NŌRDEN®

INSTALLATION MANUAL

MVB AIR HANDLER UNIT

MODELS:

MVB-60CWN1-102

Refrigerant R-410A

Rev 1.0

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1. Safety

Read the following safety instructions before installing the unit or doing service work.

WARNING may cause personal death or serious injury.

CAUTION may lead to injury or structural damage under some conditions.

WARNING

THIS PRODUCT CAN EXPOSE YOU TO CHEMICALS INCLUDING LEAD, WHICH ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

WARNING

PRESSURIZED REFRIGERANT! — IMPROPER REFRIGERANT!

SYSTEM CONTAINS OIL AND REFRIGERANT UNDER HIGH PRESSURE. RECOVER REFRIGERANT TO RELIEVE PRESSURE BEFORE OPENING THE SYSTEM.

DO NOT USE NON-APPROVED REFRIGERANTS OR REFRIGERANT SUBSTITUTES OR REFRIGERANT ADDITIVES. SEE OUTDOOR UNIT NAMEPLATE FOR REFRIGERANT TYPE.

FAILURE TO FOLLOW THE ABOVE COULD RESULT IN DEATH, SERIOUS INJURY OR EQUIPMENT DAMAGE.

WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE.

FAILURE TO DO THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.

WARNING

FLAMMABLE VAPORS!

THE USE AND STORAGE OF GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN OPEN CONTAINERS IN THE VICINITY OF THIS FURNACE CAN RESULT IN EXPLOSION OR FIRE.

FAILURE TO FOLLOW THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY, OR PROPERTY DAMAGE.

WARNING

SHARP EDGES!

AVOID CONTACT WITH COIL FINS AND SHEET METAL EDGES.

FAILURE TO FOLLOW THE ABOVE COULD RESULT IN DEATH OR SERIOUS INJURY.

