

Air Handling Unit Kit

# PAW-P+100MAH4M

Quick installation and commissioning instructions



**Read this manual carefully before installation!**

For further information, scan the QR code to see the full Installation Instructions (available in English only).

**Notes:**

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# Air Handling Unit Kit

# PAW-P+100MAH4M

## Quick installation and commissioning instructions

Original Installation Instructions (English)

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# 1 Introduction: Notes on using the manual

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## 1.1 Please Read Before Starting

### Product covered

This manual provides the quick installation and commissioning instructions for the following product:

- Air Handling Unit Kit with Model No. **PAW-P+100MAH4M**

This manual is based on controller software version V1.00.0b. Higher controller versions may differ from what is described in this manual.

### Intended use

The intended use of the AHU Kit is to connect Panasonic VRF 2-way outdoor units (ECOi ME2 / MZ1, mini ECOi LE1 / LE2 / LZ2) to third-party air handling unit systems, using the same refrigerant circuit as the outdoor unit.

The intended use of the AHU Kits requires adherence to the information and instructions contained in this Manual, especially the safety notes and warning messages. Any other use is considered improper and can lead to significant damage

### Target group

The information in this manual is designed **for experienced and suitably qualified technicians only** and is not designed for use by the general public.

The Air Handling Unit Kit must be installed and commissioned by the sales dealer or a suitably qualified installer.

This manual is provided for use by authorised persons only.



### IMPORTANT

- ▶ Before you start with the installation, read this manual completely.
- ▶ **Carefully read the “Safety Precautions”** (see → *Safety Precautions, p. 8*) and observe them during any installation, commissioning and maintenance work.
- ▶ Keep this manual throughout the lifecycle of the Air Handling Unit Kit.
- ▶ When relocating or repairing the Air Handling Unit Kit, provide this manual to the servicing personnel.

### Sources of information

The basic instructions given in this manual are typical for most installation sites. For extended information, refer to the full Installation Instructions (in English only).

Also read the installation instructions of connected devices, e.g. the Technical Data Book of the relevant outdoor unit. For the set up and commissioning, also check the remote controller manual.

If you require help for a special problem, contact our Authorised Service Centre or your certified dealer for additional instructions.



### Note

- For access to the full Installation Instructions (in English only), use the QR code on the front page.
- For any information not covered in this manual nor the full Installation Instructions, contact your relevant Authorised Service Centre or certified dealer.

### Disclaimer

The Manufacturer will accept no responsibility for any accident or damage that occurs because of such improper installation in any way not described in this manual nor the full Installation Instructions.

Also, malfunction caused by incorrect installation is not covered by the product warranty.

## 1.2 Symbols and text representations

In this manual, the following symbols and text representations are used.



**WARNING** indicates a hazard which can lead to death or severe injury



**CAUTION** indicates a hazard which may result in slight or moderate injury

**NOTICE** indicates a situation which can result in material damage occurring



indicates the hazard of electric shock



indicates prohibited items, actions or procedures



indicates important information which must be taken into account



indicates useful information or references to further sources of information

► indicates instructions for actions in a safety message

1., 2., 3. ... or a, b, c ... indicates a sequence of several steps of action, which must be executed in the order specified

**[Button]** indicates the name of a button

*Option* indicates an on-screen control option

(1) indicates references to image keys in the running text

→ *Cross reference* indicates a cross-reference (with/without hyperlink function)

www.example.com indicates an internet address (with/without hyperlink function)

# 2 Safety precautions

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The safety precautions in this section warn the installing and servicing personnel about dangers, which may arise in connection with the installation of the Air Handling Unit Kit:

The safety precautions provide instructions for the safe and proper installation, commissioning, servicing and operation of the product. To avoid possible harm to persons or damage to equipment, the safety precautions must be followed strictly at all times.

## 2.1 Precautions for installation setup

### Electricity-related dangers

#### Danger to life from electric shock!



The Air Handling Unit Kit is operated with 230 V alternating current. Improper installation can present a danger to life from electric shock as well as a danger of fire occurring due to overheating.

Also, the electromagnetic radiation emitted by the Air Handling Unit Kit can cause interference with sensitive electronic medical devices, which may result in death or serious injury.

To avoid any electricity-related dangers, observe the following precautions:

- ▶ The Air Handling Unit Kit must be installed by the sales dealer or installer.
- ▶ Electric work must be performed by authorised personnel in accordance with National Wiring Regulations, local regulations and the Installation Instructions in this manual.
- ▶ If you have a cardiac pacemaker or implantable cardioverter defibrillator, keep at least 15 cm away from the Air Handling Unit Kit.
- ▶ Do not set up in hospitals or places where electronic medical devices are located.
- ▶ Do not set up where children can reach the Air Handling Unit Kit.
- ▶ Before you start with the installation, turn off the circuit breaker of the units.
- ▶ Before performing any wiring, ground yourself to discharge static electricity.
- ▶ Use appropriate protective equipment and tools for safety while installing the Air Handling Unit Kit.
- ▶ Disassembly and modification of the Air Handling Unit Kit is not permitted under any circumstances.
- ▶ Use only the parts specified by the manufacturer as supplied accessories or spare parts.
- ▶ Ensure cables are installed properly so that external forces cannot affect them.
- ▶ The connecting cable must not touch any piping directly.
- ▶ Attach the electrical cover to the indoor unit securely.
- ▶ Make sure to connect the Air Handling Unit Kit to the PCB and terminal board of the outdoor unit properly.
- ▶ Do not splash water into open Air Handling Unit Kit or use in areas with high humidity such as a bathroom or laundry room.
- ▶ Do not operate with wet hands.
- ▶ In case of an abnormal condition (such as a burning smell), stop the indoor unit and turn the circuit breaker OFF.

### Refrigerant-related dangers

Installation of the AHU Kit requires that the expansion valve, the pressure sensor and the temperature probes are mounted in the refrigeration circuit as mandatory components. Improper procedures for handling the refrigerant (R32 or R410A) or for working on the refrigerant circuit can result in physical harm to persons or damage to equipment.

To avoid any refrigerant-related dangers, observe the following precautions:

- ▶ Installation, maintenance or repair work on the refrigerant circuit must be performed by a suitably experienced, qualified installer.
- ▶ All working procedures must comply with the national and local regulations for the relevant refrigerant.
- ▶ Make sure to minimise the risk of refrigerant gas leaks, which can result in harmfully high refrigerant gas concentrations in confined spaces or even suffocation.

If refrigerant gas has leaked during installation, maintenance or repair work, do the following:

- > Keep the refrigerant away from hot surfaces, fire or other sources of ignition, to avoid the formation of poisonous gas.
- > Ventilate the work area thoroughly.
- > Search for the leak and repair it, using best practice procedures for the relevant refrigerant.
- ▶ Avoid direct contact of the skin with the refrigerant gas or with refrigerant pipes, to prevent frostbite injuries.
- ▶ Use appropriate protective equipment and tools.

### Other adverse effects to be avoided

Improper working procedures or the selection of an improper installation location for the AHU Kit can result in physical harm to persons, damage or malfunctions of equipment.

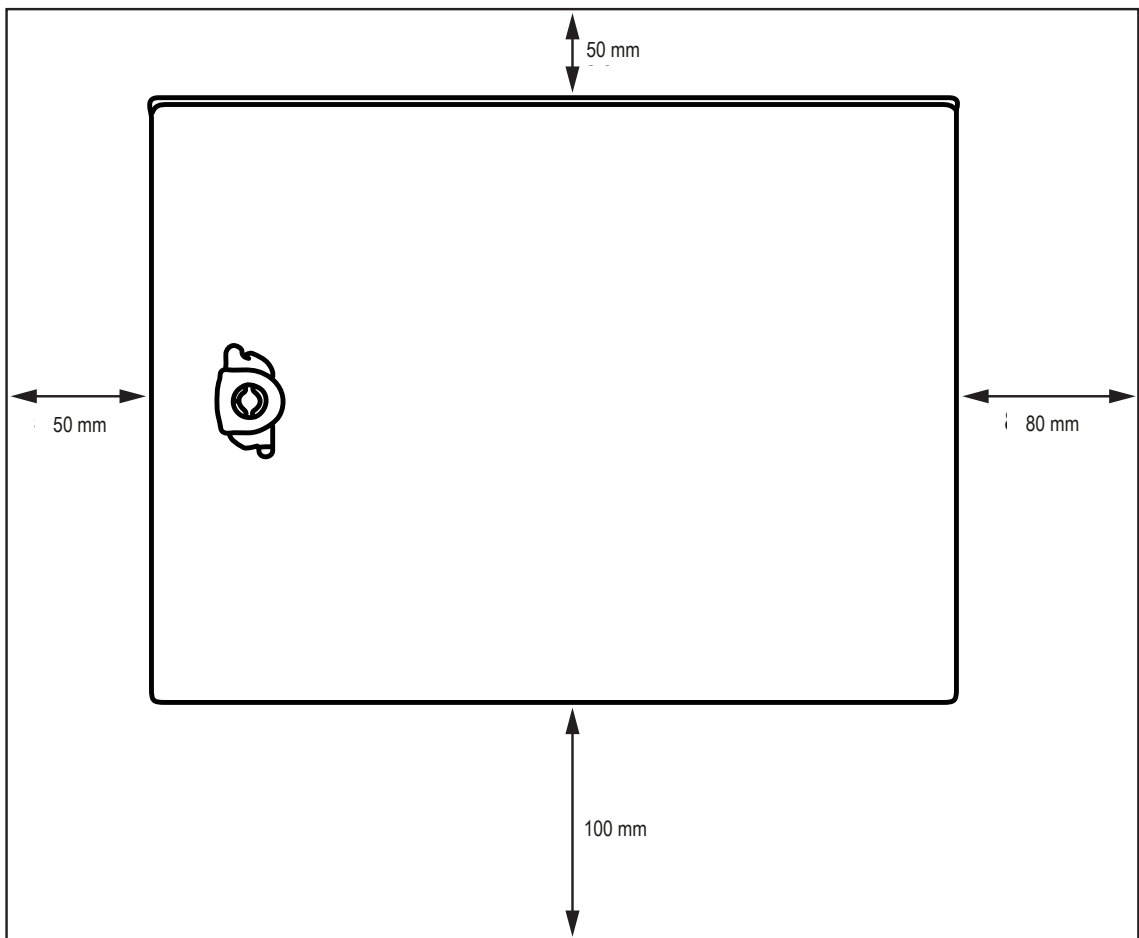
To avoid any adverse effects related to improper procedures or an improper installation location, observe the following guidelines:

- ▶ To prevent the AHU Kit falling from an elevated location, which can cause injuries or material damage (not covered by the product warranty), do the following:
  - > Select an installation location which is rigid and strong enough to support or hold this Air Handling Unit Kit.
  - > Make sure to attach the AHU Kit in a proper way and confirm that it is fixed securely.
- ▶ Do not install the AHU Kit in places with large amounts of oil (including machine oil), steam, flammable or corrosive gas, or voltage fluctuations surrounding the metal body, as this may lead to severe decrease in functionality and damage to parts.
- ▶ To avoid malfunctions caused by radio wave interference, keep the AHU Kit away from devices such as other wireless devices, microwaves and devices that use 2.4 GHz signal.
- ▶ Do not use the AHU Kit near other wireless devices, microwaves, cordless phones, or facsimiles.
- ▶ Do not use the remote controller near to automatic control equipment (automatic door, fire alarms, etc.).
- ▶ Follow the detailed guidelines for selecting an appropriate installation location (see → *Installation location, p. 10*).

## 2.2 Installation location

To choose an appropriate installation location, follow these instructions:

- Avoid the following locations for installation:
  - > Locations in direct sunlight, near heat sources or in places where the ambient temperature is more than 45 °C
  - > Locations where vibrations can occur
  - > Locations where too much dust or water occurs (the AHU Kit's protection class is IP65)
  - > Locations where condensation occurs
- Do not use in special environments, such as places with much oil (including machine oil), steam, flammable or corrosive gas, voltage fluctuation surrounding the metal body etc. Using the AHU Kit in these special environments may lead to severe decrease in functionality and damage to parts.
- In the case of high ambient humidity, condensation of water may occur inside the Air Handling Unit Kit. To avoid this, it is recommended to retrofit the AHU Kit with pressure equalisation. (This measure is to be created on site, if required.)
- Keep a distance of 1 m or more from TVs, radios, and PCs, to avoid possible image blur or related noise.
- Select an installation location which facilitates easy maintenance.
- Avoid installation locations, which require to stand on an unstable surface when operating or checking the Air Handling Unit Kit.
- Install the Air Handling Unit Kit vertically.
- Install with a clearance below the unit of 100 mm or more (due to space of wiring).
- Keep a minimum space around the Air Handling Unit Kit as detailed in the figure shown below.



## 3 Specification



### IMPORTANT

- The outdoor unit combinations listed in the following specification tables are just an exemplary selection, other combinations are also possible. For information on other combinations, refer to the Technical Data Book of the relevant outdoor units.
- For information on the required refrigerant charge, refer to the Technical Data Book of the relevant outdoor units.
- For information on pipe dimensioning and deviating piping layouts, refer to the full Installation Instructions and the Technical Data Book of the relevant outdoor units.

### 3.1 Technical data for R410A systems

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)	Unit	4 HP	5 HP	6 HP	8 HP (LE1)	8 HP (ME2)	
Expansion valve pack PAW-P+...		116EEVPACK	116EEVPACK	116EEVPACK	133EEVPACK	133EEVPACK	
Nominal cooling capacity *1	kW	12.0	14.0	16.0	22.4	22.4	
Nominal heating capacity *2	kW	12.5	16.0	17.0	25.0	25.0	
Minimum cooling capacity continuous *1	kW	4.3	4.3	4.3	7.0	7.0	
Minimum heating capacity continuous *2	kW	5.0	5.0	5.0	8.1	8.1	
Air volume flow	Min	m <sup>3</sup> /h	1,100	1,100	1,100	1,700	1,700
	Max	m <sup>3</sup> /h	4,000	5,000	5,000	8,000	10,000
AHU DX coil heat exchanger volume	Min	dm <sup>3</sup>	1.5	1.5	1.5	2.0	2.0
	Max	dm <sup>3</sup>	5.5	6.3	7.0	7.0	10.0
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. pipe length difference after first joint		m	10	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10	10
Piping connections EEV		mm	8	8	8	10	10
Pipe size branch pipe	Liquid pipe	Inch / mm	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	3/4" / 19.05	3/4" / 19.05
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
Outdoor temperature	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
		°C WB	-10 / 46	-10 / 46	-10 / 46	-10 / 46	-10 / 46
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 46	-10 / 46	-10 / 46	-10 / 46	-10 / 46
		°C WB	-20 / 18	-20 / 18	-20 / 18	-20 / 18	-25 / 18

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

# Specification

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)	Unit	10 HP (LE1)	10 HP (ME2)	12 HP	14 HP	16 HP	
Expansion valve pack PAW-P+...		133EEVPACK	133EEVPACK	133EEVPACK	145EEVPACK	145EEVPACK	
Nominal cooling capacity *1	kW	28.0	28.0	33.5	40.0	45.0	
Nominal heating capacity *2	kW	31.5	31.5	37.5	45.0	50.0	
Minimum cooling capacity continuous *1	kW	7.0	7.0	7.0	10.4	10.4	
Minimum heating capacity continuous *2	kW	8.1	8.1	8.1	12.0	12.0	
Air volume flow	Min	m³/h	2,000	2,000	2,000	3,500	3,500
	Max	m³/h	8,600	10,000	10,000	12,000	12,000
AHU DX coil heat exchanger volume	Min	dm³	2.0	2.0	3.0	3.0	4.0
	Max	dm³	7.0	10.0	17.0	17.0	17.0
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. pipe length difference after first joint	m	10	10	10	10	10	
Max. elevation difference (IU/OU)	m	10	10	10	10	10	
Piping connections EEV	mm	10	10	10	10	10	
Pipe size branch pipe	Liquid pipe	Inch / mm	3/8" / 9.52	3/8" / 9.52	1/2" / 12.7	1/2" / 12.7	1/2" / 12.7
	Gas pipe	Inch / mm	7/8" / 22.22	7/8" / 22.22	1 1/8" / 28.58	1 1/8" / 28.58	1 1/8" / 28.58
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 46	-10 / 46	-10 / 46	-10 / 46	-10 / 46
	Heating Min / Max	°C WB	-20 / 18	-25 / 18	-25 / 18	-25 / 18	-25 / 18

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)	Unit	18 HP	20 HP	22 HP [10+12]	24 HP [12+12]	26 HP [10+16]	
Expansion valve pack PAW-P+...		145EEVPACK	156EEVPACK	156EEVPACK	174EEVPACK	174EEVPACK	
Nominal cooling capacity *1	kW	50.0	56.0	61.5	68.0	73.0	
Nominal heating capacity *2	kW	56.0	63.0	69.0	76.5	81.5	
Minimum cooling capacity continuous *1	kW	10.4	15.3	15.3	21.5	21.5	
Minimum heating capacity continuous *2	kW	12.0	17.5	17.5	24.7	24.7	
Air volume flow	Min	m³/h	5,000	5,000	6,000	6,000	6,000
	Max	m³/h	20,000	20,000	24,000	24,000	24,000
AHU DX coil heat exchanger volume	Min	dm³	4.0	4.0	5.0	6.0	6.0
	Max	dm³	19.0	19.0	27.0	34.0	27.0
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. pipe length difference after first joint	m	10	10	10	10	10	
Max. elevation difference (IU/OU)	m	10	10	10	10	10	
Piping connections EEV	mm	10	16	16	7/8"	7/8"	
Pipe size branch pipe	Liquid pipe	Inch / mm	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88	3/4" / 19.05
	Gas pipe	Inch / mm	1 1/8" / 28.58	1 1/8" / 28.58	1 1/8" / 28.58	1 1/8" / 28.58	1 1/4" / 31.75
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 46	-10 / 46	-10 / 46	-10 / 46	-10 / 46
	Heating Min / Max	°C WB	-25 / 18	-25 / 18	-25 / 18	-25 / 18	-25 / 18

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

3

AHU kit model		PAW-P+100MAH4M				
Outdoor unit HP (type)		Unit	28 HP [12+16]	30 HP [14+16]	32 HP [16+16]	34 HP [14+20]
Expansion valve pack PAW-P+...			174EEVPACK	174EEVPACK	174EEVPACK	174EEVPACK
Nominal cooling capacity *1		kW	78.5	85.0	90.0	96.0
Nominal heating capacity *2		kW	87.5	95.0	100.0	108.0
Minimum cooling capacity continuous *1		kW	21.5	21.5	21.5	21.5
Minimum heating capacity continuous *2		kW	24.7	24.7	24.7	24.7
Air volume flow	Min	m³/h	6,000	7,000	7,000	8,500
	Max	m³/h	25,000	25,000	25,000	30,000
AHU DX coil heat exchanger volume	Min	dm³	6.0	6.0	6.0	7.0
	Max	dm³	34.0	34.0	34.0	36.0
Piping length	Min/Max	m	10 / 100	10 / 100	10 / 100	10 / 100
Max. branch pipe length		m	12	12	12	12
Max. pipe length difference after first joint		m	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10
Piping connections EEV		mm	7/8"	7/8"	7/8"	7/8"
Pipe size branch pipe	Liquid pipe	Inch / mm	3/4" / 19.05	3/4" / 19.05	3/4" / 19.05	3/4" / 19.05
	Gas pipe	Inch / mm	1 1/4" / 31.75	1 1/4" / 31.75	1 1/4" / 31.75	1 1/4" / 31.75
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25
Outdoor temperature	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
		°C WB	-10 / 46	-10 / 46	-10 / 46	-10 / 46
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 46	-10 / 46	-10 / 46	-10 / 46
		°C WB	-25 / 18	-25 / 18	-25 / 18	-25 / 18

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

## 3.2 Technical data for R32 systems

### Note

All technical specification data for R32 systems is tentative.

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)		Unit	4 HP	5 HP	6 HP	8 HP (LZ2)	8 HP (MZ1)
Expansion valve pack PAW-P+...			116EEVPACK	116EEVPACK	116EEVPACK	116EEVPACK	116EEVPACK
Nominal cooling capacity *1		kW	12.0	14.0	16.0	22.4	22.4
Nominal heating capacity *2		kW	12.5	16.0	17.0	25.0	25.0
Minimum cooling capacity continuous *1		kW	6.6	6.6	6.6	6.6	6.6
Minimum heating capacity continuous *2		kW	7.4	7.4	7.4	7.4	7.4
Air volume flow	Min	m³/h	1,100	1,100	1,100	1,700	1,700
	Max	m³/h	4,000	5,000	5,000	8,000	10,000
AHU DX coil heat exchanger volume	Min	dm³	1.5	1.5	1.5	2.0	2.0
	Max	dm³	5.5	6.3	7.0	7.0	8.5
Piping length	Min/Max	m	10 / 60	10 / 60	10 / 60	10 / 70	10 / 100
Max. branch pipe length		m	12	12	12	12	12
Max. pipe length difference after first joint		m	10	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10	10
Piping connections EEV		mm	8	8	8	10	10
Pipe size branch pipe	Liquid pipe	Inch / mm	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	3/4" / 19.05	3/4" / 19.05
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
Outdoor temperature	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
		°C WB	-10 / 52	-10 / 52	-10 / 52	-10 / 52	-10 / 50
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 52	-10 / 52	-10 / 52	-10 / 52	-10 / 50
		°C WB	-20 / 18	-20 / 18	-20 / 18	-20 / 18	-25 / 24 *4

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

\*4 In case of on-coil temperature > +18 °C WB in heating mode, intermittent operation could happen

# Specification

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)		Unit	10 HP (LZ2)	10 HP (MZ1)	12 HP	16 HP [8+8]	18 HP [8+10]
Expansion valve pack PAW-P+...			133EEVPACK	133EEVPACK	133EEVPACK	145EEVPACK	145EEVPACK
Nominal cooling capacity *1		kW	28.0	28.0	33.5	44.8	50.4
Nominal heating capacity *2		kW	28.0	31.5	37.5	50.0	56.5
Minimum cooling capacity continuous *1		kW	10.7	10.7	10.7	15.9	15.9
Minimum heating capacity continuous *2		kW	12.1	12.1	12.1	18.0	18.0
Air volume flow	Min	m³/h	2,000	2,000	2,000	3,400	3,700
	Max	m³/h	8,600	10,000	10,000	16,000	20,000
AHU DX coil heat exchanger volume	Min	dm³	2.0	2.0	2.0	4.0	4.0
	Max	dm³	7.0	10.0	12.0	15.0	18.0
Piping length	Min/Max	m	10 / 70	10 / 100	10 / 100	10 / 100	10 / 100
Max. branch pipe length		m	12	12	12	12	12
Max. pipe length difference after first joint		m	10	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10	10
Piping connections EEV		mm	10	10	10	10	10
Pipe size branch pipe	Liquid pipe	Inch / mm	3/8" / 9.52	3/8" / 9.52	3/8" / 9.52	1/2" / 12.7	1/2" / 12.7
	Gas pipe	Inch / mm	7/8" / 22.22	3/4" / 19.05	7/8" / 22.22	1 1/8" / 28.58	1 1/8" / 28.58
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	
	°C WB	-20 / 18	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 52	-10 / 50	-10 / 50	-10 / 50	-10 / 50
	Heating Min / Max	°C WB	-20 / 18	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

\*4 In case of on-coil temperature > +18 °C WB in heating mode, intermittent operation could happen

