Panasonic

Instructions for the Electrical Installer (PAW-PACR3)

For your safety

- Read the following instructions carefully, and carry out secure installation and electrical work.
- The precautions given in this manual consist of specific “Warnings” and “Cautions”. They provide important safety-related information. Be sure to strictly observe all safety procedures. The labels and their meanings are as described below.

⚠ Warning	This symbol refers to a hazard or unsafe procedure or practice that can result in severe personal injury or death.
⚠ Caution	This symbol refers to a hazard or unsafe procedure or practice that can result in personal injury or product or property damage.

* After installation is completed, perform a test run to check for operating trouble. Explain operating procedures to the customer following the central control device Operation Manual and then request the customer to store this Instructions for the Electrical Installer together with the central control device Operation Manual.

⚠ Warning

- Be sure to arrange installation by the dealer where the system was purchased or by a professional installer. Electric shock or fire may result if an inexperienced person performs any installation or wiring procedures incorrectly.
- Be sure that this unit is securely installed in accordance with this Instructions for the Electrical Installer. Electric shock or fire may result if any installation or wiring procedures are incorrectly performed.
- Only a qualified electrician should attempt to connect this system, in accordance with the instructions in this manual. Insufficient electrical circuit capacity or incorrect installation may cause electric shock and fire.
- Use the specified cables for the electrical connections, and connect the cables securely. Run and fasten the cables securely so that external forces or pressure placed on the cables will not be transmitted to the connection terminals. Overheating or fire may result if connections or attachments are not secure.
- Depending on the installation conditions and location, an earth leakage breaker may be required. If an earth-leakage breaker is not installed, there is a danger of electric shock or fire.
- The installation location requires the use of a circuit breaker. Failure to use a circuit breaker may result in electric shock or fire.
- Circuit breaker must be incorporated in the fixed wiring in accordance with the wiring regulations. The circuit breaker must be an approved 10-16 A, having a contact separation in all poles.

⚠ Caution

- Ground yourself to discharge static electricity before performing any wiring.

1 Material

<u>The package includes following items:</u>

- Controller box (Fig. 1-1)
- External power supply for DC 24V (Fig. 1-2)
- 2 pieces cable bushings M20 (Fig. 1-2)
- 3 pieces PAW-T10* (PCB + wire) (Fig. 1-3)

* It is necessary 1 piece for each indoor unit or group of indoor units.

<u>Required Installation material (field supplied):</u>

- Control wire min. 5 x 0,5 mm² (similar IEC 60227-5)
- Single wire LiY type 1 x 0,5 mm²
- 4 screws diameter 5 mm and wall plugs
- Set of standard electric installation tools

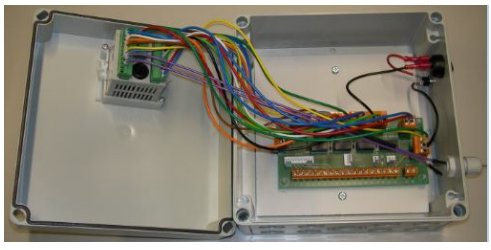


Fig. 1-1

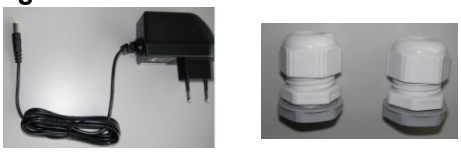


Fig. 1-2

Fig. 1-3

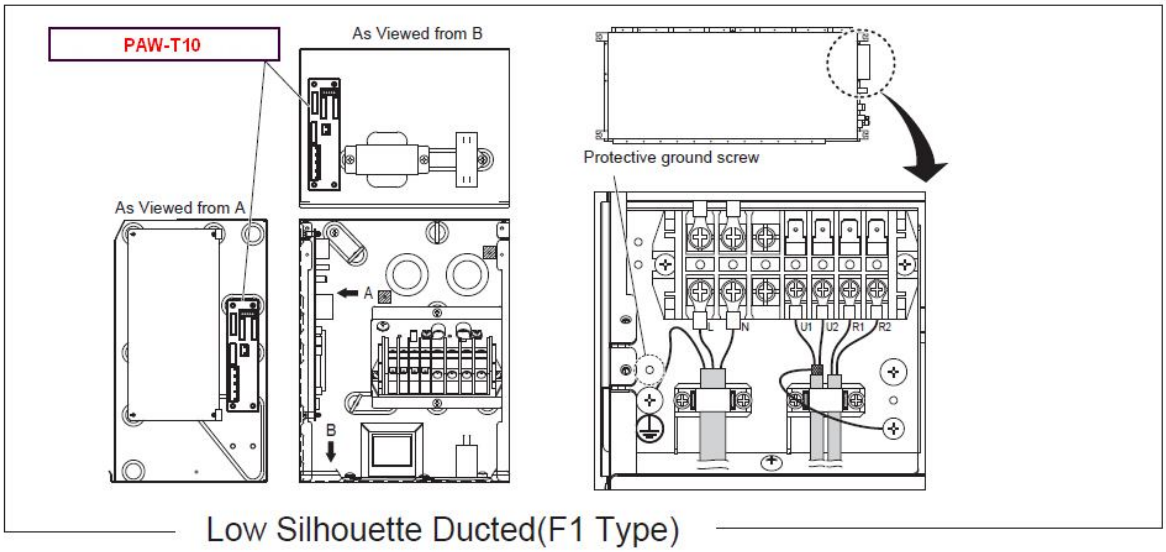
2 Installing

Note

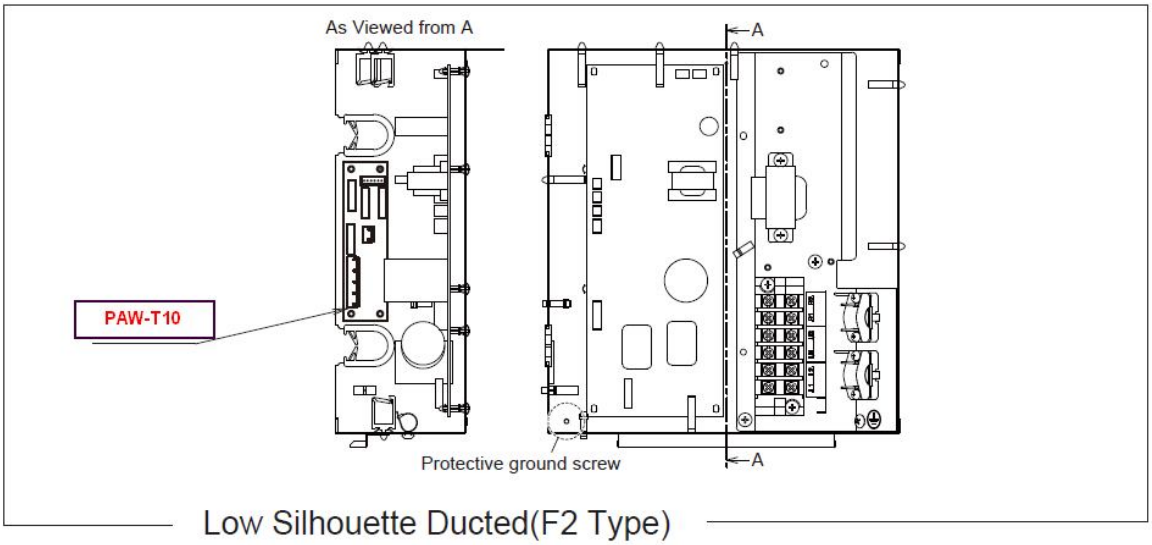
• Do not run the indoor/outdoor communication lines, input/output lines, and power cables through the same conduit, or twist those cables together, or place the cables near one another. It can cause malfunction.
• Install the main unit away from any sources of electrical noise.
• Avoid installing in any locations where the unit may come into contact with water, or in any extremely humid locations.
• Avoid installing in any location that is subject to excessive vibration or physical impacts.

