LG
Life's Good

MULTI V™ WATER V

ENGINEERING MANUAL

Variable Refrigerant Flow Water Source Outdoor Units

6.0 to 48.0 Tons

PROPRIETARY DATA NOTICE

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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, visit www.lgvrf.ca.

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TABLE OF SYMBOLS

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

UNIT NOMENCLATURE

Water Source Units

ARW	M	072	C	A	S	5

Family
ARW = MULTI V Water V Water Source Unit (Refrigerant R410A)

Type
M = Inverter Heat Pump & Heat Recovery

Capacity (Mbh)

072 = 72	192 = 192	432 = 432
096 = 96	240 = 240	480 = 480
121 = 120	288, 289 = 288	576 = 576
144 = 144	336, 337 = 336	

Electrical Ratings
C = 575V/60Hz/3Phase

Airflow Configuration
A = Not Applicable
T = Top Discharge

System Efficiency
E = High Efficiency
S = Standard Efficiency

Generation
5 = Fifth

Note:

For Heat Recovery Unit information, refer to the applicable Engineering Manual on www.lgvrf.ca

LG AIR CONDITIONER TECHNICAL SOLUTION (LATS)

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 three user interfaces: LATS HVAC, LATS CAD2, and LATS REVIT. All three LATS formats are available through 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 CAD2 combines the LG LATS program with AutoCAD® software**. It permits engineers to layout and validate LG Multi V Variable Refrigerant Flow (VRF), Multi F / Multi F MAX, Single-Zone, and Energy Recovery Ventilator (ERV) systems directly into CAD drawings.

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.

***AutoCAD® and Revit® are both registered marks of Autodesk, Inc.*

Figure 1: Example of LATS CAD2.

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.
- 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.

Note:

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

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:

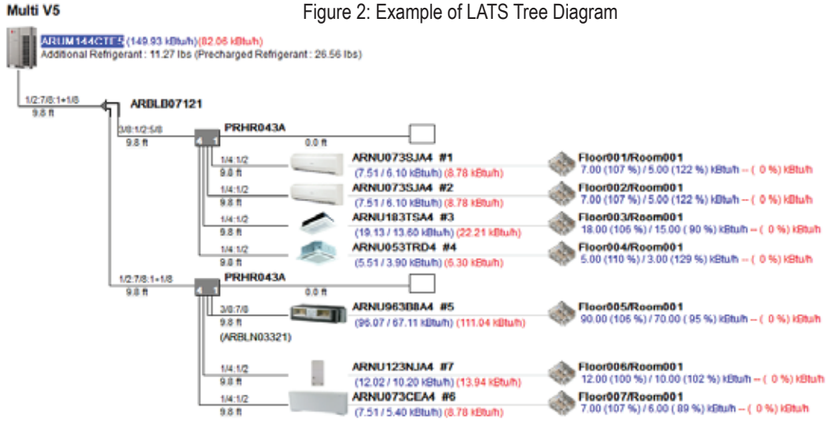
- Architect has changed location and/or purpose of room(s).
- Outdoor unit cannot be placed where originally intended.
- Structural elements prevent routing the piping as planned.
- Air conditioning system conflicts with other building systems (plumbing, gas lines, etc.).

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.

Figure 2: Example of LATS Tree Diagram



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	TN	7k to 24k		0.88	
19	4-Way 3' x 3' Cassette	TM	28k to 36k		1.08	
20	4-Way 3' x 3' Cassette	TM	42k to 48k		1.41	
21	High Static Ducted	M1	7k to 24k		0.57	
22	High Static Ducted	M2	7k to 24k		0.77	
23	High Static Ducted	M2	28k to 42k		1.15	
24	High Static Ducted	M3	28k to 54k		1.35	
25	High Static Ducted	B8	36k to 96k		2.20	
26	Low Static Ducted, Low Static Ducted Bottom Return	L1	5k to 9k		0.31	
27	Low Static Ducted, Low Static Ducted Bottom Return	L2	12k to 18k		0.42	
28	Low Static Ducted, Low Static Ducted Bottom Return	L3	21k to 24k		0.55	
29	Vertical / Horizontal Air Handling Unit	NJ	12k to 30k		1.04	
30	Vertical / Horizontal Air Handling Unit	NJ	36k		1.57	
31	Vertical / Horizontal Air Handling Unit	NK	42k to 54k		2.00	
32	Floor Standing	CE (U)	7k to 15k		0.37	
33	Floor Standing	CF (U)	18k to 24k		0.82	
34	HRU: PRHR022A/023A, 032A/033A, 042A/043A, 063A, 083A	—	—		1.1	
35					TOTAL SYSTEM CHARGE	

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

WATER SOURCE UNIT PRODUCT DATA

General

An LG Multi V Water V 575V variable refrigerant flow (VRF) water source unit (WSU) operates as a Heat Pump system or a Heat Recovery System. Single, dual, or triple frame outdoor unit combinations are connected to indoor units with a single refrigerant piping system using factory designed and supplied Y-branches, Headers, and/or Heat Recovery Units and have integrated controls.

The system is capable of being designed for minimum piping and maximum design flexibility. Each Heat Recovery Unit piping port is independently capable of operating in either heating or cooling mode regardless of the mode of other piping ports on the same heat recovery unit or in the system. The Heat Recovery Unit is capable of changing mode of individual indoor units or zones (cooling to heating or heating to cooling) within a maximum time frame of three (3) minutes to ensure indoor temperature can be properly maintained.

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 ETL label. Wiring in these units are in accordance with the National Electrical Code (NEC).

Figure 3: Single-Frame Multi V Water V 575V Water Source Unit.

Temperature Ranges

Heat Pump Configuration

In Heat Pump configuration, the system can operate in heating only mode with an entering water temperature (EWT) of 14°F to +113°F. Heat pump units can operate in cooling only mode with an EWT of 23°F to +113°F.

Heat Recovery Configuration

In Heat Recovery configuration, the system can operate in heating only mode with an entering water temperature (EWT) of 14°F to +113°F. Heat recovery units can operate in cooling only mode with an EWT of 23°F to +113°F.

Casing / Frame

Multi V Water V 575V 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 a refrigerant strainer, 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 25ºF.

MECHANICAL SPECIFICATIONS

MULTI V Water V Water Source Outdoor 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.

Figure 4: Dual Frame MULTI V Water V Water Source Unit.

Compressors

Each WSU frame is equipped with one hermetic, digitally-controlled, inverter-driven scroll compressor to modulate capacity (variable from 20 to 140Hz. 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 recommended to protect the factory-mounted heat exchanger.

Electrical

Multi V Water V 575V units are available in 575V, 60Hz, 3 Phase input power supply. All WSUs are capable of operating within voltage limits of ±10% rated voltage, and include overcurrent protection.

Controls

Multi V Water V 575V units 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 (Heat Recovery configuration only) 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 and works with condenser water pumps equipped with variable frequency drive to save pumping energy.

Note:

For Heat Recovery Unit information, refer to the applicable Engineering Manual on www.lgvrf.ca

PRODUCT FEATURES AND BENEFITS

MULTI V Water V Water Source Outdoor Units

Multi V Water V 575V

Multi V Water V 575V water source units (WSU), equipped with an inverter compressor, offer 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 5 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 V 575V 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 47 dB(A) in cooling mode and 51 dB(A) in heating mode. LG customers often ask if the water source unit is running after commissioning is complete.

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 delivers the industry's best indoor humidity levels.

Precision Load Matching

Unlike traditional air conditioning control systems, which use thermostatic controls to maintain room temperatures, LG Multi V Water V 575V 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 V 575V system delivers precise space temperature control.

