



REVERSE CYCLE UNDERCEILING SPLIT SYSTEM (ISU/OSA c/w IUC/UC8)

Installation & Maintenance

GENERAL

1. GENERAL

Temperzone ISU Indoor units are designed to be coupled to the matching OSA outdoor unit. 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 permits must be acquired and adhered to. Seismic restraints must be fitted if required.

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

2. INSTALLATION

2.1 Indoor unit – ISU

2.1.1 Positioning & Mounting

The ISU is designed to be installed :

- a. suspended horizontally beneath a level or sloping ceiling, or
- b. floor or wall mounted (i.e. vertically); see Fig.1.

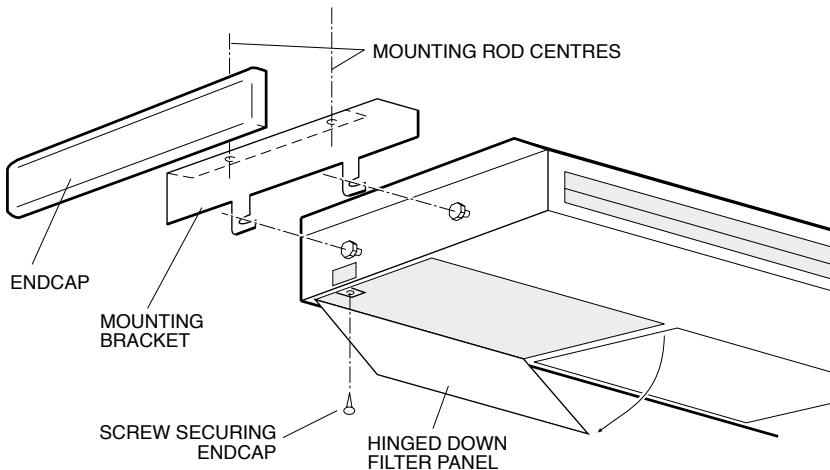
Note: For an extra low profile the unit can be recessed into the ceiling (or wall).

2.1.2 Preparation

Prior to mounting the ISU the mounting brackets must be detached from each end of the unit.

- a. Open the end filter panel and locate the screw securing the unit endcaps (refer figure 2).
- b. Remove the endcap securing screw and retain.
- c. Remove the endcap by first sliding it forward approx. 20 mm, then pull outwards away from end of the unit.
- d. Release each mounting bracket from behind the two bolts securing them to the unit.
- e. Remove the floor mounting base from the back of the ISU if when ceiling mounted it is required to fit flush to the wall.

Fig.2 Mounting Bracket Detachment (viewed from below)



2.1.3 Underceiling Mounting

Locate the ISU near a wall to take full advantage of the long supply air throw and to hide the condensate drain pipe (and other connections) exiting at the rear of the unit.

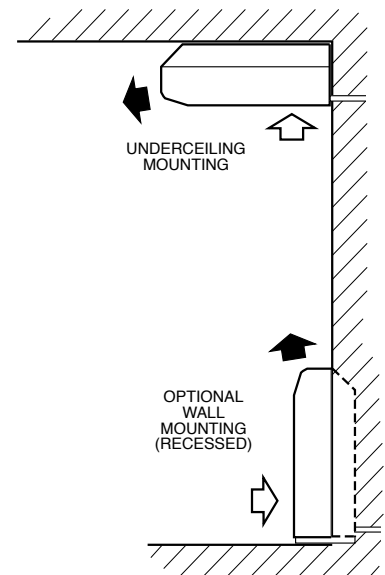
Refrigeration and wiring connections are via the top or the rear access holes. A right-angled suction pipe extension is supplied to facilitate top exit.

2.1.4 Underceiling Installation

1. If an extra low profile installation is preferred, first cut the required ceiling aperture.
2. Install four M8 threaded hanging rods (not supplied) to protrude no more than 30 mm below the level of the mounting bracket flange (refer figure 3).
3. Thread on and tighten the lower washer and locknut sets (not supplied) to secure the left and right mounting brackets.

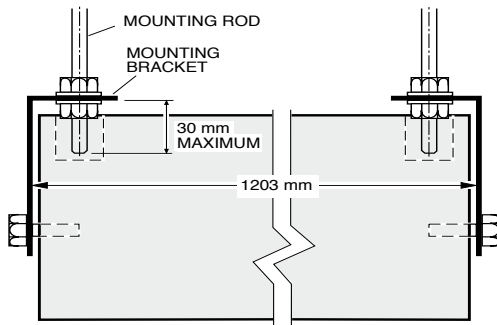
Note: Mounting bracket flanges face inwards.

