



MULTI V[™] **WATER5** **ENGINEERING MANUAL**



Variable Refrigerant Flow Water Source Units
6.0 to 48.0 Tons

PROPRIETARY DATA NOTICE

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This document is for design purposes only.**

A summary list of safety precautions is on page 3.

To access additional technical documentation such as submittals, indoor unit engineering manuals, installation, service, product data performance, general best practice, and building ventilation manuals, as well as white papers, catalogs, LATS software programs, and more, log in to www.lghvac.com.

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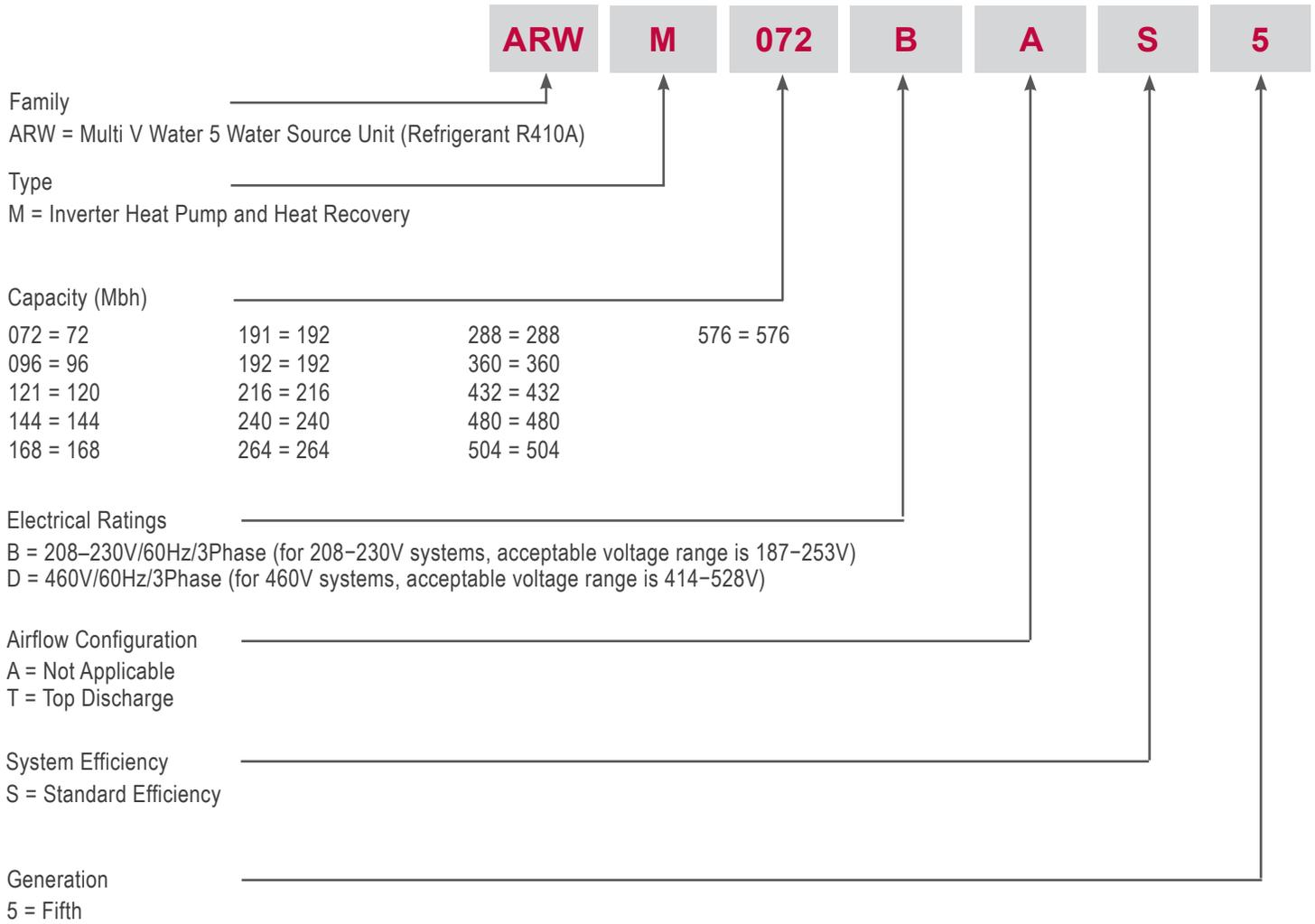
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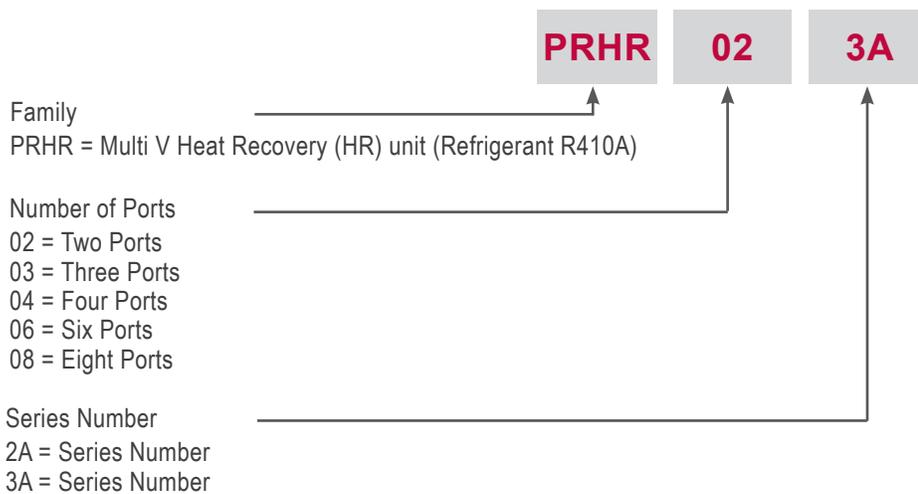
 DANGER	<i>This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</i>
 WARNING	<i>This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</i>
 CAUTION	<i>This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</i>
Note:	<i>This symbol indicates situations that may result in equipment or property damage accidents only.</i>
	<i>This symbol indicates an action that must not be performed.</i>

UNIT NOMENCLATURE

Water Source Units



Heat Recovery Units (HRU)



LG Air Conditioner Technical Solution (LATS) Software

A properly designed and installed refrigerant piping system is critical to the optimal performance of LG air-conditioning systems. To assist engineers, LG offers, free of charge, LG Air Conditioner Technical Solution (LATS) software—a total design solution for LG air conditioning systems.

Note:

To reduce the risk of designing an improper applied system or one that will not operate correctly, LG requires that LATS software be used on all projects.

Formats

LATS is available to LG customers in two user interfaces: LATS HVAC and LATS REVIT. LATS formats are available through www.myLGHVAC.com, or contact an LG Sales Representative.

LATS HVAC is a Windows®-based application that aids engineers in designing LG Variable Refrigerant Flow (VRF), Multi F / Multi F MAX, Single-Zone, and Energy Recovery Ventilator (ERV) systems.

*Windows® is a registered mark of Microsoft® Corporation.

LATS Revit integrates the LG LATS program with Revit® software**. It permits engineers to layout and validate Multi V VRF systems directly into Revit drawings.

**Revit® is a registered mark of Autodesk, Inc.

Features

All LG product design criteria have been loaded into the program, making LATS simple to use: double click or drag and drop the component choices. Build systems in Tree Mode where the refrigerant system can be viewed. Switch to a Schematic diagram to see the electrical and communications wiring.

LATS software permits the user to input region data, indoor and outdoor design temperatures, modify humidity default values, zoning, specify type and size of outdoor units and indoor units, and input air flow and external static pressure (ESP) for ducted indoor units.

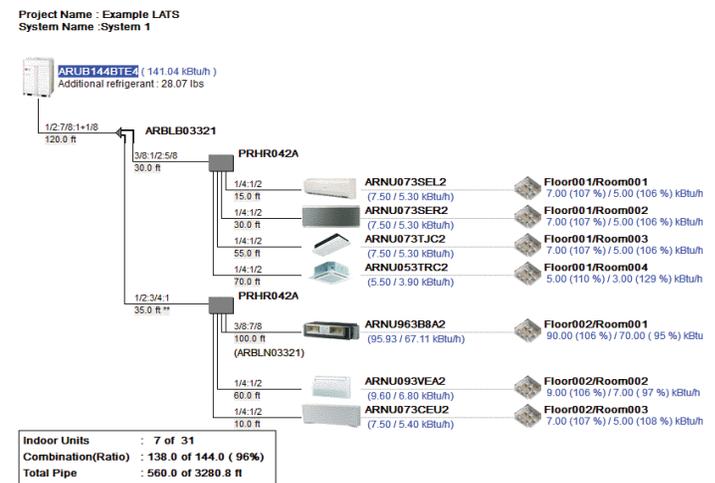
The program can also do the following:

- Import building loads from a separate Excel file.
- Present options for outdoor unit auto selection.
- Automatically calculate component capacity based on design conditions for the chosen region.
- Verify if the height differences between the various system components are within system limits.
- Provide the correct size of each refrigerant piping segment and LG Y-Branches and Headers.

Note:

Features depend on which LATS program is being used, and the type of system being designed.

Figure 1: Example of a LATS Tree Diagram.



- Adjust overall piping system length when elbows are added.
- Check for component piping limitations and flag if any parameters are broken.
- Factor operation and capacity for defrost operation.
- Calculate refrigerant charge, noting any additional trim charge.
- Suggest accessories for indoor units and outdoor units.
- Run system simulation.

LG AIR CONDITIONER TECHNICAL SOLUTION (LATS)



LATS Generates a Complete Project Report

LATS software also generates a report containing project design parameters, cooling and heating design data, system component performance, and capacity data. The report includes system combination ratio and refrigerant charge calculations; and provides detailed bill of material, including outdoor units, indoor units, control devices, accessories, refrigerant pipe sizes segregated by building, by system, by pipe size, and by pipe segments. LATS can generate an Excel GERP report that can imported into the LG SOPS pricing and ordering system.

Proper Design to Install Procedure

LG encourages a two report design-to-install-procedure. After the design engineer determines building / zone loads and other details, the engineer opens the LATS program and inputs the project's information. When the design is complete, the "Auto Piping" and "System Check" functions must be used to verify piping sizes, limitations, and if any design errors are present. If errors are found, engineers must adjust the design, and run Auto Piping and System Check again. When the design passes the checks, then the engineer prints out a project "Shop Drawing" (LATS Tree Diagram) and provides it to the installing contractor. The contractor must follow the LATS Tree Diagram when building the piping system, but oftentimes the design changes on the building site:

- Architect has changed location and/or purpose of room(s).
- Outdoor unit cannot be placed where originally intended.
- Structural elements prevent routing the piping as planned.
- Air conditioning system conflicts with other building systems (plumbing, gas lines, etc.).

The contractor must mark any deviation from the design on the Shop Drawing, including as-built straight lines and elbows. This "Mark Up" drawing must be returned to the design engineer or Rep, who must input contractor changes into the LATS file. (Copy the original LATS software file, save and rename as a separate file, and modify all piping lengths by double-clicking on each length and editing information.) Like the shop drawing, the Auto Piping and System Check must also be run on this new "As Built" drawing. The design engineer or Rep must then provide the final As Built file to the contractor. The Mark Up version must be compared to the As Built version for:

- Differences in pipe diameter(s). If incorrect diameters have been installed, the piping must be changed out. If pipe diameters have changed, check to see if Y-Branches will also need to be changed.
- Changes to outdoor unit and indoor unit capacities. Capacities changes may impact line length changes.
- Additional refrigerant charge quantity ("Trim Charge"). Trim charge will change if piping lengths and diameters change. The As Built version must reflect installed piping lengths to ensure correct trim charge.

All documents submitted by the contractor, as well as the Shop Drawing and the As Built Drawing files must be provided for commissioning purposes. Model and serial numbers for all system components must also be submitted. If the steps previously detailed are not followed, and all documents are not provided to the commissioning agent, the project runs the risk of not being commissioned and voiding any limited warranty LG offers on the equipment.



REFRIGERANT CHARGE WORKSHEET

System R410A Refrigerant Charge Calculator (lbs.)

System Tag or ID:		Job Name: _____				
		Project Manager: _____			Date: _____	
Line #	Description	Chassis I.D.	Size	Quantity	CF (Ref.) ¹	Total (lbs.)
1	Linear feet of 1/4" liquid line tubing ²	—	—		0.015	
2	Linear feet of 3/8" liquid line tubing ²	—	—		0.041	
3	Linear feet of 1/2" liquid line tubing ²	—	—		0.079	
4	Linear feet of 5/8" liquid line tubing ²	—	—		0.116	
5	Linear feet of 3/4" liquid line tubing ²	—	—		0.179	
6	Linear feet of 7/8" liquid line tubing ²	—	—		0.238	
7	Linear feet of 1" liquid line tubing ²	—	—		0.323	
8	Standard + Art Cool Mirror	SJ, SK	5k to 15k		0.53	
9	Standard + Art Cool Mirror	SJ, SK	18k to 24k		0.62	
10	Standard	SV	30k to 36k		1.01	
11	Art Cool Gallery	SF	9k to 12k		0.22	
12	1-Way Cassette	TU	7k to 12k		0.44	
13	1-Way Cassette	TT	18k to 24k		0.64	
14	2-Way Cassette	TS	18k to 24k		0.75	
15	4-Way 2' x 2' Cassette	TR	5k to 7k		0.40	
16	4-Way 2' x 2' Cassette	TR	9k to 12k		0.55	
17	4-Way 2' x 2' Cassette	TQ	15k to 18k		0.71	
18	4-Way 3' x 3' Cassette	TA	7k to 48k		1.5	
19	Mid Static Ducted	M1	7k to 24k		0.57	
20	High Static Ducted	M2	7k to 24k		0.77	
21	Mid Static Ducted	M2	28k to 42k		1.15	
22	Mid / High Static Ducted	M3	28k to 54k		1.35	
23	High Static Ducted	B8	36k to 96k		2.20	
24	Low Static Ducted, Low Static Ducted Bottom Return	L1	5k to 9k		0.31	
25	Low Static Ducted, Low Static Ducted Bottom Return	L2	12k to 18k		0.42	
26	Low Static Ducted, Low Static Ducted Bottom Return	L3	21k to 24k		0.55	
27	Vertical / Horizontal Air Handling Unit	NJ	12k to 30k		1.04	
28	Vertical / Horizontal Air Handling Unit	NJ	36k		1.57	
29	Vertical / Horizontal Air Handling Unit	NK	42k to 54k		2.00	
30	Floor Standing	CE (U)	7k to 15k		0.37	
31	Floor Standing	CF (U)	18k to 24k		0.82	
32	HRU: PRHR022A/023A, 032A/033A, 042A/043A	—	—		1.1	
33	HRU: PRHR063A, 083A	—	—		2.2	
34	ADDITIONAL Refrigerant Charge Required (Sum of lines 1 – 33)					
35	Water-Source Unit Factory Refrigerant Charge	ARWM072BAS5, ARWM096BAS5, ARWM121BAS5, ARWM144BAS5			7.7	
		ARWM072DAS5, ARWM096DAS5, ARWM121DAS5, ARWM144DAS5			7.7	
		ARWM168DAS5, ARWM192DAS5			9.9	
36	Total WSU FACTORY Refrigerant Charge (Sum of factory refrigerant charges for all WSUs in the system)					
37	TOTAL SYSTEM CHARGE					
	Sum of Additional Refrigerant Charge Required (line 34) and Total WSU Factory Refrigerant Charge (line 36)					

Introduction

¹CF (Ref.) = Correction Factor for Refrigerant Charge. ²For refrigerant charge purposes, consider only the liquid line; ignore the vapor line(s).



WATER SOURCE UNIT PRODUCT DATA

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General

An LG Multi V Water 5 variable refrigerant flow (VRF) Water Source Unit (WSU) operates as either a heat pump or a heat recovery system. The WSU consists of a single, dual or triple frame system connected to indoor units (IDU) (and heat recovery units for heat recovery systems) with a single refrigerant piping system connected using factory designed and supplied Y-branches and headers, and having integrated controls. The WSU has integrated controls and can be operated with its control system or with a building management system.

A Multi V Water 5 heat pump and heat recovery system is a VRF system that can operate in either heat pump mode (cooling or heating) or heat recovery mode (with indoor units in cooling or heating modes simultaneously).

The heat recovery unit is capable of being designed for minimum piping and maximum design flexibility. Individual indoor units or zones can change modes (cooling to heating or heating to cooling) within a maximum time of three (3) minutes to ensure indoor temperature can be properly maintained.

HRUs allow minimum piping and maximum design flexibility. Every indoor unit or zone of a heat recovery system is independently capable of operating in either heating or cooling mode regardless of the mode of other indoor units. The system ensures properly maintained indoor temperature by changing the mode of individual indoor units or zones (cooling to heating or heating to cooling) within a maximum time of three (3) minutes.

LG components are manufactured in a facility meeting International Organization for Standardization (ISO) 9001 and ISO 14001 standards. ISO 9001 defines quality management and ISO 14001 defines environmental management. The units are listed by Intertek Electrical Testing Laboratories (ETL) and bear the CSA Group (CSA) label. Wiring in these units are in accordance with the National Electrical Code (NEC).

Temperature Ranges

Heat pump or heat recovery systems

Water Source Units can operate in cooling mode with entering water temperatures (EWT) of 50°F to 113°F. Water Source Units can operate in heating or synchronous mode with entering water temperatures of 23°F to 113°F.

Casing / Frame

Water Source Units are constructed with galvanized steel, bonderized and finished with powder coat baked enamel paint. Each frame has a removable inspection panel to allow access to service tool connection, DIP switches, auto addressing, and error code display without removing the entire front panel. The entire front panel of the WSU is removable for maintenance.

WSU frames are completely factory assembled, piped and wired. Dual and triple frame WSUs must be field piped with factory designed and supplied Y-branch kits to manifold them together into a single refrigerant circuit.

Refrigerant System

The refrigeration system is a single refrigeration circuit using R410A refrigerant. The WSU is provided with factory-installed components including refrigerant sensors, check valves, oil separator, accumulator, hot gas bypass valve, four-way reversing valve, electronic controlled expansion valve (EEV), high and low side charging ports, high pressure safety switch, service valves, and interconnecting piping. Also included is an integral subcooler assembly consisting of a double spiral tube-type subcooling heat exchanger and EEV providing refrigerant subcooling modulation up to 25°F.

Figure 2: Single Frame Multi V Water 5 Water Source Unit.



MECHANICAL SPECIFICATIONS

Multi V Water 5 Water Source Units



Refrigeration Oil Control

The oil return system uses the following technologies:

High Pressure Oil Return (HiPOR)

Oil is captured from compressor discharge by the centrifugal oil separator and then returned to the compressor through a separator oil injection pipe, preventing mixing of oil and refrigerant on the suction side of the compressor.

Smart Oil Control

Smart oil control monitors the oil level inside the compressor and initiates an oil return cycle to flush oil in the pipe system back to the compressor only when the oil level is too low. Timed oil return cycles are not necessary and the compressor is protected from operating at oil levels that are too low.

Compressors

Each WSU frame is equipped with one hermetic, digitally-controlled, inverter-driven scroll compressor to modulate capacity (variable from 15 to 150Hz). The compressor has a built-in oil level sensor to provide real-time oil control.

Heat Exchanger

The water heat exchanger is a stainless steel, type SUS316, refrigerant / water plate heat exchanger. The heat exchanger requires a field-provided 50 mesh strainer and water treatment to prevent scaling inside the heat exchanger. Closed loop condenser water systems are required to protect the factory-mounted heat exchanger.

Electrical

Both heat pump and heat recovery WSUs are available with a choice of 208-230V, 60 Hz, 3-phase or 460V, 60 Hz, 3-phase input power supply. All WSUs are capable of operating within voltage limits of $\pm 10\%$ rated voltage, and include overcurrent protection.

Controls

Heat pump and heat recovery WSUs are factory wired with the necessary electrical control components, integral microprocessors, printed circuit boards, thermistors, sensors, terminal blocks, and power lugs.

The control circuit between the indoor units, heat recovery units (Multi V Water 5 systems) and the WSU is an RS-485 daisy chain communication bus. The cable is two conductor, stranded and shielded, 18 AWG.

Microprocessor-based algorithms provide component protection, soft-start capability, refrigeration system pressure and temperature control. The variable water flow control kit allows condenser water temperatures below 59°F. This accessory also works with condenser water pumps equipped with variable frequency drive to save pumping energy.

Variable Water Flow Control Kit

The variable water flow control kit (PWFCKN000) is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

Figure 3: Dual Frame Multi V Water 5 Water Source Unit.



Multi V Water 5

Multi V Water 5 Water Source Unit (WSU), equipped with an inverter compressor, offers superior load matching and long piping installation. The product optimizes power consumption in high-rise buildings. Add on features make it easy to upgrade the existing capacity at any time. Sophisticated electronic control and unique refrigerant flow gives these systems the capability to perform in extreme/unusual working conditions.

Generation 4 Equipment

The latest versions of LG's indoor units and water source units are designated Generation 4 (Gen 4). For Gen 4 units to operate with Gen 4 features, the air conditioning system must meet the following requirements:

- All indoor units, heat recovery units, and water source units must be Gen 4.
- All water source units must have Gen 4 software installed.
- Water source units DIP switch 3 must be set to ON (factory default setting is OFF).
- All controllers must support Gen 4 features.

Low Sound Levels

When Multi V Water 5 water source units operate fully loaded, they have one of the quietest sound levels in the industry. Sound is almost undetectable during off-peak operation. To promote a quiet, comfortable environment, LG Multi V water source units operate at sound levels as low as 48 dB(A) in cooling and heating mode at rated AHRI operating conditions.

All rotating components are soft-started by the controller using digitally controlled inverters, which reduces undesirable noise caused by compressors cycling on and off.

Comfort Control at Its Best

Tight temperature control through precise load matching maximizes the time that the indoor units remove moisture. This ensures maximum comfort and provides optimum indoor humidity levels.

Precision Load Matching

Unlike traditional air conditioning control systems, which use thermostatic controls to maintain room temperatures, LG Multi V Water 5 controls continuously vary the indoor unit fan speed and refrigerant flow, indirectly providing lower and more consistent humidity levels in the conditioned space. The longer the indoor coil temperature is below the dew-point of the room with air moving across the coil, the less the space humidity level varies, compared to technologies that cycle fans and compressors on and off multiple times per hour.

The water source unit varies the compressor speed as needed to maintain system operating pressure. As a result, the Multi V Water 5 system delivers precise space temperature control.

Advanced Compressor Technology

Oil Management

Oil migration is no longer a concern when choosing Multi V Water 5. An oil management system ensures a safe level of oil in the compressor sump.

1. Smart oil system monitors oil sump levels to know when to inject oil into the compressor, eliminating the need for oil return cycles.
2. HiPOR™ oil return system minimizes oil mixing with refrigerant by separating oil at compressor discharge with an oil separator and injecting oil back to the lower section of the compressor shell. Energy is saved by compressing the refrigerant without the oil mixed at the compression chamber.
3. Oil injection system provides a consistent film of oil to moving parts, even at low speeds, ensuring compressor operation down to 15 Hz.

Inverter Driven

The scroll compressor is optimized to maximize compressor efficiency, which reduces power consumption and monthly utility bills. This latest inverter technology allows the LG Multi V Water 5 to vary the compressor motor shaft speed to deliver an appropriate amount of cooling to all indoor units. Precise refrigerant volume delivery translates into long periods with coil surface temperatures below dew point and minimizes compressor component run time. Occupants remain comfortable while utility costs are reduced.

PRODUCT FEATURES AND BENEFITS



Multi V Water 5 Water Source Units

Simplified Installation

Cooling and heating systems that use the LG Multi V Water 5 simplify and reduce the mechanical and control system design time. The designer no longer has to be concerned with interconnecting chilled and condenser water piping, air-distribution duct systems, matching and selecting chillers, towers, pumps, coils, fans, air handlers, or Variable Air Volume (VAV) boxes.

System integration with existing building management systems has never been easier. Because all of the Multi V Water 5 system components are engineered and provided by LG, the system components and controls come pre-engineered and do not need custom programming from third-party contractors.

Operating Range

The Multi V Water 5 product line includes capacities from six (6.0) to forty-eight (48.0) tons, and features a connected indoor unit combination ratio of 50% to 130%. Operating ranges include:

Entering Water Temperatures

- 50 – 113°F for cooling mode
- 23 – 113°F for heating mode
- 23 – 113°F for synchronous mode (heat recovery systems only)

Compact Size

All Multi V Water 5 water source unit frames have the same physical footprint: 30-13/32" wide x 44-3/32" tall x 21-17/32" deep. Systems can be designed with one, two, or a maximum of three water source unit frames.

Other Features

- Inverter Scroll Compressors
- Elevation Advantage
- Smaller Footprint
- Precision Load Matching
- AHRI 1230 Certification

Figure 4: Triple Frame Multi V Water 5 Water Source Unit.



Table 1: Single-Frame 208-230V Units.

Combination Unit Model Number	6.0 Ton ARWM072BAS5	8.0 Ton ARWM096BAS5	10.0 Ton ARWM121BAS5	12.0 ARWM144BAS5
Individual Component Model Numbers	-	-	-	-
Cooling Performance				
Nominal Cooling Capacity (Btu/h) ¹	72,000	96,000	119,700	144,000
Heating Performance				
Nominal Heating Capacity (Btu/h) ¹	81,000	108,000	135,000	162,000
Operating Range (Entering Water Temperature)²				
Cooling (°F)	50 – 113	50 – 113	50 – 113	50 – 113
Heating (°F) ³	23 – 113	23 – 113	23 – 113	23 – 113
Synchronous Operation (°F) ³	23 – 113	23 – 113	23 – 113	23 – 113
Compressor				
Inverter Quantity	HSS DC Scroll x 1			
Oil / Type	PVE / FVC68D			
Unit Data				
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit			
R410A Refrigerant Factory Charge (lbs)	7.7	7.7	7.7	7.7
Max. Number Indoor Units / System	13	16	20	23
Sound Pressure dB(A) ⁴	48 (62)	50 (62)	56 (62)	56 (62)
Net Unit Weight (lbs.)	322	322	322	322
Shipping Weight (lbs.)	340	340	340	340
Communication Cables ^{6,7}	2 x 18 AWG			
Heat Exchanger (Stainless Steel Plate)				
Maximum Pressure Resistance (psi)	640	640	640	640
Flow at Rated Condition (GPM)	20.3	25.4	30.4	35.5
Total Heat of Rejection (Btu/h)	94,100	125,900	157,900	190,100
Total Heat of Absorption (Btu/h)	74,200	98,600	122,700	146,800
Pressure Drop (ft-wg)	3.47	5.20	7.23	9.63
Δt ⁵ (°F)	9.3	9.9	10.4	10.7
Piping⁸				
Liquid Line (in.,OD)	3/8 Braze	3/8 Braze	1/2 Braze	1/2 Braze
Low Pressure Vapor Line (in.,OD)	3/4 Braze	7/8 Braze	1-1/8 Braze	1-1/8 Braze
High Pressure Vapor Line (in.,OD)	5/8 Braze	3/4 Braze	3/4 Braze	7/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 FPT	1-1/2 FPT	1-1/2 FPT	1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 MPT	3/4 MPT	3/4 MPT	3/4 MPT

¹ Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

² Variable water flow control kit PWFCN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³ For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴ Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵ Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶ Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. Ⓞ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷ Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸ LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.

GENERAL DATA

Single Frame 460V Water Source Unit Specifications



Table 2: Single Frame 460V Units.

Combination Unit Model Number	6.0 Ton ARWM072DAS5	8.0 Ton ARWM096DAS5	10.0 Ton ARWM121DAS5	12.0 ARWM144DAS5
Individual Component Model Numbers	–	–	–	–
Cooling Performance				
Nominal Cooling Capacity (Btu/h) ¹	72,000	96,000	119,700	144,000
Heating Performance				
Nominal Heating Capacity (Btu/h) ¹	81,000	108,000	135,000	162,000
Operating Range (Entering Water Temperature)²				
Cooling (°F)	50 – 113	50 – 113	50 – 113	50 – 113
Heating (°F) ³	23 – 113	23 – 113	23 – 113	23 – 113
Synchronous Operation (°F) ³	23 – 113	23 – 113	23 – 113	23 – 113
Compressor				
Inverter Quantity	HSS DC Scroll x 1			
Oil/Type	PVE/FVC68D			
Unit Data				
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit			
R410A Refrigerant Factory Charge (lbs)	7.7	7.7	7.7	7.7
Max. Number Indoor Units / System	13	16	20	23
Sound Pressure dB(A) ⁴	48 (62)	50 (62)	56 (62)	56 (62)
Net Unit Weight (lbs.)	328	328	328	328
Shipping Weight (lbs.)	346	346	346	346
Communication Cables ^{6,7}	2 x 18 AWG			
Heat Exchanger (Stainless Steel Plate)				
Maximum Pressure Resistance (psi)	640	640	640	640
Flow at Rated Condition (GPM)	20.3	25.4	30.4	35.5
Total Heat of Rejection (Btu/h)	94,100	125,900	157,900	190,100
Total Heat of Absorption (Btu/h)	74,200	98,600	122,700	146,800
Pressure Drop (ft-wg)	3.47	5.20	7.23	9.63
Δt ⁵ (°F)	9.3	9.9	10.4	10.7
Piping⁸				
Liquid Line (in.,OD)	3/8 Braze	3/8 Braze	1/2 Braze	1/2 Braze
Low Pressure Vapor Line (in.,OD)	3/4 Braze	7/8 Braze	1-1/8 Braze	1-1/8 Braze
High Pressure Vapor Line (in.,OD)	5/8 Braze	3/4 Braze	3/4 Braze	7/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 FPT	1-1/2 FPT	1-1/2 FPT	1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 MPT	3/4 MPT	3/4 MPT	3/4 MPT

¹ Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

² Variable water flow control kit PWFCN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³ For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴ Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵ Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶ Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. Ⓢ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷ Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸ LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.



Table 3: Single Frame 460V Units.

Combination Unit Model Number	14.0 Ton ARWM168DAS5	16.0 Ton ARWM192DAS5
Individual Component Model Numbers	-	-
Cooling Performance		
Nominal Cooling Capacity (Btu/h) ¹	168,000	192,000
Heating Performance		
Nominal Heating Capacity (Btu/h) ¹	189,000	216,000
Operating Range (Entering Water Temperature)²		
Cooling (°F)	50 – 113	50 – 113
Heating (°F) ³	23 – 113	23 – 113
Synchronous Operation (°F) ³	23 – 113	23 – 113
Compressor		
Inverter Quantity	HSS DC Scroll x 1	
Oil/Type	PVE/FVC68D	
Unit Data		
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit	
R410A Refrigerant Factory Charge (lbs)	9.9	9.9
Max. Number Indoor Units / System	29	32
Sound Pressure dB(A) ⁴	58 (62)	60 (62)
Net Unit Weight (lbs.)	348	348
Shipping Weight (lbs.)	366	366
Communication Cables ^{6,7}	2 x 18 AWG	
Heat Exchanger (Stainless Steel Plate)		
Maximum Pressure Resistance (psi)	640	640
Flow at Rated Condition (GPM)	45.7	50.7
Total Heat of Rejection (Btu/h)	220,000	253,500
Total Heat of Absorption (Btu/h)	172,800	193,600
Pressure Drop (ft-wg)	8.32	10.08
Δt ⁵ (°F)	9.6	10.0
Piping⁸		
Liquid Line (in.,OD)	5/8 Braze	5/8 Braze
Low Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze
High Pressure Vapor Line (in.,OD)	7/8 Braze	1-1/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 FPT	1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 MPT	3/4 MPT

¹Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

²Variable water flow control kit PWFCKN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. Ⓞ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.

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Dual Frame 208-230V Water Source Unit Specifications



Table 4: Dual Frame 208-230V Units.

Combination Unit Model Number	14.0 Ton ARWM168BAS5	16.0 Ton ARWM192BAS5	18.0 Ton ARWM216BAS5
Individual Component Model Numbers	ARWM072BAS5 x 1 + ARWM096BAS5 x 1	ARWM096BAS5 x 2	ARWM096BAS5 x 1 + ARWM121BAS5 x 1
<i>Cooling Performance</i>			
Nominal Cooling Capacity (Btu/h) ¹	168,000	192,000	216,000
<i>Heating Performance</i>			
Nominal Heating Capacity (Btu/h) ¹	189,000	216,000	243,000
<i>Operating Range (Entering Water Temperature)²</i>			
Cooling (°F)	50 - 113	50 - 113	50 - 113
Heating (°F) ³	23 - 113	23 - 113	23 - 113
Synchronous Operation (°F) ³	23 - 113	23 - 113	23 - 113
<i>Compressor</i>			
Inverter Quantity	HSS DC Scroll x 2		
Oil / Type	PVE / FVC68D		
<i>Unit Data</i>			
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit		
R410A Refrigerant Factory Charge (lbs)	7.7 + 7.7	7.7 + 7.7	7.7 + 7.7
Max. Number Indoor Units / System	29	32	35
Sound Pressure dB(A) ⁴	52 (65)	53 (65)	57 (65)
Net Unit Weight (lbs.)	322 + 322	322 + 322	322 + 322
Shipping Weight (lbs.)	340 + 340	340 + 340	340 + 340
Communication Cables ^{6,7}	2 x 18 AWG		
<i>Heat Exchanger (Stainless Steel Plate)</i>			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	20.3 + 25.4	25.4 + 25.4	25.4 + 30.4
Total Heat of Rejection (Btu/h)	220,000	251,800	283,800
Total Heat of Absorption (Btu/h)	172,800	197,200	221,300
Pressure Drop (ft-wg)	3.47 / 5.20	5.20 / 5.20	5.20 / 7.23
Δt ⁵ (°F)	9.6	9.9	10.2
<i>Piping⁸</i>			
Liquid Line (in.,OD)	5/8 Braze	5/8 Braze	5/8 Braze
Low Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze	1-1/8 Braze
High Pressure Vapor Line (in.,OD)	7/8 Braze	1-1/8 Braze	1-1/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 + 3/4 MPT	3/4 + 3/4 MPT	3/4 + 3/4 MPT

¹ Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

² Variable water flow control kit PWFCN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³ For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴ Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵ Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶ Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷ Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸ LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.



Table 5: Dual Frame 208-230V Units.

Combination Unit Model Number	20.0 Ton ARWM240BAS5	22.0 Ton ARWM264BAS5	24.0 Ton ARWM288BAS5
Individual Component Model Numbers	ARWM121BAS5 x 2	ARWM121BAS5 x 1 + ARWM144BAS5 x 1	ARWM144BAS5 x 2
<i>Cooling Performance</i>			
Nominal Cooling Capacity (Btu/h) ¹	239,400	264,000	287,700
<i>Heating Performance</i>			
Nominal Heating Capacity (Btu/h) ¹	269,000	297,000	324,000
<i>Operating Range (Entering Water Temperature)²</i>			
Cooling (°F)	50 - 113	50 - 113	50 - 113
Heating (°F) ³	23 - 113	23 - 113	23 - 113
Synchronous Operation (°F) ³	23 - 113	23 - 113	23 - 113
<i>Compressor</i>			
Inverter Quantity	HSS DC Scroll x 2		
Oil / Type	PVE / FVC68D		
<i>Unit Data</i>			
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit		
R410A Refrigerant Factory Charge (lbs)	7.7 + 7.7	7.7 + 7.7	7.7 + 7.7
Max. Number Indoor Units / System	39	42	45
Sound Pressure dB(A) ⁴	59 (65)	59 (65)	59 (65)
Net Unit Weight (lbs.)	322 + 322	322 + 322	322 + 322
Shipping Weight (lbs.)	340 + 340	340 + 340	340 + 340
Communication Cables ^{6,7}	2 x 18 AWG		
<i>Heat Exchanger (Stainless Steel Plate)</i>			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	30.4 + 30.4	30.4 + 35.5	35.5 + 35.5
Total Heat of Rejection (Btu/h)	315,800	348,000	380,200
Total Heat of Absorption (Btu/h)	245,400	269,500	293,600
Pressure Drop (ft-wg)	7.23 / 7.23	7.23 / 9.63	9.63 / 9.63
Δt ⁵ (°F)	10.4	10.6	10.7
<i>Piping⁸</i>			
Liquid Line (in.,OD)	5/8 Braze	3/4 Braze	3/4 Braze
Low Pressure Vapor Line (in.,OD)	1-3/8 Braze	1-3/8 Braze	1-3/8 Braze
High Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze	1-1/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 + 3/4 MPT	3/4 + 3/4 MPT	3/4 + 3/4 MPT

¹Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

²Variable water flow control kit PWFKN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. Ⓞ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.

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Dual Frame 460V Water Source Unit Specifications



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Table 6: Dual Frame 460V Units

Combination Unit Model Number	16.0 Ton ARWM191DAS5	18.0 Ton ARWM216DAS5	20.0 Ton ARWM240DAS5
Individual Component Model Numbers	ARWM096DAS5 x 2	ARWM096DAS5 x 1 + ARWM121DAS5 x 1	ARWM121DAS5 x 2
<i>Cooling Performance</i>			
Nominal Cooling Capacity (Btu/h) ¹	192,000	216,000	239,400
<i>Heating Performance</i>			
Nominal Heating Capacity (Btu/h) ¹	216,000	243,000	269,000
<i>Operating Range (Entering Water Temperature)²</i>			
Cooling (°F)	50 - 113	50 - 113	50 - 113
Heating (°F) ³	23 - 113	23 - 113	23 - 113
Synchronous Operation (°F) ³	23 - 113	23 - 113	23 - 113
<i>Compressor</i>			
Inverter Quantity	HSS DC Scroll x 2		
Oil / Type	PVE / FVC68D		
<i>Unit Data</i>			
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit		
R410A Refrigerant Factory Charge (lbs)	7.7 + 7.7	7.7 + 7.7	7.7 + 7.7
Max. Number Indoor Units / System	32	35	39
Sound Pressure dB(A) ⁴	53 (65)	57 (65)	59 (65)
Net Unit Weight (lbs.)	328 + 328	328 + 328	328 + 328
Shipping Weight (lbs.)	346 + 346	346 + 346	346 + 346
Communication Cables ^{6,7}	2 x 18 AWG		
<i>Heat Exchanger (Stainless Steel Plate)</i>			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	25.4 + 25.4	25.4 + 30.4	30.4 + 30.4
Total Heat of Rejection (Btu/h)	253,500	283,800	315,800
Total Heat of Absorption (Btu/h)	193,600	221,300	245,400
Pressure Drop (ft-wg)	5.20 / 5.20	5.20 / 7.23	7.23 / 7.23
Δt ⁵ (°F)	10.0	10.2	10.4
<i>Piping⁸</i>			
Liquid Line (in.,OD)	5/8 Braze	5/8 Braze	5/8 Braze
Low Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze	1-3/8 Braze
High Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze	1-1/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 + 3/4 MPT	3/4 + 3/4 MPT	3/4 + 3/4 MPT

¹ Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

² Variable water flow control kit PWFCN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³ For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴ Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵ Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶ Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. ⚠ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷ Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸ LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.



Table 7: Dual Frame 460V Units.