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)		Unit	20 HP [10+10]	22 HP [10+12]	24 HP [12+12]	26 HP [8+8+10]	28 HP [8+10+10]
Expansion valve pack PAW-P+...			145EEVPACK	145EEVPACK	156EEVPACK	156EEVPACK	156EEVPACK
Nominal cooling capacity *1		kW	56.0	61.5	67.0	72.8	78.4
Nominal heating capacity *2		kW	63.0	69.0	75.0	81.5	88.0
Minimum cooling capacity continuous *1		kW	15.9	15.9	23.3	23.3	23.3
Minimum heating capacity continuous *2		kW	18.0	18.0	26.3	26.3	26.3
Air volume flow	Min	m³/h	4,000	4,000	4,000	5,400	5,700
	Max	m³/h	20,000	20,000	20,000	24,000	26,000
AHU DX coil heat exchanger volume	Min	dm³	4.0	4.0	4.0	6.0	6.0
	Max	dm³	20.0	22.0	24.0	27.0	28.5
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. pipe length difference after first joint		m	10	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10	10
Piping connections EEV		mm	10	10	16	16	16
Pipe size branch pipe	Liquid pipe	Inch / mm	1/2" / 12.7	1/2" / 12.7	1/2" / 12.7	1/2" / 12.7	1/2" / 12.7
	Gas pipe	Inch / mm	1 1/8" / 28.58	1 1/8" / 28.58	1 1/8" / 28.58	1 1/8" / 28.58	1 1/8" / 28.58
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	
	°C WB	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 50	-10 / 50	-10 / 50	-10 / 50	-10 / 50
	Heating Min / Max	°C WB	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

\*4 In case of on coil temperature > +18°CWB in heating mode, intermittent operation could happen

3

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)		Unit	30 HP [10+10+10]	32 HP [10+10+12]	34 HP [10+12+12]	36 HP [12+12+12]	38 HP [8+10+10+10]
Expansion valve pack PAW-P+...			174EEVPACK	174EEVPACK	174EEVPACK	174EEVPACK	174EEVPACK
Nominal cooling capacity *1		kW	84.0	89.5	95.0	100.0	106.0
Nominal heating capacity *2		kW	94.5	100.0	106.0	112.0	119.0
Minimum cooling capacity continuous *1		kW	32.8	32.8	32.8	32.8	32.8
Minimum heating capacity continuous *2		kW	37.1	37.1	37.1	37.1	37.1
Air volume flow	Min	m³/h	6,000	6,000	6,000	6,000	7,700
	Max	m³/h	30,000	30,000	30,000	30,000	34,000
AHU DX coil heat exchanger volume	Min	dm³	6.0	6.0	6.0	6.0	8.0
	Max	dm³	30.0	32.0	34.0	36.0	38.0
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. pipe length difference after first joint		m	10	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10	10
Piping connections EEV		mm	7/8"	7/8"	7/8"	7/8"	7/8"
Pipe size branch pipe	Liquid pipe	Inch / mm	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88
	Gas pipe	Inch / mm	1 3/8" / 34.98	1 3/8" / 34.98	1 3/8" / 34.98	1 3/8" / 34.98	1 3/8" / 34.98
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
		°C WB	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 50	-10 / 50	-10 / 50	-10 / 50	-10 / 50
		°C WB	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

\*4 In case of on coil temperature > +18°CWB in heating mode, intermittent operation could happen

AHU kit model		PAW-P+100MAH4M					
Outdoor unit HP (type)		Unit	40 HP [10+10+10+10]	42 HP [10+10+10+12]	44 HP [10+10+12+12]	46 HP [10+12+12+12]	48 HP [12+12+12+12]
Expansion valve pack PAW-P+...			174EEVPACK	174EEVPACK	174EEVPACK	174EEVPACK	174EEVPACK
Nominal cooling capacity *1		kW	112.0	117.0	123.0	128.0	134.0
Nominal heating capacity *2		kW	126.0	132.0	138.0	144.0	150.0
Minimum cooling capacity continuous *1		kW	32.8	32.8	32.8	32.8	32.8
Minimum heating capacity continuous *2		kW	37.1	37.1	37.1	37.1	37.1
Air volume flow	Min	m³/h	8,000	8,000	8,000	8,000	8,000
	Max	m³/h	36,000	38,000	40,000	40,000	40,000
AHU DX coil heat exchanger volume	Min	dm³	8.0	8.0	8.0	8.0	8.0
	Max	dm³	40.0	42.0	44.0	46.0	48.0
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. pipe length difference after first joint		m	10	10	10	10	10
Max. elevation difference (IU/OU)		m	10	10	10	10	10
Piping connections EEV		mm	7/8"	7/8"	7/8"	7/8"	7/8"
Pipe size branch pipe	Liquid pipe	Inch / mm	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88	5/8" / 15.88
	Gas pipe	Inch / mm	1 3/8" / 34.98	1 3/8" / 34.98	1 3/8" / 34.98	1 3/8" / 34.98	1 3/8" / 34.98
On-coil temperature	Cooling Min / Max	°C DB	12 / 32	12 / 32	12 / 32	12 / 32	12 / 32
		°C WB	8 / 25	8 / 25	8 / 25	8 / 25	8 / 25
	Heating Min / Max	°C DB	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3	0 / 32 *3
		°C WB	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4
Outdoor temperature	Cooling Min / Max	°C DB	-10 / 50	-10 / 50	-10 / 50	-10 / 50	-10 / 50
		°C WB	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4	-25 / 24 *4

\*1 At rated conditions with 35 °C DB outdoor temperature and 27 °C DB / 19 °C WB on-coil temperature.

\*2 At rated conditions with 7 °C DB / 6 °C WB outdoor temperature and 20 °C DB on-coil temperature.

\*3 In case of on-coil temperature of 5 °C or below and of 31 °C and above air flow volume is subject to restrictions.

\*4 In case of on coil temperature > +18°CWB in heating mode, intermittent operation could happen

## 4 Overview and description of components

### 4.1 Required components

The required components for operating the Air Handling Unit Kit comprise the following:

- the AHU Kit itself with its scope of delivery, including temperature probes and pressure transducer
- an electronic expansion valve, which must be ordered separately and is to be selected according to the capacity requirements






**Note**

All mounting and fixing material and all tools necessary for installation shall be field-supplied.

#### 4.1.1 Scope of delivery

**Note:**

Please check the completeness of the components before assembly!

	<p><b>PAW-P+100MAH4M</b> Control unit for connecting VRF 2-way outdoor units and external heat exchangers</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Built-in controller with graphic terminal included</li> </ul>
	<p><b>Temperature Probes (four pieces)</b> NTC-probe cable length: 3 m; IP68</p> <ul style="list-style-type: none"> <li>• Thermistor for liquid pipe (E1)</li> <li>• Thermistor for gas pipe (E3)</li> <li>• Thermistor for discharge air (BL)</li> <li>• Thermistor for suction air (TA)</li> </ul>
	<p><b>Ratiometric pressure transducer</b> 2 m cable included; IP67 connector for the pressure transducer</p>

### 4.1.2 Mandatory accessories (Expansion valve)



- PAW-P+116EEVPACK (UNIPOLAR stator, 2 m cable)
- PAW-P+133EEVPACK (UNIPOLAR stator, 2 m cable)
- PAW-P+145EEVPACK (UNIPOLAR stator, 1 m cable)
- PAW-P+156EEVPACK (UNIPOLAR stator, 2 m cable)
- PAW-P+174EEVPACK (UNIPOLAR stator, 2 m cable)

Valve pack, consisting of:

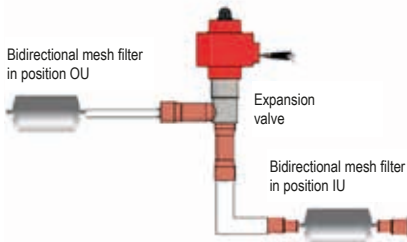
- 1 pc each of expansion valve body, stator and cable
- 2 pcs of mesh filter, whose installation is mandatory

**Notes:**

- One expansion valve pack per AHU Kit is required!
- The expansion valve must be selected according to the outdoor unit capacity requirements.

**Mandatory mesh filters**

- **Important:** It is **mandatory** to install a bidirectional mesh filter (strainer) on either side (upstream and downstream) of each expansion valve.
- Each expansion valve pack includes two suitable mesh filters.
- As spare parts, mesh filters must be selected according to the size of the expansion valve pack as specified in the following table.



Expansion valve kit	Mesh filter	
	Mesh filter in position OU*1	Mesh filter in position IU*1
PAW-P+116EEVPACK	CWB111092*2	CWB111092*2
PAW-P+133EEVPACK	CWB111067*2	CWB111067*2
PAW-P+145EEVPACK	CWB111067*2	CWB111067*2
PAW-P+156EEVPACK	14-15-06052*2	CWB111067*2
PAW-P+174EEVPACK	14-15-06052*2	371926*2

\*1 OU = Outdoor Unit, IU = Indoor Unit. For more information on mesh filters see → *Mesh filter position, p. 28* and → *Mesh filter specification, p. 63*.

\*2 Available from Panasonic as accessories; any equivalent alternative can also be used.

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### 4.2 Optional accessories



**PAW-P+100PGNEPACK**

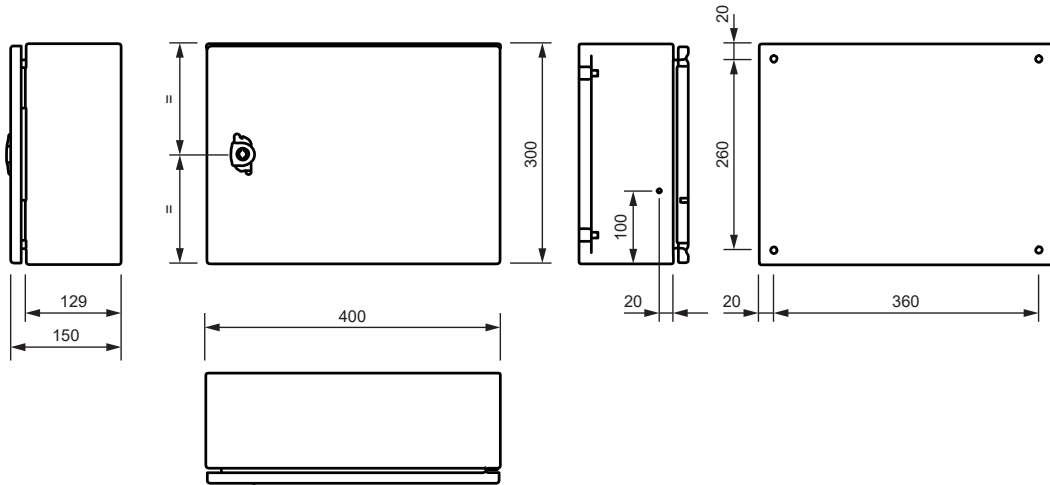
Remote control pack for service and maintenance personnel, consisting of 1 pc each of controller (132 x 64 mm), mounting panel and cable (length: 1.5 m, telephone connectors)



**PAW-P+102SENSPACK**

AHU connection kit sensor pack 1, consisting of 2 pcs of sensor (PT1000, HT, IP67, -50/250 °C) with 6 m cable length

### 4.3 Dimensions – AHU Kit



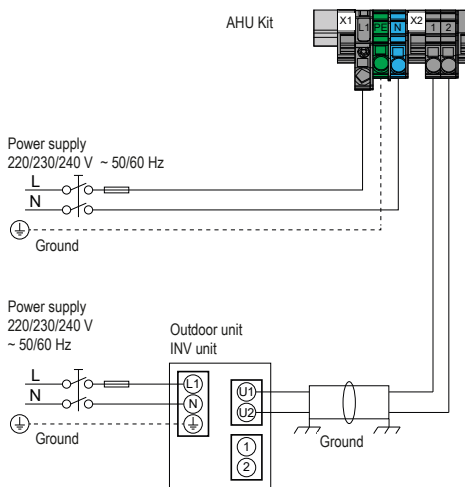
### 4.4 Technical specification – AHU Kit

PAW-P+100MAH4M technical data	Unit	Value
Power source	V / ph / Hz	220 ... 240 / 1 / 50
Rated current consumption	A	0,1
Rated power consumption (max.)	W	15
Dimensions (enclosure, W x H x D)	mm	400 x 300 x 150
Net weight (without valves)	kg	12.8
Ambient temperature (max.)	°C	45
Protection class	–	IP65

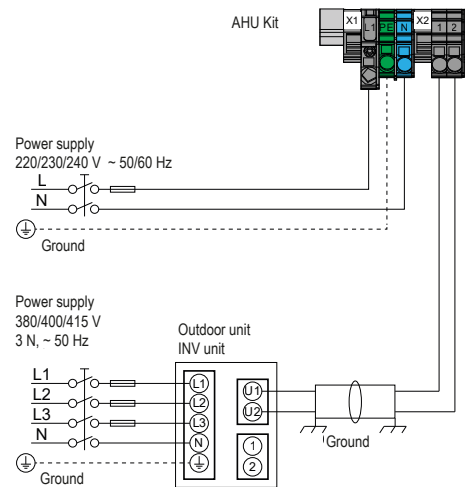
### 4.5 Power supply and connection cable between outdoor unit and AHU Kit

VRF 2-way outdoor unit (ECOi ME2 / MZ1, Mini ECOi LE1 / LE2 / LZ2)

#### 1-phase outdoor unit



#### 3-phase outdoor unit



Outdoor unit	For information on the circuit breaker, power supply cable and other details, refer to the installation instructions of the relevant outdoor unit		
AHU Kit	Circuit breaker	Power supply cable	Inter-unit control wiring (between outdoor and indoor units)
	10 A *1	0.75 mm <sup>2</sup> **2 (min.)	0.75 mm <sup>2</sup> *3 / max. 1000 m or 2.0 mm <sup>2</sup> *3 / max. 2000 m
*1 Circuit breaker must be incorporated in the fixed wiring in accordance with the wiring regulations. *2 Use a shielded cable for the control cable. Overall extension less than 1000 m. *3 Use shielded wiring.			

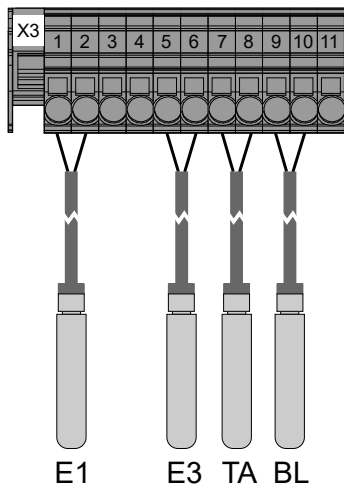
**Note:**

In case of a potential difference between outdoor unit housing and AHU kit housing, please connect the shield wire only to one side, not to both sides.

## 4.6 Temperature probes (wiring connection)

The enclosed temperature sensors are NTC probes.

The probes must be connected to the terminals provided in terminal block X3 as shown below.



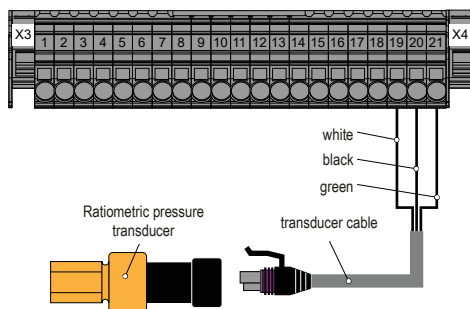
	Name	Block	Terminal
E1	Thermistor for liquid pipe	X3	1 – 2
E3	Thermistor for gas pipe	X3	5 – 6
TA	Thermistor for suction air	X3	7 – 8
BL	Thermistor for discharge air	X3	9 – 10

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## 4.7 Ratiometric pressure transducer

The ratiometric pressure transducer has a pressure sensing range of 0 to 45 bar.

The transducer must be connected to the terminals provided in terminal block X3 as shown below.



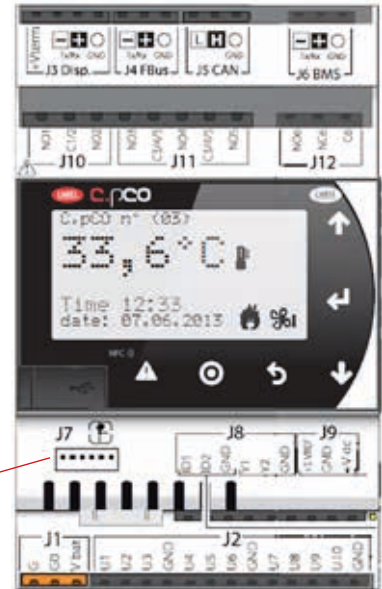
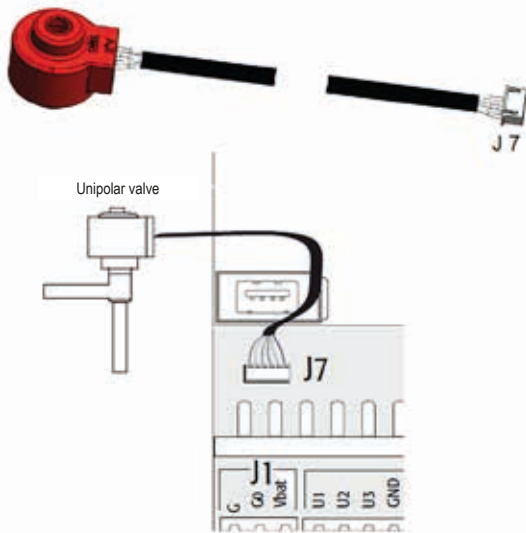
	Name	Block	Terminal
1	Pressure sensor – white	X3	19
2	Pressure sensor – black	X3	20
3	Pressure sensor – green	X3	21

## 4.8 Accessory Expansion valve (wiring connection)

The coil of the expansion valve is to be connected directly to the controller.

To make the connection, plug the cable connector of the expansion valve into slot J7 on the built-in controller as shown below.

Expansion valve pack	R410A		R32		UNIPOLAR stator
	HP range	Nominal cooling capacity	HP range	Nominal cooling capacity	
PAW-P+116EEVPACK	4 – 6 HP	16.0 kW	4 – 8 HP	22.4 kW	2 m cable
PAW-P+133EEVPACK	8 – 12 HP	33.5 kW	10 – 12 HP	33.5 kW	2 m cable
PAW-P+145EEVPACK	14 – 18 HP	50.0 kW	16 – 22 HP	61.5 kW	1 m cable
PAW-P+156EEVPACK	20 – 22 HP	61.5 kW	24 – 28 HP	78.4 kW	2 m cable
PAW-P+174EEVPACK	24 – 34 HP	96.0 kW	30 – 48 HP	134.0 kW	2 m cable



Expansion valve connector location

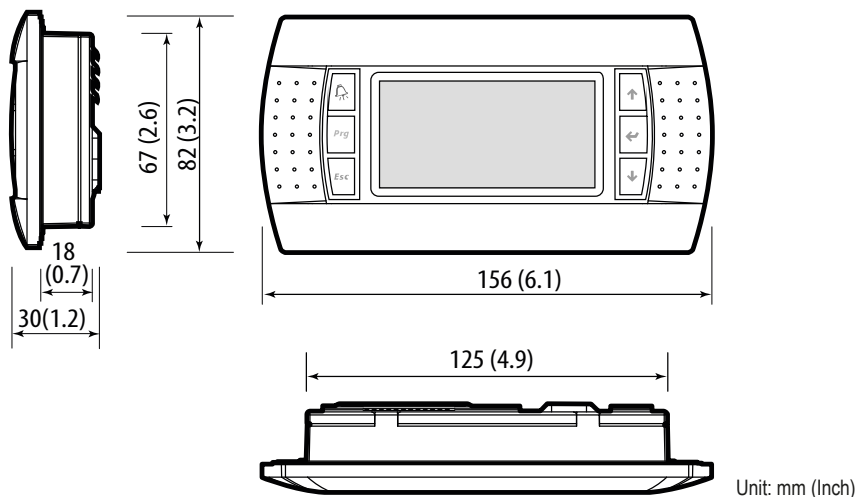
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### 4.9 Accessory Remote controller PAW-P+100PGNEPACK

The optional remote control panel PAW-P+100PGNEPACK offers the same scope of functionality as the integrated control panel, with slightly different features and design.

For a full comparison of both control panels, see → *Comparison of the control panel features, p. 36.*

#### Dimensions



Unit: mm (Inch)

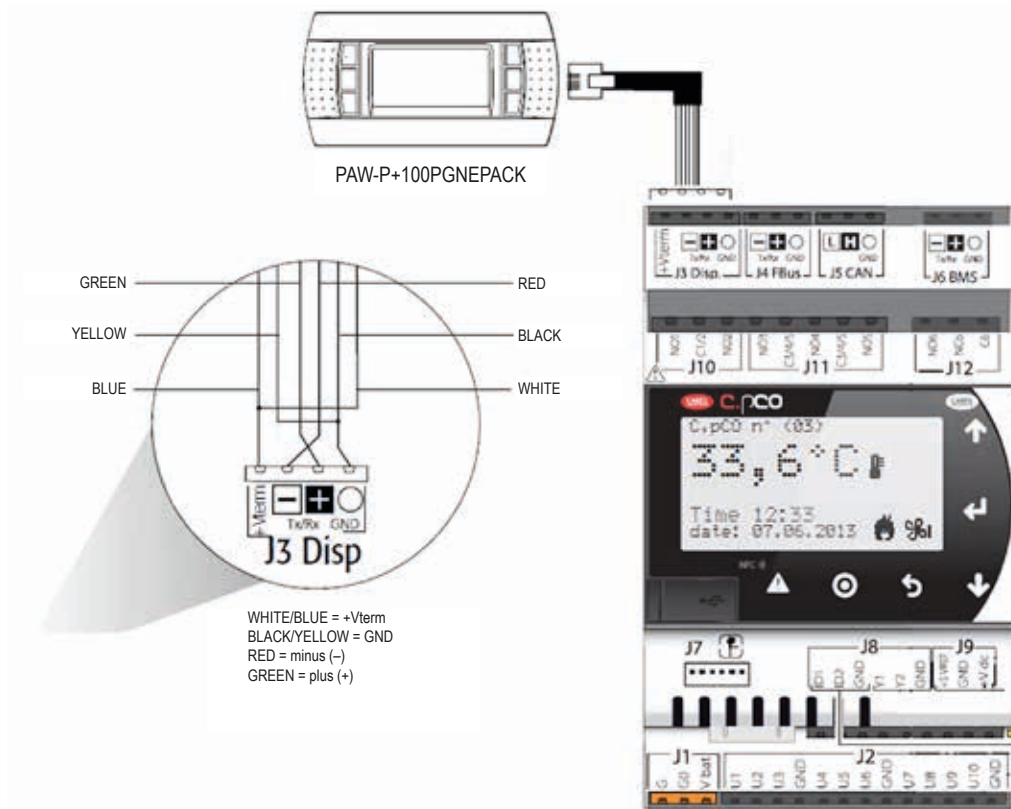
#### Wiring

The cable supplied within the scope of delivery is to be connected as shown in the figure.

The maximum distance allowed between controller and terminal is 10 m.

**Note:**

For connection cable lengths of more than 10 m, a shielded cable is to be used. Field supplied.

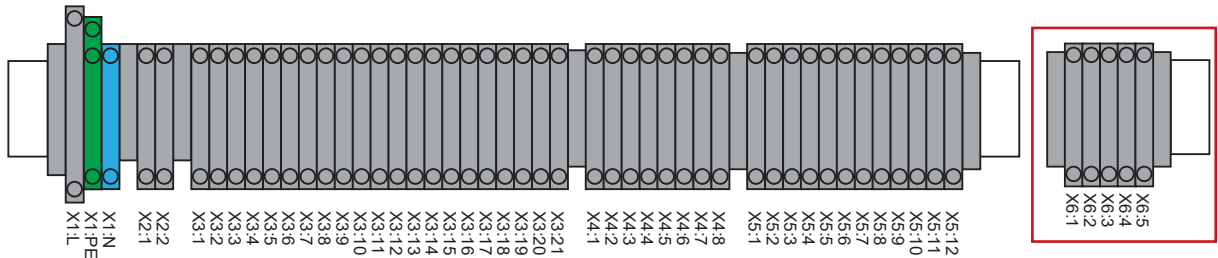


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# 5 Terminal board

## 5.1 Schematic view

Terminal block X6 (shown in the red frame) is located in the upper area of the wiring box.



