

**TECHNICAL MANUAL****FOR CD3 (929 SERIES) PACKAGED DX AIR HANDLING UNITS****FOR USE IN SPLIT SYSTEMS**

This manual details technical, installation and operating information for the CD3 range (929 series) DX indoor units for use in conjunction with 550 series MCU+ condensing units or 542 series DCUE ducted condensing units.

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INTRODUCTION

The CD3 range of direct expansion units is designed to provide the close control of temperature and humidity demanded by computer rooms, laboratories, banks, offices etc.. All units are fitted with programmable microprocessor controls.

CD3 indoor units are available in upflow or downflow configurations, matching with the Marsatair range of MCU+ and DCUE outdoor/ducted condensing units using R407C refrigerant. There is a range of 4 capacities in 3 cabinet sizes for both upflow and downflow units. Packaged units (normally ex-stock) are available in upflow versions only.

CD3-RANGE - GENERAL DESCRIPTION

DX UPFLOW PACKAGE UNITS

Twin circuit, packaged upflow units are normally supplied ex-stock. A field fit kit is available for converting from twin circuit to single circuit if required.

MODEL CD3	008	010	015	020
Twin Circuit upflow	92918001	92918002	92918003	92918004

PACKAGE UNITS INCLUDE:

- * Electronically controlled fan speeds
- * Class 'O' thermal and acoustic insulation
- * Washable filters
- * Discharge plenum and grille
- * Twin circuit coils
- * Electric heating (2 stage)
- * Humidifier with modulating control
- * Four pole mains isolator
- * Microprocessor controls
- * Display giving access to set points and alarms
- * Alarms: humidity/temperature out of limits
- * Switches: Off/standby, unit run
- * De-ice thermostat
- * Dehumidification

KITS AVAILABLE FOR FIELD FITTING TO PACKAGE UNITS:

Condensate pump, including high water level indication. (hot or cold, 5m lift)	ALL	92919077	008	92911032	
			010, 015	92911033	
			020	92911034	
Fresh air spigot 100mm dia.	ALL	92911062	Double deflection grille	008	92911094
Fresh air spigot 160mm dia.	ALL	92911063		010, 015	92911095
Fresh air fan and filter 93m ³ /h	ALL	92911003		020	92911096
Fresh air fan and filter 186m ³ /h	ALL	92911004	Disposable filter (replaces washable filter)	008	92911038
Top ducted discharge spigot	008	92911059		010, 015	92911039
	010, 015	92911060		020	92911040
	020	92911061			
Master/slave, run/standby, duty assist and unit sequencing are available using a pLAN network			Sound attenuation section	008	92911075
Changeover on alarm	ALL	92900820		010, 015	92911076
Changeover on set time and/or alarm	ALL	92900821		020	92911077
Two circuit to single circuit pipe work conversion kit	008	92911102	3 phase to 1phase conversion kit	008/2 + 50	92911125
	010	92911103		008/2 + 30	92911126
	015	92911104		010/2 + 50	92911127
	020	92911105		010/2 + 60	92911128
				015/2 + 80	92911129
			020/2 + 90	92911130	

DX UPFLOW & DOWNFLOW CONFIGURED UNITS

MODEL	COOLING CIRCUITS	CD3 008	CD3 010	CD3 015	CD3 020
UPFLOW	1	92918006	92918008	92918010	92918012
	2	92918007	92918009	92918011	92918013
DOWNFLOW	1	92918014	92918016	92918018	92918020
	2	92918015	92918017	92918019	92918021

CONFIGURABLE UNIT FEATURES

- * Electronically controlled fan speeds
- * Class 'O' thermal and acoustic insulation
- * Washable filters
- * Discharge plenum and grille
- * Single and twin circuit coils
- * Microprocessor controls
- * Display giving access to set points and alarms
- * Alarms: humidity/temperature out of limits
- * Switches: Off/standby, unit run
- * Upflow and downflow units available

MCU+ CONDENSING UNITS (For use with R407C refrigerant)

MCU+ 30 1ph	MCU+ 30 3ph	MCU+ 40 1ph	MCU+ 40 3ph	MCU+ 50 1ph	MCU+ 50 3ph	MCU+ 60 1ph	MCU+ 60 3ph	
55022004	55022011	55022005	55022012	55022006	55022013	55022007	55022014	
MCU+ 80 1ph	MCU+ 80 3ph	MCU+ 90 1ph	MCU+ 90 3ph	MCU+ 100 3ph	MCU+ 130 3ph	MCU+ 165 3ph	MCU+ 180 3ph	MCU+ 200 3ph
55022008	55022015	55022009	55022016	55022017	55022018	55022020	55022021	55022022

MCU+ 30 and 40 units are fitted with reciprocating compressors. All other MCU+ units are fitted with scroll compressors.

DCUE DUCTED CONDENSING UNITS (for use with R407C)

DCUE 30 1ph	DCUE 30 3ph	DCUE 50 1ph	DCUE 50 3ph	DCUE 60 1ph	DCUE 60 3ph	DCUE 80 1ph	DCUE 80 3ph
54200029	54200035	54200031	54200037	54200032	54200038	54200033	54200039

All DCUE units are fitted with reciprocating compressors.

STANDARD FEATURES AND OPTIONS, MCU+, DCUE

MCU+ = standard condensing unit + head pressure control + HP and LP switch and timers

DCUE = electronic controlled ducted condensing unit + head pressure control + HP and LP switches and timers

CONDENSING UNIT MODEL	MCU+	DCUE
Suction and liquid service valves	Standard	Standard
Expansion device (fixed orifice type)	Standard	Standard
Pre-charged with refrigerant (R407C)	Standard	Standard
Ducted air inlet and/or discharge	Not available	Standard
Ceiling suspendible	Not available	Standard
Capacitor start relay (1 phase) (MCU+ 30 - 40, All DCUE)	Option	Option
PTC resistor (1 phase)	Option	Option
Fan speed/head pressure control	Standard	Standard
LP cut-out - Auto	Standard	Standard
HP cut-out - Auto	Standard	Standard
HP cut-out - Manual	Option	Not available
Isolator	Option	Option
3 minute start delay timer and low ambient start	Standard	Standard
Wall mounting brackets	Option	Option
Contactors	Standard	Standard
Overload (standard on 3ph)	Not available	Option

CD3 DX UNIT CONFIGURABLE ACCESSORIES

(All options are factory fitted or supplied loose for site fitting during installation)

Description	Model	Factory Fitted Part No.
THERMOSTATIC EXPANSION VALVE	008/1	92900468
	010/1	92900469
	015/1	92900470
	020/1	92900471
	008/2	92900472
	010/2	
	015/2	
ELECTRIC HEATERS - Upflow Single stage	2kW	92919001
	4kW	92919002
	6kW	92919003
	8kW	92919004
	10kW	92919005
ELECTRIC HEATERS - Upflow Second stage	2kW	92919011
	4kW	92919012
	6kW	92919013
	8kW	92919014
	10kW	92919015
HEATER RAIL - Upflow Required for all heater kits	008	92919021
	010, 015	92919024
	020	92919026
ELECTRIC HEATERS - Downflow Single stage	2kW	92919006
	4kW	92919007
	6kW	92919008
	8kW	92919009
	10kW	92919010
ELECTRIC HEATERS - Downflow Second stage	2kW	92919016
	4kW	92919017
	6kW	92919018
	8kW	92919019
	10kW	92919020
HEATER RAIL - Downflow Required for all heater kits	008	92919022
	010, 015	92919025
	020	92919027
LPHW HEATING 7.52kW (Add de-ice stat 10.50kW For all units) 14.94kW 18.40kW	008	92900423
	010	92900424
	015	92900424
	020	92900425
LPHW VALVE Motorised 2 port 3 port Modulating	ALL	92919048
	ALL	92919049
	ALL	92919050
DE-ICE THERMOSTAT (1 per circuit)	ALL	92900410
HUMIDIFIER 0-3kg/h	008U	92919028
	010/015U	92919029
	020U	92919030
	008D	92919031
	010/015D	92919032
	020D	92919033
CONDENSATE PUMP (With alarm interface)	ALL	92919054

Description	Model	Factory Fitted Part No.
ALARMS		
High water level	ALL	92919064
Water spillage indication (no pump)	ALL	92919067
Water spillage indication (with pump)	ALL	92919066
Fan failure	ALL	92919069
Dirty filter indication	ALL	92919071
Condensing unit 1 trip	ALL	92919073
Condensing unit 2 trip	ALL	92919075
Common alarm (volt free relay)	ALL	92919056
ISOLATOR 63A	008	92900456
	010, 015	92900457
	020	92900458
FRESH AIR SPIGOT 100mm dia. 160mm dia.	ALL	92900462
	ALL	92900463
FRESH AIR FAN + FILTER 93m³/h 186m³/h	ALL	92900403
	ALL	92900404
TOP DUCTED DISCHARGE SPIGOT (If used for return air on downflow units add plenum for disposable filter access)	008	92900459
	010, 015	92900460
	020	92900461
SOUND ATTENUATOR SECTION	008U	92900475
	010/015U	92900476
	020U	92900477
FLOOR STAND PLINTH 75mm high (Recommended for all floor standing Units and for side entry of services)	008U	92900432
	010015U	92900433
	020U	92900434
	008D	92900435
	010/015D	92900436
DOWNFLOW PLINTH 300mm high Font discharge	008	92900481
	010/015	92900482
	020	92900483
	008	92900484
300mm high Rear discharge	010/015	92900485
	020	92900486
	008	92900494
DOUBLE DEFLECTION GRILLE (Upflow only)	010, 015	92900495
	020	92900496
	008U	92900438
DISPOSABLE FILTER 50mm (Replaces standard washable filter)	010/015U	92900439
	020U	92900440
	008D	92900441
	010/015D	92900442
	020D	92900443
HIGH EFFICIENCY FILTER 100mm	008	92900478
	010,015	92900479
	020	92900480
REMOTE CONTROL PANEL Supplied separately (Includes 6m ribbon cable)	008	92919078
	010, 015	92919079
	020	92919080

DIMENSIONS AND WEIGHTS

CD3 INDOOR UNITS

UPFLOW UNITS (With plenum fitted)								
	UNPACKED				PACKED			
Model	008	010	015	020	008	010	015	020
HEIGHT mm	1595	1595	1595	1595	1755	1755	1755	1755
WIDTH mm	1230	1380	1380	1580	1250	1400	1400	1600
DEPTH mm	430	430	430	430	455	455	455	455
WEIGHT kg	142	162	171	182	163	185	194	211

DOWNFLOW UNITS								
	UNPACKED				PACKED			
Model	008	010	015	020	008	010	015	020
HEIGHT mm	1165	1165	1165	1165	1300	1300	1300	1300
WIDTH mm	1230	1380	1380	1580	1250	1400	1400	1600
DEPTH mm	430	430	430	430	455	455	455	455
WEIGHT kg	124	142	151	160	141	160	169	184

MCU+ CONDENSING UNITS

UNPACKED											
Model	MCU+ 30	MCU+ 40	MCU+ 50	MCU+ 60	MCU+ 80	MCU+ 90	MCU+ 100	MCU+ 130	MCU+ 165	MCU+ 180	MCU+ 200
HEIGHT mm	620	620	720	720	720	820	820	1080	1080	1275	1275
WIDTH mm	904	904	1004	1004	1004	1004	1004	1004	1004	1104	1104
DEPTH mm	304	304	304	304	304	354	354	429	429	429	429
1 Ph kg	48	53	64	65	66	76	-	-	-	-	-
3 Ph kg	48	53	62	63	64	73	81	101	103	118	173
PACKED											
Model	MCU+ 30	MCU+ 40	MCU+ 50	MCU+ 60	MCU+ 80	MCU+ 90	MCU+ 100	MCU+ 130	MCU+ 165	MCU+ 180	MCU+ 200
HEIGHT mm	620	620	720	720	720	820	820	1080	1080	1280	1280
WIDTH mm	980	980	1080	1080	1080	1090	1090	1090	1090	1215	1215
DEPTH mm	340	340	340	340	340	390	390	465	465	465	465
1 Ph kg	50	55	66	67	68	78	-	-	-	-	-
3 Ph kg	50	55	64	65	66	75	83	105	107	123	178

DCUE DUCTED CONDENSING UNITS

	UNPACKED				PACKED			
Model	DCUE 30	DCUE 50	DCUE 60	DCUE 80	DCUE 30	DCUE 50	DCUE 60	DCUE 80
HEIGHT mm	560	625	625	625	580	650	650	650
WIDTH mm	1075	1245	1245	1245	1090	1270	1270	1270
DEPTH mm	565	565	565	565	610	610	610	610
WEIGHT kg	66	70	81	81	76	86	86	90

PRODUCT SELECTION

Systems can be selected to provide either comfort cooling or cooling with higher sensible heat ratios

CD3 COMBINATIONS AND DX PERFORMANCE DATA (nominal cooling capacities in kW)

CD3 MODEL	008	010	015	020
AIRFLOW (maximum) ³ /s	0.78	1.04	1.23	1.51

HIGH SENSIBLE COOLING SYSTEMS

	MCU+/DCUE	1 x 80	2 x 30	1 x 100	2 x 50	1 x 165	2 x 80	1 x 180	2 x 90
Return air	EXTERNAL AMBIENT 30°C								
22°C 50%RH	Total	7.20	7.36	10.63	11.08	13.56	13.86	16.76	18.05
	Sensible	7.20	7.36	10.58	10.77	13.44	13.57	16.56	17.11
24°C 50%RH	Total	7.46	7.74	11.23	11.62	14.23	14.44	17.60	19.05
	Sensible	7.46	7.74	10.86	11.01	13.76	13.84	16.96	17.54
26°C 50%RH	Total	7.75	8.09	11.89	12.13	14.87	14.98	18.40	20.04
	Sensible	7.75	8.09	11.13	11.22	14.03	14.07	17.29	17.91
Return air	EXTERNAL AMBIENT 35°C								
22°C 50%RH	Total	6.86	7.17	10.11	10.56	12.97	13.19	16.03	17.20
	Sensible	6.86	7.17	10.11	10.55	12.97	13.19	16.03	16.75
24°C 50%RH	Total	7.11	7.39	10.60	11.15	13.62	13.72	16.78	18.05
	Sensible	7.11	7.39	10.60	10.83	13.52	13.56	16.63	17.14
26°C 50%RH	Total	---	---	11.22	11.64	14.22	14.22	17.79	19.00
	Sensible	---	---	10.88	11.04	13.79	13.79	17.07	17.52
Return air	EXTERNAL AMBIENT 40°C								
22°C 50%RH	Total	6.57	6.63	9.43	10.15	12.28	12.62	15.22	15.83
	Sensible	6.57	6.57	6.63	9.43	10.15	12.28	15.22	15.22
24°C 50%RH	Total	6.79	6.98	9.93	10.60	12.85	13.08	16.00	16.78
	Sensible	6.79	6.98	9.93	10.60	12.85	13.08	16.00	16.63
26°C 50%RH	Total	---	---	10.42	11.05	13.43	13.49	16.79	17.54
	Sensible	---	---	10.42	10.82	13.43	13.49	16.70	16.98
Return air	EXTERNAL AMBIENT 45°C								
22°C 50%RH	Total	---	6.21	8.79	9.75	11.52	---	14.33	14.88
	Sensible	---	6.21	8.79	9.75	11.52	---	14.33	14.88
24°C 50%RH	Total	---	6.46	9.24	10.20	12.09	---	15.11	15.59
	Sensible	---	6.46	9.24	10.20	12.09	---	15.11	15.59
26°C 50%RH	Total	---	---	9.73	10.65	12.73	---	15.83	16.31
	Sensible	---	---	9.73	10.65	12.73	---	15.83	16.31

STANDARD COOLING SYSTEMS

	MCU+/DCUE	1 x 100	2 x 50	1 x 130	2 x 60	1 x 180	2 x 100	1 x 200	2 x 130
Return air	EXTERNAL AMBIENT 30°C								
22°C 50%RH	Total	9.84	10.26	11.67	11.81	15.98	18.78	18.88	21.90
	Sensible	8.80	8.98	11.02	11.08	14.48	15.72	17.49	18.80
24°C 50%RH	Total	10.40	10.79	12.30	12.53	16.84	19.98	19.91	23.13
	Sensible	9.01	9.17	11.29	11.38	14.82	16.13	17.89	19.22
26°C 50%RH	Total	10.96	11.32	12.92	13.08	17.69	21.20	21.04	24.36
	Sensible	9.20	9.34	11.52	11.58	15.11	16.49	18.30	19.59
Return air	EXTERNAL AMBIENT 35°C								
22°C 50%RH	Total	9.31	9.84	11.08	11.30	15.17	17.91	17.95	20.91
	Sensible	8.57	8.80	10.77	10.86	14.13	15.33	17.07	18.36
24°C 50%RH	Total	9.90	10.35	11.77	11.85	16.10	19.01	19.05	22.11
	Sensible	8.81	9.00	11.08	11.11	14.51	15.72	17.54	18.80
26°C 50%RH	Total	10.45	10.88	12.37	12.45	16.92	20.12	19.92	23.41
	Sensible	9.00	9.17	11.31	11.34	14.81	16.06	17.87	19.22
Return air	EXTERNAL AMBIENT 40°C								
22°C 50%RH	Total	8.67	9.44	10.46	10.78	14.33	16.76	16.65	19.77
	Sensible	8.29	8.63	10.46	10.64	13.77	14.82	16.52	17.86
24°C 50%RH	Total	9.19	9.94	11.07	11.31	15.13	17.65	17.71	20.93
	Sensible	8.52	8.83	10.80	10.89	14.12	15.15	17.00	18.31
26°C 50%RH	Total	9.76	10.45	11.64	11.89	16.02	18.81	18.76	22.10
	Sensible	8.74	9.00	11.04	11.13	14.46	15.54	17.43	18.71
Return air	EXTERNAL AMBIENT 45°C								
22°C 50%RH	Total	8.02	9.06	9.84	---	13.47	15.35	15.63	18.47
	Sensible	8.02	8.46	9.84	---	13.40	14.21	15.63	17.29
24°C 50%RH	Total	8.57	9.55	10.38	---	14.23	16.56	16.47	19.70
	Sensible	8.27	8.67	10.38	---	13.76	14.70	16.47	17.80
26°C 50%RH	Total	9.08	10.04	10.88	---	15.08	17.50	17.54	20.82
	Sensible	8.48	8.85	10.75	---	14.11	15.03	16.98	18.21

AIRFLOWS (m³/s)

CD3

Model	008		010		015		020	
Fan speed	Min	Max	Min	Max	Min	Max	Min	Max
Airflow m³/s	0.42	0.78	0.67	1.04	0.72	1.23	0.92	1.51

Note: Maximum external resistance at the maximum speed = 75Pa

MCU+ (Maximum fan speed)

Model	30	50	60	80	90	100	130	165	180	200
Airflow m³/s	0.81	0.78	0.78	0.78	1.14	1.14	1.74	1.74	1.74	1.74

Note: All MCU+ units are fitted with fan speed control that will allow the fan to stop during normal operation.