Combination Unit Model Number	22.0 Ton ARWM264DAS5	24.0 Ton ARWM288DAS5	30.0 Ton ARWM360DAS5
Individual Component Model Numbers	ARWM121DAS5 x 1 + ARWM144DAS5 x 1	ARWM144DAS5 x 2	ARWM168DAS5 x 1 + ARWM192DAS5 x 1
<i>Cooling Performance</i>			
Nominal Cooling Capacity (Btu/h) ¹	264,000	287,700	360,000
<i>Heating Performance</i>			
Nominal Heating Capacity (Btu/h) ¹	297,000	324,000	405,000
<i>Operating Range (Entering Water Temperature)²</i>			
Cooling (°F)	50 - 113	50 - 113	50 - 113
Heating (°F) ³	23 - 113	23 - 113	23 - 113
Synchronous Operation (°F) ³	23 - 113	23 - 113	23 - 113
<i>Compressor</i>			
Inverter Quantity	HSS DC Scroll x 2		
Oil / Type	PVE / FVC68D		
<i>Unit Data</i>			
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit		
R410A Refrigerant Factory Charge (lbs)	7.7 + 7.7	7.7 + 7.7	9.9 + 9.9
Max. Number Indoor Units / System	42	45	58
Sound Pressure dB(A) ⁴	59 (65)	59 (65)	62 (65)
Net Unit Weight (lbs.)	328 + 328	328 + 328	348 + 348
Shipping Weight (lbs.)	346 + 346	346 + 346	366 + 366
Communication Cables ^{6,7}	2 x 18 AWG		
<i>Heat Exchanger (Stainless Steel Plate)</i>			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	30.4 + 35.5	35.5 + 35.5	45.7 + 50.7
Total Heat of Rejection (Btu/h)	348,000	380,200	473,500
Total Heat of Absorption (Btu/h)	269,500	293,600	366,400
Pressure Drop (ft-wg)	7.23 / 9.63	9.63 / 9.63	8.32 / 10.08
Δt ⁵ (°F)	10.6	10.7	9.8
<i>Piping⁸</i>			
Liquid Line (in.,OD)	3/4 Braze	3/4 Braze	3/4 Braze
Low Pressure Vapor Line (in.,OD)	1-3/8 Braze	1-3/8 Braze	1-5/8 Braze
High Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze	1-1/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 + 3/4 MPT	3/4 + 3/4 MPT	3/4 + 3/4 MPT

¹ Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

² Variable water flow control kit PWFCKN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³ For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴ Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵ Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶ Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. Ⓢ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷ Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸ LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.

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Triple Frame 208-230V Water Source Unit Specifications



Table 8: Triple Frame 208-230V Units.

Combination Unit Model Number	30.0 Ton ARWM360BAS5	36.0 Ton ARWM432BAS5
Individual Component Model Numbers	ARWM121BAS5 x 3	ARWM144BAS5 x 3
<i>Cooling Performance</i>		
Nominal Cooling Capacity (Btu/h) ¹	360,000	430,500
<i>Heating Performance</i>		
Nominal Heating Capacity (Btu/h) ¹	405,000	486,000
<i>Operating Range (Entering Water Temperature)²</i>		
Cooling (°F)	50 - 113	50 - 113
Heating (°F) ³	23 - 113	23 - 113
Synchronous Operation (°F) ³	23 - 113	23 - 113
<i>Compressor</i>		
Inverter Quantity	HSS DC Scroll x 3	
Oil / Type	PVE / FVC68D	
<i>Unit Data</i>		
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit	
R410A Refrigerant Factory Charge (lbs)	7.7 + 7.7 + 7.7	7.7 + 7.7 + 7.7
Max. Number Indoor Units / System	58	64
Sound Pressure dB(A) ⁴	61 (67)	61 (67)
Net Unit Weight (lbs.)	322 + 322 + 322	322 + 322 + 322
Shipping Weight (lbs.)	340 + 340 + 340	340 + 340 + 340
Communication Cables ^{6,7}	2 x 18 AWG	
<i>Heat Exchanger (Stainless Steel Plate)</i>		
Maximum Pressure Resistance (psi)	640	640
Flow at Rated Condition (GPM)	30.4 + 30.4 + 30.4	35.5 + 35.5 + 35.5
Total Heat of Rejection (Btu/h)	473,700	570,300
Total Heat of Absorption (Btu/h)	368,100	440,400
Pressure Drop (ft-wg)	7.23 / 7.23 / 7.23	9.63 / 9.63 / 9.63
Δt ⁵ (°F)	10.4	10.7
<i>Piping⁸</i>		
Liquid Line (in.,OD)	3/4 Braze	3/4 Braze
Low Pressure Vapor Line (in.,OD)	1-5/8 Braze	1-5/8 Braze
High Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 + 1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 + 1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 + 3/4 + 3/4 MPT	3/4 + 3/4 + 3/4 MPT

¹Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

²Variable water flow control kit PWFCN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. ⚠ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.



Table 9: Triple-Frame 460V Units

Combination Unit Model Number	36.0 Ton ARWM432DAS5	42.0 Ton ARWM504DAS5	48.0 Ton ARWM576DAS5
Individual Component Model Numbers	ARWM144BAS5 x 3	ARWM144DAS5 x 1 + ARWM168DAS5 x 1 + ARWM192DAS5 x 1	ARWM192DAS5 x 3
<i>Cooling Performance</i>			
Nominal Cooling Capacity (Btu/h) ¹	430,500	504,000	571,200
<i>Heating Performance</i>			
Nominal Heating Capacity (Btu/h) ¹	486,000	567,000	648,000
<i>Operating Range (Entering Water Temperature)²</i>			
Cooling (°F)	50 - 113	50 - 113	50 - 113
Heating (°F) ³	23 - 113	23 - 113	23 - 113
Synchronous Operation (°F) ³	23 - 113	23 - 113	23 - 113
<i>Compressor</i>			
Inverter Quantity / Oil / Type	HSS DC Scroll x 3 / PVE / FVC68D		
<i>Unit Data</i>			
Refrigerant Type / Control / Location	R410A / EEV / Indoor Unit		
R410A Refrigerant Factory Charge (lbs)	7.7 + 7.7 + 7.7	7.7 + 9.9 + 9.9	9.9 + 9.9 + 9.9
Max. Number Indoor Units / System	64	64	64
Sound Pressure dB(A) ⁴	61 (67)	63 (67)	65 (67)
Net Unit Weight (lbs.)	328 + 328 + 328	328 + 348 + 348	348 + 348 + 348
Shipping Weight (lbs.)	346 + 346 + 346	346 + 366 + 366	366 + 366 + 366
Communication Cables ^{6,7}	2 x 18 AWG		
<i>Heat Exchanger (Stainless Steel Plate)</i>			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	35.5 + 35.5 + 35.5	35.5 + 45.7 + 50.7	50.7 + 50.7 + 50.7
Total Heat of Rejection (Btu/h)	570,300	663,600	760,500
Total Heat of Absorption (Btu/h)	440,400	513,200	580,800
Pressure Drop (ft-wg)	9.63 / 9.63 / 9.63	9.63 / 8.32 / 10.08	10.08 / 10.08 / 10.08
Δt ⁵ (°F)	10.7	10.1	10.0
<i>Piping⁸</i>			
Liquid Line (in.,OD)	3/4 Braze	3/4 Braze	3/4 Braze
Low Pressure Vapor Line (in.,OD)	1-5/8 Braze	1-5/8 Braze	1-5/8 Braze
High Pressure Vapor Line (in.,OD)	1-1/8 Braze	1-1/8 Braze	1-3/8 Braze
Water Inlet / Outlet Connection (in.,ID)	1-1/2 + 1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 + 1-1/2 FPT	1-1/2 + 1-1/2 + 1-1/2 FPT
Condensate Pipe Diameter (in.,ID)	3/4 + 3/4 + 3/4 MPT	3/4 + 3/4 + 3/4 MPT	3/4 + 3/4 + 3/4 MPT

¹ Rated capacity is certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

² Variable water flow control kit PWFKCN000 is required for applications with entering water temperatures below 59°F (one kit per frame). Minimum flow rate must be 40% of the nominal flow rate, 2-10V signal with a linear flow response valve.

³ For heating and synchronous operation applications with entering water temperatures lower than 50°F, refer to the Water Loop Circuit Design and Installation section in the Installation Manual.

⁴ Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard at rated AHRI operating conditions. Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

⁵ Value is calculated as follows: Δt = Total Heat of Rejection ÷ (Rated Flow Rate x 500). Data is for pure water.

⁶ Communication cable between WSU, IDU(s) / HRU(s), and Central Controller must be a minimum of 2-conductor, 18 AWG, twisted, stranded, and shielded. Ensure the communication cable shield is properly grounded to the WSU chassis only. ⚠ Do not ground the communication cable at any other point. Wiring must comply with all applicable local and national codes.

⁷ Power wiring is field provided, solid or stranded, and must comply with the applicable local and national codes.

⁸ LG requires that LATS software be used on all projects to ensure correct line sizing. Designer must verify the shop drawing design against the as built design using LATS. Contractor must also use LG manufactured Y-Branch and Header Kits only.

Electrical data for 208–230V Models

Table 10: 208-230V, 60Hz, 3-Phase Systems

Nom. Tons	System Model No.	Compressor				MCA			MOCP		
		Comp. Qty.	Motor RLA			Frame 1	Frame 2	Frame 3	Frame 1	Frame 2	Frame 3
			Frame 1	Frame 2	Frame 3						
6	ARWM072BAS5	1	11.1	-	-	13.8	-	-	20	-	-
8	ARWM096BAS5	1	15.5	-	-	19.4	-	-	30	-	-
10	ARWM121BAS5	1	22.2	-	-	27.7	-	-	45	-	-
12	ARWM144BAS5	1	26.2	-	-	32.7	-	-	50	-	-
14	ARWM168BAS5	2	15.5	11.1	-	19.4	13.8	-	30	20	-
16	ARWM192BAS5	2	15.5	15.5	-	19.4	19.4	-	30	30	-
18	ARWM216BAS5	2	22.2	15.5	-	27.7	19.4	-	45	30	-
20	ARWM240BAS5	2	22.2	22.2	-	27.7	27.7	-	45	45	-
22	ARWM264BAS5	2	26.2	22.2	-	32.7	27.7	-	50	45	-
24	ARWM288BAS5	2	26.2	26.2	-	32.7	32.7	-	50	50	-
30	ARWM360BAS5	3	22.2	22.2	22.2	27.7	27.7	27.7	45	45	45
36	ARWM432BAS5	3	26.2	26.2	26.2	32.7	32.7	32.7	50	50	50

For component model numbers, see the specification tables.

For 208–230V systems, acceptable voltage range is 187–253V.

Maximum allowable voltage imbalance is 2%.

MCA = Minimum Circuit Ampacity.

Maximum Overcurrent Protection (MOCP) is calculated as follows: (Largest motor RLA x 2.25) + (Sum of other motor RLA) rounded down to the nearest standard fuse size.

SCCR rating: 56 kA RMS symmetrical 208V maximum / 62 kA RMS symmetrical 230V maximum

Electrical data for 460V Models

Table 11: 460V, 60Hz, 3-Phase Systems

Nom. Tons	System Model No.	Compressor				MCA			MOCP		
		Comp. Qty.	Motor RLA			Frame 1	Frame 2	Frame 3	Frame 1	Frame 2	Frame 3
			Frame 1	Frame 2	Frame 3						
6	ARWM072DAS5	1	7.8	-	-	9.8	-	-	15	-	-
8	ARWM096DAS5	1	8.8	-	-	11.1	-	-	15	-	-
10	ARWM121DAS5	1	11.1	-	-	13.8	-	-	20	-	-
12	ARWM144DAS5	1	13.3	-	-	16.6	-	-	25	-	-
14	ARWM168DAS5	1	15.5	-	-	19.4	-	-	30	-	-
16	ARWM192DAS5	1	20.0	-	-	24.9	-	-	40	-	-
16	ARWM191DAS5	2	8.8	8.8	-	11.1	11.1	-	15	15	-
18	ARWM216DAS5	2	11.1	8.8	-	13.8	11.1	-	20	15	-
20	ARWM240DAS5	2	11.1	11.1	-	13.8	13.8	-	20	20	-
22	ARWM264DAS5	2	13.3	11.1	-	16.6	13.8	-	25	20	-
24	ARWM288DAS5	2	13.3	13.3	-	16.6	16.6	-	25	25	-
30	ARWM360DAS5	2	20.0	15.5	-	24.9	19.4	-	40	30	-
36	ARWM432DAS5	3	13.3	13.3	13.3	16.6	16.6	16.6	25	25	25
42	ARWM504DAS5	3	20.0	15.5	13.3	24.9	19.4	16.6	40	30	25
48	ARWM576DAS5	3	20.0	20.0	20.0	24.9	24.9	24.9	40	40	40

For component model numbers, see the specification tables.
 For 460V systems, acceptable voltage range is 414–528V.
 Maximum allowable voltage imbalance is 2%.
 MCA = Minimum Circuit Ampacity.

Maximum Overcurrent Protection (MOCP) is calculated as follows: (Largest motor RLA x 2.25) + (Sum of other motor RLA) rounded down to the nearest standard fuse size.
 SCCR rating: 65 kA RMS symmetrical 460V maximum

CONNECTION LIMITATIONS

Water Source Units

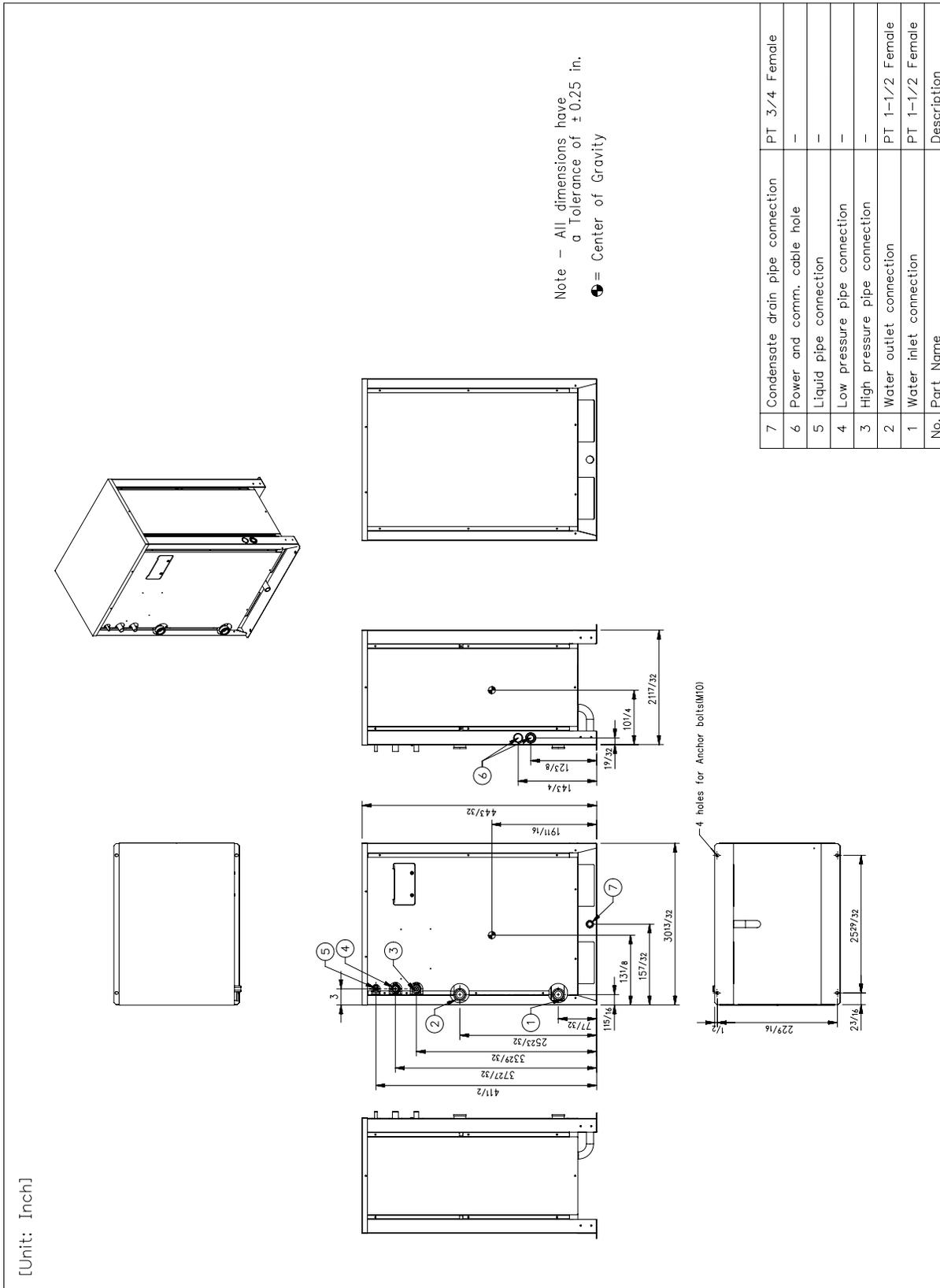


Table 12: Water Source Unit / Indoor Unit Matching Limitations.

Heat Pump / Heat Recovery Models	Nominal Cooling (Btu/h)	Indoor Units		
		Max. Qty.	Sum of Indoor Unit Nominal Cooling Capacities (Btu/h)	
			Min. Capacity (Btu/h) (50%) ¹	Max. Capacity (Btu/h) (130%) ²
ARWM072BAS5 / ARWM072DAS5	72,000 / 72,000	13/13	36,000 / 36,000	93,600 / 93,600
ARWM096BAS5 / ARWM096DAS5	96,000 / 96,000	16/16	48,000 / 48,000	124,800 / 124,800
ARWM121BAS5 / ARWM121DAS5	119,700 / 119,700	20/20	60,000 / 60,000	156,000 / 156,000
ARWM144BAS5 / ARWM144DAS5	144,000 / 144,000	23/23	72,000 / 72,000	187,200 / 187,200
ARWM168BAS5 / ARWM168DAS5	168,000 / 168,000	29/29	84,000 / 84,000	218,400 / 218,400
ARWM191DAS5	192,000	32	96,000	249,600
ARWM192BAS5 / ARWM192DAS5	192,000 / 192,000	32/32	96,000 / 96,000	249,600 / 249,600
ARWM216BAS5 / ARWM216DAS5	216,000 / 216,000	35/35	108,000 / 108,000	280,800 / 280,000
ARWM240BAS5 / ARWM240DAS5	239,400 / 239,400	39/39	120,000 / 120,000	312,000 / 312,000
ARWM264BAS5 / ARWM264DAS5	264,000 / 264,000	42/42	132,000 / 132,000	343,200 / 343,200
ARWM288BAS5 / ARWM288DAS5	287,700 / 287,700	45/45	144,000 / 144,000	374,400 / 374,400
ARWM360BAS5 / ARWM360DAS5	360,000 / 360,000	58/58	180,000 / 180,000	468,000 / 468,000
ARWM432BAS5 / ARWM432DAS5	430,500 / 430,500	64/64	216,000 / 216,000	561,600 / 561,600
ARWM504DAS5	504,000	64	252,000	655,200
ARWM576DAS5	571,200	64	288,000	748,800

¹50% = Minimum Combination Ratio.

²130% = Maximum Combination Ratio.

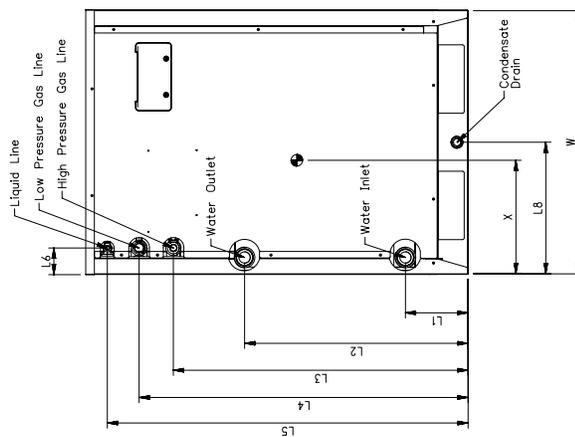
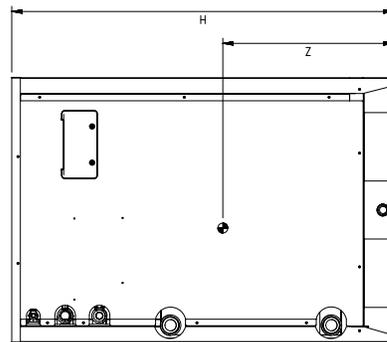
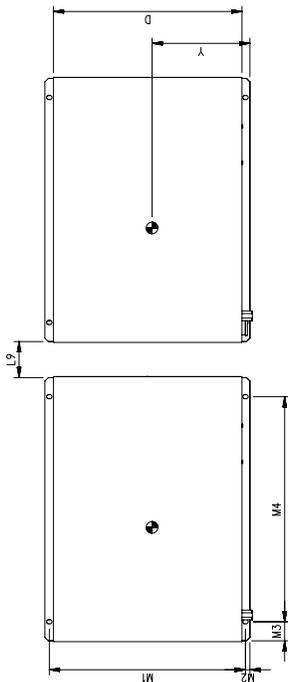
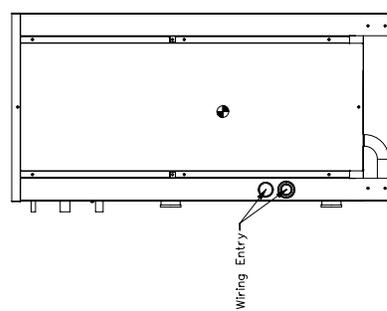
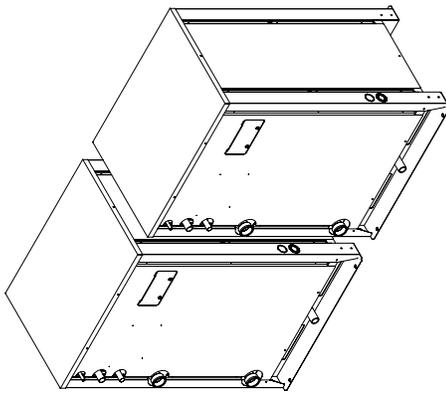


DIMENSIONS

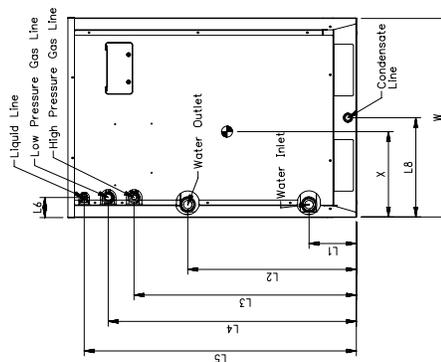
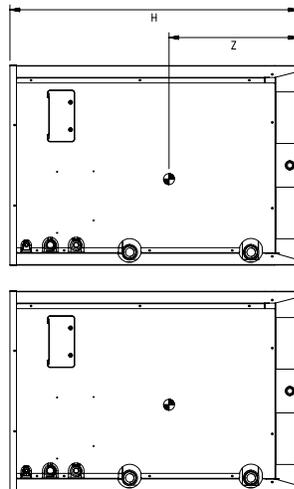
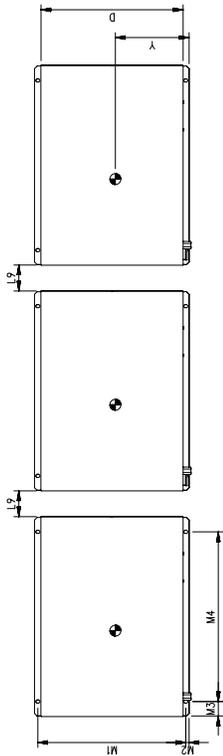
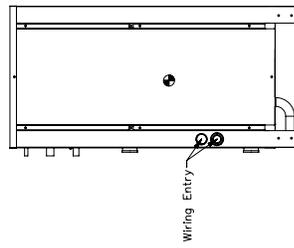
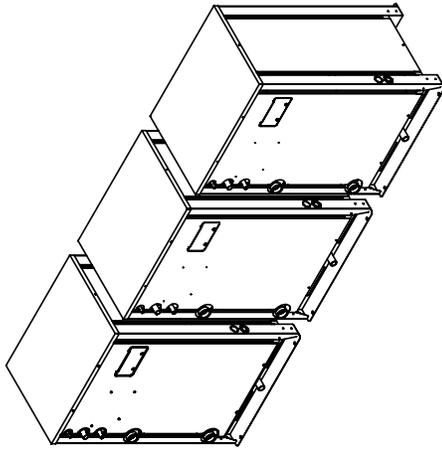
Dual Frame



X	13-1/16"
Y	11-1/4"
Z	19-11/16"
W	30-13/32"
D	21-17/32"
H	44-3/32"
L1	7-3/16"
L2	25-3/4"
L3	33-7/8"
L4	37-7/8"
L5	41-1/2"
L6	3"
L7	1-15/16"
L8	15-3/16"
L9	4"
M1	22-9/16"
M2	1/2"
M3	2-3/16"
M4	25-7/8"



X	13-1/16"
Y	11-1/4"
Z	19-11/16"
W	30-13/32"
D	21-17/32"
H	44-3/32"
L1	7-3/16"
L2	25-3/4"
L3	33-7/8"
L4	37-7/8"
L5	41-1/2"
L6	3"
L7	1-15/16"
L8	15-3/16"
L9	4"
M1	22-9/16"
M2	1/2"
M3	2-3/16"
M4	25-7/8"

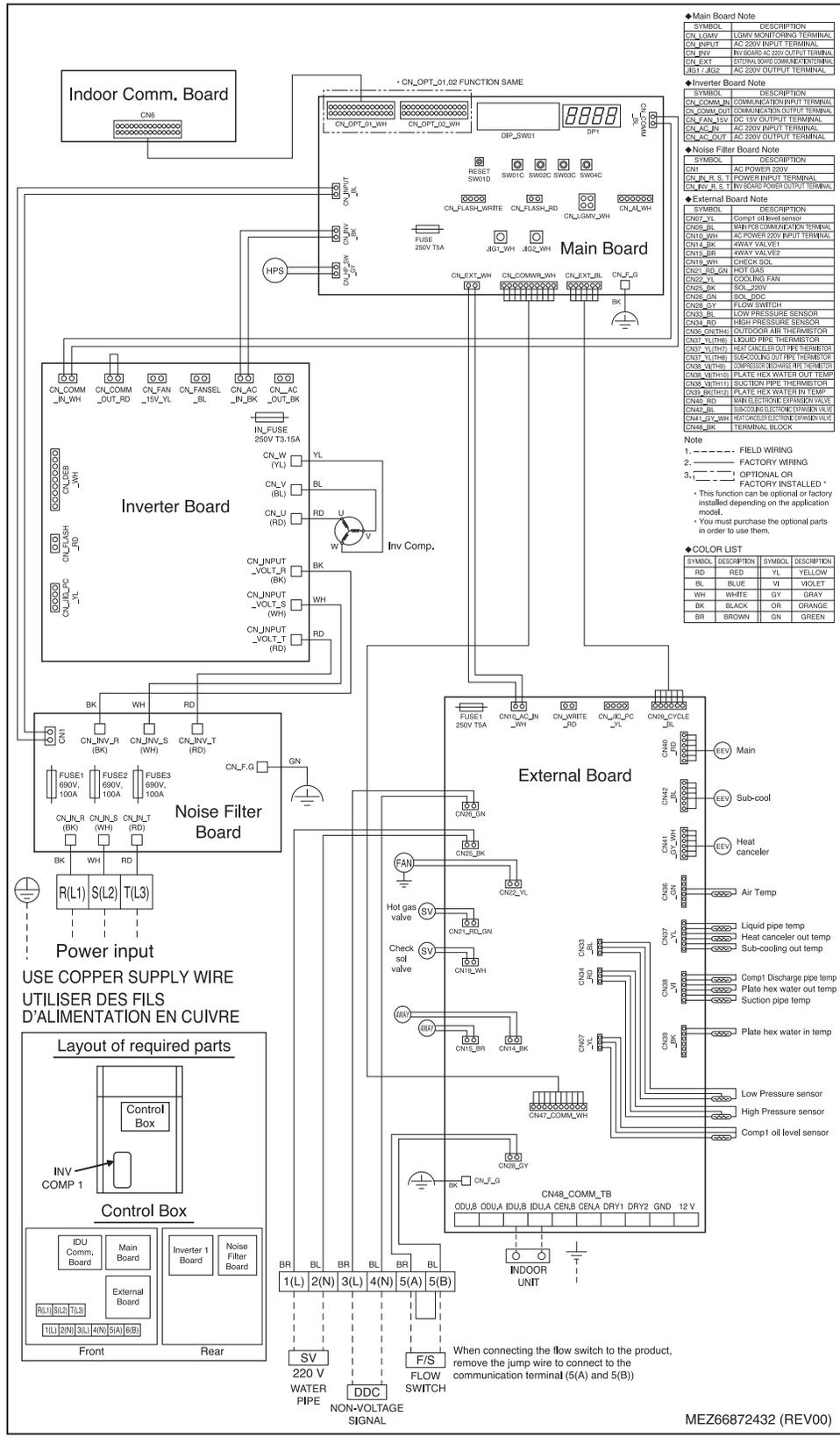


WIRING DIAGRAMS

208–230V Models



MULTI V Water 5 Water Source Unit Engineering Manual



◆Main Board Note

SYMBOL	DESCRIPTION
CN1_LGMV	LG/MV MONITORING TERMINAL
CN1_INPWT	AC 220V INPUT TERMINAL
CN1_INV	INV BOARD AC 220V OUTPUT TERMINAL
CN1_EXT	EXTERNAL BOARD COMMUNICATION TERMINAL
CN1_FAN	AC 220V INPUT TERMINAL
CN1_AC_OUT	AC 220V OUTPUT TERMINAL

◆Inverter Board Note

SYMBOL	DESCRIPTION
CN2_COMM_WH	COMMUNICATION INPUT TERMINAL
CN2_COMM_RD	COMMUNICATION OUTPUT TERMINAL
CN2_FAN_15V	DC 15V OUTPUT TERMINAL
CN2_AC_IN	AC 220V INPUT TERMINAL
CN2_AC_OUT	AC 220V OUTPUT TERMINAL

◆Noise Filter Board Note

SYMBOL	DESCRIPTION
CN3	AC POWER 220V
CN3_AL_R_S_1	POWER INPUT TERMINAL
CN3_INV_P_S_1	INV BOARD POWER OUTPUT TERMINAL

◆External Board Note

SYMBOL	DESCRIPTION
CN27_YL	Comp1 Oil level sensor
CN28_BK	MAIN FUSE COMMON 4YR TERMP
CN28_WH	AC POWER 220V INPUT TERMINAL
CN24_BK	4WAY VALVE
CN24_BR	4WAY VALVE
CN28_WH	CHECK SOL
CN27_RD_GN	HOT GAS
CN28_YL	COOLING FAN
CN28_BK	SOL_220V
CN28_GN	SOL_220V
CN28_GY	FLOW SWITCH
CN28_BK	LOW PRESSURE SENSOR
CN28_RD	HIGH PRESSURE SENSOR
CN28_GNTH4	OUTDOOR AIR THERMISTOR
CN27_YLTH4	LIQUID PIPE THERMISTOR
CN28_YLTH1	HEAT CANCELER OUT PIPE THERMISTOR
CN27_YLTH8	SUBCOOLING OUT PIPE THERMISTOR
CN28_YLTH8	COMPRESSOR DISCHARGE PIPE THERMISTOR
CN28_YLTH10	PLATE HEX WATER OUT TEMP
CN28_YLTH11	SUCTION PIPE THERMISTOR
CN28_BKTH3	PLATE HEX WATER IN TEMP
CN24_RD	MAIN ELECTRONIC EXPANSION VALVE
CN24_BK	DISCHARGE ELECTRONIC EXPANSION VALVE
CN24_YLWH	HEAT CANCELER ELECTRONIC EXPANSION VALVE
CN24_BK	TERMINAL BLOCK

Note

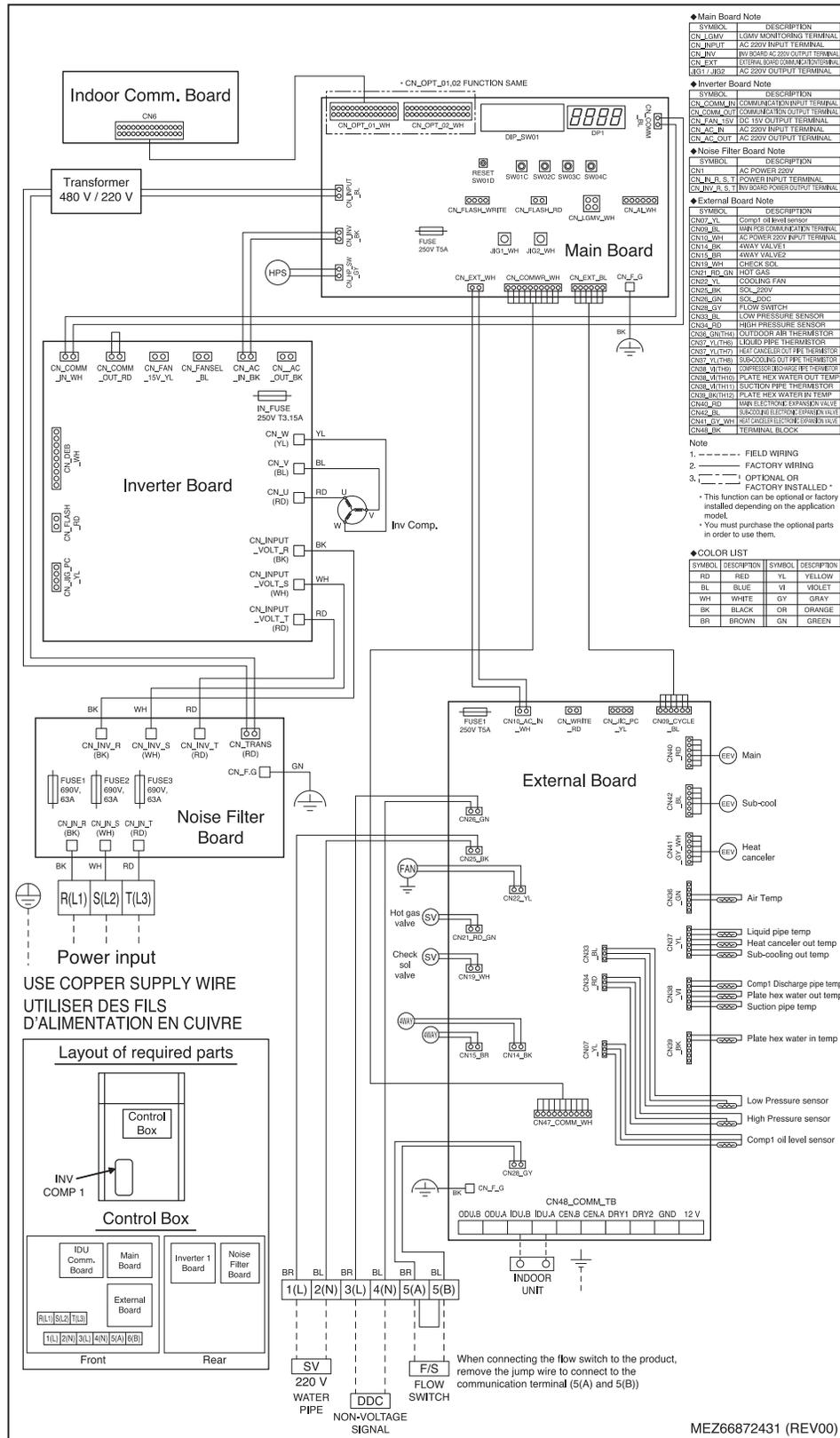
1. ----- FIELD WIRING
2. ----- FACTORY WIRING
3. ----- OPTIONAL OR FACTORY INSTALLED *

* This function can be optional or factory installed depending on the application model.
* You must purchase the optional parts in order to use them.

