OPA 700/800 RKTB (c/w UC6)
Air Cooled Packaged Units - Reverse Cycle - R410A
Installation & Maintenance

GENERAL

1. GENERAL

Follow these instructions to ensure the optimum performance, reliability and durability.

Units must be installed in accordance with all national and regional regulations and bylaws. National Health and Safety regulations must be followed to avoid personal injuries.

The appropriate local permits must be acquired and adhered to.

Local regulations on maximum boundary noise need to be considered when positioning the unit.

INSTALLATION

2. INSTALLATION

Refer to dimension diagrams below (Fig.1) for minimum clearances. If multiple units are to be placed side-by-side then allow at least 2m between coil faces.

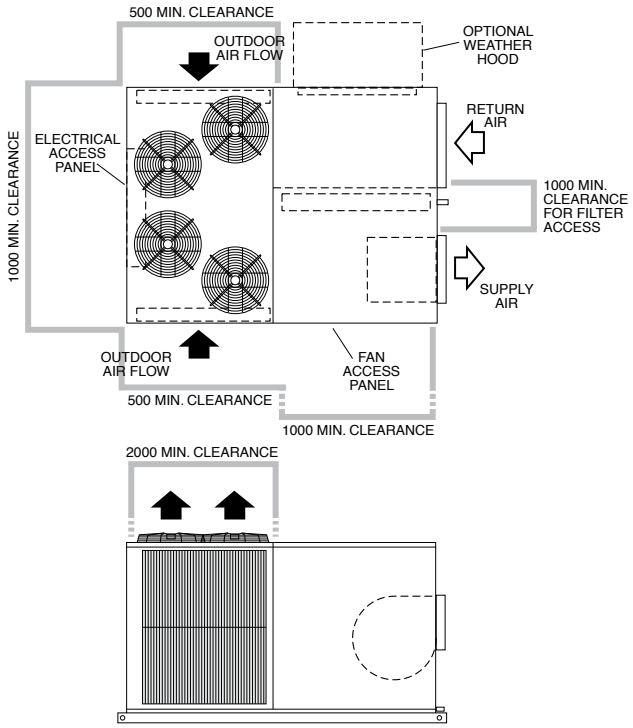


Figure 1.

2.1 Mounting

The unit should be fastened to a firm flat horizontal base using the holes supplied in the mounting channels. When the unit is being installed on a roof it is recommended that the unit is installed on a substantial structure with vibration isolating springs beneath the unit. These springs are not supplied with the unit.

Flexible duct connections are recommended between the supply and return ducts and the unit.

Unit is shipped with wooden blocks installed under the compressors. Ensure these blocks are removed from the compressor feet prior to starting the unit (not required for operation).

Factory filter slides are fitted. Access to the filter access door should be considered when designing return and supply air ductwork. Access to the filters can still be achieved by removing the return air access door, however it is imperative that the rubber insulating washers be refitted to the screws prior to replacing the panel.

2.2 Condensate Drain

The condensate drain should be 'U' trapped outside the unit. The trap should have a vertical height of at least 100 mm. The drain should have a slope of at least 1 in 50 and must not be piped to a level above the unit drain pipe. (refer fig. 2)

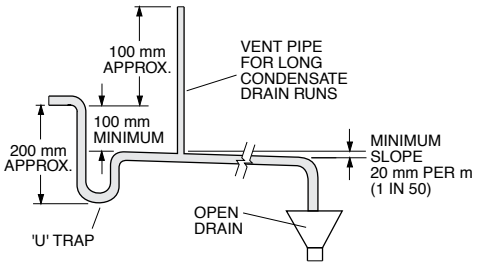


Figure 2.

REFRIGERATION SYSTEM

3. REFRIGERATION SYSTEM

3.1 General

The OPA 700/800 models have two independent refrigeration circuits and two compressors to provide the flexibility and economy of two stage operation, i.e. utilising one or two circuits as conditions vary, plus the advantage of staggered starting.

Units are supplied with a UC6 service interface display fitted for ease of service, maintenance and trouble shooting. Operating pressures and status can be read from its various display screens (refer user manual).

Each refrigeration system has been charged with HFC-410A (R410A) refrigerant; refer wiring diagram specification table for amount. This charge is based on nominal capacity, nominal conditions and nominal airflow and is sufficient under these conditions to maintain a refrigerant superheat of approximately 6 Kelvin. If the unit is installed in subtropical or tropical conditions, has a high fresh air content or has been installed with maximum supply
air quantity, the superheat should be checked and if found to be above 6 Kelvin, refrigerant may need to be added to the system to return the superheat to the factory required state. These readings should be taken with each stage operating independently and after the space has achieved conditions. The additional charge should be recorded for future reference.