## 5.2 Tabular list of terminals

Terminal No.	Allocation	Function	Description
<b>Terminal block X1</b>			
-X1 : L1	Live	Live Terminal	External Potential: 230 V AC, max. 10 A
-X1 : PE	Protective earth	Protective Earth Conductor	
-X1 : N	Neutral	Neutral Terminal	
<b>Terminal block X2</b>			
-X2 : 1	No polarity	Communication bus wiring S-Link	Required for communication with outdoor unit and centralised controller
-X2 : 2			
<b>Terminal block X3</b>			
-X3 : 1	No polarity	Sensor E1 / input	E1 – Refrigerant Liquid Temperature probe; GND / U1 (Default NTC)
-X3 : 2			
-X3 : 3	Higher Potential	Inlet / outlet Fan alarm [DI] FE2	Combined fan error input; Supply air / Exhaust air; GND / U2 Pulsed signal 24 V DC
-X3 : 4			
-X3 : 5	No polarity	Sensor E3 / input	E3 – Refrigerant Gas Temperature probe; GND / U3 (Default NTC)
-X3 : 6			
-X3 : 7	No polarity	Air Suction Temperature Sensor TA / input	Air temperature sensor; TA – Air Inlet (on-coil air temperature); GND / U4 (Default NTC)
-X3 : 8			
-X3 : 9	No polarity	Discharge Temperature Sensor BL / input	Air temperature sensor; BL – Air Outlet (off-coil air temperature); GND / U5 (Default NTC)
-X3 : 10			
-X3 : 11	Higher Potential	BMS control 0 – 10 V	0 – 10 V Setpoint value input; External control; GND / U6; Note: with potential
-X3 : 12			
-X3 : 13	Higher Potential	Operation Request (ON / OFF)	Operation (On / Off); External control; GND / U7 Pulsed signal 24 V DC
-X3 : 14			
-X3 : 15	Higher Potential	Operation Mode Request C/H	Mode; Cooling / Heating; GND / U8 Pulsed signal 24 V DC
-X3 : 16			
-X3 : 17	Higher Potential	SG ready [Grid]	SG ready [Grid]; External control; GND / U9 Pulsed signal 24 V DC
-X3 : 18			
-X3 : 19	Ratiometric signal	Refrigerant Pressure Sensor	Refrigerant Pressure Sensor PS1; Refrigerant Gas; J9: GND / +5 VREF / J2: U10
-X3 : 20			
-X3 : 21			
<b>Terminal block X4</b>			
-X4 : 1	Lower Potential; 12 V DC, max. 5 mA	Air Filter differential switch monitor	Air Filter differential switch; Voltage-free contact digital inputs; GND / ID1
-X4 : 2	GND		
-X4 : 3	Lower Potential; 12 V DC, max. 5 mA	Float switch condensate	Drain pan overflow; Float switch; GND / ID2
-X4 : 4	GND		
-X4 : 5	Lower Potential	Inlet Air temperature TA	On-coil 0 – 10 V temperature output for BMS (Room Temperature Sensor); GND / Y1
-X4 : 6	GND		
-X4 : 7	Lower Potential	Room supply air temperature BL	Off-coil 0 – 10 V temperature output for BMS (Supply air temperature); GND / Y2
-X4 : 8	GND		

Terminal No.	Allocation	Function	Description
<b>Terminal block X5</b>			
-X5 : 1	Group 1	Fan ON / OFF	Fan release; Generally 24 V AC or 110/230 V AC; C1/2 / NO1
-X5 : 2			
-X5 : 3	Group 1	Compressor On / OFF	Compressor operating signal; Generally 24 V AC or 110/230 V AC; C1/2 / NO2
-X5 : 4			
-X5 : 5	Group 2	Defrost signal	Defrost output signal; Generally 24 V AC or 110/230 V AC; C1/2/3 / NO3
-X5 : 6			
-X5 : 7	Group 2	Solenoid Valve SV1 (RAP valve)	RAP valve signal; Generally 24 V AC or 110/230 V AC; C3/4/5 / NO4
-X5 : 8			
-X5 : 9	Group 2	Future function for cascade control	Not used
-X5 : 10			
-X5 : 11	Group 3	Collective alarm	Common fault output; Generally 24 V AC or 110/230 V AC; C6 / NO6
-X5 : 12			
<b>Terminal block X6</b>			
-X6 : 1	-	BMS Port	ModBus Port
-X6 : 2	+		
-X6 : 3	GND		
-X6 : 4	0 V	Future function for cascade control	Not used
-X6 : 5	UB		

## 5.3 Input/Output Specifications

### Digital inputs

- Type: digital inputs with voltage-free contacts
- Number of digital inputs (DI): 2
- Maximum current output: 5 mA
- Maximum voltage with the contact open: 12 V DC
- Maximum connection cable length: less than 10 m

### Analogue outputs

- Type selectable from application program: 0 to 10 V DC continuous, PWM 0/10 V synchronous with power supply with phase-angle control, PWM 0/10 V frequency 100 Hz, PWM 0/10 V frequency 2 kHz
- Number of analogue outputs (Y): 2
- Maximum current output: 10 mA
- PWM output duty cycle selectable from application program: operating range 0 % – 10 %...90 % – 100 % (values in the range 1...9 % – 91...99 % are not managed).
- Precision of analogue outputs:  $\pm 3$  % of full scale
- Maximum connection cable length: less than 10 m

### Universal channels

- Analogue/digital conversion: 14-bit
- Type of input selectable from application program: NTC, PT1000, PT500, PT100, 4 to 20 mA, 0 to 1 V, 0 to 5 V, 0 to 10 V, 0 to 2 kHz (resolution  $\pm 1$  Hz) on/off or open collector digital input (Rpullup 2 kOhm)
- Type of output selectable from application program: PWM 0/3.3 V 100 Hz, PWM 0/3.3 V 2 kHz, 0 to 10 V analogue output; Maximum current output 2 mA
- Number of universal channels (U): 10
- Precision of analogue input reading:  $\pm 0.3$  % of full scale
- Analogue output precision:  $\pm 2$  % of full scale
- Maximum connection cable length: less than 10 m

## Digital outputs

	EN IEC 60730-1	UL 508
Group 1 (NO1, NO2) – J10 Group 2 (NO3, NO4, NO5) – J11	2(1)A (75,000 cycles)	5 A resistive, 250 V AC, 30,000 cycles; Definite purpose, 1 A FLA, 6 A LRA, 250 V AC, 30,000 cycles; Pilot duty C300, 250 V AC, 30,000 cycles
Group 3 (NO6) – J12	1(1)A (100,000 cycles), maximum switching voltage: 250 V AC	1 A resistive, 1 A FLA, 6 A LRA, 250 V AC, 30,000 cycles; Pilot duty D300, 250 V AC, 30,000 cycles.

NO2 output, NO5 output with SSR configuration: switching capacity 15 VA at 110/230 V AC or 15 VA at 24 V AC.

There is functional insulation between Group 1 and Group 2: if both are used, the same power source is mandatory.

The reinforced insulation of Group 3 from the other two groups means a different voltage source can be used. Connection cable length: less than 30 m.

## Unipolar valve output

- Number of valves: 1
- Maximum output for each valve: 8 W
- Type of control: unipolar
- Valve connector: 6-pin, fixed sequence
- Power supply: 13 V DC  $\pm 5\%$
- Maximum current: 0.35 A for each winding
- Minimum winding resistance: 40  $\Omega$
- Maximum length connection cable:
  - > Residential/industrial environment = 2 m without shielded cable.  
6 m using shielded cable connected to earth at both ends (E2VCABS3U0, E2VCABS6U0).
  - > Residential environment = 2 m without shielded cable.

5

## 5.4 Controller electrical and physical specifications

### Power supply

- Power supply to the product between G and G0: 24 V AC  $+10\%/-15\%$ , 50/60 Hz, 28 to 36 V DC  $\pm 10\%$
- Power supply to the product between G0 and Vbat: +18 V DC only for power supply from the Ultracap module \*1.  
**Note:** with Vdc power supply, forced closing of the ExV in the event of power failures is not managed.
- Maximum power consumption: – 30 VA /12 W (40 VA for power supply combined with Ultracap module \*1).
- Minimum duration of correctly functioning product connected to the Ultracap module \*1:
  - > 60 seconds without forced valve closure
  - > 40 seconds with forced valve closure
- Reinforced insulation between main power supply and control must be provided by the external power supply transformer with safety insulation (IEC61558-2-6), to be installed externally.
- Short-circuit protection: install external fuse T 2.5 A (IEC60127-1)

\*1 Ultracap module for future function upon request.

### Connectors

- Maximum connector voltage (NO1...C6): 250 V AC
- Minimum size of digital output wires: 1.5 mm<sup>2</sup>
- Minimum size of all other connector wires: 0.5 mm<sup>2</sup>

**IMPORTANT**

► Use a transformer with G0 earthed (compulsory) in the version with ETHERNET communication port. Power supply to the product must only be connected between G and G0. The Vbat terminal is only used for connection to the Ultracap module <sup>\*1</sup> as emergency power supply in the event of power failures.

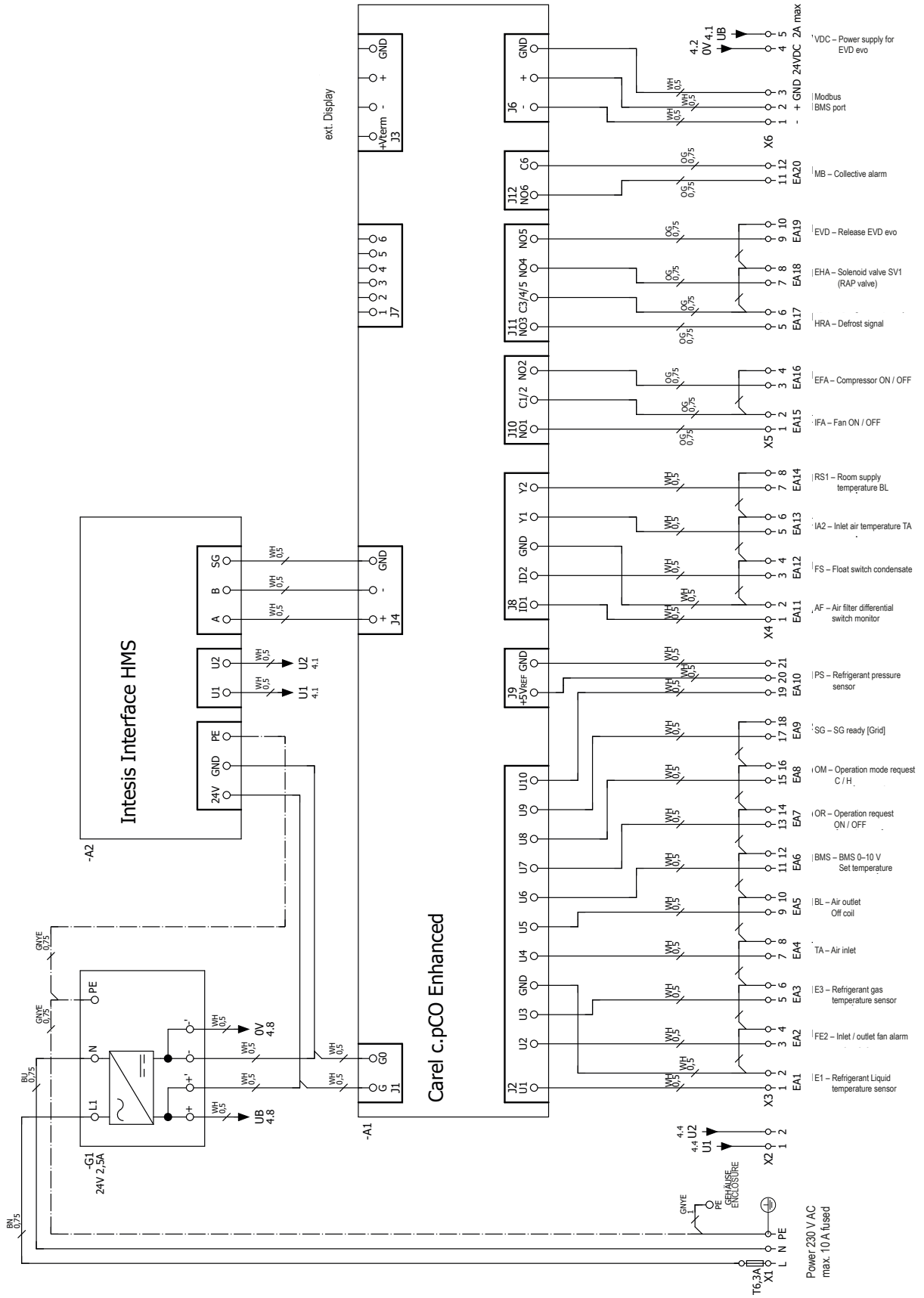
<sup>\*1</sup> Ultracap module for future function upon request.

**Power supplied by the product**

- Type: +Vdc for external probe, +5 Vref for external probe; +Vterm for terminals
- Rated voltage +Vdc: 12 V DC  $\pm 8\%$
- Max. current available +Vdc: 50 mA, protected against short-circuits
- Rated voltage +5Vref: 5 V DC  $\pm 3\%$
- Maximum current available (+5 Vref ): 50 mA, protected against short-circuits
- Rated voltage +Vterm: 24 to 36 V DC  $\pm 10\%$  according to product power supply voltage
- Maximum current available 100 mA, suitable for powering the CAREL pGD1, pLDPRO and th-Tune terminals, protected against short-circuits
- Maximum connection cable length: less than 10 m

# 5.5 Wiring diagram

5



## 6 Installation

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### 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.
  - ▶ Use appropriate protective equipment and tools.
- 



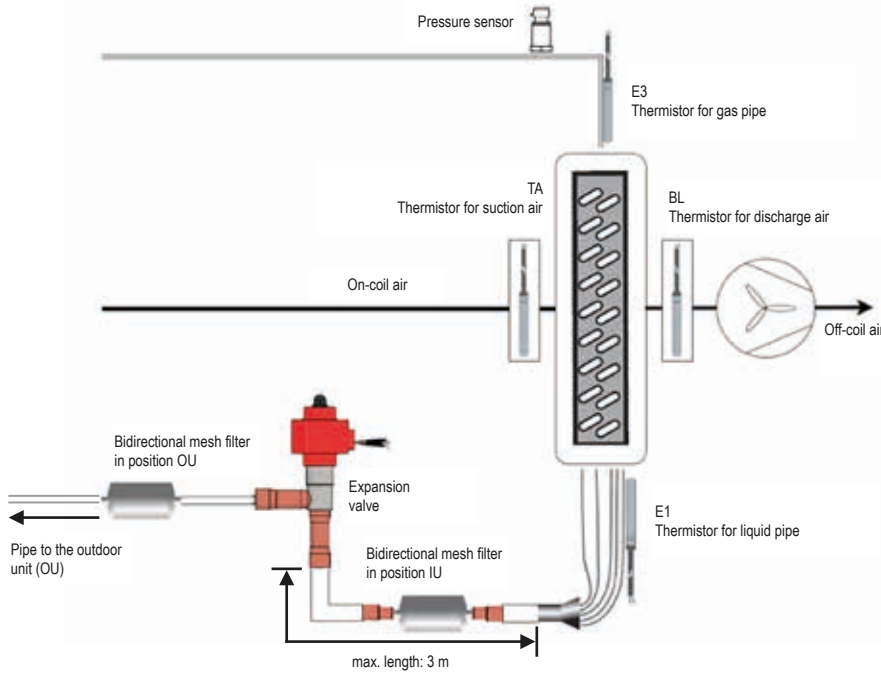
### CAUTION

#### Danger of physical harm resulting from direct contact with the refrigerant or refrigerant pipes and from refrigerant gas leakages

Direct contact of the skin with the refrigerant or refrigerant pipes can lead to burns or frostbite injuries. Refrigerant gas leaks can lead to the formation of harmfully high gas concentrations and of poisonous gases if in contact with fire or hot surfaces.

- ▶ Work on the refrigeration circuit and in connection with the refrigerant must only be carried out by a suitably qualified and trained technician or an authorised trader holding a refrigerant handling certificate.
  - ▶ Use appropriate protective equipment to prevent direct contact of the skin with the refrigerant and refrigerant pipes.
  - ▶ Use only best practice working procedures to prevent refrigerant gas leaks. Check and confirm the tightness of the refrigerant circuit.
  - ▶ Use appropriate protective equipment and tools.
-

## 6.1 Installation diagram of supplied components for the refrigerant circuit and of the mesh filter positions



### IMPORTANT

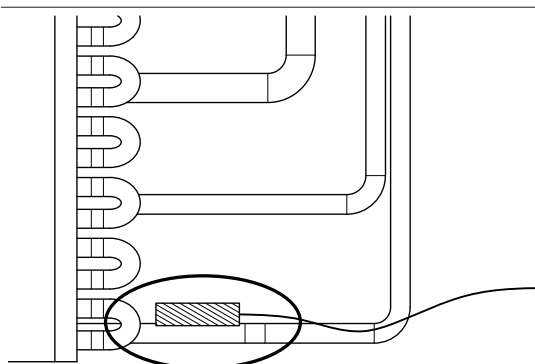
It is **mandatory** to install a bidirectional mesh filter (strainer) on either side (upstream and downstream) of each expansion valve.

For more information on the correct size, type and position of mesh filter for the relevant system, see → *Mandatory mesh filters*, p. 17 and → *Mesh filter specification*, p. 63.

6

## 6.2 Mounting refrigerant probes E1 & E3

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

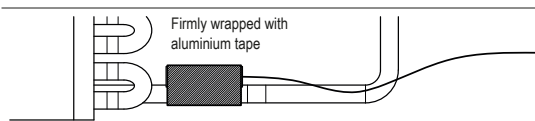


1. Attach the liquid pipe thermistor to the liquid pipe located in the lowest position downstream of the distributor in the heat exchanger.

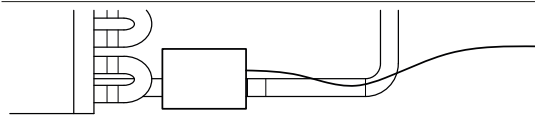
### Note

Make sure that the following conditions are met:

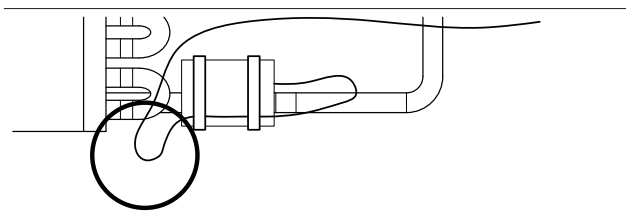
- Tight fit
- Complete contact of the sensor with the capillary tube
- Insulation against ambient air conditions



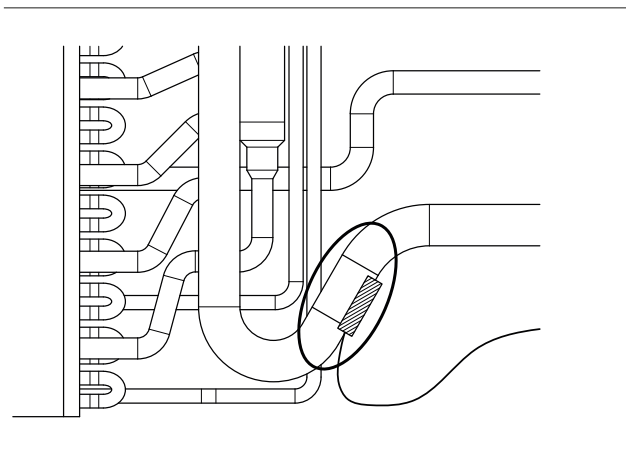
2. To prevent heat transfer, cover the thermistor and pipe with aluminum tape.

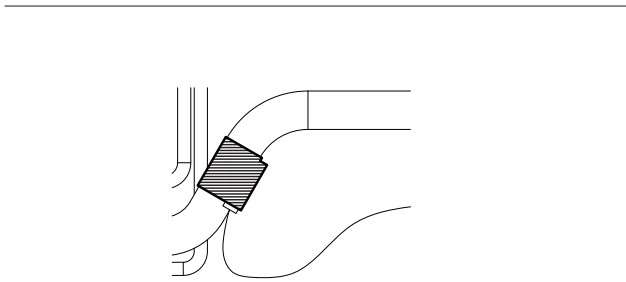


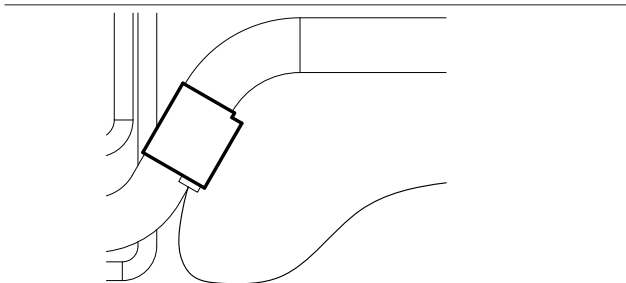
3. Cover the aluminum tape with thermal insulation.

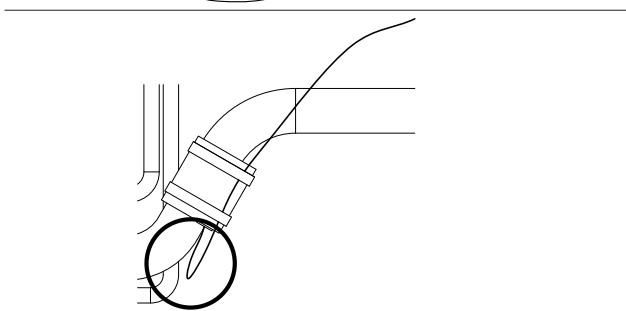
	<ol style="list-style-type: none"> <li>4. Fix thermal insulation and wiring with two bands.</li> <li>5. Then, run the wire downwards in a loop, to avoid putting tension to it and prevent ingress of moisture due to condensate.</li> </ol>
---	--

Mount the “E3” thermistor to the gas pipe (after joint pipes) of the AHU heat exchanger according to the following instructions.

	<ol style="list-style-type: none"> <li>1. Attach the gas pipe thermistor to the gas pipe located behind the joint pipes position downstream of the heat exchanger (cooling mode view).</li> </ol> <p><b>Note:</b> Make sure that the following conditions are met:</p> <ul style="list-style-type: none"> <li>• Tight fit</li> <li>• Complete contact of the sensor with the capillary tube</li> <li>• Insulation against ambient air conditions</li> </ul> <ol style="list-style-type: none"> <li>2. Run the wire downwards in a loop, to avoid putting tension to it.</li> </ol>
---	--

	<ol style="list-style-type: none"> <li>3. Cover the thermistor and pipe with aluminum tape.</li> </ol>
--	--

	<ol style="list-style-type: none"> <li>4. Cover the aluminum tape with thermal insulation.</li> </ol>
---	---

	<ol style="list-style-type: none"> <li>5. Fix thermal insulation and wiring with two bands.</li> <li>6. Then, run the wire downwards in a loop, to avoid putting tension to it.</li> </ol>
---	--

6

### 6.3 Mounting air temperature probes TA & BL

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

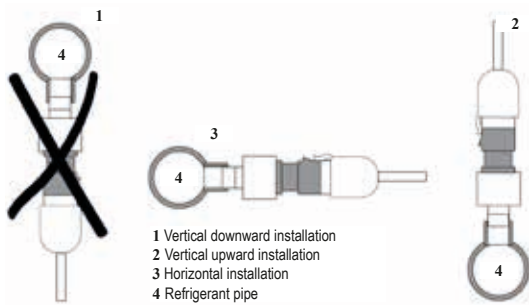
1. Attach the suction air thermistor (TA) to the representative position where suction air temperature can be measured.
2. Attach the discharge air thermistor (BL), also called “off-coil” temperature sensor, to the representative position where the blow out temperature can be measured.

**Note:**

When selecting the installation location, ensure that the air temperature can be measured correctly.

### 6.4 Mounting the pressure sensor

Mount the pressure sensor according to the following instructions.



