

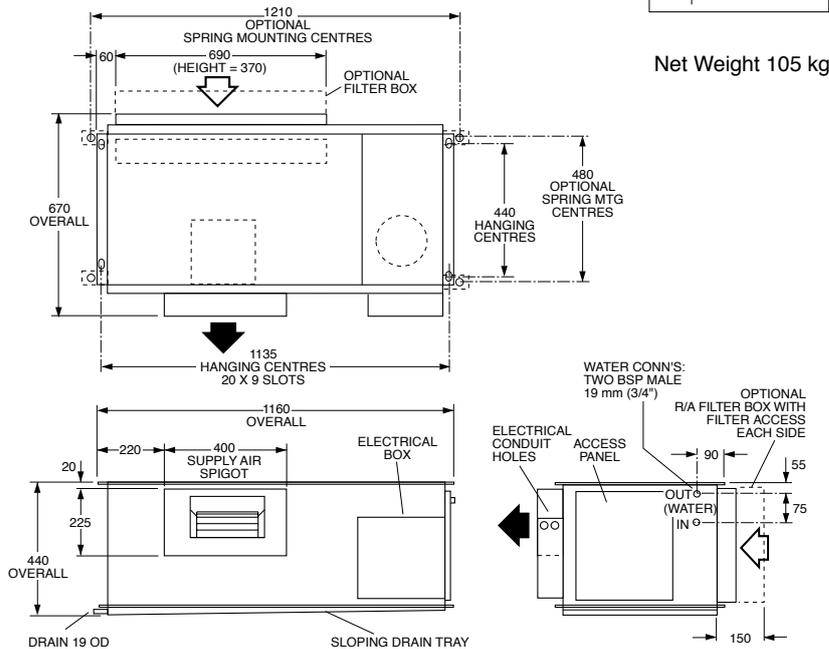
HWP 117 – 225

Ducted Water Cooled R410A Packaged Air Conditioner

Installation & Maintenance

Dimensions (mm)

Fig. 1 HWP 117



GENERAL

HWP - A general designation which applies to all versions (refer fig.7 on page 4 for nomenclature)

These HWP units must be installed in accordance with all national and local safety codes.

OPTIONS

The following items are available as optional extras:

1. Condensate Lift-Pump Kit.
2. Filter Box.

High pressure hoses (600 mm long) c/w fitting and spring mounts are supplied as standard.

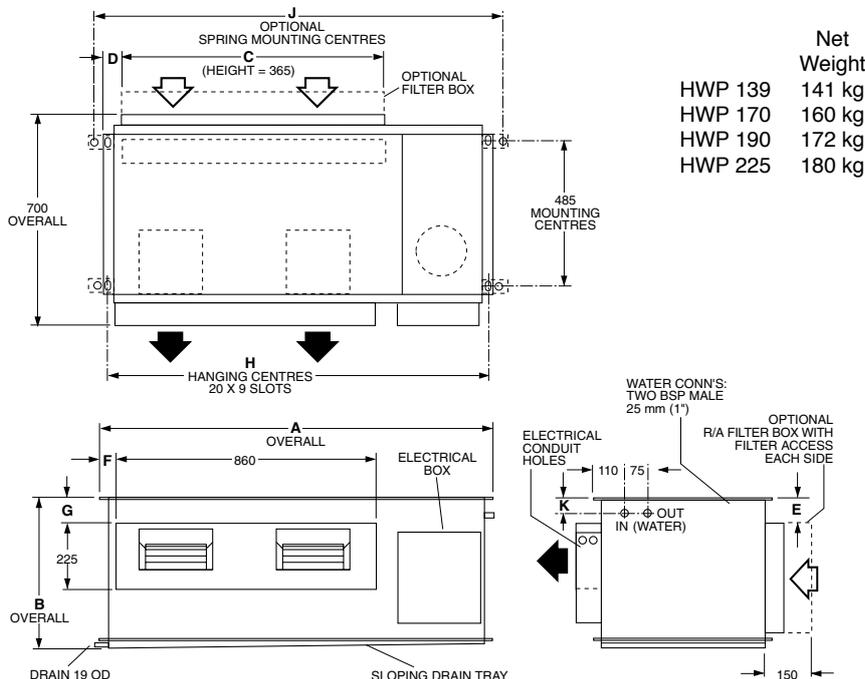
AIR FILTRATION / FILTER BOX (Option)

As air filtration requirements vary, filters are not supplied with the unit. Filters should ideally be installed on the return air side of the unit, no closer than 500 mm from the back of the unit and easily accessible for cleaning. To maximise the efficiency of air flow, the return air filter should be twice the area of the HWP unit's return air spigot/s. If efficiency is less of a concern a Filter Box is available.

The Filter Box is installed by unscrewing the return air spigot and replacing it with the Filter Box's filter-integrated spigot. The filter may be accessed from either side of this spigot. This box adds 90 mm to the overall depth of the unit.

Fig. 2 HWP 139 – 225

MODEL	A	B	C	D	E	F	G	H	J	K
HWP 139	1300	506	872	65	85	55	95	1273	1335	45
HWP 170	1510	506	1087	65	85	165	100	1483	1550	45
HWP 190	1670	526	1242	65	110	235	115	1641	1705	70
HWP 225	1820	526	1396	65	110	320	115	1792	1856	70



INSTALLATION

Positioning & Mounting

HWP units are designed to be used with simple, short duct layouts. Units should be located as close to the space to be air conditioned as acoustic criteria allows; refer to Fig. 6 for application considerations.

