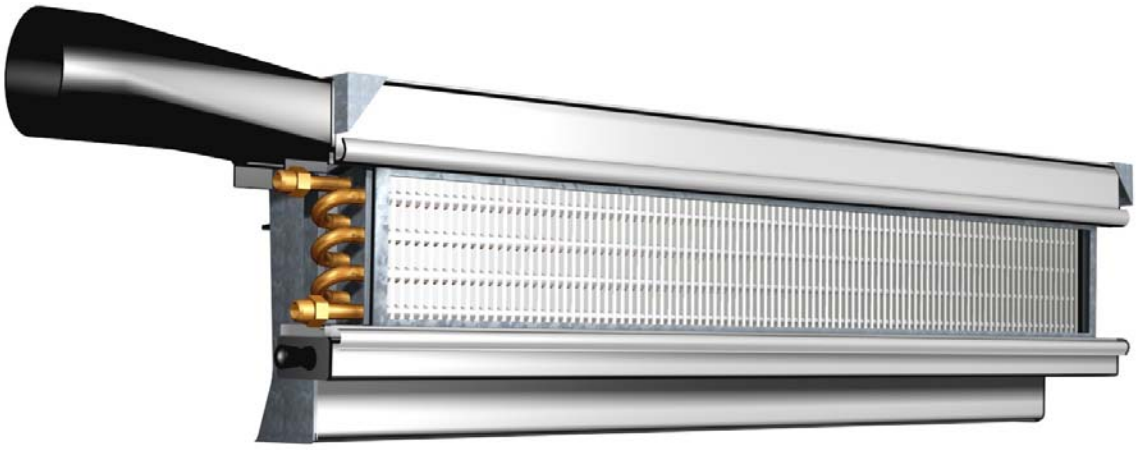
STARLINE

PRODUCT INFORMATION



Ceiling Mounted Induction Unit CM10.03

STARLINE induction terminal air conditioning units incorporate patented innovative technology that significantly improves performance compared with conventional units. This technology, developed originally to solve noise and capacity problems, common in older induction units, is incorporated with a new range of higher efficiency and lower noise perimeter air conditioning units.

The new *STARLINE* units are ideal replacements for existing induction units. For new installations they form the basis for a low noise, cost effective energy efficient air conditioning system.

STARLINE Working Principle

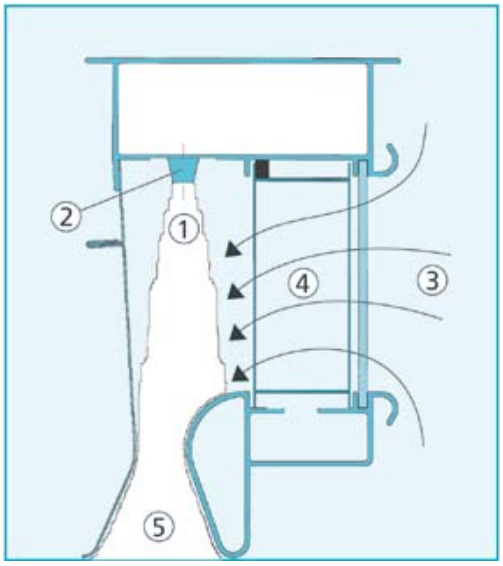
The *STARLINE* perimeter unit relies on the discharge of a primary air stream of cooled and dehumidified air (1) through primary air nozzles (2) at high velocity. The nozzle jets entrain air from the surrounding space of the *STARLINE,* inducing that second stream of air (3) to flow into the unit via the secondary air heat exchanger (4), causing the nozzle pressure to be reduced. The mixture of the primary air and the cooled secondary air streams (5), is then discharged into the conditioned space.

The New Nozzle

The new nozzle enhances turbulent mixing of the primary air jet with the surrounding air. This is achieved by a novel design that optimises the perimeter-to-area ratio of the nozzle outlet cross section. The enhanced entrainment of the surrounding air into the jet develops lower pressures in the *STARLINE* unit than that which can be achieved by conventional nozzles. Thus increasing the secondary airflow induced through the secondary heat exchanger. The entrainment ratio (the ratio of the volumetric flow rate of the induced secondary air to that of the primary air through the nozzles), is similarly increased. The more efficient entrainment reduces the stresses within the jet and so reduces the noise generation.

