Installation and Operation Manual

Navien Air Handler Unit NAS Series (24-60K, R454B)

Model | NASV 24B, 36C, 48D, 59D
NASS 24B, 36C, 48D, 59D

ALWAYS read and follow this manual completely before using the heat pump. This manual should remain with the unit for future reference.

⚠ WARNING

This air handler(Model Series NASS and NASV) is a partial unit air conditioner, complying with partial unit requirements of Standard UL 60335-2-40 / CSAC22.2 No. 60335-2-40, and must only be connected to other units that have been confirmed as complying to corresponding partial unit requirements of Standard UL 60335-2-40 / CSA C22.2 No. 60335-2-40.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Improper installation, operation, or service can damage the heat pump, your home, and other property and can create hazards such as fire, burns, electric shock, and explosion, which can result in serious injury or death.

For use with R-454B outdoor units only. The manufacturer recommends installing only indoor and outdoor systems that are approved and compatible. Read the entire user guide before starting installation.

This appliance must be installed and serviced by a technician qualified under all local and national building codes. Follow all safety codes. Wear safety glasses, protective clothing and work gloves. Use a quenching cloth for brazing operations. Have a dry powder or carbon dioxide fire extinguisher available during installation. Read this manual thoroughly and follow all warnings or cautions contained in the literature and attached to the appliance. Refer to the latest version of your local building code and the National Electrical Code (NEC) NFPA 70. In Canada, refer to the latest version of the Canadian Electrical Code CSA 22.1.

Contents

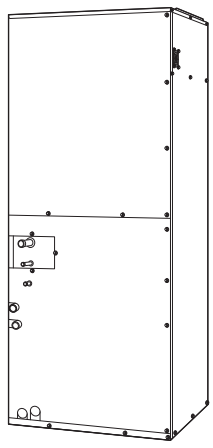
Product Installation Information	
Model	
Date Purchased	
Gas Type	
Serial Number	

1. GENERAL

The following list includes important facts and information regarding the air handler models covered in this manual.

1. Air handler size varies by model.
2. Air handler is designed for A/C or heat pump operation.
3. Air handler is designed for upflow, downflow with field installed kit and horizontal applications.
4. Air handler must not be operated with the access panels removed.
5. Air handler is listed by ETL in the United States and Canada.

2. SAFETY



NASV and NASS Series Multi-Position Air Handlers

This is a safety alert symbol. When this symbol is seen on labels or in manuals, be alert to the potential for personal injury. Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

DANGER: Indicates an imminently hazardous situation, which not avoided, **will result in death or serious injury**.

WARNING: Indicates a potentially hazardous situation, which if not avoided, **could result in death or serious injury**.

CAUTION: Indicates a potentially hazardous situation, which if not avoided, **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving property damage.

⚠ WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance; or for additional information consult a qualified contractor, installer, or service agency.

⚠ WARNING

FIRE OR ELECTRICAL HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage. A fire or electrical hazard may result causing property damage, personal injury or loss of life.

⚠ CAUTION

This air handler must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HFC's) as of July 1, 1992. Approved methods of reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

⚠ WARNING

RISK OF FIRE

This unit is equipped with a refrigerant leak detection system for safety and with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

⚠ WARNING

RISK OF FIRE

Refer to Tables 17 for the minimum floor area of the conditioned space served by this air-handler due to the use of an A2L class flammable refrigerant.

⚠ WARNING

This air handler shall only be connected to an outdoor unit suitable for the same refrigerant.

⚠ WARNING

RISK OF FIRE

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (e.g.: open flames, an operating gas appliance or an operating electric heater).

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

SAFETY REQUIREMENTS

This air handler should be installed in accordance with all national and local building/safety codes and requirements, local plumbing or waste water codes, and other applicable codes. In the absence of local codes, install in accordance with the following codes.

- Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA 90A)
- Standard for the Installation of Warm Air heating and Air Conditioning Systems (NFPA 90B)
- National Electrical Code (NFPA 70)
- Canadian Electrical Code, Part I (CSA C22.2) or ANSI/NFPA No. 70
- All local codes (State, City, and Township)

Note All applicable codes take precedence over any recommendation made in these instructions. Navien assumes no responsibility for air handlers installed in violation of any code or regulation.

1. Refer to the air handler rating plate for the air handler model number and then refer to Figures 1 and Table 2 for return air plenum dimensions that apply to that model number. The plenum must be installed according to the above listed codes or the instructions in this manual.
2. These models are not ETL listed or approved for installation into a Manufactured (Mobile) Home.
3. Provide clearances from combustible materials as listed under **Clearances to Combustibles**.
4. Provide adequate clearances for service access to the control box, indoor coil, hot water coil and blower.
5. Check the rating plate and the power supply to be sure the electrical characteristics match.
6. Failure to carefully read and follow all instructions in this manual can result in malfunction of the air handler, death, personal injury, and/or property damage.
7. The air handler must be installed so the electrical components are protected from water.
8. Installing and servicing heating/cooling equipment can be hazardous due to electrical components.
9. Only trained and qualified personnel should install repair or service heating/cooling equipment. Untrained service Untrained service personnel should only perform basic maintenance functions such as cleaning of

exterior surfaces and replacing the air filters. Observe all precautions in the manuals and on the attached labels when servicing this air handler. These instructions cover minimum requirements and conform to existing national standards and safety codes.

10. These instructions cover minimum requirements and conform to existing national standards and safety codes.
11. In some cases, these instructions exceed certain local codes and ordinances, especially those who have not kept up with changing home and/or HUD construction practices.
12. These instructions are to be followed and are the minimum requirement for a safe installation.
13. The size of the heating and cooling system should be based on an acceptable heat loss/gain calculation for the structure such as ACCA Manual J or other approved methods.
14. Air handler must not be operated with the access panels removed.
15. Confirm the power supply meets the electrical characteristics listed on the air handler rating plate. All models must be connected to a nominal 115 VAC, 1 Phase, 60-Hertz power supply. **DO NOT CONNECT THIS AIR HANDLER TO A 50 HZ POWER SUPPLY OR A VOLTAGE ABOVE 132 VOLTS**.
16. The field ground wire must be securely fastened to the ground lug terminal in the air handler control box.
17. The air handler must be attached to the supporting building structure with screws instead of relying on adhesive.
18. This air handler is for use at elevations of 10,000 ft (3,048m) or less.
19. This air handler is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of this air handler by a person responsible for their safety. Children must not be allowed to play with this air handler.
20. If the main electrical panel supplying electrical power to the air handler utilizes circuit breakers, the circuit breakers must be HACR type.
21. A means of disconnecting all poles of the incoming line voltage power to the air handler must be provided in the fixed field wiring within sight of the air handler unless the air handler is equipped with integral circuit breaker(s) with their ON/OFF lever(s) located on the outside of the air handler which can be used to disconnect line voltage electrical power to the air handler.
22. Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.
23. Installation, servicing and maintenance must only be performed by qualified service personnel that are licensed by the state to install, service, and repair HVAC equipment and those who have successfully completed a course in handling, installing, commissioning, maintenance, servicing, repairing, decommissioning, and disposing of equipment using a flammable refrigerant offered by an accredited national training organization or the manufacturer of the equipment.
24. The use of dropped ceilings for return air is not permitted for this air handler.
25. There are no approved accessories for this air handler with a potential ignition source.

PROPER SAFE WORKING PROCEDURES FOR EQUIPMENT USING FLAMMABLE REFRIGERANTS

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following steps must be completed prior to conducting work on the system.

1) Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed.
2) All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
3) The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants (i.e.: non-sparking, adequately sealed or intrinsically safe).

4) If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

5) No person performing work on a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipmentis to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.

6) Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is being performed. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

7) Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

8) The following checks shall be applied to installations using flammable refrigerants:
   - the actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed;
   - marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
   - refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

9) **Detection of Flammable Refrigerants**
Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

   The following leak detection methods are deemed acceptable for all refrigerant systems.

   Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

   Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

   Note Examples of leak detection fluids are:
   - bubble method,
   - fluorescent method agents.

   If a leak is suspected, all naked flames shall be removed/ extinguished.

   If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Step 10 below.

10) **Removal and Evacuation**
When breaking into the refrigerant circuit to make repairs or for any other purpose, conventional procedures shall be used. However, for flammable refrigerants, it is important that best practice be followed since flammability is a consideration. The following procedure shall be adhered to:
   - safely remove refrigerant following local and national regulations;
   - purge the circuit with inert gas
   - evacuate
   - continuously flush or purge with inert gas when using flame to open circuit,open the circuit

The refrigerant charge shall be recovered into the correct recovery cylinders. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

11) **Charging Procedures**
In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigerating system.
- Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

12) **Refrigerant Recovery Requirements**
When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local regulation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

13) **Commissioning of the System**

- Ensure that the floor area is sufficient for the refrigerant charge or that the ventilation duct is assembled in a correct manner.
- Connect the pipes and perform a leak test before charging with refrigerant.
- Check safety equipment before putting into service.

14) **Maintenance of the Air Handler**

- Ensure sufficient ventilation at the repair place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.

- Reassemble sealed enclosures accurately. If seals are worn, replace them.
- Check safety equipment before putting the air handler into service.

15) **Repair of the Air Handler**
- Ensure sufficient ventilation at the repair place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark.
- When brazing is required, the following procedures shall be performed in the following order:
  - Safely remove the refrigerant following local and national regulations. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building;
  - Purge the refrigerant circuit with oxygen free nitrogen;
  - Evacuate the refrigerant circuit;
  - Remove parts to be replaced by cutting or brazing.
  - Purge the braze point with nitrogen during the brazing procedure required for repair.
  - Perform a leak test before charging with refrigerant.
- Reassemble sealed enclosures accurately. If seals are worn, replace them.
- Check safety equipment before putting the system back into service.

16) **Decommissioning of the Air Handler (Refer to Section 11 of this manual for additional information)**
- If the safety is affected when the equipment is putted out of service, the refrigerant charge shall be removed before decommissioning.
- Ensure sufficient ventilation at the equipment location.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

17) **Disposal of the Air Handler (Refer to Section 11 of this manual for additional information)**
- Ensure sufficient ventilation at the working place.
- Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
- When flammable refrigerants are used,
  - evacuate the refrigerant circuit.
  - purge the refrigerant circuit with oxygen free nitrogen.

⚠ WARNING

RISK OF FIRE

For air handlers using A2L refrigerants connected via an air duct system to one or more rooms, auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 1290°F (700°C) and electric switching devices.

⚠ WARNING

FIRE HAZARD

For air handlers using A2L refrigerants connected via an air duct system to one or more rooms, only auxiliary devices approved by the air handler manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

⚠ WARNING

FIRE HAZARD

For air handlers using A2L refrigerants connected via an air duct system to one or more rooms with a floor area less than shown in Tables 17 based on the total system refrigerant charge, those rooms shall be without continuously operating open flames (e.g.: an operating gas appliance) or other potential ignition sources (e.g.: an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest.

⚠ WARNING

Hot water from a boiler used to satisfy heating requirements can be heated to temperatures of 180°F.

Parts containing hot water can scald very quickly. Use extreme caution when servicing or performing maintenance on any parts containing hot water.

⚠ WARNING

RISK OF FIRE – FLAMMABLE REFRIGERANT APPLICATIONS

If any refrigerating circuit contains more than 62.6 oz (1.776 kg) of R-454B refrigerant an unventilated area where the air-handler is installed using flammable refrigerants is installed shall be so constructed that should any refrigerant leak, it will not stagnate and create a fire or explosion hazard.

⚠ WARNING

ALWAYS SHUT OFF ELECTRICITY AT THE DISCONNECT SWITCH OR TURN OFF THE CIRCUIT BREAKERS IN THE MAIN ELECTRICAL ENTRANCE BEFORE PREFORMING ANY SERVICE ON THE AIR HANDLER.

⚠ WARNING

RISK OF FIRE – FLAMMABLE REFRIGERANT APPLICATIONS

The ductwork connected to this air-handler shall not contain an ignition source.

Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 1292°F (700°C) and electric switching devices.

Only auxiliary devices approved by the air-handler manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

2.1 GENERAL INFORMATION

This air handler provides the flexibility for installation in an upflow, horizontal, or downflow application. The direct-drive variable speed ECM or 5-speed constant torque motors provide a wide selection of air-flow volume to match any application. The air handler can be positioned for bottom air return in the upflow position, top air return in the downflow position, or air return through the end of the air handler in the horizontal position.

Note Refer to the instructions in this manual for instructions on the proper conversion to downflow or left-to-right horizontal configuration.

MAXIMUM OPERATING TEMPERATURE FOR HEAT PUMP APPLICATIONS IN HEATING MODE

For heat pump applications, the maximum outdoor temperature recommended by the manufacturer while the system is operating in the heating mode is 70.0°F/21.1°C.

2.2 INSPECTION

As soon as the air handler is received, it should be inspected for possible shipping damage. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Before installing the coil, inspect the feeder tubes to make sure they are not rubbing against each other or any part of the cabinet. Adjust as required. Check the cabinet for screws which may have loosened during transit. There are no shipping or spacer brackets requiring removal before installation.

See local Distributor for more information. Navien assumes no liability for freight damage.

Check to be sure all accessories that are required for the installation are available. Installation of these accessories should be completed before the air handler is set in place and connected to wiring, ductwork, and piping.

MODEL NUMBER NOMENCLATURE									
	N	A	S	V	36	C	2	T	2
	I	II	III	IV	V	VI	VII	VIII	IX
I	**Brand** N = Navien								
II	**Business Unit** A = Air								
III	**Product** S = Single Piece								
IV	**Blower Motor** S = Constant Torque V = Variable Speed(SECM)								
V	**Capacity** 24 = 24,000 Btu/h 36 = 36,000 Btu/h 48 = 48,000 Btu/h 59 = 60,000 Btu/h								
VI	**Width** A = 14.5″ B = 17.5″ C = 21.0″ D = 24.5″								
VII	**Refrigerant** 1 = R410A 2 = R454B								
VIII	**Expansion Device** F = Fixed Orifice T = TXV E = EEV								
IX	**Volatage** 2 = 208/230V, 1-phase 3 = 230V, 3-phase 4 = 460, 3-phase								

Table 1. Air Handler Model Number Nomenclature

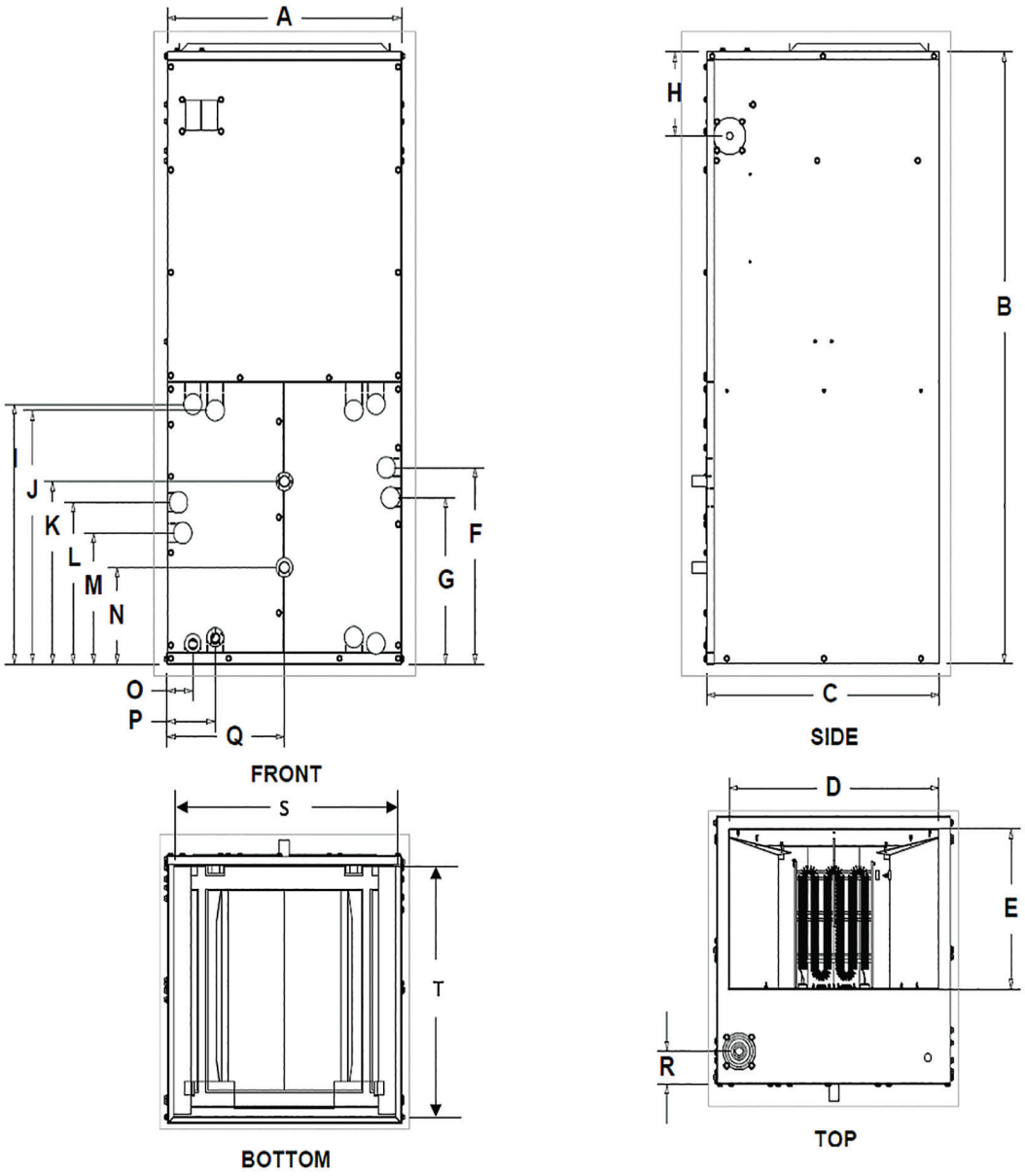


Figure 1. Air Handler Dimensions -NAS Series

DIMENSIONAL DATA MULTI-POSITION AIR HANDLER																	
Model	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**R**	**S**	**T**
NASV/NASS 24	17.50	43.00	21.00	15.63	12.50	13.50	11.00	6.75	16.75	14.00	11.00	10.75	2.00	1.50	5.00	16.10	20.20
NASV/NASS 36	21.00	48.00	21.00	19.00	12.50	14.50	13.00	6.75	20.00	17.00	12.75	10.30	2.30	4.35	5.00	19.90	20.80
NASV/NASS 48, 59	24.50	58.88	21.75	22.25	14.25	19.75	17.25	6.75	26.00	23.00	16.75	14.35	2.30	4.35	4.50	23.50	20.70

Table 2. Air Handler Dimensional Data - NASS/NASV Series

Model Name		NASS/NASV 24, 36	NASS/NASV 48, 59
Refrigerant System	Refrigerant	R454B	
	Liquid Line	3/8″	3/8″
	Vapor Line	3/4″	7/8″

Table 3. Refrigerant System Data

Model Number	Motor HP	Volts 1 Ph. 50/60 Hz	Blower Wheel	Speed Tap	CFM @ 0.10″ E.S.P	CFM @ 0.20″ E.S.P	CFM @ 0.30″ E.S.P	CFM @ 0.40″ E.S.P	CFM @ 0.50″ E.S.P	CFM @ 0.60″ E.S.P
NASS24	0.33	208/240	10 X 7	1	861	786	708	638	547	615
				2	924	872	814	726	663	656
				3	1067	1013	963	894	826	758
				4	1139	1093	1042	982	918	857
				5	1220	1157	1105	1049	985	893
NASS36	0.5	208/240	10 X 8	1	1161	1135	1086	1056	1027	992
				2	1261	1228	1198	1153	1129	1100
				3	1361	1310	1286	1262	1227	1201
				4	1478	1431	1405	1383	1351	1309
				5	1568	1536	1507	1470	1440	1400
NASS48	0.75	208/240	12 X 9	1	1579	1560	1544	1491	1445	1397
				2	1685	1671	1626	1587	1544	1507
				3	1739	1746	1711	1674	1629	1579
				4	1802	1778	1809	1764	1718	1682
				5	1876	1870	1896	1870	1836	1782
NASS59	0.75	208/240	12 X 9	1	1579	1560	1544	1491	1445	1397
				2	1685	1671	1626	1587	1544	1507
				3	1745	1734	1745	1712	1656	1616
				4	1958	1953	1943	1919	1874	1828
				5	2038	2015	2010	2005	1977	1934

Table 4. NASS Blower Performance Chart - Constant Torque Motors - Without Air Filter

Note

1) Continuous fan CFM is approximately 50% of the values shown in Table 4.

