



Commercial Manual
CV410 SERIES
Vertical Condensing Unit
2 TON - 6 TON



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Precautions

In this document, you will find a series of key recommendations to ensure proper start-up, efficient operation, and adequate maintenance of your equipment. Preventive care will not only guarantee the optimal functioning of the equipment, but it will also extend its useful life, optimize its performance, and help you save time and money in the long run.

By following these simple maintenance and operation steps, you can keep your HVAC system in the best operating conditions possible, maximizing its energy efficiency and avoiding unnecessary and costly breakdowns. Remember, regular maintenance not only improves comfort in your space, but also contributes to the well-being in general and the safety of everyone who uses it.



DANGER



Incorrect mounting, lifting, or movement may cause damage to the unit, property damage, serious personal injuries, or even death. Consult the weight and center of gravity data indicated in the project documentation to know the weights and center of gravity of the unit.



WARNING



An installation, adjustment, alteration, service, or incorrect maintenance may result in personal injury, death, or property damage. Therefore, all services or maintenance must be performed by a licensed professional contractor or an authorized service agency.



WARNING



Disconnect power source(s) before performing maintenance. Service must be performed by qualified personnel.
Risk of electric shock! May cause injury or death!



WARNING



To prevent the release of refrigerant into the atmosphere, the refrigeration circuit of this unit must be serviced only by technicians who meet local, state, and federal competency requirements.



WARNING



The installation of the system and all components, parts, and associated accessories that form part of the installation must be carried out in accordance with the regulations of ALL pertinent authorities and MUST comply with all applicable codes. It is the responsibility of the contractor/installer to determine and comply with ALL applicable regulations and codes.



WARNING



This device is not designed to be used by persons (including children) with physical, sensory, or mental limitations, or with lack of experience and knowledge, unless they have received supervision or instruction regarding the use of the device by a person responsible for their safety.



WARNING



The lifting angle must not exceed 30 degrees from the vertical, as the unit may become unstable, which could result in unit damage, property damage, serious personal injuries, or death.



WARNING



Keep in mind that the center of gravity is not necessarily located in the geometric center of the unit. Additional lifting elements must not be attached or secured to the unit, as this may affect the center of gravity and cause personal injuries or death, as well as damage to property or the unit. Qualified personnel must determine and verify, according to weight data, the lifting center of the unit, the location of the center of gravity, and lifting details according to the unit configuration.



WARNING



Please note that refrigerants may be odorless.



WARNING



Children must NOT play with the equipment without supervision.



CAUTION



Lifting mechanisms must not come into contact with the unit beyond the lifting points. Care must always be taken when lifting the unit to avoid damaging control panels, unit housings, tubing, and unit structure.



CAUTION



Do not store or install the units in corrosive environments or in places exposed to extreme temperatures or humidity. Corrosive conditions, high temperatures, or humidity can significantly affect performance, reliability, and service life. Always move and store units in a vertical position. Tilting units may cause damage to the equipment.



CAUTION



RISK OF CUT – Failure to follow this precaution may cause personal injury. Metal parts may have sharp edges or burrs. Be careful and use proper protective clothing, safety glasses, and gloves when handling parts and performing unit maintenance to avoid injuries.



CAUTION



To extend equipment life, do not use these units as a heat source during the drying process of construction. Mechanical components and filters may become clogged quickly with dust and construction debris, which may damage the system and void the product warranty.



CAUTION



All three-phase scroll compressors must have their rotation direction verified at startup. Verification is performed by checking the compressor's amperage draw. The current draw will be considerably lower compared to the values on the nameplate. Additionally, reverse rotation generates a higher noise level compared to correct rotation. Reverse rotation will trigger the compressor's internal overload protection within a few minutes. Check the compressor type before proceeding.



NOTICE



Maintenance must be carried out in accordance with the manufacturer's recommendations.



NOTICE



Only install in places not accessible to the general public.

Improper handling due to lack of knowledge of instructions or recommendations contained in this document may cause damage to equipment, reduced performance, and shortened service life. We are not responsible for damage caused by incorrect handling, unauthorized modifications, or consequences arising from using unauthorized modifications that alter the correct operation of the equipment. To guarantee safe and efficient operation, it is essential to follow all recommendations in this manual and use only original spare parts. The manufacturer reserves the right to make technical changes or add updates to improve HVAC system operation.

The following information refers to the CV410 series. The supplied units may have varying characteristics according to customer requirements. For more detailed information about the unit purchased, refer to the technical specifications and the unit's nameplate.

Construction

CV410 series air-cooled condensing units are designed for heavy-duty operation. Their construction ensures a fully stable structure, capable of withstanding and evenly distributing both static and dynamic loads of internal components.

- Manufactured from heavy-gauge galvanized steel sheet, providing high corrosion resistance.
- Single-wall galvanized steel panels.
- Structural base in galvanized steel sheet, providing ease and safety during transport and installation.
- Electrostatic powder coating system: a professional, long-lasting finish ideal for aggressive environments.
- Motor-fan assembly mounted on a galvanized steel structure with anti-vibration supports.
- Modular design that facilitates maintenance and allows for future expansions or adaptations.

Fans and Motors

CV410 condensing units offer a wide variety of fan and motor selection options across different ranges and capacities, ensuring optimal operation according to the user's requirements.

