

## INSTALLATION INSTRUCTION



### GENERAL

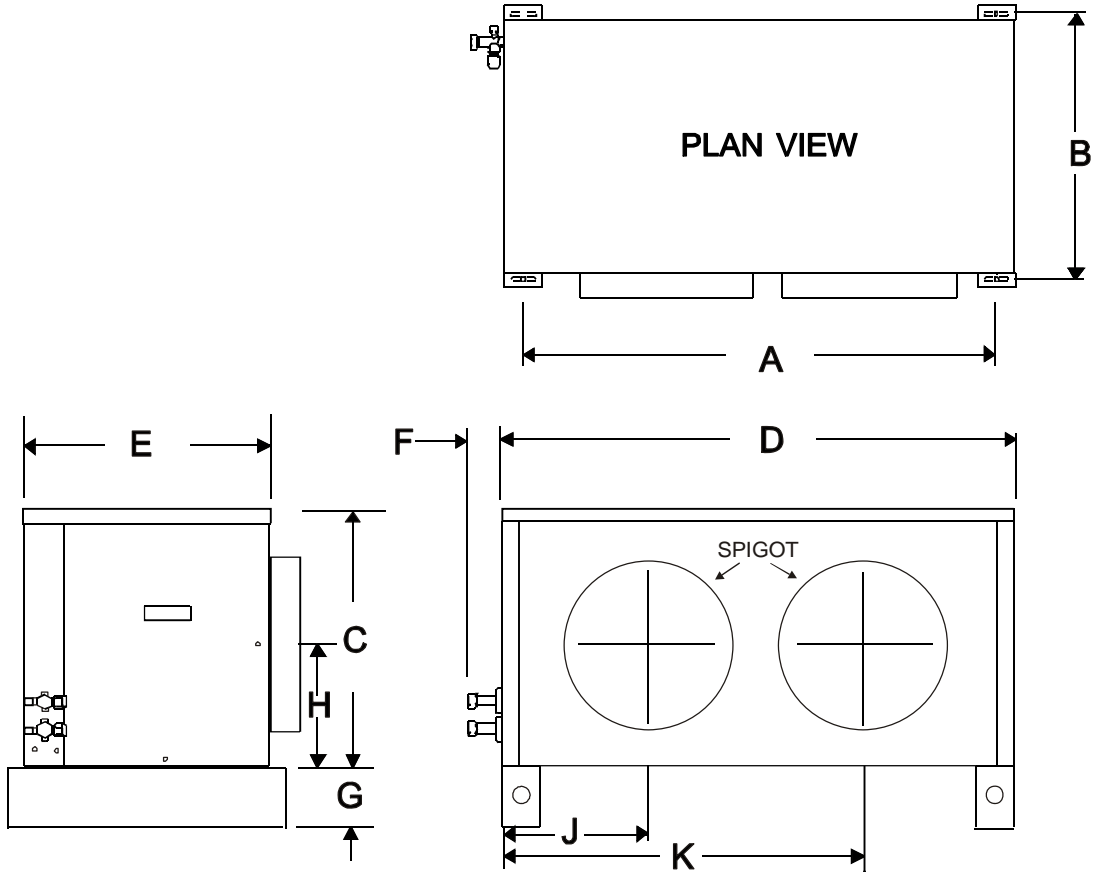
1. TEV Ltd recommend that personnel working on this equipment be skilled and fully conversant with the appropriate Air Conditioning, Refrigeration and Electrical practices and have sound knowledge of current Industrial Safe Working practices.
2. These units contain live electrical components, moving parts and refrigerant under pressure. Always site out of reach of children and protect from vandalism.
3. The units have fan speed control, start delay timer, HP and LP switches and a contactor fitted as standard
4. The data plate only gives information for the outdoor unit. For system details add input power and current of indoor and outdoor unit, including any heater load.
5. FUSES- for recommended fuse size see indoor unit instructions.

# CONTENTS

| ITEM | DESCRIPTION          | QUANTITY |
|------|----------------------|----------|
| 1    | Stabilizing brackets | 4        |
| 2    | No10 Screws          | 8        |
| 3    | Cable glands         | 2        |

**NOTE:** Units are supplied with a polystyrene packing piece supporting the blower assembly, this **MUST** be removed prior to commissioning.