◆COLOR LIST

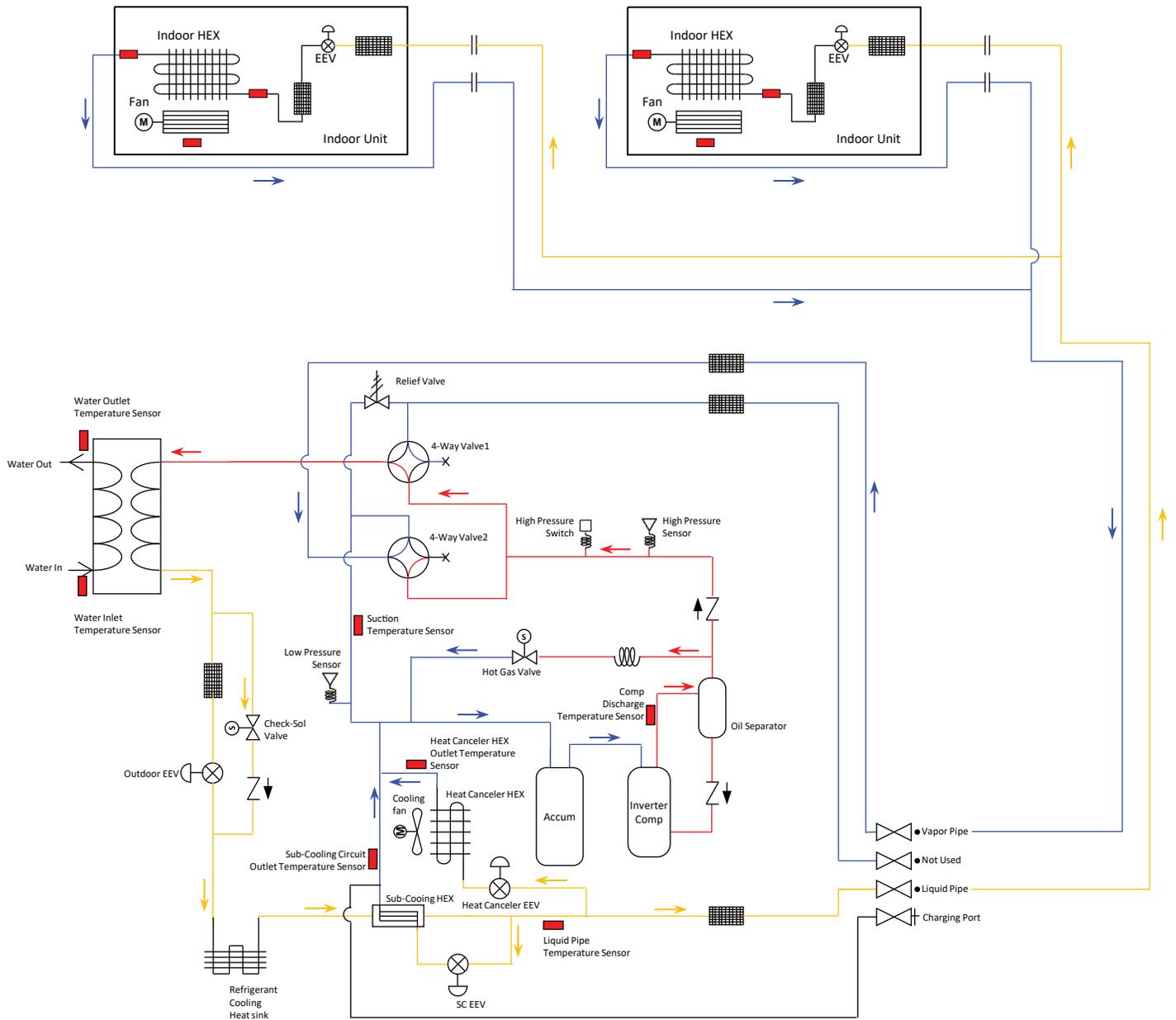
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
RD	RED	YL	YELLOW
BL	BLUE	VI	VIOLET
WH	WHITE	GY	GRAY
BK	BLACK	OR	ORANGE
BR	BROWN	GN	GREEN



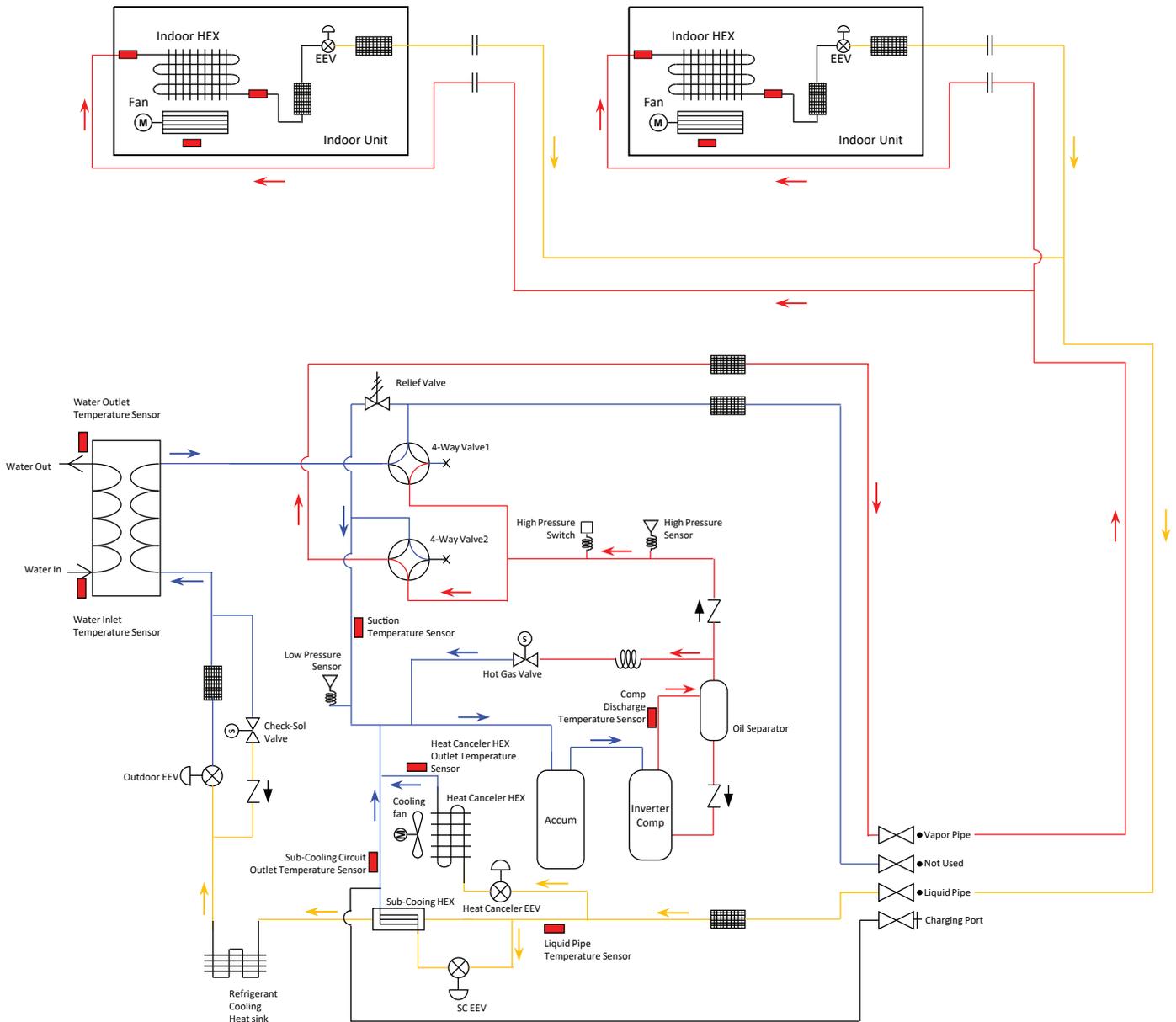


REFRIGERANT FLOW DIAGRAMS

Heat Pump — Cooling Mode



Remarks	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		



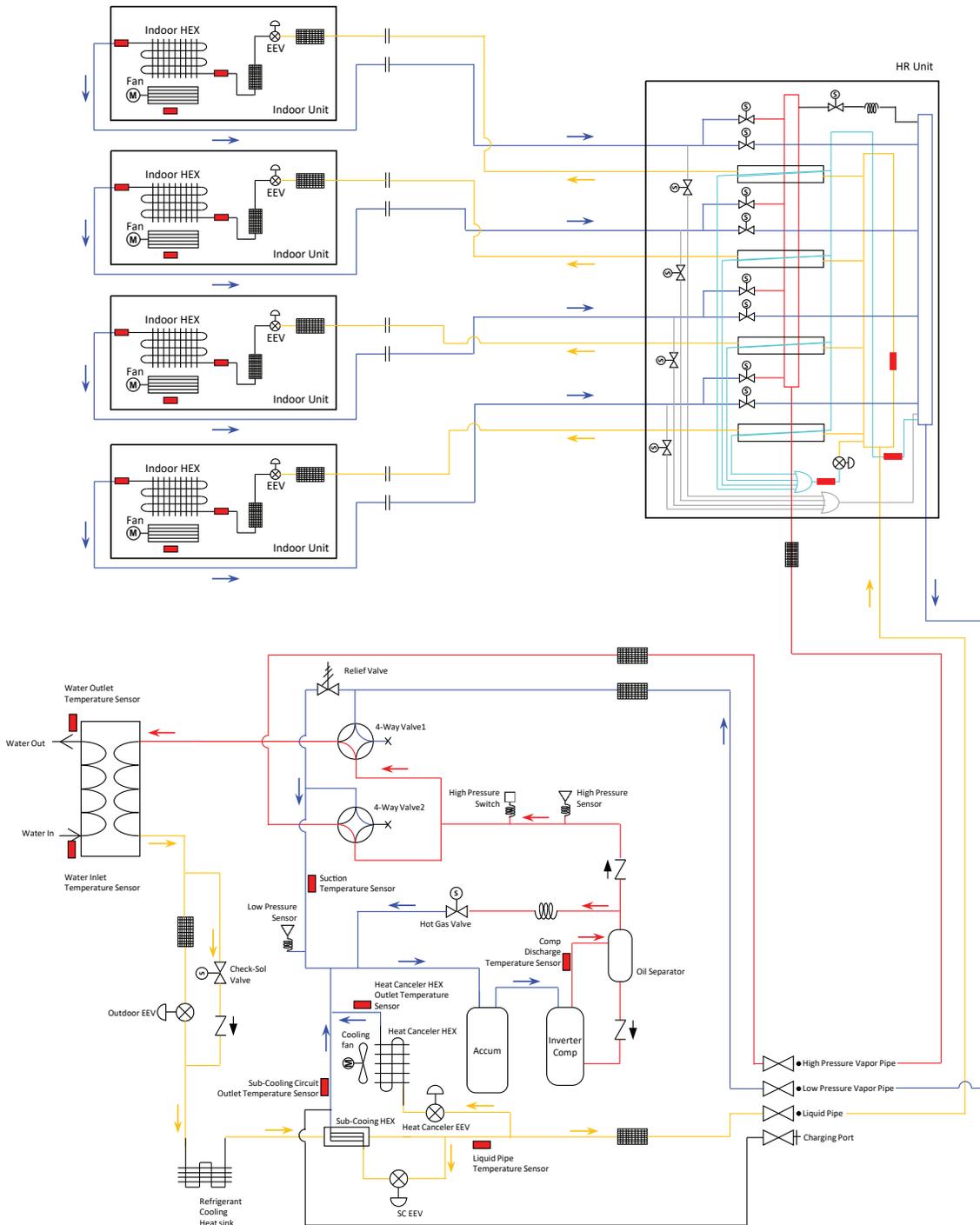
Water Source Unit Product Data

Remarks	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

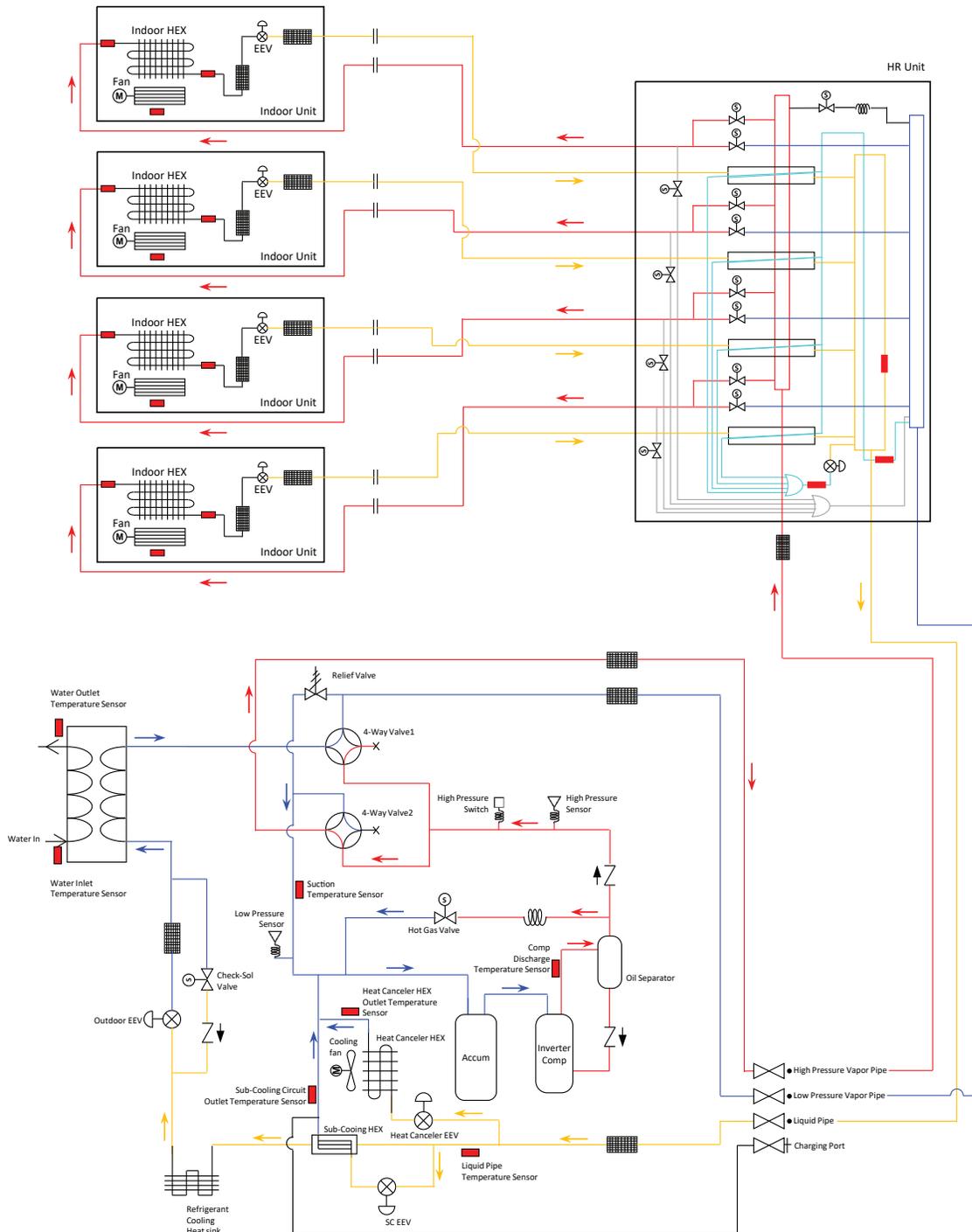
REFRIGERANT FLOW DIAGRAMS

Heat Recovery — Cooling Mode

MULTI V Water 5 Water Source Unit Engineering Manual



Remarks					



Remarks	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

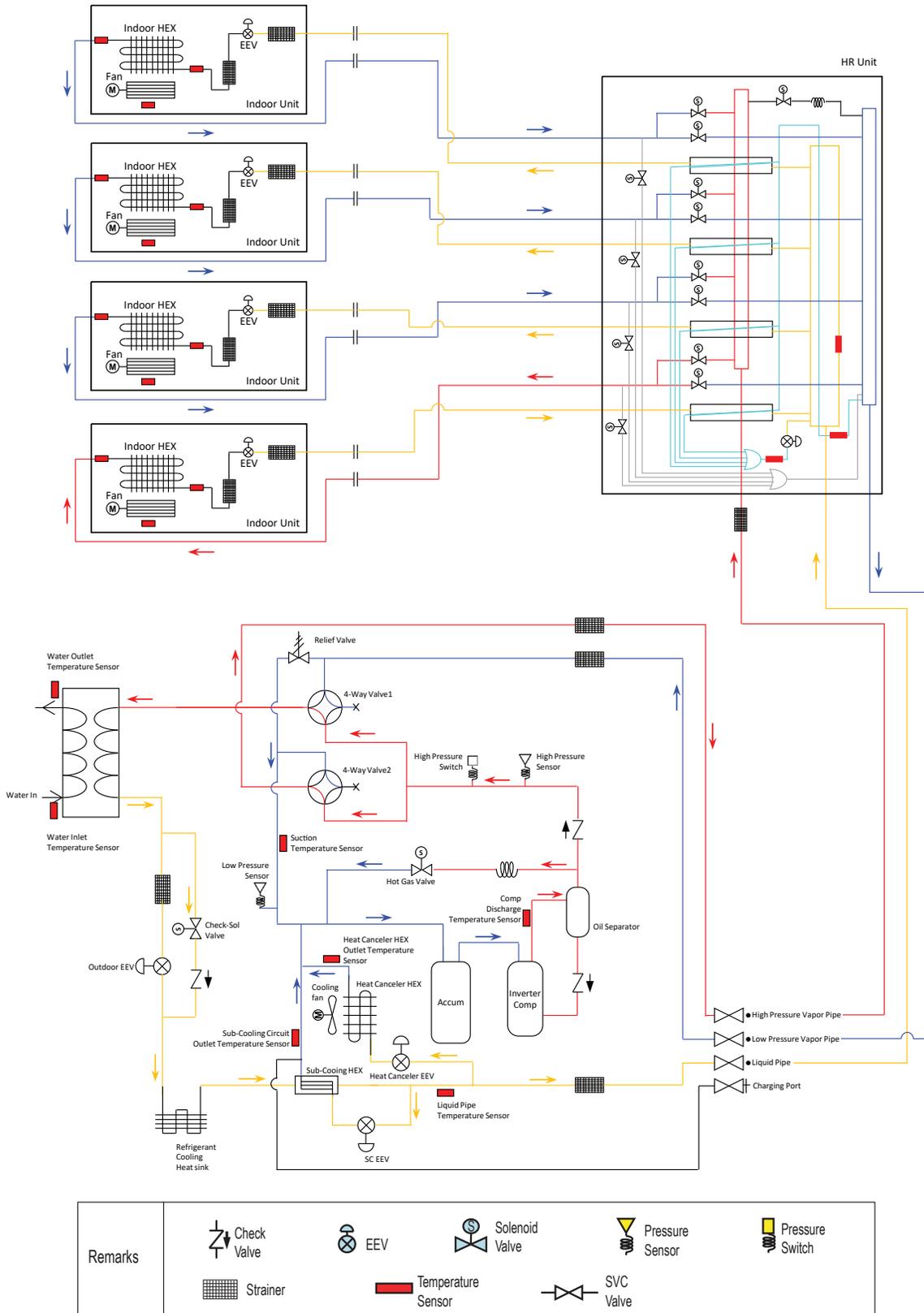
Water Source Unit Product Data

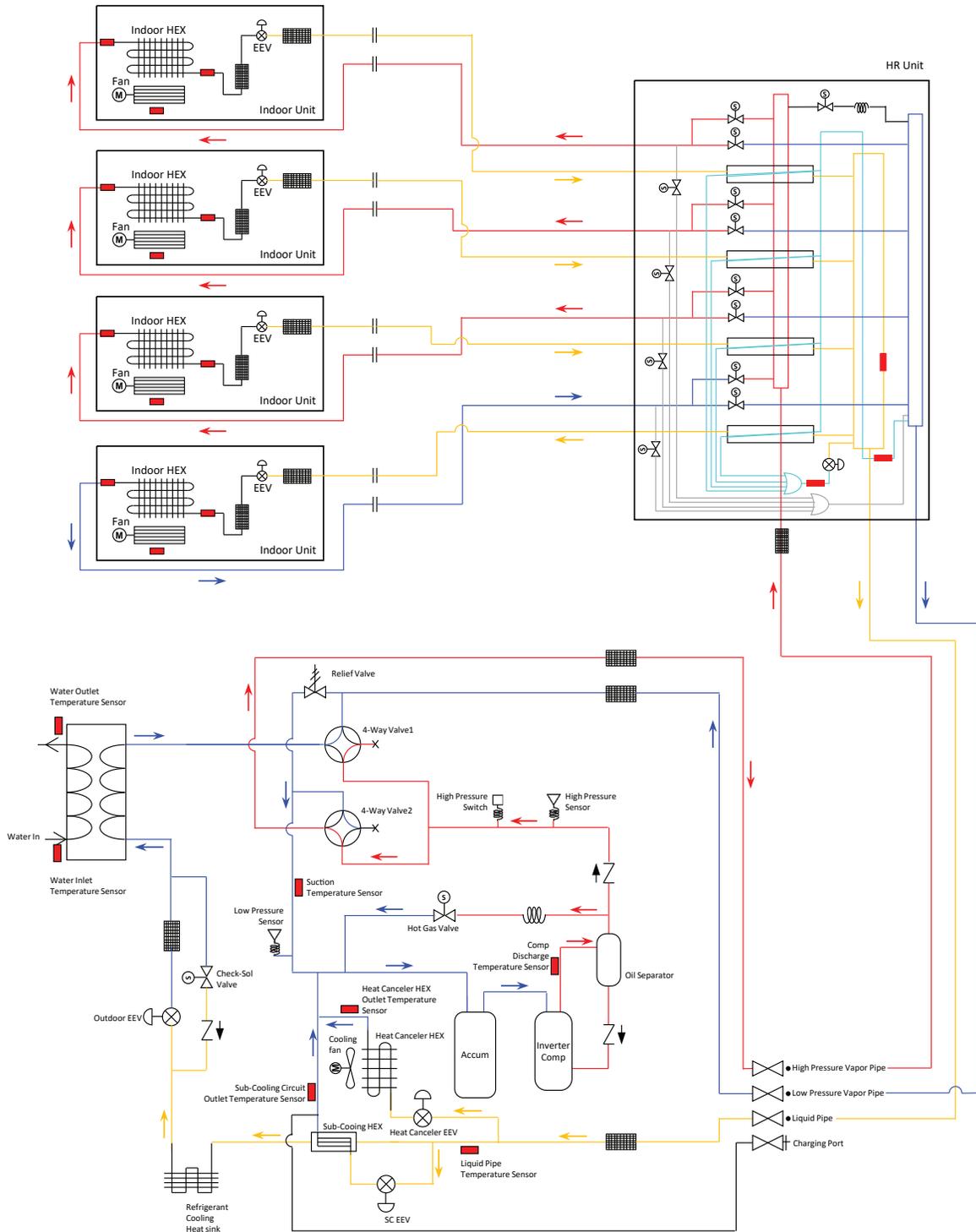
REFRIGERANT FLOW DIAGRAMS

Heat Recovery — Cooling based Simultaneous Operation Mode



MULTI V Water 5 Water Source Unit Engineering Manual



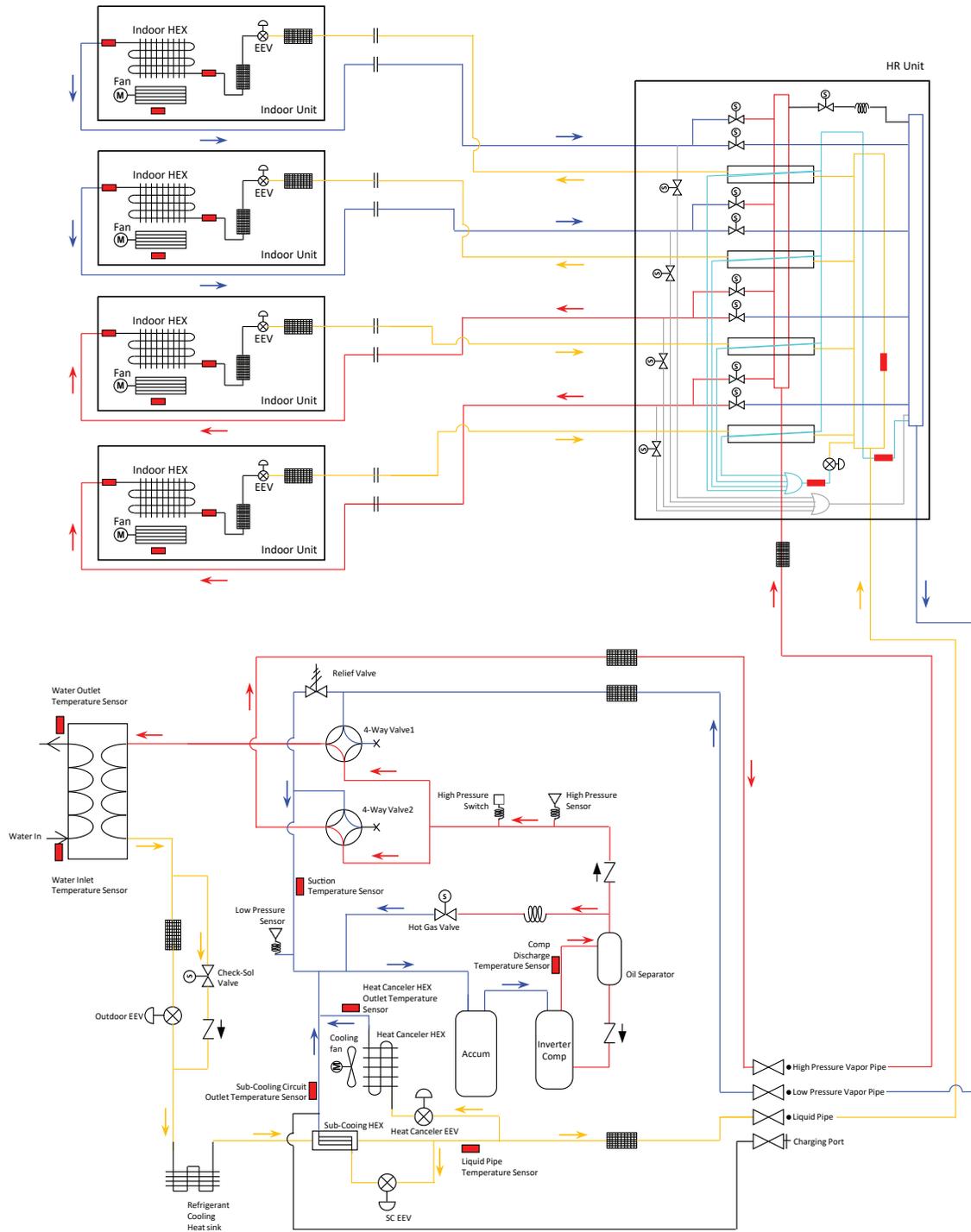


Water Source Unit Product Data

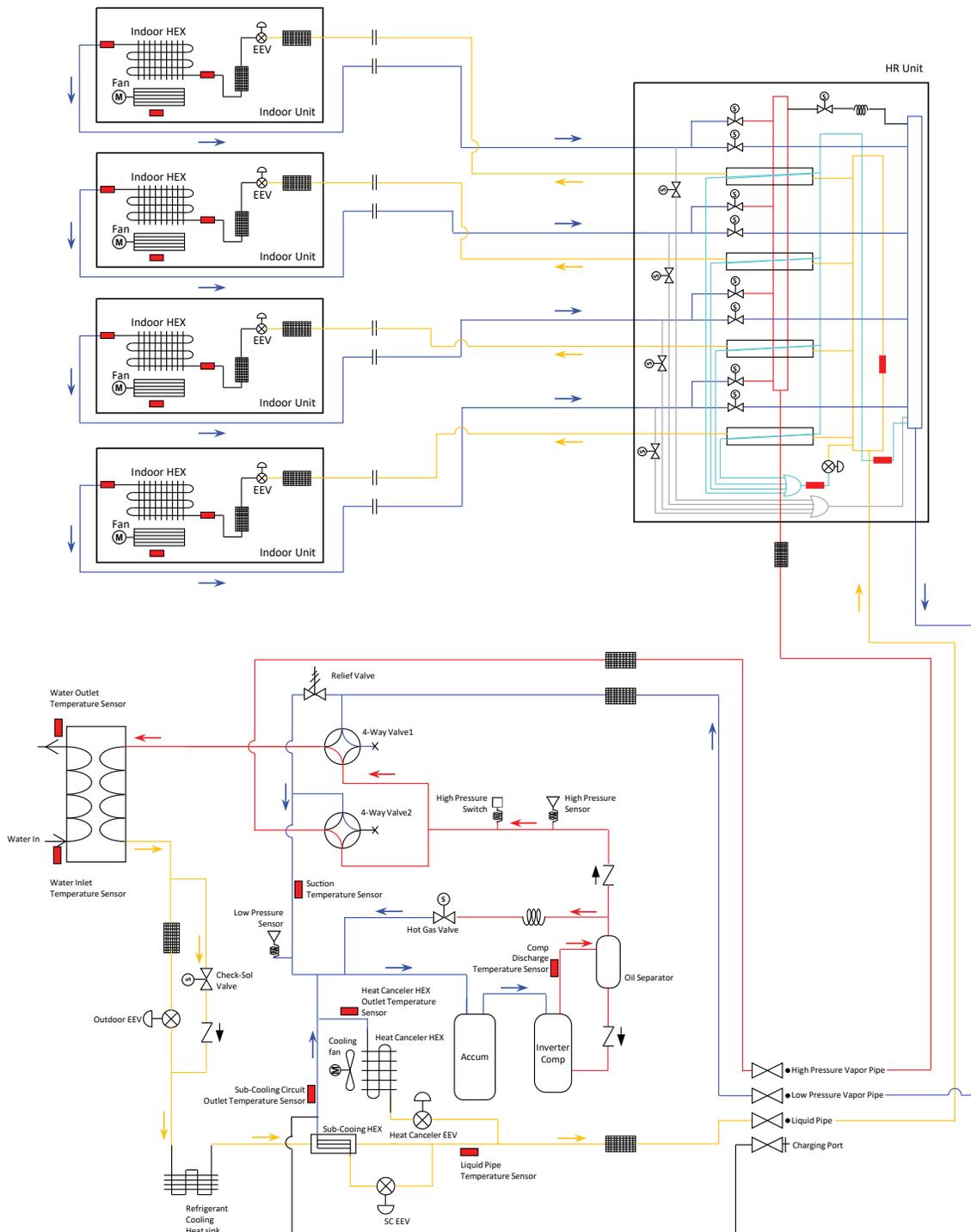
Remarks	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

REFRIGERANT FLOW DIAGRAMS

Heat Recovery — Balanced Simultaneous Operation Mode



Remarks	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		



Remarks	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

Water Source Unit Product Data

ACOUSTIC DATA

Sound Pressure and Sound Power Levels



Acoustic Data for WSU Models

- Measurement taken 3.3' above finished floor, and at a distance of 3.3' from face of unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound power levels are measured in dB(A)±3.
- Tested in anechoic chamber per ISO Standard 3745 at rated AHRI operating conditions.

Figure 5: Sound Pressure Measurement Location.

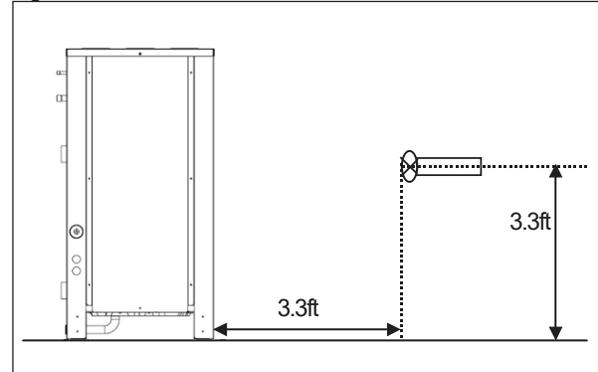


Table 13: Sound Pressure and Sound Power for 208-230V WSU Models

Ton	Model	Sound Pressure*	Sound Power
6	ARWM072BAS5	48 (62)	60
8	ARWM096BAS5	50 (62)	62
10	ARWM121BAS5	56 (62)	68
12	ARWM144BAS5	56 (62)	68
14	ARWM168BAS5	52 (65)	65
16	ARWM192BAS5	53 (65)	66
18	ARWM216BAS5	57 (65)	70
20	ARWM240BAS5	59 (65)	72
22	ARWM264BAS5	59 (65)	72
24	ARWM288BAS5	59 (65)	72
30	ARWM360BAS5	61 (67)	75
36	ARWM432BAS5	61 (67)	75

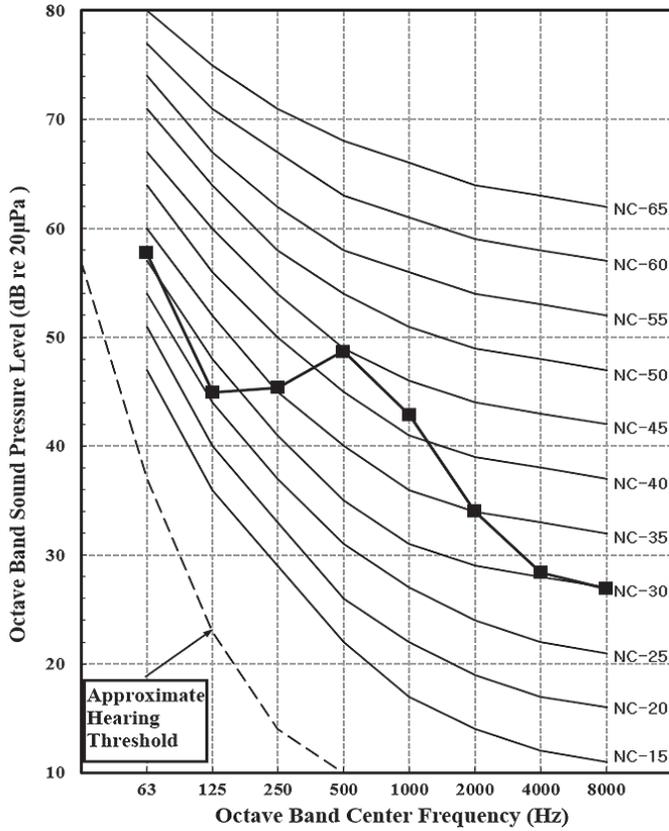
Table 14: Sound Pressure and Sound Power for 460V WSU Models.

Ton	Model	Sound Pressure*	Sound Power
6	ARWM072DAS5	48 (62)	60
8	ARWM096DAS5	50 (62)	62
10	ARWM121DAS5	56 (62)	68
12	ARWM144DAS5	56 (62)	68
14	ARWM168DAS5	58 (62)	70
16	ARWM192DAS5	60 (62)	72
16	ARWM191DAS5	53 (65)	66
18	ARWM216DAS5	57 (65)	70
20	ARWM240DAS5	59 (65)	72
22	ARWM264DAS5	59 (65)	72
24	ARWM288DAS5	59 (65)	72
30	ARWM360DAS5	62 (65)	75
36	ARWM432DAS5	61 (67)	75
42	ARWM504DAS5	63 (67)	77
48	ARWM576DAS5	65 (67)	79

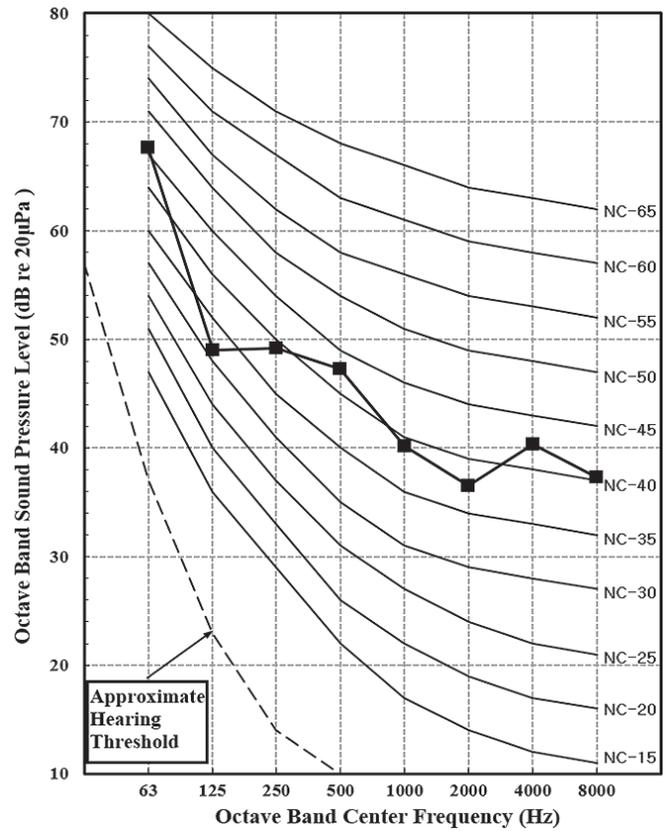
* Sound pressure level may increase during heating operation at maximum compressor frequency. Value in parenthesis is the maximum sound pressure at those conditions.

Sound Pressure for 208-230V Models

ARWM072BAS5



ARWM096BAS5



Water Source Unit Product Data

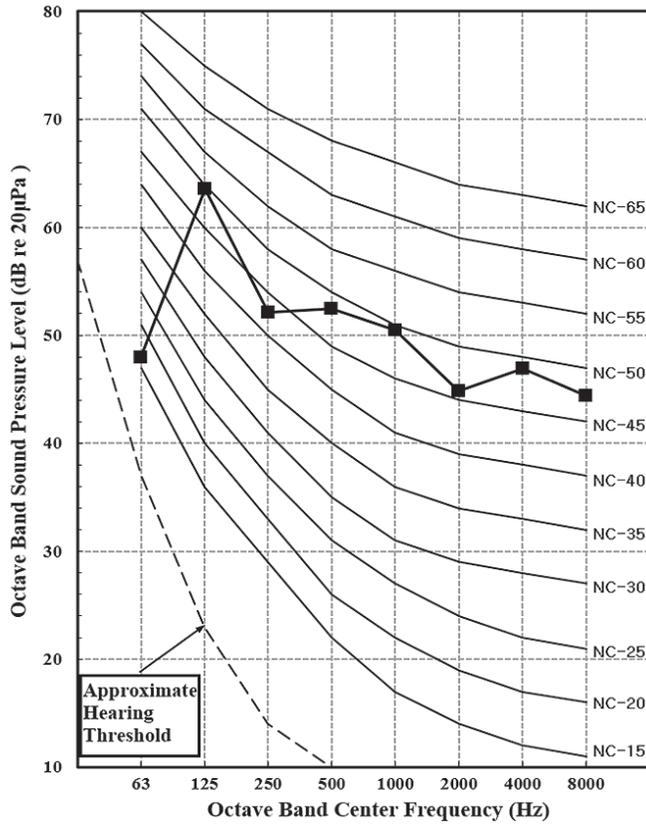
ACOUSTIC DATA

Sound Pressure Graphs

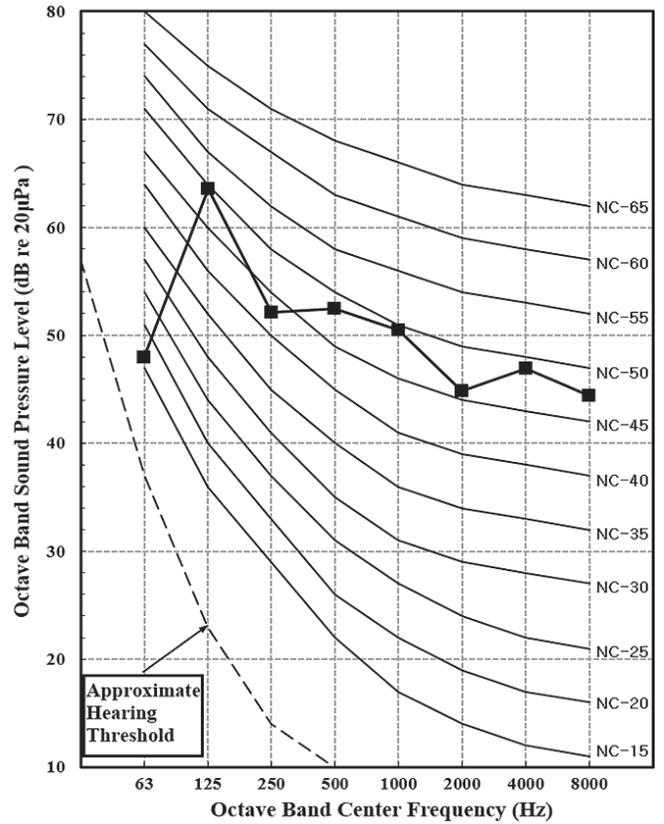


Sound Pressure for 208-230V Models, continued.

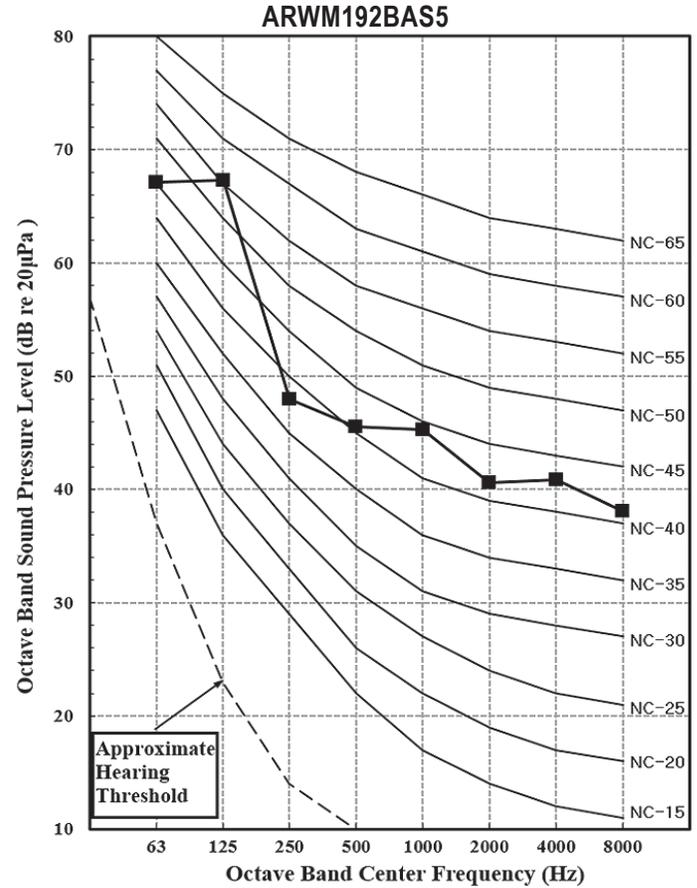
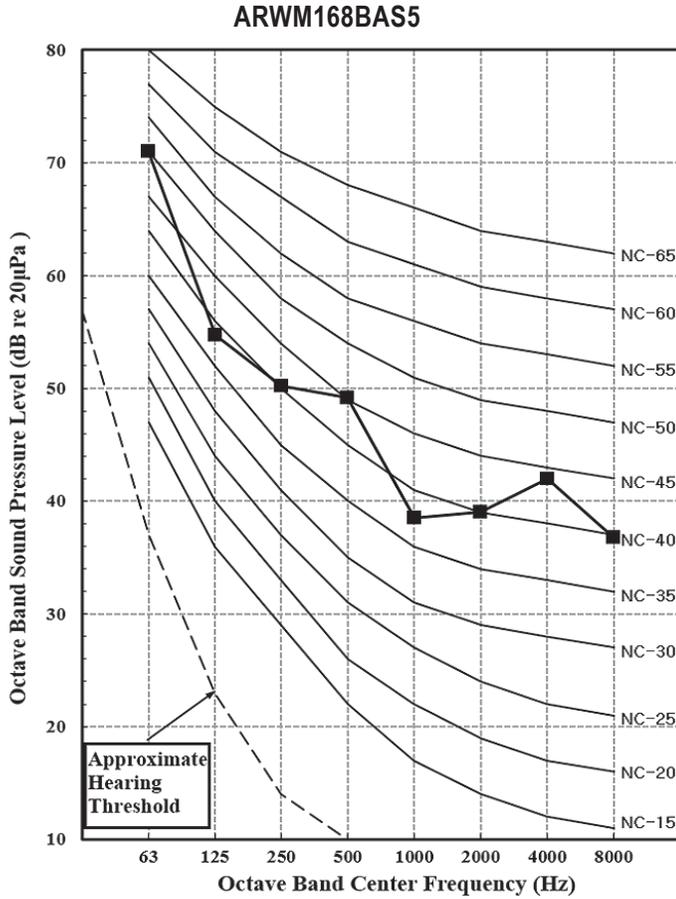
ARWM121BAS5



ARWM144BAS5



Sound Pressure for 208-230V Models, continued.