WARNING

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

WARNING

ROTATING FAN BLADE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

2. Dimensions

NOTE: 25" CLEARANCE IS REQUIRED IN THE FRONT OF THE UNIT FOR FILTER AND COIL MAINTENANCE

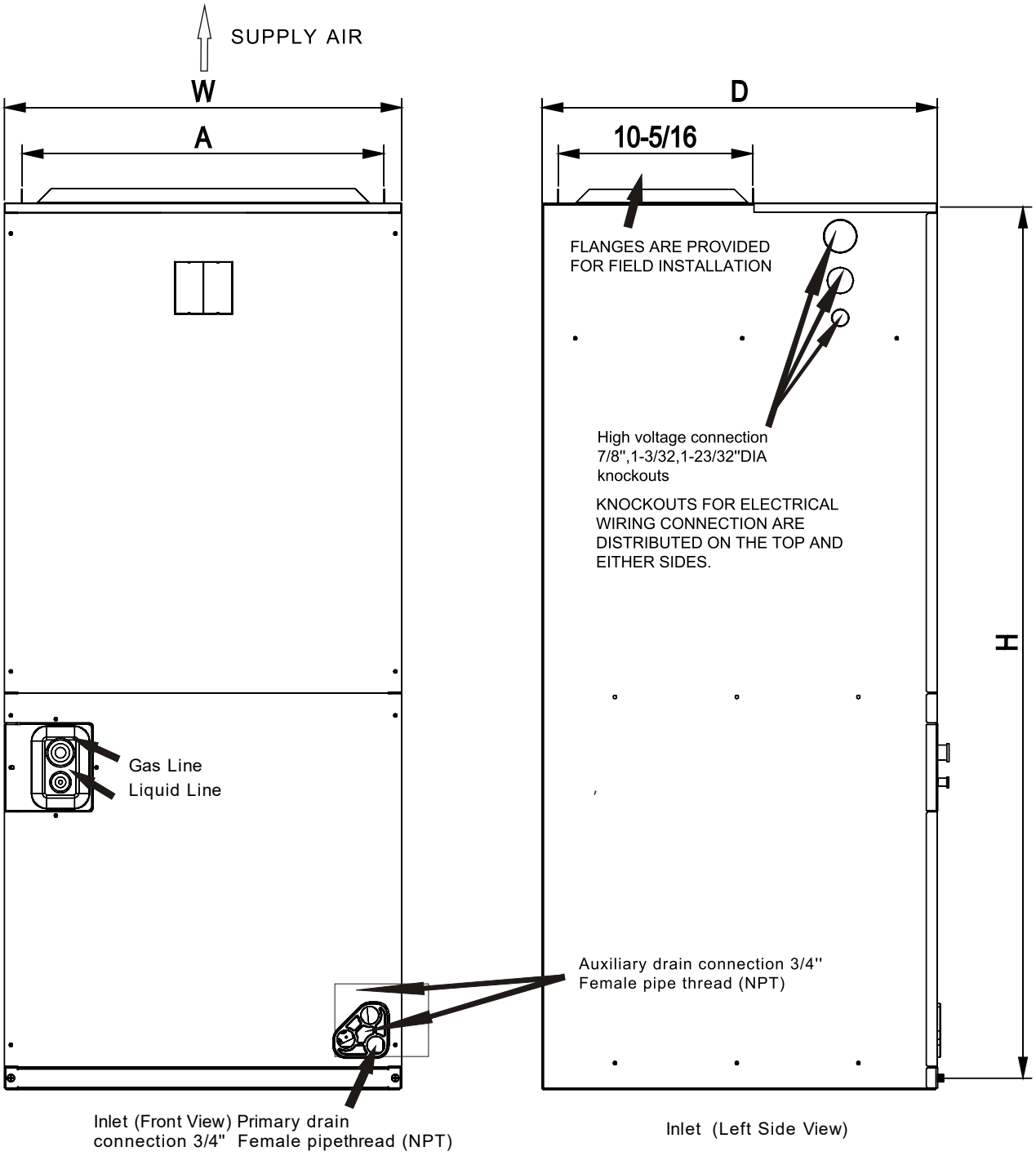


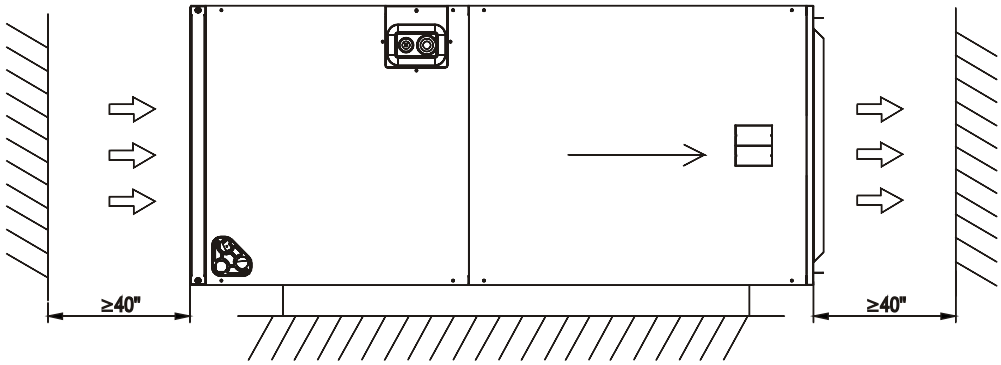
Figure 2-1 Unit dimensions

Table 1. Unit Dimensions

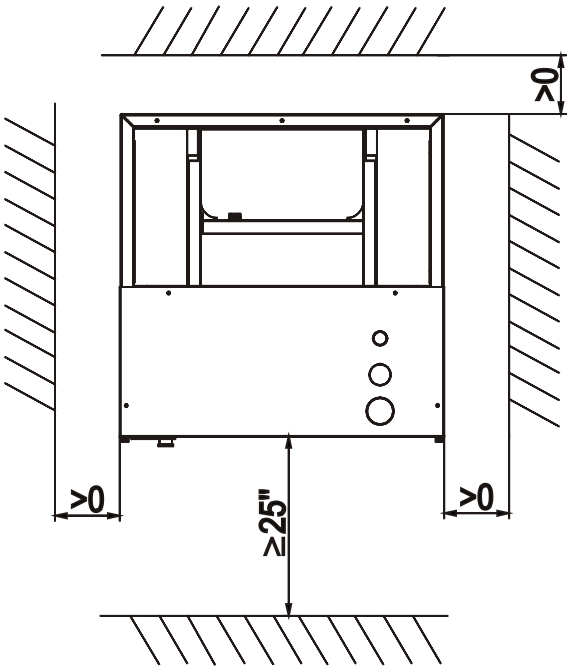
Model	Dimensions (in.)					
	H	W	D	A	Liquid Line Connection	Gas Line Connection
36K 60K	46-1/2	21	21	19-1/4	3/8	3/4

Select a solid and level site, keep enough space for proper installation and maintenance.

Adjust motor speed tap on indoor main control board (MCB) to select correct air flow according to blower performance table.



a) Horizontal position



b) Vertical position

Figure 2-2 Clearance requirement

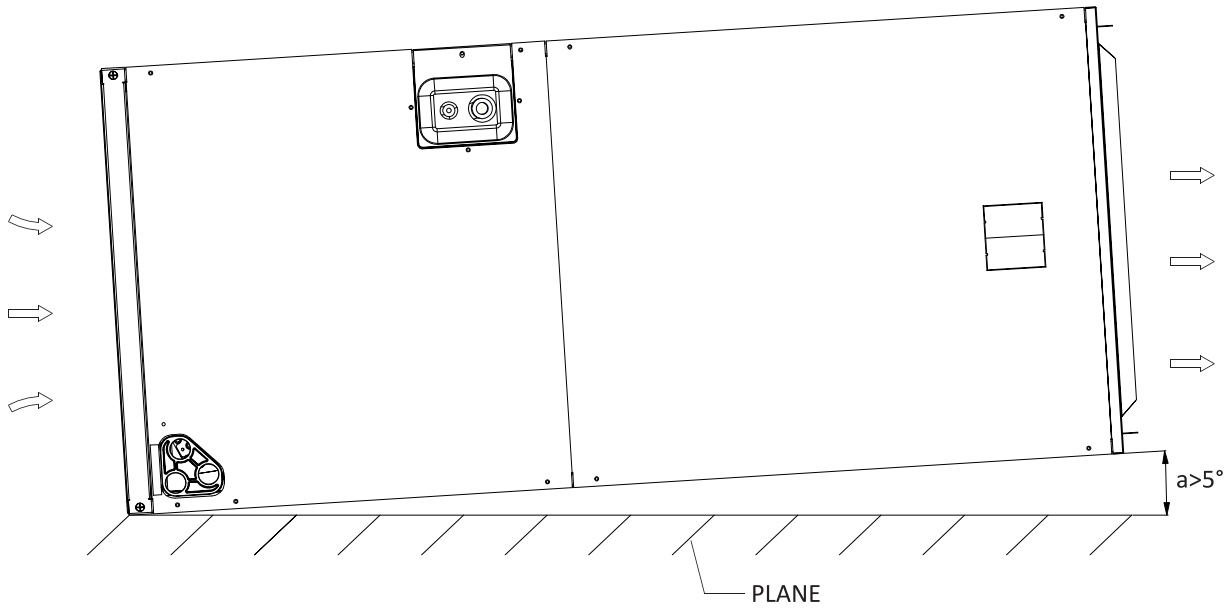


Figure 2-3 Installation slope

Note: When installing, ensure a certain tilt Angle (a>5°) to ensure smooth drainage.

3. Applications

3.1 Vertical up-flow and horizontal right-flow

Vertical up-flow and horizontal right-flow configurations are the factory settings on all models.

If return air is to be ducted, install duct flush with floor. Use fireproof resilient gasket 1/8'' to 1/4'' thick between the ducts, unit and floor. Set unit on floor over opening.

IMPORTANT
Lightly tighten the drain connections so they do not leak.
Using excessive force may cause damage to the drain connections. Torque applied to drain connections should not exceed 10.ft.lbs.