When determining the position of the air conditioner, allow adequate space around the unit to facilitate future servicing and maintenance. Ensure there is enough working space in front of the electrical access panel. Allow adequate clearance for the filter (optional) to be withdrawn to its full length.

It is recommended that the unit be mounted using the spring mount system supplied (Fig.3). This system minimises transfer of vibration into the building structure.

If a more rigid installation can be tolerated, then suspend the unit from four threaded rods using locknuts (not supplied), as shown in Fig. 4.

Mount top of the unit level as it comes with a sloping drain tray. This tray is not reversible, i.e. the drain exit can only be at the opposite end to the compressor.

The unit must be mounted with sufficient height for the condensate drain to be 'U' trapped outside the unit (see figure 5). Alternatively fit a condensate lift-pump.

The drain line must not be piped to a level above the drain tray.

When finally positioned, tighten the lock nuts on the mounting rods to give a firm installation (see Fig. 3).

Fig. 3 Spring Mounting

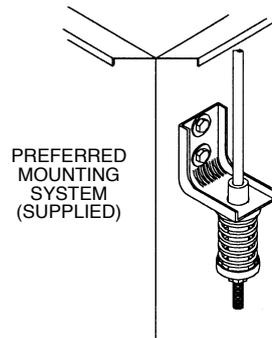
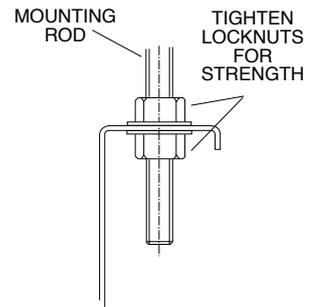


Fig. 4 Solid Mounting



Condensate Drain

The drain line must be maintained at least 19 mm ID along its full length. A vent pipe is recommended for drain pipes longer than 4 m (refer figure 4). Check drain by pouring water into the drain tray and ensuring that it clears. Failure to adhere to these instructions could cause flooding.

Water Supply & Return

The HWP unit's IN and OUT water connections are male pipe threaded (refer Fig. 1). The two **temperzone** 600 mm flexible high pressure water hoses supplied have female pipe threaded connections at each end. Maximum water pressure for each hose is 1720 kPa (250 psi). The HWP unit alone, excluding hoses, will withstand 4480 kPa (650 psi).

Poor quality water supply must be pre-filtered and it is essential that adequate water treatment is maintained, particularly where open cooling towers are used.

Note: It is required that the water supply system be fitted with a water flow switch and water pump safety interlock. These items prevent the HWP units from going into fail safe lockout status due to a loss of water flow. Failure to install the above items would require the resetting of all HWP units in the system - either by breaking the power supply to each unit or breaking the thermostat control circuit.

HWP*R units require a minimum water supply temperature of 17°C.

Circuit Balancing Valve

It is recommended that a circuit balancing valve be fitted to maintain water flow at a constant rate. The minimum water flow rates in litres per second (l/s) are as follows:

HWP:	117	139	170	190	225
Minimum	0.66	0.74	1.00	1.15	1.10

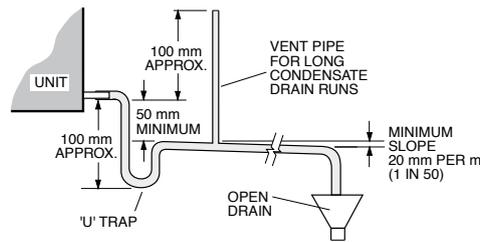
Electrical

The air conditioner should be connected to the appropriate power supply for each model, as specified in the wiring diagram, with neutral and adequate earth. The supply to have an accessible switch to allow isolation of the unit. Wire the heating and cooling room thermostat to the electrical terminals adhering to the wiring diagram supplied with the unit. All wiring to the air conditioner must comply with the wiring regulations of the local electrical authority.

Air / Water Flow

Refer to HWP 117–225 Data Sheet pamphlets for detailed information on air handling performance and water flow rates.

Fig. 5 Condensate Drain



Unit Protection

Unit protection is incorporated in either:
 a.) HWP Protection Board, or
 b.) SAT-2 Controller, depending on which HWP model is being installed.

A pump verification relay ensures that water is flowing before the compressor will start. A high pressure lockout protects the unit from low water flow in cooling mode, or fan failure in heating mode. Sensors protect against low air coil temperature and loss of refrigerant. Units include an anti rapid cycle device for compressor protection.

HWP*R units also have a low refrigerant temp. safety thermostat to protect against icing up of the water within the unit's tube-in-tube heat exchanger.

A non-specific fault LED/ output signal is also included for remote fault indication to building management systems (refer wiring).

Note: Lockout protection can be reset by switching unit's power supply off and on. Lockout protection will also reset when the thermostat switches, or is switched to the dead zone.

Units Supplied With SAT-2 Thermostat

Any faults detected are displayed on the SAT-2 Wall plaque (refer Table 1). A non-specific fault output signal is also included on SAT-2 Controllers for remote fault indication to building management systems.

Units Supplied With Electric Heat

HWP*CEKT models supplied with electric heat include both auto (90°C) and manual (120°C) high temp. safety thermostats. If the manual safety t/stat requires resetting, then the auto safety t/stat has failed and needs to be replaced.

Room Thermostat

(Reverse Cycle Models)

The thermostat should be set within the recommended operating range of between 19°C and 30°C. The thermostat should not be used as an on-off switch. Refer to **temperzone** for a list of other approved thermostats.

