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## 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. CXE models are Electronic control units that use R407C refrigerant; they provide cooling within the range of 2.3 – 5.0 kW. These units are matched with CKC outdoor units to complete a system.  
  
 CXE units are fitted with an expansion assembly, allowing the use of a liquid line. This can be transferred to the outdoor unit, when an expansion line is required to accommodate longer pipe runs.
  
3. These units contain live electrical components, moving parts and refrigerant under pressure. Always site out of reach of children and protect from vandalism.
  
4. The data plate only gives information for the CXE unit. For system details add input power and current of indoor and outdoor unit, including any heater load.

## PART NUMBERS

<b>MODEL</b>	CXE 40	CXE 50	CXE 70
<b>PART NUMBER</b>	55900016	55900015	55900014

<b>MODEL</b>	CKC 20 1ph	CKC 40 1ph	CKC 60 1ph
<b>PART NUMBER</b>	55023720	55023741	55023740

## UNIT COMBINATIONS

INDOOR UNIT	OUTDOOR UNIT
CXE 40	CKC 20
CXE 50	CKC 40
CXE 70	CKC 60

## CXE OPTIONS

OPTIONAL KITS	
PART NUMBER	DESCRIPTION
55900715	3kW heater

## DIMENSIONS & WEIGHTS

MODEL	UNPACKED				PACKED				
	CX(E)	HEIGHT	WIDTH	DEPTH	WEIGHT	HEIGHT	WIDTH	DEPTH	WEIGHT
40	483	845	320	20	23	530	950	370	23
50	483	845	320	20	23	530	950	370	23
70	483	845	320	23	26	530	950	370	26

CKC	HEIGHT	WIDTH	DEPTH	WEIGHT	HEIGHT	WIDTH	DEPTH	WEIGHT
				1Ph				1Ph
20	620	900	310	46	625	980	340	48
40	620	900	310	46	625	980	340	48
60	720	1000	310	64	730	1080	340	66

## PERFORMANCE DATA (kW)

MODEL	RATING CONDITIONS (ROOM 5°Cdb/ 3°Cwb) (AMBIENT 27°C / 19°C)			OPTIONAL ELECTRIC HEATER	
	TOTAL	SHR	SENSIBLE	240V	230V
<b>CXE 40 + CKC 20</b>	2.3	0.85	2.0	3.3	3.0
<b>CXE 50 + CKC 40</b>	3.5	0.80	2.8	3.3	3.0
<b>CXE 70 + CKC 60</b>	5.0	0.70	3.5	3.3	3.0

MODEL	RATING CONDITIONS (ROOM 5°Cdb/ 3°Cwb) (AMBIENT 35°C / 19°C)			OPTIONAL ELECTRIC HEATER	
	TOTAL	SHR	SENSIBLE	240V	230V
<b>CXE 40 + CKC 20</b>	2.0	0.85	1.7	3.3	3.0
<b>CXE 50 + CKC 40</b>	3.0	0.80	2.4	3.3	3.0
<b>CXE 70 + CKC 60</b>	4.3	0.70	3.0	3.3	3.0

## AIR FLOWS

MODEL	m <sup>3</sup> /s
<b>CXE 40</b>	0.61
<b>CXE 50</b>	0.66
<b>CXE 70</b>	0.58

MODEL	m <sup>3</sup> /s
<b>CKC 20</b>	0.81
<b>CKC 40</b>	0.72
<b>CKC 60</b>	0.78

## SOUND POWER AND SOUND PRESSURE LEVELS

### INDOOR UNIT

MAXIMUM SPEED	SOUND POWER LEVELS						SOUND PRESSURE LEVELS	
	Frequency Hz							
	125	250	500	1K	2K	4K	dB(A)	NC
<b>CXE 40</b>	69.1	67.7	67.6	65.6	62.2	56.0	55	48
<b>CXE 50</b>	71.7	69.2	69.1	67.1	63.2	58.5	56	50
<b>CXE 70</b>	70.1	68.2	68.6	66.1	63.2	57.5	56	49

*Sound Power Levels were obtained in full accordance with the direct method of BS EN ISO3174:2000. Levels are shown in dB with a standard reference of 1 pW.*

*Sound Pressure Levels in dB(A) refer to semi-hemispherical radiation (wall or ceiling mounted) at a distance of 1.5m from the front of the unit, with the fan operating at full speed.*

### OUTDOOR UNIT

MAXIMUM SPEED	SOUND POWER LEVELS						SOUND PRESSURE LEVELS	
	Frequency Hz							
	125	250	500	1K	2K	4K	dB(A)	NC
<b>CKC 20</b>	77	67	69	65	60	54	49	44
<b>CKC 40</b>	77	67	69	65	61	54	49	44
<b>CKC 60</b>	73	68	68	66	62	54	50	45

*Sound Power Levels were obtained in full accordance with the direct method of ISO 3741: 1988. Levels are shown in dB with a standard reference of 1 pW.*

*Sound Pressure Levels in dB(A) refer to semi-hemispherical radiation (wall or floor mounted) at a distance of 3m from the front of the unit, with the fan operating at full speed; (add 3dBA or 3NC for units at an intersection of a wall, add 1dBA or 1NC for high level wall mounted units).*

