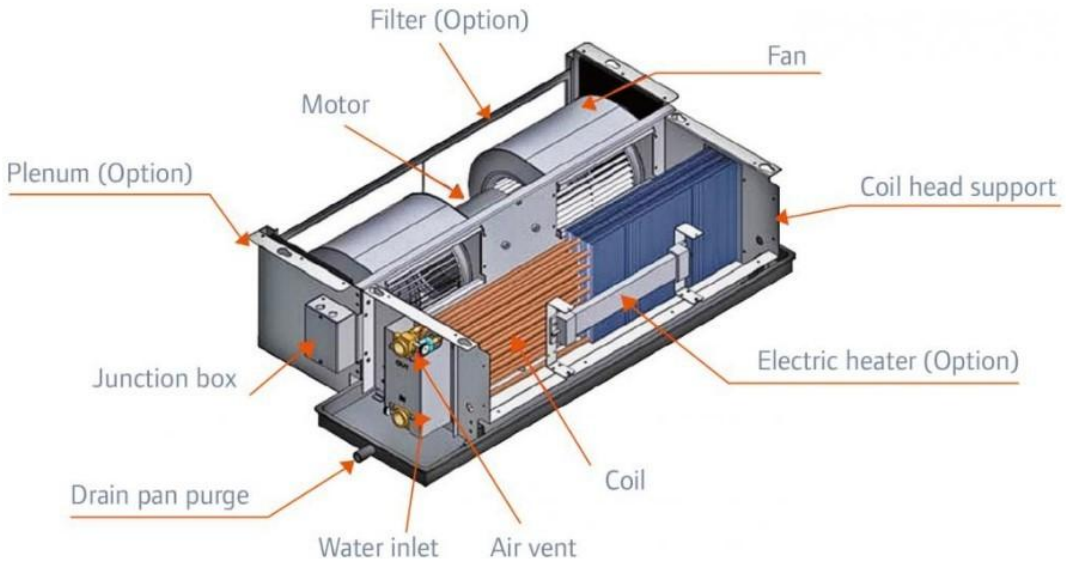
Fan Coil Condensate Requirements.

This document provides an overview of the considerations and requirements to manage condensate from chilled water fan coil systems.



What is condensate?

When fan coils are provided with chilled water the surface temperature of the heat exchange surface is lower than the dew point of the air that is being cooled, this causes water vapour in the air to condense on the coil surface.

Fan coils that are designed for cooling have the heat exchanger configured in a way where the condensation that forms on the heat exchanger can be collected in a tray that is located under the coil.

The condensate tray will be manufactured in a way where it has fall to allow the condensate collected to be drained to an outlet spigot.

Condensate drains:

When a fan coil installation is being planned the location for, and installation of drains are required to allow the condensate from the fan coil to be connected back to a suitable drain.

Condensate pipes should generally be run in PVC/Pressure pipe with glued joints, this allows pressurized cleaning in the future rather than needing inspection hatches. The final connection onto the unit or where the pipes run out of the wall can be run in flexible or ribbed pipes, but these must only be used in vertical sections of pipe.

Below are some standard guidelines when planning condensate drains.

Condensate Piping Connections:

- **Pipe Sizing:** The diameter of the condensate drainpipe connecting the drain pan to the drain line must be equal to or greater than the diameter of the drain pan outlet to ensure unrestricted condensate flow.
- **Cleaning Access:** A union or pipe coupling should be installed at the pipe connection to the drain pan. This facilitates the removal of the drain line for cleaning purposes in the event of clogs or buildup.
- **U-Trap Installation:** Where the units drain pan is internal to the casing, a deep U-trap should be incorporated downstream of the connection point at each unit. The U-trap, when filled with water, creates a liquid seal that prevents the ingress of air into the system while allowing for unobstructed condensate drainage.
- **U-Trap Pressure Rating:** The depth of the water seal within the U-trap must be designed to generate a pressure that is at least twice the suction pressure of the inline fan for draw-through applications. In blow-through applications, the water seal depth should be sufficient to withstand the maximum fan pressure. This ensures proper drainage and prevents backflow.