Motors

- Capacities based on design criteria and customer requirements.
- Single-phase or three-phase motor, 220V / 440V
- Protection rating IP54 / IP55
- Optional: suitable for classified areas, explosion-proof applications, or harsh environments
- High-efficiency motors (IE3 / IE4) available to reduce energy consumption

Components

- High-efficiency, low-noise scroll compressor
- High- and low-pressure switches
- 24 V control terminal block
- Condenser Fan:
 - Axial type
 - Direct drive
 - Forward- or backward-curved blades

Air Cooling

The CV410 series is equipped with a copper tube and aluminum fin heat exchanger. Available in various sizes and refrigerant circuit configurations, it provides the appropriate heat transfer area.

- Coils with up to 4 rows for direct expansion
- Fully removable coil
- Available in Copper/Aluminum and Copper/Copper
- Galvanized steel support structure
- Optional: anti-corrosion coating for applications in marine or industrial environments

Control and Operation

- Digital thermostat with programmable scheduling functions
- Optional control system with touchscreen HMI for local monitoring and configuration
- Automatic protections against overcurrent, overpressure, and incorrect phase sequence

Maintenance and Safety

- Front access to all components for inspection and maintenance tasks
- Fans, motors, and coils accessible without the need for special tools
- Warning labels and clear identification of electrical connections and critical components
- Installation and maintenance manual included

CV 410 - 060 - 1 -

Category

CV	Vertical Condenser
CH	Horizontal Condenser
CD	Water Condensing Box
CTW	Through-the-Wall Condenser
CVR	Remote Vertical Condenser
CHR	Remote Horizontal Condenser
CDR	Remote Water Condensing Box
CTWR	Remote Through-the-Wall Condenser
CVHP	Vertical Heat Pump Condenser

Refrigerant

	(Blank) R22
410	R410A
32	R32
290	R290

Nominal Capacity

012	1 Ton	090	7.5 Ton
024	2 Ton	120	10 Ton
036	3 Ton	150	12.5 Ton
048	4 Ton	180	15 Ton
060	5 Ton	210	17.5 Ton
072	6 Ton	240	20 Ton

Power Supply

1	220V / 1PH / 60Hz
2	110V / 1PH / 60Hz
3	220V / 3PH / 60Hz
4	440V / 3PH / 60Hz
5	380V / 3PH / 50Hz
6	480V / 3PH / 60Hz
7	380V / 3PH / 60Hz
8	220V / 3PH / 50Hz
9	440V / 3PH / 50Hz

Revision / Additional Options

	(Blank) No Additional Revisions - Standard Equipment
A	(Letter A - Z) Design Version - Specified on the Drawing / Order / Data Sheet

2 TON

MODEL	CV410-024-1
GENERAL DATA	
Cooling Capacity ^[1] (BTU/h)	24,000
Tons of Refrigeration	2
CONDENSER FAN	
Number of Fans	1
Type	Axial
Number of Motor	1
Current ^[2] (A)	1.0
Power ^[2] (HP)	1 / 6
RPM	1075
Fan Diameter (in)	18
CONDENSER COIL	
Type (Tube / Fin)	Copper / Aluminum
Area (ft ²)	11.33
Rows / Fins per Inch	1 / 19
Liquid Line Piping (Qty.)	3 / 8" (1)
Suction Line Piping (Qty.)	3 / 4" (1)
COMPRESSOR	
Refrigerant	R-410A
Quantity	1
Type	Scroll
RLA ^[3] (A)	12.8 / 14.3
LRA ^[3] (A)	58.3
ELECTRICAL DATA	
V / Ph / Hz	220 / 1 / 60
Operating Current (A)	16.5
Minimum Circuit Ampacity (A)	20.0
Max. Overcurrent Protection (A)	34.5
DIMENSIONS [L x H x W] (mm)	600 x 620 x 600
NET WEIGHT (kg)	57
GROSS WEIGHT (kg)	59

Notes: ¹ Data corresponding to a specific condition. ² This value (A / HP) corresponds to a single fan motor. ³ This value (RLA / LRA) corresponds to a single compressor. ⁴ The information provided in the table is subject to change without prior notice. The unit color may change without prior notice. Condensing unit designed for use with R-410A.

3 TON

MODEL	CV410-036-1	CV410-036-3	CV410-036-4
GENERAL DATA			
Cooling Capacity ^[1] (BTU/h)	36,000	36,000	36,000
Tons of Refrigeration	3	3	3
CONDENSER FAN			
Number of Fans	1	1	1
Type	Axial	Axial	Axial
Number of Motor	1	1	1
Current ^[2] (A)	1.7	1.7	1.3
Power ^[2] (HP)	1 / 4	1 / 4	1 / 3
RPM	1075	1075	1075
Fan Diameter (in)	20	20	20
CONDENSER COIL			
Type (Tube / Fin)	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum
Area (ft ²)	16.2	16.2	16.2
Rows / Fins per Inch	1 / 19	1 / 19	1 / 19
Liquid Line Piping (Qty.)	3 / 8" (1)	3 / 8" (1)	3 / 8" (1)
Suction Line Piping (Qty.)	3 / 4" (1)	3 / 4" (1)	3 / 4" (1)
COMPRESSOR			
Refrigerant	R-410A	R-410A	R-410A
Quantity	1	1	1
Type	Scroll	Scroll	Scroll
RLA ^[3] (A)	16.7 / 18.6	10.4 / 11.6	5.8 / 6.4
LRA ^[3] (A)	79.0	73.0	38.0
ELECTRICAL DATA			
V / Ph / Hz	220 / 1 / 60	220 / 3 / 60	440 / 3 / 60
Operating Current (A)	20.5	13.5	9.0
Minimum Circuit Ampacity (A)	25.5	16.5	10.0
Max. Overcurrent Protection (A)	44.0	28.0	17.0
DIMENSIONS [L x H x W] (mm)	760 x 675 x 760	760 x 675 x 760	760 x 675 x 760
NET WEIGHT (kg)	65	65	65
GROSS WEIGHT (kg)	68	68	68

Notes: ¹ Data corresponding to a specific condition. ² This value (A / HP) corresponds to a single fan motor. ³ This value (RLA / LRA) corresponds to a single compressor. ⁴ The information provided in the table is subject to change without prior notice. The unit color may change without prior notice. Condensing unit designed for use with R-410A.