2) Minimum CFM for Electric Heat: 5 - 10kW = 650 CFM; 15kW = 1000 CFM; 20 kW = 1400 CFM

Model Number	Nominal Tons	Motor HP	Volts 1 Ph. 50/60 Hz.	Blower Wheel	Wiring	Jumper	CFM							
							0.1" E.S.P	0.2" E.S.P	0.3" E.S.P	0.4" E.S.P	0.5" E.S.P	0.6" E.S.P	0.7" E.S.P	0.8" E.S.P
NASV24	1.5-2.0	1/3	208/240	9x6	G, Y1, Y2	A	1015	1029	1029	1034	1029	968	882	807
						B	976	988	991	991	994	964	880	804
						C	918	927	930	930	930	927	878	806
						D	813	820	820	816	813	813	806	795
					G, Y1	A	900	910	913	903	900	893	839	760
						B	816	812	809	801	794	789	784	762
						C	768	768	757	749	741	736	868	758
						D	685	681	670	660	653	640	630	623
NASV36	1.5-3.0	1/2	208/240	10x7	G, Y1, Y2	A	1641	1631	1611	1569	1532	1494	1455	1386
						B	1636	1616	1590	1585	1538	1500	1455	1398
						C	1502	1498	1498	1490	1486	1482	1445	1386
						D	1407	1416	1412	1407	1399	1399	1382	1373
					G, Y1	A	1575	1575	1569	1564	1554	1527	1494	1438
						B	1368	1362	1356	1356	1350	1344	1338	1325
						C	1151	1140	1146	1140	1135	1125	1119	1114
						D	1098	1098	1092	1092	1087	1081	1070	1059
NASV48/59	4.0-5.0	3/4	208/240	12x9	G, Y1, Y2	A	2098	2098	2098	2065	2032	1991	1963	1928
						B	2050	2057	2064	2057	2030	1996	1962	1927
						C	1854	1869	1869	1869	1862	1862	1854	1847
						D	1741	1751	1751	1751	1746	1741	1736	1736
					G, Y1	A	2026	2040	2040	2040	2033	2026	2019	1984
						B	1642	1653	1659	1664	1659	1659	1653	1648
						C	1517	1517	1523	1529	1529	1523	1523	1517
						D	1431	1435	1439	1439	1444	1444	1439	1435

Table 5. NASV Blower Performance Chart - VSD Motors (Y1+Y2, W1, or W2) - Without Air Filter

Notes

1) For single-stage cooling/heat pump systems, connect the wire from the "Y" thermostat terminal to both the "Y1" and "Y2" air handler low voltage pigtails to assure full nominal airflow.

2) Continuous fan CFM is approximately 50% of the values shown in Table 5.

3) Minimum CFM for Electric Heat: 5 - 10kW = 650 CFM; 15kW = 1000 CFM; 20 kW = 1400 CFM

3. LOCATION, CLEARANCES AND RETURN AIR REQUIREMENTS

⚠ WARNING

RISK OF FIRE

Refer to Table 17 for the minimum floor area of the conditioned space served by this air-handler due to the use of an A2L class flammable refrigerant.

⚠ WARNING

RISK OF FIRE – FLAMMABLE REFRIGERANT APPLICATIONS

If any refrigerating circuit contains more than 62.6 oz (1.776 kg) of R-454B refrigerant, an unventilated area where the air-handler is installed using flammable refrigerants is installed shall be so constructed that should any refrigerant leak, it will not stagnate and create a fire or explosion hazard.

If the air duct system connected to one or more rooms with an area less than the minimum conditioned space floor area shown in Table 17 based on the total system refrigerant charge, that room shall be without continuously operating open flames (e.g.: an operating gas appliance) or other potential ignition sources (e.g.: an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest.

When flammable A2L class refrigerants are used, the minimum floor area of the conditioned space the air handler serves must comply with Table 17 to allow a refrigerant leak to disperse and be diluted with air to eliminate the risk of the refrigerant igniting and causing an explosion and/or fire. The minimum floor area must be corrected by an altitude adjustment factor based on the building site ground level altitude. See Table 6 for the altitude adjustment factor for various altitudes and refer to the example below for how to apply the altitude adjustment factor.

Example:

Total System Charge = 5 lbs. (2.5kg) of R-454B
Altitude = 7875 ft. (2400 m)
Min. Conditioned Floor Area (Amin) from Table 17 = 303 ft_2 (29.24 m^2) Altitude Adjustment Factor (AF) from Table 6 = 1.24
Amin = MCFA x AF
Amin (@ 7875 ft. (2400 m. altitude) = 29.24 m^2 x 1.24 = 36.96 m^2

Altitude Correction Factors									
Altitude (m)	0	100	200	300	400	500	600	700	800
Altitude (ft)	0	328	656	984	1312	1640	1969	2297	2625
AF	1.00	1.01	1.02	1.02	1.03	1.04	1.05	1.06	1.07
Altitude (m)	900	1000	1100	1200	1300	1400	1500	1600	1700
Altitude (ft)	2953	3281	3609	3937	4265	4593	4921	5249	5577
AF	1.08	1.09	1.10	1.11	1.12	1.13	1.14	1.15	1.16
Altitude (m)	1800	1900	2000	2100	2200	2300	2400	2500	2600
Altitude (ft)	5906	6234	6562	6890	7218	7546	7874	8202	8530
AF	1.17	1.18	1.19	1.20	1.21	1.22	1.24	1.25	1.26
Altitude (m)	2700	2800	2900	3000	3100	3200	3400	3600	3700
Altitude (ft)	8858	9186	9514	9842	10171	10499	11155	11811	12139
AF	1.27	1.29	1.30	1.31	1.33	1.34	1.37	1.40	1.42

Table 6. Altitude Adjustment Factors

3.1 LOCATION

Access for servicing is an important factor in the location of any air handler. Provide a minimum of 30 inches in front of the air handler for access to the control box, indoor coil, water pump, blower, and air filters. This access may be provided by a closet door or by locating the air handler so that a wall or partition is not less than 30 inches from the front access panel. The location for the air handler is usually predetermined. Check with the owner or user for installation plans. If a location has not been decided, consider the following in choosing a suitable location.

1. Select a location with adequate structural support, space for service access, clearance for return and supply duct.
2. Normal operating sound levels may be objectionable if the air handler is placed directly over or under some rooms such as bedrooms, study, etc.
3. If possible, locate the air handler so ducts are about the same length to achieve even air distribution of supply and return air to and from the living spaces.
4. Locate air handler where electrical supply wiring can be easily routed to the main electrical panel and where electrical wiring will not be damaged.
5. Locate air handler where thermostat wiring can be easily routed to the thermostat and where the wiring will not be damaged.

6. Locate air handler where refrigerant lines can be easily routed from the indoor coil to the outdoor unit.
7. Locate the air handler where condensate lines can be easily routed to the outside or an available drain. Route condensate drain piping so it does not obstruct access to the air filter or access panels.
8. When the indoor coil is installed in a draw-through application such is the case with this air handler, it will create a negative pressure situation in the condensate drain system. To prevent condensate from being drawn into the air handlers and blower, it is recommended to trap the primary (main) and secondary (overflow) drain line. Refer to **CONDENSATE DRAIN SYSTEM** and Figure 8 in these instructions. If the secondary drain is not used, it must be capped.
9. The exterior surface of cabinet will sweat when an air handler is installed in a non-conditioned space such as an attic or garage. The installer must provide protection such as full size auxiliary drain pan for all air handlers installed in a non conditioned space to prevent damage from condensation runoff. It is recommended that air handlers installed in non conditioned spaces be insulated on the exterior of the entire county or local codes for insulation requirement to assure the installation complies with all codes.

3.2 CLEARANCES

This air handler is approved for 0 inches of clearance to combustible material to any part of the air handler exterior cabinet. Refer to Figure 2 and 3 and Table 7 for clearance to combustibles and for service access clearances.

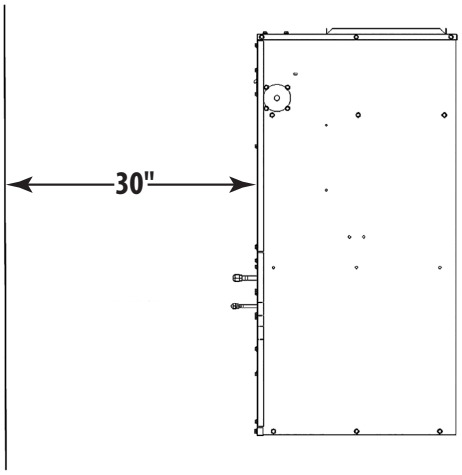


Figure 2. Clearance – Access for Service

MODEL	TOP (in)	BACK (in)	SIDES (in)	FRONT OF FURNACE		DUCT (in)
				ALCOVE (in)	CLOSET (in)	
NASV/NASS	0	0	0	30	6	0

Table 7. Clearances to Combustibles and Service Access

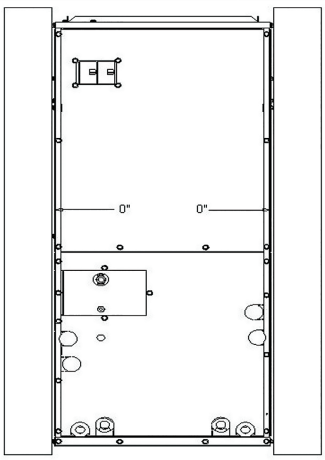


Figure 3. Closet Clearances

3.3 RETURN AIR REQUIREMENTS

Provisions shall be made to permit the air in all rooms in the living space to return to the air handler. Failure to comply may cause a reduction in the amount of return air available to the blower, causing reduced airflow resulting in improper heating of the living space. The reduced airflow may cause the air handler to cycle on the electric heater's over-temperature limit causing premature heating element failure.

The return air opening can be located in the floor, on a closet front door, or in a side wall above the air handler cabinet. If the opening for the return air is located in the floor, side walls, or closet door anywhere below the air handler cabinet, a 6-inch minimum clearance between the air handler and the wall or door must be provided on the side where the return is located to provide for proper airflow. The 6-inch minimum clearance is not required if there is a return grille installed above the air handler casing providing the grille has a sufficient return air opening.

Note A return duct attached to the air inlet of the air handler is required to assure the proper functioning of the refrigerant leak detection system.

Note Utilizing the space above a dropped ceiling for return air is not permissible for this air handler.

For the air handler to work properly, a closet or alcove must have a certain total free area opening for the return air.

Air Handlers With 1/2 HP Blower Motor (NASV/ NASS24, 36)

- Minimum 250 in2 free area opening
- Use Return Grille, A/C Coil Cabinet, or any return grille with a minimum 250 in^2 free area opening.

Air Handlers With 1.0 HP Blower Motor (NASV/ NASS, 48 & 60)

- Minimum 390 in^2 free area opening
- Use Return Grille, or A/C Coil Cabinet, or any return grille with a minimum 390 in^2 free area opening.

Provisions must be made to permit air in the rooms and living spaces to return to the air handler. Failure to comply may cause a reduction in the amount of return air available to the blower, causing reduced air flow and improper cooling and heating of the living space.

RETURN AIR FILTERS

A return air filter is necessary to prevent dust, lint, and other contaminants from accumulating on the indoor coil and interior surfaces of the air handler. Return air filter options include a return air filter grille that attaches to a wall, door, or ceiling or a filter frame that attach directly to the return opening of the air handler.

Recommended Return Air Filter Grille Size - Bottom Return Only

800 CFM – 20 X 20 Grille – 324 in^2
1000 CFM – 20 X 25 Grille - 414 in^2
1200 CFM – 25 X 25 Grille - 414 in^2
1400 CFM – 25 X 30 Grille - 644 in^2
1600 CFM – 25 X 30 Grille - 644 in^2
1800 CFM – 30 X 30 Grille - 784 in^2
2000 CFM – 30 X 35 Grille - 924 in^2

AIR FILTER BASE ACCESSORY

The Navien Air Filter Base Accessory is available as an alternative to a return air filter frame. The Air Filter Base Accessory can be used on the return air end of the air handler when configured in upflow position. The air filter base accessory is placed over the return plenum in the floor or closet platform opening and sealed to the plenum or platform using sealant, caulking material, and/or tape. The air handler is placed on top of the air filter base and sealed around its perimeter to prevent air leaks.

Note Filter size adjustment knobs are located on both sides of the frame. Make sure the flow direction arrow on the air filter is pointing towards the air handler.

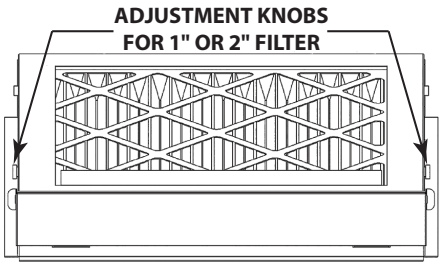


Figure 4. Air Filter Base Accessory for 1" or 2" Air Filters.

FILTER BASE ASSEMBLY KIT – FIELD INSTALLED

NAHFBC – 16″X 20″ X 2″ Small Cabinet
NAHFBB – 20″ X 20″ X 2″ Medium Cabinet
NAHFBD – 20″ X 24″ X 2″ Large Cabinet

Minimum Air Filter Size

The minimum filter size vs. CFM of airflow is shown below

800 CFM = 20 x 20 x 1
1000 CFM = 20 x 25 x 1
1200 CFM = 20 x 30 x 1
1400 CFM = 25 x 30 x 1
1600 CFM = 25 x 30 x 1
1800 CFM = 30 x 30 x 1
2000 CFM = 30 x 40 x 1 or two 30x20x1

Pleated Air Filter @ 500 ft/min or Less

800 CFM = 16 x 16 x 1
1000 CFM = 18 x 20 x 1
1200 CFM = 20 x 20 x 1
1400 CFM = 20 x 20 x 1
1600 CFM = 20 x 25 x 1
1800 CFM = 20 x 30 x 1 or two 20 x 15 x 1
2000 CFM = 20 x 30 x 1 or two 20 x 15 x 1

4. AIR HANDLER ORIENTATION AND SUPPLY AIR DUCT INSTALLATION

The air handler is shipped from the factory configured to be installed in the upflow or horizontal right-to-left air-flow position. Horizontal right-to-left means that when facing the front of the air handler and the air handler is laid on its side, the supply air opening is on the left and the return opening is on the right. The air handler can be field converted to the downflow or horizontal left-to-right air-flow position.

4.1 UPFLOW APPLICATIONS

For upflow installations, the discharge air outlet is at the top of the air handler. The air handler must be installed level to permit proper condensate drainage.

Typical upflow installations will be in a closet or basement. If installed in a closet, the closet should have a platform at least 12 inches in height framed in with an opening centered in the closet that matches the return air opening on the bottom of the air handler or an air filter frame if one is installed. The return air opening can be located in the floor, on a closet door, or in a side wall next to the air handler cabinet or a return duct can be attached directly to the platform next to the air handler. If the return air opening is located in the closet door or side wall above the platform, the front of the platform must be left open and a minimum of 6 inches of clearance between the front of the platform and the closet door must be provided to allow adequate air-flow from the return air opening into the cavity below the platform. The 6 inches of clearance is not required if the return opening is installed completely below the platform allowing the return air to enter directly into the cavity below the platform or if the return duct is connected directly to the platform beside the air handler.

Joints between the air handler, air filter frame, and platform must be sealed to prevent air leakage. A return air filter grille may be used instead of a filter frame.

Connect the supply air outlet to a plenum to the top of the air handler and secure it with screws. If the air handler is installed in a basement, run supply and return duct work in accordance with local codes. Use a non-tape sealant such as mastic or an aerosol sealant to seal between the air handler and ducts to prevent air leakage.