DCUE

Model	30		50		60		80	
Fan speed	Min	Max	Min	Max	Min	Max	Min	Max
Airflow m³/s	0.32	0.42	0.42	0.53	0.42	0.53	0.34	0.48

Note: All DCUE units are fitted with fan speed control, modulating the airflow according to system conditions.

SOUND PRESSURE LEVELS – CD3 UNITS

	UNIT	008		010		015		020	
UPFLOW	Fan speed	Min	Max	Min	Max	Min	Max	Min	Max
Top discharge and front return air	NC	43	59	46	60	47	58	48	61
	dBA	52	66.5	55	67	56	65	57	68
Front discharge with standard plenum and front return air	NC	43	60	44	58	47	58	48	60
	dBA	52	67	52.5	65	56	65	58.5	67
Front discharge with additional attenuator and front return air	NC	38	49	41	49	41	48	43	50
	dBA	47	58.5	50	58.5	50	57	52	58
DOWNFLOW									
Top return and bottom discharge air (supplied as standard)	NC	31	44	37	45	37	45	39	48
	dBA	41	53	46	54	46	54	48	56

Note: CD3 Sound Pressure Levels were calculated from measurements taken at 3m from the front of the unit in an office installation and should be used for guidance only.

SOUND POWER AND SOUND PRESSURE LEVELS – 550 SERIES MCU+ UNITS (Maximum fan speed)

MCU+	SOUND POWER LEVELS							SOUND PRESSURE LEVELS	
	Frequency Hz								
	125	250	500	1k	2k	4k	dBA	dBA	NC
30	77.4	67.5	68.5	64.8	60.2	53.8	69.8	50.0	44
50	73.6	68.2	67.1	65.5	61.1	54.3	69.7	49.2	44
60	72.9	67.7	67.8	66.4	61.9	54.1	70.3	49.8	45
80	70.9	68.6	68.1	65.3	59.5	53.8	69.7	49.2	43
90	81.8	71.8	69.2	68.6	63.1	57.4	72.8	52.3	47
100	79.4	73.7	71.5	68.5	63.8	58.1	73.4	52.9	47
130	73	70.3	70.0	68.8	65.0	56.7	72.6	52.1	47
165	73.1	70.3	70.1	68.9	65.5	57.5	73.1	57.2	51
180	72.5	71.9	71.7	68.9	66.0	58.2	75.5	59.2	53
200	73.0	71.8	71.5	70.1	66.1	58.3	75.7	61.8	55

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

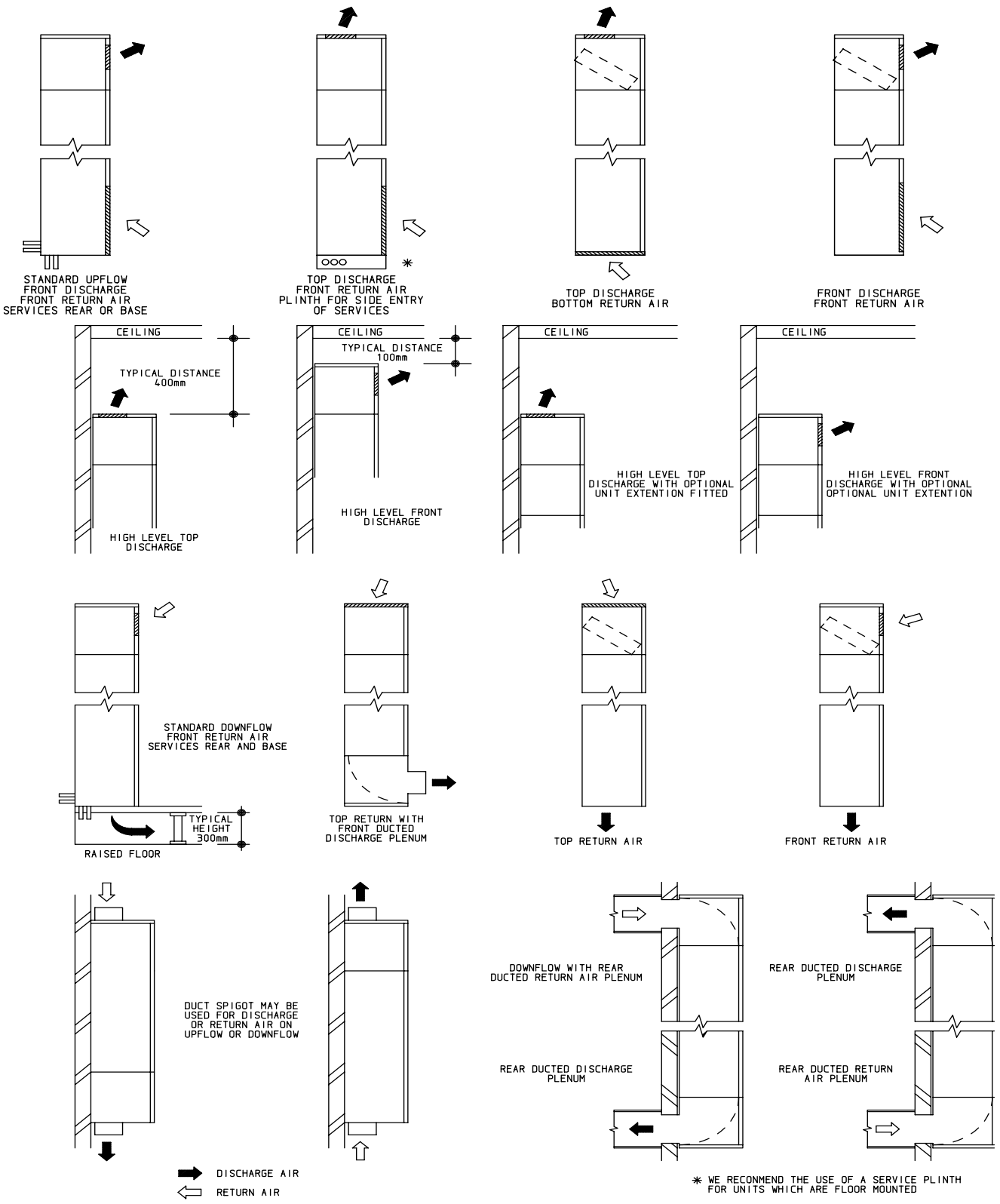
Sound Pressure Levels are dB relative to $2 \times 10^{-5} \text{N/m}^2$, calculated from the results under anechoic conditions and quoted as an average of all points on a sphere of a radius of 3m away from the centre of the unit (in cooling mode); (add 3dBA or 3NC for units at an intersection of a wall, add 1dBA or 1NC for high level wall mounted units).

DUCTED CONDENSING UNITS

Measurement point	Unit	Fan speed	dBA	NC
3m from unit in void	DCUE 30	Max	52	46
		Min	35	28
	DCUE 50, 60, 80	Max	54	48
		Min	44	31
Office area	DCUE 30	Max	37	26
		Min	30	15
	DCUE 50, 60, 80	Max	42	28
		Min	32	17
3m from discharge grille	DCUE 30	Max	52	46
		Min	34	27
	DCUE 50, 60, 80	Max	52	44
		Min	40	28

Sound Pressure Levels are dB relative to $2 \times 10^{-5} \text{N/m}^2$. All readings taken from a typical application of a unit suspended in a ceiling void complete with 5m of insulated ducting, conditioning an office directly below.

CD3 AIRFLOW OPTIONS



CD3 SERIES AIR HANDLING UNIT INSTALLATION

An envelope containing important user information is supplied with the indoor unit. Please pass to the end user.

1. The Packaged units are supplied for Upflow operation with front return air and top discharge.

Configured units are supplied for Upflow or Downflow operation. Standard upflow units are supplied with front return air and top discharge; Downflow units with top return air and front discharge.

Units may be ordered with other airflow configurations or altered on site. Other configurations include:

Upflow: (wall mounted) with bottom return air.
with front or top discharge, wall or floor mounted.

Downflow: with top return air and under floor discharge.

See page 8 for all available configurations.

Note:- The required airflow arrangement must be configured prior to installation.

2. The chassis is made up of removable panels. The central panel, with control panel inset, **MUST** be removed first using the two keys provided.

UNIT ACCESS AND CABINET STRIP DOWN

- 1 If a door interlock isolator is fitted, ensure that the switch is turned to the OFF position.
- 2 Using the keys provided, unlock the electrics access panel. Remove the panel by easing outwards and down.
- 3 The side panels can be removed by releasing the two swell latches located through the side bulkheads within the electrics compartment and carefully pulling outwards until they are clear of the upper and lower grabber catches.
- 4 Access to the fan section, (and coil section in the downflow mode), can be gained by releasing the appropriate swell latches located through the cut outs to the front of the side bulkheads and removing the panel.
- 5 The return air grille is removed by turning the 4 retaining screws anticlockwise, until a click is heard, and pulling the grille outwards.

MOUNTING

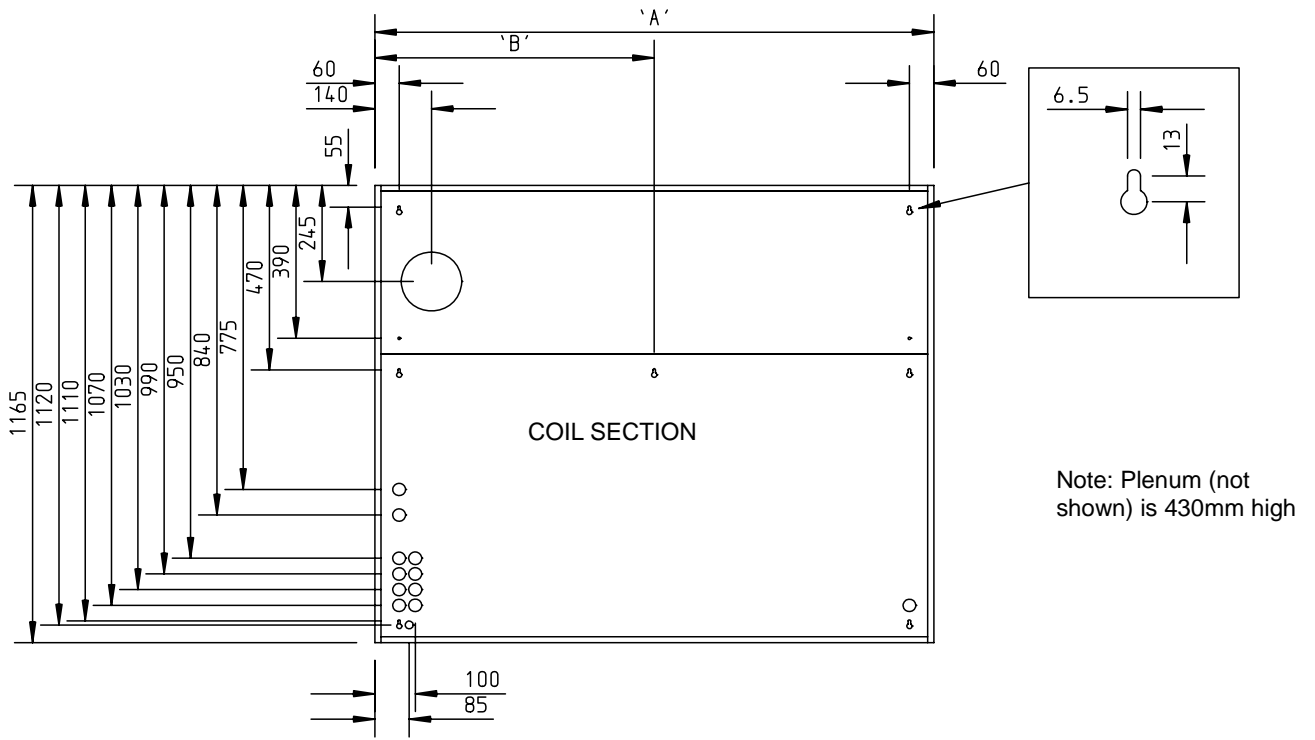
- 1 It is recommended that **ALL** field fit kits are installed prior to mounting the unit and brazing the pipe work.
- 2 Ensure that the wall or floor will accept the operating weight of the unit; weights shown below include the plenum.

MODEL		WEIGHT (kg)
Upflow units with plenum fitted	CD3	142
	CD3	162
	CD3	171
	CD3	182
Downflow units	CD3	124
	CD3	142
	CD3	151
	CD3	160

NOTE:-When wall mounting, the unit should be lifted into position using the pallet provided.

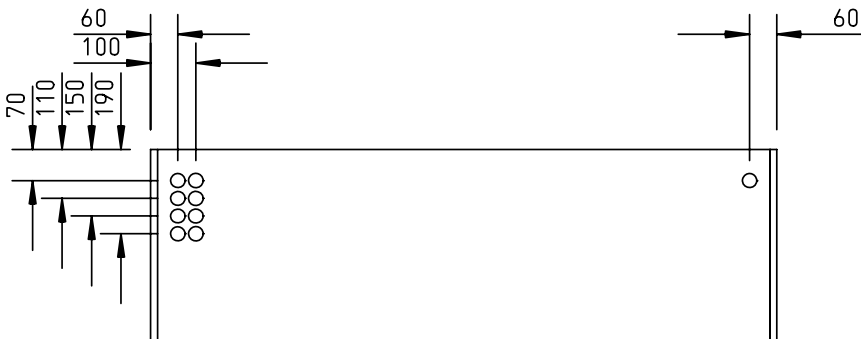
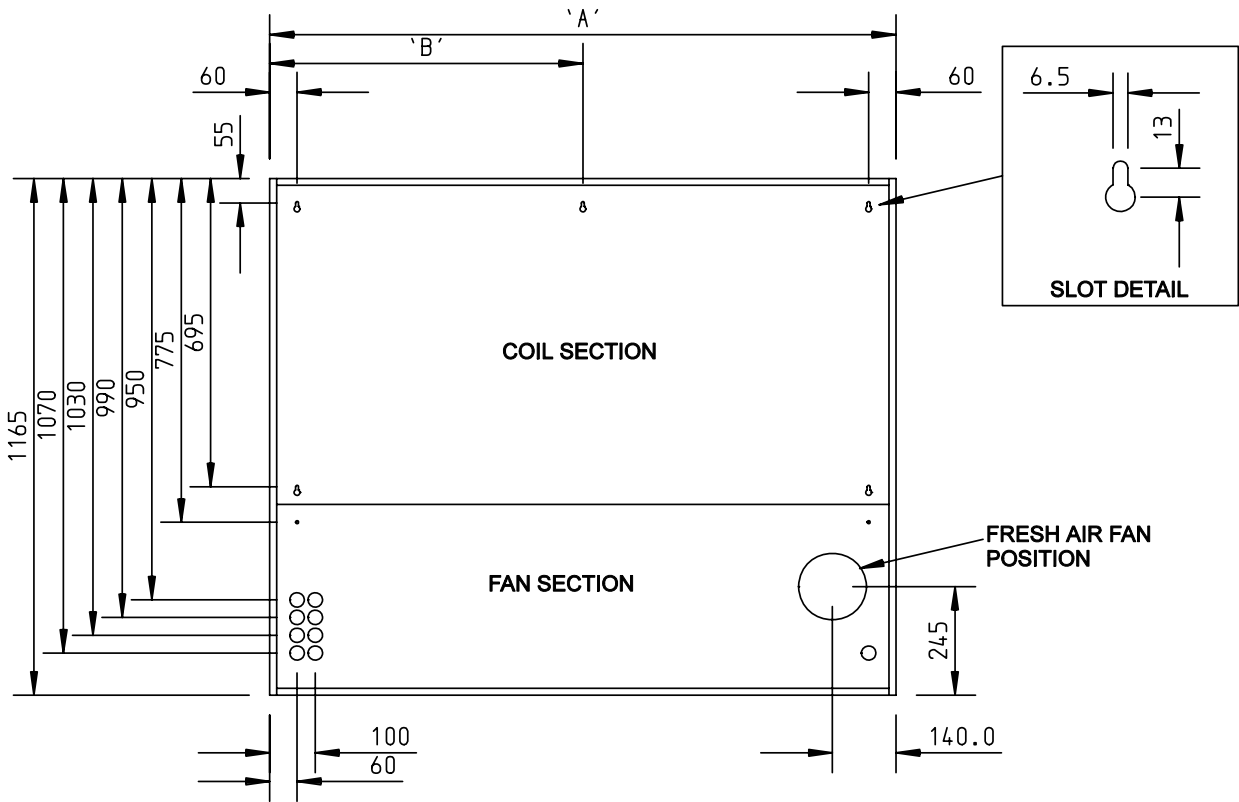
- 3 Mark off the mounting holes as shown and drill holes to suit M6 Rawlbolt shields or equivalent fasteners.
- 4 If a fresh air facility is required, the appropriate apertures must be prepared to match up with the positions of the unit fresh air inlets as shown in the diagrams following. Any opening in the external wall must be suitably lined and screened to prevent brick dust entering the unit during installation and operation.
- 5 Mount the unit as required and secure all fixing bolts
- 6 Check that the unit is square and level. Failure to do so will result in misalignment of the cabinet access panels and possible operational problems.

UPFLOW SERVICE AND FIXING HOLE CENTRES (excluding discharge plenum)



UNIT SIZE	DIMENSION 'A'	DIMENSION 'B'
008	1230	-
010 / 015	1380	690
020	1580	790

DOWNFLOW SERVICE AND FIXING HOLE CENTRES



UNIT	DIMENSION 'A'	DIMENSION 'B'
008	1230	--
010/015	1380	690
020	1580	790

INSTALLATION of 550 Series MCU+ CONDENSING UNITS

MCU+ units include fan speed control, high & low pressure switches with low ambient and compressor delay start timers.

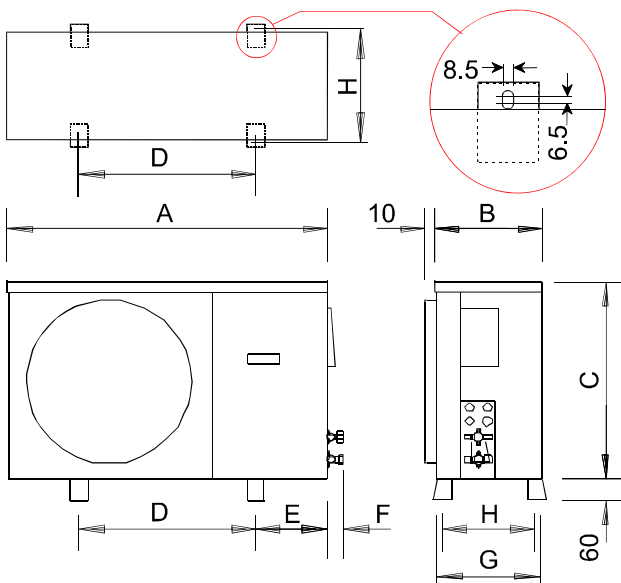
Note: It is easier to fit any kits prior to mounting the unit.