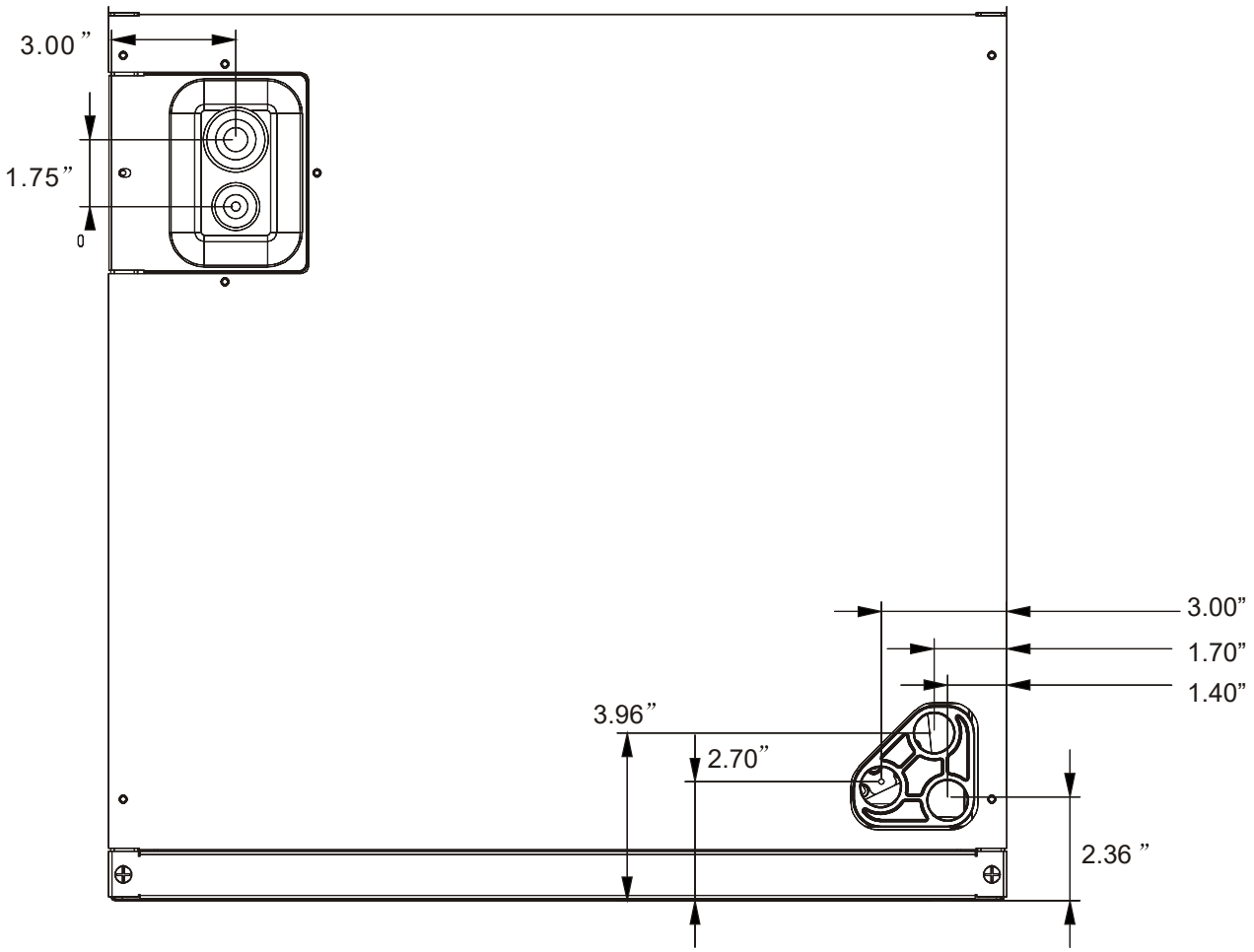


Figure 3-1 Dimensions for front connection coil

3.1.1 Installation of drain pipe

1.When the air handler is installed vertically, please block the upper drainage hole with a cover. The lower right of the drainage hole is connected with the drainage pipe, and the lower left of the drainage hole is connected with the overflow pipe that should be exposed to the air; If the pipe ① is draining, which means the pipe ② is blocked. Contact maintenance personnel as soon as possible.

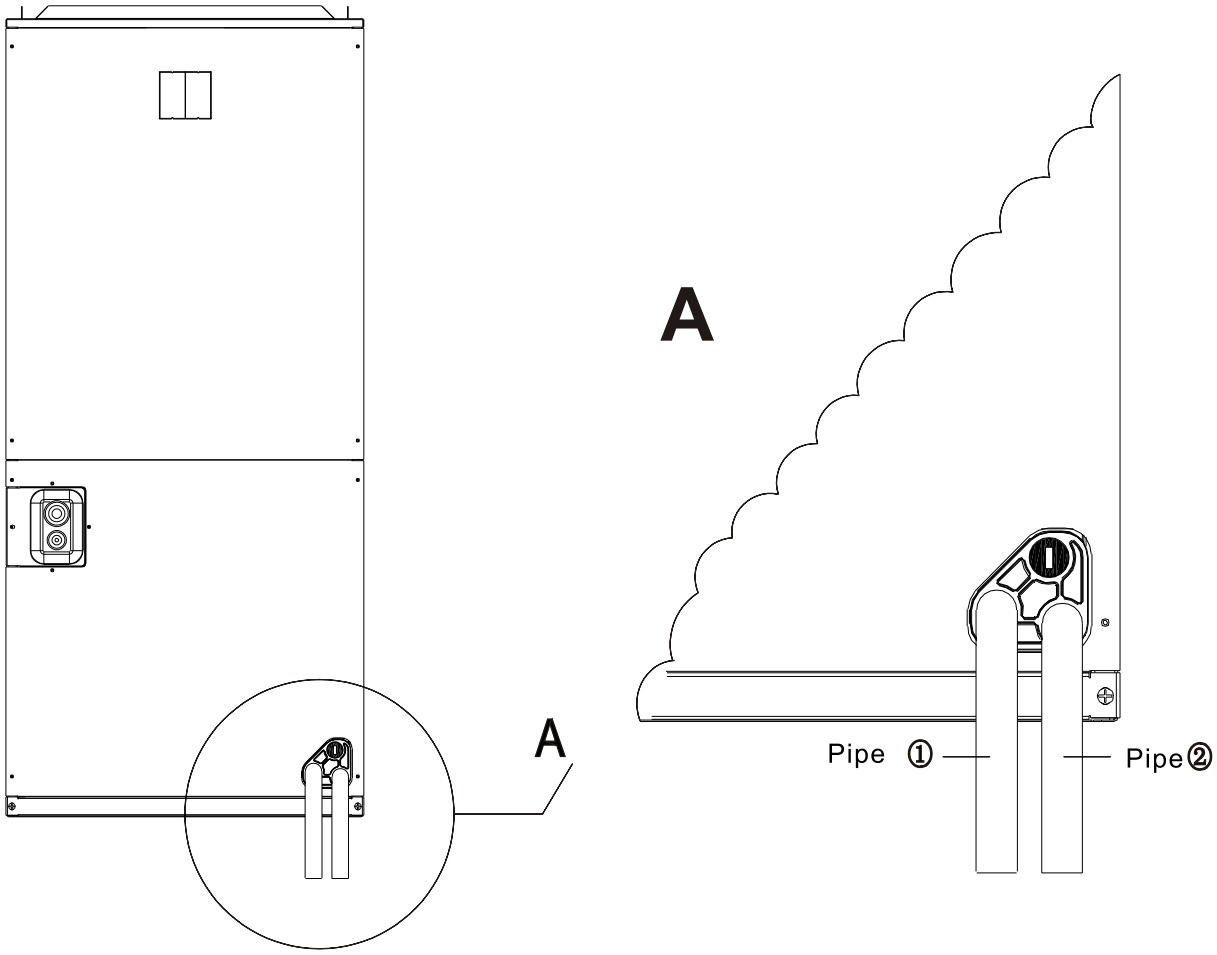


Figure 3-2 Vertical

2. When installing the air handler lying down, the upper drainage hole is covered the lower left of the drainage hole is connected with the drainage pipe, the lower right of the drainage hole is connected with the overflow pipe that should be exposed to the air. If the pipe ① is draining, which means the pipe ② is blocked. Contact maintenance personnel as soon as possible.