⚠ WARNING

RISK OF FIRE – FLAMMABLE REFRIGERANT APPLICATIONS

The following requirements are necessary to allow the flammable refrigerant mitigation system to properly dilute the refrigerant with air in the event of a refrigerant leak.
The supply and return air shall be directly ducted to the space. Open areas such as false ceilings shall not be used as a return air duct.

4.2 HORIZONTAL APPLICATIONS

Horizontal applications will normally be used in an attic or crawl space. This type of installation requires the supply air plenum or duct to be connected to the supply duct flanges and a return air plenum or duct be attached to the air handler return air inlet. The supply ducts will be connected to the supply air plenum and routed through the attic to a register in each room. The opposite end of the return air duct is attached to a return filter grille housing. The filter grille is usually located in a wall, just below the ceiling or the ceiling in a hallway. Use a non-tape sealant such as mastic or an aerosol sealant to prevent leaks in the ducts and the plenum.

The NAS Series air handlers are shipped to be installed without modifications for right-to-left or left-to-right supply air discharge applications.

The NAS Series air handlers are shipped to be installed without modification for right-to-left supply air discharge applications.

To convert the NAS Series air handler for left-to-right applications:

1. Remove the air handler access panels.
2. Disconnect the wiring harness from the refrigerant leak sensor located on the front coil's delta plate and relocate the sensor to the opposite side of the delta plate as described in **7. REFRIGERANT LEAK DETECTION SYSTEM OPERATION & SENSOR INSTALLATION**.
3. Remove the cooling coil.
4. Move the condensate drain pan to the right side.
5. Reinstall the cooling coil.
6. Reconnect the refrigerant leak sensor wiring harness to the refrigerant leak sensor.
7. Connect the condensate drains and refrigerant lines.
8. Reinstall air handler access panels.

4.3 DOWNFLOW APPLICATIONS

Downflow applications must to be installed so that the hot water pipes protruding from the top of the unit are a minimum of 12 inches above the floor.

The NAS Series air handler may be installed in the downflow configuration by simply installing it with the supply air discharge pointing downward.

The NAS Series air handlers may be converted to the downflow configuration using a required downflow conversion kit by following the instructions below (See Figures 5 and 6).

1. Remove the blower and control box access panel.
2. Remove indoor coil access panel and discard it. The indoor coil access panel will not be re-used.
3. Remove indoor coil assembly with drain pan by sliding out the front of the air handler as shown in the Figure 5.
4. Remove 6 screws (3 on each side of air handler), securing indoor coil support rails. Refer to Figure 6.
5. Flip the air handler so the discharge is on the bottom.
6. Re-install the indoor coil support rails in the holes provided in the air handler casing as shown in Figure 6. Use the six (6) screws that were removed in step 4 to secure the indoor coil support rails to the air handler casing.
7. Re-install the cooling coil in the upright position as shown in Figure 6.
8. Remove the new indoor coil access panel from the conversion kit and install over the indoor coil section as shown in Figure 6. Re-install the blower and control box access panel in the upside-down position and secure with the screws that were removed in step 1.

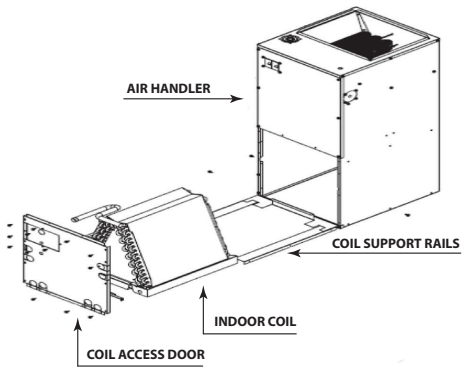


Figure 5. Indoor Coil Disassembly
When Converting to Downflow Operation

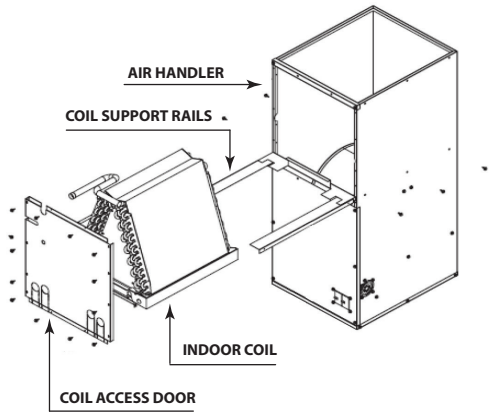


Figure 6. Indoor Coil Assembly
When Converting to Downflow Operation

5. AIR HANDLER INSTALLATION

Prior to installing the air handler, make sure the holes are cut into the floor for the refrigerant tubing, the drain line, the electrical wiring, the thermostat wiring and the outdoor unit control wiring.

1. Remove the top shipping cover and corner posts.
2. Remove the bottom shipping cover.
3. Remove the blower and control box access panel.
4. Remove the coil compartment access panel.
5. Place the air handler into position.
6. Connect the electrical supply wires to the line voltage terminal block and connect the thermostat cable wires to the low voltage terminal block or low voltage pigtails. Re-install the coil compartment access panel.
7. Connect the refrigerant lines to the coil.
8. Re-install the blower and control box access panel.
9. Turn the power on to the air handler by following the procedure in the Users Information Manual.
10. Set the thermostat to the desired operating mode and temperature.

Note When the coil door is removed to access TXV, make sure to inspect all refrigerant feeder tubes that may have moved during shipping to make sure they are not rubbing against each other or any part of the cabinet. Adjust as required.

Notice The TXV bulb is factory installed and insulated. Use heat resistant paste or wet rags to keep the suction line cool when brazing to protect the TXV bulb and copper to aluminum joint.

6. REFRIGERANT/ CONDENSATE PIPING, TXV

DX REFRIGERANT PIPING - NAS SERIES ONLY

NAS Series air handlers with DX type evaporator coils require liquid and suction piping sized in accordance with outdoor unit manufacturer's instructions. The evaporator coils have sweat copper connections. Refrigerant lines should be soldered with silver solder or high temperature brazing alloy. The suction line must be insulated to avoid condensate from forming and dropping off. Armaflex (or equivalent) with 3/8" (1 cm) minimum wall thickness is recommended. In severe conditions such as hot or high humidity areas, 1/2" (1.3 cm) minimum wall thickness may be required. If the outdoor unit is installed above the indoor coil, oil traps are required as shown in Figure 7. Horizontal suction lines should slope downward 1 inch for every 20 feet toward outdoor unit. Flow dry nitrogen through refrigerant lines during soldering operation to prevent oxidation of the interior of the copper tubes.

- Install 1 oil trap for a height difference of 16.5 ft to 33 ft (5.0 m to 10 m) between indoor and outdoor units.
- Install 2 oil trap for a height difference of 33 ft to 50 ft (10 m to 15.2 m) between indoor and outdoor units equally spaced.

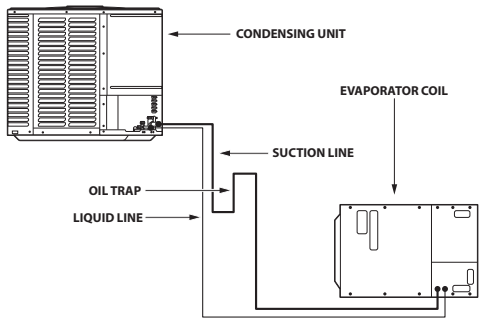


Figure 7. Evaporator Below Outdoor Unit Piping - NAS Series Only

⚠ WARNING

This following precautions must be taken for the refrigerant piping due to this air-handler being used with an A2L class flammable refrigerant.

6.1 SPECIAL PIPING INSTRUCTIONS DUE TO THE USE OF AN A2L CLASS FLAMMABLE REFRIGERANT

Piping material, pipe routing, and installation shall, including protection from physical damage in operation and service, be in compliance with national and local codes and standards, such as ASHRAE 15, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52 shall be observed. All field joints shall be accessible for inspection prior to being covered or enclosed.

The installation of pipe-work shall be kept to a minimum.

Due to this air-handler being used with an A2L class flammable refrigerant, the refrigerant pipe-work shall not be installed in an unventilated space if that space is smaller than the minimum floor area shown in Tables 17 unless there are no joints in the pipe-work in that space (e.g.: pipework that is run in walls or between floors).

Since refrigerant line length affects the final refrigerant charge, the final refrigerant charge after field charging of the system must be noted and used when determining the minimum floor area of the conditioned space from Tables.

Mechanical connections shall be accessible for maintenance purposes.

For appliances using flammable refrigerants, all joints made in the installation between parts of the refrigerating system with at least one part charged, shall be made in accordance with the following:

- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts. A vacuum valve shall be provided to evacuate the interconnecting pipe or any uncharged refrigerating part.

- Mechanical connectors used indoors shall comply with ISO 14903 or UL 207 Annex A (USA only). When mechanical connectors are reused indoors, sealing parts shall be renewed.
- Refrigerant tubing shall be protected or enclosed to avoid damage.
- Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that may be displaced during normal operation shall be protected against mechanical damage.
- For installations with field applied joints that are exposed in the occupied space, these joints shall be at least one of the following:
  - mechanical joints in compliance with ISO 14903 or UL 207 Annex A (USA only)
  - welded or brazed joints; or
  - joints in enclosures that vent to the unit or to the outside.

Provision shall be made for expansion and contraction of long runs of piping.
Protection devices, piping, and fittings shall be protected as much as possible against adverse environmental effects (e.g.: water collecting and freezing in relief pipes or the accumulation of dirt and debris).

Piping in refrigeration systems shall be so designed and installed to minimize the likelihood of hydraulic shock damaging the system.

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:

- The minimum test pressure for the low side of the system shall be the low side design pressure as stated on the air handler rating plate and the minimum test pressure for the high side of the system shall be the high side design pressure as stated on the air handler rating plate, unless the high side of the system cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
- The test pressure after removal of pressure source shall be maintained for at least 1 hour with no decrease of pressure indicated by the test gauge, with test gauge resolution not exceeding 5% of the test pressure.
- During the evacuation test, after achieving a vacuum level specified in the manual or less, the refrigeration system shall be isolated from the vacuum pump and the pressure shall not rise above 1500 microns within 10 min. The refrigerant system should be evacuated down to 500 microns.

Field-made refrigerant joints indoors shall be leak tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected.

THERMAL EXPANSION VALVES (TXV) - NAS SERIES ONLY

Navien air handlers have a factory installed thermal expansion valve (TXV). The factory TXV's for this air handler have an internal check valve making them compatible for both heat pump and cooling only applications. The TXV has an external pressure equalizer, non-adjustable superheat, and has a bleed rate of 15%.

A hard start capacitor on the outdoor unit is normally not required when a 15% bleed TXV is used, but may be necessary if compressor starting issues are encountered.

⚠ WARNING

Coil is pressurized with nitrogen from the factory. Relieve pressure before installing TXV by depressing the Schrader valve on the coil manifold.

6.2 CONDENSATE DRAIN PIPING

The air handler indoor coil drain pan has two ¾" NPT female primary and two secondary connections (left or right hand). The horizontal pan has two ¾" NPT female, one primary and one secondary. Condensate piping from each fitting must have a 2" minimum trap (See Figure 8) and the piping must be routed to provide enough slope for adequate drainage to a visible area. Do not pipe these two fittings together into a common drain. If a secondary drain is not installed, the secondary drain connection must be capped.

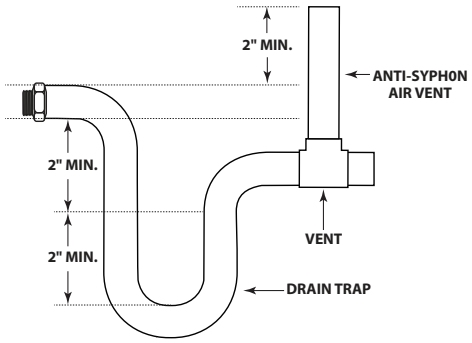


Figure 8. Typical Condensate Trap - NAS Series Only

⚠ WARNING

Air handler must be located so that if any connections should leak, water will not cause damage to the adjacent area. When such locations can't be avoided, a suitable drain pan should be installed under the air handler, not over 1½" deep, with minimum length and width at least 2" greater than the air handler dimensions and connected to an adequate drain. Under no circumstances is the manufacturer to be held liable for any water damage in connection with this air handler.

⚠ WARNING

For personal safety, turn the electrical power "OFF" at the main electrical panel and at the air handler control box circuit breakers before attempting any service or maintenance operations. Homeowners should never attempt to perform any maintenance which requires opening any of the air handler access panels.

7. REFRIGERANT LEAK DETECTION SYSTEM OPERATION & SENSOR INSTALLATION

⚠ WARNING

This air handler is equipped with a refrigerant leak mitigation system that energizes the air handler blower motor to deliver at least the required minimum airflow (See Table 17) when the refrigerant leak detection system detects a leak. This will dilute the flammable A2L class refrigerant to a point that it no longer poses a risk of an explosion or fire. Follow the procedure "Verifying Proper Functioning of Refrigerant Leak Mitigation System" later in this section to confirm the refrigerant mitigation system is functioning as it should.

This air handler is equipped a factory installed refrigerant leak detection system consisting of a refrigerant sensor with integral relays to perform the necessary leak mitigation if a refrigerant leak if detected by the sensor. Should a refrigerant leak occur in the indoor coil, the refrigerant leak detection system will energize the indoor blower and will open the 24VAC circuit to the outdoor unit compressor contactor. The circulation of air will disperse the leaked flammable refrigerant into the conditioned space where it will be diluted to a point where it can no longer be ignited by an ignition source. The indoor blower will continue to operate for 5 minutes after the concentration of the refrigerant at the sensor's setpoint drops below the sensor's setpoint. Should the concentration of the refrigerant rise above the setpoint of the sensor, the mitigation cycle will repeat until the refrigerant concentration stays below the setpoint of the sensor. The sensor pigtail marked "ALARM" will normally be energized with 24VAC when no leak is detected and will be de-energized when a leak is detected for the purpose of notifying a building management system to issue a refrigerant leak alarm.

Should the sensor fail or if the sensor wiring is damaged or disconnected, the sensor will automatically enter the mitigation mode until the sensor is replaced or the wiring is reconnected or repaired.

⚠ IMPORTANT

The outdoor unit control wiring must be connected to the refrigerant sensor "Y-CC" pigtail and the "COM" on the air handler low voltage terminal strip for the refrigerant detection system to de-energize the compressor during the leak mitigation mode of operation.

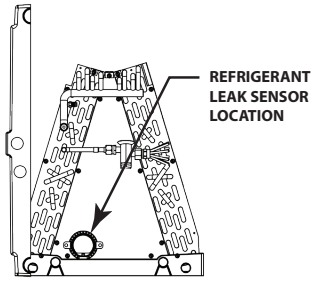
RELOCATING REFRIGERANT SENSOR FOR HORIZONTAL RIGHT DISCHARGE APPLICATIONS

The refrigerant sensor is factory installed, it will be installed in the correct location for upflow, downflow, and horizontal left discharge applications only. For horizontal right applications, the sensor must be moved to the the opposite side of the coil delta plate as shown in Figure 9. Mounting holes are provided on the opposite side of the coil's front delta plate for mounting the sensor for horizontal right discharge applications as shown in Figure 9. Remove the 2 screws securing the sensor to the coil delta plate. Attach the sensor with the same two screws to the holes in the opposite side of the coil delta plate.

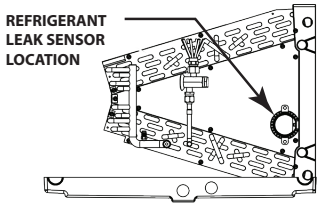
⚠ IMPORTANT

The refrigerant sensor wiring harness plug must be pointing down or horizontal. If the plug is pointing up, water could collect in the plug and result in operational issues. This does not apply to Cubic brand sensors which have a water tight plug and will be pointing up in horizontal applications.

UPFLOW AND DOWNFLOW APPLICATIONS



HORIZONTAL LEFT DISCHARGE APPLICATIONS



HORIZONTAL RIGHT DISCHARGE APPLICATIONS

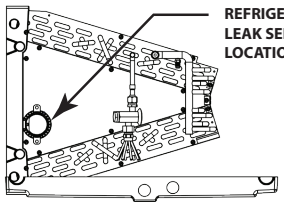


Figure 9. Refrigerant Leak Detection Sensor Location

VERIFYING PROPER FUNCTIONING OF REFRIGERANT LEAK MITIGATION SYSTEM

Follow the steps below to verify the proper functioning of the Refrigerant Leak Mitigation System.

1. Remove the coil access panel from the front of the air handler.
2. Locate the black refrigerant sensor located near the bottom front of the coil assembly.

LEAK DETECTED DURING COOLING CYCLE

3. Set the thermostat to "COOL" and the fan switch to "AUTO" and lower the temperature setpoint below the indoor temperature so the system enters the cooling mode.
4. Confirm the outdoor unit compressor is operating.
5. Within 30 seconds of the compressor starting, release a small amount of refrigerant on the refrigerant sensor to activate the leak mitigation mode.
6. Confirm the outdoor unit compressor and fan motor shut down and the indoor blower continues to operate.
7. Confirm the indoor blower is energized and 24V is not present at the ORANGE air handler pigtail marked "ALARM".
8. Confirm the outdoor unit compressor and fan motor are re-energized approximately 5 minutes after the flow of refrigerant near the sensor has ended and that the indoor blower continues to operate.

LEAK DETECTED DURING THE OFF CYCLE

9. Set the thermostat to the "OFF" position and wait until the outdoor unit compressor and fan motor stop and indoor blower stops.
10. Release a small amount of refrigerant on the refrigeransensor to activate the leak mitigation mode.
11. Confirm the indoor blower is energized and 24V is not present at the ORANGE air handler pigtail marked "ALARM".
12. Confirm the indoor blower shuts down after approximately 5 minutes after the flow of refrigerant on the refrigerant sensor has ended.
13. If the Refrigerant Leak Mitigation System does not operate as stated above, check for loose wiring connections or replace the refrigerant sensor.
14. Reinstall the coil access panel on the air handler.
15. Set the thermostat to the desired operating mode and temperature.