## DIMENSIONS & WEIGHTS



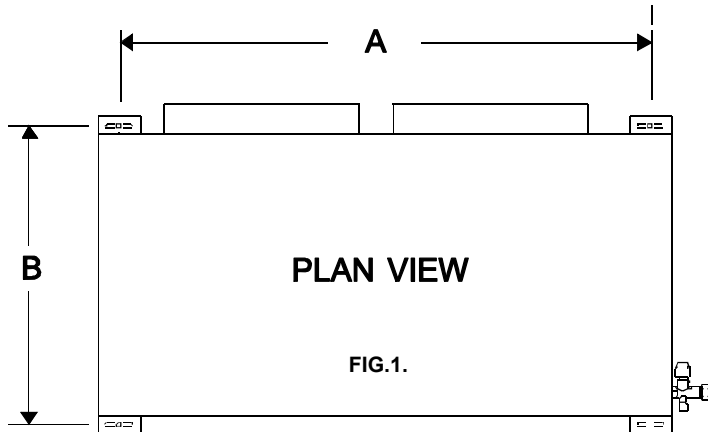
| Model         | A    | B   | C   | D    | E   | F  | G   | H   | J   | K   | Spigot Ø | Weight (kg) |
|---------------|------|-----|-----|------|-----|----|-----|-----|-----|-----|----------|-------------|
| DCU+ 15       | 930  | 510 | 495 | 1004 | 490 | 65 | 65  | 210 | 317 | 717 | 354      | 69          |
| DCU+ 20       | 930  | 510 | 495 | 1004 | 490 | 65 | 65  | 210 | 317 | 717 | 354      | 70          |
| DCU+ 30       | 930  | 510 | 495 | 1004 | 490 | 65 | 65  | 210 | 317 | 717 | 354      | 70          |
| DCU+ 40       | 930  | 510 | 495 | 1004 | 490 | 65 | 65  | 210 | 317 | 717 | 354      | 72          |
| DCU+ 50       | 1100 | 510 | 560 | 1174 | 490 | 65 | 65  | 240 | 392 | 865 | 404      | 81          |
| DCU+ 60       | 1100 | 510 | 560 | 1174 | 490 | 65 | 65  | 240 | 392 | 865 | 404      | 81          |
| DCU+ 80       | 1100 | 510 | 560 | 1174 | 490 | 65 | 65  | 240 | 392 | 865 | 404      | 84          |
| DHPU(E)(L) 15 | 930  | 510 | 495 | 1004 | 490 | 65 | 120 | 210 | 317 | 717 | 354      | 75          |
| DHPU(E)(L) 20 | 930  | 510 | 495 | 1004 | 490 | 65 | 120 | 210 | 317 | 717 | 354      | 75          |
| DHPU(E)(L) 30 | 930  | 510 | 495 | 1004 | 490 | 65 | 120 | 210 | 317 | 717 | 354      | 77          |
| DHPU(E)(L) 40 | 1100 | 510 | 560 | 1174 | 490 | 65 | 120 | 240 | 392 | 865 | 404      | 86          |
| DHPU(E)(L) 50 | 1100 | 510 | 560 | 1174 | 490 | 65 | 120 | 240 | 392 | 865 | 404      | 95          |
| DHPU(E)(L) 60 | 1100 | 510 | 560 | 1174 | 490 | 65 | 120 | 240 | 392 | 865 | 404      | 98          |

# MOUNTING

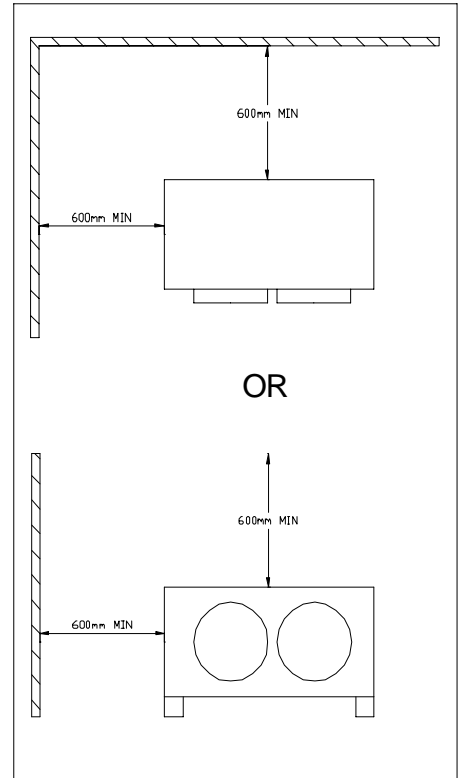
Ducted units are designed to be hung on a wall (brackets available as a kit), suspended from a ceiling (installer supplied fittings), or to stand on a flat surface. Whichever method is used it is essential that the mounting surface is capable of supporting the unit's weight. Leave space around the unit for air circulation and access for installation and maintenance.

## FLOOR MOUNTING

Using the appropriate side of the packing carton as a template, (centres marked A), mark out and drill 4 holes to suit maximum M8 bolts (also see Fig. 1). Secure the unit to the floor. Discard the 4 stabilizing brackets and 8 screws.



| DCU+     | DHPU(E)(L) | A (mm) | B (mm) |
|----------|------------|--------|--------|
| 15 to 40 | 15 to 30   | 930    | 510    |
| 50 to 80 | 40 to 60   | 1100   | 510    |



## SUSPENSION MOUNTING

The installer must supply 4 x M8 threaded rods with 16 nuts and washers to suit.

**IMPORTANT:** The stabilizing brackets provided **MUST** be used when suspending a unit. Fit the stabilizing brackets to the top corners of the backpanel and front face using the No. 10 screws provided, (2 per bracket). If these brackets are omitted the unit will be subject to unacceptable movement on compressor start (Fig. 2).

Where long drops of M8 rod are used, it is advisable to incorporate flexible pipes in the suction and expansion lines.

Using the template printed on the side of the packing carton, (centres marked A), mark out the ceiling and drill 4 holes to suit M8 screwed rod, (see Fig. 1). Raise the unit to the required height and pass the screwed rods through the mounting holes in the units feet and stabilizing brackets. Secure the unit with a nut and washer on either side of each stabilizing bracket and two nuts and washers underneath each foot mounting hole, (Fig. 2).

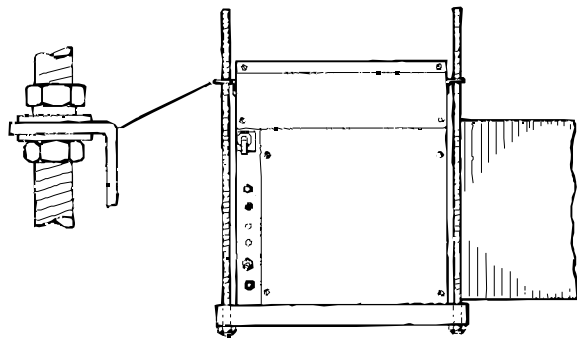


FIG.2.