Fig.1 Mounting Options



INSTALLATION

- Adjust distance between mounting brackets to match dimensions in figure 3.



- Lift the unit to the mounting brackets locating the two protruding bolts, at each end of the unit, securely into the two slots provided in each mounting bracket, then tighten bolts to secure the ISU unit.
- Check that the secured ISU is installed level to facilitate condensate drainage.
- Complete all refrigeration piping connections (refer 'Section 3. Refrigeration').
- Fit the insulated condensate drain extension, orientated so that the drain vent tube is at the highest point in the condensate line.
- After completing all piping connections replace the ISU unit's left and right endcaps as follows:
 - Place each endcap slightly forward of the appropriate end of the unit,
 - Compress the endcap at its centre and slide back hooking the endcaps hook under the 'U' shaped bracket on the unit and into position .
 - Secure each with the screws removed earlier from behind the filter panels.

2.1.5 Wall / Floor Installation

Vertically mounted, the refrigeration and wiring connections can be made through the back or base of the unit.

- Measure and cut wall recess, if required.
- Secure the mounting brackets to the wall using fastenings suitable for the wall construction and weight of the ISU unit.
(Note: Mounting bracket flanges to face inwards.)
- Refer to 'Underceiling Installation' instructions, steps 4 to 9 above, to complete vertically mounted installation.

2.2 Outdoor unit – OSA

2.2.1 Positioning.

- Clearances for optimum airflow and access for servicing are shown in the Dimension diagram on the supplied Specifications Sheet.
- Consideration should be given to the piping route to the Indoor unit as well as power and control cabling.
- The Outdoor unit noise levels need to be considered in respect to boundary noise limits. Change the Outdoor unit position if necessary or erect an acoustic barrier.

2.2.2 Mounting.

- For base mounting, fasten the unit to a solid base using the four mounting points in the feet.
- Some commercial rubber pads between the Outdoor unit feet and the base can minimise transmission of vibration. The optional Anti-vibration Mounts can be used to isolate the Outdoor unit from the base structure.
- An optional Wall Mounting Kit is available, if required.

2.2.3 Drains

The optional Drain Connection Adaptors, can be used to assist in the drainage of water and condensate from the base of the Outdoor unit if necessary

3. REFRIGERATION

3.1 General

All refrigeration pipe brazing, evacuation and charging shall be performed by a technician with a current Refrigerant Handling Licence.

Hot Permits should be acquired where necessary before work commences.

Follow the Refrigeration Code of Practice Guidelines.

3.2 Piping and Brazing.

- The Outdoor unit has shut off valves and uses swaged pipe connections.
- The Indoor unit is shipped from the factory with pressured nitrogen.
- Immediately before removing the brazed pipe seals from the Indoor and Outdoor units, relieve the pressure to atmosphere after first ensuring the Outdoor unit shut off valves are closed.
- Refer to supplied Specification Sheet for pipe sizing.
- Use clean sealed refrigeration grade piping designed for R410A.
- Before brazing any pipe connections, ventilate the pipe concerned with low pressure nitrogen.
- Use pipe cutters to avoid swarf.

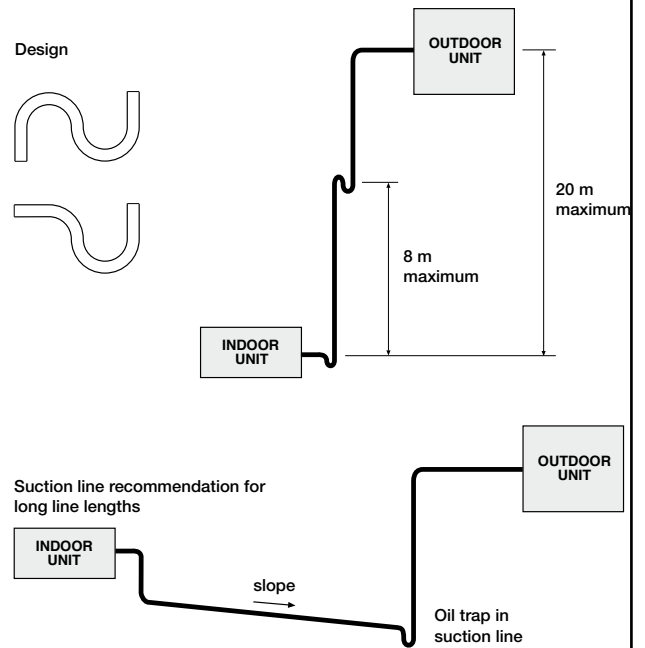
- Use long radius bends (2x pipe dia.).
- Insulate **both** suction (gas) and liquid lines; seal all insulation joints.
- Ensure open pipe ends are sealed until the final connection is made.
- If the outdoor unit is to be installed above the indoor unit, then the suction riser should be trapped at the bottom of the vertical rise and then again at 8 m (maximum) intervals. This is to ensure oil return to the compressor. The trap should be a 'swan-neck' curve in the pipe, with no change in the pipe size. Refer figure 3.

