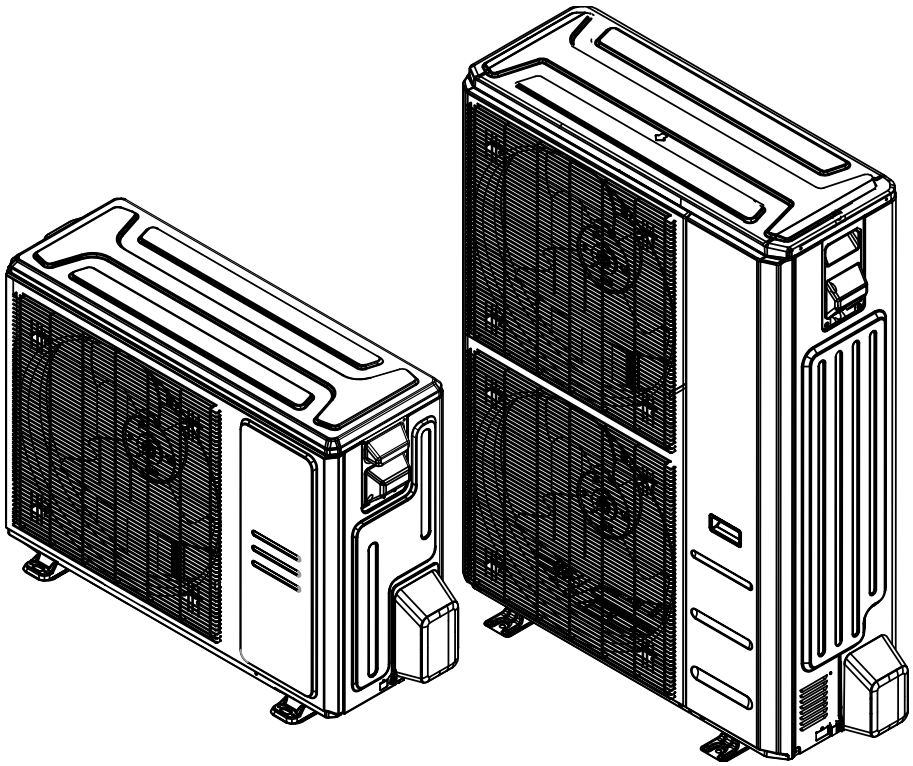
DURASTAR

INSTALLATION MANUAL

Single Zone Side–Discharge Heat Pump: 30K to 60K

DRA1U30S1A, DRA1U36S1A, DRA1U48S1A, DRA1U60S1A

208/230V 1ph 60Hz 24V / RS485 Communicating



Model Number:

Serial Number:

Purchase Date:

Installing Contractor Company Name:

TIP

Capture relevant information about your Durastar mini–split equipment before it is installed and write it above for future reference.

TABLE OF CONTENTS

INTRODUCTION

To better serve you, please do the following before contacting customer service:

- If you received a damaged product, immediately contact the retailer or dealer that sold you the product.
- Read and follow this owner's manual carefully to help you use and maintain your air handler.
- Read the troubleshooting section of this manual as it will help you diagnose and solve common issues.
- Visit us on the web at **WWW.DURASTAR.COM** to download product guides and up-to-date information.
- If you need warranty service, our friendly customer service representatives are available via email at **QUESTIONS@DURASTAR.COM** or by telephone at **1-888-320-0706**.

WARNINGS

Symbols Used in This Manual

The warning symbol indicates cautionary information for the user. Extra care and precautions should be taken to ensure the user's safety.

The pencil indicates any manufacturer notes relating to surrounding content. These may include further clarifications or call-outs.

A light bulb symbol indicates suggested manufacturer tips for the user to get the most out of the Durastar equipment and to accommodate the best user experience.

IMPORTANT SAFETY PRECAUTIONS

Improper handling can cause serious damage or injury. Please read the following safety information in its entirety.

⚠ Operation, Cleaning, and Maintenance Safety Precautions

- Children and people with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, should only use this air handler if they are given supervision and instructions concerning use of the air handler in a safe way and understand the hazards involved.
- Children should not play with the air handler.
- Never stick fingers, other body parts, or other objects into the air inlet or outlet. The internal fan may be rotating at high speeds. This could result in injury.
- Installation and maintenance must be performed by qualified professionals. Otherwise, you may experience personal injury or damage to the air handler and surrounding property.
- If an abnormal situation arises (like a burning smell), immediately turn off the air handler and disconnect power at the circuit breaker immediately. Then contact your dealer or a qualified professional for service.
- Do not climb onto or place objects on top of the outdoor unit.
- Do not install the air handler in a wet room such as a bathroom or laundry room. Too much exposure to water could cause electrical components to short circuit.
- Do not operate the air handler with wet hands. This may cause electric shock.
- Turn off the device and disconnect the power before cleaning. Failure to do so can cause electrical shock.
- Do not clean the air handler with excessive amounts of water.
- Do not clean the air handler with combustible cleaning agents. Combustible cleaning agents can cause fire or deformation.
- Do not use flammable materials such as hair spray, lacquer, or paint near the air handler as they may catch fire.
- Do not operate the air handler in places near combustible gases. Emitted gases may collect around the air handler and cause an explosion.
- Do not use the air handler for any other purpose than its intended use.
- Turn off the air handler if you are not going to use it for a long time.
- Make sure that water can drain unhindered from the unit.
- Do not allow the air handler to operate for long periods of time with doors or windows open, or if the humidity is very high.
- Do not expose your body directly to cool air for a prolonged period of time.
- If the air handler is used together with burners or other heating devices, thoroughly ventilate the room to avoid oxygen deficiency and carbon monoxide build up.
- In certain environments, such as kitchens, server rooms, etc., the use of specially designed air handler units is highly recommended.
- As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

Electrical Safety

WARNING

Before performing any electrical or wiring work, turn off the main power to the system.

- The product must be properly grounded at the time of installation, or electrical shock may occur.
- If there is a serious safety issue with the power supply, stop work immediately. Explain your reasoning to the client, and refuse to install the unit until the safety issue is properly resolved.
- For all electrical work, follow all local and national wiring standards, regulations, and the Installation Manual. Connect cables tightly, and clamp them securely to prevent external forces from damaging the terminal. Improper electrical connections can overheat and cause fire, and may also cause shock. All electrical connections must be made according to the Electrical Connection Diagram located on the panels of the indoor and outdoor units.
- All wiring must be properly arranged to ensure that the control board cover can close properly. If the control board cover is not closed properly, it can lead to corrosion and cause the connection points on the terminal to heat up, catch fire, or cause electrical shock.
- If connecting power to fixed wiring, an all–pole disconnection device which has at least 1/8" (3mm) clearances in all poles, a leakage current that may exceed 10mA, a residual current device(RCD) that has a rated residual operating current not exceeding 30mA, and a disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.
- Only connect the unit to an individual branch circuit. Do not connect another appliance to that circuit.
- No other equipment should be connected to the same power circuit.
- Power voltage should be within 90–110% of rated voltage. Insufficient power supply can cause malfunction, electrical shock, or fire.
- Installation of an external surge suppressor at the outdoor disconnect is recommended.
- The air handler's circuit board (PCB) is designed with a fuse to provide over current protection. The specifications of the fuse are printed on the circuit board.
- Do not let wires touch or rest against refrigerant tubing, the compressor, or any moving parts within the unit.
- To avoid getting an electric shock, never touch the electrical components soon after the power supply has been turned off.
- After turning on the power, always wait 10 minutes or more before you touch the electrical components.
- Make sure that you do not cross your electrical wiring with your signal wiring. This may cause distortion, interference or possibly damage to circuit boards.
- Connect the outdoor wires before connecting the indoor wires.

Installation Safety

- Installation must be performed by an authorized dealer or specialist. Defective installation can cause water leakage, electrical shock, or fire.
- Installation must be performed according to the installation instructions. Improper installation can cause water leakage, electrical shock, or fire. (In North America, installation must be performed in accordance with the requirement of NEC and CEC by authorized personnel only.)
- Contact an authorized service provider for repair or maintenance of this unit. This appliance shall be installed in accordance with national wiring regulations.
- Only use the included accessories, parts, and specified parts for installation. Using non-standard parts can cause water leakage, electrical shock, fire, and can cause the unit to fail.
- Install the unit in a firm location that can support the unit's weight. If the chosen location cannot support the unit's weight, or the installation is not done properly, the unit may fall and cause serious injury and damage.
- Install drainage piping according to the instructions in this manual. Improper drainage may cause water damage to your home and property.
- For units that have an auxiliary electric heater, do not install the unit within three (3) feet of any combustible materials.
- Do not install the unit in a location that may be exposed to combustible gas leaks. If combustible gas accumulates around the unit, it may cause fire.
- Do not turn on the power until all work has been completed.
- When moving or relocating the air handler, consult experienced service technicians for disconnection and re-installation of the unit.
- Excessive Weight Hazard – Use two (2) or more people when moving and installing the unit. Failure to do so can result in back or other type of injury.

OPERATING TEMPERATURES

Your air handler is designed to operate in the following indoor and outdoor temperatures. When your air handler is used outside of the following temperature ranges, certain safety features may activate and turn off the unit to protect it from damage.

TEMPERATURE RANGES

	COOL mode	HEAT mode	DRY mode
Indoor Air Temperature	60°F – 90°F (16°C – 32°C)	32°F – 86°F (0°C – 30°C)	50°F – 90°F (10°C – 32°C)
Outdoor Air Temperature	5°F – 122°F (–15°C – 50°C)	–13°F – 75°F (–25°C – 24°C)	32°F – 122°F (0°C – 50°C)

To further optimize the performance of your unit, do the following:

- Keep doors and windows closed.
- Limit energy usage by using TIMER ON and TIMER OFF features.
- Do not block air inlets or outlets.
- Regularly inspect and clean air filters.