The units are designed to stand on a flat surface. If they are to be wall mounted the following kits are available. (TEV Ltd cannot accept liability for installers own mounting arrangements).

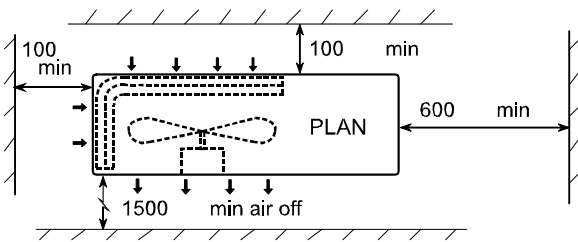
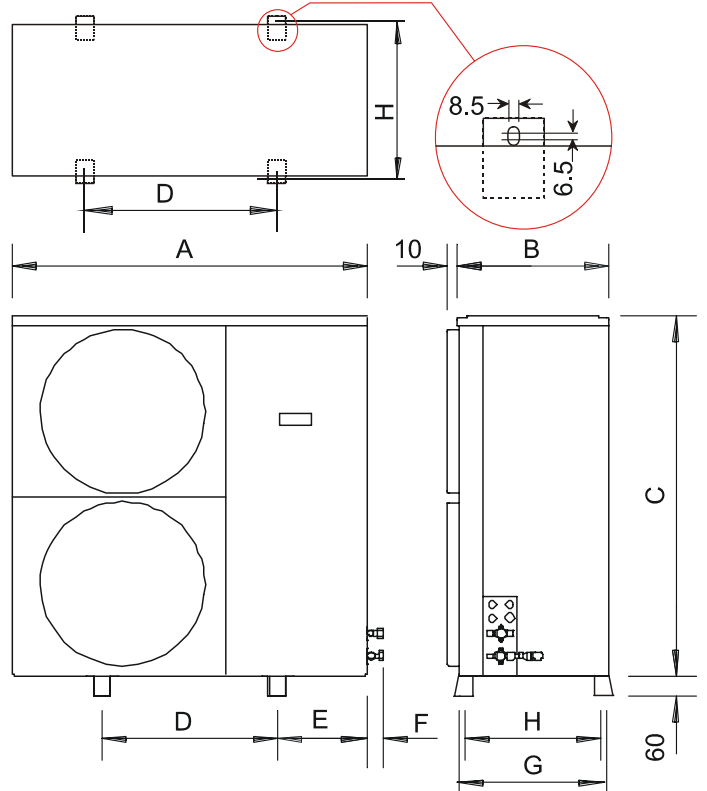
Model	MCU+ 30 - 80	MCU+ 90 - 200
Mounting Bracket Kit	55021100	55021101

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.

MOUNTING:MCU+ 15 – 100



MCU+ 130 - 200



Dimensions in mm.

MODEL	A	B	C	D	E	F	G	H	Weight (kg)	
									1 Ph	3 Ph
MCU+ 30	900	300	560	525	185	60	333	308	48	48
MCU+ 50	1000	300	660	570	213	60	333	308	64	62
MCU+ 60	1000	300	660	570	213	60	333	308	65	63
MCU+ 80	1000	300	660	570	213	60	333	308	66	64
MCU+ 90	1000	350	760	495	250	70	383	358	76	73
MCU+ 100	1000	350	760	495	250	70	383	358	-	81
MCU+ 130	1000	425	1020	495	251	100	458	433	-	101
MCU+ 165	1000	425	1020	495	251	100	458	433	-	103
MCU+ 180	1100	425	1215	675	211	95	458	433	-	118
MCU+ 200	1100	425	1215	675	211	95	458	433	-	173

INSTALLING 542 SERIES DUCTED CONDENSING UNITS

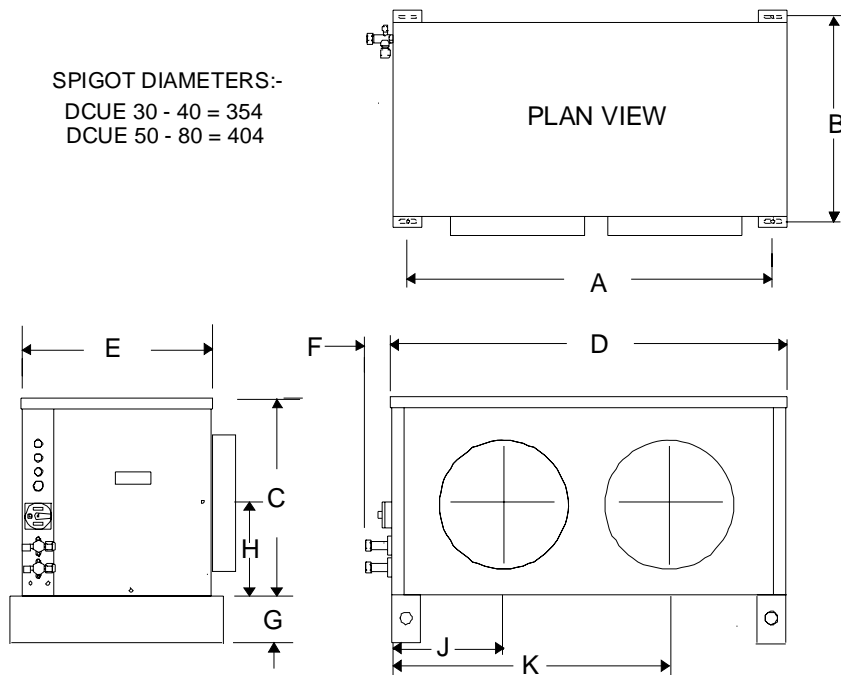
MOUNTING

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

Ducted Units are designed to be hung on a wall (kit available), 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 units weight.

DIMENSIONS

SPIGOT DIAMETERS:-
 DCUE 30 - 40 = 354
 DCUE 50 - 80 = 404

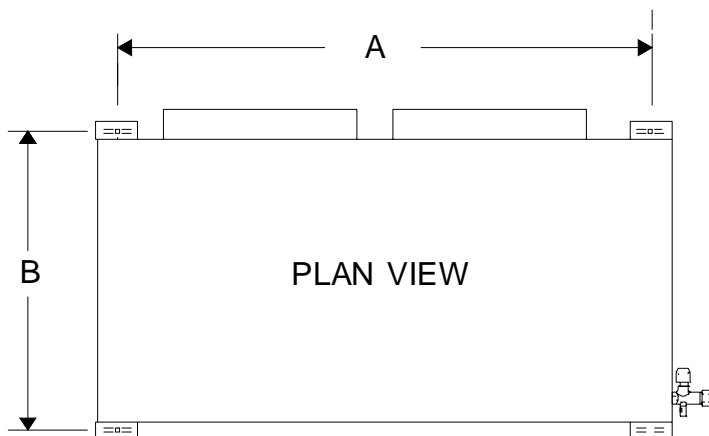


Dimensions in mm

Model	A	B	C	D	E	F	G	H	J	K	Spigot dia.	Weight (kg)
DCUE 30	930	510	495	1004	490	65	65	210	317	717	354	70
DCUE 50	1100	510	560	1174	490	65	65	240	392	865	404	81
DCUE 60	1100	510	560	1174	490	65	65	240	392	865	404	81
DCUE 80	1100	510	560	1174	490	65	65	240	392	865	404	84

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 opposite). Secure the unit to the floor. Discard the stabilizing brackets.



Dimensions in mm

DCUE	A	B
30	930	510
50-80	1100	510

SUSPENSION MOUNTING

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

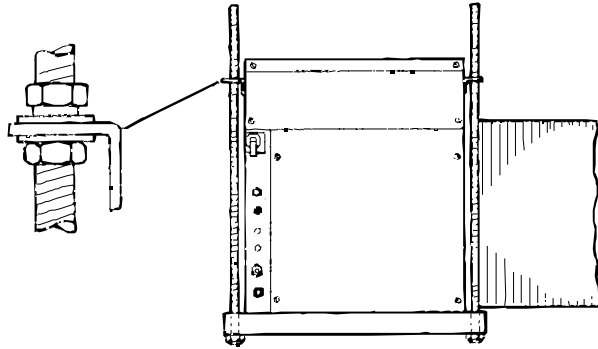
IMPORTANT: The stabilizing brackets provided **MUST** be used when suspending a unit.

Fit the stabilizing brackets to the top corners of the back panel 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.

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

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. 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, (as shown).



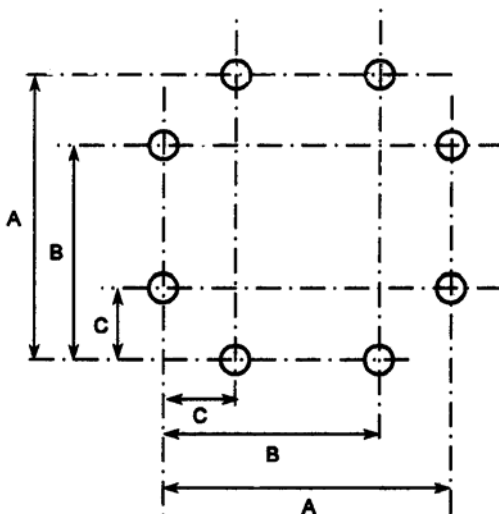
WALL MOUNTING

Brackets to enable ducted units to be wall mounted are available as an optional kit (53200407).

DUCTWORK

Each unit is supplied with air inlet and discharge spigots, models 30 to 40 - 354mm (14") dia., models 50 to 80 - 404mm (16") dia. These may be used for connecting installers ducting or used with the optional Duct, Plenum and Grille kits. Please refer to the kit instruction for installation methods. The front face of the units are also fitted with M6 rivnuts to accept installer 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.



Dimensions mm.	Model	
	30	50-80
A	400	450
B	300	350
C	100	100

APPLICATION

- 1 To maximise performance, pipe runs should be kept as short as possible, avoiding sharp bends. Individual pipe runs to a maximum of 45m are allowed for air conditioners, providing pipe work is sized and installed correctly. Performance ratings are based on 6m pie runs but there will be no significant loss of capacity on extended pipe runs for correctly sized pipes.
 - a) Pipe sizes are based on:-
 - Minimum of 3.8 m/s (750fpm) suction gas velocity for horizontal or down flow.
 - Minimum of 7.6 m/s (1500 fpm) suction gas velocity for up flow.
 - 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 Add 25 grams of refrigerant oil for every 350 grams of charge added to systems with pipe runs exceeding 25m, up to a maximum of 300 grams; preferably by slowly pumping into the suction side with the unit running, after charging the system.
 - R407C : Use polyolester oil - L'Unite 181-023, ICI Emkarate RL32S,RL32CF,Mobil Artic EAL22 or EAL22CC
 - R22 : Use mineral oil (Suniso 3GS, Texaco WF32, Fuchs KM) or polyolester oil, as shown on the compressor.
- 3 For systems with capillary control at the indoor unit; the table shows the suggested pipe sizes (in inches).

Equivalent length of run		Suction Line Size					Liquid Line Size	
		Horizontal or Downflow				Upflow		
MCU(+)	DCUE	0 - 6m	6 - 15m	15 - 21m	21 - 45m	Up to 15m	0 - 21m	21 - 45m
30	30	1/2	5/8	5/8	5/8	1/2	1/4	3/8
40	40	1/2	5/8	5/8	3/4	1/2	3/8	3/8
50	50	1/2	5/8	3/4	3/4	5/8	3/8	1/2
60	60	5/8	3/4	3/4	7/8	5/8	3/8	1/2
80	80	5/8	3/4	3/4	7/8	5/8	3/8	1/2
90	-	5/8	3/4	3/4	7/8	5/8	3/8	1/2
100	-	3/4	7/8	7/8	1 1/8	3/4	1/2	5/8
130	-	3/4	7/8	7/8	1 1/8	3/4	1/2	5/8
150	-	3/4	7/8	7/8	1 1/8	3/4	1/2	5/8
165	-	3/4	7/8	1-1/8	1-1/8	3/4	1/2	5/8
180	-	7/8	1-1/8	1-1/8	1-3/8	1-1/8	1/2	5/8
200	-	7/8	1-1/8	1-1/8	1-3/8	1-1/8	1/2	5/8

- 4 In calculating equivalent lengths of pipe runs, the effect of bends and fittings must be taken into account. Information relating to the equivalent lengths of line fittings and bends etc. is generally available to the design engineer. The table below covers the fittings most likely to be encountered in this type of installation. The equivalent lengths of all the 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.

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

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 = 2	0.24	0.27	0.30	0.37	0.43	0.52
180° Bend C/d = 1	0.73	0.91	1.10	1.28	1.46	1.83
180° Bend C/d = 2	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						

- 5 Use the shortest possible route, avoiding sharp bends.
- 6 Fully insulate the suction line, (or suction and liquid line if run together).

REFRIGERATION INSTALLATION

- 1 Units are supplied with the following pipe connections (in inches):-

Model	008S	008T	010S	010T	015S	015T	020S	020T
Liquid	3/8	3/8	3/8	3/8	1/2	3/8	1/2	3/8
Suction	3/4	1/2	3/4	1/2	7/8	5/8	7/8	5/8

S = Single Circuit T = Twin Circuit

NOTE: On twin circuit units, the lower half of the coil is the first circuit.

- Using a tube cutter, remove sealed ends of suction and liquid pipes. This will release a small holding charge of dry nitrogen. Discard the expansion device on the condensing unit.
- Pipe exit positions are shown on pages 2 and 3. It is recommended that the liquid and suction lines be kept at the supplied size until exit, when the full pipe size can be run.
- Connect pipe work between units noting the following:-
 - Use only refrigeration quality copper tube/pipe, supported every 2 metres.
 - Use tube cutters to avoid forming swarf.
 - If brazing, use copper phosphorus alloy with 5% silver, and purge the system with dry nitrogen to avoid oxidation and build up of scale.
 - Do not leave pipe ends, valves, driers etc. open to the atmosphere longer than necessary.
 - Fully insulate the suction line, or suction and liquid if run together.
- A strainer is fitted in the liquid line just prior to the capillary on the air handler. It is recommended that a liquid line filter drier is fitted.
- If a sight glass is fitted to assist charging, position this in the liquid line as near to the air handler as practicable, and downstream of the liquid line filter/drier.

EVACUATING AND CHARGING

When the compressor is first started in the field, the bearing surfaces are susceptible to damage if not properly lubricated. Care should be taken when the bearings are being run in to ensure that:-

- The compressor is not started the first time with excessive refrigerant charge.
- The system is not overcharged, which could result in liquid return to the compressor.

Evacuate the air handler and interconnecting pipe work by connecting a vacuum pump to the Schrader connections on both suction and discharge service valves on the condensing unit (**DO NOT OPEN THE VALVES**) and evacuate to 1000 microns (1 Torr) or better and hold for a minimum of 15 minutes.

REFRIGERANT CHARGE

Units are shipped with refrigerant in the MCU+, as shown below.

Single circuit systems	CD3	Outdoor unit	MCU+ charge (g)		Twin circuit systems	CD3	Outdoor units	MCU+ charge (g)	
			R407C	R22				R407C	R22
S 08 S	008	MCU+90	2060	1960	S 08 T	008	2 x MCU+50	1690*	1610*
S 10 S	010	MCU+130	4170	3970	S 10 T	010	2 x MCU+60	2000*	1900*
S 15 S	015	MCU+180	4640	4420	S 15 T	015	2 x MCU+100	2520*	2400*
S 20 S	020	MCU+200	5480	5220	S 20 T	020	2 x MCU+130	4170*	3970*
HS 08 S	008	MCU+80	1880	1800	HS 08 T	008	2 x MCU+30	1000*	950*
HS 10 S	010	MCU+100	2520	2400	HS 10 T	010	2 x MCU+40	1240*	1180*
HS 15 S	015	MCU+165	4540	4320	HS 15 T	015	2 x MCU+80	1880*	1800*
HS 20 S	020	MCU+180	4640	4420	HS 20 T	020	2 x MCU+90	2060*	1960*

* = per circuit

The factory charge will generally be sufficient for 3m pipe runs at room 22°C 50% RH, ambient 27°C 50% RH.

Typical charge to be added for longer liquid lines:-

1/4" OD add 20 g/m; 3/8" OD add 50 g/m; 1/2" OD add 80 g/m; 5/8" OD add 110 g/m.

The preferred method of adding refrigerant is:-

- Start the unit (on highest fan setting) and allow the compressor to run for a few seconds.
- Additional charge should be introduced through the Schrader valve on the suction side of the compressor.
- The correct unit charge may be determined by examining the condition of the evaporator coil during the charging process (with the system running in cooling). Refrigerant enters the coil at the bottom left hand side and leaves at the top left hand side. A properly charged unit should show signs of 'sweating' all the way up the coil. 'Sweating' should be reduced at the coil outlet as it enters the suction line, which should be completely dry a few inches before it enters the compressor.
- If a sight glass is fitted, position this in the liquid line as near to the air handler as possible. Charge should be added to the unit, (with the system running), until the sight glass is just clear of bubbles (flooded).

Undercharged Unit - the top few tubes of the evaporator are dry and there are, (possibly), slight signs of frosting at the inlet to the evaporator coil.

Overcharged Unit - the suction line 'sweats' all the way back to the compressor.

ELECTRICAL CONNECTIONS

The installation wiring should be carried out in accordance with I.E.E. regulations and/or local codes.

A mains isolator should be used and the system suitably fused, (see page 6). Supply cables and inter-connecting cables are to be provided by the installer.

INDOOR UNIT WIRING

Connections for internal wiring are made within the electrics enclosure accessed by removing the centre front cover. Disconnect the connecting cable from the display panel before moving the cover away from the unit.

Mains cables should be connected via a fused switch and routed through knockouts in the bottom left hand corner of the unit, then through an access hole in the bottom left hand side of the electrics compartment to the mains terminal block.

System Interconnecting Wiring

On single or three phase systems, connect the incoming mains supply to the indoor unit and then link to the condensing unit via a three pole circuit breaker.

The earth wire is connected to an earth stud at the right hand side of the mains terminal block. All mains and interconnecting cable must be sized to suit the electrical rating of the unit and the length of cable run.

Make sure that all connections are secure and all wires are clear of any rotating parts.

Data Plates

Because indoor and outdoor units can be mix-matched, the data plates only give information relevant to the indoor unit with maximum possible running currents. To determine the full system details please refer to the Technical Manual for more specific information.

