

CONTEG DATASHEET

TARGETED COOLING



CoolTeg Plus Direct expansion (DX) version AC-TDX

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CoolTeg Plus

Direct expansion (DX) version: AC-TDX



Application

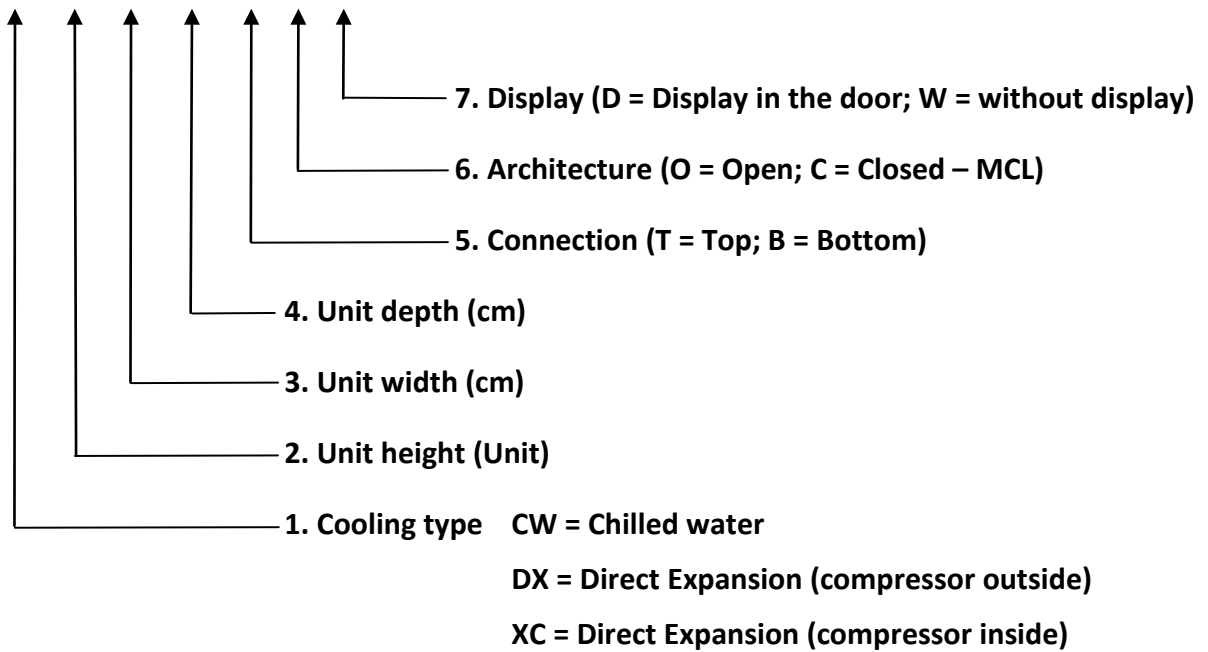
CoolTeg Plus air-conditioning units for data centers are designed to fit perfectly with the Conteg IT cabinet (rack) row. Their main task is to take hot air out from the rear side of the racks, cool it down and blow it to the front side of the racks to cool servers and other IT equipment.

We recommend mechanically separating hot and cold zones in the IT room and increasing the temperature in the hot zone. This will increase the CoolTeg Plus unit's cooling capacity. The most typical application is the Conteg Modular Closed Loop (MCL). It is a custom-made container with various numbers of server racks and cooling units incorporated inside the loop.

CoolTeg Plus DX units are ready to be connected to Mitsubishi outdoor condensing units that include compressor with variable speed control.

Type Code

AC - T 1 - 2 - 3 / 4 - 5 6 7 - ACCESSORIES



Example:

AC-TDX-42-30/1200-TOD



Function

The main parts and their functions:

Heat exchanger – to transfer heat from the hot air to the refrigerant. It is the evaporator of the closed compressor cycle. It is made of copper pipes with aluminum fins. The cross position of the HX inside the unit ensures maximum possible cooling capacity. The fins' hydrophilic surfaces help to keep the droplets of condensate. A condensation pan collects the water buildup and drains it through a hosepipe (Ø 22 mm). The condensate pump is available as an accessory.

Fans – to transfer air from the room's hot zone through the air-conditioning unit to the cold zone. We only use high-efficiency radial fans with EC motors with variable speed control to maintain the required airflow with minimum energy consumption. Any fan failure is reported to the controller.

Filters – to clean the air and protect interior components. The Zick-zack filters made from synthetic material in paper frames maintain the EU4 filtration class. They are easily replaceable if they become clogged.