The Internal Ducting

The internal ducting of the *STARLINE* unit forms a profile which produces a smooth contraction to a minimum flow cross section downstream from the secondary heat exchanger. This “Venturi throat” establishes the point of minimum pressure within the *STARLINE* unit and from this point the mixture of the primary air and the entrained secondary air diffuses smoothly toward the outlet from the unit to reach the “datum” pressure in the conditioned space at the outlet plane. Alignment of the jets from the primary air nozzles with the crest or crests of this Venturi throat produces a “wall jet”, or “Coanda” effect. This increases the efficiency with which the momentum of the flowing air can be converted to pressure as it diffuses to room pressure at the outlet, avoiding flow separation from the walls of the unit.



***STARLINE* CM10 –** Ceiling Mounted Unit.

The CM10 unit is designed as a ceiling mounted downward discharge unit with compact dimensions to keep ceiling spaces to a minimum height.

Processes in The STARLINE *Unit*

Within the *STARLINE* units, the two **thermal energy elements, Primary Air** and **Secondary Chilled Water**, are harnessed, to achieve the following:

PRIMARY AIR -

- Provides cooled (or heated) air to offset transmission gains (losses) through the glass, walls, roof, floor etc. , as described below:

  $Q_{TS} = Q_{PA}$

  Q_{TS} (W) Transmission Sensible Cooling (Heating) Load

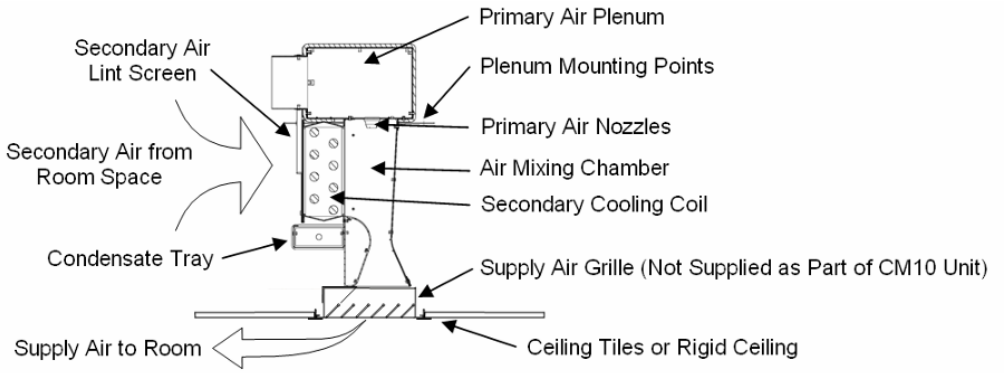
  Q_{PA} (W) Primary Air Sensible Cooling (Heating) Capacity
- Provides dehumidified air to offset latent loads.
- Provides ventilation air to satisfy building ventilation regulations.
- Provides motivating energy to induce room air through the secondary air heat exchanger and discharges the air mixture to the room.

SECONDARY CHILLED WATER -

- Provides cooling through the secondary air heat exchanger to offset the variable heat gains from: solar radiation, people, lights, office equipment and other internal sensible cooling loads.
- $Q_{IS} = Q_{SA}$
- Q_{IS}(W) Internal Sensible Cooling Load
- Q_{SA}(W) Secondary Air Sensible Cooling Capacity (Secondary Cooling Capacity)

DESCRIPTION

STARLINE CM10 induction terminal units are designed for ceiling space installation with downward air discharge through low resistance ceiling diffusers. Units are manufactured to suit eleven different coil lengths and three different heat exchanger coil heights (refer to Physical Data – Table A).