## ELECTRICAL DATA

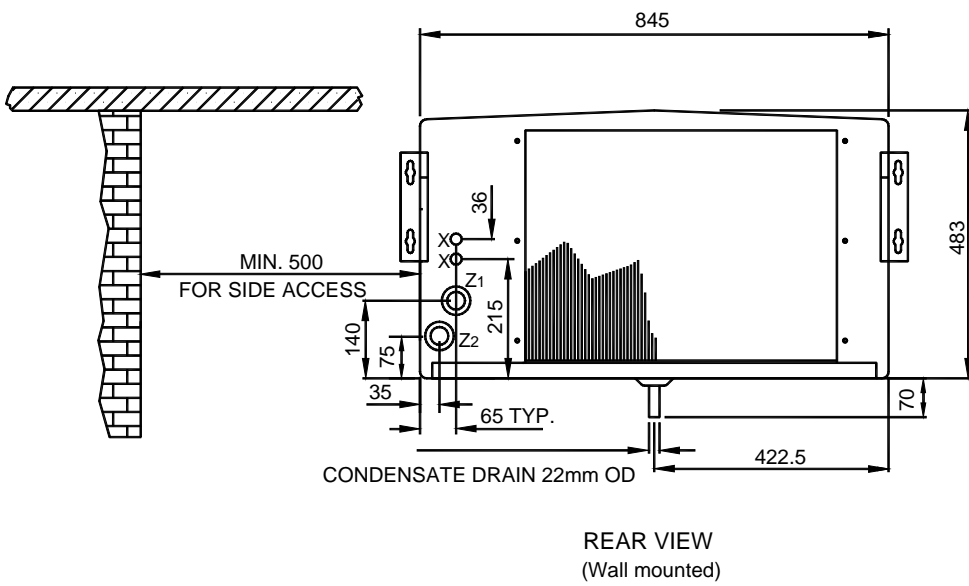
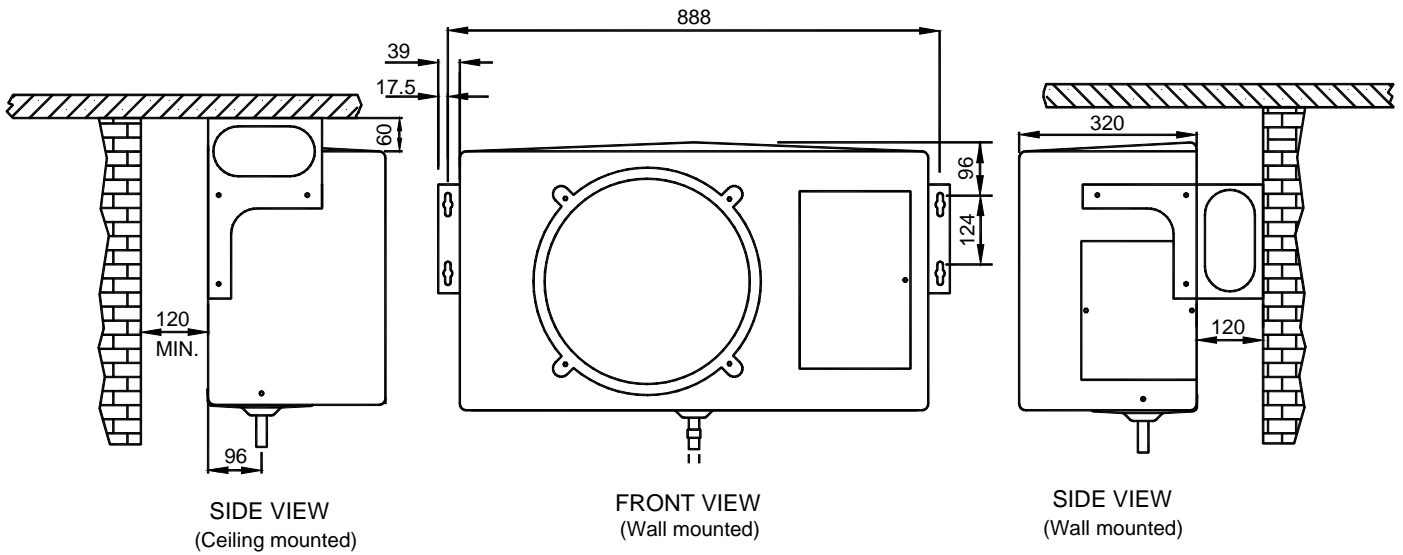
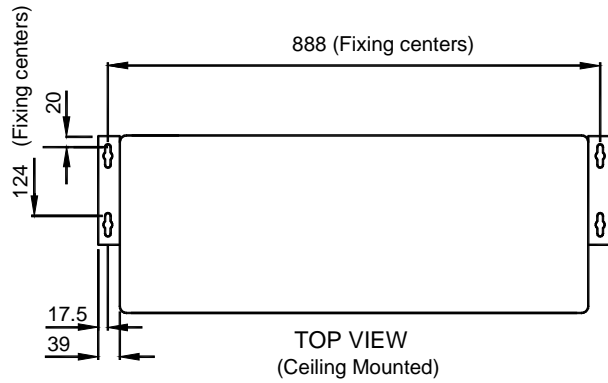
MODEL INDOOR/OUTDOOR	1 PH 230V 50Hz				
	INPUT POWER		FULL LOADS AMPS		SYSTEM MAX. STARTING CURRENT
	COOLING	HEATING	COOLING	HEATING	
	kW	kW	AMPS	AMPS	AMPS
<b>CXE 40 + CKC 20</b>	1.3	3.1	7.15	12.8	28
<b>CXE 50 + CKC 40</b>	2.1	3.1	10.2	13.8	50
<b>CXE 70 + CKC 60</b>	2.4	3.1	9.8	13.8	61

### UNIT ELECTRICAL LOADS [230V 50Hz 1Ph (A)]

MODEL	FAN MOTOR	HEATER
<b>CXE 40</b>	0.8	13.0
<b>CXE 50</b>	0.8	13.0
<b>CXE 70</b>	0.8	13.0

CKC	20	40	60
Fan motor	0.6	0.6	0.6
R407C compressor (1 Ph) nominal FLA	6.9	10.2	9.8
Crankcase heater	0.25	0.25	0.25

