Panasonic

Air Handling Unit Kit

Installation Instructions

PAW-160MAH2(L/M)
PAW-280MAH2(L/M)
PAW-560MAH2(L/M)

PAW-280PAH2(L/M)

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)

November 2021

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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 ECOi and ECO G systems typically use R410A as refrigerant, some PACi systems are operated with R410A while others 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 heat pumps 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 three different product versions, “light”, “medium” or “advanced”, and can be selected based on the required functionality. The following products are covered in this documentation:

Product version	ECO i / ECO G	PAC i	PAC i / PAC i NX
Light	PAW-160MAH2L PAW-280MAH2L PAW-560MAH2L	PAW-280PAH2L	–
Medium	PAW-160MAH2M PAW-280MAH2M PAW-560MAH2M	PAW-280PAH2M	PAW-280PAH3M PAW-280PAH3M-1
Advanced	PAW-160MAH2 PAW-280MAH2 PAW-560MAH2	PAW-280PAH2	–

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 minimize 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.

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. 18*).
- ► 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. 19*)
- ► Repair any leaks diligently (see → *1.3.4 Repairing leaks, p. 19*), 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 PACi or PACi NX unit.

1.3.1 Calculating the density limit

As R32 is a slightly 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:

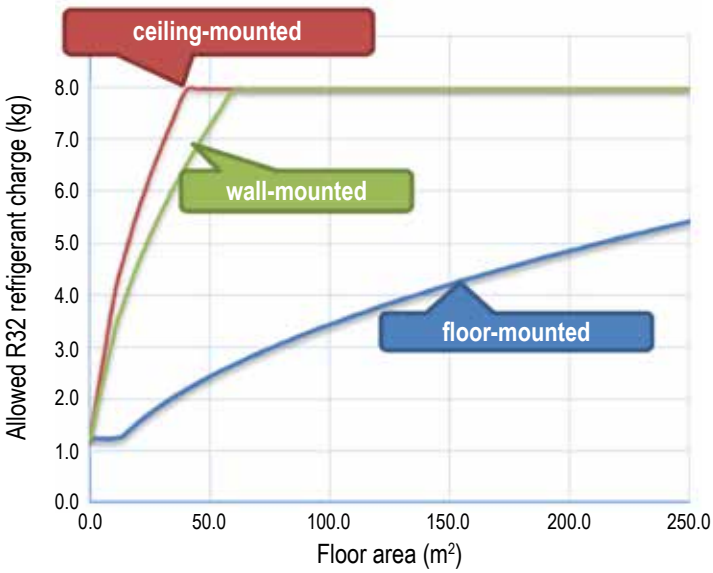
$$A_{min} = \left[\frac{m_c}{2.5 \times LFL^{5/4} \times h_0} \right]^2$$

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 ([mc]) must be calculated by the following formula:

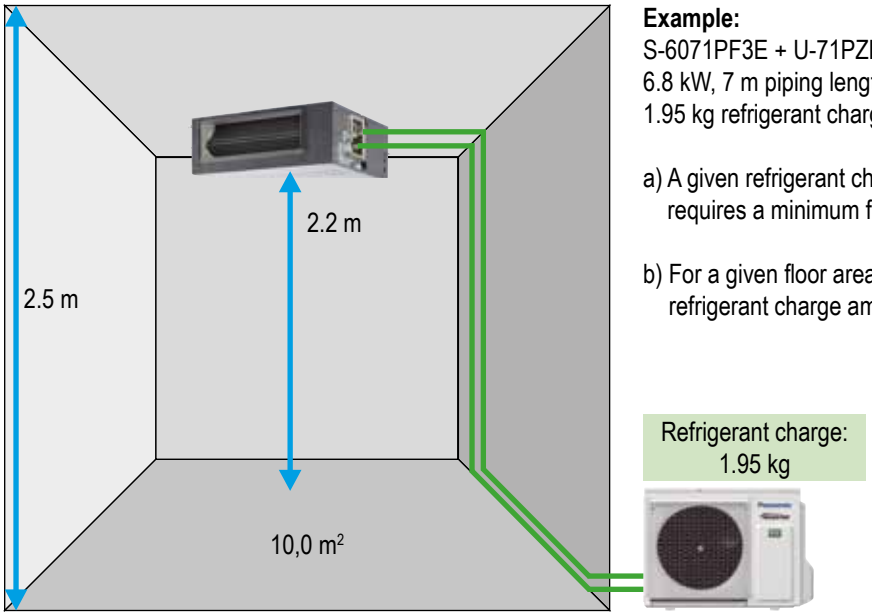
$[m_c] = [1] + [2] = [1] + ([3] * ([4] – [5]))$

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.

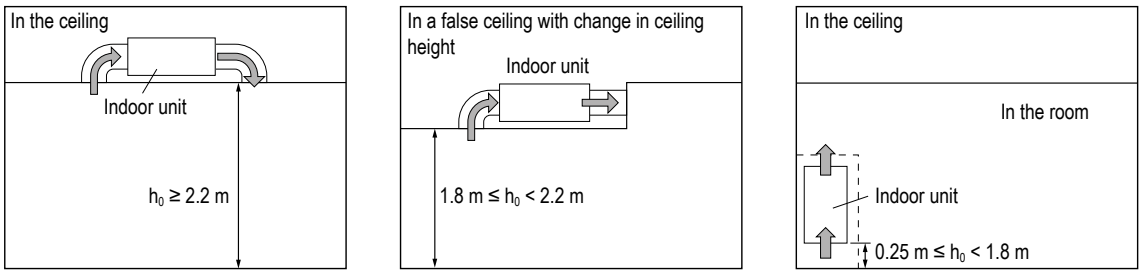
Density limit diagrams

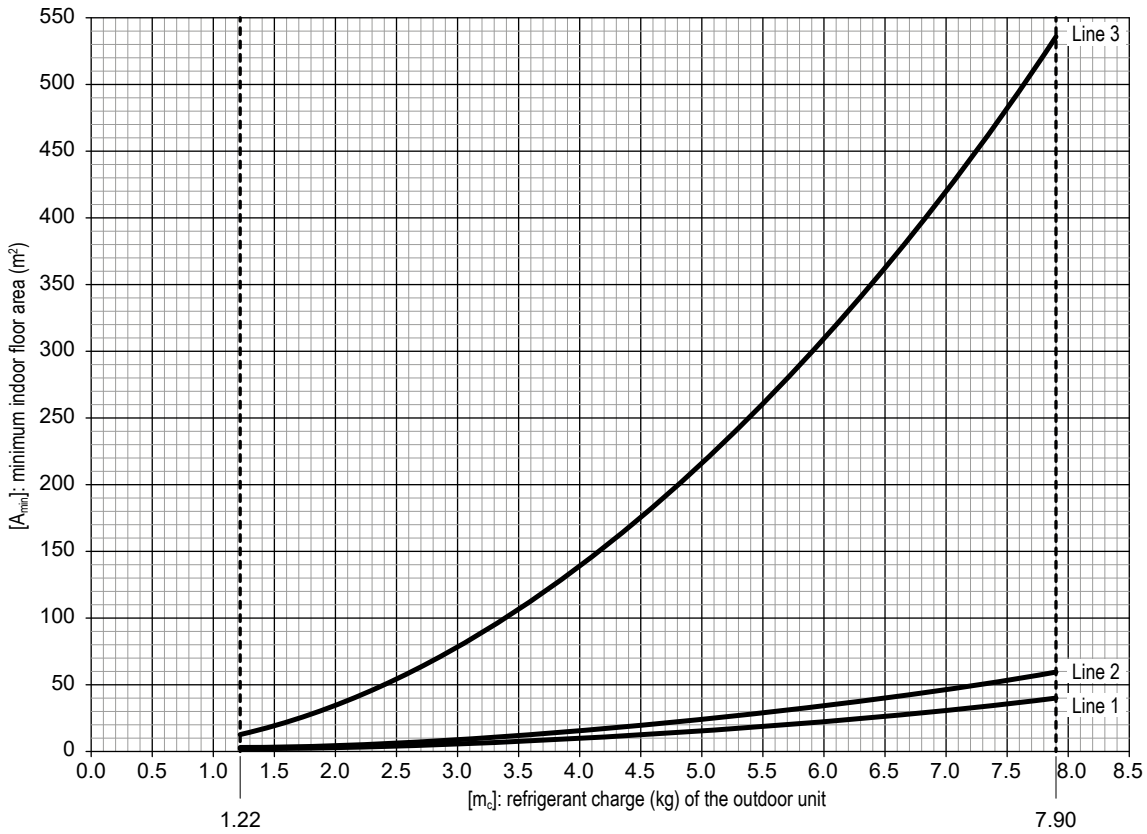
The following diagrams roughly demonstrate the relation between the amount of refrigerant charged for the relevant R32 PACi or PACi NX outdoor units ([mc]) and the required minimum installation space floor area.

AHU units

For the AHU units, the density limit diagram shows three different “Density Limit Lines”, where each line applies to a different 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

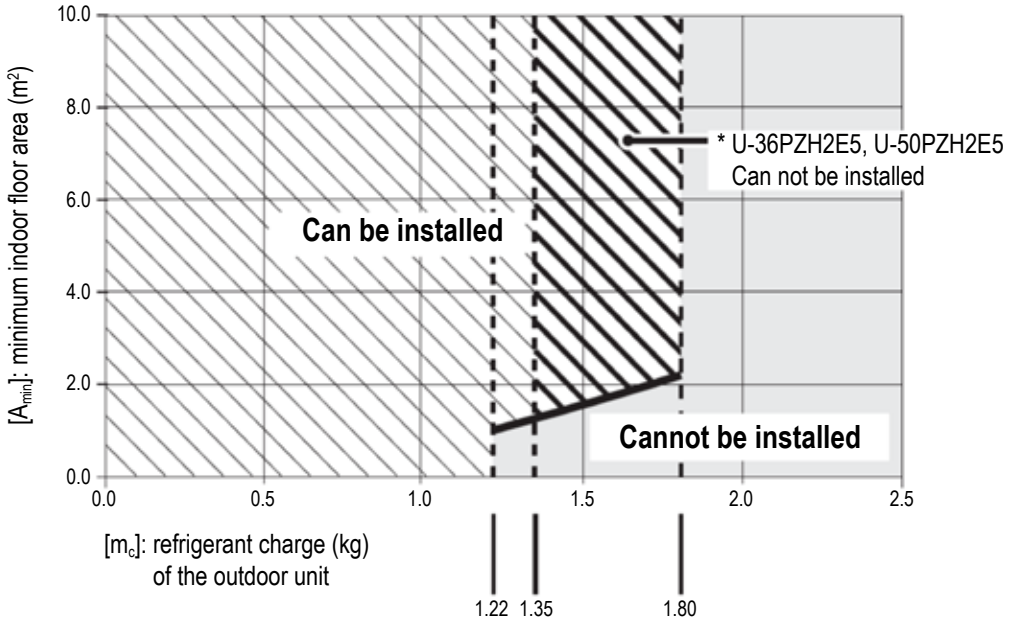
[m_c]	[A_{min}]		
	Line 1	Line 2	Line 3
3.5	7.9	11.7	105.1
3.6	8.3	12.4	111.2
3.7	8.8	13.1	117.5
3.8	9.3	13.8	123.9
3.9	9.8	14.6	130.5
4.0	10.3	15.3	137.3
4.1	10.8	16.1	144.2
4.2	11.3	16.9	151.4
4.3	11.9	17.7	158.7
4.4	12.4	18.5	166.1
4.5	13.0	19.4	173.8
4.6	13.6	20.2	181.6
4.7	14.1	21.1	189.5
4.8	14.8	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

PACi outdoor units

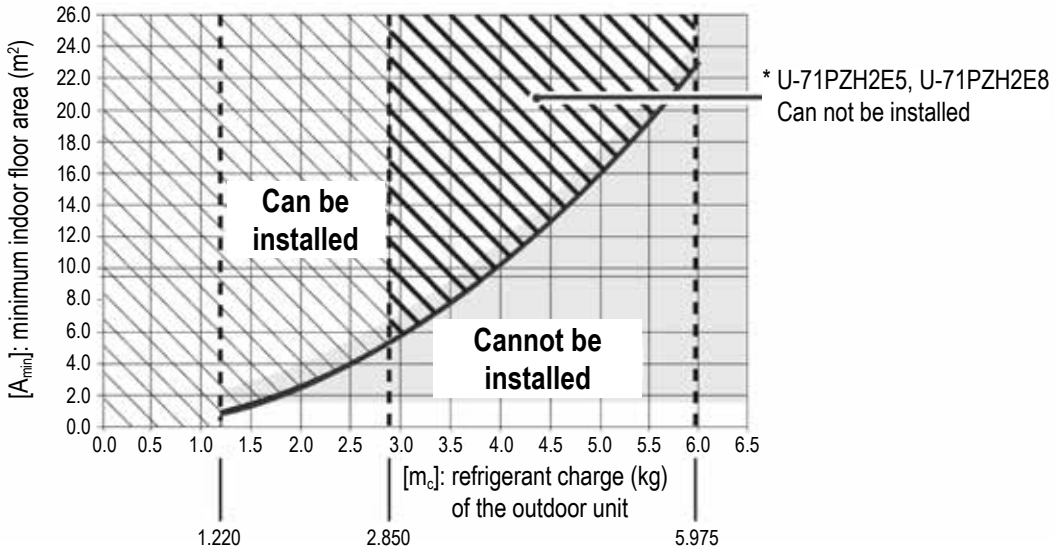
[m_c]	Refrigerant charge amount (i.e. total of refrigerant at shipment and refrigerant charge amount in the field), specified in kilogrammes (kg)
[m_{max}]	Maximum refrigerant charge amount, specified in kilogrammes (kg)
[m_c] ≤ 1.22	Can be installed
1.22 < [m_c] ≤ [m_{max}]	Installation possible within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

U-60PZ2E5, U-71PZ2E5, U-36PZH2E5, U-50PZH2E5, U-60PZH2E5



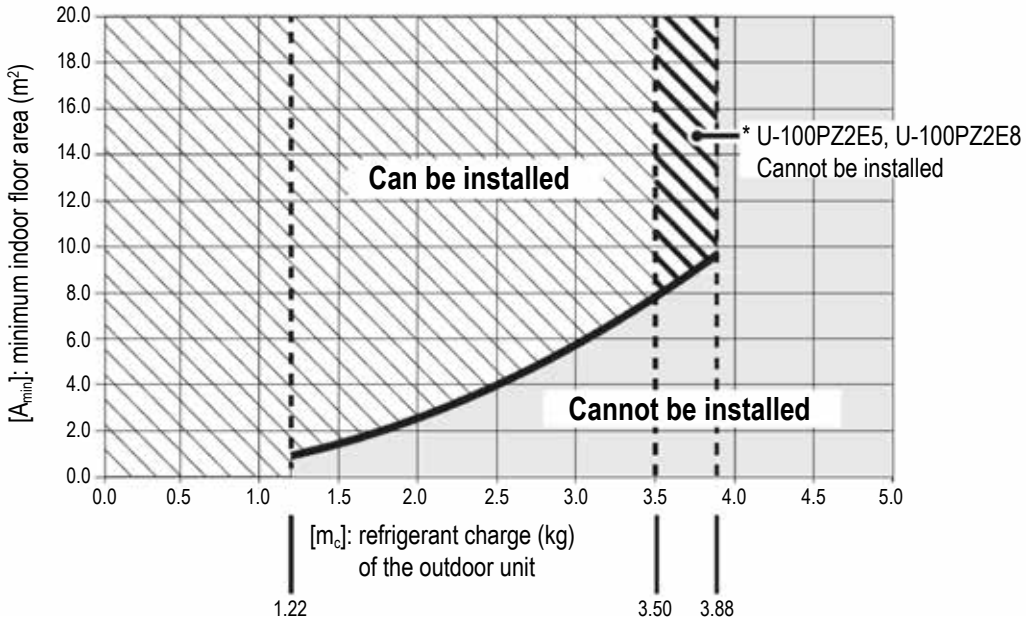
	Standard	Elite	
	U-60PZ2E5 U-71PZ2E5	U-36PZH2E5 U-50PZH2E5	U-60PZH2E5
[m_{max}] (kg)	**1.80**	**1.35**	**1.80**

U-71PZH2E5, U-71PZH2E8, U-100PZH2E5, U-100PZH2E8, U-125PZH2E5, U-125PZH2E8, U-140PZH2E5, U-140PZH2E8



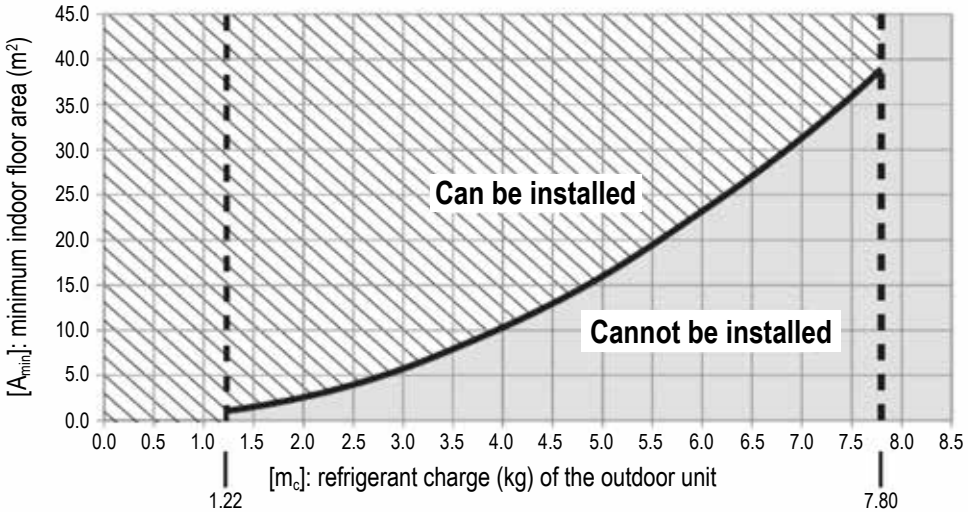
	Elite			
	U-71PZH2E5 U-71PZH2E8	U-100PZH2E5 U-100PZH2E8	U-125PZH2E5 U-125PZH2E8	U-140PZH2E5 U-140PZH2E8
[m_{max}] (kg)	**2.850**	**5.975**		

U-100PZ2E5, U-100PZ2E8, U-125PZ2E5, U-125PZ2E8, U-140PZ2E5, U-140PZ2E8



	Standard		
	U-100PZ2E5 U-100PZ2E8	U-125PZ2E5 U-125PZ2E8	U-140PZ2E5 U-140PZ2E8
[m_{max}] (kg)	**3.50**	**3.88**	

U-200PZH2E8, U-250PZH2E8



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

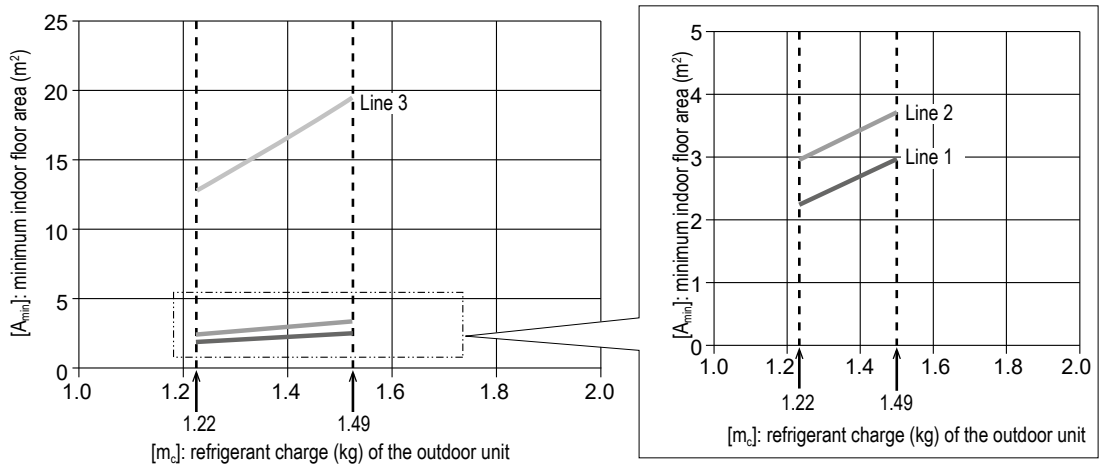
PACi NX outdoor units

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)
$[m_c] \leq 1.22$	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



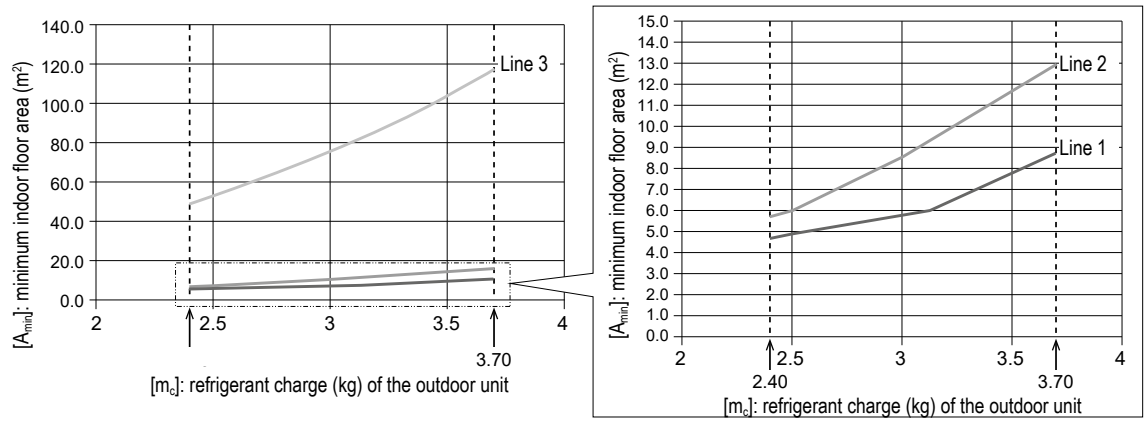
	Standard			
	U-36PZ3E5	U-50PZ3E5	U-60PZ3E5A	U-71PZ3E5A
$[m_{max}]$ (kg)	**0.95**	**1.33**	**1.30**	**1.49**

Calculating example

Conditions	**Outdoor unit: U-71PZ3E5A** Total pipe length: 40 m — Refrigerant charged at shipment: 1.32 kg Max. charge-less pipe length: 30 m — 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

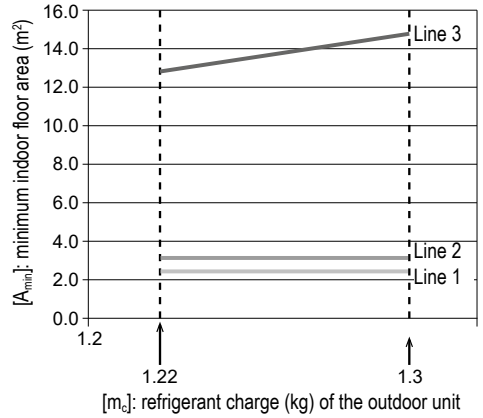
$[m_c]$	Refrigerant charge amount, specified in kilogrammes (kg)
$[m_{max}]$	Maximum refrigerant charge amount, specified in kilogrammes (kg)
$2.40 \leq [m_c] \leq [m_{max}]$	Installation possible above the "Density Limit Line" for the relevant indoor/outdoor unit combination (see diagrams and tables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



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

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] ≤ 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

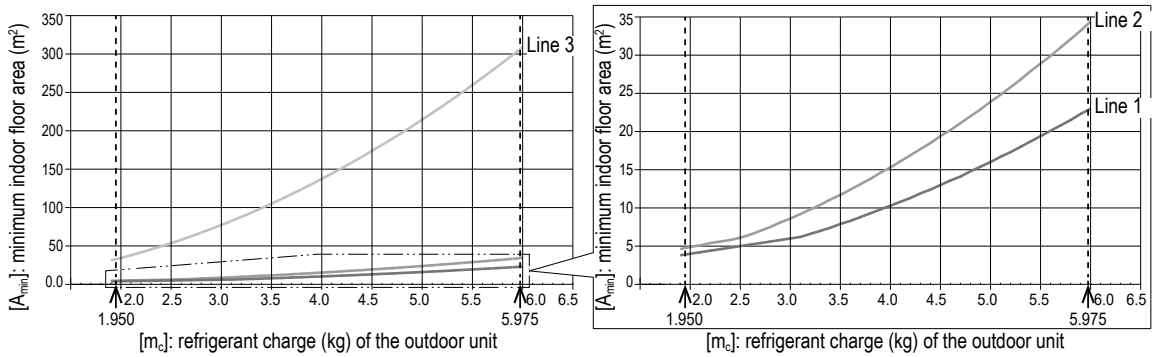


	Elite	
	U-36PZH3E5 U-50PZH3E5	U-60PZH3E5
[m_{max}] (kg)	**1.28**	**1.30**

U-71PZH3E5, U-71PZH3E8, U-100PZH3E5, U-100PZH3E8, U-125PZH3E5, U-125PZH3E8, U-140PZH3E5, U-140PZH3E8

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-71PZH3E5 U-71PZH3E8	U-100PZH3E5 U-100PZH3E8	U-125PZH3E5 U-125PZH3E8	U-140PZH3E5 U-140PZH3E8
$[m_{max}]$ (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. 19*) 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 refirgerant-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. 19*).
- 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.

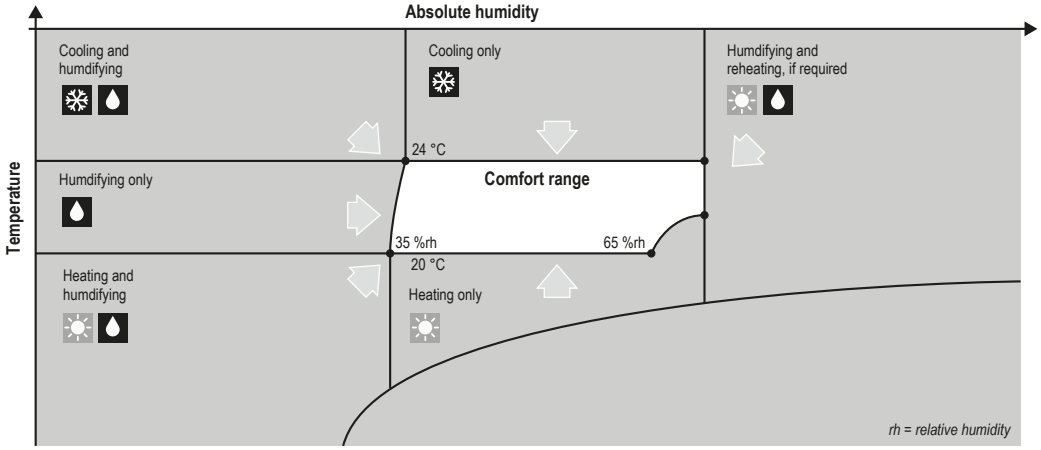
Comfort

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

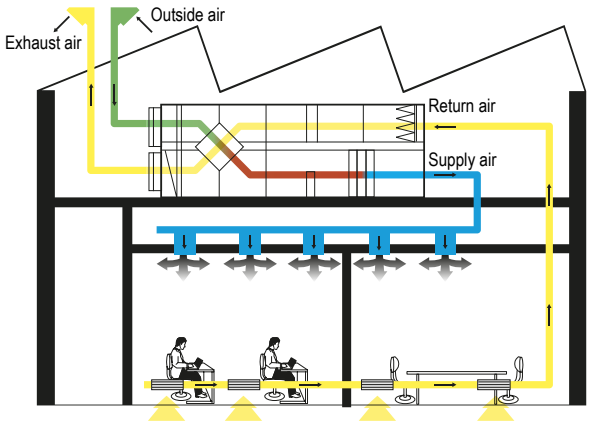
The larger the area of the comfort range, the better the energy saving opportunities.

2.2 Mechanical ventilation systems

Main components of mechanical ventilation systems

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

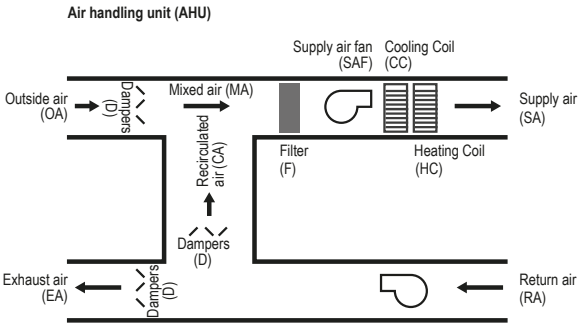
- Air handling unit (AHU)
- Air ducts
- Air distribution elements



2.3 Air handling units

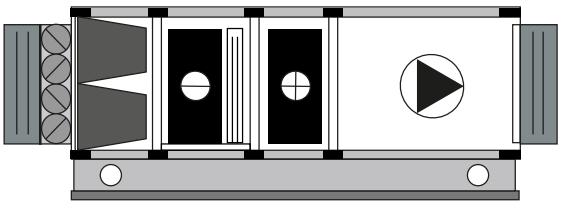
Main components of air handling units

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

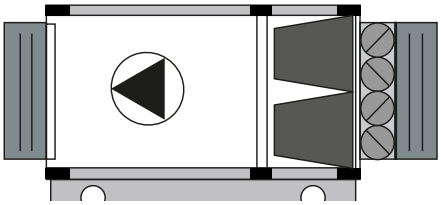


Main types of air handling units

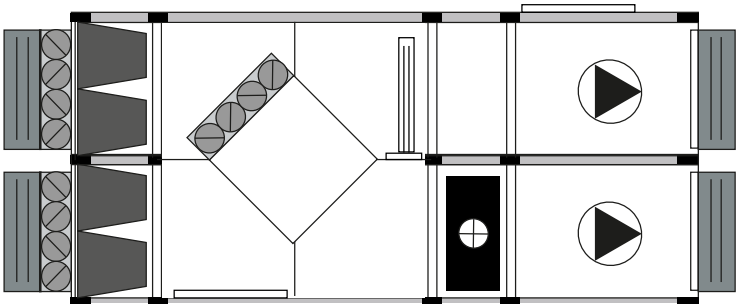
Supply type



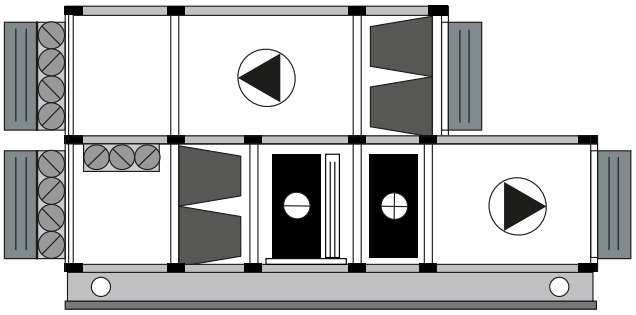
Exhaust type



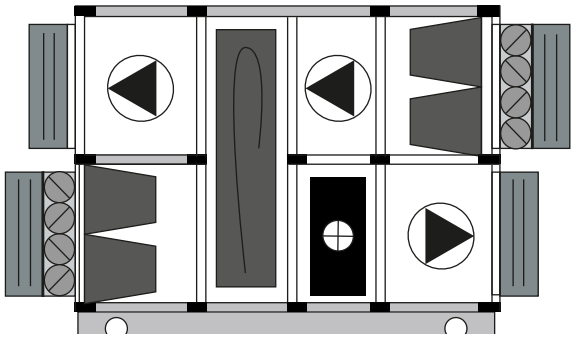
Supply/Exhaust type with cross-flow heat exchanger



Supply/Exhaust type with mixing chamber



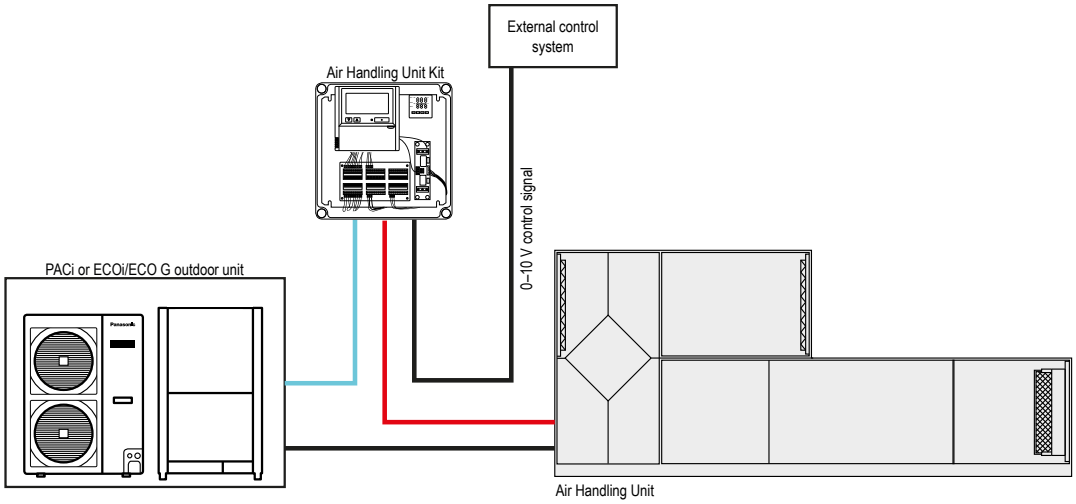
Supply exhaust type with rotary heat exchanger



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

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

Air handling unit control by external 0–10 V signal



1 This schematic layout applies only to the advanced and medium AHU Kit versions (MAH2/PAH2/PAH3) only, because they 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 and PACi, but not by ECO G outdoor units)
   - Capacity control through in-built supply air or ambient temperature sensor (only available with advanced version and only supported by ECOi and PACi, but not by ECO G outdoor units)
   - Temperature setpoint control

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

3 Product description

3.1 General description

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

The AHU Kits are part of an on-going development process aiming at constant improvement of the product to better meet customer demand. The new generation model, PAW-280PAH3M(-1), has been developed to connect the new PACi NX outdoor units to third party AHU systems. However, it is also compatible with PACi outdoor units.