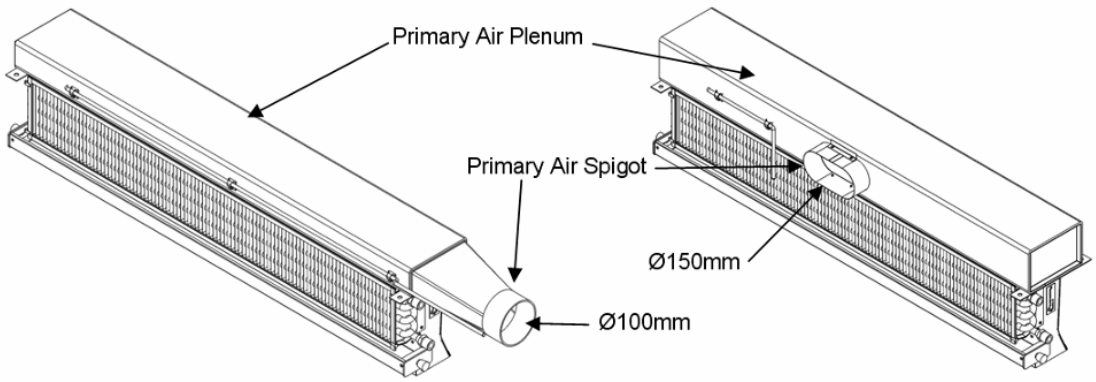


UNIT CONSTRUCTION

As shown in the above illustration, the CM10 induction terminal unit comprises:

- Primary air plenum which accommodates an array of primary air nozzles, and mounting points.
- Air entrainment/mixing chamber, constructed of a fixed back plate and two end plates sealed as an integral part of the primary air plenum to form a supply air discharge opening.
- Secondary heat exchanger coil, constructed of 1/2" finned copper tube with 1/2" BSP male water inlet/outlet fittings, protected by a fabric mesh lint screen. The heat exchanger coil is attached to the air entrainment/mixing chamber by L-shaped bolted brackets and sits in a condensate drip tray with two end caps that incorporate two condensate outlets.

The Primary Air Inlet Spigot can be specified as **End Entry** or **Centre Entry** to suit any primary air duct connection method.



'**End Entry**' Primary Air Spigot

Primary Air 'End Entry' Transition can be fitted to either end of the unit for Left or Right hand air entry connection.

Unit handing can be changed at site by reversing the positions of the entry spigot and end cap on the primary air plenum.

'**Centre Entry**' Primary Air Spigot

Primary Air 'Centre Entry Front' is fitted to the centre of the unit on the same face as the secondary heat exchanger, 'Centre Entry Rear' is fitted on the opposite face to the secondary heat exchanger

This air configuration cannot be modified or reversed on site.

The location of the Primary Air Inlet Transition, together with the coil water connections, determines the unit handing configuration. The heat exchanger coil connections can be at either end (2-row coil shown).

STARLINE CM10 induction units are suitable for a variety of air & water connection configurations. It is important to specify the preferred connections as viewed looking into the front of the unit (heat exchanger coil face).

air right / water right
air right / water left
centre front air / water right
centre front air / water left
air left / water left
air left /water right
centre rear air / water right
centre rear air / water left

PHYSICAL DATA

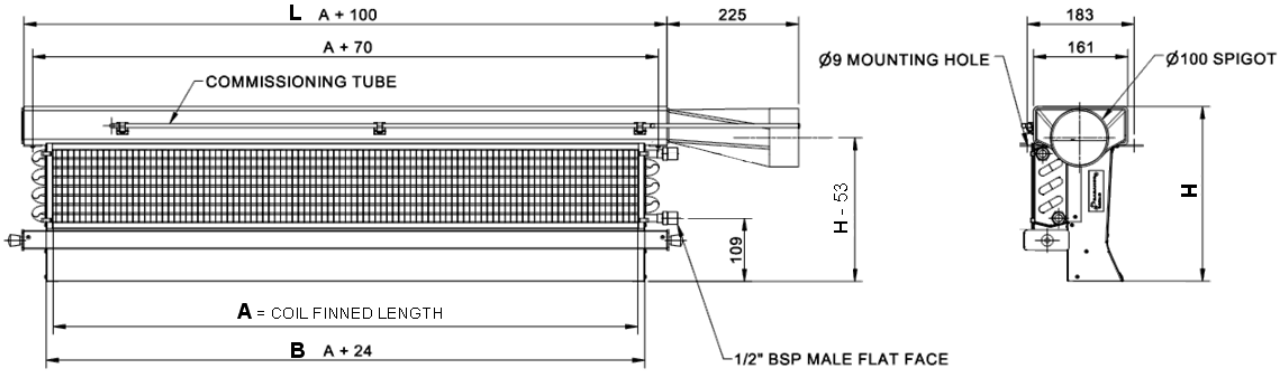


Table A (Unit Dimensions)