Sensors – to provide real feedback. The temperature is measured at two points on the rear panel and two points on the front panel (in the upper and bottom positions). Thanks to this arrangement, the controller always has up-to-date information. The air humidity is measured in the top position on the unit's front and rear panels. A differential pressure meter monitors the filters' cleanness and alerts if filters become dirty.

Control box – for electric power distribution, function control, safety and communication. There is a circuit breaker on the power supply; one for the fan motors and a second one for the controller. The controller that comes with the original Conteg software also manages all the functions for the CoolTeg Plus unit. According to the values set by the user, the controller can change the speed of the fans, control the cooling capacity of the outdoor compressor unit, and operate various accessories. The control box contains a Mitsubishi control board for communication with the outdoor unit. This is the reason why only specific types of outdoor units can be connected to CoolTeg Plus DX indoor units.

Display – for user-friendly communication with the unit controller. The standard way for communication is through a 4.3" color touch display, which can be placed on the unit's front door or separately in the room. One display can maintain communication with up to 30 units. An RS485 port and two ethernet ports enable remote control and monitoring via various building systems. A USB port is mainly used for easy software updates. Color touch displays, starting at 7", are available for the whole room or facility monitoring project as an option (with specific programming).



Indoor unit installation

CoolTeg Plus DX indoor units are designed to be installed in a row between IT racks. Indoor units need to be connected between two racks or mounted at the end of row. We highly recommend to use Conteg IT racks for your installation where you can utilize Conteg's standard connection kit.

Separation of hot air zone and cold air zone in your datacenter will increase efficiency of the whole cooling system and will ensure good working conditions for IT equipment.

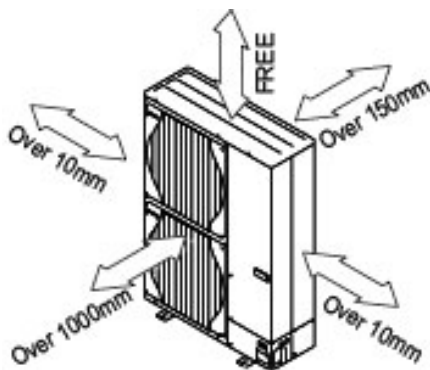
Outdoor unit installation

Mitsubishi AC-DX PUHZ outdoor unit needs to be installed at shadowed and wind shielded place to keep outdoor unit at the best operation conditions and temperature limits. Manufacturer

Ensure adequate operation and service space around outdoor unit as shown in pictures:

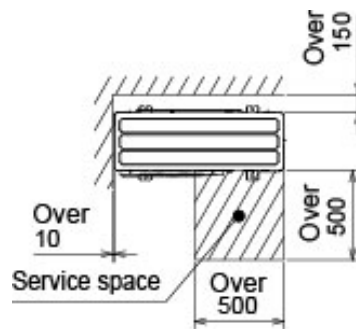
Free space around the unit

Diagram below shows a basic example

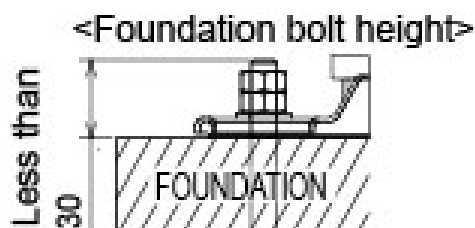


Service space

Dimensions of space needed for service access are shown in the diagram below.



For bottom leg attachment use 4 bolts M10 as shown in picture:



Foundation bolts

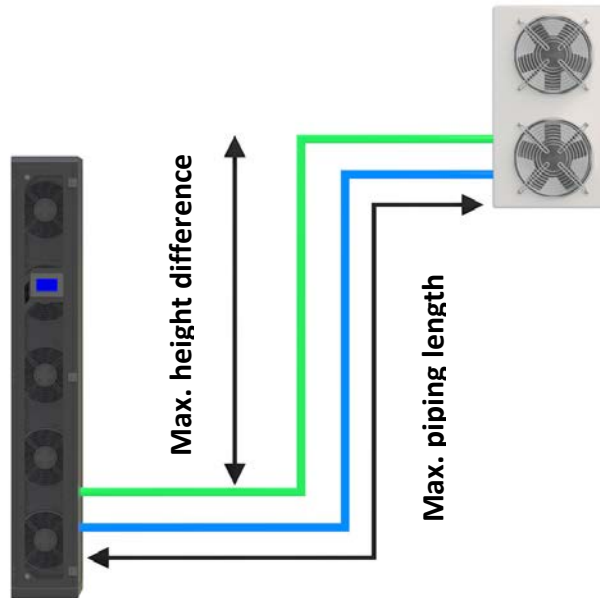
Please secure the unit firmly with 4 foundation (M10) bolts. Bolts and washers are not included.