# CXE DIMENSIONS



X = Interconnecting Wiring  
 Z<sub>1</sub> = Suction  
 Z<sub>2</sub> = Liquid / Expansion

CONTENTS		
PARTS DESCRIPTION	QTY	ACTION
Envelope containing operating instructions and Declaration of Conformity	1	Pass to the end user.
0.037" restrictor (CXE 40 only)	1	Use with CKC 20 outdoor unit.
0.051" restrictor (CXE 50 only)	1	Use with CKC 40 outdoor unit.
0.057" restrictor (CXE 70 only)	1	Use with CKC 60 outdoor unit.
Mounting brackets	2	Use to hang unit.
Drain Stub/Nut/Gasket	1	Fitted by installer.
Drain stub adaptor	1	Convert to 3/4" drain if required.
Screw M5	6	To fix brackets to unit.
Washer nylon	6	To fix brackets to unit.
Washer M5 shakeproof	6	To fix brackets to unit.
Reducing flare nut 1/2" – 3/8"	1	Fit to liquid connection on the CXE 70 indoor unit when matched with a CKC 60 outdoor unit

The unit may be mounted on a wall or solid ceiling using brackets supplied. It should be matched with the appropriately sized outdoor unit; this instruction should be used in conjunction with the outdoor unit installation instructions.

- Fit all kits prior to installing the unit. (Heater kit is easier to fit when unit has been mounted).
- Ensure that the mounting surface will support the operating weight of the unit (see table below).
- Mark out the mounting positions and drill holes to suit 6mm rawlbolt shields or equivalent strength fasteners (ensure that the unit is positioned to give sufficient access (min 0.5m) to the electrics access side).
- Fix the mounting brackets to the unit in the correct position for wall or ceiling mounting.
- Raise the unit into position and secure the fixings, ensuring that it is square and level.
- Remove the drain tray then fit the drain stub, nut & gasket (Fig.1). Refit the drain tray.

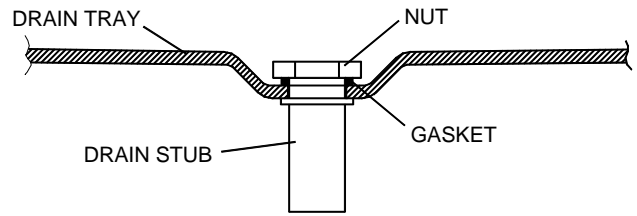


Fig.1

## CXE PIPEWORK

### NITROGEN CHARGE

The unit contains a small charge of dry nitrogen, which should be discharged into the atmosphere. This is a non-toxic, non-ozone depleting gas with no global warming potential.

### PIPE CONNECTIONS

Pipework is terminated with 2 flare nuts & bonnets. Access is via the rear right hand side. Pipes exit the unit through holes in the back panel.

INDOOR UNIT	CXE 40	CXE 50	CXE 70
LIQUID / EXPANSION	3/8"	3/8"	1/2"
SUCTION	1/2"	1/2"	5/8"

### CONDENSATE DRAIN

Push fit connections are widely available for the 7/8" (22mm) OD condensate drain and 3/4" (19mm) ID drain stub adaptor. Alternatively 7/8" (22mm) bore plastic tubing may be fitted directly to the stub/adaptor with a hose clamp. Take care not to over tighten hose clamps as this could damage the stub pipe.

Cables are routed to the terminal block via the cable cord grips at the rear of the unit and then through the back of the electrics box (see page 2).