3.2 Compressors

The compressors are directional scroll type. The compressor lubricant is polyolester oil (POE). Note, this oil absorbs moisture quickly if exposed to open air.

On commissioning, the compressors must be checked for correct rotation (refer Start Up Procedure). A time delay prevents simultaneous starting of the compressors.

3.3 Economiser *(Option)*

If the outdoor air temperature or heat (enthalpy) content preferably, is below that of the return air the fresh air damper opens and the return air damper closes to provide the first stage of cooling. The fresh air damper should return to minimum setting and the return air damper open before the compressors are allowed to operate to provide further cooling.

3.4 Setting Supply Air Flow

If the indoor air returning to the unit is regularly expected to be above 50%RH, then the coil face velocity should be limited to be 2.5 m/s or less (refer Air Handling graph on page 5).

High humidity levels can occur in tropical or subtropical conditions, and/or when heavily moisture laden fresh air is introduced. Select a fan speed that avoids water carry-over problems.

In a free blow or low resistance application, beware of exceeding the fan motor's full load amp limit (refer wiring diagram).

The indoor air fan motor is fitted with a factory set adjustable pitch pulley. Instructions for the adjustment of pulleys is included on the back page of the supplied Commissioning Sheet. One revolution of adjustment is equal to approx. 7% change in air volume flow rate.

WIRING

4. WIRING

4.1 Electrical Requirements

Electrical work must be done by a qualified electrician.

DANGER LIVE ELECTRICAL CONNECTIONS. ONLY QUALIFIED PERSONS WHO ARE COMPETENTLY TRAINED SHOULD PERFORM SERVICE AND MAINTENANCE TASKS.

The unit must be wired directly from a distribution board by means of a circuit breaker or H.R.C. fuse, and a mains isolator provided - preferably close to the unit.

Note: DO NOT USE REWIRABLE FUSES.

The OPA unit is provided with a 24V ac control circuit thermostat (TZT Optional), on/off switch and/or time clock, field supplied and fitted. The control transformer 240V primary is used for countries with 230-240V power supply. Alternatively control can be via a Modbus connection.

For countries with supply voltages 200-220V, change the primary voltage on the transformer to 208V.

Standard units are suitable for use with thermostats with either manual Heat/Cool selection or automatic changeover subject to the contact ratings of the thermostats.

A 24 hour power supply to the compressor crank case heaters is required, otherwise the warranty is void.

4.2 Unit Controller (UC6)

The temperzone Unit Controller 6 (UC6) combines the μPC controller board from Carel plus an interface board to connect temperzone standard sensors and plugs. The UC6 receives requests such as "Unit On/Off", "Start 1 or 2 compressors", "Activate HEAT (Reverse Cycle)" and transfers these requests to the outputs after enforcing safety timers. The UC6 ensures unit safety by continuously monitoring input signals such as pressures and temperatures. Beside the normal controls and unit safety the UC6 has many other functions, for example head pressure control, capacity control, superheat control, serial communications and more.

The Unit Controller provides system protection functions such as coil frost protection, de-icing, high head pressure and low suction pressure cut-out. It also protects against rapid cycling of the compressor(s) and loss of refrigerant. The UC6 regulates the superheat of the refrigeration system by controlling the position of an electronic expansion valve (EEV). Various methods of head pressure control (or limiting) are employed in temperzone units. The particular method used varies from model to model, but is also handled by the Unit Controller. In combination, these features deliver optimised performance across a wide operating temperature range.

As a result of the UC6's control of these inter-related functions, the outdoor fans may take some time to start rotating after each compressor start. They may also run on when the compressor stops. The fans will stop during a de-ice cycle and the speed will vary either smoothly, or in steps, in order to protect against excessively low or high head pressure.

Refer to temperzone for operation & fault diagnostics information OR www.temperzone.biz.

5. STARTUP PROCEDURE

5.1 Pre-Startup

1. Leave the external temperature controller on/off switch in the off position and close the unit's mains isolating switch. A four hour delay period is required to allow the crankcase heaters to drive any liquid refrigerant out of the compressor oil.
2. Check that the shipping blocks beneath each compressor have been removed and that each compressor is secure on its mounts
3. Check that all fan motors are free running.
4. Check that the thermostat is correctly wired to the unit and is set at the desired temperature.
5. Check that the air filters have been correctly installed if fitted.
6. Check air diffuser dampers are open.
7. Check and tighten all electrical connections.