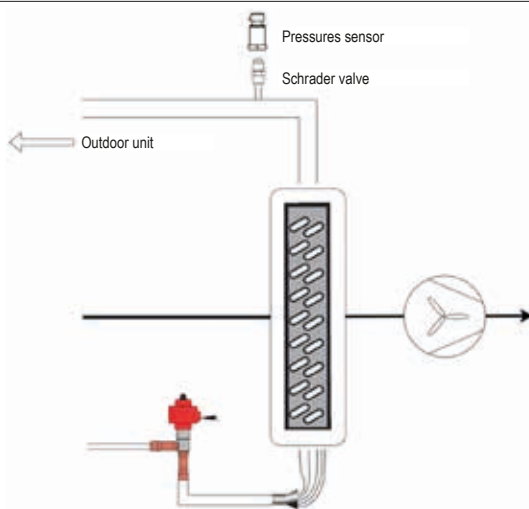
**Recommendations on mounting position**

The sensor works correctly whenever it is directly in contact with fluid refrigerant and independent of the installation angle. However, we suggest to install it in horizontal position, for the following reasons:

- **Vertical downward installation (1):**  
Possible traces of mechanical pipe processing (e.g. burrs and chips) may have remained inside the refrigerant circuit and can cause the obstruction of the sintered filter, which transfers the refrigerant pressure load on the detecting bulb to the sensor.
- **Vertical upward installation (2):**  
Possible condensation permanently occurring on some applications (evaporators for chillers, cabinet) can create a water logging inside the electrical connector (causing problems of isolation).  
If these conditions are present only sometimes, this problem does not exist.
- **Horizontal installation (3):**  
**We therefore recommend the installation in the horizontal position as the best choice.**

**Note:**

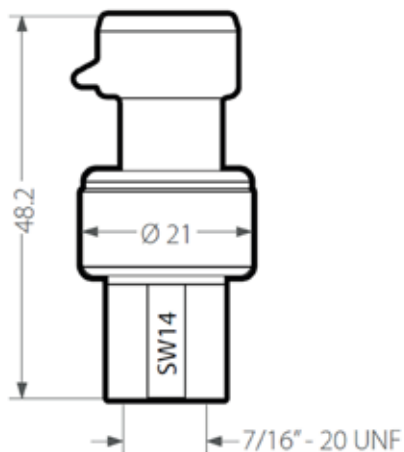
**Do not use sealing glue or copper gasket for mechanical connection!**



1. Considering the → *Recommendations on mounting position* above, select the best possible mounting position for the pressure sensor on the gas pipe (downstream of the joint pipes) of the AHU heat exchanger. The sensor can be directly installed on the refrigerant pipe.
2. Mount a Schrader valve with male Packard-type connector by brazing it on the gas pipe in the selected position.
3. Screw the pressure sensor on to the Schrader valve.

6

## Dimensions – Pressure sensor

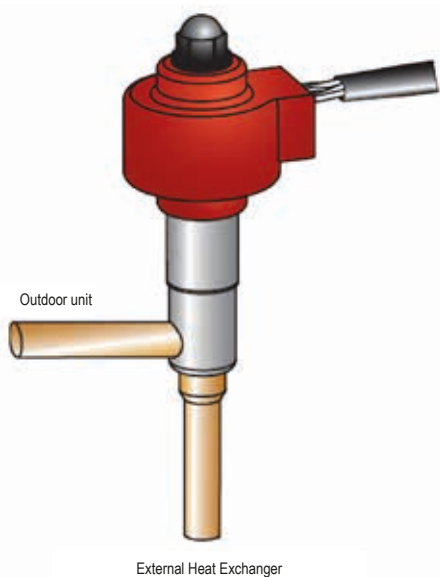


Unit: mm; unless explicitly stated otherwise

## 6.5 Mounting the expansion valve

### 6.5.1 Brazing and handling the valve

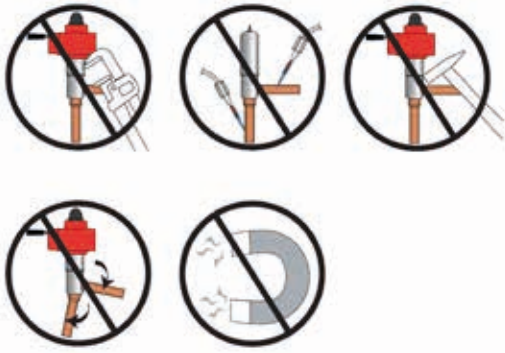
Mount the expansion valve according to the following instructions.



#### Preliminary considerations

- The valve has two-way operation, with liquid inlet (in cooling mode) preferably from the side connection.
- Always install a mechanical filter before the refrigerant inlet. For installation, follow the layout illustrated in figures **A** to **B** below.
- The recommended position of the valve is the same as for a traditional thermostat, upstream of the evaporator and the distributor, if installed.
- The sensors (supplied with the AHU Kit) must be positioned as shown above (see sections → 5.2 and 5.3): upstream of any devices that affect the pressure (e.g. valves) and/or temperature (e.g. heat exchangers).

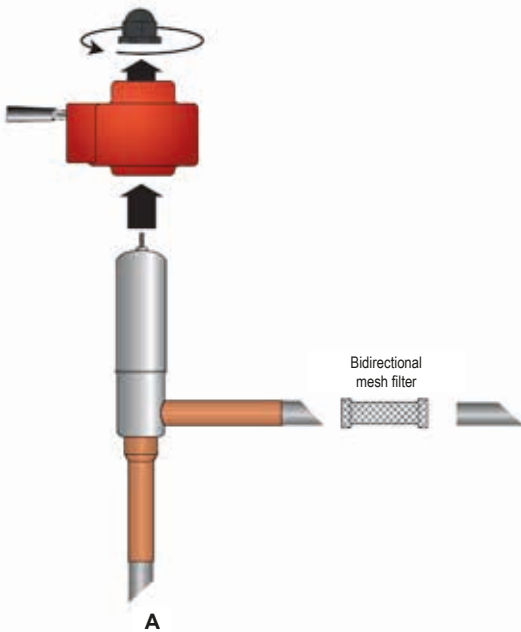
6



The valve must be connected to the circuit by brazing the connections to the condenser outlet (IN) and evaporator inlet (OUT) pipes.

Follow the sequence (A – B – C) illustrated below, and make sure to avoid the following:

- Do not twist or deform the valve or connecting pipes
- Do not strike the valve with hammers or other objects.
- Do not use pliers or other tools that could deform the external structure or damage inside parts.
- Never direct the flame towards the valve.
- Do not place the valve close to magnets or magnetic fields.



1. **For mesh filters in position OU of PAW-P+156EEVPACK and PAW-P+174EEVPACK only:**

Remove the stator (if already present in the valve) and insert the bidirectional metal mesh filter (see figure A).

**For mesh filters in both positions of all other EEV packs:**

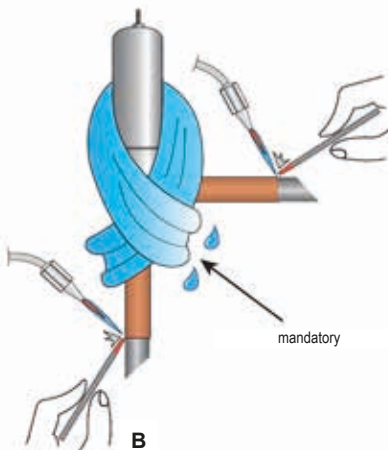
Install the hermetic mesh filters within the piping.

**Note:**

Any particles of dirt present may cause the valve to malfunction!

- Do not install or use the EEV in the event of deformation or damage to the external structure or heavy impact for example due to a fall or damage to the electrical parts (stator, connectors etc.)

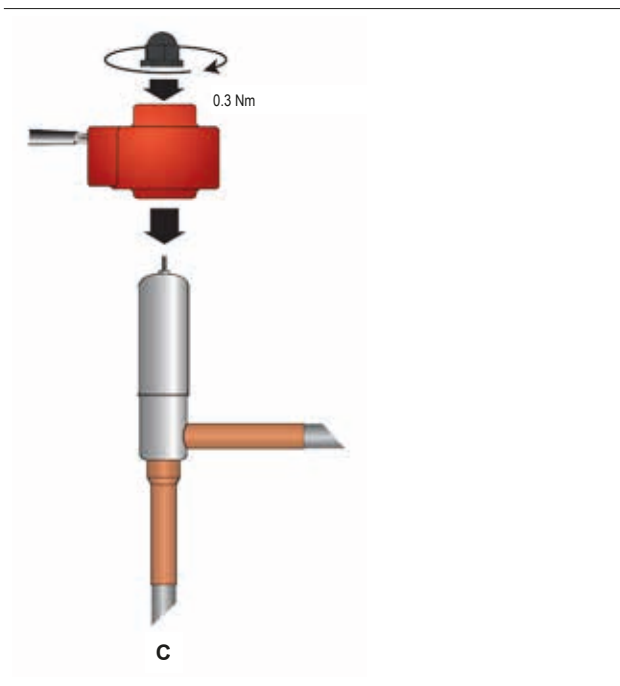
Operation of the valve cannot be guaranteed in the event of deformation of the external structure or damage to the electrical parts.



2. While brazing, direct the flame towards the ends of the fittings, as shown in figure B, blowing inert gas (e.g. nitrogen) in the outward direction with respect to the valve body and wrapping a wet rag around the valve body throughout the brazing process.

It is recommended to use a phosphorus-based alloy, e.g. CuP 281 (ISO17672).

The valve body temperature must never exceed 110 °C.



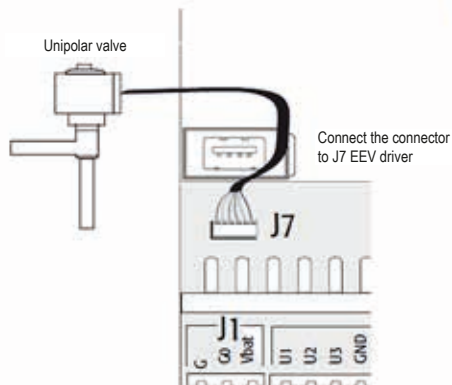
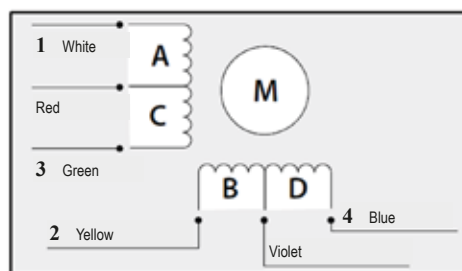
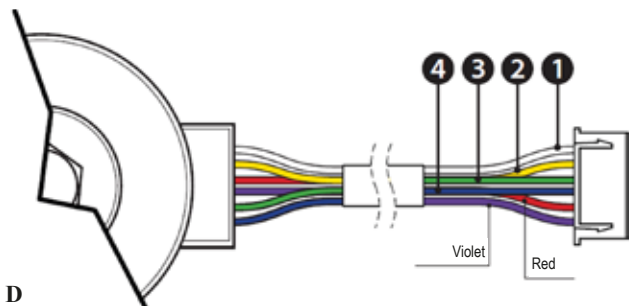
**Note:**

The expansion valves are supplied in fully open position. If the valve is operated before brazing in the circuit, it is necessary to bring it back to the fully open condition to prevent that the high temperatures damage the internal components.

3. Insert the motor into the cartridge as far as it will go, following the instructions shown in figure C.

### 6.5.2 Connecting the expansion valve coil to the valve driver

Connect the coil to the expansion valve driver, according to the instructions shown in figures D and E below.

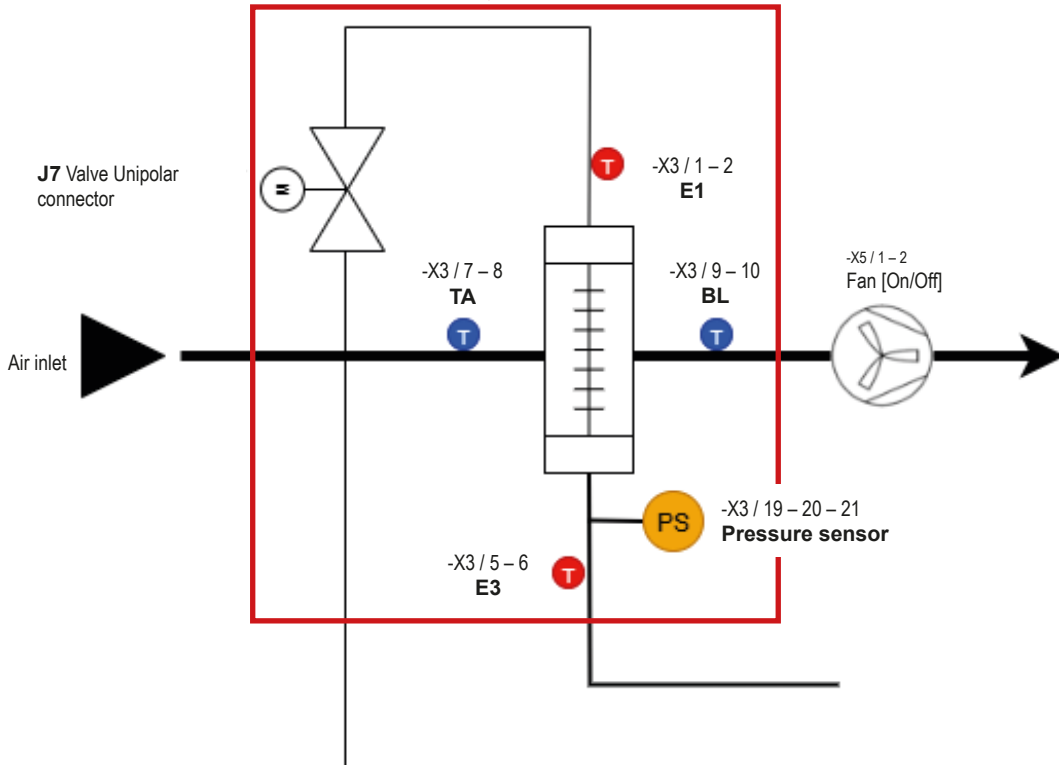
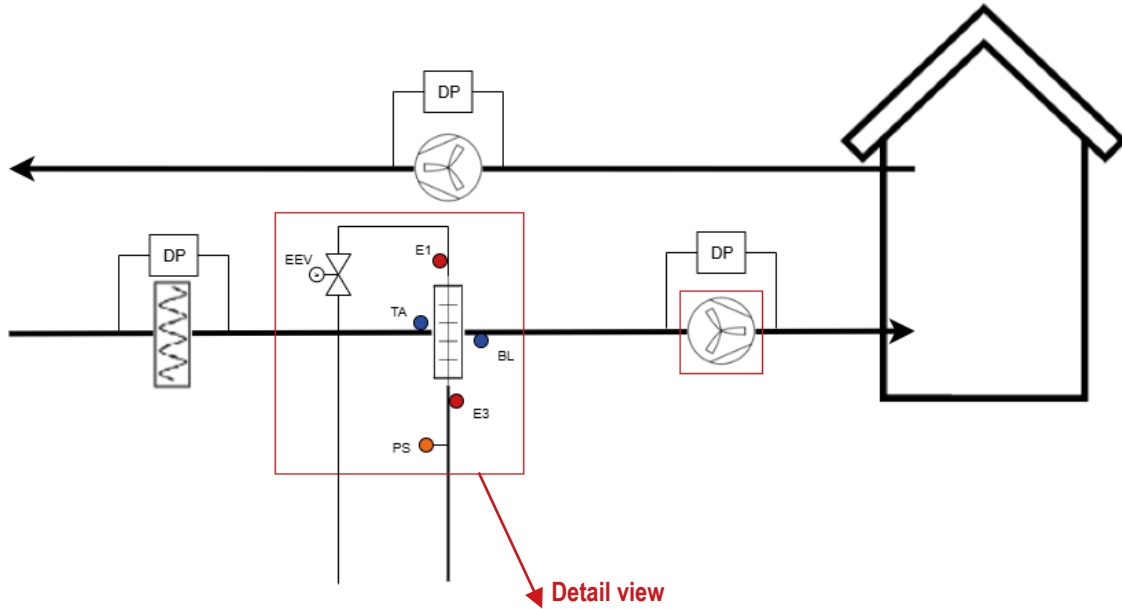


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### 6.5.3 Mandatory components to be connected

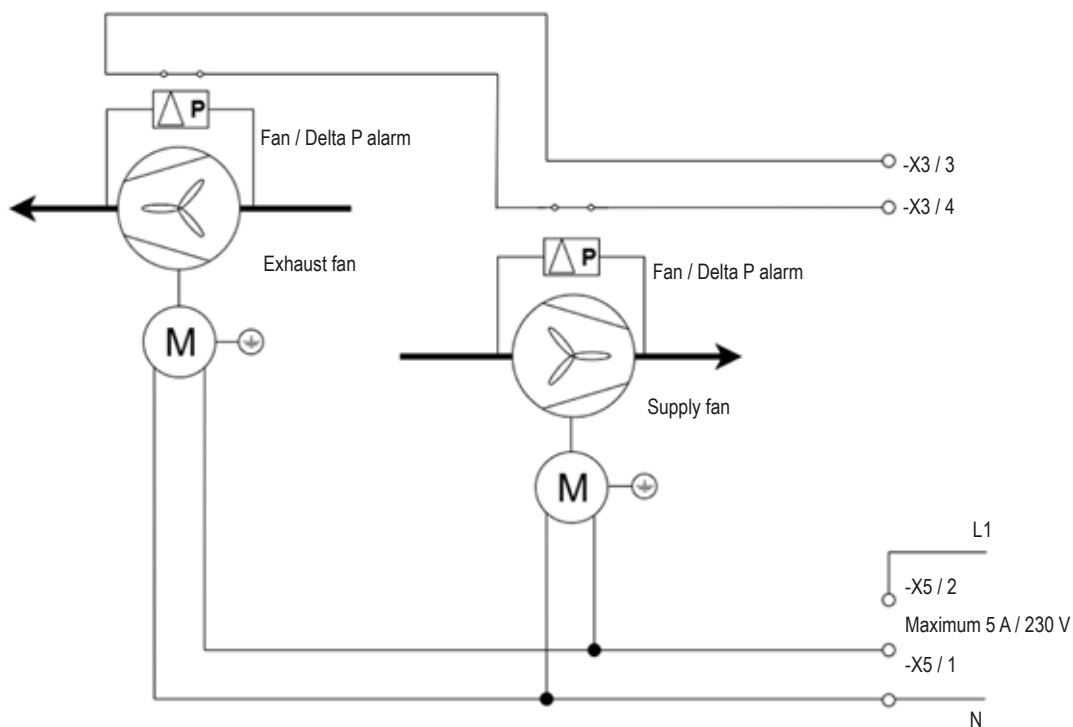
The following components must be connected and controlled:

- Expansion valve: EEV (within scope of delivery)
- Refrigerant sensor: E1 & E3 (within scope of delivery)
- Air temperature sensor: TA & BL (within scope of delivery)
- Refrigerant pressure sensor: PS (within scope of delivery)
- Supply air fan (field-supplied)

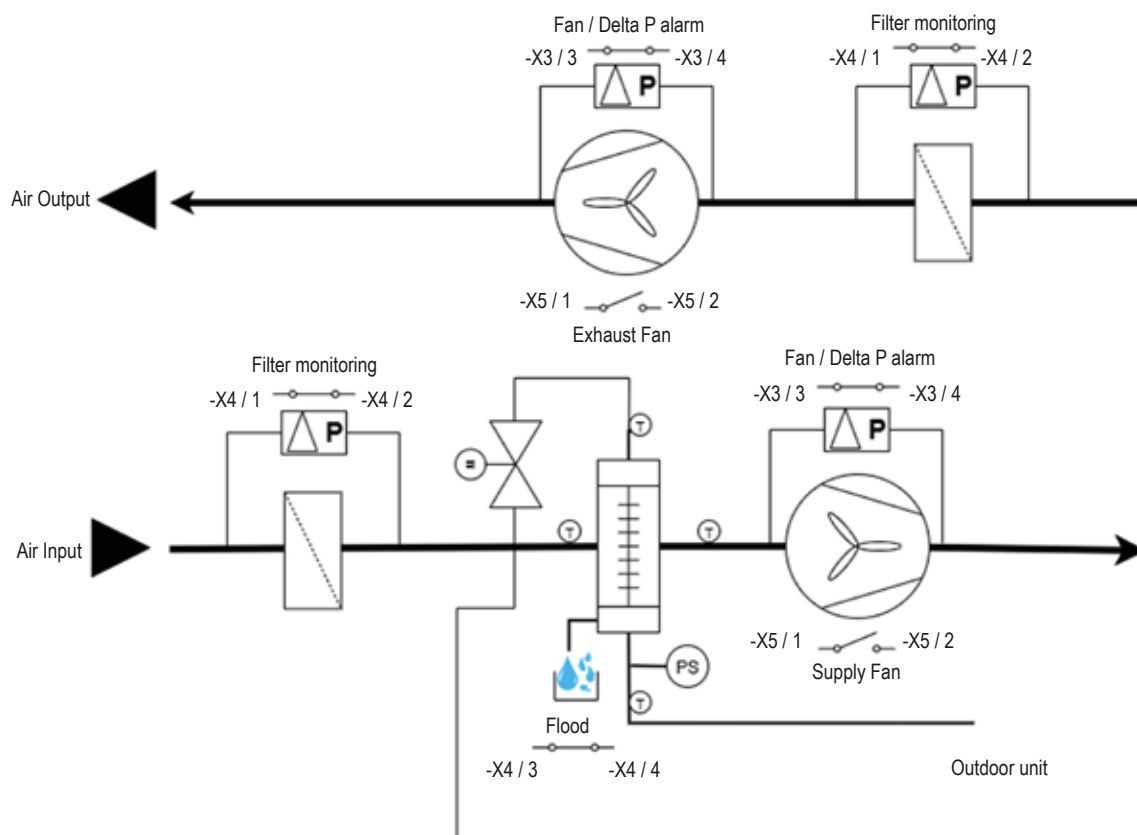


### 6.5.4 System example

#### Pressure differential switch and Fan control for supply and exhaust air



#### Overview of complete ventilation system



6

# 7 User Interface


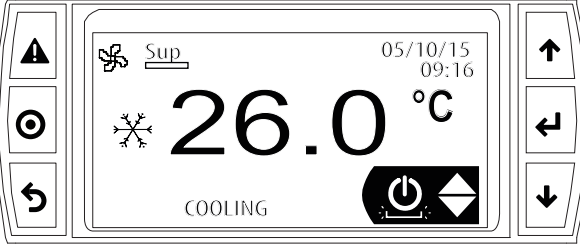
This chapter provides a brief overview of the graphic terminal, display and keypad items and general controller functionality.

## Graphic terminals

The AHU Kit's factory-mounted controller has an integrated graphic control panel which provides the complete scope of control functionality for configuring and programming the unit.

The remote control panel PAW-P+100PGNEPACK can be obtained as optional accessory. It provides exactly the same scope of control functionality and can be installed and used in parallel to the integrated control panel for more convenience.

### Comparison of the control panel features

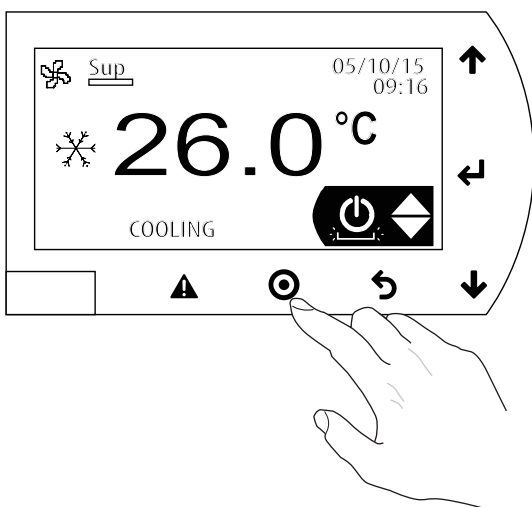
Integrated control panel	Optional remote control panel PAW-P+100PGNEPACK
	 <p data-bbox="858 999 1091 1021">Note: Images are not to scale</p>
<p><b>Features</b></p> <ul style="list-style-type: none"> <li>• provides the complete scope of control functionality for configuring and programming the unit</li> <li>• has a small black-and-white display</li> <li>• has a keypad with six touch-control buttons, which are clearly labelled with easy-to-understand symbols</li> <li>• is factory-mounted within the AHU Kit enclosure</li> </ul>	<ul style="list-style-type: none"> <li>• provides exactly the same scope of functionality, menu structure and control options</li> <li>• has a significantly larger colour display (132 x 64 pixel)</li> <li>• has a keypad with six push buttons, which are labelled with exactly the same symbols</li> <li>• is an optional accessory supplied loose including mounting panel and connecting cable:                         <ul style="list-style-type: none"> <li>&gt; can either be wall-mounted remotely and used permanently as an extra remote control</li> <li>&gt; or can just be connected temporarily by service personnel during their commissioning or maintenance work</li> </ul> </li> </ul>

### Notes

- While the remote control panel is connected to the controller (see → *Remote controller wiring, p. 20*), both control panels show exactly the same information on their displays and can be operated simultaneously and coequally (without one taking precedence over the other)
- As both control panels have the same functionality, menu structure, control options and button labelling, any description or procedure in chapter 6 and 7 applies to both control panels.