1. Install PAW-T10 to each individual controlled indoor unit or to one single unit of each group (master or slave) by inserting the PCB holder into the appropriate holes.
2. Connect the supplied T10 wire to the T10 connector of the indoor unit main PCB (CN061 yellow) and to the T10 connector of the PAW-T10 PCB (T10 white)

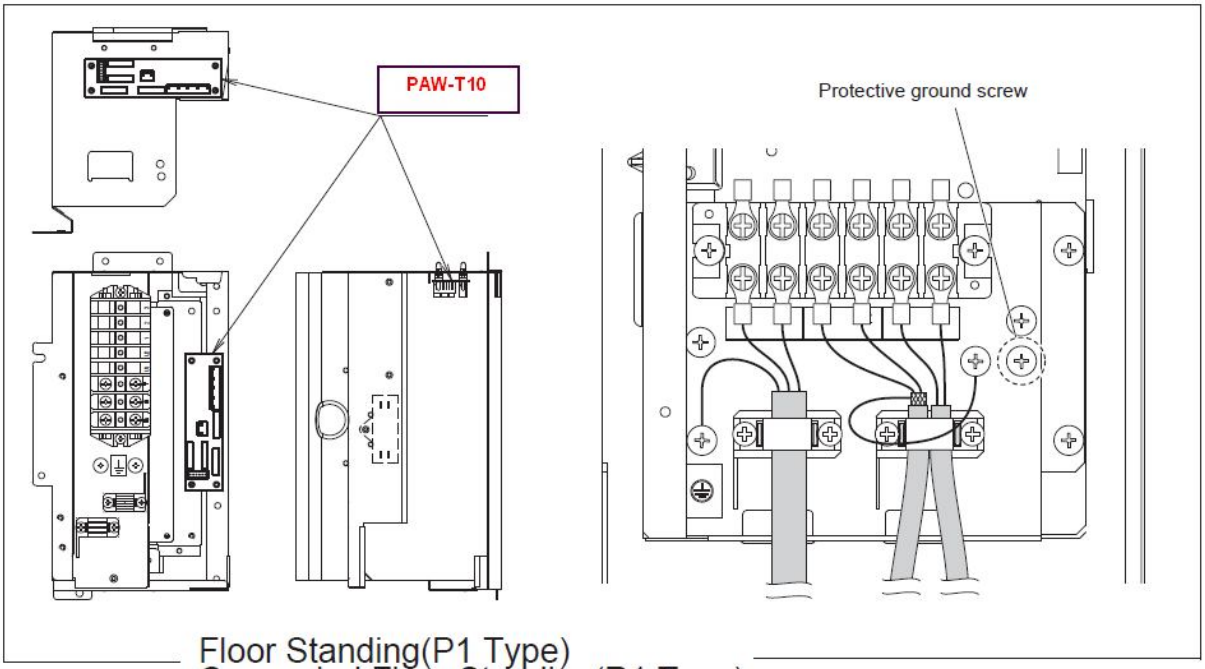
Figure of installation to each Indoor unit



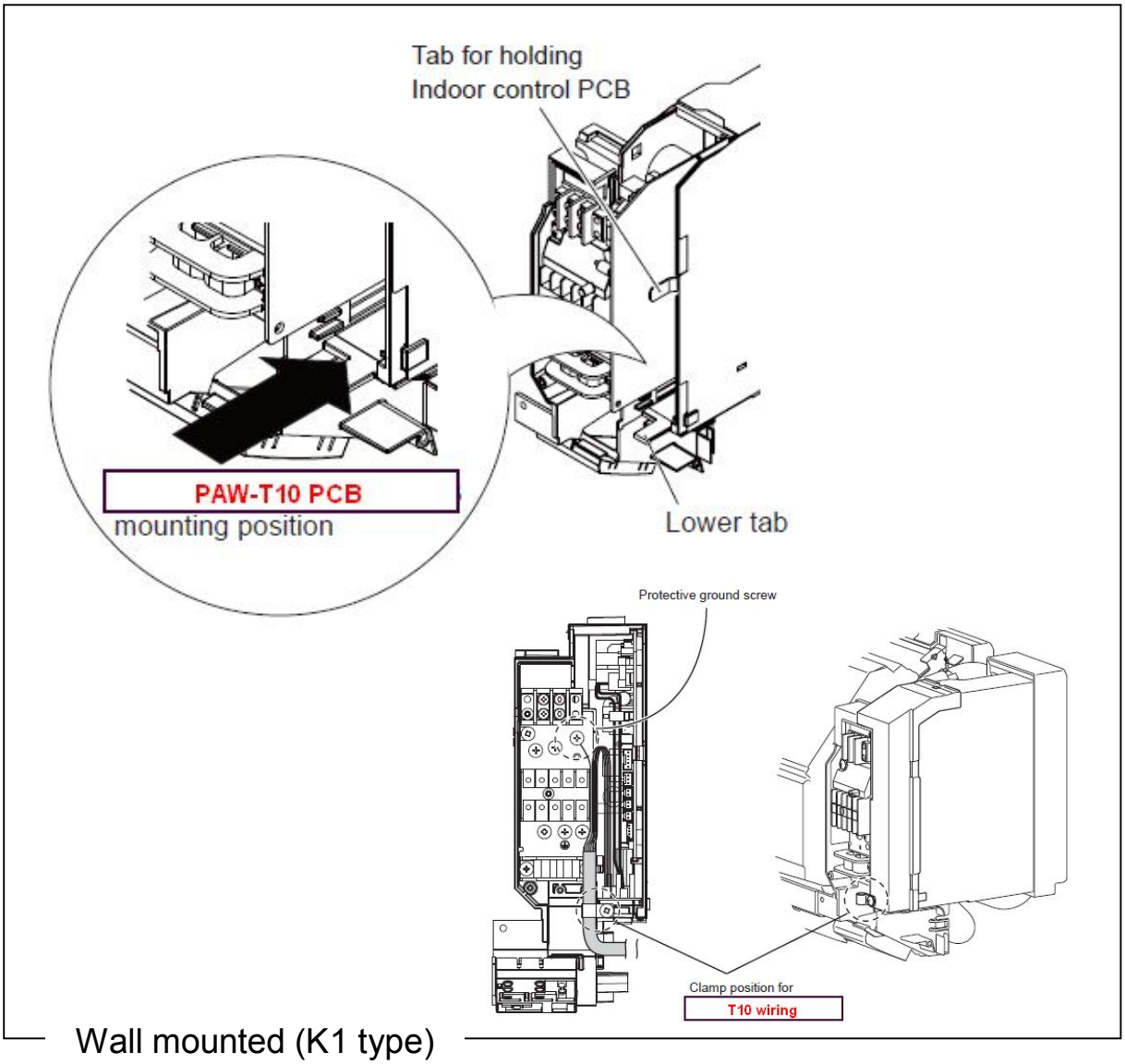
Low Silhouette Ducted(F1 Type)