Water Source Unit Product Data

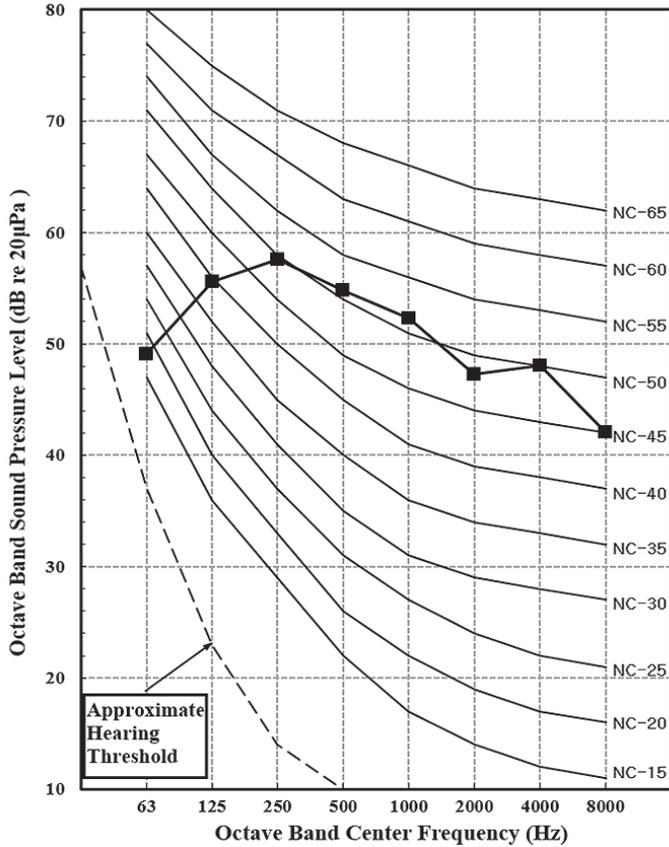
ACOUSTIC DATA

Sound Pressure Graphs

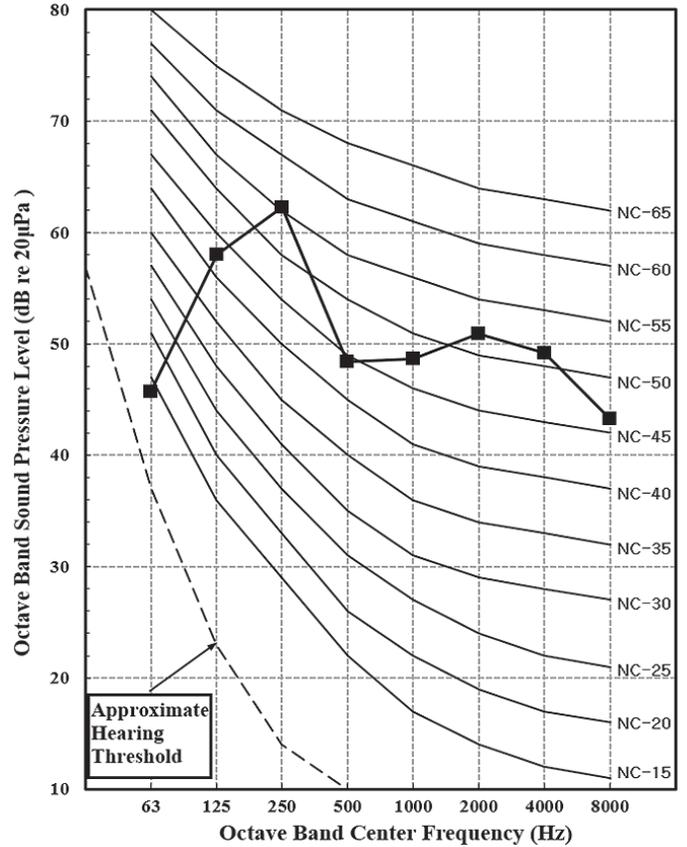


Sound Pressure for 208-230V Models, continued.

ARWM216BAS5

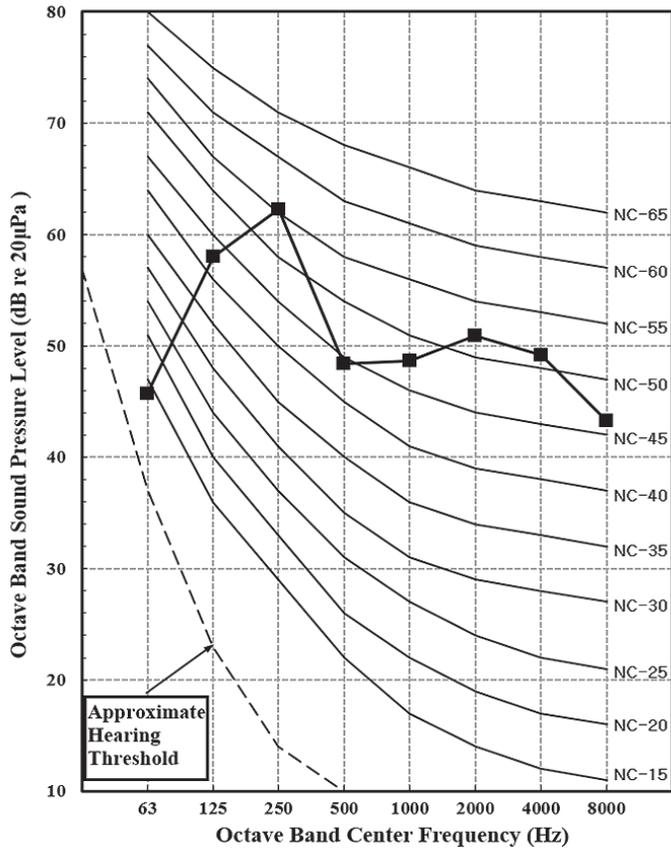


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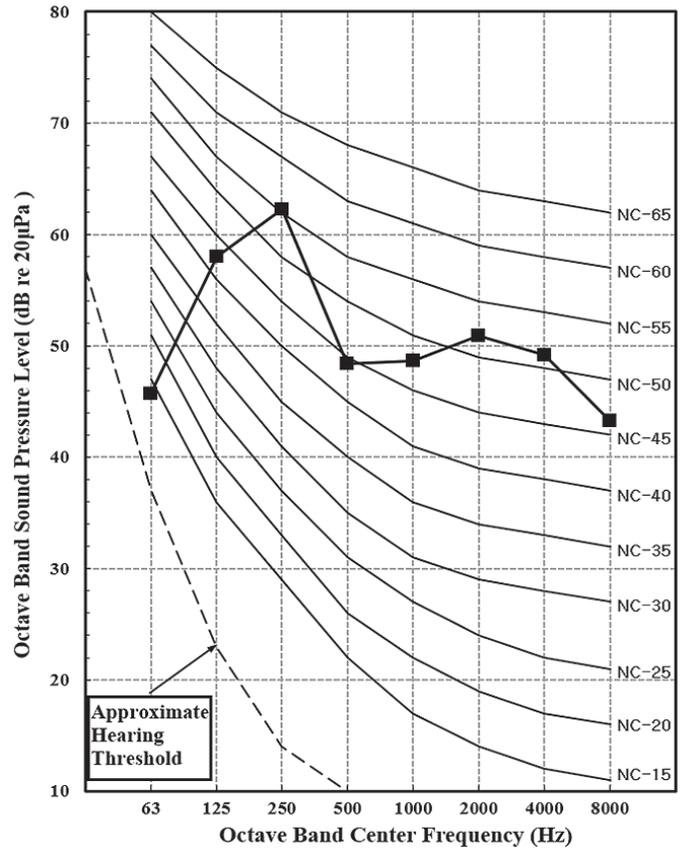


Sound Pressure for 208-230V Models, continued.

ARWM264BAS5



ARWM288BAS5



Water Source Unit Product Data

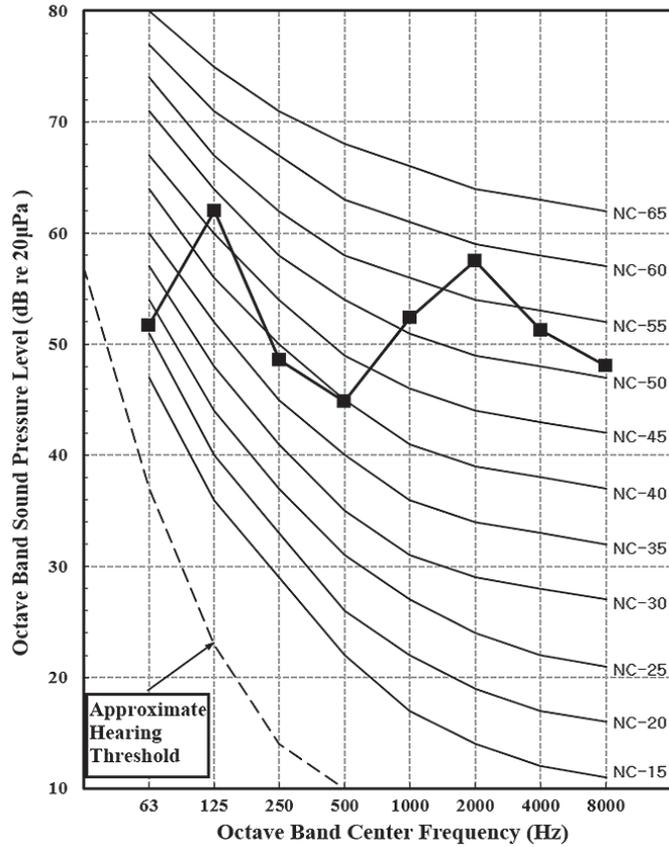
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Sound Pressure Graphs

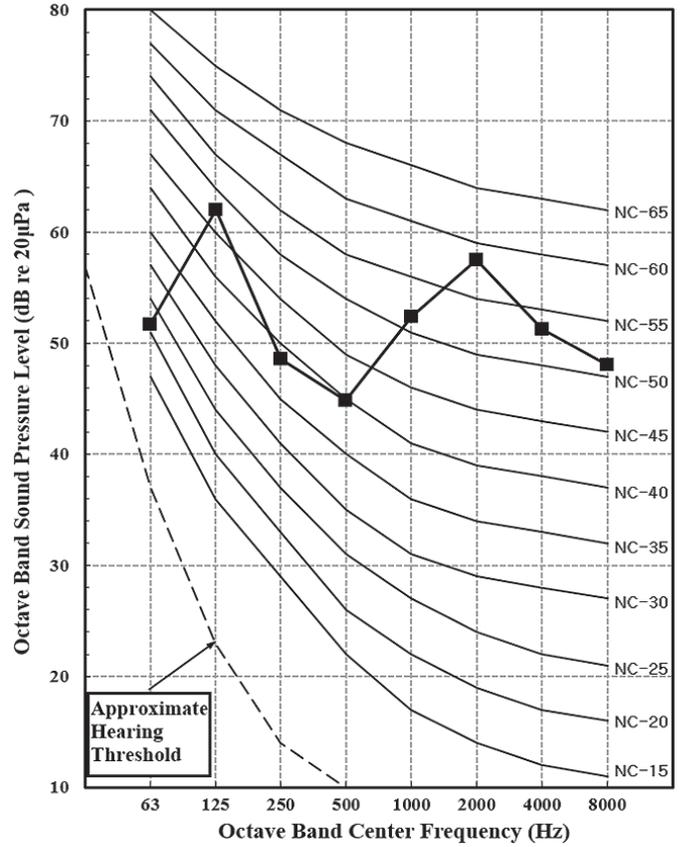


Sound Pressure for 208-230V Models, continued.

ARWM360BAS5

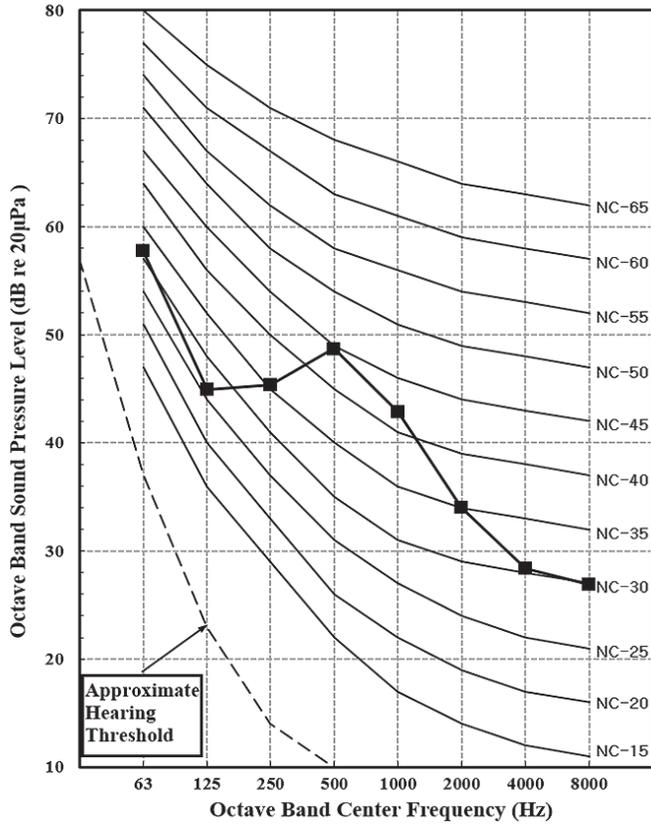


ARWM432BAS5

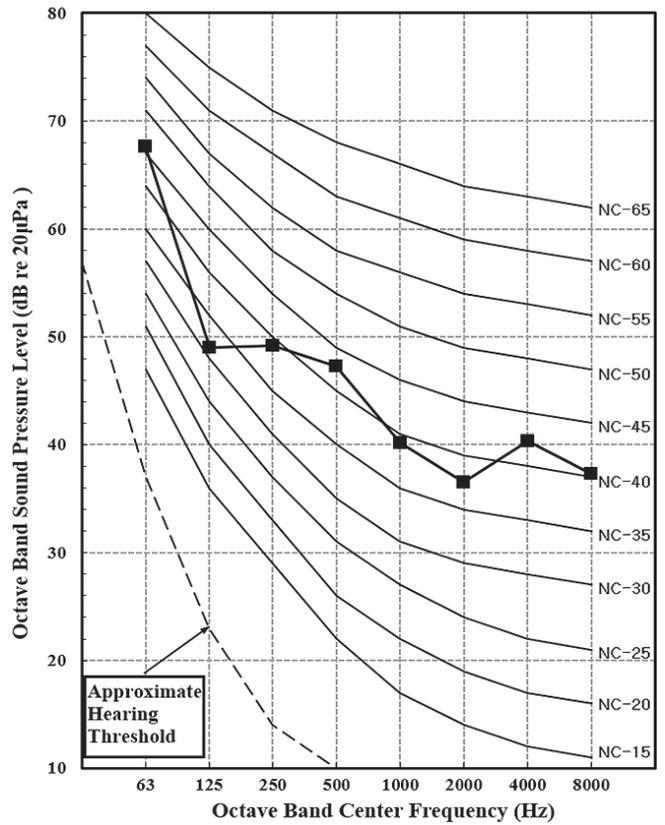


Sound Pressure for 460V Models

ARWM072DAS5



ARWM096DAS5



Water Source Unit Product Data

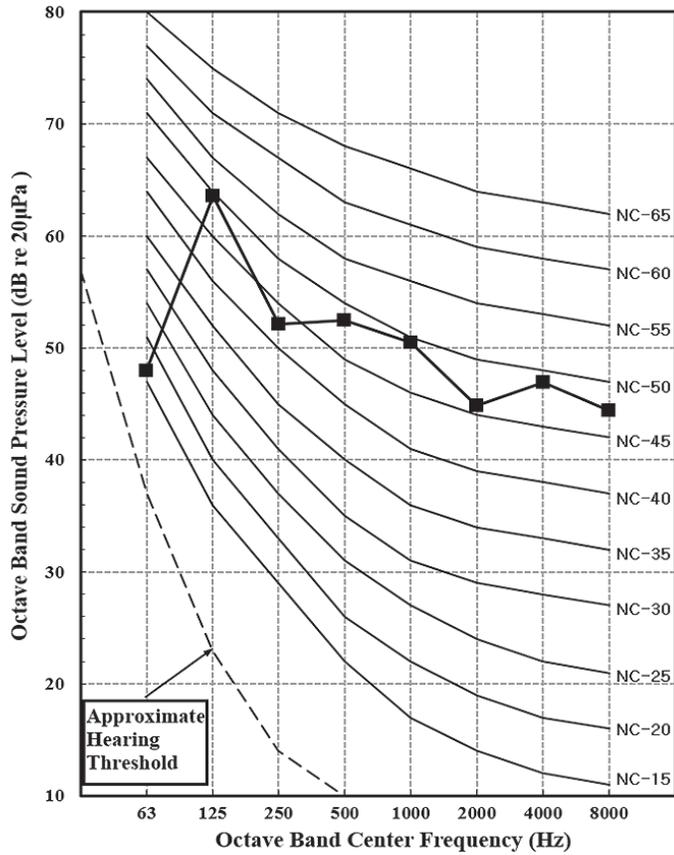
ACOUSTIC DATA

Sound Pressure Graphs

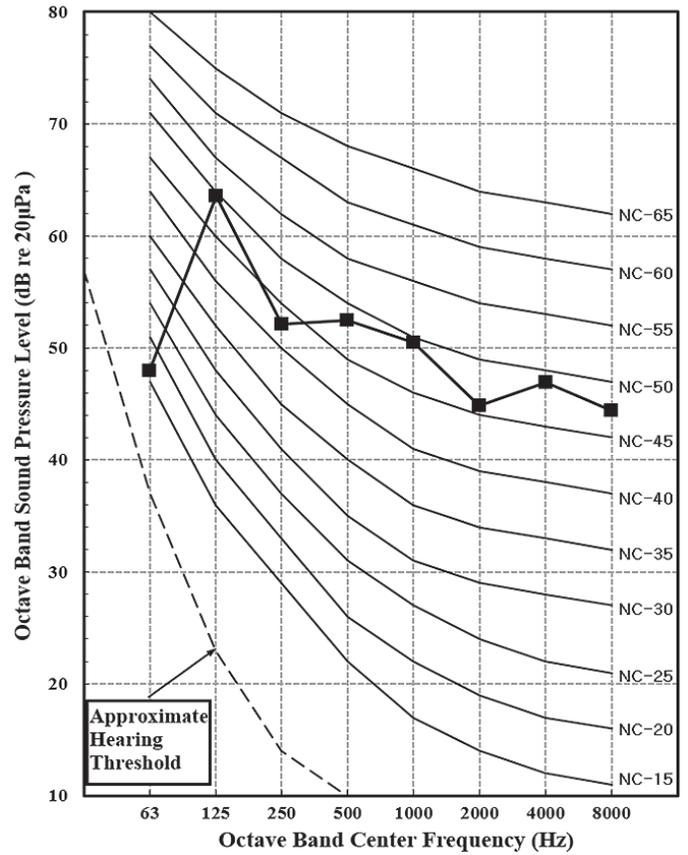


Sound Pressure for 460V Models, continued.

ARWM121DAS5

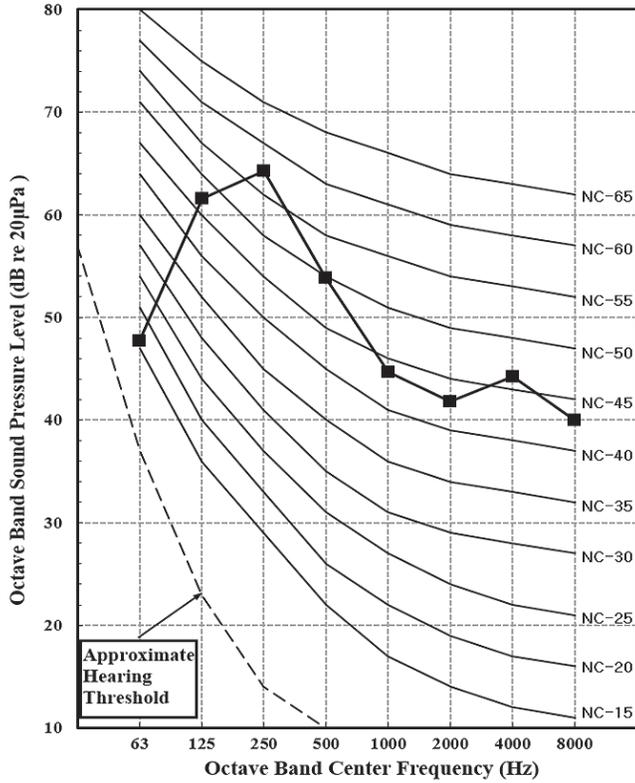


ARWM144DAS5

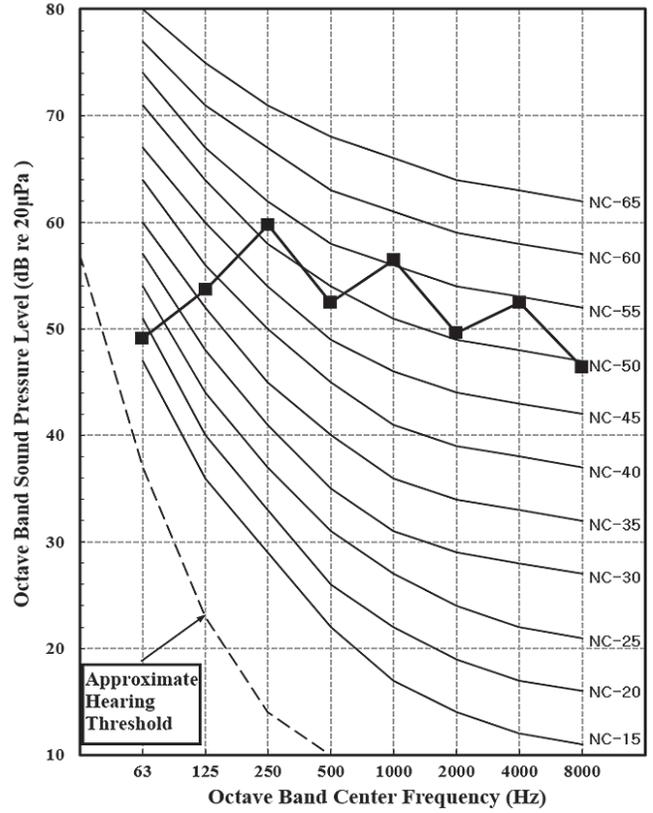


Sound Pressure for 460V Models, continued.

ARWM168DAS5



ARWM192DAS5



Water Source Unit Product Data

ACOUSTIC DATA

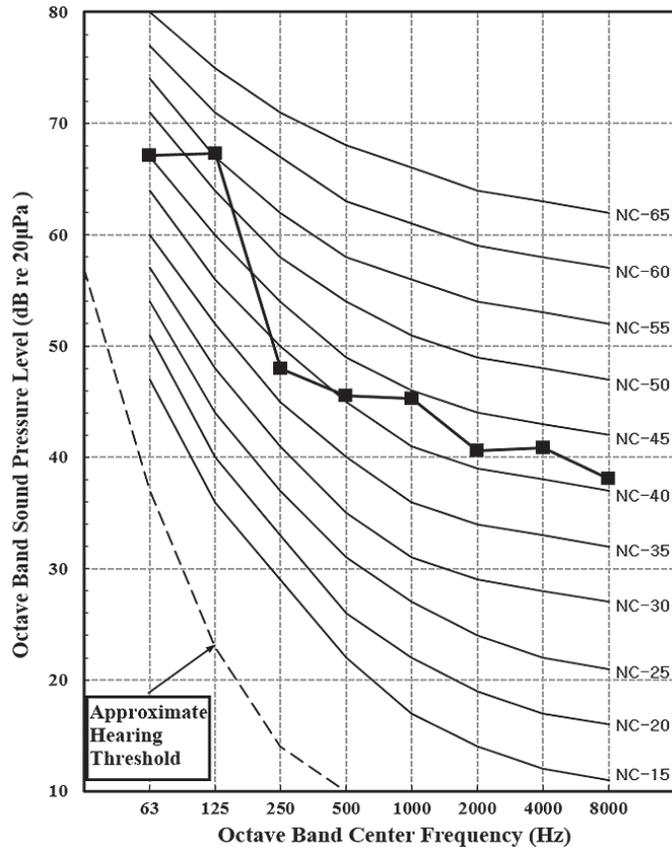
Sound Pressure Graphs



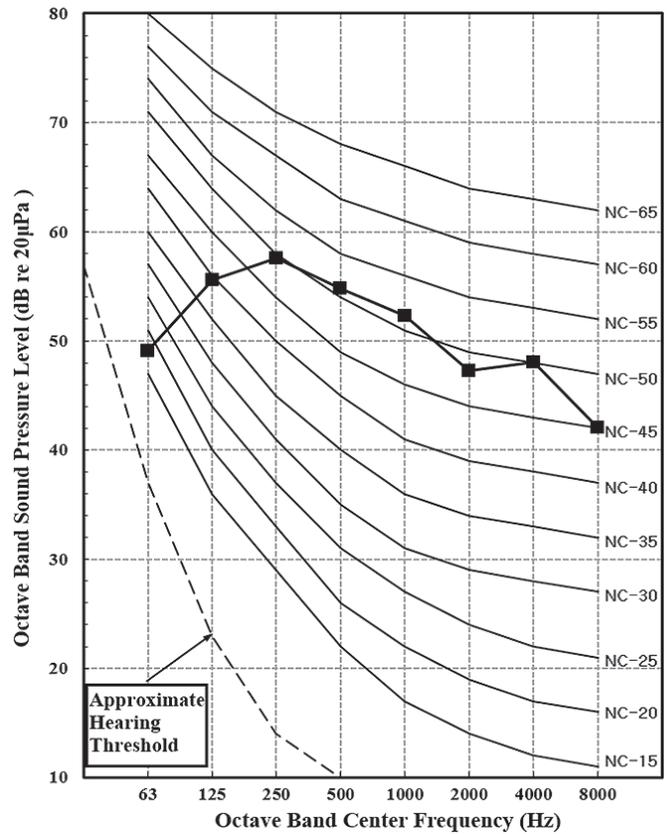
MULTI V Water 5 Water Source Unit Engineering Manual

Sound Pressure for 460V Models, continued.

ARWM191DAS5

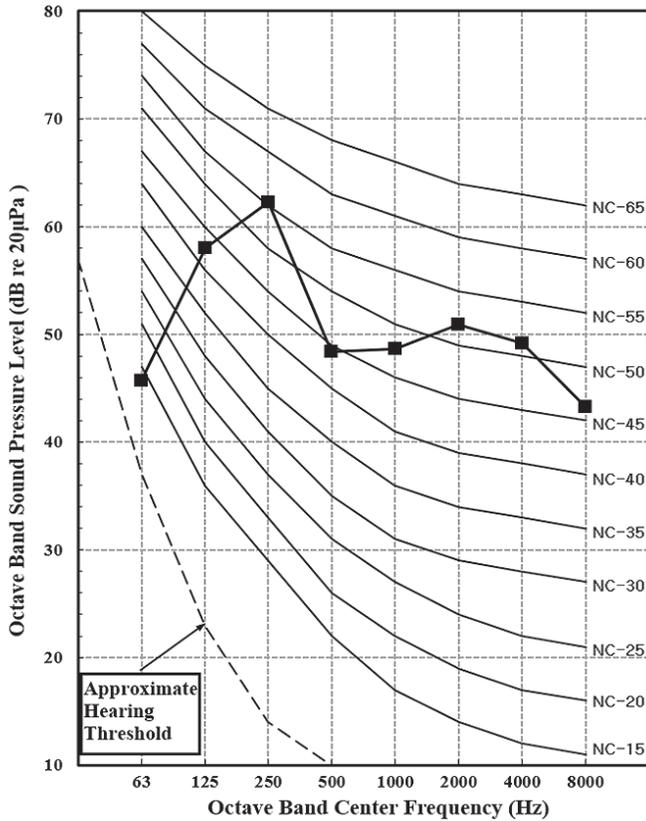


ARWM216DAS5

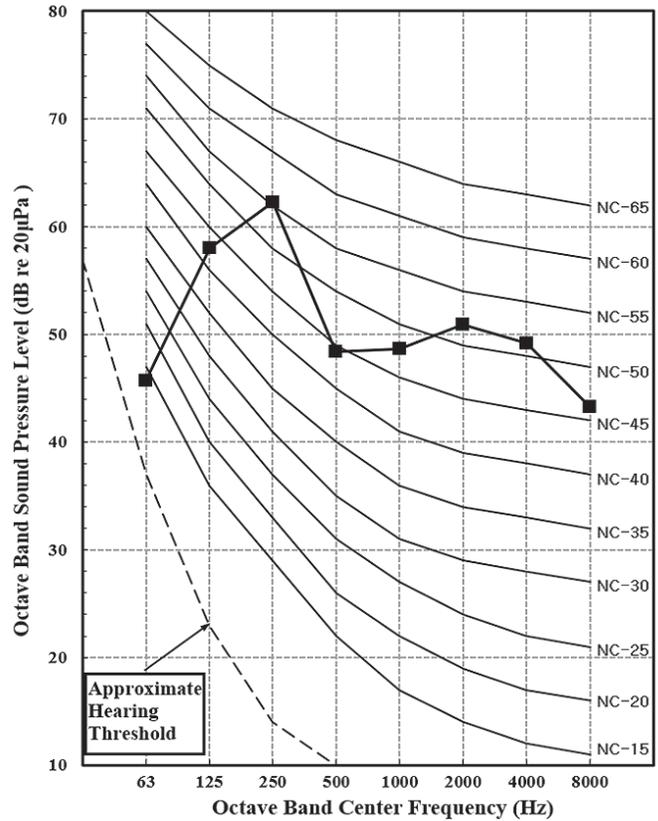


Sound Pressure for 460V Models, continued.

ARWM240DAS5



ARWM264DAS5



Water Source Unit Product Data

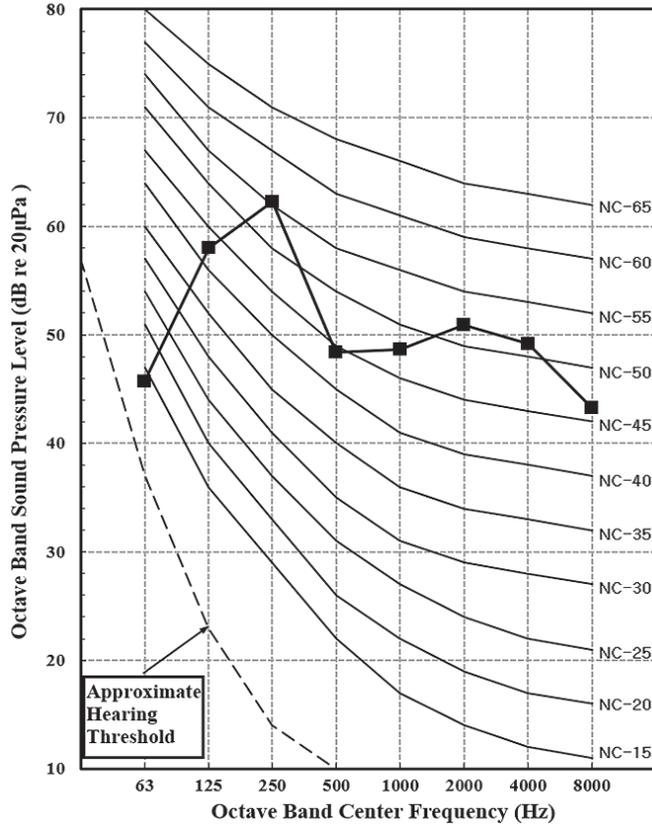
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Sound Pressure Graphs

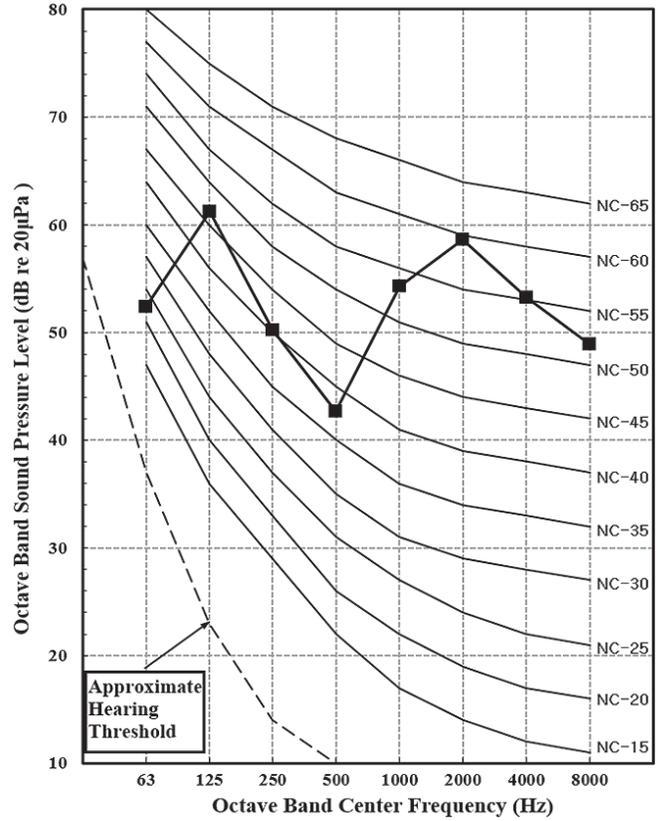


Sound Pressure for 460V Models, continued.

ARWM288DAS5

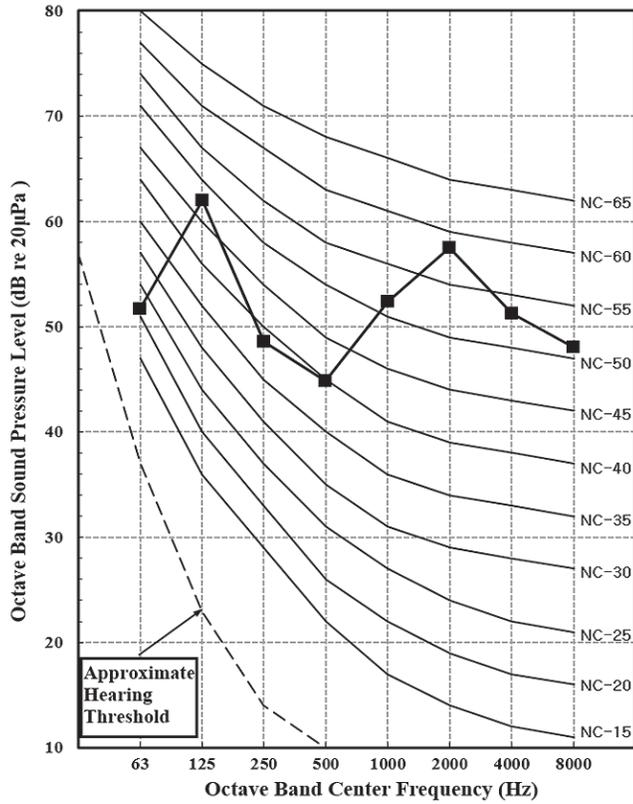


ARWM360DAS5

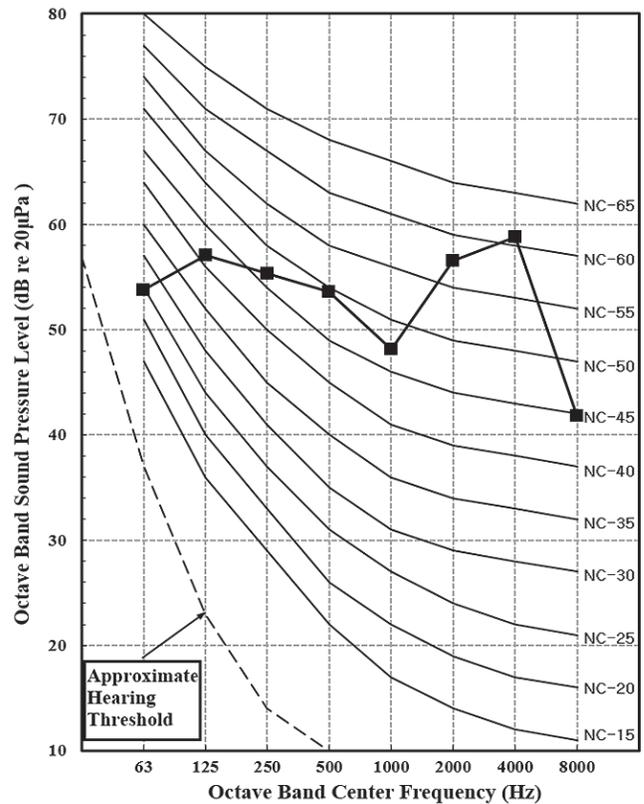


Sound Pressure for 460V Models, continued.

ARWM432DAS5



ARWM504DAS5

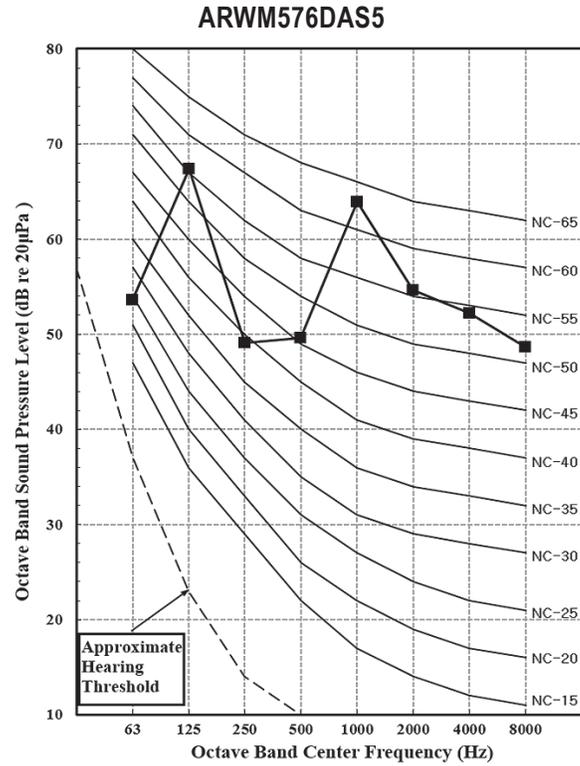


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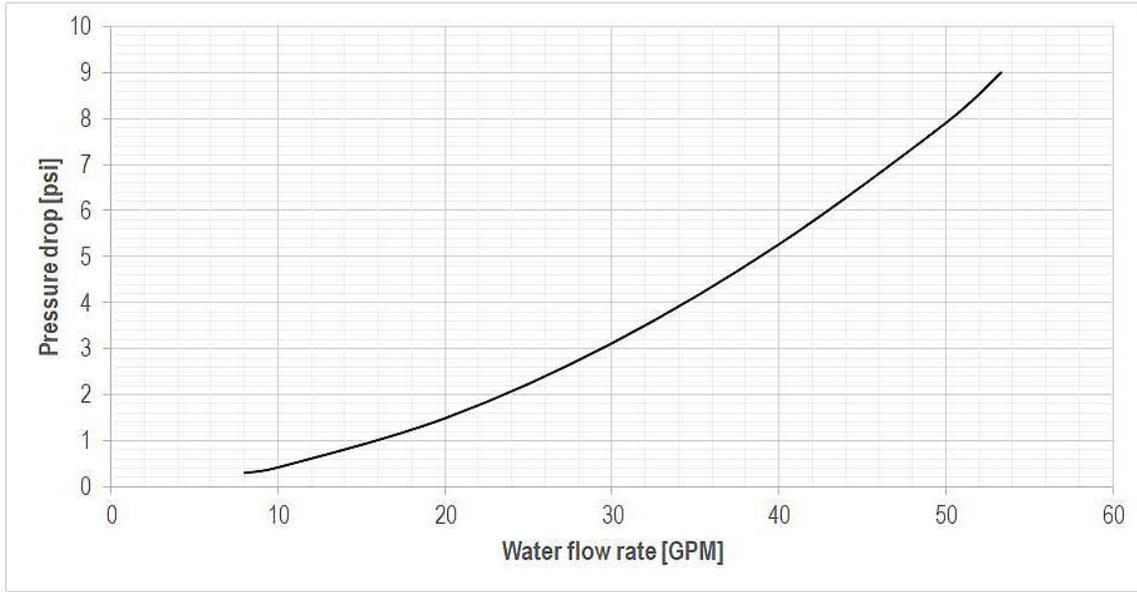
Sound Pressure Graphs



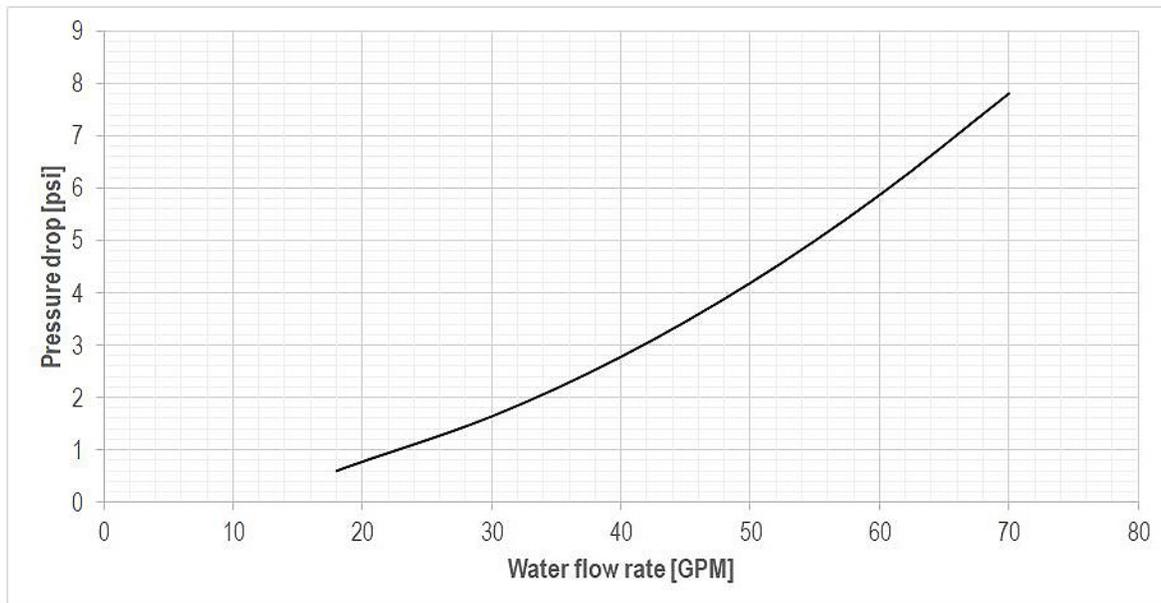
Sound Pressure for 460V Models, continued.