## WALL MOUNTING

Wall mounting brackets are available as an optional Kit (53200407)

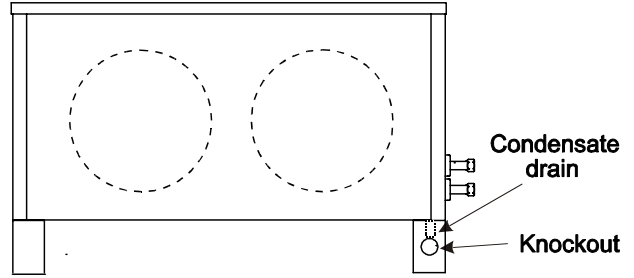
## CONDENSATE DRAIN DHPU(E)(L)

### CONDENSATE DRAIN DHPU(E)(L)

The DHPU(E)(L) coil will act as an evaporator during the heating cycle and create water. **A condensate drain must be fitted.**

Remove the plate from the valve end mounting foot and fit a 22mm ID hose to the copper stub. Route the hose through one of the knockouts.

A 5m head condensate pump kit (54300452) is available for applications where gravity drain is not possible.



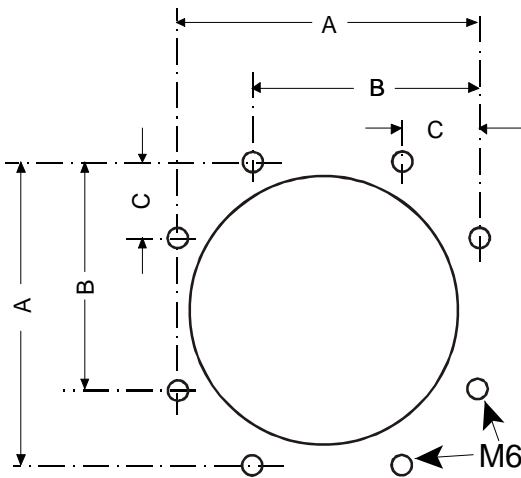
## DUCTWORK

Each unit is supplied with air inlet and discharge spigots.(see page 2 for sizes)

These may be used for connecting installers ducting or used with the optional duct, plenum and grille kits (refer to kit instructions for installation)

The front face of the units are fitted with M6 rivnuts to accept installers supplied square ducting, see dimensions below. Maximum flange width is 25mm and fixing holes should be central within them.

**NOTE:** It is essential that ducting is adequately insulated to prevent sweating. An insulation thickness of at least 45mm is recommended.



| DCU+     | DHPU(E)(L) | A (mm) | B (mm) | C (mm) |
|----------|------------|--------|--------|--------|
| 15 to 40 | 15 to 30   | 400    | 300    | 100    |
| 50 to 80 | 40 to 60   | 450    | 350    | 100    |

## PIPEWORK

- 1 To maximise performance, pipe runs should be kept as short as possible. However, individual pipe runs to a maximum of 80m (50m on sizes 15 & 20) including 20m lift are permissible, provided good refrigeration practice is followed.

Performance rating is based on 7.5m pipe runs. Correctly sized pipes for each installation and fitting the correct expansion orifice will result in no significant loss of capacity on extended pipe runs.

- a Pipe sizes are based on:-
  - Minimum of 3.8 m/s (750 fpm) suction gas velocity for horizontal or downflow.
  - Minimum of 7.6 m/s (1500 fpm) suction gas velocity for upflow.
  - Maximum of 15.2 m/s (3000 fpm) suction gas.
- b Where vertical risers exceed 5m, oil traps must be formed in the pipe. This will help ensure that oil returns to the compressor. Typically fit an oil trap every 3m with a trap at the bottom of the riser.

- 2 The maximum pipe lengths to be used for each pipe size and outdoor unit are shown in the table below. Use of these sizes and lengths is recommended in order to achieve optimum system performance. Smaller suction line sizes may be used but will impose a loss in performance of approximately 2% per 1K additional suction line pressure drop on total cooling and approximately 1% on sensible cooling.