Indoor and Outdoor unit connection

CoolTeg Plus DX indoor unit can be connected to two different sizes of Mitsubishi outdoor units (type 125 and 200). The entire system's cooling capacity depends on outdoor unit's cooling capacity. Evaporator inside CoolTeg indoor unit is tested for both outdoor unit sizes. One indoor unit always has to be connected to one outdoor unit. A multi-unit system is not possible.

Refrigerant pipes

Indoor and outdoor units must be connected by copper pipes for refrigerant leading. In this system, ecological refrigerant R410A is used. Pipe dimensions and maximal lengths are outlined in the table of Outdoor unit's technical data. Maximum distances and level differences must be strictly observed. If you need longer distances, please contact the Conteg technical department. A smaller diameter must always be used for liquid leading, while a bigger diameter must be used for gas leading. All pipes must be thermally insulated to protect against heat losses and surface condensation.



Outdoor units are pre-filled with refrigerant for a maximum piping length of 30m. For pipes longer than 30m, additional charge is required.

Refrigerant R410A in kg

Outdoor unit type	Piping length (one way)							Factory charged
	10m	20m	30m	40m	50m	60m	70m	
AC-DX-PUHZ-P125	4.3	4.4	4.5	5.1	5.7	-	-	4.5
AC-DX-PUHZ-P200	4.8	5.3	5.8	6.7	7.6	8.5	9.4	5.8
	Factory pre-charged			Additional charge is required				

Precautions for refrigerant piping work

Thickness of pipes

Because the working pressure of R410A is higher compared to R22, be sure to use refrigerant piping with thickness shown below. (Never use pipes of 0.7 mm or below.)

Nominal dimensions (inch)	Outside diameter (mm)	Thickness (mm)
1/4	6.35	0.8
3/8	9.52	0.8
1/2	12.70	0.8
5/8	15.88	1.0

Dimensions of flares

The component molecules in HFC refrigerant are smaller compared to conventional refrigerants. In addition to that, R410A is a refrigerant, which has a higher risk of leakage because its working pressure is higher than that of other refrigerants. Therefore, to enhance air tightness and intensity, the flare-cutting dimension of the copper pipe for R410A has been specified separately from the dimensions of other refrigerants.

Power supply and communication wiring

The Outdoor units are offered in two capacity sizes. The three-phase version is standard (mentioned in this DataSheet), but one-phase units are also available upon request. Indoor and outdoor units must be connected by communication cabling according to the wiring diagram in the User and installation manual.

AC-DX-PUHZ-P200Y

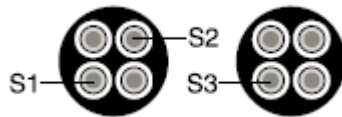
The recommended size of the unit's main switch (breaker) is 32 A. A breaker with at least 3.0 mm of contact separation in each pole shall be provided. Use earth leakage breaker. Always use a current leakage breaker that is compatible with higher harmonics as this unit is equipped with an inverter. The use of an inadequate breaker might cause the incorrect operation of inverter. Recommended power supply wiring is 5 x 4 mm² as minimum. The circuit rating for L1-N, L2-N and L3-N is AC 230 V.