If the leak detection system does not function properly when subjected to the above procedure, check for miswiring of the system. If the wiring connections are found to be correct per the air handler wiring diagram, replace the sensor with an approved replacement from the manufacturer.

LEAK DETECTION SENSOR REPLACEMENT

When the refrigerant leak detection system sensor fails or reaches the end of its life, the leak detection system will enter and remain in the leak mitigation mode even though there is no refrigerant leak present. If the leak detection system continues to operate in the mitigation mode even when a refrigerant leak isn't indicated by a portable refrigerant leak detector, replace the sensor with an approved replacement from the air handler manufacturer. Disconnect the wiring harness connector from the failed sensor and remove the sensor mounting screws. Discard the failed sensor. Mount the replacement sensor in the same location as the failed sensor that was removed and connect the sensor wiring harness connector to the sensor.

⚠ IMPORTANT

Navien may source sensors from various manufacturers that have a different wiring harness connection. A wiring may be necessary to allow the replacement sensor to connect the sensor wiring harness. The wiring adapter will be provided with the replacement sensor. Alternate mounting holes are provided in the coil delta plate to accommodate the various approved sensors. Only use a replacement sensor approved by and provided by Navien to assure proper operation and compatibility.

MINIMUM CIRCULATING AIRFLOW FOR REFRIGERANT LEAK MITIGATION

There is a minimum circulating airflow required when the refrigerant leak detection system is operating in the leak mitigation mode. This minimum depends on the total system refrigerant charge and can be found listed in Table 17. The refrigerant mitigation system energizes the continuous fan speed on the air handler. The continuous fan CFM (l/s) may need to increased to achieve the minimum leak mitigation circulating airflow level by changing to a different indoor blower motor speed tap or ECM motor setting that delivers the minimum mitigation airflow level. Refer to the blower performance tables and wiring diagrams in this manual to determine if this adjustment is necessary and if it is determined to be necessary to increase the continuous fan airflow level, follow the instructions in **10. MOTOR SPEED SELECTION AND AIR HANDLER STARTUP** in this manual to make the necessary adjustment.

REFRIGERANT LEAK ALARM OUTPUT

The air handler has an alarm output signal that can be used as an input to a building management system or smart thermostat to alert the homeowner or user that the refrigerant detection system has detected a refrigerant leak and is in the leak mitigation mode. There is an ORANGE low voltage pigtail wire located inside the air handler control box that is labeled "ALARM". When the air handler is powered and no refrigerant leak is detected, the ORANGE "ALARM" pigtail wire is energized with 24 VAC indicating normal operation. When the refrigerant detection system detects a refrigerant leak and the air handler is in the leak mitigation mode (indoor blower energized and outdoor unit disabled), the ORANGE "ALARM" pigtail wire will be de-energized (0 VAC). The ORANGE "ALARM" pigtail wire is capped with a wire nut from the factory. Remove this wire nut and connect it to the building management system or smart thermostat as required if a refrigerant leak alert is desired. The building management system or smart thermostat shall be programmed to accept the reverse logic alarm signal (24 VAC – Normal; 0 VAC – Refrigerant Leak).

If a 24 VAC output when a refrigerant leak is detected is required to activate a warning light or audible alarm, the ORANGE "ALARM" pigtail wire shall be connected to the coil of a field supplied relay with normally closed contacts and a 24 VAC coil. An 18 AWG minimum wire from the furnace 24 VAC common circuit shall be connected to the other side of the relay coil. An 18 AWG minimum wire from the furnace 24 VAC "R" transformer circuit shall be connected to the terminal for one side of the normally closed relay contacts and an 18 AWG minimum wire to the warning light or audible alarm shall be connected to terminal for the other side of the normally closed relay contacts. All field supplied wiring shall be protected from damage. When no refrigerant leak is detected, the relay will be energized and the relay contacts will be open, disconnecting the 24 VAC signal to the warning light or audible alarm. When a refrigerant leak is detected, the relay will be de-energized and the contacts will close sending a 24 VAC signal to the warning light or audible alarm.

8. LINE VOLTAGE WIRING

POWER SUPPLY WIRING

The factory air handler internal wiring is complete except for the power supply and the thermostat wires. See Table 8-11 for wire size, fuse/circuit breaker size, and ground wire sizes. The use of cable connectors on incoming power supply wires to relieve any strain on wiring is required. Follow the steps in the next column to connect the power supply wires.

Note A means of disconnecting all poles of the line voltage power to the air handler must be provided in the field wiring within sight of the air handler.

LINE VOLTAGE WIRING CONNECTIONS

1. Remove the blower and control box access panel.
2. Remove the control box cover.
3. Remove the appropriate size slug from the line voltage wiring entrance knockout on the left side or top of the air handler cabinet and install a strain relief bushing that will accommodate all of the power supply wires in the hole.
4. Strip ½" of the insulation on the end of each wire.
5. Insert the wires through strain relief bushing.
6. Insert the black wire into the L1 screw terminal on the terminal block and tighten the set screw on the wire.
7. Insert the white wire into the N screw terminal on the terminal block and tighten the set screw on the wire.
8. Insert the green wire into the ground lug and tighten the set screw on the wire.
9. Tighten the screw on the strain relief bushing until the wires are securely held by the bushing.

	NASS 24			NASS 36				NASS 48, 59				
Indoor Blower Motor Type	Constant Torque			Constant Torque				Constant Torque				
Indoor Blower Amps - 208/240VAC	2.43/2.80			3.55/4.10				5.37/6.20				
Heater – kW	0	5	10	0	5	10	15	0	5	10	15	20
Minimum Circuit Ampacity	3.5	29.54	55.58	6.25	32.29	58.33	84.37	7.75	33.79	59.83	85.67	111.91
Minimum Wire Size (194°F)	#14	#12	#8	#14	#12	#8	#4	#14	#12	#6	#4	#3
Minimum Wire Size (167°F)	#14	#10	#6	#14	#10	#6	#4	#14	#10	#6	#4	#2
Minimum Wire Size (140°F)	#14	#10	#6	#14	#10	#6	#3	#14	#10	#4	#3	#1
Ground Wire Size	*	*	*	*	*	*	*	*	*	*	*	*
Maximum Overcurrent Protection Amps**	15	35	60	15	30	60	90	15	35	60	90	120

Table 8. Wiring Requirements - NASS Series

	NASV 24			NASV 36				NASV 48, 59				
Indoor Blower Motor Type	ECM			ECM				ECM				
Indoor Blower Amps - 208/240VAC	3.81/4.40			4.33/5.00				5.46/6.30				
Heater - kW	0	5	10	0	5	10	15	0	5	10	15	20
Minimum Circuit Ampacity	5.5	31.54	56.48	6.25	32.29	58.33	84.37	7.88	33.92	59.96	86	112.04
Minimum Wire Size (194°F)	#14	#12	#8	#14	#12	#8	#4	#14	#12	#6	#4	#3
Minimum Wire Size (167°F)	#14	#10	#6	#14	#10	#6	#4	#14	#10	#6	#4	#2
Minimum Wire Size (140°F)	#14	#10	#6	#14	#10	#6	#3	#14	#10	#4	#3	#1
Ground Wire Size	*	*	*	*	*	*	*	*	*	*	*	*
Maximum Overcurrent Protection Amps**	15	35	60	15	30	60	90	15	35	60	90	120

Table 9. Wiring Requirements - NASV Series

	NASS36		NASS48,59			
Circuit Number	1	2	1		2	
Indoor Blower Motor Type	CONSTANT TORQUE		CONSTANT TORQUE			
Indoor Blower Amps	3.55/4.10		5.37/6.20			
Heater - kW	15		15		20	
Circuit Number	1 (10kW)	2 (5kW)	1 (10kW)	2 (5kW)	1 (10kW)	2 (10kW)
Minimum Circuit Ampacity	57.21	31.17	59.83	26.04	59.83	52.08
Minimum Wire Size (90°C)	#8	#12	#8	#12	#8	#8
Minimum Wire Size (75°C)	#6	#10	#6	#10	#6	#6
Minimum Wire Size (60°C)	#6	#10	#6	#10	#6	#6
Ground Wire Size	*	*	*	*	*	*
Maximum Overcurrent Protection Amps **	60	35	60	30	60	60

Table 10. Wiring Requirements - NASS Series - Dual Branch Circuit

	NASV36		NASV48,59			
Circuit Number	1	2	1		2	
Indoor Blower Motor Type	ECM		ECM			
Indoor Blower Amps	4.33/5.00		5.46/6.30			
Heater - kW	15		15		20	
Circuit Number	1 (10kW)	2 (5kW)	1 (10kW)	2 (5kW)	1 (10kW)	2 (10kW)
Minimum Circuit Ampacity	58.33	32.29	59.96	26.04	59.96	52.08
Minimum Wire Size (90°C)	#8	#12	#8	#12	#8	#8
Minimum Wire Size (75°C)	#6	#10	#6	#10	#6	#6
Minimum Wire Size (60°C)	#6	#10	#6	#10	#6	#6
Ground Wire Size	*	*	*	*	*	*
Maximum Overcurrent Protection Amps **	60	35	60	30	60	60

Table 11. Wiring Requirements - NASV Series - Dual Branch Circuit

Note Tables 8 - 11: Wiring Requirements 15kW and 20kW models may have a dual or single power supply. Single power supply requires a jumper bar or a jumper wire.

+Refer to the National Electrical Code Table 250-95 for Non-Sheathed Conductor Ground Wire.

* Ground conductor must be the same size and temperature rating as the other conductors listed in Tables 8 - 11.

** Circuit breakers must be HACR type.

Note If sheathed cable is used, refer to NEC National Electrical Code (NFPA 70) or the Canadian Electrical Code, Part I (CSA C22.1) and local codes for additional requirements concerning supply circuit wiring. Air handler electrical data can be found in Tables 8 - 11.

Note This air handler is shipped from the factory for 240VAC applications. The transformer must be reconfigured for 208VAC applications using the following steps to assure adequate control voltage (24VAC).

a) Remove the zip tie from the transformer wire bundle that secures the BLACK, ORANGE and WHITE wires together.

b) Disconnect the WHITE (240VAC) transformer primary wire with an insulated terminal from the load side of the circuit breaker and connect the ORANGE (208VAC) transformer primary wire with an insulated terminal to the same terminal on the circuit breaker.

c) Secure the loose BLACK, ORANGE and WHITE wires to the transformer wire bundle with a zip tie.

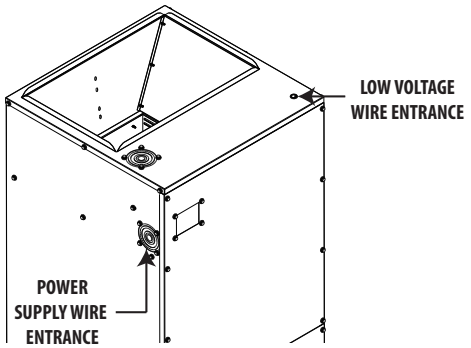


Figure 10. Power Supply and Low Voltage Wire Entrance Locations

⚠ IMPORTANT

All field wiring must be rated for 140°F/60°C or higher. Refer to the wiring diagrams on the air handler orl in this manual for more information.

Refer to the NEC National Electrical Code (NFPA 70) or the Canadian Electrical Code, Part I (CSA C22.1) and local codes for wiring material requirements.

9. THERMOSTAT WIRING AND CONNECTIONS

THERMOSTAT WIRING

Thermostat wires connect through side of air handler and should be no smaller than 22 gauge. Refer to Table 12 for recommended wire gauge, lengths and maximum current for each wire gauge.

Max. Thermostat Wire Length	Thermostat Wire Gauge	Thermostat Wire Maximum Current
0 - 100 Feet	22	3.0 amps
0 - 125 Feet	20	3.0 amps
0 - 250 Feet	18	3.0 amps

Table 12. Low Voltage Wire Gauge and Maximum Lengths

Thermostat wires can enter through the side or top of the air handler. When bringing wiring through the top or side of the air handler, cable connectors must be installed to hold wiring in place and to relieve any strain on the wiring.

The thermostat wire colors and the typical heating/cooling connections are listed in Table 13. The thermostat wire colors and the typical heat pump connections are listed in Table 14.

THERMOSTAT INSTALLATION

The thermostat heat anticipator must be set at 0.4 amps if the thermostat has a manual heat anticipator adjustment. This setting should be checked at the time of installation.

The thermostat may be a "self-setting" type in which no heat anticipator setting will be found on the thermostat, eliminating the need for field adjustment.

The thermostat should be located on an inside wall in an open area or hallway to more closely sense average room air, preferably where there is air movement back to air handler.
The thermostat should not be located within 3 feet of from any windows and should be 52 to 66 inches above the floor. Do not place the thermostat within 3 feet of any supply air register.

Maintenance, operating, and/or programming instructions are in the envelope shipped with the thermostat. The envelope should be given to the homeowner or user after the installation is complete.

AIR HANDLER AND OUTDOOR UNIT WITH SEPARATE TRANSFORMERS

If the air-hander and the outdoor unit have separate transformers, it is important to use a thermostat with isolated heating and cooling terminals "RC" and "RH" to prevent interconnection of separate Class II 24VAC control systems. These thermostats have an "RC" terminal for cooling and an "RH" terminal for heating. Connect the outdoor unit RED wire from the "R" terminal on the outdoor unit to the "RC" terminal on the thermostat and the RED air handler pigtail wire to the "RH" terminal on the thermostat. Remove the jumper between the "RH" and "RC" terminals if one exists. If the air handler and outdoor unit using separate transformers are both connected to the thermostat single "R" terminal, or if the jumper between "RH" and "RC" is not removed, a transformer burnout can occur or either the air handler or outdoor unit control system could go into lockout mode. If an air handler and outdoor unit with separate transformers are being installed and the thermostat does not have º"RC" and "RH" terminals, a new thermostat with "RC" and "RH" terminals must be purchased and installed.

⚠ IMPORTANT

Cycle the air handler and outdoor unit separately to make sure both operate correctly.

SEPARATE HEATING AND OUTDOOR UNITS WITH SEPARATE THERMOSTATS

If the home has a central heating and cooling system, but cooling are controlled by separate thermostats, the use of a thermostat interlock switch is required in order to prevent heating and cooling from operating at the same time.

⚠ CAUTION

Do not locate thermostat within three feet of any of the following items:

1. Supply air registers
2. Lights or heat lamps
3. Aquariums
4. Televisions, stereo, amplifiers, surround sound systems
5. Stoves or any cooking appliance
6. Refrigerator
7. Clothes washer or dryer
8. Hot water tank
9. Sink or near any hot water
10. Within 15 feet of any electric space heater
11. Within 2 feet of any direct sunlight

⚠ CAUTION

When using separate heating and cooling thermostats, a thermostat interlock system must be provided to prevent simultaneous operation of the heat and cooling. Simultaneous operation can result in equipment overheating, equipment damage, and wasted energy.

DO NOT connect the YELLOW wire to the thermostat unless an outdoor unit is installed.

DESCRIPTION	LETTER CODE	AIR HANDLER PIG TAIL WIRE CONNECTION	THERMOSTAT CONNECTION	OUTDOOR UNIT CONNECTION
24 VAC	R	RED	R	N/A
Heat	W	WHITE	W	N/A
Indoor Fan	G	GREEN	G	N/A
Cooling / Opt. 1st Stage Cooling	Y /Y1	YELLOW	Y /Y1	Y /Y1
Optional 2nd Stage Cooling	Y2	BLUE	Y2	Y2
24 VAC Common	C	BROWN	C	C
Y-Out to Outdoor Unit	Y-CC	WHITE	N/A	Y/Y1
Refrigerant Leak Alarm	ALARM	ORANGE	See Thermostat Instructions	N/A

Table 13. Typical Heat / Cool Thermostat Wire Color Colors and Low Voltage Connections

DESCRIPTION	LETTER CODE	AIR HANDLER PIG TAIL WIRE CONNECTION	THERMOSTAT CONNECTION	OUTDOOR UNIT CONNECTION
24 VAC	R	RED	R	R
Heat	W	WHITE	E (Thermostat) W (Air Handler)	See Outdoor Unit Instructions
Indoor Fan	G	GREEN	G	N/A
Cooling / Opt. 1st Stage Cooling	Y /Y1	YELLOW	Y /Y1	Y /Y1
Optional 2nd Stage Cooling	Y2	BLUE	Y2	Y2
24 VAC Common	C	BROWN	C	C
Heat Pump Reversing Valve Solenoid (Most Outdoor Unit Brands)	O	N/A	O	O See Outdoor Unit Instructions
Heat Pump Reversing Valve Solenoid (Some Outdoor Unit Brands)	B	N/A	B	B See Outdoor Unit Instructions
Y-Out to Outdoor Unit	Y-CC	WHITE	N/A	Y/Y1
Refrigerant Leak Alarm	ALARM	ORANGE	See Thermostat Instructions	N/A

Table 14. Typical Heat Pump Thermostat Wire Colors and Low Voltage Connections

TYPICAL HEATING/COOLING THERMOSTAT WIRING CONNECTIONS

1. Remove blower/control box access panel.
2. Remove the control box cover.
3. Insert the low voltage wire cables from the thermostat and outdoor unit through the 9/16" diameter hole located in the top or right side of the air handler and into the control box. Place the ends of these cables next to the air handler low voltage terminal block (LVTB) or air handler low voltage pigtails. Secure these cables in the 9/16" diameter hole with a strain relief to prevent wire connections from being pulled apart.
4. Strip ½" of the insulation on the end of each thermostat cable wire.
5. Connect the RED (24 VAC) wire from the thermostat cable to the "R" screw terminal on the LVTB or to the RED air handler pigtail with a wire nut.
6. Connect the WHITE wire from the thermostat cable to the "W" screw terminal on the LVTB or to the WHITE air handler pigtail with a wire nut.
7. Connect the GREEN (indoor fan) wire from the thermostat cable to the "G" screw terminal on the LVTB or to the GREEN air handler pigtail with a wire nut.
8. For NASS models (constant torque motor), connect the YELLOW (cooling) wire from the thermostat to the "Y" screw terminal on the LVTB.
9. For NASV models (ECM motor), connect the YELLOW wire from the thermostat to both the YELLOW "Y1" and BLUE "Y2" air handler pigtails with a wire nut for single-stage cooling applications to assure full nominal airflow. For 2-stage cooling applications, connect the wire from the thermostat "Y1" terminal to the YELLOW "Y1"air handler pigtail and connect the wire from the thermostat "Y2" terminal to the BLUE "Y2" air handler pigtail.
10. Connect the two BROWN (24 VAC common) wires from the thermostat and outdoor unit cables to the "C" screw terminal on the LVTB or to the BROWN air handler pigtail with a wire nut.
11. Also connect the 24 VAC common wire from the outdoor unit compressor contactor coil to the "C" terminal on the LVTB (NASS) or to the BROWN air handler 24 VAC common pigtail (NASV) with a wire nut.
12. For 15kW and 20kW models, connect the BLUE wire from the thermostat "W2" terminal (2nd stage heat) to the "W2" terminal on the LVTB (NASS) or to the BLACK air handler pigtail wire (NASV) and secure with a wire nut.