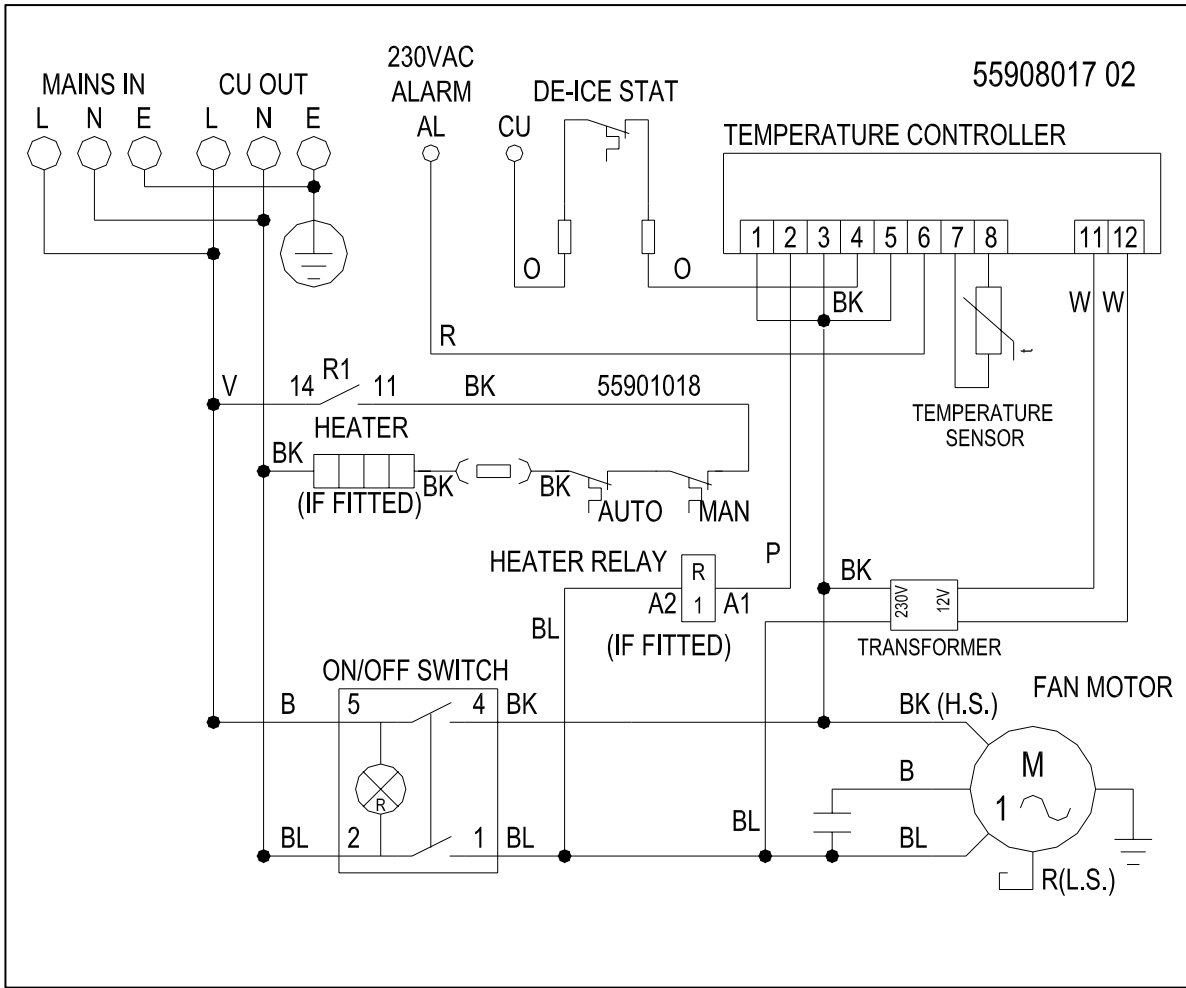
## CXE ELECTRICAL CONNECTIONS

- Cables **MUST** be size compatible with the recommended system fuse.

### FUSES

SYSTEM	COOL ONLY	WITH ELECTRIC HEATER
	1PH	1PH
<b>CXE 40</b>	20A	20A
<b>CXE 50</b>	20A	20A
<b>CXE 70</b>	20A	32A

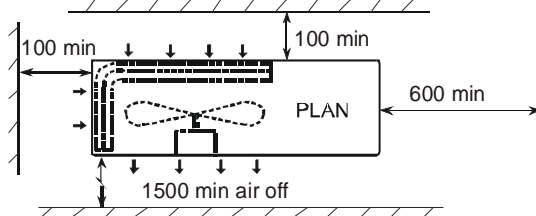
**WIRING DIAGRAM**



**CKC INSTALLATION**

**MOUNTING**

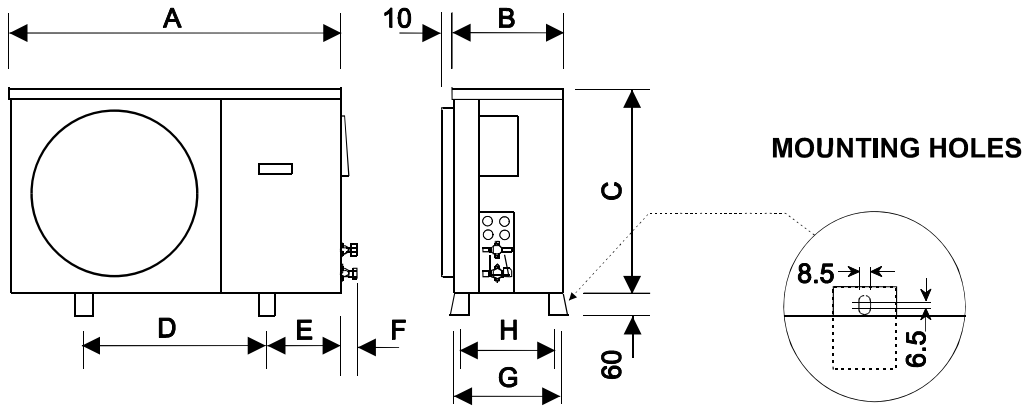
Whether floor or wall mounted, it is essential that the mounting surface is capable of supporting the unit weight. Leave space around the unit for air circulation and access for installation and maintenance.



Dimensions in mm.



## CKC DIMENSIONS



MODEL	A	B	C	D	E	F	G	H
<b>CKC 20</b>	900	300	560	525	185	60	333	308
<b>CKC 40</b>	900	300	560	525	185	60	333	308
<b>CKC 60</b>	1000	300	660	570	213	60	333	308

## CKC PIPEWORK

1. Individual pipe runs to a maximum of 20m, including 7.5m lift, are permissible with liquid lines, 80m with expansion lines, provided good refrigeration practice is followed. Performance is based on 7.5m pipe runs. Correctly sized pipes for each installation 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 3m, 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. In calculating equivalent lengths of pipe runs, the effect of bends and fittings must be taken into account. The table below covers the fittings most likely to be encountered in this installation.
 

The equivalent lengths of all the fittings in a pipe run should be added together and the total added to the actual pipe length in order to calculate the total equivalent length.
3. Use the shortest possible route, avoiding sharp bends.
4. Completely insulate the suction line, fully over the indoor unit drain tray.