Advanced Compressor Technology

Oil Management

Oil migration is no longer a concern when choosing Multi V Water V 575V. 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 20 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 V 575V 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 V Water Source Outdoor Units

Simplified Installation

Cooling and heating systems that use the
LG MULTI V Water V 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 V 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 V 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

- 23–113 °F for cooling mode
- 14–113 °F for heating mode
- 23–113 °F for synchronous mode (heat recovery systems only)

Compact Size

All Multi V Water V 575V water source unit frames have the same physical footprint: 30-3/8” wide by 21-1/2” 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 5: Triple Frame MULTI V Water V Water Source Unit.

GENERAL DATA

Multi V Water V 575V Unit Specifications

Table 1: Multi V Water V 575V Units

Combination Unit Model Number	6.0 Ton ARWM072CAS5	8.0 Ton ARWM096CAS5	10.0 Ton ARWM021CAS5	12.0 ARWM144CAS5	16.0 Ton ARWM192CAS5
Individual Component Model Numbers	–	–	–	–	–
Cooling Performance					
Nominal Cooling Capacity (Btu/h)[1]	72,000	96,000	119,700	144,000	192,000
Heating Performance					
Nominal Heating Capacity (Btu/h)[1]	81,000	108,000	135,000	162,000	216,000
Operating Range (Entering Water Temperature)					
Cooling (°F)[2]	23 – 113	23 – 113	23 – 113	23 – 113	23 – 113
Heating (°F)	14 – 113	14 – 113	14 – 113	14 – 113	14 – 113
Synchronous Operation (°F)	23 – 113	23 – 113	23 – 113	23 – 113	23 – 113
Compressor					
Inverter Quantity	HSS DC Scroll x 1				
Oil/Type	PVE/FVC68D				
Unit Data					
Refrigerant Type	R410A				
R410A Refrigerant Factory Charge (lbs)	9.9	9.9	9.9	9.9	9.9
Refrigerant Control/Location	EEV/Indoor Unit				
Max. Number Indoor Units/System[2]	13	16	20	23	32
Sound Press dB(A)[3] Cooling/Heating	46	48	54	54	58
Net Unit Weight (lbs.)	348	348	348	348	348
Shipping Weight (lbs.)	370	370	370	370	370
Communication Cables[5,6]	2 x 18 AWG				
Heat Exchanger (Stainless Steel Plate)					
Maximum Pressure Resistance (psi)	640	640	640	640	640
Flow at Rated Condition (GPM)	20.3	25.4	30.4	35.5	50.7
Range of Flow (GPM)	10.2 – 30.5	12.7 – 38.1	15.2 – 45.6	17.8 – 53.3	25.4 – 76.1
Total Heat of Rejection (Btu/h)	94,100	125,900	157,900	190,100	253,500
Total Heat of Absorption (Btu/h)	74,200	98,600	122,700	146,800	193,600
Pressure Drop (ft-wg)	2.34	3.51	4.94	6.50	12.61
Δt^4 (°F)	9.3	9.9	10.4	10.7	10.0
Piping for Heat Recovery Operation[7]					
Liquid Line Connection (in., OD)	3/8 Braze	3/8 Braze	1/2 Braze	1/2 Braze	5/8 Braze
Low Press Vapor Line Conn (in., OD)	3/4 Braze	7/8 Braze	1-1/8 Braze	1-1/8 Braze	1-1/8 Braze
High Press Vapor Line Conn (in., OD)	5/8 Braze	3/4 Braze	3/4 Braze	7/8 Braze	1-1/8 Braze
Piping for Heat Pump Operation[7]					
Liquid Line Connection (in., OD)	3/8 Braze	3/8 Braze	1/2 Braze	1/2 Braze	5/8 Braze
Low Pressure Vapor Line Conn (in., OD)	3/4 Braze	7/8 Braze	1-1/8 Braze	1-1/8 Braze	1-1/8 Braze
Piping for Water[7]					
Water Inlet/Outlet Connection (in)	1-1/2 Fem	1-1/2 Fem	1-1/2 Fem	1-1/2 Fem	1-1/2 Fem
Condensate Drain (in)	3/4 Female	3/4 Female	3/4 Female	3/4 Female	3/4 Female

[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] When entering water temperature is lower than 59ºF, variable water flow control kit PWFCKN000 is required.

[3] Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard.

[4] Value is calculated as follows: Δt = Total Heat of Rejection/(Nominal Flow Rate x 500).

[5] Communication cable between Master ODU to Slave ODU(s), and Master ODU to IDUs / HRUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Master 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.

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

[7] 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
Multi V Water V 575V Unit Specifications

Table 2: Multi V Water V 575V Units

Combination Unit Model Number	20.0 ARWM240CAS5	24.0 ARWM288CAS5	28.0 Ton ARWM336CAS5
Individual Component Model Numbers	ARWM096CAS5 x 1 ARWM144CAS5 x 1	ARWM144CAS5 x 2	ARWM144CAS5 + ARWM192CAS5
Cooling Performance			
Nominal Cooling Capacity (Btu/h)[1]	239,400	287,700	336,000
Heating Performance			
Nominal Heating Capacity (Btu/h)[1]	269,000	324,000	378,000
Operating Range (Entering Water Temperature)			
Cooling (°F)[2]	23 – 113	23 – 113	23 – 113
Heating (°F)	14 – 113	14 – 113	14 – 113
Synchronous Operation (°F)	23 – 113	23 – 113	23 – 113
Compressor			
Inverter Quantity	HSS DC Scroll x 2		
Oil/Type	PVE/FVC68D		
Unit Data			
Refrigerant Type	R410A		
R410A Refrigerant Factory Charge (lbs)	9.9 + 9.9	9.9 + 9.9	9.9 + 9.9
Refrigerant Control/Location	EEV/Indoor Unit		
Max. Number Indoor Units/System[2]	39	45	55
Sound Pressure dB(A)[3] Cooling/Heating	55	57	59
Net Unit Weight (lbs.)	348 + 348	348 + 348	348 + 348 309 + 309
Shipping Weight (lbs.)	370 + 370	370 + 370	370 + 370
Communication Cables[5,6]	2 x 18 AWG		
Heat Exchanger (Stainless Steel Plate)			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	25.4 + 35.5	35.5 + 35.5	35.5 + 50.7
Range of Flow (GPM)	30.5 – 91.4	35.5 - 106.5	43.1 - 129.3
Total Heat of Rejection (Btu/h)	316,000	380,200	443,600
Total Heat of Absorption (Btu/h)	245,400	293,600	340,400
Pressure Drop (ft-wg)	3.51 + 6.50	6.50 + 6.50	6.50 + 12.61
Δt[4] (°F)	10.4	10.7	10.3
Piping for Heat Recovery Operation7			
Liquid Line Connection (in., OD)	3/8 + 1/2 Braze	1/2 + 1/2 Braze	1/2 + 5/8 Braze
Low Pressure Vapor Line Conn (in., OD)	7/8 + 1-1/8 Braze	1-1/8 + 1-1/8 Braze	1-1/8 + 1-1/8 Braze
High Pressure Vapor Line Conn (in., OD)	3/4 + 7/8 Braze	7/8 + 7/8 Braze	7/8 + 1-1/8 Braze
Piping for Heat Pump Operation[7]			
Liquid Line Connection (in., OD)	3/8 + 1/2 Braze	1/2 + 1/2 Braze	5/8 + 5/8 Braze
Low Pressure Vapor Line Conn (in., OD)	7/8 + 1-1/8 Braze	1-1/8 + 1-1/8 Braze	1-1/8 + 1-1/8 Braze
Piping for Water[7]			
Water Inlet/Outlet Connection Size (in)	(1-1/2 + 1-1/2 Fem) x2	(1-1/2 + 1-1/2 Fem) x2	(1-1/2 + 1-1/2 Fem) x2
Condensate Drain (in)	3/4 Female	3/4 Female	3/4 Female

[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] When entering water temperature is lower than 59ºF, variable water flow control kit PWFCKN000 is required.

