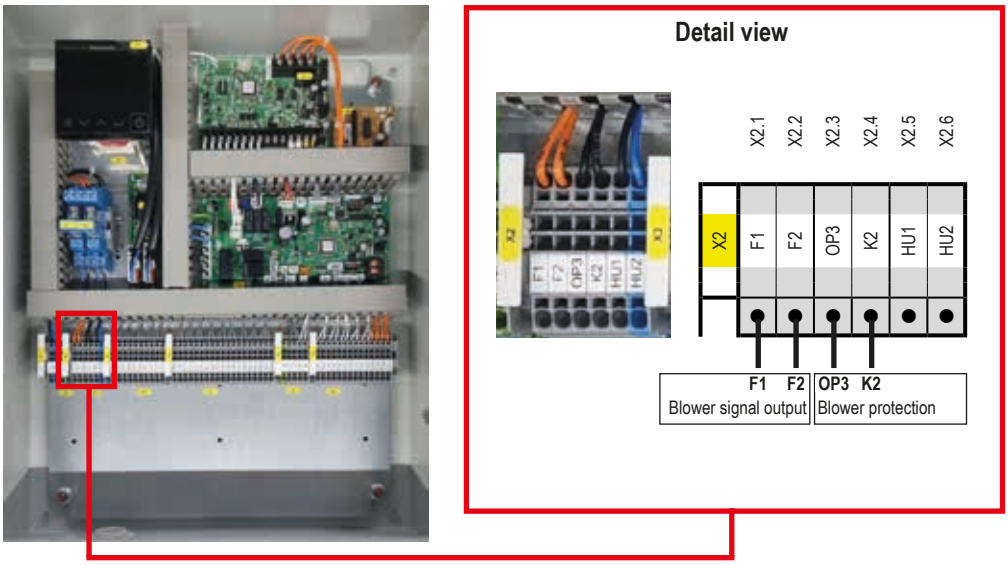
Two suitable methods will be explained in the following sections. All wiring diagrams are just examples. It is not necessary to build the electric circuit with 230 V AC. Any other suitable lower voltage being available on site may be used as well.

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.

For MAH3 generation models

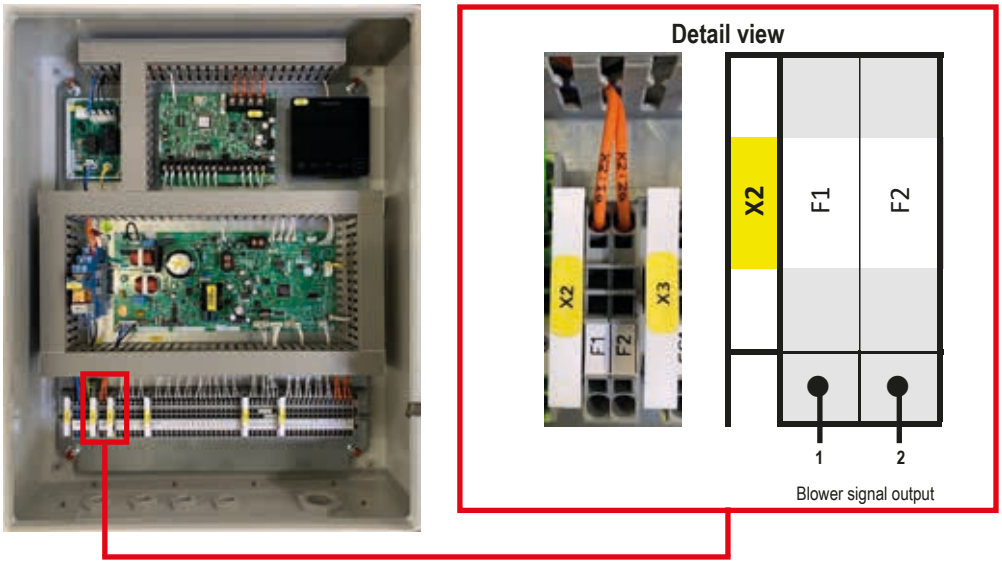
- Blower signal output: terminals F1 (X2.1) and F2 (X2.2), max. 5 A / 250 VAC
  Blower protection input: terminals OP3 (X2.3) and K2 (X2.4).



- Blower signal and blower protection lines must be routed through left wiring port below the terminal board.

For PAH3 generation models

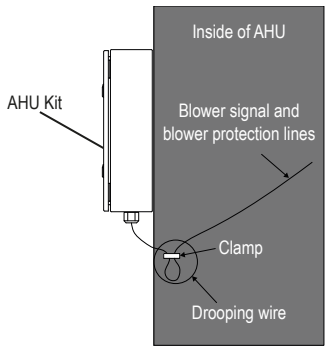
- Blower signal output: terminals F1 (X2.1) and F2 (X2.2).
- Max. 8 A / 230 V AC, potential free



5

For all models

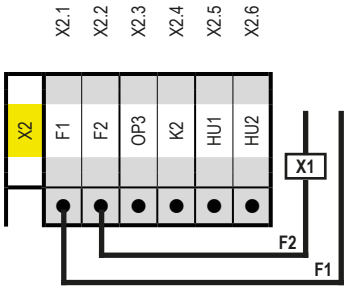
- The external signal lines must be inserted drooped in the AHU body and protected by a clamp with the drooping wire being close to the AHU Kit to avoid water reaching the AHU Kit.