7

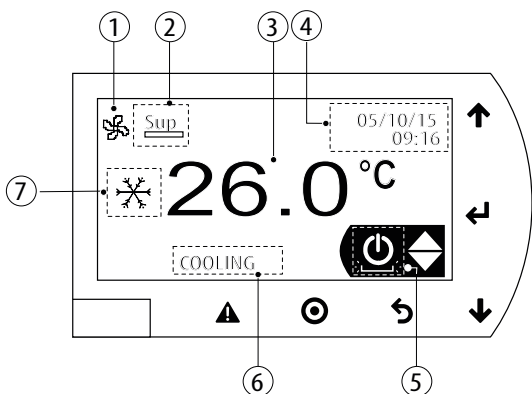
Keypad



Button	Description / Function
[ALARM]	<ul style="list-style-type: none"> <li>• Display active alarms/mute buzzer</li> <li>• Reset alarms with manual reset (pressed and held)</li> </ul>
[PRG]	<ul style="list-style-type: none"> <li>• Access the main menu</li> </ul>
[ESC]	<ul style="list-style-type: none"> <li>• Return to previous screen</li> </ul>
[UP]	<ul style="list-style-type: none"> <li>• Scroll rows of quick access menu</li> <li>• Scroll between screens</li> </ul>
[DOWN]	<ul style="list-style-type: none"> <li>• Increase / decrease value</li> </ul>
[ENTER]	<ul style="list-style-type: none"> <li>• Select row of quick access menu</li> <li>• Switch from parameter display to setting</li> <li>• Confirm value and move to next parameter</li> </ul>

Display

During normal operation, the display shows the current time and date, fan status, the control probe reading, the operating mode and the active time bands.



Key	Display
1	Fan status: ON  OFF
2	Supply fan (activation)
3	Control probe reading
4	Current time/date
5	Quick access menu button icon
6	Operating mode/unit status
7	Current operating mode: Heating  Cooling

Note

The control probe can be selected as the supply air probe (BL, default setting) or the return air probe (TA) or the room air probe \*1, once configured. To identify the current temperature control probe and the corresponding set point, see screen *Qc01* in the **A. Unit - a. Setpoints** submenu.

\*1 Not yet available: control function based on room air temperature will be implemented in the controller software in a future software update. Once available, the update can be performed on site (see → *Software installation*, p. 57).

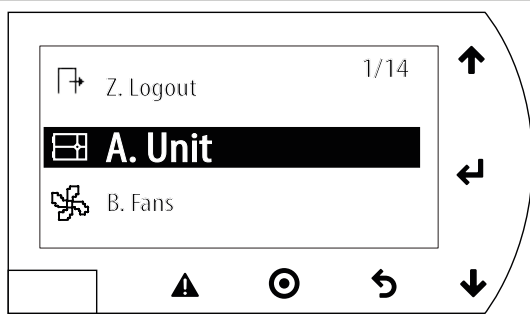
## Operating mode labels

The following table shows the meaning of the operating mode labels.

Operating mode	Description	Operating mode	Description
HEATING	Heating	OFFbyALR	Off due to alarm
COOLING	Cooling	OFFbyBMS	Off from BMS
MAN. SWIT. ON	Switch on *1	OFFbySCHED	Off from scheduler
MAN. WARM UP	Preheating *1	OFFbyDIN	Off from digital input
MAN. HEATING	Heating *1	OFFbyKEYB	Off from keypad
MAN. COOLING	Cooling *1	OFFbyFAN	Off due to fan alarm
DEFROST	Defrost	OFFbyCOND	Off due to condition (e.g. probe reading or particular status)
REG. PRB ERR	Control probe error	SWITCH ON	Switch on
SHUT DOWN	Switch off	WARM UP	Preheating
I/O TEST	Input/output test		

\*1 At least one device controlled in manual mode.

## Programming mode



The parameters can be modified using the front keypad. Access depends on the authorisation level:

- User level (password=00000)
- Service level (password=04711)

Press [PRG] to access the main menu.

## Setting the parameters

### Note

- The User and Service level passwords can be changed.

# 8 Commissioning by the installer





## 8.1 Overview of masks for the installer

**Note**

If masks are readable or even writeable depends on the user's authorisation level.






**A. Unit**

	a. Set points	→	<ul style="list-style-type: none"> <li>• Temperature set point in different operating modes: ECONOMY, PRE-COMFORT, COMFORT</li> <li>• Compensation by external temperature</li> </ul>
	b. Scheduler	→	<ul style="list-style-type: none"> <li>• Daily time bands, vacation periods, special days</li> </ul>
	c. Configuration	→	<ul style="list-style-type: none"> <li>• Temperature regulation: SUPPLY AIR, RETURN AIR or ROOM AIR)</li> <li>• Devices enabling, Start-up procedure, Unit operation mode, On/Off from BMS, SG-Ready, export/import configuration</li> </ul>
	d. Manual mode	→	<ul style="list-style-type: none"> <li>• Possibility to activate each device during normal operation at a certain percentage</li> </ul>



**B. Fans**

	a. Configuration	→	<ul style="list-style-type: none"> <li>• Fan type, Air flow switch</li> </ul>
	b. Supply	→	<ul style="list-style-type: none"> <li>• Modulating supply fan: Working hours remaining until alarm / until maintenance</li> </ul>
	c. Return	→	<p>Currently not supported. However, the return air fan can be controlled together with the supply air fan (see → <i>System example</i>, p. 35).</p>

Read:

- Thermostat status

Read/Write:

- Hysteresis, Thermostat settings, Float switch, Load level
- Configuration: Refrigerant and capacity setting
- Compressor: Working hours remaining until alarm / until maintenance



**D. Coils**





**G. Filters**

- Filters: Working hours remaining until alarm / until maintenance



**T. Alarms logger**

	a. View	→	<ul style="list-style-type: none"> <li>• Alarm messages: date, time, history</li> </ul>
	b. Export	→	<ul style="list-style-type: none"> <li>• Export of alarm message as csv file</li> <li>• Error parameter</li> </ul>



**U. Outdoor unit**

Read:

- Main unit compressor, Motor-operated valve (MOV) pulse, Compressor frequency, High pressure, Low pressure, Heat exchanger temperature, Unit on-time, Compressor workin ghours and starts





























**V. EEV**

Read:

- EEV (electronic expansion valve), Refrigerant, Probe values, Superheat in cooling and subcool in heating

Read/Write:

- Manual expansion valve positioning

		<b>W. In/Out</b>	
123		For each physical input/output value, the following can be displayed: <ul style="list-style-type: none"> <li>• Analogue input: current value, set the type of probe, calibration, minimum and maximum values</li> <li>• Digital input: current value, activation logic</li> <li>• Analogue output: value and type (for the settings see → <i>Initial setup</i>, p. 40)</li> </ul>	
		c. Config	<ul style="list-style-type: none"> <li>• Setting for analogue and digital input and output: Type, Minimum, Maximum, Offset / Value, Logic</li> </ul>
		d. Test	<ul style="list-style-type: none"> <li>• Enable I/O test</li> </ul>
		e. Map	<ul style="list-style-type: none"> <li>• I/O Map</li> </ul>
		<b>X. Setting</b>	
		a. Date/Time	<ul style="list-style-type: none"> <li>• Time and date (Time zone)</li> </ul>
		b. Language	<ul style="list-style-type: none"> <li>• Language: English, Italiano, Deutsch, Français, Español</li> </ul>
		c. Unit of measure	<ul style="list-style-type: none"> <li>• Unit of measure</li> </ul>
		d. Pwd change	<ul style="list-style-type: none"> <li>• Password change: User, Service</li> </ul>
		e. Initialization	<ul style="list-style-type: none"> <li>• Initialisation: Alarm initialisation</li> </ul>
		<b>Y. Connectivity</b>	
		a. Status	<ul style="list-style-type: none"> <li>• Line info</li> </ul>
		b. Configuration	<ul style="list-style-type: none"> <li>• Address setting IDU - ODU, Supervisor BMS, Serial port, Gateway</li> </ul>
		<b>Z. Logout</b>	
			<ul style="list-style-type: none"> <li>• Exit programming level and access with a different level (with password)</li> </ul>

8

## 8.2 Initial setup

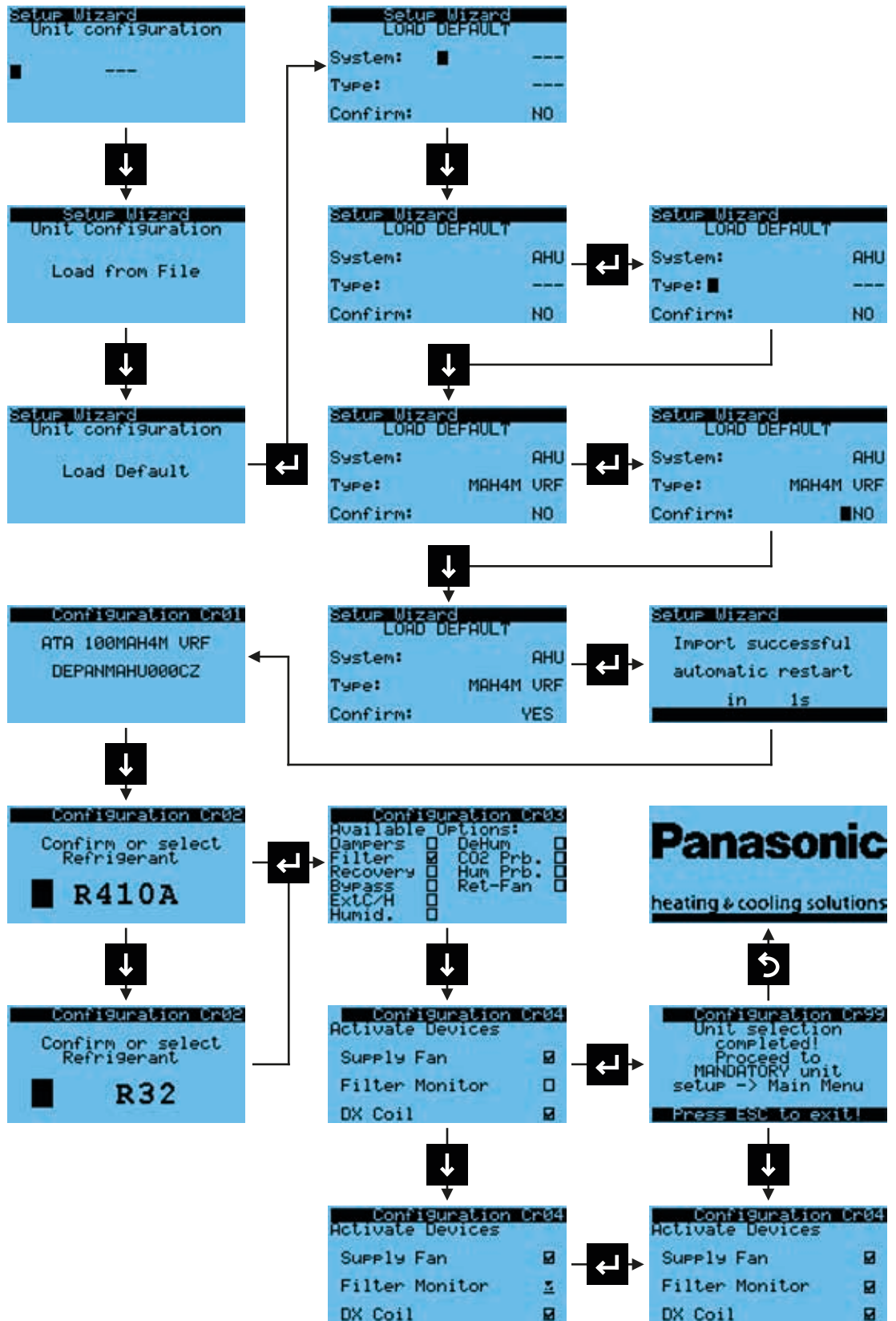
The settings for the initial setup must be made in five steps:

- Step 1: General settings
- Step 2: Addressing
- Step 3: Heat exchanger cooling capacity
- Step 4: Logout
- Step 5: Temperature regulation setting

If the client desires to use the system in heating mode, the mandatory outdoor unit parameter for heating mode operation (see → *Outdoor unit parameter (heating)*, p. 44) must be adjusted as the final step.

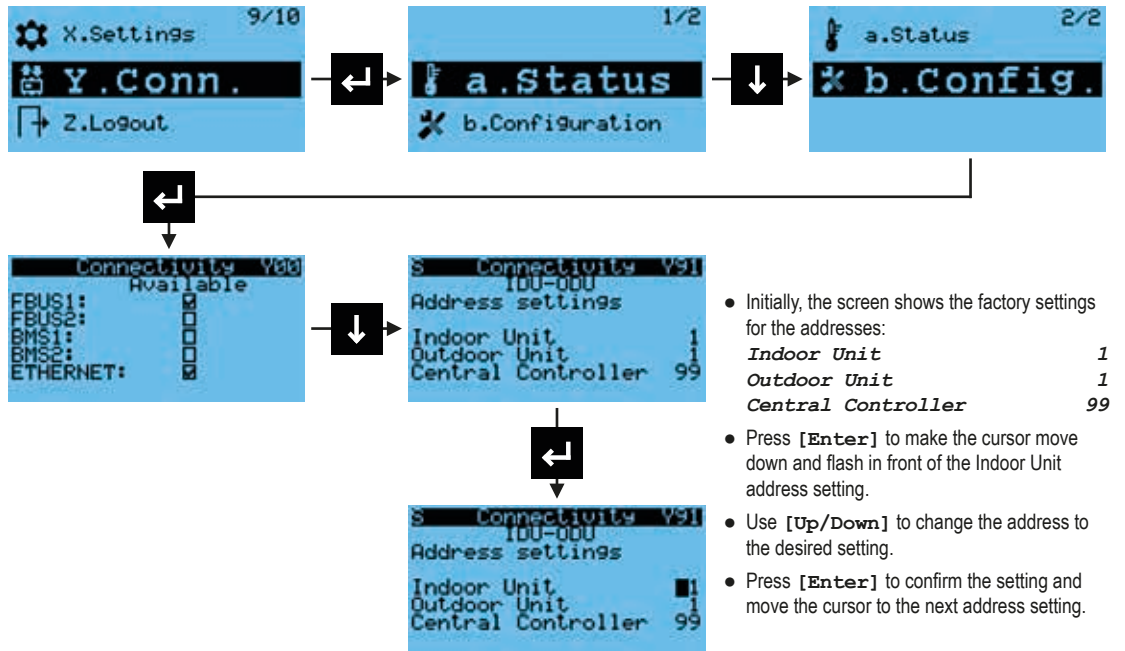
### 8.2.1 Step 1: General settings

Follow the steps in this flow chart to make the general settings for the AHU Kit.



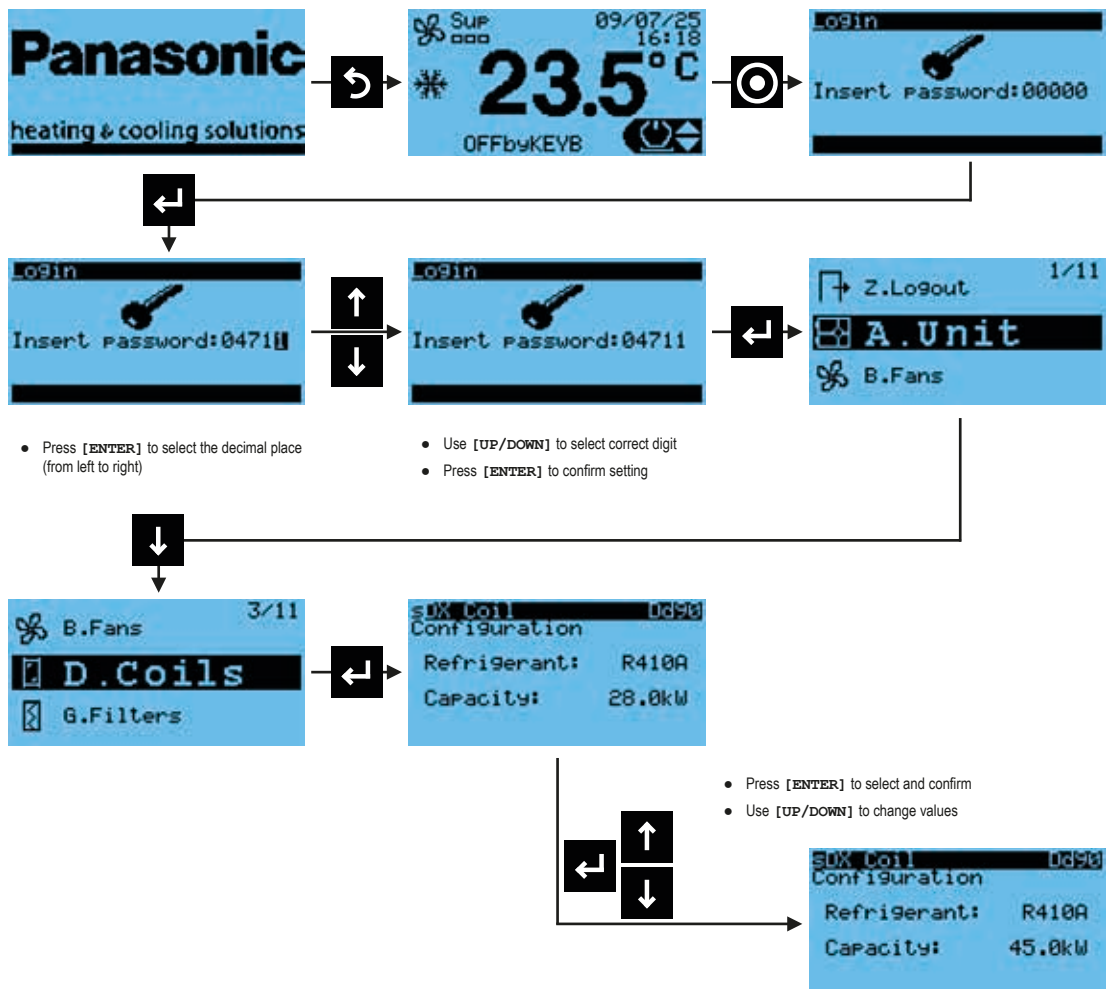
### 8.2.2 Step 2: Addressing

Follow the steps in this flow chart to adjust the Indoor Unit, Outdoor Unit and Central Controller addresses.



### 8.2.3 Step 3: Heat exchanger cooling capacity

Follow the steps in this flow chart to specify the design capacity of the AHU DX coil in cooling mode.



8

In mask Dd09 (see above), select the setting which corresponds to the coil capacity and minimum operation range of the expansion valve, as detailed below.

Possible settings according to the design criteria of the heat exchanger\*1

kW	5.0	5.6	6.3	7.1	8.0	9.0	10.0	11.2	12.5	14.0	16.0	18.0	20.0	22.2
kW	25.0	28.0	34.0	35.5	40.0	45.0	50.0	56.0	60.0	63.0	67.0	71.0	80.0	84.0

\*1 For the required setting of the capacity values by each expansion valve pack combination with the corresponding outdoor unit in mask Dd90, see → *Technical data for R410A systems, p. 11* or → *Technical data for R32 systems, p. 13* respectively.

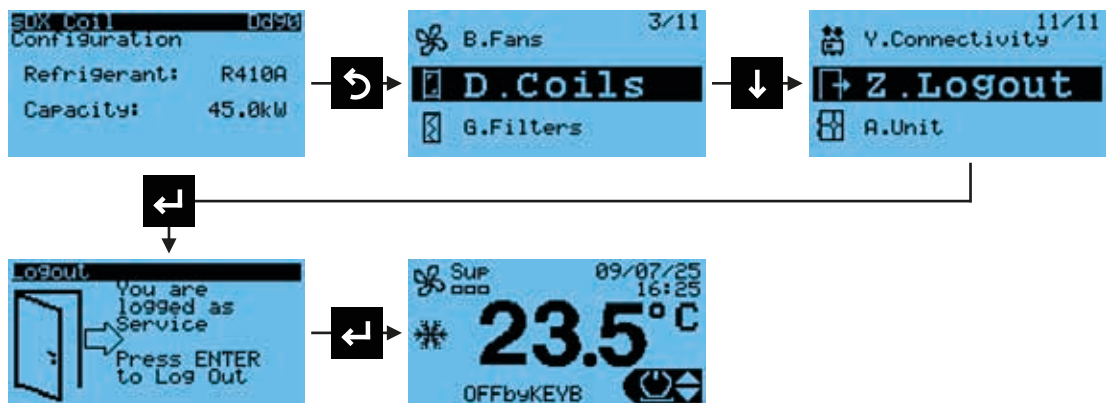
In case the nominal cooling capacity matches the calculated heat exchanger coil capacity, set the capacity value in mask Dd90 to the nominal cooling capacity.

In any other case, when following the calculated coil capacity data for the design conditions, please respect the minimum continuous cooling capacity as shown in the Technical data tables.

You must not set the capacity in mask Dd90 to any values below those values for the expansion valve packs.

### 8.2.4 Step 4: Logout

To complete the configuration of the settings for commissioning, following this flow chart to log out of the programming mode. The programming mode is terminated and logout performed automatically after 10 minutes of idle time without any action on the user interface.



### 8.2.5 Step 5: Temperature regulation setting

Temperature regulation can be based either on supply air or return air temperature. Before selecting one of the temperature regulation settings, the following aspects should be considered.

#### Temperature regulation option *SUPPLY AIR*

- Measuring probe is the BL sensor
- Discharge temperature control via the supply air temperature.

The single split (1:1) application (outdoor unit + AHU) enables linear control of the supply air temperature following the setpoint. With the correct design, constant temperature control can be achieved.

Temperature stability can be reduced by the following influences: Oil recirculation, defrost phase, sudden load changes, as well as other external influences.

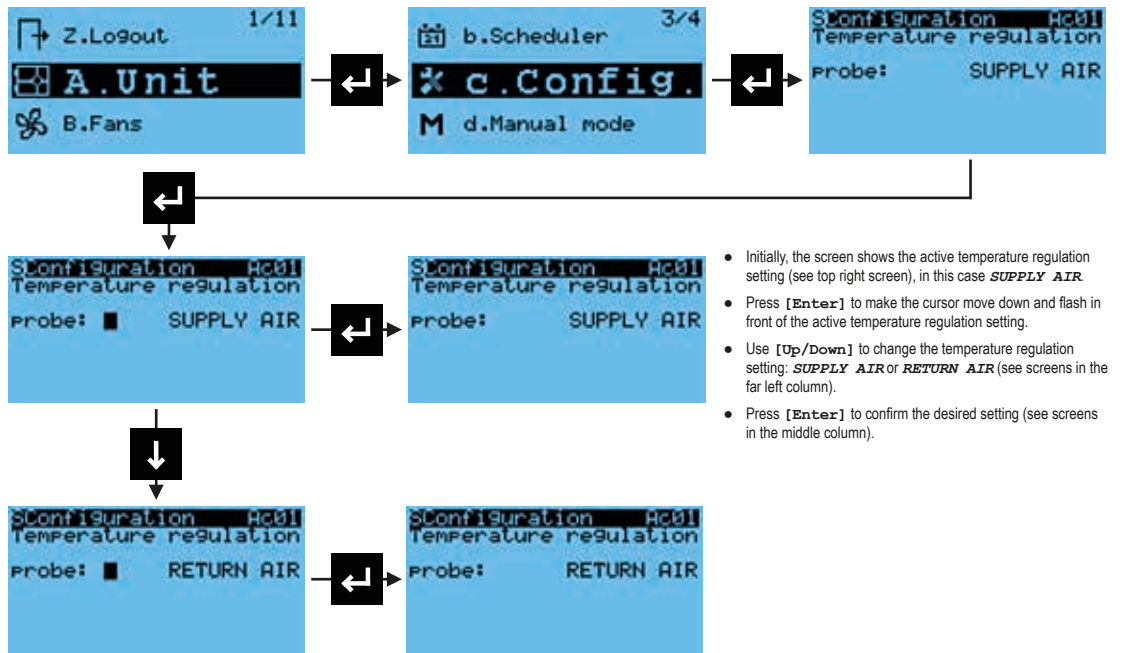
In mixed operation (outdoor unit, AHU + indoor units), fluctuations in the control can occur as a result of the operation of the indoor units.