ARWM072BAS5, ARWM096BAS5, ARWM121BAS5, ARWM144BAS5, ARWM072DAS5, ARWM096DAS5, ARWM121DAS5, ARWM144DAS5



ARWM168DAS5, ARWM192DAS5



ACCESSORIES

Indoor Unit Y-Branches



Indoor Unit Y-Branches for Heat Pump Operation

(Unit: Inch [mm])

Models	Pipe	
	Vapor Pipe	Liquid Pipe
ARBLN01621	<p>AJR54072929</p>	<p>AJR54072927</p>
ARBLN03321	<p>AJR54072930</p>	<p>AJR54072928</p>
ARBLN07121	<p>AJR54072933</p>	<p>AJR54072931</p>
ARBLN14521	<p>AJR54072908</p>	<p>AJR54072932</p>
ARBLN23220	<p>AJR54072909</p>	<p>AJR54072910</p>

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MULTI V Water 5 Water Source Unit Engineering Manual

Indoor Unit Y-branches for Heat Recovery Operation

(Unit: Inch [mm])

Models	Pipe		
	Low-Pressure Vapor Pipe	Liquid Pipe	High-Pressure Vapor Pipe
ARBLB01621	<p>AJR54072905</p>	<p>AJR54072901</p>	<p>AJR72963601</p>
ARBLB03321	<p>AJR54072906</p>	<p>AJR54072902</p>	<p>AJR72963602</p>
ARBLB07121	<p>AJR54072907</p>	<p>AJR54072903</p>	<p>AJR72963603</p>
ARBLB14521	<p>AJR54072908</p>	<p>AJR54072904</p>	<p>AJR72963604</p>
ARBLB23220	<p>AJR54072909</p>	<p>AJR54072910</p>	<p>AJR54072908</p>

ACCESSORIES

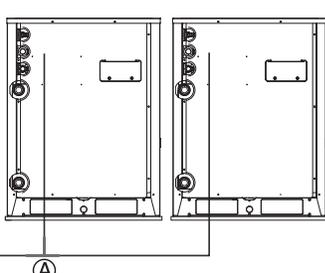
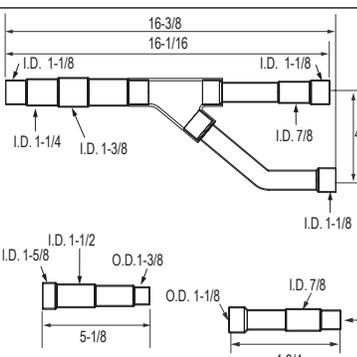
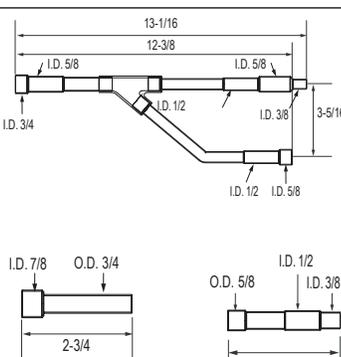
Outdoor Unit Y-Branches



Outdoor Unit Y-branches for Heat Pump Systems

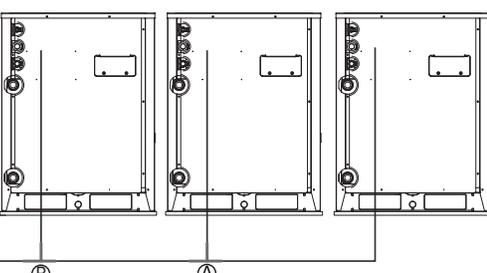
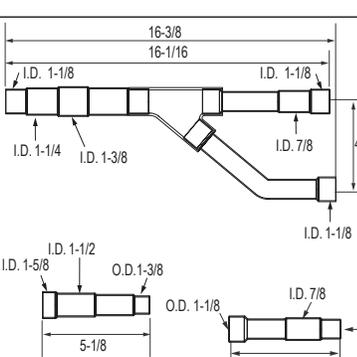
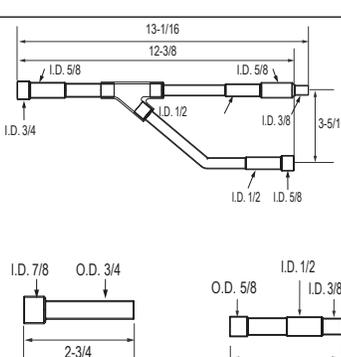
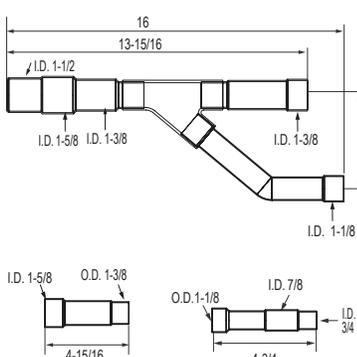
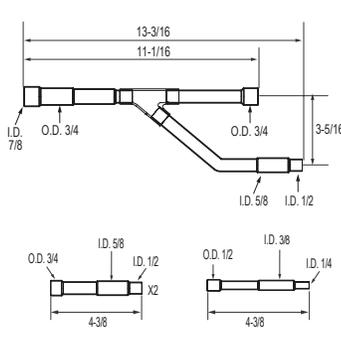
For Dual Frame Systems

Unit: inch

Combination	Multi-frame Connector	Vapor pipe	Liquid pipe
	<p>Ⓐ</p> <p>ARCNN21</p>		

For Triple Frame Systems

Unit: inch

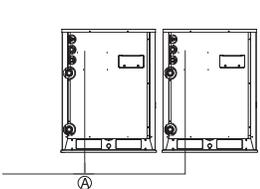
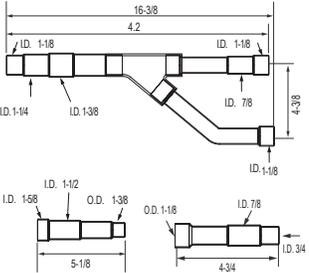
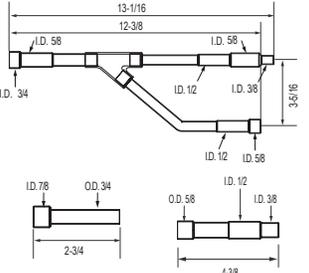
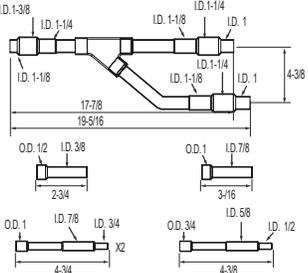
Combination specification	Multi-frame Connector	Vapor pipe	Liquid pipe
	<p>Ⓐ</p> <p>ARCNN21</p>		
	<p>Ⓑ</p> <p>ARCNN31</p>		

MULTI V Water 5 Water Source Unit Engineering Manual

Outdoor Unit Y-branches for Heat Recovery Systems

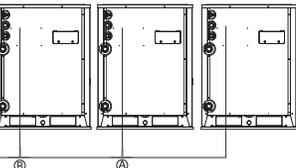
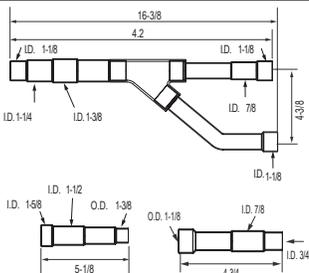
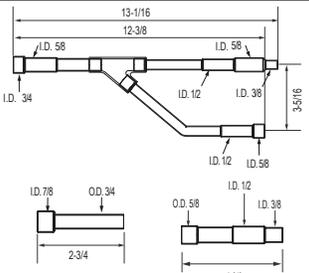
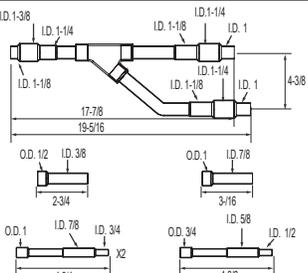
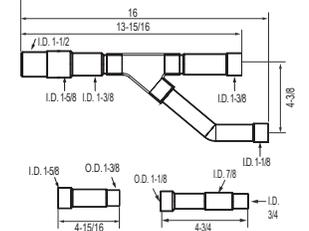
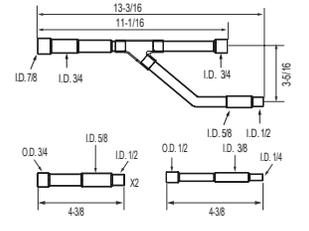
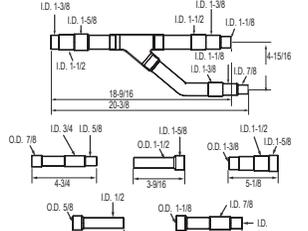
For Dual Frame Systems

Unit: inch

Combination specification	Multi-frame Connector	Low-pressure Vapor Pipe	Liquid Pipe	High-pressure Vapor Pipe
	<p>Ⓐ</p> <p>ARCNB21</p>			

For Triple Frame Systems

Unit: inch

Combination specification	Multi-frame Connector	Low-pressure Vapor Pipe	Liquid Pipe	High-pressure Vapor Pipe
	<p>Ⓐ</p> <p>ARCNB21</p>			
	<p>Ⓑ</p> <p>ARCNB31</p>			

ACCESSORIES

Headers



Headers for Heat Pump and Heat Recovery Operation

Unit: Inch

Models	Vapor pipe	Liquid pipe
4 branch ARBL054		
7 branch ARBL057		
4 branch ARBL104		
7 branch ARBL107		
10 branch ARBL1010		
10 branch ARBL2010		

MULTI V Water 5 Water Source Unit Engineering Manual

- LG headers serve as central connections for multiple runout pipe segments terminating at indoor units.
- Headers must be used with LG systems and be properly installed following the instructions in the applicable LG manual. Field-supplied headers are not permitted.
- Kit components must be kept free of debris and dry before installation.
- All Header Kits include:
 - Insulation jacket (one each for vapor and liquid pipes)
 - Plugging tubes / Insulation for plugging tubes (see Table 26).

Figure 6: Header.

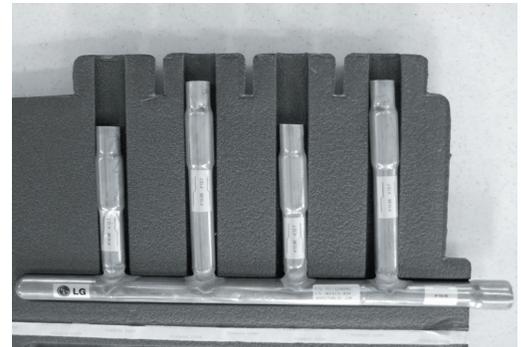


Table 15: Nominal Capacity Range.

Model	Fitting Capacity	Port Capacity
ARBL054 (4 branch)	≤72,000 connected capacity	≤54,300 per port
ARBL057 (7 branch)	≤75,100 connected capacity	≤54,300 per port
ARBL1010 (10 branch)	≤172,200 connected capacity	≤76,300 per port
ARBL104 (4 branch)	≤305,200 connected capacity	≤76,300 per port
ARBL107 (7 branch)	≤534,000 connected capacity	≤76,300 per port
ARBL2010 (10 branch)	≤560,000 connected capacity	≤76,300 per port

Table 16: Plugging Tubes and Plugging Tube Insulation Amounts.

Header Kits	Plugging Tubes (in OD)			Insulation for Plugging Tubes
	1/4	1/2	5/8	
ARBL054 (4 port)	—	—	—	—
ARBL057 (7 port)	2	2	—	4
ARBL1010 (10 port)	2	2	2	6
ARBL104 (4 port)	—	—	—	—
ARBL107 (7 port)	2	2	2	6
ARBL2010 (10 port)	2	2	2	6

Table 17: Insulation Jacket Properties.

Material	Polyolefin Foam
UL94 Flame Classification	HF-1
Density	1.84 lbs./ft. ³
Thermal Conductivity	.0208 Btu/h/ft. °F
Thickness	1/2 inch

Table 18: Fitting Properties.

Material	Copper
Design Pressure	550 psig

LG Monitoring View (LGMV) Diagnostic Software and Cable

LGMV software allows the service technician or commissioning agent to connect a computer USB port to the outdoor unit main printed circuit board (PCB) using an accessory cable without the need for a separate interface device. The main screen for LGMV allows the user to view the following real time data on one screen:

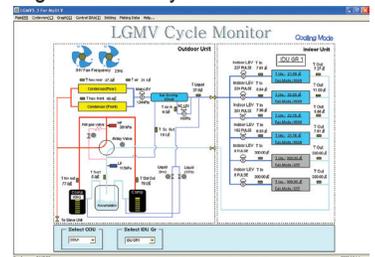
- Actual inverter compressor speed
- Target inverter compressor speed
- Actual outdoor fan speed
- Target outdoor unit fan speed
- Actual superheat
- Target superheat
- Actual subcooler circuit superheat
- Target subcooler circuit superheat
- Main EEV position
- Subcooling EEV position
- Inverter compressor current transducer value
- Outdoor air temperature
- Actual high pressure/saturation temperature
- Actual low pressure/saturation temperature
- Suction temperature
- Inverter compressor discharge temperature
- Constant speed compressor discharge temperature
- temperature
- Front outdoor coil pipe temperature
- Back outdoor coil pipe temperature
- Liquid line pipe temperature
- Subcooler inlet temperature
- Subcooler outlet temperature
- Average indoor unit (IDU) pipe temperature
- Inverter compressor operation indicator light
- Four-way reversing valve operation indicator light
- Pressure graph showing actual low pressure and actual high pressure levels
- Error code display
- Operating mode indicator
- Target high pressure
- Target low pressure
- PCB (printed circuit board) version
- Software version
- Installer name
- Model no. of outdoor units
- Site name
- Total number of connected indoor units
- Communication indicator lights
- Indoor unit capacity
- Indoor unit operating mode
- Indoor unit fan speed
- Indoor unit EEV position
- Indoor unit room temperature
- Indoor unit inlet pipe temperature
- Indoor unit outlet pipe temperature
- Indoor unit error code



Additional screens can be accessed by tabs on the main screen:

1. Cycleview: Graphic of internal components including:
 - Compressors showing actual speeds
 - EEVs
 - Indoor Units
 - Liquid injection valves
 - Temperature and pressure sensors
 - Four-way reversing valve
 - Outdoor fans showing status and speeds
2. Graph: Full screen graph of actual high and low pressures and high and low pressure limits. A sliding bar enables user to go back in time and view data.
3. Control IDU: Enables user to turn on all IDU's default setpoints of 86°F in heat mode or 64°F in cool mode.
4. Setting: Converts metric values to imperial values.
5. Making Data: Recording of real time data to a separate file created to be stored on the user's computer.
6. Loading Data: Recorded data from a saved ".CSV" file can be loaded to create an LGMV session.
7. Electrical Data: The lower half of main screen is changed to show the following:
 - Inverter compressor
 - Amps
 - Volts
 - Power Hz
 - Inverter control board fan Hz
 - Constant compressor
 - Current transducer value
 - Phase

Figure 7: MV Cycleview.



In lieu of connecting to the outdoor unit, user has the option to connect to the indoor unit with the use of a USB to RS-485 connector kit. When connected through the indoor unit, user will not be able to record data.

This software can be used to both commission new systems and troubleshoot existing systems. LGMV data can be recorded to a ".CSV" file and emailed to an LG representative to assist with diagnostic evaluations.

Recommended Minimum PC Configuration:

- CPU: Pentium® IV 1.6 GHz
- Operating System: Windows® NT/2000/XP/Vista
- Main Memory: 256 MB
- Hard Disk: 600 MB when operating
- Web Browser: Internet Explorer® 5.0

LGMV is available in different formats, including Mobile LGMV, which is an app for use on wireless devices. Contact your LG Sales Representative for more information.

HEAT RECOVERY UNIT PRODUCT DATA

Mechanical Specifications on page 62

General Data on page 63

Electrical Data on page 65

Wiring Diagrams on page 66

External Dimensions on page 70

Refrigerant Flow Diagram on page 75

Acoustic Data on page 76

Accessories on page 77

Multi V Heat Recovery Units

Four-port Heat Recovery Unit.

General

Multi V heat recovery units are for use with Multi V 5, Multi V Water 5, and Multi V S heat recovery outdoor units to permit simultaneous heating and cooling operation. Heat recovery units have two (2), three (3), four (4), six (6), or eight (8) ports for connections to indoor units. Each port is capable of connecting from one (1) indoor unit up to eight (8) indoor units up to a maximum nominal capacity of ≤ 60 MBh. When multiple indoor units are connected to one port, all indoor units on that port must operate in the same mode (cooling or heating). Individual indoor units ≥ 60 MBh nominal capacity must use two (2) neighboring heat recovery unit ports twinned together using a reverse Y-branch kit. Connect largest indoor unit to first port of the heat recovery unit. Each heat recovery unit can support a maximum capacity (sum of ports) of up to 230 MBh.



Heat recovery ports can operate in heating or cooling mode independently, regardless of the mode of any other port on the unit or in the system except where heat recovery unit ports are twinned. Heat recovery units contain one double spiral subcooling heat exchanger per port, are internally insulated, and do not require a condensate drain.

Casing and Construction

Heat recovery units are completely factory assembled, internally piped, wired, and are designed for indoor installation. Casing is constructed of galvanized steel, and houses piping, valves and controls to divert refrigerant controlling each port to operate in either heating or cooling mode. Heat recovery units contain one double spiral subcooling heat exchanger per port, are internally insulated, and do not require a condensate drain.

Refrigerant Valves

Each heat recovery port is circuited with two two-position motorized valves to control R410A refrigerant flow path to allow indoor units to operate in heating or cooling mode.

Refrigerant Piping

Units can be piped in series and / or parallel to optimize cost between material and labor. Up to 16 heat recovery units can be piped in series, parallel, or a combination of series and parallel to optimize cost between material and labor. Any series string of heat recovery ports/units can connect up to 230 MBh of indoor unit nominal capacity (series string is defined as heat recovery units piped in series).

Heat recovery unit piping limitations also depend on the allowable piping parameters of the outdoor unit installed.

- Indoor units up to 131 equivalent feet of piping length from the heat recovery unit to which it is connected.
- Indoor units up to 295 equivalent feet of piping length from the first branch.
- Difference between highest and lowest elevation indoor units piped to separate parallel heat recovery units (HRUs) up to 131 feet in elevation.
- Difference between highest and lowest heat recovery units piped in parallel up to 98 feet in elevation.
- Difference between highest and lowest elevation heat recovery units piped in series up to 16 feet in elevation.
- Elevation difference of series connected heat recovery units cannot exceed 16 feet.

All refrigerant lines from the outdoor unit to the heat recovery units, and from the heat recovery units to the indoor units must be field insulated separately.

Electrical

Heat recovery units require 208-230V, 1-phase, 60 Hz electrical power, and are capable of operation within $\pm 10\%$ of nominal voltage.

Controls

Heat recovery units include factory-installed control boards with integral microprocessors. Heat recovery unit control boards communicate with the main control board in the outdoor unit and interface with the VRF equipment controls system. The control circuit between the indoor units, heat recovery units and the outdoor unit is RS-485 daisy chain communication over two-conductor, twisted, stranded, shielded, 18 AWG cable.



Figure 18: Two-Port Heat Recovery Unit.



Figure 19: Three-Port Heat Recovery Unit.



Figure 20: Four-Port Heat Recovery Unit.

Note:

Heat recovery units can only be used with LG systems piped for heat recovery operation.

Table 16: Heat Recovery Unit Specifications.

Model		PRHR023A	PRHR033A	PRHR043A	
Number of Ports		2	3	4	
Max. Connectible No. of Indoor Units		16	24	32	
Max. Connectible No. of Indoor Units on each port		8	8	8	
Max. Port Capacity (each port)	Btu/h	60,000	60,000	60,000	
Max. Unit Capacity (sum of ports)	Btu/h	120,000	180,000	230,000	
Net Weight	lbs.	33	37	40	
Shipping Weight	lbs.	46	50	53	
Dimensions (W x H x D)	Inches	19-1/8 x 8-5/8 x 18-15/16			
Casing		Galvanized Steel Plate			
Connecting Pipes	To Indoor Units	Liquid Pipe (inches)	3/8	3/8	3/8
		Vapor Pipe (inches)	5/8	5/8	5/8
	To Outdoor Units	Liquid (inches)	3/8	1/2	5/8
		Low-pressure Vapor (inches)	7/8	1-1/8	1-1/8
	High-pressure Vapor (inches)	3/4	7/8	7/8	
Insulation Material		Polyethylene Foam			

GENERAL DATA

PRHR063A, PRHR083A



Figure 21: Six-Port Heat Recovery Unit.



Figure 22: Eight-Port Heat Recovery Unit.

Note:

Heat recovery units can only be used with LG systems piped for heat recovery operation.

Table 17: Heat Recovery Unit Specifications, continued.

Model		PRHR063A	PRHR083A	
Number of Ports		6	8	
Max. Connectible No. of Indoor Units		48	64	
Max. Connectible No. of Indoor Units on each port		8	8	
Max. Port Capacity (each port)	Btu/h	60,000	60,000	
Max. Unit Capacity (sum of ports)	Btu/h	230,000	230,000	
Net Weight	lbs.	60	68	
Shipping Weight	lbs.	75	82	
Dimensions (W x H x D)	Inches	31-1/4 x 8-5/8 x 18-15/16		
Casing		Galvanized Steel Plate		
Connecting Pipes	To Indoor Units	Liquid Pipe (inches)	3/8	3/8
		Vapor Pipe (inches)	5/8	5/8
	To Outdoor Units	Liquid (inches)	5/8	5/8
		Low-pressure Vapor (inches)	1-1/8	1-1/8
	High-pressure Vapor (inches)	7/8	7/8	
Insulation Material		Polyethylene Foam		

Table 18: Heat Recovery Unit Electrical Data.

Unit Model No.	Voltage Range	Rated Amps	MCA	MFA	Power Supply			Power Input (W)	
					Hz	Volts	Phase	Cooling	Heating
PRHR023A	187-253	0.06	0.17	15	60	208-230	1	39.8	37.2
PRHR033A									
PRHR043A		0.09	0.27					75.9	72.1
PRHR063A									
PRHR083A									

MCA : Minimum Circuit Ampacity.
MFA : Maximum Fuse Amps.

Units are suitable for use on an electrical system where voltage supplied to unit terminals is within the listed range limits.
Select wire size based on the larger MCA value.
Instead of a fuse, use the circuit breaker.

WIRING DIAGRAM

PRHR023A, PRHR033A, PRHR043A



Figure 23: PRHR023A, PRHR033A, and PRHR043A Wiring Diagram.

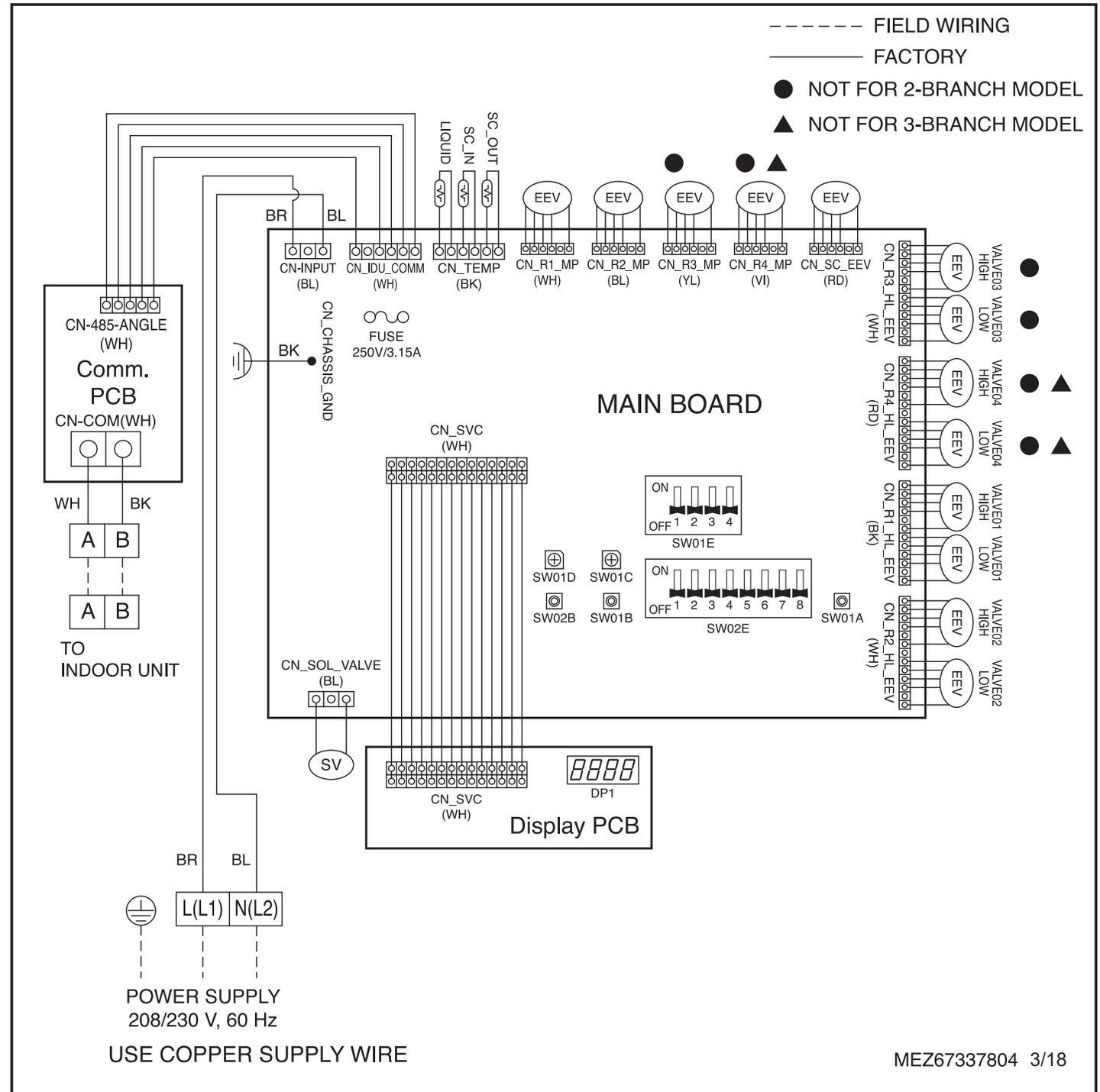


Table 19: PRHR023A, PRHR033A, and PRHR043A Wiring Diagram Legend.

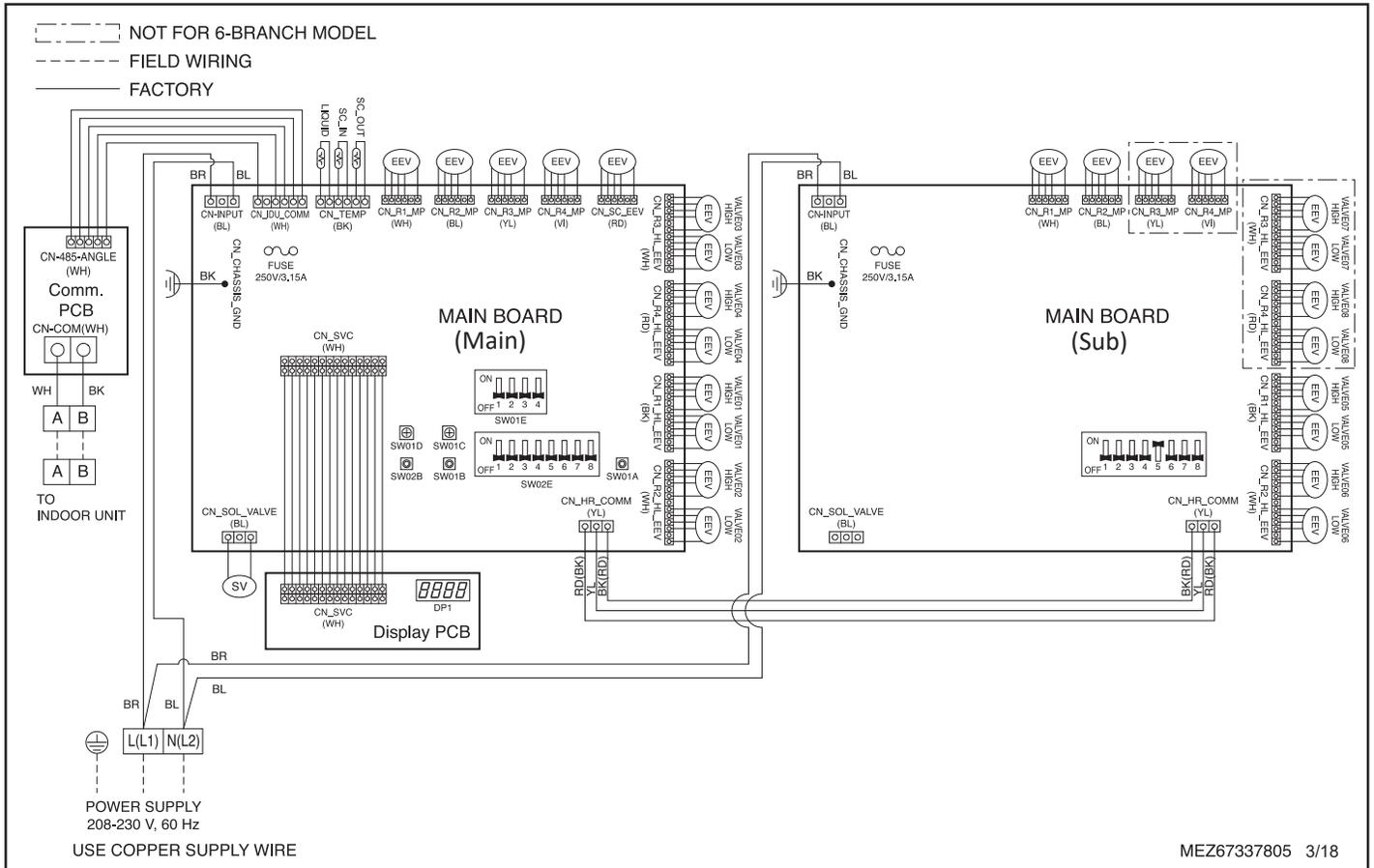
Description	Purpose	Function
<i>Terminals</i>		
CN-INPUT (BL)	Power Input	Power Supply Input
CN_IDU_COMM (WH)	Communication	Communication Connection Between Indoor Units and Heat Recovery Units
CN_TEMP (LIQUID) (BK)	Liquid Temperature Receiver Sensor	Liquid Temperature Sensor
CN_TEMP (SC_IN) (BK)	Subcooling Inlet Sensor	Subcooling Inlet Sensor
CN_TEMP (SC_OUT) (BK)	Subcooling Outlet Sensor	Subcooling Outlet Sensor
CN_R1_MP (WH)	EEV 01	EEV 01 (Bypass for Room or Zone 1)
CN_R2_MP (BL)	EEV 02	EEV 02 (Bypass for Room or Zone 2)
CN_R3_MP (YL)	EEV 03	EEV 03 (Bypass for Room or Zone 3)
CN_R4_MP (VI)	EEV 04	EEV 04 (Bypass for Room or Zone 4)
CN_SC_EEV (RD)	Subcooling EEV	Subcooling EEV
CN_R3_HL_EEV (WH)	Low / High EEV 03	Low / High EEV 03 for Room or Zone 3
CN_R4_HL_EEV (RD)	Low / High EEV 04	Low / High EEV 04 for Room or Zone 4
CN_R1_HL_EEV (BK)	Low / High EEV 01	Low / High EEV 01 for Room or Zone 1
CN_R2_HL_EEV (WH)	Low / High EEV 02	Low / High EEV 02 for Room or Zone 2
CN_SVC (WH)	Display	For Display PCB
CN_SOL_VALVE (BL)	Solenoid Valve Bypass 01	Solenoid Valve Bypass 01
CN_CHASSIS_GND (BK)	Ground Terminal	Ground Terminal for Heat Recovery Unit Chassis
<i>DIP Switch Banks</i>		
SW01E	EEV or Zone Address Setting	Sets EEV Number When Using Manual Addressing; Sets Time of Zoning Address When Using Automatic Addressing
SW02E (No. 1)	Address Method	Selects Automatic or Manual Addressing Procedure
SW02E (Nos. 2 through 4)	Setting for Number of Indoor Units	Setting for Total Number of Indoor Units Connected
SW02E (No. 5)	Sub PCB Setting	Sets Sub PCB
SW02E (No. 6)	EEPROM Reset	Resets EEPROM to Save Settings
SW02E (Nos. 7 and 8)	Mode Setting (Zoning, etc.)	Sets the Mode (Zoning, etc.)
<i>Rotary Dials and Tact Switches</i>		
SW01B	Indoor Address Setting (Increase by One)	Increases the Indoor Address by One When Using the Manual Addressing Procedure
SW01C	Heat Recovery Unit Number Setting; EEV Zoning Number Setting	Sets the Heat Recovery Unit Number; Sets the EEV Zoning Number When Using the Manual Addressing Procedure
SW01D	EEV Group Setting	Sets the EEV Group
SW02B	Indoor Address Setting (Increase by Ten)	Increases the Indoor Address by Ten When Using the Manual Addressing Procedure

WIRING DIAGRAM

PRHR063A, PRHR083A



Figure 24: PRHR063A and PRHR083A Wiring Diagram.



MEZ67337805 3/18

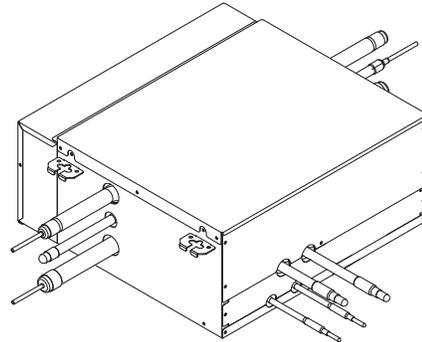
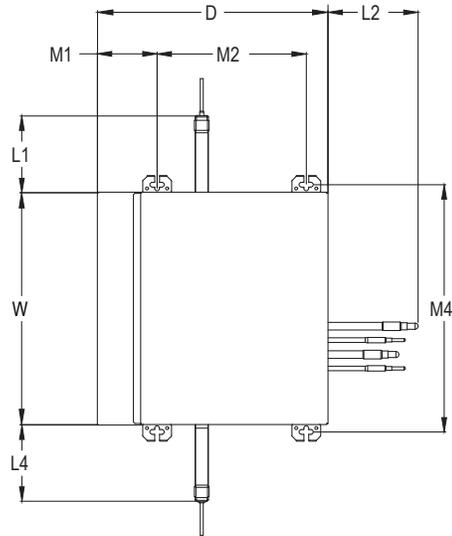
MULTI V Water 5 Water Source Unit Engineering Manual

Table 20: PRHR063A and PRHR083A Wiring Diagram Legend.

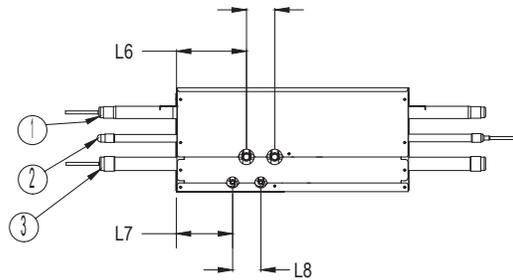
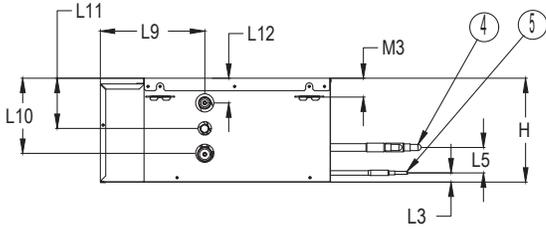
Description	Purpose	Function
Main PCB Terminals		
CN-INPUT (BL)	Power Input	Power Supply Input
CN_IDU_COMM (WH)	Communication	Communication Connection Between Indoor Units and Heat Recovery Units
CN_TEMP (LIQUID) (BK)	Liquid Temperature Receiver Sensor	Liquid Temperature Sensor
CN_TEMP (SC_IN) (BK)	Subcooling Inlet Sensor	Subcooling Inlet Sensor
CN_TEMP (SC_OUT) (BK)	Subcooling Outlet Sensor	Subcooling Outlet Sensor
CN_R1_MP (WH)	EEV 01	EEV 01 (Bypass for Room or Zone 1)
CN_R2_MP (BL)	EEV 02	EEV 02 (Bypass for Room or Zone 2)
CN_R3_MP (YL)	EEV 03	EEV 03 (Bypass for Room or Zone 3)
CN_R4_MP (VI)	EEV 04	EEV 04 (Bypass for Room or Zone 4)
CN_SC_EEV (RD)	Subcooling EEV	Subcooling EEV
CN_R3_HL_EEV (WH)	Low / High EEV 03	Low / High EEV 03 for Room or Zone 3
CN_R4_HL_EEV (RD)	Low / High EEV 04	Low / High EEV 04 for Room or Zone 4
CN_R1_HL_EEV (BK)	Low / High EEV 01	Low / High EEV 01 for Room or Zone 1
CN_R2_HL_EEV (WH)	Low / High EEV 02	Low / High EEV 02 for Room or Zone 2
CN_HR_COMM (YL)	Main and Sub PCB Communication	Communication Connection Between Heat Recovery Unit Main and Sub PCBs
CN_SVC (WH)	Display	For Display PCB
CN_SOL_VALVE (BL)	Solenoid Valve Bypass 01	Solenoid Valve Bypass 01
CN_CHASSIS_GND (BK)	Ground Terminal	Ground Terminal for Heat Recovery Unit Chassis
Sub PCB Terminals		
CN-INPUT (BL)	Power Input	Power Supply Input
CN_R1_MP (WH)	EEV 05	EEV 05 (Bypass for Room or Zone 5)
CN_R2_MP (BL)	EEV 06	EEV 06 (Bypass for Room or Zone 6)
CN_R3_MP (YL)	EEV 07	EEV 07 (Bypass for Room or Zone 7)
CN_R4_MP (VI)	EEV 08	EEV 08 (Bypass for Room or Zone 8)
CN_R3_HL_EEV (WH)	Low / High EEV 07	Low / High EEV 07 for Room or Zone 7
CN_R4_HL_EEV (RD)	Low / High EEV 08	Low / High EEV 04 for Room or Zone 8
CN_R1_HL_EEV (BK)	Low / High EEV 05	Low / High EEV 05 for Room or Zone 5
CN_R2_HL_EEV (WH)	Low / High EEV 06	Low / High EEV 02 for Room or Zone 6
CN_HR_COMM (YL)	Main and Sub PCB Communication	Communication Connection Between Heat Recovery Unit Main and Sub PCBs
CN_SOL_VALVE (BL)	N/A	N/A
CN_CHASSIS_GND (BK)	Ground Terminal	Ground Terminal for Heat Recovery Unit Chassis
Main PCB DIP Switch Banks		
SW01E	EEV or Zone Address Setting	Sets EEV Number When Using Manual Addressing; Sets Time of Zoning Address When Using Automatic Addressing
SW02E (No. 1)	Address Method	Selects Automatic or Manual Addressing Procedure
SW02E (Nos. 2 through 4)	Setting for Number of Indoor Units	Setting for Total Number of Indoor Units Connected
SW02E (No. 5)	Sub PCB Setting	Sets Sub PCB
SW02E (No. 6)	EEPROM Reset	Resets EEPROM to Save Settings
SW02E (Nos. 7 and 8)	Mode Setting (Zoning, etc.)	Sets the Mode (Zoning, etc.)
Main PCB Buttons		
SW01B	Indoor Address Setting (Increase by One)	Increases the Indoor Address by One When Using the Manual Addressing Procedure
SW01C	Heat Recovery Unit Number Setting; EEV Zoning Number Setting	Sets the Heat Recovery Unit Number; Sets the EEV Zoning Number When Using the Manual Addressing Procedure
SW01D	EEV Group Setting	Sets the EEV Group
SW02B	Indoor Address Setting (Increase by Ten)	Increases the Indoor Address by Ten When Using the Manual Addressing Procedure

EXTERNAL DIMENSIONS

PRHR023A



Strainers are factory installed on the indoor unit vapor piping.