AC-DX-PUHZ-P125Y

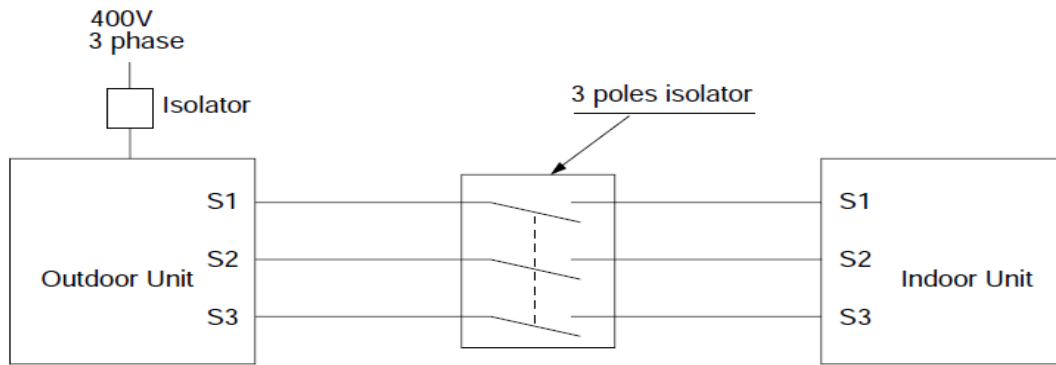
The recommended size of the unit's main switch (breaker) is 16 A. A breaker with at least 3.0 mm of contact separation in each pole shall be provided. Use earth leakage breaker. Always use a current leakage breaker that is compatible with higher harmonics as this unit is equipped with an inverter. The use of an inadequate breaker might cause the incorrect operation of inverter. Recommended power supply wiring is 5 x 1.5 mm² as minimum. The circuit rating for L1-N, L2-N and L3-N is AC 230 V.

The indoor unit is a one-phase electric appliance. It can be supplied from the outdoor unit or separately from a circuit breaker.

If the indoor unit is supplied from a Mitsubishi outdoor unit, use 3 x 4 mm² (polar) wires for cable lengths up to 50 m or 3 x 6 mm² (polar) wires for cable lengths up to 80m. It is recommended that the earth wire between the indoor and outdoor units is 1 x 2.5 mm². Use one cable for S1 and S2 and another cable for S3 as shown in the picture.

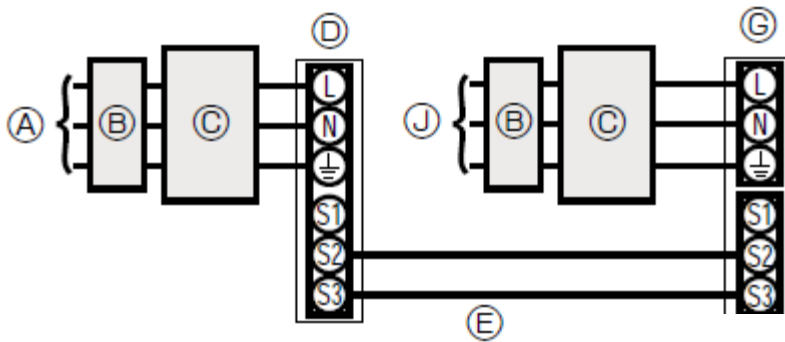


The circuit rating for S1-S2 is AC 230 V. The circuit rating for S2-S3 is DC 24 V. These figures are NOT against the ground. The S3 terminal has DC 24 V against the S2 terminal. However, the terminals between S3 and S1 are not electrically insulated by a transformer or other device.



If the indoor unit is supplied separately, then keep the wiring diagram below:

- A – Outdoor unit power supply
- B – Earth leakage breaker
- C – Wiring circuit breaker or isolating switch
- D – Outdoor unit
- E – Indoor unit/outdoor unit connecting cords
- G – Indoor unit



Be sure to install the N-Line. Without the N-Line, the unit could be damaged.

The wiring sizes must comply with the applicable local and national codes!

Power supply cords and indoor/outdoor unit connecting cords will be no lighter than polychloroprene sheathed flexible cord (Design 60245 IEC 57). Use an earth wire, which is longer than the other cords, so that it will not become disconnected when tension is applied.

Drainage

Each indoor unit must be connected to the room's drainage system. Condensate from the bottom pan should be collected with a syphon and put in the drainage piping or drained off with a condensate pump. Inner diameter of the pipe is 21 mm.

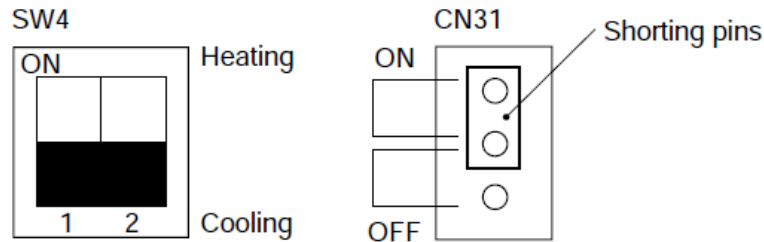
Recommended settings for outdoor units

Emergency operation:

When the error codes shown below are displayed on an outdoor unit or indoor unit has a failure but no other problems are found, an emergency operation will be activated, if the emergency operation switch CN31 (short-circuiting the connector) on the outdoor controller board is set ON.