4 TON

MODEL	CV410-048-1	CV410-048-3	CV410-048-4
GENERAL DATA			
Cooling Capacity ^[1] (BTU/h)	48,000	48,000	48,000
Tons of Refrigeration	4	4	4
CONDENSER FAN			
Number of Fans	1	1	1
Type	Axial	Axial	Axial
Number of Motor	1	1	1
Current ^[2] (A)	2.4	2.4	1.0
Power ^[2] (HP)	1 / 3	1 / 3	1 / 3
RPM	825	825	825
Fan Diameter (in)	22	22	22
CONDENSER COIL			
Type (Tube / Fin)	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum
Area (ft ²)	18.6	18.6	18.6
Rows / Fins per Inch	1 / 19	1 / 19	1 / 19
Liquid Line Piping (Qty.)	3 / 8" (1)	3 / 8" (1)	3 / 8" (1)
Suction Line Piping (Qty.)	7 / 8" (1)	7 / 8" (1)	7 / 8" (1)
COMPRESSOR			
Refrigerant	R-410A	R-410A	R-410A
Quantity	1	1	1
Type	Scroll	Scroll	Scroll
RLA ^[3] (A)	21.8 / 24.3	14.5 / 16.1	6.3 / 7.1
LRA ^[3] (A)	117.0	98.0	18.0
ELECTRICAL DATA			
V / Ph / Hz	220 / 1 / 60	220 / 3 / 60	440 / 3 / 60
Operating Current (A)	27.0	20.0	10.0
Minimum Circuit Ampacity (A)	33.0	23.0	11.5
Max. Overcurrent Protection (A)	60.0	40.0	19.0
DIMENSIONS [L x H x W] (mm)	760 x 800 x 760	760 x 800 x 760	760 x 800 x 760
NET WEIGHT (kg)	79	79	79
GROSS WEIGHT (kg)	82	82	82

Notes: ¹ Data corresponding to a specific condition. ² This value (A / HP) corresponds to a single fan motor. ³ This value (RLA / LRA) corresponds to a single compressor. ⁴ The information provided in the table is subject to change without prior notice. The unit color may change without prior notice. Condensing unit designed for use with R-410A.

5 TON

MODEL	CV410-060-1	CV410-060-3	CV410-060-4
GENERAL DATA			
Cooling Capacity ^[1] (BTU/h)	60,000	60,000	60,000
Tons of Refrigeration	5	5	5
CONDENSER FAN			
Number of Fans	1	1	1
Type	Axial	Axial	Axial
Number of Motor	1	1	1
Current ^[2] (A)	2.4	2.4	1.0
Power ^[2] (HP)	1 / 3	1 / 3	1 / 3
RPM	825	825	825
Fan Diameter (in)	22	22	22
CONDENSER COIL			
Type (Tube / Fin)	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum
Area (ft ²)	20.0	20.0	20.0
Rows / Fins per Inch	1 / 19	1 / 19	1 / 19
Liquid Line Piping (Qty.)	3 / 8" (1)	3 / 8" (1)	3 / 8" (1)
Suction Line Piping (Qty.)	7 / 8" (1)	7 / 8" (1)	7 / 8" (1)
COMPRESSOR			
Refrigerant	R-410A	R-410A	R-410A
Quantity	1	1	1
Type	Scroll	Scroll	Scroll
RLA ^[3] (A)	26.4 / 29.4	16.0 / 17.8	7.8 / 8.6
LRA ^[3] (A)	134.0	110.0	52.0
ELECTRICAL DATA			
V / Ph / Hz	220 / 1 / 60	220 / 3 / 60	440 / 3 / 60
Operating Current (A)	32.0	21.0	10.0
Minimum Circuit Ampacity (A)	40.0	25.0	12.0
Max. Overcurrent Protection (A)	69.0	43.0	21.0
DIMENSIONS [L x H x W] (mm)	760 x 820 x 760	760 x 820 x 760	760 x 820 x 760
NET WEIGHT (kg)	85	85	85
GROSS WEIGHT (kg)	88	88	88

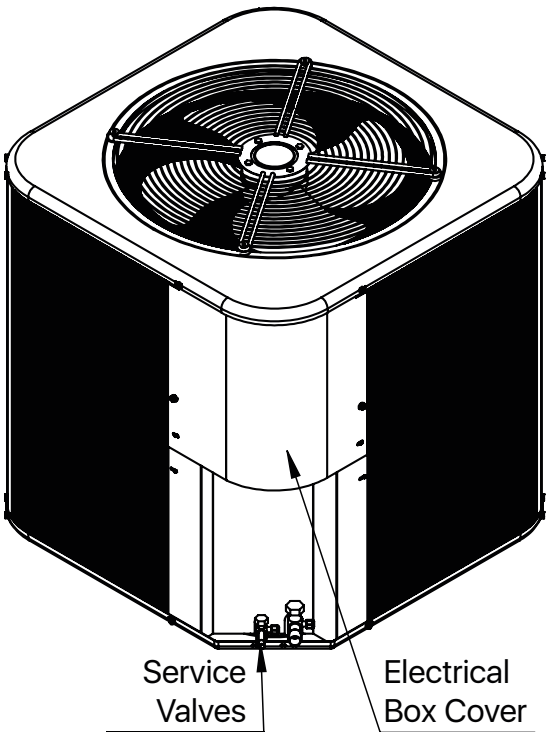
Notes: ¹ Data corresponding to a specific condition. ² This value (A / HP) corresponds to a single fan motor. ³ This value (RLA / LRA) corresponds to a single compressor. ⁴ The information provided in the table is subject to change without prior notice. The unit color may change without prior notice. Condensing unit designed for use with R-410A.