If your unit is supplied with **temperzone's SAT-2 Thermostat**, refer to page 3 for installation instructions.

COMMISSIONING

1. Check that the thermostat is correctly wired and set at the desired temperature.
2. Check that the air filter (if fitted) is clean.
3. Check that the fan runs freely without vibration.
4. Check condensate drain and safety drain tray for free drainage.

Demonstrate the SAT-2 Wall Control (if supplied) to the owner/user, after having first thoroughly familiarised yourself with the User's Operating Instructions. This page is to remain with the owner/user.

MAINTENANCE

Quarterly

1. Remove lint and dust accumulation from heat exchange air coil. (Note: failure to do this may affect efficiency).
2. Check air filters and vacuum or wash clean as necessary.
3. Check condensate drain for free drainage.
4. Check compressor compartment for oil stains indicating refrigerant leaks.
5. Check quality of water supply.

Six Monthly

Check tightness of electrical connections.

Yearly

1. Remove lint and dust accumulation from heat exchange air coil. (Note: failure to do this may affect efficiency).
2. Replace air filter if damaged to maintain adequate air flow and efficiency.

Units Supplied With Integrated Thermostat (SAT-2 Controller)

Components

The following components are supplied in a box taped inside the supply air spigot:

1. SAT-2 Wall Control plaque, including wall mounting plate.
2. 10 m interface lead (electrical box-to-plaque).
3. User's Operating Instructions booklet.
4. Lithium CR2032 battery (3V).

Optional

1. Remote return air sensor (in box).
2. Remote return air temperature sensor lead; 1.5, 6, 12 or 25 m.
3. 20 m extended interface lead (electrical box-to-plaque).
4. SAT-2 Zone Control PCB.
5. Zone Control 24V transformer.
6. Additional SAT-2 Wall Control plaque.
7. Infra red remote control.

Installation

The SAT-2 Controller PCB is supplied pre-installed in the HWP unit's electrical box.

1. Isolate the HWP unit from power supply, then remove electrical box cover.
2. Remove the SAT-2 box supplied taped inside the supply air spigot.
3. Remove the Wall Control's interface lead from this box and connect to the terminal block (A1/B1/Vcc/GND) on the SAT-2 Controller board. Trace the remaining length of the lead to the Wall Control's intended location. **Note:** Make sure the coloured wires are connected as per the wiring diagram.
4. Remove the Wall Control's backing plate by using a small screw driver to remove the single screw at the bottom edge of the plaque.
5. Install the Lithium battery, supplied loose, positive (+) side up in the Wall Control's battery holder.
6. Check the wall where the Wall Control plaque is to be located is flat before fastening the wall mounting plate. Alternatively, the mounting plate can be screwed to a standard wall socket mounted horizontally. **Note:** Use low profile (mush) headed screws to prevent contact with the PCB board. Fixing the plate to a distorted surface may damage the control.
7. Drill hole in wall to allow cable entry.
8. Connect the interface lead to the the Wall Control board. **Note:** Make sure the coloured wires are consistently connected at each end as per the wiring diagram.
9. Ensure the interface lead is run separately and away from main power supply wires, including the interconnecting cable. When installing cabling, trim any excess length to suit your location.
10. Fill around the interface lead with foam or cover hole with PVC tape to prevent draft from wall cavity affecting control operation. Do not use aluminium duct tape.
11. Secure the Wall Control body to the mounting plate by replacing the locking screw removed earlier.
12. Replace the HWP electrical box cover.

Remote Air Temperature Sensor/s (option)

The air temperature sensor is by default located in the Wall plaque. Optional remote air temperature sensors are available so that the measurement of the room temperature can be taken away from the wall plaque, eg. elsewhere in the room or in the return air duct.

Remote sensor's can be plugged directly into the Controller board (PCB). This board accepts up to four sensors which are designated as 'zones' one to four. The first return air sensor will automatically replace the Wall Control sensor and should be located in the same room as the Wall Control. The Controller will always use the average of the zones selected. Refer to the separate installation instructions supplied with the PCB for further details.

Ensure all remote sensor wires are run separately and away from main power supply wires, including the interconnecting cable.

Fault Detection

Any faults detected are displayed on the SAT-2 Wall plaque (refer Table 1). A non-specific fault output signal is also included on SAT-2 Controllers for remote fault indication to building management systems.

NOTE

The manufacturer reserves the right to make changes in specifications at any time without notice or obligation. Certified data is available on request.

This pamphlet replaces the previous issue no. 36842 dated 08/12. Wiring revisions H, I, H & I respectively.

Table 1 SAT-2 Controller - Troubleshooting

If an fault is detected, an 'ERR' symbol will light up on the Wall plaque display. The following error codes may be displayed:

Error Code	Fault	Remarks
1	Room sensor #1 failure	Main board AD3
2	Room sensor #2 failure	Main board AD4
3	Room sensor #3 failure	Main board AD5
4	Room sensor #4 failure	Main board AD6
5	#1 indoor coil sensor failure	Main board AD1
6	#1 LST sensor failure	Main board AD2
7	#1 insufficient refrigerant	
8	#1 compressor overload	
9	#1 low pressure failure	
10	#1 high pressure failure	
11	Room sensor #5 failure	At wallpad B
12	Room sensor #6 failure	At wallpad A
13	All room sensor failure	
14	Float switch failure	
15	#1 Low safety thermostat failure	
16	Communication failure	
17	Hydronic pump switch failure	
18	#2 insufficient refrigerant	
19	#2 compressor overload	
20	#2 Low safety thermostat failure	
21	Discharge sensor 1 failure	
22	Discharge sensor 2 failure	
23	Discharge temp 1 failure	
24	Discharge temp 2 failure	

Fig. 6 Application Considerations

Recommendations for Noise Isolation:

1. Avoid installing units, with non-ducted return air, directly above spaces where noise is critical.
2. Use flexible connections between unit and rigid ducting.
3. Use generously sized acoustically lined ducts.
4. If generous duct size is not possible, use turning vanes on bends to reduce air turbulence (regenerated noise).
5. Use 90° bends in ducting to significantly assist in noise reduction.