[3] Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard.

[4] Value is calculated as follows: Δt = Total Heat of Rejection/(Nominal Flow Rate x 500).

[5] Communication cable between Master ODU to Slave ODU(s), and Master ODU to IDUs / HRUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Master 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.

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

[7] 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
Multi V Water V 575V Unit Specifications

Table 3: Multi V Water V 575V Units

Combination Unit Model Number	36.0 Ton ARWM432CAS5	40.0 Ton ARWM480CAS5	48.0 ARWM576CAS5
Individual Component Model Numbers	ARWM144CAS5 x 3	ARWM144CAS5 x 2 +ARWM192CAS5 x 1	ARWM192CAS5 x 3
Cooling Performance			
Nominal Cooling Capacity (Btu/h)[1]	430,500	472,500	571,200
Heating Performance			
Nominal Heating Capacity (Btu/h)[1]	486,000	536,000	642,000
Operating Range (Entering Water Temperature)			
Cooling (°F)[2]	23 – 113	23 – 113	23 – 113
Heating (°F)	14 – 113	14 – 113	14 – 113
Synchronous Operation (°F)	23 – 113	23 – 113	23 – 113
Compressor			
Inverter Quantity	HSS DC Scroll x 3		
Oil/Type	PVE/FVC68D		
Unit Data			
Refrigerant Type	R410A		
R410A Refrigerant Factory Charge (lbs)	9.9 + 9.9 + 9.9	9.9 + 9.9 + 9.9	9.9 + 9.9 + 9.9
Refrigerant Control/Location	EEV/Indoor Unit		
Max. Number Indoor Units/System[2]	64	64	64
Sound Pressure dB(A)[3] Cooling/Heating	59	61	63
Net Unit Weight (lbs.)	348 + 348 + 348	348 + 348 + 348	348 + 348 + 348
Shipping Weight (lbs.)	370 + 370 + 370	370 + 370 + 370	370 + 370 + 370
Communication Cables[5,6]	2 x 18 AWG		
Heat Exchanger (Stainless Steel Plate)			
Maximum Pressure Resistance (psi)	640	640	640
Flow at Rated Condition (GPM)	35.5 + 35.5 + 35.5	35.5 + 35.5 + 50.7	50.7 + 50.7 + 50.7
Range of Flow (GPM)	53.3 - 159.8	60.9 – 182.6	76.1 – 228.2
Total Heat of Rejection (Btu/h)	570,300	633,700	760,500
Total Heat of Absorption (Btu/h)	440,400	487,200	580,800
Pressure Drop (ft-wg)	6.50 + 6.50 + 6.50	6.50 + 6.50 + 12.61	12.61 + 12.61 + 12.61
Δt[4] (°F)	10.7	10.4	10.0
Piping for Heat Recovery Operation[7]			
Liquid Line Connection (in., OD)	1/2 + 1/2 + 1/2 Braze	1/2 + 1/2 + 5/8 Braze	5/8 + 5/8 + 5/8 Braze
Low Pressure Vapor Line Conn (in., OD)	1-1/8 + 1-1/8 + 1-1/8 Braze	1-1/8 + 1-1/8 + 1-1/8 Braze	1-1/8 + 1-1/8 + 1-1/8 Braze
High Pressure Vapor Line Conn (in., OD)	7/8 + 7/8 + 7/8 Braze	7/8 + 7/8 + 1-1/8 Braze	1-1/8 + 1-1/8 + 1-1/8 Braze
Piping for Heat Pump Operation[7]			
Liquid Line Connection (in., OD)	1/2 + 1/2 + 1/2 Braze	1/2 + 1/2 + 5/8 Braze	5/8 + 5/8 + 5/8 Braze
Low Pressure Vapor Line Conn (in., OD)	1-1/8 + 1-1/8 + 1-1/8 Braze	1-1/8 + 1-1/8 + 1-1/8 Braze	1-1/8 + 1-1/8 + 1-1/8 Braze
Piping for Water[7]			
Water Inlet/Outlet Connection Size (in)	(1-1/2 + 1-1/2 Fem) x3	(1-1/2 + 1-1/2 Fem) x3	(1-1/2 + 1-1/2 Fem) x3
Condensate Drain (in)	3/4 Female	3/4 Female	3/4 Female

[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] When entering water temperature is lower than 59ºF, variable water flow control kit PWFCKN000 is required.

[3] Sound pressure levels are tested in an anechoic chamber under ISO 3745 standard.

[4] Value is calculated as follows: Δt = Total Heat of Rejection/(Nominal Flow Rate x 500).

[5] Communication cable between Master ODU to Slave ODU(s), and Master ODU to IDUs / HRUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Master 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.

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

[7] 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

Multi V Water V 575V Unit Specifications

Table 4: 575V, 60Hz, 3-Phase Multi V Water V

Nom. Tons	System Model No.	Compressor (Comp.)				MCA			MOCP		
		Comp. Qty.	Motor RLA (Ea.)			Frame 1	Frame 2	Frame 3	Frame 1	Frame 2	Frame 3
			Frame 1	Frame 2	Frame 3						
6.0	ARWM072CAS5	1	7.1	–	–	8.9	–	–	15	–	–
8.0	ARWM096CAS5	1	7.6	–	–	9.5	–	–	15	–	–
10.0	ARWM121CAS5	1	9.3	–	–	11.7	–	–	20	–	–
12.0	ARWM144CAS5	1	11.6	–	–	14.5	–	–	25	–	–
16.0	ARWM192CAS5	1	14.2	–	–	17.8	–	–	30	–	–
20.0	ARWM240CAS5	2	7.6	11.6	–	14.5	9.5	–	25	15	–
24.0	ARWM289CAS5	2	11.6	11.6	–	14.5	14.5	–	25	25	–
28.0	ARWM337CAS5	2	14.2	11.6	–	17.8	14.5	–	30	25	–
36.0	ARWM432CAS5	3	11.6	11.6	11.6	14.5	14.5	14.5	25	25	25
40.0	ARWM480CAS5	3	14.2	11.6	11.6	17.8	14.5	14.5	30	25	25
48.0	ARWM576CAS5	3	14.2	14.2	14.2	17.8	17.8	17.8	30	30	30

For component model numbers, see the specification tables.

For 575V systems, acceptable voltage range is 518V - 632V.

Maximum allowable voltage unbalance 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.

CONNECTION LIMITATIONS

Water Source Units

Table 5: Multi V Water V 575V Unit / Indoor Unit Matching Limitations

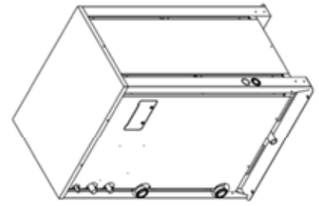
Multi V Water V 575V Models	Nominal Cooling (Btu/h)	Indoor Units		
		Max. Qty.	Sum of Indoor Unit Nominal Cooling Capacities (Btu/h)	
			Min. Capacity (Btu/h) (50%)[1]	Max. Capacity (Btu/h) (130%)[2]
ARWM072CAS5	72,000	13	36,000	93,600
ARWM096CAS5	96,000	16	48,000	124,800
ARWM121CAS5	119,700	20	60,000	156,000
ARWM144CAS5	144,000	23	72,000	187,200
ARWM192CAS5	192,000	32	96,000	249,600
ARWM240CAS5	239,400	39	120,000	312,000
ARWM288CAS5	287,700	45	144,000	374,400
ARWM336CAS5	336,000	55	168,000	436,800
ARWM432CAS5	430,500	64	216,000	561,600
ARWM480CAS5	472,500	64	240,000	624,000
ARWM576CAS5	571,200	64	288,000	748,800

[1] 50% = Minimum Combination Ratio.
[2] 130% = Maximum Combination Ratio.