Setting procedure:

1. Turn the main power supply off.
2. Switch the shorting pins of the emergency operation connector (CN31) on the outdoor controller board to ON.
3. Use SW4-2 on the outdoor controller board to set the operation mode (cooling or heating). (SW4-1 is not used.)



When the following abnormalities occur, an emergency operation can be activated:

Error code	Inspected content
U4	Open/short of pipe thermistor (TH3/TH6)
E8	Indoor/outdoor unit communication error • Signal receiving error (outdoor unit)
E9	Indoor/outdoor unit communication error • Transmitting error (indoor unit)
E0 ~ E7	Communication error other than outdoor unit
Ed	Communication error between outdoor controller board and M-NET board (Serial communication error)

Power failure automatic recovery

The outdoor unit has a "Power failure automatic recovery" function. Please check that the outdoor unit control board's Dip-switch SW 5-2 is switched ON to activate the "Auto recovery" function. Please refer to the outdoor unit installation manual.

Control function

Each CoolTeg Plus unit includes an independent controller inside the control box. This controller sends a signal to the fans and the outdoor compressor unit to change the airflow and the speed of the compressor in order to maintain the temperature setting in the cold and hot zones.

The cold zone temperature set-point: The compressor in the outdoor unit changes the speed (momentary load) to keep the temperature in the cold zone.

The temperature difference set-point: The indoor unit's fans change the speed to keep the temperature difference between the cold and hot zones. The goal is to maintain a balanced airflow in the whole system (the cooling units and IT equipment). The user can set limits for minimum and maximum fan speed.

The humidity setting can start the dehumidifying mode if the value is too high. During the dehumidifying mode, the fan speed is minimized and the heat exchanger surface temperature is decreased to its minimum level by using the compressor's maximum capacity. It causes maximum condensation on the cooler surface. The condensate is collected in the bottom pan and drained away.

If the unit is equipped with a humidifier, the humidifying mode is also available.

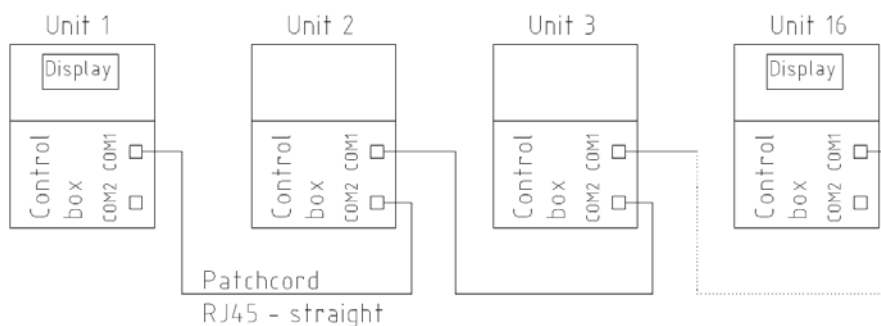
Communication

Each air conditioner can be equipped with a one-touch display on the front door. If one display operates more than one unit, then all units in the group must be connected. Up to 30 units can be connected to one display. They can be divided into four zones with up to eight units each. The units connected to the zones can cooperate with each other. Zone functions – standby management and overload start – are available. When the number of units in a zone is established, the following parameters must be set: number of running units (standby units are set automatically), changeover period (daily or weekly) and overload start (temperature limit for start of standby units).

We do not recommend connecting more than 16 units to one group to keep the communication speed of response reasonable. Two displays in each group are recommended to ensure the redundancy for case of failure.

The display includes a web server application supporting IP address access. The communication protocol is TCP/IP (Ethernet connection). If needed, each controller can be equipped with an additional ModBus card extension (separate wiring is needed).

It is also possible to use both standard and additional digital inputs and outputs in each cooling unit, which are typically used for general warnings and alarms as well as sending other basic information.