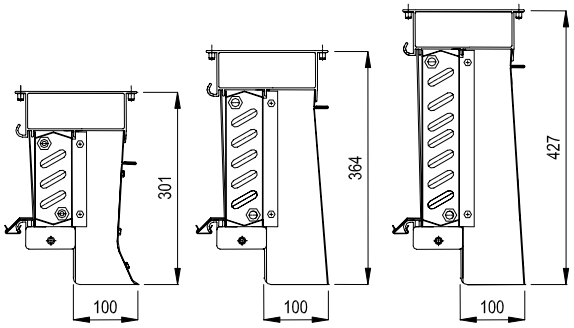
Unit Model	Coil Finned Length **A** (mm)	Air Plenum Length **L** (mm)	Supply Air Opening **B** (mm)	Overall Length (mm)	**H** = Unit Height (mm) 4 Row	6 Row	8 Row	Unit Width (mm)
CM10.03-0700.--	700	800	724	1025	301	364	427	183
CM10.03-0800.--	800	900	824	1125				
CM10.03-0900.--	900	1000	924	1225				
CM10.03-1000.--	1000	1100	1024	1325				
CM10.03-1050.--	1050	1150	1074	1425				
CM10.03-1100.--	1100	1200	1124	1375				
CM10.03-1200.--	1200	1300	1224	1525				
CM10.03-1300.--	1300	1400	1324	1625				
CM10.03-1400.--	1400	1500	1424	1725				
CM10.03-1500.--	1500	1600	1524	1825				

Table B (Primary Air Flow Operating Range)

CM10 Induction Terminal Unit	Primary Air Flow Range (L/sec) @ Primary Air Static Pressure (Pa)				
	100 Pa	150 Pa	200 Pa	250 Pa	300 Pa
CM10.03-0700.--	6.4 – 18.5	7.9 – 22.8	9.2 – 26.5	10.4 – 29.9	11.4 – 32.7
CM10.03-0800.--	7.3 – 21.3	9.1 – 26.4	10.6 – 30.6	12.0 – 34.5	13.2 – 37.8
CM10.03-0900.--	8.3 – 23.5	10.3 – 29.0	12.0 – 33.7	13.5 – 37.9	14.9 – 41.6
CM10.03-1000.--	9.3 – 26.3	11.5 – 32.5	13.5 – 37.7	15.1 – 42.5	16.7 – 46.6
CM10.03-1050.--	9.8 – 27.7	12.1 – 34.3	14.2 – 39.8	16.0 – 44.8	17.6 – 49.1
CM10.03-1100.--	10.3 – 29.1	12.8 – 36.0	14.9 – 41.9	16.7 – 47.1	18.5 – 51.7
CM10.03-1200.--	11.3 – 31.3	14.0 – 38.7	16.3 – 44.9	18.3 – 50.6	20.2 – 55.4
CM10.03-1300.--	12.3 – 34.1	15.2 – 42.2	17.7 – 49.0	19.9 – 55.2	22.0 – 60.5
CM10.03-1400.--	13.2 – 37.0	16.4 – 45.7	19.1 – 53.1	21.5 – 59.8	23.7 – 65.5
CM10.03-1500.--	14.2 – 39.8	17.6 – 49.2	20.6 – 57.2	23.1 – 64.4	25.5 – 70.5

A wide range of primary air flow rates are possible for each unit length at different primary air pressures and number of STARLINE nozzles specified to suit the particular design. Refer to Dadanco for more detailed selections.