ELECTRICAL DATA

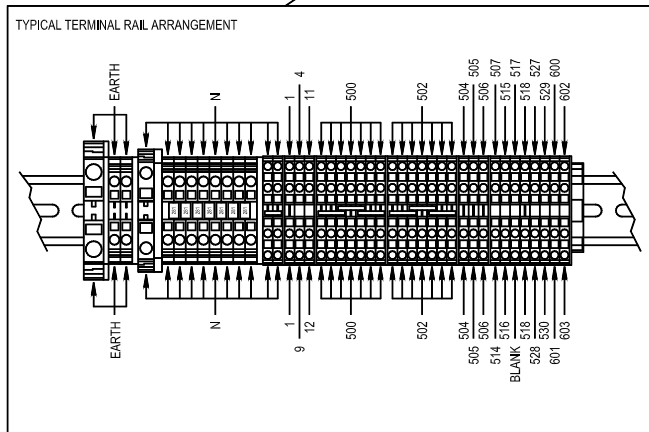
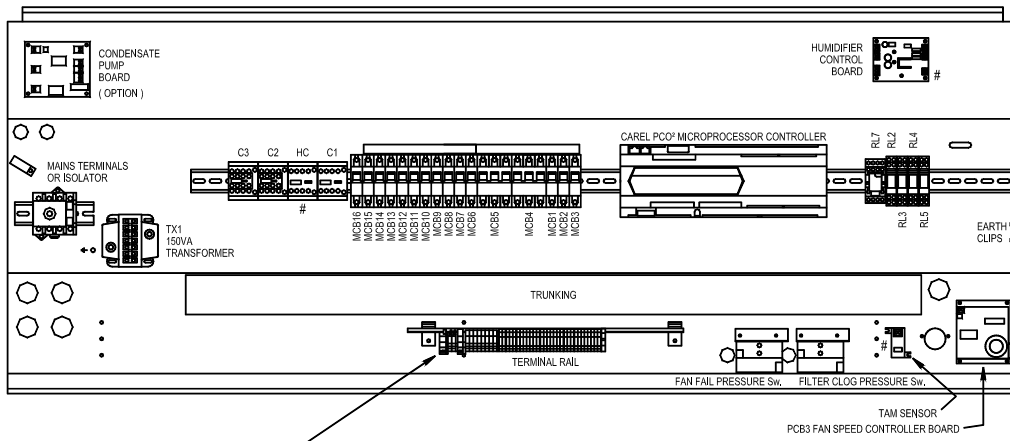
System	Model Combination	Single Phase Supply 230 Volts - 50 Hz					Three Phase Supply 400 Volts - 50 Hz				
		Full Load Amps				System max. starting current	Full Load Amps				System max. starting current
		Cool Only	Cool & Heat	Cool/Heat/Hum/Dehum	If DCUE fitted		Cool Only	Cool & Heat	Cool/Heat/Hum/Dehum	If DCUE fitted	
Amps	Amps	Amps	Amps	Amps	A/PH*	A/PH*	A/PH*	A/PH	A/PH		
S 08 S	CD008 + MCU(+) 100	-	-	-	-	-	12.5	16.7	32.7	-	69.0
S 10 S	CD010 + MCU(+) 130	-	-	-	-	-	15.75	16.7	32.7	-	89.3
S 15 S	CD015 + MCU(+) 180	-	-	-	-	-	22.1	33.0	47.1	-	139.6
S 20 S	CD020 + MCU(+) 200	-	-	-	-	-	23.91	33.4	49.3	-	138.0
HS 08 S	CD008 + MCU(+) 80 / DCUE 80	19.9	**38.7	-	+1.0	82.5	10.3	16.7	32.7	+2.0	57.8
HS 10 S	CD010 + MCU(+) 100	-	-	-	-	-	14.5	23.1	32.7	-	75.4
HS 15 S	CD015 + MCU(+) 165	-	-	-	-	-	19.4	33.0	44.6	-	109.2
HS 20 S	CD020 + MCU(+) 180	-	-	-	-	-	22.5	33.4	49.3	-	140.0
S 08 T	CD008 +2x MCU(+) 50 / DCUE 50	26.8	**38.7	-	+1.0	75.2	13.7	16.7	32.7	+4.0	43.8
S 10 T	CD010 +2x MCU(+) 60 / DCUE60	35.5	**40.7	-	+1.0	83.0	16.3	23.1	32.7	+5.0	56.2
S 15 T	CD015 +2x MCU(+) 100	-	-	-	-	-	25.1	33.0	41.0	-	85.3
S 20 T	CD020 +2x MCU(+) 130	-	-	-	-	-	27.1	33.4	49.3	-	99.6
HS 08 T	CD008 +2x MCU(+) 30 / DCUE30	21.9	**38.7	-	+4.0	51.0	11.8	16.7	32.7	+4.0	36.1
HS 10 T	CD010 +2x MCU(+) 50 / DCUE50	28.8	**40.7	-	+1.0	77.2	15.9	23.1	32.7	+4.0	50.2
HS 15 T	CD015 +2x MCU(+) 80 / DCUE80	38.5	**42.3	-	+1.0	100.9	19.7	33.0	41.0	+4.0	74.1
HS 20 T	CD020 +2x MCU(+) 90	44.7	**44.7	-	-	129.4	22.5	33.4	49.3	-	81.7

* Max. Phase

**Single phase models are available for twin circuit dx systems where electric heating requirement is 8kW or less.

The electric heating loads shown are based on maximum amounts of heating which are:-

CD 008 = 8kW (4+4) CD 010 = 10kW (4+6) CD 015 = 16kW (8+8) CD 020 = 20kW (10+10)



NOTE -
THESE ITEMS MARKED WITH AN # ARE NOT REQUIRED WHEN HUMIDIFIERS OTHER THAN CAREL ARE FITTED.

MCB1	TRANSFORMER PRIMARY [2 AMP]
MCB2	FAN MOTOR
MCB3	HUMIDIFIER
MCB4	CONDENSING UNIT No.1 [3 POLE]
MCB5	CONDENSING UNIT No.2 [3 POLE]
MCB6 - MCB15	HEATERS [10 AMP]
MCB16	TRANSFORMER SECONDARY [6 AMP]
C1	FAN CONTACTOR
C2	STAGE No.1 HEATER CONTACTOR
C3	STAGE No.2 HEATER CONTACTOR
HC	HUMIDIFIER CONTACTOR
RL2	CONDENSING UNIT No.1 CONTROL RELAY
RL3	CONDENSING UNIT No.1 TRIP RELAY
RL4	CONDENSING UNIT No.2 CONTROL RELAY
RL5	CONDENSING UNIT No.2 TRIP RELAY
RL7	HEATER BANK OVERHEAT RELAY

Typical control panel and terminal layout

RECOMMENDED FUSE SIZES

The system and its supply/interconnecting wiring must be protected by fuses, preferably H.R.C. motor rated types to BS60269 or miniature circuit breakers to BS60898 or local codes having similar time lag characteristics that allow starting of the compressor yet still afford close over current protection under running conditions. The ratings below are for H.R.C. motor rated or semi-enclosed wire fuses.

Standard Cooling

System	S 08 S	S 10 S	S 15 S	S 20 S	S 08 T	S 10 T	S 15 T	S 20 T
1 Phase Cool Only	-	-	-	-	40	40	-	-
1 Phase Cool and Heat	-	-	-	-	50	50	-	-
3 Phase Cool Only	20	25	35	40	16	20	32	35
3 Phase Cool and Heat	20	32	40	40	20	32	40	40
3 Phase Cool/Heat/Hum/Dehum	40	40	63	63	40	40	50	63

High Sensible Cooling

System	HS 08 S	HS 10 S	HS 15 S	HS 20 S	HS 08 T	HS 10 T	HS 15 T	HS 20 T
1 Phase Cool Only	32	-	-	-	32	40	50	63
1 Phase Cool and Heat	50	-	-	-	50	50	50	63
3 Phase Cool Only	16	20	32	40	16	20	25	32
3 Phase Cool and Heat	20	32	40	40	20	32	40	40
3 Phase Cool/Heat/Hum/Dehum	40	40	63	63	40	40	50	63

CONDENSATE DRAIN

The condensate drain connection is at the left hand end of the condensate drain tray.

A 15mm O.D. copper drain pipe is provided in the drain sump for connection with non-kink plastic tubing secured with a suitable clip.

Should it be necessary for the drain pipe to go through the back or base of the unit, a knockout is provided in the back panel or base plate.

The drain line must have a constant fall to open drain using a 'U' trap if required. Check that the water will run freely and that there are no leaks.

IMPORTANT: If a humidifier is fitted the drain pipe must be capable of carrying water at 60°C.

FAN SPEED CONTROLLER

One control is used on each CD3 unit, and has a switch for selecting high or boost speed (see diagram below).

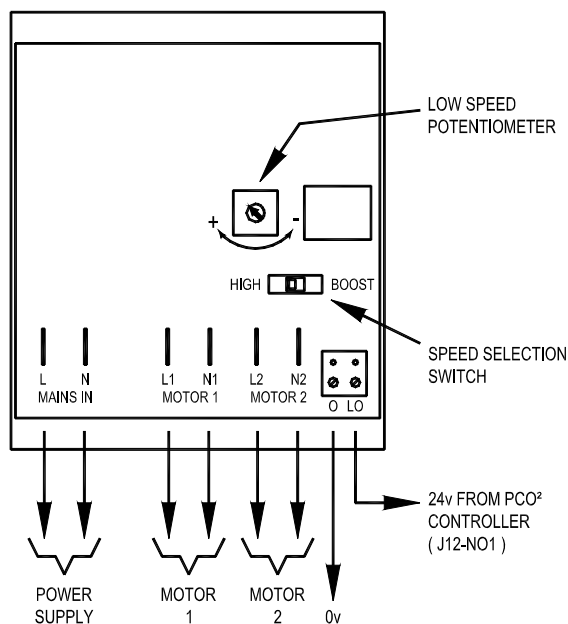
SETTING

The **boost** speed should be selected for:-

- **ALL DOWNFLOW** units
- Upflow units requiring ductwork on the supply or return air
- When high efficiency filters are fitted.

The **High** speed should be selected for standard '**Free Blow**' Upflow units.

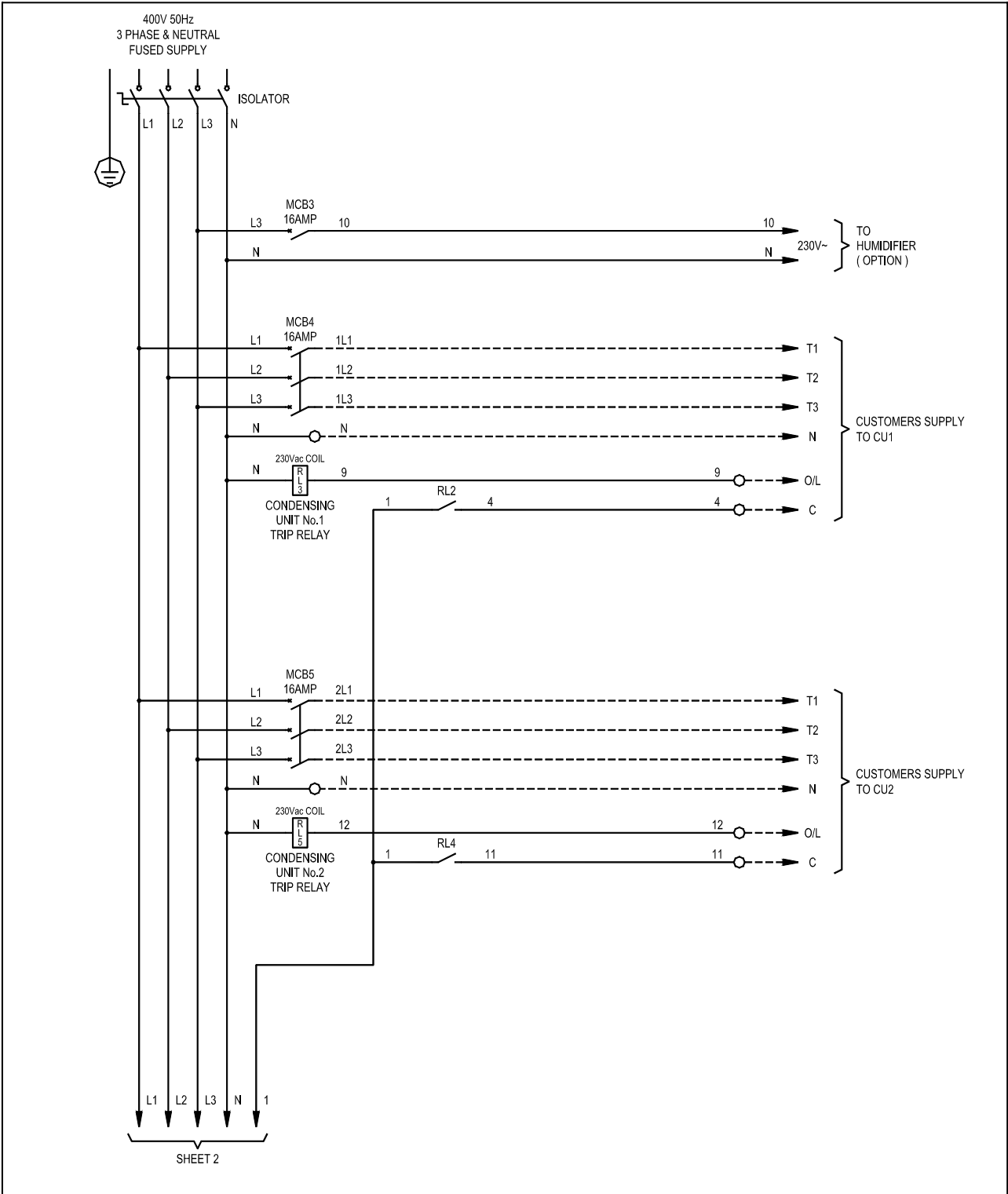
Units are despatched with the low speed set on minimum. The fan speed may be adjusted between 50% and 100% of the selected top speed by turning the low speed potentiometer clockwise.



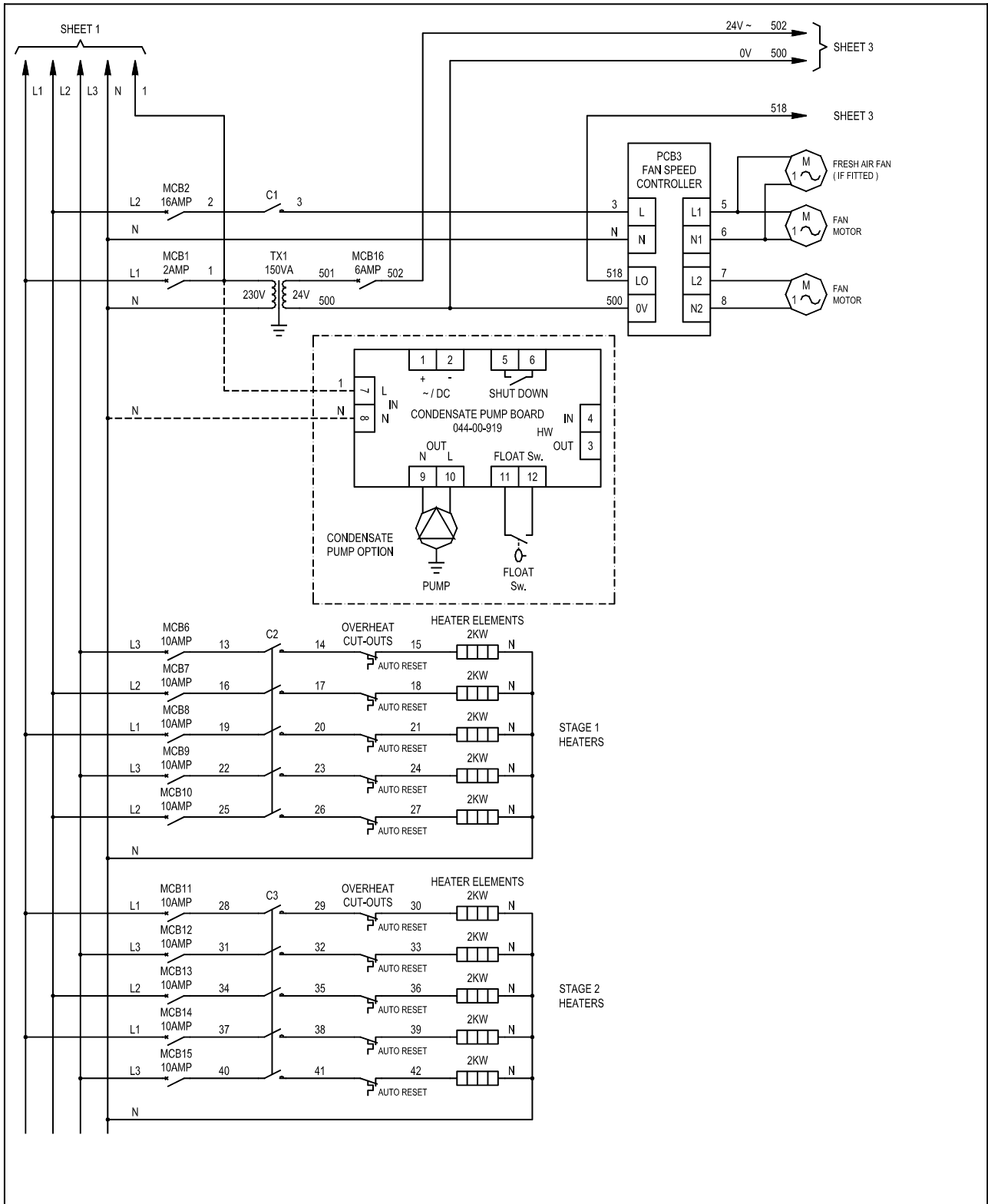
WHEN INSTALLATION HAS BEEN COMPLETED - CHECK:-

1. All pipe work and joints for leakage.
2. All pipe work and fittings for insulation.
3. All bolts are secure and that fan rotates freely.