Low Silhouette Ducted(F2 Type)

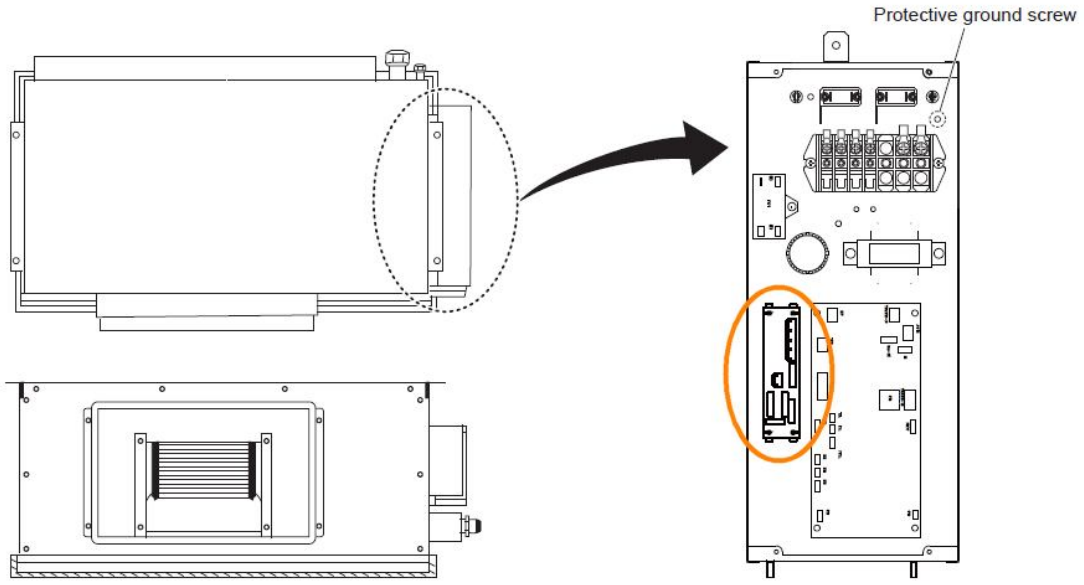


Floor Standing(P1 Type)
Concealed Floor Standing(R1 Type)

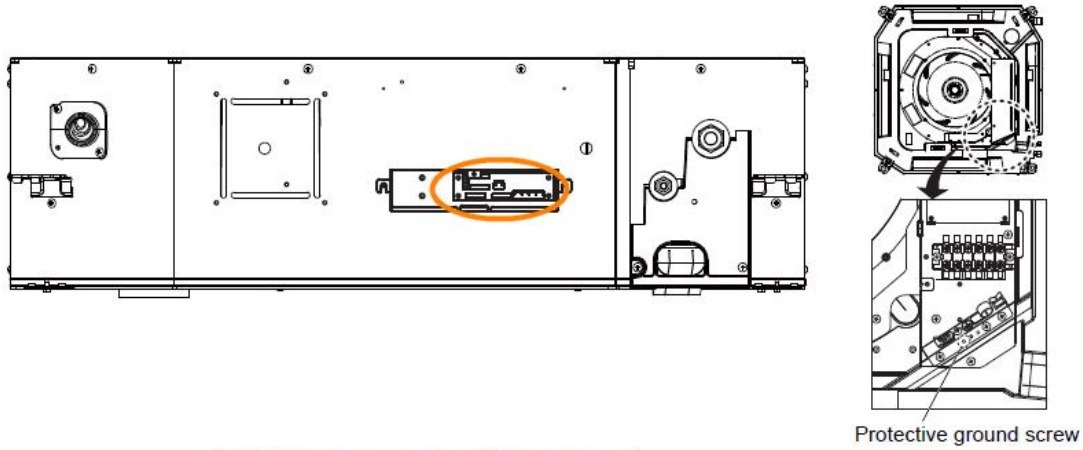


Wall mounted (K1 type)

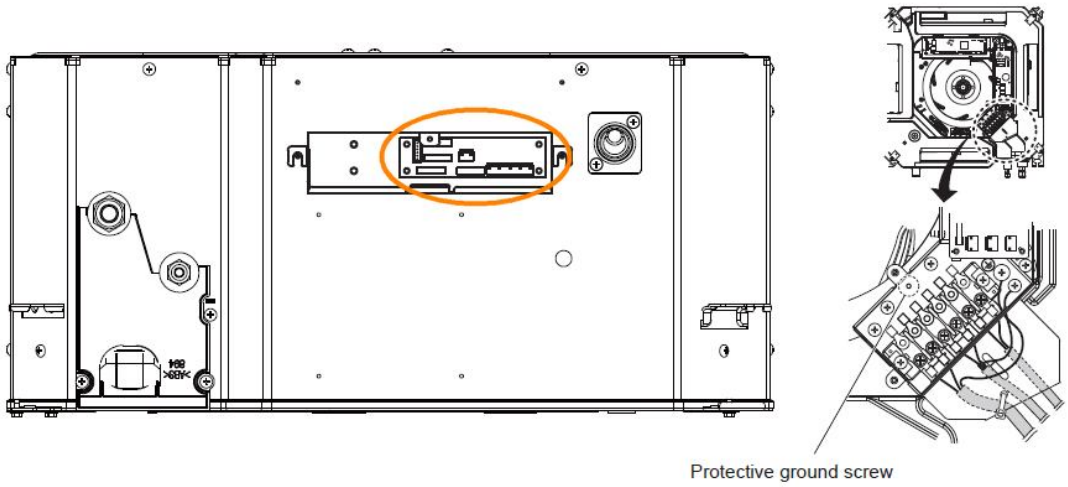
73-140 Type



High Static Pressure Ducted(E1 Type)

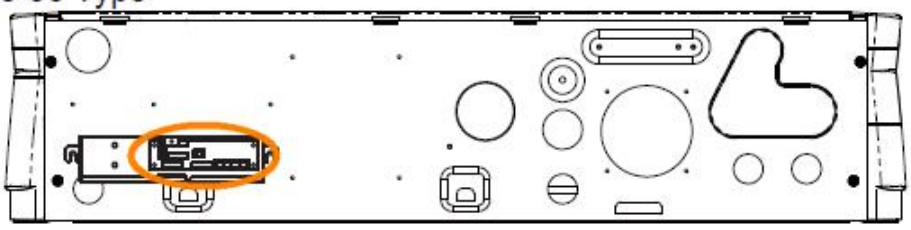


4-Way Cassette (U1 Type)