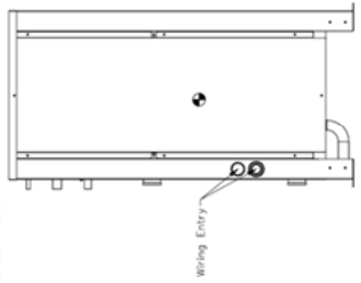
DIMENSIONS

Single Frame Heat Pump and Heat Recovery

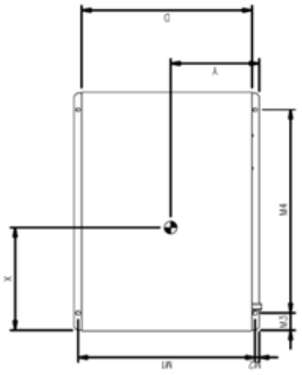
X	13-1/16"
Y	11-1/4"
Z	19-11/16"
W	30-3/8"
D	21- 1/2"
H	44-1/8"
L1	7-3/16"
L2	25-3/4"
L3	33-7/8"
L4	37-7/8"
L5	41-1/2"
L6	3"
L7	1-15/16"
L8	15-3/16"
M1	22-9/16"
M2	1/2"
M3	2-3/16"
M4	25-7/8"



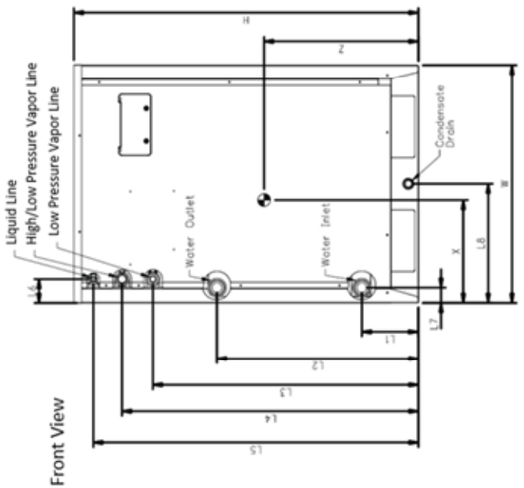
Isometric



Side View



Top View

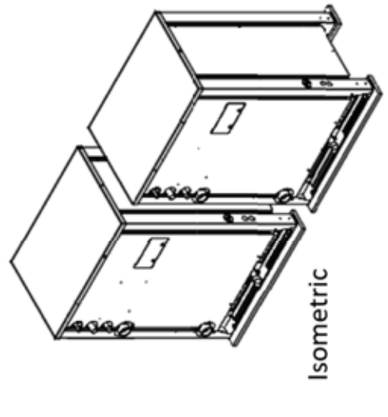


Front View

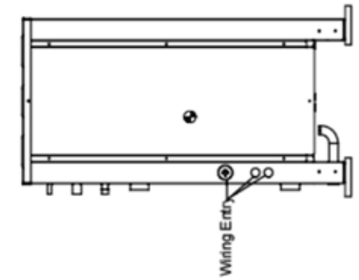
DIMENSIONS

Dual Frame Heat Pump and Heat Recovery

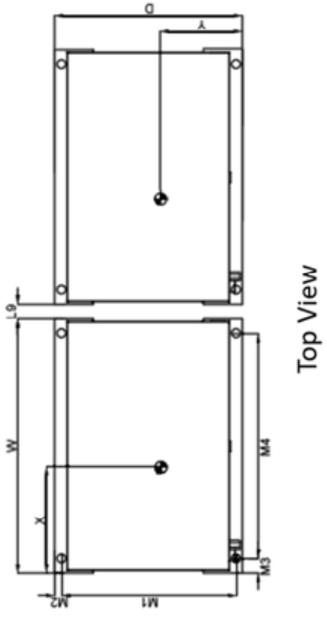
X	13-1/16"
Y	11-1/4"
Z	19-11/16"
W	30-3/8"
D	21- 1/2"
H	44-1/8"
L1	7-3/16"
L2	25-3/4"
L3	33-7/8"
L4	37-7/8"
L5	41-1/2"
L6	3"
L7	1-15/16"
L8	15-3/16"
M1	22-9/16"
M2	1/2"
M3	2-3/16"
M4	25-7/8"