### FITTING LOSSES, in equivalent straight lengths of pipe (m).

FITTING	Pipe Size OD					To calculate the total equivalent length, the equivalent lengths of all fittings in a pipe run must be added to the actual length of pipe in the run: these are the fittings most likely to be used.  R = Radius of bend d = Diameter of tube C = Centres of bend
	3/8"	1/2"	5/8"	3/4"	7/8"	
45° Bend	0.12	0.15	0.18	0.21	0.24	
90° Bend R/d = 1	0.37	0.43	0.49	0.55	0.61	
90° Bend R/d = 1.5	0.24	0.27	0.3	0.37	0.43	
180° Bend R/d = 1.5	0.73	0.91	1.1	1.28	1.46	
180° Bend C/d = 2.5	0.46	0.55	0.64	0.76	0.85	
90° Elbow	0.67	0.85	1.04	1.25	1.46	

## A. USING SUCTION AND LIQUID LINES:

With the expansion device connected to the indoor unit, the equivalent pipe run should be 20m maximum, including a maximum lift of 7.5m. Fully insulate the suction line. Ensure the suction pipe is insulated well over the drain tray at the indoor unit. Liquid lines should be routed to avoid hot areas. This prevents flash gas forming, which may result in erratic control of liquid refrigerant to the evaporator.

SYSTEM	MAXIMUM EQUIVALENT LENGTH OF SUCTION LINE PIPE SIZES (m)				LIQUID LINE	
	3/8"	1/2"	5/8"	-	1/4"	3/8"
CXE40 + CKC20	7.5	20	-	-	20	--
CXE50 + CKC40	-	15	20	-	-	20
CXE70 + CKC60	-	7.5	18	20	-	20

## B. USING SUCTION AND EXPANSION LINES

The expansion assembly must be removed from the indoor unit and connected to the outdoor unit allowing a pipe run of up to 80m, including a maximum lift of 20m (CKC20 maximum 50m with 7.5m lift).

CXE units only, remove the right hand panel cover plate from the indoor unit and remove the expansion assembly. [Make good the gap using Extended Pipe Run Kit 55900709 (30,40,50), 55900710 (70).]

Fit the expansion assembly onto the outdoor unit liquid line service valve. Fully insulate both the suction and expansion lines, including the expansion device: ensure the pipes are insulated well over the drain tray at the indoor unit.

SYSTEM	MAXIMUM EQUIVALENT LENGTH OF SUCTION LINE PIPE SIZES (m)					EXPANSION LINES			CHARGE (kgs) AT 7.5m
	3/8"	1/2"	5/8"	3/4"	7/8"	3/8"	1/2"	5/8"	
CXE40 + CKC20	7.5	23	50	-	-	50	-	-	0.93
CXE50 + CKC40	-	10	36	80	-	7.5	80	-	1.30
CXE70 + CKC60	-	7.5	18	50	80	7.5	50	80	1.90

## PIPE CONNECTIONS

Units are supplied with the following male flare connections (sizes in inches):  
(\*\* Use reducing nut provided)

OUTDOOR UNIT	CKC20	CKC40	CKC60**
LIQUID / EXPANSION	3/8"	3/8"	3/8"
SUCTION	1/2"	1/2"	5/8"

## RESTRICTORS

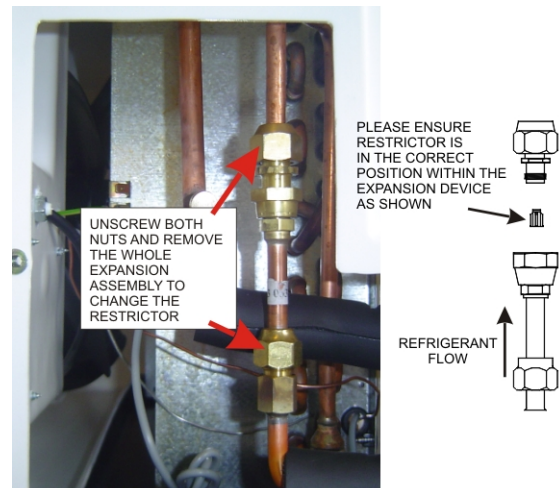
Indoor units are supplied with restrictors fitted.

### NOTE

When the CXE 40 is matched with a CKC 20.  
The restrictor in the indoor unit must be changed to 0.033"

When the CXE 50 is matched with a CKC 40.  
The restrictor in the indoor unit must be changed to 0.051"

When the CXE 70 is matched with a CKC 60.  
The restrictor in the indoor unit must be changed to 0.057"



## INTERCONNECTING PIPEWORK

- Indoor and outdoor units have a low pressure charge of N<sub>2</sub>, which may be safely released into the atmosphere before connection. The service valves on the outdoor unit should remain closed (IN, fully clockwise) until pipework has been fitted, to avoid unnecessary moisture ingress.
- Connecting the pipework
  - Remove the flare nuts from the suction and liquid service valves.
  - Ensure that the suction line is fully insulated: if an expansion line is used this should also be 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.  
R407C is very hygroscopic, and will absorb damaging levels of moisture if left open. Always use two 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 filter driers are not necessary, but if required should be fitted between the outdoor unit liquid shut off valve and the expansion device.

## EVACUATING

1. Release the nitrogen holding charge in the indoor and outdoor units to atmosphere. Open the valves (hex drive fully out) using a 5mm Allen key. Connect a vacuum pump to the service ports on the outdoor unit valves and evacuate the system to 1000 microns (1 Torr) or better and allow to be held for a minimum of 15 minutes.
2. Replace the caps on the service ports, (torque to 25NM).