Note If a single-stage heat thermostat is used with an air handler with 15kW or 20kW of electric heat, place a jumper between the "W1" and "W2" terminals on the LVTB (NASS) or connect the BLACK and the WHITE air handler pigtail wires (NASV) to the WHITE wire from the thermostat "W" terminal with a wire nut.

13. If a refrigerant leak alert is desired and a building management system or smart thermostat capable of providing that alert is being used, removed the wire nut from the end of the ORANGE pigtail wire labeled "ALARM" and connect it to the appropriate building management system or smart thermostat connections.

TYPICAL HEAT PUMP THERMOSTAT WIRING CONNECTIONS

1. Remove the blower / control box access panel.
2. Remove the control box cover.
3. Insert the low voltage wire cables from the thermostat and outdoor unit through the 9/16" diameter hole located in the top or side of the air handler and into the control box. Place the ends of these low voltage cables next to the air handler low voltage terminal block (LVTB) or low voltage pigtails. Secure these cables in the 9/16" diameter hole with a strain relief to prevent wire connections from being pulled apart.
4. Strip ½" of the insulation on the end of each thermostat wire.
5. Connect the RED (24 VAC) wire from the thermostat cable to the "R" screw terminal on the LVTB or to the RED air handler pigtail with a wire nut.
6. Connect the WHITE (emergency heat) wire from the thermostat's "E" terminal to the "W" screw terminal on the air handler LVTB or to the WHITE air handler pigtail. If applicable, also connect the wire from the outdoor control board that calls for supplemental heat during the defrost cycle to the "W" terminal on the air handler LVTB or to the WHITE air handler pigtail. Refer to the outdoor unit installation instructions for additional information.

7. Connect the GREEN wire from the thermostat "G" terminal to the "G" screw terminal on the LVTB or to the GREEN air handler pigtail with a wire nut.
8. For NASS models (constant torque motor), connect the YELLOW (cooling) wire from the thermostat to the "Y" screw terminal on the LVTB.
9. For NASV models (ECM motor), connect the YELLOW wire from the thermostat to both the YELLOW "Y1" and BLUE "Y2" air handler pigtails with a wire nut for single-stage cooling applications to assure full nominal airflow. For 2-stage cooling applications, connect the wire from the thermostat "Y1" terminal to the YELLOW "Y1" air handler pigtail and connect the wire from the thermostat "Y2" terminal to the BLUE "Y2" air handler pigtail.
10. Connect the WHITE air handler pigtail labelled "Y-CC" to the wire from the outdoor unit compressor contactor coil with a wire nut.
11. Connect the BROWN (24 VAC common) wire from the thermostat "C" terminal and the wire from the outdoor unit "C" terminal or 24 VAC common pigtail to the "C" screw terminal on the LVTB or to the BROWN air handler pigtail with a wire nut.
12. Connect the wire (reversing valve solenoid) wire from the thermostat "O" or "B" terminal with the wire from the "O" or "B" terminal or pigtail on the outdoor unit with a wire nut. Refer to the outdoor unit installation instructions for additional information.
13. For 15kW and 20kW models, connect the BLACK wire from the thermostat "W2" terminal (2nd stage heat) to the "W2" terminal on the LVTB (NASS) or to the BLACK air handler pigtail wire (NASV) and secure with a wire nut.

Note If a single-stage heat thermostat is used with an air handler with 15kW or 20kW of electric heat, place a jumper between the "W1" and "W2" terminals on the LVTB (NASS) or connect the BLACK and the WHITE air handler pigtail wires (NASV) to the WHITE wire from the thermostat "W" terminal with a wire nut.

14. If a refrigerant leak alert is desired and a building management system or smart thermostat capable of providing that alert is being used, removed the wire nut from the end of the ORANGE pigtail wire labeled "ALARM" and connect it to the appropriate building management system or smart thermostat connections. When the air handler is powered and no refrigerant leak is detected, the ORANGE "ALARM" pigtail wire is energized with 24 VAC indicating normal operation.

THERMOSTAT HEAT ANTICIPATOR

Some thermostats have a heat anticipator that must be set to 0.4 in order to function correctly. If the heat anticipator setting is too low the air handler will short cycle. If the heat anticipator setting is too high the air handler will run long cycles thus causing the temperature to overrun the temperature setting. This will cause the homeowner to feel hot by the time the blower completes its cycle and then too cold by the time the air handler cycles on again.

10. BLOWER MOTOR SPEED SELECTION

⚠ NOTICE

The factory motor speed tap settings are appropriate for most applications. Refer to the blower performance tables in Table 4 and 5 of this manual before changing the motor speeds from the factory settings.

⚠ WARNING

This air handler is equipped with a refrigerant leak mitigation system that energizes the air handler blower motor to deliver at least the required minimum airflow (See Table 17) when the refrigerant leak detection system detects a leak. This will dilute the flammable A2L class refrigerant to a point that it no longer poses a risk of an explosion or fire. Follow the procedure "Verifying Proper Functioning of Refrigerant Leak Mitigation System" later in this section to confirm the refrigerant mitigation system is functioning as it should.

MOTOR SPEED CHANGE - ECM MOTOR

1. Turn off the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "OFF" position.
2. Remove the blower / control box access panel and remove the control box cover.
3. Changing the heating mode blower motor speed is accomplished by moving the "HEAT" jumper pins to one of the following settings. A = High Speed, B = Medium High Speed, C = Medium Speed, and D = Low Speed.
4. Changing the cooling mode blower motor speed is accomplished by moving the "COOL" jumper pins to one of the following settings.
5. A = High Speed, B = Medium High Speed, C = Medium Speed, and D = Low Speed. The **ADJUST** pin can be used to either increase or decrease the blower air-flow by 10% - 12% and will affect both the heating and cooling air-flows by the same percentage. Placing the jumper in normal setting will result in no increase or decrease in air-flow. The + setting will increase the air-flow by 10% -12%. The – setting will decrease the air-flow by 10% - 12%.
6. The **PROFILES** jumper pins are used for blower motor ON and OFF delays. See Climate Profiles in the back of the **SERVICE AND MAINTENANCE MANUAL** for this air handler to determine the proper setting for the climate where the air handler is being installed.
7. Reinstall the control box cover and blower / control box access panel.
8. Turn on the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "**ON**" position.
9. Set the thermostat to the desired mode and temperature.

CONTROL BOARD FLASH CODE

The ECM control board has a CFM flash code when the air handler is operation to indicate the current CFM.

- Flashes once per 100 CFM.
- To determine the selected CFM, count the number of flashes between pauses and multiply by 100.
- The flash sequence is followed by a 10 second OFF period signifying the end of the flash code and the flash sequence then starts over.

Note Since blower external static pressure will be reduced when the blower access panel is removed, blower RPM will be lower than normal to maintain the selected CFM.

⚠ WARNING

To avoid personal injury or property damage, make certain that the motor leads cannot come into contact with non-insulated metal components of the air handler.

⚠ CAUTION

The **test** setting on the ADJUST jumper pins must not be used except for trouble shooting to determine if the blower operates.

1	Common C1
2	W/W1
3	Common C2
4	Delay Tap Select
5	Cool Tap Select
6	Y1
7	Adjust Tap Select
8	Output –
9	Reversing Valve (Heat Pump Only)
10	Humidistat (BK)
11	Heat Tap Select
12	24 VAC (R)
13	2nd Stage Heat (EM/W2)
14	2nd Stage Cool (Y/Y2)
15	Fan (G)
16	Output +

Table 15. ECM Motor Control Connector Terminals

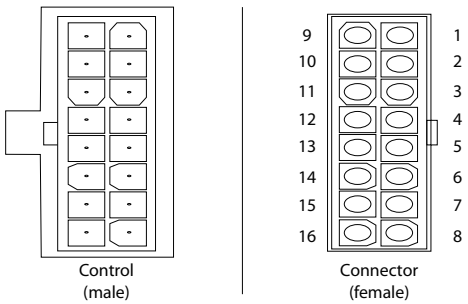


Figure 11. ECM Motor Control Plug Pin Positions

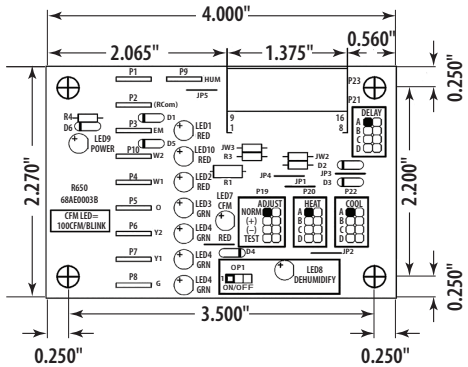


Figure 12. ECM Control Board Layout

EXAMPLE OF THE FLASH CODE:

The air handler is operating at 1400 CFM. The flash sequence will be 14 one-second flashes, 0.1 seconds apart, followed by a 10 second pause before the flash sequence starts over.

DEHUMIDIFICATION MODE

The ECM control board has a jumper pin (OP1) to enable or disable the de-humidification mode. If the OP1 jumper is set to the ON position, humidification mode is enabled and a 24 VAC signal from a dehumidification capable thermostat or humidistat must be present at the HUM terminal on the ECM control board when the humidity is below the humidity set point.

⚠ IMPORTANT

The humidistat contacts must open when humidity is above the set point which will remove 24 VAC from the HUM terminal and reduce the air-flow by 30%.

The dehumidify LED on the control board will be lit when the motor is running at the reduced "dehumidify" air-flow.

If the dehumidification mode is not desired by the homeowner, the OP1 jumper pin must be placed in the OFF position to disable dehumidification.

MOTOR SPEED CHANGE – CONSTANT TORQUE MOTOR

1. Turn off the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "OFF" position.
2. Remove the blower / control box access panel.
3. Locate the BLACK and RED wires connected to two of the 1–5 speed tap terminals on the motor terminal block (See Figure 13).
4. The BLACK wire is for HIGH speed and the RED wire is for LOW speed. Connect the BLACK and RED wires to the desired speed taps.
5. Reinstall the blower / control box access panel.
6. Turn on the circuit breaker to the air handler at the main electrical panel and move the local air handler disconnect switch to the "ON" position.
7. Set the thermostat to the desired mode and temperature.

TERMINAL	CONNECTION
C	Speed Tap Common - 24 VAC Common
L	Supply Voltage - 115 VAC
G	Ground Connection
N	Supply Voltage - Neutral
1	Low Speed Tap - 24 VAC Input
2	Medium - Low Speed Tap - 24 VAC Input
3	Medium Speed Tap - 24 VAC Input
4	Medium - High Speed Tap - 24 VAC Input
5	High Speed Tap - 24 VAC Input

Table 16. Constant Torque Motor Terminal Connections

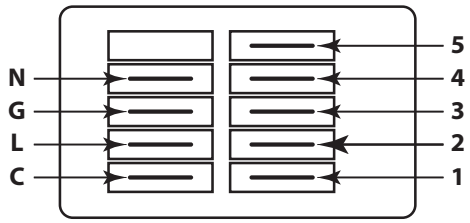


Figure 13. Constant Torque Motor Terminals

COOLING SYSTEM STARTUP

1. Set the thermostat FAN Switch to the ON position to enable the continuous fan mode.
2. Check for air leaks at all duct connections and seal any leaks that are found.
3. Set the thermostat FAN switch to the AUTO position.
4. Set the thermostat HEAT/COOL switch to the COOL position and adjust the set point below the room temperature to enable the cooling mode.
5. Check for proper cooling operation per the outdoor unit installation and operating manual.
6. Set the thermostat to the desired operating mode and adjust the temperature for comfort conditions.

VERIFYING PROPER FUNCTIONING OF REFRIGERANT LEAK MITIGATION SYSTEM

A test to confirm the proper functioning of the refrigerant leak mitigation system must be performed at the final system check-out. Follow the procedure below to perform that test.

1. Remove the coil access panel from the front of the air handler.
2. Locate the black refrigerant sensor located near the bottom front of the coil assembly.

LEAK DETECTED DURING COOLING CYCLE

3. Set the thermostat to "COOL" and the fan switch to "AUTO" and lower the temperature setpoint below the indoor temperature so the system enters the cooling mode.
4. Confirm the outdoor unit compressor is operating.
5. Within 30 seconds of the compressor starting, release a small amount of refrigerant on the refrigerant sensor to activate the leak mitigation mode.
6. Confirm the outdoor unit compressor and fan motor shut down and the indoor blower continues to operate.
7. Confirm the indoor blower is energized and 24V is not present at the air handler pigtail marked "ALARM".
8. Confirm the outdoor unit compressor and fan motor are re-energized approximately 5 minutes after the flow of refrigerant near the sensor has ended and that the indoor blower continues to operate.

LEAK DETECTED DURING THE OFF CYCLE

9. Set the thermostat to the "OFF" position and wait until the outdoor unit compressor and fan motor stop and indoor blower stops.
10. Release a small amount of refrigerant on the refrigerant sensor to activate the leak mitigation mode.
11. Confirm the indoor blower is energized and 24V is not present at the air handler pigtail marked "ALARM".
12. Confirm the indoor blower shuts down after approximately 5 minutes after the flow of refrigerant on the refrigerant sensor has ended.
13. If the Refrigerant Leak Mitigation System does not operate as stated above, check for loose wiring connections or replace the refrigerant sensor.
14. Reinstall the coil access panel on the air handler.

15. Set the thermostat to the desired operating mode and temperature.

If the leak detection system does not function properly when subjected to the above procedure, check for miswiring of the system. If the wiring connections are found to be correct per the air handler wiring diagram, replace the sensor with an approved replacement from the manufacturer using the following procedure.

LEAK DETECTION SENSOR REPLACEMENT

When the refrigerant leak detection sensor fails or reaches the end of its life, the leak detection sensor will enter and remain in the leak mitigation mode even though there is no refrigerant leak present. If the leak detection system continues to operate in the mitigation mode even when a refrigerant leak isn't indicated by a portable refrigerant leak detector, replace the sensor with an approved replacement from the air coil manufacturer. Disconnect the wiring harness connector from the failed sensor and remove the sensor mounting screws. Discard the failed sensor. Mount the replacement sensor in the same location as the failed sensor that was removed and connect the sensor wiring harness connector to the sensor. Verify the proper function of the refrigerant leak mitigation system using the "**Verifying Proper Functioning of Refrigerant Leak Mitigation System**" above.

⚠ IMPORTANT

Navien may source sensors from various manufacturers that have a different wiring harness connection. A wiring adapter may be necessary to allow the replacement sensor to connect the sensor wiring harness. The wiring adapter will be provided with the replacement sensor. Alternate mounting holes are provided to accommodate the various approved sensors. Only use a replacement sensor approved by and provided by Navien to assure proper operation and compatibility.

⚠ IMPORTANT

The refrigerant sensor wiring harness plug must be pointing down or horizontal. If the plug is pointing up, water could collect in the plug and result in operational issues. This does not apply to Cubic brand sensors which have a water tight plug and will be pointing up in horizontal applications.