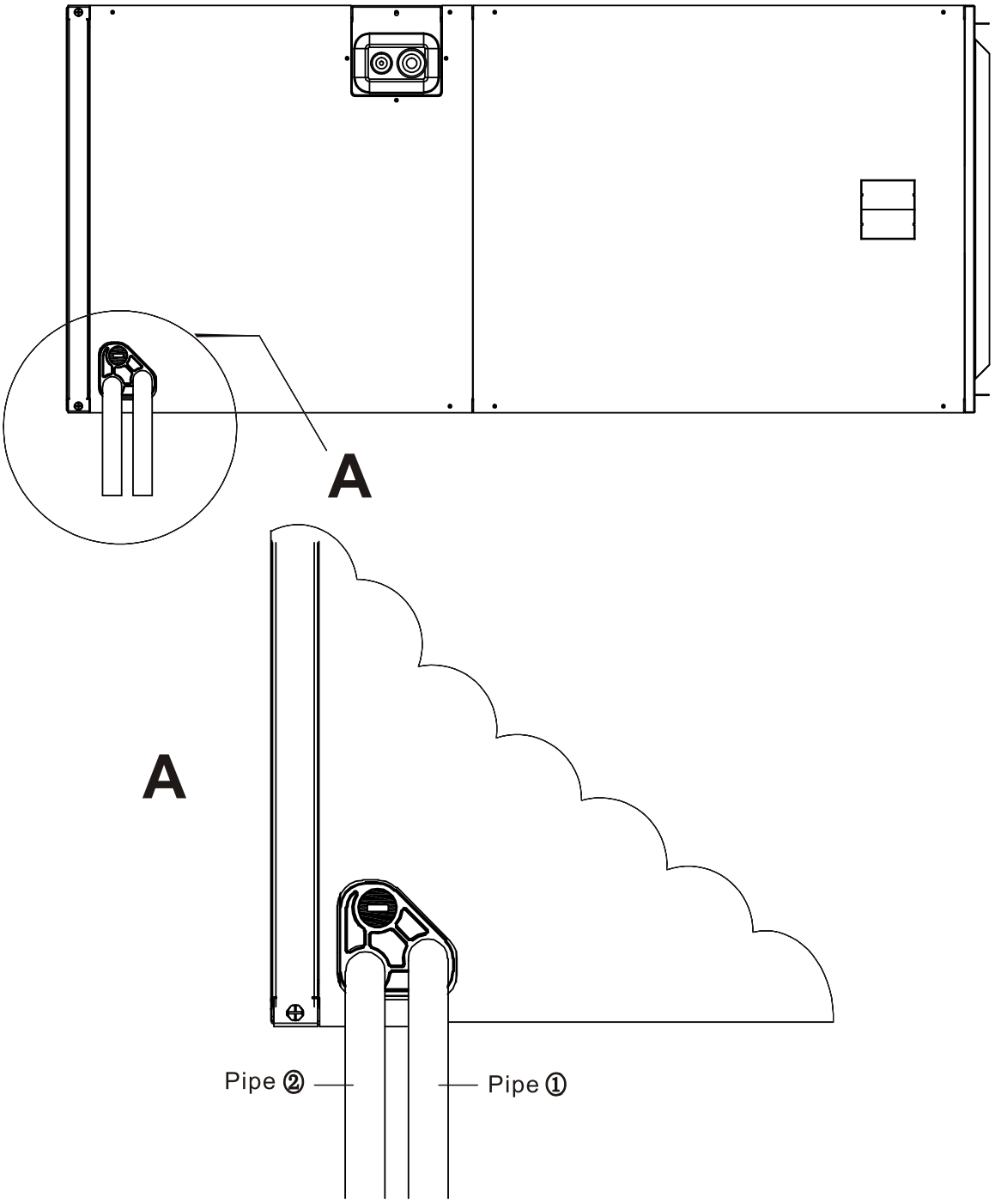


Figure 3-3 Horizontal right

Keep the coil connections sealed until refrigerant connections are made. Refer to condensing unit installation instructions for details on pipe size and insulation.

- Coil is shipped with nitrogen. Evacuate the system before charging with refrigerant.
- Make sure the refrigerant pipes layout do not block service access.
- Purge the refrigerant pipes and indoor coil with dry nitrogen while brazing.

Condensate Drain Connection

- Use a thin layer of Teflon paste,silicone or Teflon tape when making drain fitting connections.
- Do not over tighten fittings resulting in splitting pipe connections on the drain pan.

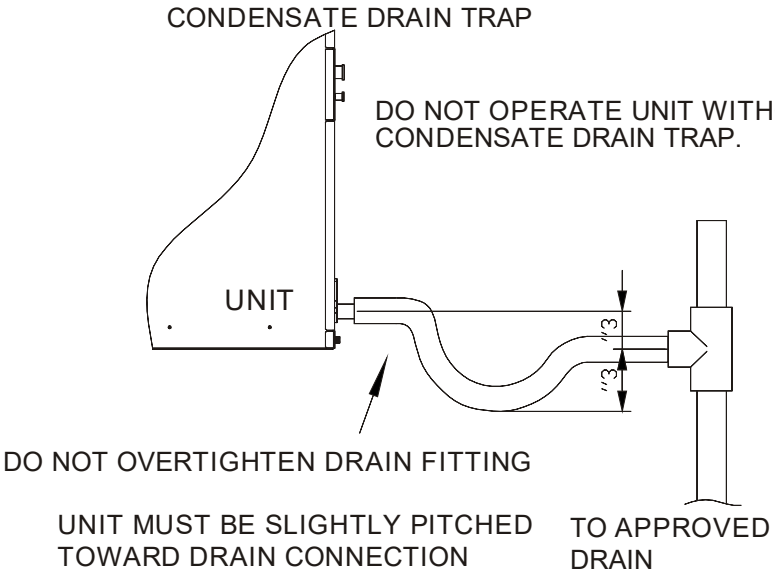


Figure 7-1 Condensate drain trap

- Make sure the drain pipes layout do not block service access. Minimum clearance of 25'' is required for filter, coil or blower removal and service access.
- Ensure the unit is level or pitched slightly toward primary drain connection so that water will drain smoothly from the pan. All horizontal drain pipes must be pitched downward away from the unit a minimum of 1/8" per foot of line to ensure proper drainage.
- Do not reduce drain pipe size less than connection size provided on condensate drain pan.
- Do not connect condensate drain pipe to a closed or open sewer pipe.
- The drain pipe should be insulated where necessary to prevent sweating and damage due to condensate forming on the outside surface of the line.
- Make provisions for disconnecting and cleaning of the primary drain pipe if it become necessary. Install a 3 inch trap in the primary drain pipe as close as possible to the unit. Make sure that the top of the trap is below connection to the drain pan to allow complete drainage of pan.
- Auxiliary drain pipe should be connected to a place where it will be noticeable. Homeowner should be warned that a problem exists if water begins running from the auxiliary drain pipe.
- Test condensate drain pan and drain pipe after installation is complete. Pour enough water into drain pan, make sure that the drain pan is draining completely, no leaks are found in drain pipe fittings, and no water is draining from the termination of the primary drain pipe.

3.2 Horizontal left-flow

- Horizontal left-flow is another default factory configuration for the units. These units may be converted to horizontal left-flow by removing indoor coil assembly with drain pan and reinstalling it as shown below.
- Rotate the unit 90° into the horizontal left position, with the coil compartment on the right and the blower compartment on the left.
- Reinstall the indoor coil 180° from original position. Ensure the retaining channel is fully engaged with the coil rail(Figure 3-4 and 3-5).
- Aftermarket drain pan kits are required when the unit is configured for the horizontal position over a finished ceiling and living space.