- Three versions available for MAH2/PAH2 generation, depending on the required functionality (light, medium or advanced version), medium version available for PAH3 generation
- IP65 enclosure (MAH2/PAH2 and PAH3 generation) providing the possibility for outdoor installation
- 0–10 V demand control* (included on the CZ-CAPBC2 interface)
- Easy control by BMS

* Only available with all ECOi, 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	Product generation	MAH2/PAH2			PAH3
	Product version	Light	Medium	Advanced	Medium
Connectable with P-LINK system.		X	X	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	X	X	X
Defrost operation signal, Thermo-ON/OFF states output		X	X	X	X
Drain pump control (Drain-pump and the float switch to be field-supplied)		X	X	X	–[1]
Basic humidifier control output (Humidifier to be field-supplied)		X	X	X	–
Alarm and operation output		X	X	X	X
The system is controlled by the air intake (or room return air) temperature in the same way as a standard indoor unit. Selectable modes: Automatic / Cooling / Heating / Fan / Dry (equivalent to Cooling).		X	X	X	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	X
Temperature set point adjustment by external control system using 0–10 V or 0–140 Ohm signal		–	X	X	X
Room supply air temperature can be controlled by the additional thermostat, its supply air temperature sensor and the 0–10 V input signal for enhanced comfort and efficiency		–	–	X	–
Target temperature setting based on ambient temperature with CZ-CAPBC2 interface using 0–10 V signal		–	–	X	–
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-71PZH3E5/8, U-100/125/140PZ(H)3E5/8 and after setting the proper parameters.

3.2 Scope of supply

The scope of supply of the AHU Kits depends on the product generation (MAH2/PAH2 or PAH3), product version (light, medium or advanced) and on the relevant VRF system range. The following table shows an overview of the different scopes of supply.

Scope of supply	Product generation	MAH2/PAH2						PAH3
	Product version	Light		Medium		Advanced		Medium
		ECOi ECOG	PACi	ECOi ECOG	PACi	ECOi ECOG	PACi	PACi PACiNX
		PAW-160MAH2L PAW-280MAH2L PAW-560MAH2L	PAW-280PAH2L	PAW-160MAH2M PAW-280MAH2M PAW-560MAH2M	PAW-280PAH2M	PAW-160MAH2 PAW-280MAH2 PAW-560MAH2	PAW-280PAH2	PAW-280PAH3M PAW-280PAH3M-1
IP65 case		X	X	X	X	X	X	X
Control unit including transformer		X	X	X	X	X	X	X
Relays		X	X	X	X	X	X	X
Terminal boards		X	X	X	X	X	X	X
Remote controller (CZ-RTC5B)		X	X	X	X	X	X	–
Remote controller (CZ-RTC6BL)		–	–	–	–	–	–	X
Compatibility with Panasonic H&C Control App		–	–	–	–	–	–	X
Compatibility with Panasonic H&C Diagnosis App		–	–	–	–	–	–	X
PCB for T10 connection (PAW-T10)		X	X	–	–	X	X	–
Expansion valve		X	–	X	–	X	–	–
PCBs for the expansion and RAP / SVK valves		X	–	X	–	X	–	–
Refrigerant temperature sensors	E1 + E3	X	–	X	–	X	–	–
	E1 + E2	–	X	–	X	–	X	X
Air intake and air outlet temperature sensors	TA	X	X	X	X	X	X	X
	BL	X	–	X	–	X	–	–
CZ-CAPBC2 interface for 0-10 V control (ACC-SP1A)		–	–	X	X	X	X	X
Thermostat (TR-16 / TR-16e*) including an additional temperature sensor to be used either for room supply air or ambient air temperature		–	–	–	–	X	X	–

* Depending on AHU Kit generation.

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

Exterior view of AHU Kits and some of their compoments

Light version: PAW-280PAH2L*

1 Remote controller (CZ-RTC5B)
2 External signal control PCB (PAW-T10)
3 Terminal board with 6 connectors

* Shown as an example and with transparent front cover removed. Layout also applicable for ECOi and ECO G, see table above, → *3.2 Scope of supply, p. 25*, for details.

PACi accessories

PACi


Thermistor x2
(Refrigerant: E1, E2)


Thermistor
(Air: TA)

Medium version: PAW-280PAH2M*

1 Remote controller (CZ-RTC5B)
2 Terminal board with 6 connectors
3 CZ-CAPBC2 interface (on rear side)

* Shown as an example and with transparent front cover removed. Layout also applicable for ECOi and ECO G, see table above, → *3.2 Scope of supply, p. 25*, for details.

PACi accessories

PACi


Thermistor x2
(Refrigerant: E1, E2)


Thermistor
(Air: TA)

Advanced version: PAW-560MAH2*

1 Remote controller (CZ-RTC5B)
2 Thermostat (TR-16/TR-16e**)
3 External signal control PCB (PAW-T10)
4 Terminal board with 6 connectors
5 CZ-CAPBC2 interface (on rear side)

* AHU Kit shown with transparent front cover removed. Layout also applicable for PACi, see table above, → *3.2 Scope of supply, p. 25*, for details.
** Depending on AHU Kit generation.

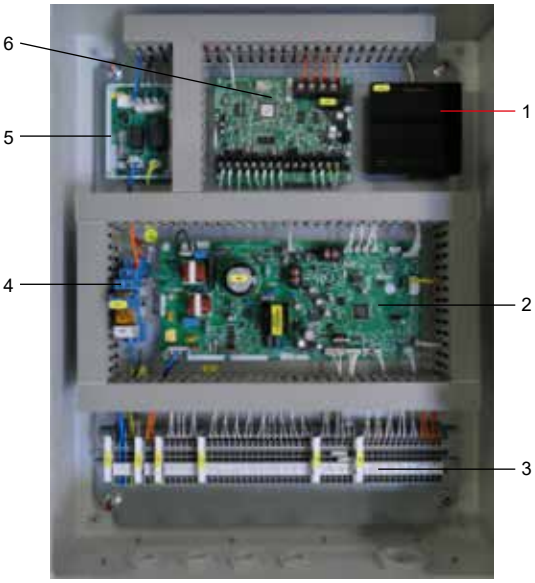
ECOi / ECO G accessories

ECOi
ECO G


Thermistor x2
(Refrigerant: E1, E3)


Thermistor x2
(Air: TA, BL)


Expansion
valve



Medium version: PAW-280PAH3M(-1)[1]

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

1 Shown with front cover opened.
2 Fan PCB is omitted from PAW-280PAH3M-1

PACi and PACi NX accessories

PACi
PACi NX


Thermistor x2
(Refrigerant: E1, E2)


Thermistor
(Air: TA)

Control functions provided as standard by integral components

CZ-RTC5B / CZ-RTC6BL remote controller

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

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

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

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

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

- Easy integration in external AHU control systems and BMS
- Demand control: 40 to 115 % (5 % steps) of nominal current by 0–10 V input signal[1]
  > Medium version: Terminals M2-3, M2-4.
  Advanced version: Terminals M2-1, M2-2 in case of using TR-16e; Terminals M2-3, M2-4 without using TR-16e.
- Target temperature setting by 0–10 V or 0–140 Ω input signal[1]
  > Medium and advanced versions: Terminals M2-3, M2-4.
- Suction air temperature (TA sensor) output by 4–20 mA signal
  > Medium version (MAH2/PAH2 generation): Terminals PT9, PT10;
  medium version (PAH3 generation): Terminals M2.1, M2.2.
  Advanced version only, directly on CZ-CAPBC2 interface: Terminals 1, 2.
- Mode select and/or ON/OFF control[2]
  > Medium and advanced versions: Terminals DI1, DI2, DI3, COM.
- Fan operation control[2]
  > Medium and advanced versions: Terminals DI1, DI2, DI3, COM.
- Operation status output/ Alarm output
  > Medium and advanced versions: Terminals COM, DO1 / COM, DO2.
- Thermostat ON/OFF control[2]
  - Medium and advanced versions: 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 thermostat. However, if simultaneous demand control and target temperature setting is needed, this can only be achieved by using a second (optional) CZ-CAPBC2 interface.

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

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

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

PAW-OCT, DC12 V outlet, OPTION terminal

- Output signal for Cooling/Heating/Fan status
  - > MAH2/PAH2 generation: Terminal ON4; ON5; ON6; Potential ON1;
    PAH3 generation: Terminal OP4; OP5; OP6; Potential OP1.
- Output signal for Defrost operation indication
  - > MAH2/PAH2 generation: Terminal ON2; Potential ON1;
    PAH3 generation: Terminal OP2; Potential OP1.
- Output signal for Thermostat-ON status
  - MAH2/PAH2 generation: Terminal ON3; Potential ON1;
    PAH3 generation: Terminal OP3; Potential OP1

Additional contacts available

- External humidifier control (ON/OFF) 230 V AC 3 A (not available for PAH3 versions)
  - > Terminal HU1; HU2.
- External fan control (ON/OFF) 12 V DC
  - > Terminal FD1; FD2.
- External filter status signal potential free (not available for PAH3 versions)
  - > 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

OPT terminal contacts (only available for PAH3 versions)

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

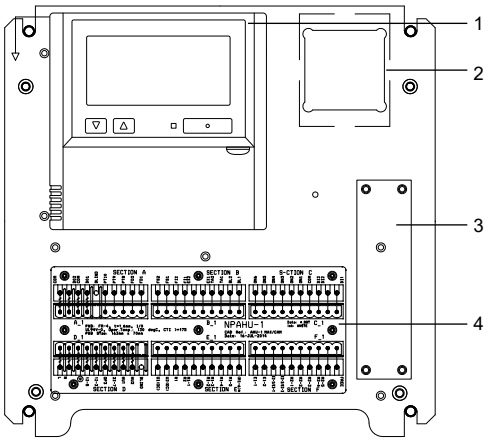
The following two control functions are alternatively configurable by parameter settings on the remote controller:

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

or

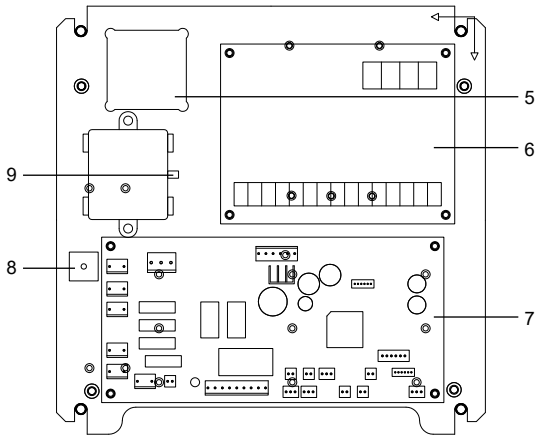
- Quiet mode on outdoor unit (only available for U-71PZH3E5/8; U-100/125/140PZ(H)3E5/8), Thermostat Off (free cooling)
  - Terminal OT1 Potential; OT5 Quiet mode; OT6 Thermostat Off

Mounting boards



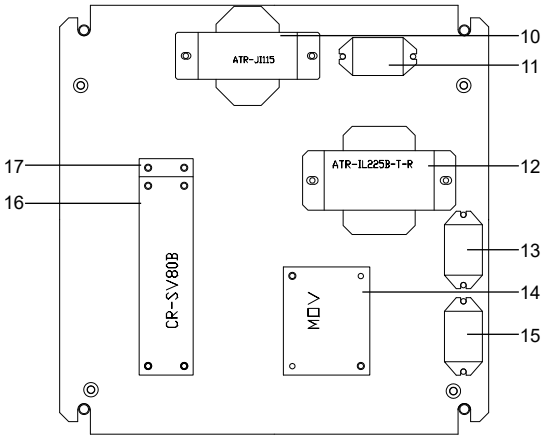
MAH2/PAH2 Upper mounting board – front side

1 Remote controller (CZ-RTC5B)
2 Thermostat (TR-16 / TR-16e) [1]
3 External signal control PCB (PAW-T10) [1]
4 Terminal board with 6 connectors (labelled Section A to Section F) each with 20 contacts [2]



MAH2/PAH2 Upper mounting board – rear side

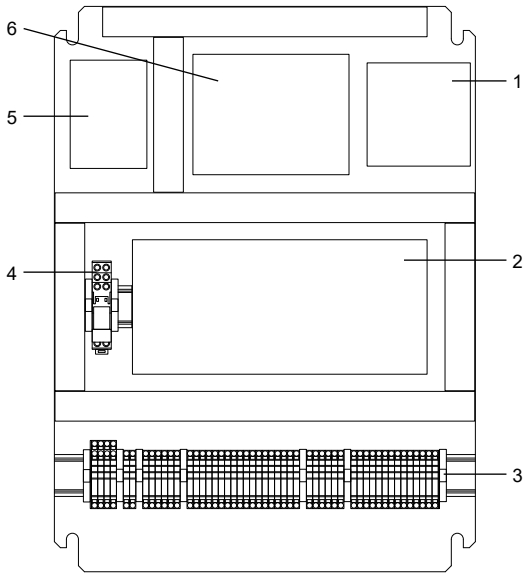
5 Pocket for thermostat
6 CZ-CAPBC2 interface for 0-10 V control (PCB name: ACC-SP1A)[1]
7 Main control board (PCB name: CR-UXRP71B-P)
8 Terminal for upper mounting board
9 EMC filter [1]



MAH2/PAH2 Lower mounting board

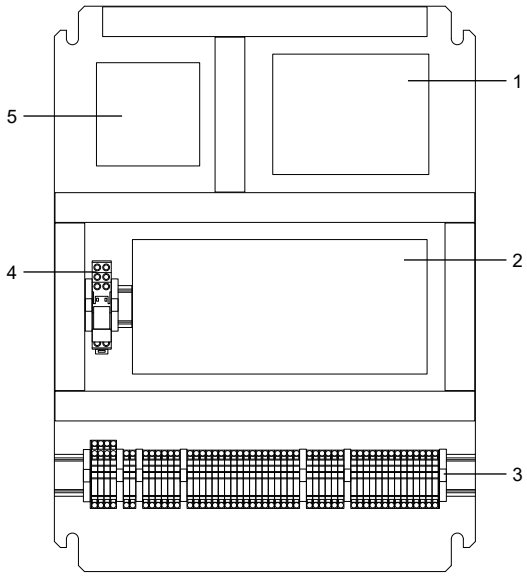
10 Auxiliary transformer [1]
11 Relay [1]
12 Transformer
13 Relay
14 Single motorized valve PCB [1]
15 Relay
16 Single RAP valve control PCB [3]
17 Double RAP valve control PCB [3]

1 Not available in all versions.
2 For details see → *5.3 Terminal board layout, p. 66*.
3 Depending on the model used, the single RAP valve control PCB (16) or double RAP valve control PCB (17) is mounted in this position.



PAH3M **Mounting board**

1 Remote controller (CZ-RTC6BL)
2 Main control board
(PCB name: ACXA73-38670)
3 Terminal board [1]
4 Fan relay
5 Fan control board
(PCB name: ACXA73-38680)
6 CZ-CAPBC2 interface for 0-10 V control
(PCB name: ACC-SP1A)



PAH3M-1 **Mounting board**

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

1 For details see → *5.3 Terminal board layout, p. 66*.

3.3 System lineup

System lineup – ECOi systems

Capacity HP	Capacity kW	Outdoor unit combination U-...				AHU Kit combination PAW-...			
5	16	all Mini ECOi/ECOi outdoor units				160MAH2(L/M)[1]	–	–	–
10	28	all Mini ECOi/ECOi 2-pipe and 3-pipe outdoor units with nominal cooling capacity of at least 8 HP				280MAH2(L/M)[2]	–	–	–
20	56	20ME2E8	–	–	–	560MAH2(L/M)[3]	–	–	–
30	84	16ME2E8	14ME2E8	–	–	560MAH2(L/M)[4]	280MAH2(L/M)	–	–
40	112	20ME2E8	20ME2E8	–	–	560MAH2(L/M)[4]	560MAH2(L/M)	–	–
50	140	18ME2E8	16ME2E8	16ME2E8	–	560MAH2(L/M)[4]	560MAH2(L/M)	280MAH2(L/M)	–
60	168	20ME2E8	20ME2E8	20ME2E8	–	560MAH2(L/M)[4]	560MAH2(L/M)	560MAH2(L/M)	–
70	196	20ME2E8	20ME2E8	20ME2E8	10ME2E8	560MAH2(L/M)4	560MAH2(L/M)	560MAH2(L/M)	280MAH2(L/M)
80	224	20ME2E8	20ME2E8	20ME2E8	20ME2E8	560MAH2(L/M)4	560MAH2(L/M)	560MAH2(L/M)	560MAH2(L/M)

1 PAW-160MAH2(L/M):
- PAW-160MAH2(L/M) 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-280MAH2(L/M):
- PAW-280MAH2(L/M) 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-280MAH2(L/M) 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-560MAH2(L/M):
- 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 have to disconnect the included remote controllers and CZ-CAPBC2 boards (ACC-SP1A PCB) except for one each. It is irrelevant which one is retained, there is no preference. The external connections need to be done only on the unit with the connected CZ-CAPBC2 board.
Note: In this particular case it is even possible to combine a single advanced or medium version with one, two or three light versions, and still have full functions of the advanced or medium version respectively.

ECO G System lineup – ECO G systems

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

1 PAW-160MAH2(L/M):
- Like any other standard indoor unit, PAW-160MAH2(L/M) 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-280MAH2(L/M):
- Like any other indoor unit of similar capacity, PAW-280MAH2(L/M) 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 ECOG technical data books.
- Connection to ECO G 3-way systems is not allowed.

3 PAW-560MAH2(L/M):
- Like any other indoor unit of similar capacity, PAW-560MAH2(L/M) 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[1]				AHU Kit
		PACi Standard		PACi Elite		
		Single-phase units	Three-phase units	Single-phase units	Three-phase units	
3.6	R410A	–	–	U-36PE2E5A	–	PAW-280PAH2(L/M)[2] or PAW-280PAH3M(-1)[2]
	R32	–	–	U-36PZH2E5	–	
5.0	R410A	–	–	U-50PE2E5A	–	
	R32	–	–	U-50PZH2E5	–	
6.0	R410A	U-60PEY2E5	–	U-60PE2E5A	–	
	R32	U-60PZ2E5	–	U-60PZH2E5	–	
7.1	R410A	U-71PEY2E5	–	U-71PE1E5A	U-71PE1E8A	
	R32	U-71PZ2E5	–	U-71PZH2E5	U-71PZH2E8	
10.0	R410A	U-100PEY1E5	U-100PEY1E8	U-100PE1E5A	U-100PE1E8A	
	R32	U-100PZ2E5	U-100PZ2E8	U-100PZH2E5	U-100PZH2E8	
12.5	R410A	U-125PEY1E5	U-125PEY1E8	U-125PE1E5A	U-125PE1E8A	
	R32	U-125PZ2E5	U-125PZ2E8	U-125PZH2E5	U-125PZH2E8	
14.0	R410A	–	U-140PEY1E8	U-140PE1E5A	U-140PE1E8A	
	R32	U-140PZ2E5	U-140PZ2E8	U-140PZH2E5	U-140PZH2E8	
20.0	R410A	–	–	–	U-200PE2E8A	
	R32	–	–	–	U-200PZH2E8	
25.0	R410A	–	–	–	U-250PE2E8A	
	R32	–	–	–	U-250PZH2E8	

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

PACi NX System lineup – PACi NX systems

Capacity (kW)	Refrigerant	Outdoor unit [1]				AHU Kit
		PACi NX Standard		PACi NX Elite		
		Single-phase units	Three-phase units	Single-phase units	Three-phase units	
3.6	R32	U-36PZ3E5	–	U-36PZH3E5	–	PAW-280PAH3M(-1) [2]
5.0	R32	U-50PZ3E5	–	U-50PZH3E5	–	
6.0	R32	U-60PZ3E5A	–	U-60PZH3E5	–	
7.1	R32	U-71PZ3E5A	–	U-71PZH3E5	U-71PZH3E8	
10.0	R32	U-100PZ3E5	U-100PZ3E8	U-100PZH3E5	U-100PZH3E8	
12.5	R32	U-125PZ3E5	U-125PZ3E8	U-125PZH3E5	U-125PZH3E8	
14.0	R32	U-140PZ3E5	U-140PZ3E8	U-140PZH3E5	U-140PZH3E8	

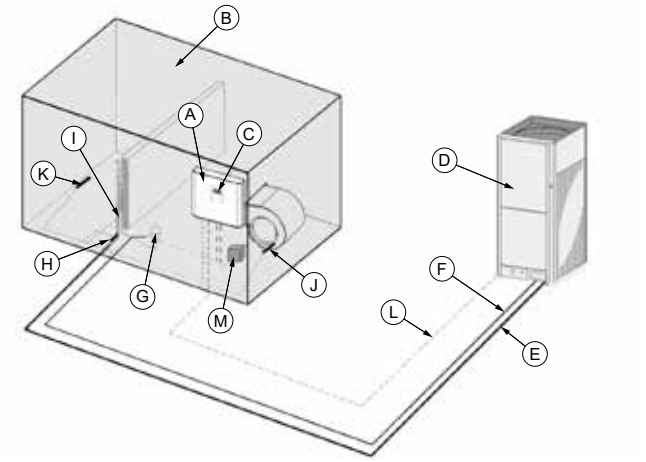
1 With PACi NX systems, only 1-to-1 installations are allowed (e.g. 1 x PACi NX outdoor unit + 1 x PAW-280PAH3M). Combinations with more than 1 outdoor unit or more than 1 AHU Kit are not possible.
2 Mixed installation with standard indoor units is not allowed.

3

3.4 System Overview

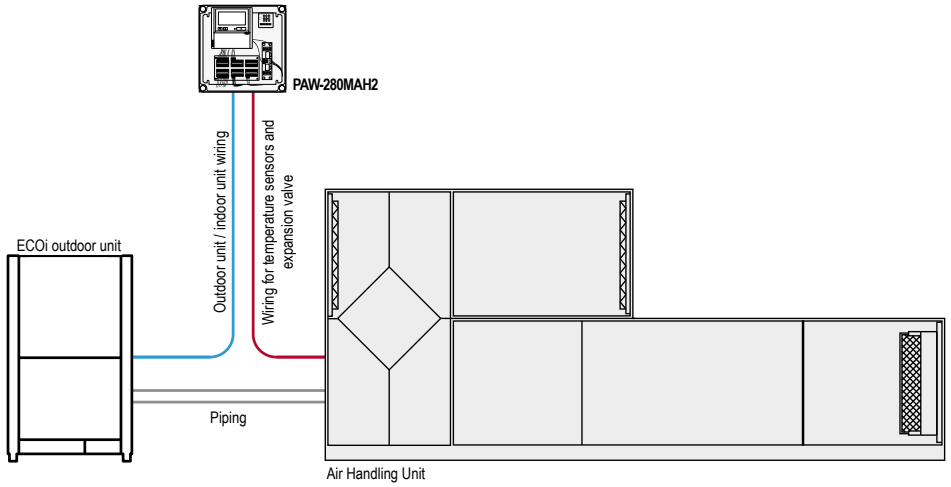
ECOi System Overview – ECOi systems

Single-connection system

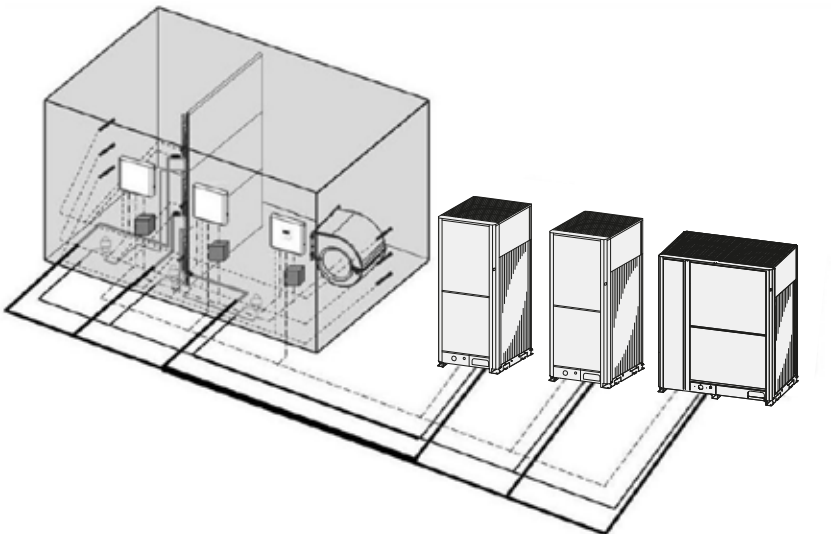


A AHU Kit enclosure (complete)
B AHU system (field supplied)
C Remote controller (integrated in AHU Kit enclosure)
D Outdoor unit
E Liquid piping (field supplied)
F Gas piping (field supplied)
G Electronic expansion valve
H Thermistor for liquid pipe
I Thermistor for gas pipe
J Thermistor for suction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

System example for ECOi single-connection system



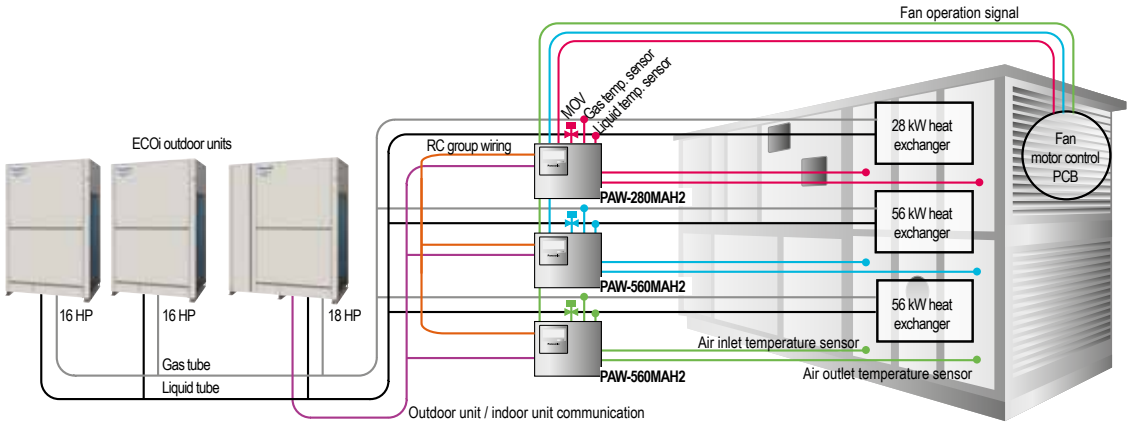
Multi-connection system



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

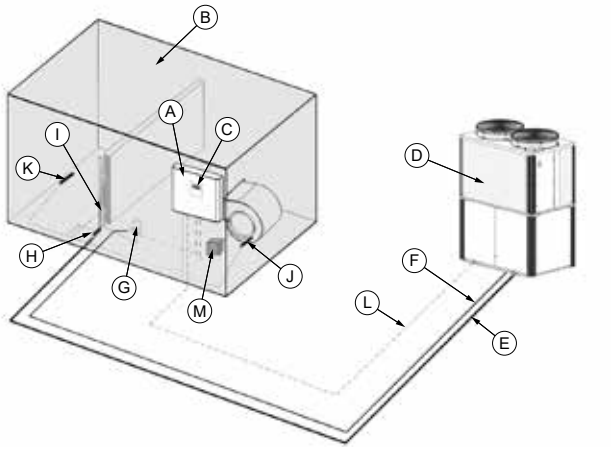
1 All AHU heat exchangers belonging to the same refrigerant circuit have to be installed in the same chassis equipped with one single fan motor.
2 One AHU Kit and correspondingly one magnetic relay is required for each heat exchanger. All AHU Kits have to be wired to the fan motor.
3 All AHU Kits shall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

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



ECO G System Overview – ECO G systems

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

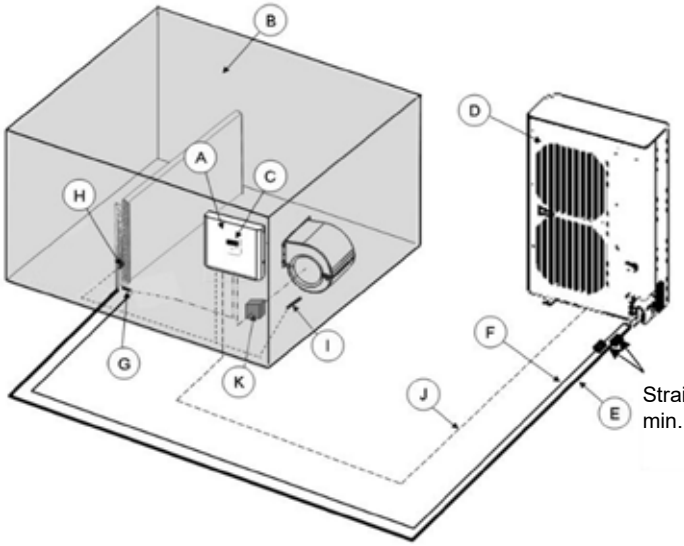


A	AHU Kit enclosure (complete)
B	AHU system (field supplied)
C	Remote controller (integrated in AHU Kit enclosure)
D	Outdoor unit
E	Liquid piping (field supplied)
F	Gas piping (field supplied)
G	Electronic expansion valve
H	Thermistor for liquid pipe (E1)
I	Thermistor for gas pipe (E3)
J	Thermistor for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