11. WIRING DIAGRAMS

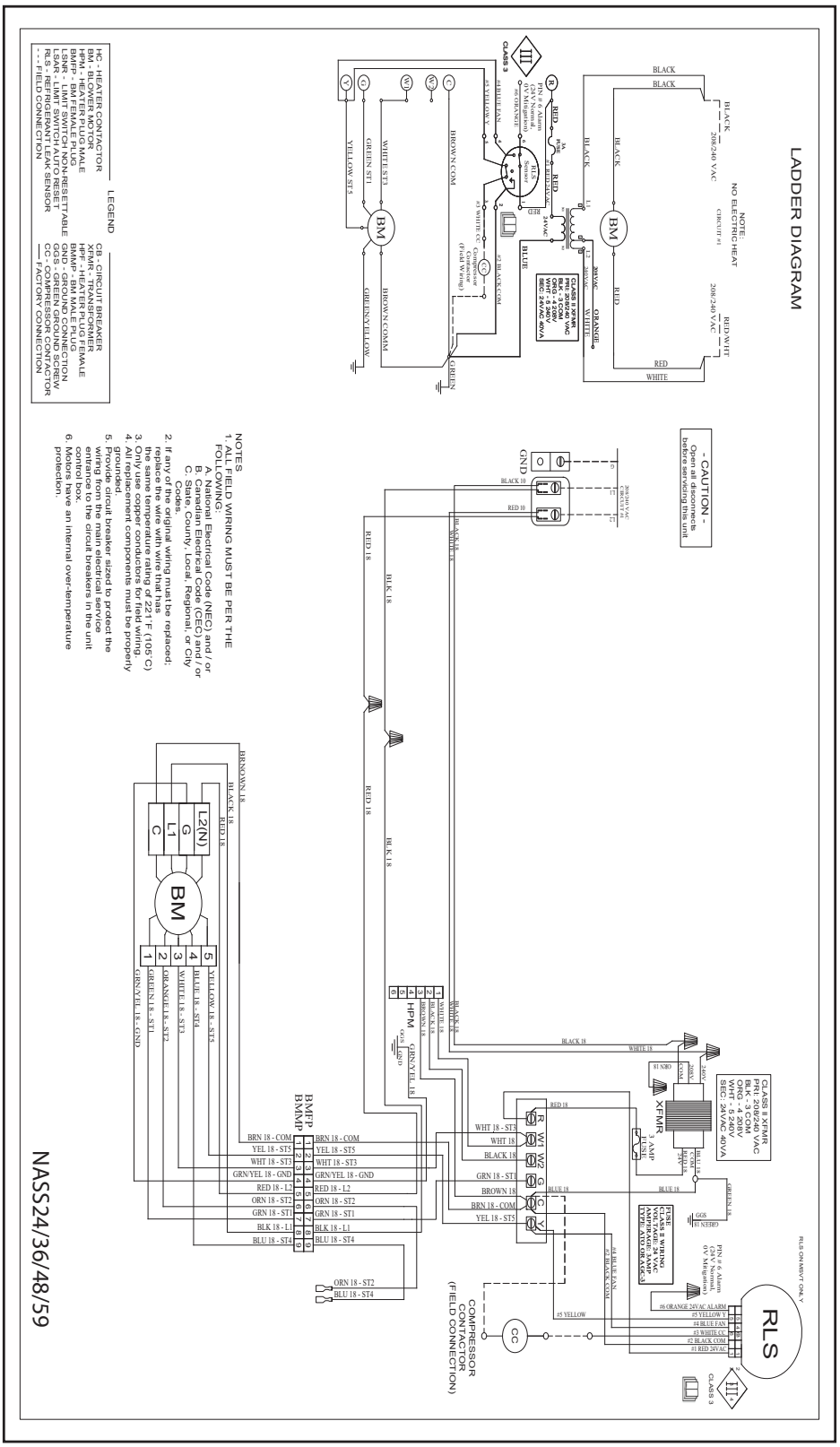


Figure 14. NASS – Constant Torque Motor – No Electric Heater

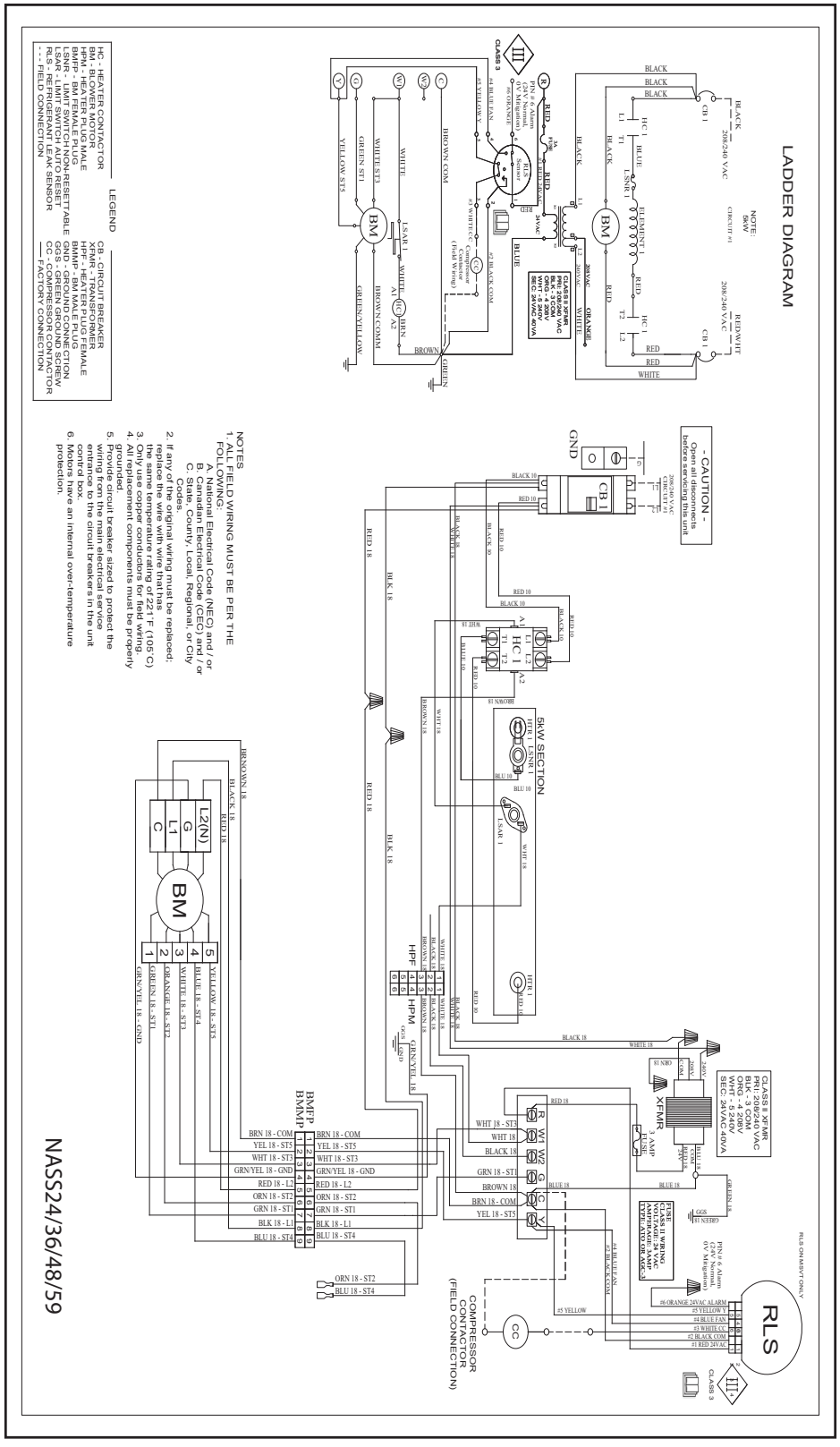


Figure 15. NASS – Constant Torque Motor – 5kW Electric Heater

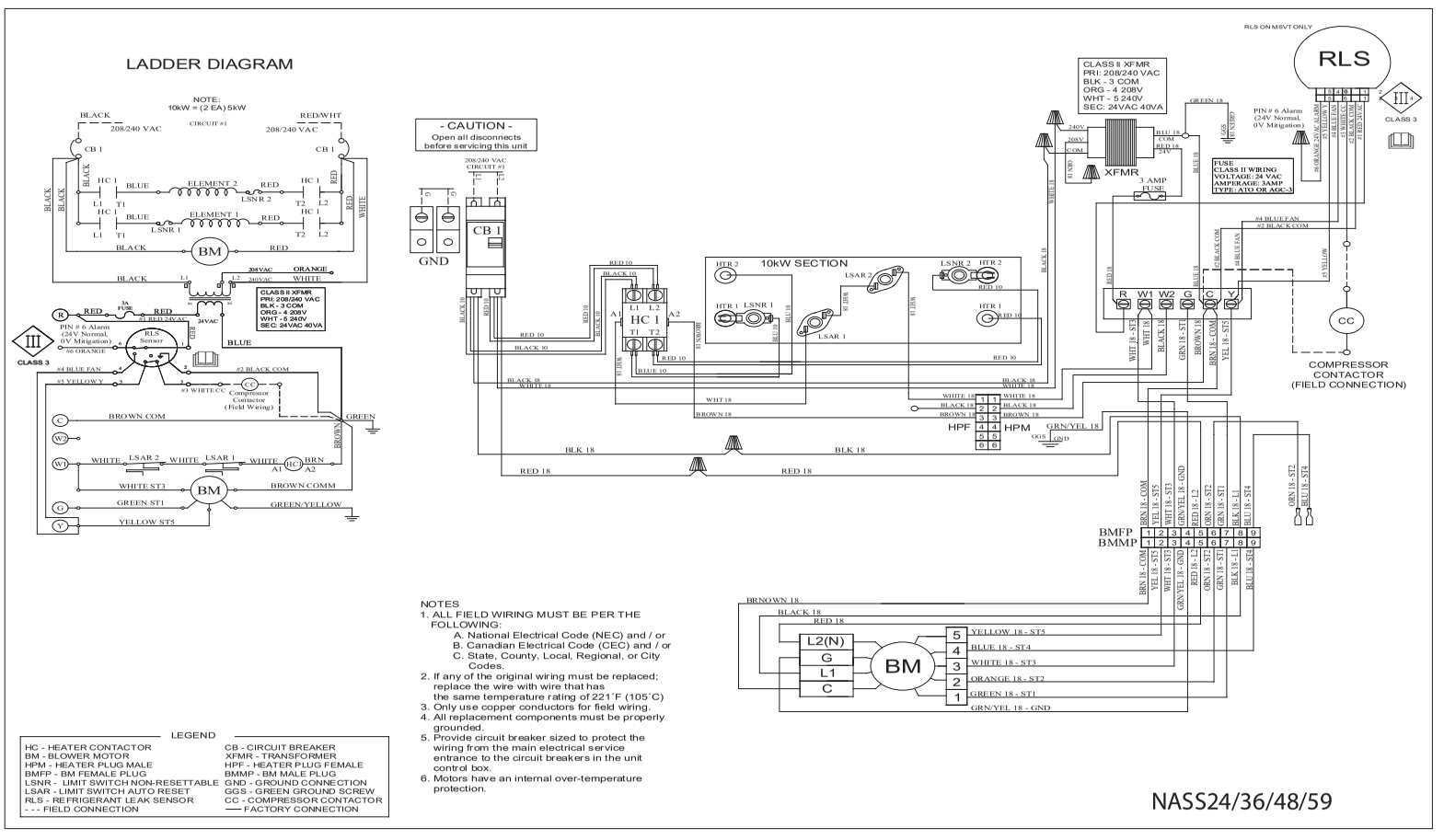


Figure 16. NASS – Constant Torque Motor – 8kw & 10kW Electric Heater

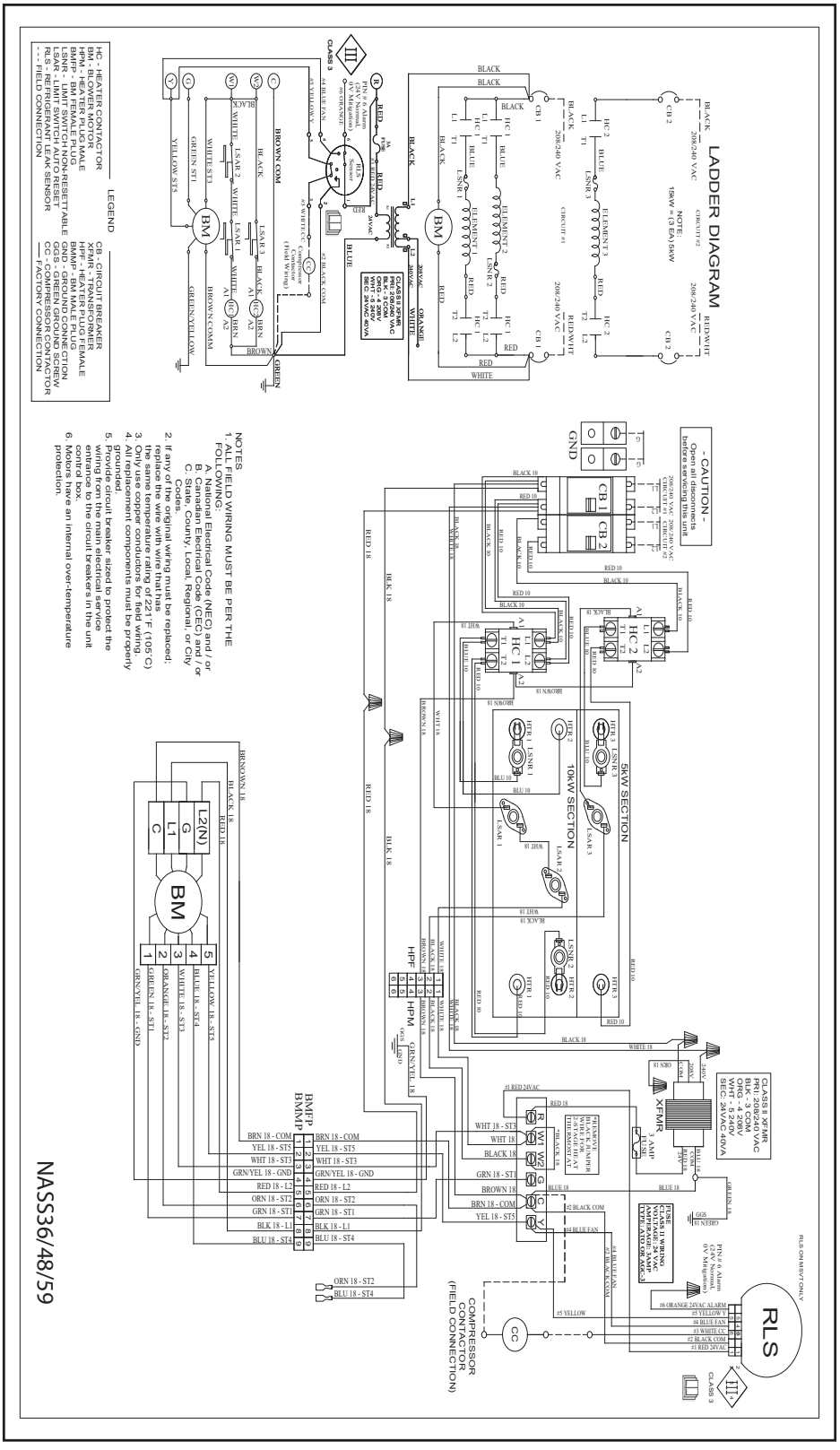


Figure 17. NASS – Constant Torque Motor – 15kW Electric Heater

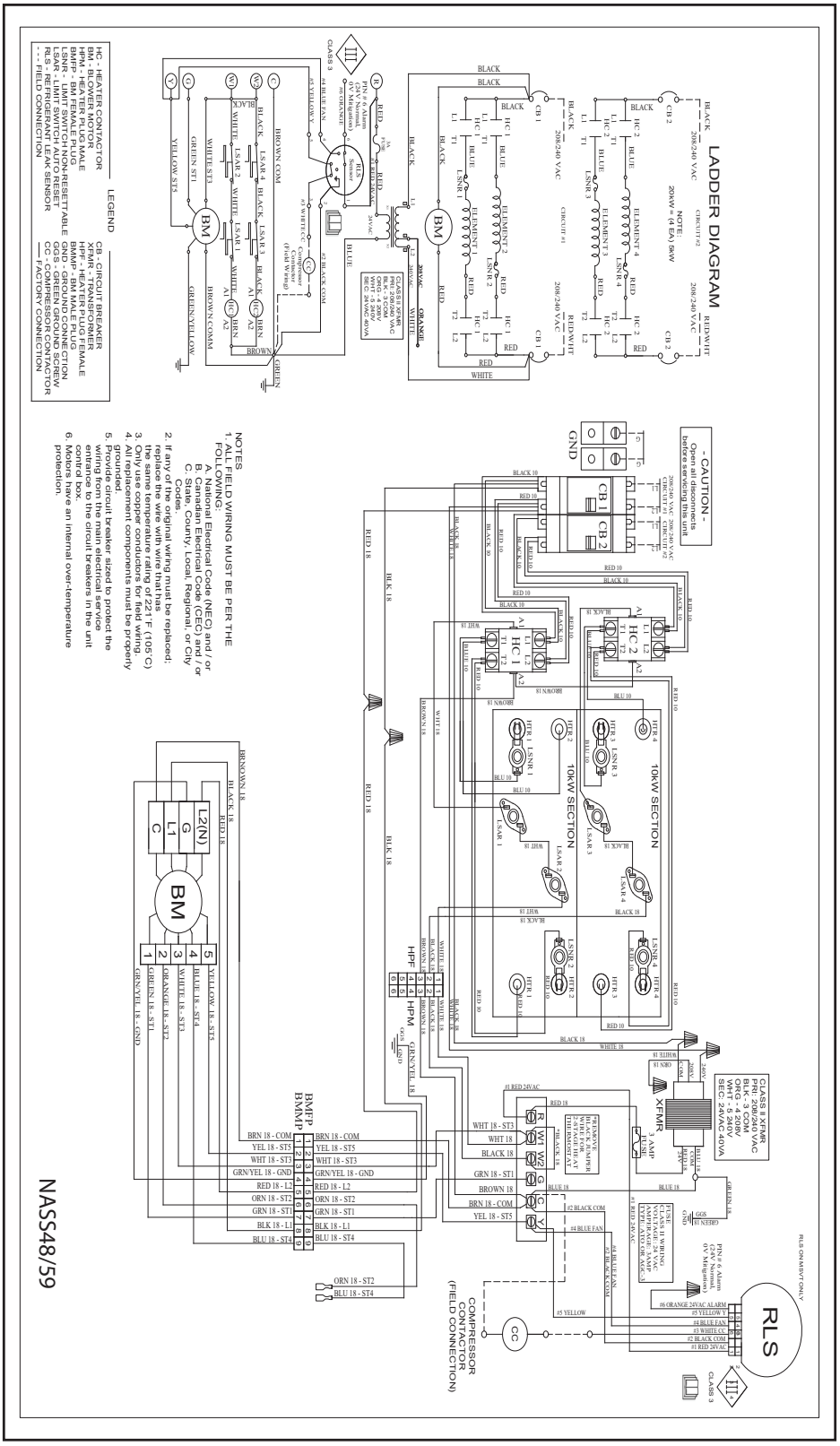


Figure 18. NASS – Constant Torque Motor – 20kW Electric Heater

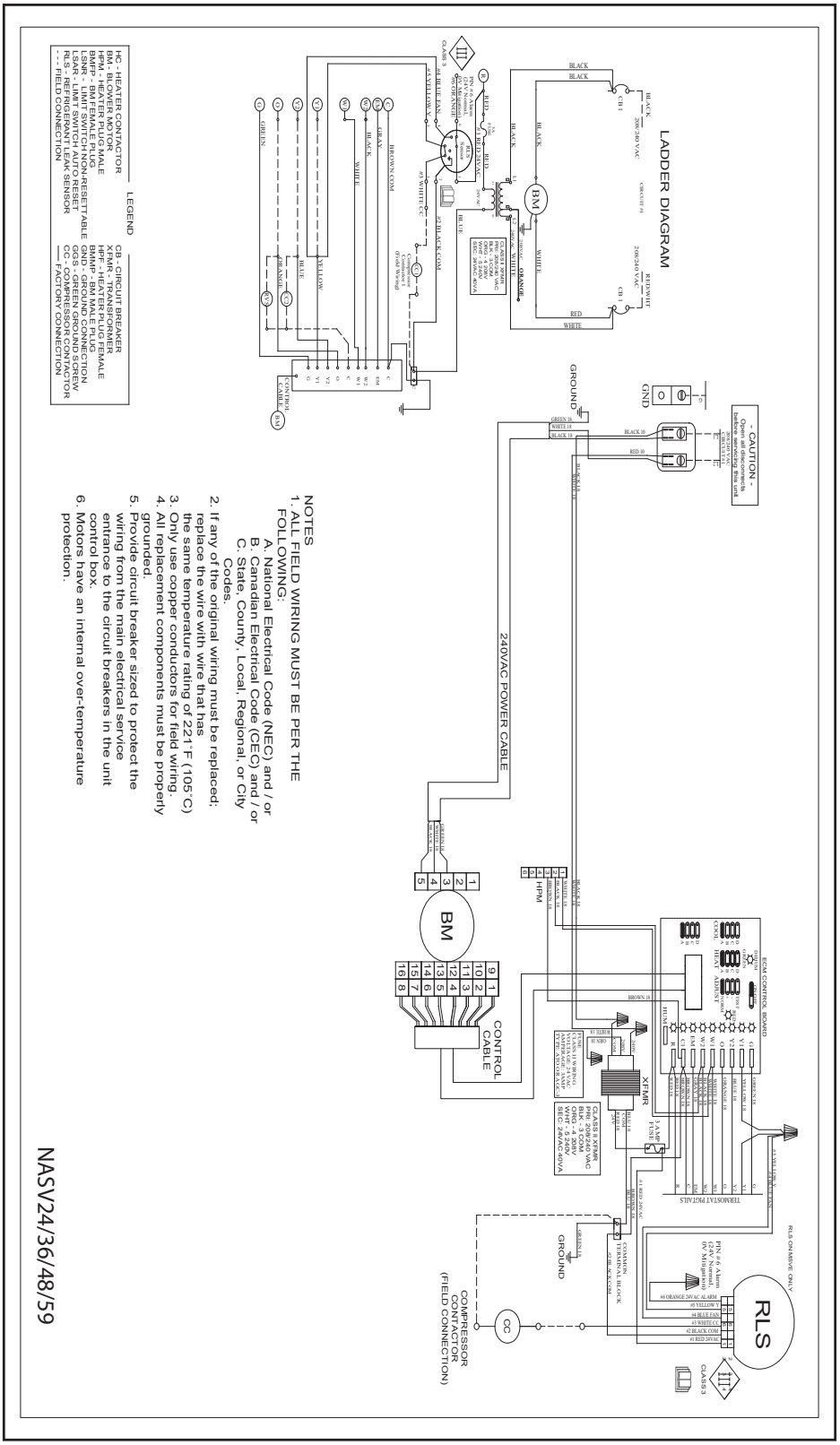


Figure 19. NASV – ECM Motor – No Electric Heater