3.3 Evacuation and Charging

- Evacuate Indoor Unit and interconnecting pipework to a vacuum pressure of 500 microns and hold for 15 minutes.
- The OSA Outdoor unit is supplied with refrigerant HFC-410A (R410A) sufficient for 10m line length.
- Calculate additional refrigerant to suit your line length; refer supplied Specification Sheet
- If needed, add refrigerant via the Schraeder connection on the smaller of the Outdoor unit's two service valves.
- Open the service valve at the Outdoor unit to allow refrigerant to flow throughout the system.

- f. For long line lengths, oil (of the correct type) should be added to the refrigerant system at the rate shown in the Specification Data table.
- g. Leak check all brazed and fitted joints.

Figure 3 Oil Traps.



4. WIRING

4.1 General

Electrical power wiring must be fitted and certified by persons with appropriate qualifications and certification.

A signed 'Certificate of Compliance' must be left with the unit for insurance purposes.

Power and control connections on the indoor unit are behind the endcap at the drain end of the unit. Refer figure 4 on page 6 for power wiring and control wiring schematics.

4.2 Power to Outdoor Unit – OSA

All power wiring is to be done to the appropriate electrical standard of the country in which the unit is being installed.

The person installing the wiring is responsible for the correct selection of wiring size and auxiliary components. See the Specification Sheet for supply voltage range, frequency, phase and maximum operating current .

Wire the outdoor unit directly from the Electrical Distribution Board.

The unit shall have its own dedicated circuit breaker on the Distribution Board.

A lockable Motor Rated Isolator Switch shall be fitted as close as possible to the outdoor unit.

4.3 Power to Indoor Unit – ISU

Single phase mains power wiring to the indoor unit shall be taken from the connection on the outdoor unit.

4.4 Control

4.4.1 Indoor – Outdoor

- a. The Outdoor unit is fitted with a unit controller (UC8) which communicates with an Indoor Unit Controller (IUC) in the Indoor unit.
- b. Communication wiring between indoor and outdoor unit shall be shielded twisted pair cable, wire gauge 22 to 26 AWG (optional Temperzone part no. 012-000-399).

c. Communications wiring shall be connected to the indoor and outdoor units as per diagram, refer fig.4 page 6.

d. It is recommended that communications cabling not be laid directly adjacent to any high voltage 230 or 400 VAC power cables for more than 1m. To minimise signal interference, it is preferable to keep the communication cable at least 300mm away from the mains cable as much as possible and only coming together through wall penetrations and other narrow passages.

4.4.2 Room Temperature Controller

Various options are available to control the air conditioning unit operation.

a. Temperzone TZT-100 Wall Thermostat.

Refer to www.temperzone.biz for features and installation details; model search 'TZT-100'. Separate 'Installer' and 'User' instructions are supplied with the TZT-100 for installation and operation.

b. The Temperzone SAT-3 Wall Thermostat.

Refer to www.temperzone.biz for features and installation details; model search 'SAT-3'. Separate instruction booklets come with the SAT-3 for installation and operation.

c. BMS Control, dry contact and analog inputs: both the Outdoor unit controller (UC8) and the Indoor unit controller (IUC) offer facilities to connect a BMS system via a series of no-voltage contacts and 0-10V dc analog signals.

d. BMS control is via Modbus over RS485. For a full list of the Modbus control setup, settings and read/write parameters. Contact Temperzone for details, or visit www.temperzone.biz; model search 'BMS'.