NOTE

Your Durastar air handler's outdoor unit is equipped with a base pan heater, allowing it to continue to operate at freezing temperatures as low as –13°F (–25°C). When outdoor air temperatures are at or below 32°F (0°C), we strongly recommend keeping the unit plugged in at all times to ensure smooth ongoing performance.

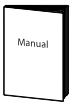
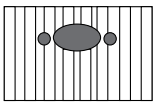
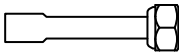
NOTE

Keep the room's relative humidity below 80%. If the air handler operates in excess of this, the surface of the air handler may attract condensation. To help prevent condensation from forming and dripping, set the vertical airflow louver to its maximum angle (vertically to the floor) and set the fan to HIGH.

ACCESSORIES

INCLUDED INSTALLATION ACCESSORIES

The air handler system comes with the following accessories.

Accessory	Quantity	Image	Accessory	Quantity	Image
Installation Manual	1		Drain Joint Seal	1	
Drain Joint	1		Rubber Foot	4	
Braze To Flare Adapter	2				

FIELD SUPPLIED INSTALLATION ACCESSORIES

The following installation accessories may be required and must be purchased separately.

- Refrigerant piping (line set)
- 3/8 Bi-flow Drier
- Indoor and outdoor connection/ thermostat wire
- Outdoor power supply cord and disconnect
- Drain pipe
- Pipe and cable wrapping tape
- Wall hole sleeve and cover
- Unit pad or wall bracket
- Wiring u-lugs

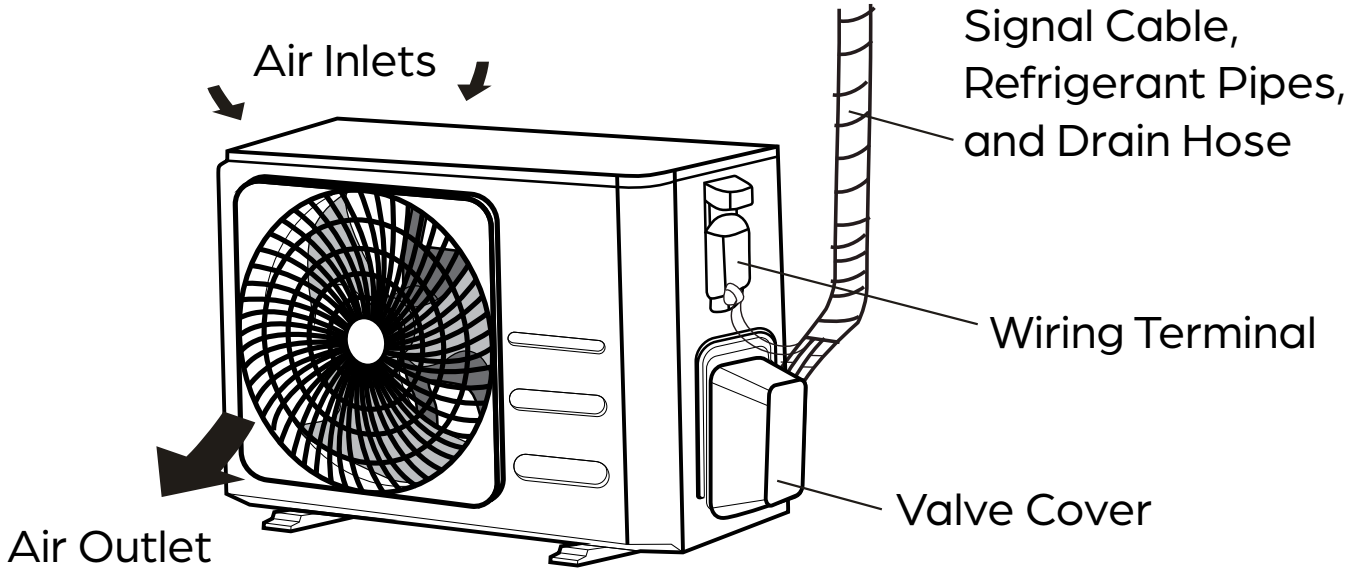
TOOLS NEEDED (OPTIONAL)

The following tools are required for installation.

- Phillips screwdriver
- Drill with 2 1/2" or 3 1/2" hole saw bit (depends on line set size)
- Vacuum pump
- HVAC manifold gauge set
- Micron Gauge
- Refrigerant leak detector
- Copper pipe cutter
- Flaring tool
- Burr reamer
- Crescent or spanner wrench
- Hexagonal wrench set
- Torque wrench
- Multimeter
- Electroprobe
- Level
- Hammer
- Wire strippers
- Wire crimper

PARTS IDENTIFICATION

NOTE
The installation must be performed in accordance with the required local and national standards. The installation may be slightly different in different areas.



NOTE
Illustrations in this manual are for explanatory purposes. The actual shape of your mini-split equipment may vary slightly.

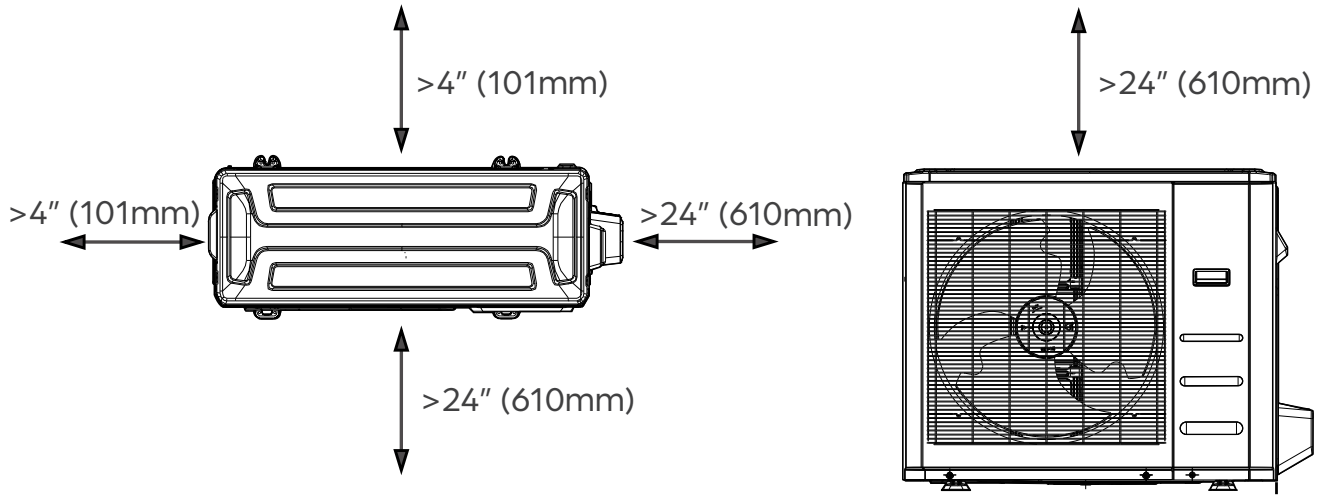
OUTDOOR UNIT INSTALLATION

Installation Instructions

Install the unit following local codes and regulations. These may differ slightly between regions.

STEP 1: SELECT INSTALLATION LOCATION

Before installing the outdoor unit, you must choose an appropriate location. The following are standards that will help you choose an appropriate location for the unit.



Proper installation locations meet the following standards:

- Meets all spatial requirements shown in installation space requirements above.
- Good air circulation and ventilation.
- Firm and solid location —the location can support the unit's weight and will not vibrate.
- Noise from the unit will not disturb others.
- Protected from prolonged periods of direct sunlight or rain.

NOTE

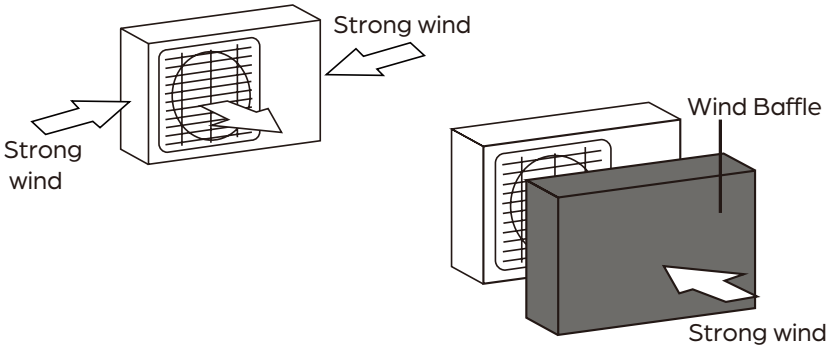
Where snowfall is anticipated, raise the unit above the base pad to prevent ice buildup and coil damage. Mount the unit high enough to be above the average accumulated area snowfall. The minimum height must be 18 inches.

DO NOT install unit in the following locations:

- Near an obstacle that will block air inlets and outlets.
- Near a public street, crowded areas, or where noise from the unit will disturb others.
- Near animals or plants that will be harmed by hot air discharge.
- Near any source of combustible gas.
- In a location that is exposed to large amounts of dust.
- In a location exposed to an excessive amount of salty air.

Special considerations for extreme weather

If the unit is exposed to heavy wind, install the unit so that the air outlet fan is at a 90° angle to the direction of the wind. If needed, build a barrier in front of the unit to protect it from extremely heavy winds. See figures below.