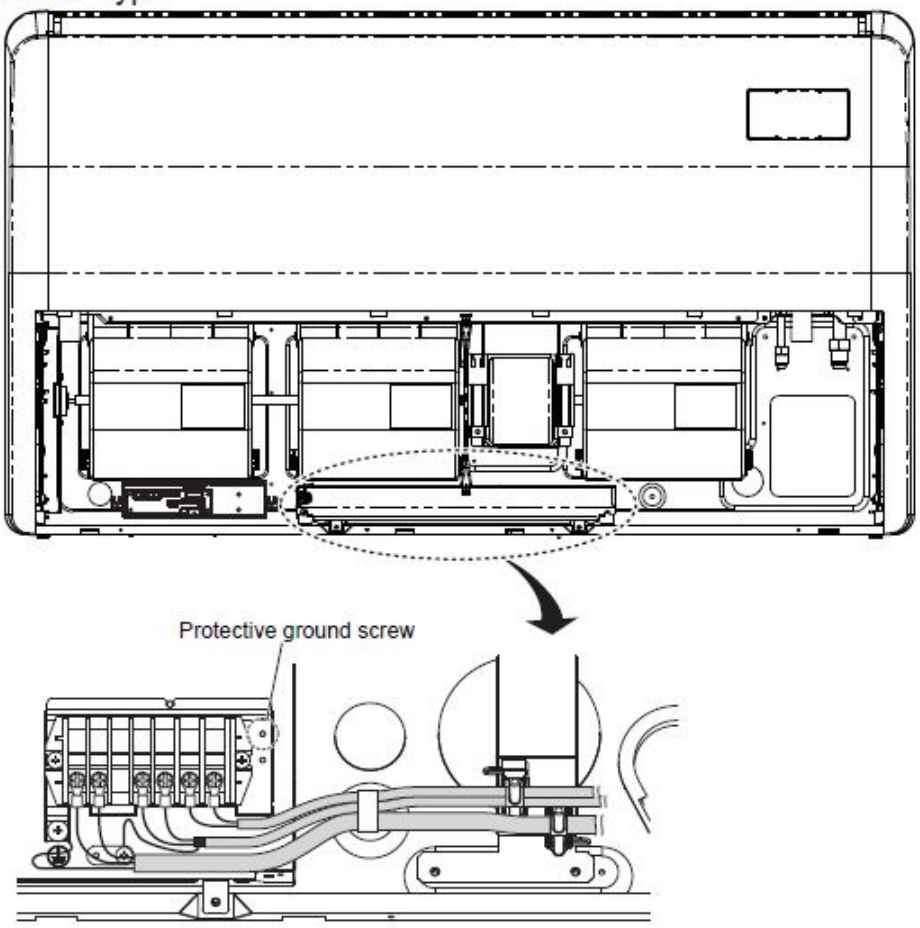


4-Way Cassette 60x60(Y1 Type)

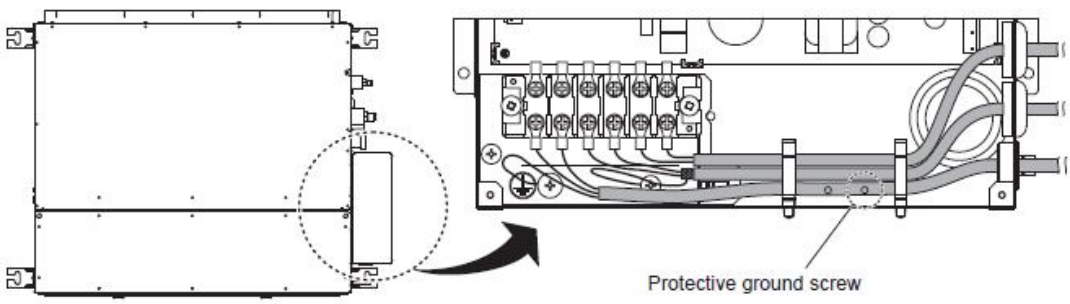
36-56 Type



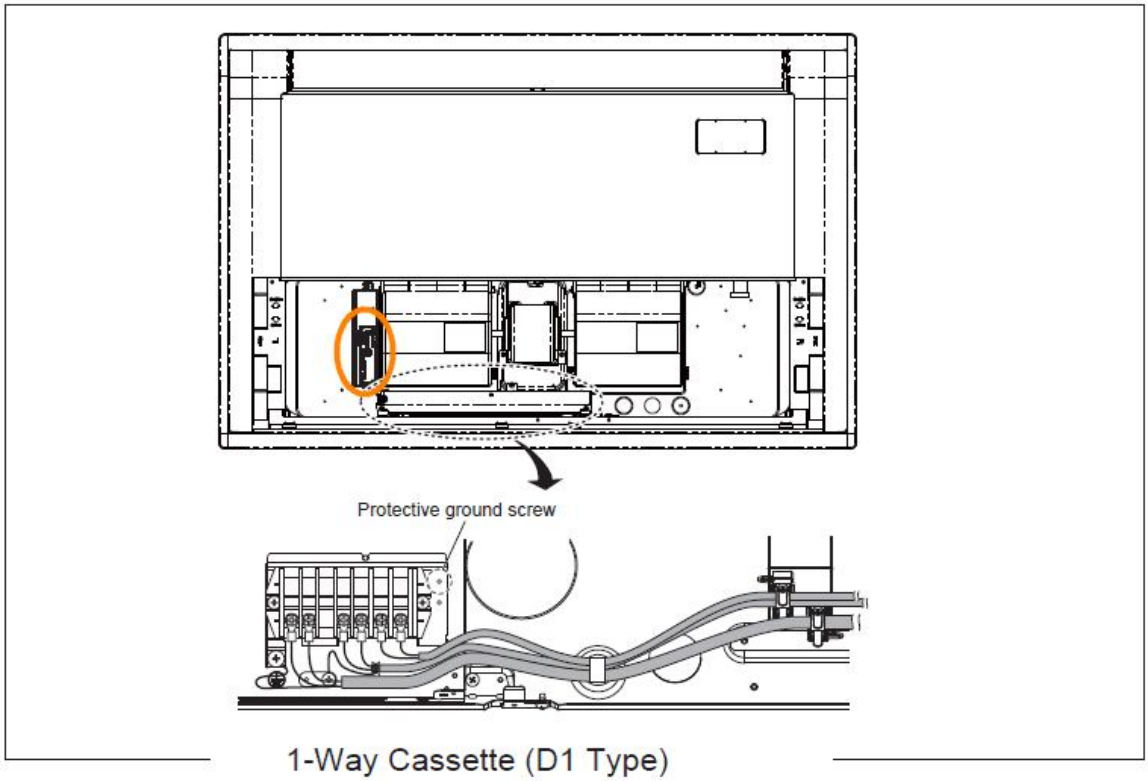
73-140 Type



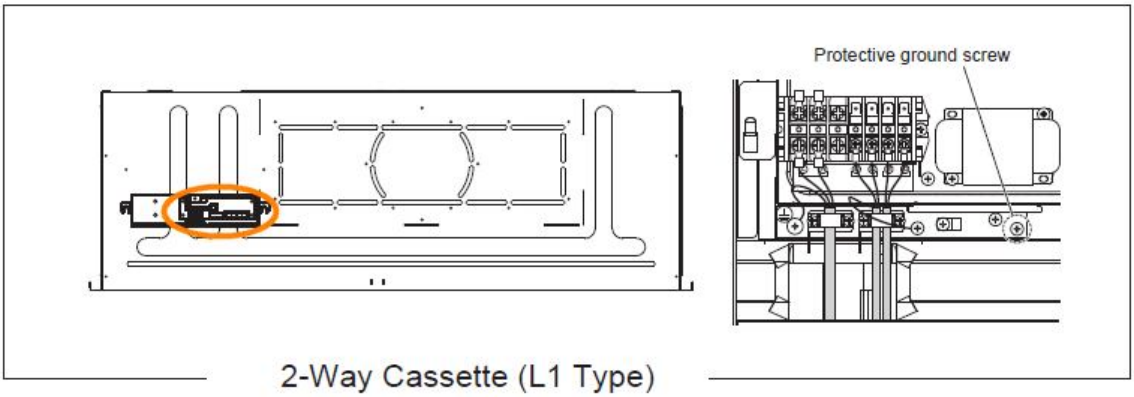
Ceiling (T1 Type)