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

System Overview – PACi and PACi NX systems

Single-connection[1] system only

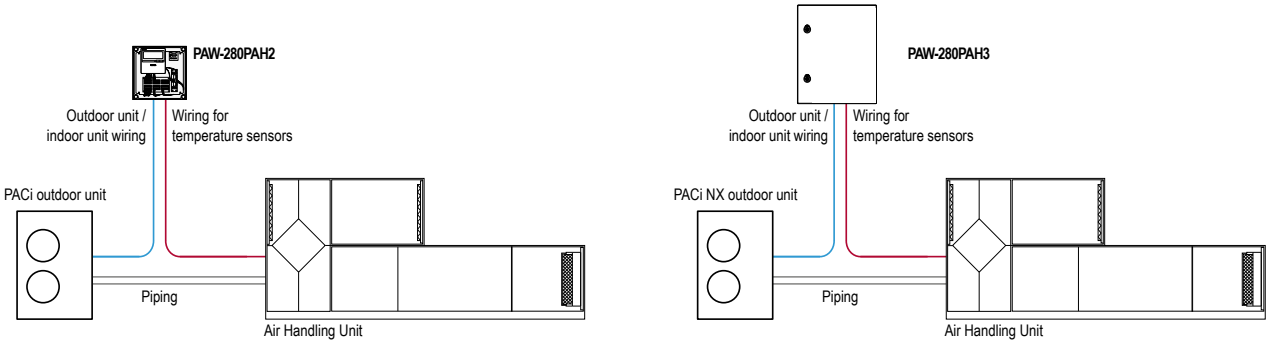


Strainer (liquid pipe & gas pipe)
min. Ø 25.4 mm (field supplied)

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)		

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



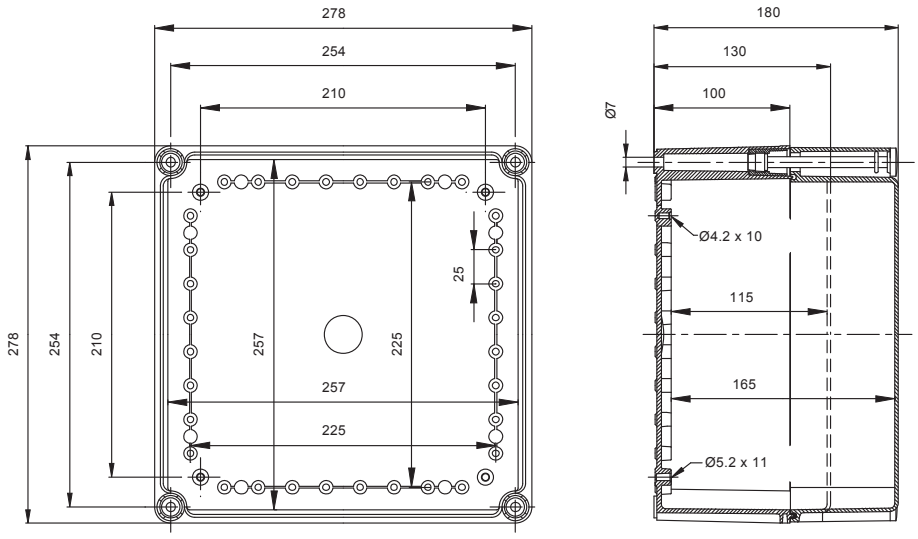
3.5 Technical data

Technical data – AHU Kit

			MAH2/PAH2 generation	PAH3 generation
Power source		V / ph / Hz	220 ... 240 / 1 / 50	220 ... 240 / 1 / 50
Rated current consumption		A	0.1	0.1
Rated power consumption (max.)		W	18.0	18.0
Dimensions (enclosure)	H x W x D	mm	278 x 278 x 180	400 x 500 x 150
Net weight	Advanced / Medium	kg	4.25	11.5 (Medium only)
	Light	kg	3.98	–
Protection class			IP65	IP65
Thermostat (Fitted on advanced versions only: PAW-160/280/560MAH2 and PAW-250PAH2)				
Dimensions	W x H x D	mm	48 x 48 x 90 (approximately)	–
Required void space		mm	85 mm (approximately)	–
Mounting cut-out	W x H	mm	44 x 44 (DIN 1/16)	–
Display height		mm	10 (approximately)	–
Temperature range	measuring / indicating	°C	–50 ... +580 / –50 ... +580	–
Temperature increments	measuring / indicating	°C	0.1 / 1	–
Sampling period		sec	< 3	–
Output signal	factory setting / alternative setting	V	0 ... 10 / 2 ... 10	–
Input signal			Pt100, 2-/3-wire	–
Control voltage		V / ph / Hz	85 ... 265 / 1 / 50/60	–
Ambient temperature (max.)		°C	45	–
Ambient air humidity (max. in hostile environments)		% RH	85	–
Quiescent current consumption		W	< 3	–

Dimensions – AHU Kit

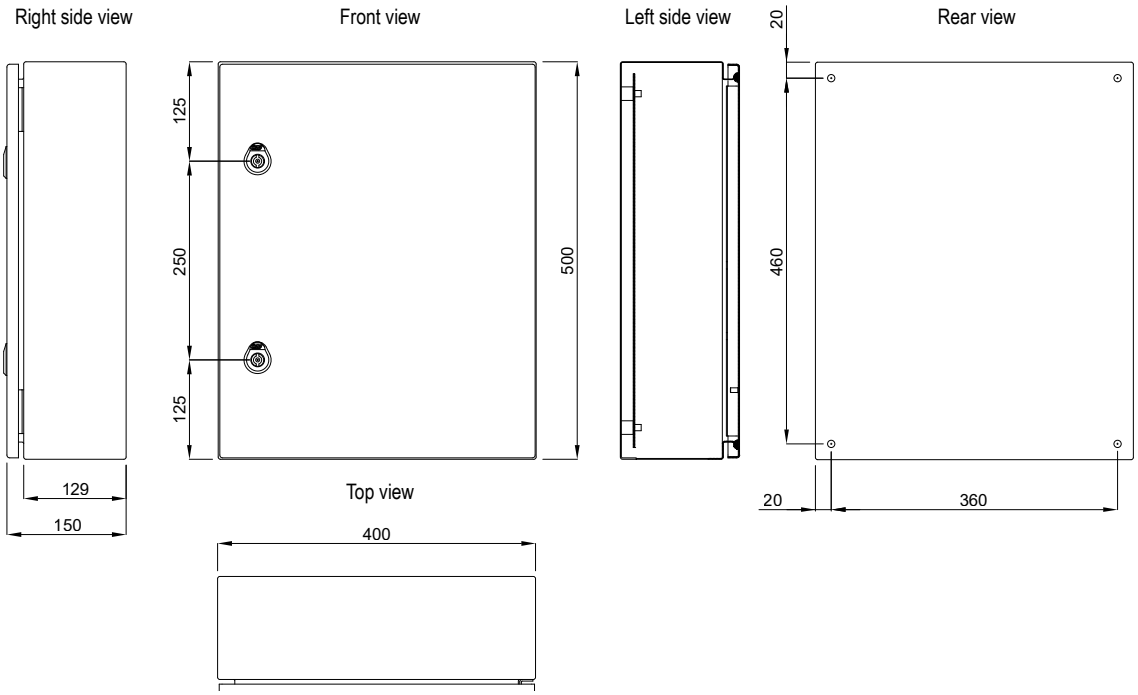
MAH2/PAH2 generation



Front view (transparent cover removed)

Side view

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-160MAH2(L/M)	PAW-280MAH2(L/M)	PAW-560MAH2(L/M)	PAW-280MAH2(L/M) + PAW-560MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M)
Nominal cooling capacity		kW	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	m³/h	1,140	3,500	7,000	10,500	14,000
	Max	m³/h	2,600	5,000	10,000	15,000	20,000
AHU DX coil heat exchanger volume	Min	dm³	1.7	2.8	5.6	8.4	11.2
	Max	dm³	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

Continued on following page.

Technical data and limitations – ECOi and ECO G systems – R410A (cont.)

AHU Kit HP			50[1]	60[1]	70[1]	80[1]
AHU Kit model			PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-280MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-560MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-280MAH2(L/M)	PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-560MAH2(L/M) + PAW-560MAH2(L/M)
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	m³/h	17,500	21,000	24,000	28,000
	Max	m³/h	25,000	30,000	35,000	40,000
AHU DX coil heat exchanger volume	Min	dm³	14.0	16.8	19.6	22.4
	Max	dm³	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 – R410A

AHU Kit			PAW-280PAH2(L/M) or PAW-280PAH3M(-1)						
Outdoor unit – PACi Standard			U-60PEY2E5	U-71PEY2E5	U-100PEY1E5	U-125PEY1E5	U-100PEY1E8	U-125PEY1E8	U-140PEY1E8
Nominal cooling capacity		kW	6.0	7.1	10.0	12.5	10.0	12.5	14.0
Nominal heating capacity		kW	6.0	7.1	10.0	12.5	10.0	12.5	14.0
Piping connections	Liquid pipe	Inch (mm)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)
	Gas pipe	Inch (mm)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)
Piping length	Min / Max	m	3 / 40	3 / 35	5 / 30	5 / 30	5 / 30	5 / 30	5 / 30
Precharged length (R410A)	Max	m	30	30	30	30	30	30	30
Additional refrigerant charge (R410A) due to extended piping length		g/m	40	40	50	50	50	50	50
Ambient temperature	Cooling (Min / Max)	°C DB	-10 / 43	-10 / 43	-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	-20 / 15	-20 / 15
AHU unit under "standard conditions"									
Air volume flow	Cooling (Min / Max)	m³/h	540 / 960	540 / 960	840 / 1,980	1,140 / 2,100	840 / 1,980	1,140 / 2,100	1,140 / 2,160
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	13 / 23	13 / 23	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	16 / 30	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	1.3 / 1.4	1.3 / 1.4	1.5 / 1.9	1.5 / 1.9	1.5 / 1.9	1.5 / 1.9	1.5 / 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 A2"									
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	540 / 1,450	540 / 1,600	840 / 2,400	1,140 / 2,500	840 / 2,400	1,140 / 2,500	1,140 / 2,600
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30
		°C WB	13 / 23	13 / 23	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	16 / 30	16 / 30
AHU unit under "special conditions B3"									
AHU DX coil heat exchanger volume, subject to restrictions[3]	Min / Max	dm³	1.3 / 1.8	1.3 / 2.0	1.5 / 2.8	1.5 / 2.75	1.5 / 2.8	1.5 / 2.75	1.5 / 2.8
Additional refrigerant charge (R410A) due to larger heat exchanger volume		kg/dm³	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Max. additional refrigerant charge (R410A)		kg	0.36	0.54	0.81	0.76	0.81	0.76	0.81
Max. pipe length		m	40	35	30	30	30	30	30
Max. ambient temp. for pump down		°C	n/a	n/a	35	25	35	25	n/a

Continued on following page. See footnotes overleaf.

Technical data and limitations – PACi systems – R410A (cont.)

AHU Kit			PAW-280PAH2(L/M) or PAW-280PAH3M(-1)						
Outdoor unit – PACi Elite			U-36PE2E5A	U-50PE2E5A	U-60PE2E5A	U-71PE1E5A	U-100PE1E5A	U-125PE1E5A	U-140PE1E5A
Nominal cooling capacity		kW	3.6	5.0	6.0	7.1	10.0	12.5	14.0
Nominal heating capacity		kW	4.0	5.6	7.0	8.0	11.2	14.0	16.0
Piping connections	Liquid pipe	Inch (mm)	1/4 (6,35)	1/4 (6,35)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)
	Gas pipe	Inch (mm)	1/2 (12,7)	1/2 (12,7)	5/8 (15,88)	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 / 50	5 / 50	5 / 50	5 / 50
Precharged length (R410A)	Max	m	30	30	30	30	30	30	30
Additional refrigerant charge (R410A) due to larger heat exchanger volume		g/m	20	20	40	50	50	50	50
Ambient temperature	Cooling (Min / Max)	°C DB	-10 / 43	-10 / 43	-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	-20 / 15	-20 / 15
AHU unit under "standard conditions"									
Air volume flow	Cooling (Min / Max)	m³/h	480 / 780	480 / 780	540 / 960	720 / 1,500	840 / 1,980	1,140 / 2,100	1,140 / 2,160
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	13 / 23	13 / 23	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	16 / 30	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	– / 1.3	– / 1.3	– / 1.4	– / 1.8	1.7 / 2.1	1.7 / 2.1	1.7 / 2.1
Heat exchanger face area	Min / Max	m²	– / –	– / –	– / –	– / –	0.43 / 0.51	0.43 / 0.51	0.43 / 0.51
AHU unit under "special conditions A2"									
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	480 / 1,080	480 / 1,080	540 / 1,600	720 / 1,800	840 / 2,400	1,140 / 2,600	1,140 / 2,700
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30
		°C WB	13 / 23	13 / 23	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	16 / 30	16 / 30
AHU unit under "special conditions B3"									
AHU DX coil heat exchanger volume, subject to restrictions[3]	Min / Max	dm³	– / 1,5	– / 1.5	– / 1.8	– / 2.2	1.7 / 3.0	1.7 / 3.0	1.7 / 3.0
Additional refrigerant charge (R410A) due to larger heat exchanger volume		kg/dm³	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Max. additional refrigerant charge (R410A)		kg	0.18	0.18	0.36	0.36	0.81	0.81	0.81
Max. pipe length		m	30	30	40	40	30	30	30
Max. ambient temp. for pump down		°C	n/a	n/a	35	35	25	25	25

AHU Kit			PAW-280PAH2(L/M) or PAW-280PAH3M(-1)					
Outdoor unit – PACi Elite			U-71PE1E8A	U-100PE1E8A	U-125PE1E8A	U-140PE1E8A	U-200PE2E8A	U-250PE2E8A
Nominal cooling capacity		kW	7.1	10.0	12.5	14.0	19.5	25.0
Nominal heating capacity		kW	8.0	11.2	14.0	16.0	22.4	28.0
Piping connections	Liquid pipe	Inch (mm)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	1/2 (12,7)
	Gas pipe	Inch (mm)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	1 (25,4)	1 (25,4)
Piping length	Min / Max	m	5 / 50	5 / 50	5 / 50	5 / 50	5 / 70	5 / 70
Precharged length (R410A)	Max	m	30	30	30	30	30	30
Additional refrigerant charge (R410A) due to extended piping length		g/m	50	50	50	50	50	80
Ambient temperature	Cooling (Min / Max)	°C DB	-10 / 43	-10 / 43	-10 / 43	-10 / 43	-15 / 43	-15 / 43
	Heating (Min / Max)	°C WB	-20 / 15	-20 / 15	-20 / 15	-20 / 15	-20 / 15	-20 / 15
AHU unit under "standard conditions"								
Air volume flow	Cooling (Min / Max)	m³/h	720 / 1,500	840 / 1,980	1,140 / 2,100	1,140 / 2,160	1,680 / 3,960	2,280 / 4,440
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32
		°C WB	13 / 23	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	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	– / 1.8	1.7 / 2.1	1.7 / 2.1	1.7 / 2.1	2.3 / 4.3	2.7 / 4.3
Heat exchanger face area	Min / Max	m²	– / –	0.43 / 0.51	0.43 / 0.51	0.43 / 0.51	0.54 / 1.0	0.66 / 1.0
AHU unit under "special conditions A2"								
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	720 / 1,800	840 / 2,400	1,140 / 2,600	1,140 / 2,700	1,680 / 4,300	2,280 / 5,400
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30
		°C WB	13 / 23	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	16 / 30
AHU unit under "special conditions B3"								
AHU DX coil heat exchanger volume, subject to restrictions[3]	Min / Max	dm³	– / 2.2	1.7 / 3.0	1.7 / 3.0	1.7 / 3.0	2.3 / 5.7	2.7 / 7.1
Additional refrigerant charge (R410A) due to larger heat exchanger volume		kg/dm³	0.9	0.9	0.9	0.9	0.9	0.9
Max. additional refrigerant charge (R410A)		kg	0.36	0.81	0.81	0.81	1.25	2.51
Max. pipe length		m	40	30	30	30	n/a	n/a
Max. ambient temp. for pump down		°C	35	25	25	25	n/a	n/a

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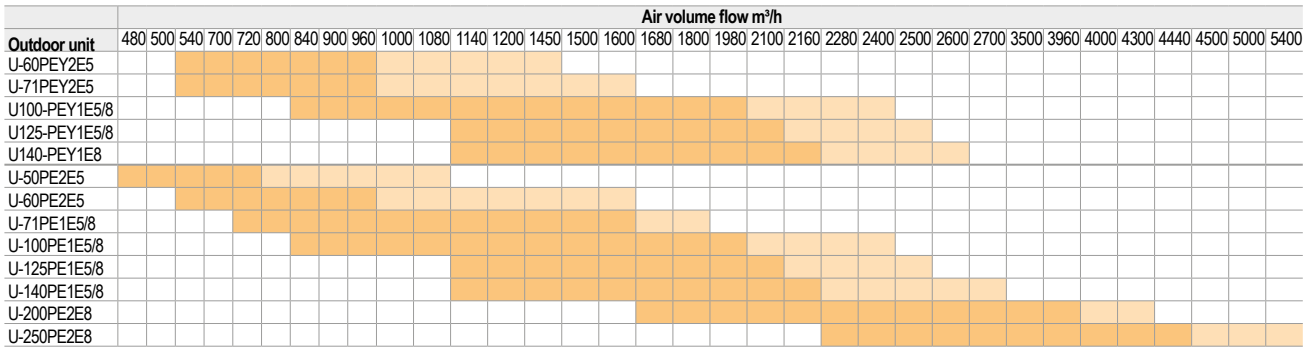


Maximum allowed air volume flow under "Standard conditions"

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 (R410A), 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 (R410A)

Unit: U-60PE2E5A
Pipe length: 40 metres
AHU DX coil (supplied by AHU manufacturer): 1,7 dm^3
Refrigerant charge at shipment fitted for pipe length within 30 m
Pipes additional refrigerant charge: 0,04 kg/m
AHU DX coil additional refrigerant charge: 0,9 kg/dm^3
Refrigerant charge at shipment is sufficient for AHU DX coil volume up to 1,4 dm^3

Total additional refrigerant charge calculation
((1.7 dm^3 – 1.4 dm^3) x 0.9 kg/dm^3) + (10 m x 0.04 kg/m) = 0.27 kg + 0.40 kg = 0.67 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 × 1,000 x 3 × 1.5 × 10^{-4} = 5.4
This value must be rounded up to 6.

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

PACi Technical data and limitations – PACi systems – R32

AHU Kit			PAW-280PAH2(L/M) or PAW-280PAH3M(-1)							
Outdoor unit – PACi Standard			U-60PZ2E5	U-71PZ2E5	U-100PZ2E5	U-125PZ2E5	U-140PZ2E5	U-100PZ2E8	U-125PZ2E8	U-140PZ2E8
Nominal cooling capacity		kW	6.0	7.1	10.0	12.5	14.0	10.0	12.5	14.0
Nominal heating capacity		kW	6.0	7.1	10.0	12.5	14.0	10.0	12.5	14.0
Piping connections	Liquid pipe	Inch (mm)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)
	Gas pipe	Inch (mm)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	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	5 / 50	5 / 50	5 / 50	5 / 50	5 / 50	5 / 50
Precharged length (R32)	Max	m	30	30	30	30	30	30	30	30
Additional refrigerant charge (R32) due to extended piping length		g/m	35	35	45	45	45	45	45	45
Ambient temperature	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	780 / 1,320	780 / 1,320	900 / 2,160	1,140 / 2,280	1,200 / 2,400	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	1.3 / 1.4	1.3 / 1.4	1.5 / 1.9	1.5 / 1.9	1.5 / 1.9	1.5 / 1.9	1.5 / 1.9	1.5 / 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	0.43 / 0.51
AHU unit under "special conditions A[2]"										
Air volume flow, subject to restrictions[2]	Cooling (Min / Max)	m³/h	780 / 1,450	780 / 1,600	900 / 2,300	1,140 / 2,500	1,200 / 2,600	900 / 2,300	1,140 / 2,500	1,200 / 2,600
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 30	18 / 30	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	1.3 / 1.8	1.3 / 2.0	1.5 / 2.6	1.5 / 2.6	1.5 / 2.8	1.5 / 2.6	1.5 / 2.6	1.5 / 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	0.33	0.50	0.58	0.58	0.74	0.58	0.58	0.74
Max. pipe length		m	30	25	35	35	35	35	35	35
Max. ambient temp. for pump down		°C	n/a	n/a	35	25	35	35	25	35

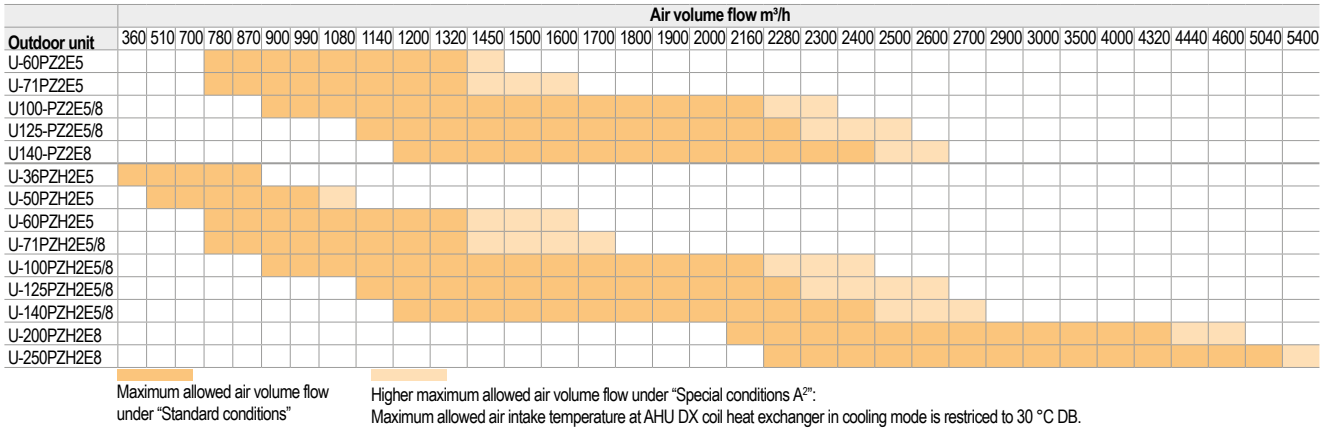
See footnotes overleaf.

AHU Kit			PAW-280PAH2(L/M) or PAW-280PAH3M(-1)						
Outdoor unit – PACi Elite			U-36PZH2E5	U-50PZH2E5	U-60PZH2E5	U-71PZH2E5	U-100PZH2E5	U-125PZH2E5	U-140PZH2E5
Nominal cooling capacity		kW	3.6	5.0	6.0	7.1	10.0	12.5	14.0
Nominal heating capacity		kW	4.0	5.6	7.0	8.0	11.2	14.0	16.0
Piping connections	Liquid pipe	Inch (mm)	1/4 (6,35)	1/4 (6,35)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)
	Gas pipe	Inch (mm)	1/2 (12,7)	1/2 (12,7)	5/8 (15,88)	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 / 50	5 / 85	5 / 85	5 / 85
Precharged length (R32)	Max	m	30	30	30	30	30	30	30
Additional refrigerant charge (R32) due to larger heat exchanger volume		g/m	20	20	35	45	45	45	45
Ambient temperature	Cooling (Min / Max)	°C DB	-15 / 46	-15 / 46	-15 / 46	-15 / 46	-15 / 46	-15 / 46	-15 / 46
	Heating (Min / Max)	°C WB	-20 / 18	-20 / 18	-20 / 18	-20 / 18	-20 / 18	-20 / 18	-20 / 18
AHU unit under "standard conditions"									
Air volume flow	Cooling (Min / Max)	m³/h	360 / 870	510 / 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
		°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	– / 1.3	– / 1.3	– / 1.4	– / 1.8	1.7 / 2.1	1.7 / 2.1	1.7 / 2.1
Heat exchanger face area	Min / Max	m²	– / –	– / –	– / –	– / –	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	510 / 1,080	780 / 1,600	780 / 1,700	900 / 2,400	1,140 / 2,600	1,200 / 2,700
Air intake temperature[1]	Cooling (Min / Max)	°C DB	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
	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	– / 1.5	– / 1.5	– / 1.9	– / 2.2	1.7 / 3.0	1.7 / 3.0	1.7 / 3.0
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	0.41	0.33	0,74	0,74	0,74
Max. pipe length		m	30	30	30	40	65	65	65
Max. ambient temp. for pump down		°C	n/a	n/a	n/a	35	43	43	43

Continued on the following page. See footnotes overleaf.

Technical data and limitations – PACi systems – R32 (cont.)

AHU Kit			PAW-280PAH2(L/M) or PAW-280PAH3M(-1)					
Outdoor unit – PACi Elite			U-71PZH2E8	U-100PZH2E8	U-125PZH2E8	U-140PZH2E8	U-200PZH2E8	U-250PZH2E8
Nominal cooling capacity		kW	7.1	10.0	12.5	14.0	19.5	23.2
Nominal heating capacity		kW	8.0	11.2	14.0	16.0	22.4	28.0
Piping connections	Liquid pipe	Inch (mm)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	3/8 (9,52)	1/2 (12,7)
	Gas pipe	Inch (mm)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	5/8 (15,88)	1 (25,4)	1 (25,4)
Piping length	Min / Max	m	5 / 50	5 / 85	5 / 85	5 / 85	5 / 90	5 / 60
Precharged length (R32)	Max	m	30	30	30	30	30	30
Additional refrigerant charge (R32) due to extended piping length		g/m	45	45	45	45	60	80
Ambient temperature	Cooling (Min / Max)	°C DB	-15 / 46	-15 / 46	-15 / 46	-15 / 46	-15 / 46	-15 / 46
	Heating (Min / Max)	°C WB	-20 / 18	-20 / 18	-20 / 18	-20 / 18	-20 / 24	-20 / 24
AHU unit under "standard conditions"								
Air volume flow	Cooling (Min / Max)	m³/h	780 / 1,320	900 / 2,160	1,140 / 2,280	1,200 / 2,400	2,160 / 4,320	2,280 / 5,040
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32	18 / 32
		°C WB	14 / 25	14 / 25	14 / 25	14 / 25	n/a	n/a
	Heating (Min / Max)	°C DB	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30	16 / 30
AHU DX coil heat exchanger volume	Min / Max	dm³	– / 1.8	1.7 / 2.1	1.7 / 2.1	1.7 / 2.1	2.3 / 4.3	2.7 / 4.3
Heat exchanger face area	Min / Max	m²	– / –	0.43 / 0.51	0.43 / 0.51	0.43 / 0.51	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	780 / 1,700	900 / 2,400	1,140 / 2,600	1,200 / 2,700	2,160 / 4,600	2,280 / 5,400
Air intake temperature[1]	Cooling (Min / Max)	°C DB	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30	18 / 30
		°C WB	14 / 25	14 / 25	14 / 25	14 / 25	n/a	n/a
	Heating (Min / Max)	°C DB	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	– / 2.2	1.7 / 3.0	1.7 / 3.0	1.7 / 3.0	2.3 / 5.7	2.7 / 7.1
Additional refrigerant charge (R32) due to larger heat exchanger volume		kg/dm³	0.83	0.83	0.83	0.83	0.83	0.83
Max. additional refrigerant charge (R32)		kg	0.33	0,74	0,74	0,74	1.16	2.32
Max. pipe length		m	40	65	65	65	90	60
Max. ambient temp. for pump down		°C	35	43	43	43	n/a	n/a



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-60PZ2E5
Pipe length: 40 metres
AHU DX coil (supplied by AHU manufacturer): 1,7 dm³
Refrigerant charge at shipment fitted for pipe length within 30 m
Pipes additional refrigerant charge: 0.035 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 1,4 dm³

Total additional refrigerant charge calculation
((1.7 dm³ – 1.4 dm³) x 0.83 kg/dm³) + (10 m x 0.035 kg/m) = 0.249 kg + 0.35 kg = 0.599 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 × 1,000 x 3 × 1.5 × 10^{-4} = 5.4
This value must be rounded up to 6.

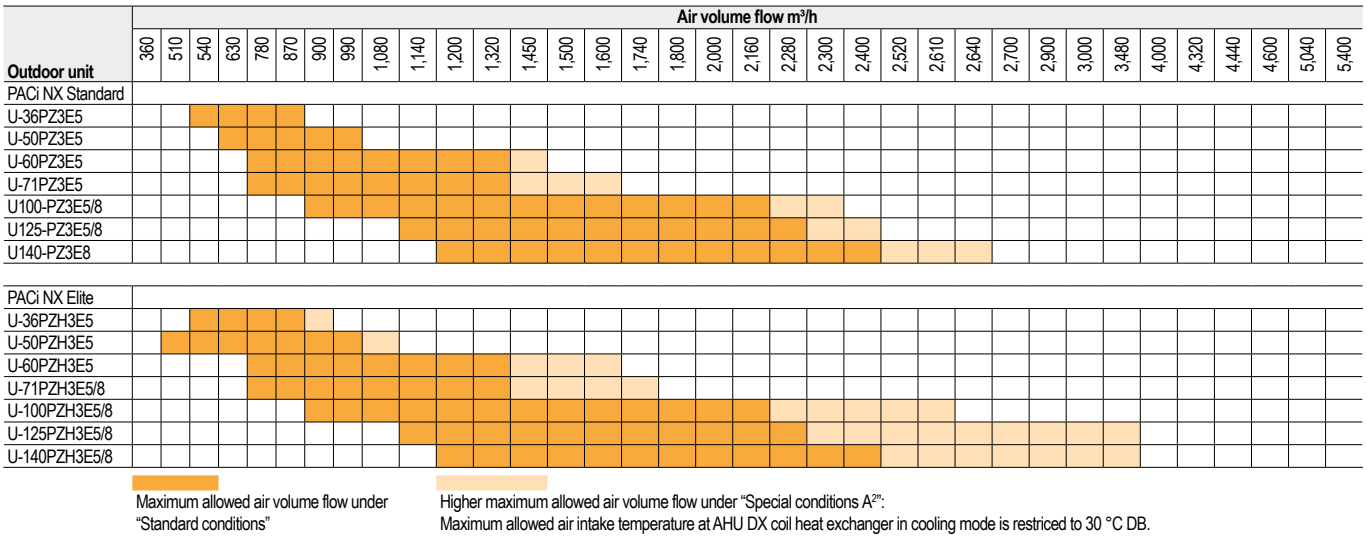
This means that the minimum number of passes is 6 passes.

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

AHU Kit			PAW-280PAH3M(-1)						
Outdoor unit – PACi NX Standard			U-36PZ3E5	U-50PZ3E5	U-60PZ3E5A	U-71PZ3E5A	U-100PZ3E5/8	U-125PZ3E5/8	U-140PZ3E5/8
Nominal cooling capacity		kW	3.6	5.0	6.0	7.1	10.0	12.5	14.0
Nominal heating capacity		kW	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)	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 / 15	3 / 20	3 / 40	3 / 40	5 / 50	5 / 50	5 / 50
Precharged length (R32)	Max	m	7.5	7.5	30	30	30	30	30
Additional refrigerant charge (R32) due to extended piping length		g/m	0.01	0.015	0.015	0.017	0.045	0.045	0.045
Ambient temperature	Cooling (Min / Max)	°C DB	-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
AHU unit under "standard conditions"									
Air volume flow	Cooling (Min / Max)	m³/h	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
		°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	1.00 / 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	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 / 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
	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	1.00 / 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
Max. additional refrigerant charge (R32)		kg	0.07	0.07	0.17	0.17	0.58	0.58	0.74
Max. pipe length		m	7.5	15	25	30	35	35	35
Max. ambient temp. for pump down		°C DB	n/a	30	30	30	30	30	30

Continued on the following page. See footnotes overleaf.