#### Temperature regulation option *RETURN AIR*

- Measuring probe is the TA sensor
- Power-orientated control via return air temperature

The system adjusts its power output according to the temperature difference between the setpoint and the return air temperature reading.

To activate the desired regulation option during initial setup, log in again and select the corresponding measuring probe as shown in the following flow chart:



## 8.3 Mandatory outdoor unit parameter for heating mode operation

To make sure that heating mode operation is handled correctly by the system, it is mandatory to set one certain outdoor unit parameter using the outdoor unit maintenance controller CZ-RTC4 or CZ-RTC2.

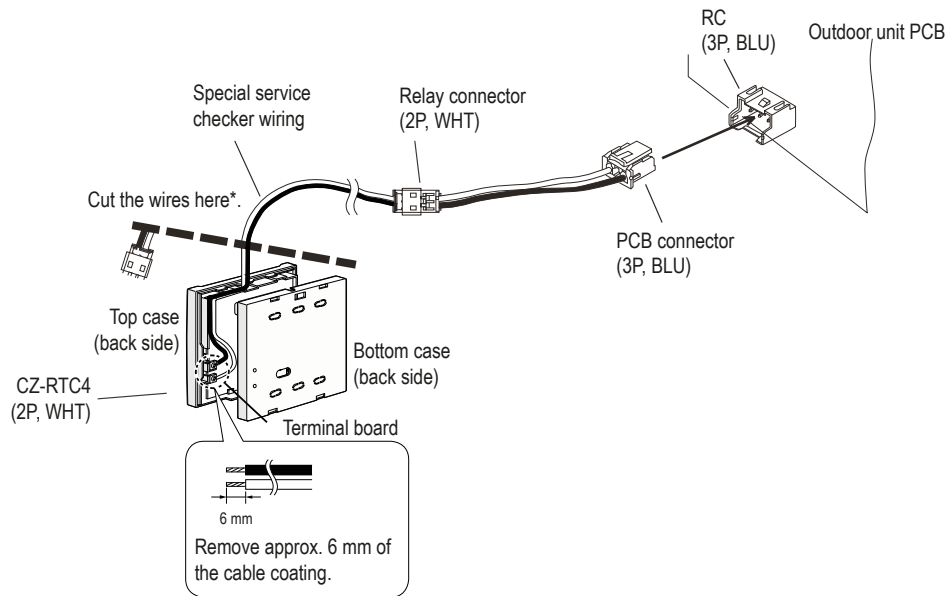
### Outdoor unit maintenance controller

The outdoor unit maintenance controller (CZ-RTC4 or CZ-RTC2) must be connected to the outdoor unit PCB:

- For ECOi ME2 / MZ1 systems, the controller can be connected directly to terminals 1 and 2 of the inter-outdoor unit control wiring.
- For mini ECOi LE1 / LE2 / LZ2 systems, it is mandatory to use the special service checker wiring as described below and as shown in the following figure.

### Connecting the maintenance controller with the special service checker wiring

When connecting the special service checker wiring to the CZ-RTC4 or CZ-RTC2 controller, cut the wires as shown in the figure below. The connector of the remote controller cannot be used directly. The wires must be stripped and connected to the screw terminals.



**Notes**

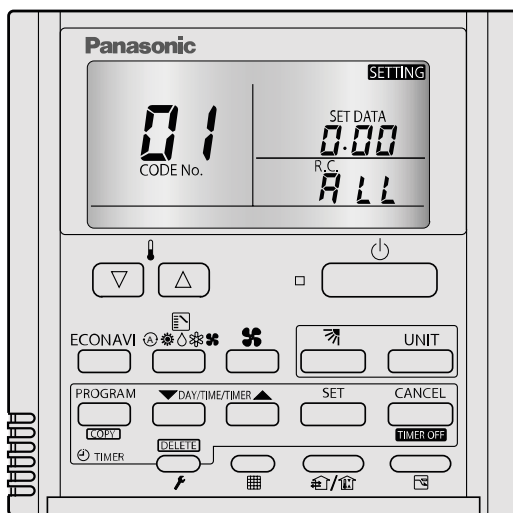
- If the communications line in the inter-unit control wiring is connected, it can be left as is.
- Setting mode 1 can be used to set the outdoor unit parameters for heating mode operation.
- The overall system status for that refrigerant system is displayed.

For further details on this procedure, refer to the relevant section in the Technical Data Book of the outdoor unit.

**Procedure for setting the outdoor unit parameter**

The following procedure relates to the CZ-RTC4 controller. For details about the procedure for CZ-RTC2, refer to the relevant section in the Operating Manual of the CZ-RTC2 controller.

**CZ-RTC4 display and keypad**



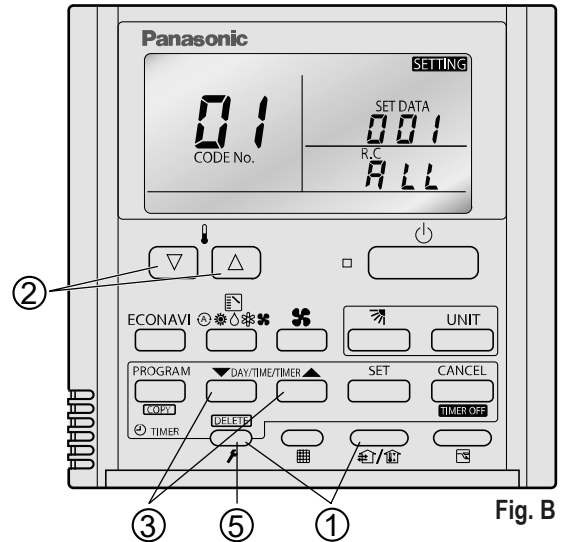
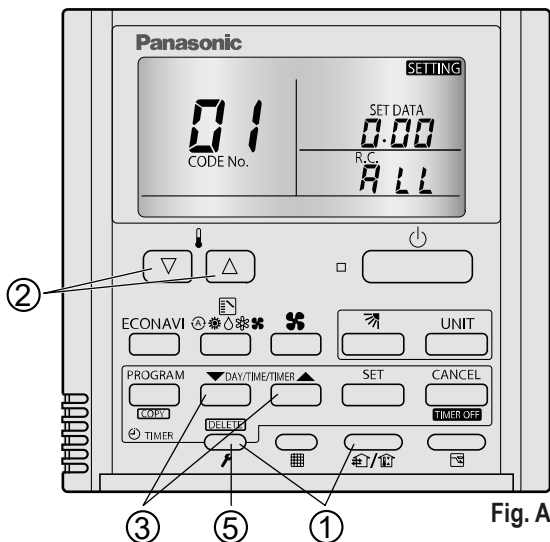
Display / keypad item	Name
	[TEMPERATURE] setting buttons
	[TIMER] setting buttons
	[SET] button
	[CHECK] button
	[VENTILATION] button
	SETTING display
	Outdoor unit address display section

## Commissioning by the installer

Carry out the following steps, to set the outdoor unit parameter on CZ-RTC4:

- Press and hold the [CHECK] and [VENTILATION] buttons simultaneously (1) for 4 seconds or longer, to enter the setting mode.  
During this mode, **SETTING** is displayed blinking.  
The outdoor unit address display section displays **ALL**, the item code and number (DN value) and the setting data (6 digits).  
(The setting data is displayed in 6 digits. The display changes between the first 3 digits (Fig. A) and the last 3 digits (Fig. B).  
(When the first 3 digits are displayed, the bottom dot of the colon is illuminated.)
- Press the [TEMPERATURE] setting buttons (2) to change the item code.  
Press the [TIMER] setting buttons (3) to select the desired setting data.  
**For the mandatory outdoor unit parameter, select the following settings:**

> DN (code)	14	DC
> Default (SET DATA)	14	0
> AHU (SET DATA)	1	1
- To confirm the changed setting data, press the [SET] button.  
(At this time, the **SETTING** display stops blinking and remains lit.)
- To exit the setting mode, press the [CHECK] button (5).

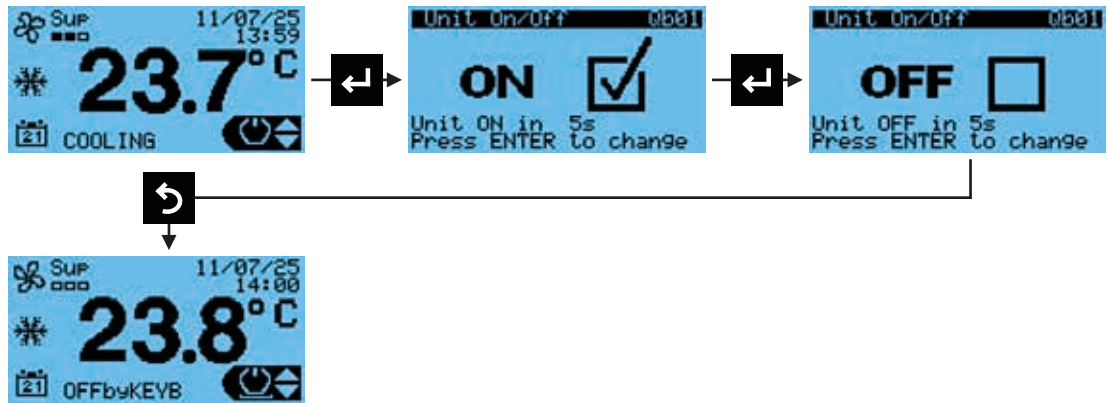


# 9 Operation and displays for the user

After commissioning has been completed by the installer, the user can start operating the unit.

## 9.1 Switching the unit on/off from the keypad

Follow the steps in this flow chart to switch the unit on and/or off.



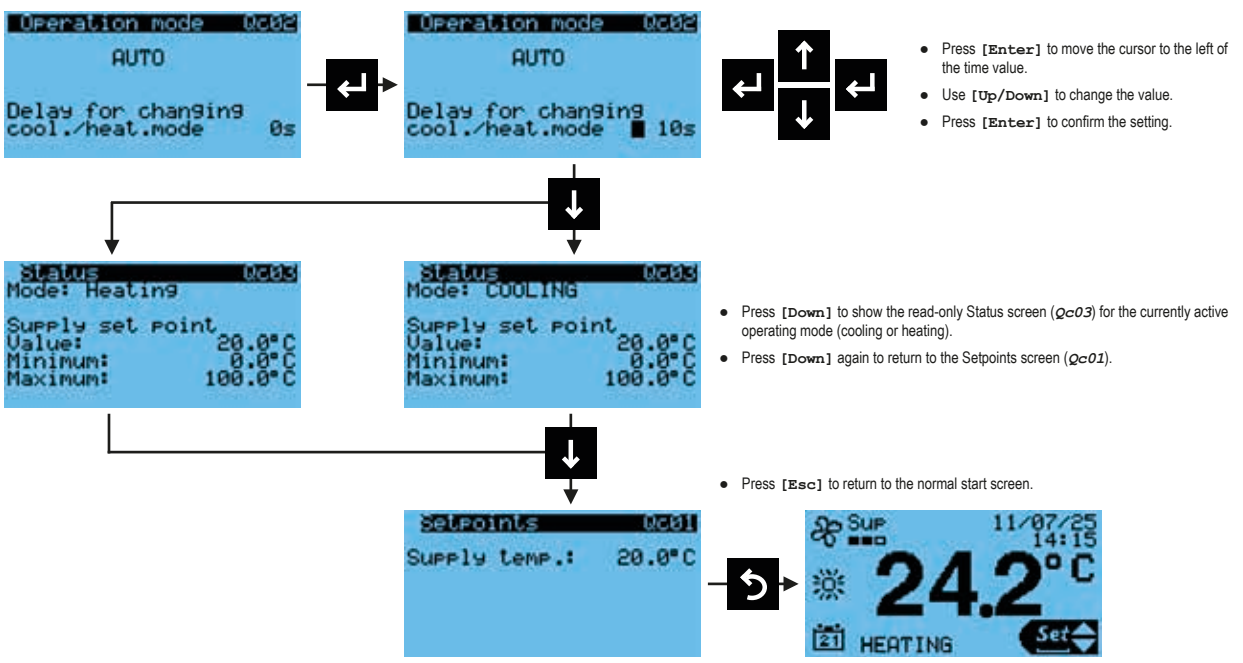
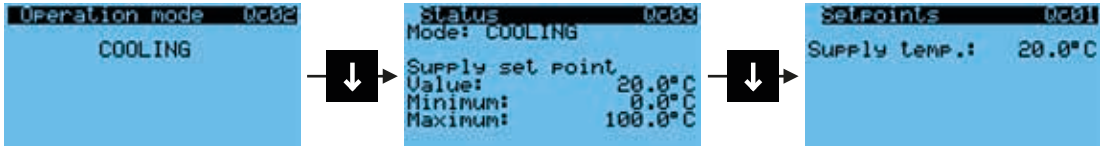
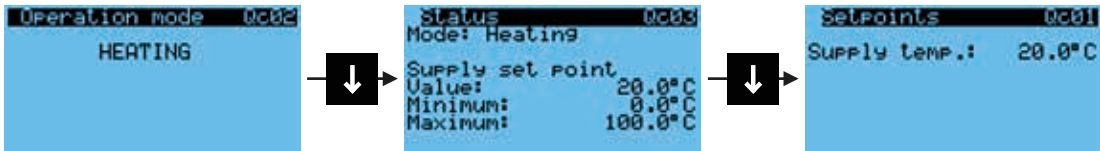
## 9.2 Adjusting the set points

The user can adjust the following general settings for daily use: the set temperature and the operation mode (Cooling, Heating, Auto (if released)).

The following flow chart comprises read/write screens and read-only screens displaying the main unit information:

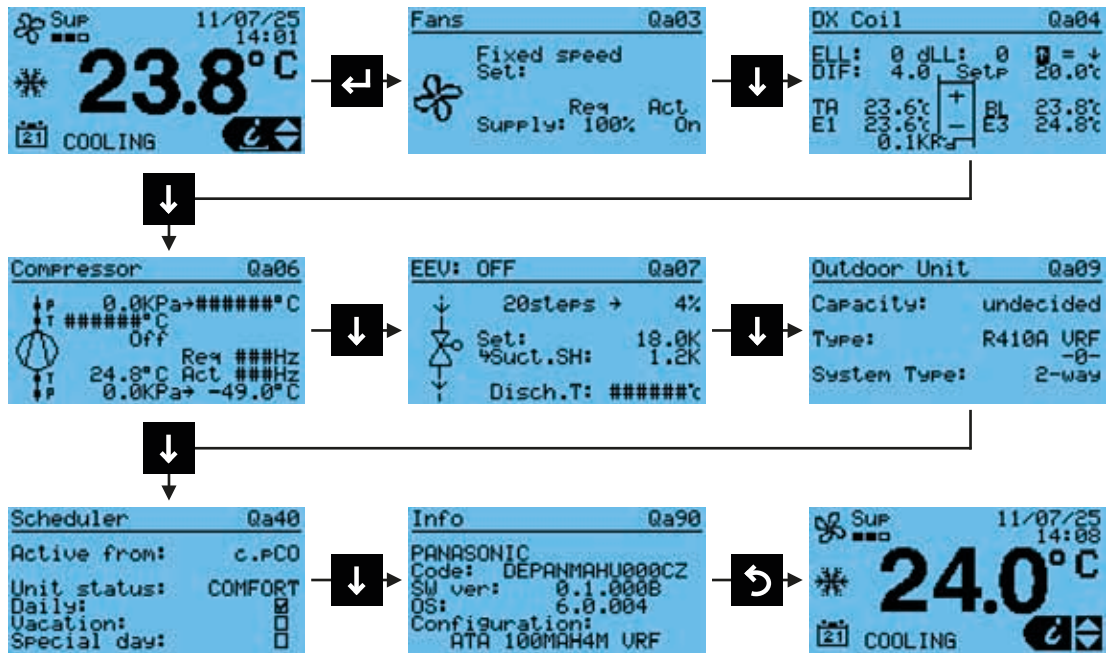
- Temperature set point for the control probe
- Operating mode: cooling, heating, automatic
- Screen summarising the set point and current operating mode





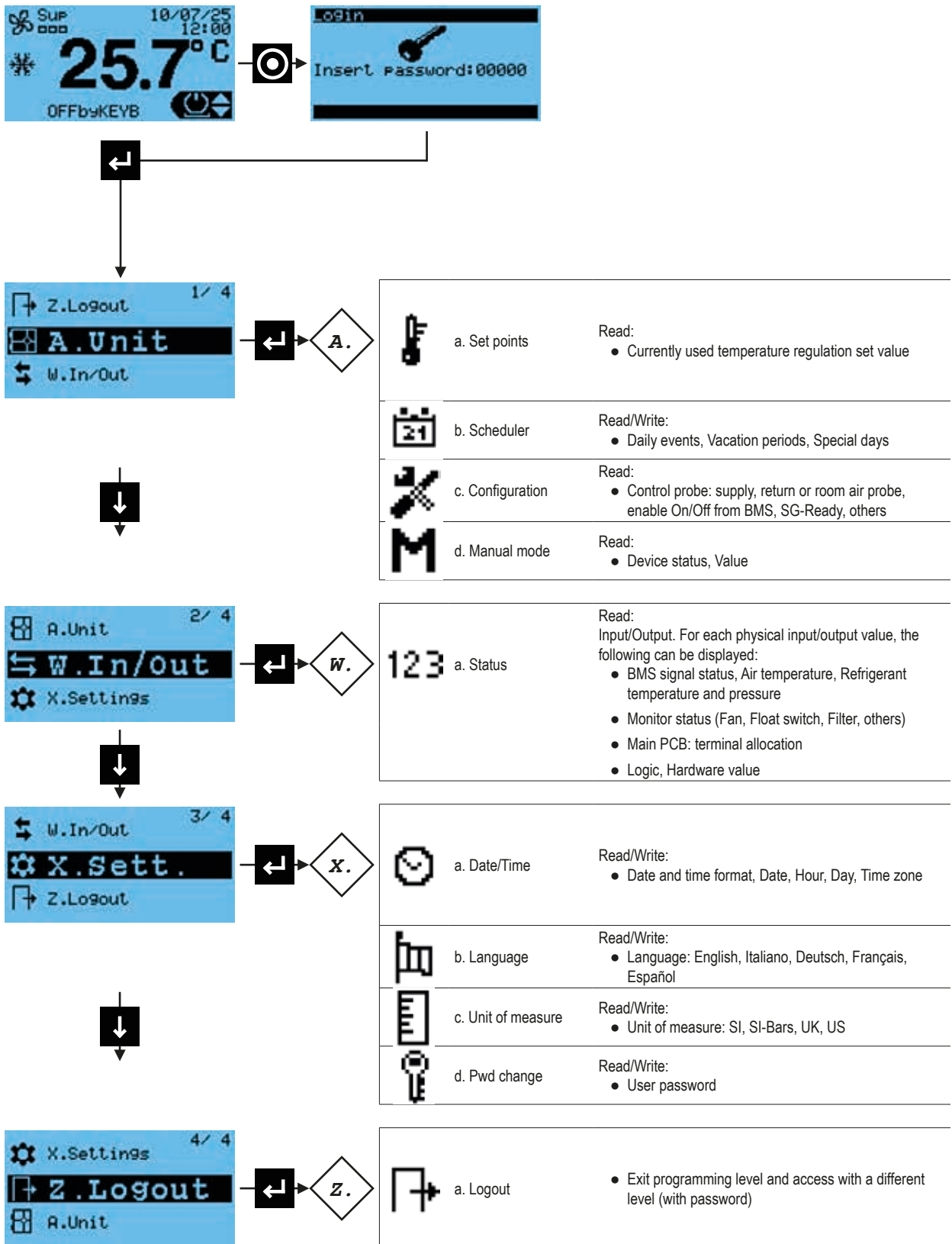
### 9.3 Viewing the *Info* menu

Follow the steps in this flow chart to display a sequence of screens with basic status information. Settings cannot be made at this level.