5.2 Commissioning

Use the supplied Commissioning Sheet to help you complete the following procedure:

1. After the four hour delay period has crankcase heater thermostat has been reconnected.
2. Check the supply voltage between each phase and neutral.
3. Compressors fitted are directional. Check for correct rotation. If rotation is incorrect the compressor will not pump, be noisy, and will draw minimal current. To correct motor rotation, change the phasing at the main power terminal. If changing the phasing, check the indoor air fan then runs in the correct direction also.
4. Measure the current draw on each phase to the compressor motors and measure the current draw of each fan motor. Check all readings against the specified values in the wiring diagram.
5. Use the on board UC6 Service Interface display (if supplied) or fit R410A compatible gauges and measure the suction and discharge pressures of both refrigeration circuits.
6. Check that the outdoor air fan motors are running smoothly.
7. Test the operation of the reversing valve in cooling and heating mode (refer Commissioning Sheet).
8. Check the supply air flow at each outlet after commissioning of fans
9. Check the tightness of all electrical connections and sign the check label.
10. Touch up any outdoor unit paintwork damage to prevent corrosion

START UP PROCEDURE

6. OPERATION

6.1 Remote on/off

The remote on/off function can be enabled or disabled by using the UC6 Service Interface (option).

When the function is enabled the remote on/off signal must connect to input **DI7**, signal return is **DIC1**. The remote on/off signal must be an external voltage free switched relay contact.

The unit is active when DI7 is connected to DIC1.

6.2 High pressure protection (HP)

If high pressure transducers are connected to inputs **HP1** and **HP2** then a compressor is switched off when the discharge line pressure reading exceeds 42.0bar.

Instead of high pressure transducers some systems may be fitted with high pressure switches. These also connect to inputs **HP1** and **HP2**. When a high pressure switch activates (electrical circuit opens) the compressor is stopped.

Similarly, if the condensing temperature reported by an outdoor coil temperature sensor (connected to **TS1** and **TS2**) reports a coil temperature above +66°C (cooling mode) the compressor is switched off.

The UC6 will automatically reduce capacity of a digital scroll compressor before the maximum value of 42bar / 66°C is reached.

When a compressor is stopped due to high pressure it is held off for a period of 3 minutes, after which it is allowed to restart (provided pressure has fallen well below the maximum).

If three consecutive trips occur then the unit will be "locked out". The trip counter is reset to 0 when there has been no compressor run request for longer than 60 minutes.

Display indication when protection is active - number 4 (flashing)

6.3 Loss of refrigerant protection (LOR)

When a compressor is running the UC6 continuously monitors the various temperatures. The controller software applies logic that enables it to determine whether the system has an adequate amount of refrigerant. Signals used for this check are mid-coil temperatures (**TS1**, **TS2**), suction temperatures (**ST1**, **ST2** and discharge line pressures (**HP1** and **HP2**, if present).

The check is not made during the first 5 minutes after a compressor is started to allow pressures and temperatures to settle.

If the compressor is a variable speed type or a digital scroll type then the check is made only when the capacity is at 100%.

When a compressor is stopped due to loss of refrigerant it is held off for a period of 3 minutes, after which it is allowed to restart.

If three consecutive trips occur then the unit will be "locked out". The trip counter is reset to 0 when there has been no compressor run request for longer than 60 minutes.

Display indication when protection is active - number 3 (flashing)

6.4 Indoor coil frost protection (FROST)

When the unit is cooling the evaporating temperature in the indoor coil must remain above -10°C (adjustable from -10°C to -2°C by using a UC6 service tool). If this temperature falls below the threshold then some amount of ice (frost) is likely to have formed on the indoor coil.

OPERATION

When indoor coil frost protection is activated the compressor is stopped for 15 minutes, after which it is allowed to restart.

If three consecutive trips occur then the unit will be "locked out". The trip counter is reset to 0 when there has been no compressor run request for longer than 60 minutes.

Display indication when protection is active - number 7 (flashing)

6.5 High discharge line temperature protection (HDT)

The controller monitors the discharge line temperature (inputs **DT1**, **DT2**) and should it rise above 110°C the compressor will be stopped.

When high temperature protection is activated the compressor is stopped for at least 3 minutes. The compressor is allowed to restart after 3 minutes provided that the discharge line temperature has fallen to below 100°C.

If three consecutive trips occur then the unit will be "locked out". The trip counter is reset to 0 when there has been no compressor run request for longer than 60 minutes.

Units with a variable compressor or digital scroll compressor will automatically reduce capacity before the discharge temperature rises close to the threshold.

Display indication when protection is active - number 9 (flashing)

6.6 Compressor lock-out

Certain faults (as outlined in the preceding paragraphs) can cause the unit to be "locked out" if they occur three consecutive times while the compressor-run request has remained active. When a unit is locked out the compressor is not allowed to start until the lock-out is manually reset. Lock-out protects the unit from repeatedly starting the compressor when a serious fault exists that requires the attention of a service technician.