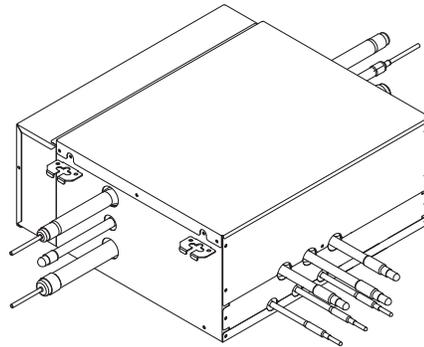
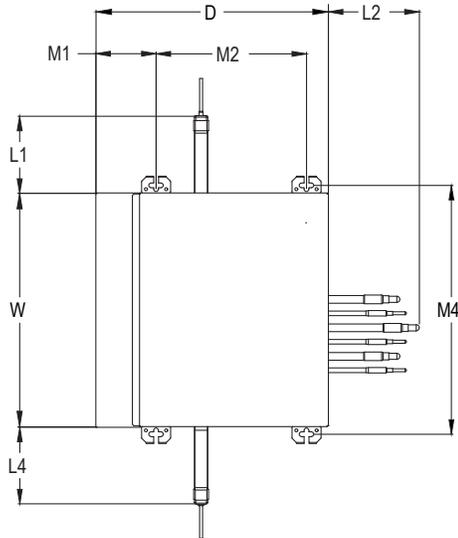
W	19-1/8"
H	8-5/8"
D	18-15/16"
L1	5-15/16"
L2	6-15/16"
L3	3/4"
L4	5-15/16"
L5	2-3/16"
L6	5-3/4"
L7	4-9/16"
L8	2-5/16"
L9	8-9/16"
L10	6-3/16"
L11	3-9/16"
L12	2"
M1	4-15/16"
M2	12-1/4"
M3	1-1/2"
M4	20-3/8"

[Unit: inch]

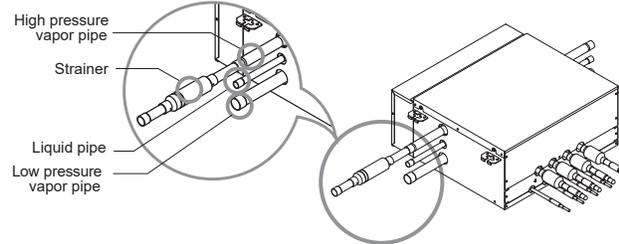
Note:

1. Unit should be installed in compliance with the appropriate LG installation manual.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials supplied from the site must comply with the local regulations or national codes.

6	Control box
5	Liquid pipe to Indoor unit
4	Vapor pipe to Indoor unit
3	Low pressure vapor pipe
2	Liquid pipe to Outdoor unit
1	High pressure vapor pipe
No.	Part Name

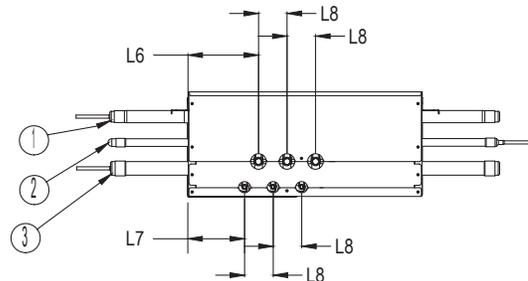
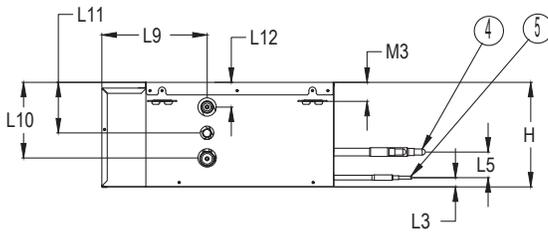


– Connect the strainer that is provided as an accessory to the HRU high pressure vapor pipe.
– Strainers are factory installed on the indoor unit vapor piping.



W	19-1/8"
H	8-5/8"
D	18-15/16"
L1	5-15/16"
L2	6-15/16"
L3	3/4"
L4	5-15/16"
L5	2-3/16"
L6	5-3/4"
L7	4-9/16"
L8	2-5/16"
L9	8-9/16"
L10	6-3/16"
L11	3-9/16"
L12	2"
M1	4-15/16"
M2	12-1/4"
M3	1-1/2"
M4	20-3/8"

[Unit: inch]



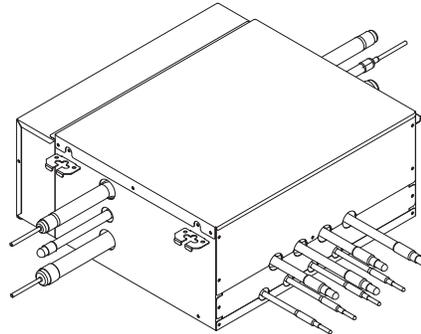
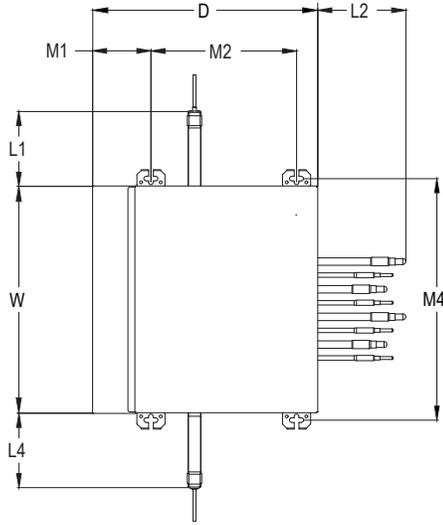
Note:

1. Unit should be installed in compliance with the appropriate LG installation manual.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials supplied from the site must comply with the local regulations or national codes.

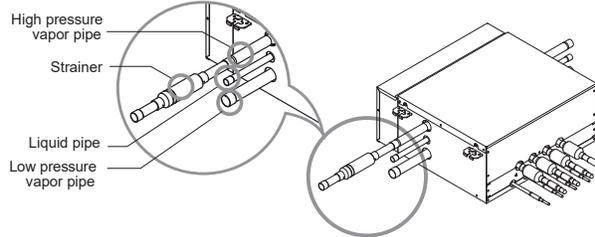
6	Control box
5	Liquid pipe to Indoor unit
4	Vapor pipe to Indoor unit
3	Low pressure vapor pipe
2	Liquid pipe to Outdoor unit
1	High pressure vapor pipe
No.	Part Name

EXTERNAL DIMENSIONS

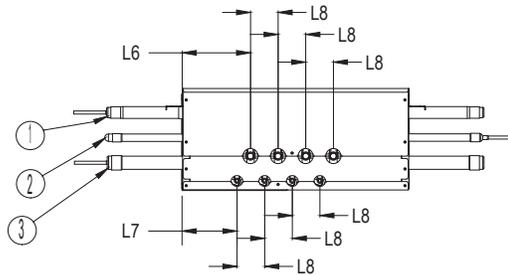
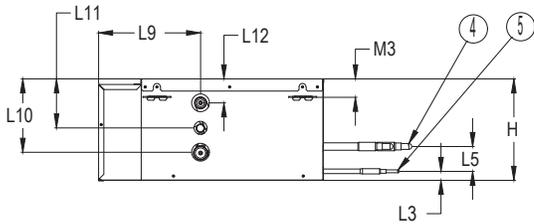
PRHR043A



- Connect the strainer that is provided as an accessory to the HRU high pressure vapor pipe.
- Strainers are factory installed on the indoor unit vapor piping.



W	19-1/8"
H	8-5/8"
D	18-15/16"
L1	5-15/16"
L2	6-15/16"
L3	3/4"
L4	5-15/16"
L5	2-3/16"
L6	5-3/4"
L7	4-9/16"
L8	2-5/16"
L9	8-9/16"
L10	6-3/16"
L11	3-9/16"
L12	2"
M1	4-15/16"
M2	12-1/4"
M3	1-1/2"
M4	20-3/8"

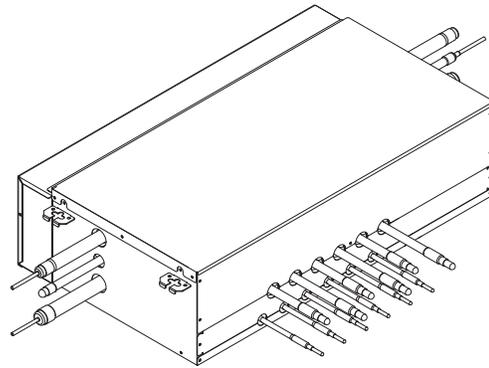
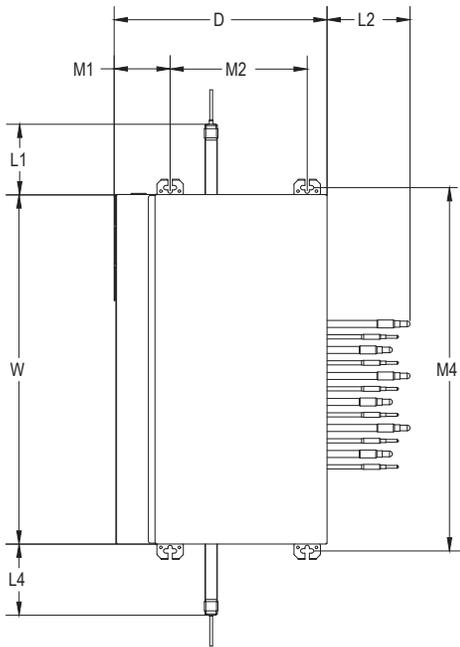


[Unit: inch]

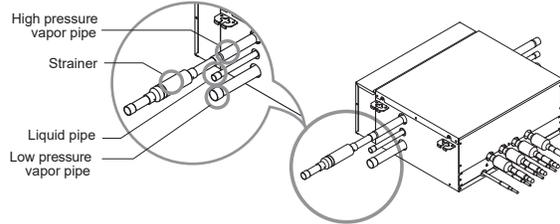
Note:

1. Unit should be installed in compliance with the appropriate LG installation manual.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials supplied from the site must comply with the local regulations or national codes.

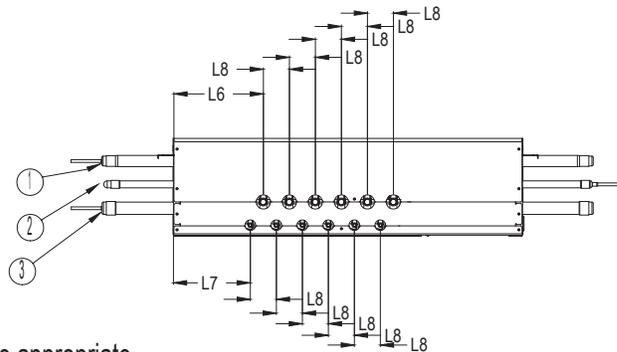
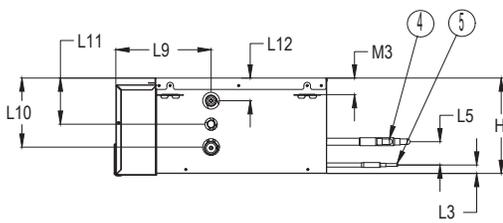
6	Control box
5	Liquid pipe to Indoor unit
4	Vapor pipe to Indoor unit
3	Low pressure vapor pipe
2	Liquid pipe to Outdoor unit
1	High pressure vapor pipe
No.	Part Name



– Connect the strainer that is provided as an accessory to the HRU high pressure vapor pipe.
– Strainers are factory installed on the indoor unit vapor piping.



W	31-1/4"
H	8-5/8"
D	18-15/16"
L1	6-5/16"
L2	6-15/16"
L3	3/4"
L4	6-5/16"
L5	2-3/16"
L6	8-1/16"
L7	6-7/8"
L8	2-5/16"
L9	8-9/16"
L10	6-3/16"
L11	3-9/16"
L12	2"
M1	4-15/16"
M2	12-1/4"
M3	1-1/2"
M4	32-1/2"



[Unit: inch]

Note:

1. Unit should be installed in compliance with the appropriate LG installation manual.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials supplied from the site must comply with the local regulations or national codes.

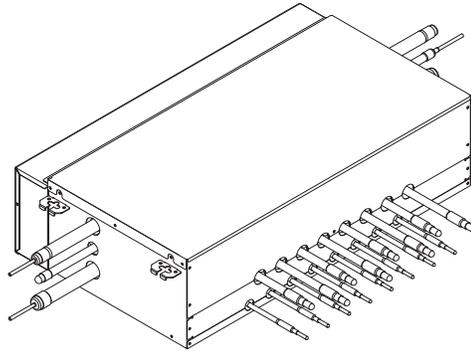
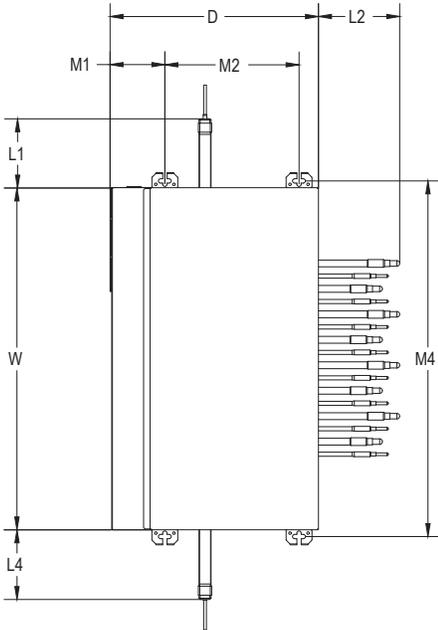
6	Control box
5	Liquid pipe to Indoor unit
4	Vapor pipe to Indoor unit
3	Low pressure vapor pipe
2	Liquid pipe to Outdoor unit
1	High pressure vapor pipe
No.	Part Name

EXTERNAL DIMENSIONS

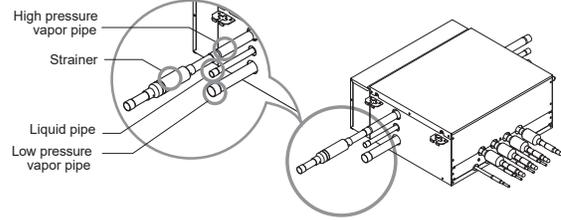
PRHR083A



MULTI V Water 5 Water Source Unit Engineering Manual

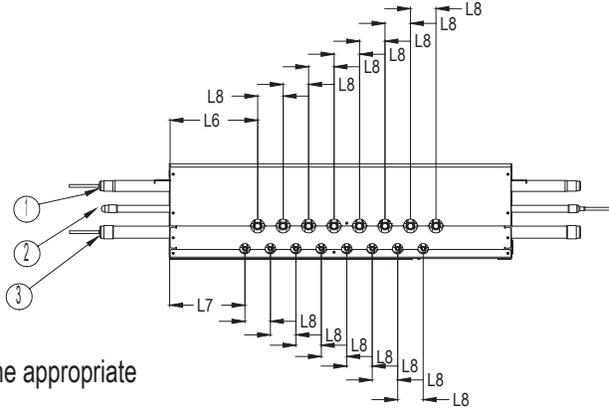
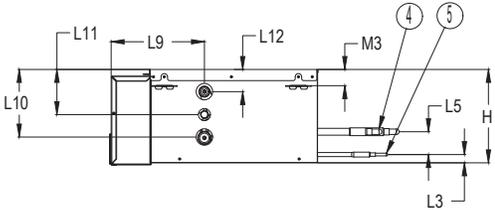


- Connect the strainer that is provided as an accessory to the HRU high pressure vapor pipe.
 - Strainers are factory installed on the indoor unit vapor piping.



W	31-1/4"
H	8-5/8"
D	18-15/16"
L1	6-5/16"
L2	6-15/16"
L3	3/4"
L4	6-5/16"
L5	2-3/16"
L6	8-1/16"
L7	6-7/8"
L8	2-5/16"
L9	8-9/16"
L10	6-3/16"
L11	3-9/16"
L12	2"
M1	4-15/16"
M2	12-1/4"
M3	1-1/2"
M4	32-1/2"

[Unit: inch]



Note:

1. Unit should be installed in compliance with the appropriate LG installation manual.
2. Unit should be grounded in accordance with the local regulations or applicable national codes.
3. All electrical components and materials supplied from the site must comply with the local regulations or national codes.

6	Control box
5	Liquid pipe to Indoor unit
4	Vapor pipe to Indoor unit
3	Low pressure vapor pipe
2	Liquid pipe to Outdoor unit
1	High pressure vapor pipe
No.	Part Name

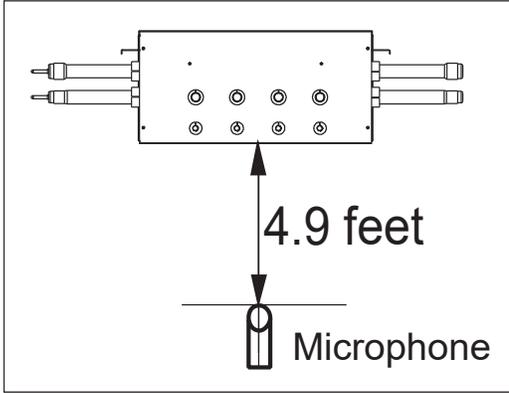


ACOUSTIC DATA

Sound Pressure Levels



Figure 26: Sound Pressure Measurement Location.



- Measurements are taken 4.9 ft. away from the center of the unit.
- Sound level will vary depending on a range of factors including the construction (acoustic absorption coefficient) of a particular room in which the unit was installed.
- Sound pressure levels are measured in dB(A) with a tolerance of ± 3 .
- Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745.

Operating Conditions:

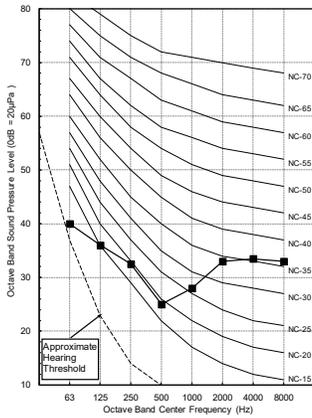
- Power source: 220V 60Hz
- Reference acoustic pressure: 0dB = 20 μ Pa.
- Cooling: Indoor Temperature 80.6°F D.B., 66.2°F W.B., Outdoor Temperature 95°F D.B., 75.2°F W.B.
- Heating: Indoor Temperature 68°F D.B., 59°F W.B., Outdoor Temperature 44.6°F D.B., 42.8°F W.B.

Table 21: PRHR**3A Sound Pressure Levels.

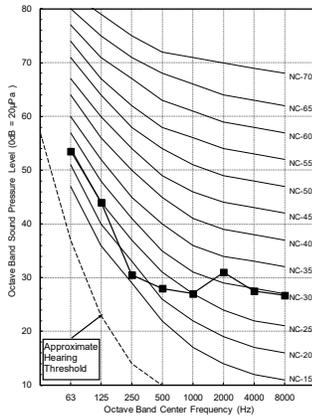
Operation Mode	Sound Pressure Levels dB(A)
Cooling	31
Heating	31
Simultaneous	38
Changeover From Cooling to Heating	33
Changeover From Heating to Cooling	38

Figure 25: PRHR**3A Sound Pressure Level Diagrams.

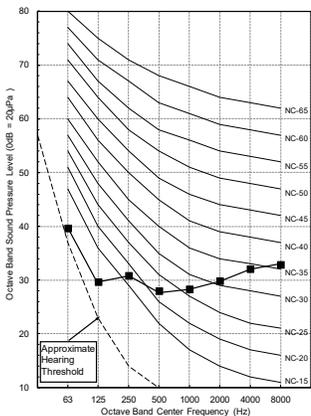
Cooling



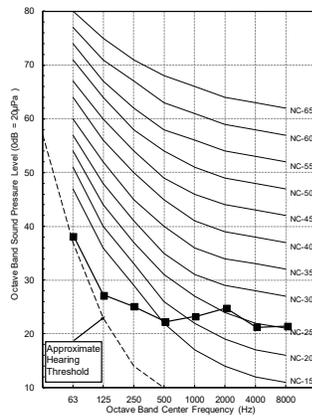
Heating



Changeover from Cooling to Heating



Changeover, from Heating to Cooling



Combining Heat Recovery Ports for Large Indoor Units

It is necessary to combine two ports on a system designed for heat recovery operation when installing a single indoor unit with a capacity exceeding 60,000 Btu/h. Two neighboring heat recovery ports are combined using a reverse Y-branch that is then connected to the one large indoor unit (Kit sold separately).

Table 22: Y-Branch for Twinning Large Indoor Units.

Unit: Inch

Kit Model No.	Vapor Pipe Dimensions	Liquid Pipe Dimensions
ARBLN03321		

Reducers

It may be necessary to install a reducer if the indoor unit piping or outdoor unit piping is too large or too small for the heat recovery unit connections.

Table 23: Reducers for Heat Recovery Units.

Unit: Inches (mm)

Model	Liquid Piping	Vapor Piping	
		High Pressure	Low Pressure
Heat Recovery Unit Reducer			
PRHR033A PRHR043A PRHR063A PRHR083A			

Heat Recovery Unit Product Data

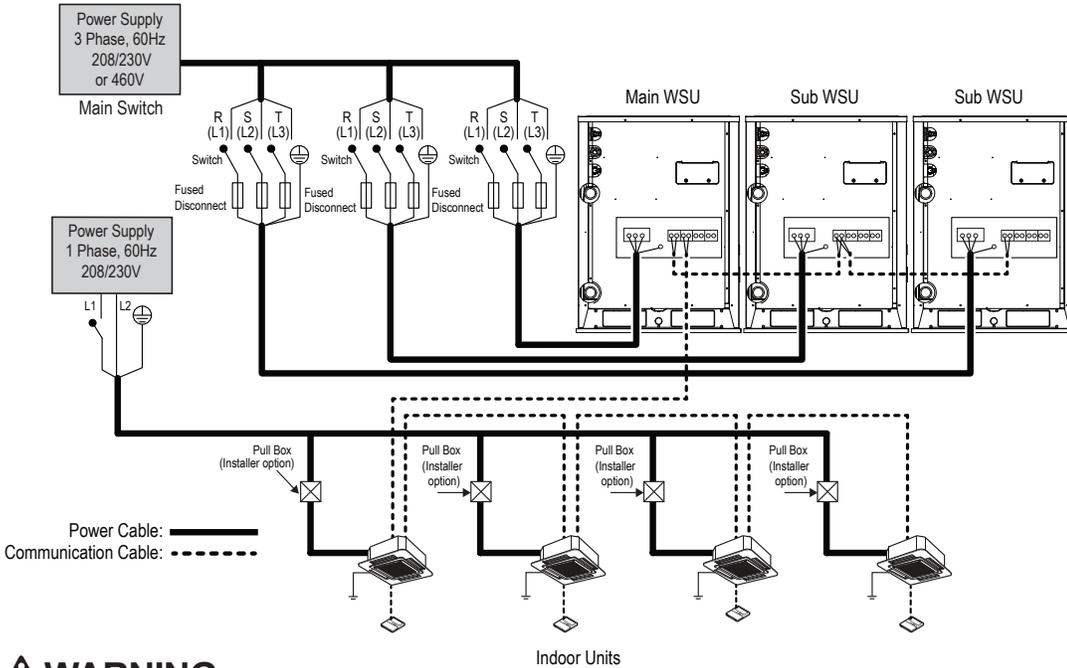
ELECTRICAL CONNECTIONS

System for Heat Pump Operation on page 79

System for Heat Recovery Operation on page 80

**DIP Switch Settings For Use With Gen 4 Indoor Units on
page 81**

Figure 8: Example of a Typical Heat Pump Operation Power Wiring and Communications Cable Schematic.



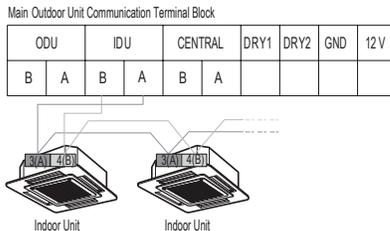
⚠ WARNING

- Ground wiring is required to prevent accidental electrical shock during current leakage, communication problems from electrical noise, and motor current leakage. ⚡ Do not connect the ground line to the pipes. There is risk of fire, electric shock, explosion, physical injury or death.
- Install a main shutoff switch that interrupts all power sources simultaneously. There is risk of fire, electric shock, explosion, physical injury or death.
- Communication cable between Main ODU to Sub ODU(s), and Main ODU to IDUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Main ODU chassis only. ⚡ Do not ground the ODU to IDUs communication cable at any other point. Wiring must comply with all applicable local and national codes. Inadequate connections may generate heat, cause a fire, and physical injury or death.
- The GND terminal at the main PCB is a negative terminal for dry contact, not a ground. Inadequate connections may generate heat, cause a fire, and physical injury or death.

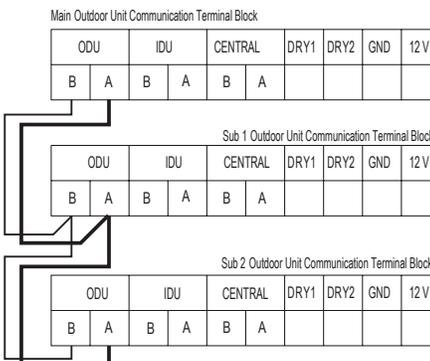
Figure 9: Close-up of Heat Pump Operation Communications Cable Schematic.

Heat Pump Operation

Communications Cable Between Main Outdoor Unit and Indoor Unit



Communications Cable Between Main Outdoor Unit and Sub Outdoor Unit(s)

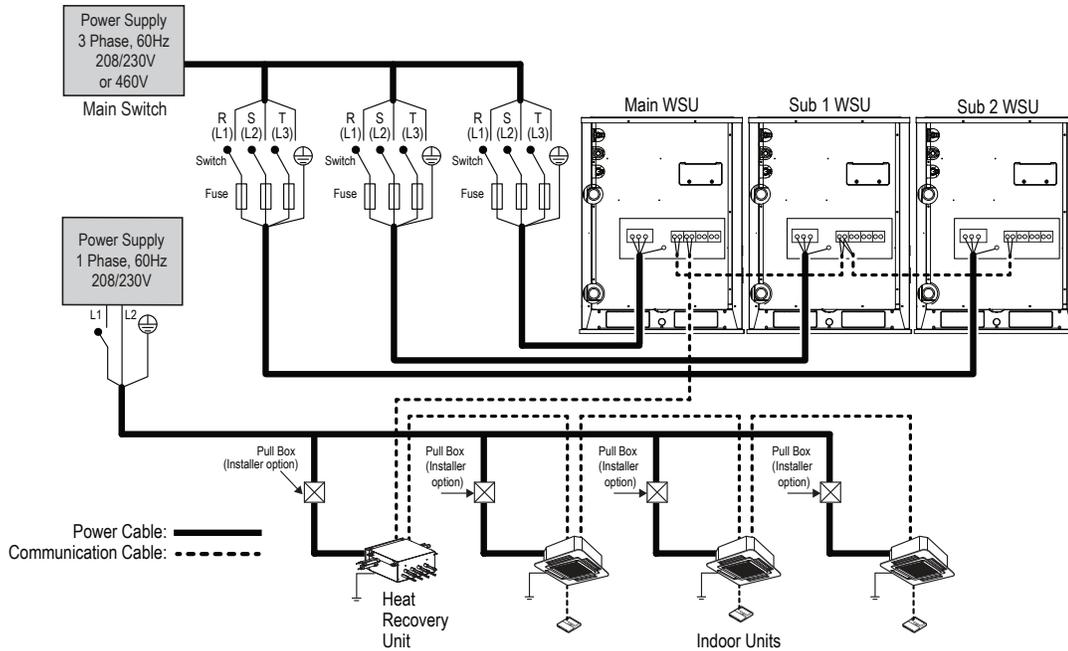


Note:

- Make sure that the terminal numbers of main water source unit and sub water source unit(s) match (A to A, B to B). The system will malfunction if not properly wired.
- Maintain polarity throughout the communication network. The system will malfunction if not properly wired.
- If the system operates in reversed phase, it may break the compressors and other components.
- If there is a possibility of reversed phase, phase loss, momentary blackout, or the power goes on and off while the system is operating, install a field-supplied phase loss protection circuit. Operating the system in reverse phase may break the compressor and other unit components.

SYSTEM FOR HEAT RECOVERY OPERATION, 208-230V AND 460V

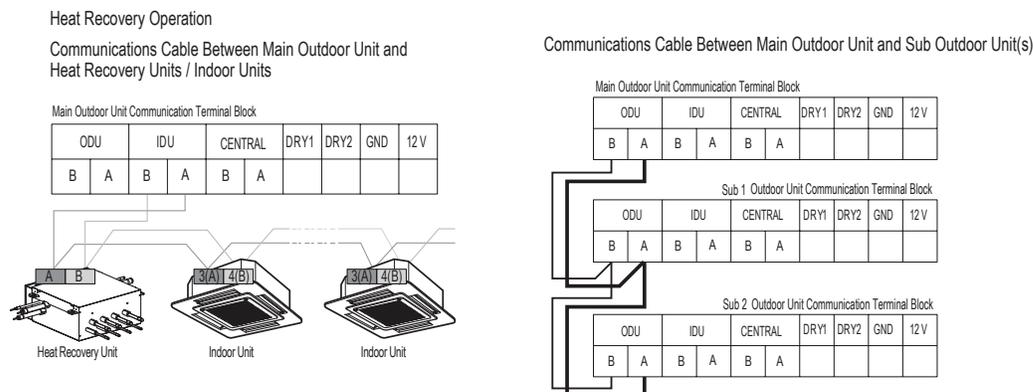
Figure 10: Example of a Typical Heat Recovery Operation Power Wiring and Communications Cable Schematic.



⚠ WARNING

- Ground wiring is required to prevent accidental electrical shock during current leakage, communication problems from electrical noise, and motor current leakage. ⚡ Do not connect the ground line to the pipes. There is risk of fire, electric shock, explosion, physical injury or death.
- Install a main shutoff switch that interrupts all power sources simultaneously. There is risk of fire, electric shock, explosion, physical injury or death.
- Communication cable between Main ODU to Sub ODU(s), and Main ODU to IDUs / HRUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Main ODU chassis only. ⚡ Do not ground the ODU to IDUs / HRUs communication cable at any other point. Wiring must comply with all applicable local and national codes. Inadequate connections may generate heat, cause a fire, and physical injury or death.
- The GND terminal at the main PCB is a negative terminal for dry contact, not a ground. Inadequate connections may generate heat, cause a fire, and physical injury or death.

Figure 11: Close-up of Heat Recovery Operation Communications Cable Schematic.



Note:

- Make sure that the terminal numbers of main water source unit and sub water source unit(s) match (A to A, B to B). The system will malfunction if not properly wired.
- Maintain polarity throughout the communication network. The system will malfunction if not properly wired.
- If the system operates in reversed phase, it may break the compressors and other components.
- If there is a possibility of reversed phase, phase loss, momentary blackout, or the power goes on and off while the system is operating, install a field-supplied phase loss protection circuit. Operating the system in reverse phase may break the compressor and other unit components.

PRHR*3 Heat Recovery Units

The PRHR*3A series of Heat Recovery units were released in June 2018, are not automatically backwards compatible with all LG manufactured VRF air / water source units. The 3A series of Heat Recovery units will be compatible with many LG manufactured air / water source units if the “Starting Production Date”, the “Production Starting Serial No.,” and / or the “Upgrade Software Service” dates fall after the dates shown below (see table).

LG VRF systems can operate with both old 2A Heat Recovery units and new 3A Heat Recovery units, if the outdoor unit software has been upgraded. If a system includes a mix of both old and new Heat Recovery units, the system design must follow 2A Heat Recovery unit series piping rules.

Table 19: PRHR*3 Heat Recovery Unit to Air / Water Source Unit Compatibility.

Air / Water Source Units	Model	Starting Production Date	Production Starting Serial No.	Upgrade Software Service
Multi V 5 with LGRED ^o *	ARUM****TE5	February 1, 2019	1902xxx	N/A
Multi V 5	ARUM****TE5	February 1, 2018	1802xxx	September 28, 2018
Multi V S	ARUB060GSS4	October 1, 2018	1810xxx	September 28, 2018
Multi V Water IV	ARWB****AS4	October 1, 2018	1810xxx	September 28, 2018
Multi V IV	ARUB****TE4	N/A	N/A	October 31, 2018
Multi V II and III	ARUB****TE2 ARUB****TE3	N/A	N/A	N/A
Multi V Water II	ARWB****A2	N/A	N/A	N/A

*Low ambient performance with LGRED^o heat technology is included in Multi V 5 air source units produced after February 1, 2019.

Generation 4 Equipment

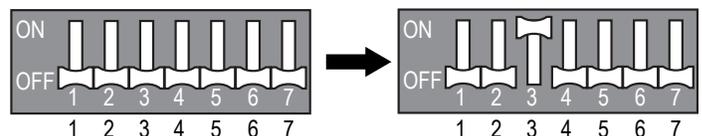
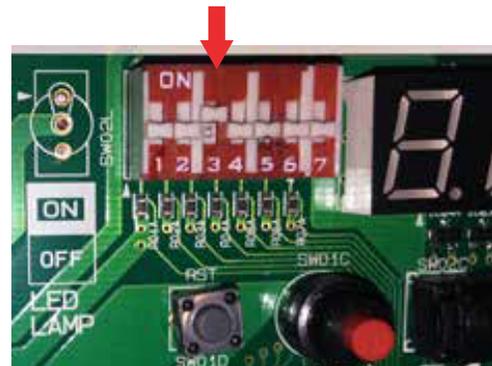
LG’s indoor units are designated Generation 4 (Gen 4). For Gen 4 indoor units to operate with Gen 4 indoor unit features, the air conditioning system must meet the following requirements:

- All indoor units, heat recovery units, and air / water source units must be Gen 4 or higher.
- All air / water source units must have Gen 4 or higher software installed.
- Air / water source units DIP switch 3 must be set to ON (factory default setting is OFF).
- All controllers must support Gen 4 indoor unit features.

The figure at right shows the outdoor unit DIP switch. All air and water source units, indoor units, heat recovery units, and controllers in a system must be Gen 4 compatible or the system will not operate with Gen 4 indoor unit features.

Figure 12: Location and Setting of Outdoor Unit DIP Switch 3.

ODU/WSU DIP Switch No. 3



WATER LOOP CIRCUIT DESIGN

Refer to the Multi V Water 5 Installation Manual for details on Water Loop Circuit Design and Water Circuit Installation.

PIPING LIMITATIONS AND PLACEMENT CONSIDERATIONS

Piping Limitations for systems designed for Heat Pump operation on page 84

Piping Limitations for systems designed for Heat Recovery operation on page 89

WSU Capacity Correction Factors on page 95

Refrigerant Piping for Separated Water Source Units on page 99

Placement Considerations on page 101

Transporting/Lifting on page 102

Installation Considerations on page 103

Corner Weights on page 105

PIPING LIMITATIONS



For Systems Designed for Heat Pump Operation

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Figure 13: Typical Heat Pump System Building Layout with Piping Limitations.

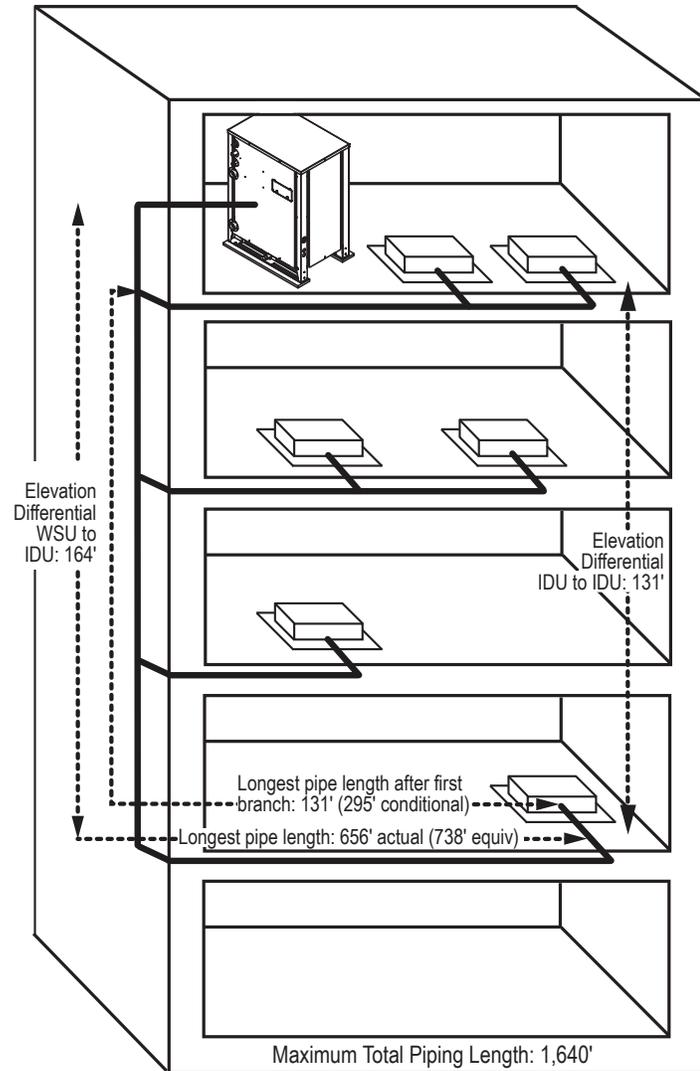


Table 20: Piping Limitations for Heat Pump Operation.

Length	Total pipe length	Longest actual pipe length	Equivalent pipe length ¹
		$A + \Sigma B + \Sigma C \leq 984$ ft. (Standard) / 1,640 ft. (Conditional Application)	492 ft. (Standard) / 656 ft. (Conditional Application)
ℓ	Longest pipe length after first branch		
	≤ 131 feet (295 feet conditional application)		
Elevation1	Elevation differential (Water Source Unit ↔ Indoor Unit)		
	Height ≤ 164 feet		
Elevation2	Elevation differential (Indoor Unit ↔ Indoor Unit)		
	Height ≤ 131 feet		
height1	Elevation differential ((Highest Water Source Unit ↔ Lowest Water Source Unit)		
	Height ≤ 16 feet		
Distance between Water Source Unit to Water Source Unit			≤ 33 feet
Distance between fittings and Indoor Unit			≥ 20 inches
Distance between fittings and Y-branches / Headers			≥ 20 inches
Distance between two Y-branches / Headers			≥ 20 inches

¹ Assume equivalent pipe length of Y-branch is 1.6 feet, and equivalent pipe length of header is 3.3 feet.