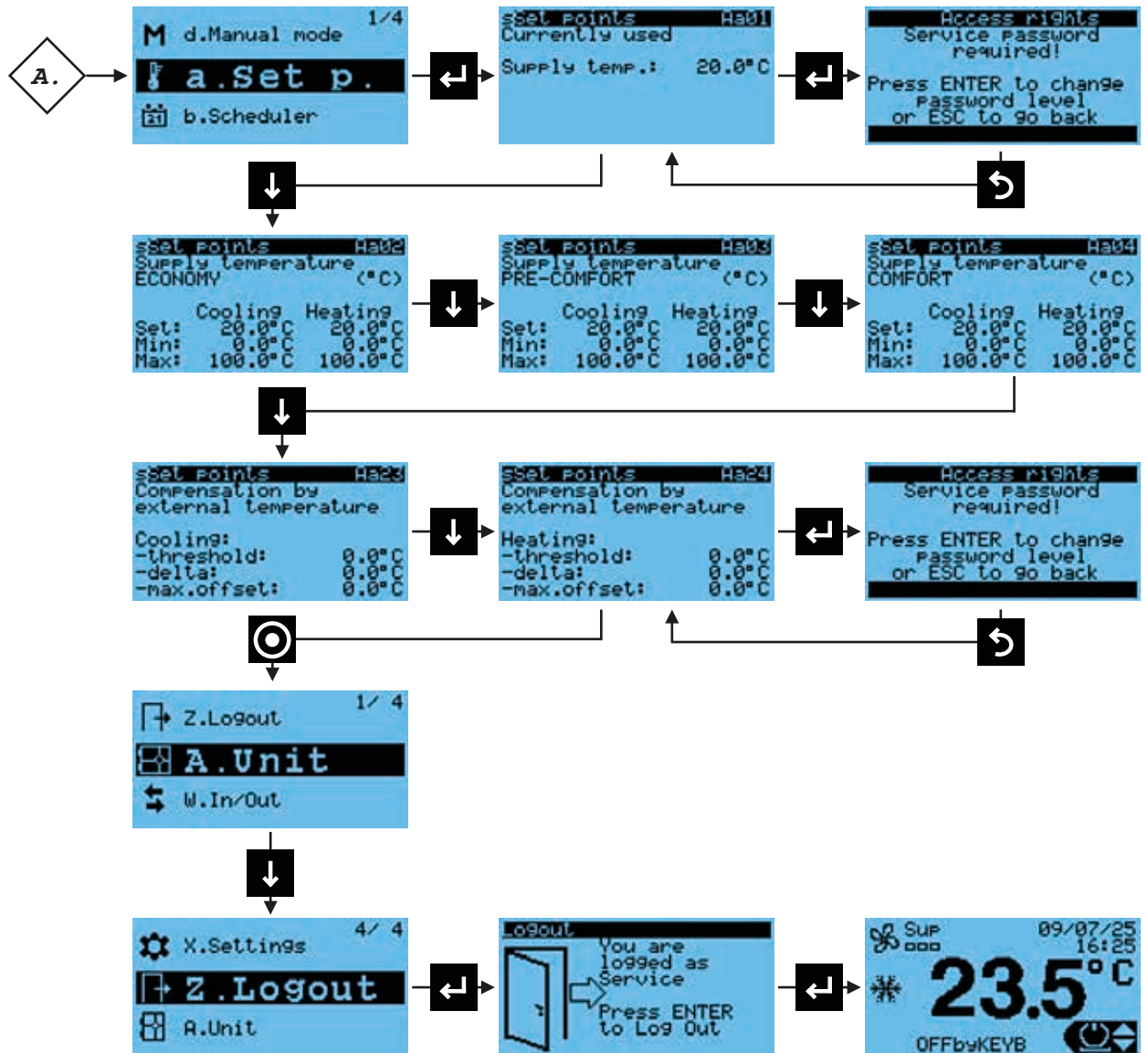


## 9.4 Detailed displays and settings

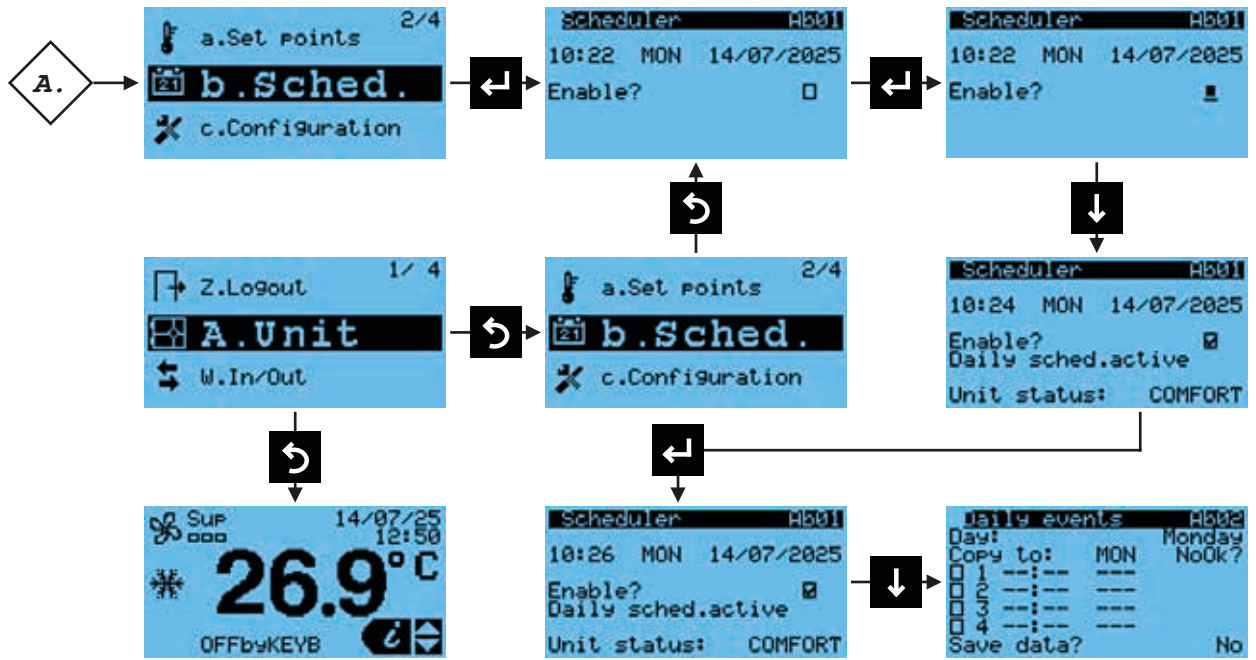
### 9.4.1 Overview of masks for the user



### 9.4.2 Menu A. Unit – Submenu a. Set points

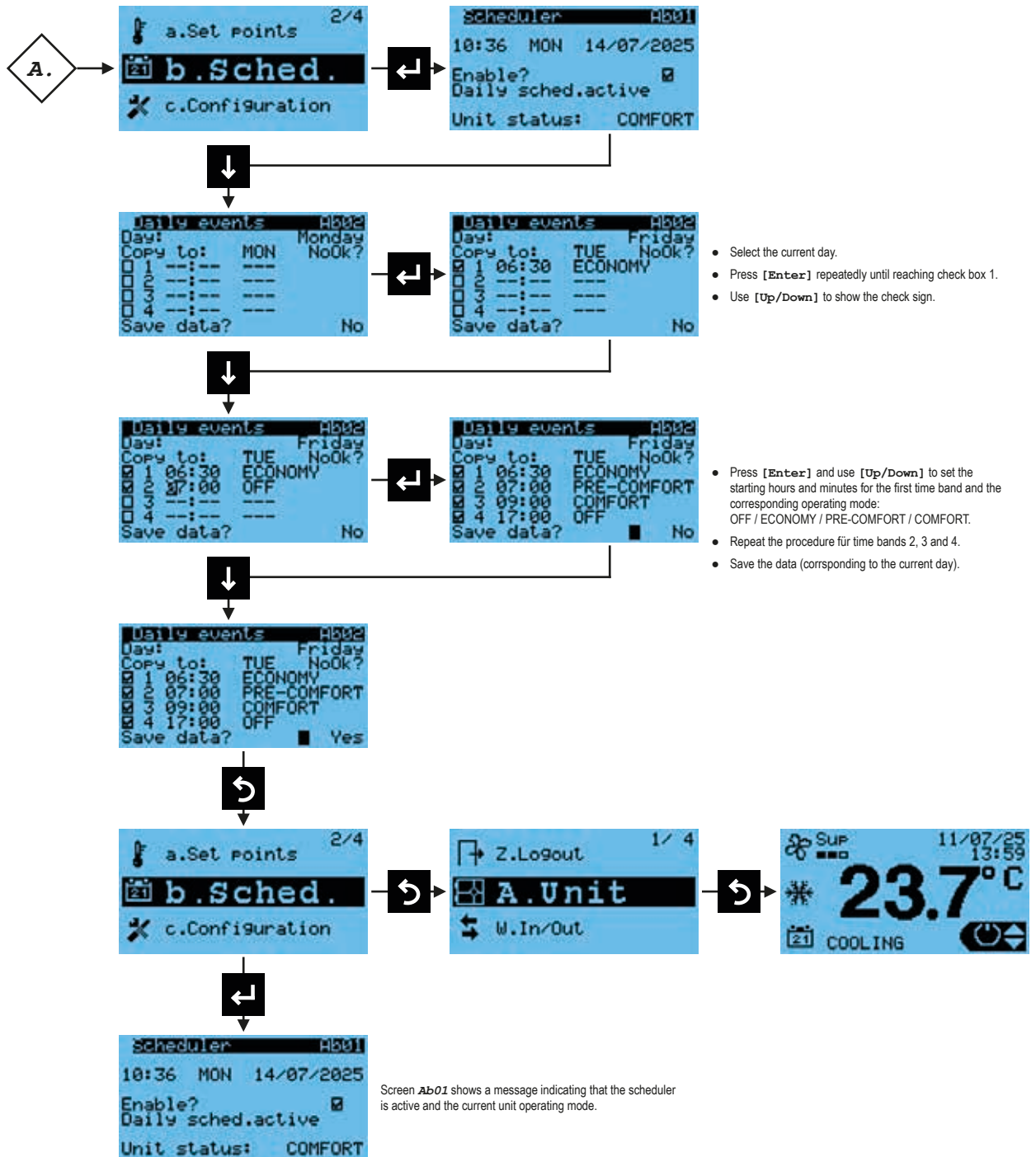


9.4.3 Menu A. Unit – Submenu b. Scheduler

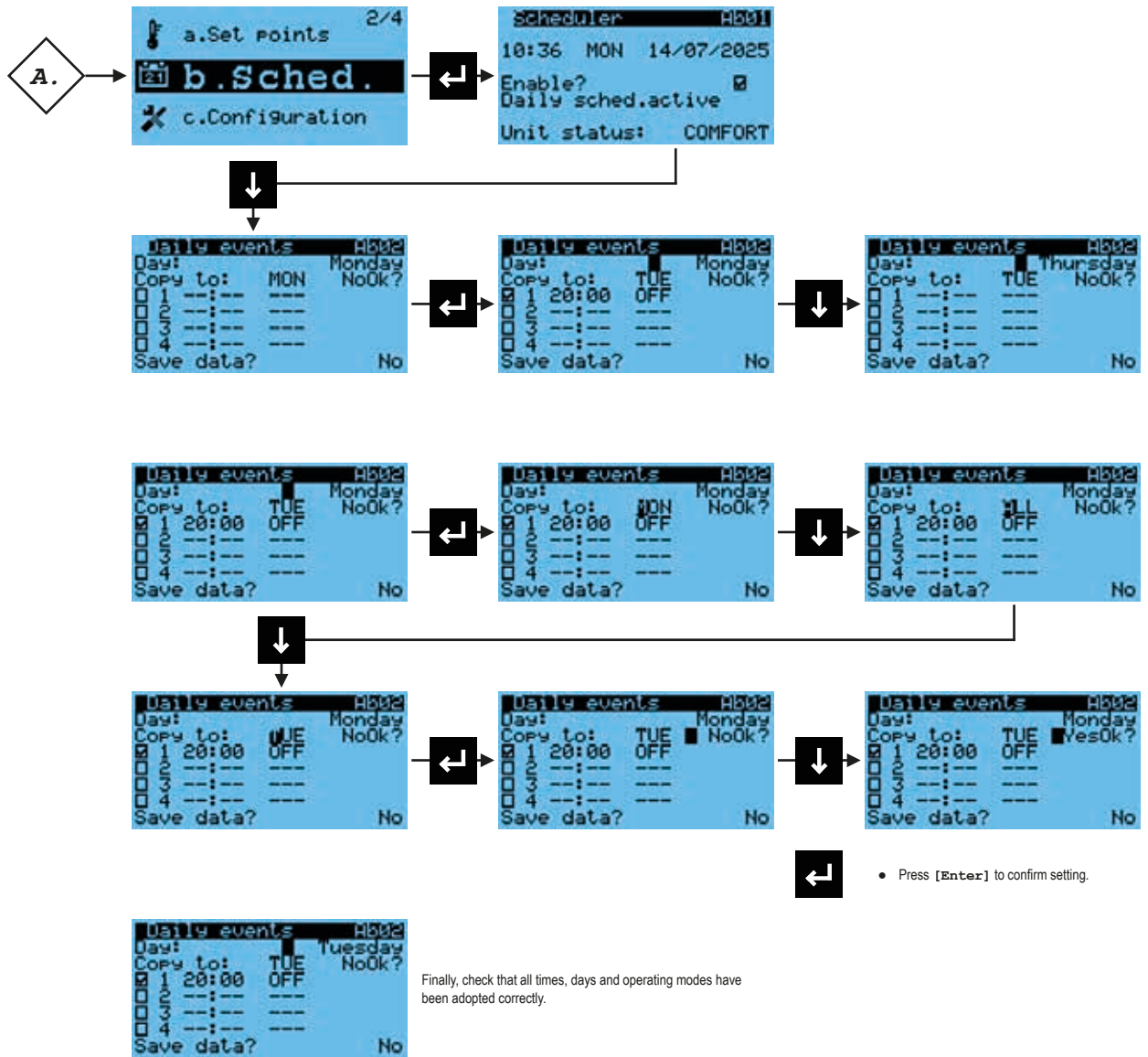


Select *b. Scheduler* and press [Enter] to enter screen *Ab01: Enable scheduler*.  
 A message is shown indicating that the scheduler is NOT active and that the unit is in Comfort operating mode.

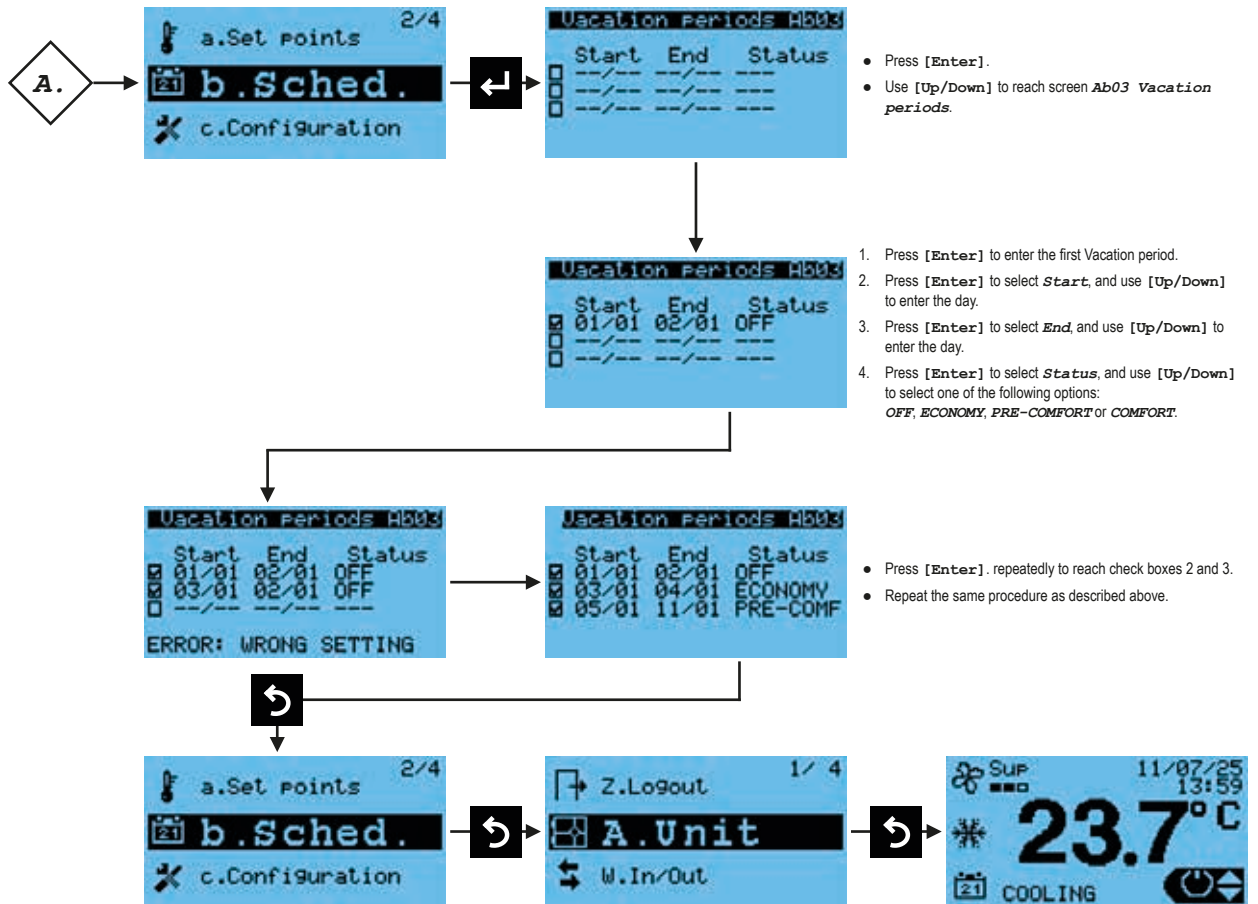
### 9.4.4 Submenu *b. Scheduler* – Daily events



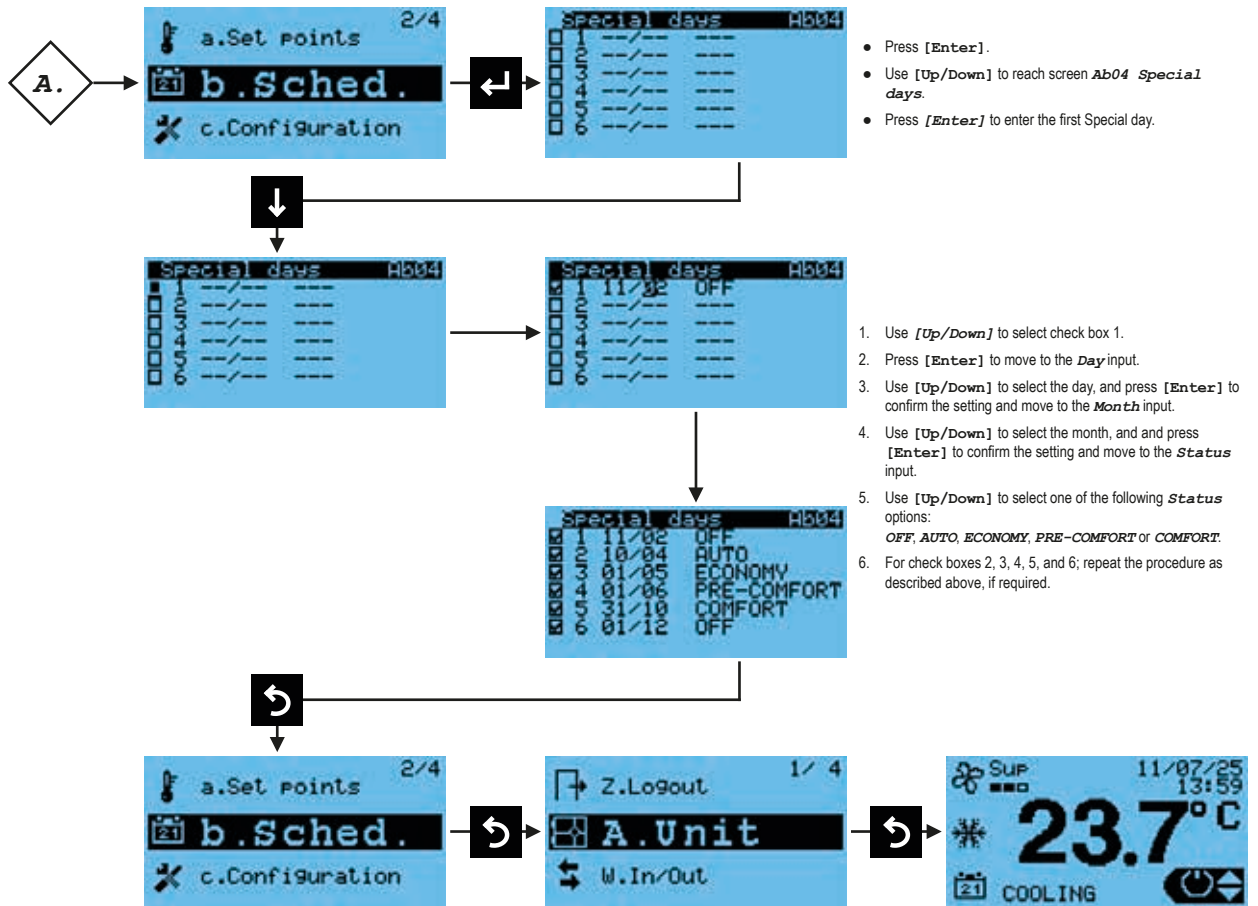
### 9.4.5 Submenu *b. Scheduler* – Copying daily events



### 9.4.6 Submenu *b. Scheduler* – Vacation periods



### 9.4.7 Submenu *b. Scheduler* – Special days



### 9.4.8 Menu *Z. Logout*



# 10 Software installation


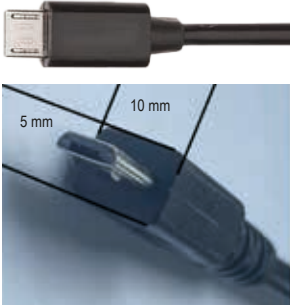
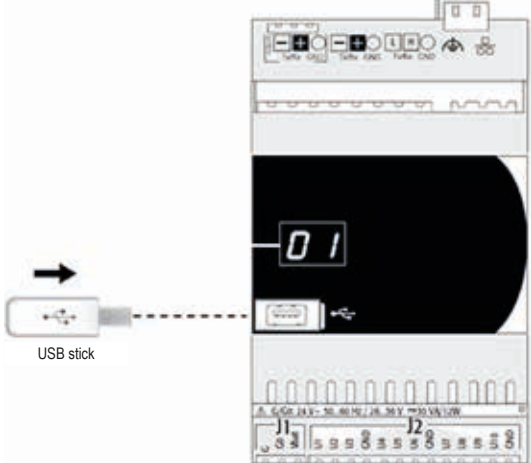
## Update via USB stick

The PAW-P+100MAH4M controllers are supplied with a host micro USB port (Master) that can be connected to a USB mass storage device (typically a USB stick or portable hard drive), from which an application program can be loaded onto the integrated programmable controller. To update the controller, the **application file with extension AP1 (.ap1)** needs to be loaded onto the USB stick.

### Example:

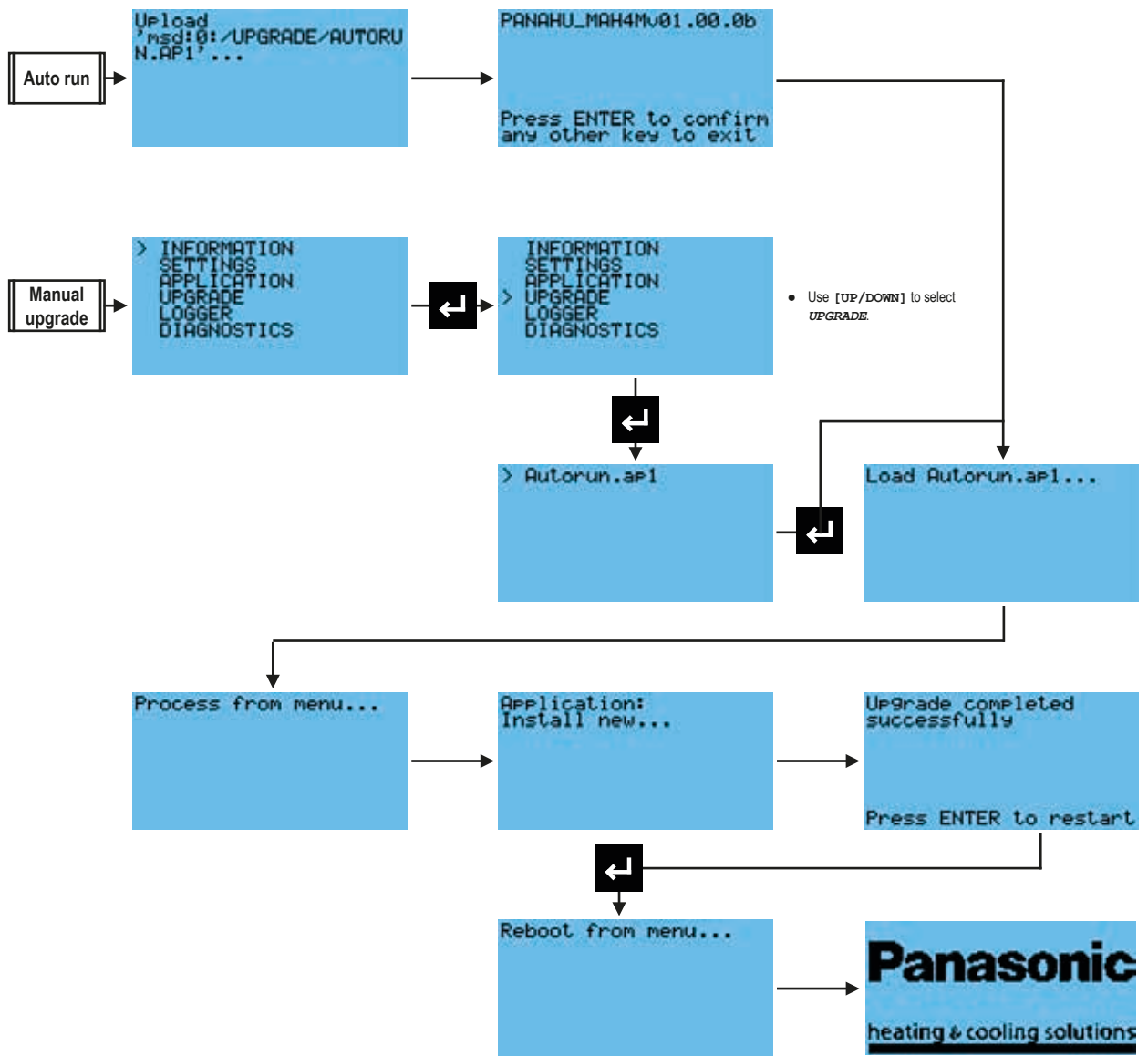
BMS Modbus is supported with a software version higher than controller software version v1.00.0b.