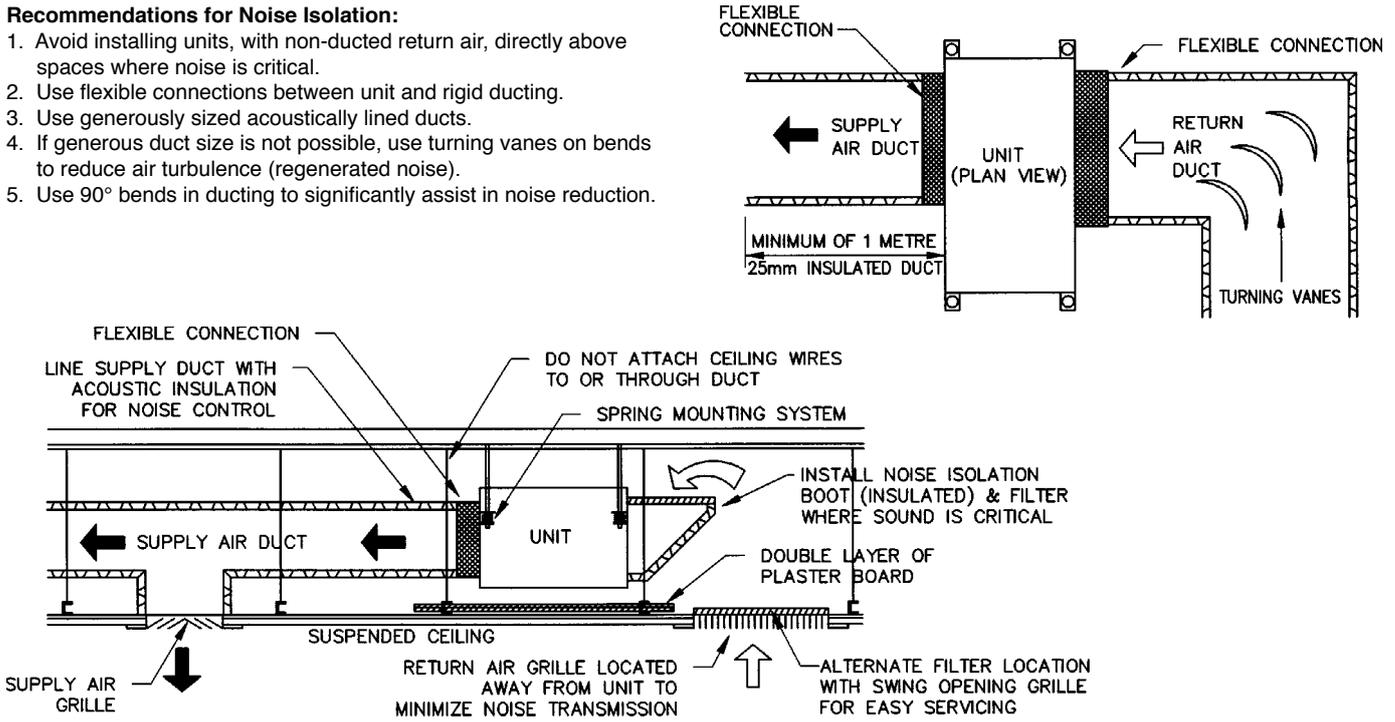
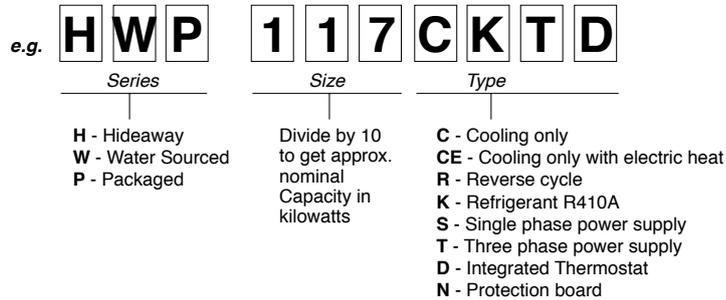


Fig. 7 Nomenclature



HWP 117-225 CKTD & CEKTD

SPECIFICATION TABLE

CAPACITIES - AS/NZS 3823	HWP	HWP	HWP	HWP	HWP	HWP	HWP	HWP
COOLING - NET	MODEL	117C	139C	170C	190C	225C	225C	225C
HEATING - ELECTRIC HEAT OPTION	KW	11.38	13.44	16.6	18.27	22.47	22.47	22.47
ELECTRICAL INPUT	9	9	9	9	9	12	12	12
COOLING -	KW	3.08	3.55	4.5	4.95	5.67	5.67	5.67
HEATING - ELECTRIC HEAT OPTION	KW	9.15	9.5	9.6	12.6	12.6	12.6	12.6
E.E.R./ COOLING	KW/KW	3.69	3.78	3.66	3.69	3.38	3.38	3.38
A.E.E.R./ COOLING	KW/KW	3.68	3.77	3.65	3.68	3.37	3.37	3.37