AHU Kit			PAW-280PAH3M(-1)						
Outdoor unit – PACi NX Elite			U-36PZH3E5	U-50PZH3E5	U-60PZH3E5	U-71PZH3E5/8	U-100PZH3E5/8	U-125PZH3E5/8	U-140PZH3E5/8
Nominal cooling capacity		kW	3,6	5	6	7,1	10	12,5	14
Nominal heating capacity		kW	3,6	5	6	7,1	10	12,5	14
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 / 50	5 / 85	5 / 85	5 / 85
Precharged length (R32)	Max	m	30	30	30	30	30	30	30
Additional refrigerant charge (R32) due to extended piping length		g/m	0,015	0,015	0,015	0,045	0,045	0,045	0,045
Ambient temperature	Cooling (Min / Max)	°C DB	-15 / +46	-15 / +46	-15 / +46	-15 / +46	-20 / +48	-20 / +48	-20 / +48
	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	540 / 870	510 / 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
		°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	1.2 / 1.8	1.7 / 2.1	1.7 / 2.1	1.7 / 2.1
Heat exchanger face area	Min / Max	m2	– / –	– / –	– / –	– / –	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	540 / 900	630 / 1,080	780 / 1,600	780 / 1,740	900 / 2,610	1,140 / 3,480	1,200 / 3,480
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 / 2.2	1.7 / 3.0	1.7 / 3.0	1.7 / 3.0
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	0.33	0.74	0.74	0.74
Max. pipe length		m	25	25	18	40	65	65	65
Max. ambient temp. for pump down		°C DB	n/a	n/a	30	30	30	30	30



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-71PZH3E5
Pipe length: 40 metres
AHU DX coil (supplied by AHU manufacturer): 2.0 dm³
Refrigerant charge at shipment fitted for pipe length within 30 m

Pipes additional refrigerant charge: 0.045 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
((2.0 dm³ – 1.8 dm³) x 0.83 kg/dm³) + (10 m x 0.045 kg/m) = 0.166 kg + 0.45 kg = 0.616 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.

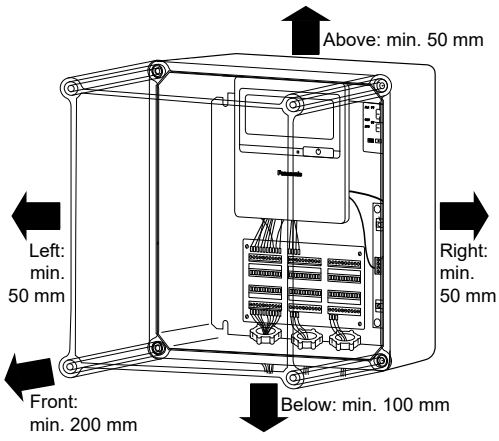
Exposing the wires of thermistors or, in case of the ECOi and ECO G systems, of the expansion valve to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

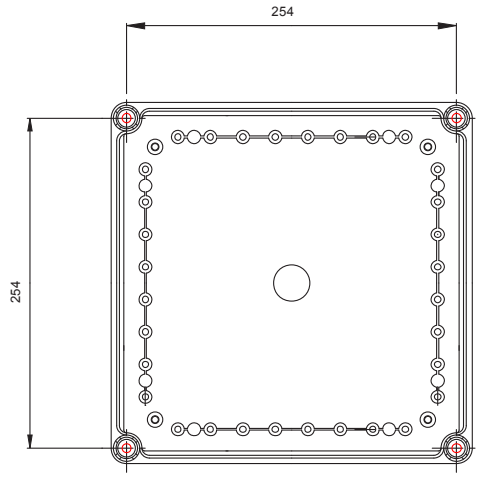
- ► Attach the AHU Kit either directly to the Air Handling Unit or to a wall nearby and make sure that it is not exposed to direct sunlight.
- ► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

4.1.1 MAH2/PAH2 generation

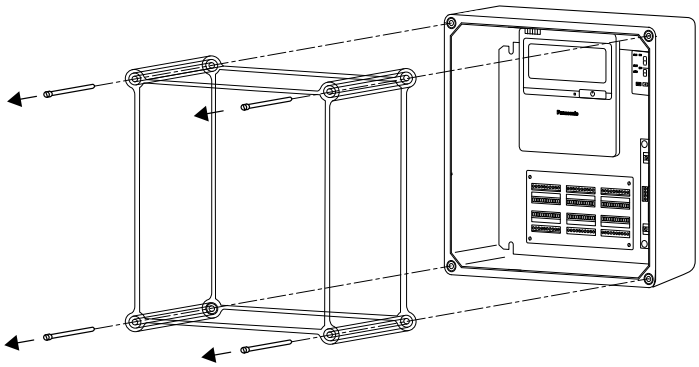
Mount the MAH2/PAH2 generation AHU Kit according to the following instructions. Please note that screws and other fixing materials, which may be required, are not included in the kit.

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 254 mm.

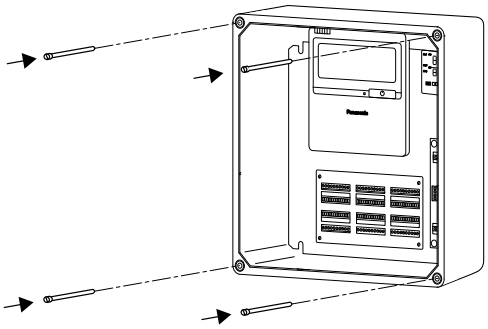




3. Loosen the 4 screws in the corners of the enclosure and remove the cover from the enclosure.



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



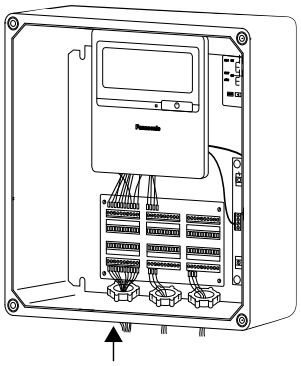
ATTENTION

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

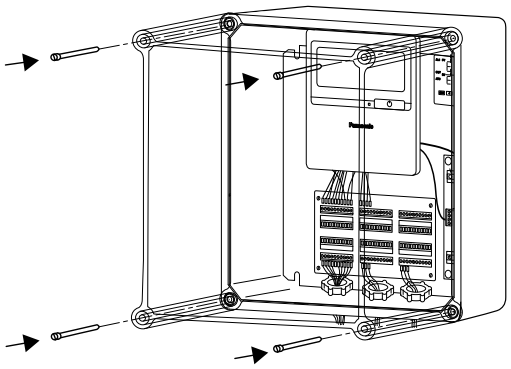


After having finished wiring and applying power to the AHU Kit, auto-addressing can be performed and the parameters of the thermostat (advanced version only) can be set.

Important

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

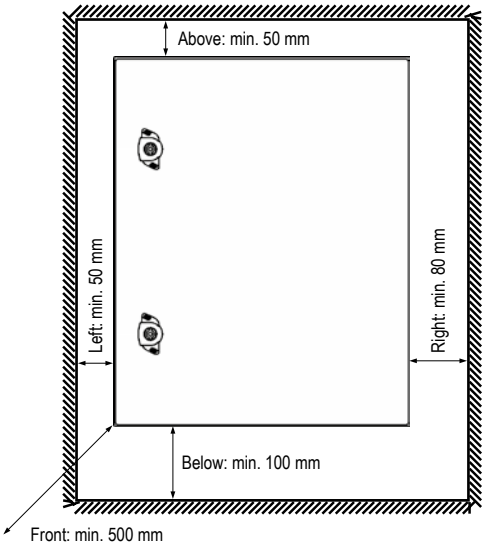
6. Place the cover back on the enclosure and fix it with the 4 screws at the corners.

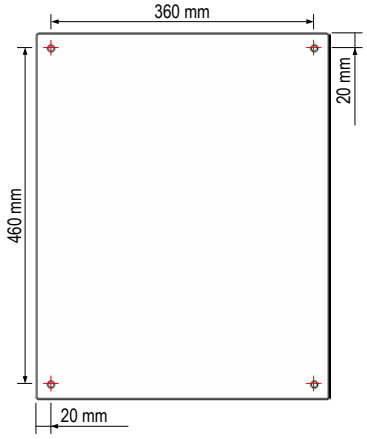


4.1.2 PAH3 generation

Mount the 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.

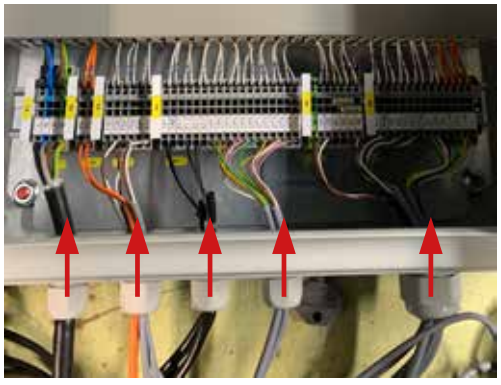
ATTENTION

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. After 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. 51* and → *4.3 Installation of thermistors, p. 53*). 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. 56*).

4.1.3 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

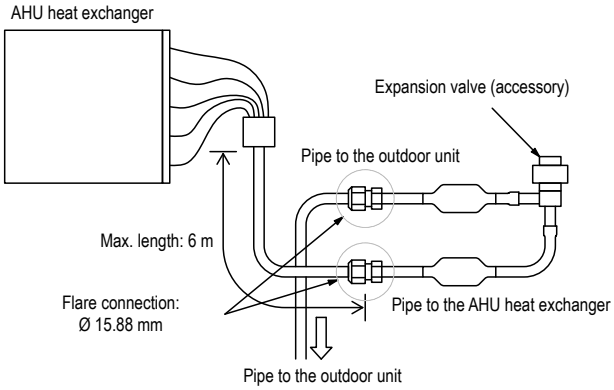
Exposing the wires of the expansion valve to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

► 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.

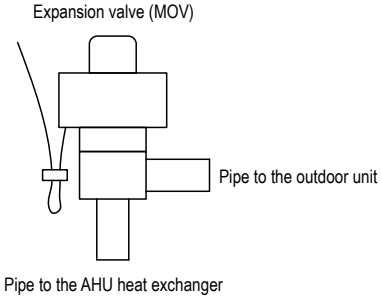
► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

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

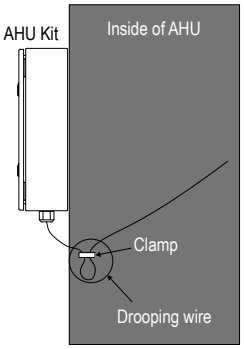
- Wires must not be installed externally. Cable protection such as conduit is required.
- Do not detach connector.
- The distance from AHU heat exchanger must not exceed 6 m.
- Pipe reducers must be installed in the field where applicable.
  For example, for 10HP ECOi systems, piping size to outdoor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

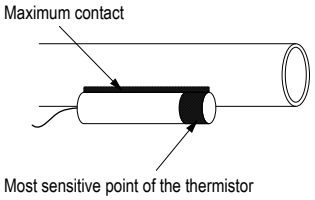
Exposing the wires of thermistors to the outside and/or to direct sunlight might damage the wires and should therefore be avoided.

► 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.

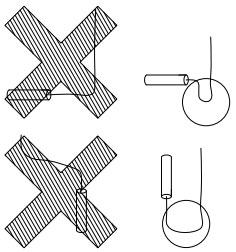
► Use protecting wire ducts to avoid exposing the wires of thermistors and the electronic expansion valve to the outside.

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

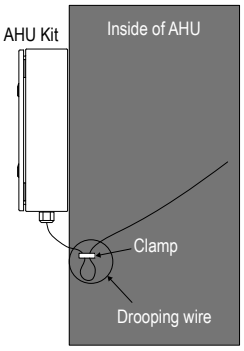
- Wires must not be put out of equipments.
- Wires must not be cut and connector of wires must not be detached.
- Thermistors must be Identified by the tag which is wound to each thermistor.
- The head of the thermistor must be attached exactly onto the pipe, because the head is the most sensitive point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



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



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



Important

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

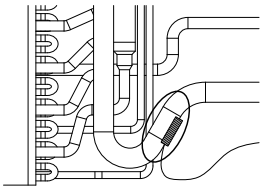
4.3.1 Installation of thermistor on gas pipe

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

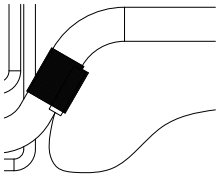
Mount “E3” thermistor to the gas pipe of the AHU heat exchanger according to the following instructions.

For PAW-160MAH2(L/M)

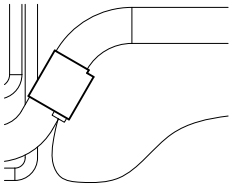
1. Attach the gas pipe thermistor onto the collecting gas pipe in the heat exchanger.



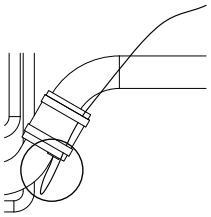
2. Cover the thermistor and pipe with aluminum tape.



3. Cover the aluminum tape with thermal insulation.



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



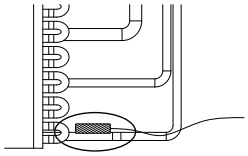
For PAW-280MAH2(L/M) and PAW-560MAH2(L/M)

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

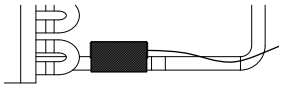
4.3.2 Installation of thermistor on liquid pipe

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

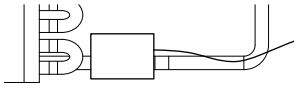
1. Attach the liquid pipe thermistor to the liquid pipe located in the lowest position after the distributor in the heat exchanger.



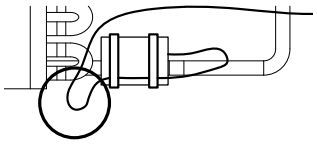
2. Cover the thermistor and pipe with aluminum tape.



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

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

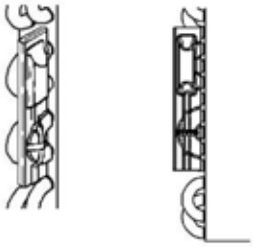
Mount “E2” thermistor to the heat exchanger pipe middle according to the following instructions.

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.
3. In case of using the additional thermostat (advanced version only) for:
   a. target temperature setting based on ambient temperature, install the 3-wired temperature sensor in a protected location suitable for detecting the proper ambient temperature (avoid direct sunlight and moisture);
   b. demand control based on room supply air temperature install the 3-wired temperature sensor in the blow-out duct of the AHU where the proper air temperature can be measured.

4.4 Matching outdoor unit capacity with AHU Kit capacity

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

As all AHU Kit models (PAW-280PAH2(L/M) or PAW-280PAH3M) have only one fixed capacity and can be combined with the complete range of PACi and PACi NX systems, where outdoor unit capacities vary from 3.6 (PACi range) or 2.5 (PACi NX range) to 25 kW, 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 three different methods to achieve this aim.

PACi 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 PEY/PE outdoor units (R410A) and PAH2/PAH3 AHU Kit models
- PACi PZ2/PZH2 outdoor units (R32) and PAH2/PAH3 AHU Kit models

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:

Standard – R410A
U-60PEY2E5
U-71PEY2E5

Standard – R32
U-60PZ2E5
U-71PZ2E5

Elite – R410A
U-36PE2E5A
U-50PE2E5A
U-60PE2E5A

Elite – R32
U-36PZH2E5
U-50PZH2E5
U-60PZH2E5

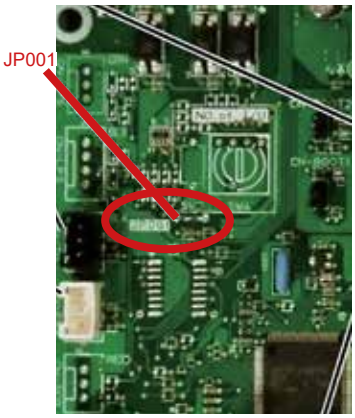
Standard – R410A
U-100PEY1E5
U-125PEY1E5
U-100PEY1E8
U-125PEY1E8
U-140PEY1E8

Elite – R410A
U-71PE1E5A
U-100PE1E5A
U-125PE1E5A
U-140PE1E5A
U-71PE1E8A
U-100PE1E8A
U-125PE1E8A
U-140PE1E8A

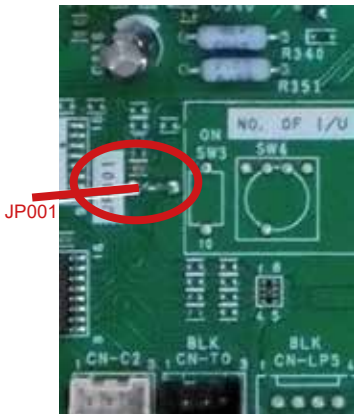
Standard – R32
U-100PZ2E8
U-125PZ2E8
U-140PZ2E8

Elite – R410A
U-200PE2E8A
U-250PE2E8A

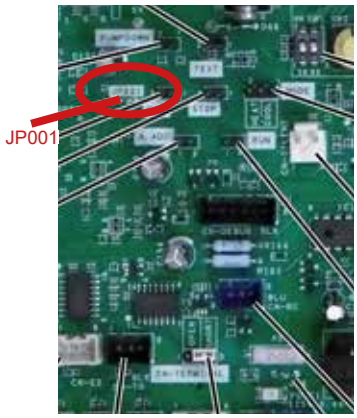
Elite – R32
U-200PZH2E8
U-250PZH2E8



Standard – R32
U-100PZ2E5
U-125PZ2E5
U-140PZ2E5

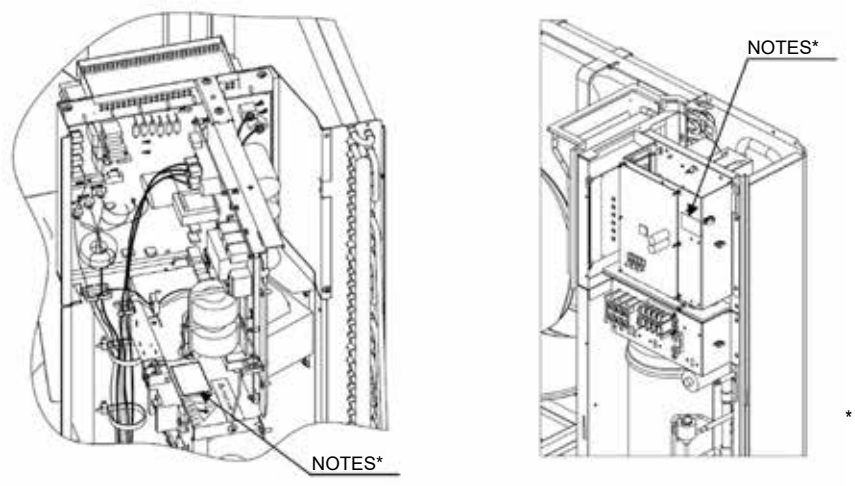


Elite – R32
U-71PZH2E5
U-100PZH2E5
U-125PZH2E5
U-140PZH2E5



Elite – R32
U-71PZH2E8
U-100PZH2E8
U-125PZH2E8
U-140PZH2E8

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



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

PACi 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 PEY/PE outdoor units (R410A) and PAH2/PAH3 AHU Kit models
- PACi PZ2/PZH2 outdoor units (R32) and PAH2/PAH3 AHU Kit models

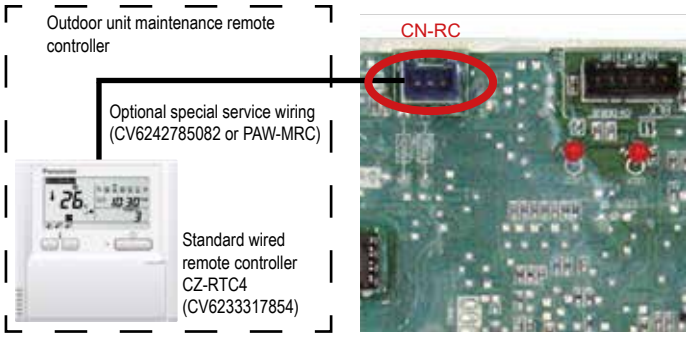
Required accessories:

- 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 one of the following positions:

   a.



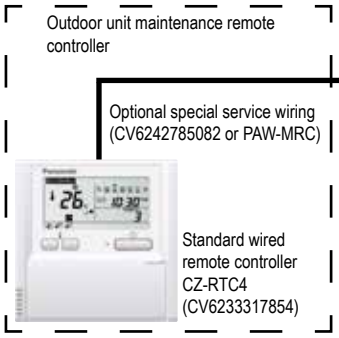
Standard – R410A
U-60PEY2E5
U-71PEY2E5

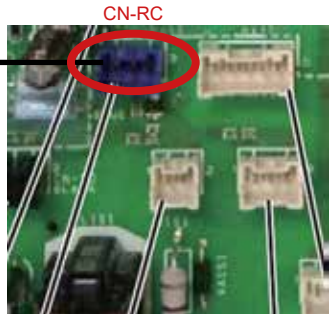
Standard – R32
U-60PZ2E5
U-71PZ2E5

Elite – R410A
U-36PE2E5A
U-50PE2E5A
U-60PE2E5A

Elite – R32
U-36PZH2E5
U-50PZH2E5
U-60PZH2E5

b.

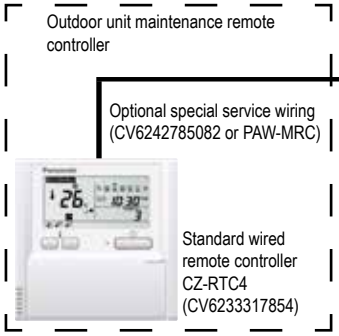




Standard – R410A
U-100PEY1E5
U-125PEY1E5
U-100PEY1E8
U-125PEY1E8
U-140PEY1E8

Elite – R410A
U-60PE1E5A
U-71PE1E5A
U-100PE1E5A
U-125PE1E5A
U-140PE1E5A
U-71PE1E8A
U-100PE1E8A
U-125PE1E8A
U-140PE1E8A

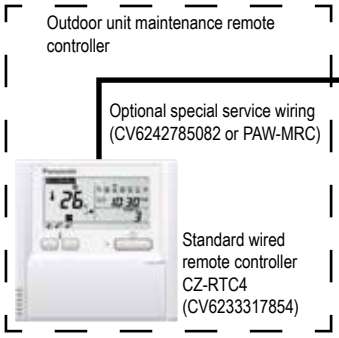
c.



Elite – R410A
U-200PE2E8A
U-250PE2E8A

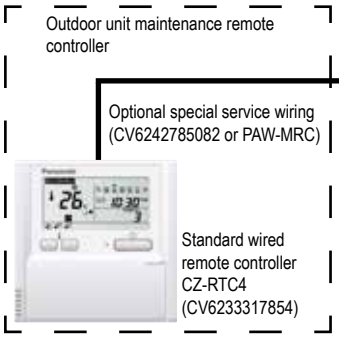
Elite – R32
U-200PZH2E8
U-250PZH2E8

d.



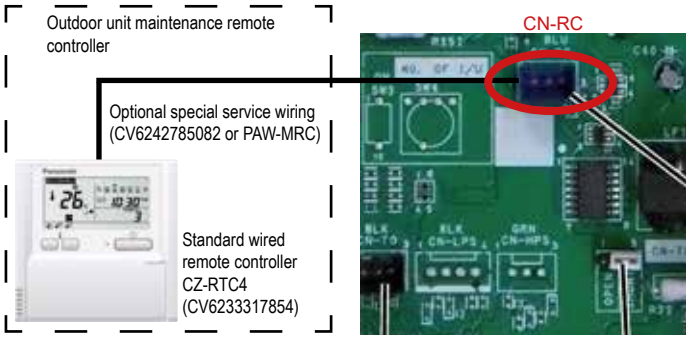
Standard – R32
U-100PZ2E5
U-125PZ2E5
U-140PZ2E5

e.



Standard – R32
U-100PZ2E8
U-125PZ2E8
U-140PZ2E8

f.

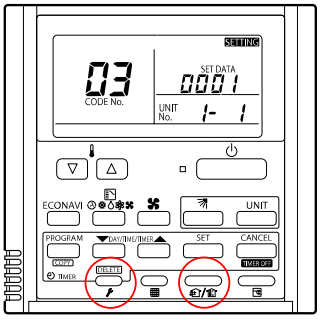


Elite – R32
U-71PZH2E8
U-100PZH2E8
U-125PZH2E8
U-140PZH2E8

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.

PAC i
PAC i NX

Method C: Adapting AHU capacity to PACi outdoor unit capacity

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

Important

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

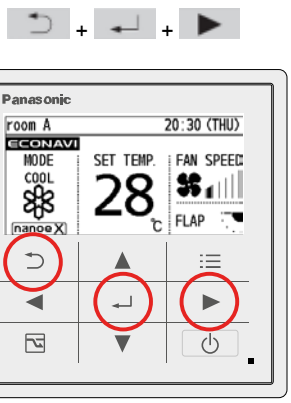
- PACi PEY/PE outdoor units (R410A) and PAH2/PAH3 AHU Kit models
- PACi PZ2/PZH2 outdoor units (R32) and PAH2/PAH3 AHU Kit models
- PACi NX PZ3/PZH3 outdoor units (R32) and PAH3 AHU Kit models

To change the relevant setting, invoke the „Detailed settings“ mode on the AHU Kit’s integrated remote controller (CZ-RTC5B / CZ-RTC6BL).

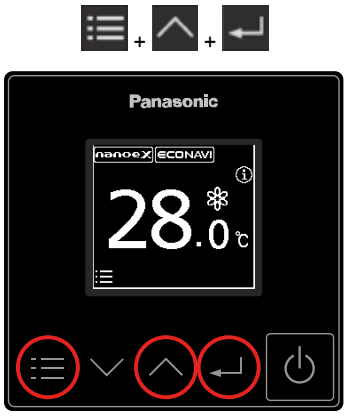
1. Verify that the display of the integrated remote controller is working, then stop the system and power it on again before performing the following steps.

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) 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.

PAH2 models: CZ-RTC5B

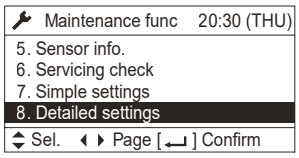


PAH3 model: CZ-RTC6BL

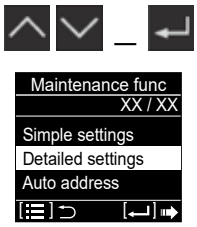


3. On the “Maintenance func” screen, scroll through the menu items with the “UP” and “DOWN” buttons, and select “Detailed settings” by pressing the “ENTER” button when it is highligted in the list.

CZ-RTC5B

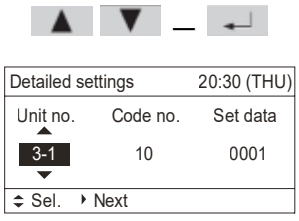


CZ-RTC6BL

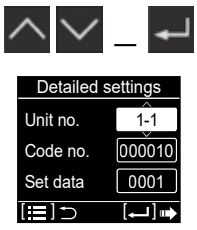


4. On the “Detailed settings” screen, the “Unit No.” option will be highlighted.
   Note: If auto-addressing has been completed before, the relevant unit number will be displayed, or if not, “All” will be displayed instead.
   With the “UP” and “DOWN” buttons, change the value to the unit number of the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

CZ-RTC5B

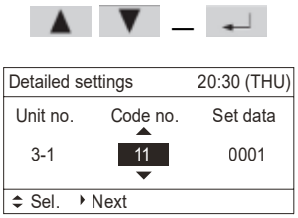


CZ-RTC6BL

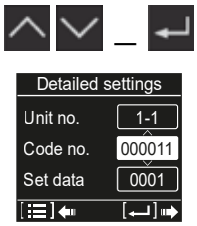


5. Highlight the “Code No.“ option using the “RIGHT” button (RTC5B) or the “DOWN” and “ENTER” buttons (RTC6BL) respectively. With the “UP” and “DOWN” buttons, select the value “11” (Code No. 11 = Adapting indoor unit capacity), and press the “ENTER” button to confirm this setting.

CZ-RTC5B

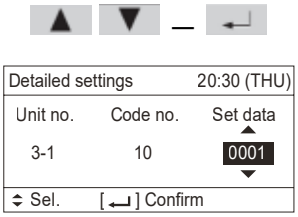


CZ-RTC6BL

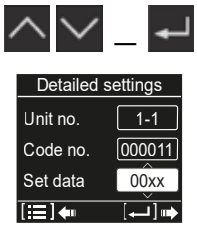


6. Highlight the “Set data“ option using the “RIGHT” button (RTC5B) or the “DOWN” and “ENTER” buttons (RTC6BL) respectively. With the “UP” and “DOWN” buttons, change the default value according to the table below and press the “ENTER” button to confirm the new setting and return to the initial “Detailed Settings“ screen (as shown in step 4).

CZ-RTC5B



CZ-RTC6BL



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

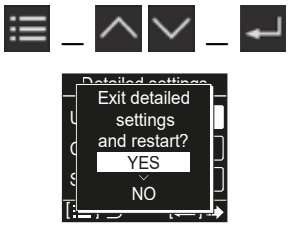
Outdoor unit capacity	PACi Outdoor unit model				PACi NX Outdoor unit model		Setting for Code No. “11”
	Standard		Elite		Standard	Elite	
	R410A	R32	R410A	R32	R32		
U-25...					...PZ3E5		0002
U-36...			...PE2E5A	...PZH2E5	...PZ3E5	...PZH3E5	0005
U-50...			...PE2E5	...PZH2E5	...PZ3E5	...PZH3E5	0009
U-60...	...PEY2E5	...PZ2E5	...PE2E5A	...PZH2E5	...PZ3E5A	...PZH3E5	0011
U-71...	...PEY2E5	...PZ2E5	...PE1E5A ...PE1E8A	...PZH2E5 ...PZH2E8	...PZ3E5A	...PZH3E5 ...PZH3E8	0012
U-100...	...PEY1E5 ...PEY1E8	...PZ2E5 ...PZ2E8	...PE1E5A ...PE1E8A	...PZH2E5 ...PZH2E8	...PZ3E5 ...PZ3E8	...PZH3E5 ...PZH3E8	0015
U-125...	...PEY1E5 ...PEY1E8	...PZ2E5 ...PZ2E8	...PE1E5A ...PE1E8A	...PZH2E5 ...PZH2E8	...PZ3E5 ...PZ3E8	...PZH3E5 ...PZH3E8	0017
U-140...	...PEY1E5 ...PEY1E8	...PZ2E5 ...PZ2E8	...PE1E5A ...PE1E8A	...PZH2E5 ...PZH2E8	...PZ3E5 ...PZ3E8	...PZH3E5 ...PZH3E8	0018
U-200...			...PE2E8	...PZH2E8			0021
U-250...			...PE2E8	...PZH2E8			0023

7. Only for R32 models of the PACi PZ2/PZH2 range in combination with PAH2 AHU Kit models:
Press the Temperature “UP” button (▲) just once shortly, in order to scroll to parameter “2C”.
With the Timer “UP” and “DOWN” buttons (▲▼) modify the parameter value from the factory default “0002” to the new value “0006” (to set the AHU Kit to R32).
Confirm the new setting by pressing the “SET” button.

8. Once the setting procedure is completed, exit the “Detailed settings” mode by pressing the “RETURN” button (RTC5B) or “MENU” button (RTC6BL) respectively. This will invoke a confirmation message (see below). Select “YES” with the “LEFT“ and “RIGHT“ buttons (RTC5B) or “UP” and “DOWN” buttons (RTC6BL) respectively, and then press the “ENTER” button to finish the “Detailed settings” mode and return to the normal remote controller screen.

CZ-RTC5B

CZ-RTC6BL



5 Electrical Wiring

5.1 General precautions on wiring

WARNING

Electric shock from live power supply cords

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

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

CAUTION

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

- ► Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.
- ► This equipment is not provided with a power supply cord. 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.
- ► Unauthorized changes in the internal wiring can be very dangerous. The manufacturer will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.
- ► Regulations on wire diameters differ from locality to locality. For field wiring rules, please refer to the relevant local electrical codes before beginning.
  You must ensure that installation complies with all relevant rules and regulations.
- ► To prevent malfunction of the air conditioner caused by electrical noise, care must be taken when wiring as follows:
  - The remote control wiring and the inter-unit control wiring should be wired apart from the inter-unit power wiring.
  - Use shielded wires for inter-unit control wiring (between units) and ground the shield on both sides.
- ► If the power supply cord of this appliance is damaged, it must be replaced by a repair shop designated by the manufacturer, because special-purpose tools are required.