6 TON

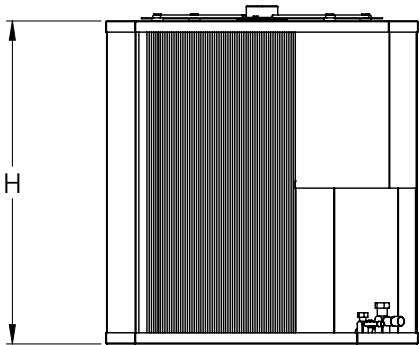
MODEL	CV410-072-1	CV410-072-3	CV410-072-4
GENERAL DATA			
Cooling Capacity ^[1] (BTU/h)	72,000	72,000	72,000
Tons of Refrigeration	6	6	6
CONDENSER FAN			
Number of Fans	1	1	1
Type	Axial	Axial	Axial
Number of Motor	1	1	1
Current ^[2] (A)	2.4	2.4	1.0
Power ^[2] (HP)	1 / 3	1 / 3	1 / 3
RPM	825	825	825
Fan Diameter (in)	22	22	22
CONDENSER COIL			
Type (Tube / Fin)	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum
Area (ft ²)	22.37	22.37	22.37
Rows / Fins per Inch	2 / 17	2 / 17	2 / 17
Liquid Line Piping (Qty.)	3 / 8" (1)	3 / 8" (1)	3 / 8" (1)
Suction Line Piping (Qty.)	7 / 8" (1)	7 / 8" (1)	7 / 8" (1)
COMPRESSOR			
Refrigerant	R-410A	R-410A	R-410A
Quantity	1	1	1
Type	Scroll	Scroll	Scroll
RLA ^[3] (A)	36.9 / 41.1	22.4 / 25.0	10.6 / 11.8
LRA ^[3] (A)	185.0	149.0	75
ELECTRICAL DATA			
V / Ph / Hz	220 / 1 / 60	220 / 3 / 60	440 / 3 / 60
Operating Current (A)	44.0	28.0	13.0
Minimum Circuit Ampacity (A)	54.0	34.0	16.0
Max. Overcurrent Protection (A)	95.0	60.0	28.0
DIMENSIONS [L x H x W] (mm)	950 x 875 x 950	950 x 875 x 950	950 x 875 x 950
NET WEIGHT (kg)	112	112	112
GROSS WEIGHT (kg)	113	113	113

Notes: ¹ Data corresponding to a specific condition. ² This value (A / HP) corresponds to a single fan motor. ³ This value (RLA / LRA) corresponds to a single compressor. ⁴ The information provided in the table is subject to change without prior notice. The unit color may change without prior notice. Condensing unit designed for use with R-410A.

