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.

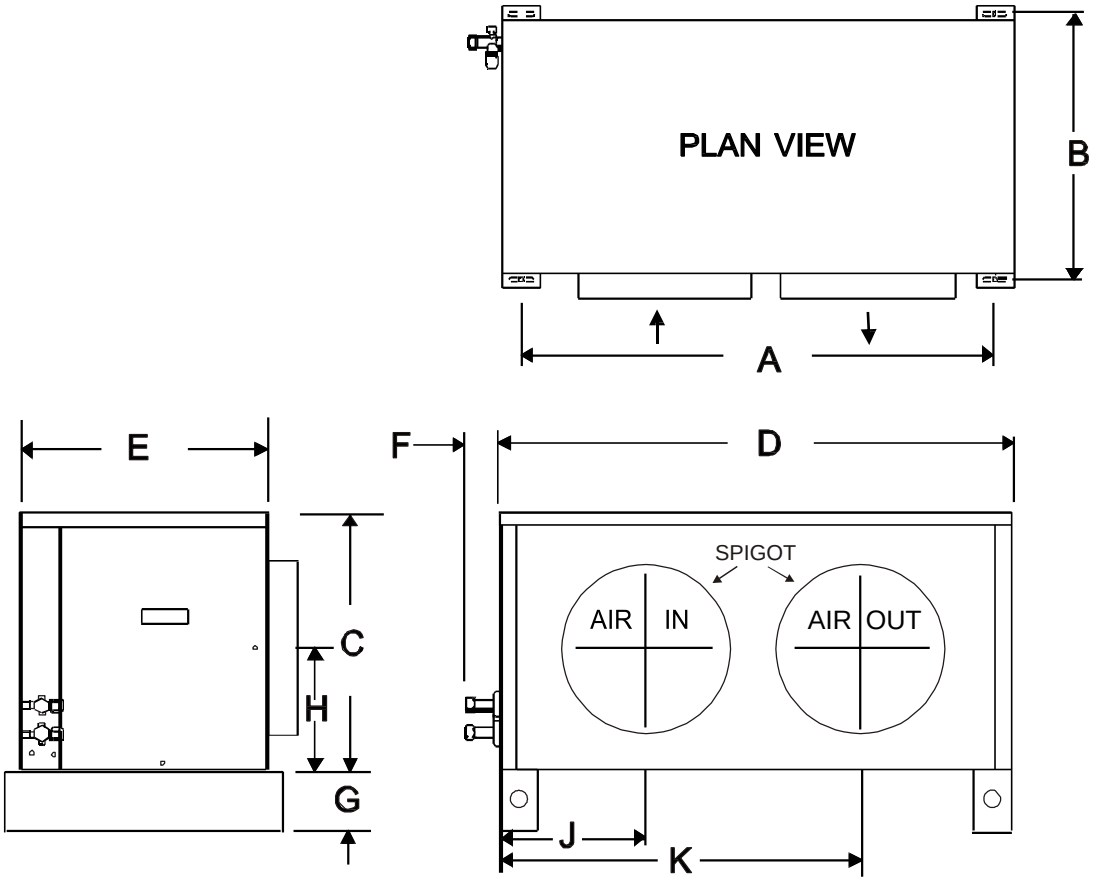
DCU+ OUTDOOR UNITS & DHPU(L) OUTDOOR HEAT PUMP UNITS

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	757	354	69
DCU+ 20	930	510	495	1004	490	65	65	210	317	757	354	70
DCU+ 30	930	510	495	1004	490	65	65	210	317	757	354	70
DCU+ 40	930	510	495	1004	490	65	65	210	317	757	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(L) 15	930	510	495	1004	490	65	120	210	317	757	354	75
DHPU(L) 20	930	510	495	1004	490	65	120	210	317	757	354	75
DHPU(L) 30	930	510	495	1004	490	65	120	210	317	757	354	77
DHPU(L) 40	1100	510	560	1174	490	65	120	240	392	865	404	86
DHPU(L) 50	1100	510	560	1174	490	65	120	240	392	865	404	95
DHPU(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.