ELECTRICAL

SUPPLY REQUIRED 3PH 342-436V ~ 50Hz INCLUDING VOLTAGE FLUCTUATION LIMITS

COMPRESSOR RUN AMPS AT RATING

A	5.15/4.91/5.51/5.86/5.5/5.6	7/8/B	8.2/8.3/8.3	10.4/10.5/10.3
FAN MOTOR	FLA	1.83	1.87	2.7
FAN MOTOR CAPACITOR SIZE	µF	10	12	15
RUNNING AMPS/PH - COOLING	TRA/PH	7.5/5.5/5.86/5.8/5.6	9.7/8/8	11.2/8.3/8.3
RUNNING AMPS/PH - ELECTRIC HEAT	TRA/PH	14.8/13/13	14.8/13/13	19.7/17/17
MAXIMUM OPERATING CURRENT	A/PH	9.1	10.3	12.5
MAXIMUM CURRENT WITH ELECTRIC HEAT OPTION	A/PH	12.6	13.8	16
REFRIGERANT - R410A	grams	1660	1860	2250
WEIGHT - NET	kg	1.09	1.41	1.60
				172
				2700
				180

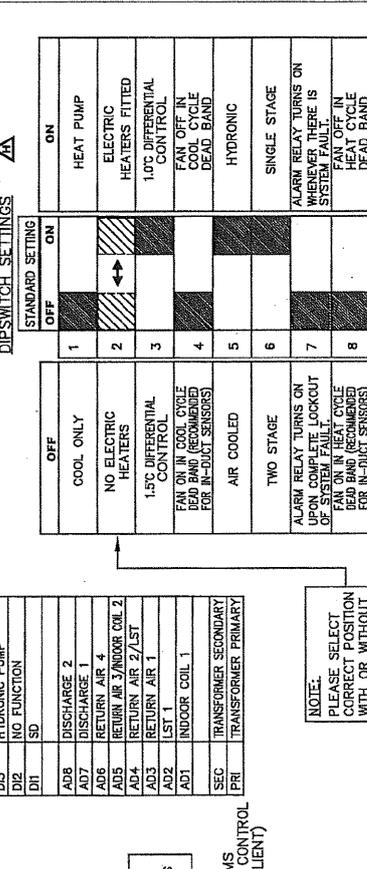
OIL TYPE: POLYVINYL ETHER (PVE) HWP 117-139-170-190 - P.O.E. FOR HWP 225

SAT 2 BOARD DEFINITIONS

QUT1	4-WAY VALVE
QUT2	HEATER COIL #2
QUT3	RAIN/PUMP
QUT5	POWER IN
QUT6	ZONE/MOTOR
ALARM OUT	FAULT RELAY
RELAY1	ZONE CONTROL BOARD
COM	COMMON
D16	HP SWITCH
D15	LP SWITCH
D14	FLOAT SWITCH
D13	HYDRONIC PUMP
D12	IG FUNCTION
D11	SD
A08	DISCHARGE 2
A07	DISCHARGE 1
A06	RETURN AIR 4
A05	RETURN AIR 3/INDOOR COIL 2
A04	RETURN AIR 2/LST
A03	RETURN AIR 1
A02	LST 1
A01	INDOOR COIL 1
SEC	TRANSFORMER SECONDARY
PRI	TRANSFORMER PRIMARY

DIP SWITCH SETTINGS

STANDARD SETTING	OFF	ON
1	COOL ONLY	HEAT PUMP
2	NO ELECTRIC HEATERS	ELECTRIC HEATERS FITTED
3	1.5°C DIFFERENTIAL CONTROL	1.0°C DIFFERENTIAL CONTROL
4	FAN ON IN COOL CYCLE (FOR IN-DUCT SENSORS)	FAN OFF IN COOL CYCLE (FOR IN-DUCT SENSORS)
5	AIR COOLED	HYDRONIC
6	TWO STAGE	SINGLE STAGE
7	ALARM RELAY TURNS ON UPON COMPLETE LOCKOUT	ALARM RELAY TURNS ON WHENEVER THERE IS A SYSTEM FAULT
8	FAN ON IN COOL CYCLE (FOR IN-DUCT SENSORS)	FAN OFF IN COOL CYCLE (FOR IN-DUCT SENSORS)



WALL PAD 1

B	A	Vcc	RED
WHITE	YELLOW	BLACK	RED

WALL PAD 2

B	A	Vcc	RED
WHITE	YELLOW	BLACK	RED

ISSUE MODIFICATION

ISSUE	MODIFICATION	EC/N	DATE	APRVD
*H	WWR ADDED. 3.38/3.37 WERE. 3.83/3.82	N3238	12-08-13	D.A.B.
G	REINSTATE OLD STYLE HWP 117/139 SPECIFICATION DETAILS	N3078	30-07-12	J.S.L.
F	HWP 139 SPECIFICATIONS REVISED AS PER TEST REPORT NO.0084. DEFINITIONS UPDATED ON SAT 2/SHUT DOWN RELAY OPTION ADDED. REMOVED HEAT FROM SCHEMATIC/RESISTOR NOT REQUIRED/ADD RA SENSOR	N2500	11-11-11	J.S.L.
E	HWP170 CAPACITOR NOW 15MFD WAS 12 MFD	N2752	14-03-11	D.A.B.