Slim Low Static Ducted (M1 Type)



1-Way Cassette (D1 Type)



2-Way Cassette (L1 Type)

3. Determine the attachment position of the redundancy controller housing following these guidelines:

- Position ideally half way between the 2 indoor units or in the center of the 3 indoor units or of the group of units.
- Install so that the room temperature sensor (factory mounted on the left side of the box) is located at a representative room position. The sensor comes with a 1 m extension cable already fitted within the box. You may place the sensor also outside the box. In this case please use field supplied fixing material (such as small pipe clips). Please do not extend this wire by standard wires, as it is a thermocoupler element you need special extension cable for thermocouple elements type K) . The temperature sensor is flexible and may be ajusted according to local needs, however do not use force in order to not brake it.
- Maximum wire length between the control box and each of the indoor units must not exceed 10 m
- Within 1,5 m of the control box a 100 - 240V AC socket must be provided for the power supply
- Take especially care that the controller is not mounted near to an external heat source
- Take care that there is enough space to plug and unplug the power supply to the box (on the left side) and to be able switching the controller on/off. Free access must be provided to the front plate for the setup and wiring etc.

4. Prepare the holes in the wall according to the illustration here (Fig. 2-1)
Please use the holes, red marked in the drawing, under the screws of the cover.

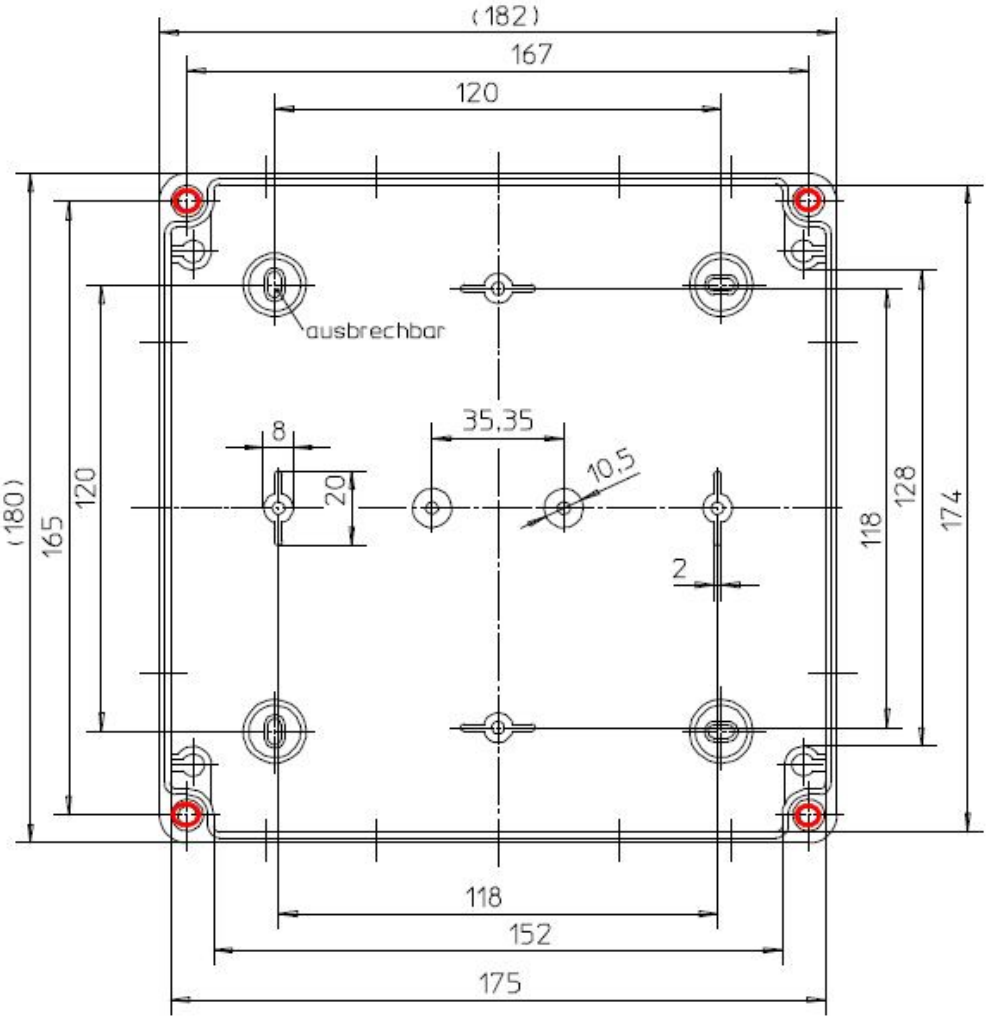


Fig. 2-1

3 Wiring

Always remove the power supply plug before installing or uninstalling the redundancy controller.

Open the 4 screws in the corners of the front cover and carefully lift the cover up, then you may turn it beside.

Caution Be careful, do not use force and do not let it hang down just by the internal wiring! (Fig. 3-1):

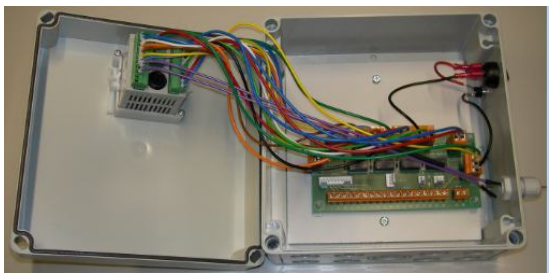
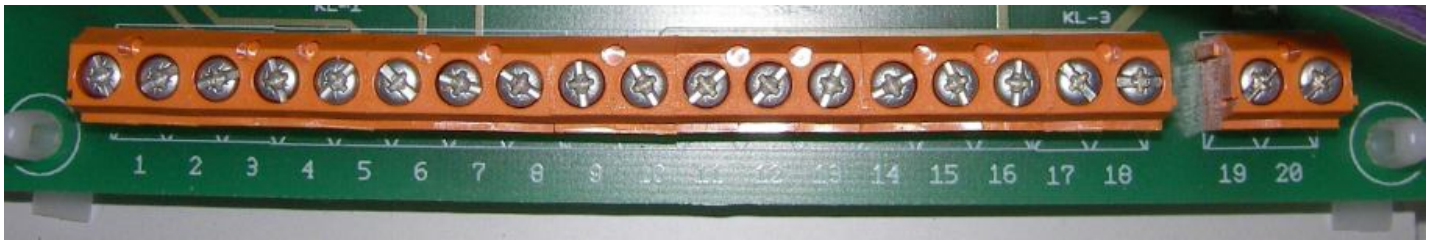


Fig. 3-1

Arrangement of the terminal board and switches

Fig. 3-2

Fig. 3-3



1	PE External Ground
2	Operation signal Unit 1 to PAW-T10 contact 6
3	Alarm signal Unit 1 to PAW-T10 contact 9
4	Operation signal Unit 2 to PAW-T10 contact 6
5	Alarm signal Unit 2 to PAW-T10 contact 9
6	Operation signal Unit 3 to PAW-T10 contact 6
7	Alarm signal Unit 3 to PAW-T10 contact 9
8	COM contact of Status Unit 1 to PAW-T10 contact 7
9	COM contact of Status Unit 2 to PAW-T10 contact 7
10	COM contact of Status Unit 3 to PAW-T10 contact 7
11	Start/Stop Unit 1 to PAW-T10 contact 2
12	Start/Stop Unit 1 to PAW-T10 contact 1
13	Start/Stop Unit 2 to PAW-T10 contact 2
14	Start/Stop Unit 2 to PAW-T10 contact 1
15	Start/Stop Unit 3 to PAW-T10 contact 2
16	Start/Stop Unit 3 to PAW-T10 contact 1
17	All Operation Signal COM
18	All Operation Signal NO contact
19	General Alarm Out NO contact
20	General Alarm Out COM