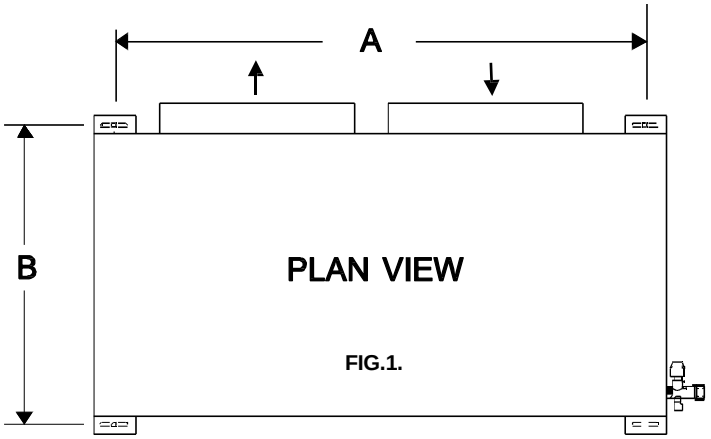
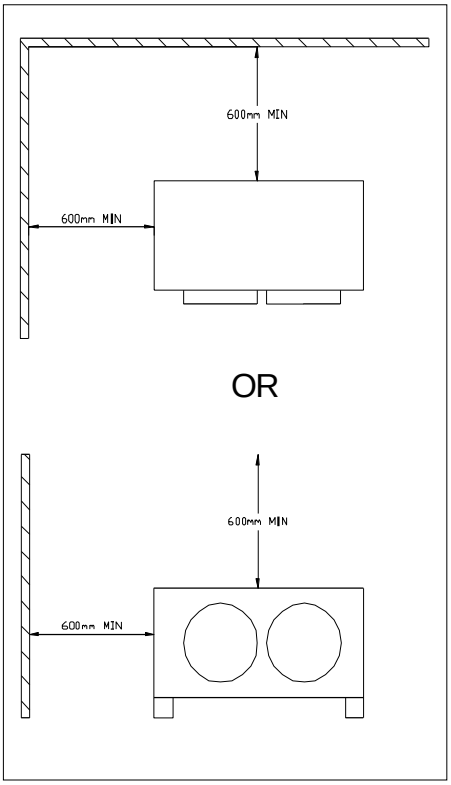


FIG.1.

DCU+	DHPU(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).

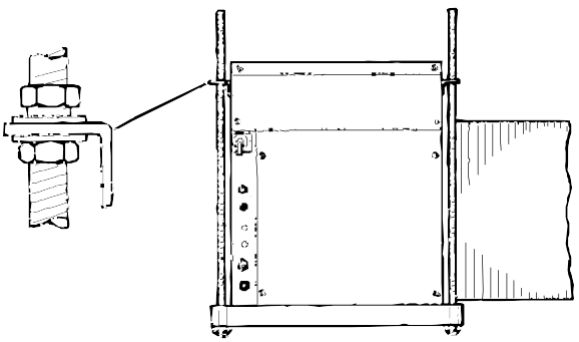


FIG.2.

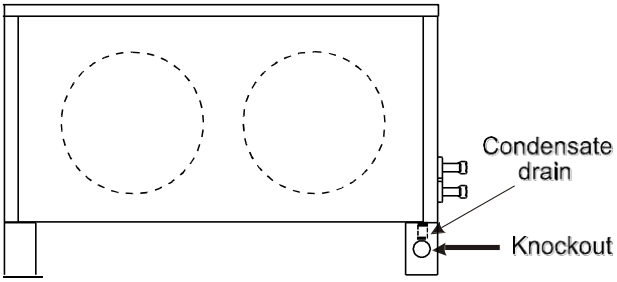
WALL MOUNTING
Wall mounting brackets are available as an optional Kit (53200407)

CONDENSATE DRAIN DHPU(L)

CONDENSATE DRAIN DHPU(L)

The DHPU(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)