Blower signal output

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

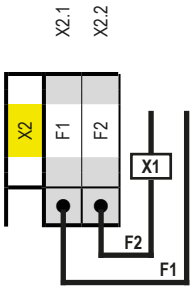
MAH3 generation models



External Potential: max. 250 VAC 5 A

X1: Relay (field supplied)

PAH3 generation model



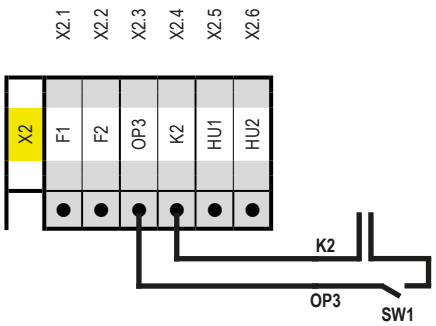
External Potential: max. 230 VAC 8 A

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 (terminals OP1 and OP2 (MAH3: X4.9 and X4.10; PAH3: X4.7 and X4.8)) can be used with an additional field supplied relay.

Blower protection input (for MAH3 generation models only)

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



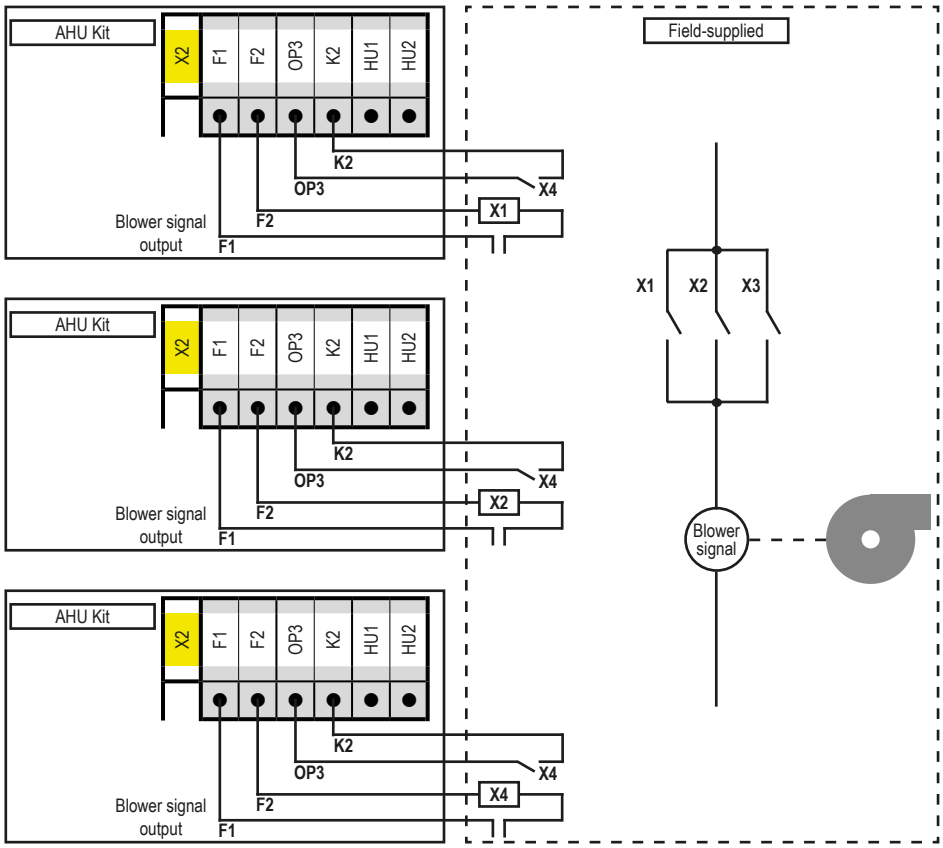
OP3: Fan Alarm Signal Input
Internal potential 230 VAC

Important:
Unit will only operate if this contact is closed, otherwise error code P01 will be displayed.

5

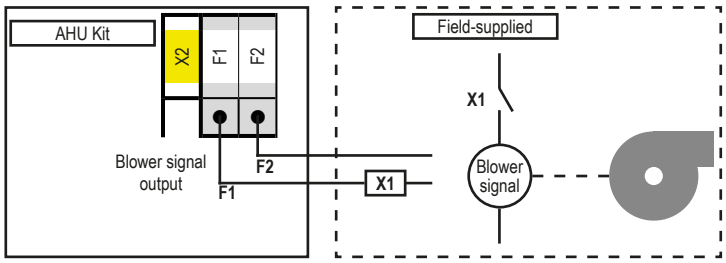
Electric circuit example – ECOi systems

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.

PAH3 generation model

For PAW-280PAH3M-1, you can use the terminal contacts T10.1 and T10.2 on the main PCB to make a connection between the AHU system and an external building management system. For correct use of these contacts see → *5.3 Terminal board layout, p. 55*.

MAH3 generation models

For PAW-160/280/560MAH3M, there are several possibilities for making a connection between the AHU system and an external building management system.

You can either use the terminal contacts T10.1 and T10.2 on the main PCB, or you may purchase the PAW-T10 PCB as a field-supplied optional part and connect it as per the following diagram, which shows just one wiring example of several possibilities.