Drain Line Discharge:

- **Open Drain Discharge:** The condensate drain line should terminate at an open drain, if a trap is not fitted at the connection onto the unit, then a trap prior to this termination is recommended. This configuration minimises back pressure that could impede or obstruct condensate flow.
- **Drain Line Pitch:** The condensate drain line must be installed with a minimum downward slope of 3% (3 cm per 100 cm). This incline leverages gravity to promote efficient condensate drainage. The pipe should also be adequately supported along its entire length to prevent sagging or the formation of low spots that could trap condensate.
- **Insulation Considerations:** In environments susceptible to freezing temperatures or where high humidity levels are likely, condensate drain line insulation is recommended to prevent condensation on the outer pipe surface or freezing of the condensate fluid and potential damage to building materials or finishes. In extreme cold conditions, a heating element might be necessary to safeguard against condensate freezing within the drain line during winter. In

all situations, it is also recommended to insulate the first 1m of condensate drain from the fan coil terminal unit where able. This minimizes risk of condensate from forming on the outside of the condensate drain due to the low temperature condensate water passing through it in humid environments.

Safety Considerations:

- **Safe Discharge Location:** The chosen condensate drain location must prioritize safety. Avoid discharging condensate:
    - In areas frequented by people where it could create a slip hazard, such as walkways or patios.
    - Into a shared drain or sewer system in a manner that could permit hazardous waste fumes to enter the building or occupied spaces.

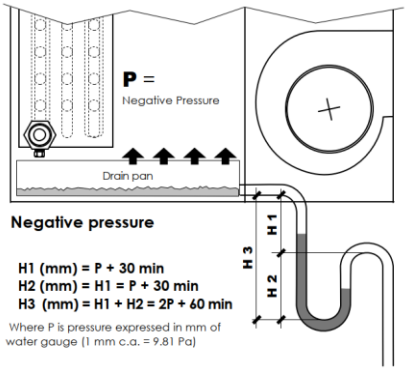
Condensate Traps:

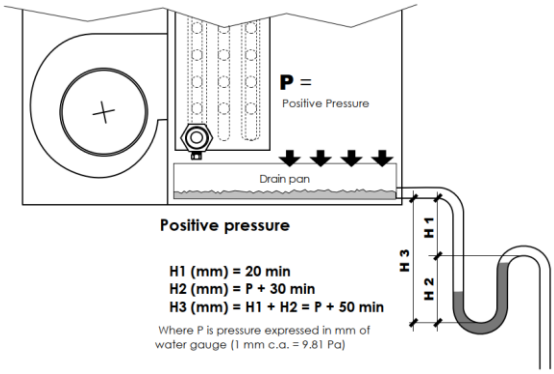
Where fan coils have an integral drain pan with only a spigot on the outside of the unit the drain pain is exposed to the pressure created by the units fan. In these scenarios all units need to include a suitable sized trap prior to the condensate connection.

The selection and design of a condensate trap needs to consider where the trap is located in relation to the fan;

- **Positive Pressure (heat exchanger downstream of fan):** when the fan is on it creates positive pressure in the drain increasing the height requirement of the drain trap. The drain trap minimum depth equals the sum of the 20 mm water clearance and 30mm minimum clearance and then the maximum fan discharge pressure (converted to water column height):

- **Negative Pressure (heat exchanger before fan):** when the fan is on it creates negative pressure in the drain which could cause water or odours to be pulled through the drain and into the air stream if the trap is not sufficient. The condensate drain trap must double the maximum negative pressure in mm and double the minimum 30mm to achieve a minimum depth. The return on the trap is half the height of the starting height.