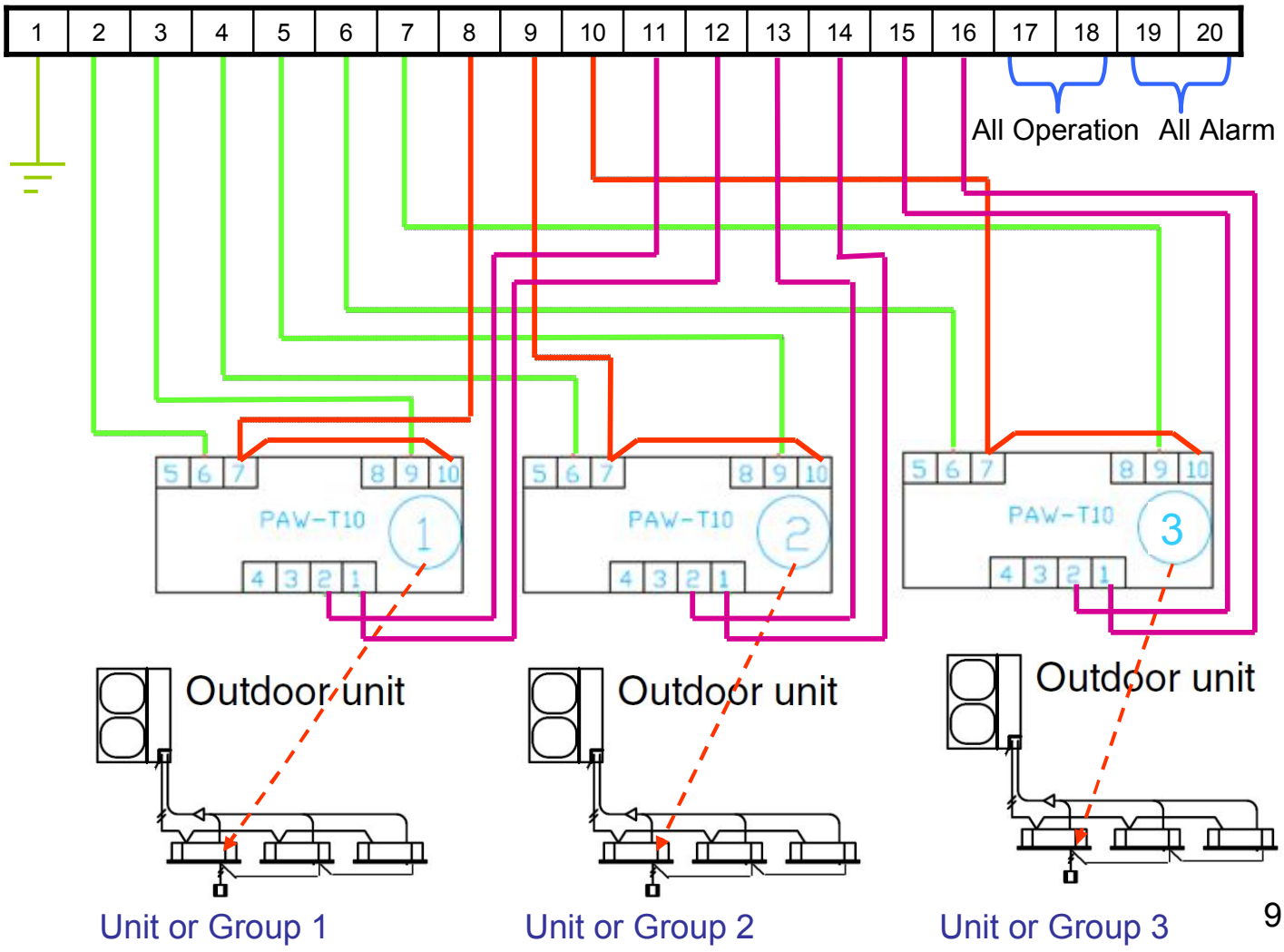
1. Connecting the power supply

- The unit can use AC power sources between 100 and 240 Volts.
- Connect the power supply to a nearby socket and the DC connector to the DC supply plug (Fig. 3-2) Connect the ground line securely to (1)
- Please do not connect the power supply until all other wiring is finished and the box is closed

2. Connecting the communication lines

- Use the field supplied 3 pieces minimum 5 x 0,5 mm² wires to connect each PAW-T10 (contacts 2, 3, 8, 11, 12 **unit 1** / contacts 4, 5, 9, 13, 14 **unit 2** / contacts 6, 7, 10, 15, 16 **unit 3** *(optional)*)
- Preferrably route the wires through the pre-cut holes in the bottom part, you may however choose any other of the pre-cut holes on the right side or the top. Please use the supplied M20 cable bushings. Even insertion by the backside is possible, however it may be difficult to run the wires then through the box under the internal mounting plate.
- The communication wires shouldn‘t exceed 10 m. In case you need a longer distance, please choose a bigger wiring diameter.
- Do not run the communication lines through the same conduit as any local power supply cable or run close to any power supply line (maintain at least 30 cm separation).
- On each PAW-T10 bridge the contacts 7 & 10 by using the 1 x 0,5 mm² wire.
- Optional you can connect the all alarm signal (contacts 19 & 20) to external BMS (max. 250 VAC 2A or 30 VDC 2A)
- Optional you can connect the all operation signal (contacts 17 & 18) to external BMS (max. 30 VDC 1 A or 110 VDC 0,3 A)

Basic Wiring Diagram



4 Setting the Indoor units

Before starting the redundancy controller please confirm following has been carried out:

• Each system has been completely started up: pressure test, evacuation, refrigerant filling, powering up, addressing and test run had been finished successfully. Please do not proceed before start up has been performed and good operation verified on each system.

• Each system is equipped with a remote controller (it can be any local or centralized controller which is suitable for that model).

1. Please cut the jumper JP001 on each indoor unit main PCB. (See Fig. 4-1.)

   This will convert T10 signals to static ones.