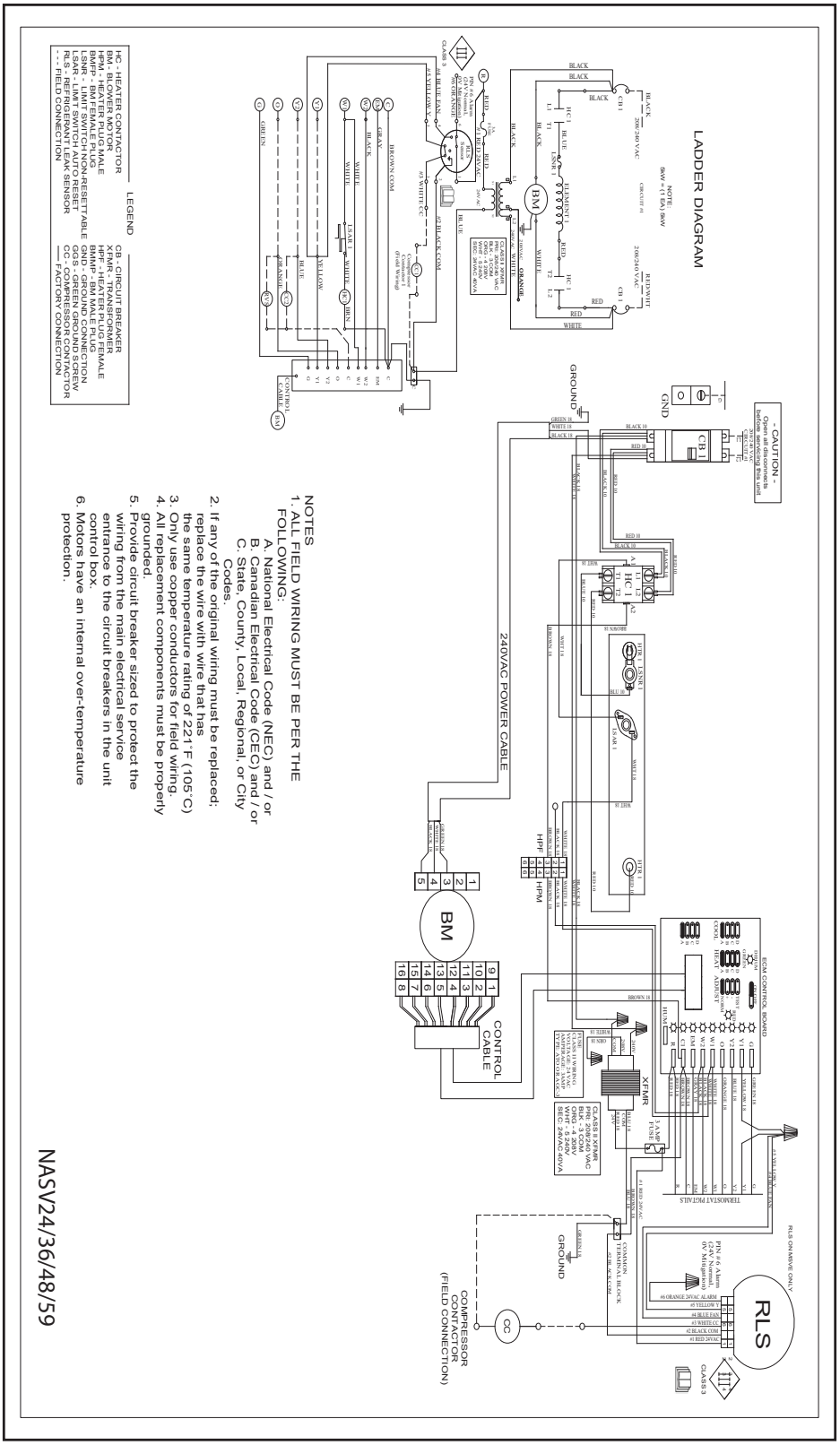


Figure 20. NASV – ECM Motor – 5 kW Electric Heater

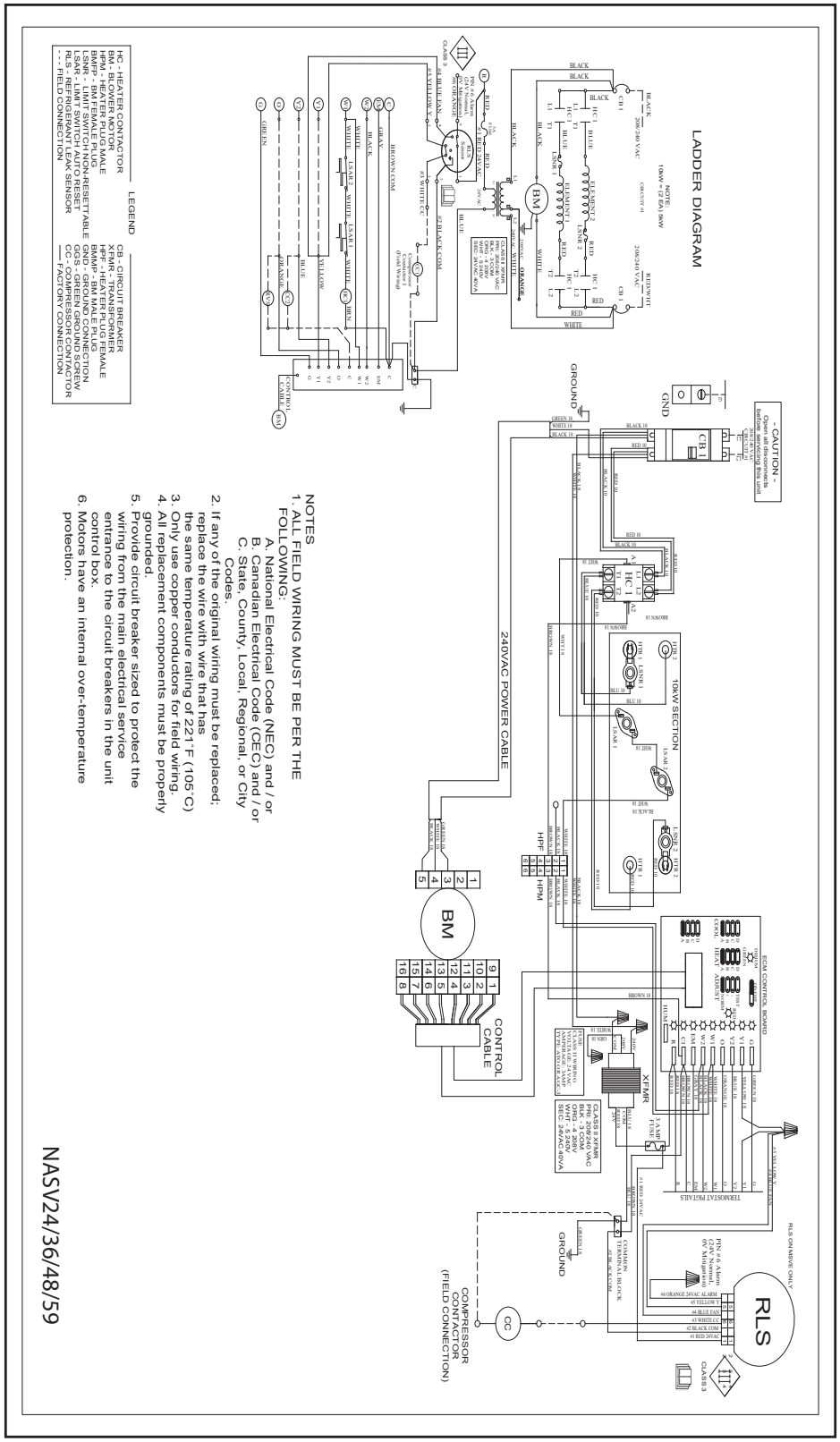


Figure 21. NASV – ECM Motor – 10 kW Electric Heater

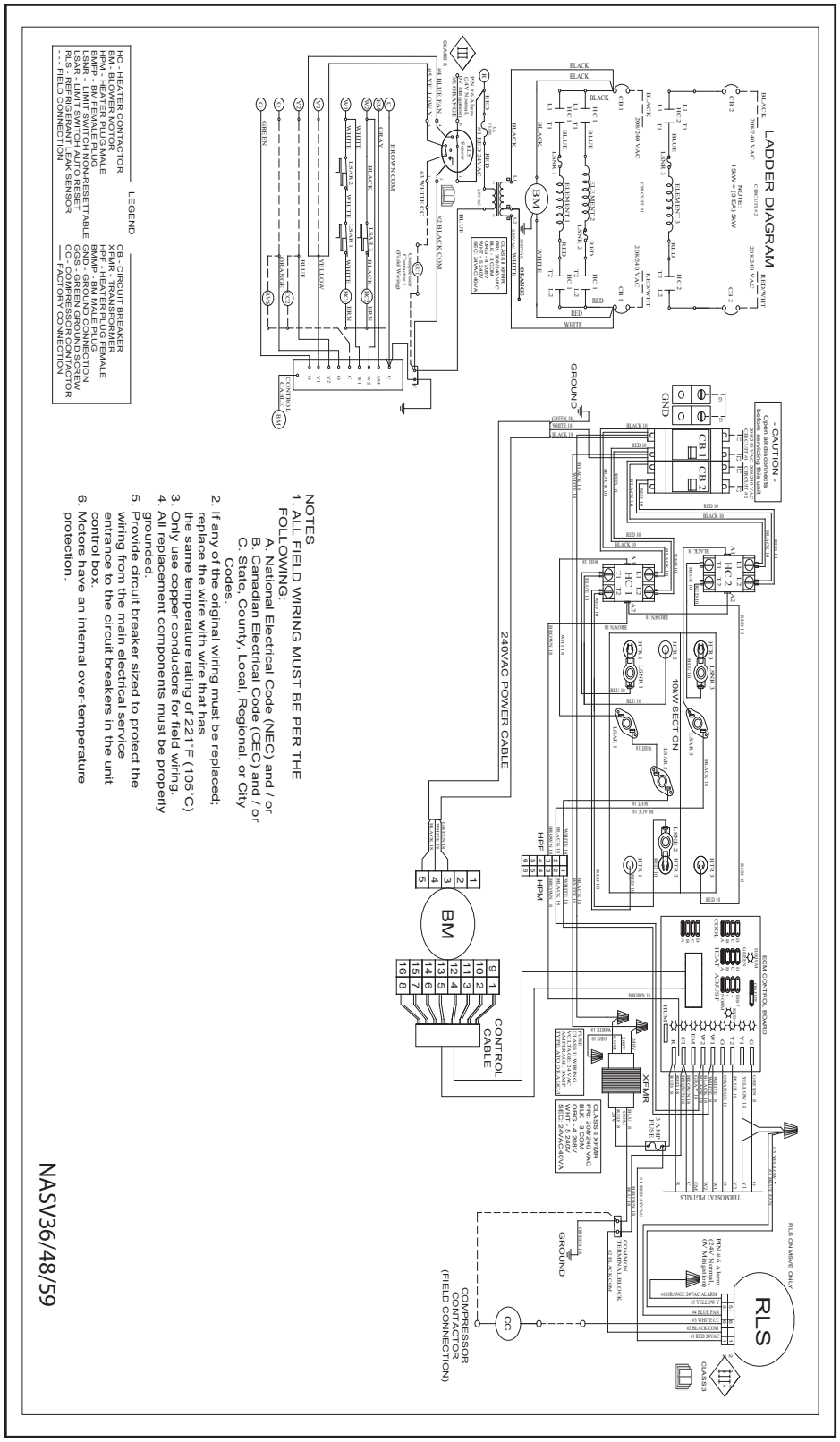


Figure 22. NASV – ECM Motor – 15 kW Electric Heater

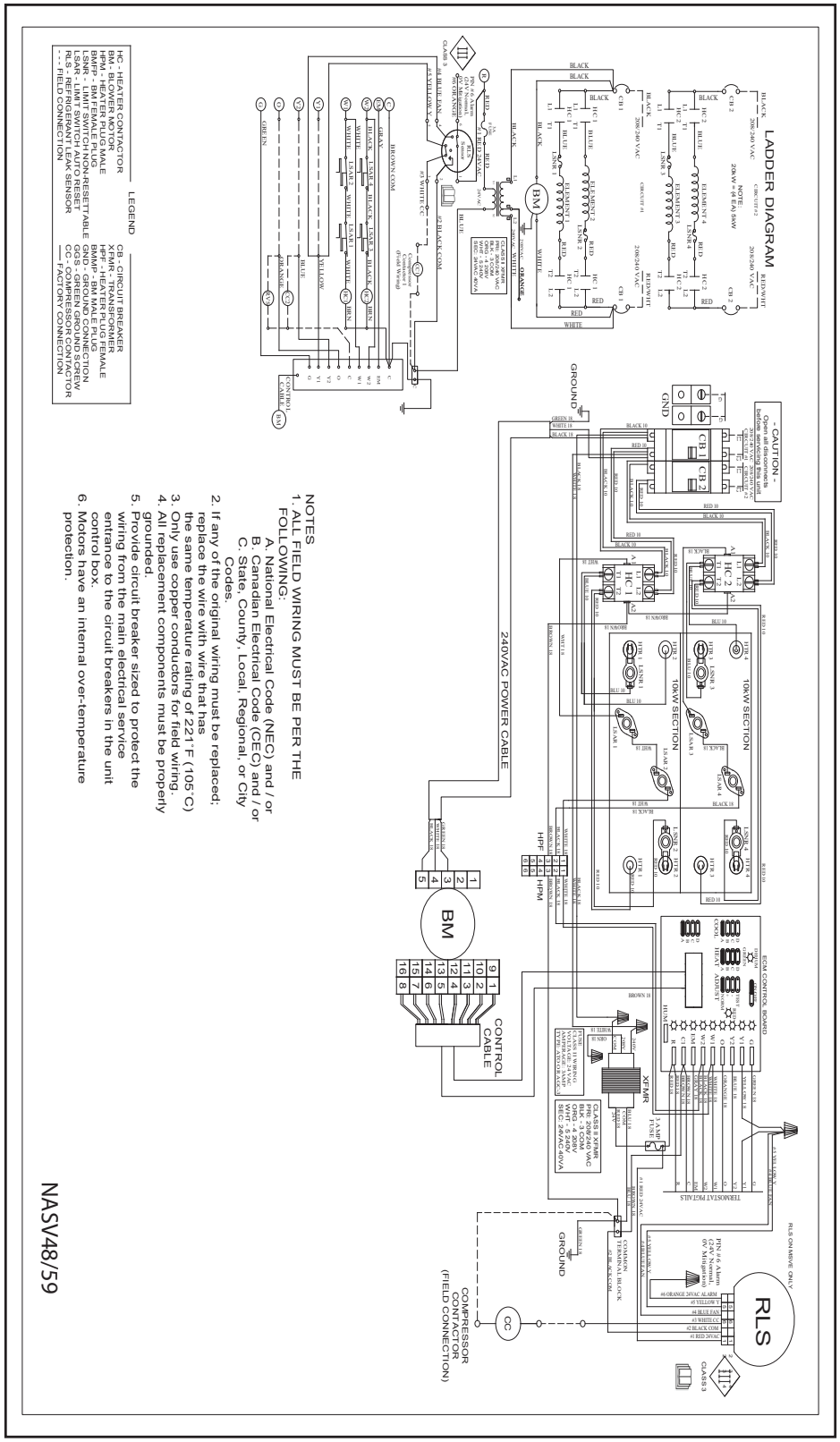


Figure 23. NASV – ECM Motor – 20 kW Electric Heater

12. ACCESSORIES

ELECTRIC HEATER KITS NOMENCLATURE					
	N	EH	S	05	B
	I	II	III	IV	V
I	**Brand** N=Navien				
II	**Type** EH=Electric Heater				
III	**Motor** S-Constant Torque V-Variable Speed				
IV	**Capacity** 05kw/08kw/10kw/15kw/20kw				
V	**Cabinet Width** B-17.5″ C-21.0″ D-24.5″				