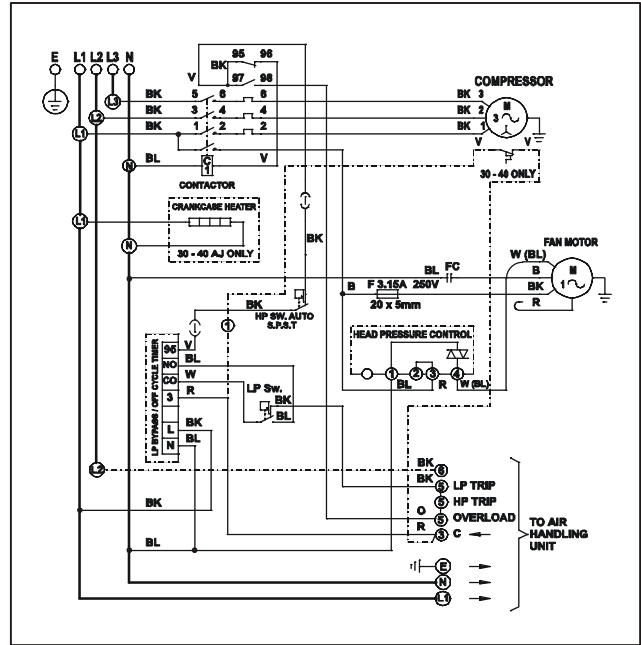
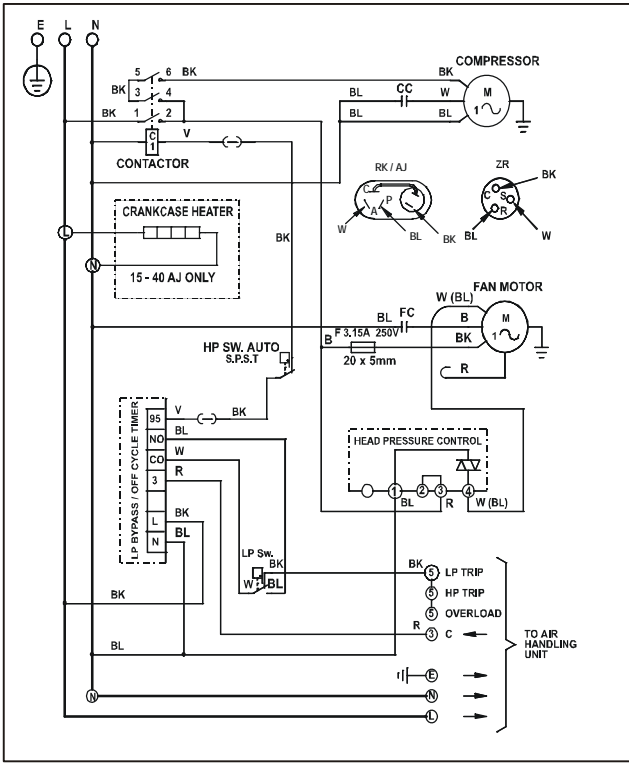
POWER WIRING DIAGRAM – Sheet 1



POWER WIRING DIAGRAM – Sheet 2

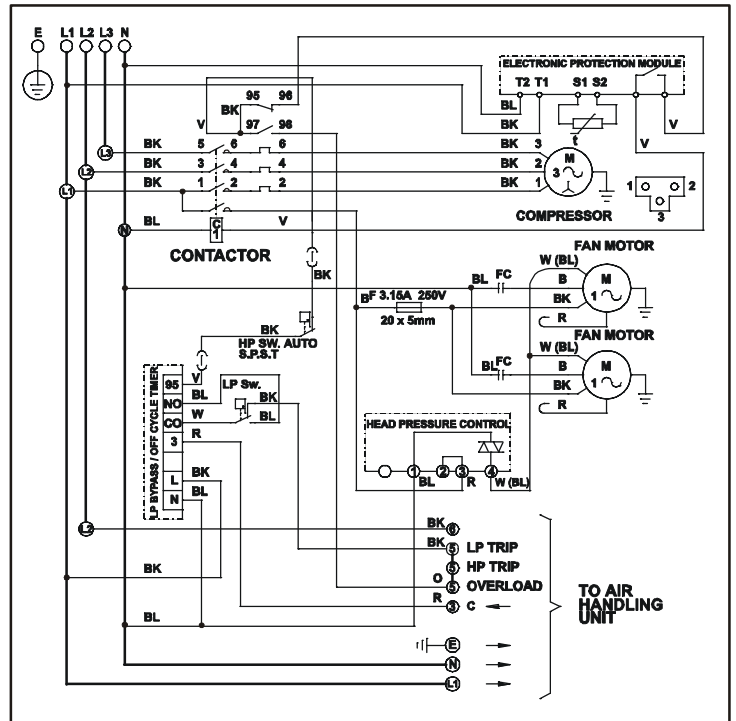
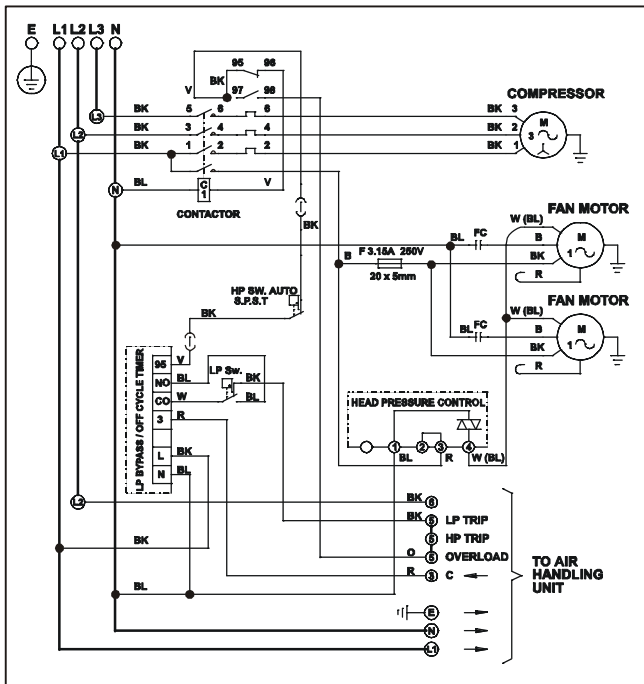


MCU+ WIRING DIAGRAMS



1 PHASE MCU+ 30 to 90

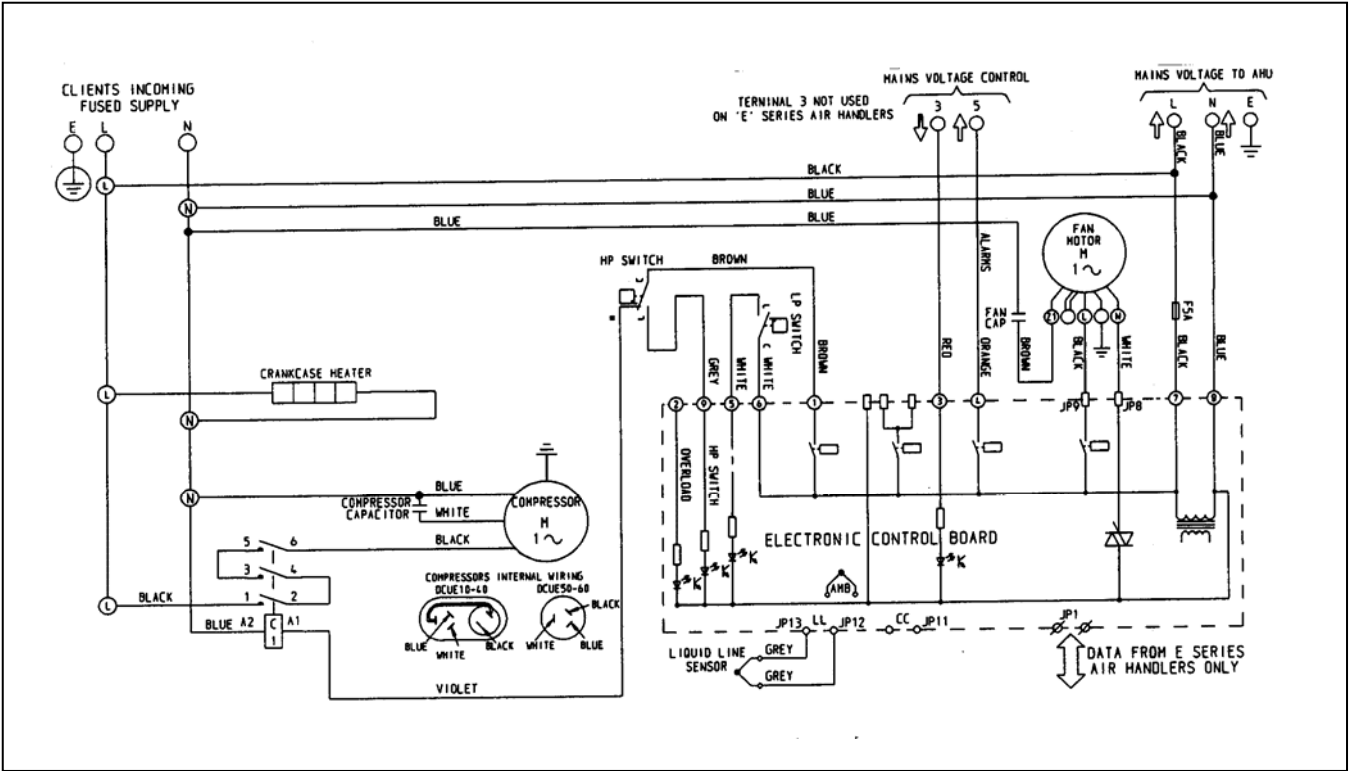
3 PHASE MCU+ 30 to 100



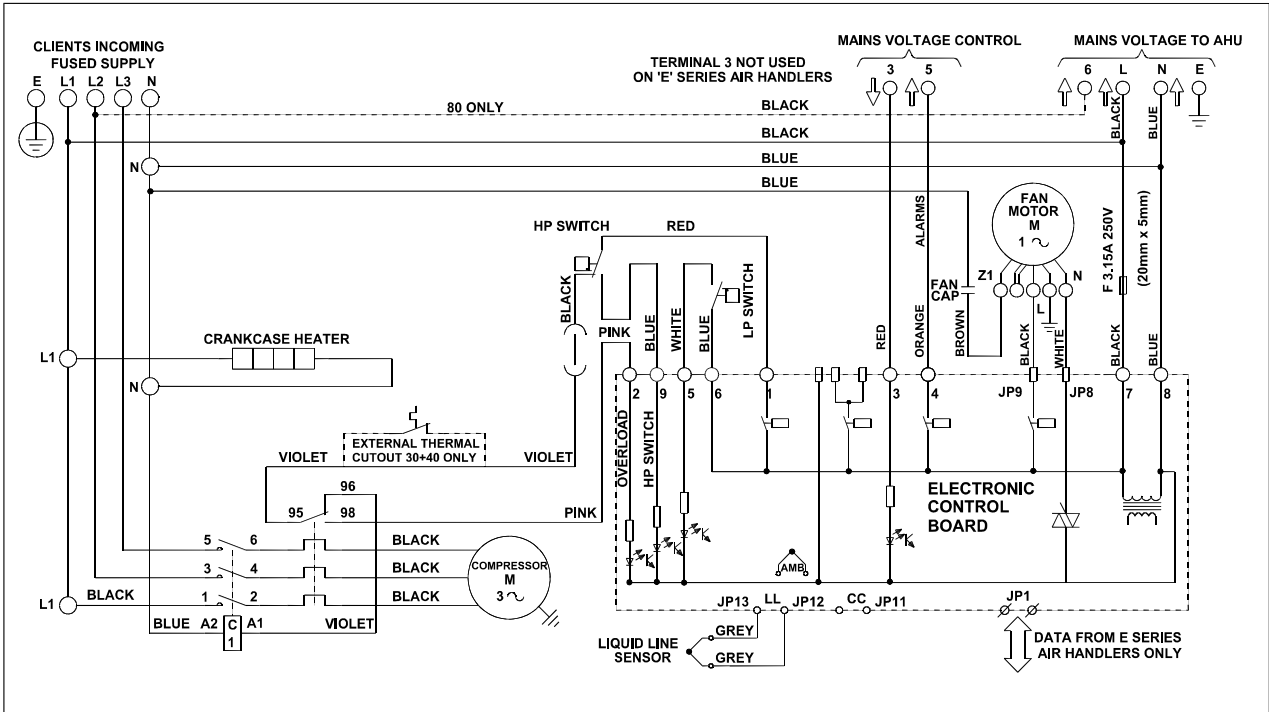
3 PHASE MCU+ 130 to 180

3 PHASE MCU+ 200

DCUE WIRING DIAGRAMS



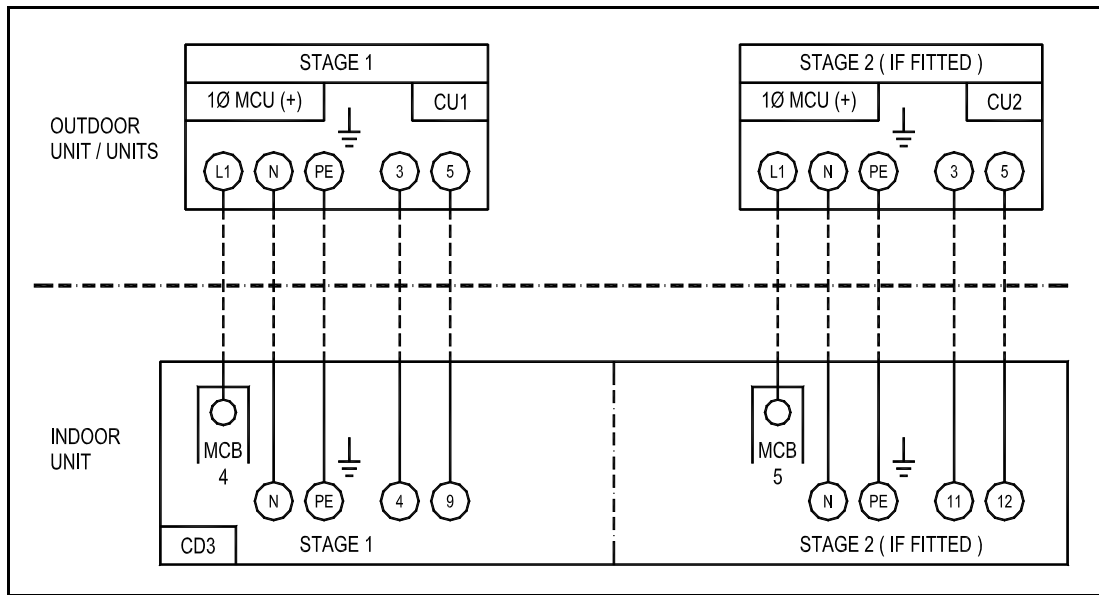
DCUE 30 to 80 1 phase



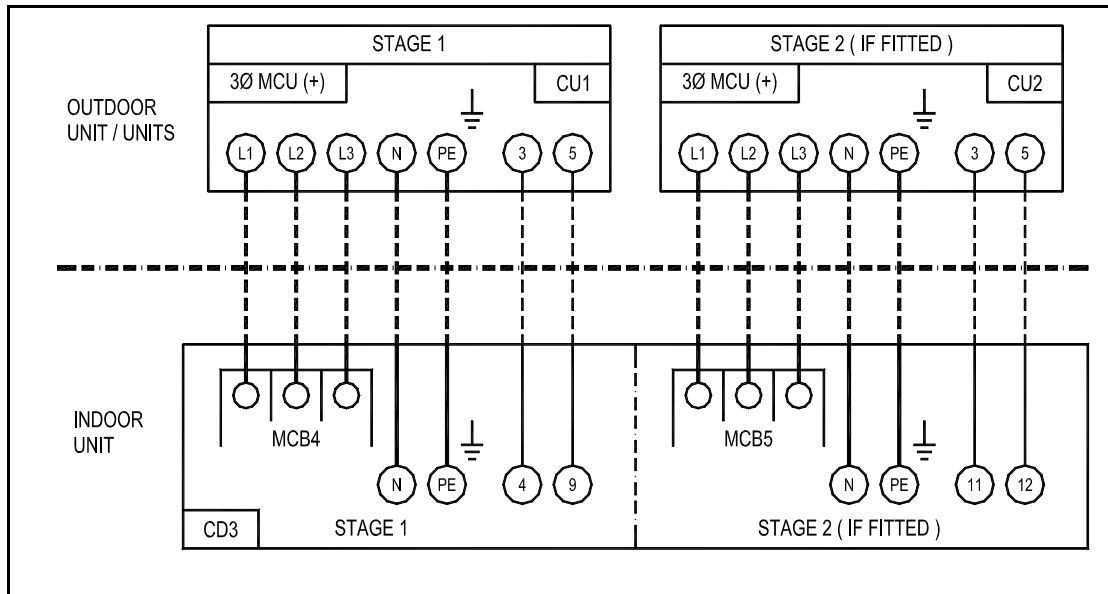
DCUE 30 to 80 3 phase

INTERCONNECTING WIRING DIAGRAMS

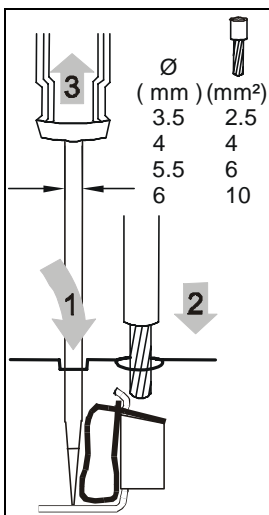
1 phase units



3 phase units



WAGO terminals



CONDENSATE PUMP (OPTIONAL)

An optional condensate pump is available, providing a 5m lift where gravity drain is not an option. The full assembly comprises a condensate pump (suitable for hot and cold water removal), a control board, a float switch to activate the pump and a second float switch to provide a high water level alarm. The high level alarm disables cooling until the condensate in the tray has fallen to a safe level.

WATER SPILL SENSOR (OPTION)

Can be connected to the condensate pump board providing an alarm in the event of condensate spillage.

CD3 SYSTEM HUMIDIFIER (OPTIONAL)

DESCRIPTION

The humidifier is an electrode steam boiler, electronically controlled. The steam bottle will require replacing periodically. The humidifier is fitted with bottle change indication and the frequency of change is dependent upon the condition of the water feeding the humidifier.

INSTALLATION

Water supply

The humidifier operates with a range of water qualities; pre-treated water is preferable, extending the bottle life (fully de-mineralised water is not suitable). The humidifier system incorporates an air break in the water feed to meet local regulations. Connect directly to a water supply operating at pressures between 0.1 and 1 MPa (14 to 145 psig). For supplies at higher pressures fit a pressure regulator set at 0.4 to 0.6 MPa (60 to 90 psig).

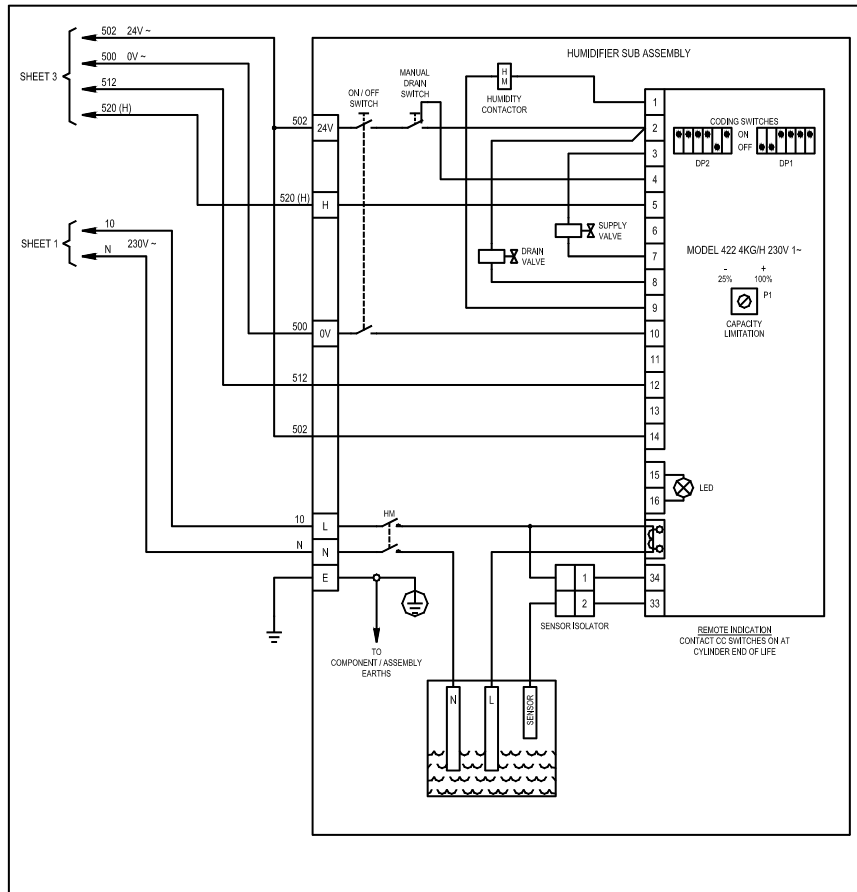
Plumbing connections

The inlet connection is a 1/8" BSPF. A stop valve and strainer should be fitted ahead of the control solenoid valve that is fitted to the inlet of the humidifier.