## CKC ELECTRICAL

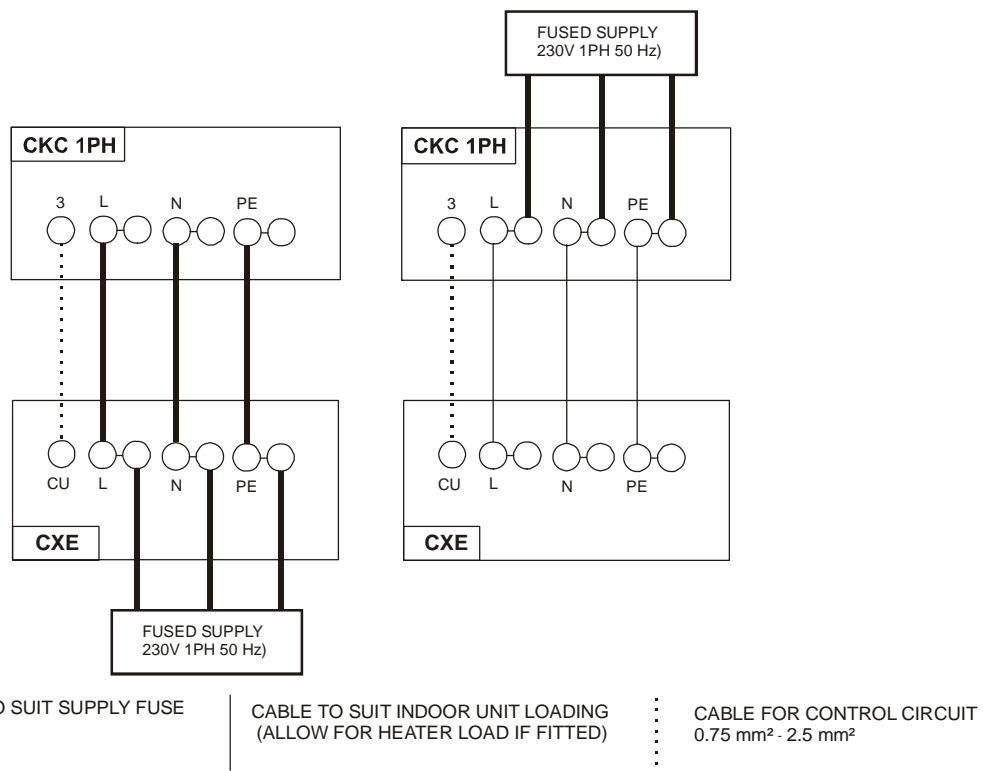
- ❑ The installer supplies mains, control and interconnecting cables: equipment must be earthed.
- ❑ Wiring must be carried out in accordance with local and national codes.
- ❑ Mains supply cables must be size compatible with the recommended fuse (see indoor unit instruction for system fuse size).
- ❑ An all pole isolator switch should be positioned within easy reach of the indoor/outdoor unit dependant on which receives the fuse supply.
- ❑ Cable clamps for use with stranded cables are supplied and should be used to secure incoming/outgoing cables. Installers must supply a method of securing solid sheathed cables.

## WIRING

- ❑ Cable entry for the outdoor unit electrics is through the cabinet to a terminal block.
- ❑ Ensure that all connections are secure and that both units are earthed.
- ❑ CKC fan motors have a single speed and are ready for use at all outdoor temperatures.

**NOTE:** The CKC wiring diagram can be found on the inside of the front panel.

## INTERCONNECTING WIRING

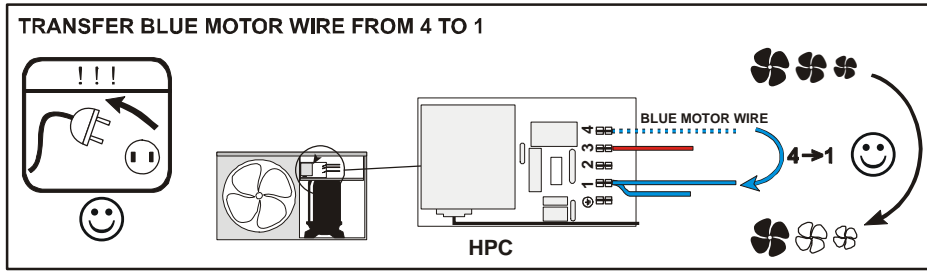


**FUSES:** Refer to indoor unit installation instructions.

# CKC REFRIGERANT

## ADDING REFRIGERANT

1. The unit is fitted with head pressure control; before charging, isolate the outdoor unit and transfer the motor wire on the head pressure control from terminal 4 to terminal 1. **(Don't forget to transfer it back after charging).**



2. If a manual HP cut-out is fitted, ensure that the reset button is depressed.
3. A 3 minute delay occurs between successive compressor operations.
4. R407C should be introduced through the Schrader valve on the indoor unit, or the service port on the suction service valve on the outdoor unit. **No other refrigerant must be used.**

**NOTE: LABEL R407C POE (supplied loose) TO BE FIXED ABOVE SERVICE VALVES.  
CHARGE (g)**

		LIQUID LINE (m)			
		5	10	15	20
R407C	CXE 40 + CKC 20	780	1080	1380	1680
	CXE 50 + CKC 40	1150	1450	1750	2050
	CXE 70 + CKC 60	1750	2050	2350	2650

No extra POE oil needed with liquid lines.  
Charges shown are for guidance: actual charge will depend on the individual application. It is recommended that you charge to a sweat line on the outlet of the evaporator and/or a full sight glass if fitted.

Additional charge based on:-	Liquid line		Expansion line		
	1/4"	3/8"	3/8"	1/2"	5/8"
	25 g/m	60 g/m	16 g/m	30 g/m	48 g/m