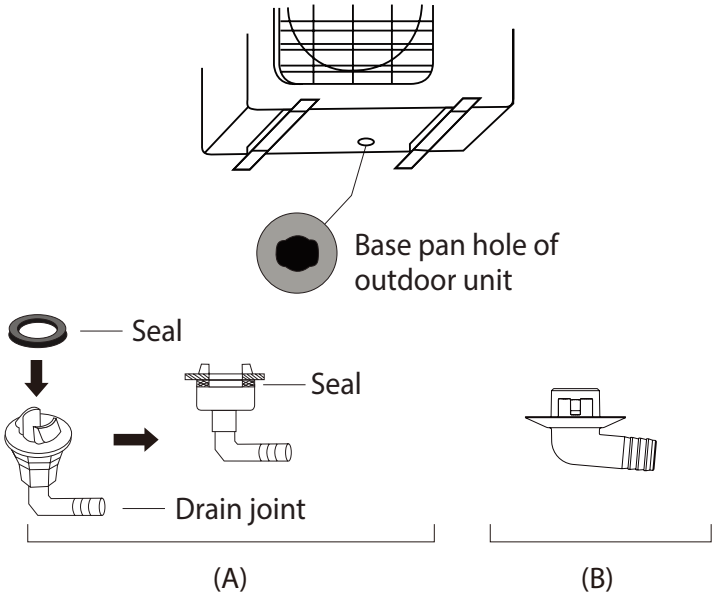


If the unit is frequently exposed to heavy rain or snow

Build a shelter above the unit to protect it from rain or snow. Be careful not to obstruct airflow around the unit.

STEP 2: INSTALL THE DRAIN JOINT

1. Fit the rubber seal on the end of the drain joint that will connect to the outdoor unit.
2. Insert the drain joint into the hole in the base pan of the unit.
3. Rotate the drain joint 90° until it clicks in place facing the front of the unit.
4. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.



NOTE

In cold climates, make sure that the drain hose is as vertical as possible to ensure swift water drainage. If water drains too slowly, it can freeze in the hose and flood the unit.

STEP 3: MOUNT THE OUTDOOR UNIT

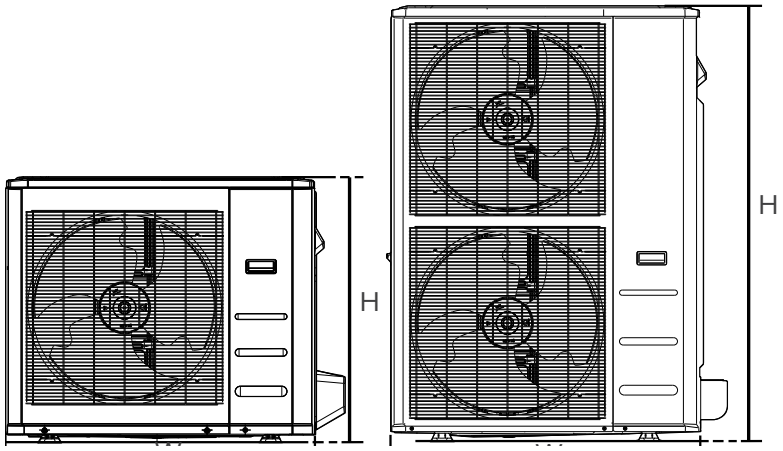
NOTE
The unit should be mounted or raised above the maximum snowfall depth of the region.

Anchoring the Unit

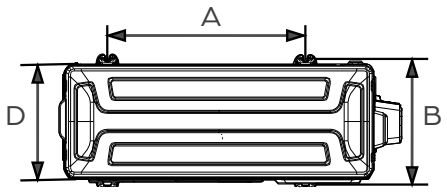
The outdoor unit can be anchored to the ground or to a wall-mounted bracket (sold separately) with bolts (M10). Mount the unit on a cement slab, condenser mounting pad, or other level surface able to support the unit's weight. **Do not place the unit directly on the ground**. If using a wall-mounting bracket, make sure the attached structure can support at least four times the unit's weight.

Unit Mounting Dimensions

The distance between their mounting feet varies by outdoor unit. Prepare the installation base of the unit according to the dimensions below. In most cases, it may be easier to place the outdoor unit in its correct location and mark the exact placement for the anchor holes.



Front View



Top View

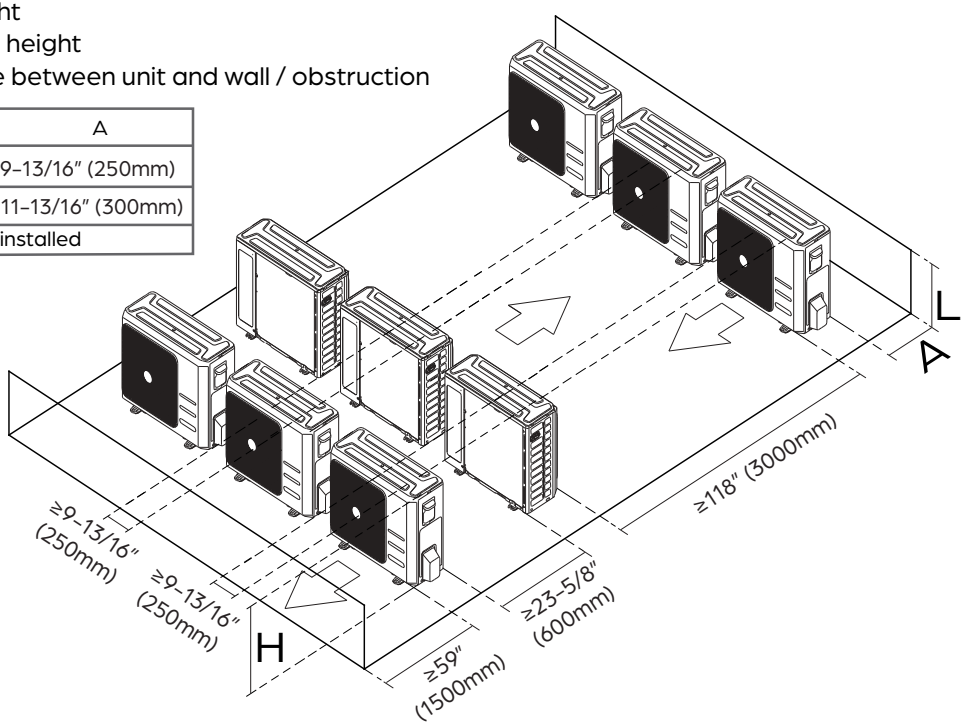
MODEL	OUTDOOR UNIT DIMENSIONS						MOUNTING DIMENSIONS			
	W		H		D		A		B	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
DRA1U30S1A	37-1/4	946	31-15/16	810	16-3/16	410	26.5	673	5-7/8	403
DRA1U36S1A	37-1/4	946	31-15/16	810	16-3/16	410	26.5	673	5-7/8	403
DRA1U48S1A	37-1/2	952	52-1/2	1333	16-3/8	415	24	634	15-15/16	404
DRA1U60S1A	37-1/2	952	52-1/2	1333	16-3/8	415	24	634	15-15/16	404

Installing multiple outdoor units

If installing multiple outdoor units, refer to the diagram below for proper airflow clearances. Please note it is still recommended to leave 24" between units for service.

H = Outdoor unit height
L = Wall / Obstruction height
A = Required distance between unit and wall / obstruction

	L	A
L ≤ H	L ≤ 1/2H	≥9-13/16" (250mm)
	1/2H < L ≤ H	≥11-13/16" (300mm)
L > H	Can not be installed	



REFRIGERANT PIPING CONNECTION

All field piping must be completed by a licensed technician and must comply with the local and national regulations.

In the event of refrigerant leakage, measures should be taken to prevent the refrigerant concentration in the room from exceeding the safe limit. If the refrigerant leaks and its concentration exceeds its proper limit, hazards due to lack of oxygen may result. Ventilate the area immediately.

WARNING

When connecting refrigerant piping, do not let substances or moisture other than specified refrigerant enter the unit or pipes. Run nitrogen through the refrigerant tubing when brazing to avoid carbon build up. The presence of foreign materials will lower the unit's capacity and can cause abnormally high pressure in the refrigeration system. This can result in explosion and personal injury.

REFRIGERANT PIPE LENGTH

The length of refrigerant piping will affect the performance and efficiency of the unit. Nominal efficiency is tested with a pipe length of 25 feet (7.6 meters). A minimum pipe run of 10 feet (3 meters) is required to minimize vibration and excessive noise.

ADDING ADDITIONAL REFRIGERANT

Each outdoor unit is factory charged with enough refrigerant to support up to 25' (7.5m) per zone. This is based on a one way liquid line measurement from the outdoor unit to the indoor unit. Systems with line sets that exceed this length will require additional refrigerant (see the following chart). The refrigerant should be charged from the service port on the outdoor unit's low pressure valve. Additional refrigerant information can be found in the **SUBMITTAL DOCUMENTS** at **WWW.SERVICE.DURASTAR.COM**. Additional refrigerant can be calculated using the following chart and formula: (Actual pipe length – Standard pipe length) x Additional Refrigerant Charge

WARNING

DO NOT mix refrigerant types.

Refrigerant Piping Specifications

Capacity	Refrigerant Connection Size	Standard Length w/ Precharged Refrigerant	Additional Refrigerant Charge	Maximum Length of Piping	Maximum Rise Length
	in (L x G)	ft (m)	oz/ft (g/m)	ft (m)	ft (m)
30k	3/8 x 3/4	25 (7.6)	0.69 (65)	164 (50)	82 (25)
36k	3/8 x 3/4	25 (7.6)	0.69 (65)	213 (65)	98.4 (30)
48k	3/8 x 3/4	25 (7.6)	0.69 (65)	213 (65)	98.4 (30)
60k	3/8 x7/8	25 (7.6)	0.69 (65)	213 (65)	98.4 (30)

NOTE

Adapters are included with the indoor unit and outdoor unit to convert the flared fittings to brazed if necessary.