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

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			FACTORY CHARGE (g)
	⅜	½	⅝	¾	⅞	⅜	½	⅝	R407C
DCU+ 15	7.5	30	50			50			660
DCU+ 20	7.5	23	50			50			930
DCU+ 30		15	50	80		50	80		990
DCU+ 40		10	36	80		7.5	80		1050
DCU+ 50		7.5	18	50	80	7.5	50	80	1250
DCU+ 60			14	36	80	7.5	50	80	1190
DCU+ 80			11	30	80		50	80	1480
DHPU(L)15	7.5	30	50*			50			870
DHPU(L) 20	7.5	23	50			50			1090
DHPU(L) 30		15	50	80		50	80		1000
DHPU(L) 40		10	36	80		7.5	80		1220
DHPU(L) 50		7.5	18	50	80	7.5	50	80	1080
DHPU(L) 60			14	36	80	7.5	50	80	1570

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

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)						
	Pipe Size (outside diameter in inches)					
Fitting	⅜	½	⅝	¾	⅞	1⅛
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
EXPANSION	3/8	3/8	3/8	3/8	1/2
SUCTION	3/8	1/2	1/2	5/8	5/8

MODEL	DHPUL			
	15	30	50	80
EXPANSION	3/8	3/8	3/8	1/2
SUCTION	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.

RESTRICTORS

Outdoor units (cool only & heat pumps) are supplied with expansion assemblies and cooling restrictors fitted.

DCU+	10	15	20	30	40	50	60	80
Restrictor	0.027	0.032	0.035	0.037	0.042	0.046	0.050	0.058

HEAT PUMP HEATING

All heat pump units have an additional expansion assembly supplied loose inside the unit. This is to be fitted to some indoor units for heating. Fit the assembly within 10m of the indoor unit in the expansion line.
Note: the refrigerant flow is from indoor to outdoor, opposite to cooling assembly. Placing it directly at the indoor coil may cause increased noise during the heating cycle. No separate check valve is needed. The expansion assembly and line must be fully insulated.

Note: The indoor units listed below are fitted with heating capillarys.
WM60H, WM80H, WM100H, CC875/80H, CC875/110H, CC875/140H, HL380, HL460, HL540
The additional heating expansion assembly (supplied loose in the heat pump unit) is not required.
Retain as a spare.

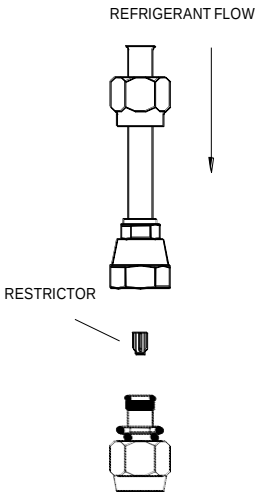
DHPUL	15	20	30	40	50	60
Restrictor Cooling	0.032	0.037	0.039	0.043	0.049	0.052
Restrictor Heating	0.027	0.036	0.037	0.042	0.044	0.053

CONNECTING THE UNITS

1. Ensure both service valves on the unit are closed (clockwise) before commencing installation.

2. If a expansion assembly requires cleaning:

a. Remove the entire expansion assembly from the outdoor unit.
b. Split the expansion assembly in the middle and remove the existing restrictor.
c. Drop the new restrictor vertically into the field connector.
d. Reassemble in the vertical plane (field connector lowest) when reassembled the restrictor can be heard to be free to move if the assembly is shaken.
e. Refit the expansion assembly.



3. Connecting the pipework:

a. Remove the flare nuts from the suction service valve and the expansion device as appropriate.
b. Ensure that both the suction and expansion lines are fully insulated.
c. Place the flare nuts over the incoming pipework and flare the pipe ends.
d. Connect the pipework between the units. Do not leave pipes ends, valves etc open to the atmosphere. Always use 2 spanners when tightening the flare nuts to avoid twisting the pipes. Use a small amount of refrigerant oil on the mating surfaces.
e. Sight glasses and filters driers are not necessary, but if required should be fitted between the out door unit liquid shut off valve and the expansion device on the units.