For the main PCB terminals T10.1/T10.2 or the PAW-T10 PCB terminals No. 1 and 2 used in this wiring system to work properly, the following requirements must be observed:

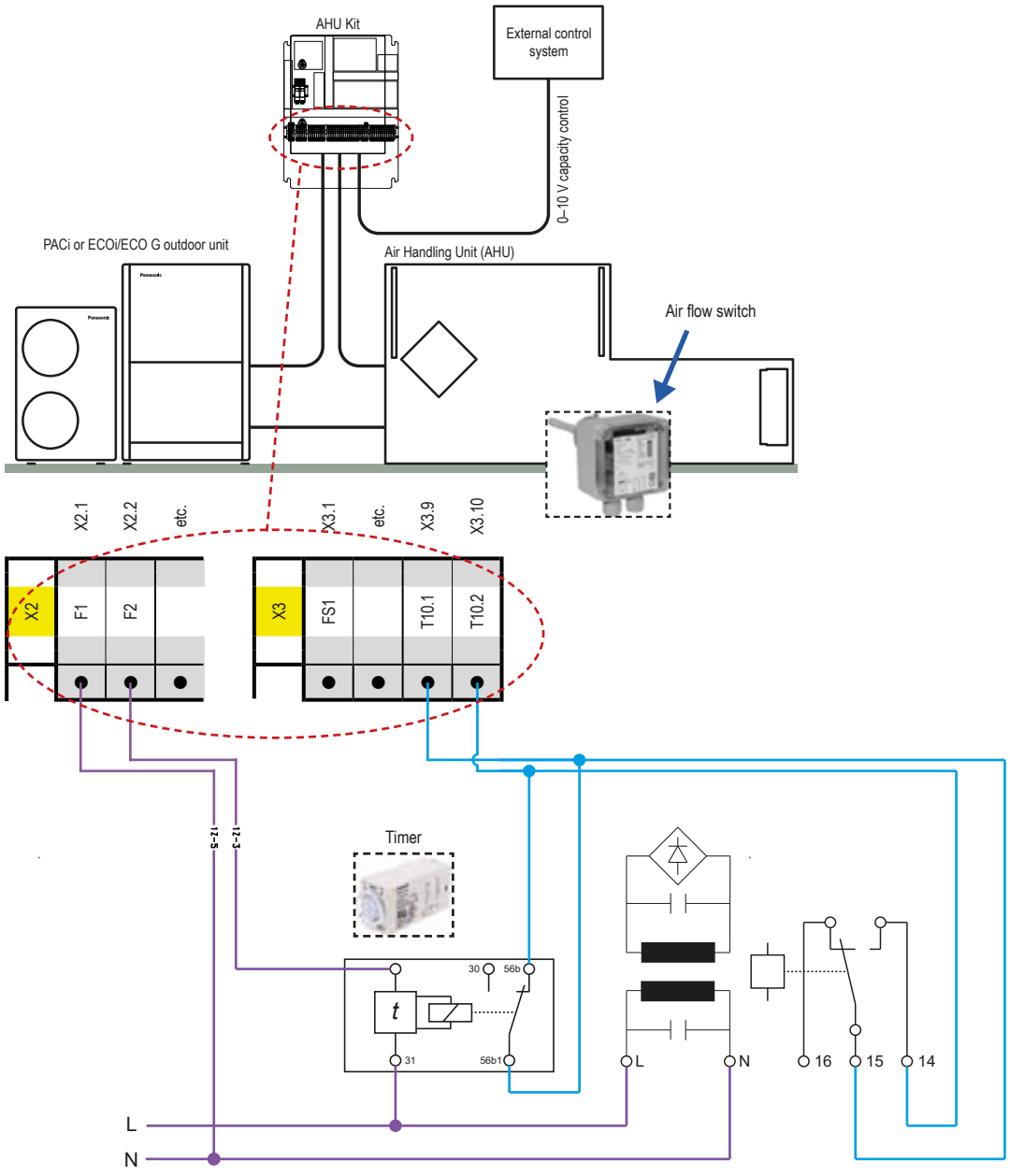
- On the AHU Kits's integrated remote controller, invoke the "Detailed Settings" mode and set parameter "2E" to "0001". (For details on the "Detailed Settings" mode, see the operating instructions of the relevant remote controller model or the ECOi/ECO G service manuals.)
- Make sure that jumper JP1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

As an alternative to using either the main PCB contacts T10.1/T10.2 or the PAW-T10 PCB contacts No. 1 and 2, it is also possible to use for example terminal contacts X6.7 to X6.10 in Section X6 of the main PCB ("COM" and "DI1" to "DI3"). For correct use of these contacts see → *5.3 Terminal board layout, p. 55*.

The wiring system shown in below 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-RTC6BL is an integral part of the AHU Kit. All control and setting operations for the ECOi, ECO G, PACi NX or PACi system can be performed on this remote controller.

Important

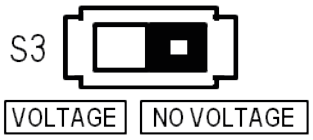
The relevant control operations are described in the “Operating Instructions” manual for the CZ-RTC6BL remote controller. It is supplied with the AHU Kit or can be downloaded from the “Service” section at www.panasonicproclub.com.

In case of PAH3 generation AHU kit models in combination with PACi NX outdoor units, please check the bluetooth functionality inlcuding remote checker operation in the relevant operation instructions of CZ-RTC6BL, H&C Control App and H&C Diagnosis App.