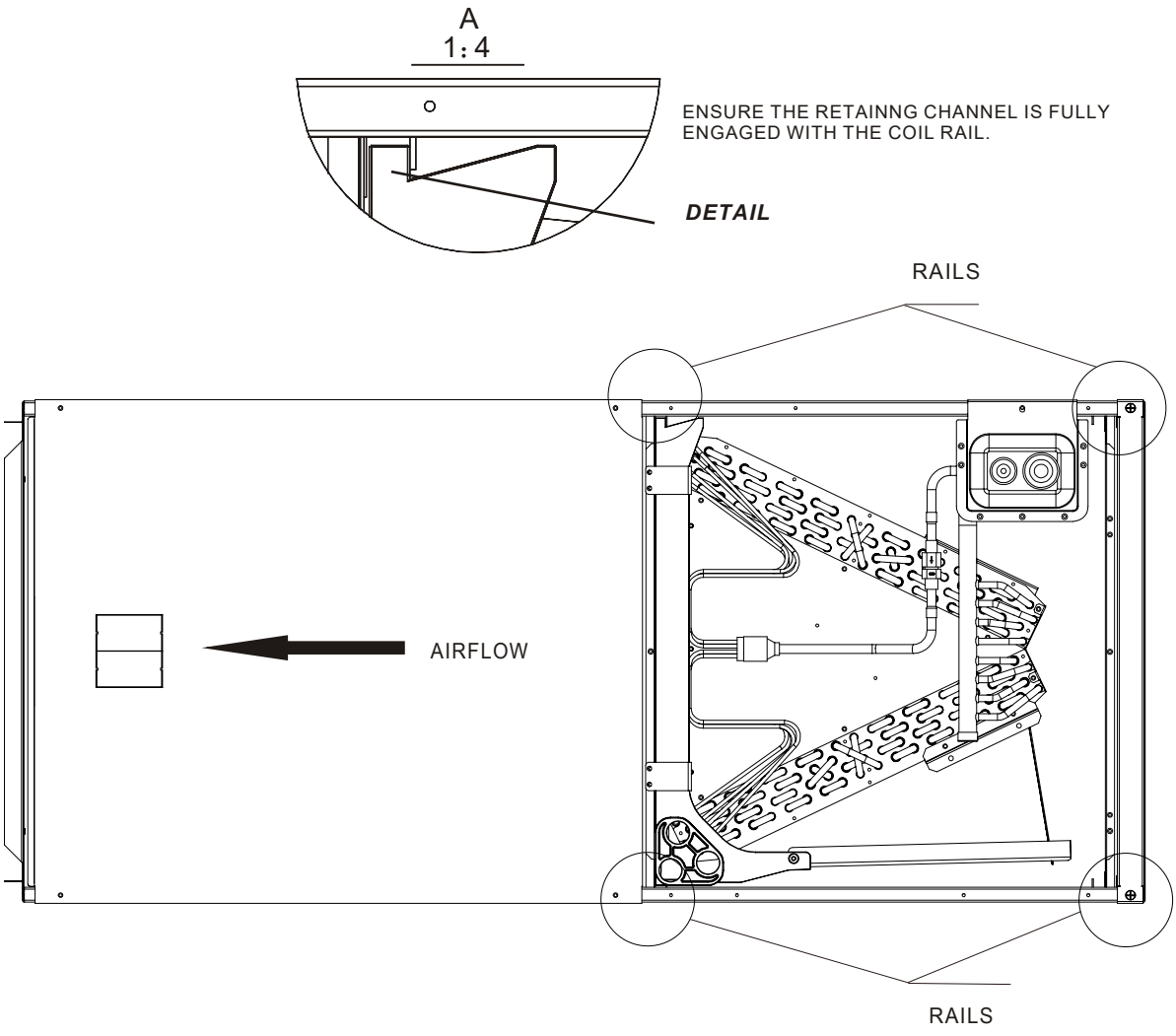


Figure 3-4 Horizontal left-flow application

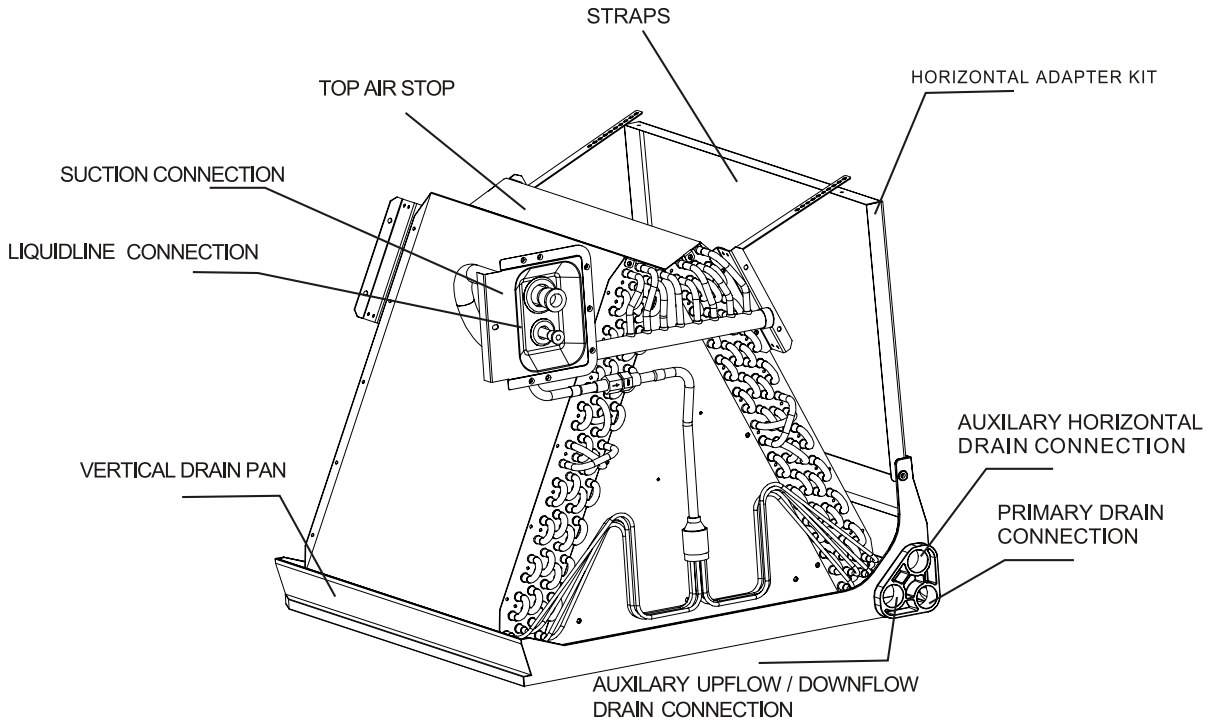


Figure 3-5 Evaporator diagram

CAUTION

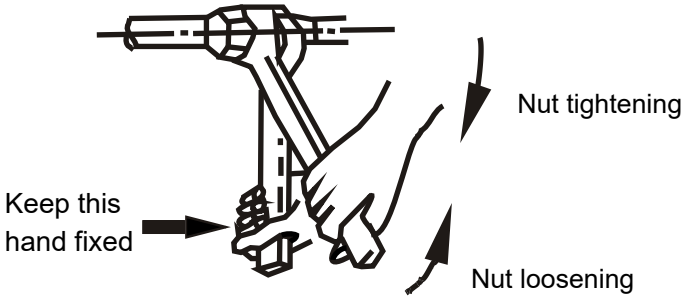
Horizontal units must be configured for right hand air supply or left hand air supply.
Horizontal drain pan must be located under indoor coil. Failure to use the drain pan can result in property damage.