To install a higher software version, proceed as follows:

	<p>Controller USB micro – B plug</p> <p>USB stick Storage capacity: 4 to 8 GB Hardware interface: USB 2.0 (adapter required) Use an adapter cable (see example picture on the left).</p> <p>Prepare the USB stick as follows:</p> <ol style="list-style-type: none"> <li>1. Create a folder by the name of <b>UPGRADE</b> as main folder. <b>Important:</b> Write all letters of the folder name <b>UPGRADE</b> in capital letters.</li> <li>2. Copy the AP1 file to this folder.</li> <li>3. Plug the USB stick into the controller or connect it with the adapter cable.</li> <li>4. Always make sure to remove the USB stick correctly. Safe removal of hardware in Windows (example): In Explorer, right-click on the hardware name in the list on the left; then select the <b>Remove</b> option in the context menu.</li> </ol>
	<p><b>Note:</b> USB micro-B plug The slot on the controller is narrow. Use a narrow USB micro-B plug with the following dimensions: approximately 5 mm x 10 mm (H x W).</p>
	<ol style="list-style-type: none"> <li>5. Plug the USB stick drive into the host USB port. The file <b>Autorun.ap1</b> is started automatically after the USB stick is recognized.</li> </ol> <p><b>Alternative manual upgrade:</b> Plug the USB stick into the host USB port and press <b>[ALARM]</b> and <b>[ENTER]</b> for 3 seconds, to enter the system menu.</p>

### Note:

To prevent the controller from restarting the installation after the restart, remove the USB stick beforehand. Confirm by pressing **[Enter]**.



# 11 Error codes / Alarm list

The following table provides a list of the most relevant alarm messages. The alarm messages shown as clear text messages on the controller and are therefore mostly self-explicatory.

For detailed error descriptions relating to outdoor unit (ODU) errors, please refer to the Technical Data Book of the relevant outdoor units. The more detailed descriptions are assigned to the outdoor unit type, and explanations and descriptions may vary depending on the connected outdoor unit.

Supply temperature probe error	EVD - Emergency closing
Suction pressure probe error	th-Tune clock error
Discharge temperature probe error	th-Tune temperature probe error
Generic alarm from digital input	th-Tune humidity probe error
Reheating heater overload	BMS offline
Supply fan overload	Room temperature probe error
Return fan overload	Room humidity probe error
Fans overload	Supply differential pressure probe error
Compressor overload	Return differential pressure probe error
High discharge pressure switch	EVD - Selftuning alarm
Low suction pressure switch	Modulating humidifier maintenance required
Supply air flow switch alarm	Thermal wheel overload
Return air flow switch alarm	Antifreeze temperature probe error
Air flow switch alarm	c.pCOe no. 1 - Offline
Antifreeze alarm	c.pCOe no. 1 - Configuration error
EVD - Low SH	DX EVD Embedded Low superheat protection
EVD - Motor error	DX EVD Embedded Low evaporation temp. protection
EVD - Setting out of bound	DX EVD Embedded High evaporation temperature protection
EVD - Settings range error	DX EVD Embedded High condensation temperature protection
Prototype software	DX EVD Embedded Low suction temp.
High number of retain memory writings	DX EVD Embedded EEV motor error
Error in retain memory writings	DX EVD Embedded Ineffective adaptive control
Return temperature probe error	DX EVD Embedded Emergency closing
External temperature probe error	DX EVD Embedded Parameter range error
CO2 air quality probe error	DX EVD Embedded Service positioner outside range 0-100
Exhaust temperature probe error	DX EVD Embedded wrong valve ID (only 1 or 2 allowed)
Auxiliary probe error	DX EVD Embedded Settings out of bound
Discharge pressure probe error	DX coil - Air In temperature probe error
Suction temperature probe error	DX coil - Air Mid temperature probe error
th-Tune offline	DX coil - Air Out temperature probe error
Low supply temperature	DX coil - Refrig. liquid temp. probe error
Warm up failure warning	DX coil - Suction pressure probe error
Warm up failure alarm	DX coil - Suction temperature probe error
Evaporator defrost ended by maximum time	Refrigerant Leakage detected
Heat recovery defrost ended by maximum time	Condensate float switch
Supply air flow warning	Mismatch IDU-ODU type Mismatch Refrigerant
Return air flow warning	ODU Gateway Offline
Air flow warning	ODU Pretrip Alarm
Antifreeze warning	ODU Off by Alarm
Humidifier alarm	ODU Alarm (E04) IU no communication from OU
Humidifier maintenance required	ODU Alarm (E05) IU no transmission to OU
Supply fan maintenance required	ODU Alarm (E06) OU no communication from IU
Return fan maintenance required	ODU Alarm (E07) OU no transmission to IU
Reheating heater maintenance required	ODU Alarm (E08) Duplicated IU address
Heat recovery maintenance required	ODU Alarm (E10) 3-WAY IU PCB serial transmission error
Filters maintenance required	ODU Alarm (E11) IU receive error from signal output board
Dirty filters alarm	ODU Alarm (E12) Auto address by other OU in progress
Compressor maintenance required	ODU Alarm (E15) Too few IU after auto address
EVD - LOP	ODU Alarm (E16) Too many IU after auto address
EVD - MOP	ODU Alarm (E17) IU to IU transmission error
EVD - High condensing temperature	ODU Alarm (E20) No IU in auto address
EVD - Low suction temperature	ODU Alarm (E21) OU main PCB error
	ODU Alarm (E22) OU PCB sensor error

## Error codes / Alarm list

ODU Alarm (E23) Main OU to sub OU transmission error	ODU Alarm (J01) R32 leakage sensor error
ODU Alarm (E24) Main OU to sub OU reception error	ODU Alarm (J02) Leakage sensor lifetime expired
ODU Alarm (E25) Duplicated OU sub setting	ODU Alarm (J03) IU leakage sensor 1 error
ODU Alarm (E26) Mismatch in number of OU setting	ODU Alarm (J04) IU Leakage sensor 1 lifetime expired
ODU Alarm (E27) OU to OU communication miswiring	ODU Alarm (J05) IU leakage sensor 2 error
ODU Alarm (E28) Misconnection of OU	ODU Alarm (J06) IU Leakage sensor 1+2 lifetime expired
ODU Alarm (E29) Sub OU from main OU reception error	ODU Alarm (J08) Refrigerant leak device abnormal
ODU Alarm (E30) OU transmission error	ODU Alarm (J12) Leakage sensor / alarm address duplication
ODU Alarm (E31) OU internal communication error	ODU Alarm (J13) Leakage alarm fault
ODU Alarm (F01) E1 coil sensor error	ODU Alarm (J14) Shut off valve fault
ODU Alarm (F02) E2 coil sensor error	ODU Alarm (J15) Leakage sensor fault
ODU Alarm (F03) E3 coil sensor error	ODU Alarm (J16) Shut off valve duplication
ODU Alarm (F04) Comp1 discharge temp. error	ODU Alarm (J20) DC voltage abnormal
ODU Alarm (F05) Comp2 discharge temp. error	ODU Alarm (J22) DCCT failure
ODU Alarm (F06) OU hex1 coil gas temp. error	ODU Alarm (J24) Poor compressor wiring
ODU Alarm (F07) OU hex1 coil liq temp. error	ODU Alarm (J26) Compressor phase loss detection
ODU Alarm (F08) OU ambient temp. Error	ODU Alarm (J28) Abnormal airflow from outdoor unit
ODU Alarm (F09) Scroll compressor thermostat protection	ODU Alarm (L01) Main IU address not set
ODU Alarm (F10) TA sensor error	ODU Alarm (L02) IU - OU model not matching
ODU Alarm (F11) BL sensor error	ODU Alarm (L04) OU address duplicated
ODU Alarm (F12) Compressor inlet temp. sensor error	ODU Alarm (L05) Duplicated priority IU
ODU Alarm (F14) OU SC sensor error	ODU Alarm (L06) Duplicated priority IU
ODU Alarm (F15) OU hex coil mid. temp. sensor error	ODU Alarm (L08) IU address not set
ODU Alarm (F16) High-pressure sensor abnormal	ODU Alarm (L09) IU capacity not set
ODU Alarm (F17) Low-pressure sensor abnormal	ODU Alarm (L10) OU capacity incorrect
ODU Alarm (F19) OU compressor bottom temp. sensor error	ODU Alarm (L12) IU capacity incorrect
ODU Alarm (F22) Comp3 discharge temp. error	ODU Alarm (L13) IU - OU model not matching
ODU Alarm (F23) OU hex2 coil gas temp. error	ODU Alarm (L15) Double-duct models combination error
ODU Alarm (F24) OU hex2 coil liq temp. error	ODU Alarm (L16) WHE setting error
ODU Alarm (F25) Old series OU coil1 gas temp. Error	ODU Alarm (L17) OU unit type mismatch
ODU Alarm (F26) Old series OU coil2 gas temp. Error	ODU Alarm (L18) 4-way valve error
ODU Alarm (F31) OU EEPROM error	ODU Alarm (L19) WHE duplicated address
ODU Alarm (H01) Comp.1 overcurrent	ODU Alarm (L20) Duplicated central addr at local adaptor
ODU Alarm (H02) Comp.1 locked	ODU Alarm (P01) IU fan thermal protector error
ODU Alarm (H03) Comp.1 primary CT sensor error	ODU Alarm (P02) OU fan thermal protector error
ODU Alarm (H04) Scroll comp.1 thermostat protection	ODU Alarm (P03) Comp.1 high discharge temperature
ODU Alarm (H05) Comp.1 discharge temp. sensor error	ODU Alarm (P04) High pressure switch actuated
ODU Alarm (H06) Low pressure too low	ODU Alarm (P05) Comp.1 phase open or reverse
ODU Alarm (H07) Comp.1 low oil error	ODU Alarm (P06) OU type or capacity mismatch
ODU Alarm (H08) Comp.1 oil sensor error	ODU Alarm (P07) OU DC-current overload
ODU Alarm (H09) MG sw chattering	ODU Alarm (P10) IU float sw activated
ODU Alarm (H10) Unbalanced voltage between phases	ODU Alarm (P11) IU drain pump error/ WHE freezing trouble
ODU Alarm (H11) Comp.2 overcurrent	ODU Alarm (P12) IU DC fan error
ODU Alarm (H12) Comp.2 locked	ODU Alarm (P13) Self learning pretrip display
ODU Alarm (H13) Comp.2 primary CT sensor error	ODU Alarm (P14) Leakage alarm
ODU Alarm (H14) Scroll comp.2 thermostat protection	ODU Alarm (P15) No refrigerant gas
ODU Alarm (H15) Comp.2 discharge temp. sensor error	ODU Alarm (P16) Comp.1 secondary overcurrent
ODU Alarm (H16) Comp.2 low oil error	ODU Alarm (P17) Comp.2 high discharge temperature
ODU Alarm (H17) Unbalanced voltage between phases	ODU Alarm (P18) Comp.3 high discharge temperature
ODU Alarm (H18) MG sw1 chattering	ODU Alarm (P19) Comp.2 locked
ODU Alarm (H19) MG sw2 chattering	ODU Alarm (P20) High load alarm
ODU Alarm (H20) Crank case heater 2 sensor error	ODU Alarm (P21) Compressor oil press. diffence Error
ODU Alarm (H21) Comp2. HIC error	ODU Alarm (P22) OU fan motor error
ODU Alarm (H22) Comp.3 locked	ODU Alarm (P23) WHE interlock error
ODU Alarm (H23) Comp.3 primary CT sensor error	ODU Alarm (P26) Comp.2 secondary overcurrent
ODU Alarm (H24) Scroll comp.3 thermostat protection	ODU Alarm (P29) Comp.1 locked
ODU Alarm (H25) Comp.3 discharge temp. sensor error	ODU Pretrip Alarm No error
ODU Alarm (H26) Comp.3 low oil error	ODU Pretrip Alarm High-pressure sensor abnormal
ODU Alarm (H27) Comp.2 oil sensor error	ODU Pretrip Alarm Comp.1 overcurrent
ODU Alarm (H28) Comp.3 oil sensor error	ODU Pretrip Alarm Comp.1 locked
ODU Alarm (H29) MG sw3 chattering	ODU Pretrip Alarm Comp.1 primary CT sensor error
ODU Alarm (H30) Crank case heater 3 sensor error	ODU Pretrip Alarm Scroll comp.1 thermostat protection
ODU Alarm (H31) Comp.1 HIC error	ODU Pretrip Alarm Comp.1 discharge temp. sensor error

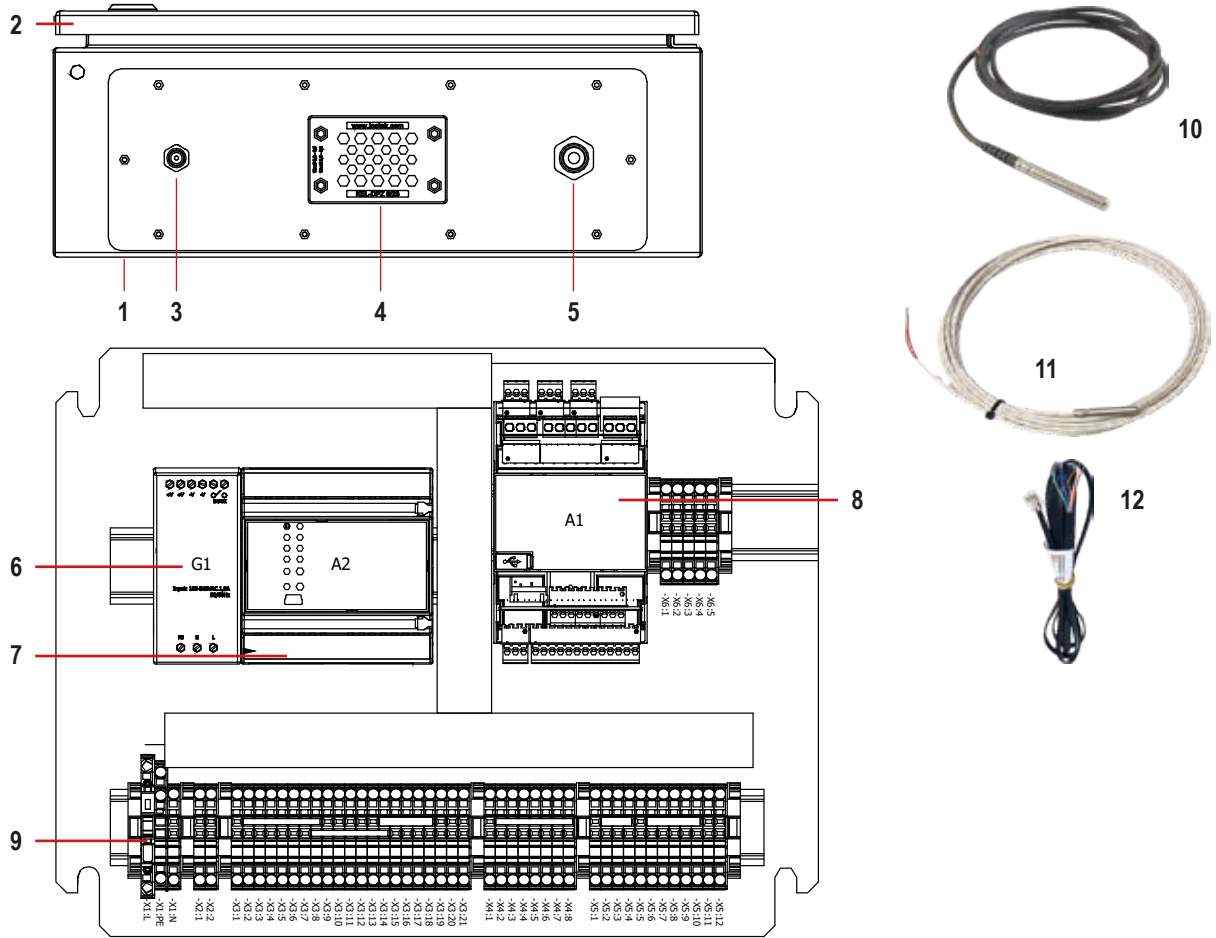
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ODU Pretrip Alarm Low pressure too low
ODU Pretrip Alarm Comp.1 low oil error
ODU Pretrip Alarm Comp.1 oil sensor error
ODU Pretrip Alarm Comp.2 overcurrent
ODU Pretrip Alarm Comp.2 locked
ODU Pretrip Alarm Comp.2 discharge temp. sensor error
ODU Pretrip Alarm Comp2. HIC error
ODU Pretrip Alarm Comp.2 oil sensor error
ODU Pretrip Alarm Comp.1 HIC error
ODU Pretrip Alarm OU fan thermal protector error
ODU Pretrip Alarm Comp.1 high discharge temperature

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ODU Pretrip Alarm High pressure switch open or reverse
ODU Pretrip Alarm Comp.1 phase open or reverse
ODU Pretrip Alarm Self learning pretrip display
ODU Pretrip Alarm Comp.1 secondary overcurrent
ODU Pretrip Alarm Comp.2 high discharge temperature
ODU Pretrip Alarm Comp.3 high discharge temperature
ODU Pretrip Alarm Comp.2 locked
ODU Pretrip Alarm OU fan motor error
ODU Pretrip Alarm WHE interlock error
ODU Pretrip Alarm Comp.2 secondary overcurrent
ODU Pretrip Alarm Comp.1 locked

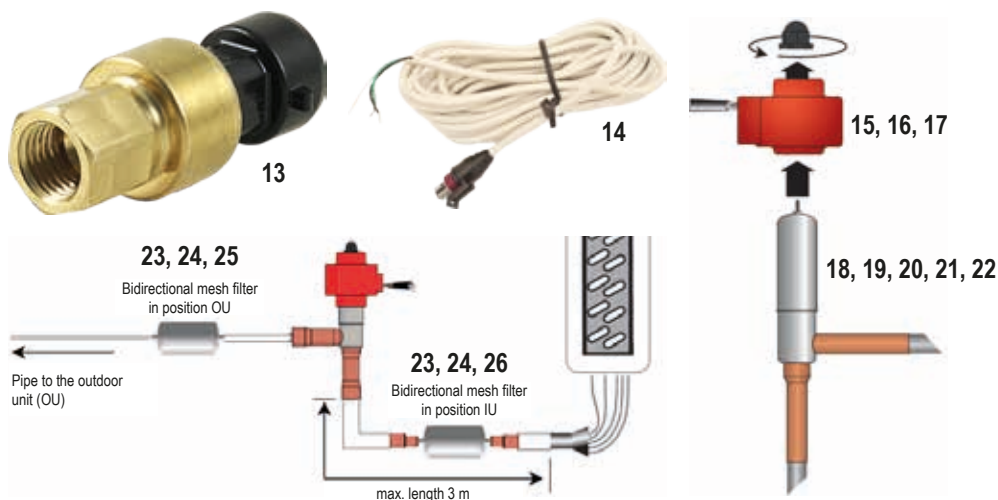
# 12 Spare Parts



Note: Images are not to scale

No.	Part No.	Part name
1	14-10-09341	Electrical enclosure, 1-door, W x H x D: 300 x 400 x 150 mm
2	14-10-09343	Electrical enclosure door
3	10-06-26043	Cable grommet (round), Ø 16 mm
4	14-15-09543	Square cable grommet
5	10-06-26044	Cable grommet (round), Ø 20 mm
6	10-06-26041	Switch-mode power supply, 24 V / 2.5 A
7	14-15-06047	Signal converter S-Link (programmed and packaged)
8	14-15-06030	c.pCO mini DIN ENHANCED, LCD display
9	14-15-00064	Fuse 6.3 A
10	10-06-26040	NTC-probe WH 3 m; IP68; operating range -50 °C to 105 °C
11	10-06-26032	Sensor PT1000 HT IP67 -50/250 cable 6 m (1 pc.)
12	10-06-26042	Cable 1.5 m, telephone connectors

(continued on next page)



Note: Images are not to scale

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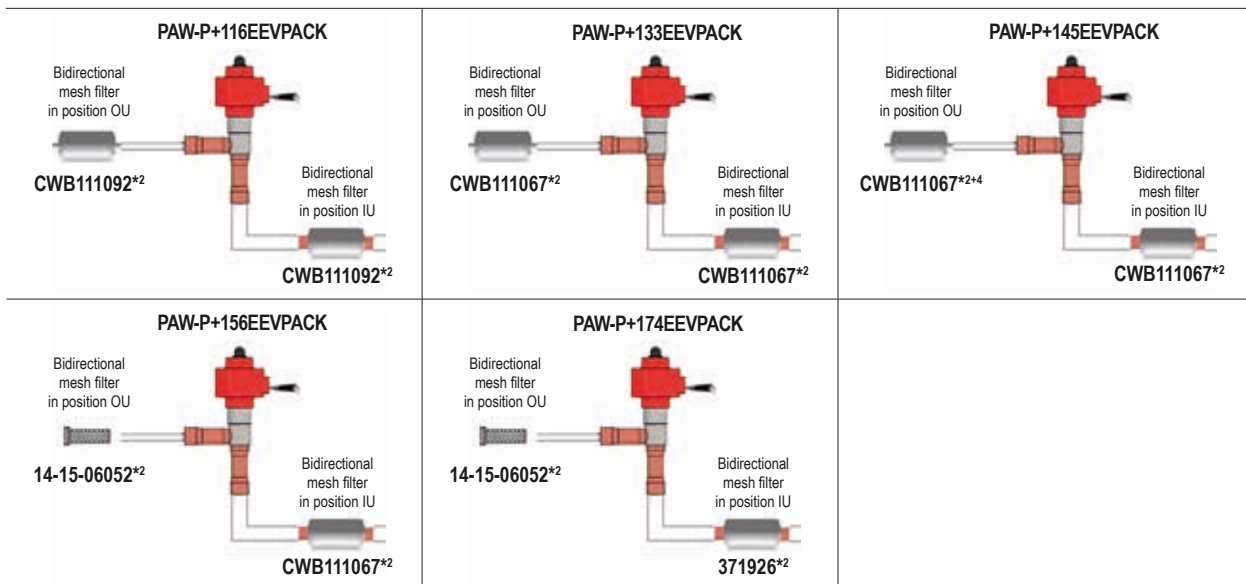
Legend No.	Part No.	Part name
13	14-15-06032	Pressure transducer, 0 to 45,0 bar
14	14-15-06033	2 m cable IP67 Connector for Pressure transducer
15	14-15-06035	Stator STA116 Cable 2 m (PAW-P+116 / 133 EEVPACK)
16	14-15-06036	Stator STA145 Cable 1 m (PAW-P+145 EEVPACK)
17	14-15-06063	Stator STA156 Cable 2 m (PAW-P+156 / 174 EEVPACK)
18	14-15-06037	Expansion valve R410A and R32 PAW-P+116EEVPACK (body)
19	14-15-06038	Expansion valve R410A and R32 PAW-P+133EEVPACK (body)
20	14-15-06039	Expansion valve R410A and R32 PAW-P+145EEVPACK (body)
21	14-15-06050	Expansion valve R410A and R32 PAW-P+156EEVPACK (body)
22	14-15-06051	Expansion valve R410A and R32 PAW-P+174EEVPACK (body)
23 to 26	see below	Bidirectional mesh filter (strainer)

### Mesh filter specification

Bidirectional mesh filter		Expansion valve pack				
Legend No.	Part No.	PAW-P+116EEVPACK	PAW-P+133EEVPACK	PAW-P+145EEVPACK	PAW-P+156EEVPACK	PAW-P+174EEVPACK
23	CWB111092*2	pos. OU*1 + pos. IU*1	—	—	—	—
24	CWB111067*2	—	pos. OU*1 + pos. IU*1	pos. OU*1 + pos. IU*1	pos. IU*1	—
25	14-15-06052*2	—	—	—	pos. OU*1	pos. OU*1
26	371926*2	—	—	—	—	pos. IU*1

\*1 OU = Outdoor Unit, IU = Indoor Unit.

\*2 Mesh filters (2 pcs) included in each expansion valve pack, and also available from Panasonic as accessories; any equivalent alternative can also be used.



**Notes:**

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· This document is valid from November 2025. · We reserve the right to make technical changes without notice. · No guarantee for completeness and accuracy of the information.  
· The printed colours of the equipment may differ from the actual device colours. · Copying in full or in parts is prohibited.

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