| UNIT                 | MAXIMUM LENGTH OF EQUIVALENT SUCTION LINE PIPE SIZES (m) |     |     |     |     | EXPANSION LINES |     |     | RESTRICTOR IN OUTDOOR UNIT |       |     | FACTORY CHARGE (g)  |
|----------------------|--|-----|-----|-----|-----|-----------------|-----|-----|----------------------------|-------|-----|---------------------|
|                      | 3/8  | 1/2 | 5/8 | 3/4 | 7/8 | 3/8             | 1/2 | 5/8 | FITTED                     | LOOSE | HTG |                     |
| <b>DCU+ 15</b>       | 7.5  | 30  | 50  |     |     | 50              |     |     | 32                         | -     | -   | <b>R407C</b><br>660 |
| <b>DCU+ 20</b>       | 7.5  | 23  | 50  |     |     | 50              |     |     | 35                         | -     | -   | 930                 |
| <b>DCU+ 30</b>       |  | 15  | 50  | 80  |     | 50              | 80  |     | 39                         | -     | -   | 990                 |
| <b>DCU+ 40</b>       |  | 10  | 36  | 80  |     | 7.5             | 80  |     | 41                         | 43    | -   | 1050                |
| <b>DCU+ 50</b>       |  | 7.5 | 18  | 50  | 80  | 7.5             | 50  | 80  | 43                         | -     | -   | 1250                |
| <b>DCU+ 60</b>       |  |     | 14  | 36  | 80  | 7.5             | 50  | 80  | 50                         | -     | -   | 1190                |
| <b>DCU+ 80</b>       |  |     | 11  | 30  | 80  |                 | 50  | 80  | 58                         | -     | -   | 1480                |
| <b>DHPU(E)(L)15</b>  | 7.5  | 30  | 50* |     |     | 50              |     |     | 32                         | -     | 27  | 870                 |
| <b>DHPU(E)(L) 20</b> | 7.5  | 23  | 50  |     |     | 50              |     |     | 33                         | -     | -   | 1090                |
| <b>DHPU(E)(L) 30</b> |  | 15  | 50  | 80  |     | 50              | 80  |     | 39                         | -     | 37  | 1000                |
| <b>DHPU(E)(L) 40</b> |  | 10  | 36  | 80  |     | 7.5             | 80  |     | 43                         | -     | -   | 1220                |
| <b>DHPU(E)(L) 50</b> |  | 7.5 | 18  | 50  | 80  | 7.5             | 50  | 80  | 49                         | -     | 44  | 1080                |
| <b>DHPU(E)(L) 60</b> |  |     | 14  | 36  | 80  | 7.5             | 50  | 80  | 52                         | 55    | 53  | 1570                |

\* Use one pipe size smaller for vertical risers (max. rise 20m)

**DCU+ UNITS ARE SUPPLIED FITTED WITH RESTRICTORS SUITABLE FOR IMPACT UNITS, NO CHANGES REQUIRED. FOR OTHER INDOOR UNITS REFER TO THE INDOOR UNIT INSTRUCTIONS FOR POSSIBLE RESTRICTOR CHANGES.**

**DHPU(E)(L) ARE SUPPLIED FITTED WITH RESTRICTORS SUITABLE FOR USE WITH IMPACT AND 600 CASSETTE INDOOR UNITS, NO CHANGES ARE REQUIRED. FOR OTHER INDOOR UNITS REFER TO THE INDOOR UNIT INSTRUCTIONS FOR POSSIBLE RESTRICTOR CHANGES.**

- 3 In calculating equivalent lengths of pipe runs, the effect of bends and fittings must be taken into account. The table below covers fittings most likely to be encountered in this type of installation. The equivalent lengths of all fittings in a particular pipe run must be added together and the total added to the actual length of pipe in the run, in order to calculate its total equivalent length.
- 4 Use the shortest possible route, avoiding sharp bends.
- 5 Fully insulate both the suction and expansion lines, including the expansion device, since both lines may sweat.

| FITTING LOSSES, in equivalent straight lengths of pipe (m) |  |                      |      |                     |      |       |
|--|--|----------------------|------|---------------------|------|-------|
| Fitting  | Pipe Size (outside diameter in inches) |                      |      |                     |      |       |
|  | 3/8                                    | 1/2                  | 5/8  | 3/4                 | 7/8  | 1 1/8 |
| 45° Bend   | 0.12                                   | 0.15                 | 0.18 | 0.21                | 0.24 | 0.3   |
| 90° Bend R/d = 1   | 0.37                                   | 0.43                 | 0.49 | 0.55                | 0.61 | 0.79  |
| 90° Bend R/d = 1.5   | 0.24                                   | 0.27                 | 0.30 | 0.37                | 0.43 | 0.52  |
| 180° Bend C/d = 1.5  | 0.73                                   | 0.91                 | 1.10 | 1.28                | 1.46 | 1.83  |
| 180° Bend C/d = 2.5  | 0.46                                   | 0.55                 | 0.64 | 0.76                | 0.85 | 1.07  |
| 90° Elbow  | 0.67                                   | 0.85                 | 1.04 | 1.25                | 1.46 | 1.89  |
| R = Radius of bend   |  | d = Diameter of tube |      | C = Centres of bend |      |       |

# PIPE CONNECTIONS / RESTRICTORS

1 Outdoor units are supplied with the following male flare connections ( in inches).

| MODEL            | DCU+ |     |     |     |     |
|------------------|------|-----|-----|-----|-----|
|                  | 15   | 30  | 40  | 60  | 80  |
| <b>EXPANSION</b> | 3/8  | 3/8 | 3/8 | 3/8 | 1/2 |
| <b>SUCTION</b>   | 3/8  | 1/2 | 1/2 | 5/8 | 5/8 |

| MODEL            | DHPU(E)(L) |     |     |     |
|------------------|------------|-----|-----|-----|
|                  | 15         | 30  | 50  | 60  |
| <b>EXPANSION</b> | 3/8        | 3/8 | 3/8 | 3/8 |
| <b>SUCTION</b>   | 3/8        | 1/2 | 5/8 | 5/8 |

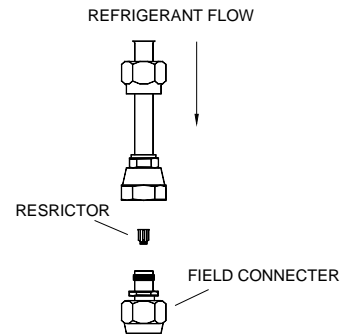
**NOTE:** Ensure both service valves on the outdoor unit are closed (IN, fully clockwise) before commencing installation.