REFRIGERANT

EVACUATING

1. 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.
2. Open the valves slowly using a 5mm Allen key. If no additional charge is required, read note 4.
3. If additional charge is required:

a. 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.
b. Allow system pressures to stabilize.
c. 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.

IF NO ADDITIONAL REFRIGERANT CHARGE IS REQUIRED:
Open the valves very slowly using a 5 or 8mm Allen key. On DCU+/DHPU (L) units, remove **link JP6** on the pcba (identified by a white label), otherwise the fan will always run at maximum speed and the infrared handset will be inoperative. Replace the caps on the service ports, (torque to 25NM).

IF ADDITIONAL REFRIGERANT IS REQUIRED:

1. After evacuating the indoor unit and interconnecting pipework, slowly open the valves using 5 or 8mm Allen key. The high and low pressure should equalise within a minute.

2. Additional charge should be introduced with the system running in the **air conditioning mode** (including heat pumps). See indoor unit instruction for additional system charge.

3. DCU+/DHPUL units are all fitted with head pressure control. The link wire across the orange terminals (DCU+) and link between terminal 1 & 6 (DHPUL), allows the fan to operate at full speed. **THIS SHOULD BE REMOVED AFTER CHARGING**

ADDITIONAL REFRIGERANT - pipe runs over 7.5m.

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

Expansion line size.	3/8"	1/2"	5/8"
Additional refrigerant (g/m).	16	30	48
Additional POE oil	25g per 350g of additional refrigerant to a maximum of 300g		

Additional polyolester oil: L'Unite 181-023, ICI Emkarate RL32S or RL32CF, Mobil Arctic EAL22 or EAL22C.

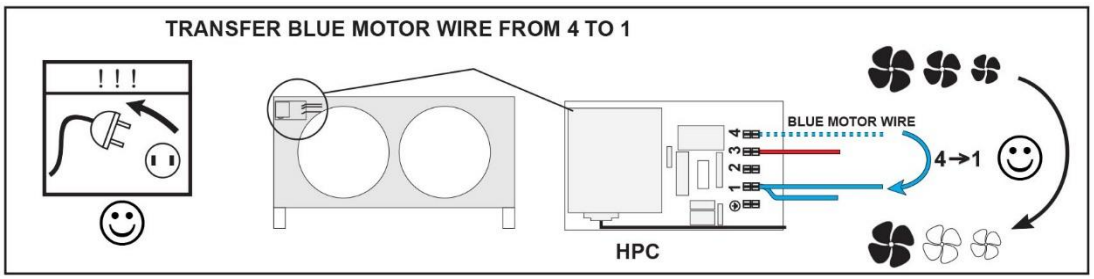
4. If a manual HP cutout is fitted, ensure that the reset button is depressed.

5. Additional refrigerant and polyolester oil should be introduced through the Schrader valve on the indoor unit, or the service port on the suction service valve on the outdoor unit. **Ensure the refrigerant is the correct type, as shown on the rating plate**. R407C must always be added in the liquid state.

6. Run the system for a few minutes to allow it to stabilize. Where possible, charge to a sweat line on the evaporator. Typical suction pressures on short lines at UK conditions, with high speed evaporator fan, high speed condenser fan, should be; electromechanical comfort system approx 4.4 bar (65 psig); electronic comfort system approx 3.8 bar (55 psig); heat pump system approx (58 psig). **Systems should not be overcharged, to avoid liquid return to the compressor**.