Unit Model	Unit Weight (kg)		
	4 Row	6 Row	8 Row
CM10.03 -1500.--	23.9	24.9	25.8
CM10.03 -1400.--	22.3	23.2	24.0
CM10.03 -1300.--	20.7	21.5	22.3
CM10.03 -1200.--	19.1	19.8	20.8
CM10.03 -1100.--	17.5	18.2	18.9
CM10.03 -1050.--	16.7	17.5	18.2
CM10.03 -1000.--	15.9	16.7	17.4
CM10.03 - 900.--	14.3	14.8	15.5
CM10.03 - 800.--	12.7	13.5	13.7
CM10.03 - 700.--	11.2	11.6	12.0



CM10.03–242 CM10.03–262 CM10.03–282

SUPPLY AIR OPENING & UNIT HEIGHT

NOTE: Unit weights vary slightly for 1 and 2 row coil, insulated & uninsulated plenum, and side or centre primary air inlet transition locations.

Refer to Dadanco for specific operating weights for individual unit configurations.

UNIT NOMENCLATURE

Model Number: **CM10.03 – A. 2 8 _ ___** Example: **CM10-1200.282EE**

- Product Family & Generation)
- Unit Coil Face Length (mm)
- 2-Pipe Coil Circuit
- Coil Height (Tube Rows) **4, 6 or 8**
- Air Entry Style
  - **EE** = End Entry
  - **CEF** = Centre Entry Front
  - **CEB** = Centre Entry Back
- Coil Depth (**1** or **2** Rows)

OPTIONS

- Insulation: Foil faced 6mm foam sheet insulation can be applied to the primary air plenum and the condensate drip tray, for applications where primary air temperature and/or secondary water temperature is lower than the room dew point temperature (Specify at time of quote and order).
- End Primary Air Entry with moulded primary air transition piece to suit Left or Right hand air connections
- Centre Primary Air Entry (Front or Back permanently fixed ovalised spigot) to suit primary air duct layouts
- Left or Right Hand water connections (viewed looking into secondary coil fined surface)
- Heat Exchanger options. (4, 6 or 8 tubes high)
- Heat Exchanger options (1 or 2 row heat exchanger coils)
- Supply only or combined supply / return air grille configurations
- Special unit configurations and performance specifications

INSTALLATION

UNIT AS DELIVERED

For 'End Entry' air handings, the duct transition piece is supplied loose, in a separate box, for fitting prior to installation.

Each unit is delivered by Dadanco in a separate carton containing: -

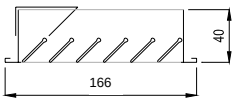
- All nozzles fitted
- The heat exchanger coil fitted and secured in place
- The lint screen fitted to the air entry side of the heat exchanger coil
- A 6mm plugged plastic extension tube in the primary air plenum to measure the plenum pressure
- 1/2" male BSP tapered thread flat-face fittings on the coil inlet and outlet

If insulation is nominated at the time of ordering, the primary air plenum and/or the condensate drip tray will have been insulated with 6mm foil faced closed cell foam sheet insulation. This insulation will conceal the plenum end caps at the opposite end to the primary air spigot connection.

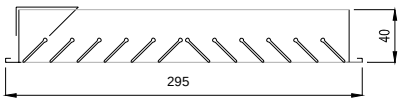
INSTALLER TO PROVIDE

The installer is to provide the following:-

- A suspension system or frame. This should allow the unit to drain the condensate drip tray and for the air discharge duct to meet the top of the supply air grille without any significant gaps.
- Condensate drainage from the drip tray outlet to tundish (if specified).
- A separate condensate drip tray beneath the unit (if specified) connected to the drainage system.
- Air volume control or balancing device for each unit.
- Secondary water flow and return piping with isolation valves (both lines) and water flow valve.
- Insulation to the primary air plenum and condensate drip tray if required and not provided with the unit.
- Assembly of the duct transition by metal threads and high-pressure sealant.
- A supply air grille suitable for use with induction terminal units (Unless provided with the unit).
- An infill piece between the unit and grille to provide an air tight seal between unit and grille and to raise the unit to allow a fall in the drain line, if a drain from the drip tray is required.