- Nominal Drop (30 mm): This static height ensures sufficient clearance for water to drain from the tray.
- The fan suction head refers to the total pressure drop across all components upstream of the coil, including:
  - Coils
  - Pre-filters and final filters
  - Mixing box dampers
  - Return and fresh air duct losses

- **Proprietary traps:** some manufacturers make traps specifically for use for fan coil condensate drains, these traps are often built in a way where they are suitable for most positive pressure applications in a compact arrangement, these traps also include ports for cleaning the condensate lines and vents:

Vacuum vent

A vacuum vent must be installed near the trap on condensate drains with long runs. The height of the vent must be at least equal to the maximum pressure of the fan coil plus 60mm from the condensate drain height on the unit.

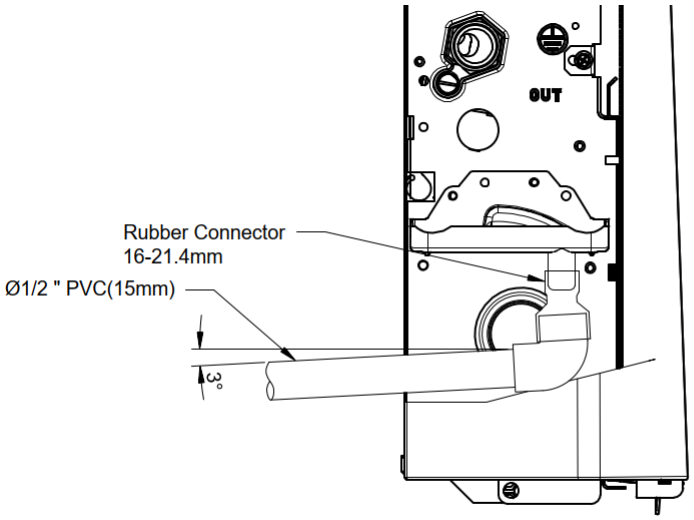
Recommended Condensate Connections:

Below lists the recommended condensate connection requirements for the fan units that CHNZ supply:

- **Olimpia Splendid Bi2 SL SMART S1:**
  The condensate connection on the unit is 14mm but it is recommended to run a 15mm PVC dedicated drain to this unit. This drain can then run from the wall directly into the unit with a rubber reducing boot used to connect the drain and unit secured with cable ties or pipe clamps.

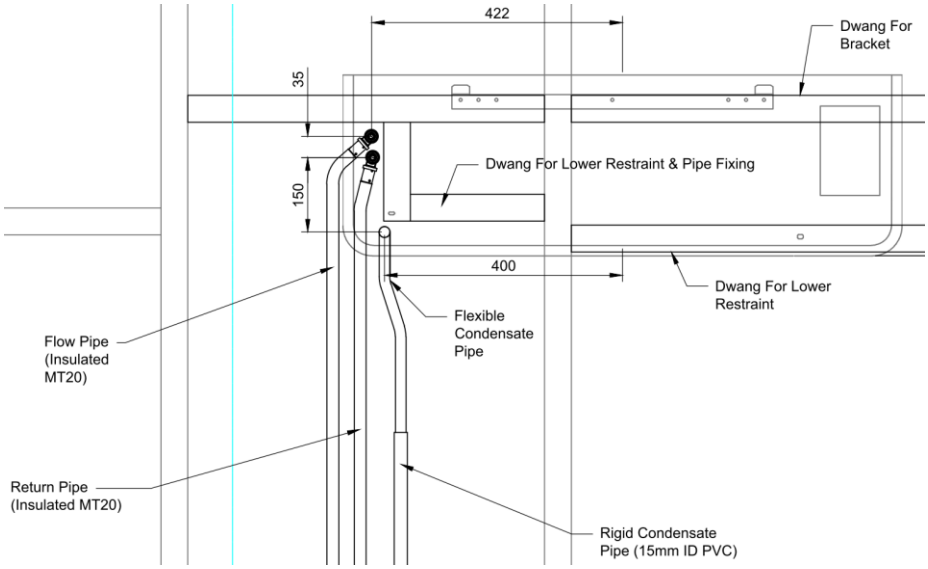
  As these units are mounted at low level the planning for a condensate drain needs to be done early, either a drain is installed in the/below the floor level and into the wall behind the unit or where the unit backs onto an external wall a penetration at the base of the wall to outside is formed during the buildings construction.