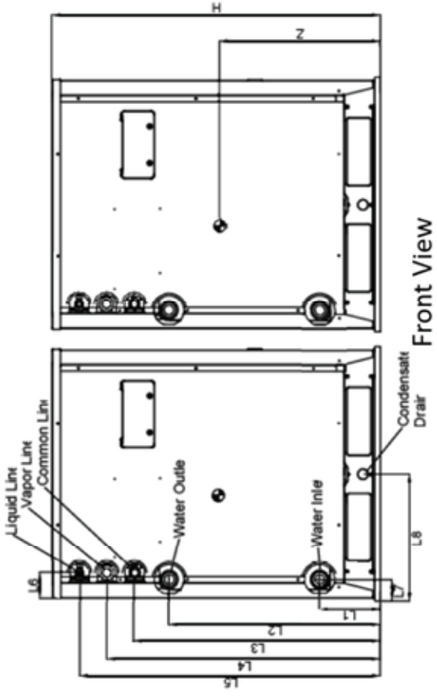
Isometric



Side View



Top View

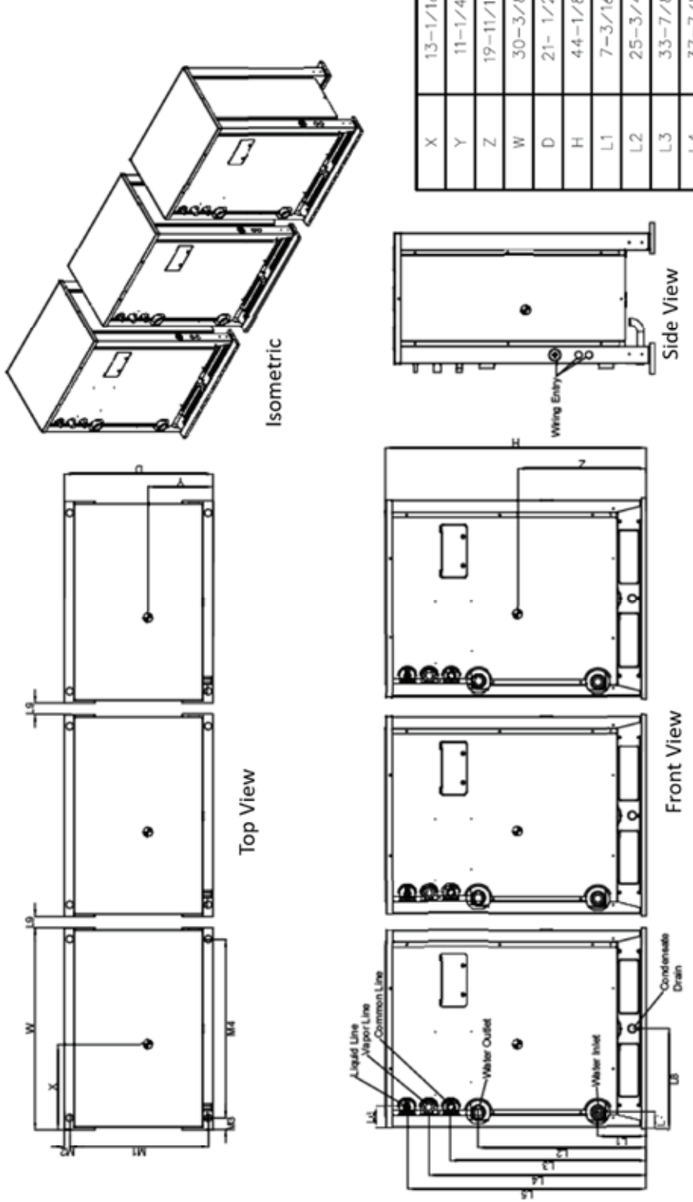


Front View

DIMENSIONS

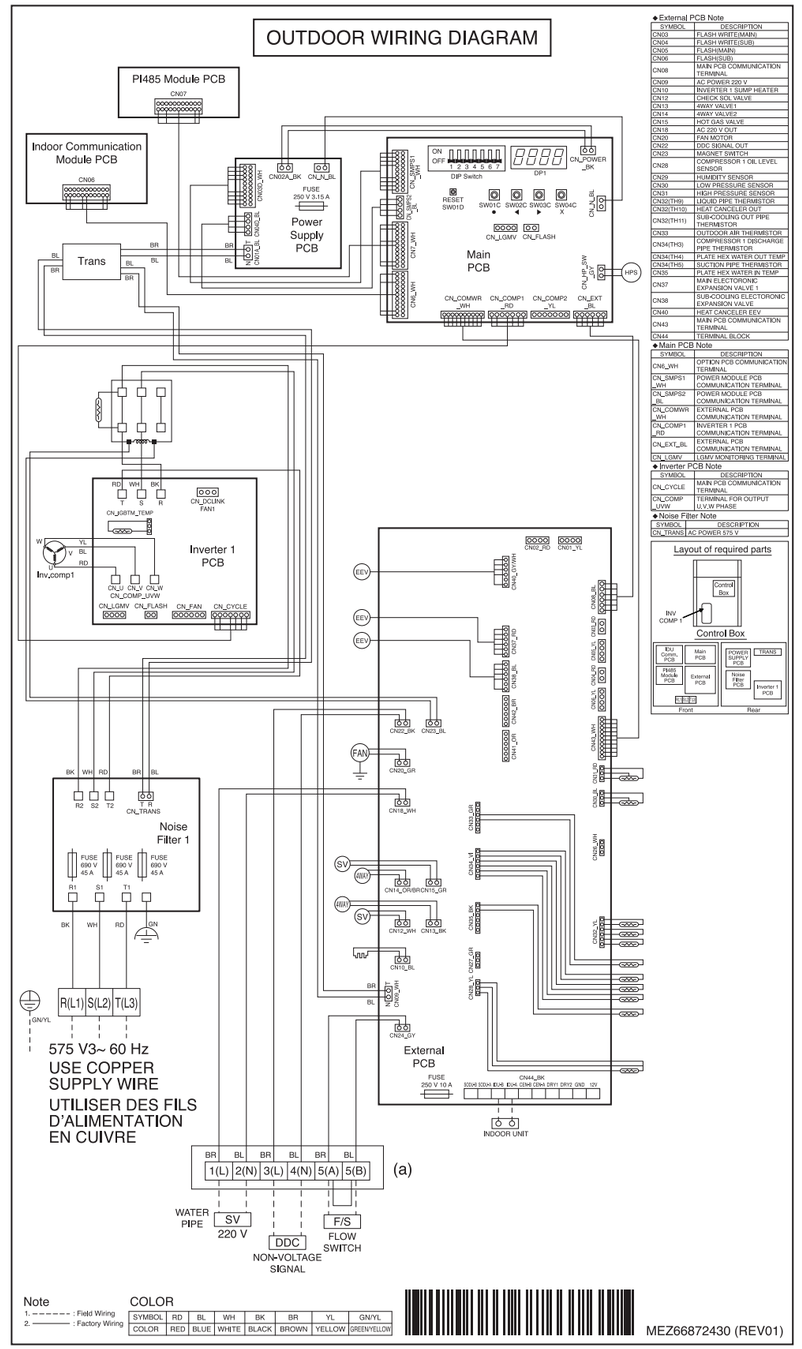
Triple Frame Heat Pump and Heat Recovery

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



WIRING DIAGRAMS

Multi V Water V 575V
6/8/10/12/16 Tons



◆External PCB Note

SYMBOL	DESCRIPTION
CN03	FLASH WRITE(MAIN)
CN04	FLASH WRITE(SUB)
CN05	FLASH(MAIN)
CN06	FLASH(SUB)
CN08	MAIN PCB COMMUNICATION TERMINAL
CN09	AC POWER 220 V
CN10	INVERTER 1 SUMP HEATER
CN12	CHECK SOL VALVE
CN13	4WAY VALVE1
CN14	4WAY VALVE2
CN15	HOT GAS VALVE
CN18	AC 220 V OUT
CN20	FAN MOTOR
CN22	DDC SIGNAL OUT
CN23	MAGNET SWITCH
CN28	COMPRESSOR 1 OIL LEVEL SENSOR
CN29	HUMIDITY SENSOR
CN30	LOW PRESSURE SENSOR
CN31	HIGH PRESSURE SENSOR
CN32(TH9)	LIQUID PIPE THERMISTOR
CN32(TH10)	HEAT CANCELER OUT
CN32(TH11)	SUB-COOLING OUT PIPE THERMISTOR
CN33	OUTDOOR AIR THERMISTOR
CN34(TH3)	COMPRESSOR 1 DISCHARGE PIPE THERMISTOR
CN34(TH4)	PLATE HEX WATER OUT TEMP
CN34(TH5)	SUCTION PIPE THERMISTOR
CN35	PLATE HEX WATER IN TEMP
CN37	MAIN ELECTRONIC EXPANSION VALVE 1
CN38	SUB-COOLING ELECTORONIC EXPANSION VALVE
CN40	HEAT CANCELER EEV
CN43	MAIN PCB COMMUNICATION TERMINAL
CN44	TERMINAL BLOCK

◆Main PCB Note

SYMBOL	DESCRIPTION
CN_WH	OPTION PCB COMMUNICATION TERMINAL
CN_SMPS1 _WH	POWER MODULE PCB COMMUNICATION TERMINAL
CN_SMPS2 _BL	POWER MODULE PCB COMMUNICATION TERMINAL
CN_COMWR _WH	EXTERNAL PCB COMMUNICATION TERMINAL
CN_COMP1 _RD	INVERTER 1 PCB COMMUNICATION TERMINAL
CN_EXT_BL	EXTERNAL PCB COMMUNICATION TERMINAL
CN_LGMV	LGMV MONITORING TERMINAL