LSBS SUPPLY AIR GRILLE



LSBC SUPPLY AND RETURN AIR GRILLE

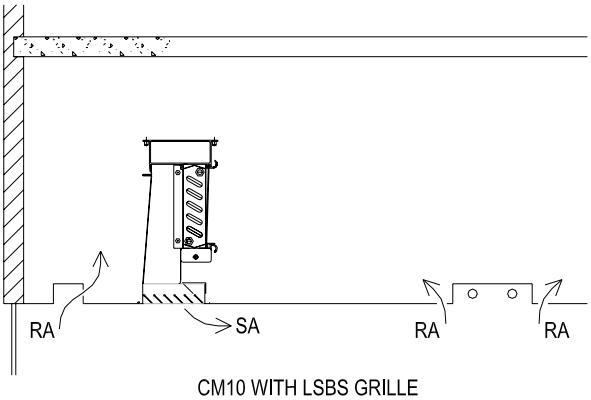
INSTALLING THE UNIT

When preparing to install the STARLINE CM10 induction terminal unit and connect it to the air and water systems, observe the following:

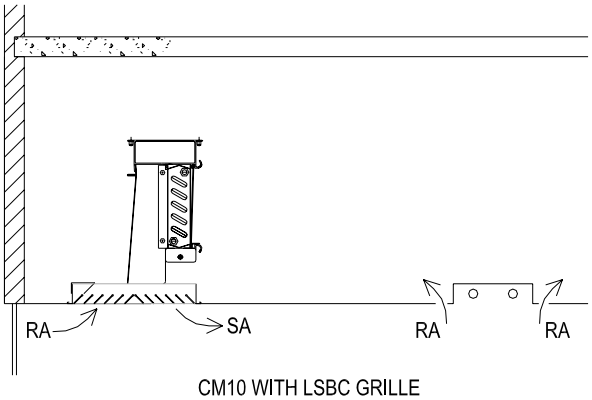
- Ensure the installation space for the unit has adequate clearance to remove the lint screen during maintenance, and to make piping and duct connections. The space for the lint screen removal will provide adequate air entry space to the heat exchanger coil.
- Determine the orientation of the air and water connections.
- Apply sealant in a continuous bead to the inner side of the insertion-limiting ridge of the primary air spigot transition piece. Assemble spigot to the primary air plenum according to the desired unit handing and fix air-tight with silicon sealant.
- Ensure the return air path to the unit is clear and the airflow to the unit is not restricted.

- Provide adequate ceiling relief for return of secondary air from the conditioned space.

  NOTE: CM10 units should be positioned with secondary heat exchanger coil facing toward interior of the conditioned space for best results and easiest access to coil. Provide access to coil face for lint screen removal.