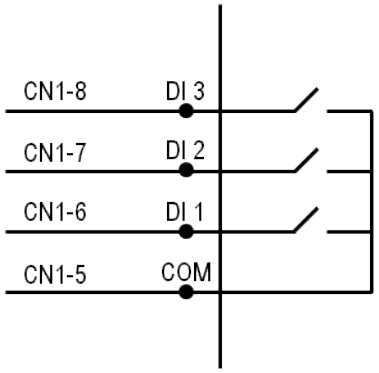
7.2 Enabling 0–10 V demand control by an external BMS

To set the CZ-CAPBC2 PCB (ACC-SP1A) for 0–10 V demand control by an external building management system (BMS), perfom the following steps:

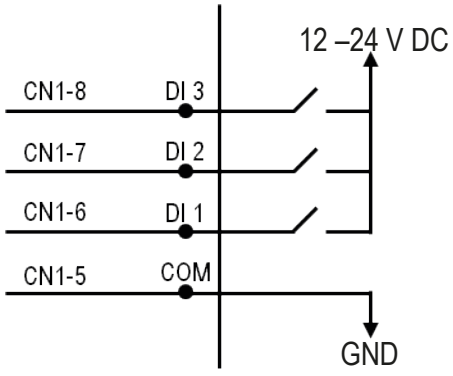
1. Open the AHU Kit enclosure (see → *4.1.1 Installation of AHU Kit – MAH3/PAH3 – step 3, p. 40*).
2. Only in case the BMS digital input configuration requires a change of control method from dry contacts (factory default) to 12 – 24 V DC signals, follow this step to make the relevant setting on the CZ-CAPBC2 PCB. Otherwise, proceed with step 3.
   a. On the CZ-CAPBC2 PCB (ACC-SP1A), set switch S3 to “VOLTAGE” or “NO VOLTAGE”, depending on the BMS digital input (DI) configuration.



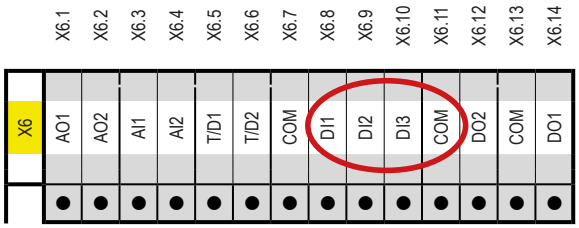
Control via dry contacts (factory default) = “NO VOLTAGE”



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

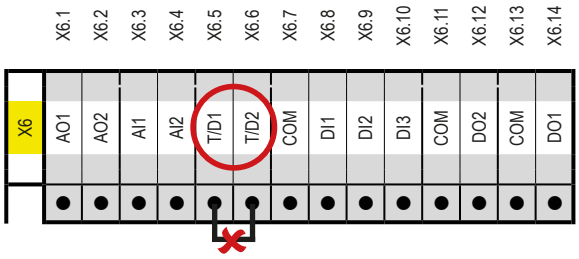


b. On Section X6 of the main PCB (see diagram below), connect the digital inputs (DI) as follows:

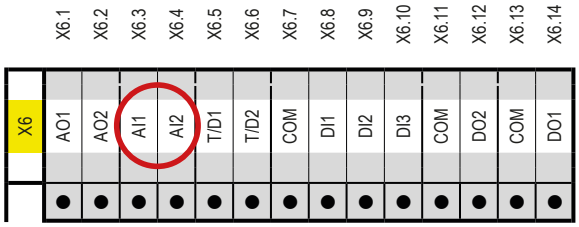


- Heating start to COM and DI1
- Cooling start to COM and DI2
- Fan mode (free cooling) start to COM and DI3
- All DI contacts open = Stop

3. In order to activate the 0–10 V demand control mode for the external BMS, remove the bridge between terminals “T/D1” and “T/D2” (X6.5 and X6.6) on section X6 on the AHU Kit’s main PCB. Make sure that all other jumpers remain intact.



4. In 0–10 V demand control mode, in order to achieve the default relation of voltage versus capacity as shown in step 7, adapt the wiring on the AHU Kit’s terminal connectors of section X6 as follows (see also → *5.3 Terminal board layout, p. 55*):
Connect the positive pole (“+”) to “AI1 (X6.3)” and the negative pole (“–”) to “AI2 (X6.4)”.



5. Close the AHU Kit enclosure again (see → *4.1.1 Installation of AHU Kit – MAH3/PAH3 – step 6, p. 40*).

6. Via the signal wiring from the external BMS, select the 0–10 V demand control functionality as follows:

Input Voltage* (V)	Demand (% of nominal current)	Indoor unit start / stop
0	No cut[1]	Stop[1]
0.6 –1.0	40	Start
1.1 –1.5	45	Start
1.6 –2.0	50	Start
2.1 –2.5	55	Start
2.6 –3.0	60	Start
3.1 –3.5	65	Start
3.6 –4.0	70	Start

Input Voltage* (V)	Demand (% of nominal current)	Indoor unit start / stop
4.1 –4.5	75	Start
4.6 –5.0	80	Start
5.1 –5.5	85	Start
5.6 –6.0	90	Start
6.1 –6.5	95	Start
6.6 –7.0	100	Start
7.1 –7.5	105	Start
7.6 –8.0	110	Start

Input Voltage* (V)	Demand (% of nominal current)	Indoor unit start / stop
8.1 –8.5	115	Start
8.6 –9.0	120	Start
9.1 –10.0	No limit / Full capacity[2]	Start

1 No cut/Stop: AHU system / indoor unit is completely switched of.
2 No Limit: No restrictions applied by BMS to AHU system / indoor unit performance (equivalent to “full-load operation“ of AHU system / indoor unit).