Electric Heater Kits	
Model #	**Description**
NEHS05B	Electric Heater Kit 05KW B Width NASS
NEHS08B	Electric Heater Kit 08KW B Width NASS
NEHS10B	Electric Heater Kit 10KW B Width NASS
NEHS05C	Electric Heater Kit 05KW C Width NASS
NEHS08C	Electric Heater Kit 08KW C Width NASS
NEHS10C	Electric Heater Kit 10KW C Width NASS
NEHS15C	Electric Heater Kit 15KW C Width NASS
NEHS05D	Electric Heater Kit 05KW D Width NASS
NEHS08D	Electric Heater Kit 08KW D Width NASS
NEHS10D	Electric Heater Kit 10KW D Width NASS
NEHS15D	Electric Heater Kit 15KW D Width NASS
NEHS20D	Electric Heater Kit 20KW D Width NASS
NEHV05B	Electric Heater Kit 05KW B Width NASV
NEHV08B	Electric Heater Kit 08KW B Width NASV
NEHV10B	Electric Heater Kit 10KW B Width NASV
NEHV05C	Electric Heater Kit 05KW C Width NASV
NEHV08C	Electric Heater Kit 08KW C Width NASV
NEHV10C	Electric Heater Kit 10KW C Width NASV
NEHV15C	Electric Heater Kit 15KW C Width NASV
NEHV05D	Electric Heater Kit 05KW D Width NASV
NEHV08D	Electric Heater Kit 08KW D Width NASV
NEHV10D	Electric Heater Kit 10KW D Width NASV
NEHV15D	Electric Heater Kit 15KW D Width NASV
NEHV20D	Electric Heater Kit 20KW D Width NASV

FILTER BASE NOMENCLATURE			
	N	AHFB	B
	I	II	III
I	**Brand** N=Navien		
II	**Type** AHFB=Filter Base		
III	**Cabinet Width** B-17.5″ C-21.0″ D-24.5″		

DOWNFLOW KIT NOMENCLATURE			
	N	AHDF	B
	I	II	III
I	**Brand** N=Navien		
II	**Type** AHDF=Downflow Kit		
III	**Cabinet Width** B-17.5″ C-21.0″ D-24.5″		

Filter Base Assemblies	
Model #	**Description**
NAHFBB	Filter Base Assemby 20x20x2 (For Medium Chasis)
NAHFBC	Filter Base Assemby 16x20x2 (For Small Chasis)
NAHFBD	Filter Base Assemby 20x24x2 (For Large Chasis)

Downflow Kit Assemblies	
Model #	**Description**
NAHDFB	Downflow Kit Small
NAHDFC	Downflow Kit Medium
NAHDFD	Downflow Kit Large

Total System Refrigerant Charge (kg) 1.776 kg or less	Total System Refrigerant Charge (oz) 62.6 oz or less	Total System Refrigerant Charge (lb) 3.91 lb or less	Min. Area of Condtioned Space (m^2) No Minimum	Min. Area of Conditioned Space (ft^2) No Minimum	Min. Air-Flow (m^3/hr) No Minimum	Min. Air-Flow (liter/s) No Minimum	Min. Air-Flow (CFM) No Minimum
1.78	63	3.92	20.05	216	180	50	106
1.92	68	4.22	21.58	232	194	54	114
2.05	72	4.52	23.11	249	208	58	122
2.19	77	4.82	24.64	265	222	62	131
2.32	82	5.12	26.18	282	236	65	139
2.46	87	5.42	27.71	298	249	69	147
2.60	92	5.72	29.24	315	263	73	155
2.73	96	6.02	30.77	331	277	77	163
2.87	101	6.32	32.31	348	291	81	171
3.00	106	6.62	33.84	364	305	85	179
3.14	111	6.92	35.37	381	318	88	187
3.28	116	7.22	36.90	397	332	92	195
3.41	120	7.52	38.44	414	346	96	204
3.55	125	7.82	39.97	430	360	100	212
3.69	130	8.12	41.50	447	374	104	220
3.82	135	8.42	43.03	463	387	108	228
3.96	140	8.73	44.57	480	401	111	236
4.09	144	9.03	46.10	496	415	115	244
4.23	149	9.33	47.63	513	429	119	252
4.37	154	9.63	49.17	529	442	123	260
4.50	159	9.93	50.70	546	456	127	269
4.64	164	10.23	52.23	562	470	131	277
4.77	168	10.53	53.76	579	484	134	285
4.91	173	10.83	55.30	595	498	138	293
5.05	178	11.13	56.83	612	511	142	301
5.18	183	11.43	58.36	628	525	146	309
5.32	188	11.73	59.89	645	539	150	317
5.45	192	12.03	61.43	661	553	154	325
5.59	197	12.33	62.96	678	567	157	333
5.73	202	12.63	64.49	694	580	161	342
5.86	207	12.93	66.02	711	594	165	350
6.00	212	13.23	67.56	727	608	169	358
6.14	216	13.53	69.09	744	622	173	366
6.27	221	13.83	70.62	760	636	177	374
6.41	226	14.13	72.16	777	649	180	382
6.54	231	14.43	73.69	793	663	184	390
6.68	236	14.73	75.22	810	677	188	398
6.82	240	15.03	76.75	826	691	192	407
6.95	245	15.33	78.29	843	705	196	415
7.09	250	15.63	79.82	859	718	200	423
7.22	255	15.93	81.35	876	732	203	431
7.36	260	16.23	82.88	892	746	207	439
7.50	264	16.53	84.42	909	760	211	447
7.63	269	16.83	85.95	925	774	215	455
7.77	274	17.13	87.48	942	787	219	463
7.90	279	17.43	89.01	958	801	223	471
8.04	284	17.73	90.55	975	815	226	480
8.18	288	18.03	92.08	991	829	230	488
8.31	293	18.33	93.61	1008	843	234	496
8.45	298	18.63	95.15	1024	856	238	504
8.59	303	18.93	96.68	1041	870	242	512
8.72	308	19.23	98.21	1057	884	246	520
8.86	312	19.53	99.74	1074	898	249	528
8.99	317	19.83	101.28	1090	911	253	536

Table 17. MINIMUM CONDITIONED SPACE AREA & AIR-FLOW FOR R-454B REFRIGERANT INSTALLATIONS

Note

1. Applies to fixed ducted systems with continuous air-flow or refrigerant detection systems only.
2. Based on release height of 0.6 meters above floor and LFL of 0.296 kg/m^3

13. DECOMMISSIONING AND DISPOSAL OF THE AIR HANDLER

When the air handler is at the end of its life and is being removed for replacement, proper procedures must be followed to assure the safety of the technician and building occupants due to the flammable refrigerant contained in the refrigeration system. Before conducting this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being conducted, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

Decommissioning Procedure

a. Become familiar with the equipment and its operation.

b. Before attempting the procedure, ensure that:
   - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
   - all personal protective equipment is available and being used correctly;
   - the recovery process is supervised at all times by a competent person;
   - recovery equipment and cylinders conform to the appropriate standards.

c. Pump down the refrigerant into the outdoor unit, if possible, by closing the outdoor unit liquid service valve and energizing the compressoruntil the suction pressure is near atmospheric pressure. If pumping the system down is not possible due to an inoperable compressor, the refrigerant must be recovered.

d. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

e. Make sure that cylinder is situated on the scales before recovery takesplace.

f. Start the recovery machine and operate in accordance with instructions. (Also, refer to Refrigerant Recovery Requirements in the next column.)

g. Do not overfill cylinders (no more than 80 % volume liquid charge).

h. Do not exceed the maximum working pressure of the cylinder, eventemporarily.

i. When the cylinders have been filled correctly and the processcompleted, make sure that the cylinders and the equipment areremoved from site promptly and all isolation valves on the equipment are closed off.

j. Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked. Disconnect all electrical wiring from the air handler.

k. Once all of the refrigerant has been pumped into the outdoor unitor has been recovered, disconnect the refrigerant lines from the airhandler. Continuously flush or purge with inert gas when using a flame to open the circuit at the field refrigerant line connections.

l. Turn the circuit breaker(s) serving the air handler in the main electrical panel to the OFF position. If a disconnect switch has been installednear the air handler, switch it to the OFF position.

m. Disconnect all electrical wiring from the air handler.

n. Once the refrigerant lines and electrical wiring have been disconnected from the air handler, remove the air handler from the property anddispose of it. Taking the air handler to a recycling center is encouraged.

o. Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

Refrigerant Recovery Requirements

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order.

Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be performed safely.

14. LIMITED WARRANTY

This Limited Warranty is provided by Navien, Inc. ("Navien") to cover only labor and parts for the Navien NAS Series Air Handler Unit ("Product") as originally installed in a Navien AHRI system.

How Long is the Coverage?

The warranty periods begin from the date of original installation ("Commencement Date"), and proof of such date must be provided to Navien. When the Product is installed in new construction, the Commencement Date shall be the date that the end-user takes title to the property. If proof of the installation date is unavailable, then the original installation date shall be deemed to be six months after the unit's manufacture date. If the Product is registered online within 60 days of the Commencement Date, the base limited warranty term shall be extended from "Non-Registered[4]" to "Registered[3]" as shown in the Coverage Table. Any Product not properly registered online within 60 days of the Commencement Date shall be subject to the "Non-Registered[4]" base limited warranty. You may register the unit and receive an email confirmation for your records at https://www. navieninc.com/register.

What is Covered?

Subject to the terms and conditions set forth in this limited warranty, Navien will repair or furnish a replacement Parts[1], at no charge, for installation by a qualified HVAC service provider, if the Part fails due to a manufacturing defect under normal use and maintenance. Purchaser must pay for any and all shipping and handling charges and other warranty service costs for the replacement Part. If a Part is not available, Navien will, at its option, a) provide a free suitable Part or b) provide a credit in the amount of the then factory selling price for a new suitable substitute Part that Purchaser may use towards the retail purchase price of a new Navien product. Any new Product purchase shall be at Purchaser's sole cost and expense including, but not limited to, all shipping, removal, and installation costs and expenses. Navien will pay reasonable labor charges for the repair subject to Navien's prior written approval and in accordance with Navien's schedule of approved labor allowances for a period of 90 days from the date of original installation. All repair Parts must be genuine Navien Parts unless otherwise authorized by Navien. All repairs and replacements must be performed by an individual or servicing company that is qualified to do the type of repair. During the applicable warranty period, replacement of the Product or Part requires Navien's direct prior written approval, and no third party is authorized to provide such approval on behalf of Navien. The replacement Part or Product will be warranted only for the unexpired portion of the applicable warranty period for the original Part or Product. Warranty rights will not be diminished or affected for residents of any jurisdiction, such as California and Quebec, that prohibit warranty benefits conditioned on registration.

Transfer of Warranty to Subsequent Owners

When ownership is transferred to a subsequent owner, while the Product remains at the site of original installation, warranties are reduced to the "Non-Registered[4]" duration listed in the table below.

NAS Series - Coverage Table for Labor and Parts Only			
Residential[2]			Commercial
Parts[1]	Registered[3]	10 Years	1 Year
	Non-Registered[4]	5 Years	
Labor	90 days		

Definitions:
Parts[1] – Refers to all internal functional components of the unit
Residential[2] – Refers to a Single-Family, residential application.
Registered[3] – Refers to coverages for units registered within 60 days of the Commencement date.
Non-Registered[4] – Refers to coverages for units registered 61 days or more after the Commencement Date

Eligibility Requirements

To be covered under this limited warranty, the Product or Parts must meet the following requirements: (i) The Product must be in the same location where it was originally installed; (ii) The Product must be properly installed, operated, and maintained by a licensed HVAC service provider in accordance with the specifications or installation, operation, and maintenance instructions provided by Navien, and you must upon request, present written maintenance records, (iii) The Product or Parts replaced under this limited warranty must be given to the servicing provider for return to Navien; and (iv) All claims under this limited warranty must be filed within 30 days of the failure date.

How do I get service?

You must contact the original installer of your Product who must then contact Navien to report the issue. If you cannot find or do not wish to use the original installer, you may choose any service provider who is qualified to complete the necessary repair. Your service provider must contact and obtain approval from Navien's Technical Support team at 800-519-8794 or an authorized Navien distributor prior to commencing any warranty service. The installer and/or service provider must comply with Navien's warranty service and return procedures as available on Navien's website.

Additional terms and conditions are continued on the reverse side.

Customer Name :	
Customer Address :	
Telephone :	Fax :
Email :	
Installer Name :	License No :
Installer Address :	
Place of Purchase :	
Model No :	
Serial No :	
Date of Purchase :	

SKIP THE STAMP!

Use your camera to scan this QR code and register your unit online.

PLACE STAMP HERE

Navien, Inc.
20 Goodyear, Irvine, CA 92618
Tel : 1-800-519-8794
Fax : 949-420-0430
www.navieninc.com

For instant warranty registration, please register your product online at www.navieninc.com

What is not covered?

Navien's Limited Warranty shall be void in the event of an occurrence of any of the following:

- Improper installation, including but not limited to, installation in violation of applicable rules, laws or building codes, incorrect refrigerant type, reinstallation at another location, etc.
- Failure to install the unit by a qualified HVAC installer.
- Accident, abuse or misuse including but not limited to installation for non-recommended uses, failure to follow or comply with the Manual, etc.
- Improper maintenance including but not limited to, operating in corrosive atmospheric elements, including but not limited to, chlorine, fluorine, salt, sulfur, recycled waste water, urine, fertilizers, rust, or other damaging substances or chemicals.
- Modification, alteration, addition of non-approved components, or misapplication of the Product in any manner.
- Damage or problems caused by electrical surges, flooding, fire, freezing, abnormal external temperature, force majeure, riot, act of war, or any acts of God.
- Performance problems caused by improper use of refrigerant lines, filter drier, electric service voltage, wiring, fusing or any other components, parts or specifications.
- Vibration and noise unless caused by a defect in materials or workmanship. Any other causes other than defects in materials or workmanship.
- Operating the Product at temperatures outside the factory calibrated temperature limits and/or exceeding the maximum setting of the high limit control.
- Installation at any location outside the United States or Canada.
- Conversion from R-454B refrigerant to other refrigerants or attempt to operate with a type of refrigerant not specified for the air handler unit.
- Accidental or intentional damage.
- Failure to perform normal maintenance as described in the manual, such as cleaning of the heat exchangers, unit cleaning and/or filter replacement.
- Parts or accessories not supplied or designated by the manufacturer.
- Any damage, or the need for any repairs, caused by frozen or broken heat exchanger, moisture intrusion, mold or other biological growth.
- Changes in the appearance of the unit that do not affect its performance.
- Replacement of fuses and replacement or resetting of circuit breakers.
- There is no warranty on any Product purchased through the internet or from any installer that obtained the Product from a supplier or distributor not authorized by Navien.
- Purchase of Product made on an uninstalled basis, whether direct, online or through a secondary or auction market.

Warranty Limitations

EXCEPT AS EXPRESSLY PROVIDED HEREIN, THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE WARRANTY HEREIN AND FURTHER NAVIEN SHALL NOT BE LIABLE FOR INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, PUNITIVE OR OTHER SIMILAR DAMAGES THAT MAY ARISE, INCLUDING LOST PROFITS, DAMAGE TO A PERSON OR PROPERTY, LOSS OF USE, INCONVENIENCE, OR LIABILITY ARISING FROM IMPROPER INSTALLATION, SERVICE OR USE OF THE PRODUCT. ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS ARISING UNDER STATE LAW ARE LIMITED IN DURATION TO THE PERIOD OF COVERAGE PROVIDED BY THIS WARRANTY, UNLESS THE PERIOD PROVIDED BY STATE LAW IS LESS.

No one is authorized to make any other warranties on behalf of Navien. Some states do not allow the exclusion or limitation of incidental or consequential damages, or how long an implied warranty lasts, so the above limitation may not apply to you. This Limited Warranty gives you specific legal rights and you may also have other rights which vary from state to state. If this Product is considered a consumer product, please be advised that some local laws do not allow exclusions or limitations on incidental or consequential damages, or limitations on how long a warranty lasts; or how long an implied warranty lasts, so that the above limitations may not apply to you. Refer to your local laws for your specific rights under this limited warranty. If you have any questions regarding this limited warranty, please contact your original installation dealer, or any participating dealer, should your original installation dealer no longer be available. No action arising out of any claimed breach of this limited warranty may be brought by the Purchaser (or any subsequent purchaser retaining the balance of a properly transferred limited warranty) more than one (1) year after the cause of action or claim has arisen.

SKIP THE STAMP!

Use your camera to scan this QR code and register your unit online.

Retain this document for future reference.

For instant warranty registration, please register your product online at www.navieninc.com

Memo

Installation and Operation Manual

Navien Air Handler Unit NAS Series (24-60K, R454B)

Getting Service

If your Air Handler Unit requires service:

- All repairs require pre-authorization by Technical Support.
- Request for your installer or any licensed professional to contact Technical Support at 1-800-519-8794 Option 2 once at the installation site.
- A short list of independent service providers in your area can be found on the website: www.navieninc.com/installers.
- Contact a licensed professional for the affected system (for example, a plumber, gas fitter, or electrician).

When you contact Technical Support, please have the following information at hand:

- Model number
- Serial number
- Date purchased
- Installation location and type
- Error code, if any appears on the front panel display

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Navien, Inc.
800.519.8794 www.navieninc.com
20 Goodyear, Irvine, CA 92618