◆Inverter PCB Note

SYMBOL	DESCRIPTION
CN_CYCLE	MAIN PCB COMMUNICATION TERMINAL
CN_COMP _UVW	TERMINAL FOR OUTPUT U,V,W PHASE

◆Noise Filter Note

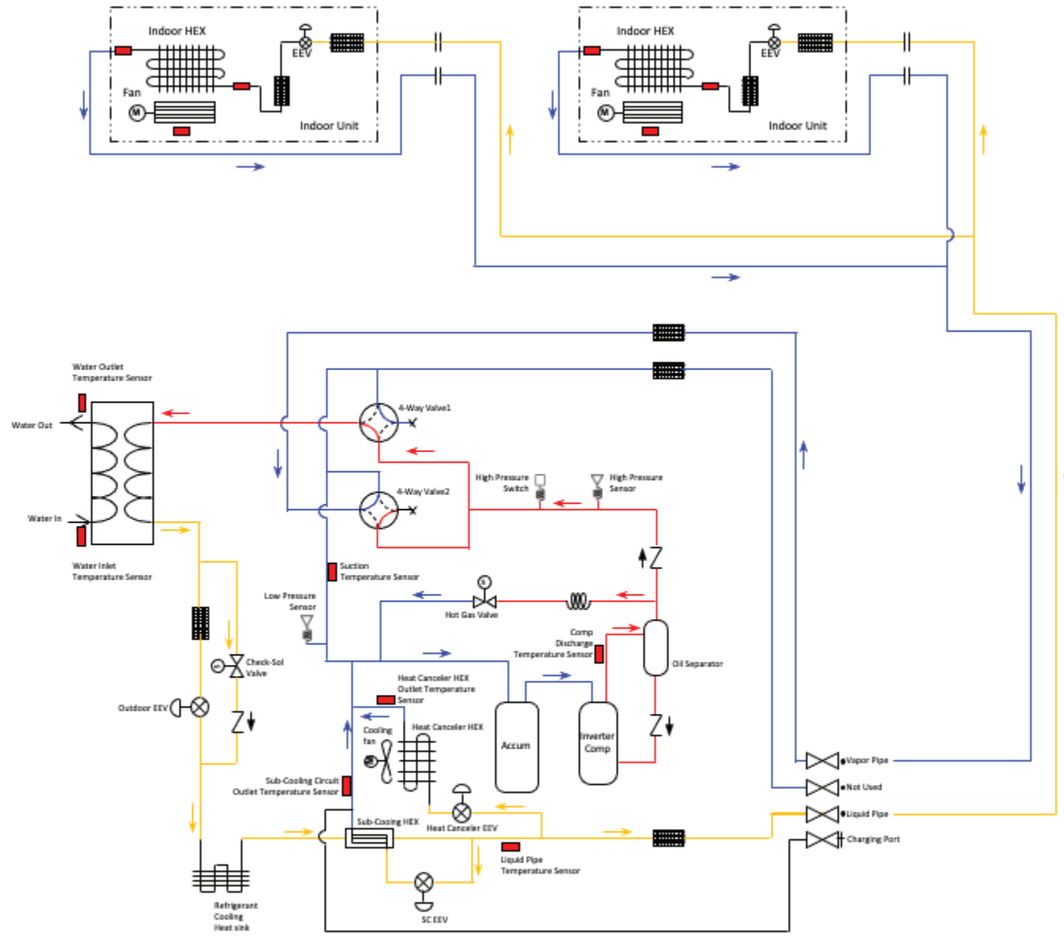
SYMBOL	DESCRIPTION
CN_TRANS	AC POWER 575 V

COLOR							
SYMBOL	RD	BL	WH	BK	BR	YL	GN/YL
COLOR	RED	BLUE	WHITE	BLACK	BROWN	YELLOW	GREEN/YELLOW

REFRIGERANT FLOW DIAGRAMS

Multi V Water V Heat Pump Config. - Cooling Operation

575V 6/8/10/12/16 Ton

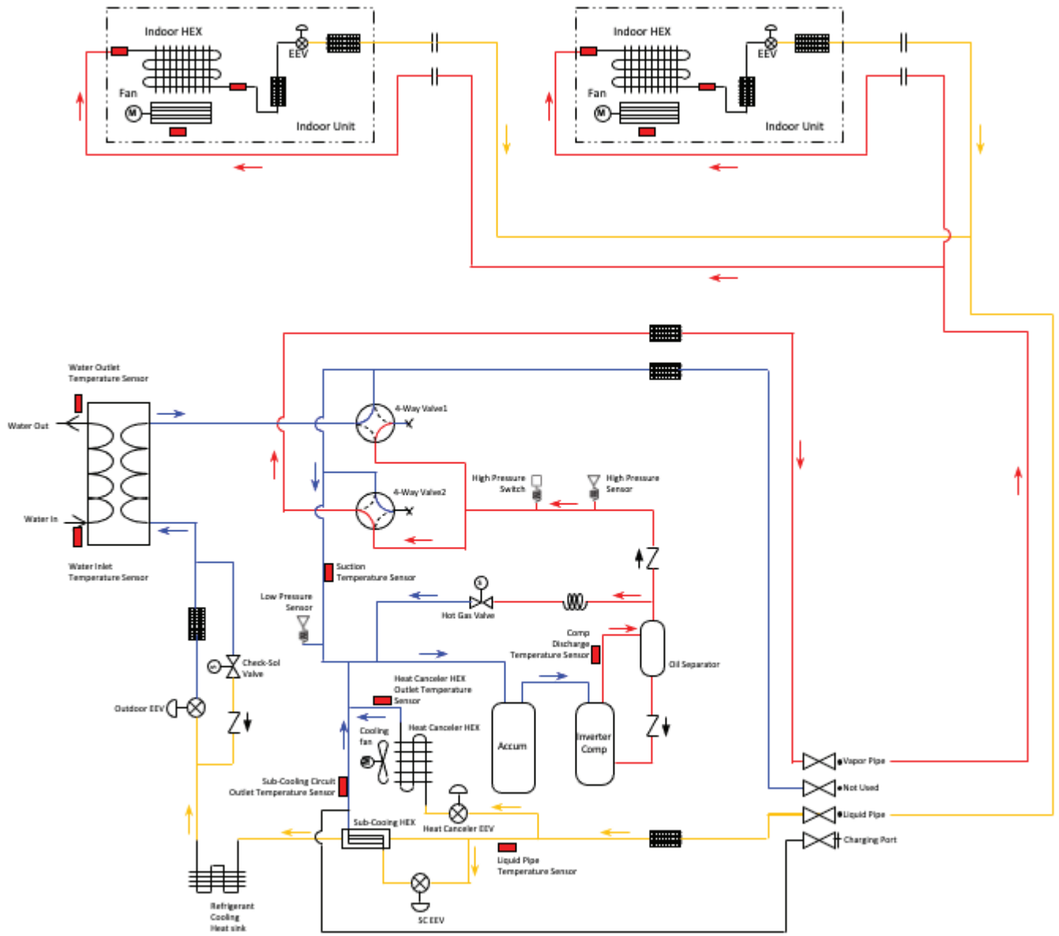


Remarks					
	Pressure Sensor	EEV	Service Valve	4-Way Valve	Temperature Sensor
	Pressure Switch	Strainer	Check Valve	Solenoid Valve	