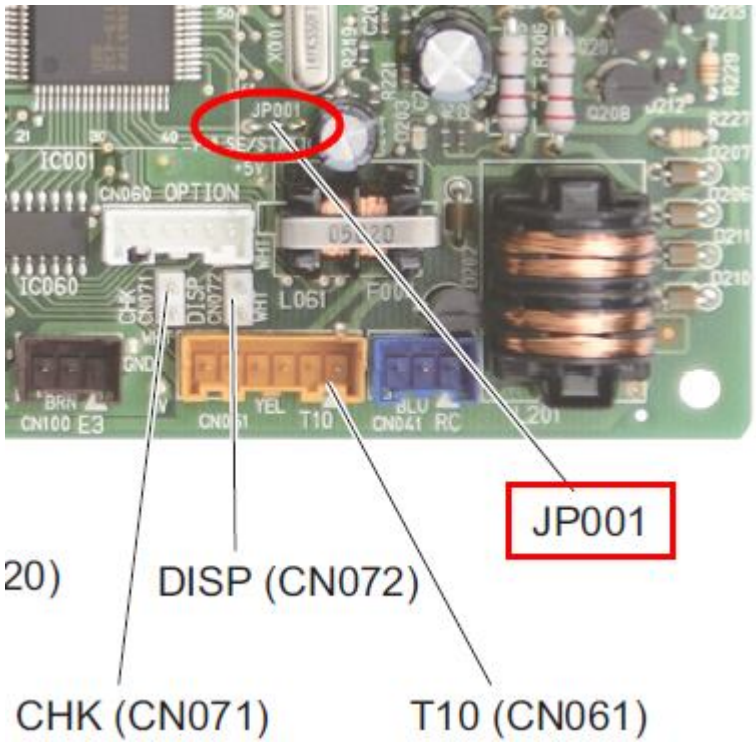


Fig.4-1

2. Set the 2 (or 3) indoor units (or groups) to the desired mode and temperature. Take care that it must be the same mode for all, in order to get the redundancy function and not make the units to work against each other.

5 Setting the Redundancy Controller

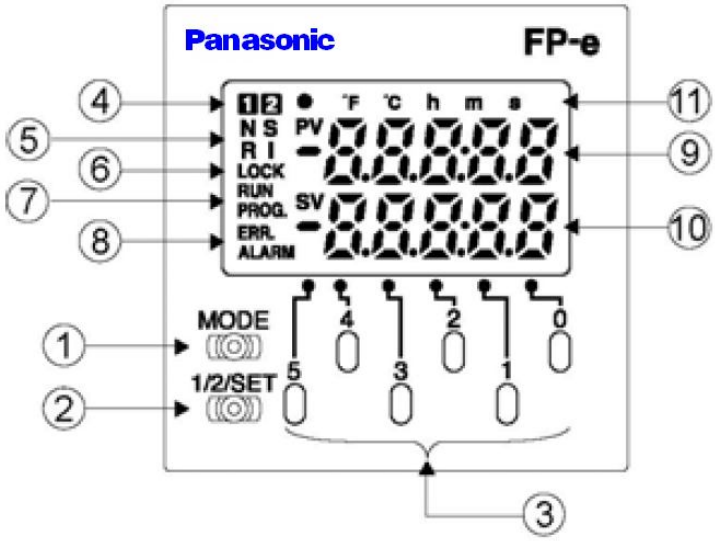


Fig. 4-1

① Display mode switch

Changes the display mode to the 8 different windows.

When the switch is pressed for 2 seconds or longer, the front switch key is locked. Pressing the switch once more for 2 seconds or longer it unlocks the key.

② Setting switch

When data has been changed, pressing the switch for one second or more, the new data is confirmed.

③ Front operation switches

Change the data. Pressing a switch of the digit for which you would like to change the numerical value during the data change adds one to the numerical value displayed. (Data display blinks during the data change). #5 is used to start stop operation.

④⑤ No special meaning in this case

⑥ Lock display

Shows that the switches are locked

⑦ RUN/PROG. Display

Displays the operation mode (RUN or PROG.)

⑧ ERR./ALARM display

Indicates when an error or an alarm occurs

ERR. : Lights up if an error is detected during the self diagnostic function

ALARM : Lights up if a hardware error occurs, or if operation slows because of the program and the watchdog is activated

⑨ Data display (Upper section)

Displays the data in the upper line in green, orange or red, depending on the chosen screen

⑩ Data display (Upper section)

Displays the data in the lower line in green, orange or red, depending on the chosen screen

⑪ Setting display

Indications (e.g. ● = control operation ON; °C; h = hours)

After confirming that wiring is finished and verified that indoor units are ready to operate (see 4.) you can set up the redundancy controller.

1. Plug in DC power to the DC power connection and switch the unit ON. Take care that firstly the external power supply has been connected to a socket, then switch the controller on. Never switch first on, then insert the power supply, this may damage the controller. Similar for switching the controller off: Firstly switch off by the on/off knob, then cut the power supply.
2. Immediately after switching the controller to on, it will automatically switch the indoor units on/off for just some Milliseconds and check if 2 or 3 indoor units (or groups) are connected. If not all connected units are detected at that time (because maybe power supply missing on indoor or outdoor unit(s)), the program will not run properly. In this case you can simply switch the controller off/on again to repeat the automatic detection. Normal status is indicated by a green screen (Fig. 4-2):

Initial screen:

Actual detected room temperature is shown

Fig. 4-2

3. Pressing the << MODE >> button shortly (less than 2 seconds) toggles between the 8 available screens. Press it 2 times to get to the mode setting screen (All setting screens are in orange color). Here you can set the mode “cool“ or “heat“ with the button <<0>>. Depending on the chosen mode alarms or cascade control will be executed either with rising or descending temperature.
4. Press again the << MODE >> button shortly (less than 2 seconds) to get to the limit temperature 1 setting screen (Fig. 4-3). Upper line indicating “E 1“. Here you can set the first limit temperature above which the external alarm should be activated between 16 … 30°C (cool) and 24 … 50°C (heat) in 0,1 K steps.

   Press << 0 >> for the digits after the comma, press << 1 >> for the ones and << 2 >> for the tenths. If you exceed the limit, by default the next highest or lowest limit is chosen after confirmation.

   Finish the temperature limit 1 setting by pressing shortly the << 1/2/SET >> button.

Fig. 4-3

5. Press again the << MODE >> button shortly (less than 2 seconds) to get to the limit temperature 2 setting screen. Upper line indicating “E 2“. Here you can set the second limit temperature above which the 2nd unit and / or the external alarm should be activated between 20 … 40°C (cool) and 18 … 45°C (heat) in 0,1 K steps.

   Press << 0 >> for the digits after the comma, press << 1 >> for the ones and << 2 >> for the tenths. If you exceed the limit, by default the next highest or lowest limit is chosen after confirmation.

   Finish the temperature limit 2 setting by pressing shortly the << 1/2/SET >> button.

6. Press again the << MODE >> button shortly (less than 2 seconds) to get to the limit temperature 3 setting screen. Upper line indicating “E 3“. Here you can set the third limit temperature above which the 3rd unit and / or the external alarm should be activated between 20 … 40°C (cool) and 18 … 45°C (heat) in 0,1 K steps.

   Press << 0 >> for the digits after the comma, press << 1 >> for the ones and << 2 >> for the tenths. If you exceed the limit, by default the next highest or lowest limit is chosen after confirmation.

   Finish the temperature limit 2 setting by pressing shortly the << 1/2/SET >> button.

7. Press again the << MODE >> button shortly (less than 2 seconds) to get to the time period setting screen (Fig. 4-4). Here you can set the time intervall after which the operation changes between the units. By default operation always starts with unit 0, then unit 1, followed by unit 2 (if any).

   Press << 0 >> for the the ones and << 2 >> for the tenths. If you exceed the limit, by default the next highest or lowest limit is chosen after confirmation. It is possible to select 1 … 24 hours in one hour steps.

   Finish the time period setting by pressing shortly the << 1/2/SET >> button.

Fig. 4-4

8. Press again the << MODE >> button shortly (less than 2 seconds) to get to the alarm temperature activation screen. Upper line indicating “Alarm“, lower line indicating “on“ or “off“. Here you can set if an alarm should be output when a temperature limit has been exceeded or not.