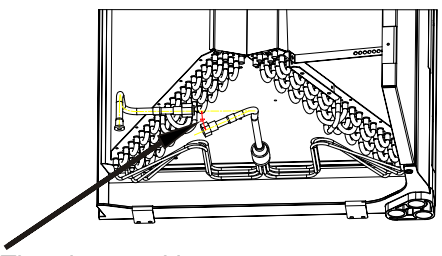
3.3 Installation in an unconditioned space

There are two pairs of coil rails in the air handler for default and counter flow application. If the air handler is installed in an unconditioned space, the two unused coil rails should be removed to minimize air handler surface sweating. The coil rails can be easily removed by taking off the 6 mounting screws from both sides of the cabinet.

3.4 Spool replacement

When replacing the spool, use two wrenches together. Hold one of the wrenches in your right hand to fix the entire pipe, and hold the other handle in your left hand to move upward, and then loosen the nut to replace the spool. It should be noted that the amplitude of cracking should not be too large, and the outward deformation Angle of the pipeline should not be greater than 15°.





The pipe cracking range
cannot be greater than 15°

4. Electrical wiring

Field wiring must comply with the National Electric Code and any applicable local ordinance.

WARNING

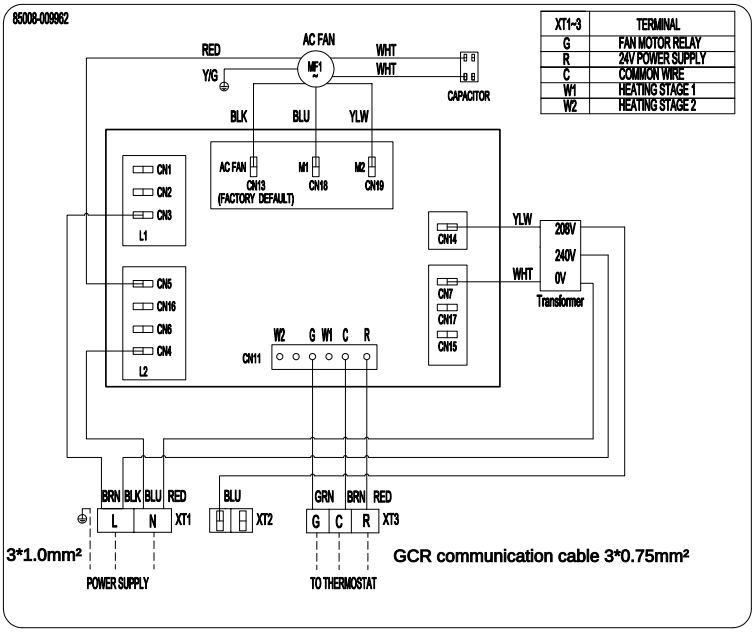
Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to de-energize the equipment. Hazardous voltage can cause severe personal injury or death.

4.1 Power wiring

It is important that proper electrical power is available for connection to the unit model being installed. Refer to the unit nameplate, wiring diagram and electrical data in the installation instructions.

- If required, install a branch circuit disconnect of adequate size, located within sight of, and readily accessible to the unit.
- Supply circuit power wiring must be 167 ˚F minimum copper conductors only. Refer to electrical data in this section for ampacity, wire size and circuit protector requirements. Supply circuit protective devices may be either fuses or “HACR” type circuit breakers.

36K wiring diagram



60K wiring diagram

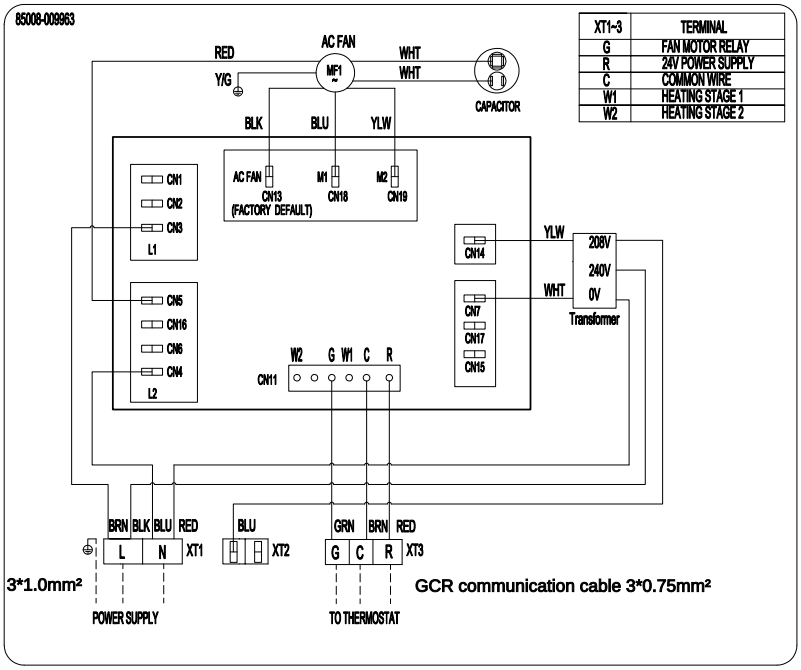
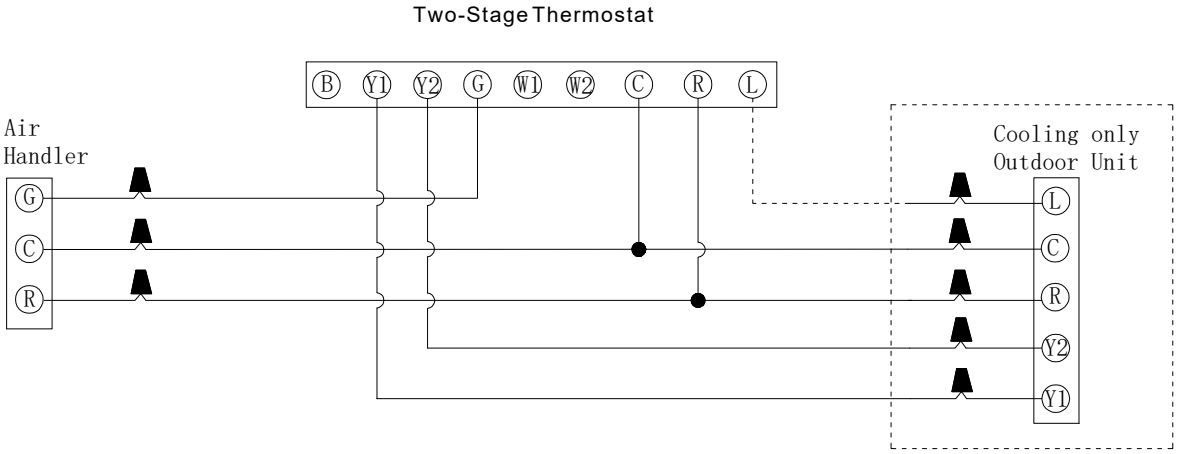