temperzone

Title: HWP 117-225 CKTD & CEKTD
WIRING SCHEMATIC C/W INTEGRATED ROOM T/STAT

Drawn G.J.R. Date 10/09-07 508-324-002
Scale Aprvd [Signature] Revision H

PLOTTED 12-08-13
©temperzone ltd 2007

HWP 117-225 CKTN & CEKTN

SPECIFICATION TABLE

CAPACITIES - AS/NZS 3823	HWP	HWP	HWP	HWP	HWP	HWP
COOLING - NET	MODEL	117C	139C	170C	190C	225C
HEATING - ELECTRIC HEAT OPTION	KW	11.38	13.44	16.6	18.27	22.47
ELECTRICAL INPUT		9	9	9	12	12
COOLING -	KW	3.08	3.55	4.5	4.95	5.87
HEATING - ELECTRIC HEAT OPTION	KW	9.15	9.5	9.6	12.6	12.6
E.E.R./ COOLING	KW/AW	3.69	3.78	3.66	3.68	3.38
A.E.E.R./ COOLING	KW/AW	3.68	3.77	3.65	3.68	3.37

ELECTRICAL

SUPPLY REQUIRED 3Ph 342-436V ~ 50Hz INCLUDING VOLTAGE FLUCTUATION LIMITS

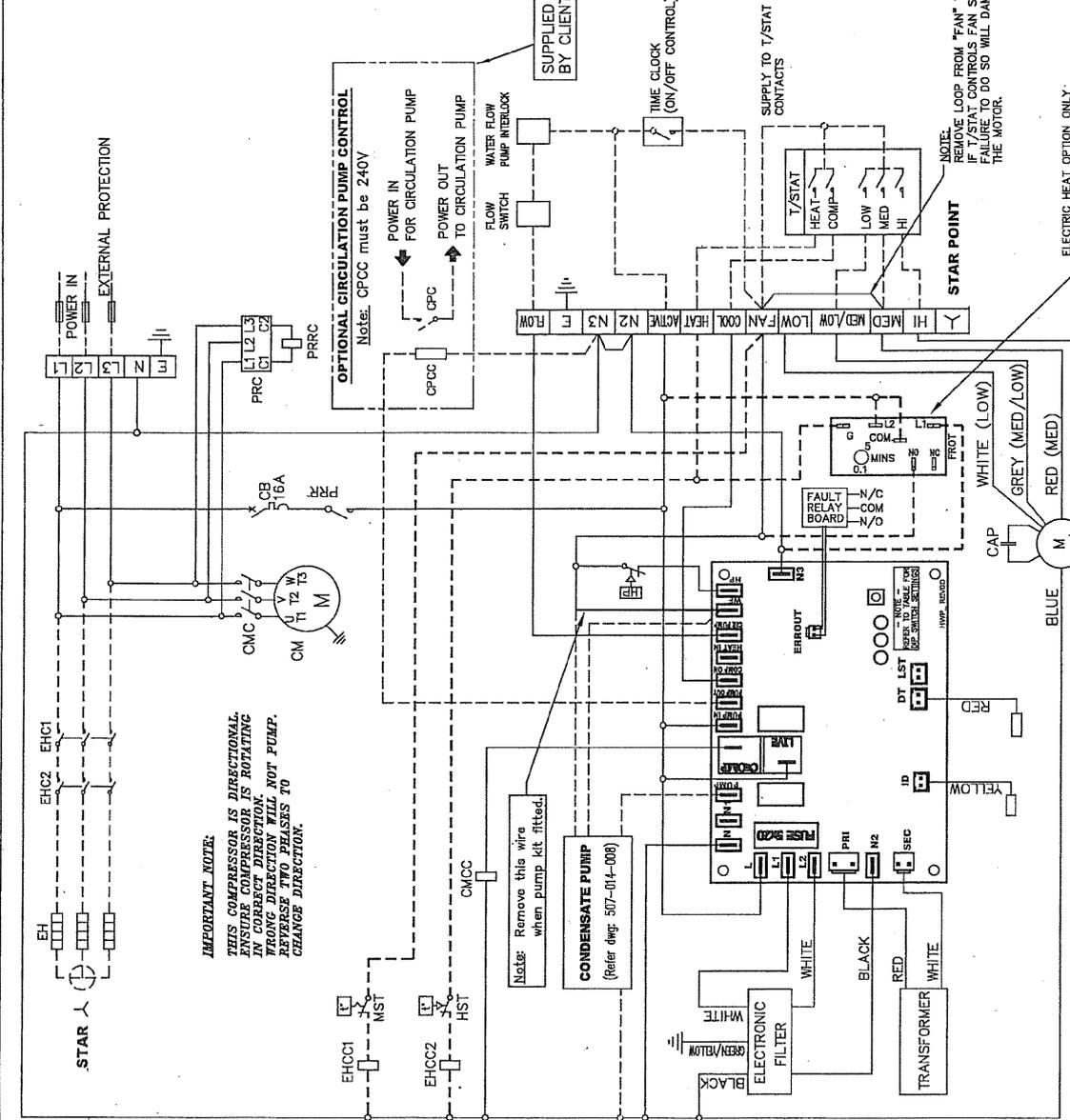
COMPRESSOR RUN AMPS AT RATING

A/PH	5.15/4.9/5.5	5.86/5.6/5.6	7.8/8	8.2/8.3/8.3	10.1/10.5/10.3
FAN MOTOR	FLA	1.83	1.87	2.7	2.9
FAN MOTOR CAPACITOR SIZE	µF	10	12	15	15
RUNNING AMPS/PH - COOLING	TRA/PH	7.5/5.5	7.7/5.8/5.6	9.7/7.8/8	11.2/8.3/8.3
RUNNING AMPS/PH - ELECTRIC HEAT	TRA/PH	14.8/13.1/14.9	13.1/13.13	15.7/13.13	18.7/17.1/19.1/17.1
MAXIMUM OPERATING CURRENT	A/PH	9.1	10.3	12.5	14.1