Indoor units have a low pressure holding charge of nitrogen, which may be released into the atmosphere without damage to the environment. This should be done prior to making pipework connections.

2 Outdoor units are fitted with an expansion assembly (for the cooling cycle) which includes a restrictor suitable for use with IMPACT indoor units ( sizes shown on page 5). Refer to the indoor unit instructions to determine whether the restrictor needs to be changed.

To replace the restrictor in the outdoor unit:

- a. Completely remove the expansion assembly from the outdoor unit valve.
- b. Split the expansion assembly in the middle.
- c. Remove the existing restrictor.
- d. Drop the new restrictor vertically downwards into the field connector.
- e. Reassemble in the vertical plane (field connector lowest) and refit the expansion assembly to the outdoor unit.



3 DHPU(E)(L) units are also supplied with a loose expansion assembly for the heating cycle, to be fitted to the indoor unit if a heating capillary is not used. Refer to the indoor unit installation instruction. This second expansion assembly (140mm long) must be fitted to the expansion line as close to the indoor unit as possible. This provides throttling of the refrigerant and eliminates the need for separate check valves.

4 Pipe connection:

- a. Remove the flare nuts from the suction service valve and the expansion device as appropriate.
- b. Ensure both suction and expansion lines are fully insulated.
- c. Place the flare nuts over the incoming pipework and flare the pipe ends. The use of a little refrigeration oil on the flaring tool will help.
- d. Connect the pipework between the units. Do not leave pipe ends, valves etc. open to the atmosphere. Always use two spanners when tightening the flare nuts to avoid twisting the pipes.
- e. Sight glasses and filter driers are not necessary, but if required should be fitted between the outdoor unit liquid shut off valve and the expansion device.

# ELECTRICAL

Mains, control and interconnecting cables must be supplied and fitted by the installer.

Cables must be size compatible with the recommended fuse for a given system.

An isolator switch should be positioned within easy reach of the indoor unit.

The equipment must be earthed.

Cable glands for use with stranded cables are supplied and should be used to secure all incoming/outgoing cables. Installers must supply a method of securing any solid sheathed cables.

### Electromechanical Systems:

Systems including an electromechanical indoor unit require a supply to the condensing unit with connecting cables run to the indoor unit.

### Electronic Systems:

It is recommended that systems with electronic indoor units ('E' or 'L' specification) have a supply taken to the DCU+/DHPU(E)(L) and a separate supply taken to the indoor unit, which in many cases can be from a domestic 13 Amp socket.

On DHPUE only, communication between the indoor and outdoor unit is via a two wire (max. 0.75mm<sup>2</sup>) non-polarised connection (installer supplied), using cable type RS 485 or equivalent, (or two cores of 00526077, 4 core cable, available from TEV Ltd). **The cable screen should be secured to ground (earth) at BOTH ends using the clamps provided. Do not attempt to run the communication in the spare cores of any power carrying cable. If possible the communication cable should be run separately from any mains cable.**

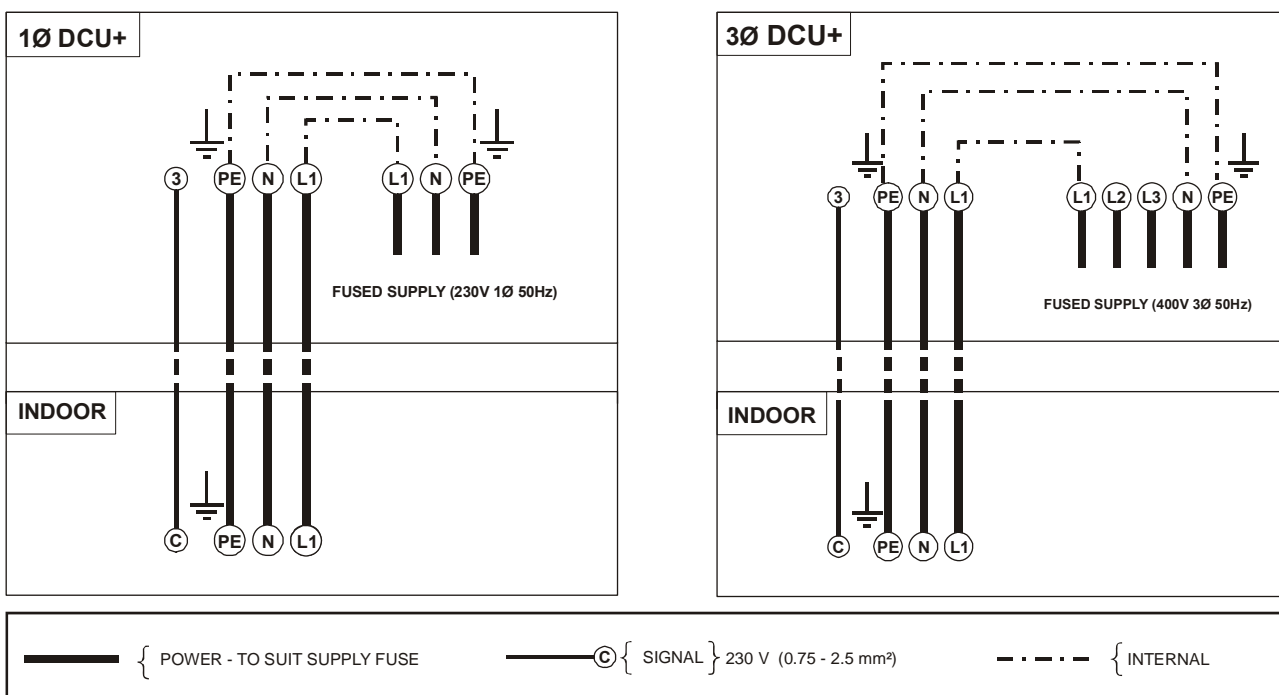
### OUTDOOR UNIT WIRING

Cable entry for the outdoor unit electrics is through the cabinet to a terminal block.