7. DCU+/DHPUL: HEAD PRESSURE CONTROL SAGINOMIYA (RGE – ZIN4 – SH)

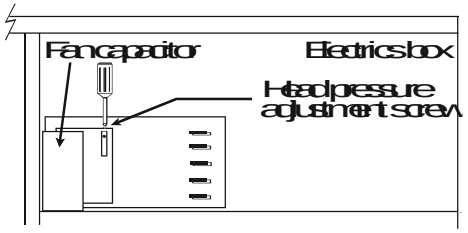
The head pressure controller is factory set to suit the refrigerant. It may be necessary to adjust this to suit site conditions, to raise or lower the nominal head pressure.



a. With the system switched off, connect a high pressure gauge to the liquid line service valve.

b. Switch on the system, indoor fan set to high speed, and run for a few minutes to stabilise.

c. The head pressure should be approximately:



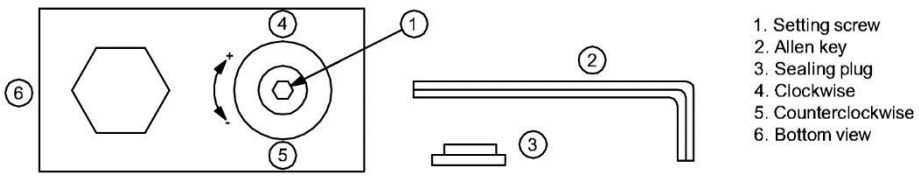
R407C: 275-280 psig (18.9-19.6barg) to achieve this adjust the screw clockwise to increase pressure or anticlockwise to decrease. Each ½ turn will alter the pressure by approx 5 psig (0.5 barg)

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)

8. DCU+/DHPUL: HEAD PRESSURE CONTROL ALCO (FSY-42S)

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.



a. With the system switched off, connect a high pressure gauge to the liquid line service valve.

b. Switch on the system, and run for a few minutes to stabilise.

c. The head pressure should be approximately:

R407C: 275-280 psig (18.9-19.6barg) to achieve this remove sealing plug and insert 2mm or 5/64" allen key into setting screw. Turn allen key clockwise (+) or counter clockwise (-) to readjust the setting. Do not turn setting screw **more than 3 turns clockwise** (+3). Use following table as a quick guideline for setting:

Pressure changes per turn of adjusting screw:
Pressure change 1: 4.0 … 12.5 bar:
Clockwise ~ +1,2 bar, counter clockwise ~ -1,2 bar

Pressure change 2: 9.2 … 21.2 bar:
Clockwise ~ +2,5 bar, counter clockwise ~ -2,5 bar

Pressure change 3: 12.4 … 28.4 bar:
Clockwise ~ +3,3 bar, counter clockwise ~ -3,3 bar

After adjustment, re-insert sealing plug and make sure that it is properly fitted. IP65 protection requires firmly sealed plug

NOTES:
Tolerances for condensing temperatures setpoint: ±2K

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)

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.

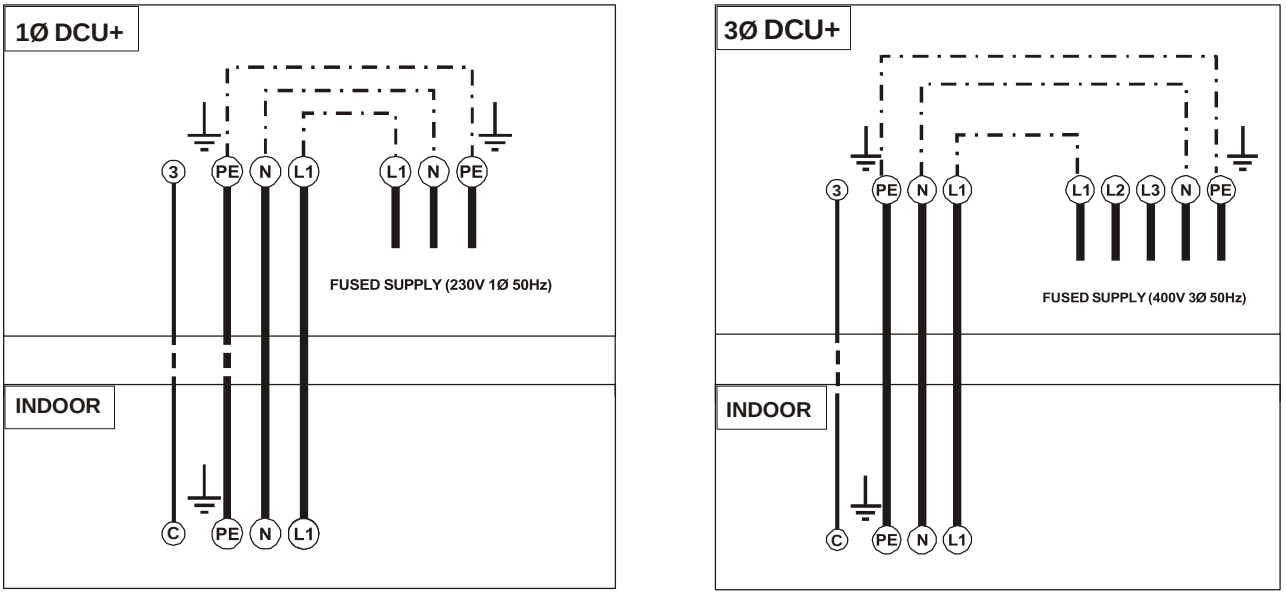
Electromechanical Systems:
Systems including an electromechanical indoor unit require a supply to the condensing unit with connecting cables run to the indoor unit.