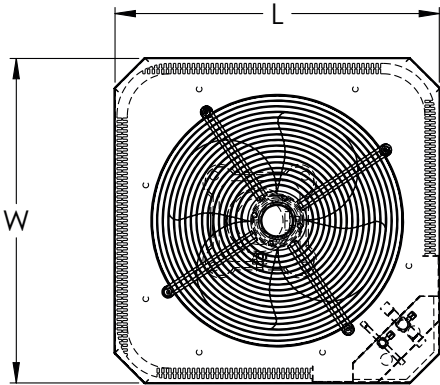
2 TON - 6 TON



Side View



Top View

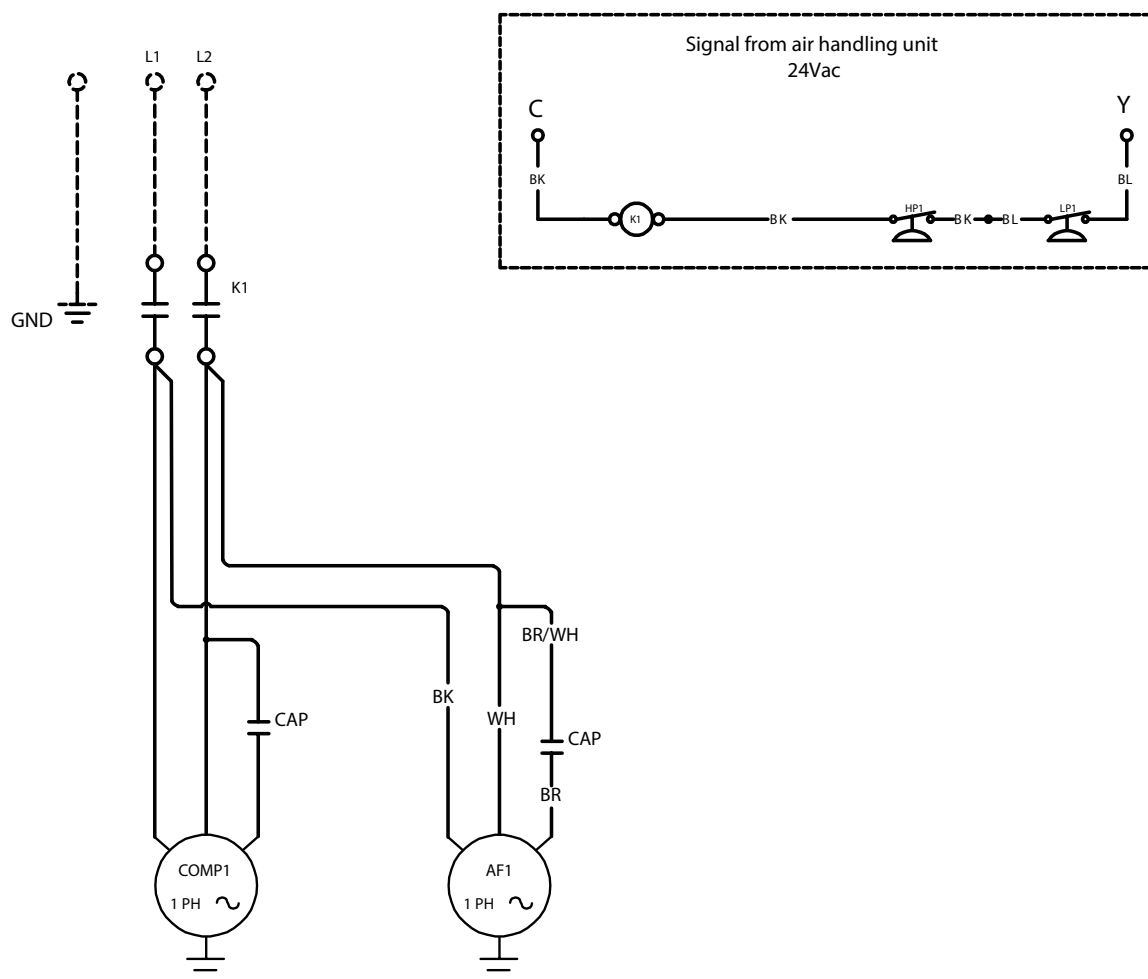


	2 TON	3 TON	4 TON	5 TON	6 TON
H	620	715	770	830	920
W	600	690	760	760	760
L	600	690	760	760	760

Note: All measurements are in millimeters (mm).

While performing the electrical installation, the authorized technician must verify that the electrical circuit of the equipment shown below is in compliance:

220V / 1PH / 60Hz



⚠ WARNING ⚠

High Voltage: Disconnect the power source(s) before performing maintenance. Service must be performed by qualified personnel. Risk of electric shock! May cause injury or death!

Elements:

COMP: Compressor
 K: Contactor
 AF: Axial Fan
 HP: High Pressure Switch
 LP: Low Pressure Switch
 Y: Compressor stage signal
 C: Common
 CAP: Capacitor
 GND: Ground

Colors Code:

BK: Black
 BL: Blue
 BR: Brown
 OR: Orange
 RD: Red
 WH: White
 YL: Yellow
 GR: Green

Factory Wiring:

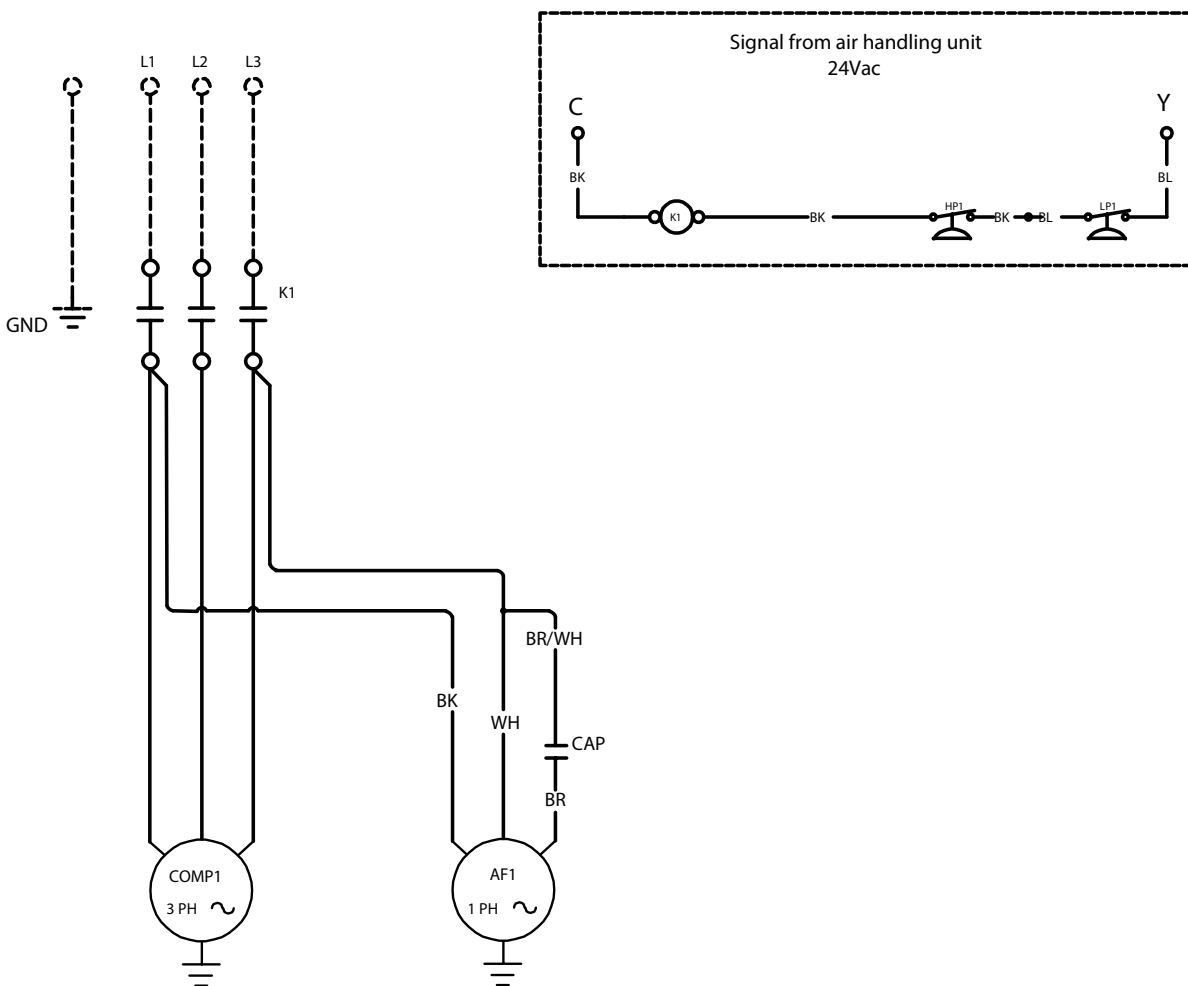
— High Voltage
 — Low Voltage

Field Wiring:

- - - High Voltage
 - - - Low Voltage

While performing the electrical installation, the authorized technician must verify that the electrical circuit of the equipment shown below is in compliance:

220V / 3PH / 60Hz



⚠ WARNING ⚠

High Voltage: Disconnect the power source(s) before performing maintenance. Service must be performed by qualified personnel. Risk of electric shock! May cause injury or death!

Elements:

COMP: Compressor
 K: Contactor
 AF: Axial Fan
 HP: High Pressure Switch
 LP: Low Pressure Switch
 Y: Compressor stage signal
 C: Common
 CAP: Capacitor
 GND: Ground

Colors Code:

BK: Black
 BL: Blue
 BR: Brown
 OR: Orange
 RD: Red
 WH: White
 YL: Yellow
 GR: Green

Factory Wiring:

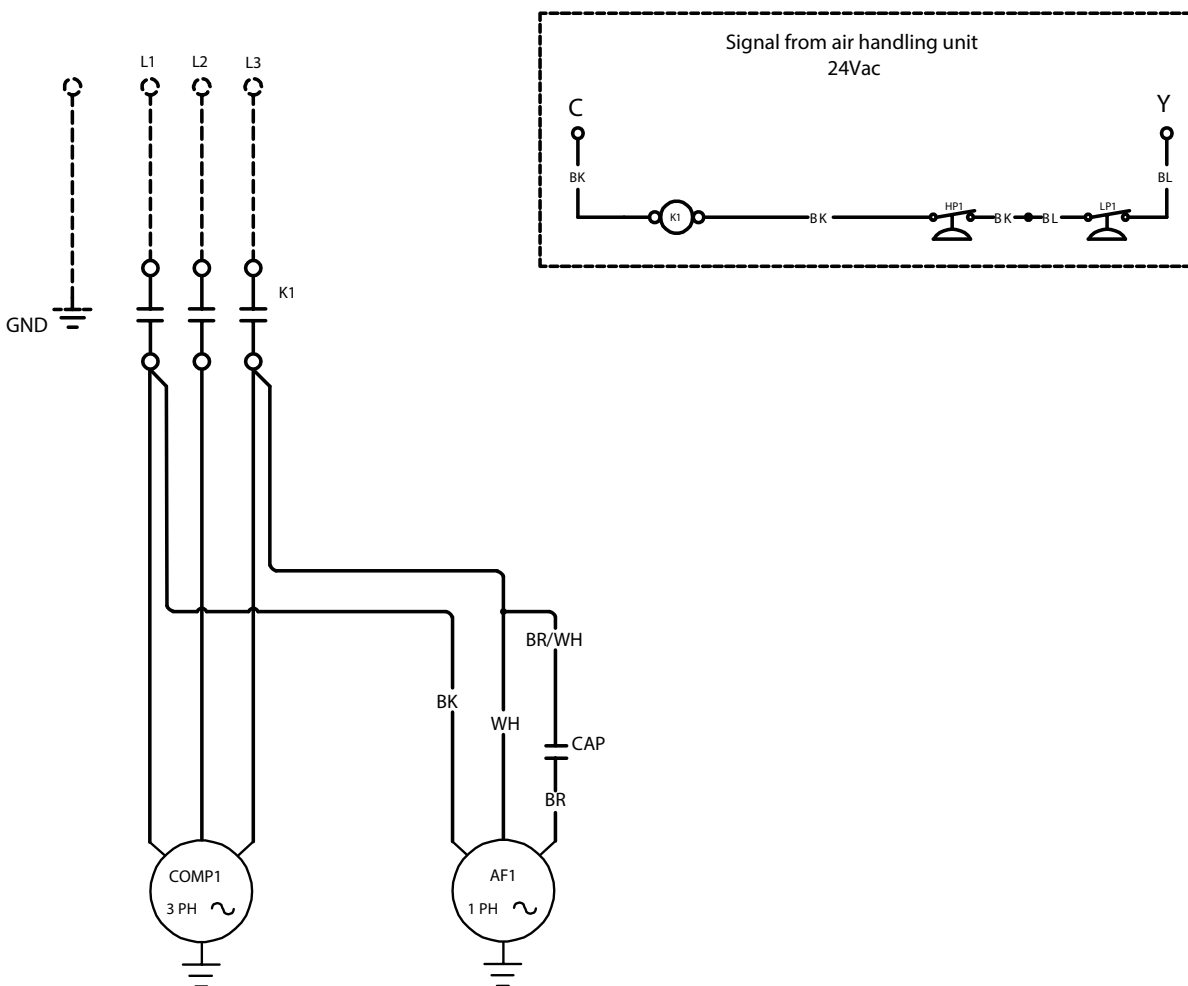
— High Voltage
 — Low Voltage

Field Wiring:

- - - High Voltage
 - - - Low Voltage

While performing the electrical installation, the authorized technician must verify that the electrical circuit of the equipment shown below is in compliance:

440V / 3PH / 60Hz



⚠ WARNING ⚠

High Voltage: Disconnect the power source(s) before performing maintenance. Service must be performed by qualified personnel. Risk of electric shock! May cause injury or death!