OIL TRAPS

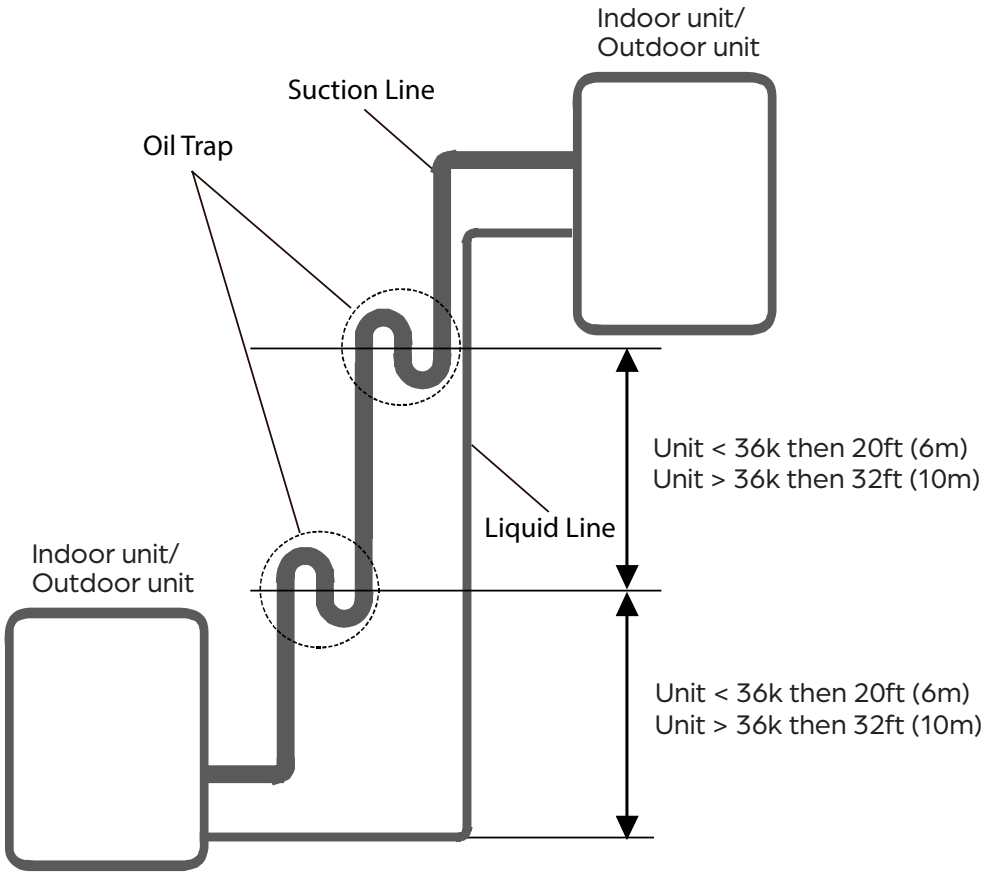
Oil traps are necessary for the continued performance of the system if the indoor and outdoor units are installed at significantly different heights.

CAUTION

If oil flows back into the outdoor unit's compressor, this might cause liquid compression or deterioration of oil return. Oil traps in the rising gas piping can prevent this.

If the unit is **less than** 36000Btu/h an oil trap should be installed every 20ft (6m) of vertical suction line rise.

If the unit is **greater than** 36000Btu/h an oil trap should be installed every 32.8ft (10m)of vertical suction line rise.

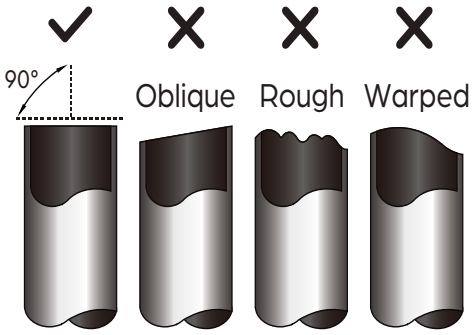


REFRIGERANT PIPE CONNECTION INSTRUCTIONS

STEP 1: CUT PIPES

When preparing refrigerant pipes, take extra care to cut and flare them properly. This will ensure efficient operation and minimize leaks and the need for future maintenance.

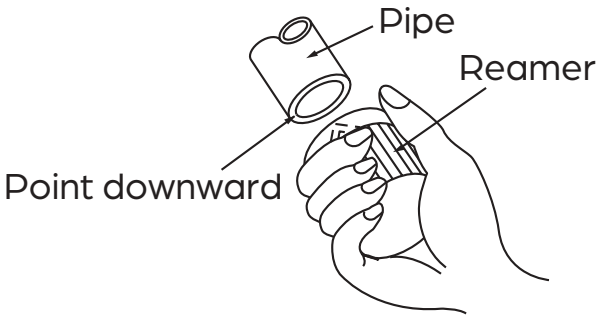
1. Measure the distance between the indoor and outdoor units.
2. Using a pipe cutter, cut the pipe length a little longer than the measured distance.
3. Make sure that the pipe is cut at a perfect 90° angle.
4. Do not damage, deform, or dent the pipe while cutting.



STEP 2: REMOVE BURRS

Burrs can affect the airtight seal of the refrigerant piping connection and must be completely removed.

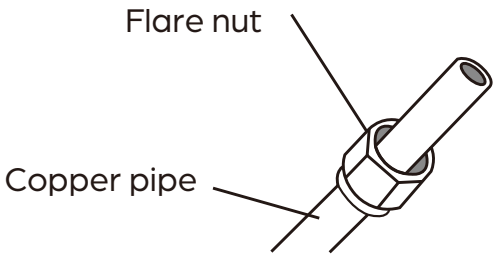
1. Hold the pipe at a downward angle to prevent burrs from falling into the pipe.
2. Using a reamer or deburring tool, remove all burrs from the cut section of the pipe.



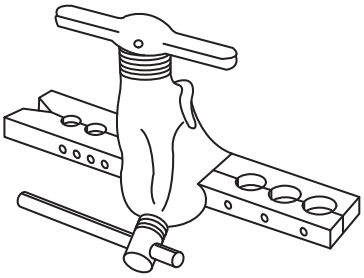
STEP 3: FLARE PIPE ENDS

Proper flaring is essential to achieve an airtight seal.

1. After removing burrs from cut pipe, seal the ends with PVC tape to prevent foreign materials from entering the pipe.
2. Sheath pipe with insulating material.
3. Place flare nuts on both ends of the pipe. Make sure they are facing in the right direction as you cannot change their orientation after flaring.

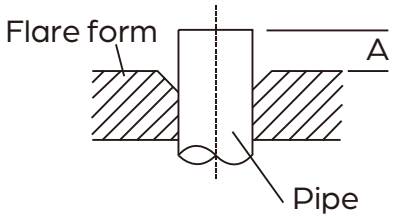


4. Remove PVC tape from ends of pipe when ready to perform flaring.
5. Clamp flare form on the end of pipe. The end of the pipe must extend beyond the edge of the flare form in accordance with the pipe extension table on the next page.



PIPE EXTENSION BEYOND FLARE FORM

Outer Diameter of Pipe Inches (mm)	"A" Minimum Extension Inches (mm)	"A" Maximum Extension Inches (mm)
Ø 3/8" (9.5mm)	0.04" (1.0mm)	0.063" (1.6mm)
Ø 3/4" (19.1mm)	0.078" (2.0mm)	0.094" (2.4mm)
Ø 7/8" (22.0mm)	0.078" (2.0mm)	0.094" (2.4mm)



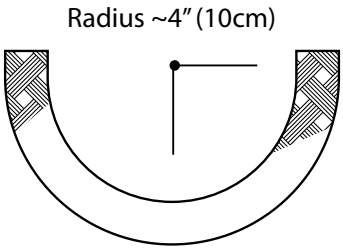
TIP: THICKNESS COMPARISON
- 0.0275" = A Thumbnail
- 0.04" = A Dime
- 0.078" = A Nickle

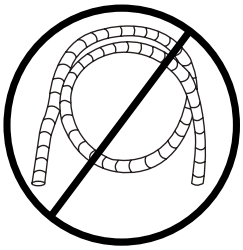
6. Place flaring tool onto the form.
7. Turn the handle of the flaring tool clockwise until the pipe is fully flared.
8. Remove the flaring tool and flare form, then inspect the pipe for cracks and even flaring.

STEP 4: CONNECT PIPES

When connecting refrigerant pipes, be careful not to use excessive torque or to deform the piping in any way. You should first connect the low-pressure pipe, then the high-pressure pipe.

When bending connective refrigerant piping, the minimum bending radius is 4 inches (10cm). Do not leave coils in the refrigerant line sets. Remove excess line length to ensure proper system operation.



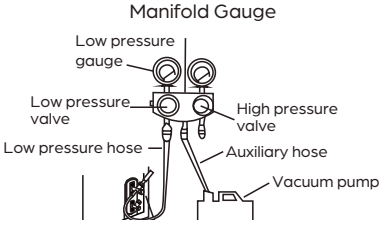


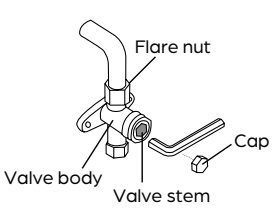
WARNING
Do not leave coils in the refrigerant line sets. All excess line length must be removed to ensure proper system operation.

CONNECTING PIPING TO INDOOR UNIT

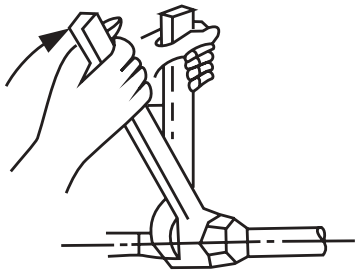
NOTE
It is advised to install a 3/8 **bi-flow** drier on the liquid line near the indoor unit.

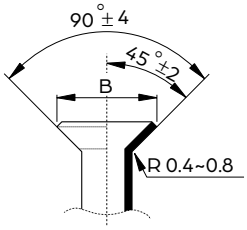
1. Align the center of the two pipes that you will connect.





2. Tighten the flare nut as tightly as possible by hand.
3. Using a spanner, grip the nut on the unit tubing.
4. While firmly gripping the nut on the unit tubing, use a torque wrench to tighten the flare nut according to the torque values in the table below. Loosen the flaring nut slightly, then tighten again.