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Example of Pipe Sizing When Installing a Heat Pump System

Example: Five (5) indoor Units Connected

WSU: Water Source Unit

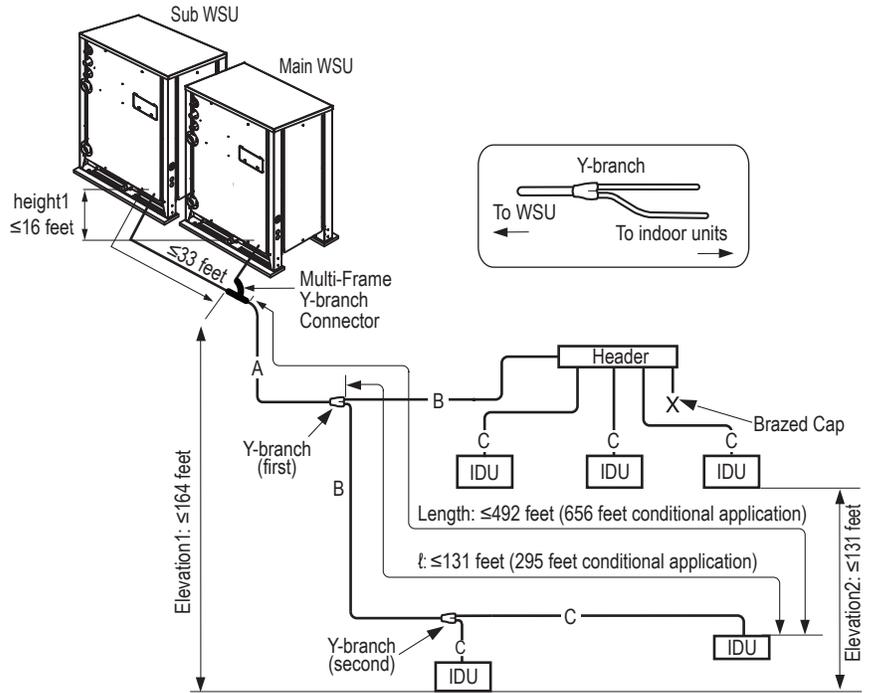
IDU: Indoor Unit

A: Main Pipe from Water Source Unit to First Y-branch

B: Y-branch to Y-branch / Header

C: Y-branch / Header to Indoor Unit

Figure 14: Sample pipe sizing for Heat Pump System.



Note:

- Always reference the LATS Multi V software report.
- The largest capacity unit must be the main unit in a multi-frame system.
- Main water source unit capacity must be greater than or equal to the sub water source unit capacity.
- Connection piping from branch to branch cannot exceed the main pipe diameter (A) used by the water source unit.
- Install the header branches so that the pipe distances between the connected indoor units are minimized. Large differences in pipe distances can cause indoor unit performances to fluctuate.
- ⊗ Y-branches and other header branches cannot be installed downstream of the initial header branch.

Table 21: Main Pipe (A) Diameter from Water Source Unit to First Y-branch / Header Branch.

WSU Capacity (tons)	Equivalent pipe length from WSU to farthest IDU is <295 ft.		Equivalent pipe length from WSU to farthest IDU is ≥295 ft.	
	Liquid pipe (inches OD)	Vapor pipe (inches OD)	Liquid pipe (inches OD)	Vapor pipe (inches OD)
6	3/8	5/8	1/2	3/4
8	3/8	3/4	1/2	7/8
10	1/2	3/4	5/8	7/8
12	1/2	7/8	5/8	1-1/8
14	5/8	7/8	3/4	1-1/8
16	5/8	1-1/8	3/4	1-3/8
18	5/8	1-1/8	3/4	1-3/8
20	5/8	1-1/8	3/4	1-3/8
22	3/4	1-1/8	7/8	1-3/8
24	3/4	1-1/8	7/8	1-3/8
30	3/4	1-1/8	7/8	1-3/8
36	3/4	1-1/8	7/8	1-3/8
42	3/4	1-1/8	7/8	1-3/8
48	3/4	1-3/8	7/8	1-5/8

PIPING LIMITATIONS



For Systems Designed for Heat Pump Operation

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Table 22: Refrigerant Pipe Diameter (B) from Y-branch to Y-branch / Header.

Downstream Total Capacity of IDUs (Btu/h) ¹	Liquid pipe (inches OD)	Vapor pipe (inches OD)
≤19,100	1/4	1/2
≤54,600	3/8	5/8
≤76,400	3/8	3/4
≤112,600	3/8	7/8
≤160,400	1/2	1-1/8
≤242,300	5/8	1-1/8
≤354,900	3/4	1-3/8
>354,900	3/4	1-5/8

¹For the first branch pipe, use the branch pipe that matches main pipe A diameter.

Table 23: Indoor Unit Connecting Pipe from Branch (C).

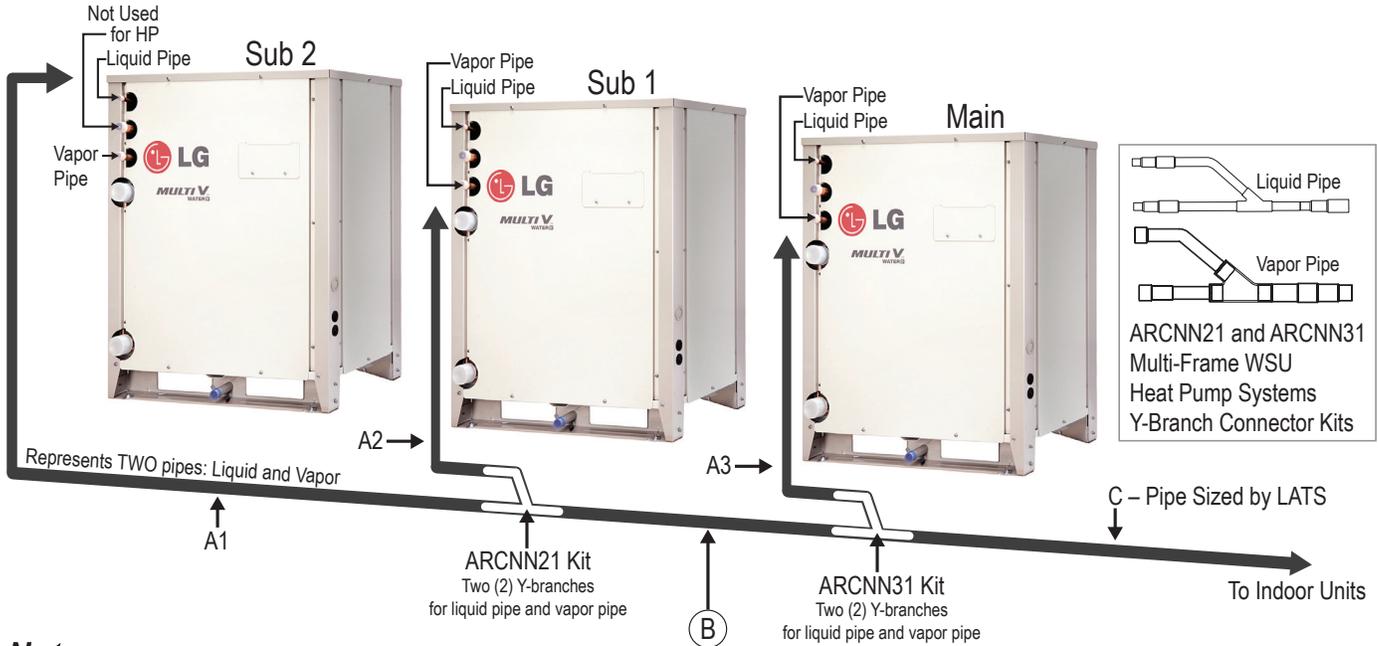
Indoor Unit Capacity ¹	Liquid pipe (inches OD)	Vapor pipe (inches OD)
≤19,100	1/4	1/2
≤54,600	3/8	5/8
≤76,400	3/8	3/4

¹9,600-24,200 Btu/h 4-way 3 feet x 3 feet Cassette and 15,400-24,200 Btu/h High Static Ducted indoor units have 3/8 in (liquid) and 5/8 in (vapor).

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Triple-Frame Heat Pump Water Source Unit Connections

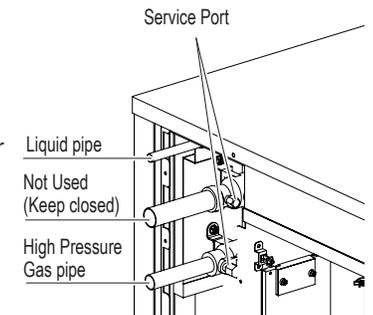
Figure 15: Heat Pump Triple-Frame Connections.



Note:

- A1, A2, and A3 diameters match the water source unit connection diameters. Main pipe C diameters are sized by LATS.
- For single and dual-frame systems, the pipe size is the same size as the frame connections.
- Always reference the LATS Multi V software report.
- The largest capacity water source unit must be the main unit in a multi-frame system.
- Main water source unit capacity must be greater than or equal to the sub1 water source unit capacity, and, where applicable, sub1 water source unit capacity must be greater than or equal to the sub2 water source unit capacity.
- Connection piping from branch to branch cannot exceed the main pipe diameter (A) used by the water source unit.
- Install the header branches so that the pipe distances between the connected indoor units are minimized. Large differences in pipe distances can cause indoor unit performances to fluctuate.
- Y-branches and other header branches cannot be installed downstream of the initial header branch.
- Outdoor unit Y-branches can only be installed in a horizontal or vertical UP configuration. The vertical DOWN configuration is not permitted.

Figure 16: Heat Pump Pipes and Service Ports.



Heat Pump Triple-Frame Connection Pipe Sizes

Table 24: Triple-Frame Connection Pipe Sizes.

Size (tons)	Water Source Unit (WSU)	Voltage	Main Unit	Sub Unit 1	Sub Unit 2	B			
						Equivalent pipe length from WSU to farthest IDU is <295'		Equivalent pipe length from WSU to farthest IDU is ≥295'	
						Liquid	Vapor	Liquid	Vapor
30	ARWM360BAS5	208-230V	ARWM121BAS5	ARWM121BAS5	ARWM121BAS5	3/4"	1-3/8"	7/8"	1-5/8"
36	ARWM432BAS5	208-230V	ARWM144BAS5	ARWM144BAS5	ARWM144BAS5	3/4"	1-3/8"	7/8"	1-5/8"
36	ARWM432DAS5	460V	ARWM144DAS5	ARWM144DAS5	ARWM144DAS5	3/4"	1-3/8"	7/8"	1-5/8"
42	ARWM504DAS5	460V	ARWM192DAS5	ARWM168DAS5	ARWM144DAS5	3/4"	1-3/8"	7/8"	1-5/8"
48	ARWM576DAS5	460V	ARWM192DAS5	ARWM192DAS5	ARWM192DAS5	3/4"	1-3/8"	7/8"	1-5/8"

Conditional Applications

Conditional applications are computed in LATS. See below for an explanation of when pipes are upsized.

If the equivalent length between the first Y-branch to the farthest indoor unit is >131 feet (up to 295 feet maximum):

- Pipe segment diameters between the first Y-branch and the second Y-branch must be sized up by one. This applies to both liquid and low pressure vapor pipes. If the next size up is not available, or if the piping segment diameters are the same as main pipe (A) diameters, sizing up is not possible.
- While calculating the entire refrigerant pipe length, pipe lengths for ΣB should be multiplied by two: $A+(\Sigma B \times 2)+\Sigma C \leq 3,280$ feet.
- Length of pipe (C) from each indoor unit to the closest Y-branch or header ≤ 131 ft.
- $[\text{Length of pipe from water source unit to farthest indoor unit (A+B+C)}] - [\text{Length of pipe from water source unit to closest indoor unit (A+B+C)}] \leq 131$ feet.
- When an indoor unit is directly connected after the 1st branch. When installing the pipe of an Indoor unit directly connected after the 1st branch that is between 131 ft and 295 ft.,
 - Pipe diameter must be sized up by one.
 - This pipe length must be multiplied by two: $A+(\Sigma B \times 2)+C(1)+\Sigma C \leq 3,280$ feet.

If the pipe (B) diameters after the first branch are bigger than the main pipe (A) diameters, pipe (B) should be changed to match main pipe (A) sizes. If one (or both) of the conditions below are met, the main pipe must be upsized.

- The equivalent length between outdoor unit and the farthest indoor unit is 295 ft. or more (liquid and gas pipes are upsized).
- The elevation distance between outdoor unit and indoor unit is 164 ft. or more (only the liquid pipe is upsized).

Refer to Table 21: Main Pipe (A) Diameter from Water Source Unit to First Y-branch / Header Branch”.

Example: When an indoor unit combination ratio of 120% is connected to a 22-ton water source unit:

Water source unit main pipe (A) diameters: 1-3/8Ø inches (vapor) and 5/8Ø inches (liquid).

1. Pipe (B) diameters: 1-3/8Ø (vapor) and 3/4Ø (liquid) (after the first branch, when indoor unit combination ratio is 120% [26 tons]).
2. After the first branch, pipe (B) diameters must be changed to 1-3/8Ø inches (vapor) and 5/8Ø inches (liquid) to match main pipe (A) sizes.

Instead of using the total indoor unit capacity to choose main pipe (A) diameters, use water source unit capacity to choose downstream main pipe (A) diameters. Do not permit connection pipes (B) from branch to branch to exceed main pipe (A) diameters as indicated by water source unit capacity. Example: When an indoor unit combination ratio of 120% is connected to a 20-ton water source unit (24 tons), and indoor unit with a 7,000 Btu/h capacity is located at the first branch:

1. Main pipe (A) diameters on a 20-ton water source unit: 1-1/8Ø inches (vapor) and 5/8Ø inches (liquid).
2. Pipe diameters between first and second branches, however, are: 1-3/8Ø (vapor) and 3/4Ø (liquid) (connected downstream indoor unit capacity is 20 tons).
3. If main pipe (A) diameters of a 20-ton water source unit are 1-1/8Ø (vapor) and 5/8Ø (liquid), then the pipe diameters between the first and second branches should be changed to match.

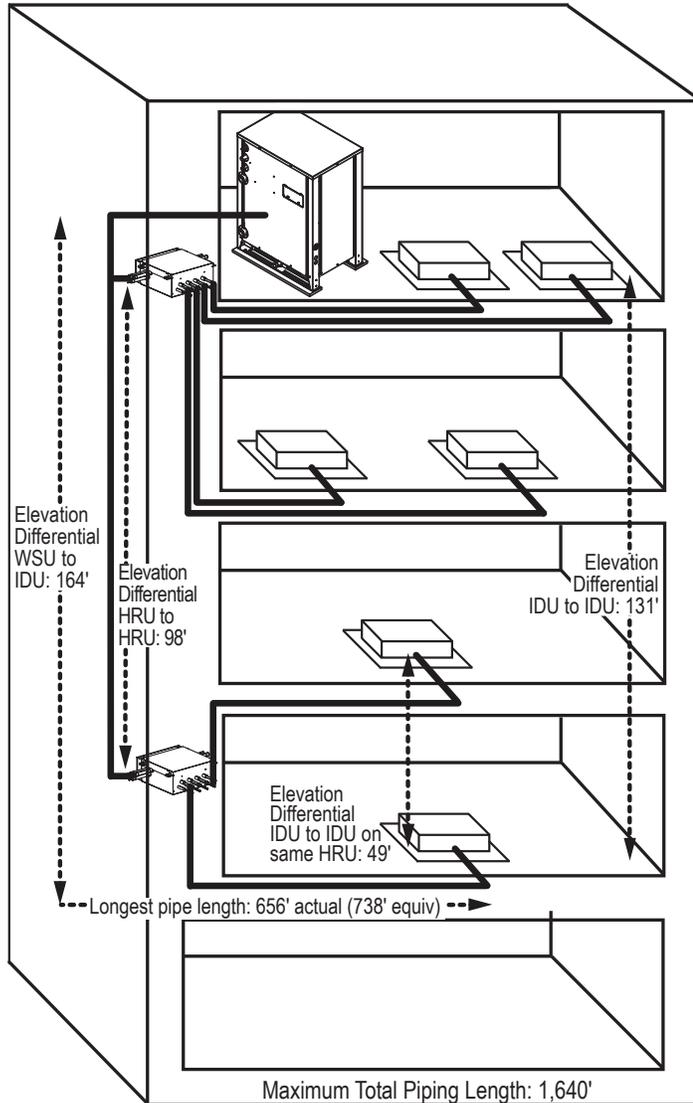
Note that the pipe diameters computed in LATS may not be standard ACR copper tube sizes that are commonly available. In these instances, refer to the table below and use the next commonly available pipe size. Please refer to the Copper Development Association Inc. Publication A4015-14/19: Copper Tube handbook for additional information.

Table 25: LATS Conditional Piping Upsizing.

LATS Conditional Applications Upsized Pipe Diameters	Standard Size Commonly Available ACR Pipe Diameters
1"	1-1/8"
1-1/4"	1-3/8"
1-1/2"	1-5/8"

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Figure 17: Typical Heat Recovery System Building Layout with Piping Limitations.



PIPING LIMITATIONS



For Systems Designed for Heat Recovery Operation

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Table 26: Piping Limitations for Heat Recovery Operation.

Length	Total pipe length	Longest actual pipe length	Equivalent pipe length ¹
		$A + \Sigma B + \Sigma C \leq 984$ ft. (Standard) / 1,640 ft. (Conditional Application)	492 ft. (Standard) / 656 ft. (Conditional Application)
ℓ	Longest pipe length after first branch ≤ 131 feet (295 feet conditional application)		
Elevation 1	Elevation differential (Water Source Unit ↔ Indoor Unit) Height ≤ 164 feet		
Elevation 2	Elevation differential (Indoor Unit ↔ Indoor Unit) [IDUs connected to separate HRUs which are parallel (Y-branch) connected.] Height ≤ 131 feet		
Elevation 3	Elevation differential (Indoor Unit ↔ Connected HRU or Series Connected HRU) Height ≤ 49 feet		
Elevation 4	Elevation differential (Indoor Unit ↔ Indoor Unit [connected to same Heat Recovery Unit]) Height ≤ 49 feet		
Elevation 5	Elevation differential (Highest WSU ↔ Lowest WSU unit) Height ≤ 16 feet		
	Distance between WSU to WSU		≤ 33 feet
	Distance between fittings and Indoor Unit		≥ 20 inches
	Distance between fittings and Y-branches / Headers		≥ 20 inches
	Distance between two Y-branches / Headers		≥ 20 inches
	Height differential between two Heat Recovery Units if installed with a Y-branch		98 ft. ²
	Height differential between two series-piped Heat Recovery Units		≤ 16 feet
	Maximum number of Heat Recovery Units per system		16

¹ Assume equivalent pipe length of Y-branch is 1.6 feet, and equivalent pipe length of header is 3.3 feet.

² Up to 131 ft. may be possible with certain applications. Contact LG Engineering for additional information.

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Example of Pipe Sizing When Installing a Heat Recovery System

Example: Triple-frame system, four (4) heat recovery units, one (1) header, and twelve (12) indoor units connected

Figure 18: Heat Recovery Triple-Frame Connections.

WSU: Water Source Unit

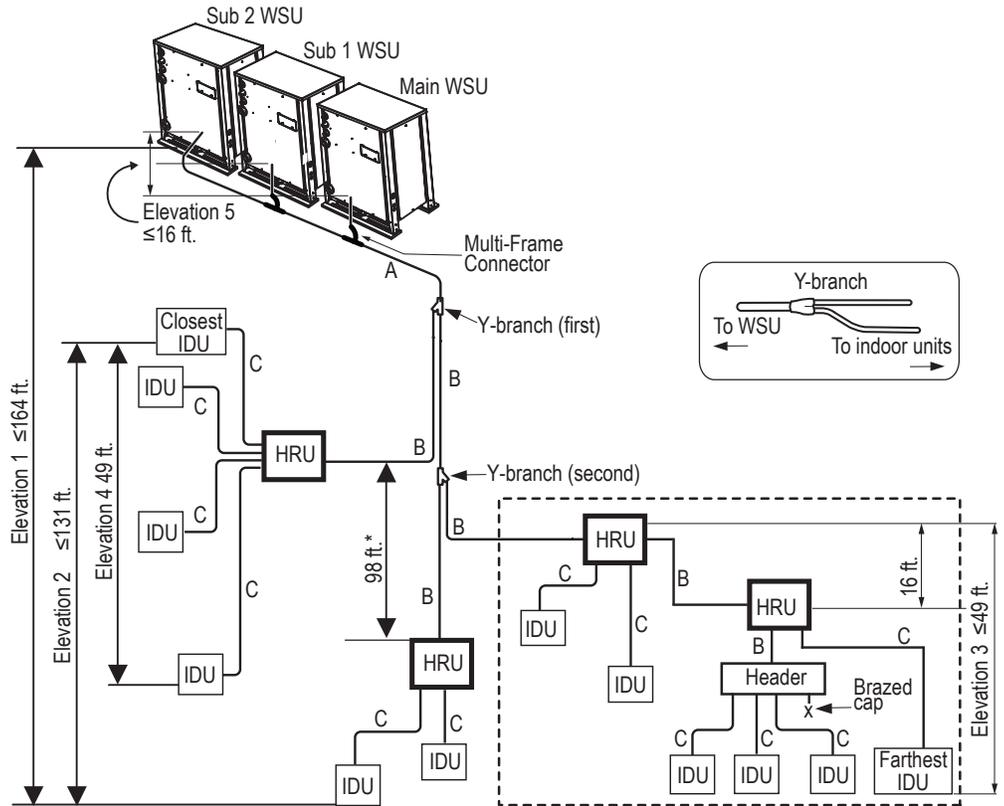
HRU: Heat Recovery Unit

IDU: Indoor Unit

A: Main Pipe from Water Source Unit to First Y-branch.

B: HRU to HRU, Y-branch to HRU, HRU to Header, or Y-branch to Y-branch.

C: Heat Recovery Unit / Header to Indoor Unit.



Note:

- Always reference the LATS Multi V software report.
- The largest capacity WSU must be the main unit in a multi-frame system.
- Main WSU capacity must be greater than or equal to the sub1 WSU capacity, and, where applicable, sub1 WSU capacity must be greater than or equal to the sub2 WSU capacity.
- Connection piping from branch to branch cannot exceed the main pipe diameter (A) used by the water source unit.
- Install the header branches or heat recovery units so that the pipe distances between the connected indoor units are minimized. Large differences in pipe distances can cause indoor unit performances to fluctuate.
- Y-branches and other header branches cannot be installed downstream of the initial header branch.
- Total capacity of indoor units in series connection of heat recovery units $\leq 192,400$ Btu/h.
- If large capacity indoor units ($>12,000$ Btu/h with piping sizes $>5/8\text{Ø} / 3/8\text{Ø}$) are installed, the valve group setting must be used. (Refer to the PCB of the heat recovery unit for the valve group control setting.)

* Up to 131 ft. may be possible with certain applications. Contact LG Engineering for additional information.

PIPING LIMITATIONS



For Systems Designed for Heat Recovery Operation

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Table 27: Main Pipe (A) Diameter from Water Source Unit to First Y-branch.

WSU Capacity (ton)	Pipe diameter when equivalent pipe length from WSU to farthest IDU is <295 ft.			Pipe diameter when equivalent pipe length from WSU to farthest IDU is >295 ft.		
	Liquid Pipe (inches OD)	Low Pressure Vapor Pipe (inches OD)	High Pressure Vapor Pipe (inches OD)	Liquid Pipe (inches OD)	Low Pressure Vapor Pipe (inches OD)	High Pressure Vapor Pipe (inches OD)
6	3/8	3/4	5/8	1/2	7/8	3/4
8	3/8	7/8	3/4	1/2	1-1/8	7/8
10	1/2	1-1/8	3/4	5/8	1-3/8	7/8
12	1/2	1-1/8	7/8	5/8	1-3/8	1-1/8
14	5/8	1-1/8	7/8	3/4	1-3/8	1-1/8
16	5/8	1-1/8	1-1/8	3/4	1-3/8	1-3/8
18	5/8	1-1/8	1-1/8	3/4	1-3/8	1-3/8
20	5/8	1-3/8	1-1/8	3/4	1-5/8	1-3/8
22	3/4	1-3/8	1-1/8	7/8	1-5/8	1-3/8
24	3/4	1-3/8	1-1/8	7/8	1-5/8	1-3/8
30	3/4	1-5/8	1-1/8	7/8	1-5/8	1-3/8
36	3/4	1-5/8	1-1/8	7/8	1-5/8	1-3/8
42	3/4	1-5/8	1-1/8	7/8	1-5/8	1-3/8
48	3/4	1-5/8	1-3/8	7/8	1-5/8	1-5/8

Table 28: Refrigerant Pipe (B) Diameter between Y-branches and Y-branches / Heat Recovery Unit / Headers.

Downstream IDU total capacity (Btu/h)	Liquid pipe (inches OD)	Vapor pipe (inches OD)	
		Low pressure	High pressure
≤19,100	1/4	1/2	3/8
<54,600	3/8	5/8	1/2
<76,400	3/8	3/4	5/8
<112,600	3/8	7/8	3/4
<160,400	1/2	1-1/8	7/8
<242,300	5/8	1-1/8	1-1/8
<354,900	3/4	1-3/8	1-1/8
≥354,900	3/4	1-5/8	1-3/8

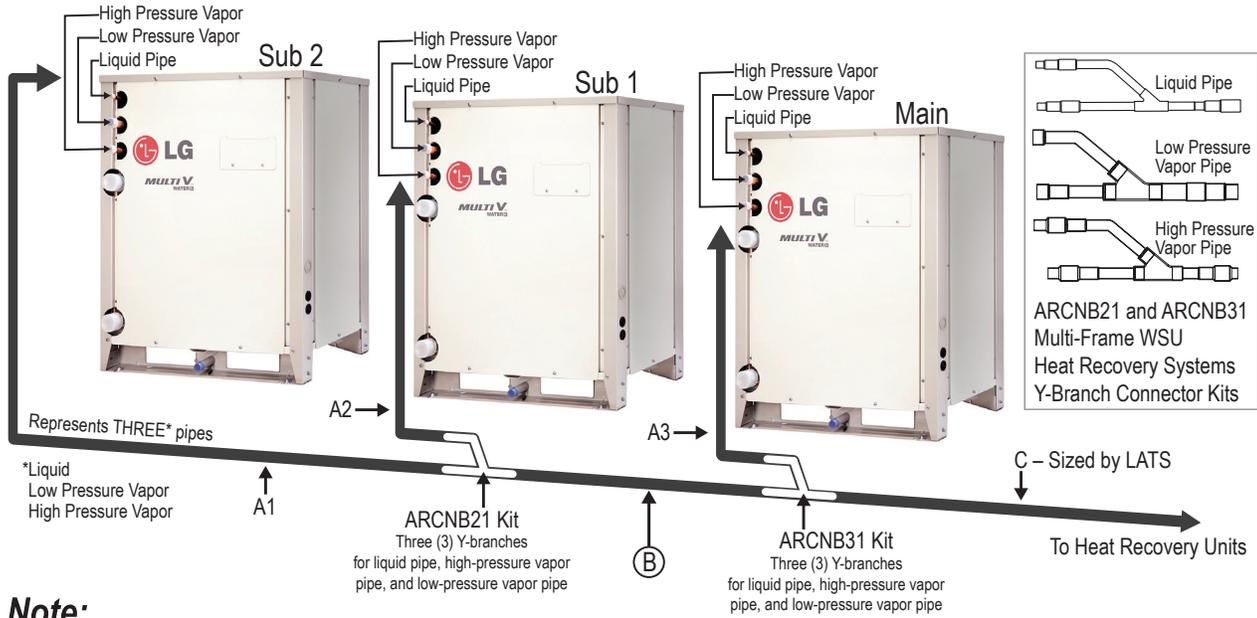
Table 29: Indoor Unit Connecting Pipe from Branch (C).

Indoor Unit Capacity ¹	Liquid pipe (inches OD)	Vapor pipe (inches OD)
≤19,100	1/4	1/2
≤54,600	3/8	5/8
≤76,400	3/8	3/4

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Triple-Frame Heat Recovery Water Source Unit Connections

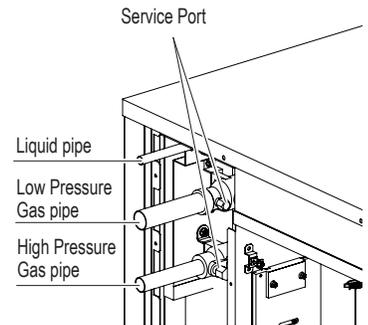
Figure 19: Heat Recovery Triple-Frame Connections.



Note:

- A1, A2, and A3 diameters match the water source unit connection diameters. Main pipe C diameters are sized by LATS.
- For single and dual frame systems, the pipe size is the same size as the frame connections.
- Always reference the LATS Multi V software report.
- The largest capacity water source unit must be the main unit in a multi-frame system.
- Main water source unit capacity must be greater than or equal to the sub1 water source unit capacity, and, where applicable, sub1 water source unit capacity must be greater than or equal to the sub2 water source unit capacity.
- Connection piping from branch to branch cannot exceed the main pipe diameter (A) used by the water source unit.
- Install the header branches so that the pipe distances between the connected indoor units are minimized. Large differences in pipe distances can cause indoor unit performances to fluctuate.
- Y-branches and other header branches cannot be installed downstream of the initial header branch.
- Outdoor unit Y-branches can only be installed in a horizontal or vertical UP configuration. The vertical DOWN configuration is not permitted.

Figure 20: Heat Recovery Pipes and Service Ports.



Heat Recovery Triple-Frame Connection Pipe Sizes

Table 30: Triple-Frame Connection Pipe Sizes.

Size (tons)	Water Source Unit	Voltage	Main unit	Sub unit 1	Sub unit 2	B Pipe					
						Equivalent pipe length from WSU to farthest IDU is <295'			Equivalent pipe length from WSU to farthest IDU is ≥295'		
						Liquid (in)	Low Pressure Vapor	High Pressure Vapor	Liquid	Low Pressure Vapor	High Pressure Vapor
30	ARWM360BAS5	208-230V	ARWM121BAS5	ARWM121BAS5	ARWM121BAS5	3/4"	1-3/8"	1-1/8"	7/8"	1-5/8"	1-1/8"
36	ARWM432BAS5	208-230V	ARWM144BAS5	ARWM144BAS5	ARWM144BAS5	3/4"	1-3/8"	1-1/8"	7/8"	1-5/8"	1-1/8"
36	ARWM432DAS5	460V	ARWM144DAS5	ARWM144DAS5	ARWM144DAS5	3/4"	1-3/8"	1-1/8"	7/8"	1-5/8"	1-1/8"
40	ARWM504DAS5	460V	ARWM192DAS5	ARWM168DAS5	ARWM144DAS5	3/4"	1-3/8"	1-1/8"	7/8"	1-5/8"	1-1/8"
48	ARWM576DAS5	460V	ARWM192DAS5	ARWM192DAS5	ARWM192DAS5	3/4"	1-3/8"	1-1/8"	7/8"	1-5/8"	1-1/8"

PIPING LIMITATIONS



For Systems Designed for Heat Recovery Operation

Following pages present Multi V Water 5 piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

Conditional Applications

Conditional applications are computed in LATS. See below for an explanation of when pipes are upsized.

If the equivalent length between the first Y-branch to the farthest indoor unit is >131 feet (maximum 295 feet):

- Pipe segment diameters between the first branch and the last branch must be sized up by one. This applies to both liquid and low pressure vapor pipes. If the next size up is not available, or if the pipe segment diameters are the same as main pipe (A) diameters, sizing up is not possible.
- While calculating total refrigerant piping length, pipe (B) segment lengths between the first Y-branch and second Y-branch, and between the second Y-branch and the heat recovery unit must be calculated by two: $A + (\sum B \times 2) + C(1) + \sum C \leq 3,280$ feet.
- Length of pipe (C) from each indoor unit to the closest Y-branch, header, or heat recovery unit ≤ 131 feet.
- $[\text{Length of pipe from water source unit to farthest indoor unit (A+B+C)}] - [\text{Length of pipe from water source unit to closest indoor unit (A+B+C)}] \leq 131$ feet.

If one (or both) of the conditions below are met, the main pipe must be upsized.

- The equivalent length between outdoor unit and the farthest indoor unit is 295 ft. or more (liquid and gas pipes are upsized).
- The elevation distance between outdoor unit and indoor unit is 164 ft. or more (only the liquid pipe is upsized).

Refer to Table 27: Main pipe (A) diameter from the outdoor unit to the first Y-branch/header branch.

If the pipe (B) diameters after the first branch are bigger than the main pipe (A) diameters, pipe (B) must be changed to match main pipe (A) sizes.

Example: When an indoor unit combination ratio of 120% is connected to a 24-ton water source unit:

Water source unit main pipe (A) diameters: 1-3/8 inches (vapor) and 5/8 inches (liquid).

1. Pipe (B) diameters: 1-3/8 (vapor) and 3/4 (liquid) (after the first branch, when indoor unit combination ratio is 120% [26 tons]).
2. After the first branch, pipe (B) diameters must be changed to 1-3/8 inches (vapor) and 5/8 inches (liquid) to match main pipe (A) sizes.

Instead of using the total indoor unit capacity to choose main pipe (A) diameters, use water source unit capacity to choose downstream main pipe (A) diameters. ⚠ Do not permit connection pipes (B) from branch to branch to exceed main pipe (A) diameters as indicated by water source unit capacity. Example: When an indoor unit combination ratio of 120% is connected to a 20-ton water source unit (24 tons), and indoor unit with a 7,000 Btu/h capacity is located at the first branch:

1. Main pipe (A) diameters on a 20-ton water source unit: 1-1/8 inches (vapor) and 5/8 inches (liquid).
2. Pipe diameters between first and second branches, however, are: 1-3/8 (vapor) and 3/4 (liquid) (connected downstream indoor unit capacity is 20 tons).
3. If main pipe (A) diameters of a 20-ton water source unit are 1-1/8 (vapor) and 5/8 (liquid), then the pipe diameters between the first and second branches must be changed to match.

Note that the pipe diameters computed in LATS may not be standard ACR copper tube sizes that are commonly available. In these instances, refer to the table below and use the next commonly available pipe size. Please refer to the Copper Development Association Inc. Publication A4015-14/19: Copper Tube handbook for additional information.

Table 31: LATS Conditional Piping Upsizing.

LATS Conditional Applications Upsized Pipe Diameters	Standard Size Commonly Available ACR Pipe Diameters
1"	1-1/8"
1-1/4"	1-3/8"
1-1/2"	1-5/8"

WSU Capacity Correction Factors

Note:

The LATS software program calculates these correction factors. Use this procedure only when performing manual calculations.

The nominal heating and/or cooling capacities of WSU(s) can be reduced by the design of the refrigerant piping system. Parameters that can reduce nominal capacity are the following:

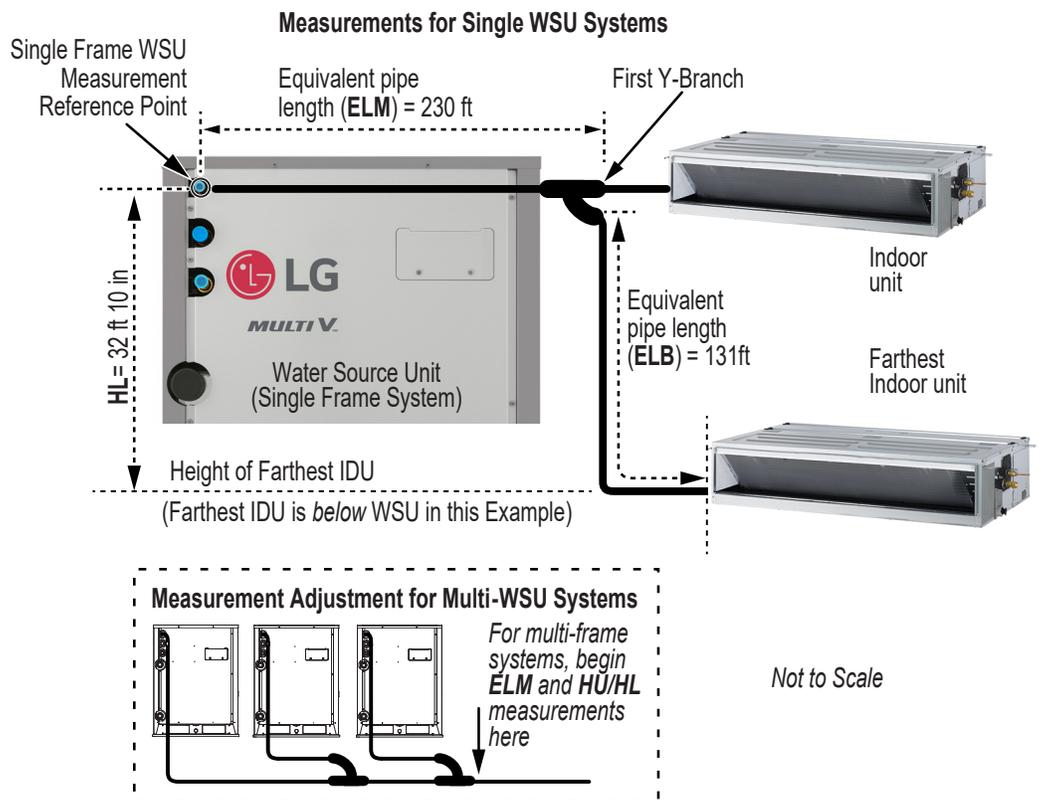
- Length of the liquid refrigerant pipe run to the farthest IDU (vapor pipes do not affect this calculation)
- Number and type of components in this liquid pipe run (elbows, Y-branches, etc.)
- Distance above or below the WSU(s) of the farthest IDU

To determine WSU capacity in your system design, multiply the WSU cooling and heating nominal capacities by the correction factors calculated in this procedure. The correction factor could be 1.0, resulting in no capacity loss, or could be less than 1.0, resulting in a certain amount of capacity loss. If the cooling or heating correction factor causes reduced capacity, the system designer must determine if the reduced capacity is acceptable or if redesign is required.

Two parameters determine WSU cooling and heating correction factors:

1. Height in feet above (HU) or below (HL) the WSU of the IDU farthest away from the WSU. Follow the procedure in the "HU/HL Measurement" on page 95 to find this parameter.
2. Total equivalent length (TEL) in feet of the liquid refrigerant pipe between the WSU and the IDU farthest away from the WSU. Equivalent length considers the effect of pressure drop due to components such as elbows and Y-branches. Equivalent feet will be a larger number than the measured physical distance in feet. Follow the procedure in the "Liquid Pipe Total Equivalent Length Calculation" section to find this parameter.
3. After determining the HU/HL and TEL parameters, follow the procedure in the "WSU Cooling/Heating Capacity Correction Factor Calculation" section to determine if the proposed refrigerant pipe design and WSU/IDU locations will reduce WSU capacity.

Figure 21: Equivalent Pipe Length Measurements Example.



HU/HL Measurement

Follow this procedure to determine the value of HU (farthest IDU above WSU) or HL (farthest IDU below WSU). Refer to the figure above.

1. Based on your system's refrigerant pipe design, determine which IDU is the farthest from the WSU.
2. Determine the vertical distance in feet between the WSU and the farthest IDU. For a single WSU system, measure from the WSU liquid pipe connection. For a dual or triple WSU system, measure from the end of the last multi-frame connector. At the IDU end, measure to the IDU's liquid pipe connection.
3. Record the vertical distance measurement in feet, and note if the IDU is above the WSU (HU) or below the WSU (HL).
4. Proceed to the total equivalent pipe length calculation.

Liquid Pipe Total Equivalent Length Calculation

A Multi V system may have many liquid refrigerant pipe runs, each composed of multiple segments, elbows, and other components, but the single pipe run that determines TEL is the run from the WSU(s) through the first Y-branch, to the farthest IDU. The TEL of this pipe run is its physical length plus an amount of "length" added to represent the effect of pressure drop due to elbows, Y-branches, headers, and other pipe system components.