Important

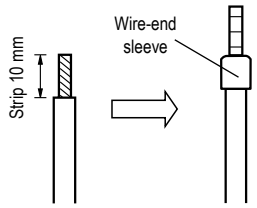
For the recommended wiring lengths and diameters, please see → *5.5 Wiring system diagrams, p. 87*.

5.2 Connection of wiring to terminals

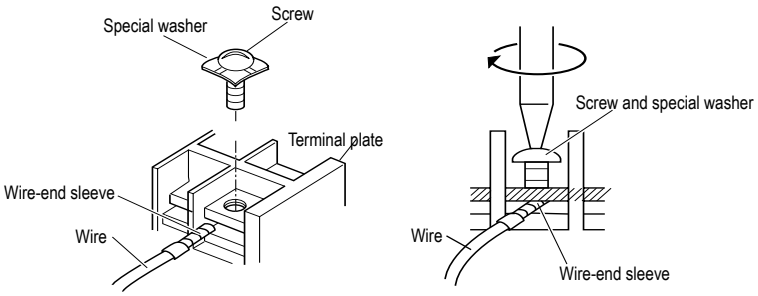
Connect wiring to the terminals according to the following instructions.

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.

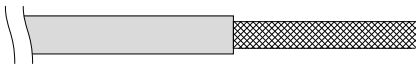


2. Using a flat-blade screwdriver, loosen the terminal screw(s) on the terminal plate.
3. Attach a wire-end sleeve to each stripped wire end using a crimping tool.
4. Place the wire-end sleeve into the socket on the connector and replace and tighten the removed terminal screw using a flat-blade screwdriver.

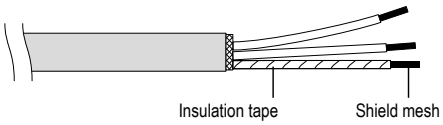


Shielded wire

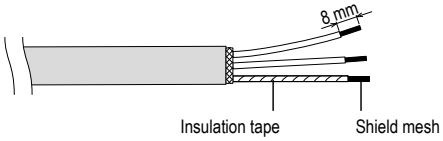
1. Remove cable sheath not to scratch braided shield.



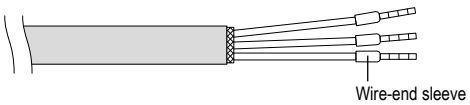
2. Unbraid the braided shield carefully and twist the unbraided shield wires tightly together. Insulate the shield wires by covering them with an insulation tube or wrapping insulation tape around wire.



3. Remove insulation of signal wire.



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

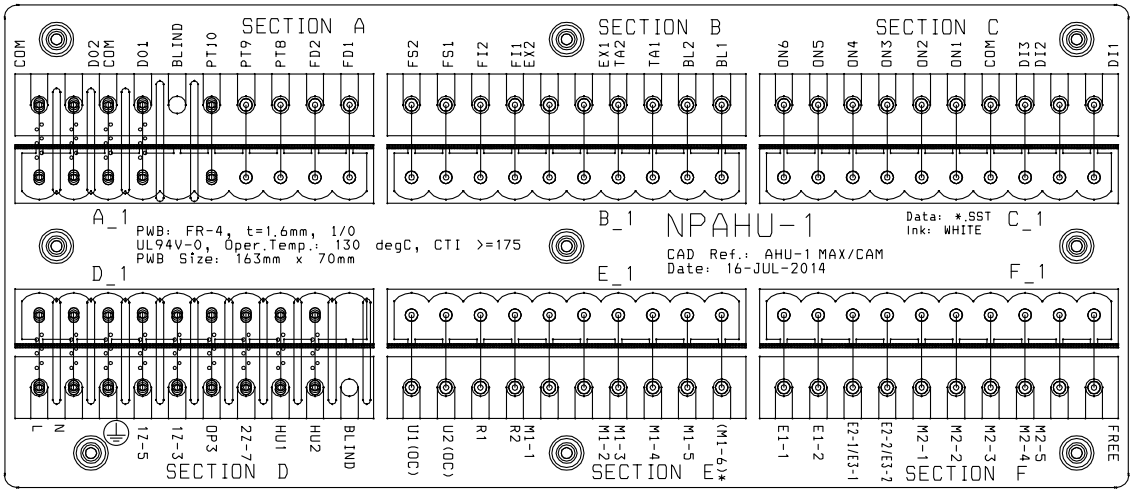


5. Connect the shield for the inter-unit control wiring to ground.

5.3 Terminal board layout

5.3.1 MAH2/PAH2 models

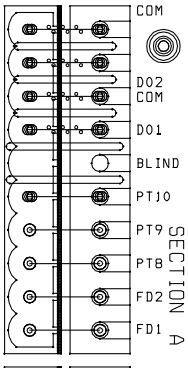
Terminal layout – Main terminal board (CR-UXRP71B-P)



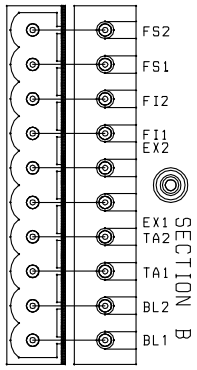
= Input or Output necessary to connect.

= Input or Output can be connected if required.

Section A

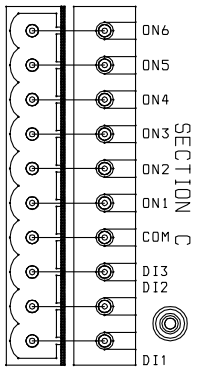
Connections	No.	Name	In / Out	Allocation	Function	Description
	10	COM	O	Alarm Signal	Alarm Signal	External Potential: max. 230 V AC / 3 A
	9	DO2	O	Alarm Signal		
	8	COM	O	Operation Signal	Operation Signal	External Potential: max. 230 V AC / 3 A
	7	D01	O	Operation Signal		
	6	Blind	Unused			
	5	PT10	I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

Section B

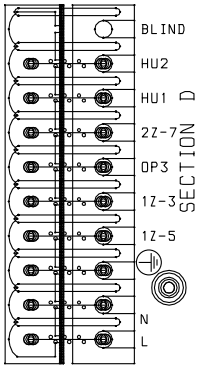
Connections	No.	Name	In / Out	Allocation	Function	Description
	10	FS2	I	Float switch	Float switch (ex factory bridged)	Internal Potential: 12 V DC
	9	FS1	I	Potential for FS2		
	8	FI2	I	Filter contact	Filter contact	Internal Potential: 5 V DC **Note**: For activating filter input, verify in Detailed Settings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

To be continued on next page.

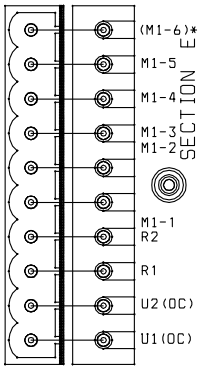
Section C

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

Section D

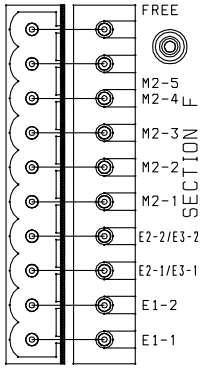
Connections	No.	Name	In / Out	Allocation	Function	Comment
	10	BLIND		Unused		
	9	HU2	O	No polarity	External Humidifier Control	Internal Potential: 230 V AC / max. 3 A
	8	HU1	O	No polarity		
	7	2Z-7	I	Potential for OP3	Fan Alarm Input (Unit will only operate if this contact is closed, otherwise error code P01 will be displayed.)	Internal Potential: 230 V AC
	6	OP3	I	Fan Alarm		
	5	1Z-3	O	No polarity	Fan Start – Stop Signal	External Potential: max. 230 V AC / 5 A
	4	1Z-5	O	No polarity		
	3	⏚	I	Protective earth	Protective Earth Conductor	
	2	N	I	Neutral	Neutral Terminal	
	1	L	I	Live	Live Terminal	External Potential: 230 V AC, max. 1 A

Section E

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

To be continued on next page.

Section F

Connections	No.	Name	In / Out	Allocation	Function	Comments
	10	M2-6 (FREE)	I	GRY	Advanced & Medium: Activation of demand control	Remove bridge for use of demand control (if bridge is intact and in place, temperature setpoint control is active)
	9	M2-5	I	ORG	Advanced & Medium: Activation of demand control	
	8	M2-4	I	WHT	Advanced & Medium: Analogue input Demand	Advanced & Medium: Negative potential (–10 V DC) for demand control
	7	M2-3	I	RED	Advanced & Medium: Analogue input Demand	Advanced & Medium: Analogue input (+10 V DC) for demand control
	6	M2-2	I/O	RED	Advanced only: Analogue output	Advanced only: Internal potential (+10 V DC) from TR-16/TR-16e via bridge
	5	M2-1	O	WHT	Advanced only: Analogue output	Advanced only: Internal potential 10 V DC from TR-16/TR-16e via bridge
	4	E2-2 / E3-2	I	No polarity	Sensor E2 / TH3 (PACi) or Sensor E3 / TH4 (ECOi), respectively	
	3	E2-1 / E3-1	I	No polarity		
	2	E1-2	I	No polarity	Sensor E1 / TH2	
	1	E1-1	I	No polarity		

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

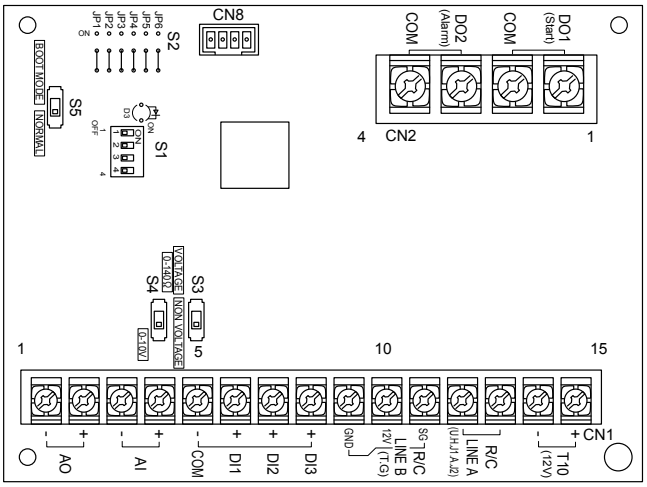
PAW-T10 PCB

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

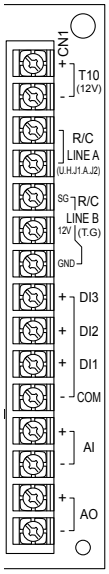
Important

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

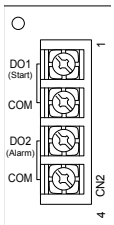
Terminal layout – CZ-CAPBC2 / ACC-SP1A (for advanced and medium versions only)



CZ-CAPBC2 interface, terminal block CN1

Connections	No.	Polarity	Name	Allocation	Function	Comments
	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		

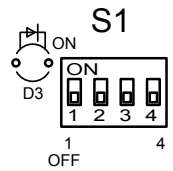
CZ-CAPBC2 interface, terminal block CN2

Connections	No.	Name	Allocation	Function	Comments
	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

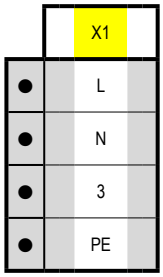
Keep S3 default setting “NON VOLTAGE”, if digital inputs are to accept non-voltage signals from dry contacts.

Important

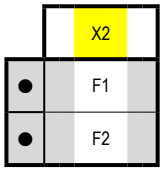
For more details about the connection and functions of the CZ-CAPBC2 interface, please refer to the separate installation instructions for CZ-CAPBC2.

5.3.2 PAH3M model

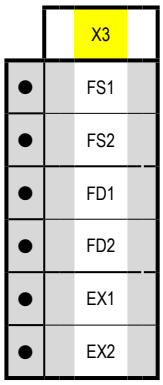
Terminal layout – Main terminal board (ACXA73-38670)



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



Terminal No.	Allocation	Function	Description
X2.1	COM for F2	Fan Operation Signal	External Potential: max. 250 VAC 8 A
X2.2	Fan contact		



Terminal No.	Allocation	Function	Description
X3.1	Lower Potential Float Sw.	Float switch (ex factory bridged)	Internal Potential: 12 V DC
X3.2	Higher Potential Float Sw.		
X3.3	Higher Potential Fan Dr.	Control of an additional external fan or additional external air handling unit	Internal potential: 12 V DC
X3.4	Lower Potential Fan Dr.		
X3.5	Higher Potential EXCT	EXCT-Contact (external thermostat off switch)	Internal Potential: 5 V DC
X3.6	Lower Potential EXCT		

To be continued on next page.

		Terminal No.	Allocation	Function	Description
	X4				
●	TA1	X4.1	No polarity	Suction Temperature Sensor TA (included) (Room Temperature Sensor)	
●	TA2	X4.2	No polarity		
●	E1.1	X4.3	No polarity	Sensor E1 / TH2	
●	E1.2	X4.4	No polarity		
●	E2.1	X4.5	No polarity	Sensor E2 / TH3	
●	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 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 Operation	Fan (free cooling) operation signal output	
●	OT1	X4.13	COM for OT2 - OT6 Lower Potential	COM -2.5 … - 5.0 V DC	
●	OT2	X4.14	Heat input Higher Potential	Heat mode input	Internal potential 2,5 - 5 V DC 0.5mA Current
●	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 V DC 0.5mA Current
●	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	

		Terminal No.	Allocation	Function	Description
	X5				
●	U1	X5.1	No polarity	Communication bus wiring P-link	Required for centralized 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)	2 types of usage: a) Potential-free: Keep S3 of CZ-CAPBC 2/ ACC-SP1A on “NON VOLTAGE”. b) 12 to 24 V DC, 10 mA external: Change S3 of CZ-CAPBC2 / ACC-SP1A to “VOLTAGE”.
●	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		

5

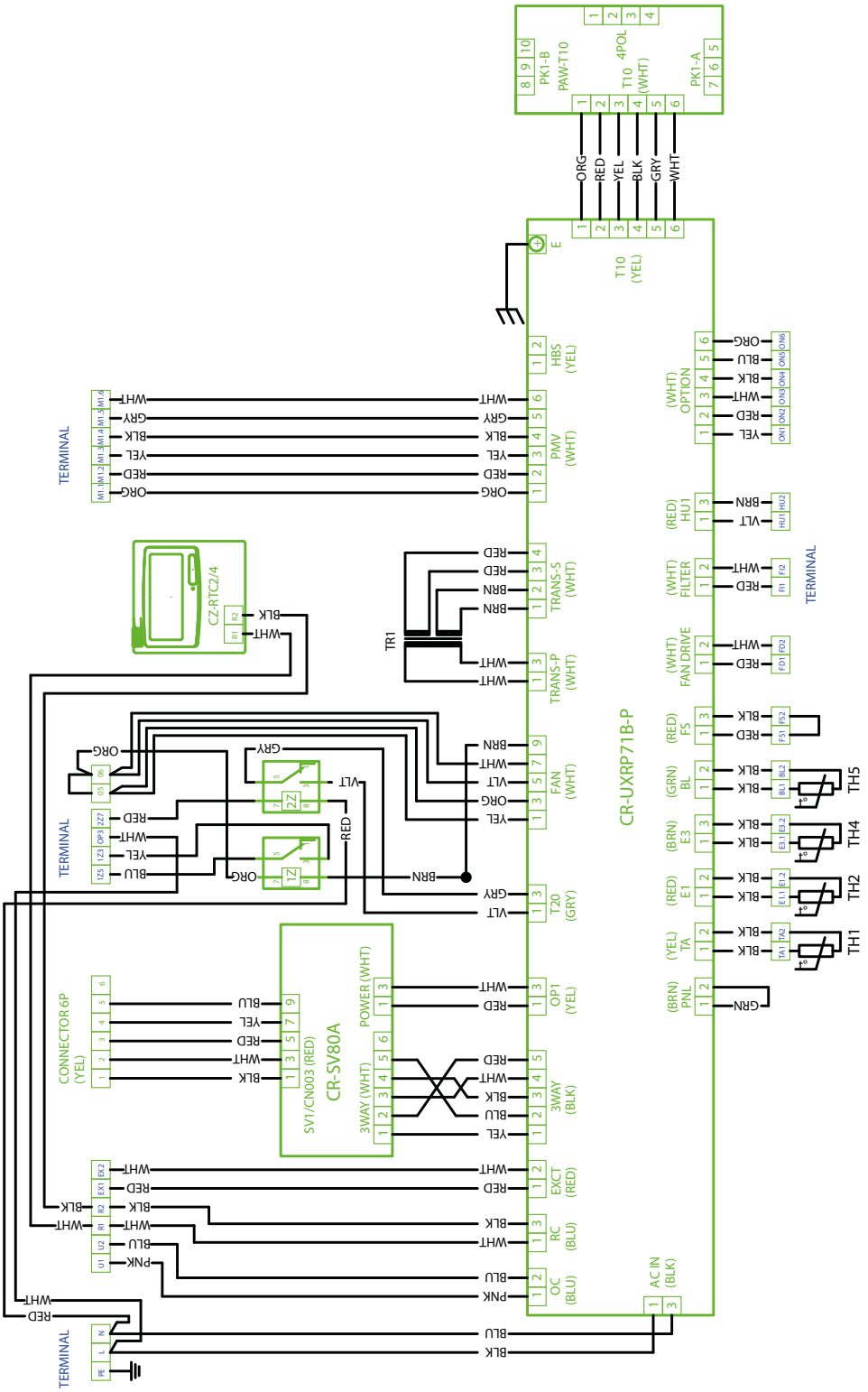
Terminal layout – CZ-CAPBC2 / ACC-SP1A

For information on the terminal layout of CZ-CAPBC2 / ACC-SP1A see → *5.3 Terminal board layout – CZ-CAPBC2 / ACC-SP1A, p. 69*.

5.4 Wiring layout

Wiring layout – MAH2 models

PAW-160MAH2L for ECO i and ECO G



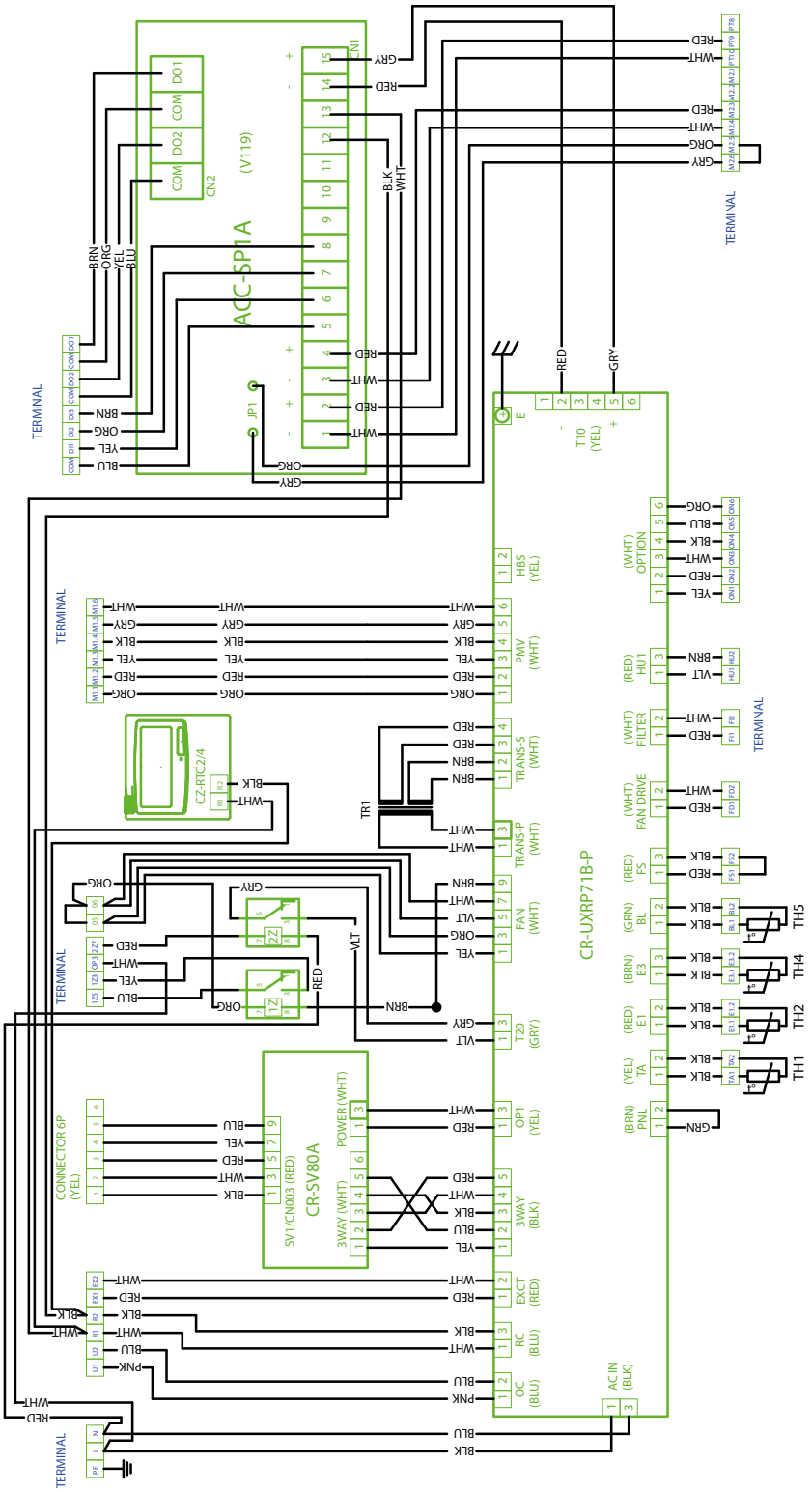
Legend

	Light	
	PAW-160MAH2L	
TH1	X	Air intake temperature sensor TA
TH2	X	Indoor coil thermistor E1
TH4	X	Indoor coil thermistor E3
TH5	X	Air outlet temperature sensor BL
CZ-RTC2 / CZ-RTC4*	X	Remote controller
CR-SV80A	X	RAP valve control PCB
CR-UXRP71B-P	X	Main PCB

	Light	
	PAW-160MAH2L	
1Z / 2Z	X	Auxiliary power relay
TR1	X	Power transformer
PAW-T10	X	External signal control PCB
ACC-SP1A	–	External signal control PCB
TR-16 / TR-16e*	–	Thermostat
PT100	–	Supply air temperature sensor

* Depending on AHU Kit generation

PAW-160MAH2M for ECO i and ECO G



Legend

	Medium	
	PAW-160MAH2M	
TH1	X	Air intake temperature sensor TA
TH2	X	Indoor coil thermistor E1
TH4	X	Indoor coil thermistor E3
TH5	X	Air outlet temperature sensor BL
CZ-RTC2 / CZ-RTC4*	X	Remote controller
CR-SV80A	X	RAP valve control PCB
CR-UXRP71B-P	X	Main PCB

	Medium	
	PAW-160MAH2M	
1Z / 2Z	X	Auxiliary power relay
TR1	X	Power transformer
PAW-T10	–	External signal control PCB
ACC-SP1A	X	External signal control PCB
TR-16 / TR-16e*	–	Thermostat
PT100	–	Supply air temperature sensor

* Depending on AHU Kit generation

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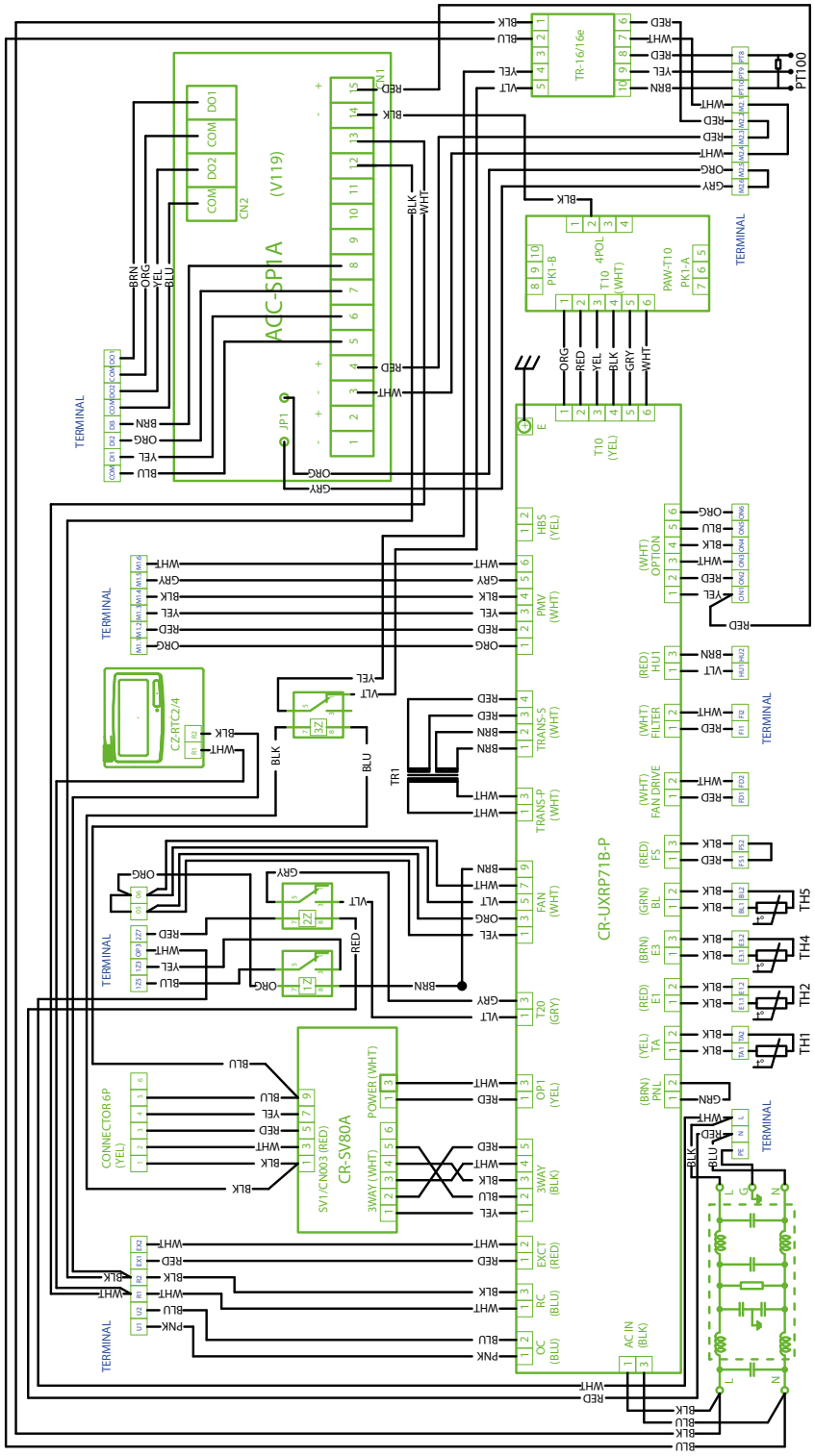
PAW-160MAH2 for ECO i and ECO G



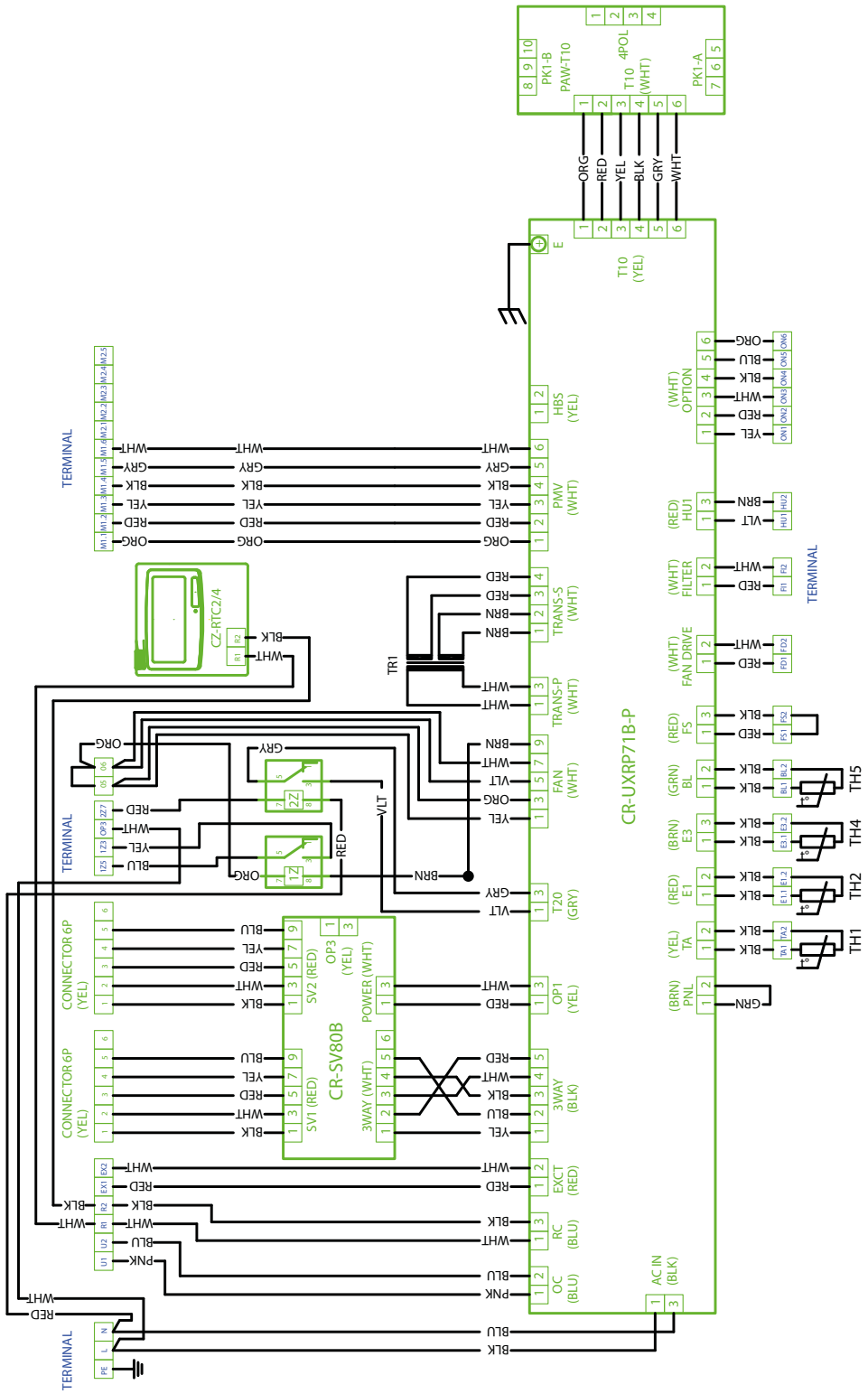
Legend

		Advanced
		PAW-160MAH2
TH1	Air intake temperature sensor TA	X
TH2	Indoor coil thermistor E1	X
TH4	Indoor coil thermistor E3	X
TH5	Air outlet temperature sensor BL	X
CZ-RTC2 / CZ-RTC4*	Remote controller	X
CR-SV80A	RAP valve control PCB	X
CR-UXRP71B-P	Main PCB	X

		Advanced
		PAW-160MAH2
1Z / 2Z / 3Z	Auxiliary power relay	X
TR1	Power transformer	X
PAW-T10	External signal control PCB	X
ACC-SP1A	External signal control PCB	X
TR-16 / TR-16e*	Thermostat	X
PT100	Supply air temperature sensor	X

* Depending on AHU Kit generation

PAW-280MAH2L for ECO i and ECO G



Legend

		Light
		PAW-280MAH2L
TH1	Air intake temperature sensor TA	X
TH2	Indoor coil thermistor E1	X
TH4	Indoor coil thermistor E3	X
TH5	Air outlet temperature sensor BL	X
CZ-RTC2 / CZ-RTC4*	Remote controller	X
CR-SV80A	RAP valve control PCB	X
CR-UXRP71B-P	Main PCB	X