Technical data – indoor units

		DX12	DX20
Indoor unit type		AC-TDX-42-30...	AC-TDX-42-30...
Connected outdoor unit ⁽¹⁾		AC-DX-PUHZ125YHA	AC-DX-PUHZ200YHA
BASIC DATA			
Cooling system		Direct Expansion	
Architecture ⁽²⁾		Open or Closed	Open or Closed
Nominal cooling capacity ⁽³⁾	kW	12	19
Nominal Net cooling capacity ⁽⁴⁾	kW	12	18
Power supply	V/ph/Hz	230 / 1 / 50 ⁽¹⁾	
Nominal Power consumption	W	190	770
Running current	A	1,2	4,2
Maximum current	A	6	6
Nominal Airflow ⁽⁵⁾	m ³ /h	2200	3800
Number of fans	pcs	5	5
Motor fan technology		EC	
or Refrigerant type	kg/h	R 410 A	
Filter class ⁽⁶⁾		G4	
DIMENSIONS			
Height ⁽⁷⁾	mm (Unit)	1978 (42U), 2111 (45U), 2245 (48U)	
Width	mm	300	300
Depth ⁽⁸⁾	mm	1000 or 1200	
Weight – depth 1000 mm, height 42/45/48U	kg	163/168/173	248/256/264
Weight – depth 1200 mm, height 42/45/48U	kg	173/179/185	260/270/280
PIPING CONNECTION			
Supply pipe diameter and type		10 mm braze	10 mm braze
Return pipe diameter and type		22 mm braze ⁽⁹⁾	22 mm braze

Notes:

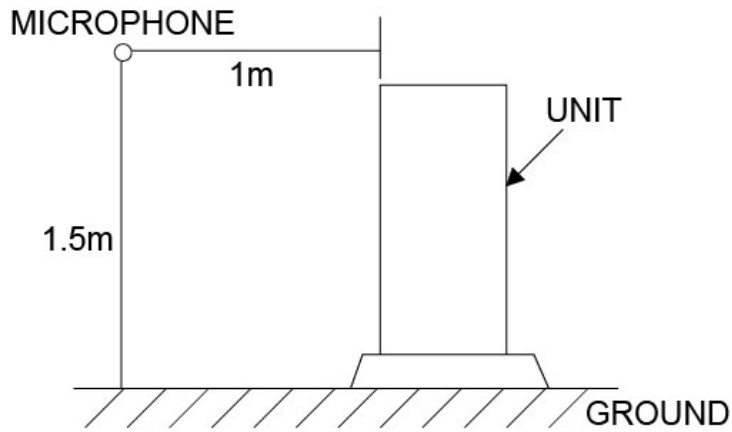
- (1)... AC-DX-PUHZ outdoor condensing units need power supply 400V / 3ph / 50Hz, but one-phase units are also available
- (2)... CoolTeg units can be used independently in rack rows or integrated in a Modular Closed Loop (MCL) - closed-architecture system of racks and cooling units. Type code is changed according to the key.
- (3)... Cooling capacity is changed by controller. The nominal one is calculated at indoor hot air temperature 35°C without condensation (air humidity below dew-point), outdoor temp. +35°C, clean filters
- (4)... Net cooling capacity is the Total capacity reduced for the heat load of fans. This is the available cooling capacity for the unit.
- (5)... Airflow is changed by controller. The Nominal one matches the Nominal cooling capacity
- (6)... Closed-architecture (MCL) units are generally delivered without filters
- (7)... Without plinth or transport trolley
- (8)... Closed Architecture (MCL) units are available only in 1200 mm depth
- (9)... Piping reduction to 10/16 mm is necessary to connect to this type of outdoor unit

Technical data – outdoor units

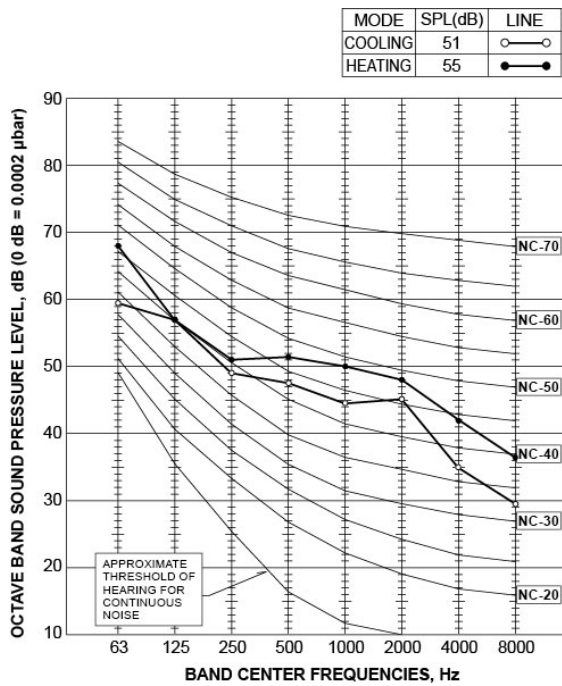
Unit type		AC-DX-PUHZ-P125Y	AC-DX-PUHZ-P200Y
BASIC SPECIFICATION			
Nominal cooling capacity	kW	12	19
Power supply	V/ph/Hz	400 V, 3N~(3ph 4-wires), 50 Hz	
Running current	A	6.2	9.5
Max. current	A	13	19
Compressor control		Inverter	
Refrigerant control		Linear expansion valve	
Refrigerant R410A volume	kg	4.5	5.8
Airflow	m ³ /min	100	130
Noise Level	dB	51	59
DIMENSIONS			
Width	mm	950	
Depth	mm	360	
Height	mm	1350	
Weight	kg	101	126
CONNECTION			
Liquid pipe	mm	10	10
Gas pipe	mm	16	26
Max. piping length	m	50	70
Max. height difference	m	30	30