  The units have a condensate tray external to the fan casing of the unit and therefore this is not exposed to the pressure of the fan, where the unit has a dedicated drain no condensate trap at the unit is required and the drain should terminate with an open connection. Where the unit needs to connect into a common drain with other services a suitably sized trap (generally made from 4 elbows the same ID as the condensate pipe) must be installed prior to this connection.



Olympia Splendid Bi2 SMART S1 Fan Coil

- **Olimpia Splendid Bi2 Wall:**
  The condensate connection on the unit is 18mm but it is recommended to run a 15mm PVC dedicated drain to this unit. For ease of installation, it is recommended to at the pre-pipe stage transition in the wall below the unit into ribbed flexible tube for the final length of drain and use this hose to make the connection onto the units drain. The flexible hose should be glued or secured into the PVC drain and then secured onto the units drain with cable ties or a pipe clamp.



Where these units are mounted directly on or connected to an external wall a dedicated drain through the wall to outside is recommended. Where this is not possible a drain should be installed in the floor at the base of the wall the unit is fitted to during the construction of the building, or connected into the drain for another service that is nearby via a suitably sized trap.

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- **Built-In Fan Coils:**
  The condensate connection on the Built-In fan coil models is 20mm and is recommended to run a 20mm PVC dedicated drain to this unit. The PVC drain should be run up to the units drain and then a connection formed between the two with a rubber boot secured with cable ties or pipe clamps.

  These units can be mounted vertically or horizontally (as per ordered model). The planning of a condensate drain will depend on the intended location of the unit but generally it would be recommended to pipe a dedicated drain into the base of a wall near where the unit is being installed and then run PVC pipe through the wall to terminate at the unit. If a suitable drain for another service can be accessed for this unit then this may also be used but this must be trapped prior to the connection with a suitably sized trap.

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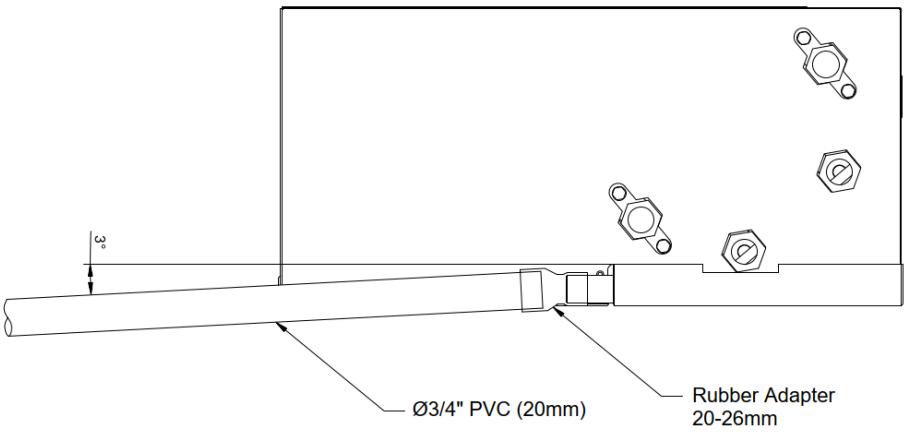
FC-HBI Fan Coil

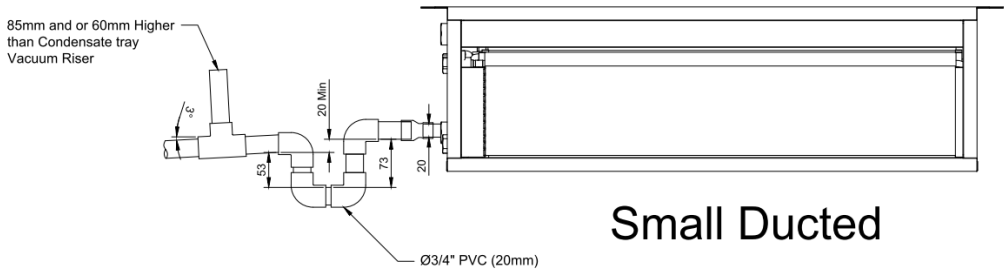


- **Ducted Fan Coils:**
  The condensate connection on the smaller size of ducted fan coil is 20mm and is recommended to run a 20mm PVC dedicated drain to this unit. The larger series of ducted fan coils have a 30.5mm drain spigot but it is recommended to run a 25mm PVC dedicated drain to this unit. The PVC drain should be run up to the units drain and then a connection formed between the two with a rubber boot secured with cable ties or pipe clamps.