Note:
The control system is based on the rule that the last command within a sequence always takes precedence over the previous commands. In order to avoid unexpected control behaviour in a system where both 0-10 V demand control signals and digital input signals are being used, it is essential to ensure that the DI signals are applied **BEFORE** applying the demand control signals.

8 Trouble diagnosis

8.1 Common error codes (PACi & ECOi)

Remote Controller Display	Description	Detailed Explanation
C17	Central Controller Reception Error	Indoor unit does not respond to central control equipment.
E01	Remote Controller Reception Error	It is judged an error if no self-addressed communication is sent to the remote controller in a 3-minute period. • When a remote controller is set to sub remote controller. • When there are 9 or more indoor units in a remote control group's wiring. • When the CHK (check pin) and / or TEST (test pin) on the AHU main control PC board (A1) are short circuited. • The nonvolatile memory (EEPROM) is not installed or faulty when turning on the power. • AHU control PC board error. • Remote controller check mode. • Malfunctions of the remote controller itself (reception circuit error). • No setting of system address, indoor unit address, indoor unit individualization / main / sub (Auto address setting not completed.)
E02	Remote Controller Transmission Error	When the remote controller itself cannot transmit. Or when it cannot receive the signal it transmitted itself, or when they are different and judged an error. • Malfunction of the remote controller itself (transmit circuit error).
E03	Error in AHU Unit Receiving Signal from Remote Controller (central)	It is judged an error when there is no communication from any remote controller (collectively) in a 3-minute period or if there is no communication from the central device in a 15-minute period. • When there was once communication, but during use the remote control wiring is opened or miswired. • The line to the central control unit for indoor / outdoor operations is opened. • Settings are made only for sub remote controller. • The power to the central control unit is not on and remote controllers are not being used (or the inter-unit control wiring to the central control unit is opened). • When remote controller are not being used, only the sub remote controller is set up.
E04	Error in AHU Unit Receiving Signal from the Outdoor unit	When there is no communication within a 3-minute period from the outdoor unit. Or, judged an error when no reply comes from the outdoor unit. • The outdoor unit is not turned on. • When the power was turned on after auto address setting was completed, the number of indoor units had been changed. • Forgot to turn on the AHU unit. • The CHK pin and / or TEST pin on the AHU unit's control PC board are shorted. • Forgot to install the nonvolatile memory (EEPROM) when replacing the AHU unit control PC board. • Mistakenly set the indoor unit address to Not Set in the remote control's detailed setting mode. • When indoor unit addresses are duplicated. • There is a short, open, wrong contact or grounding of the indoor / outdoor control line. • There is an error in the receiving circuit on the signal output PC board (CZ-CAPBC2 PCB). • Malfunctions of the outdoor unit • The thermistor inside the AHU unit is grounded. • The capacity setting is mismatched between AHU units and the outdoor unit. • High voltage (AC230V, etc.) applied across indoor/outdoor operation wire circuit
E08	Duplicate Indoor Unit Address Settings Error	It is judged an error if the addresses of indoor units are duplicated. • The indoor unit address settings are duplicated in the remote control detailed settings mode. • The multiple unit DISP pin is shorted across the indoor unit whose address is Not Set.
E09	More Than One Remote Controller Set to Main Error	It is judged an error when more than one remote controller in a remote control group is set as the main remote controller. • Forgot to set one remote controller to sub in a 2-remote control group. • When using one wireless and one wired remote controller in a control group, forgot to set one of them to sub.
E14	Main Unit duplication in Simultaneous-operation Multi Control	It is judged an error the total capacity of indoor units replied by communication is lower than that of outdoor unit. • PACi: The total capacity of AHU unit(s) is lower than that of outdoor unit. • Some AHU unit(s) are connected but power is not turned on. • The CHK pin (CN062 / CN071) and / or TEST pin (CN064) of the AHU unit is shorted when its power is turned on.