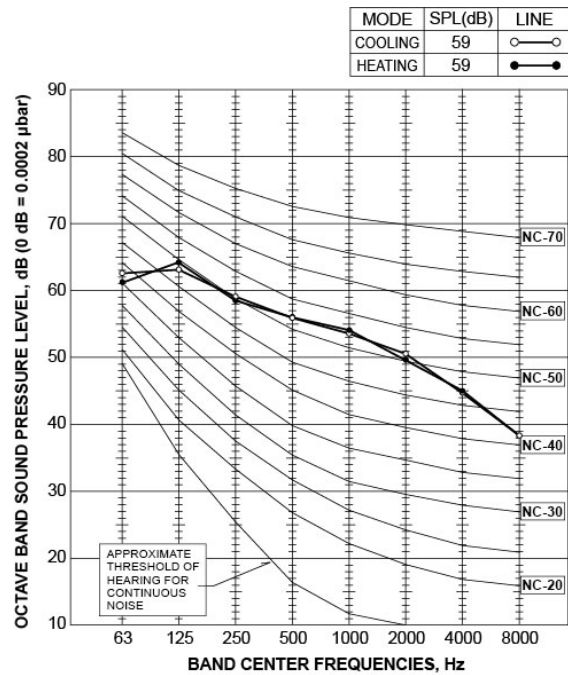
Acoustic data – Outdoor units



AC-DX-PUHZ-P125Y

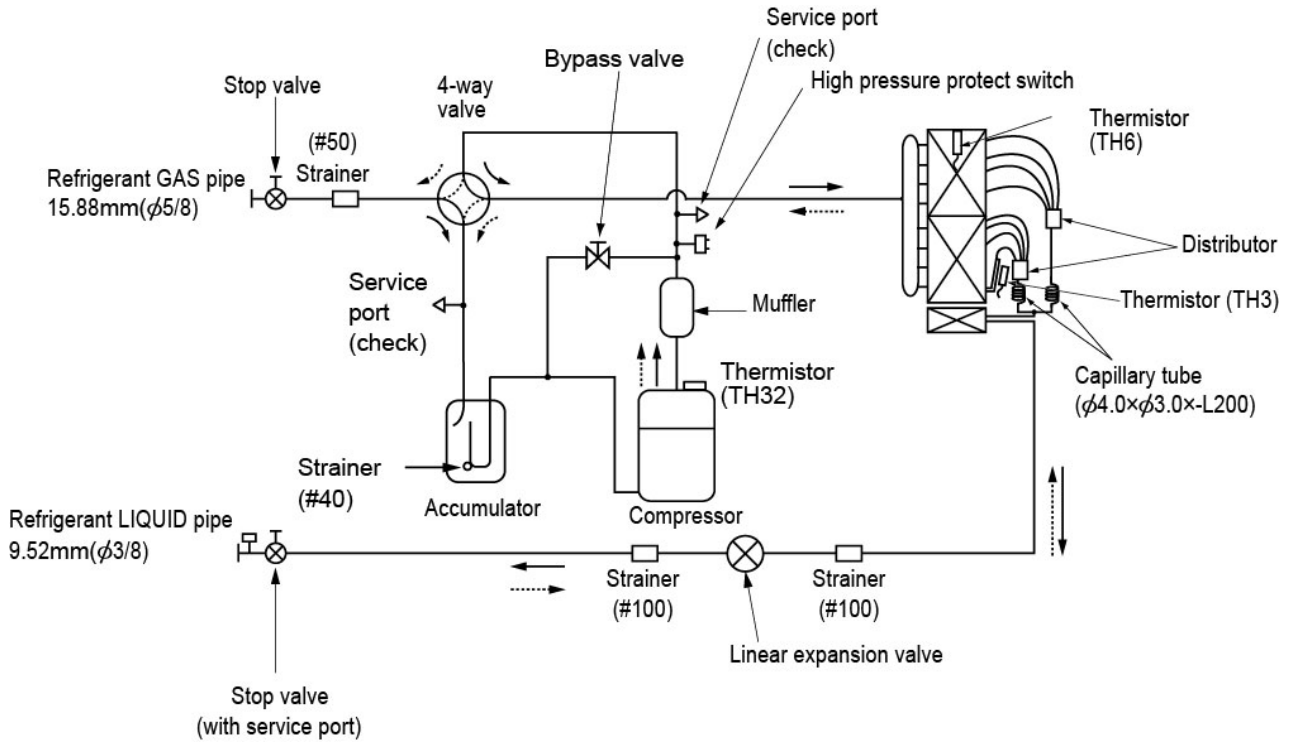