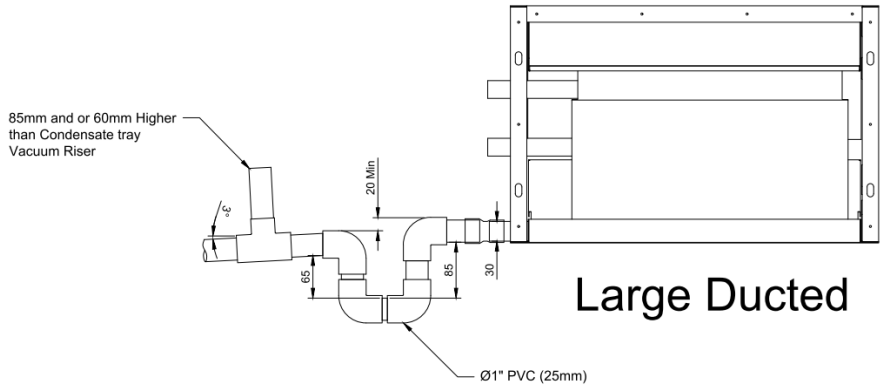
  These units are typically mounted in the roof space. It is recommended to run a dedicated drain for the unit into the roof as close as possible to where the unit will be located, this drain could be run in/under the floor then up through a wall into the roof, or if suitable from the unit to the nearest eave but must have a minimum of 3% fall across its path. Where a suitable drain for another service is located near the unit then this could be used.

  The condensate tray in these units are internal to the fan casing of the unit and therefore must always be installed with a suitable trap prior to the connection of the unit.

  For the Small ducted fan coils where a trap is manufactured with PVC pipe and fittings it is recommended that the trap is made from four elbows as long as the total height equals 90mm and the first vertical downwards section is minimum 20mm longer than the upwards section.



  For the Large ducted fan coils where a trap is manufactured with PVC pipe and fittings it is recommended that the trap is made from four elbows as long as the total height equals 130mm and the first vertical downwards section is minimum 20mm longer than the upwards section.



  The trap to be formed at the unit and must be accessible to inspect and clean.

Condensate Flexible Joiners:

The connection from the rigid PVC pipe work on the condensate spigot of each fan coil shall be done via a flexible rubber adapter, these adapters are supplied with some fan coils and act as a reducer to adapt the PVC pipe onto the condensate spigot.

The following fan coils are supplied with rubber connectors:

FAN COIL MODEL	CONDENSATE BOOT SIZE
Olimpia Splendid Bi2 SL SMART S1	16mm x 21mm (connects to 15mm pressure PVC)
Horizontal Built-In Fan Coil – 3kW	20mm x 26mm (connects to 20mm pressure PVC)
Horizontal Built-In Fan Coil – 6kW	20mm x 26mm (connects to 20mm pressure PVC)
Horizontal Built-In Fan Coil – 8kW	20mm x 26mm (connects to 20mm pressure PVC)
Horizontal Ducted Fan Coil – 7kW	20mm x 26mm (connects to 20mm pressure PVC)
Horizontal Ducted Fan Coil – 14kW	32mm x 32mm (connects to 25mm pressure PVC)

For the high wall fan coil unit (Olimpia Splendid Bi2 Wall) as is included in the previous detail it is recommended to terminate the PVC pipe in the wall framing below the fan coil and then use a flexible hose to create the transition from this to the fan coil unit's condensate spigot. Many options for flexible condensate hose are available and these are typically supplied in 50m rolls, at every meter the pipe will have a profile that when cut in a specific location will allow the pipe to be connected into the PVC drain or over the fan coil condensate spigot.