Remote Controller Display	Description	Detailed Explanation
E16	Auto address setting alarm (too many units)	It is judged an error when the total capacity of indoor units is too high or the total number of indoor units is too many. • The total capacity of AHU units is too high. • The total number of AHU units is too many. • When making group control of the different refrigerant system, the steps to turn on the systems one at a time has not been performed.
E18	Faulty Communication in Group Control Wiring	When the main remote controller cannot communicate with a sub remote controller in the remote control group. It is judged an error if a sub remote controller in a remote control group fails to communicate with the main remote controller for a period of 3 minutes. • An indoor unit within the control group does not have its power on. • The CHK pin and TEST pin on the indoor unit in the control group are shorted. • The DISP pin of an indoor unit sub remote controller in the control group is shorted. • Remote control group wiring is open. • More than one indoor unit in the control group is set to Main. • An indoor unit in the control group is set to Separate.
E20	No indoor units at auto address setting.	When auto address setting was performed, no indoor units were recognised. • Indoor unit address is not properly assigned. • Indoor unit power is OFF.
F01	E1 sensor trouble	AHU unit E1 coil temperature sensor not connected or defective or not set (R < 30Ω or R > 330kΩ)
F02	E2 sensor trouble	AHU unit E2 coil temperature sensor not connected or defective or not set (PACi) (R < 30Ω or R > 330kΩ)
F03	E3 sensor trouble	AHU unit E3 coil temperature sensor not connected or defective or not set (ECOi) (R < 30Ω or R > 330kΩ)
F10	TA sensor trouble	AHU unit TA (suction air) temperature sensor not connected or defective or not set (R < 24Ω or R > 270kΩ)
F11	BL sensor trouble	AHU unit BL (discharge air) temperature sensor not connected or defective or not set (ECOi) (R < 24Ω or R > 270kΩ)
F29	EEPROM of AHU unit failure	EEPROM of the AHU unit main PCB failure An error is determined when the nonvolatile memory (EEPROM) on the AHU control board cannot be read or written.
L03	Duplication of group control's main indoor unit	Duplication of main indoor unit address in group control • When remote controller group wiring is changed after auto-addressing is complete. • When multiple main units are set in remote controller detailed settings mode.
L07	Group control setting trouble	Group control wiring is detected for an indoor unit set as individual controlled unit An error is determined when remote controller group wiring includes an indoor unit set for independent operation. • When remote controller group wiring is set up after auto-addressing is complete. • When group settings for an indoor unit wired into a remote controller group are changed to “Independent” in remote controller detailed settings mode.
L08	Indoor unit address not set	AHU address (indoor unit address) is not set • When the indoor unit address was not set when new non-volatile memory (EEPROM) was installed. • When indoor unit address in the remote controller detailed settings mode is “invalid.”
L09	Indoor unit capacity not set	AHU capacity (indoor unit capacity) is not set • When the indoor unit capacity setting was forgotten after installing a new nonvolatile memory (EEPROM). • In the remote controller detailed settings mode, the indoor unit capacity is “invalid”.
L13	Indoor unit type setting error	Type of indoor / outdoor units is different
P09	Improper wiring of ceiling panel connector	ECOi: AHU main PCB (A1) PNL contacts 1 & 3 open PACi: AHU main PCB (A1) LM contacts 17 & 18 open
P10	Float switch activated	AHU terminal board FS1 & FS2 is open
P12	DC fan protection active	Incorrect parameter settings, type of indoor set as DC fan model (by connector DCM (CN141) on AHU main PCB A1)
P14	O2 sensor alarm	AHU terminal board EX1 & EX2 closed contact
P31	Other indoor unit	Other indoor unit in group control has an alarm. Survey the indoor unit that alarms other than “P31” in the indoor unit group and specify the causes of failure.

8.2 Specific error codes for PACi

Remote Controller Display	Description	Detailed Explanation
L02	Indoor & outdoor unit type mismatched	Setting error, indoor / outdoor unit type / model mismatched

8.3 Specific error codes for ECOi

Remote Controller Display	Description	Detailed Explanation
L02	Connected indoor unit is not a multi unit.	Either AHU kit is PACi type or parameter 2C not properly set.
L05	Priority setting trouble	2 or more indoor units set as priority (priority indoor unit).
L06	Priority setting trouble	2 or more indoor units set as priority (non priority indoor unit).
P01	Fan protection error	Thermal protection for AHU fan motor is activated Terminal contacts OP3 & K2 open (respectively T20 connector no the AHU main PCB A1)

8.4 Error codes for outdoor units

For all error codes not mentioned here, please check in the service manual of the corresponding outdoor unit model. The meaning of those error codes might be different by specific outdoor unit model.

8.5 Special displays on the wired remote controller

Blinking Exclamation mark display

	Automatic backup is in progress. A/C units can be operated. Check error history in the outdoor unit (see service manual of the corresponding outdoor unit) for the original trouble alarm.

Energy saving display

	Energy saving is on to control energy consumption.*
	The operation capacity of the outdoor unit is restricted.
	Units are operated at the capacity set by schedule.*

* Can only be set using the “Panasonic H&C Control App”

The display of “operation capacity of the outdoor unit is restricted” is typically shown while the 0 – 10 V demand control is active.

For further details about CZ-RTC6BL please refer to the operation maual of the remote controller.

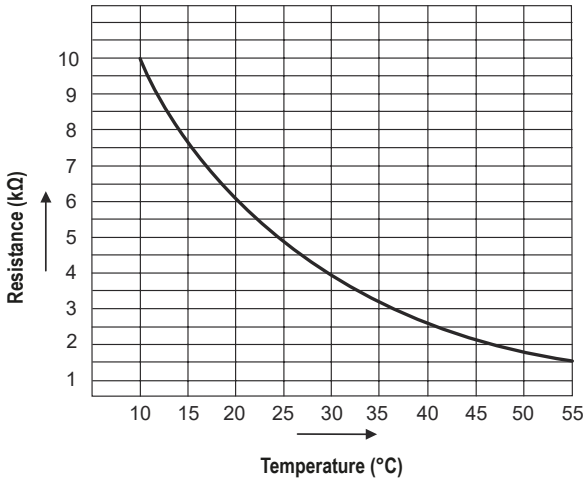
8.6 Error codes on A4 PCB (ACC-SP1A)