5. START-UP PROCEDURE

5.1 Power

- Check the units are electrically connected in accordance with the wiring diagrams.
- Check all wiring connection and terminal tightness.
- Switch ON the Main distribution board circuit breaker and the local isolator.
- Ensure the thermostat is OFF. Leave the unit off for 4 hours to drive the refrigerant out of the compressor. Failure to do so may cause liquid slugging and could damage the compressor at start-up.
- Check the supply voltage.

5.2 Indoor Fan

- 5.2.1 The Indoor fans can be switched ON through the thermostat or BMS by selecting High, Medium or Low fan speed. This can be done without starting the compressor.
- 5.2.2 Check the operation of the indoor fan for noise and vibration.
- 5.2.3 Check if the High speed airflow is to specification.
- 5.2.4 Check if the Low speed is sufficiently low yet without risk of frost on the indoor coil.
- 5.2.5 Refer Indoor unit wiring diagram for the factory default setting of the maximum fan speed and the fan speed range High – Low.
- 5.2.6 Various options are available if either High speed or Low speed need adjusting:
 - If a SAT-3 wall thermostat is fitted:-
Set DIP switch 5 on the UC8 to ON, then reset the controller by cycling mains power to the unit off and on again.
The maximum and minimum fan speed can be adjusted through the SAT-3 key-pad. Refer to the Installation instructions supplied with the SAT-3.
 - To use the Indoor unit control board (IUC) in the Indoor Unit to adjust the indoor fan speed :-
The IUC has two sets of DIP switches:
 - DS1 : 8 switches,
 - DS2: 4 switches (do not adjust)
 On DS1 switches 1, 2 and 3 are used to select the fan 'High' speed setting.
Switches 4 and 5 are used to select the difference (or 'range') between the 'High' and 'the Low' speed settings.
Refer to Indoor unit wiring diagram. The shaded cells indicate the factory default settings.
If a change is made to the DIP switch settings the new selection comes into effect after cycling power to the unit off and on again.
Example: The factory default settings (shaded cells) are 8V for fan High speed and 3V for the range. This provides $8 - 3 = 5V$ for fan low speed.
Note: Minimum output voltage for low speed is 2.3V in order to ensure the fan will always start.
 - To use the UC8 in the Outdoor unit to adjust the indoor fan speed (applies only when the SAT-3 thermostat is NOT used):-
 - Set DIP switch 5 on the UC8 to ON, then reset the controller by cycling mains power to the unit off and on again.
 - Ensure the compressor is off and the thermostat or BMS does not request for the compressor to start.
 - Press and hold down the SW3 push button

on the UC8 circuit board until the display shows the letter 'H', then release the push button.

- The indoor fan will start and run at the 'High' speed setting (factory default setting is 8.0V). The display will show the value ('8.0') and the indoor fan will run at the selected speed.
- Each following press on the SW3 push button increases the indoor fan control voltage in steps of 0.5V, up to a maximum of 10.0V. Pressing the push button again when value 10.0 is shown returns the fan control voltage down to the minimum value for 'High' fan speed (3.0V).
- When the desired setting for high fan speed is selected then wait for 30 seconds. The controller will save the selected value in its memory and return to normal operation.
- To adjust the indoor fan 'Low' speed repeat the above procedure but wait until the display shows the letter 'L' before releasing the push button. The factory default value for low speed is 7.0V.

5.3 Starting the Compressor

- On the UC8 in the Outdoor unit, press and hold the SW3 push button until the display shows a letter 'C' for Commissioning, then release. This reduces the waiting times at start-up and between cycles.
- If the unit is equipped with high and low pressure transducers (these connect to inputs HPT and LPT on the UC8 circuit board), then refrigerant pressure gauges are not needed because pressures, temperatures and superheat can be read from the UC8 display.
- Set the thermostat to cooling and wait until the compressor starts.
- For 3 phase systems only:**
Check for correct rotation of the compressor. If rotation is incorrect the compressor will not pump, be noisy and will draw low current. To correct motor rotation, swap two phases at the mains power terminals.
- Use a clip-on current meter to record compressor and indoor unit amps during stable operation.
- Check the readings against the specified values on Specification Sheet and record these values on the Commissioning Check List on page 7.
- Use the SW3 push button on the UC8 to cycle through the pressures and temperatures of the system; refer display message list on the Commissioning Check List or UC8 unit label.
- Record the Cooling cycle pressures, temperatures and superheat on the Commissioning Check List.
- Switch the thermostat to Heating Cycle. The reversing valve should engage with a click and the compressor start.
 - Let the system stabilise. Note: During commissioning the time between cycles is considerably reduced; if the indoor coil still holds moisture this may evaporate and temporary 'steam' may enter the room. This is not a fault but a result of commissioning mode.
 - Use the SW3 push button on the UC8 to cycle through the pressures and temperatures of the system
 - Record the Heating cycle pressures, temperatures and superheat on the Commissioning Check List.