MAXIMUM CURRENT WITH ELECT. HEAT OPTION	A/PH	12.6	13.8	16	21
REFRIGERANT - R410A	grams	1660	1860	2250	2500
WEIGHT - NET	kg	109	141	160	172
					180

OIL TYPE: POLYVINYL ETHER (PVE) HWP 117-139-170-190 - P.O.E. FOR HWP 225

DIPSWITCH SETTINGS

STANDARD SETTING	OFF	ON
1	COOL ONLY	HEAT PUMP
2	FAULT RELAY ACTIVATED UPON FINAL LOCK OUT.	FAULT RELAY ACTIVATED WITH EACH SYSTEM FAULT
3	LST ACTIVATED AT -2°C	LST ACTIVATED AT -1°C
4	SPARE	



ISSUE MODIFICATION

ISSUE	MODIFICATION	EC/N	DATE	APPROV
#1	3.38 WAS 3.83, 3.37 WAS 3.82	N3300	23-08-13	D.A.B.
H	REINSTATE OLD STYLE HWP 117/225 SPECIFICATION DETAILS	N3078	23-07-12	J.S.L.
G	REMOVE HWP 139C FROM SCHEMATIC REFER DWG NO.508-304-002	N2500	11-11-11	J.S.L.
F	CORRECTION TO DETAIL ON SPECIFICATION	N2838	25-07-11	ROD
E	HWP170 CAPACITOR NOW 15MED WAS 12MED	N2752	14-03-11	D.A.B.

Electric Heat Wiring -----
c/w Fan Run On Timer

CLIENT WIRING -----
Interconnections between units by client. Double insulated multi-core cable.

temperzone

PLOTTED 23-08-13

©temperzone ltd 2007

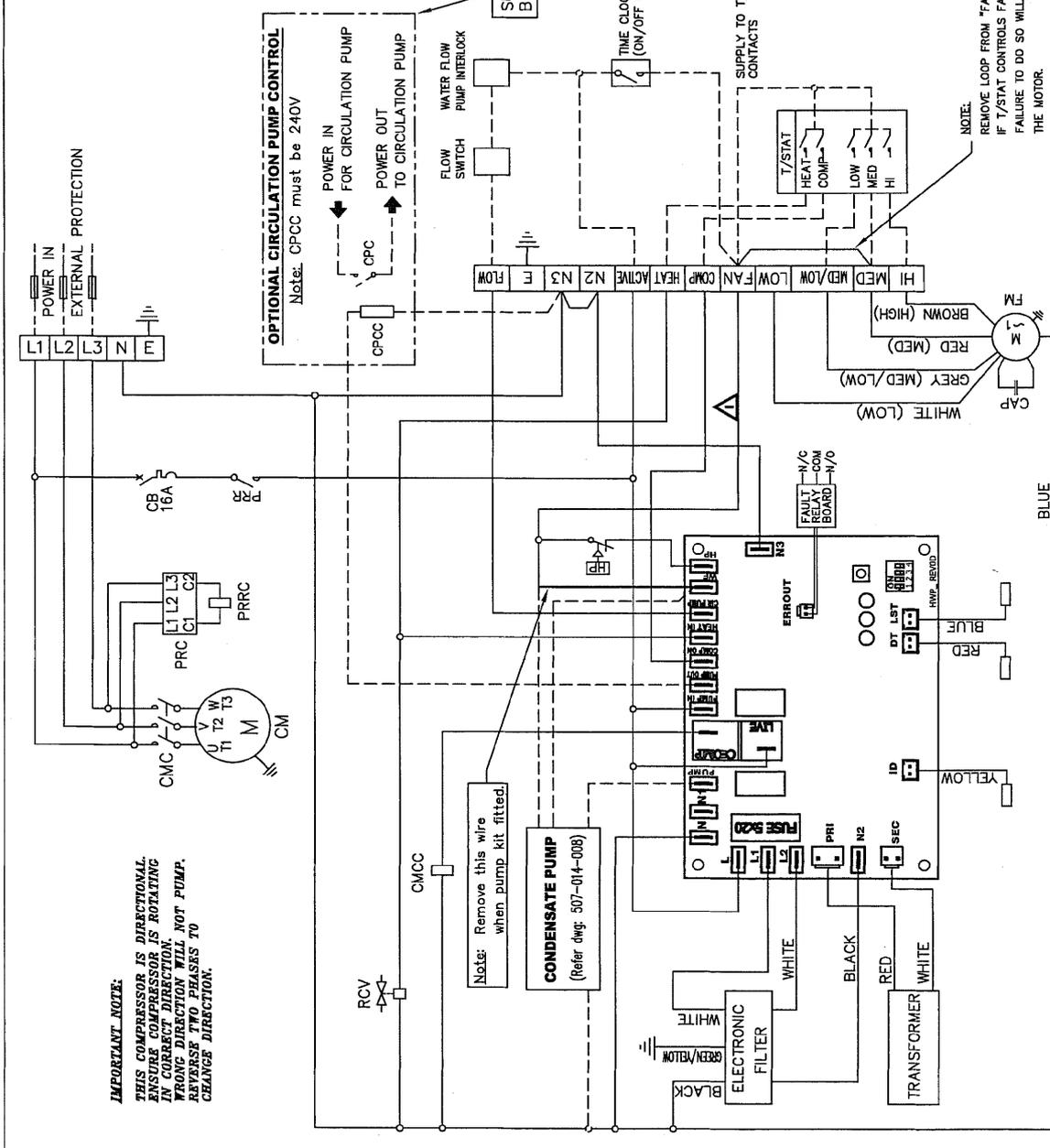
Title HWP 117-225 CKTN & CEKTN
WIRING SCHEMATIC-PROTECTION BOARD