Green LED display	Meaning	Action to take
Off	Power Off	Check the remote control line connection (A4 PCB CN1 terminals 12 & 13 to A1 PCB CN041 blue)
Blinking at 3 s intervals	12VDC (T10 terminal) power supply error	Check the power supply line connection (A4 PCB CN1 terminals 14 & 15 to A1 PCB T10 CN061 yellow contacts 2 & 5) Attention polarity!
On/off out at 1 s intervals	Indoor unit alarm	Check and clear the indoor unit alarm
On/off out at 100 ms intervals	Initializing communications, communications error	Check the remote control line connection (A4 PCB CN1 terminals 12 & 13 to A1 PCB CN041 blue)
On[1]	Normal operation	–

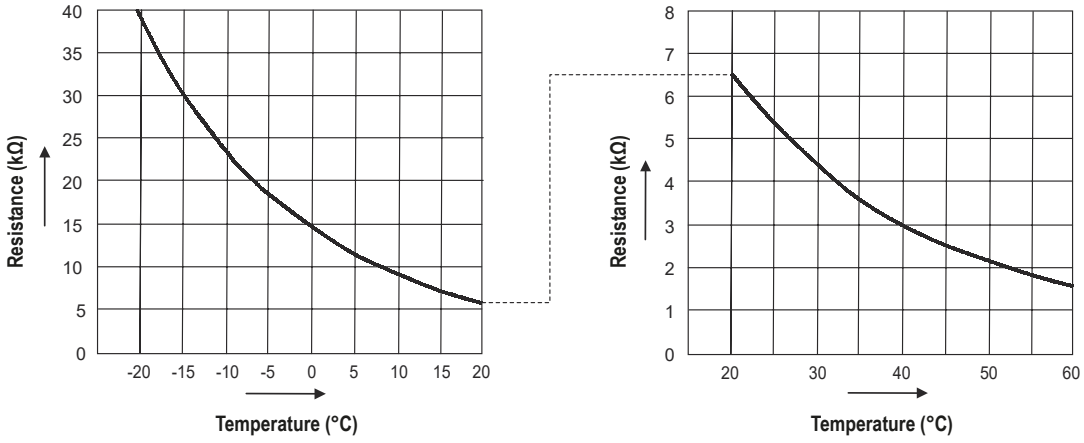
1 Each time when setting data is transmitted to an indoor unit the LED will be turned off for 200 ms.

8.7 Thermistor curves

Suction Air (TA) temperature sensor and Discharge Air (BL) temperature sensor



Refrigerant Coil (E1, E2, E3) temperature sensor



8

9 Parameter settings

On how to access the “Detailed settings” mode, please see → *4.4 Matching outdoor unit capacity with AHU Kit capacity – Method C – steps 1 to 3, p. 48* in this document, or in case of using the Bluetooth connection with CZ-RTC6BL, see the manual of the “Panasonic H&C Control App” or the service manual of PACi NX outdoor units, chapter 6.

Code No.	Item	Data	Description
03	Central control address	0001 … 0064	Central control address 1 … 64 (only required in case of centralised controllers)
		0099	Not set (Factory preset)
04	Operating mode priority change	0000	Normal (Factory preset)
		0001	Priority (only relevant for ECOi)
05	Fan speed when heating thermostat is OFF	0000 … 0002 0004 … 0006	While compressor ON or OFF → fan output signal ON (do not use 0003 or 0007 as this would cause fan stop while compressor operating, dangerous!)
		0008 … 0010	While compressor ON → fan output signal ON While compressor OFF → fan output signal OFF
		0011	While compressor ON or OFF → fan output signal OFF (take care when using this setting!)
06	Heating intake temperature shift	0000	No offset
		0001 … 0006	Makes an offset for the intake temperature by the set value in °C during heating mode
0A	RC sensor differential	0000	Thermostat OFF differential: −1°C (setting at time of shipping)
		0001	Thermostat OFF differential: −0.5°C
0b	Function of EX1 & EX2 terminal	0000	AHU thermostat OFF (factory preset mode) when closed
		0001	AHU shows “P14” alarm and transmits the refrigerant leakage signal when closed
0C	Display of cold wind protection	0000	Displayed on RC
		0001	Not displayed
0d	AUTO mode cooling/heating	0000	Permit
		0001	Prohibit
0E	Mode dependency (3way)	0000	Normal
		0001	Same mode of main indoor unit in case of sharing valve kit in 3way systems
0F	Cooling Only	0000	Normal
		0001	Cooling only operation (heat mode prohibited)
10	Type	0033	AHU DX-kit
11	AHU unit capacity	0000	Not set
		0001	2,2 kW nominal cooling
		0003	2,8 kW nominal cooling
		0005	3,6 kW nominal cooling
		0007	4,5 kW nominal cooling
		0008	5,0 kW nominal cooling
		0009	5,6 kW nominal cooling
		0010	6,3 kW nominal cooling
		0011	7,1 kW nominal cooling
		0012	8,0 kW nominal cooling
		0013	9,0 kW nominal cooling
		0015	11,2 kW nominal cooling
		0017	14,0 kW nominal cooling
		0018	16,0 kW nominal cooling
		0021	22,4 kW nominal cooling
		0023	28,0 kW nominal cooling
		0028	56,0 kW nominal cooling