REFRIGERANT FLOW DIAGRAMS

Multi V Water V Heat Pump Config. - Heating Operation

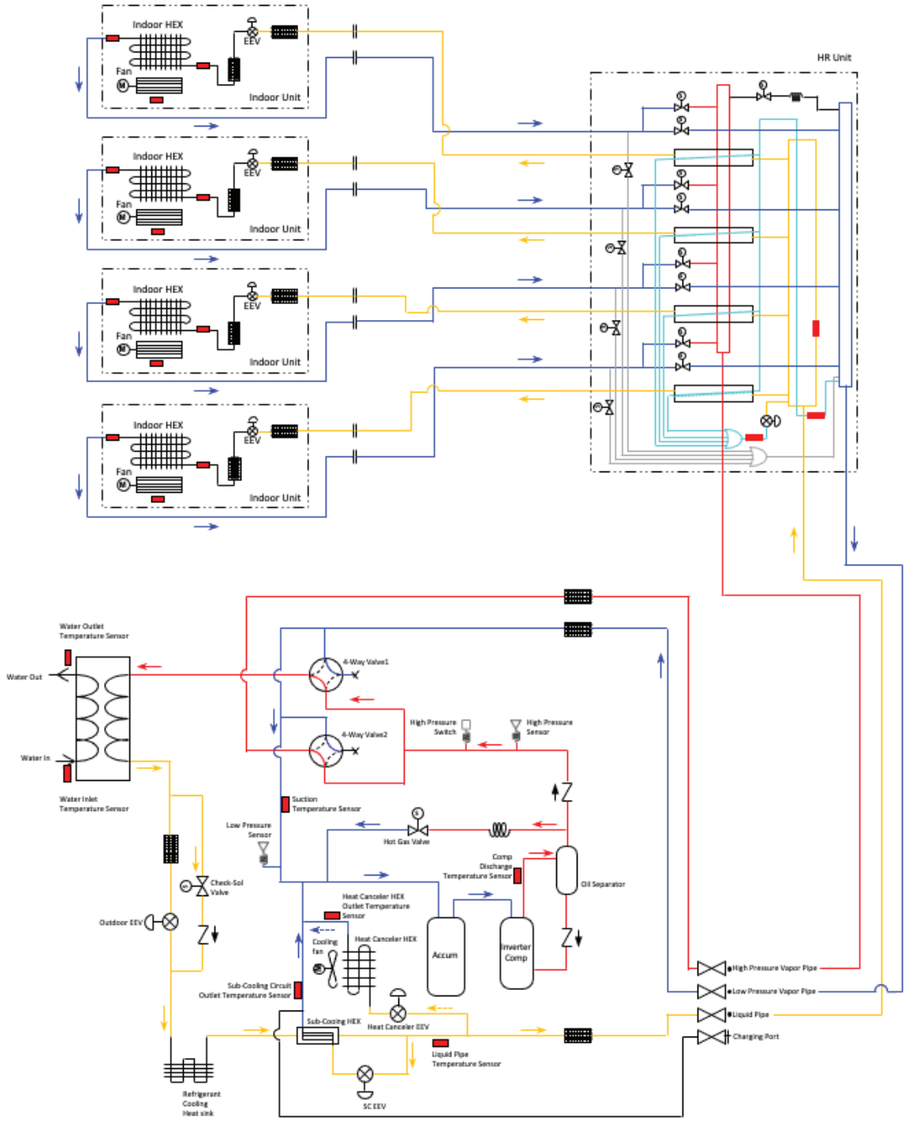
575V 6/8/10/12/16 Ton



Remarks					
	Pressure Sensor	EEV	Service Valve	4-Way Valve	Temperature Sensor
	Pressure Switch	Strainer	Check Valve	Solenoid Valve	

REFRIGERANT FLOW DIAGRAMS

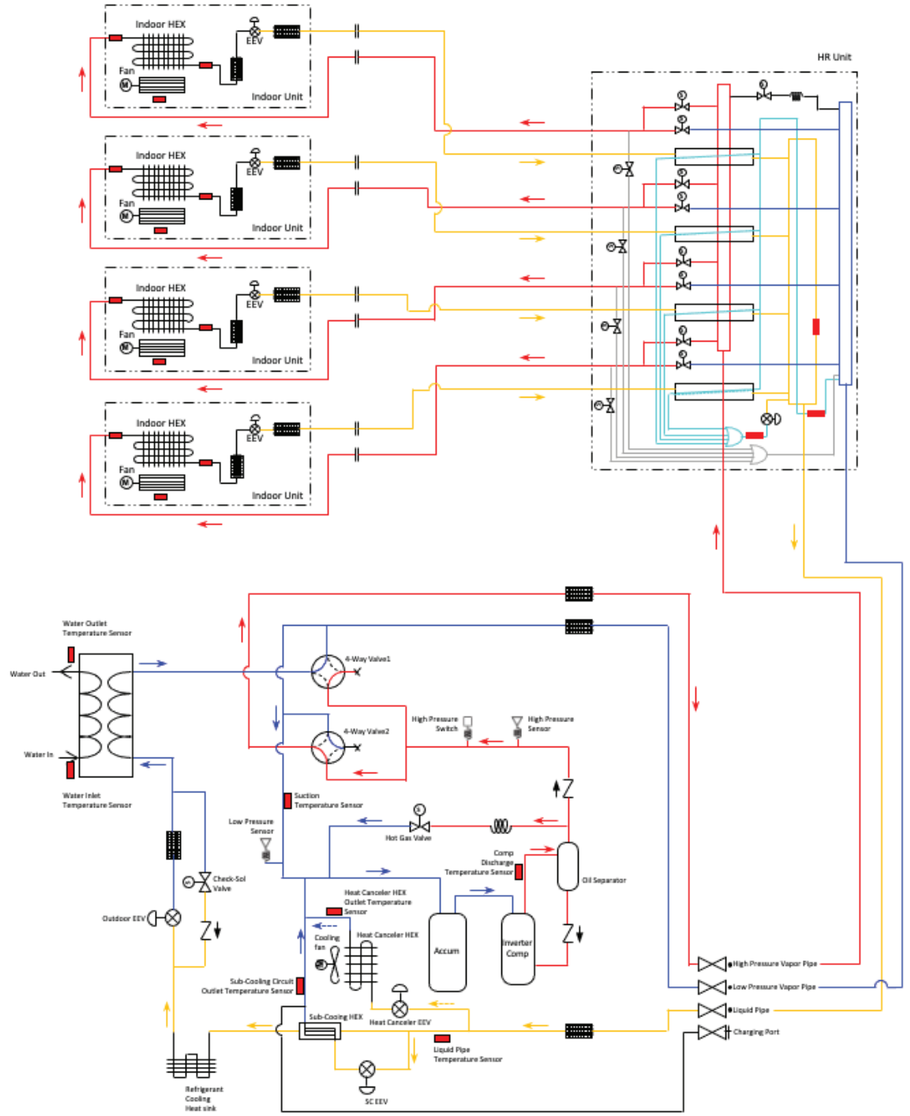
Multi V Water V Heat Recovery Config. - Cooling Operation
575V 6/8/10/12/16 Ton



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

REFRIGERANT FLOW DIAGRAMS

Multi V Water V Heat Recovery Config. - Heating Operation
575V 6/8/10/12/16 Ton

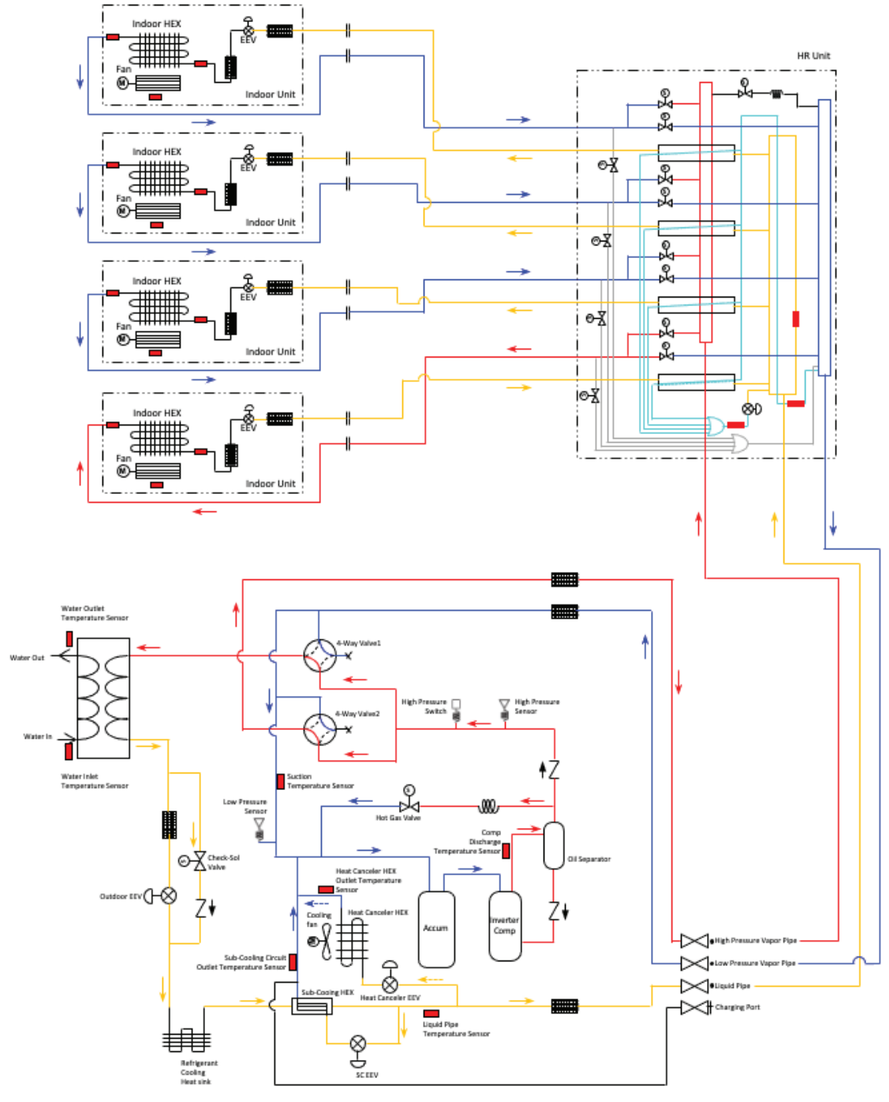


Remarks					
	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

REFRIGERANT FLOW DIAGRAMS

MULTI V WATER V

Multi V Water V Heat Recovery Config. - Cooling Based Simultaneous Operation
575V 6/8/10/12/16 Ton