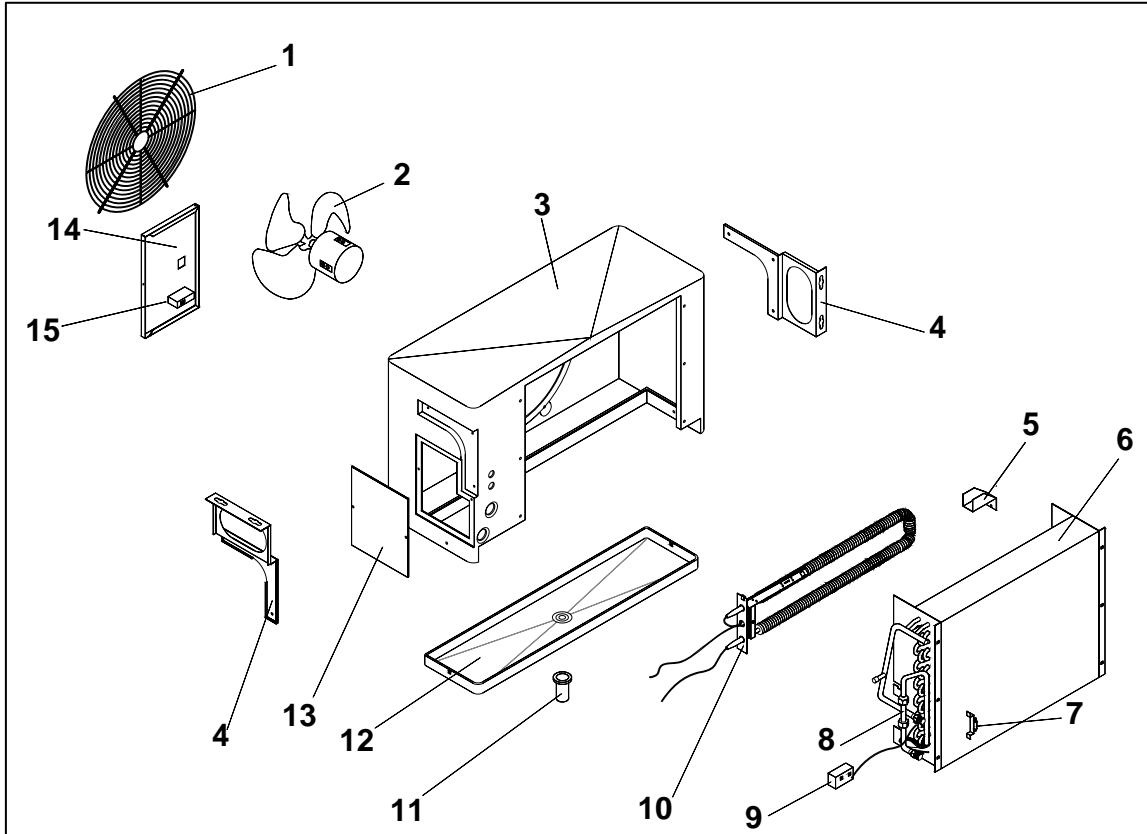
		EXPANSION LINE (m)															
		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
R407C	CXE 40 + CKC 20	890	970	1050	1130	1280	1430	1580	1730	1880	2030	-	-	-	-	-	-
	CXE 50 + CKC 40	1260	1340	1490	1640	1790	1940	2090	2330	2570	2810	2960	3110	3260	3410	3560	3710
	CXE 70 + CKC 60	1860	1940	2090	2240	2390	2540	2690	2840	2990	3140	3380	3620	3860	4100	4340	4580

POE OIL (EXP. LINE)	CXE 40 + CKC 30	-	-	-	-	25	25	25	50	50	50	-	-	-	-	-	-
	CXE 50 + CKC 50	-	-	-	-	50	50	50	50	100	100	100	100	100	150	150	150
	CXE 70 + CKC 80	-	-	-	-	50	50	100	100	100	150	150	150	200	200	200	250

5. Run the system for a few minutes to allow it to stabilize. Where possible, charge to a sweat line on the evaporator. Typical suction pressure on short lines at UK conditions should be approx. **3.8bar (55 psig)**.
6. Transfer the motor wire back from terminal 1 to 4 on the HPC pcb.
7. **Head pressure controller**  
The HPC is factory set to suit R407C refrigerant. It may be necessary to adjust this to suit site conditions, to raise or lower the nominal head pressure.
  - I. With the system switched off, connect a high pressure gauge to the liquid line service valve.
  - II. Switch on the system, indoor fan set to high speed and run for a few minutes to stabilise.
  - III. The head pressure should be approximately **275-280 psig (18.9-19.6 barg)**. To achieve this adjust the screw clockwise to increase the pressure by approx 5 psig (0.5barg)

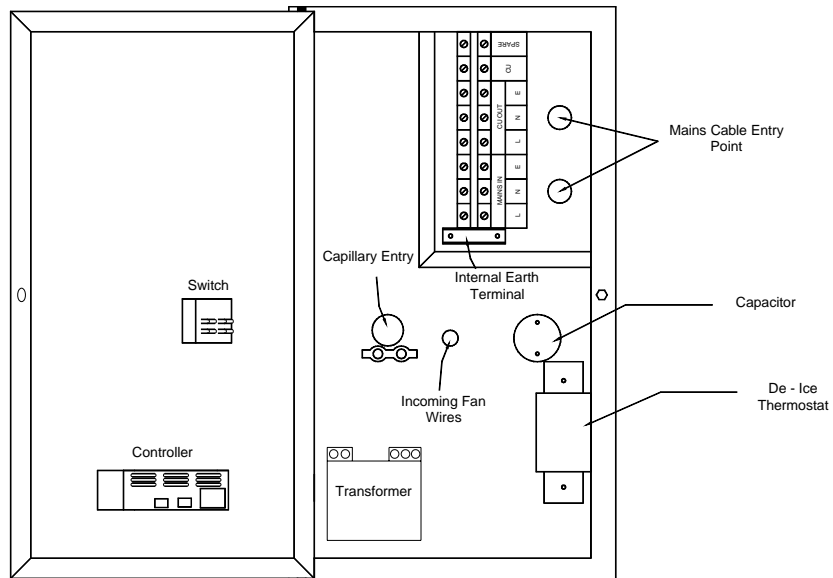
**NOTE:** Min fan speed (0 rpm) and fan cut in pressure (230psig / 15.6 barg) are factory set and not adjustable.