Elements:

COMP: Compressor
 K: Contactor
 AF: Axial Fan
 HP: High Pressure Switch
 LP: Low Pressure Switch
 Y: Compressor stage signal
 C: Common
 CAP: Capacitor
 GND: Ground

Colors Code:

BK: Black
 BL: Blue
 BR: Brown
 OR: Orange
 RD: Red
 WH: White
 YL: Yellow
 GR: Green

Factory Wiring:

— High Voltage
 — Low Voltage

Field Wiring:

- - - High Voltage
 - - - Low Voltage

The general conditions that must be considered before installing the equipment:

**WARNING**

Work on the equipment must be carried out exclusively by professionals. Do not connect the power supply until all work has been completed.

**CAUTION**

RISK OF CUT – Failure to follow this precaution may result in personal injury. Metal parts may have sharp edges or burrs. Be careful and use proper protective clothing, safety glasses, and gloves when handling parts and performing maintenance on the air conditioning units.

**NOTICE**

For installation only in areas not accessible to the general public, such as mechanical rooms or rooftops.

IMPORTANT CONSIDERATIONS

1. Electrical installation: All wiring shall be performed by qualified personnel in accordance with applicable local and national codes.
2. Grounding: Follow NEC requirements or applicable local regulations for grounding to ensure safety and protection against faults.
3. Power supply: Verify that the electrical supply complies with the manufacturer's specifications, including voltage stability and adequate current capacity.
4. Surge protection: Install surge protection devices to prevent damage from lightning strikes or electrical fluctuations.
5. Outdoor electrical connections: Use weatherproof enclosures and sealing methods for outdoor electrical connections to prevent corrosion or failure.
6. Safe environment: Select a location away from gases, flammable vapors, or combustible materials that could pose risks during operation or maintenance.
7. Structural support: Ensure the supporting structure is capable of withstanding the total unit weight, including vibration and long-term structural stress.
8. Weight Distribution: Most of the weight is concentrated in the refrigerant condensing section; therefore, the base must be properly reinforced.
9. Seismic restraints (if applicable): In seismic zones, secure the unit with anchors or restraint systems compliant with local codes
10. Unit leveling: Install the unit level to ensure proper performance, efficient drainage, and to prevent operational issues or vibration-related wear.
11. Vibration isolation: Install vibration isolators between the unit and its base to minimize noise transmission and structural vibration.
12. External visual inspection: Inspect the exterior — top panel, access panels, and hardware — for shipping or handling damage.
13. Internal inspection: Perform a visual inspection of internal components for bent fins, loose wiring, or misaligned fans.
14. Equipment verification: Confirm that model number, options, and voltage match the unit nameplate to avoid compatibility or warranty issues.
15. Maintenance Clearance: Maintain the recommended minimum clearance to allow proper access for maintenance and service.
16. Pest protection: Seal cable entries, piping penetrations, and duct openings to prevent the ingress of rodents or insects.
17. Pipe insulation: Insulate refrigerant lines and drain piping to prevent condensation, energy loss, and thermal degradation.
18. Unrestricted airflow: Ensure there are no obstructions in the supply and return air paths to maintain proper circulation and temperature control.
19. Airflow verification: Confirm proper fan and duct airflow before sealing connections to avoid rework.
20. Well-Ventilated Location: Install the condensing unit in an open or well-ventilated area, avoiding enclosed spaces that may restrict heat dissipation.
21. Recommended Minimum Clearance: Ensure the minimum distance between the unit and walls or other structures to facilitate proper airflow and prevent recirculation.
22. Avoid Direct Sun Exposure (if possible): Although not essential, installing the unit in a shaded area or providing sun protection may improve efficiency and extend service life.
23. Noise Control: Verify local noise level regulations and consider acoustic barriers if the unit is installed near occupied areas.
24. Labeling and documentation: Label all wiring and piping. Keep wiring diagrams and manuals accessible near the unit.

The following is a brief description of the steps for system startup and commissioning (to be carried out only by an authorized technician):



WARNING



Never perform work on the equipment without the assistance of qualified professionals. Before making any connection, make sure that the power supply lines are completely disconnected and without energy until all work is fully completed.