Figure 4-1 Wiring diagram

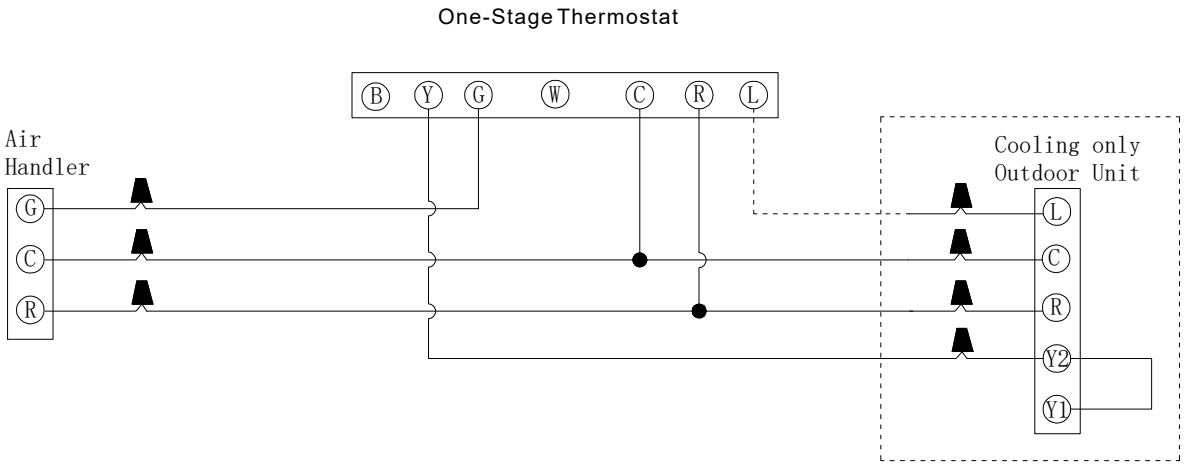
4.2 Control wiring

Class 2 low voltage control wiring should not be run in conduit with main power wiring and must be separated from power wiring, unless class 1 wire of proper voltage rating is used.

- Low voltage control wiring should be color-coded **18 AWG**. For lengths longer than 100 ft, 16 AWG wire shall be used.
- Refer to wiring diagrams attached to indoor and outdoor sections to be connected.
- Make sure separation of control wiring and power wiring has been maintained.



a) Two-Stage thermostat



b) Single-Stage thermostat

Figure 4-2 Schematic diagram for control wiring connection

Table 2. Thermostat terminal definition chart.

Unit Terminal	Terminal defination
R	24VAC power supply for thermostat from secondary transformer.
C	Common wire.
G	Fan motor relay.
Y1	Compressor stage 1, low load-output control.
Y2	Compressor stage 2, high load-output control.
W1	Heating stage 1, electrical heater low load-output control.
W2	Heating stage 2, electrical heater high load-output control.

NOTES:

1. Be sure power supply agrees with equipment nameplate.
2. Power wiring and grounding of equipment must comply with local codes.
3. Low voltage wiring to be No. 18 AWG minimum conductor.
4. For single stage thermostat with Y/Y1 terminal only, place both Y1 and Y2 wire together to Y/Y1 terminal.

4.3 Grounding

WARNING
The unit must be grounded.
Failure to do so can result in electrical shock causing personal injury or death.

- Grounding may be accomplished by grounding metal conduit when installed in accordance with electrical codes to the unit cabinet. Grounding may also be accomplished by attaching ground wire(s) to ground lug(s) provided in the unit wiring compartment.
- Use of multiple supply circuits require grounding of each circuit to lug(s) provided in the unit.

4.4 Electrical data

Table 3. Electrical data

Model	Voltage-Phase-Hz	Motor HP	Minimum Circuit AMPS	MAX overcurrent protective(A)
36K	208-230 1Ph-60Hz	1/3	2.2	2.6
60K		1/2	2.9	4.7

5. Airflow performance

Airflow performance data is based on cooling performance with a coil and no filter in place. Check the performance table for appropriate unit size selection. External static pressure should stay within the minimum and maximum limits shown in the table below in order to ensure proper airflow.

Table 5. Airflow performance data

Model	Motor Speed		SCFM / Watts				
			External Static Pressure-Inches W.C.]				
			0	25	50	75	100
36K	Tap (1)	SCFM	1632	1479	1325	1176	1093
		Watts	368	364	359	354	348
	Tap (2)	SCFM	1710	1542	1374	1272	1071
		Watts	402	396	392	387	381
	Tap (3)	SCFM	1806	1663	1532	1283	1275
		Watts	447	440	435	429	421
60K	Tap (1)	SCFM	1731	1648	1552	1414	1329
		Watts	514	501	489	476	460
	Tap (2)	SCFM	2058	1930	1782	1603	1427
		Watts	575	557	542	523	503
	Tap (3)	SCFM	2316	2183	2030	1860	1685
		Watts	648	627	604	582	559

NOTES: Airflow based upon cooling performance at 230V with no filter.

The air distribution system has the greatest effect on airflow. For this reason, the contractor should use only industry-recognized procedures to finish ductwork.

Heat pump systems require a specified airflow. Each ton of cooling requires between 300 and 450 cubic feet per minute (CFM). Duct design and construction should be carefully done. System performance can be lowered dramatically through bad planning or workmanship. Air supply diffusers must be selected and located carefully. They must be sized and positioned to deliver treated air along the perimeter of the space. Return air grilles must be properly sized to carry air back to the blower as well. Failure to follow these may cause abnormal noise and drafts.

The installers should balance the air distribution system to ensure proper quiet airflow to all rooms in the home. This ensures a comfortable living space. An air velocity meter or airflow hood can give a reading of system CFM.

6. Ductwork

WARNING

Do not, under any circumstances, connect return ductwork to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.

Sheet metal ductwork run in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous ductwork may be used if constructed and installed in accordance with SMACNA Construction Standard on Fibrous Glass Ducts. Ductwork must comply with National Fire Protection Association as tested by U/L Standard 181 for Class I Air Ducts. Check local codes for requirements on ductwork and insulation.

- Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return ductwork, grilles, special filters, accessories, etc. are accounted for in total flow resistance. Refer to the airflow performance table in this manual.
- Supply plenum is attached to the 3/4” duct flanges supplied with the unit.
  Attach flanges around theblower outlet.
- Secure the supply and return ductwork to the unit flanges using proper fasteners for the type of duct used and tape the duct-tounit joint as required to prevent air leaks.

IMPORTANT

If an elbow is included in the plenum close to the unit, it must not be smaller than the dimensions of the supply duct flange on the unit.

The front flange on the return duct connected to the blower casing must not be screwed into the area where the power wiring is located. Drills or sharp screw points can damage insulation on wires located

7. Air filter

Filter application and replacement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the system's major components, such as motor, heat relays, evaporator coil or compressor. Units should be sized for a maximum of 300 feet/min. air velocity or what is recommended for the filter type installed.

Ensure the air flow is in the range of 300~450CFM if adding high efficiency filters or electronic air filtration systems. Note that the overall performance and efficiency of the unit will be reduced because of pressure drop by filters.

IMPORTANT
Do not double filter the return air duct.
Do not filter the supply air duct which will change the performance of the unit and reduce airflow.

WARNING
Do not operate the system without filters. A portion of the dust suspended in the air may temporarily lodge in the duct. Any circulated dust particles could be heated and charred by contact with the air handler elements. This residue could soil ceilings, walls, drapes, carpets and other articles in the house. Soot damage may occur without filters in place when certain types of candles, oil lamps or standing pilots are burned.