When a unit is locked out the alarm relay output (**NO7**, **NC7**) will be active.

A unit that is locked out can be reset by either of the following two methods:

1. Remove mains power from the unit for at least 3 seconds, then restore power.
2. Use a UC6 service tool service tool to manually reset the lock-out condition.

Display indication when protection is active - letter F (flashing)

6.7 Sensor alarm

If the signal of a temperature sensor or pressure transducer is out of normal operating range the UC6 will generate an alarm. The sensor may be faulty, disconnected or short circuit.

Display indication temperature sensor alarm - number 5 (flashing)

Display indication pressure transducer alarm - number 6 (flashing)

7. TEST MODE

Test mode can only be activated when both compressors are OFF.

To start test mode press and hold down the push button on the lower board between 1 and 5 seconds.

In test mode each output is activated for 5 to 10 seconds, one output at a time. When test mode completes the unit automatically returns to normal operation.

Display indication during test mode - letter A

8. COMMISSIONING MODE

To start commissioning mode press and hold down the push button on the lower board between 10 and 15 seconds.

In commissioning mode all time delays are reduced to 1/10th their standard value to enable rapid diagnostic testing.

Commissioning mode automatically completes after 30 minutes and the unit will return to normal operation. Cycling mains power off and on again also ends commissioning mode.

Display indication during commissioning mode - letter C

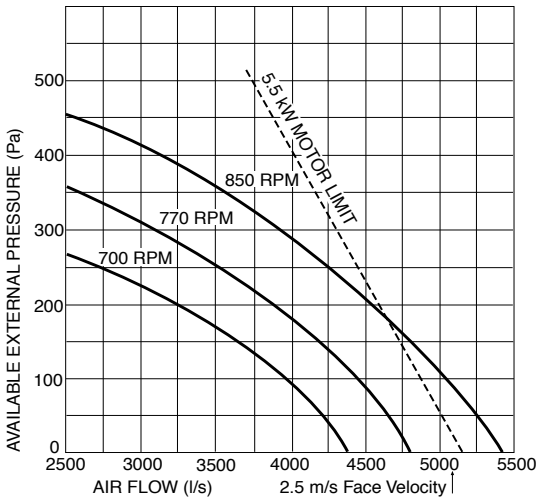
9. PERFORMANCE DATA

Air Handling

Note: Airflows are for a dry coil. Reduce airflow by 5% In high moisture removal conditions. In a free blow or low resistance application, beware of exceeding indoor fan motor's full load amp limit (refer wiring diagrams). As filters are optional, the fan air flows given are for units installed without filters.

OPA 700

l/s - Pa



OPA 800

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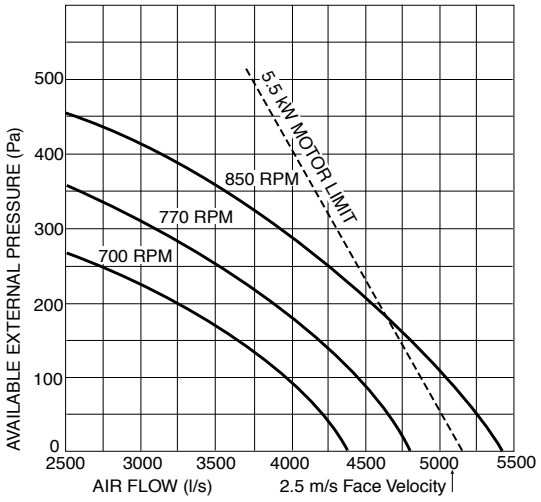
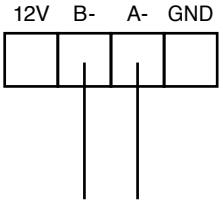


10. CONTROLS

10.1 Modbus Connections

The bridging wires should be screwed to terminals A and B separately and should be long enough to be used as the bridging cables between the 24 V hot terminal and compressors 1 and 2. If in the event a TZT is not used, they can stay there and not be of anyone's concern. If on the other hand a TZT with Modbus is used, the installing contractor will see the label and wires and then wire them to the 24 volt terminals.