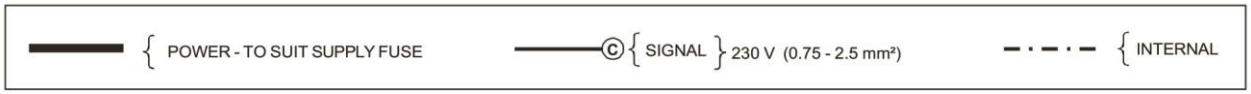
Electronic Systems:
It is recommended that systems with electronic indoor units ('L' specification) have a supply taken to the DCU+/DHPU(L) and a separate supply taken to the indoor unit, which in many cases can be from a domestic 13 Amp socket.

OUTDOOR UNIT WIRING
Cable entry for the outdoor unit electrics is through the cabinet to a terminal block. Ensure all

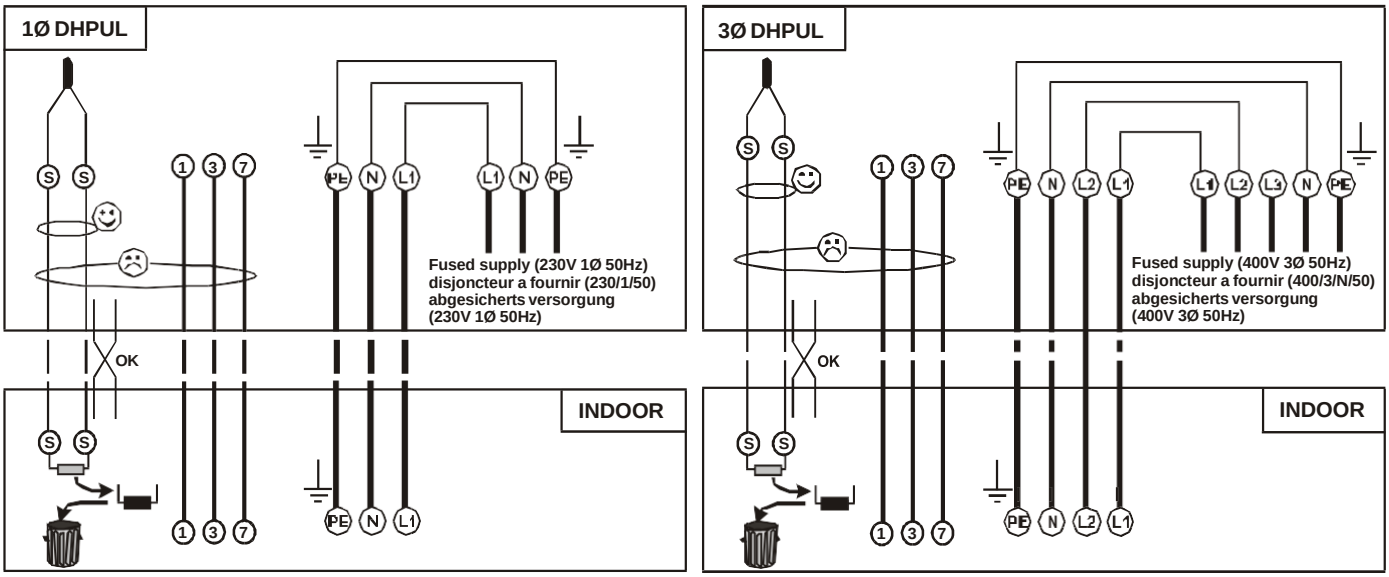
connections are secure and both units are earthed.