- j. If superheat on either cycle is too high at normal operating ambient conditions (and the Electronic Expansion Valve EEV, if fitted, is fully open), check that the refrigerant charge in the unit is correct taking into account the pipe line length between Indoor and Outdoor unit.
- k. Add refrigerant if necessary.

- g. Check that the air flow over the Outdoor unit's coil is not restricted and that the fan is running smoothly.
- h. Touch up any Outdoor unit paintwork damage to prevent corrosion.
- i. Ensure all penetrations through the building from outside are weather tight.
- j. Leave all relevant documentation of the unit with the unit.

5.3 General Checks

- a. Check that the Indoor unit's air filter is clean.
- b. Check that the fan runs freely without vibration.
- c. Check Indoor unit's condensate drain for free drainage.
- d. Check the operation of the thermostat or BMS.
- e. Run the motorised louvre to check up/down air distribution. Use the switch to set up/down louvre in **fixed** position, if required. Do not try to set up/down louvre manually.
- f. With the motorised louvre switched off, manually adjust the left/right louvre to throw the air in the required direction.

6. MAINTENANCE

6.1 Weekly For First Four Weeks

- a. Check air conditioning system air filters; vacuum or wash clean as necessary.
- b. Check condensate drains for free drainage.
- c. Check compressor compartment for oil stains indicating refrigerant leaks.
- d. Check tightness of electrical connections.

6.2 Monthly

Check air conditioning system air filters; vacuum or wash clean, or replace as necessary.

6.3 Six Monthly

- a. Check tightness of all fan and motor mountings.
- b. Check tightness of electrical connections.
- c. Check that fan motors are free running.
- d. Check condensate drains and safety drain tray for free drainage.
- e. Check the indoor heat exchanger coil; vacuum or brush clean as necessary.
- f. Check air supply at diffuser outlets.

6.4 Yearly

- a. Check all refrigerant piping for chafing and vibration.
- b. Check air supply at all diffusers.
- c. Check for excessive noise and vibration and correct as necessary.
- d. Check for insulation and duct damage and repair as necessary.
- e. Remove lint and dust accumulation from outdoor coil fins.
- f. Touch up any outdoor unit paintwork damage to prevent corrosion.

7. TROUBLESHOOTING

7.1 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.
- Bad air circulation in the room can cause incorrect temperature readings.

7.2 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.

7.3 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.

7.4 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.
- Units need some nursing through this period and should not be left to their own devices.