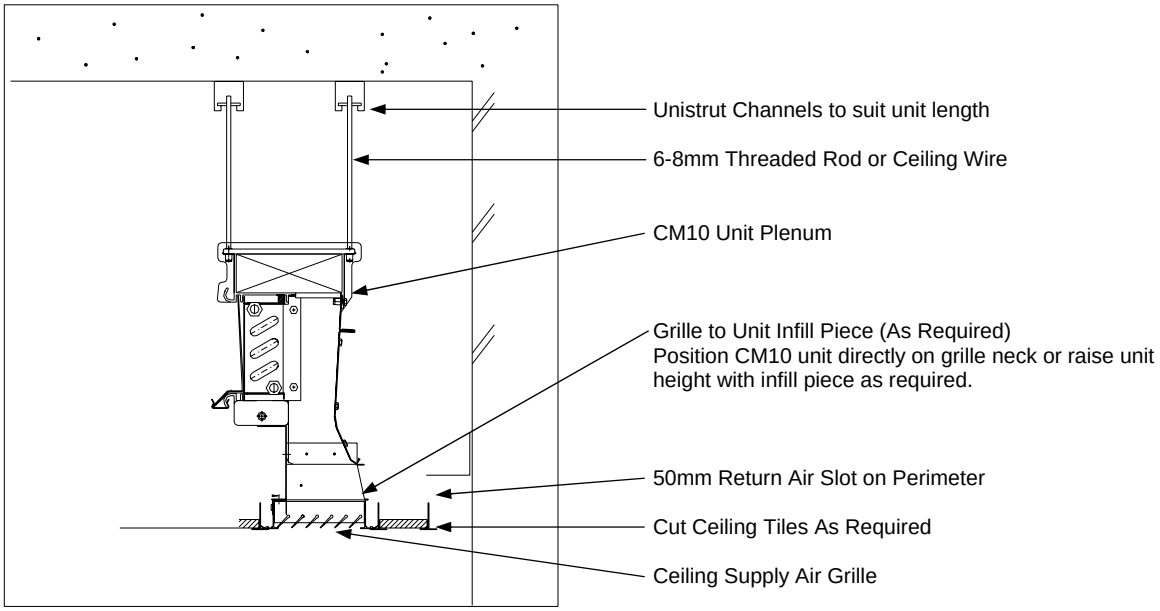


CM10 WITH LSBS GRILLE

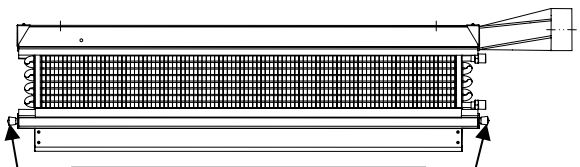


CM10 WITH LSBC GRILLE

- Position the unit in the ceiling space and fix it to the supporting structure by the four mounting points, using M6 bolts, lengths of threaded rod or ceiling wire.



- Connect the primary air spigot to the primary air duct. Insulate the primary air transition piece or spigot up to the primary air duct insulation, and make a vapour tight seal with approved tape at the duct and plenum insulation joint. Ensure the plenum test point commissioning tube is visible and fitted.



CM10 units are fitted with 12mm condensate drain fittings at each end of the condensate tray.

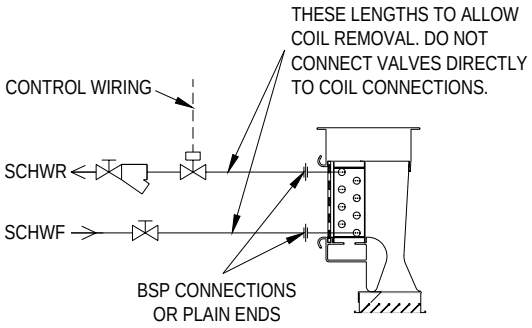
Remove the required sealing cap to suit unit handing, if condensate drainage is required.

NOTE: Condensate drainage should not be required if the secondary coil capacity is specified for sensible cooling only and secondary water temperature is above room the dew point temperature.

If condensate drainage is not specified for the installation, leave the rubber sealing caps of each condensate drain connection in place.

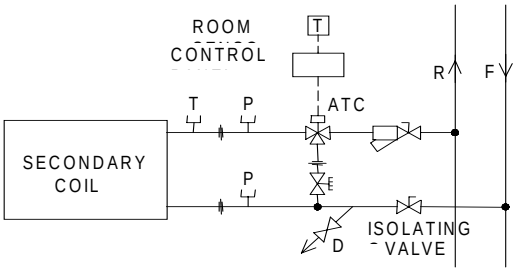
NOTE: Exercise care when removing the sealing caps from the condensate drain fittings. Excessive force can result in damage to the plastic drain fittings or damage the seal between the plastic drain end caps and the folded metal drain tray.

- Install the secondary chilled water piping and valves as indicated on the working drawings.



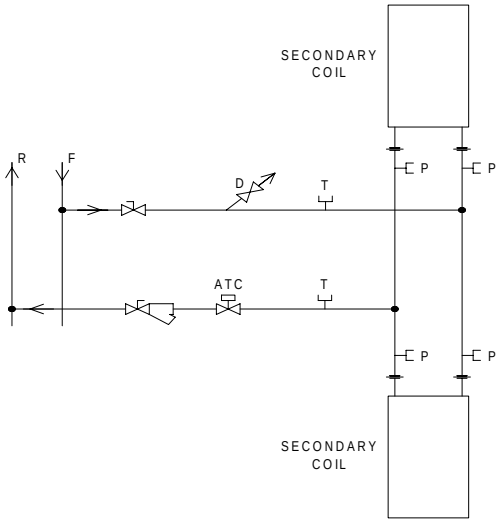
Connect the unit secondary water inlet /outlets to the secondary water reticulation system.

Single Unit Connection



NOTE: It is recommended that the unit be connected with readily removable pipe lengths to permit disconnection and removal of the coil, should this be required during maintenance

Dual Unit Connection



COMMISSIONING

The only way to accurately commission the primary air flow to the CM10 Unit is to measure the static pressure in the plenum. To achieve this, remove the plug from the commissioning extension tube and connect the Pitot tube instrument (Manometer) onto the commissioning extension tube.