		Light
		PAW-280MAH2L
1Z / 2Z	Auxiliary power relay	X
TR1	Power transformer	X
PAW-T10	External signal control PCB	X
ACC-SP1A	External signal control PCB	–
TR-16 / TR-16e*	Thermostat	–
PT100	Supply air temperature sensor	–

* Depending on AHU Kit generation

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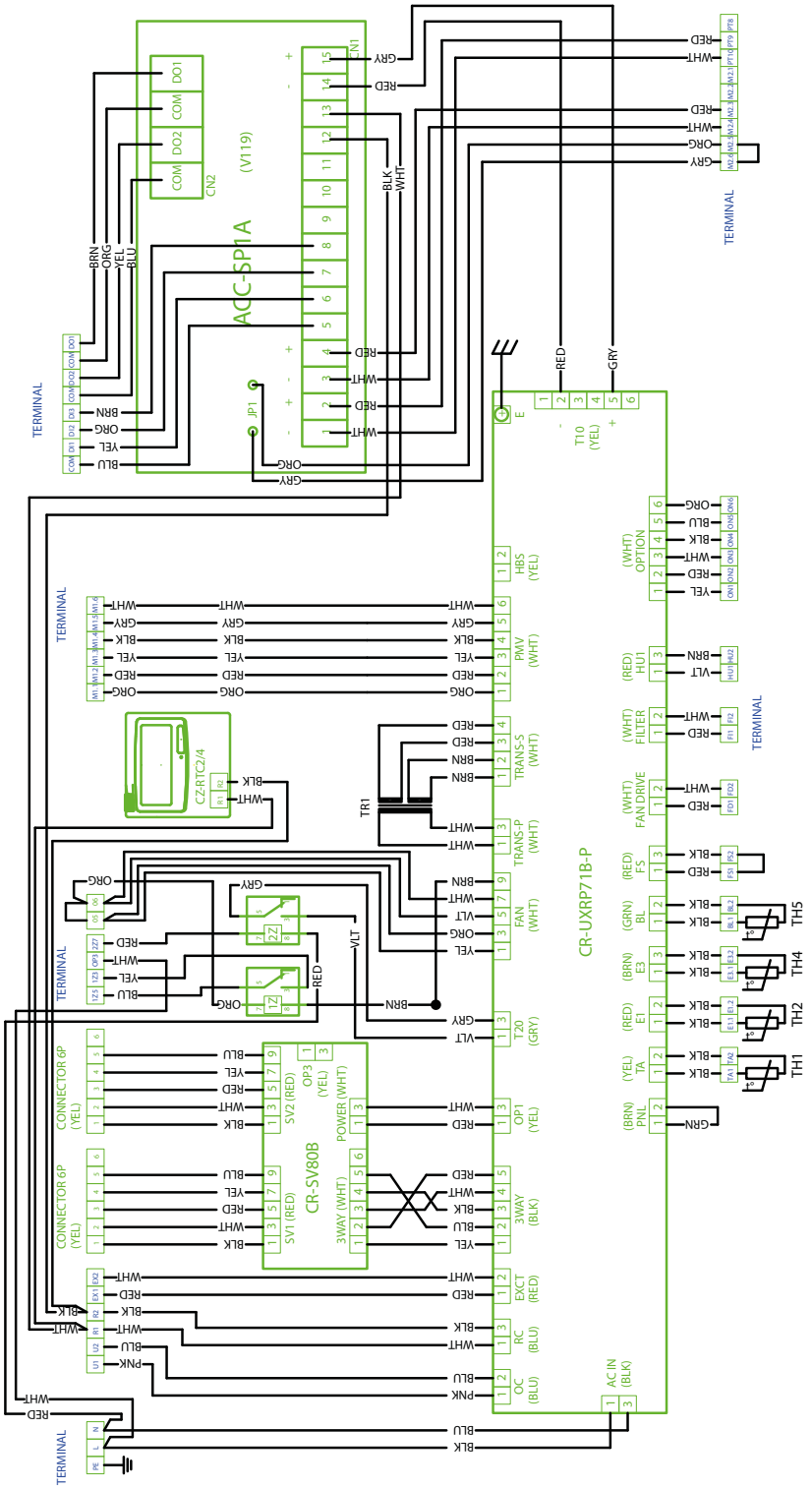
PAW-280MAH2M for ECO i and ECO G



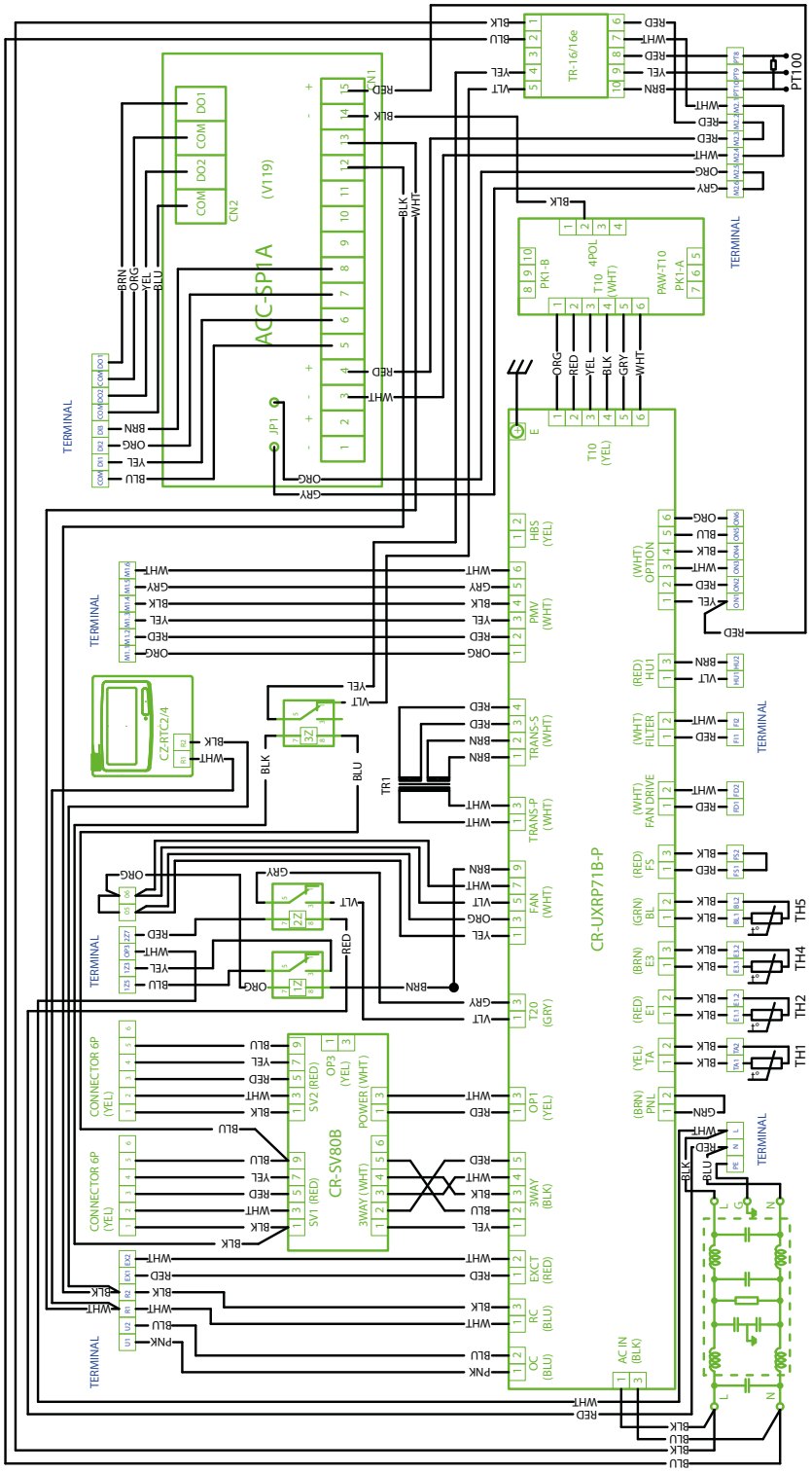
Legend

		Medium	
		PAW-280MAH2M	
TH1	Air intake temperature sensor TA	X	1Z / 2Z / 3Z
TH2	Indoor coil thermistor E1	X	TR1
TH4	Indoor coil thermistor E3	X	PAW-T10
TH5	Air outlet temperature sensor BL	X	ACC-SP1A
CZ-RTC2 / CZ-RTC4*	Remote controller	X	TR-16 / TR-16e*
CR-SV80A	RAP valve control PCB	X	PT100
CR-UXRP71B-P	Main PCB	X	

Medium	
PAW-280MAH2M	
X	Auxiliary power relay
X	Power transformer
–	External signal control PCB
X	External signal control PCB
–	Thermostat
–	Supply air temperature sensor

* Depending on AHU Kit generation

PAW-280MAH2 for ECO i and ECO G



Legend

	Advanced	
	PAW-280MAH2	
TH1	X	Air intake temperature sensor TA
TH2	X	Indoor coil thermistor E1
TH4	X	Indoor coil thermistor E3
TH5	X	Air outlet temperature sensor BL
CZ-RTC2 / CZ-RTC4*	X	Remote controller
CR-SV80A	X	RAP valve control PCB
CR-UXRP71B-P	X	Main PCB
1Z / 2Z / 3Z	X	Auxiliary power relay
TR1	X	Power transformer
PAW-T10	X	External signal control PCB
ACC-SP1A	X	External signal control PCB
TR-16 / TR-16e*	X	Thermostat
PT100	X	Supply air temperature sensor

* Depending on AHU Kit generation

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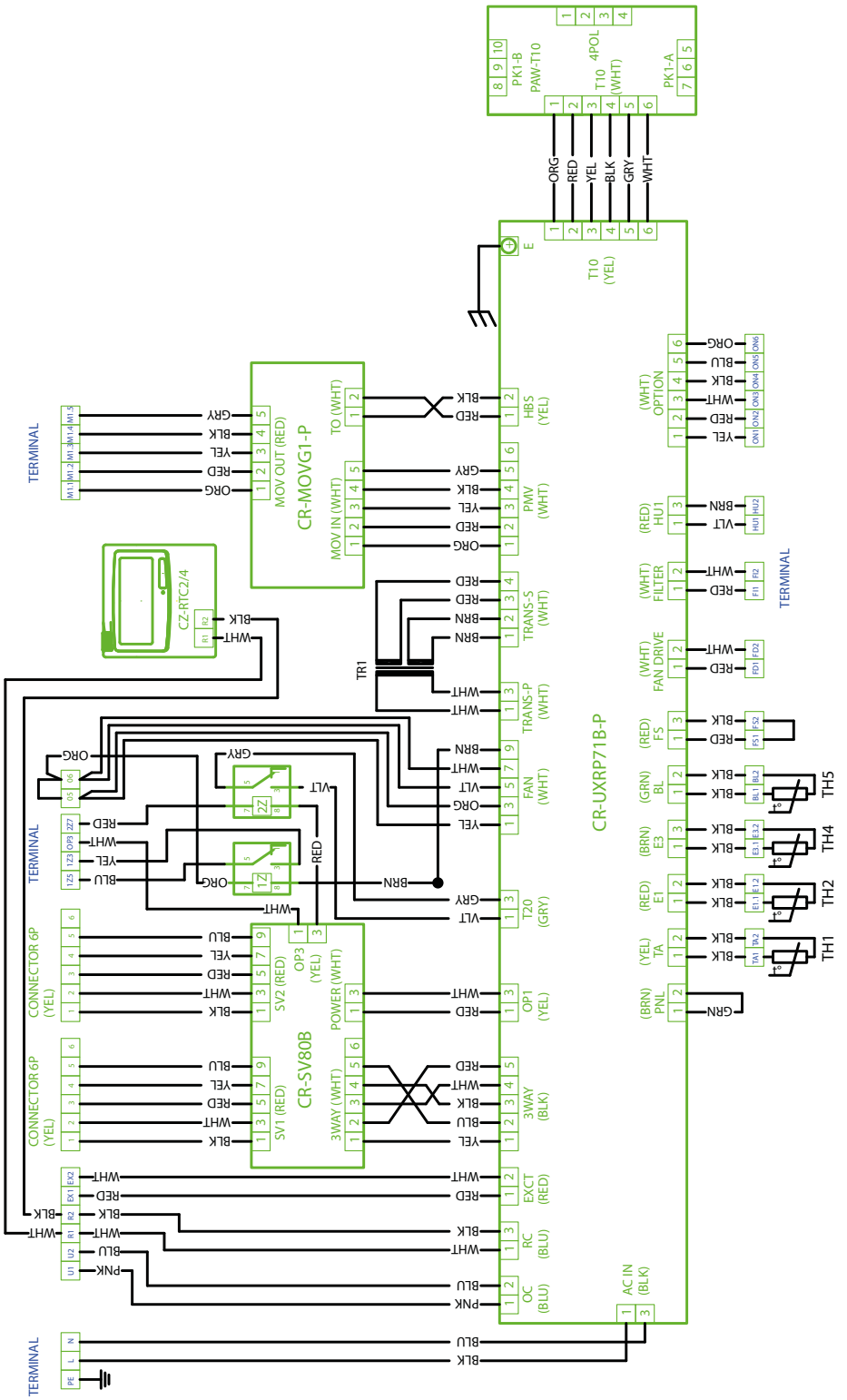
PAW-560MAH2L for ECO i and ECO G



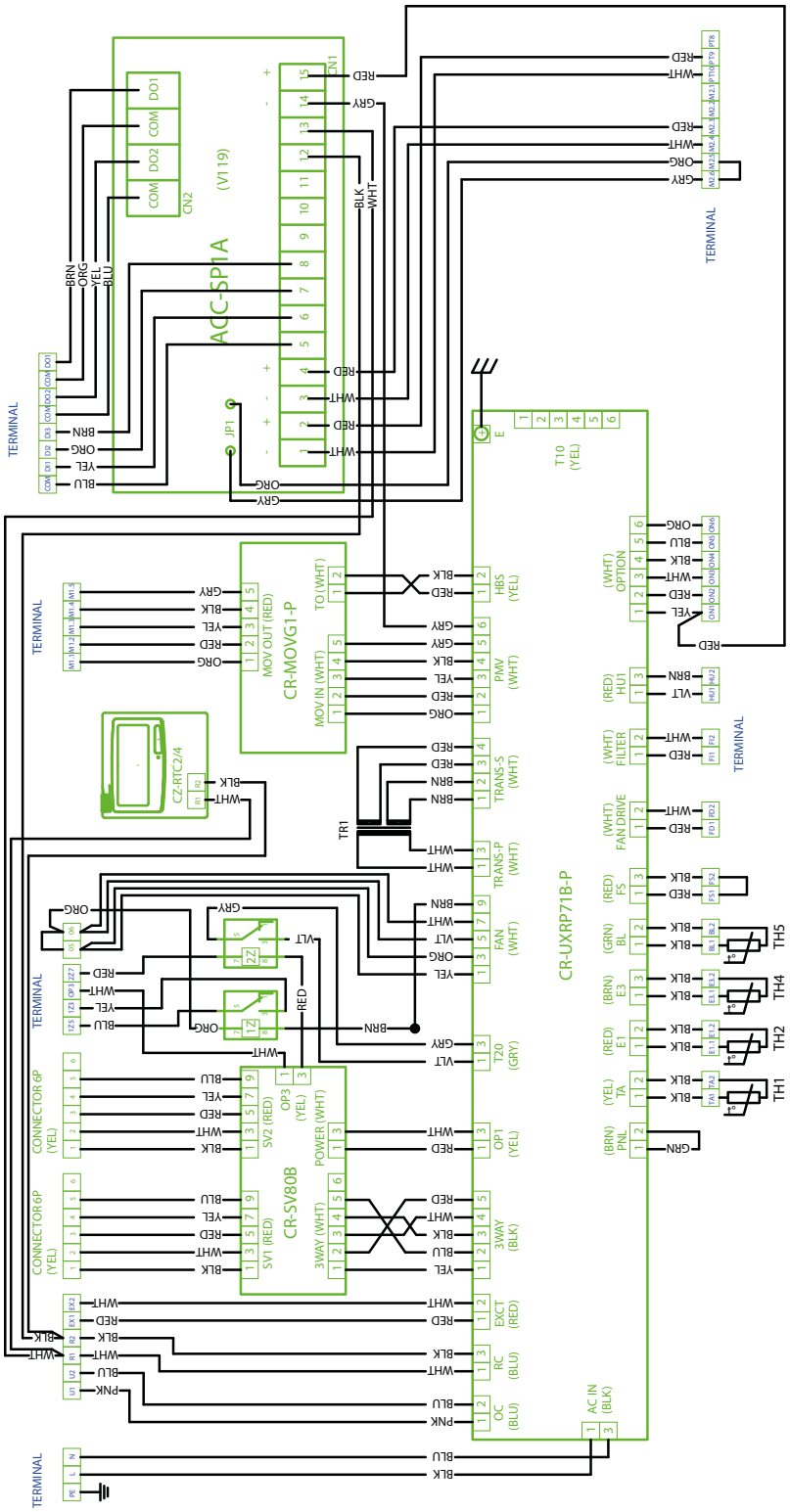
Legend

		Light
		PAW-560MAH2L
TH1	Air intake temperature sensor TA	X
TH2	Indoor coil thermistor E1	X
TH4	Indoor coil thermistor E3	X
TH5	Air outlet temperature sensor BL	X
CZ-RTC2 / CZ-RTC4*	Remote controller	X
CR-SV80A	RAP valve control PCB	X
CR-UXRP71B-P	Main PCB	X

		Light
		PAW-560MAH2L
1Z / 2Z	Auxiliary power relay	X
TR1	Power transformer	X
CR-MOVG1-P	Motorized valve PCB	X
PAW-T10	External signal control PCB	X
ACC-SP1A	External signal control PCB	–
TR-16 / TR-16e*	Thermostat	–
PT100	Supply air temperature sensor	–

* Depending on AHU Kit generation

PAW-560MAH2M for ECO i and ECO G



Legend

		Medium	
		PAW-560MAH2M	
TH1	Air intake temperature sensor TA	X	1Z / 2Z	Auxiliary power relay	X
TH2	Indoor coil thermistor E1	X	TR1	Power transformer	X
TH4	Indoor coil thermistor E3	X	CR-MOVG1-P	Motorized valve PCB	X
TH5	Air outlet temperature sensor BL	X	PAW-T10	External signal control PCB	–
CZ-RTC2 / CZ-RTC4*	Remote controller	X	ACC-SP1A	External signal control PCB	X
CR-SV80A	RAP valve control PCB	X	TR-16 / TR-16e*	Thermostat	–
CR-UXRP71B-P	Main PCB	X	PT100	Supply air temperature sensor	–

* Depending on AHU Kit generation

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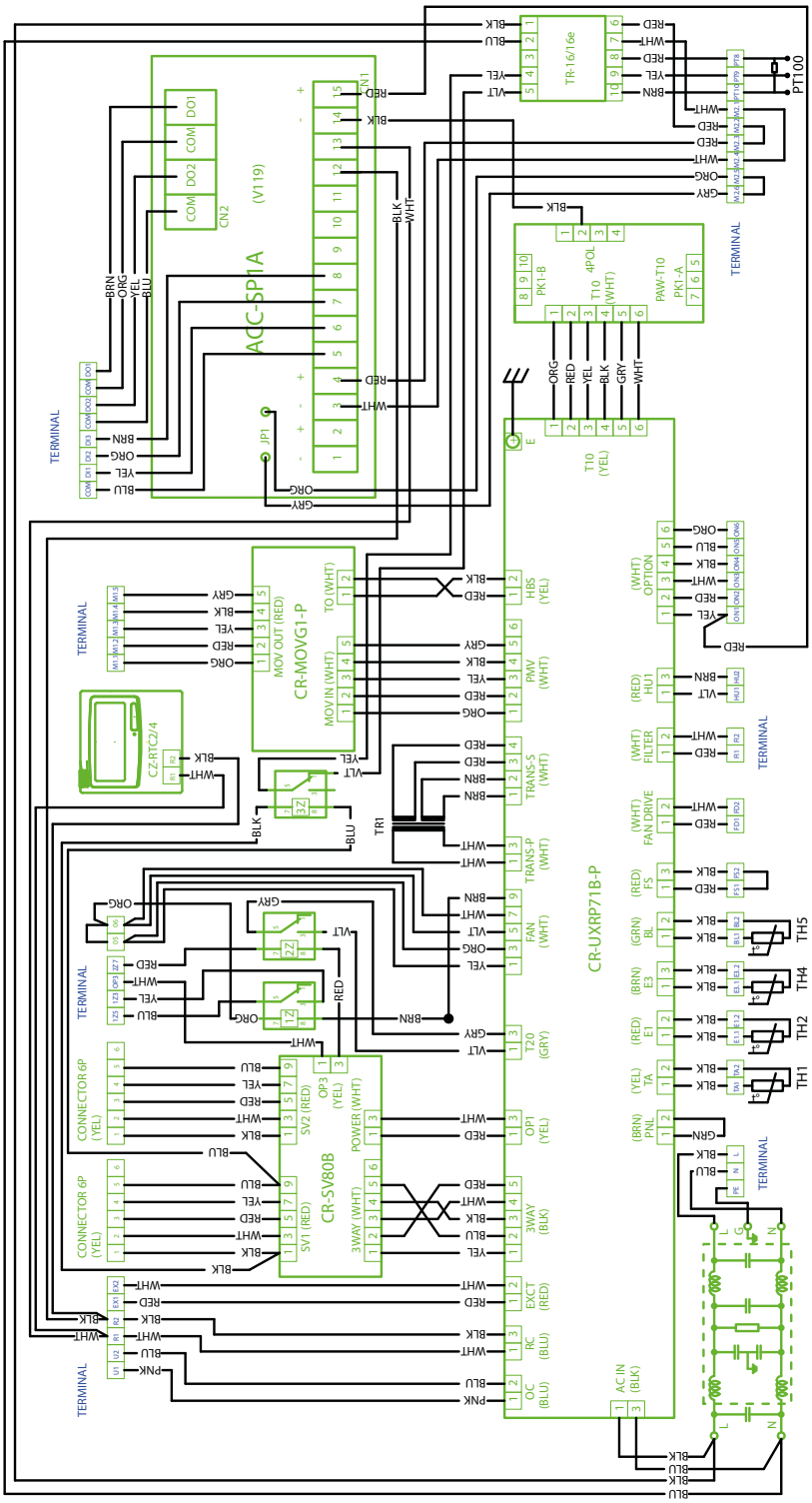
PAW-560MAH2 for ECO i and ECO G



Legend

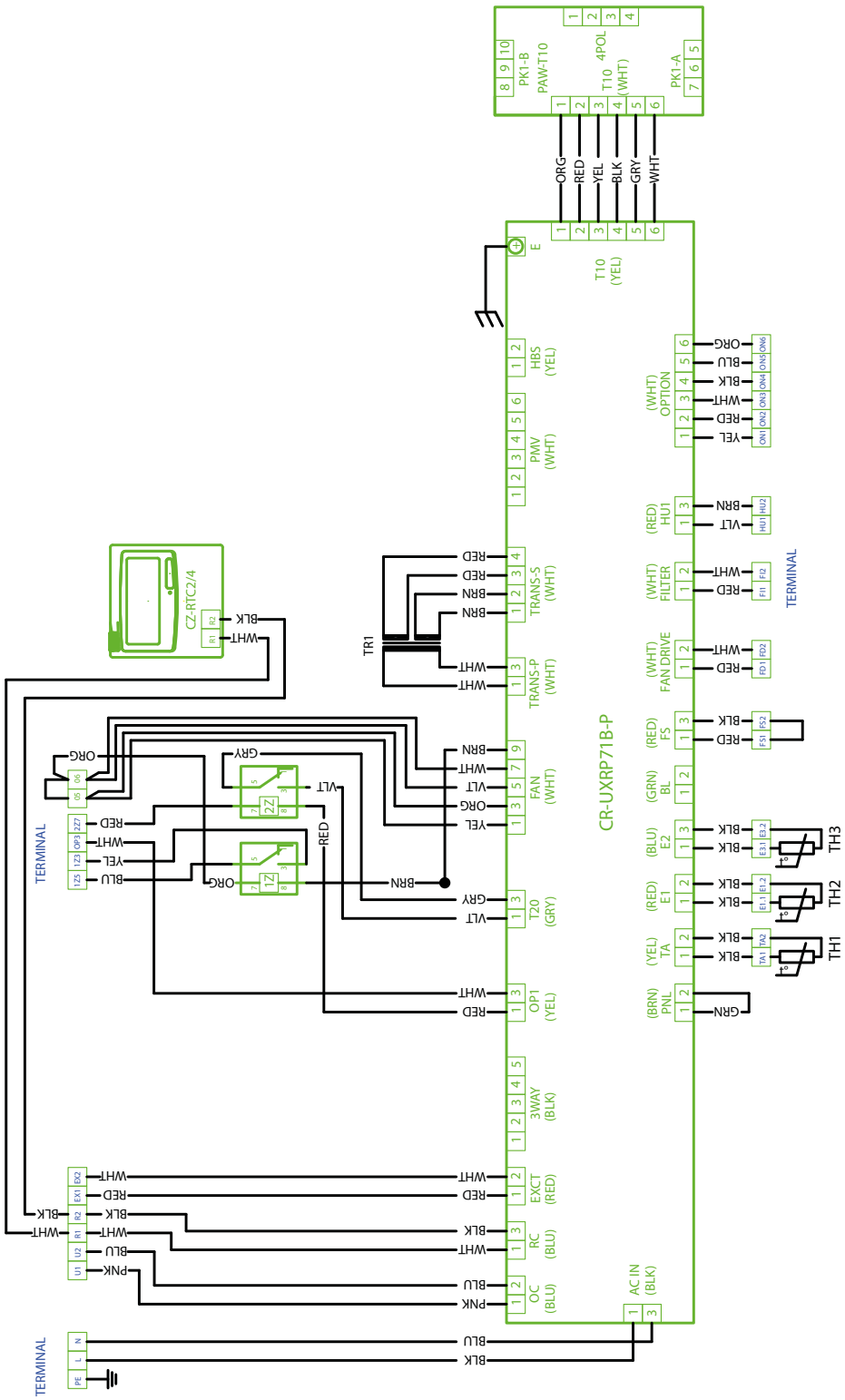
		Advanced PAW-560MAH2
TH1	Air intake temperature sensor TA	X
TH2	Indoor coil thermistor E1	X
TH4	Indoor coil thermistor E3	X
TH5	Air outlet temperature sensor BL	X
CZ-RTC2 / CZ-RTC4*	Remote controller	X
CR-SV80A	RAP valve control PCB	X
CR-UXRP71B-P	Main PCB	X

		Advanced PAW-560MAH2
1Z / 2Z / 3Z	Auxiliary power relay	X
TR1	Power transformer	X
CR-MOVG1-P	Motorized valve PCB	X
PAW-T10	External signal control PCB	X
ACC-SP1A	External signal control PCB	X
TR-16 / TR-16e*	Thermostat	X
PT100	Supply air temperature sensor	X

* Depending on AHU Kit generation

Wiring layout – PAH2 models

PAW-280PAH2L for PAC*i*



Legend

		Light	
		PAW-280PAH2L	
TH1	Air intake temperature sensor TA	X	
TH2	Indoor coil thermistor E1	X	
TH3	Indoor coil thermistor E2	X	
CZ-RTC2 / CZ-RTC4*	Remote controller	X	
CR-UXRP71B-P	Main PCB	X	
1Z / 2Z	Auxiliary power relay	X	
TR1	Power transformer	X	
PAW-T10	External signal control PCB	X	
ACC-SP1A	External signal control PCB	–	
TR-16 / TR-16e*	Thermostat	–	
PT100	Supply air temperature sensor	–	

* Depending on AHU Kit generation

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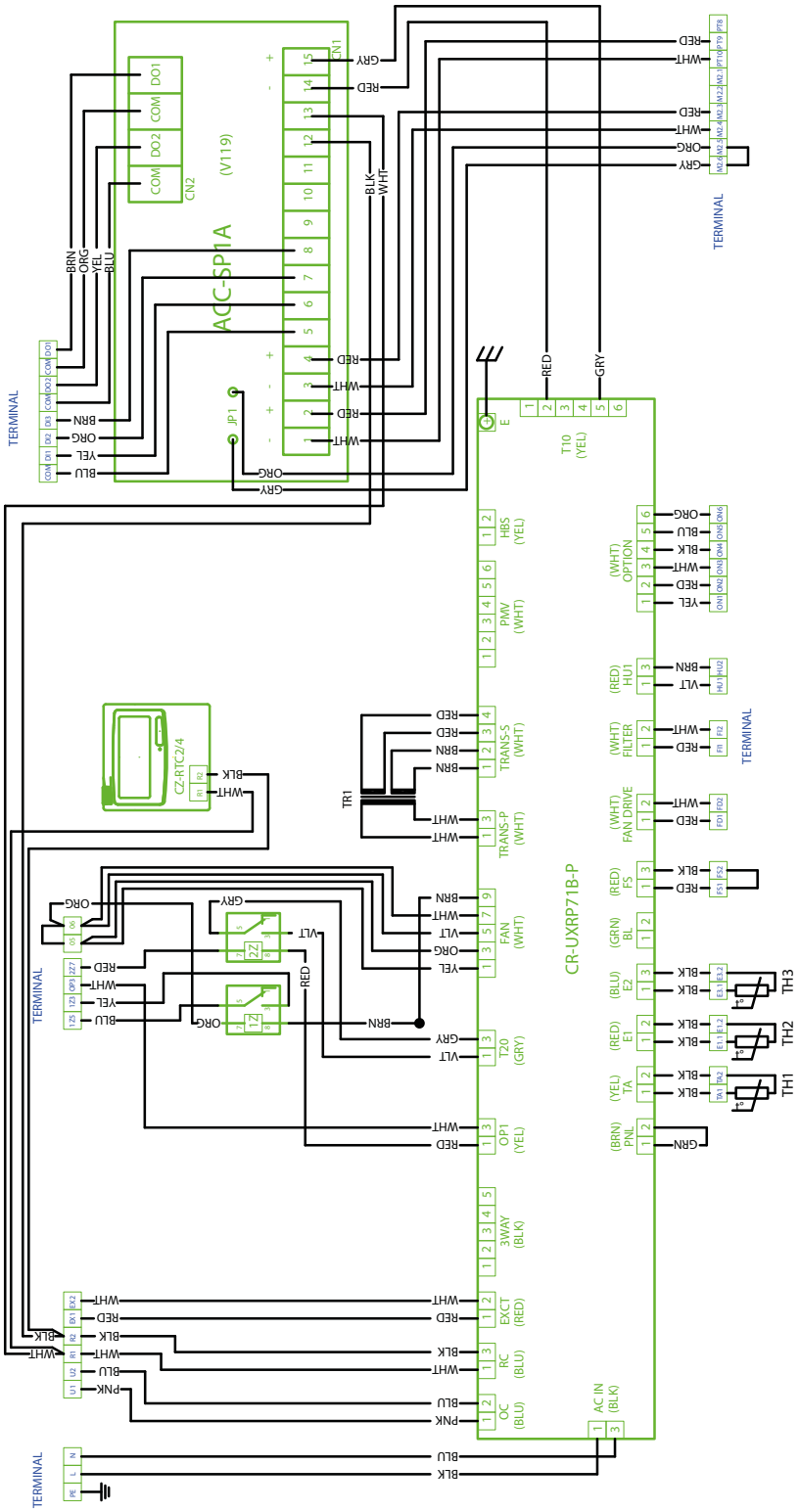
PAW-280PAH2M for PAC i