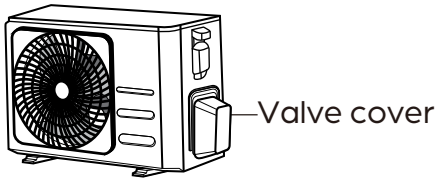
Outer Diameter of Pipe Inches (mm)	Tightening Torque lb–ft (Nm)	Flare Dimension "B" Inches (mm)	Flare Shape
Ø 3/8" (9.5mm)	23.6~28.8 (32~39)	0.52~0.53 (13.2~13.5)	
Ø 3/4" (19.1mm)	49.4~74.5 (67~101)	0.91~0.93 (23.2~23.7)	
Ø 7/8" (22.0mm)	62.7~81.1 (85~110)	1.04~1.06 (26.4~26.9)	

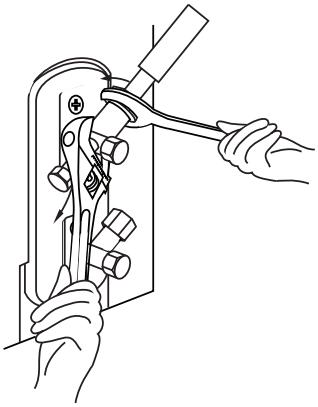
WARNING

Do not use excessive torque. Excessive force can break the nut or damage the refrigerant piping. You must not exceed the torque requirements shown in the table above.

CONNECTING PIPING TO OUTDOOR UNIT

1. Remove the valve cover on the side of the outdoor unit.
2. Remove the protective caps from the ends of the valves.
3. Align flared pipe end with each valve and tighten the flare nut as tightly as possible by hand.
4. Using a spanner, grip the body of the valve. Do not grip the nut that seals the service valve.
5. While firmly gripping the body of the valve, use a torque wrench to tighten the flare nut according to the correct torque values in the table above.
6. Loosen the flare nut slightly, then tighten again.
7. Repeat steps 3–6 for the remaining pipe.





SYSTEM EVACUATION

PREPARATIONS AND PRECAUTIONS

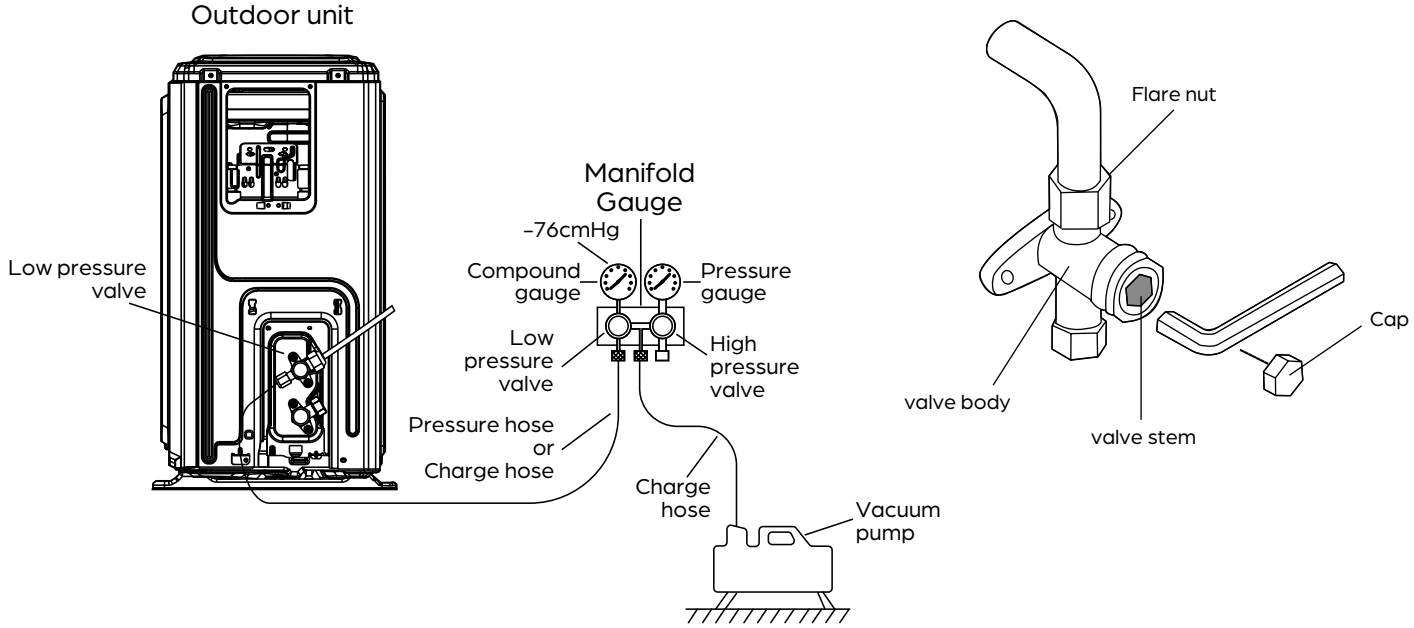
Air and foreign matter in the refrigerant system can cause abnormal rises in pressure, which can damage the air handler, reduce energy efficiency, and cause injury. Use a vacuum pump and manifold gauge to evacuate the refrigerant system, removing any non-condensible gas and moisture from the system. Evacuation should be performed upon initial installation and if unit is relocated.

BEFORE PERFORMING EVACUATION

1. Check to make sure the refrigerant pipes connecting the indoor and outdoor units are connected properly and leak free.

EVACUATION INSTRUCTIONS

1. Connect the charge hose of the manifold gauge to service port on the outdoor unit's low pressure valve.
2. Connect another charge hose from the manifold gauge to the vacuum pump.
3. Open the Low Pressure side of the manifold gauge. Keep the High Pressure side closed.
4. Tighten refrigerant valve caps hand tight plus flat to ensure there are no vacuum leaks.
5. Turn on the vacuum pump to evacuate the system.
6. Run the vacuum for at least 15 minutes until the meter reads -76cmHG(-10 Pa) or 500 microns. (the time will depend on the vacuum pump used)
7. Close the low pressure side of the manifold gauge, and turn off the vacuum pump.
8. Wait for 5 minutes, then check that there has been no change in system pressure.
9. If there is a change in system pressure, check to make sure the brazed and flare fittings are sealed and refer to *Gas Leak Check* section. If there is no change in system pressure, you can proceed.
10. If each unit is shipped with 25ft (7.6m) of refrigerant. If more is necessary, add it through the low pressure service port on the unit.
11. After additional refrigerant is added if necessary, remove the charge hose from the service port and unscrew the cap from the high pressure valve on the unit.



12. Insert hexagonal wrench into the high pressure valve and open the valve by turning the wrench in a 1/4 counterclockwise turn. Listen for gas to exit the system, then close the valve after 5 seconds. (Open the high pressure valve first. Do not try to force the valve to open further).
13. Watch the pressure gauge for one (1) minute to make sure that there is no change in pressure. The pressure gauge should read slightly higher than atmospheric pressure.
14. Using hexagonal wrench, fully open both the high pressure and low pressure valves.
15. Tighten all valve caps to ensure no leaks. You may tighten it further using a torque wrench if needed, being careful not to over tighten.

WIRING THE OUTDOOR UNIT

WARNING
Before performing any electrical or wiring work, turn off the main power to the system.

WARNING
Failure to follow warnings may lead to equipment damage, injury or death.
Field line side wires may remain live, DO NOT perform service or maintenance until the main disconnect is pulled.

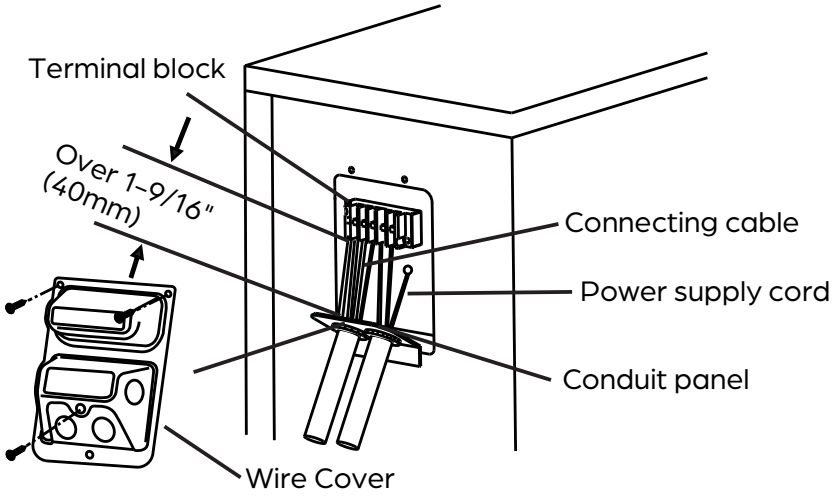
WARNING
While connecting the wires, strictly follow the wiring diagram, and refer to the nameplate for electrical information. Wire according to NEC and local codes.
The refrigerant circuit can become very hot. Keep the interconnection cable away from the copper tube.

Connect the Power Cable

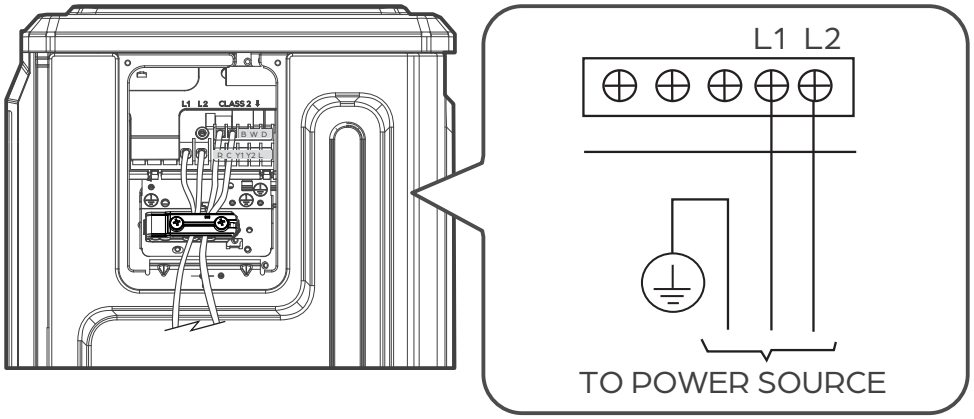
The size of the power supply cable, fuse, and switch needed is determined by the minimum circuit ampacity (MCA) and maximum over current protection (MOCP) of system and the NEC and local codes in your area. Refer to the nameplate and power specification chart.