NOTE: Do not attempt to measure the static pressure back from the unit at the start of a flexible duct connection. Measure only at the provided commissioning point.

1. To obtain the designed primary air and total air flow rate, adjust the damper / volume control device as necessary to obtain the specified design primary air plenum pressure corresponding to the required primary air flow.
2. For secondary water flow commissioning, a suitable balancing valve should be installed in order to measure and adjust the secondary water flow to the designed/specified value. Adjust the balancing valve in order to achieve the specified flow rate per unit, according to the unit schedule.

MAINTENANCE

In normal operating conditions the minimum required maintenance involves the heat exchanger coil (14), the lint screen (16) and the condensate drip tray (11) and consists of:

- Visual inspection to comply with AS/NZS 3666.2:1995, or local regulations, for grime, lint, bacterial growth, etc., on the heat exchanger coil and in the condensate drip tray. If found, such deposits must be removed using appropriate methods.
- Yearly mechanical cleaning of heat exchanger coil and lint screen (e.g. vacuuming, brushing).
- Inspect the nozzles and the inside of the air-mixing chamber for any deposits of dust. Clean if dirty.
- Four yearly chemical cleaning (e.g. washing with health safe chemicals and clean water rinsing).

GUIDE SPECIFICATION

Scope

Supply DADANCO ceiling mounted induction terminal units type STARLINE CM10.03-*XXXX.XXX*, or equal and approved, fitted with low-noise, high efficiency patented nozzles capable of delivering the primary air quantities as listed in the specification schedule. Connect the units to the primary air duct and secondary water loop in the configuration shown on the drawings.

Construction

The STARLINE CM10.03 induction terminal unit shall be manufactured to provide a compact unit with a primary air plenum, mounting support points, air entrainment chamber with supply air outlet, secondary heat exchanger coil with condensate drain tray and an inlet air lint screen.

Plenum: The medium pressure primary air plenum shall be manufactured of 0.8mm wall thickness galvanized sheet steel designed to incorporate DADANCO multi lobe induction nozzles of the nominated number and size to discharge the specified primary air quantity into the air entrainment chamber.

Nozzles shall be DADANCO multi-lobed induction nozzles of flexible fire retardant polymer, designed for low noise generation and rapid secondary air entrainment.

Unit shall be provided with a fire retardant moulded polymer spigot transition piece of 100mm diameter at one end of the primary air plenum for the primary air flexible duct connection. Spigot to be fitted at site to one end of the plenum as required.

Where specified, the unit shall be provided with a metal fabricated permanently fixed ovalised 150mm equivalent diameter spigot on the front face of the primary air plenum.

The secondary air entrainment chamber shall be constructed of galvanised sheet steel end panels and back plate sealed as an integral part to the primary air plenum and secondary heat exchanger. The entrainment chamber will facilitate mounting of the secondary heat exchanger coil above a condensate drain tray capable of collecting and discharging secondary air condensate in humid conditions.

The unit shall incorporate a removable secondary air heat exchanger coil of the nominated tube height and number of tube rows designed to process the specified secondary air quantity into the entrainment chamber and obtain the specified secondary sensible cooling capacity. The coil construction shall be of 12.7mm seamless copper tubes mechanically expanded into 0.145mm rippled edge aluminium fins spaced at the specified fin density per meter with drawn collars and galvanised end plates with top and bottom support frames. Coils will be fitted with ½" BSP male tapered thread flat face inlet and outlet fittings at one end of the coil.

Secondary coil capacities shall be equal to the specified secondary air sensible cooling capacity when operated at the scheduled secondary chilled water flow and inlet temperature.

Secondary coil maximum recommended site test pressure not to exceed 900 kPa (9 Bar) with continuous maximum recommended operating pressure of 600 kPa (6 Bar). Coil to be factory pressure tested to 2500 kPa and conform to a burst pressure rating of 13,000 kPa (130 Bar) at 50^{o}C.

The unit shall be mounted by its plenum mounting points to a suitable building member or support structure in a manner to ensure unrestricted secondary air entry to the unit, secure level alignment and leak free connection to the supply air discharge grille.