Waste water is drained into the unit condensate tray. The drainpipe should be suitable for use with water at 60°C and 100°C for short periods.

Drain pipes should be correctly sized with a minimum slope of 5% (1 in 20) and an air break at the entry.

HUMIDIFIER WIRING DIAGRAM

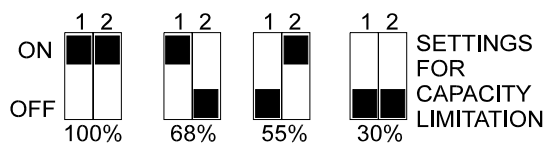
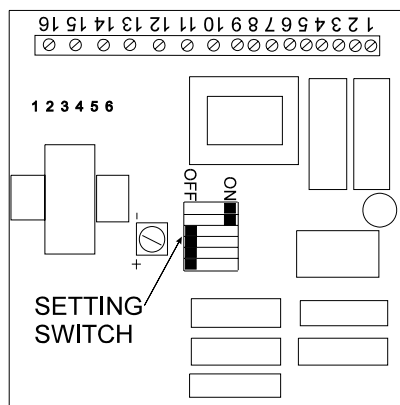


COMMISSIONING HUMIDIFIER

Pre-start checks

1. Ensure the drain line is connected and that water flows away freely. Do this by filling and draining the bottle using the manual drain switch.

HUMIDIFIER CONTROL UNIT



2. Check positions of the DIL switches on the control PCB situated inside the humidifier electric box. The humidifier output may be set to 100%, 68%, 55% or 30% by setting switches 1 and 2 as shown above.
3. Ensure that the rubber hose is securely connected at both the steam distribution pipe and cylinder ends.

HUMIDIFIER START UP

On initial start up the feed valve will open to fill the bottle and the drain valve will remain closed.

The initial current draw will be below the normal operating level as the bottle is filled with fresh water. This will increase as the humidifier continues to operate until reaching its full value (this may take several operations depending upon the condition of the water and the length of time it is operating). The bottle will continue to fill and drain automatically on demand.

During the start up period, whenever the current is less than 70% of the set operating level, the 'bottle change' indication will be active. This is normal and the indication will go off once the current has risen above 70% of the set output. The 'bottle change' indication will not appear again until the bottle requires changing.

NOTE: The start up process described above occurs only when a new bottle has been fitted.

Adding a teaspoon of table salt into the new bottle before connecting up may reduce the start-up time after a bottle change.

NORMAL OPERATION

After the start up period, the unit will operate automatically, at a constant output until the bottle requires changing. The frequency of the drain and fill sequence will depend upon the quality of the water.

There will be a short delay from the unit receiving a humidifier on signal and the steam being generated as the water is brought up to temperature.

HUMIDIFIER MAINTENANCE

Prior to carrying out maintenance on the humidifier, the cylinder should be drained by operating the manual switch. The system should also be isolated from the electrical supply.

STEAM BOTTLE REPLACEMENT

Access to the bottle and solenoid valves is from the front and left hand side of the unit.

1. Before switching off the power to the humidifier, isolate the water supply and drain the bottle using the manual drain switch.
2. Remove the discharge hose from the top of the bottle.
3. Remove the electrical connectors pulling upwards.
4. Lift the bottle support bracket clear of the outlet spigot.
5. Remove and replace the bottle.
6. Replace the hose and electrical connectors.
7. When replacing the bottle clean the feed/drain manifold and check the "O" ring seal, replacing if necessary. Check and clean the strainer protecting the outlet solenoid valve
8. Reconnect the water supply and switch on the electrical supply.

After replacing the bottle check that the operating current is correct (see start up).

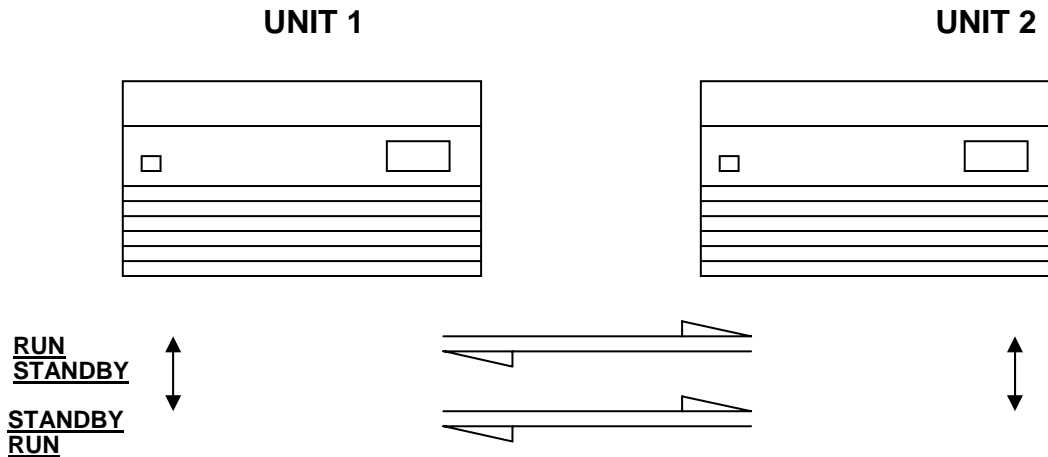
GENERAL MAINTENANCE

12 MONTHLY (or more frequently if conditions dictate)

1. Clean the feed water strainer and drain solenoid valve. Check hoses for wear and flush out the drain pipe.
2. Check all electrical connections are tight.
3. Check and clean the drain tray to prevent a build up of deposits.

CD3 AUTO CHANGEOVER

It is possible to connect two CD3 units to allow them to operate in Run/Standby operation, changing over on alarm or on a timer to equalise component wear. One unit will be configured as the run unit, the second as the standby unit.



UNIT 1 starts as the run unit with UNIT 2 in standby mode. One of the following will cause the units to change modes.

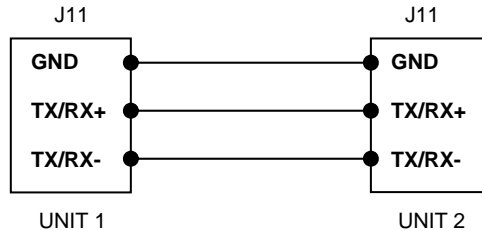
1. **Run time:** If programmed, units will switch between run and standby on a timer basis to ensure even running of fans and compressors. This is factory set at 168hrs and is factory adjustable by TEV Ltd.
2. **Unit assist:** The standby unit will switch on in the event the room load exceeds the running unit capacity.
3. **Alarm:** If the run unit is disabled by alarm or power loss (including switching off) the standby unit will take over.
4. **Network:** If communication is broken.

Critical alarms are set in the Engineering Level mask (see operating Instructions page 5 of 9) note that only AL01 and ALO2 are used with Marstair condensing units. AL03, AL04, AL32 and AL33 are not available.

WIRING

WARNING !! Units can start automatically, isolate both units before beginning work..

Connections



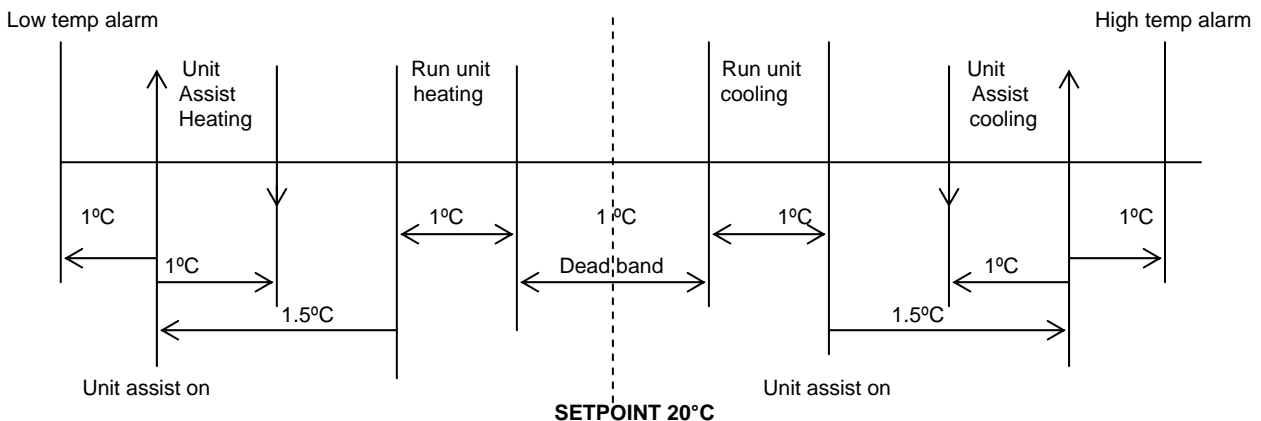
CAUTION:

Do not cross the polarity of the connections.

Units are connected in parallel using a twisted pair shielded cable (min AWG20/22, 0.75/0.5mm²) via J11 on the controllers. Communication is via an RS485 connection. Using correct shielded cable, units may be up to 200m apart.

UNIT ASSIST

In this mode the stand-by unit is enabled if the room temperature drifts out of limits, subject to a 3 Minute delay. This allows the run unit to control the temperature, and not respond to fast transients.



This is a typical example: values will change for the run unit between one and two stage cooling, one and two stage heating, L.P.H.W. and any combination depending upon conditions.

OPERATING INSTRUCTIONS

DESCRIPTION OF CONTROLS

All CD3 units are fitted with a microprocessor controller and display keypad, providing the functionality necessary for all applications. Each unit is delivered tested, fully programmed and ready to run.

USER INTERFACE

The user interface is divided into 3 parts:

1. **FIRST USER LEVEL**, not protected by password, which allows the user to view monitored items, e.g. running hours, display active /stored alarms and temperature /humidity set points.
2. **SECOND USER LEVEL**, protected by a password, which allows an authorised user to select various control parameters including; set point limits, differentials and dead zones.
3. **ENGINEERING LEVEL**, protected by a password, allowing the commissioning/service/maintenance engineers access to the time functions and hours run counters. This level also provides the facility for calibrating the attached sensors and manually operating the fans, the cooling mode, the heating mode and the humidification and de-humidification sequences during commissioning.

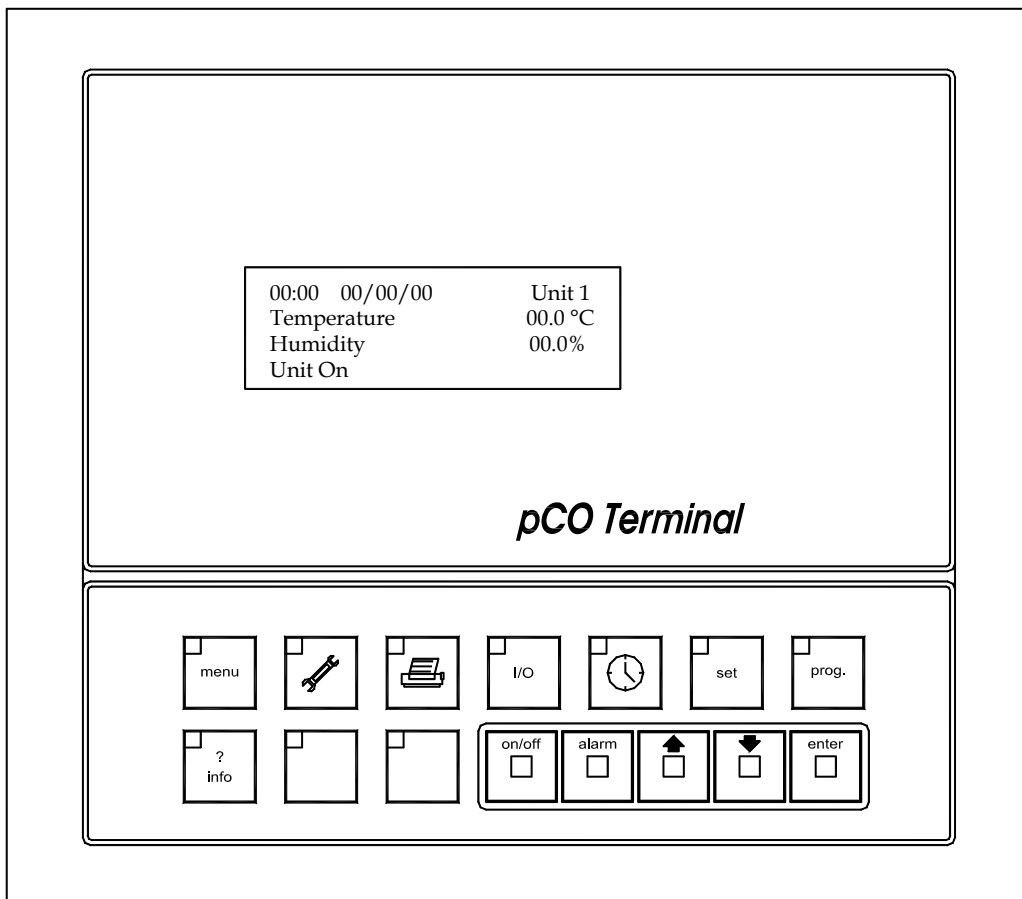
A fourth **MANUFACTURES LEVEL**, protected by password, is for configuring and programming the controller. This level is only available to TEV and any changes to the operating software, which may be required for an individual application, must be carried out by an TEV engineer.

PASSWORDS

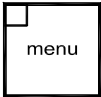

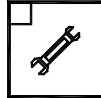
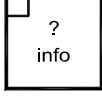

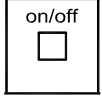
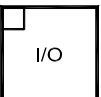
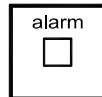
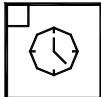
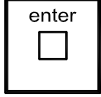
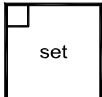

A document is enclosed separately in the unit containing the passwords for the second level user and engineering levels. This should be held by the installer and passed to the relevant person once the unit has been installed and commissioned. Passwords may be altered by the user or Engineer, if changes are made ensure that a record of the new passwords is kept in a safe location. Should passwords be lost, contact TEV Ltd. for assistance.

DISPLAY AND KEYPAD

The display/keypad is mounted on the front of the unit, connected by a 1.5m cable. It is fixed to the front panel of the unit and if the panel is removed, the cable should be disconnected before moving the panel away from the unit.



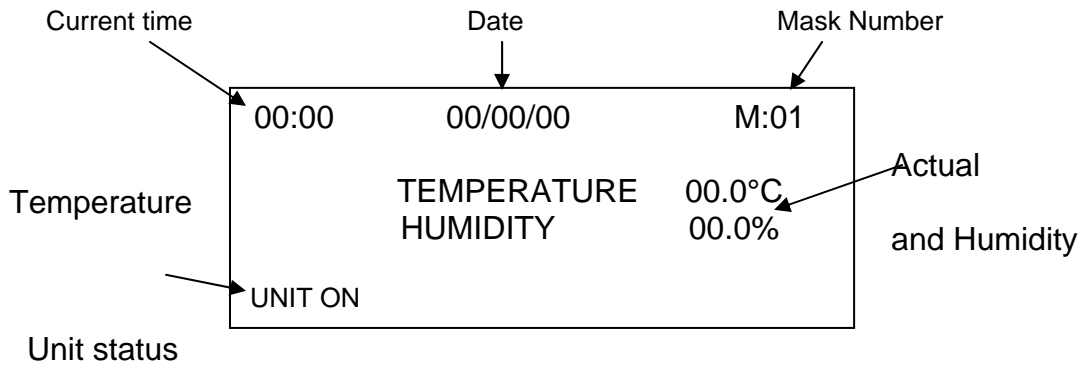
KEYPAD FUNCTIONS

KEY	FUNCTION	KEY	FUNCTION
	1. Displays measured values. 2. Returns operator to the main mask window.		Setting of operating parameters and safety thresholds.
	Displays working hours and allows counter re-set.		Displays the version of the application programme loaded into the controller.
	Not used.		Unit ON/OFF button. The green LED is lit when the unit is ON.
	Displays current status of inputs and outputs.		1. Displays alarm status. 2. Mute and reset alarms. Red LED lit when alarm is present.
	Allows the time clock functions to be displayed and programmed.		Confirms data entry. Yellow LED is lit when there is power to the unit.
	For setting and adjusting set-points.		1. Toggle between display screens. 2. Raise or lower set values.



Each function button has a green LED in the top left hand corner that is lit when the particular function button is operated. This does not apply to the ON/OFF, ALARM and ENTER buttons that have LEDs as defined above.

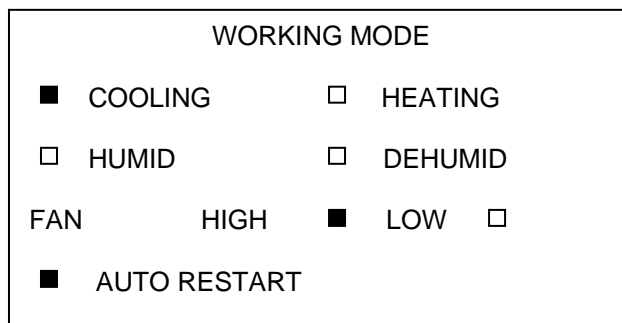
OPERATING SEQUENCE

When the unit is first powered up the display will show; SELF TEST - PLEASE WAIT. Once the self test has been completed the MAIN MASK will be displayed. This is the default screen.