1. Remove the electrical wiring cover.
2. Remove the caps on the conduit panel.
3. Be sure to cut the wire several inches longer than the required length for future maintenance.
4. Feed the wires through the conduit mounting panel and temporarily mount the conduit tubes (sold separately).
5. Properly connect both the power supply to the corresponding terminals on the terminal block.
6. Ground the unit in accordance with local codes.

(See images on next page.)



Select the appropriate conduit size depending on the size of the wire.



Connect the Signal Cable

The signal cable enables communication between the indoor and outdoor units. You must first choose the right cable size before preparing it for connection. Run a continuous length of cable and avoid splicing the cable.

Cable Sizing

Use the correct size cable depending on the communication type. See the indoor unit installation manual for more information.

- Non-polar RS485 Communication (S1/S2): 16 AWG stranded, shielded
- 24V Communication: 18 AWG/ 8 conductor thermostat wire

NOTE

The use of shielded communication or thermostat wire is not required, but is recommended where separation from high voltage conductors can not be maintained, or in areas with high electrical noise. The shield and drain conductor must be grounded at the outdoor unit and stripped back and taped at the indoor unit. Grounding at both ends results in an increase of noise transmitted onto the signal wires.

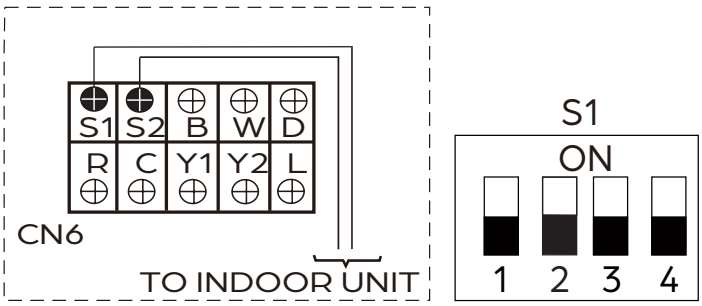
WARNING
Pay attention to the live wire. While crimping wires, make sure you clearly distinguish the Live ("L") Wire from other wires.

Connecting the signal cable

1. Using wire strippers, strip the rubber jacket from both ends of cable to reveal about 1.5" (38–40mm) of the wires inside.
2. Strip the insulation from the ends of the wires.
3. Using a wire crimper, crimp u-lugs on the ends of the wires.
4. Connect the low voltage wires according to desired connection method below. Refer to the wiring diagram and the indoor unit installation manual for more information.

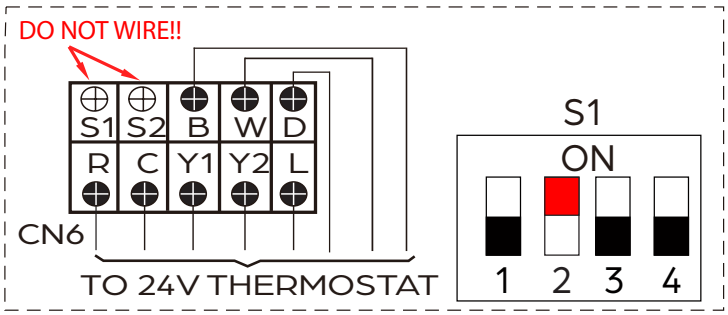
WARNING
All wiring work must be performed strictly in accordance with the wiring diagram. Isolate the power supply leads from the communication wire leads with the strain relief.

Connection Method 1 and 2: RS485 Communication



Connection Method 3: 24V Communication

WARNING
Do not connect 24V AC to S1 – S2, as this will damage the system.



NOTE
The "B" terminal energizes the reversing valve on call for heat. Please ensure that thermostat configuration is set up for B functionality. Note: These methods are for use with a Durastar outdoor unit with 24V communication or with a third party air handler, cased coil, and gas furnace.

Connect the Signal Cable cont.

5. Make sure any unused wired are properly insulated.
6. Permanently secure the conduit tubes to the conduit panel.
7. Replace the wire cover on the side of the unit, and screw it in place.

CONTROL LOGIC

Connector	Purpose
R	24v Power Connection
C	Common
Y1	Low Cooling
Y2	High Cooling
B	Heating Reversing Valve
W	Heating Control
D	Defrost Control
L	System Fault Signal

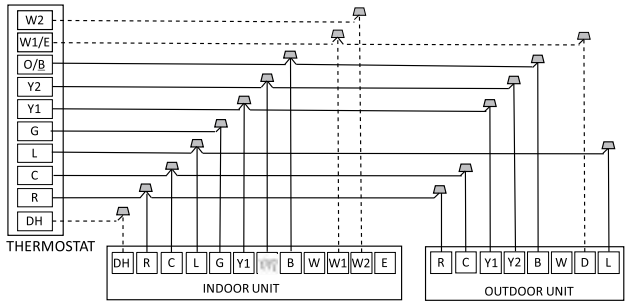
POWER SPECIFICATIONS

Model Number	MCA (A)	MOCP (A)	Voltage Range (V)	Cooling Current (A)	Cooling Input Power (W)	Heating Current (A)	Heating Input Power (W)
DRA1U30S1A	20	35	187–253	13.20	2835	12.40	2795
DRA1U36S1A	24	40	187–253	15.82	3560	15.80	3110
DRA1U48S1A	34	50	187–253	23.20	5320	22.50	5117
DRA1U60S1A	34	60	187–253	29.00	6475	20.90	5085

Connection Method 3 (cont.):

The following wiring diagrams are suitable for the air handler and outdoor with a 24V thermostat.

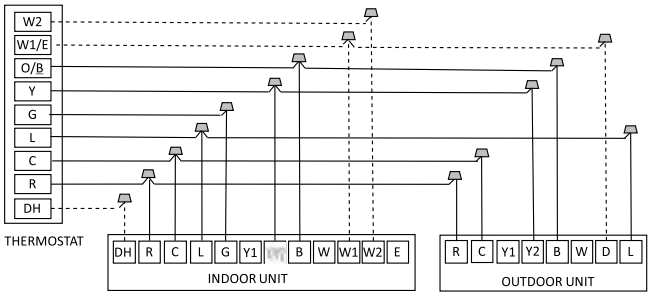
Wiring for 4H and 2C Thermostat



S4-2 Defaults ON: DH function off. Turn switch OFF to activate DH function.

S4-1 Defaults ON: W1 and W2 set for single stage Aux heat. Turn OFF to separate stages.

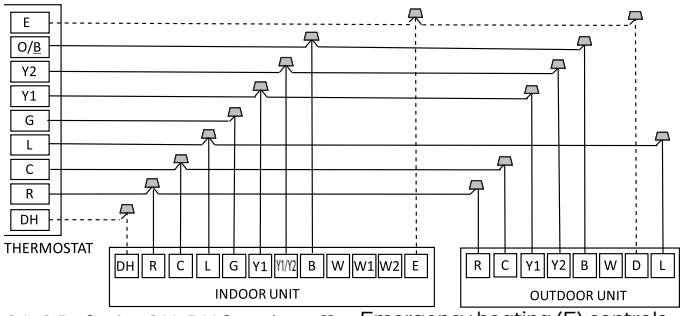
Wiring for 3H and 1C Thermostat



S4-2 Defaults ON: DH function off. Turn switch OFF to activate DH function.

S4-1 Defaults ON: W1 and W2 set for single stage Aux heat. Turn OFF to separate stages.

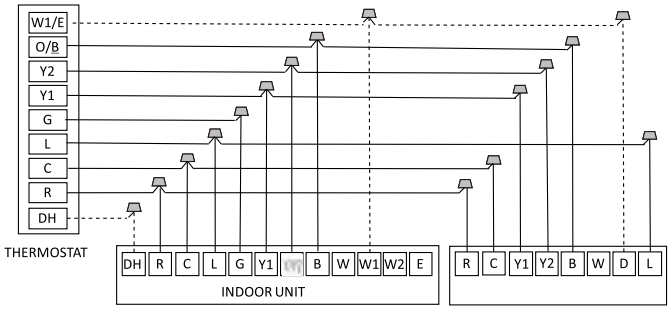
Wiring for 3H and 2C Thermostat



S4-2 Defaults ON: DH function off. Turn switch OFF to activate DH function.

Emergency heating (E) controls two groups of electric heating at the same tme.

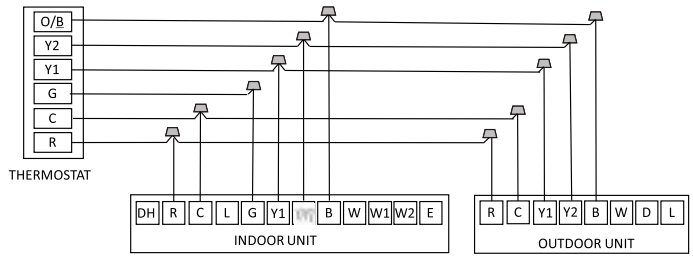
Wiring for 3H and 2C Thermostat



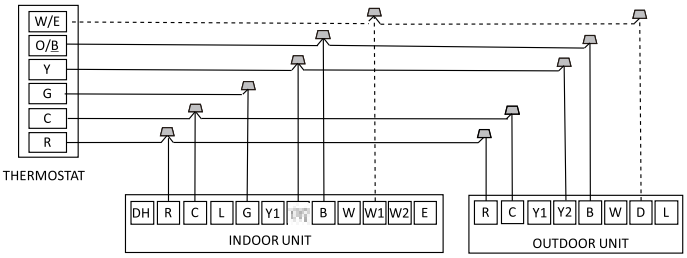
S4-2 Defaults ON: DH function off. Turn switch OFF to activate DH function.