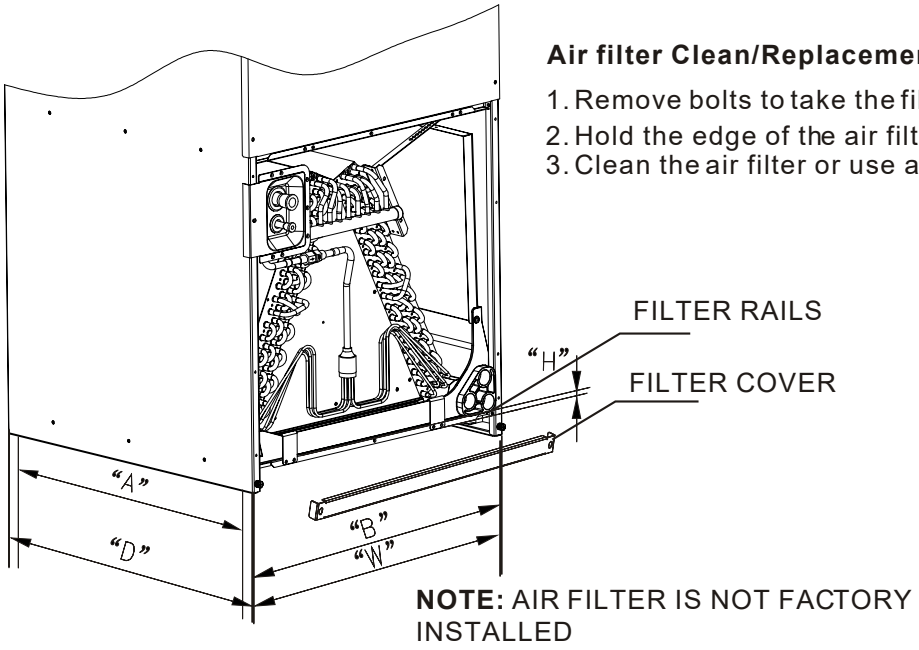


Figure 8-1 Filter installation and clean

Table 6. Filter Dimensions

Model	Dimensions (in.)					
	Filter size	W	D	H	A	B
36K 60K	18 x 20	19-3/4	21	1	16	13-7/8

NOTE:

- Refer to the label on filter cover to install the correct filter size.
- Units built on and prior to Dec 31, 2019.

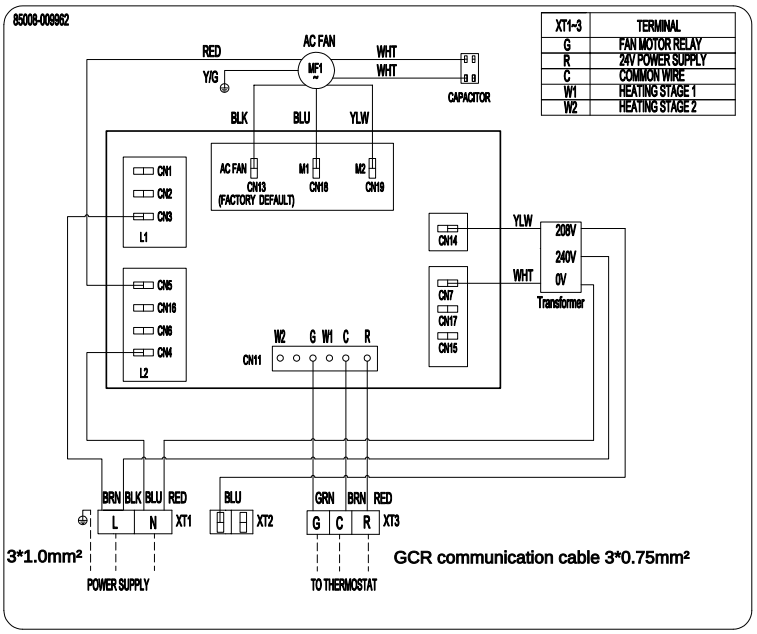
8. Indoor Unit Function

8.1 Indoor fan speed adjustment

This function is for the user in the installation, according to the length of the air duct to determine the best fan speed, so that indoor air supply to achieve the best performance. If the user wants to adjust the fan speed level, the operation is as follows:

The dip-switch for adjusting the fan speed level is located at SW1 of the indoor unit Main PCB, as shown in Figure 9-1. Dip-switch have digital end and “ON” end, The setting of dip-switch is explained as follows:

36K wiring diagram



60K wiring diagram

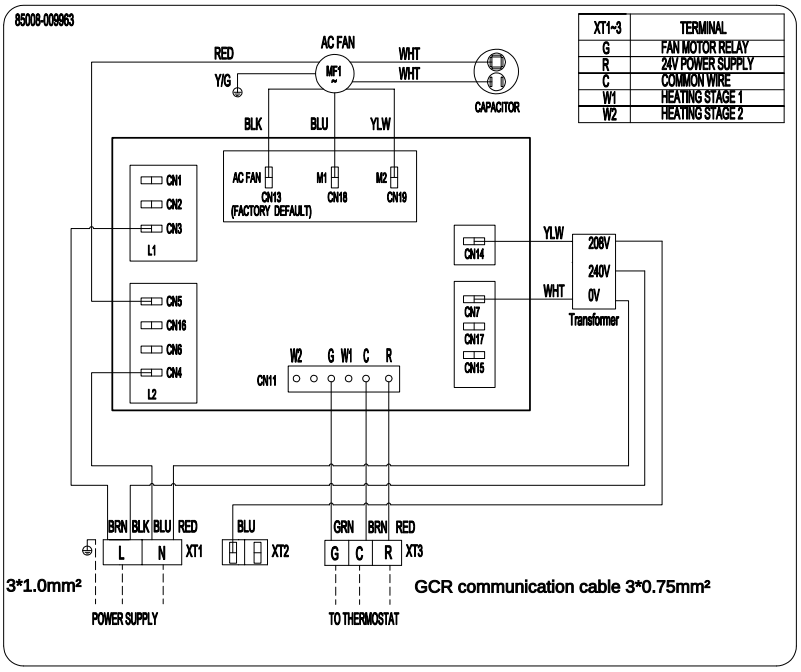


Figure 8 -1 Indoor unit main PCB

NOTE:

For the transformer：If the local voltage is 208V, switch the blue line corresponding to 208V on the transformer and the black line corresponding to 240V on the transformer. This operation is only for "XT1 , XT2, transformer", you can check the wiring diagram of the corresponding model wiring guidelines. Note: Do this after 1 minute of shut down.

About the fan motor：The fan motor has 7 connection lines, corresponding to "white 1, white 2,red,black ,blue and yellow ". The lines that users can operate are black, blue, and yellow. According to the wiring diagram, "AC_FAN (CN13)" printed on the PCB board is the power input. The user can manually switch the wind speed gear of the fan motor according to the actual use to change the air volume. The "black line" is connected to the power input for the highest speed, the "blue line" is connected to the power input for the middle speed, and the "yellow line" is connected to the power input for the low speed. The default wiring is in factory state according to the electrical schematic diagram. If the air volume needs to be changed, you can switch the blue wire (silk screen: M1 (CN18)) or yellow wire (silk screen: M2 (CN19)) and black wire (silk screen: AC_FAN (CN13) on the PCB according to your actual needs. Note: Do not change the connection position of other cable groups.

NOTE - Due to Nōrden's ongoing commitment to quality, specifications, ratings, and dimensions are subject to change without notice and without incurring liability.