   Press << 0 >> to toggle between “on“ and “off“.

9. Press again the << MODE >> button shortly (less than 2 seconds) to get to the initial main screen (Fig. 4-5). Now you are ready to start the operation by simply pressing the button << 5 >>. The ● symbol will light up in the upper left corner to show that operation is in progress.

   You may stop the redundancy operation at any time by simply pressing button << 5 >> in this screen again. The ● symbol will go off then.

Fig. 4-5

10. If you want to check, which unit is actually under operation, you may press again the << MODE >> button shortly (less than 2 seconds) to get to the unit indication screen (Fig. 4-6). Here you can see in the upper line the actual operating unit number (0 = unit 1, 1 = unit 2, 2 = unit 3). In the lower line you can see the set switch over time value (e. g. 1 hour). No settings are available in this screen.

Fig. 4-6

11. Don‘t forget to switch back to the main screen with temperature display (press << MODE >> button several times until you see the green screen with the temperature display.

In case of any alarm occuring, the display will automatically jump to the red alarm display (Fig. 4-7) and an alarm signal is output. During an alarm you can still go to the other screens. In the main screen however the alarm will be displayed as long as there is an alarm present.

Fig. 4-7

Following will cause an alarm:

- Set temperature limit is exceeded in case Alarm is set to “on“
- Any of the units outputs an alarm

In case any of the set temperature limits is exceeded, this alarm can be rest by simply pressing the <<1/2/SET>> button.

In case any of the units outputs an alarm, that alarm can not be reset manually, it will automatically reset by following conditions:

- All indoor units do not output an alarm any more (In that case there is a time delay to avoid loosing an alarm too fast if someone switches the unit off, or if the unit is cycling to off. This alarm will only be reset, if the unit switches back to on – either manually or by cycling control – and operates well for at least 15 seconds.)

6 Operation

You can use this controller for either redundancy control or cascade control of 2 or 3 units in cooling or heating mode with the surveillance option by alarm and operation output signals. It is provided with the material for using with Panasonic PACi, ECOi or ECO-G indoor units, however it can be used for any electrical activated device.

• If the first temperature threshold limit is either exceeded (during cool mode) or undershoot (during heat mode) an alarm will be output in case this option has been activated.

• If the second temperature threshold limit is either exceeded (during cool mode) or undershoot (during heat mode) a second unit will be started and optional an alarm will be output.

• If the third temperature threshold limit is either exceeded (during cool mode) or undershoot (during heat mode) a third unit will be started and optional an alarm will be output.

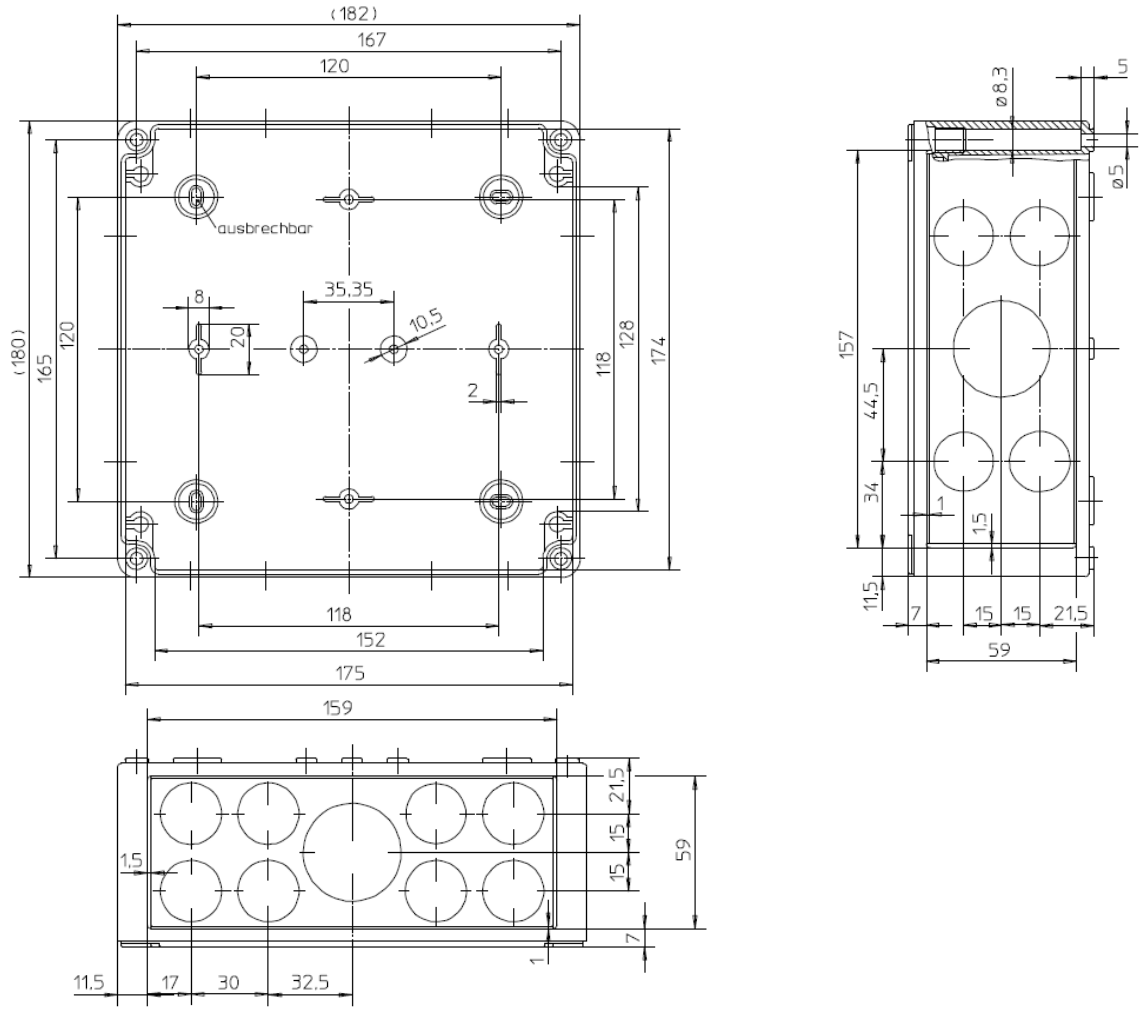
• After cycling time has passed, the leading unit automatically is changed in order to achieve same operation time on all units.

• In case of any unit stopping by an unit internal alarm, automatically the next unit is started and an alarm signal is output.

7 Specifications

Rated voltage	Single phase 100-240V~
Rated frequency	47 - 63 Hz
Power consumption	7 W max
Operating temperature	0 to +55°C (power supply 0 to +40°C)
Operating humidity	30 to 85% (no condensation)
Storage temperature	-20 to +70°C
Allowed momentary power off time	10 ms
Vibration resistance	10 to 55 Hz, 1 cycle/min Double amplitude: 0.75 mm, 10 min. on X, Y, and Z axes
Shock resistance	98 m/s², 4 times on X, Y and Z axes
Noise resistance	1000V (p-p) with pulse widhts 50 ns 1 μs (based on in-house measurements)
Operating condition	Free from corrosive gases and excessive dust
Protection	IP66-compliant (Only when cabling is inserted properly)
Weight	Approx. 1160 g (without packing material)

8 Outer Dimensions



Power supply:	75 x 34 x 43 mm
Temperatuer sensor shaft:	L = 50 mm; D = 1,5 mm