# CXE INDOOR UNIT COMPONENT IDENTIFICATION

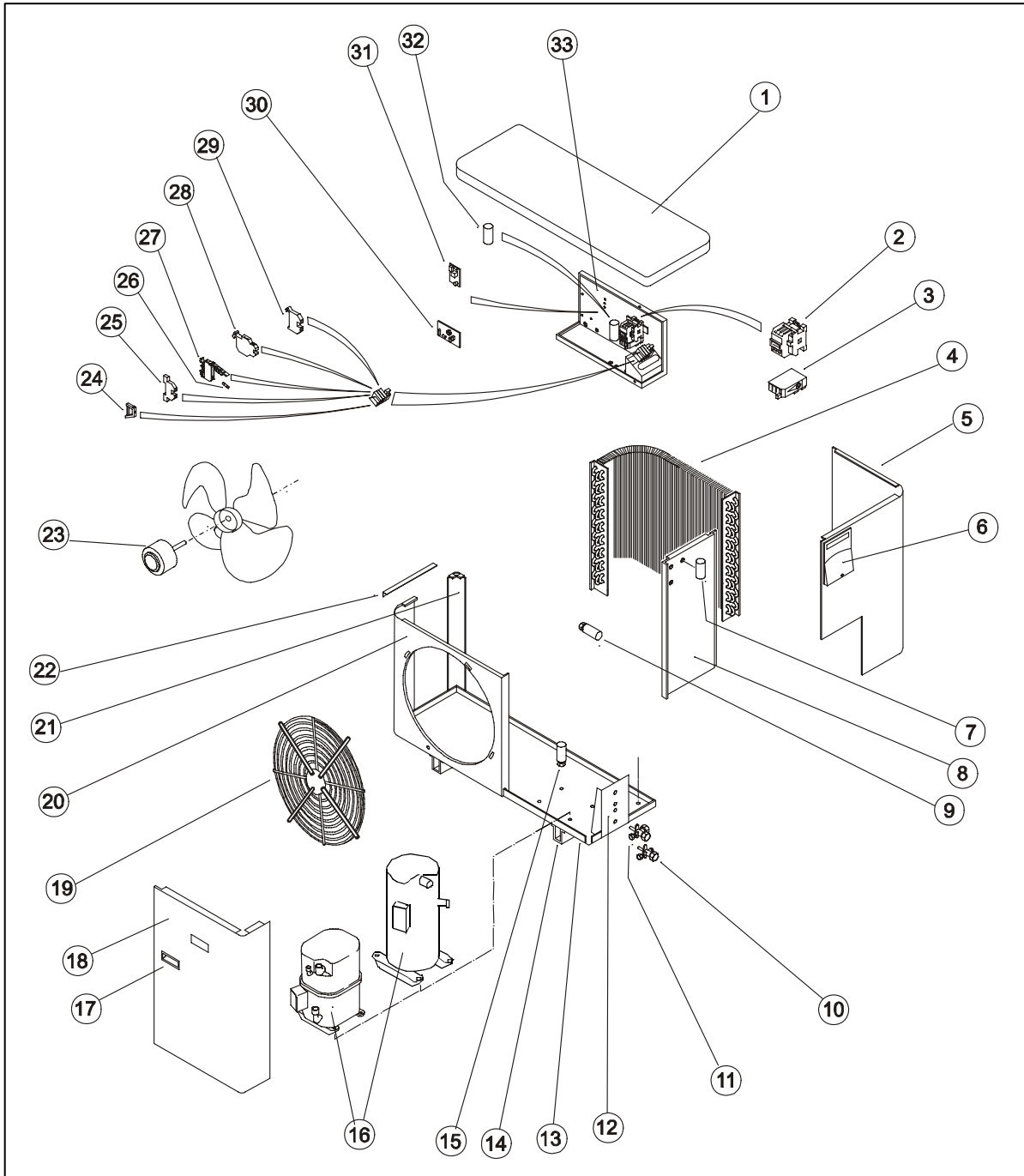


1	Grille	9	De-ice stat
2	Fan / motor	10	Heater assembly (option)
3	Case	11	Drain stub adaptor
4	Wall / ceiling mounting brackets	12	Drain tray
5	Heater bracket	13	Side access panel
6	Coil assembly	14	Electrics box door
7	Thermostat bulb & bracket	15	Controller
8	Restrictor assembly / extended pipe (option)		

## INSIDE VIEW OF ELECTRICS BOX



# CKC OUTDOOR UNIT COMPONENT IDENTIFICATION



1	LID	18	FRONT ACCESS
2	CONTACTOR	19	FAN GUARD
3	OVERLOAD	20	FASCIA PANEL
4	HEAT EXCHANGER COIL	21	CORNER PANEL
5	REAR ACCESS PANEL	22	SUPPORT BRACKET
6	MAINS TERMINAL COVER	23	FAN / MOTOR ASSEMBLY
7	FAN CAPACITOR	24	END CLAMP
8	BULKHEAD PANEL	25	TERMINAL
9	HP SWITCH (MANUAL, OPTION)	26	FUSE
10	SERVICE VALVE (LIQUID)	27	FUSE TERMINAL
11	SERVICE VALVE (SUCTION)	28	TERMINAL (4 WAY)
12	VALVE PANEL	29	EARTH TERMINAL
13	BASE	30	HEAD PRESSURE CONTROL pcb
14	MOUNTING FOOT	31	3 MINUTE TIMER pcb
15	LP SWITCH	32	COMPRESSOR CAPACITOR
16	COMPRESSOR	33	ELECTRICS BOX
17	HANDLE		