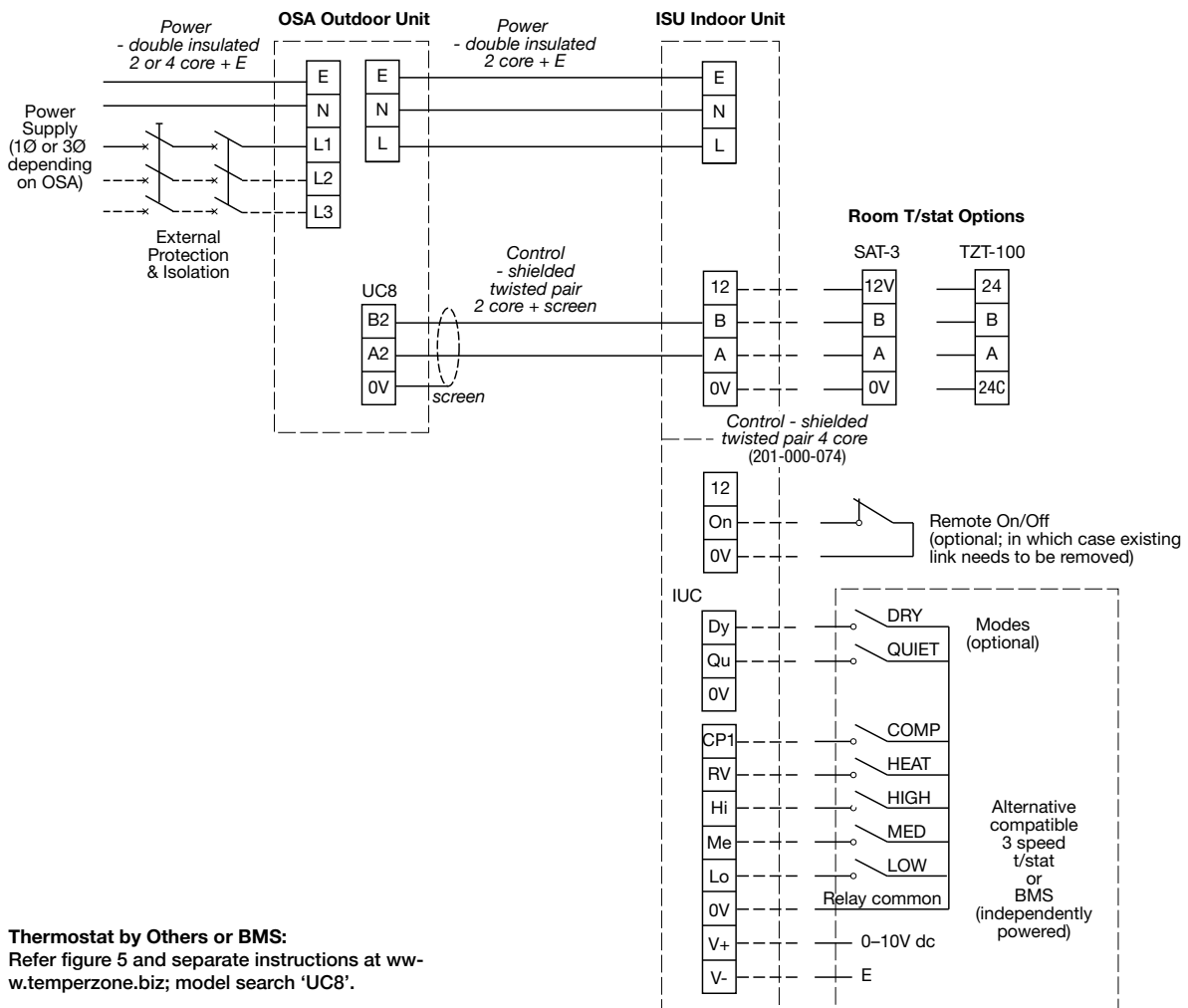
7.5 Air conditioner runs excessively – the temperature remains too hot in summer or too cold in winter.

- Windows or doors may be opened to non-conditioned areas.
- Keep doors to unconditioned areas (eg laundries, bathrooms etc.) closed. Note that any doorways on the return air path will need to be kept open, which may mean for example that doors to an unconditioned hallway will need to be kept open.
- Leaves, papers or other items blocking air flow over the outdoor unit coil. Clear all debris away from the outdoor unit.
- Location of wall controller or remote temperature sensor is wrong.
- Check for leaks in supply or return air ductwork.

7.6 Outdoor unit displays an error code:

Refer to UC8 Controller label on the unit for operation & fault diagnostics information; or visit www.temperzone.biz and model search 'UC8'.