Drawn G.J.R. Date 10-09-07 Drawing No. 508-344-002
Scale Aprvd [Signature] Revision 1

HWP 117-225 RKTN

SPECIFICATION TABLE		HWP	HWP	HWP	HWP	HWP	HWP
CAPACITIES - AS/NZS 3823		MODEL	117R	139R	170R	190R	225R
COOLING - NET		KW	11.38	13.44	16.6	18.27	22.47
HEATING - REVERSE CYCLE		KW	11.2	13.72	16.3	18.5	21
ELECTRICAL INPUT							
COOLING -		KW	3.08	3.55	4.5	4.95	5.87
HEATING - REVERSE CYCLE		KW	3.0	3.4	3.68	4.73	4.77
E.E.R. / COOLING		KW/AW	3.69	3.78	3.66	3.69	3.38
A.E.E.R. / COOLING		KW/AW	3.68	3.77	3.65	3.68	3.37
ELECTRICAL							
SUPPLY REQUIRED 3PH 342-438V ~ 50HZ INCLUDING VOLTAGE FLUCTUATION LIMITS							
COMPRESSOR RUN AMPS AT RATING		A	5.15/5.5/5.86/5.8/5.6	7/B/B	8.2/8.3/8.3	10.7/10.5/10.3	
FAN MOTOR		FLA	1.83	1.87	2.7	2.9	2.9
FAN MOTOR CAPACITOR SIZE		µF	12	12	15	15	15
RUNNING AMPS./PH - COOLING		TRA/PH	7/5/5.5/7.7/5.8/5.6	9.7/8/B	11.2/8.3/8.3	13.3/10.5/10.3	
MAXIMUM OPERATING CURRENT		A/PH	9.1	10.3	12.5	14.1	17
REFRIGERANT - R410A		grams	1660	1860	2250	2500	2700
WEIGHT - NETT		kg	109	141	160	172	180
OIL TYPE: POLYVINYL ETHER (PVE)		HWP 117-139-170-190 - P.O.E. FOR HWP 225					

COMPONENT	FUNCTION
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CM	COMPRESSOR MOTOR
CMC	COMPRESSOR CONTACTOR
CMCC	COMPRESSOR CONTACTOR COIL R
CPC	CIRCUIT PUMP CONTACTOR
CPCC	CIRCUIT PUMP CMC COIL
FLA	FULL LOAD AMPS
FM	FAN MOTOR
FRB	FAULT RELAY BOARD
HP	HIGH PRESSURE CONTROL
PRC	PHASE ROTATION CONTROLLER
PRR	PHASE ROTATION RELAY
RCV	REVERSE CYCLE
TRV	TOTAL RUNNING AMPS



IMPORTANT NOTE:
 THIS COMPRESSOR IS DIRECTIONAL. ENSURE COMPRESSOR IS ROTATING IN CORRECT DIRECTION. REVERSE DIRECTION WILL NOT PUMP. REVERSE TWO PHASES TO CHANGE DIRECTION.

STANDARD SETTING	ON	OFF
1	COOL ONLY	HEAT PUMP
2	FAULT RELAY ACTIVATED FINAL LOCK OUT.	FAULT RELAY ACTIVATED WITH EACH SYSTEM FAULT
3	LST ACTIVATED AT -2°C	LST ACTIVATED AT -1°C
4	SPARE	

temperzone

Title: HWP 117-225 RKTN
 WIRING SCHEMATIC-PROTECTION BOARD

Drawn G.J.R. Date 10-09-07
 Scale: 1:1

Revision: 1
 Drawing No.: 507-344-002

PLOTTED 23-08-13
 ©temperzone ltd 2007

CLIENT WIRING - Interconnections between units by client. Double insulated multi-core cable.

ISSUE	MODIFICATION	EC/N	DATE	APR/VD
I	WF terminal on Protection Board connected to FAN	N3765	27-07-15	R.A.S
H	3.38 WAS 3.83, 3.37 WAS 3.82	N3300	23-08-13	D.A.B.
G	REINSTATE OLD STYLE HWP 117/219 SPECIFICATION DETAILS	N3078	23-07-12	J.S.L.
F	HWP 139 SPECIFICATIONS REVISED AS PER TEST REPORT N010084 ADD T/STAT OPTION DETAILS AND REVISED LOOP REMOVAL LABEL REMOVED HWP117 FROM SCHEMATIC/RESISTOR NOT REQUIRED	N2500	10-11-11	J.S.L.