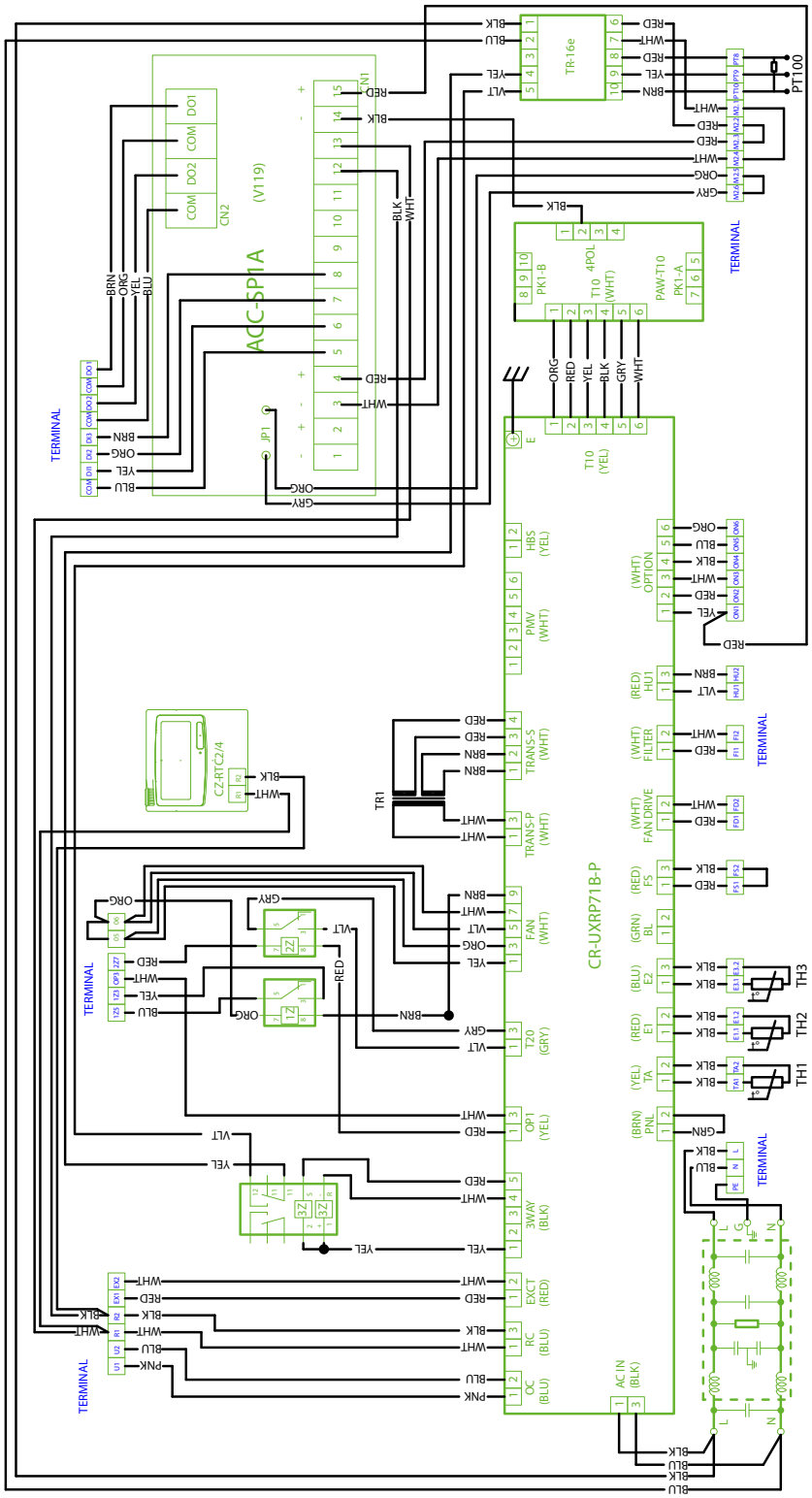
Legend

	Medium	
	PAW-280PAH2M	
TH1	X	Air intake temperature sensor TA
TH2	X	Indoor coil thermistor E1
TH3	X	Indoor coil thermistor E2
CZ-RTC2 / CZ-RTC4*	X	Remote controller
CR-UXRP71B-P	X	Main PCB
1Z / 2Z	X	Auxiliary power relay

	Medium	
	PAW-280PAH2M	
TR1	X	Power transformer
PAW-T10	–	External signal control PCB
ACC-SP1A	X	External signal control PCB
TR-16 / TR-16e*	–	Thermostat
PT100	–	Supply air temperature sensor

* Depending on AHU Kit generation

PAW-280PAH2 for PAC i



Legend

	Advanced PAW-280PAH2
TH1	Air intake temperature sensor TA	X
TH2	Indoor coil thermistor E1	X
TH3	Indoor coil thermistor E2	X
CZ-RTC2 / CZ-RTC4*	Remote controller	X
CR-UXRP71B-P	Main PCB	X
1Z / 2Z / 3Z	Auxiliary power relay	X

	Advanced PAW-280PAH2
TR1	Power transformer	X
PAW-T10	External signal control PCB	X
ACC-SP1A	External signal control PCB	X
TR-16 / TR-16e*	Thermostat	X
PT100	Supply air temperature sensor	X

* Depending on AHU Kit generation

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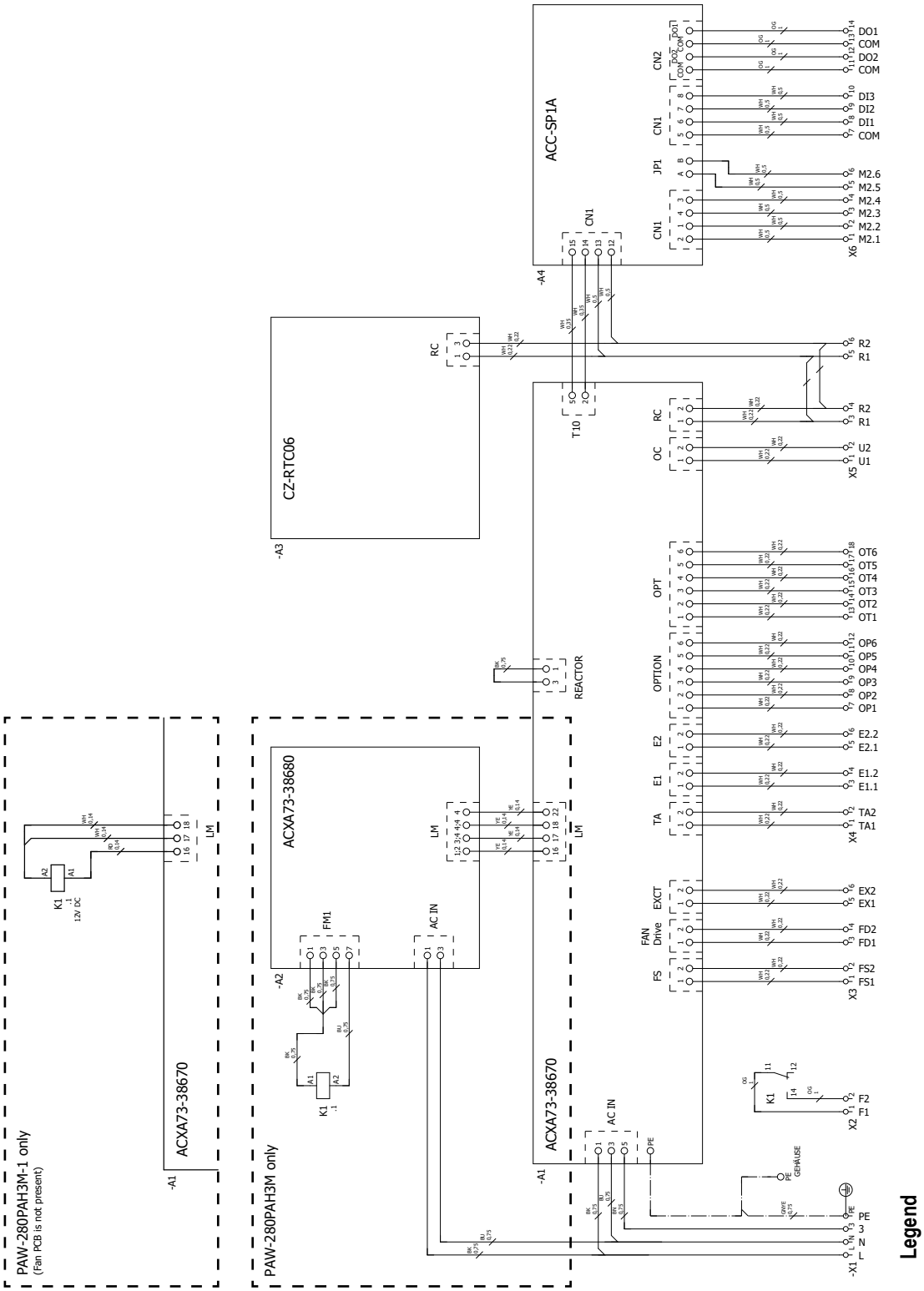
Wiring layout – PAH3M(-1) model

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



Legend

	Medium	
	PAW-280PAH3M	
TA	X	Air intake temperature sensor TA
E1	X	Indoor coil thermistor E1
E2	X	Indoor coil thermistor E2
CZ-RTC6BL	X	Remote controller
ACXA73-38670	X	Main PCB
K1	X	Auxiliary power relay

	Medium	
	PAW-280PAH3M	
ACC-SP1A	X	External signal control PCB
ACXA73-39890[1]	X	Fan PCB

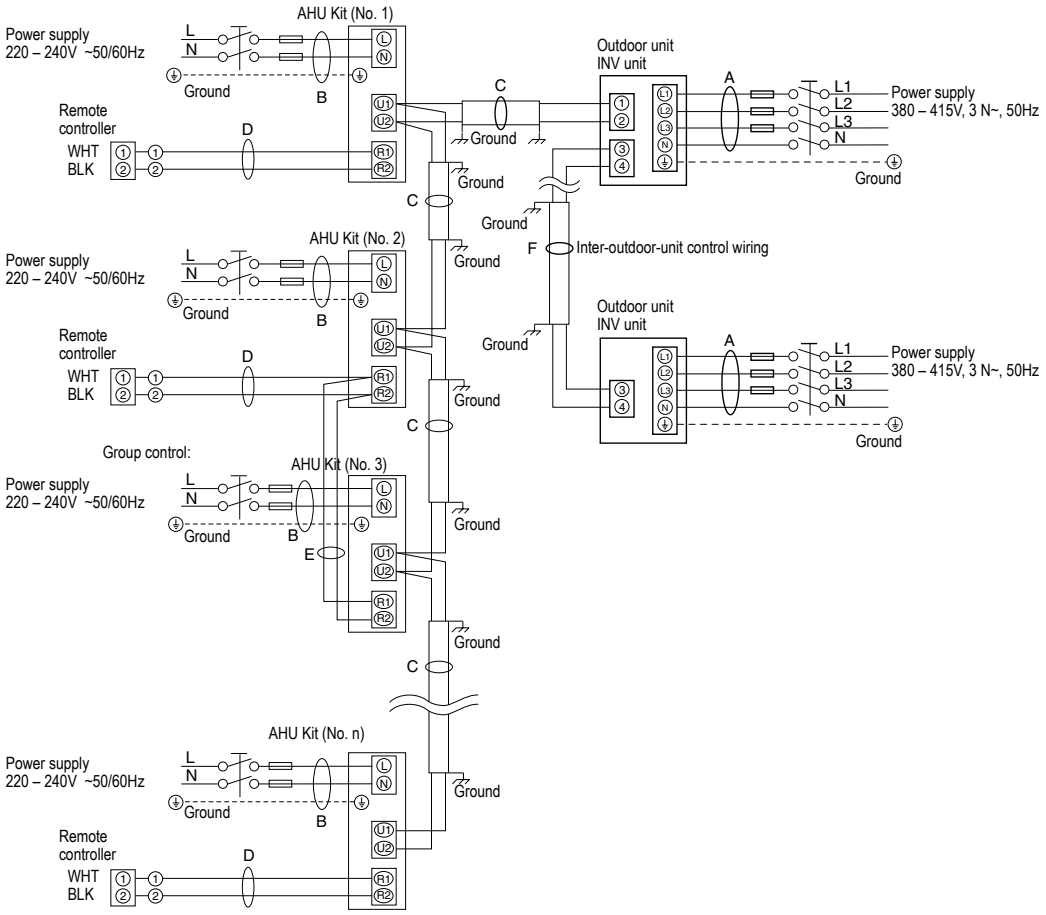
1 - Fan PCB not present on PAW-280PAH3M-1

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



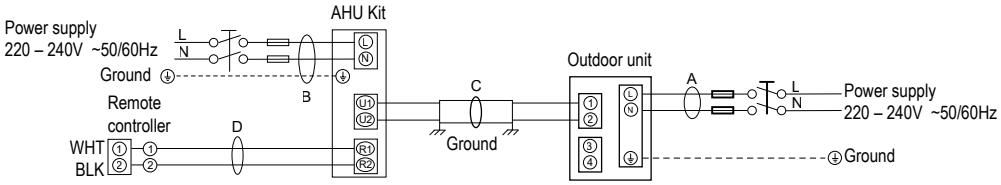
Recommended wire lengths and diameters

AHU Kit		
Type	**(B) Power supply**	**Time delay fuse or circuit breaker**
PAW-160/280/560MAH2(M/L)	2.5 mm² (AWG#13)	10 – 16 A
	Max. 150 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” and “F” are 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-160/280/560MAH2(M/L)	2.5 mm² (AWG#13)	10 – 16 A
	Max. 150 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**
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)

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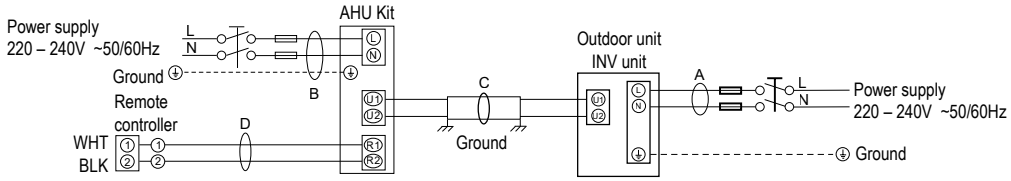
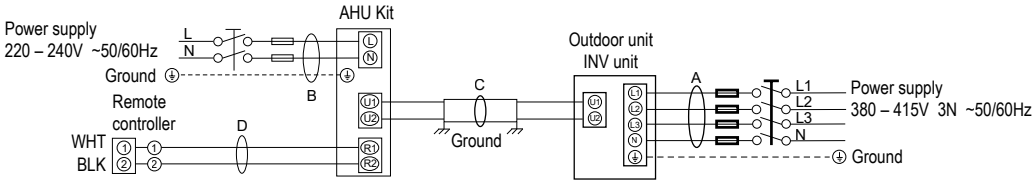
PACi Wiring system diagram – PACi systems and PAH2 generation AHU Kits

For single-phase outdoor units



For three-phase outdoor units



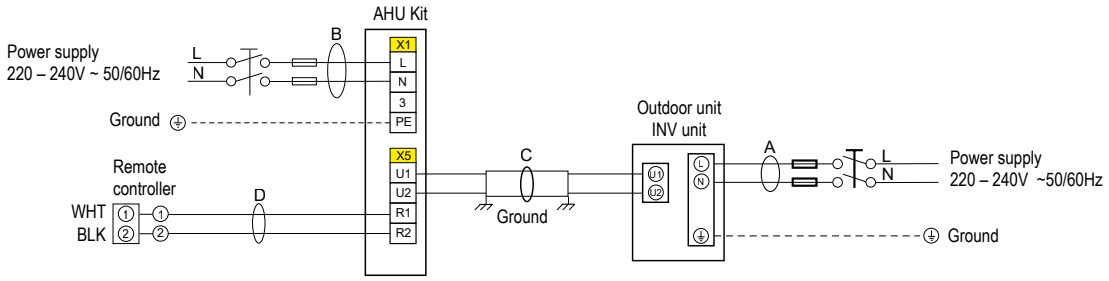
Recommended wire lengths and diameters

AHU Kit		
Type	**(B) Power supply**	**Time delay fuse or circuit breaker**
PAW-280PAH2(M/L)	2.5 mm² (AWG#13) Max. 150 m	10 – 16 A

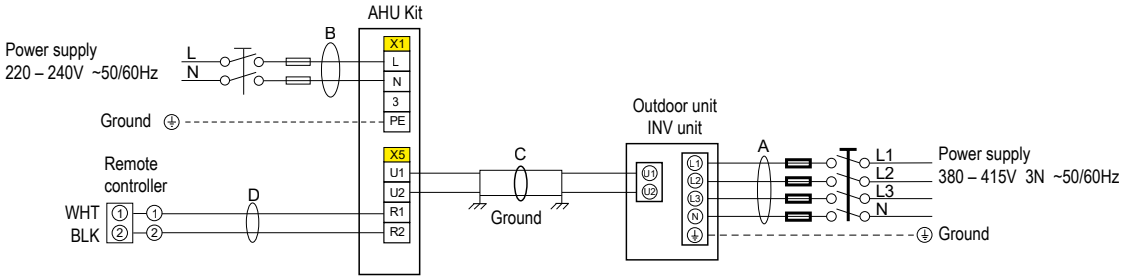
Control wiring				
(C) Inter-unit control wiring (between outdoor unit and AHU Kit)			**(D) Remote control wiring**	**(E) Control wiring for group control 1**
0.75 mm² (AWG# 18) Use shielded wiring	or	2.0 mm² (AWG# 14) Use shielded wiring	0.75 mm² (AWG# 18) Use shielded wiring	0.75 mm2 (AWG# 18) Use shielded wiring
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 single-phase outdoor units



For three-phase outdoor units



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Recommended wire lengths and diameters

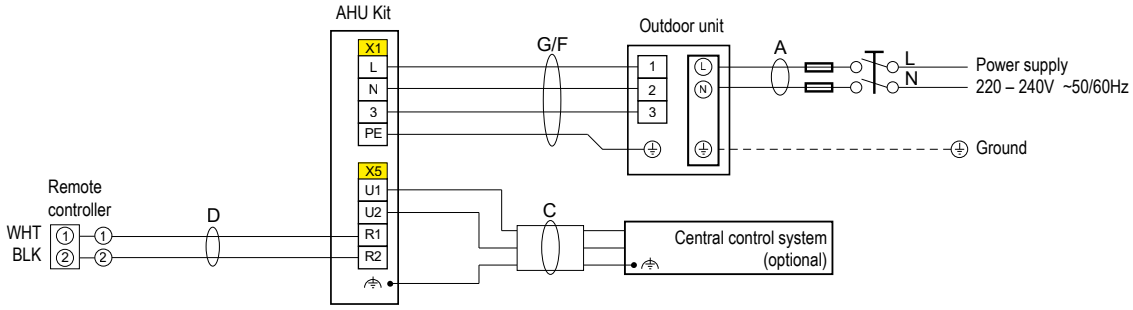
AHU Kit		
Type	**(B) Power supply**	**Circuit breaker [1]**
PAW-280PAH3M	Min. 0.75 mm²	6 A
	Max. 25.0 m	

Control wiring		
(C) Inter-unit control wiring [2] (between outdoor unit and AHU Kit)	**(D) Remote control wiring**	**(E) Control wiring for group control [1]**
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)

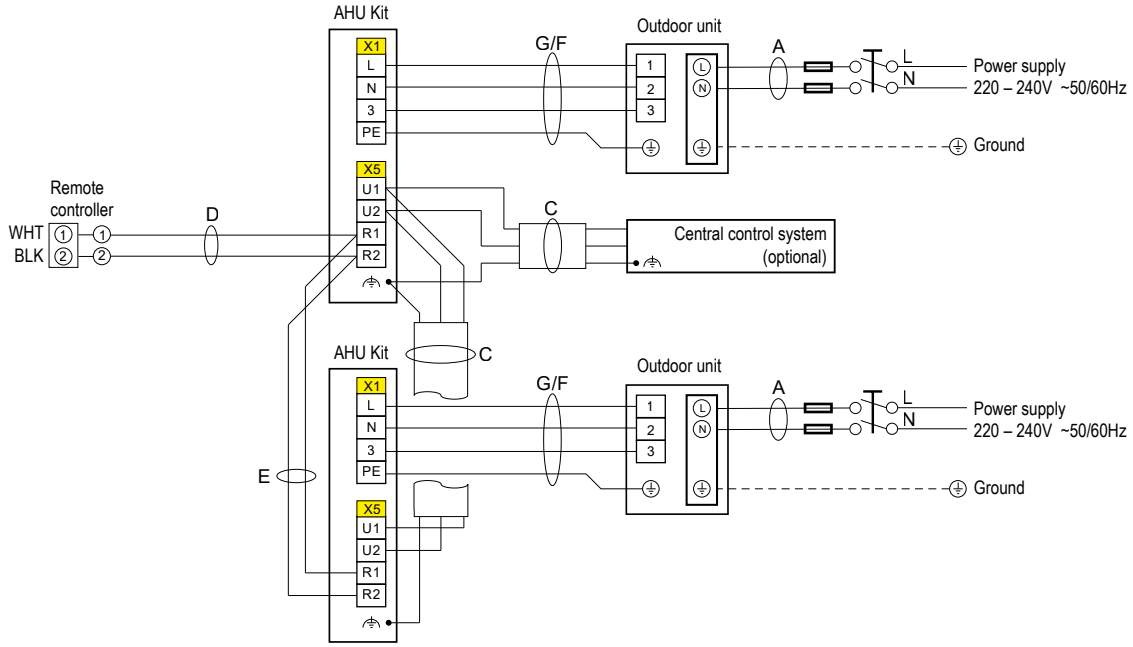
1 The circuit breaker must be incorporated in the fixed wiring in accordance with the wiring regulations.
2 Use a shielded cable for the control wiring.

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

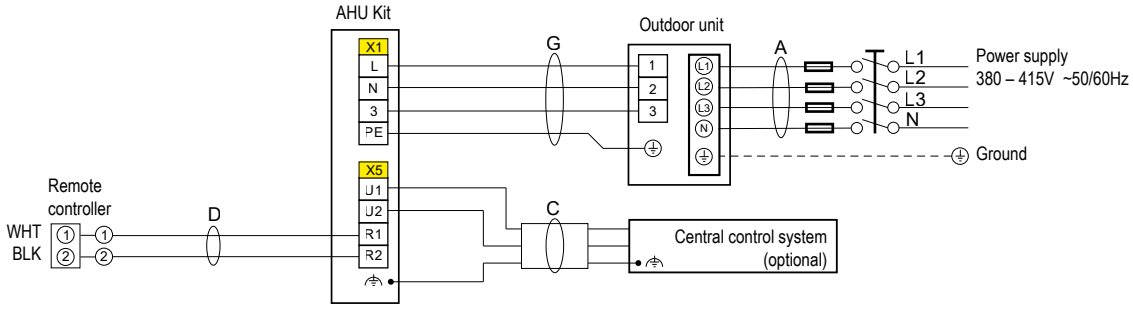
For single-phase outdoor units – Single-system connection



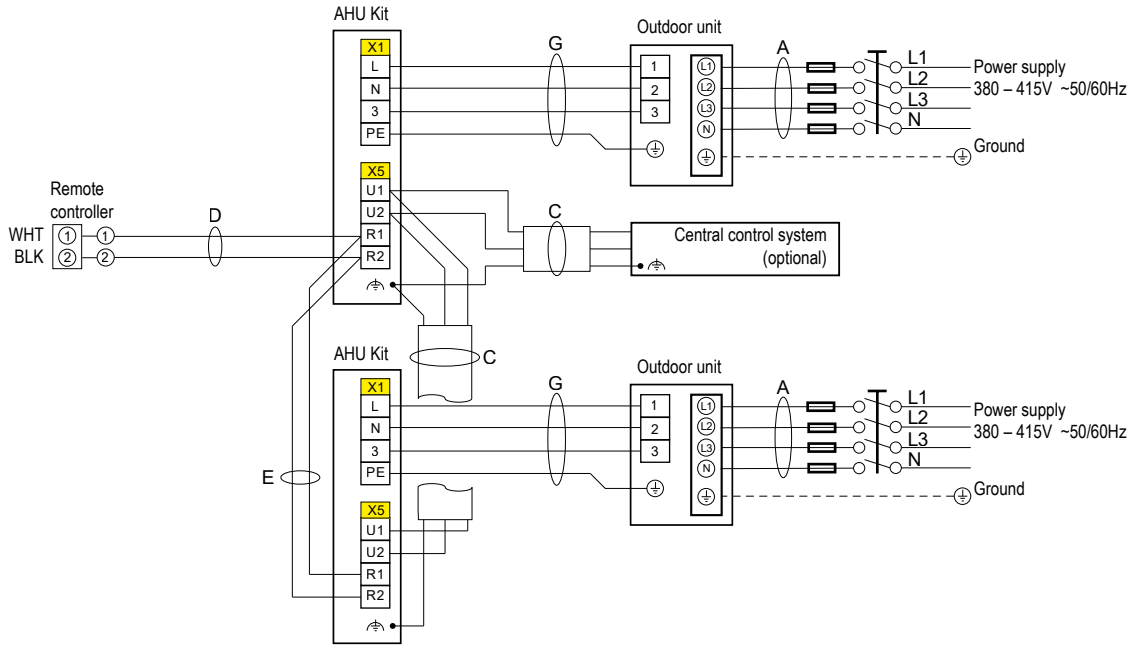
For single-phase outdoor units – Multi-system connection



For three-phase outdoor units – Single-system connection



For three-phase outdoor units – Multi-system connection



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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-36~60PZH3E5	**(G) Outdoor units: U-100~140PZ3E5, U-100~140PZ3E8**	**(G) Outdoor units: U-71~140PZH3E5, U-71~140PZH3E8**
PAW-280PAH3M	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.	

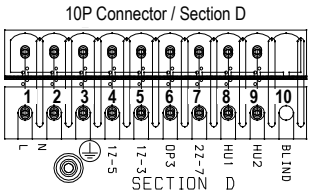
1 Maximum applicable wire for terminal board of indoor unit: 4 mm
2 This maximum length shows a 2 % voltage drop.
3 With ring-type wire terminal

ECO i ECO G PAC i PAC i NX

Notes on wiring system diagrams – All systems

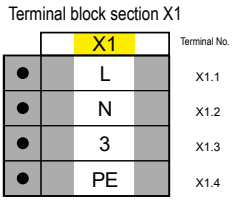
1. Refer to the “Recommended wire lengths and diameters” tables for the explanation of “A”, “B”, “C”, “D”, “E”, “F” and “G” in the above diagrams.
2. The connection diagram below shows the power supply connector of the AHU Kit’s terminal board (actual appearance may differ slightly).

MAH2/PAH2 generation



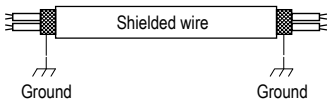
1	L	Power supply
2	N	Neutral conductor
3	⏚	Protective earthing
etc.		

PAH3 generation



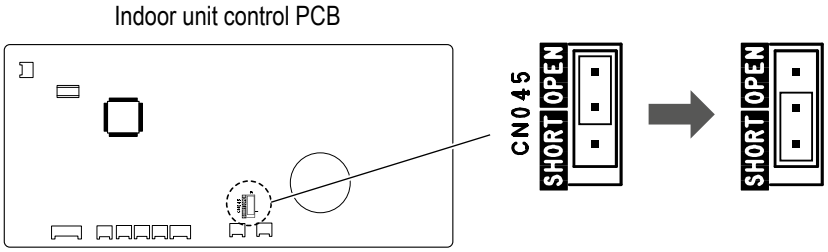
X1.1	L	Power supply
X1.2	N	Neutral conductor
X1.3	3	Communication terminal
X1.4	PE	Protective earthing

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 centralized controllers in case of PACi NX systems, with shielded woven mesh grounded on both sides, otherwise misoperation from noise may occur.

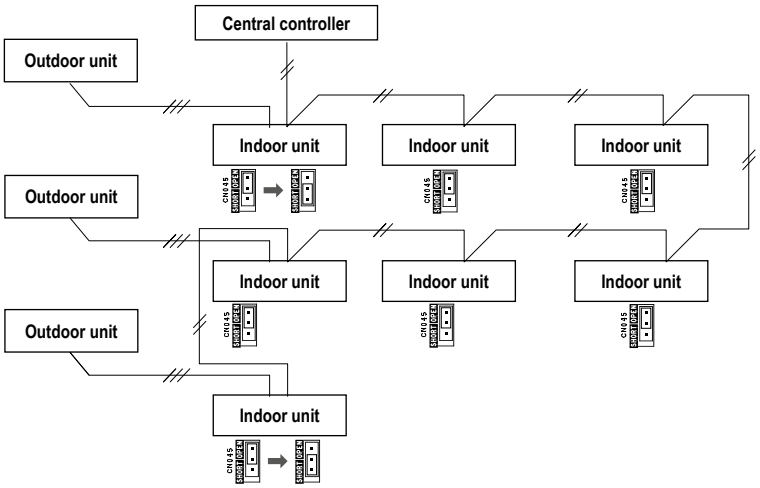


   Connect wiring as shown in the section “Wiring System Diagrams”.
6. Use the standard power supply cables for Europe (such as H05RN-F or H07RN-F which conform to CENELEC(HAR) rating specifications) or use the cables based on IEC standard (245 IEC57, 245 IEC66).
7. When linking ECOi, ECO G and PACi outdoor units in a network, the following rules for bus terminators must be observed.
   Upon shipment the bus terminator is in shorted condition. 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 are all 3-line connection:

   > Set the terminating resistance on the indoor unit control PCB.
   Upon shipment, the 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).

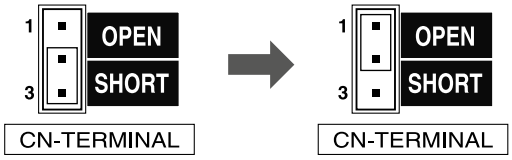


> Note that setting 3 or more terminating resistances to “SHORT” (operative) is prohibited.

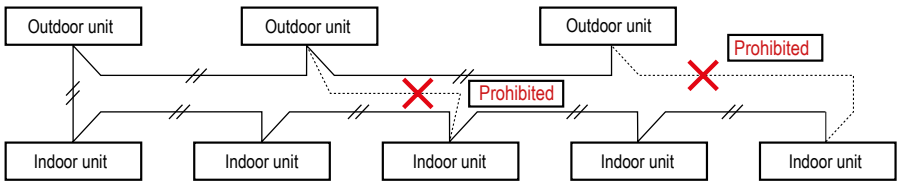


- In case that the inter-unit control wiring in the link are mixed with 3-line and 2-line connections:

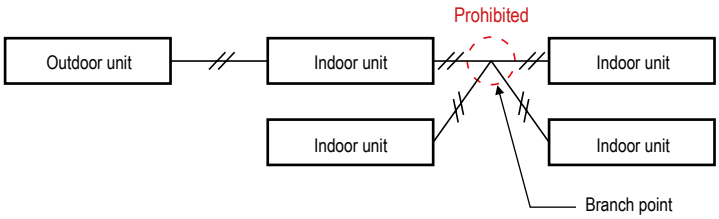
> Set the terminating resistance with the TERMINAL pin (CN-TERMINAL) on the outdoor unit control PCB (note, that the outdoor unit is connected by 2-line connection).
> Upon shipment the terminating resistance is set to “SHORT” (operative).
> Leave one unit in short circuit condition among outdoor units 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.