STEPS FOR SYSTEM STARTUP:

1. Verify grounding connection: Confirm that the grounding connection is reliable and that the conductor is properly connected to the building's grounding system. Never connect the grounding conductor to gas piping, water piping, telephone lines, or other non-dedicated systems, as this may compromise equipment safety.
2. Ensure adequate electrical capacity: Verify that sufficient electrical capacity is available for proper equipment operation. Confirm that the conductor size complies with the specified current consumption indicated in the technical specifications.
3. Provide power from the breaker panel: Connect the electrical supply to the unit from the main breaker panel. Ensure that the circuit breaker rating is adequate to protect the equipment and prevent overload or internal component damage.
4. Connect power supply lines: Connect the supply conductors to the corresponding terminals. For single-phase units, use terminals labeled L1 and L2. For three-phase units, ensure that phases L1, L2, and L3 are correctly connected within the electrical panel.
5. Tighten all electrical terminals: During transportation or over time, terminals may loosen. Retighten all terminal screws to prevent arcing or electrical faults.
6. Inspect for visible damage or debris: Examine the unit for physical damage, loose panels, or foreign objects inside the cabinet before energizing. Remove any obstruction that may interfere with moving parts or airflow.
7. Inspect drain lines: Ensure that the condensate drain line is free of obstructions and properly routed to prevent overflow or water damage to the unit or building.
8. Connect control wiring: From the unit, connect the control conductors (R, G, Y, and O*, if applicable) as indicated in the electrical panel to the corresponding thermostat terminals to ensure proper system control.
9. Verify all electrical connections: Confirm that all electrical connections are properly made and secured in accordance with the wiring diagrams supplied with the equipment to ensure safe and reliable operation.
10. Verify fan rotation (three-phase units): For three-phase equipment, confirm that the fan or blower motor rotates in the correct direction. If incorrect, interchange any two phases (e.g., L1 and L2) to correct rotation.
11. Activate the switches to start the unit: Once connected, turn on the field-installed disconnect switches to energize the unit. Verify that all connections are correct before proceeding.
12. Verify refrigerant levels: Before operating the unit, confirm that refrigerant levels are within the manufacturer's recommended range. Low refrigerant levels may affect performance, efficiency, and compressor reliability. If levels are incorrect, contact a certified technician.
13. Measure voltage and current at start-up: After energizing, measure supply voltage and operating current to confirm they are within acceptable limits according to the unit nameplate. This helps identify issues such as undervoltage or overcurrent conditions.
14. Test system operation: Once all connections are verified and the unit is energized, test system operation. Set the thermostat to the desired temperature and confirm that the unit cools properly without unusual noise or vibration.
15. Operate unit under observation: Allow the system to operate for at least 15–20 minutes while monitoring pressures, temperatures, and overall performance to detect any early signs of malfunction.
16. Thermostat adjustment: System operation is controlled by the indoor thermostat. Ensure it is set to the desired temperature to maintain indoor comfort conditions.
17. Program thermostat (if applicable): If a programmable thermostat is used, ensure it is properly configured with operating schedules, cooling setpoints, and fan settings.

With proper maintenance and care, your air conditioning unit will operate efficiently and cost-effectively. Before performing any maintenance task, consider the following essential safety precautions:



WARNING



To avoid equipment damage and prevent personal injury or even death, make sure to completely disconnect the power supply before performing any maintenance task. This includes disconnecting power from both indoor and outdoor units. **NOTE:** There may be multiple electrical disconnect switches. Verify and deactivate all of them to ensure your safety.



WARNING



Although special attention has been given to minimizing sharp edges during equipment manufacturing, we recommend handling parts very carefully and avoiding placing hands inside the unit without proper precautions.

MAINTENANCE RECOMMENDATIONS

1. **Electrical Power Supply Inspection:** Periodically check the unit's power supply to ensure proper operation. Monitor the current of the main components according to the equipment's nameplate.
2. **Tighten Electrical Connections:** Inspect and tighten all terminals and electrical connections to prevent arcing, voltage drops, or overheating due to loose or corroded connections.
3. **Inspection and Testing of Capacitors and Contactors:** Check capacitors for bulging or leakage and test contactors to ensure proper operation. Faulty components may cause start-up failures.
4. **Inspection of Safety Controls and Sensors:** Test the operation of safety switches, pressure sensors, and other automatic shutdown systems to ensure proper functioning under emergency or overload conditions.
5. **Operating Pressure Inspection:** Periodically check the system's operating pressures (high and low). Make sure they do not exceed the established ranges for normal operation.
6. **Condenser Coil Inspection:** Check the condition of the condenser coil to ensure there are no obstructions, allowing proper airflow and adequate heat transfer.
7. **Coil Cleaning:** If necessary, clean the coil with a mild detergent solution and rinse with water. This process may require coil removal. Be careful not to damage the fins.
8. **Fan Airflow Verification:** Ensure that the fans operate without obstructions and maintain the proper airflow rate.
9. **Refrigerant Line Insulation Inspection:** Check the refrigerant line insulation for deterioration, which may cause energy loss or reduced cooling performance.
10. **Fan Motor Lubrication (if applicable):** Lubricate fan motors and bearings (for models with serviceable components) according to manufacturer recommendations to prevent overheating or failures.
11. **Check for Unusual Noises or Vibrations:** Listen for abnormal sounds (knocking, humming, squealing) that may indicate loose components or impending failure.
12. **Structural Vibration Inspection:** Check whether the base or supporting structure shows signs of abnormal vibration or loosening.
13. **Condensate Drain Verification:** Ensure that the drain pan and piping are free of obstructions to prevent water accumulation.
14. **Avoid Debris Accumulation:** Do not allow debris to accumulate around or on top of the unit, as this may reduce cooling capacity.
15. **Controller Calibration:** Periodically check and calibrate the controller to ensure accuracy in water return temperature and achieve optimal comfort.
16. **System Shutdown and Restart Test:** Verify that the system shuts down and restarts correctly after a power outage, sensor activation, or controller adjustment.
17. **Firmware or Control Updates (if applicable):** In modern units, check for available control software updates that may improve performance.
18. **Annual comprehensive maintenance:** After one year of operation, perform a complete maintenance inspection of the unit, including verification of the motor, bearings, and shaft condition.
19. **Maintenance Record:** Maintain a detailed maintenance log including dates, responsible technicians, findings, and corrective actions.





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