RS485 Terminal on UC6



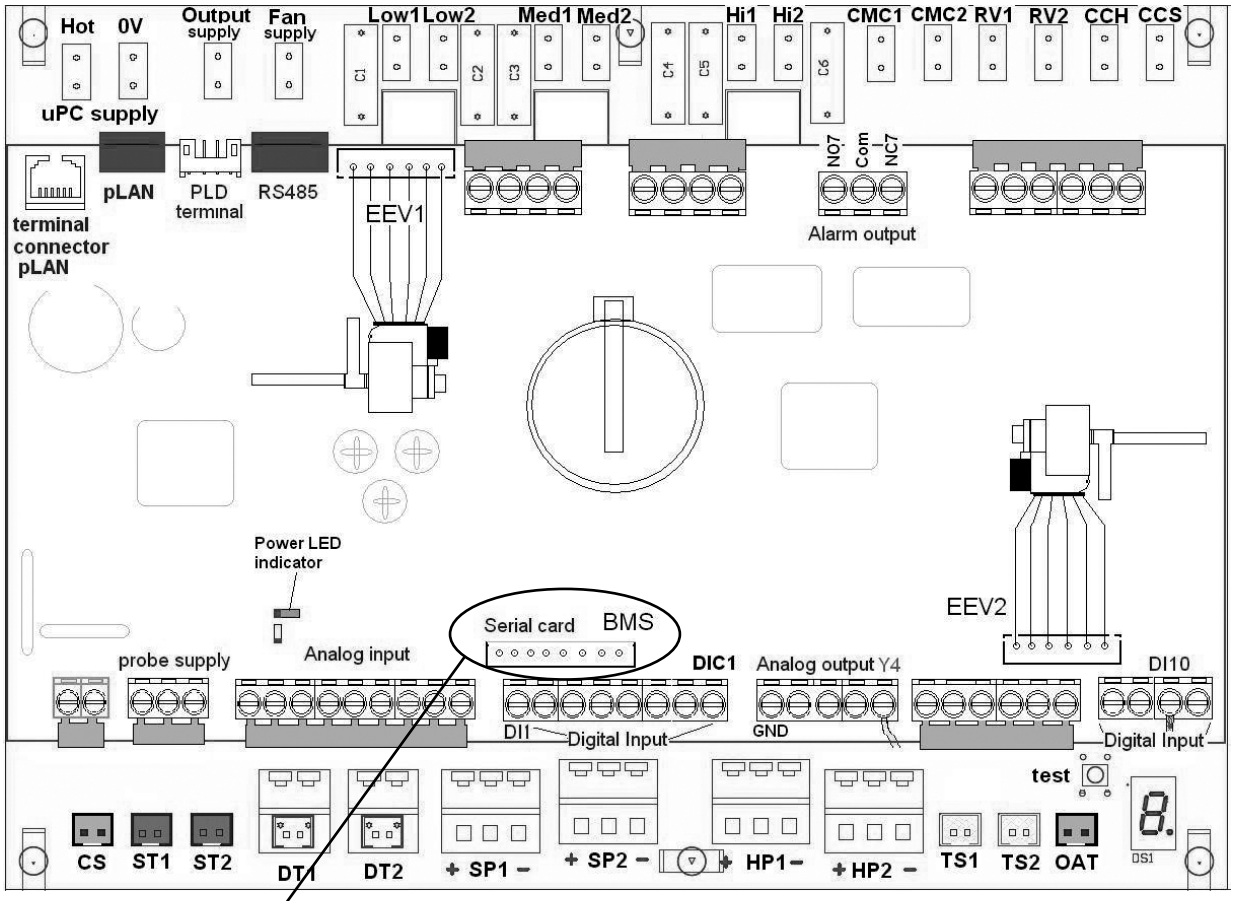
TZT Controller Installation

If a TZT-100 controller is used in Modbus format these cables should be wired to the following terminals on the low voltage input terminal strip.

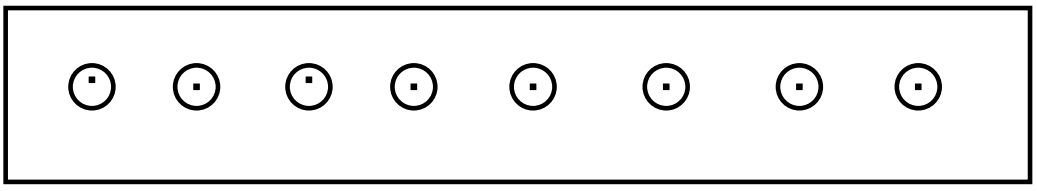
24V Hot terminal to Comp 1
Comp 1 terminal to Comp 2 terminal

Please disregard this instruction if non-Modbus controllers are used.