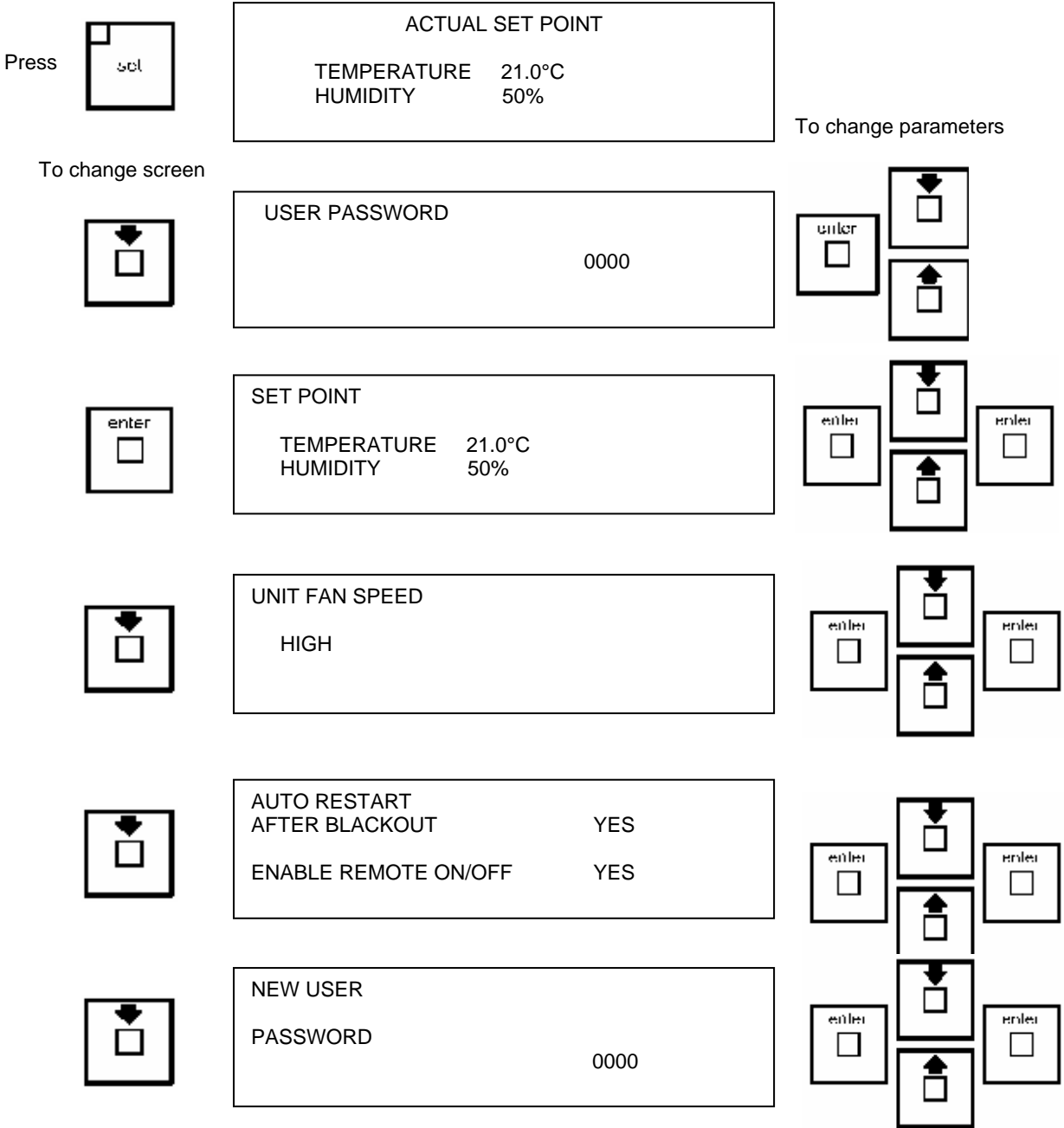
The default screen will always be displayed during normal operation. To view the current operating mode of the unit:

Press  or  to toggle between the MAIN MASK and the WORKING MODE MASK.



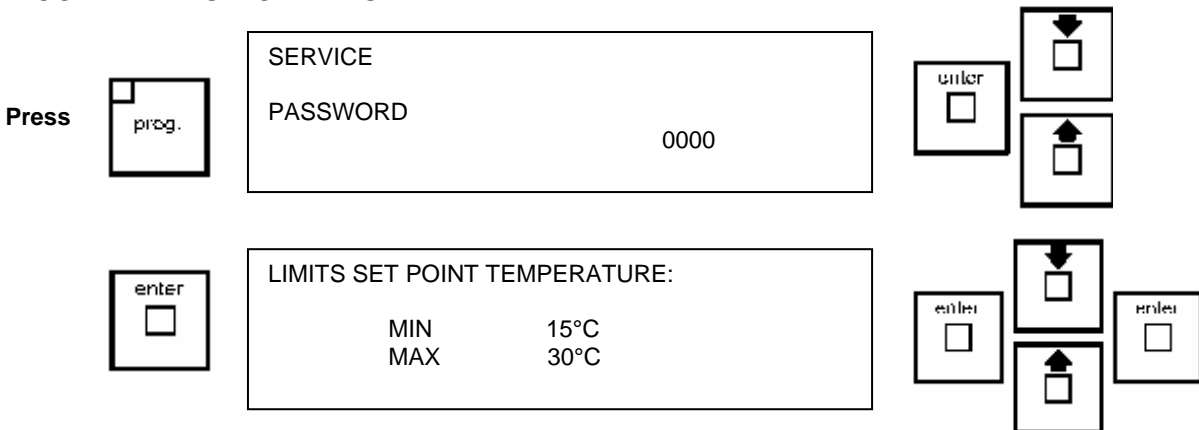
SECOND USER LEVEL ACCESS (Password required)

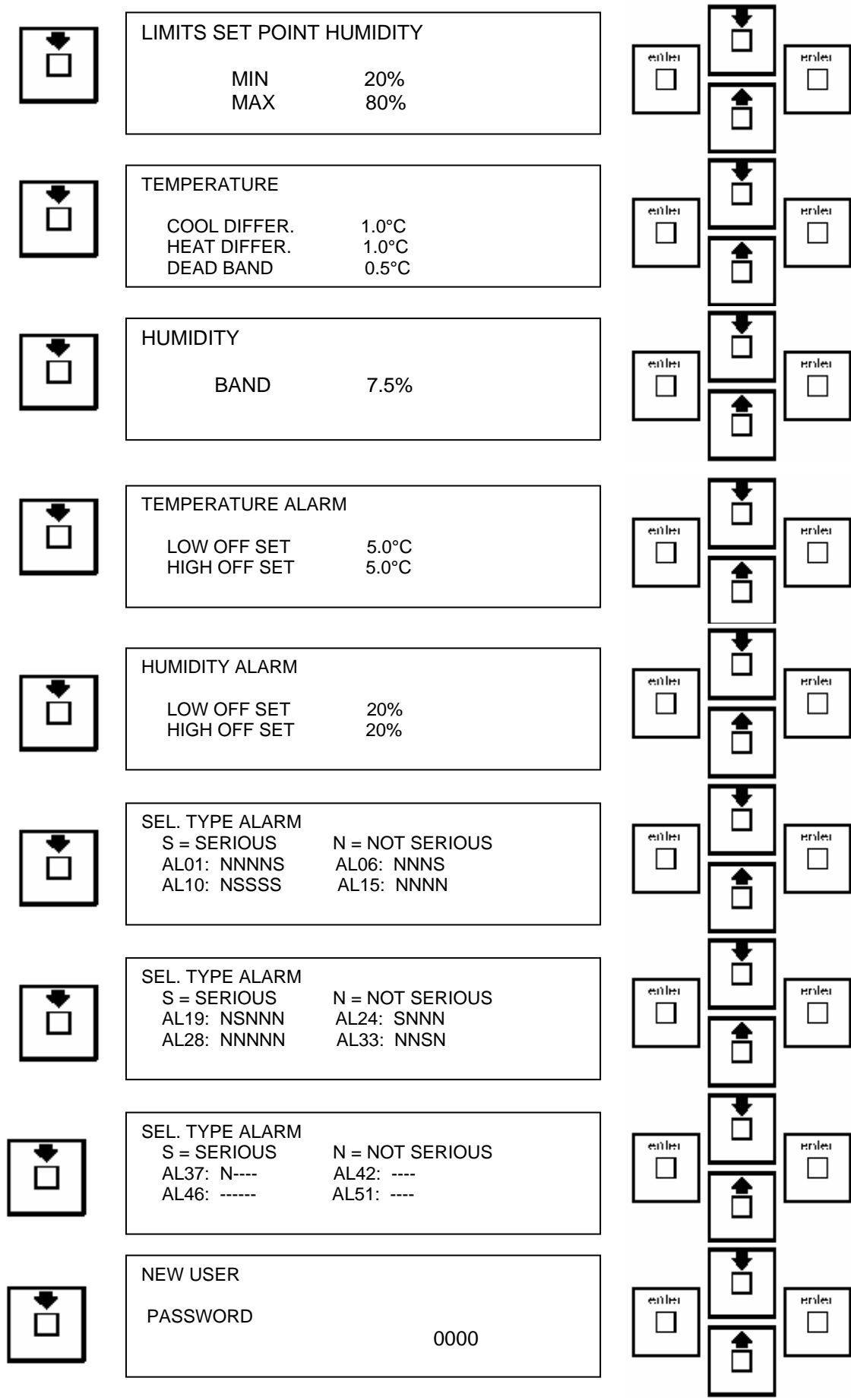
SET BUTTON MENU



ENGINEERING LEVEL ACCESS (Password required)

PROGRAMME BUTTON MENU






The values shown in the above screen masks are the default settings when the unit leaves the factory.

ALARM DESCRIPTIONS

ALARM	DESCRIPTION	ALARM	DESCRIPTION
AL01	Compressor 1 General alarm	AL20	Return Air Temperature Probe Fault
AL02	Compressor 2 General alarm	AL21	Not used
AL03	Low Pressure Circuit 1	AL22	Not used
AL04	Low Pressure Circuit 2	AL23	Not used
AL05	Fan Fail (Serious alarm) Unit OFF	AL24	Return Air Humidity Probe Fault
AL06	Fan Overload (Serious alarm) Unit OFF	AL25	Not used
AL07	Heater 1 & 2 Over temperature	AL26	Not used
AL08	Not used	AL27	Not used
AL09	Smoke/Fire (Serious alarm) Unit OFF	AL28	Alarm E06 – Humidifier High Current
AL10	Filter Clog	AL29	Alarm E09 – Humidifier Low Water
AL11	High Return Air temperature	AL30	Alarm E10 – Humidifier Low Current
AL12	Low Return Air temperature	AL31	Clock alarm
AL13	High Return Air humidity	AL32	High Pressure Circuit 1
AL14	Low Return Air humidity	AL33	High Pressure Circuit 2
AL15	Not used	AL34	Not used
AL16	Not used	AL35	Water Spill (Serious alarm) Unit OFF
AL17	Hours Run Compressor 1	AL36	Condensate High Level Cooling OFF
AL18	Hours Run Compressor 2	AL37	Humidifier Bottle Change
AL19	Hours run Fan		

CLOCK BUTTON MENU


Press 

REGULATION CLOCK

HOUR 00:00

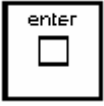
DATE 00/00/00

DAY MONDAY



SERVICE


PASSWORD 0000



ENABLE AUTOMATIC

TEMPERATURE SET POINT

VARIATION NO




TEMPERATURE

TIME ZONE N.1

START HOUR 00:00

SET POINT 00.0°C

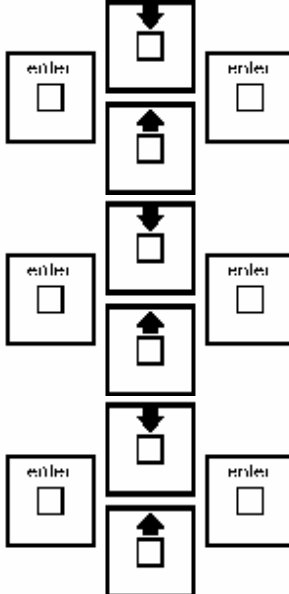


TEMPERATURE

TIME ZONE N.2

START HOUR 00:00

SET POINT 00.0°C





ANALOGUE OUTPUTS	
COOL VALVE	00.0V
HEAT VALVE	00.0V

Only available when modulating valves are fitted



DIGITAL OUTPUTS	
C = CLOSE	O = OPEN
01: 000	04: 000
07: 000	10: 0000

Press  to return to the MAIN MASK

MAINTENANCE BUTTON MENU

Press



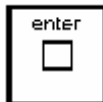
WORK HOURS	
FAN	000000
COMPRESSOR 1	000000
COMPRESSOR 2	000000



HISTORY ALARM		000
AL00	00:00	00/00/00
SET T:	00.0	T: 00.0
SET H :	000.0	H: 000.0



SERVICE	
PASSWORD	0000



FAN	
H. THRESHOLD	100 x 1000
RESET	No 000000



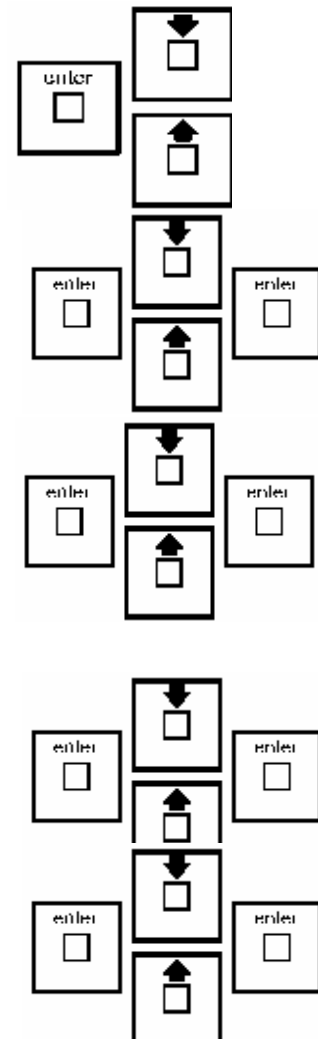
COMPRESSOR 1	
H. THRESHOLD	100 x 1000
RESET	No 000000