Use this formula to calculate TEL:

TEL = (ELM x CF) + ELB, where:

TEL = total equivalent length of the liquid refrigerant pipe

ELM = equivalent length of the liquid refrigerant pipe to end of first Y-branch

CF = pipe length correction factor

ELB = equivalent length of the liquid refrigerant pipe from end of first Y-branch to farthest IDU

The ELM and ELB parameters will vary according to the system design. CF is a constant and is listed in the table on the next page. Determine ELM and ELB and then use the TEL formula to calculate total equivalent length.

Follow these steps to calculate ELM. Refer to the "Equivalent Pipe Length Measurements Example" Figure on previous page.

- Determine the beginning measurement reference point at the WSU end of the liquid refrigerant pipe.
 - For a single WSU system, begin the measurement at the WSU's liquid refrigerant pipe connection (smallest diameter pipe, closest to top of unit).
 - For a dual or triple WSU system, begin the measurement at the end of the last multi-frame connector.
- Locate the first Y-branch in the liquid pipe.
- Measure the length in feet of this liquid pipe run. Measure along the length of the pipe, following any changes in direction. Record this value.
- Count the number of elbow connectors in the pipe measured in step 3. Determine the outside diameter (OD) of the elbow connectors. All elbows in this segment should have the same OD.
- Refer to the table below and find the equivalent length for this size of elbow connector. Multiply the number of elbows by the equivalent length in feet. Record this value.
- Add the physical measurement found in step 3, the elbow connector value found in step 5, and 1.6 ft. for the first Y-branch. The result is the equivalent length in feet of this section of pipe, and is the **ELM** parameter of the total equivalent length equation.

Follow these steps to calculate ELB. Refer to the "Equivalent Pipe Length Measurements Example" Figure on previous page.

- Measure the distance in feet from the end of the first liquid pipe Y-branch to the liquid pipe connection of the farthest IDU. Measure along the length of the pipe, following any changes in direction. Record this value.
- Count the number of elbow connectors in the liquid pipe run measured in step 1. If there is more than one size of elbow connector, count the number of each size. Determine the outside diameter (OD) of each size of elbow connector.
- Refer to the table below and find the equivalent length for each size of elbow connector. Multiply the number of each size of elbow by its equivalent length. Add these equivalent length values to determine a total equivalent length for elbow connectors. Record this value.
- Count the number of Y-branches in the liquid pipe run measured in step 1. Multiply the number of Y-branches by 1.6 to determine their equivalent length in feet. Record this value. If there are no Y-branches, the value is zero.

Table 32: Equivalent Piping Length for Elbow Pipe Connectors.

		Equivalent Lengths of Elbow Pipe Connectors													
Elbow (90° or 45°)	Size, inches OD	1/4	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	2-1/8
	Equivalent Length (ft.)	0.5	0.6	0.7	0.8	1.2	1.3	1.5	1.6	1.8	2.0	2.1	2.3	2.5	2.8
Y-branch (ft.)		1.6													
Header (ft.)		3.3													
Heat Recovery Unit (ft.) (For ARWB Heat Recovery Units only)		8.2													

Steps to calculate ELB, continued.

5. Count the number of headers in the liquid pipe run measured in step 1. Multiply the number of headers by 3.3 to determine their equivalent length in feet. Record this value. If there are no headers, the value is zero.
6. Count the number of heat recovery units in the liquid pipe run measured in step 1. Multiply the number of heat recovery units by 8.2 to determine their equivalent length in feet. Record this value. If there are no heat recovery units, the value is zero.
7. Add the physical measurement found in step 1, the elbow connector value found in step 3, the Y-branch value found in step 4, the header value found in step 5 and the heat recovery unit value found in step 6. The result is the equivalent length in feet of this liquid pipe run, and is the **ELB** parameter of the total equivalent length equation.

Follow these steps to calculate TEL.

1. Multiply ELM by in feet to ELB in feet. This value is the equivalent length in feet of this section of refrigerant pipe.
2. Refer to the table below to find the equivalent length correction factor (**CF**) for cooling or heading mode.
3. Use the equation below with the HU/HL, ELB, and CF parameters to calculate total equivalent pipe length. Record this value.

$$\text{Total Equivalent Length (TEL) in feet} = [(\text{ELM in feet}) \times (\text{CF from Table below})] + (\text{ELB in feet})$$

Table 33: Equivalent Pipe Length Correction Factors.

If Equivalent Pipe Length (ELM + ELB) is:	
Less than 295 ft, Correction Factor (CF) is:	295 ft or More Correction Factor (CF) is:
1.0 for Cooling	0.5 for Cooling
1.0 for Heating	0.2 for Heating

WSU Cooling/Heating Capacity Correction Factor Calculation

Follow this procedure to determine the system's WSU corrected capacity. You must have the results of the HU/HL Measurement procedure and the Total Equivalent Pipe Length Calculation procedure to accurately calculate the correction factors. If the cooling or heating correction factor causes reduced capacity, the system designer must determine if the reduced capacity is acceptable or if redesign is required.

1. Locate the recorded results of the HU/HL Measurement and the Total Equivalent Pipe Length Calculation.
2. Refer to the Cooling Capacity Correction Factors table. Refer to the HU or HL section of the table, as appropriate for your system.
3. Use the HU/HL measurement and the calculated TEL length to find the cooling correction factor. Record this value.
4. Multiply the nominal WSU cooling capacity by the correction factor found in step 3 to determine the corrected cooling capacity.
5. Refer to the Heating Capacity Correction Factors table. Refer to the HU or HL section of the table, as appropriate for your system.
6. Use the HU/HL measurement and the calculated TEL length to find the heating correction factor. Record this value.
7. Multiply the nominal WSU cooling capacity by the correction factor found in step 6 to determine the corrected heating capacity.
8. If either the cooling or heating corrected capacity is less than the nominal capacity, determine if the corrected capacity is acceptable or if system parameters must change to achieve an acceptable corrected capacity.

WSU Cooling/Heating Capacity Correction Factor Calculation Examples

Examples below use the data in the "Equivalent Pipe Length Measurements" in Figure 21 to determine cooling and heating capacity correction factors.

In **Figure 21**, ELM = 230 ft; ELB = 131 ft; HL = 33 ft

- For the cooling calculation:
 - TEL = (230 ft x 0.5) + 131 ft
 - TEL = 246 ft.
 - Cooling capacity correction factor when TEL is 246 ft and HL is 33 ft is approximately 0.88
 - Multiplying the WSU nominal cooling capacity by 0.88 gives the corrected cooling capacity
- For the heating calculation,
 - TEL = (230 ft x 0.2) + 131 ft
 - TEL = 177 ft.
 - Heating capacity correction factor when TEL is 177 ft and HL is 33 ft is approximately 1.0
 - Multiplying the WSU nominal heating capacity by 1.0 gives the corrected heating capacity

Cooling and Heating Correction Factor Tables

These tables show the change in capacity of a standard indoor unit system at maximum load under standard conditions. If pipe insulation is insufficient, heat loss will become larger and capacity will decrease.

Note:

The LATS software program calculates these correction factors. To reduce the risk of designing an improper applied system or one that will not operate correctly, designers MUST use LATS when designing LG VRF systems.

Table 34: WSU Capacity Cooling Correction Factors.

Elevation Difference (ft.) Above WSU (HU)	Total Equivalent Length (TEL) in Feet												
	25	33	66	98	131	164	197	230	263	295	328	361	394
	Correction Factor												
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
33	-	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
66	-	-	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.84	0.83
98	-	-	-	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.85	0.84	0.83
131	-	-	-	-	1.0	1.0	1.0	0.98	0.96	0.95	0.85	0.84	0.83
164	-	-	-	-	-	1.0	1.0	0.98	0.96	0.95	0.85	0.84	0.83
Elevation Difference (ft.) Below WSU (HL)	Total Equivalent Length (TEL) in Feet												
	25	33	66	98	131	164	197	230	263	295	328	361	394
	Correction Factor												
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
33	-	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
66	-	-	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
98	-	-	-	1.0	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
131	-	-	-	-	1.0	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84
164	-	-	-	-	-	1.0	1.0	0.98	0.96	0.95	0.86	0.85	0.84

Table 35: WSU Capacity Heating Correction Factors.

Elevation Difference (ft.) Above WSU (HU)	Total Equivalent Length (TEL) in Feet									
	25	33	66	98	131	164	197	230	263	295
	Correction Factor									
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
33	-	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
66	-	-	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
98	-	-	-	1.0	1.0	1.0	1.0	0.98	0.96	0.95
131	-	-	-	-	1.0	1.0	1.0	0.98	0.96	0.95
164	-	-	-	-	-	1.0	1.0	0.98	0.96	0.95
Elevation Difference (ft.) Below WSU (HL)	Total Equivalent Length (TEL) in Feet									
	25	33	66	98	131	164	197	230	263	295
	Correction Factor									
0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
33	-	1.0	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
66	-	-	1.0	1.0	1.0	1.0	1.0	0.98	0.96	0.95
98	-	-	-	1.0	1.0	1.0	1.0	0.98	0.96	0.95
131	-	-	-	-	1.0	1.0	1.0	0.98	0.96	0.95
164	-	-	-	-	-	1.0	1.0	0.98	0.96	0.95

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MULTI VTM WATER5 REFRIGERANT PIPING FOR SEPARATED WATER SOURCE UNITS

Dual-frame and triple-frame systems must be installed with all water source units located next to each other. In conditions where the dual-frame or triple-frame water source units need to be separated, the following rules must be followed.

⊖ These rules do not apply to single-frame Water Source Units.

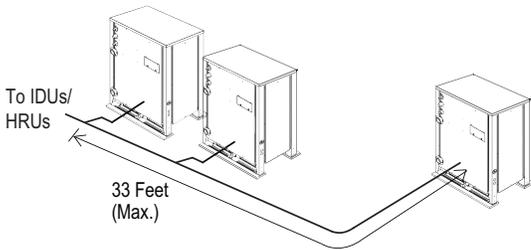
Measurements

1. All measurements must be made from the union center of the water source unit Y-branch.

Maximum pipe length

2. Maximum pipe length from first water source unit Y-branch to farthest water source unit.
- Total pipe length from the first outdoor unit Y-branch to the piping connection at the farthest outdoor unit must not exceed thirty-three (33) feet.

Figure 23: Maximum Pipe Length from First WSU Y-branch to Farthest WSU.



Trapping

1. When required, all traps must be inverted type traps $\geq 8"$ in the vapor line(s).
 - a. Heat pump water source units would be trapped in the suction vapor line, and heat recovery water source units would be trapped in the high AND low pressure vapor lines.
 - b. Inverted traps are defined as any piping that is $\geq 8"$ in a vertical direction up the horizontal pipe it elevates from.

Figure 24: Traps for Heat Pump and Heat Recovery Units.

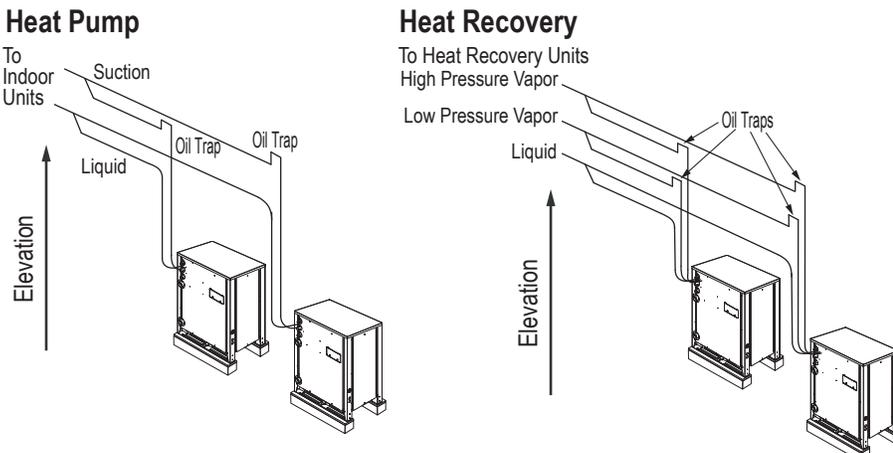
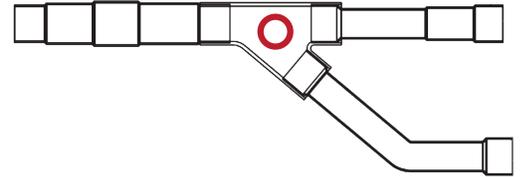


Figure 22: Y-branch Measurement Location.



Elevation difference

3. Elevation difference between water source units.
 - The elevation difference between the highest and lowest elevation water source unit must not exceed sixteen (16) feet.

Figure 26: Elevation Difference Between WSUs.

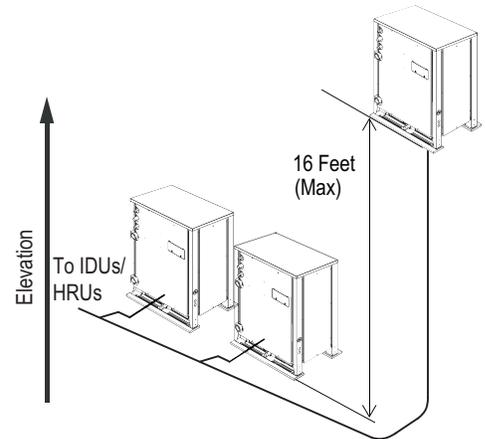


Figure 25: Close Up of An Inverted Oil Trap.



REFRIGERANT PIPING FOR SEPARATED WATER SOURCE UNITS

1. Inverted traps are required when:

- a. Piping in a horizontal direction from the outdoor Y-branch towards an outdoor unit or another outdoor unit Y-branch is greater than 6.6'.
The inverted trap must be installed close to the outdoor unit Y-branch (no more than 6.6' away, 20" is optimum).
- b. Anytime piping turns downward leaving an outdoor unit Y-branch toward an outdoor unit or another outdoor unit Y-branch.
The inverted trap must be installed close to the outdoor unit Y-branch (no more than 6.6' away, 20" is optimum), and before the pipe toward the outdoor unit turns downward.
A trap is required for piping within 8" below the unit connection(s) but not required for piping 8" or more below the unit connection(s).

Figure 28: Inverted Trap Applications.

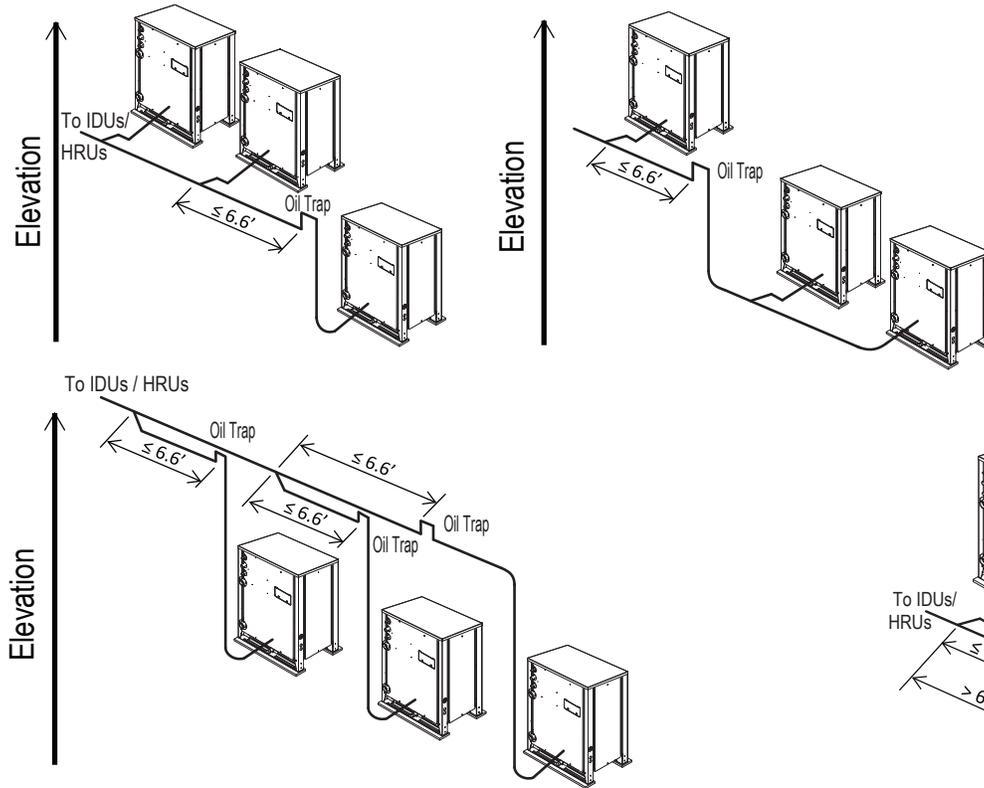
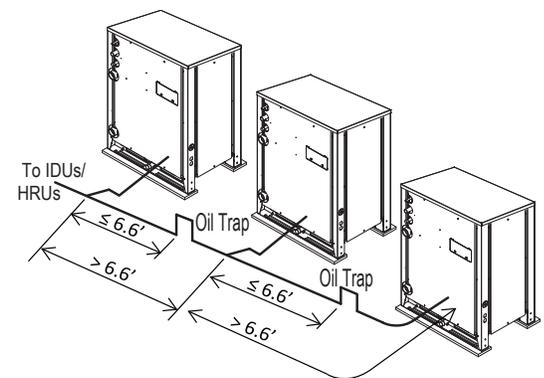


Figure 27: Examples of Inverted Traps.

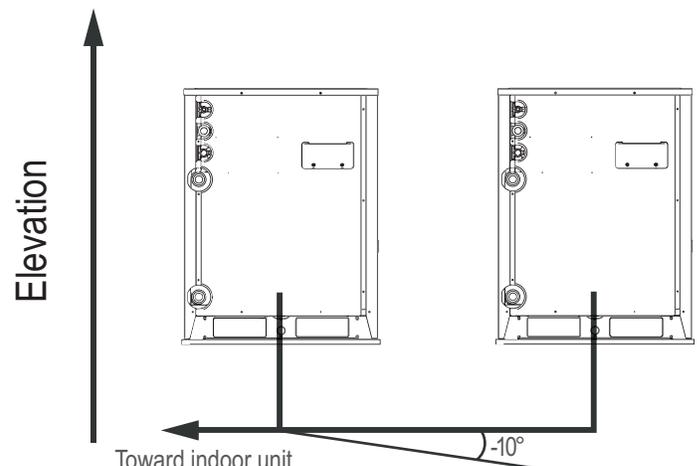


Pipe Slope

Horizontal pipe slope must be level or slightly away from the water source units, otherwise refrigerant and oil will migrate toward the water source units and accumulate in the pipe segment serving the frame that is not running or at the lowest elevation.

- ⊘ Piping must never slope more than -10° (see figure) without installing an inverted trap within 6.6' of the water source unit Y-branch and before the pipe slopes downward toward the water source unit.

Figure 29: Allowable Pipe Slope.



Selecting the Best Location for the Water Source Unit(s)

⚠ DANGER

-  Do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak. These conditions can cause a fire, resulting in bodily injury or death.
-  Do not install the unit in a location where acidic solution and spray (sulfur) are often used as it can cause bodily injury or death.
-  Do not use the unit in environments where oil, steam, or sulfuric gas are present as it can cause bodily injury or death.
- Water source units are not weatherproof. Always install water source units indoors. Failure to follow this installation guideline can create an electrical hazard that can result in bodily injury or death.

Select a location for installing the water source unit that will meet the following conditions:

- Where the floor is waterproof and can bear the weight of the unit(s). The floor must contain a liquid drainage system and must have a slight slope to aid in liquid drainage.
- Where there is enough strength to bear the weight of the water source unit.
- A location that allows for optimum air flow and is easily accessible for inspection, maintenance, and service.
- Where piping between the water source unit and indoor unit(s) / heat recovery units are within allowable limits.
- Install the unit(s) in a separate machine room not exposed to external air.
- Install the unit(s) in a space where the ambient temperature is within 32 to 104°F.
- Have an anti-freeze plan for the water supply if the unit(s) is stopped during cold weather.

Don'ts

- Where it will be subjected to direct thermal radiation from other heat sources, or an area that would expose the water source unit to heat or steam like discharge from boiler stacks, chimneys, steam relief ports, other air conditioning units, kitchen vents, plumbing vents, and other sources of extreme temperatures.
- Where high-frequency electrical noise / electromagnetic waves will not affect operation.
- Where operating sound from the unit will disturb inhabitants of the building.
- Where there is carbon fiber or combustible dust.

Note:

For detailed placement considerations and installation requirements for indoor units, refer to the applicable Indoor Unit Engineering and / or Installation Manuals.

TRANSPORTING / LIFTING

Water Source Unit(s)

Transporting / Lifting Water Source Unit(s)

When lifting the unit, use lifting straps and place around the unit as shown.

- Always lift the unit using properly sized lifting straps rated to carry the unit weight.
- Ensure the straps are long enough to maintain a maximum of a 40° angle as shown.

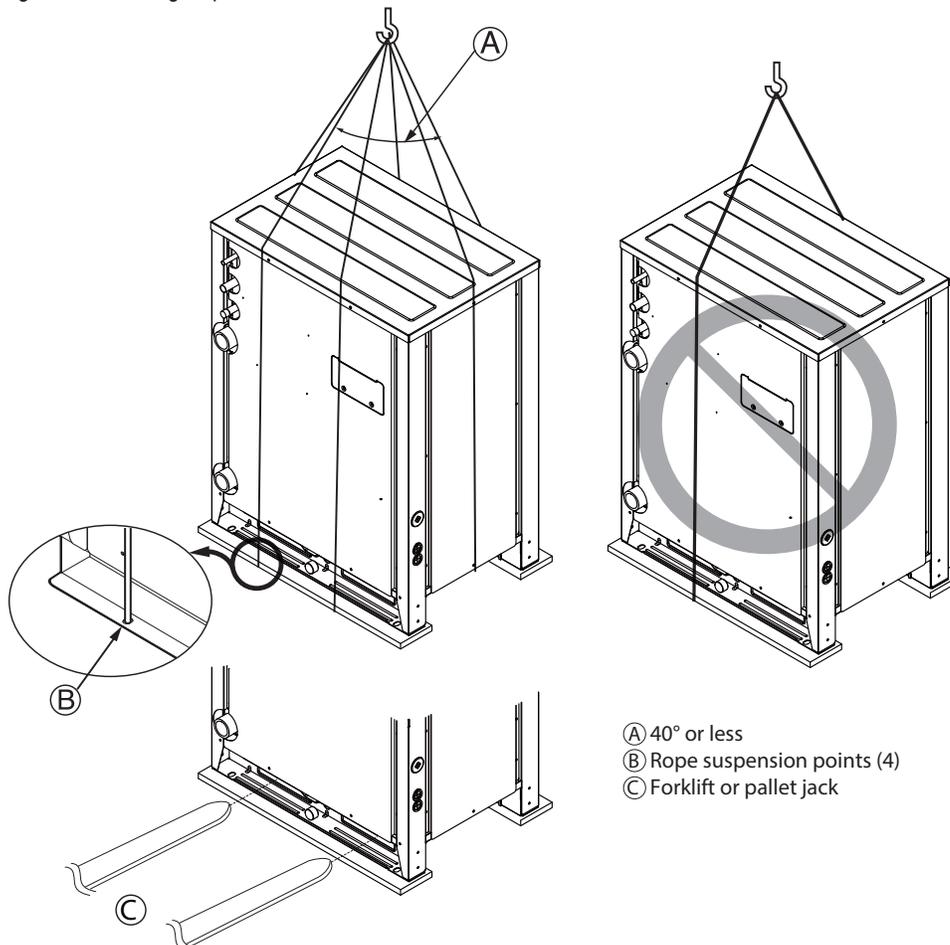
⚠ WARNING

- Use appropriate moving equipment to transport each frame; ensure the equipment is capable of supporting the weights listed above. If the equipment is not properly secured, it may result in an accident that causes physical injury or death.
- Wear protective gloves when handling equipment. Sharp edges may cause personal injury.
- Some products include polypropylene bands around the unit for packaging.  Do not use polypropylene bands to lift the unit. There is a risk of the product falling and causing physical injury.
- Tear apart and throw away plastic packaging bags so that children may not play with them and risk suffocation and death.
- Consider the unit's center of gravity before lifting. Hoist the unit with the center of gravity centered among the lifting straps. There is a risk of the product falling and causing physical injury.
- Lift the water source unit from the base at specified locations. Support the unit at a minimum of six (6) points to avoid slippage from the rigging apparatus, and use a minimum of three (3) lifting straps. There is a risk of the product falling and causing physical injury.
- Use caution when using a forklift to transport an unpackaged unit.  Do not drop the unit when carrying it with a forklift. There is a risk of the product falling and causing physical injury.

Note:

Place a protective cloth or other soft material at the locations where the casing comes in contact with the lifting straps to prevent damage to painted surfaces.

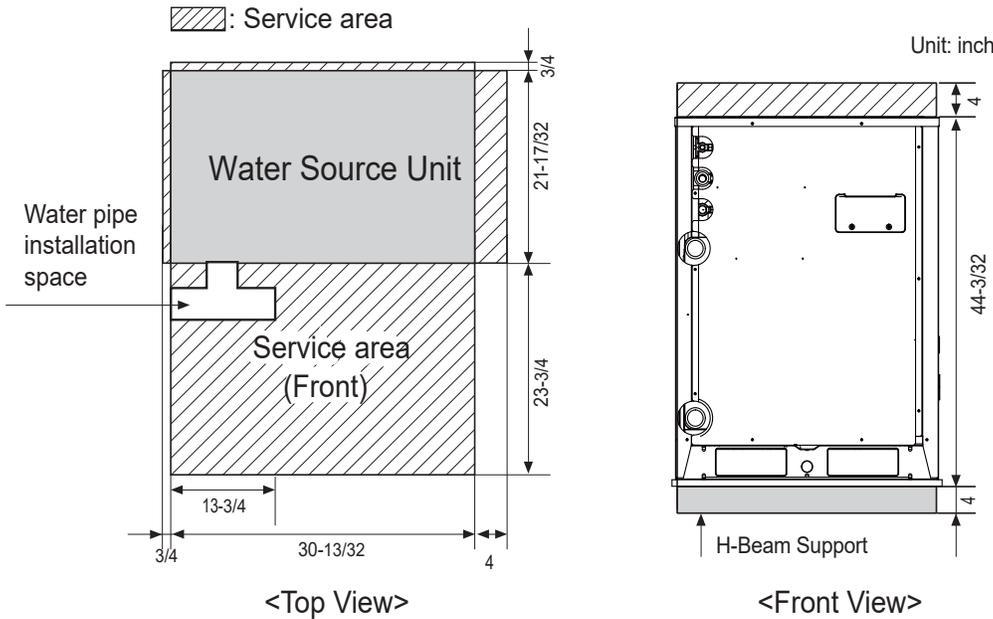
Figure 30: Moving requirements for water source units.



Single Frame Installation

Install single frame water source units as shown. Anchor bolt locations for installing water source units are shown on the next page.

Figure 31: Single Frame Installation.



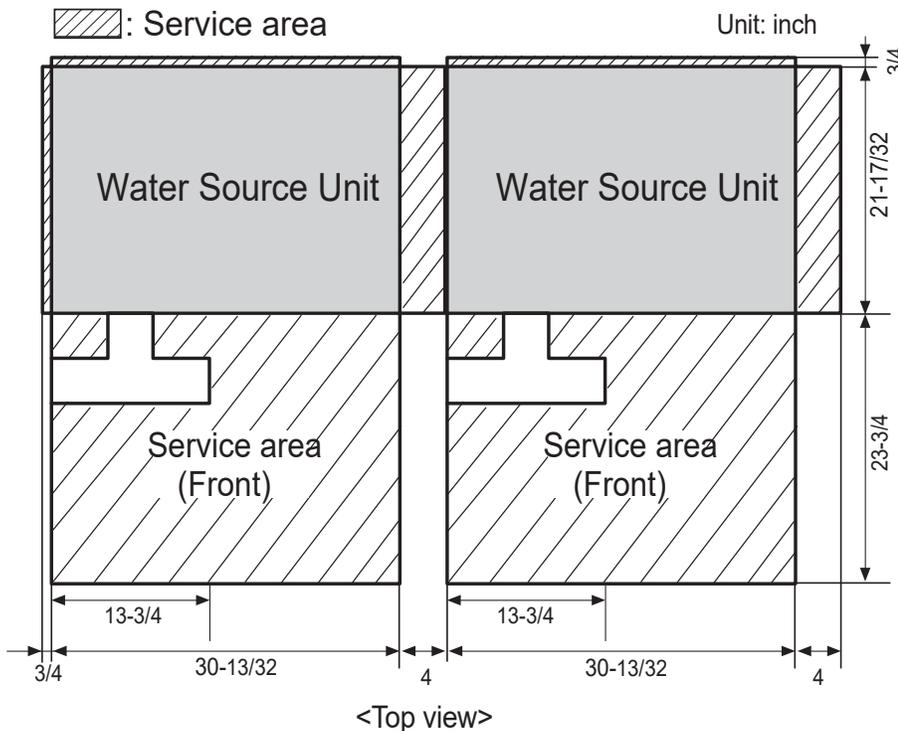
Note:

- Consult with LG Electronics, U.S.A., Inc. if the available space is less than the space shown in these figures.
- If water piping passes along the side of a frame, ensure the indicated space is available after considering the space taken by the piping.

Dual Frame Installation

Install dual frame water source units as shown. Anchor bolt locations for installing water source units are shown on the next page.

Figure 32: Dual Frame Installation.



⚠ WARNING

- Ensure that the floor / chosen location has enough strength to support the weight of the unit(s). If it does not have sufficient strength, the unit(s) may fall and cause physical injury or death.
- Water source units are not weatherproof. Always install water source units indoors. Failure to follow this installation guideline can create an electrical hazard that can result in bodily injury or death.

Note:

- Ensure that the floor / chosen location has enough strength to support the weight of the unit(s). Failure to follow this guideline could cause product malfunction or inefficient performance.
- Ensure that the floor / chosen location is waterproof. It must contain a liquid drainage system with a slight slope to aid in liquid drainage. Failure to follow this guideline could cause product malfunction or inefficient performance.

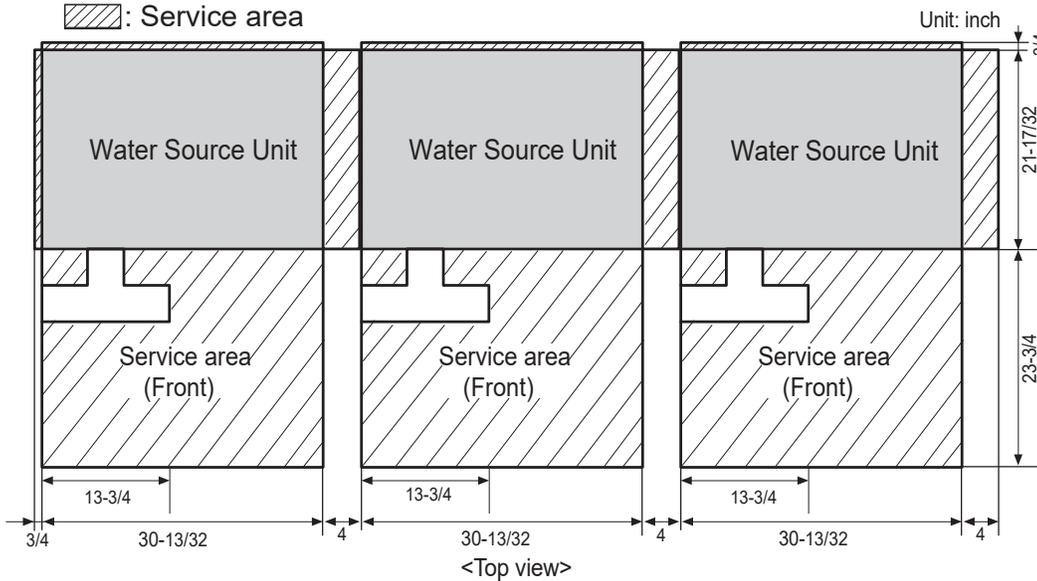
INSTALLATION CONSIDERATIONS

Triple Frame and Stacked Frame Installation



Triple Frame Installation

Install triple frame water source units as shown. Anchor bolt locations for installing water source units are shown below.
Figure 33: Triple Frame Installation.



Note:

- Consult with LG Electronics, U.S.A., Inc. if the available space is less than the space shown in these figures.
- If water piping passes along the side of a frame, ensure the indicated space is available after considering the space taken by the piping.

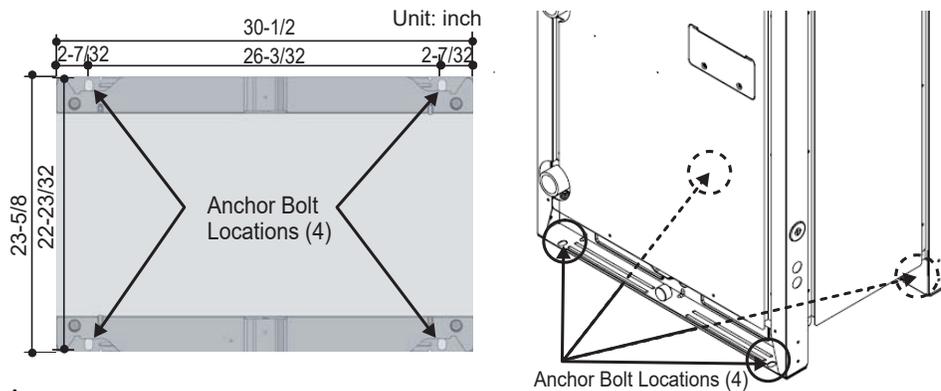
Stacked Frame Installation

Install stacked single frame water source units as shown on right. Dual frame systems cannot be stacked.

Anchor bolt locations

Anchor bolt locations for installing water source units are shown below.

Figure 34: Anchor Bolt Locations.



⚠ WARNING

- Ensure that the floor / chosen location has enough strength to support the weight of the unit(s). If it does not have sufficient strength, the unit(s) may fall and cause physical injury or death.
- Water source units are not weatherproof. Always install water source units indoors. Failure to follow this installation guideline can create an electrical hazard that can result in bodily injury or death.

Note:

- Ensure that the floor / chosen location has enough strength to support the weight of the unit(s). Failure to follow this guideline could cause product malfunction or inefficient performance.
- Ensure that the floor / chosen location is waterproof. It must contain a liquid drainage system with a slight slope to aid in liquid drainage. Failure to follow this guideline could cause product malfunction or inefficient performance.

Figure 35: Stacked Frame Installation.

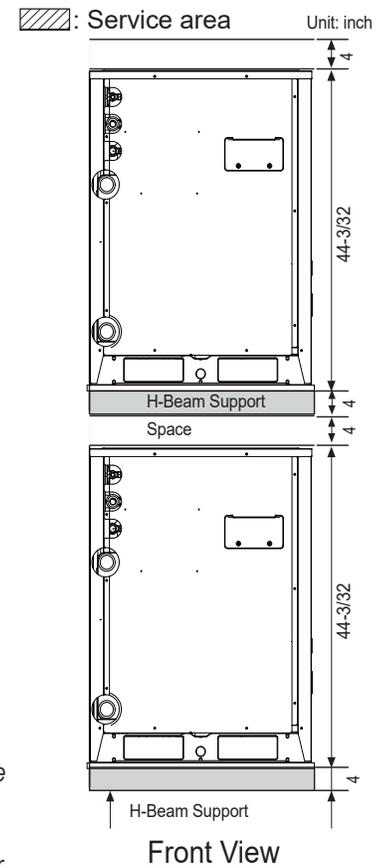


Figure 36: Corner weights.

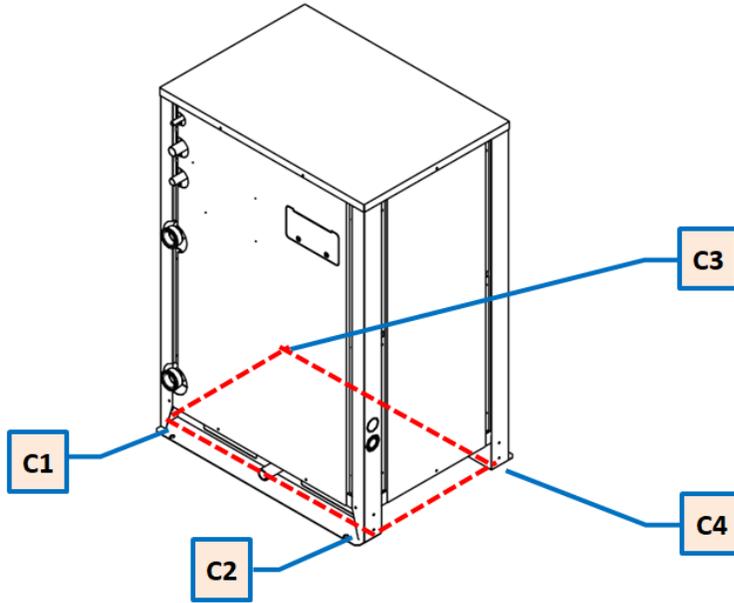


Table 36: Corner Weights.

WSU Model	Frame (Main)	Net Weight (lbs.)	Corner Weight (lbs.)				Frame (B)	Net Weight (lbs.)	Corner Weight (lbs.)				Frame (C)	Net Weight (lbs.)	Corner Weight (lbs.)			
			C1	C2	C3	C4			C1	C2	C3	C4			C1	C2	C3	C4
ARWM072*AS5	ARWM072*AS5	322	121	55	106	40												
ARWM096*AS5	ARWM096*AS5	322	121	55	106	40												
ARWM121*AS5	ARWM121*AS5	322	121	55	106	40												
ARWM144*AS5	ARWM144*AS5	322	121	55	106	40												
ARWM168DAS5	ARWM168DAS5	348	131	60	114	43												
ARWM192DAS5	ARWM192DAS5	348	131	60	114	43												
ARWM191DAS5	ARWM096DAS5	322	121	55	106	40	ARWM096DAS5	322	121	55	106	40						
ARWM192BAS5	ARWM96BAS5	322	121	55	106	40	ARWM96BAS5	322	121	55	106	40						
ARWM168BAS5	ARWM096*AS5	322	121	55	106	40	ARWM072*AS5	322	121	55	106	40						
ARWM216*AS5	ARWM121*AS5	322	121	55	106	40	ARWM096*AS5	322	121	55	106	40						
ARWN240*AS5	ARWM121*AS5	322	121	55	106	40	ARWM121*AS5	322	121	55	106	40						
ARUM264*AS5	ARWM144*AS5	322	121	55	106	40	ARWM121*AS5	322	121	55	106	40						
ARWN288*AS5	ARWM144*AS5	322	121	55	106	40	ARWM144*AS5	322	121	55	106	40						
ARWN360DAS5	ARWM192DAS5	348	131	60	114	43	ARWM168DAS5	348	131	60	114	43						
ARWN360BAS5	ARWM121BAS5	322	121	55	106	40	ARWM121BAS5	322	121	55	106	40	ARWM121BAS5	322	121	55	106	40
ARWN432*AS5	ARWM144*AS5	322	121	55	106	40	ARWM144*AS5	322	121	55	106	40	ARWM144*AS5	322	121	55	106	40
ARWN504DAS5	ARWM192DAS5	348	131	60	114	43	ARWM168DAS5	348	131	60	114	43	ARWM144DAS5	322	121	55	106	40
ARWN576DAS5	ARWM192DAS5	348	131	60	114	43	ARWM192DAS5	348	131	60	114	43	ARWM192DAS5	348	131	60	114	43

To access additional technical documentation such as submittals, indoor unit engineering manuals, installation, service, product data performance, general best practice, and building ventilation manuals, as well as white papers, catalogs, LATS software programs, and more, log in to www.lghvac.com.

Inverter



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EM_MultiV_Water5_03_24
Supersedes: EM_MultiV_Water5_01_23
EM_MultiV_Water5_05_22
EM_MultiV_Water5_04_22
EM_MultiV_Water5_01_22