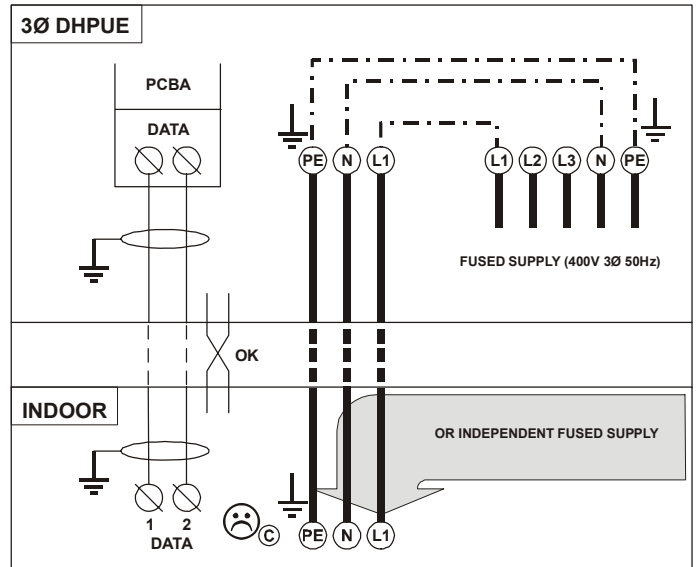
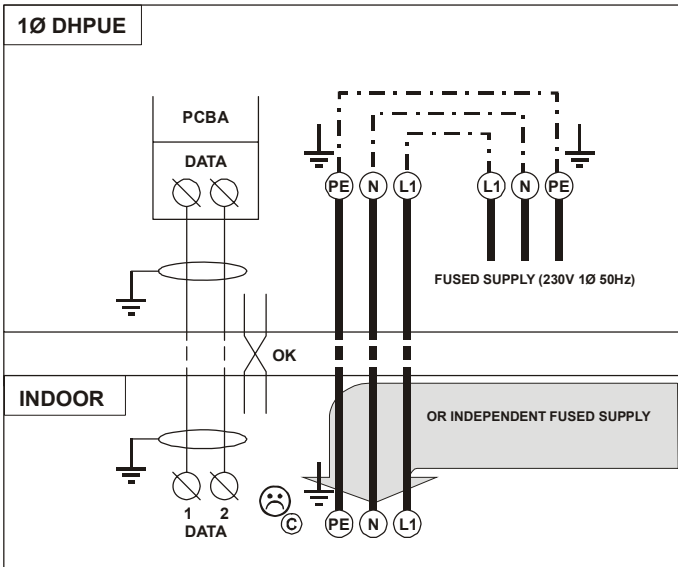
Ensure all connections are secure and both units are earthed.

### Interconnecting wiring diagram

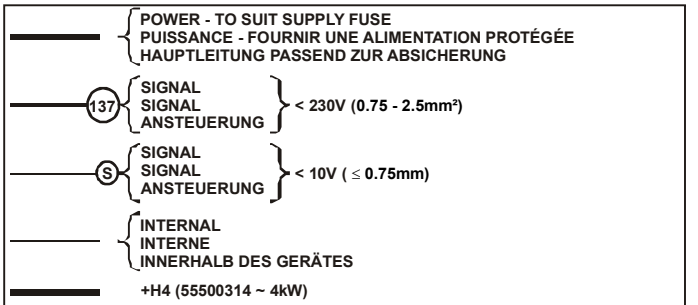
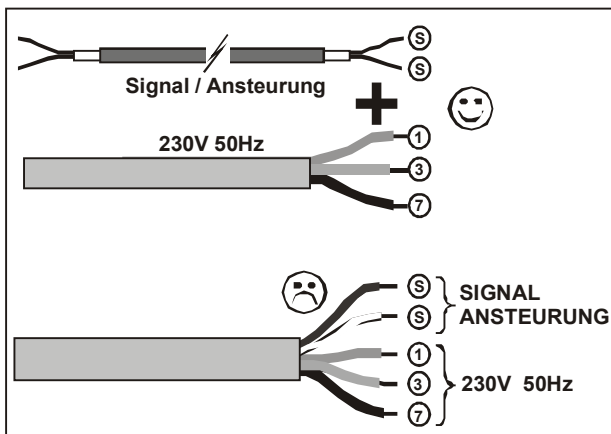
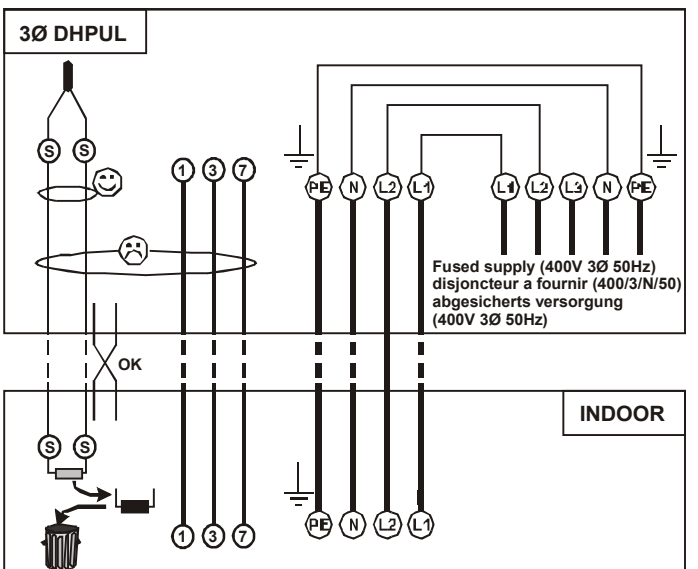
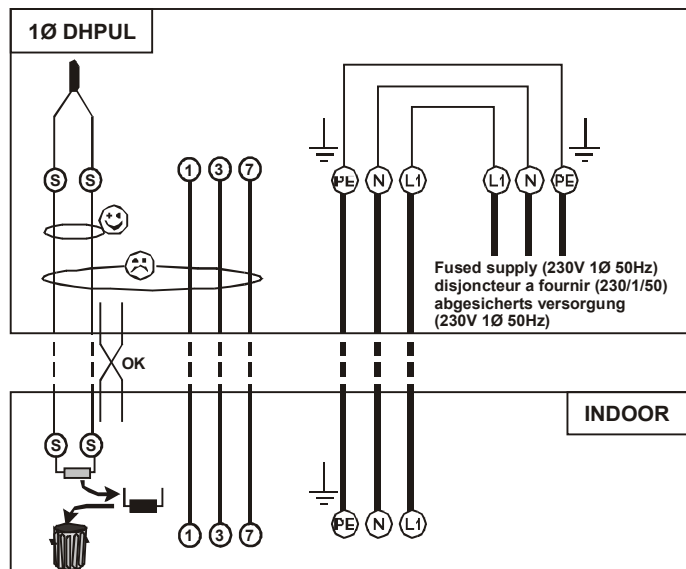
#### DCU+:



# DHPUE:



# DHPUL:



## FUSES

The system and its supply/interconnecting wiring must be protected by fuses, preferably High Rupture Current (HRC) motor rated types (to EN 60269) or miniature circuit breakers (to EN 60898) or local codes having similar time lag characteristics, that allow starting of the compressor yet still afford close overcurrent protection under running conditions. The ratings shown are for HRC motor rated fuses.

### 1 Ph 230V 50Hz DUCTED UNITS (Amps)

| MODEL   | IMPACT |    |    |    |    |    |
|---------|--------|----|----|----|----|----|
|         | 20     |    | 40 |    | 60 |    |
|         | S      | H  | S  | H  | S  | H  |
| DCU+ 15 | 13     | 16 |    |    |    |    |
| 30      |        |    | 16 | 16 |    |    |
| 40      |        |    | 20 | 20 | 20 | 20 |
| 60      |        |    |    |    | 25 | 25 |
| 80      |        |    |    |    |    |    |

| DHPU(E)(L) | S  | H  | S  | H  | S  | H  |
|------------|----|----|----|----|----|----|
| 15         | 13 | 16 |    |    |    |    |
| 20         | 16 | 20 |    |    |    |    |
| 30         |    |    | 20 | 25 |    |    |
| 40         |    |    | 20 | 25 |    |    |
| 50         |    |    |    |    | 25 | 32 |
| 60         |    |    |    |    |    |    |

S= Standard unit H= Heaters fitted

|                   | IMPACT |       |       |
|-------------------|--------|-------|-------|
|                   | 20(H)  | 40(H) | 60(H) |
| 1Ph Cool Only     | 5      | 5     | 5     |
| 1Ph Cool and Heat | 5      | 10    | 10    |

### 3 Ph 400V 50Hz DUCTED UNITS (Amps)

| MODEL      | IMPACT |    |    |    |
|------------|--------|----|----|----|
|            | 40     |    | 60 |    |
|            | S      | H  | S  | H  |
| DCU+ 30    | 10     | 10 |    |    |
| 40         | 10     | 16 | 10 | 10 |
| 60         |        |    | 16 | 16 |
| 80         |        |    |    |    |
| DHPU(E)(L) | S      | H  | S  | H  |
| 30         | 10     | 16 |    |    |
| 40         | 10     | 16 |    |    |
| 50         |        |    | 10 | 20 |
| 60         |        |    | 16 | 25 |

| DUCTED UNITS     | DCU+ 15      |              | DCU+ 20, DCU+ 30 |  | DCU+ 40      | DCU+50, DCU+ 60 |  | DCU+ 80      |
|------------------|--------------|--------------|------------------|--|--------------|-----------------|--|--------------|
|                  | DHPU(E)(L)15 | DHPU(E)(L)20 | DHPU(E)(L)30     |  | DHPU(E)(L)40 | DHPU(E)(L)50    |  | DHPU(E)(L)60 |
| 1Ph (Amps)       | 13           | 16           | 16               |  | 20           | 25              |  | 32           |
| 3Ph (Amps/Phase) | ---          | ---          | 10               |  | 10           | 10              |  | 16           |

**NOTE: REFER TO THE RELEVANT INDOOR UNIT INSTALLATION INSTRUCTION FOR ALL OTHER SYSTEM FUSE SIZES.**

## REFRIGERANT

### EVACUATING

- Evacuate the interconnecting pipework and indoor unit by connecting a vacuum pump to the service ports on the outdoor unit valves and evacuate to 1000 microns (1 Torr) or better: hold for a minimum of 15 minutes.
- Open the valves slowly using a 5mm Allen key. If no additional charge is required, read note 4.
- If additional charge is required:
  - Start the unit on maximum indoor fan setting (with heat pump systems in AIR CONDITIONING MODE) and allow the compressor to run for approximately 10 seconds.