Lower Board Connections



Serial Card BMS



11. COMMUNICATION PORTS

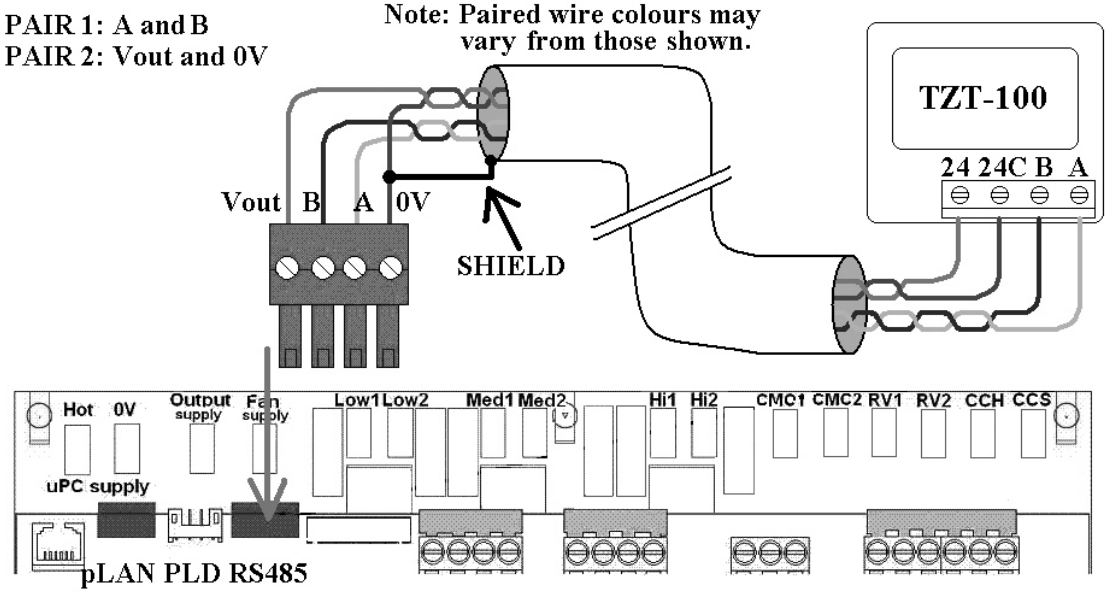
11.1 Several types of communication ports are available on the UC6.

COMM PORT	Signal	Notes
RS485[1]	Modbus / CAREL RS485	Thermostat, Inverter
pLAN	UC6 service tool	Programmable graphic display
PLD[1]	Fieldbus (RS485 or TLan)	Supervisory System
BMS	Modbus RS485, or BACnet TCP/IP	Available only with additional plug-in module connected to the "BMS" connector (adjacent to the Digital Input connector).

Note 1: Connectors to the UC6 show R+/T+ for signal A, R-/T- for signal B.

11.2 Temperzone TZT-100 thermostat connection

The UC6 can connect directly to the temperzone TZT-100 thermostat using a shielded cable with two twisted pair wires suitable for RS485 serial communications. The drawing below shows connection details.



12. MAINTENANCE

WARNING HAZARDOUS VOLTAGE. ENSURE ALL POWER SUPPLIES ARE ISOLATED BEFORE PERFORMING MAINTENANCE. FAILURE TO ISOLATE POWER CAN LEAD TO SERIOUS INJURY.

12.1 Monthly

1. Check air filters, if fitted, and vacuum or wash clean as necessary.
2. Check condensate drain for free drainage.
3. Check compressor compartment for oil stains indicating refrigerant leaks.
4. Check system operating pressures and history using UC6 Service Interface display (option).

12.2 Three Monthly (or every 1200 hrs of operation)

Check the indoor unit's fan belt tension and adjust if necessary.

12.3 Six Monthly

1. Check the tightness of electrical connections.
2. Check the tightness of fans, motor mountings, pulleys and belt tension.
3. Check suction and discharge operating pressures using UC6 service interface display (if supplied) or fit R410A compatible gauges and measure the suction and discharge pressures of both refrigeration circuits.
4. Check and or replace indoor air filters
5. Check condensate drain for free drainage.

12.4 Yearly

1. Check all refrigerant piping for chafing and vibration.
2. Check the operation of electric heaters, if fitted
3. Check air supply at all diffusers
4. Check for excessive noise and vibration and correct as necessary.
5. Check for insulation and duct damage and repair as necessary.
6. Check system operating pressures and history using UC6 Service Interface display (option).
7. Remove lint and dust accumulation from outdoor coil fins with soft brush or low pressure water spray.
8. Touch up any paintwork damage to prevent corrosion.

TROUBLE SHOOTING

13. TROUBLESHOOTING

13.1 Room temperature varies significantly from its setting

- Unit may have been incorrectly sized for the building.
- Drafts from wrongly placed supply air diffusers or from the back of the wall plaque could be affecting the temperature sensor built into the wall plaque.
- Poor air circulation in the room can cause incorrect temperature readings.

13.2 Air conditioner does not seem to deliver the heating when most needed

- Heating capacity at design conditions may be incorrect. As the outside temperature falls, heat losses through the walls, floor and ceiling increase.
- Check the unit's brochure for information on the minimum/ maximum operating temperatures.