Code No.	Item	Data	Description
12	System address (= address of outdoor unit)	0001 … 0030	Outdoor unit address 1 … 30
		0099	Not set
13	Indoor unit address	0001 … 0064	Indoor unit address 1 … 64
		0099	Not set
14	Group control address	0000	Individual (1:1 = AHU with no group wiring)
		0001	Main unit (One of the group-control indoor units)
		0002	Sub unit (All group-control indoor units except for main unit)
		0099	Not set
15	Temperature sensors	0022	PACi default: TA, E1, E2
		0029	ECOi default: TA, BL, E1, E3
17	Cooling intake temperature shift	0000	No offset (factory default)
		-010 … 0010	Makes an offset for the intake temperature by the set value in °C during cooling mode
18	Automatic stop time after operation start	0000	Function disabled
		0001 … 0125	Stop time = set value * 5 minutes (example 0004 = operation stop after 20 minutes)
1C	Cooling discharge temperature shift	0000	No offset (factory default)
		-010 … 0010	Makes an offset for the target blow out temperature limit for thermostat off while discharge control enabled (code 3A) by the set value in °C during cooling mode
1d	Heating discharge temperature shift	0000	No offset (factory default)
		-010 … 0010	Makes an offset for the target blow out temperature limit for thermostat off while discharge control enabled (code 3A) by the set value in °C during heating mode
1E	Temperature shift for cooling/heating change in auto heat/cool mode	0001 … 0007	Set value in °C for switch over hysteresis between cooling and heating mode while AUTO mode being active
1F	Cooling upper limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0030 (30°C)
20	Cooling lower limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0018 (18°C)
21	Heating upper limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0030 (30°C)
22	Heating lower limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0016 (16°C)
23	Drying upper limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0030 (30°C)
24	Drying lower limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0018 (18°C)
25	Auto mode upper limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0027 (27°C)
26	Auto mode lower limit T set	-015 … 0060	Set limit value range in °C. Factory default = 0017 (17°C)
28	Automatic power failure recovery	0000	No automatic recovery
		0001	With automatic recovery
2A	Filter FI1 & FI2 (CN70) input switching	0000	Filter input (differential pressure switch input)
		0001	Alarm input (for trouble input about air cleaner or similar device)
		0002	Humidifier input (Operates linked with drain pump when humidifier is ON.)
2C	Indoor unit electronic control valve	0000	VRF (ECOi) R410A
		0002	PACi (R410A)
		0004	VRF (ECOi) R32
		0006	PACi (R32)
		0008	VRF (ECOi) R32

Code No.	Item	Data	Description
2E	"T10" terminal switching for terminal contacts T10.1 & T10.2	0000	In case of pulse signal (JP001 on AHU main PCB A1 closed) for each pulse signal change from current operation ON to OFF respectively from current OFF to ON state In case of static signal (JP001 on AHU main PCB A1 open) NC = operation ON, NO = operation OFF
		0001	"OFF reminder function" With JP001 on AHU main PCB A1 closed: NC = RC operation possible, NO = operation OFF and RC usage prohibited JP001 on AHU main PCB A1 open: NC = no change, NO = unit operates at upper temperature limit setting in cooling and at lower temperature limit setting in heating (does not work in Fan mode or Auto mode)
		0002	"Fire alarm function" JP001 status invalid. NC = operation stop and RC prohibited, NO = RC usage possible
31	Ventilation fan operation for PACi terminal contacts FD1 & FD2, for VRF terminal contacts F1 & F2	0000	RC key of additional ventilation fan operation not used
		0001	Additional fan operation can be used by RC key
32	Wired RC sensor	0000	Not used (TA sensor used for temperature control), factory default
		0001	RC sensor used for temperature control
33	RC display °C or °F	0000	°C (factory default)
		0001	°F
36	Display room temperature on RC	0000	Room temperature not displayed, only set temperature displayed
		0001	Room temperature displayed
37	Defrost symbol displayed on RC	0000	Defrost not displayed
		0001	Defrost displayed
3A	Discharge temperature control only for VRF	0000	Discharge temperature control through BL sensor not active
		0001	Discharge temperature control through BL sensor active (only for VRF not PACi)
3B	RAP valve control only for VRF	0000	No RAP valve control
		0001	With RAP valve control
3C	Heat exchanger control temperature for cold draft prevention in heating mode	-001 … 0026	For the first 6 minutes after heating operation start, the fan remains OFF until max. E1, E2 or BL temperature exceeds the set value + 10 K. If 3B = 0001, the temperature limit value is shifted down by 17 K.
3d	Fan output switching for terminals OP6 & OP1	0000	Output signal linked with fan. (ON when AHU unit fan is operating.)
		0001	Output signal only during dedicated FAN mode
42	Fan delay after cooling stop	0000 … 0120	Delay in seconds for Fan signal after cooling operation stop
43	Fan delay after heating stop	0000 … 0120	Delay in minutes for Fan signal after heating operation stop
5E	Humidifier ON time (ON time per 60 seconds)	0000 … 0060	Only VRF: HU1 & HU2 terminal output signal
86	Fan operation when cooling thermostat OFF (Only PACi)	0000	No control
		0001	Fan X minutes (code 87), no fan Y minutes (code 88)
		0008	Fan stop
87	Fan ON time for cooling thermostat OFF (Only PACi)	0000	0 minutes
		0001	3 minutes
		0002	5 minutes
88	Fan OFF time for cooling thermostat OFF (Only PACi)	0000	0 minutes
		0001	10 minutes
		0002	30 minutes
		0003	60 minutes

Notes:

Notes:

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