S4-1 Defaults ON: W1 and W2 set for single stage Aux heat. Turn OFF to separate stages.

Wiring for 2H and 2C Thermostat

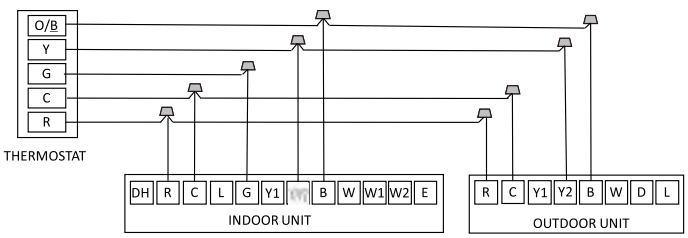


Wiring for 2H and 1C Thermostat

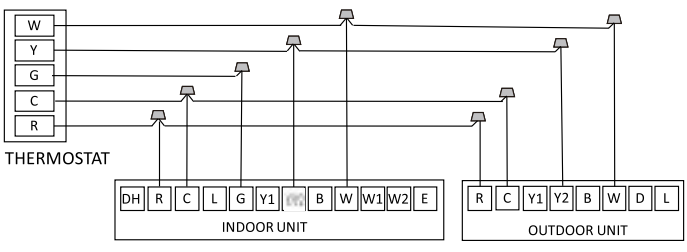


S4-1 Defaults ON: W1 and W2 set for single stage Aux heat. Turn OFF to separate stages.

Wiring for 1H and 1C Thermostat



Wiring for 1H and 1C Thermostat



FINAL CHECKS

BEFORE THE TEST RUN

Only perform the test run after you have completed the following steps:

- Electrical Safety Checks – Confirm that the unit's electrical system is connected and operating correctly.
- Gas Leak Check – Check all flare nut connections and confirm the system is not leaking.
- Confirm that the low and high pressure valves are fully open.
- Check grounding work by measuring the grounding resistance by visual detection and with a multimeter. The grounding resistance must be less than 0.1 Ω.

ELECTRICAL SAFETY CHECKS

After installation, confirm that all electrical wiring is installed in accordance with local and national regulations, and according to this installation manual.

DURING TEST RUN

Using your multimeter, verify the voltage of the main power entering the system. If the main power voltage is greater than ±10% of the name plate voltage, turn off the unit and immediately call a licensed electrician to find and resolve the cause.

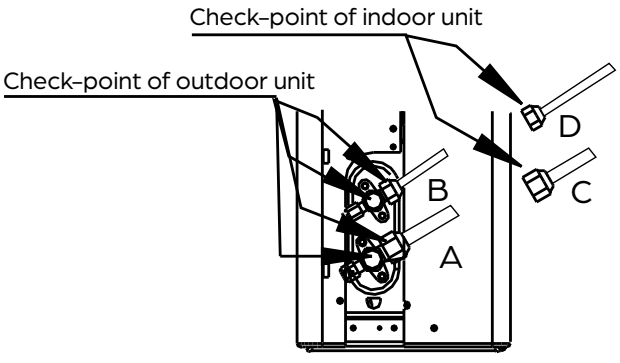
WARNING
RISK OF ELECTRICAL SHOCK – All wiring must comply with local and national electrical codes, and must be installed by a licensed electrician.

GAS LEAK CHECK

There are two methods to check for gas leaks:

1. Soap and Water Method – Using a soft brush, apply a soapy water or liquid detergent to all pipe connection points on the indoor and outdoor unit. The presence of bubbles indicates a leak.
2. Leak Detector Method – If using a leak detector, refer to the device's operation manual for proper usage instructions.

GAS LEAK CHECK POINTS



A: Low pressure stop valve
B: High pressure stop valve
C & D: Indoor unit flare nuts

TIP
Use the Durastar Job Site Information Sheet at the end of this manual as a commissioning report to record your start up readings.

TEST RUN

TEST RUN INSTRUCTIONS

You should perform the test run for at least 30 minutes.

1. Connect power to the unit.
2. Press the ON/OFF button on the remote controller or wired thermostat to turn the unit on.
3. Press the MODE button to scroll through the following functions, one at a time:
   - COOL – Select lowest possible temperature.
   - HEAT – Select highest possible temperature.
4. Let each function run for 5 minutes and perform the following checks:

LIST OF CHECKS TO PERFORM	[X]
Unit is Properly Grounded	[ ]
All Electrical Terminals are Properly Covered	[ ]
Indoor and Outdoor Units are Solidly Installed	[ ]
All Pipe Connection Points Do Not Leak	[ ]
Water Drains Properly from Drain Hose without leaks	[ ]
All Piping is Properly Insulated	[ ]
Unit Performs COOL Function Properly	[ ]
Unit Performs HEAT Function Properly	[ ]
There is no abnormal noise or vibration	[ ]
Indoor Unit Responds to Remote Controller or Thermostat	[ ]

5. Double check all pipe connections. During operation, the pressure of the refrigerant system will increase. This may reveal leaks that were not present during the initial leak check. Take time during the test run to recheck all pipe connection points. Refer to *Gas Leak Check* section for instructions.

TROUBLESHOOTING

SAFETY PRECAUTIONS

If ANY of the following conditions occurs, turn off your unit immediately!

- The power cord is damaged or abnormally warm
- You smell a burning odor
- The unit emits loud or abnormal sounds
- A power fuse blows or the circuit breaker frequently trips
- Water or other objects fall into or out of the unit

DO NOT ATTEMPT TO FIX THESE YOURSELF! CONTACT AN AUTHORIZED SERVICE PROVIDER IMMEDIATELY!

COMMON ISSUES

The following problems are not a malfunction and in most situations will not require repairs.

ISSUE	POSSIBLE CAUSES
Unit does not turn on when pressing ON/OFF button	The unit has a 3-minute protection feature that prevents the unit from overloading. The unit cannot be restarted within three minutes of being turned off.
The unit changes from COOL/HEAT mode to FAN mode	The unit may change its setting to prevent frost from forming on the unit. Once the temperature increases, the unit will start operating in the previously selected mode again.
	The set temperature has been reached, at which point the unit turns off the compressor. The unit will continue operating when the temperature fluctuates again.
The indoor unit emits white mist	In humid regions, a large temperature difference between the room's air and the conditioned air can cause white mist.
Both the indoor and outdoor units emit white mist	When the unit restarts in HEAT mode after defrosting, white mist may be emitted due to moisture generated during the defrosting process.
The indoor unit makes noises	A rushing air sound may occur when the louver resets its position.
	A squeaking sound may occur after running the unit in HEAT mode due to expansion and contraction of the unit's plastic parts.
Both the indoor unit and outdoor unit make noises	Low hissing sound during operation: This is normal and is caused by refrigerant gas flowing through both indoor and outdoor units.
	Low hissing sound when the system starts, has just stopped running, or is defrosting: This noise is normal and is caused by the refrigerant gas stopping or changing direction.
	Squeaking sound: Normal expansion and contraction of plastic and metal parts caused by temperature changes during operation can cause squeaking noises.

ISSUE	POSSIBLE CAUSES
The outdoor unit makes noises	The unit will make different sounds based on its current operating mode.
Dust is emitted from either the indoor or outdoor unit	The unit may accumulate dust during extended periods of non–use, which will be emitted when the unit is turned on. This can be mitigated by covering the unit during long periods of inactivity.
The unit emits a bad odor	The unit may absorb odors from the environment (such as furniture, cooking, cigarettes, etc.) which will be emitted during operations.
	The unit's filters have become moldy and should be cleaned.
The fan of the outdoor unit does not operate	During operation, the fan speed is controlled to optimize product operation.
Operation is erratic, unpredictable, or unit is unresponsive	Interference from cell phone towers and remote boosters may cause the unit to malfunction. In this case, try the following: • Disconnect the power, then reconnect. • Press ON/OFF button on remote control to restart operation.

NOTE
If your problem persists after performing the checks and diagnostics above, turn off your unit immediately and contact an authorized service center.

LED DISPLAY

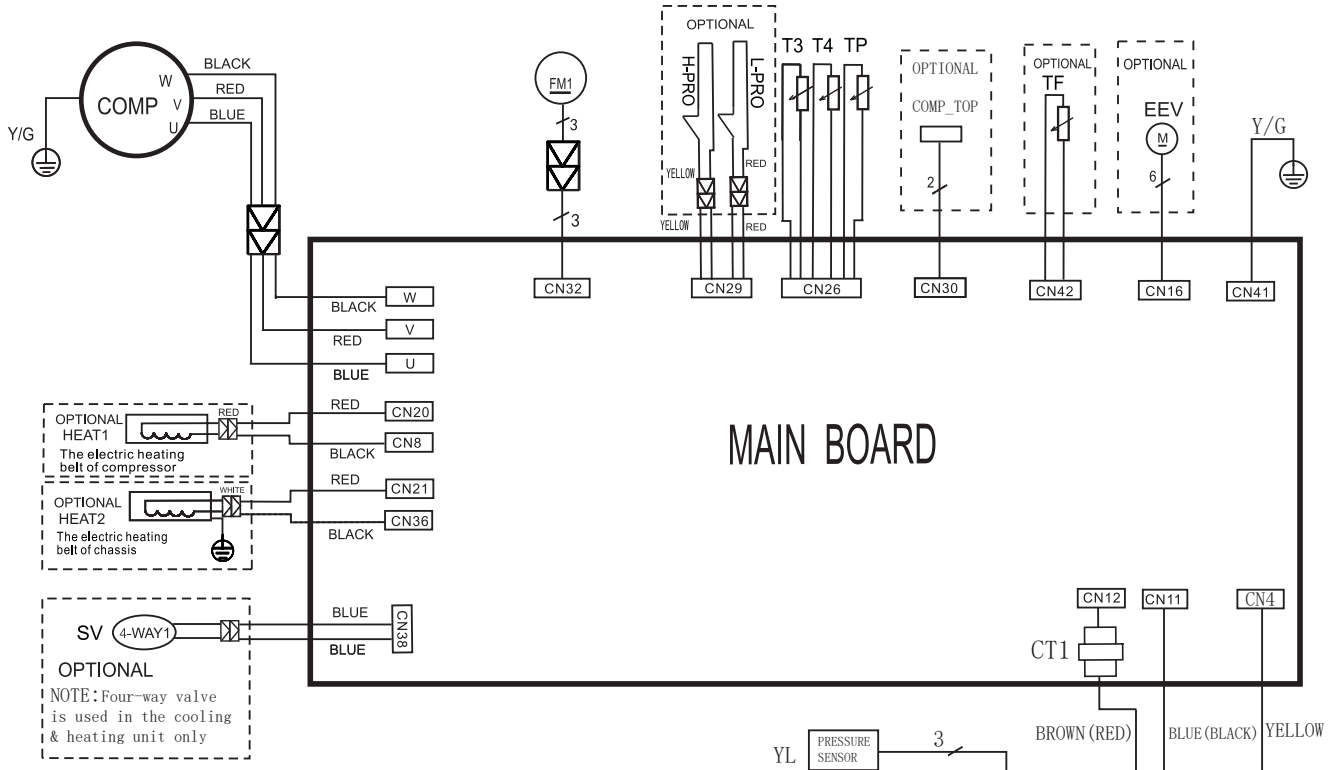
The control displays unit status as well as any active fault codes on the LED display. If the unit is functioning normally, the LED will display current temperature set point. When a fault code is active, the display will flash quickly the active fault code. Please refer to the error code table on the following page.