13.3 When heating, units have de-icing cycles built in to remove ice on the outdoor coil.

- This usually means reversing the cycle for a few minutes during which time there is no heating and in fact a little cooling can occur.

13.4 In a new building, why does it take some days before the air conditioning heat hump unit seems to work properly

- Many new buildings, especially a commercial buildings, have a large amount of concrete and other structural materials that are generally cold and full of moisture. This is most evident in the winter when trying to heat the building from scratch.

13.5 Unit is leaking water

- Check the drain trap/vent/slope before moving on to
- Water carry-over : Reduce the maximum fan speed to the factory default setting.

13.6 Air conditioner runs excessively – the temperature remains too hot in summer or too cold in winter.

- Windows or doors may be opened to non conditioned areas.
- Keep doors to unconditioned areas closed.
- Leaves, papers or other items blocking air flow over the outdoor unit coil.
- Location of wall controller or remote temperature sensor is incorrect.
- Check for leaks in supply or return air ductwork.

13.7 Outdoor unit displays an error code:

- Refer to UC6 Controller label on the unit for operation & fault diagnostics information; model search 'UC6 - www.temperzone.biz

WARRANTY

14. WARRANTY

Please refer to the separate warranty document supplied with the unit, or visit www.temperzone.biz for details.

Australia:

warranty@temperzone.com.au

spares@temperzone.com.au

Telephone: 1800 21 1800

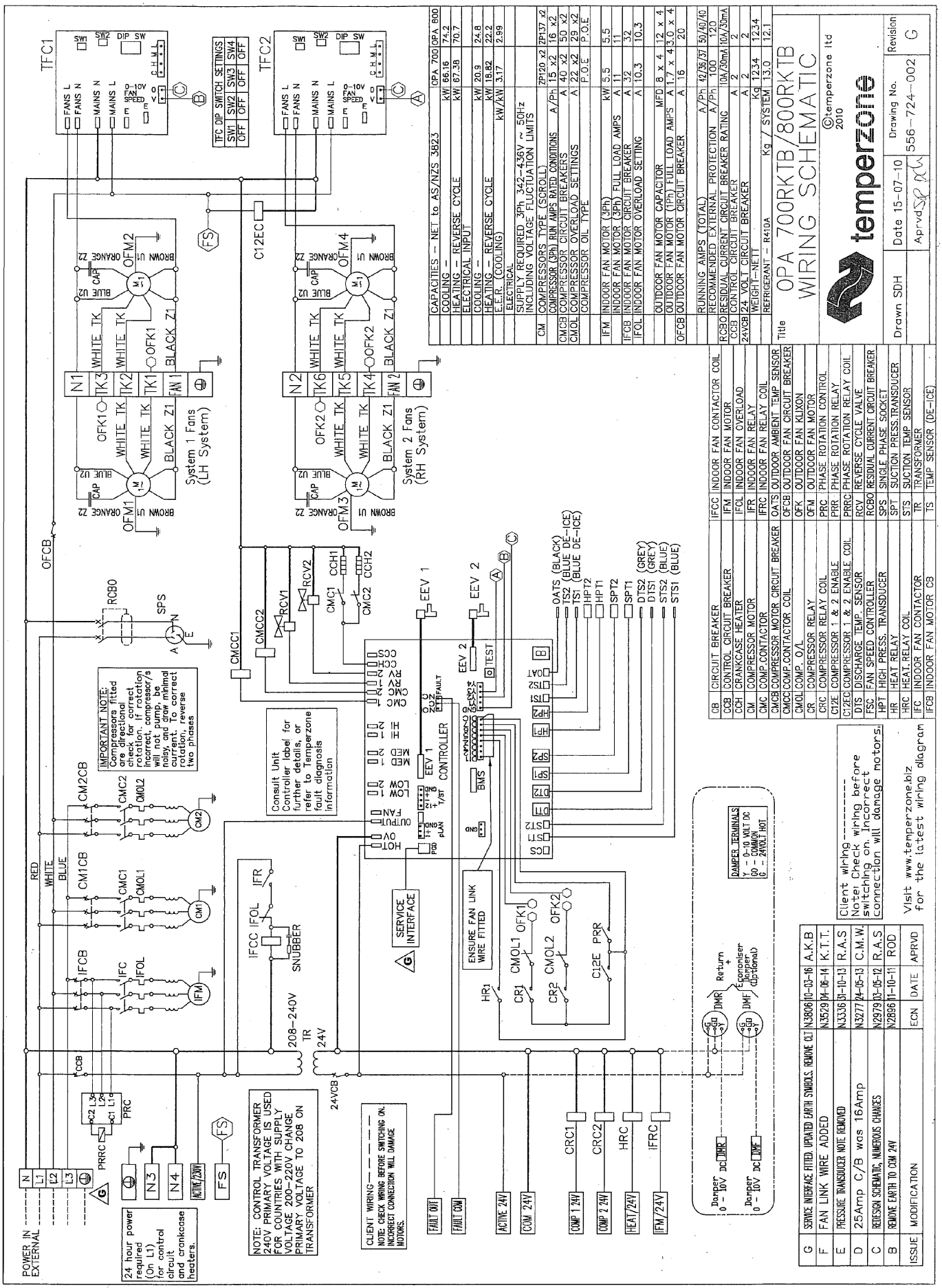
New Zealand:

customerservices@temperzone.co.nz

Telephone: 0800 TZWARRANTY

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

OPA 700/800 RKTB



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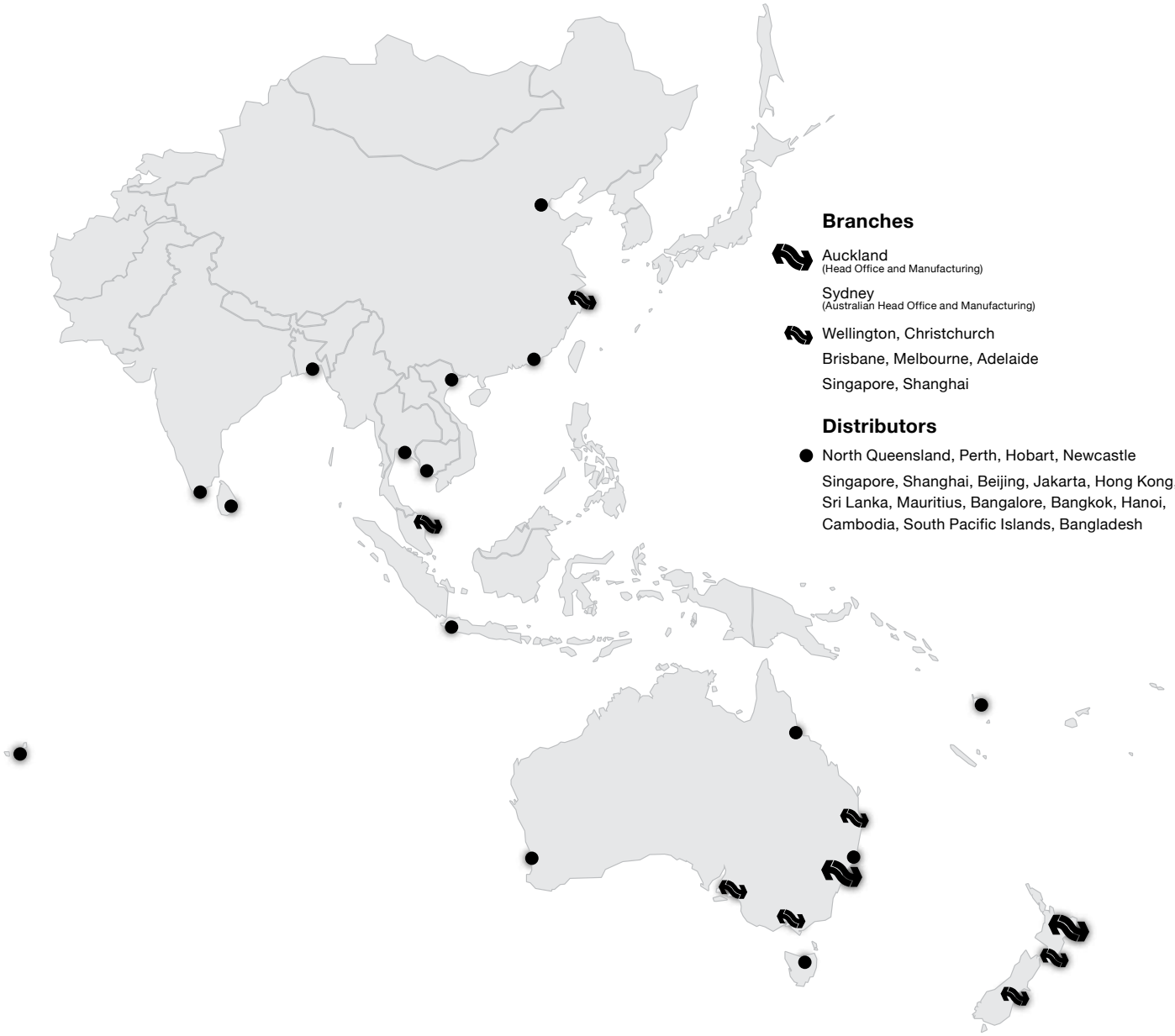

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