All flexible joins must be secured with cable ties or similar to prevent these being able to be easily removed.

Combined Drains:

In most cases each fan coil will require a dedicated condensate drain. In some situations units will be close enough to each other that a common drain can be used, where units are joined into a common drain the pipe size of the drain should be increased to the next available pipe size – for example 2 units with 15mm drains into a common 20mm drain, or 2 units one with a 15mm drain and one with a 20mm drain into a common 32mm drain etc.

Condensate pumps

Condensate pumps should be avoided by creating condensate drains with sufficient natural fall, but this is not always possible. Where a natural fall cannot be maintained, or the condensate must be lifted above the level of the fan coil a condensate pump will be required.

The condensate pumps should be fitted near the unit's condensate drain with a fall provided to the pump, the remaining drainpipe can then be piped as required to run the condensate to a suitable location making sure to not lift the drain higher than the ability of the condensate pump.

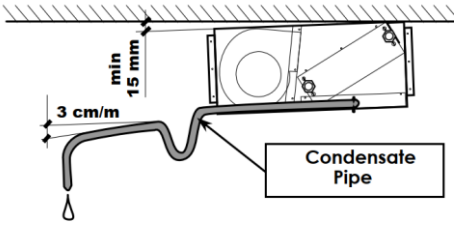
The condensate pump should pump the condensate up a riser to a maximum height of 10% below the maximum lift of the condensate pump. The condensate drain is then to be formed with a 3% fall from this point to the required drain location.

Where the fan coil requires a dedicated condensate trap the condensate pump must be fitted downstream of this trap.

Fan coil installation:

When installing the fan coil unit, the following considerations should be made with regards to the condensate drainage.

- **Unit mounting:** For horizontally installed units fix the unit with a slight slope to encourage flow of the condensate to the drain location:

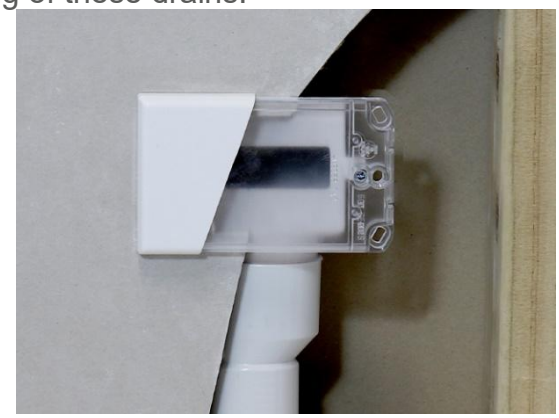


- **Access:** Ensure the drain connection onto the unit is accessible from the maintenance hatch.

Responsibility:

The connection of any condensate drain into the buildings drainage system needs to be completed by a registered plumber. If the person installing the fan coil is not a registered plumber, they should provide the projects plumber with a plan showing the locations where drains are required. The plumber should then provide a drain point for the fan coil installer to connect the fan coils condensate drain into at this location within a wall or inside a vanity/joinery unit and inspect this connection once made.

When creating this transition within a wall It is possible to purchase a tundish with an integrated inspection hatch for this transition and this will also support future inspection and cleaning of these drains:



The fan coil installer should then run the condensate drain from the fan coil or fan coils to this location ensuring all pipe connections are sealed and the pipe is suitably supported.

The plumber should ensure that the termination of the condensate is permitted in the intended drainage system, generally it is not permitted to terminate condensate into gully traps and only some councils will allow these the be connected into the stormwater drainage systems due to concerns around the risk of refrigerant leaking into the drains, even though this risk is extremely unlikely with a hydronic fan coil system these blanket rules may apply and be difficult to have accepted as an exemption. The plumber should be aware of the local regulations regarding this and provide the fan coil installer with advice for the suitability of connecting units into common services drains.