Interconnecting wiring diagram DCU+:





DHPUL :


1Ø DHPUL
S S
1 3 7
PE N L1
L1 N PE
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disjoncteur a fournir (230/1/50)
abgesicherts versorgung
(230V 1Ø 50Hz)
OK
INDOOR
S S
1 3 7
PE N L1
3Ø DHPUL
S S
1 3 7
PE N L2 L1
L1 L2 L3 N PE
Fused supply (400V 3Ø 50Hz)
disjoncteur a fournir (400/3/N/50)
abgesicherts versorgung
(400V 3Ø 50Hz)
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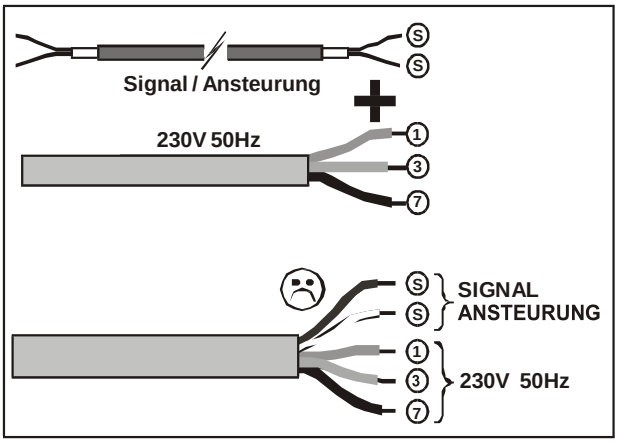
INDOOR
S S
1 3 7
PE N L2 L1


Signal / Ansteurung
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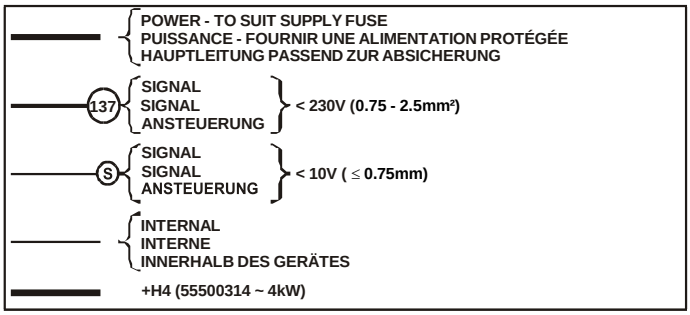
S
230V 50Hz
1
3
7
SIGNAL
ANSTEUERUNG
230V 50Hz


POWER - TO SUIT SUPPLY FUSE
PUISSANCE - FOURNIR UNE ALIMENTATION PROTÉGÉE
HAUPTLEITUNG PASSEND ZUR ABSICHERUNG
137
SIGNAL
SIGNAL
ANSTEUERUNG
< 230V (0.75 - 2.5mm²)
S
SIGNAL
SIGNAL
ANSTEUERUNG
< 10V (≤ 0.75mm)
INTERNAL
INTERNE
INNERHALB DES GERÄTES
+H4 (55500314 ~ 4kW)

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.

DUCTED UNITS	DCU+ 15		DCU+ 20, DCU+ 30	DCU+ 40	DCU+50, DCU+ 60	DCU+ 80
	DHPU(L)15	DHPU(L)20	DHPU(L)30	DHPU(L)40	DHPU(L)50	DHPU(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 SIZE.