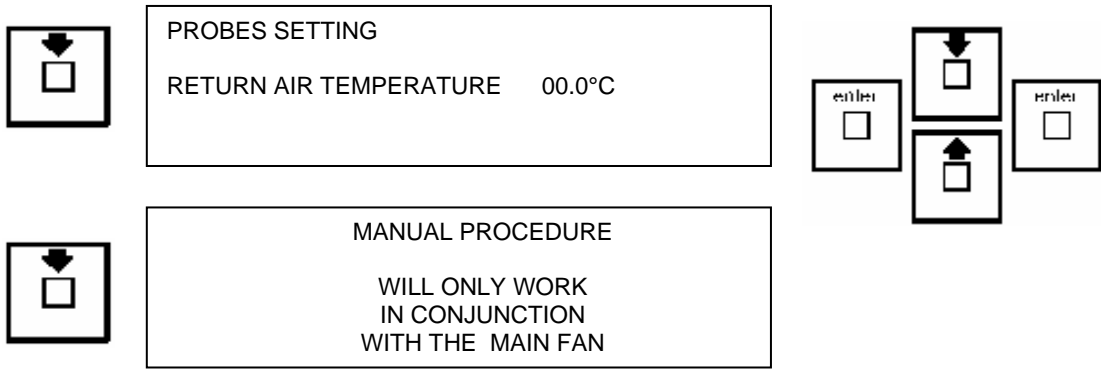


COMPRESSOR 2	
H. THRESHOLD	100 x 1000
RESET	No 000000

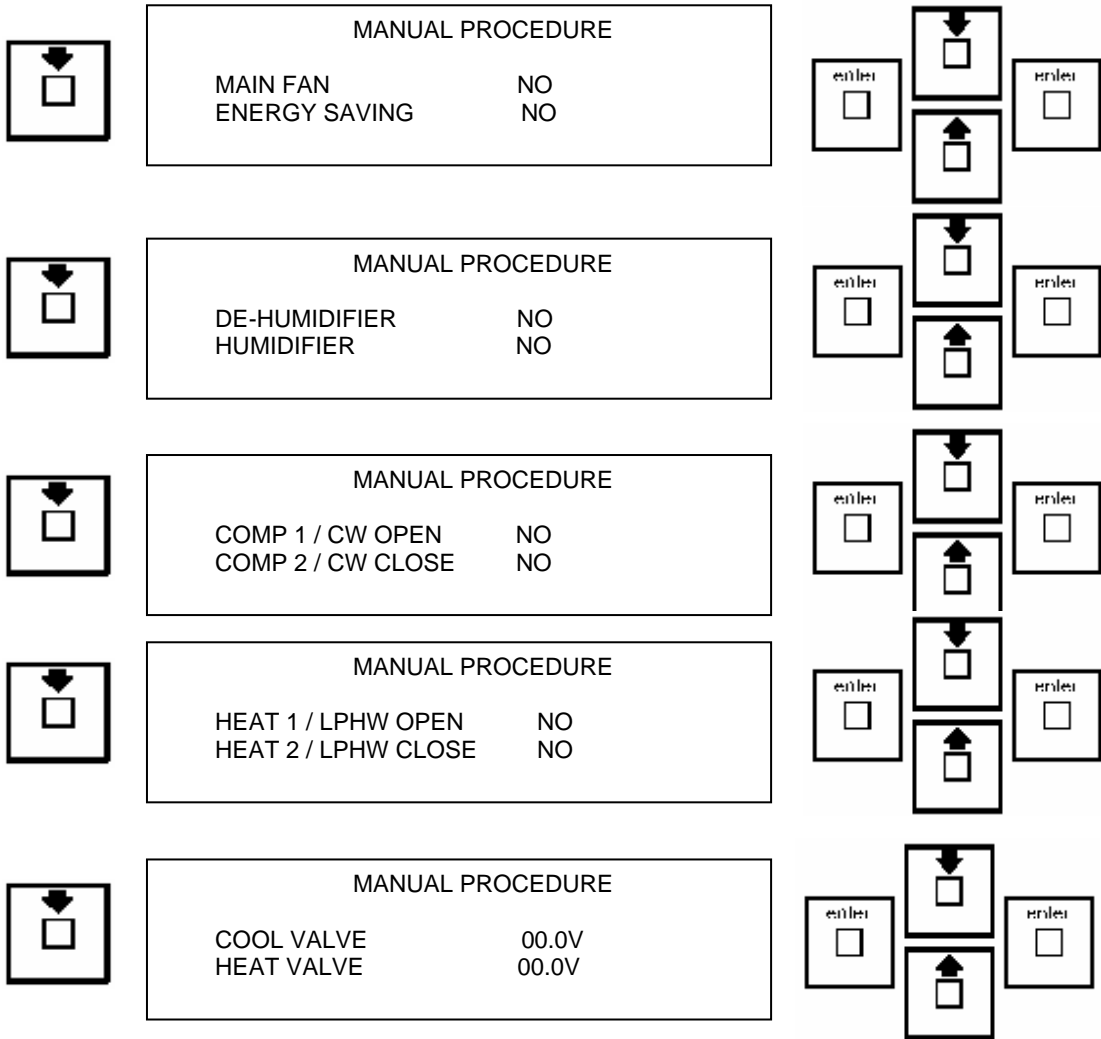



PROBES SETTING	
RETURN AIR HUMIDITY	00.0%





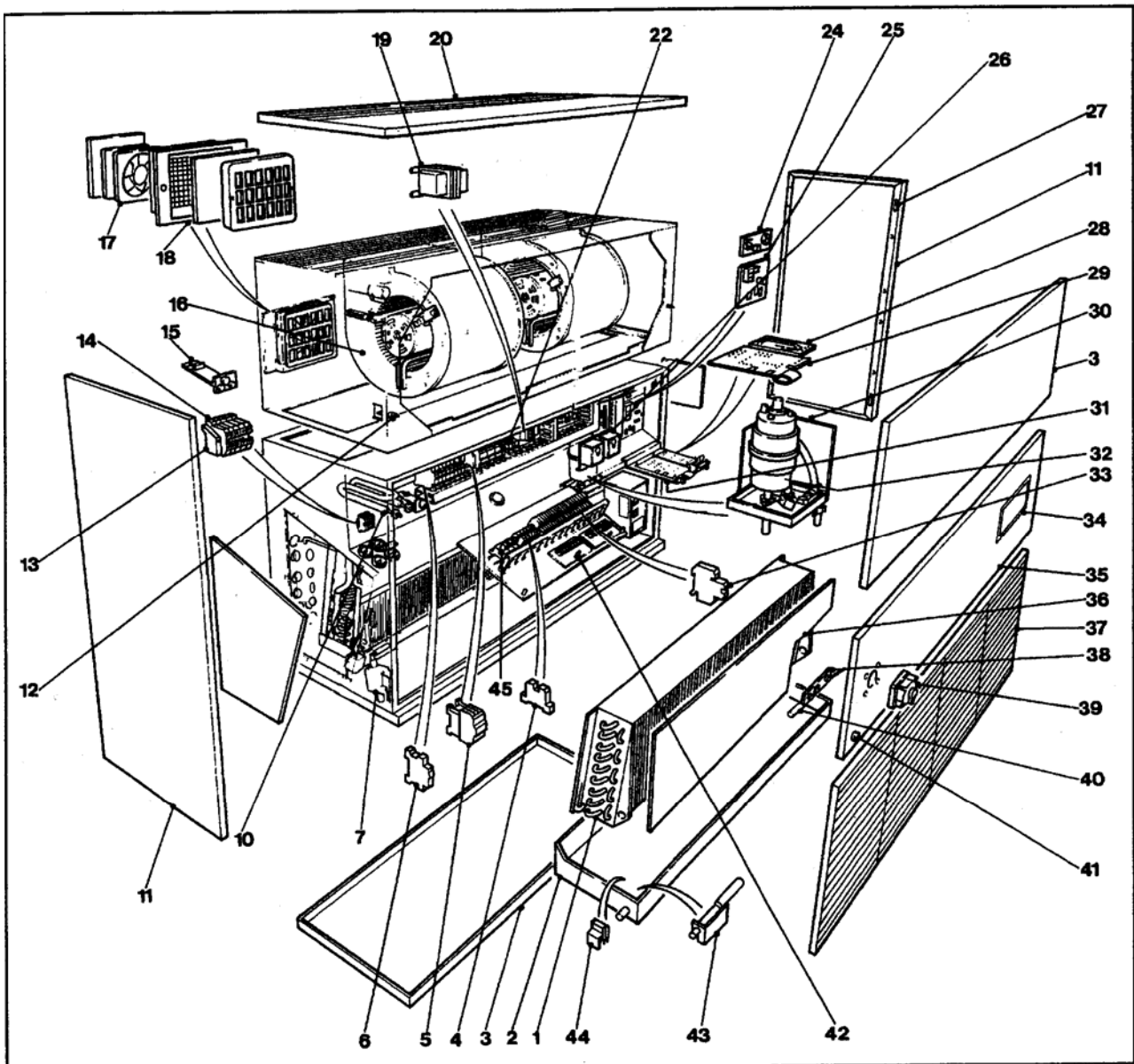
The manual operating procedure may only be activated when the unit is in standby mode. In this mode the ON/OFF button is in OFF.



Press  to return to the MAIN MASK

NOTE:

Alarms and conditions referring to compressors, low pressure and high pressure are not relevant to Chilled Water units unless an alternative Chilled Water option is displayed.

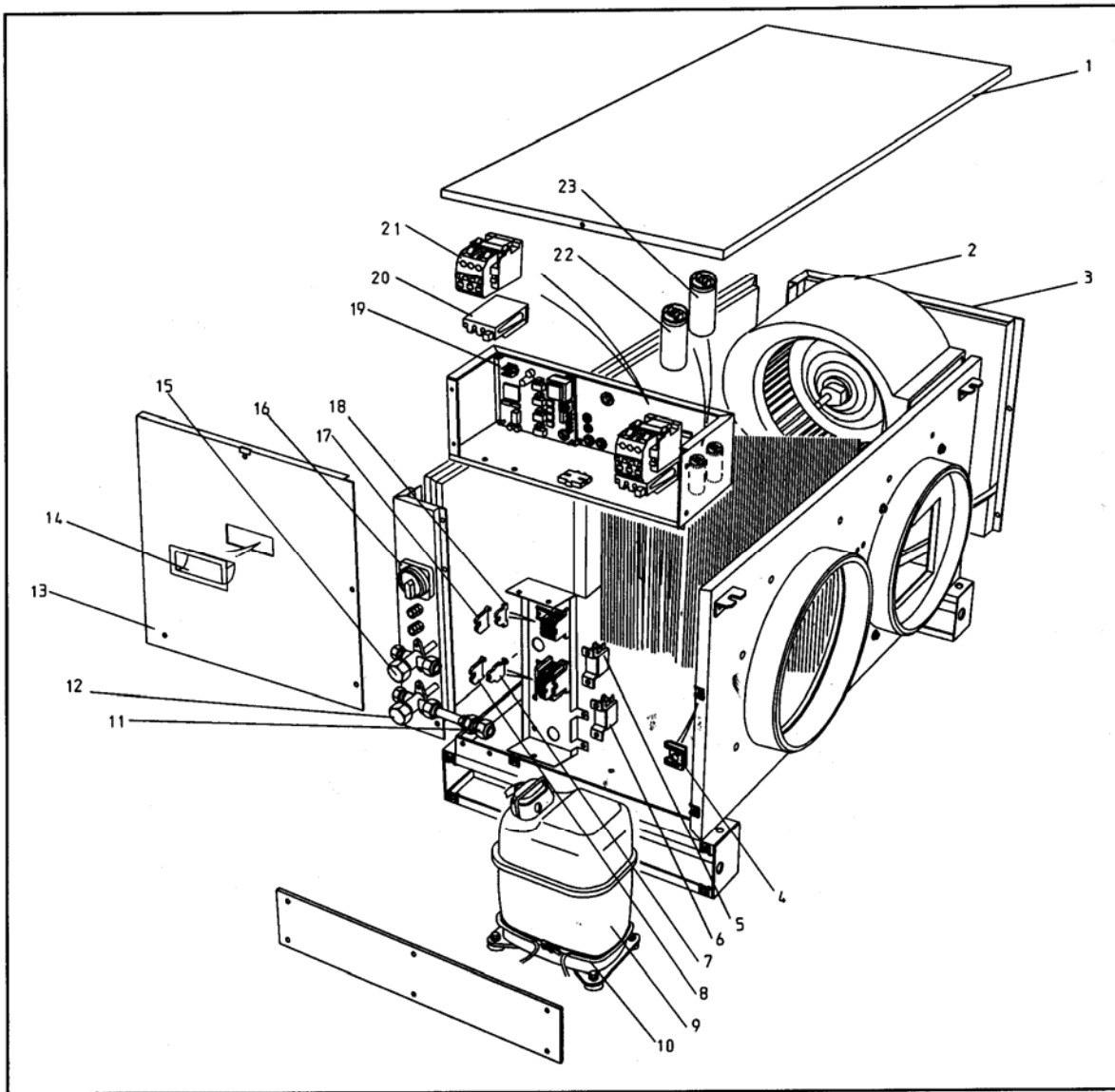


Note: The position of some of the controls shown in this diagram may vary from those in the unit delivered.

1	Coil
2	Drain tray
3	Access panel
4	Terminal
5	Contactors
6	Circuit breaker
7	Condensate pump
10	Heater element (2kW)
11	Side panel assembly
12	Swell latch
13	End stop
14	Terminal
15	Heater cut out
16	Blower assembly
17	Fresh air fan

18	Filter
19	Transformer
20	Discharge grille
22	Relay
24	Fan speed control
25	Humidity control pcb
26	Pressure switch
27	Grabber
28	Alarm indicator
29	Touch control
30	Humidifier assembly
31	Membrane key pad
32	Humidifier bottle
33	Terminal
34	Panel surround

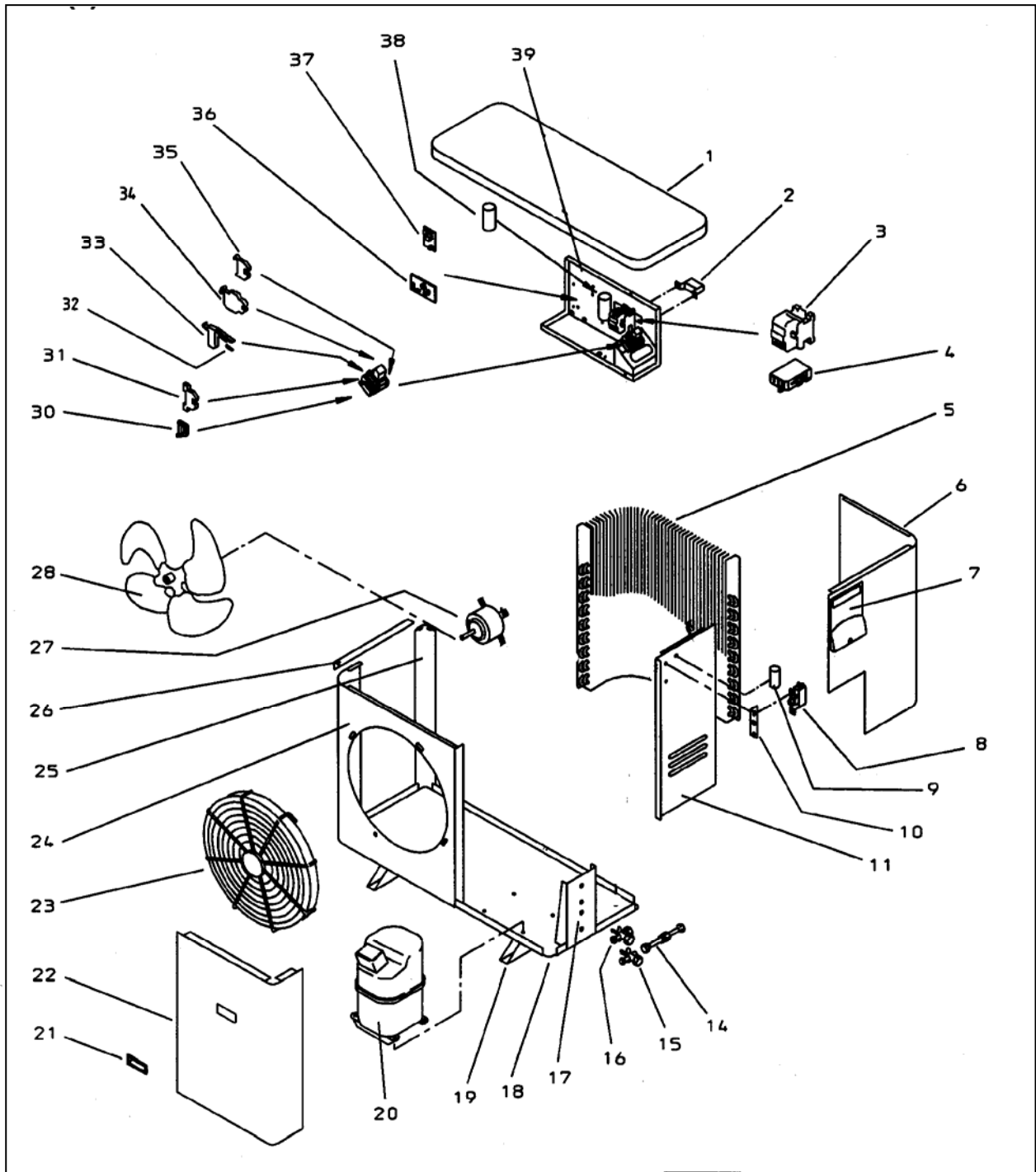
35	Electrics access
36	Washable filter
37	Return air grille
38	Humidity sensor
39	Isolator
40	Temperature sensor
41	Vice latch
42	Volt free pcb
43	Float switch
44	High water level assembly
45	Relay



COMPONENT IDENTIFICATION

ITEM No.	DESCRIPTION
1	Lid
2	Fan assembly
3	Right hand access panel
4	Spire clip
5	LP switch auto
6	HP switch auto
7	4 way terminal
8	Fused terminal
9	Compressor
10	Crankcase heater
11	Expansion assembly (including restrictor)
12	Liquid service valve

ITEM No.	DESCRIPTION
13	Electrics access panel
14	Handle
15	Suction service valve
16	Isolator
17	End clamp
18	Terminal
19	Power board PCBA
20	Overload (3 phase)
21	Contactor
22	Fan capacitor
23	Compressor capacitor (1 phase only)



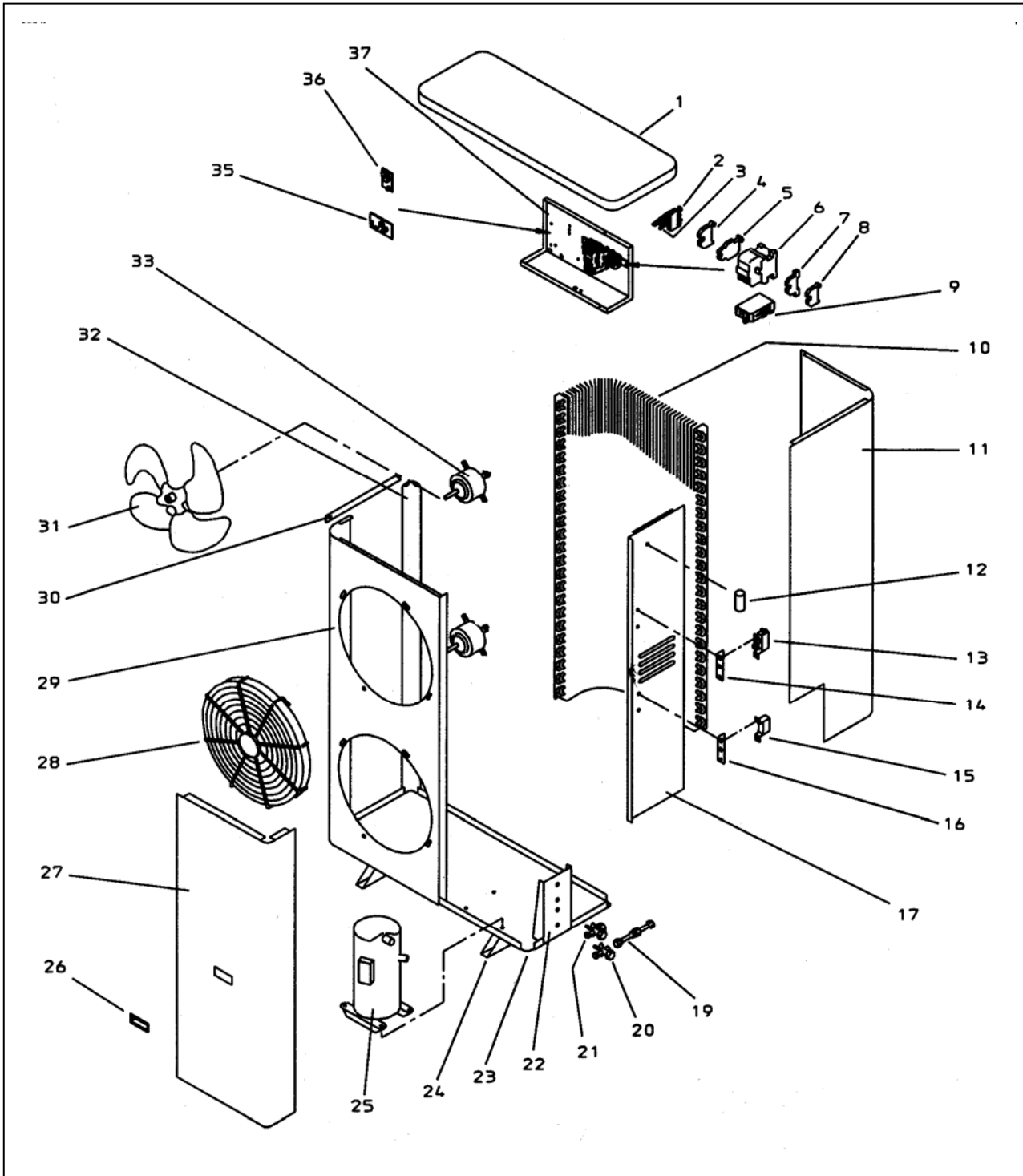
ITEM No.	DESCRIPTION
1	Lid
2	LP switch auto
3	Contactator
4	Overload (3 phase)
5	Heat exchanger
6	Rear access panel
7	Mains terminal cover
8	HP switch auto
9	Fan capacitor
10	Switch bracket
11	Bulkhead panel
14	Expansion assembly

ITEM No.	DESCRIPTION
15	Service valve
16	Service valve
17	Valve panel
18	Base
19	Mounting foot
20	Compressor
21	Handle
22	Front access panel
23	Fan guard
24	Fascia panel
25	Corner panel
26	Support bracket

ITEM No.	DESCRIPTION
27	Motor
28	Fan
30	Terminal end clamp
31	Terminal
32	Fuse
33	Fuse terminal
34	Terminal 4 way
35	Earth terminal
36	Fan speed controller
37	3 minute timer
38	Compressor capacitor (1 ph)
39	Electrics box

Note: The fan, motor and fan guard are supplied as a single assembly.

MCU+ 130 to 200



ITEM No.	DESCRIPTION
1	Lid
2	Fuse terminal
3	Fuse
4	Terminal
5	Terminal 4 way
6	Contactora
7	Terminal
8	Earth terminal
9	Overload
10	Heat exchanger
11	Rear access panel
12	Fan capacitor

ITEM No.	DESCRIPTION
13	HP switch auto
14	Switch bracket
15	LP switch auto
16	Switch bracket
17	Bulkhead panel
19	Expansion assembly
20	Service valve
21	Service valve
22	Valve panel
23	Base
24	Mounting foot
25	Compressor

ITEM No.	DESCRIPTION
26	Handle
27	Front access panel
28	Fan guard
29	Fascia panel
30	Support bracket
31	Fan
32	Corner panel
33	Motor
35	Fan speed controller
36	3 minute timer
37	Electrics box

Note: The fan, motor and fan guard are supplied as a single assembly.