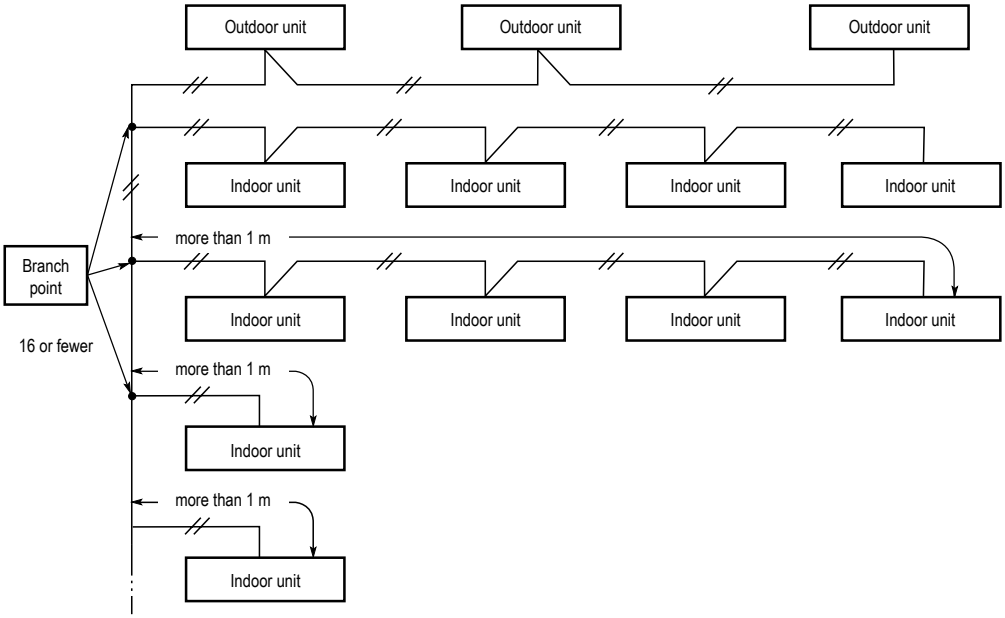
8. Do not install the inter-unit control wiring in a way that forms a loop.



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 1m are not included in the total branch number.)



11. In case of a multiple MAH2 generation AHU Kit combination within one refrigerant system, those kits must share the same AHU housing including fan, and they have to be “group-wired” and operate as a single group. In this case you have to disconnect the included remote controllers and CZ-CAPBC2 boards (ACC-SP1A PCB) except for one each. It is irrelevant which one is retained, there is no preference. The external connections need to be done only on the unit with the connected CZ-CAPBC2 board. **Note**: In this particular case it is even possible to combine a single advanced or medium version with one or two light versions, and still have full functions of the advanced or medium version respectively.

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. 95*) 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, in order to prevent the heat exchanger coil from freezing up due to insufficient air volume flow.

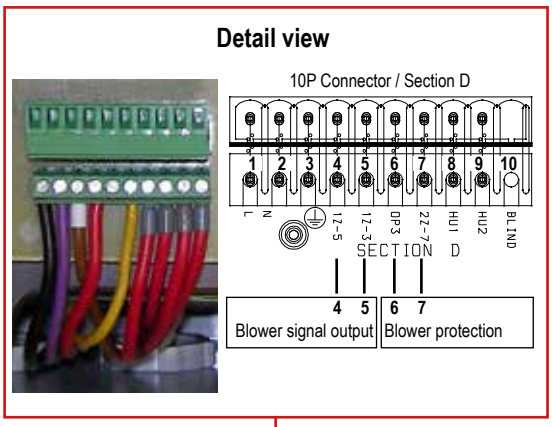
Two suitable methods will be explained in the following sections. All wiring diagrams are just examples. It is not necessary to build the electric circuit with 230 V AC. Any other suitable lower voltage being available on site may be used as well.

Method A: For standard fan control

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

For MAH2/PAH2 generation models

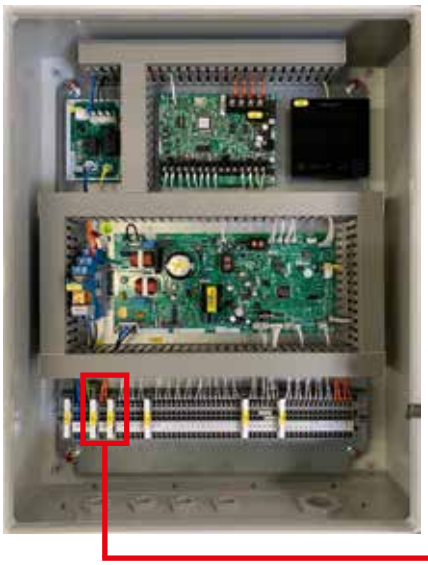
- Blower signal output: terminals D4 (IZ-5) and D5 (IZ-3).
  Blower protection input: terminals D6 (OP3) and D7 (2Z-7).

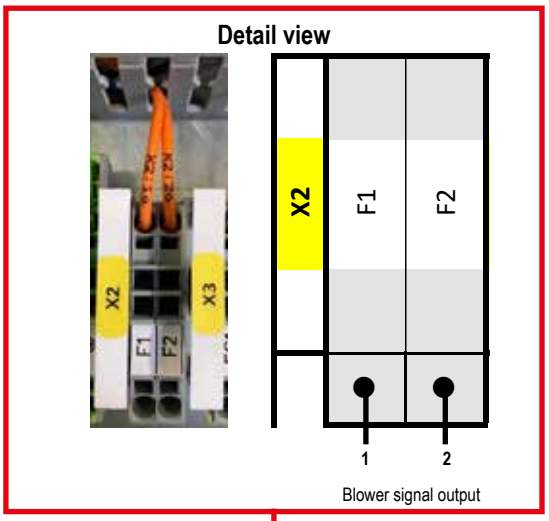


- Blower signal and blower protection lines must be routed through left wiring port below the terminal board.

For PAH3 generation models

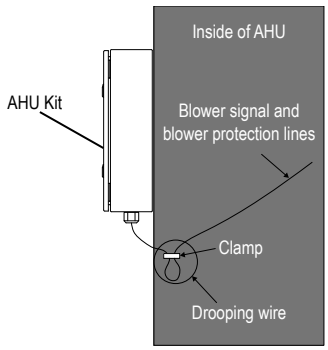
- Blower signal output: terminals F1 (X2.1) and F2 (X2.2).
- Max. 8 A / 230 V AC, potential free





For all models

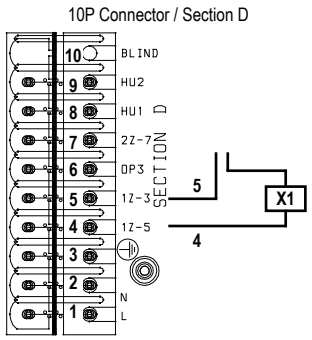
- The external signal lines must be inserted drooped in the AHU body and protected by a clamp with the drooping wire being close to the AHU Kit to avoid water reaching the AHU Kit.



Blower signal output

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

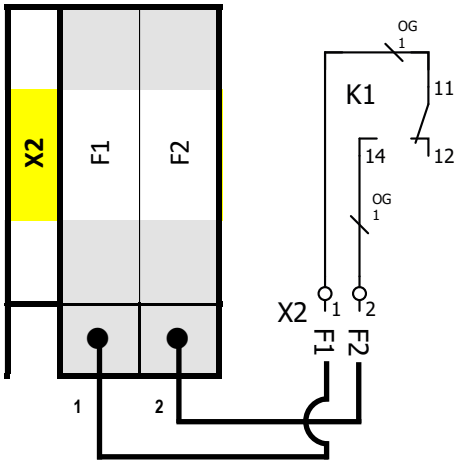
MAH2/PAH2 generation models



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

X1: Relay (field supplied)

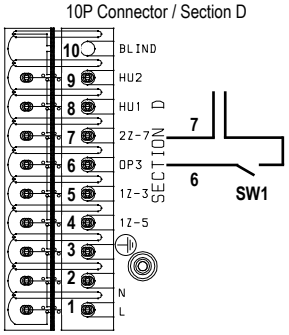
PAH3 generation model



If uninterrupted fan operation is needed and cold draft air is avoided for example by some internal bypass etc., the defrost signal (for MAH2/PAH2 generation models: contacts C5 (ON1) and C6 (ON2); for PAH3 generation model: OP1 and OP2) can be used with an additional field supplied relay.

Blower protection input (for MAH2/PAH2 generation models only)

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



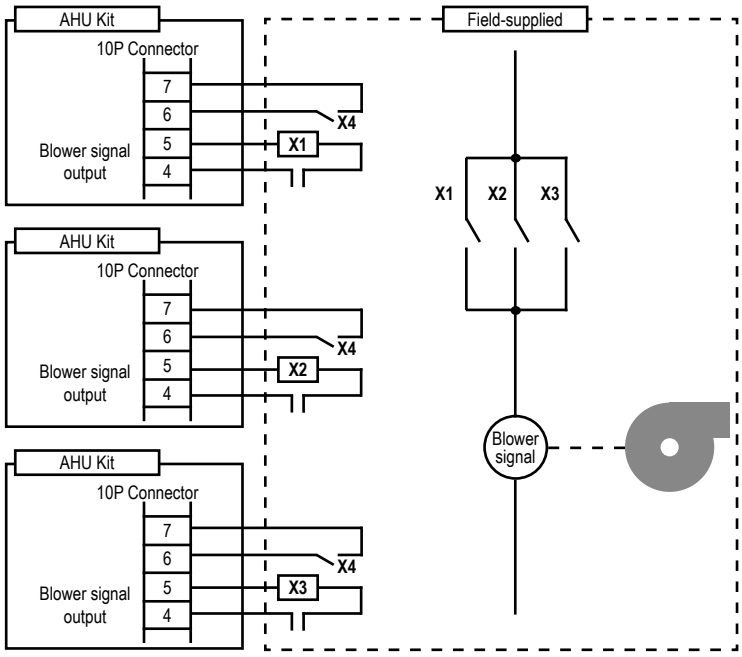
SW1: operation command (field supplied)
220 ~ 240 V AC, 0.1 A

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

5

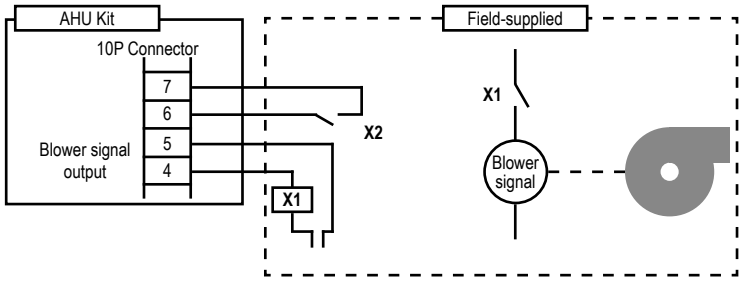
Electric circuit example – ECOi systems

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

Method B is applicable for MAH2/PAH2 generation models only.

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

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

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

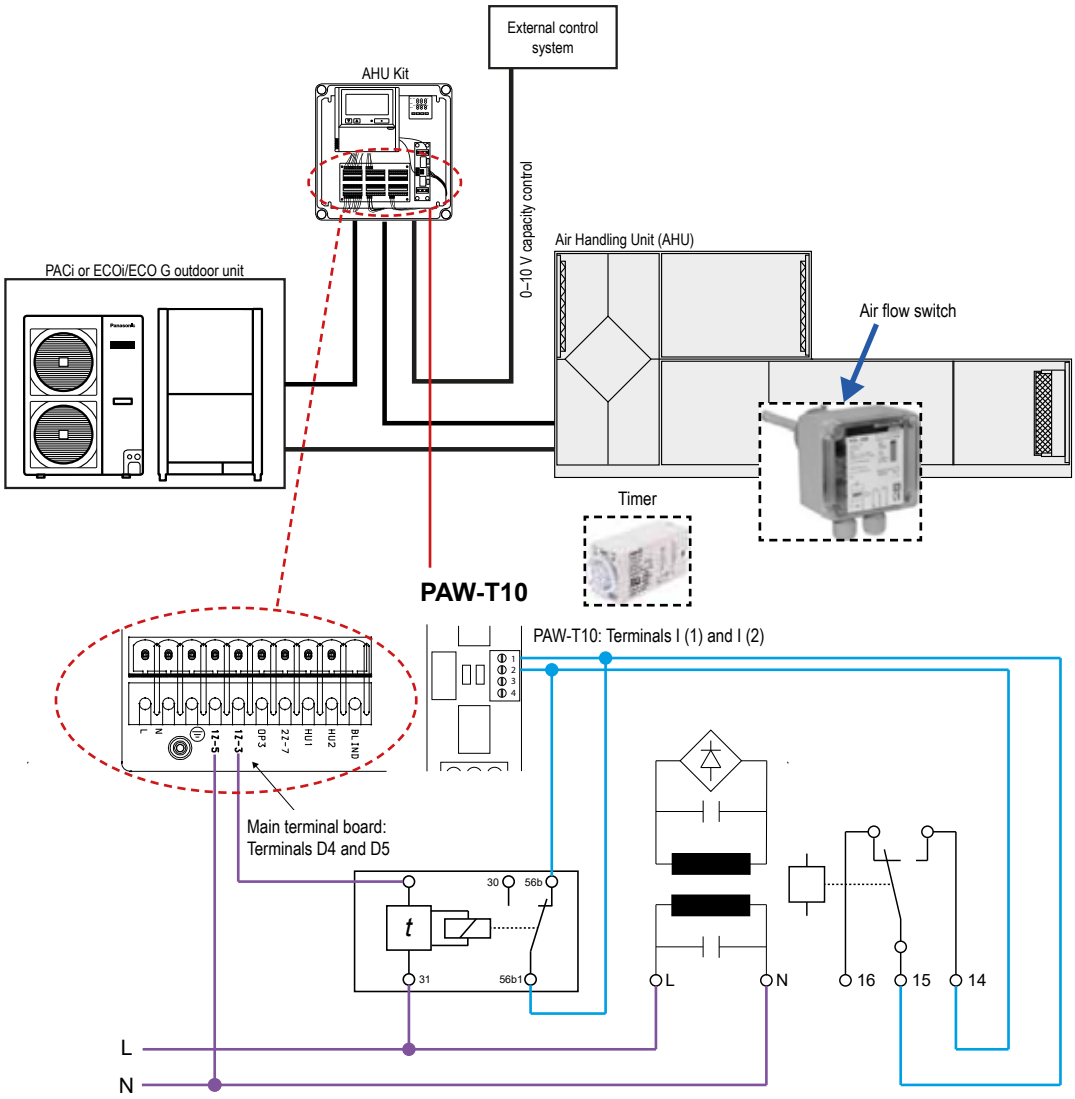
- On the AHU Kits's integrated remote controller, invoke the "Detailed Settings" mode and set parameter "2E" to "0001". (For details on the "Detailed Settings" mode, see the operating instructions of the relevant remote controller model or the ECOi/ECO G or PACi service manuals.)
- Make sure that jumper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

As an alternative to using PAW-T10 terminals 1 and 2, it is also possible to use for example contacts 1 to 4 in Section C of the main control board (“COM” and “DI1” to “DI3”). For correct use of these contacts see → *5.3 Terminal board layout, p. 66*.

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

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

Electric circuit example including a timer and air flow switch



6 Test Run

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

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

7 Control

7.1 Remote controller

The standard Panasonic wired remote controller CZ-RTC5B / CZ-RTC6BL is an integral part of the AHU Kit. All control and setting operations for the ECOi, ECO G or PACi system can be performed on this remote controller.

Important

The relevant control operations are described in the “Operating Instructions” manual for the CZ-RTC5B / 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.

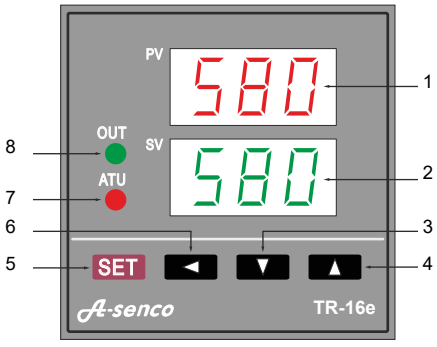
7.2 Thermostat

The advanced version of the MAH2/PAH2 generation AHU Kit models features a thermostat (temperature controller), which can optionally be set and parametrized separately if using the controller is required.

Important

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

7.2.1 Control and display elements

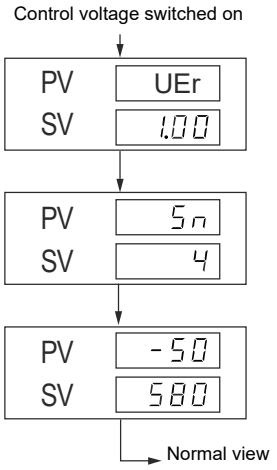


1 Display “PV”: Process value
2 Display “SV”: Set value
3 Button “Down”
4 Button “Up”
5 Button “Set”
6 Button “Left”
7 LED “Alarm”
(ON when Auto-Tuning is active)
8 LED “Out”
(ON when Process Value is lower than Set Value)

7.2.2 Operation

Status messages

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

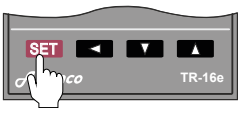


1. Software version view (factory setting)
2. Input specification view (factory setting)
3. Measuring range (factory setting)
   PV = lower limit
   SV = upper limit
4. The two displays finally change to normal view:
   PV = currently measured temperature (process value)
   SV = currently set temperature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

Changing the set temperature value

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

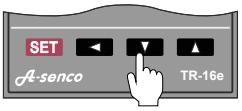
1. During operation, press the SET button.



1 x briefly

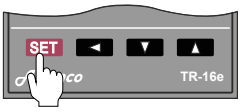
The SV display is blinking.

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



The SV display shows the desired temperature value.

3. Confirm the setting by pressing the SET button.



1 x briefly

The SV display permanently shows the new set value.

Important

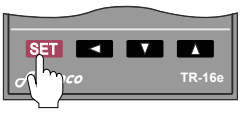
The set temperature value, which is adjustable by the above procedure, can be used in different ways and with different functions depending on how the thermostat is used in the individual application.

For further information see → *7.2.3 Initial Settings, p. 107*.

Changing values in the “Parameter” menu

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

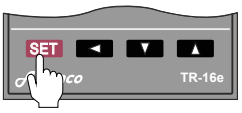
1. Press and hold the SET button for approximately 3 seconds to enter the “Parameter” menu.



1 x for 3 sec.

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

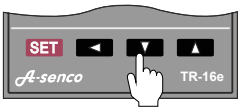
2. Press the SET button repeatedly to select the parameter to be changed.



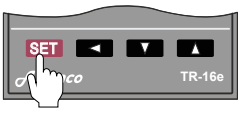
repeatedly

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

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

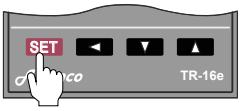


4. Confirm the new setting by pressing the SET button.



1 x briefly

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



1 x for 3 sec.

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

Parameter menu

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

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

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

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

Switching from PID mode to ON/OFF mode

1. To switch from PID mode to ON/OFF mode, the P, I and D parameters (menu items 3 through 5) must be set to the value “0” (zero). For detailed steps see → *7.2.2 Thermostat – Operation – Changing values in the “Parameter” menu, p. 103* above.
2. During ON/OFF mode, if the PID parameter values (menu items 3 through 5) are changed manually or if Auto-Tuning (menu item 8) is activated, PID mode is automatically re-activated.

Auto-Tuning in PID mode

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

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

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

ATTENTION

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

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

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

Switching from “heating mode” to “cooling mode”

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

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

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

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

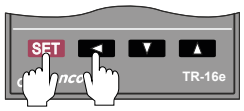
Important:

On AHU Kit models equipped with thermostat TR-16e, the mode can be changed automatically by the remote controller (CZ-RTC5B) or by an external control signal via the terminal contacts (DI1 – DI3). (In case the mode is not changing automatically on the TR-16e, perform the steps in the following section to ensure that parameter PSL is set to “3” in step 5.)

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

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

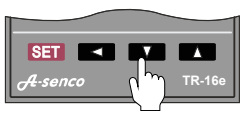
1. Press and hold the SET and ◄ buttons jointly for approximately 5 seconds.



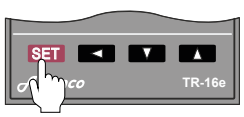
1 x 2 buttons for 5 sec.

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

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



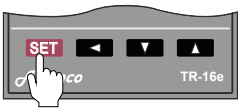
3. Confirm the new setting by pressing the SET button.



1 x briefly

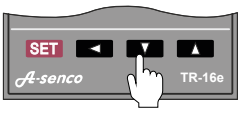
The PV display now shows “nun”, while the SV display now shows “3”.

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

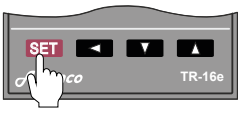


repeatedly

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



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



1 x for 3 sec.

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

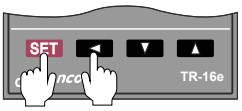
Switching from 0–10 V to 2–10 V output signals

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

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

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

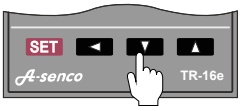
1. Press and hold the SET and ◄ buttons jointly for approximately 5 seconds.



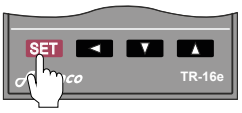
1 x 2 buttons for 5 sec.

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

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



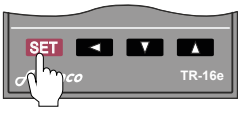
3. Confirm the new setting by pressing the SET button.



1 x briefly

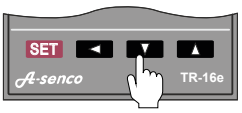
The PV display now shows “nun”, while the SV display now shows “3”.

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

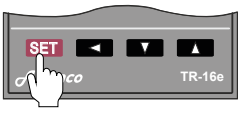


repeatedly

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



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



1 x for 3 sec.

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

7.2.3 Initial Settings

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

Case 1: Controlling the room supply air temperature

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

1. Open the AHU Kit enclosure (see → *4.1.1 Installation of AHU Kit – MAH2/PAH2 – step 3, p. 48*).
2. On the thermostat, switch to PID mode by entering the “Parameter” menu and set parameters P, I and D to the values given below (see → *7.2.2 Thermostat – Operation – Changing values in the “Parameter” menu, p. 103*).

AHU situation	P	I	D
(a) Capacity high and air volume flow low	7	120	3
(b) Capacity low and air volume flow high	3	180	10

These PID settings are intended to respond to AHU situations, where either the required capacity is rather high (close to the upper limit of the nominal AHU kit capacity) while at the same time the air volume flow is rather low (a), or vice versa (b).
If the initial PID setting results in an unstable temperature during operation, these values may be adjusted manually at a later stage.

3. On the thermostat, switch to cooling or heating mode, depending on the AHU requirements (for AHU Kit models equipped with thermostat TR-16, see → *7.2.2 Thermostat – Operation – Switching from “heating mode” to “cooling mode”, p. 105*; for models with TR-16e, this procedure is not required).
4. On the thermostat, change the set temperature value (T_{set}) as required (see → *7.2.2 Thermostat – Operation – Changing the set temperature value, p. 102*).
In this case, the set temperature value represents the desired room supply air temperature.
5. On the AHU kit’s terminal connector of section F, remove the jumper (JP1) between terminals “M2-5” and “M2-6 (FREE)”, in order to activate the 0-10 V control mode for the thermostat.
6. Close the AHU Kit enclosure again (see → *4.1.1 Installation of AHU Kit – MAH2/PAH2 – step 6, p. 49*).

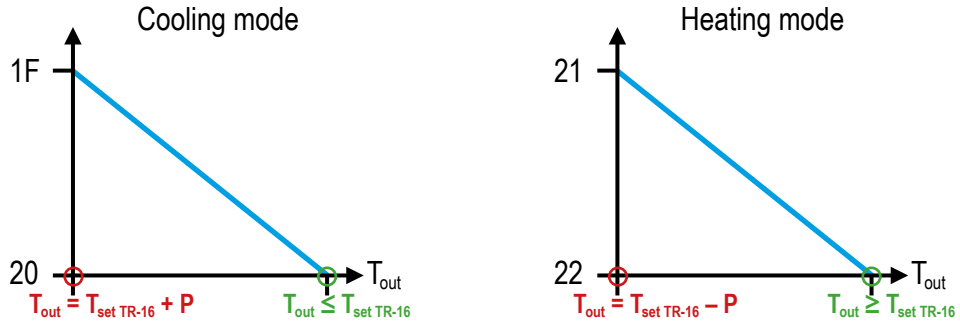
Case 2: Adjusting the temperature setpoint based on ambient air temperature

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

1. Open the AHU Kit enclosure (see → *4.1.1 Installation of AHU Kit – MAH2/PAH2 – step 3, p. 48*).
2. On the thermostat, switch to PID mode by entering the “Parameter” menu and setting parameters P, I and D to the values given below (see → *7.2.2 Thermostat – Operation – Changing values in the “Parameter” menu, p. 103*):
   P ≠ 0 (not zero)
   I = 0 (zero)
   D = 0 (zero)
   The value of parameter P represents the required gradient for the cooling or heating curve in modulating temperature control (see diagrams below) and must not be equal to zero.
3. On the thermostat, switch to cooling or heating mode, depending on the AHU requirements (for AHU Kit models equipped with thermostat TR-16, see → *7.2.2 Thermostat – Operation – Switching from “heating mode” to “cooling mode”, p. 105*; for models with TR-16e, this procedure is not required).
4. On the thermostat, change the set temperature value as required (see → *7.2.2 Thermostat – Operation – Changing the set temperature value, p. 102*).
   In this case, the set temperature value represents the adjusted temperature setpoint based on ambient air temperature ($T_{set\ TR\text{-}16}$), beyond which any cooling or heating operation is stopped (heating or cooling limit temperature).
5. On the remote controller (CZ-RTC5B), set the upper and lower limits for the adjusted temperature setpoint in cooling or heating mode.
   Inbetween the upper and lower limit the setpoint will be adjusted in a linear way (see diagrams below).

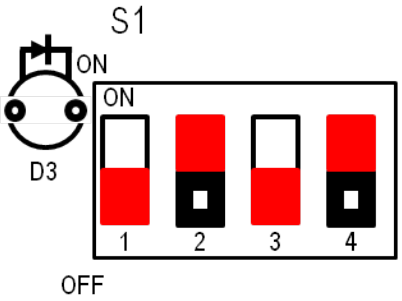
Mode	Parameter name	
	For upper limit	For lower limit
Cooling	Parameter “1F”	Parameter “20”
Heating	Parameter “21”	Parameter “22”

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

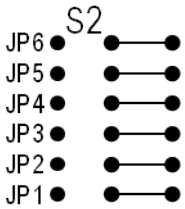


6. Remove the AHU Kit’s upper mounting board.
7. On the CZ-CAPBC2 PCB (ACC-SP1A), located on the rear side of the upper mounting board inside the AHU Kit enclosure, make sure that switches S1 to S4 are set as follows:

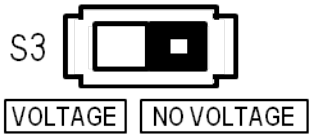
a. S1: Set to “OFF-ON-OFF-ON” (factory default on AHU Kit)



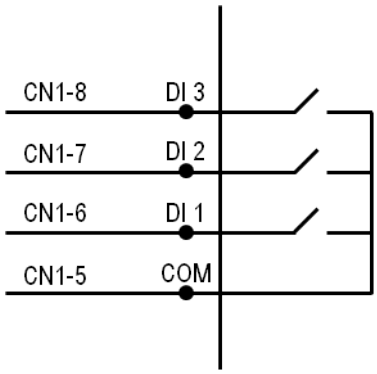
b. S2: All jumpers are intact, i e. no jumper has been cut. Also make sure, that the bridge connector between terminals “M2-5” and “M2-6” (FREE) on the AHU kit’s terminal connector of section F has not been removed.



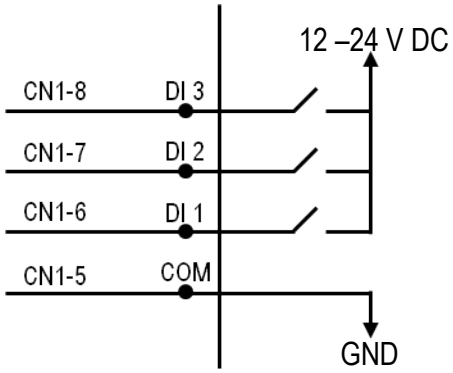
c. S3: Set to “VOLTAGE” or “NO VOLTAGE”, depending on the local digital input (DI) configuration.



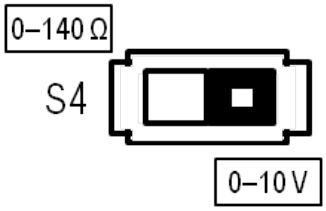
Control via dry contacts (factory default)
= “NO VOLTAGE”



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



d. S4: Set to “0–10 V“.

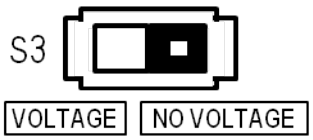


8. Restore and fasten the upper mounting board in its original position, and close the AHU Kit enclosure again (see → *4.1.1 Installation of AHU Kit – MAH2/PAH2 – step 6, p. 49*).

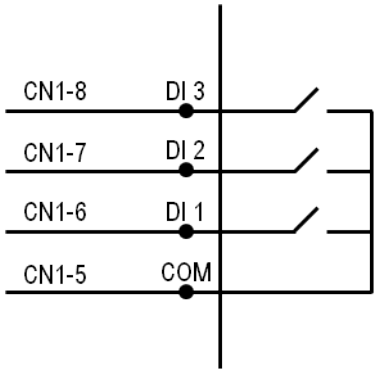
Case 3: 0–10 V demand control by an external BMS (available in medium and advanced version only)

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:

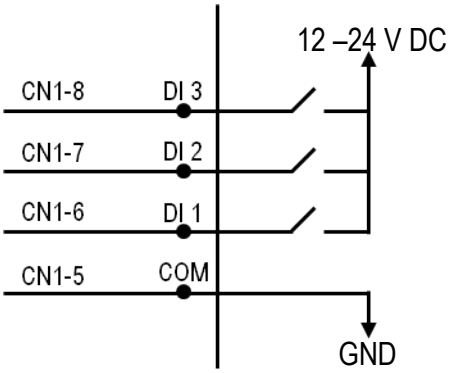
1. Open the AHU Kit enclosure (see → *4.1.1 Installation of AHU Kit – MAH2/PAH2 – step 3, p. 48*).
2. Only in case the setting of switch S3 must be modified, remove the upper mounting board. Otherwise, proceed with step 3.
   a. On the CZ-CAPBC2 PCB (ACC-SP1A), located on the rear side of the upper mounting board, set switch S3 to “VOLTAGE” or “NO VOLTAGE”, depending on the BMS digital input (DI) configuration.



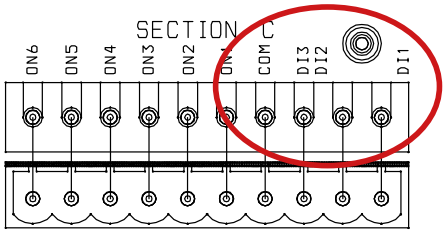
Control via dry contacts (factory default) = “NO VOLTAGE”



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



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



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

3. In order to activate the 0–10 V demand control mode for the external BMS, remove the jumper (JP1) between terminals “M2-5” and “M2-6 (FREE)” on the AHU kit’s terminal connector of section F. Make sure that all other jumpers remain intact.
4. For advanced version only:
   On the AHU kit’s terminal connector of section F, disconnect the white wire from terminal “M2-1” and the red wire from terminal “M2-2”.
   For medium version: Proceed with step 5.
5. 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 connector of section F as follows (see also → *5.3 Terminal board layout, p. 66*).
   For advanced version: Remove the jumpers from M2-1, M2-2 to M2-3 and M2-4 and connect the positive pole (“+”) to “M2-3” and the negative pole (“–”) to “M2-4”.
   For medium version: Connect the positive pole (“+”) to “M2-3” and the negative pole (“–”) to “M2-4”.
6. Close the AHU Kit enclosure again (see → *4.1.1 Installation of AHU Kit – MAH2/PAH2 – step 6, p. 49*).
7. Via the signal wiring from the external BMS, select the 0–10 V demand control functionality as follows:

Input Voltage* (V)	0	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
Demand (% of nominal current)	No cut[1]	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	No limit / Full capacity[2]
Indoor unit start / stop	Stop[1]	Start																	

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

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 very important to ensure that the DI signals are applied **BEFORE** applying the demand control signals.

7.2.4 Error Codes

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

7.2.5 Maintenance and Service

In normal operation, the thermostat is maintenance-free.

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

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

Notes:

Panasonic

www.aircon.panasonic.eu