Figure 4. CONNECTION WIRING

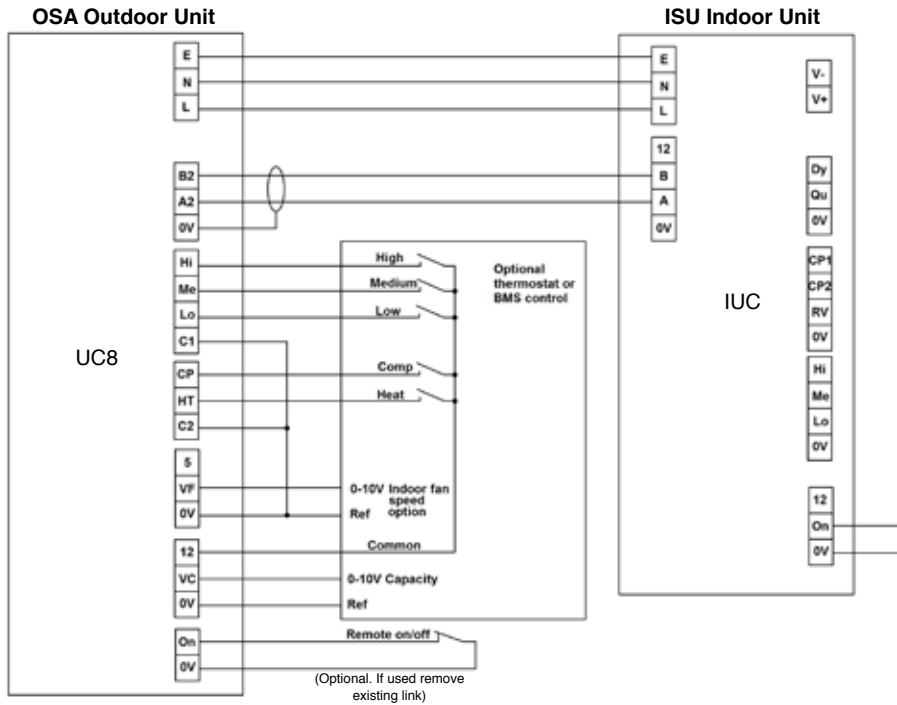


Thermostat by Others or BMS:
Refer figure 5 and separate instructions at www.temperzone.biz; model search 'UC8'.

Figure 5. CONNECTING ALTERNATIVE THERMOSTATS (Non-communicating contact switching type)

A non-temperzone alternative thermostat can be connected to:
 1. IUC on the indoor unit (as shown on p.6), or
 2. UC8 on the outdoor unit, as shown below.

NOTE: DO NOT try to connect an alternative thermostat to both the IUC on the indoor unit and the UC8 on the outdoor unit. It is one or the other, not both.



NOTE
 Specifications are subject to change without notice due to the manufacturer's ongoing research and development programme.



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INSTALLER TO COMPLETE

Commissioning Check List

Site Name/address:

Installing Company Date:

Serviceman: Tel:

Indoor Unit Model Serial No.....

Outdoor Unit Model..... Serial No.....

Both units are level?	Y / N	Certificate Of Compliance issued?	Y / N
Water drains tested okay?	Y / N	Pipe insulation okay?	Y / N
Interconnecting pipes supported?	Y / N	Refrigeration leak checked?	Y / N
Do units have adequate safe access?	Y / N	External electrical isolator fitted?	Y / N
All electrical terminals are tight?	Y / N	Vertical pipe length?	m
Interconnecting pipe sizes?	/	Total pipe length?	m
Vacuum held? (microns/minutes)	/	Extra oil added (if req'd)?	g
Quantity of additional R410 added?	g	Are controller parameters set?	Y / N
Has client had controls demo?	Y / N		
Thermostat type:	BMS / SAT-3 / TZT-100 / Other? (name):		

Mark UC8 dip switch positions with an 'X'

	SW1							
	1	2	3	4	5	6	7	8
On								
Off								

	SW2							
	9 (1)	10 (2)	11 (3)	12 (4)	13 (5)	14 (6)	15 (7)	16 (8)
On								
Off								

Record the following UC8 monitored conditions using push button SW3 (repeat to scroll through list):

Cool Cycle:

Low Pressure:	SLP	kPa
Evap temperature:	Et	°C
Suction Line temperature:	SLt	°C
Suction Superheat:	SSH	K
Discharge Line Pressure:	dLP	kPa
Condensing temperature:	Ct	°C
Discharge Line temperature:	dLt	°C
Discharge Superheat:	dSH	K
De-ice Sensor temperature:	ICEt	°C
Required Capacity:	CAP	%
Expansion Valve 1:	EE1	%
Expansion Valve 2:	EE2	%

Outdoor unit Ambient temperature:	°C
Indoor unit Return air temperature:	°C
Indoor unit Total amps:	A
Outdoor unit Total amps:	A

Heat Cycle:

Low Pressure:	SLP	kPa
Evaporating temperature:	Et	°C
Suction Line temperature:	SLt	°C
Suction Superheat:	SSH	K
Discharge Line Pressure:	dLP	kPa
Condensing temperature:	Ct	°C
Discharge Line temperature:	dLt	°C
Discharge Superheat:	dSH	K
De-ice Sensor temperature:	ICEt	°C
Required Capacity:	CAP	%
Expansion Valve 1:	EE1	%
Expansion Valve 2:	EE2	%

Outdoor unit Ambient temperature:	°C
Indoor unit Return air temperature:	°C
Indoor unit Total amps:	A
Outdoor unit Total amps:	A