ERROR AND OPERATING CODES

Error Code	Description
EC 51	Outdoor EEPROM malfunction
EL 01	Indoor / outdoor units communication error
EL 16	Communication malfunction between adapter board and outdoor main board
PC 00	IPM module protection
PC 02	Top temperature protection of compressor or IPM module
PC 06	Temperature protection of compressor discharge
PC 08	Outdoor overcurrent protection
PC 0A	High temperature protection of condenser
PC 0F	PFC module protection
PC 10	Outdoor unit low AC voltage protection
PC 11	Outdoor unit main control board DC bus high voltage protection
PC 12	Outdoor unit main control board DC bus high voltage protection /341 MCE error
PC 30	High pressure protection
PC 31	Low pressure protection
PC 40	Communication malfunction between IPM board and outdoor main board
PC 41	Outdoor compressor current sampling circuit failure
PC 43	Outdoor compressor lack phase protection
PC 44	Outdoor unit zero speed protection
PC 45	Outdoor unit IR chip drive failure
PC 46	Compressor speed has been out of control
PC 49	Compressor overcurrent failure
EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited
EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited
EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited
EC 57	Refrigerant pipe temperature sensor error
EC 5C	High pressure sensor is in open circuit or has short circuited
EC 71	Over current failure of outdoor DC fan motor
EC 72	Lack phase failure of outdoor DC fan motor
EC 73	Zero-speed failure of outdoor DC fan motor
EC 07	Outdoor fan speed has been out of control
PC 0L	Low ambient temperature protection
LC 06	High temperature protection of IPM module
EC 55	Outdoor IPM module temperature sensor fault
PH 90	High temperature protection of evaporator
PH 91	Low temperature protection of evaporator

WIRING DIAGRAMS

DRA1U30S1A & DRA1U36S1A



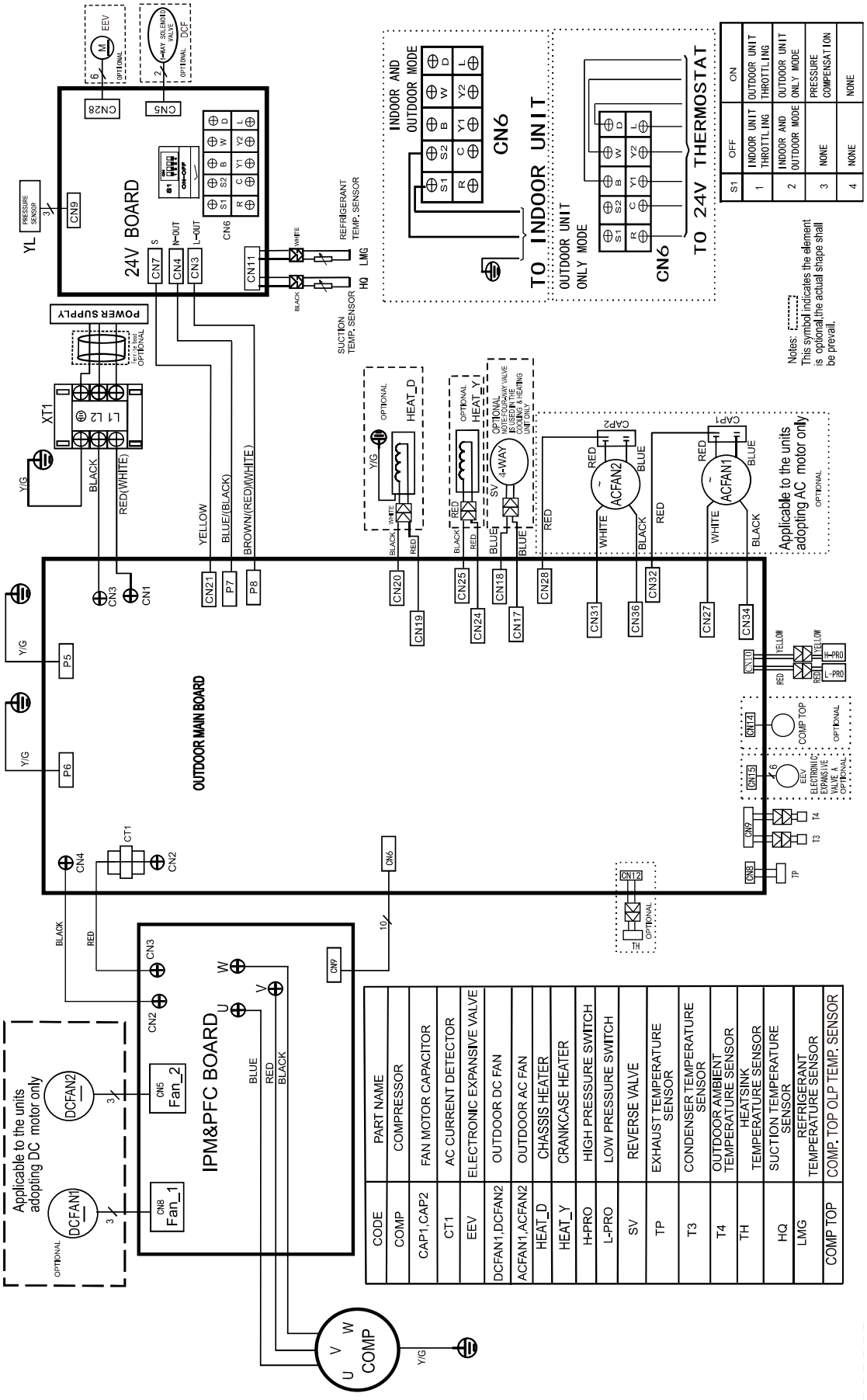
CODE	PART NAME
JX1	TERMINAL BLOCK
COMP_TOP	COMPRESSOR OLP TEMPERATURE SENSOR
EEV	ELECTRIC EXPANSIVE VALVE
FM1	OUTDOOR DC FAN
COMP	COMPRESSOR
HEAT1,HEAT2	CRANKCASE HEATING
CT1	AC CURRENT DETECTOR
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	4-WAY VALVE
TP	EXHAUST TEMPERATURE SENSOR
T3	CONDENSER TEMPERATURE SENSOR
T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
TF	TUBE FOR HEATSINK TEMPERATURE SENSOR
HQ	TUBE FOR SUCTION TEMPERATURE SENSOR
LMG	TUBE FOR REFRIGERANT TEMPERATURE SENSOR

S1	OFF	ON
1	INDOOR UNIT THROTTLING	OUTDOOR UNIT THROTTLING
2	INDOOR AND OUTDOOR MODE	OUTDOOR UNIT ONLY MODE
3	NONE	PRESSURE COMPENSATION
4	NONE	NONE

Notes:

This symbol indicates the element is optional, the actual shape shall be prevail.

DRA1U48S1A & DRA1U60S1A



JOB SITE INFORMATION SHEET

Site Information

Job Name: _____ Installation Date: _____

Address: _____ City: _____ State: _____ Zip: _____

Phone: _____ Email: _____

Contractor Information

Contractor Name: _____ Technician Name: _____

Address: _____ City: _____ State: _____ Zip: _____

Phone: _____ Email: _____

Outdoor Unit (ODU) Information

ODU Model #: _____ ODU Serial #: _____

Unit Location: _____

_____

Indoor Unit (IDU) Information

IDU Model #: _____ IDU Serial #: _____

Unit Type: _____ Unit Location: _____

_____

Refrigerant Line Size (Circle Liquid and Gas Line): 1/4" 3/8" 1/2" 5/8"

Line Set Length: _____

Outdoor Electrical Readings

Line Power Wire Color: L1 _____ L2 _____ G _____

Line Voltage (Power Off): L1 to L2 _____ L1 to G _____ L2 to G _____

Line Voltage (Power On): L1 to L2 _____ L1 to G _____ L2 to G _____

Outdoor to Indoor Electrical Readings

IDU Power/Control Wire Color: 1 _____ 2 _____ 3 _____

Voltage Readings: 1-2 _____ AC 2-3 _____DC

Outdoor Thermal Readings

ODU Discharge: _____°F OD Ambient: _____°F

Gas Line Saturation: _____°F Liquid Line Saturation: _____°F

Indoor Electrical Readings

IDU Power/Control Wire Color: 1 _____ 2 _____ 3 _____

Voltage Readings: 1-2 _____ AC 2-3 _____DC

Indoor Thermal Readings

Return Air: _____°F Supply Air: _____°F Room Air: _____°F

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