AC-DX-PUHZ-P200Y

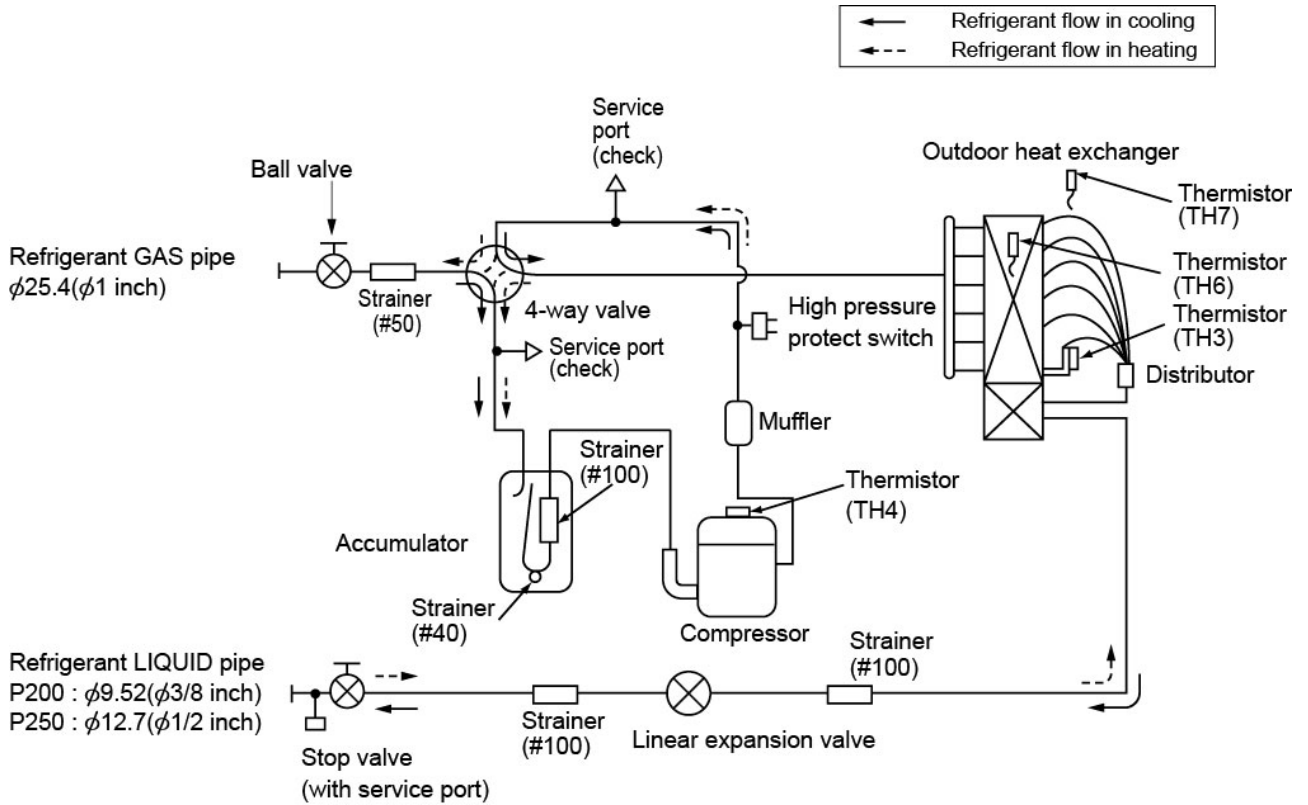


Refrigerant system diagram

AC-DX-PUHZ-P125Y



AC-DX-PUHZ-P200Y



Outdoor units drawings