#### NOTE:

DHPUE units are supplied fitted with link JP6 on the outdoor unit pcb, to allow addition of refrigerant and to override the alarms during the charging process. This ensures that, (for 'E' specification units only).with indoor and outdoor units powered, the outdoor unit fans will run at high speed and the indoor unit fans will run at boost speed

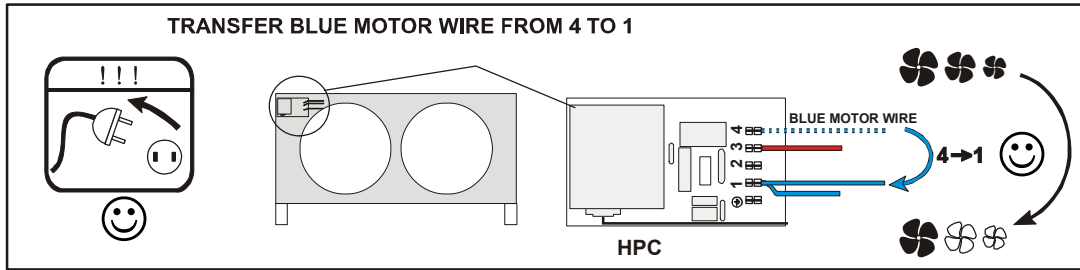
Indoor units other than 'E' specification should be set to operate at maximum speed in cooling mode. When JP6 is linked, the 'E' handset is inoperative and indicator lights should be ignored.

- Allow system pressures to stabilize.
- Any additional charge should be introduced through the Schrader valve on the indoor unit or the service port on the suction service valve on the outdoor unit.

Where possible, charge to a sweat line on the evaporator. Typical suction pressures on short lines at UK conditions, with maximum evaporator and condenser fan speeds, i.e. during commissioning, will be 55-60 psig.

Take care not to overcharge the system, otherwise liquid could return to the compressor, causing damage.

4. **DCU+,DHPUL:** Units are fitted with head pressure control; before charging isolate the unit and transfer the blue wire on the head pressure control from terminal 4 to terminal 1. **(DO NOT FORGET TO TRANSFER IT BACK ONCE CHARGING IS COMPLETE)**



**DHPUE:** When the system is adequately charged, **REMOVE link JP6** from the outdoor unit circuit board situated to the left of the terminals

## **CHARGING**

**NOTE:**For systems charges other than IMPACT refer to the relevant indoor unit installation instructions.

**IMPACT WALL MOUNTED SYSTEMS** - pipe runs below 7.5m  
 DCU+ 40 used with an IMPACT 60, ADD 200g refrigerant.  
 For other Impact systems, additional refrigerant and oil are not required.

**IMPACT WALL MOUNTED SYSTEMS** - pipe runs over 7.5m.  
 DCU+ 40 used with an IMPACT 60, ADD 200g refrigerant plus refrigerant and oil for each additional metre over 7.5m

### **ADDITIONAL REFRIGERANT (all systems) - pipe runs over 7.5m**

Add refrigerant and oil for each additional metre over 7.5m, based on the following:

|                                      |   |      |      |  |
|--------------------------------------|---|------|------|--|
| <b>Expansion line size.</b>          | 3/8"  | 1/2" | 5/8" | Additional polyolester oil:<br>L'Unite 181-023,<br>ICI Emkarate RL32S or<br>RL32CF, Mobil Arctic<br>EAL22 or EAL22C. |
| <b>Additional refrigerant (g/m).</b> | 16  | 30   | 48   |  |
| <b>Additional POE oil</b>            | 25g per 350g of additional refrigerant to a maximum of 300g |      |      |  |

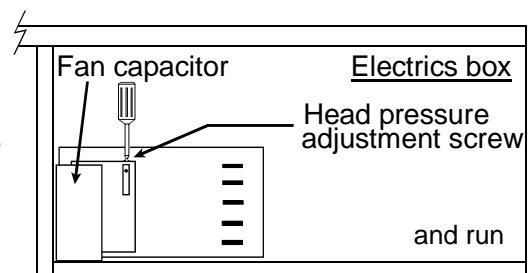
5. **Ensure the refrigerant being added is the correct type, as shown on the rating plate.**  
 6. If a manual HP cutout is fitted, ensure that the reset button is depressed.

**NOTE:** A random start delay of up to 1 minute occurs when mains is first applied.  
 A 3 minute delay occurs between successive compressor operations.

### 7. **DCU+,DHPUL:**

The head pressure controller is factory set to suit the refrigerant. It may be necessary to adjust this to suit site conditions, to raise or lower the nominal head pressure.

- With the system switched off, connect a high pressure gauge to the liquid line service valve.
- Switch on the system, indoor fan set to high speed, for a few minutes to stabilise.
- The head pressure should be approximately:



**R407C: 275-280 psig (18.9-19.6barg)** to achieve this adjust the screw clockwise to increase pressure or anticlockwise to decrease. Each ½ turn will alter the pressure by approx 5 psig (0.5 barg)  
 Min fan speed (0 rpm) and fan cut in pressure 200 psig (13.8 barg) are factory set and not adjustable.  
**NOTE:** The condenser fan may stop if the operating pressure drops below 200 psig (13.8 barg)