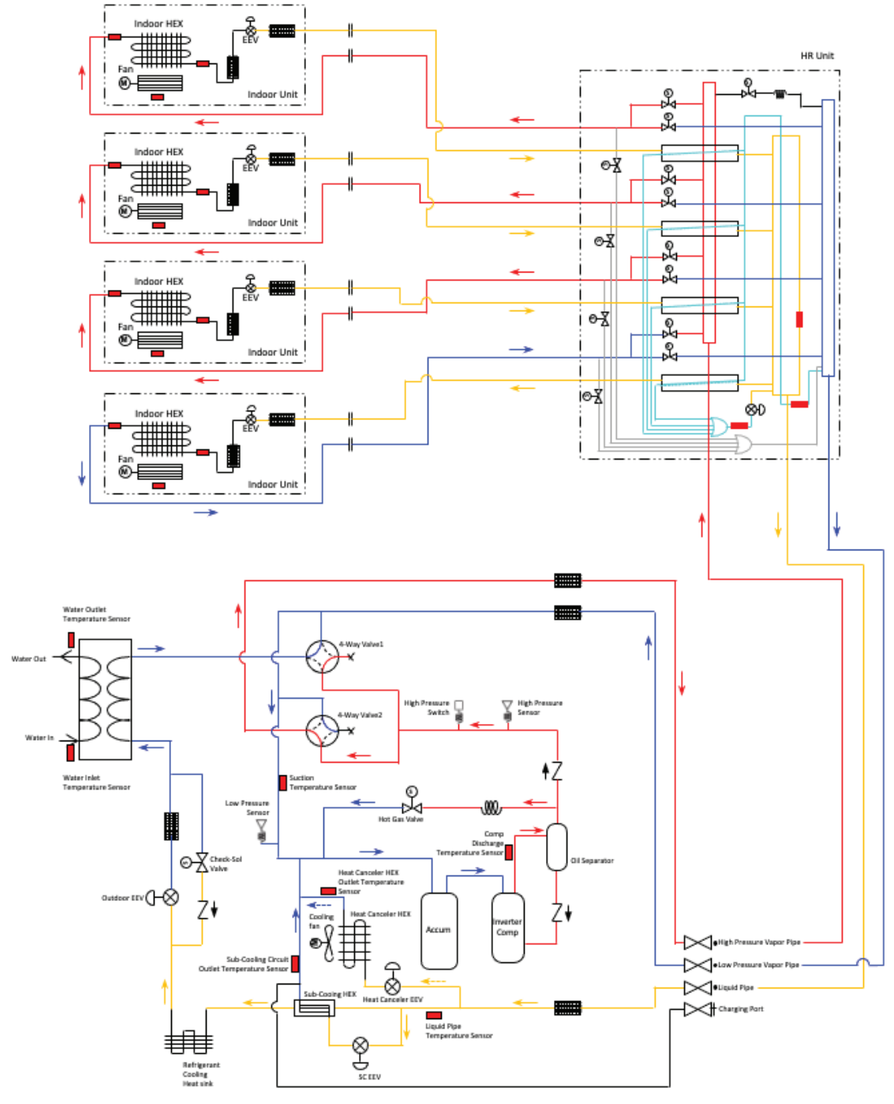


Remarks					
	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

MULTI V WATER V

REFRIGERANT FLOW DIAGRAMS

Multi V Water V Heat Recovery Config. - Heating Based Simultaneous Operation
575V 6/8/10/12/16 Ton

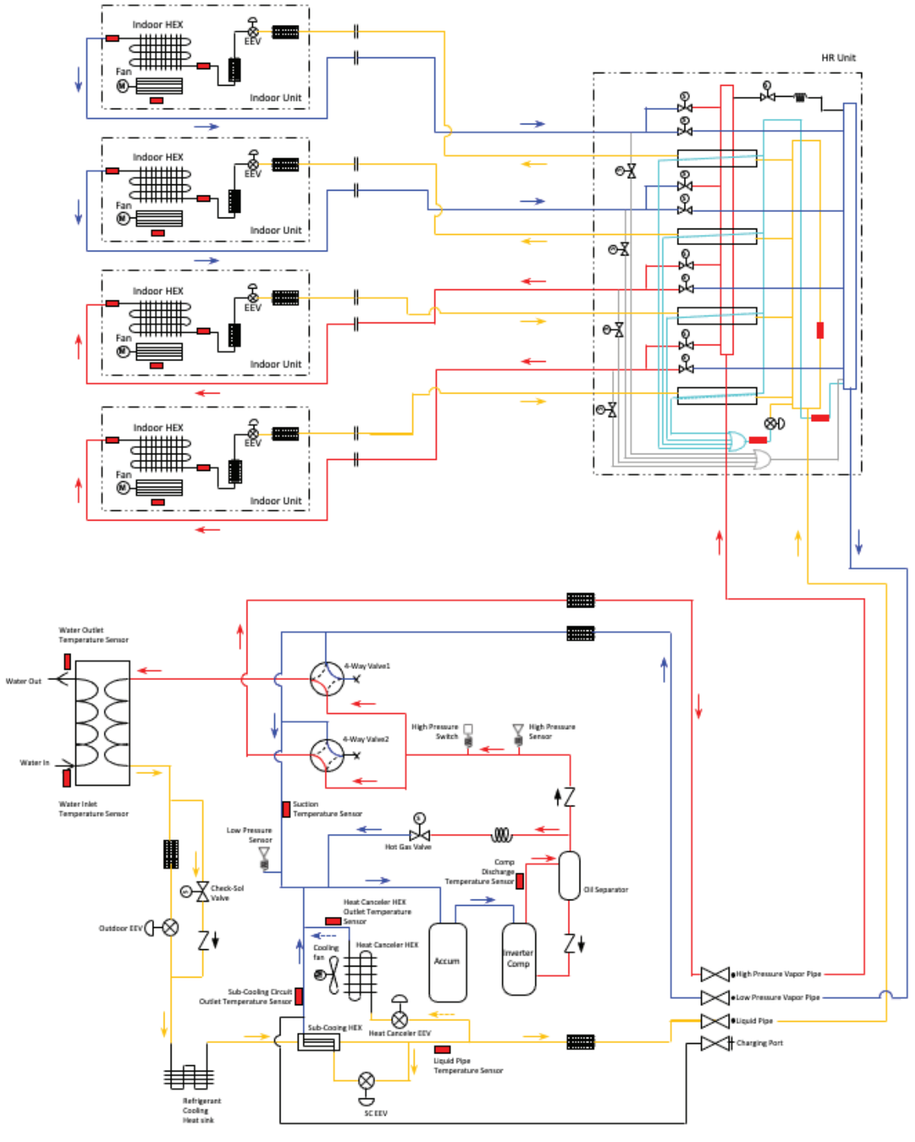


Remarks					
	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

REFRIGERANT FLOW DIAGRAMS

MULTI V WATER V

Multi V Water V Heat Recovery Config. - Balanced Simultaneous Operation
575V 6/8/10/12/16 Ton

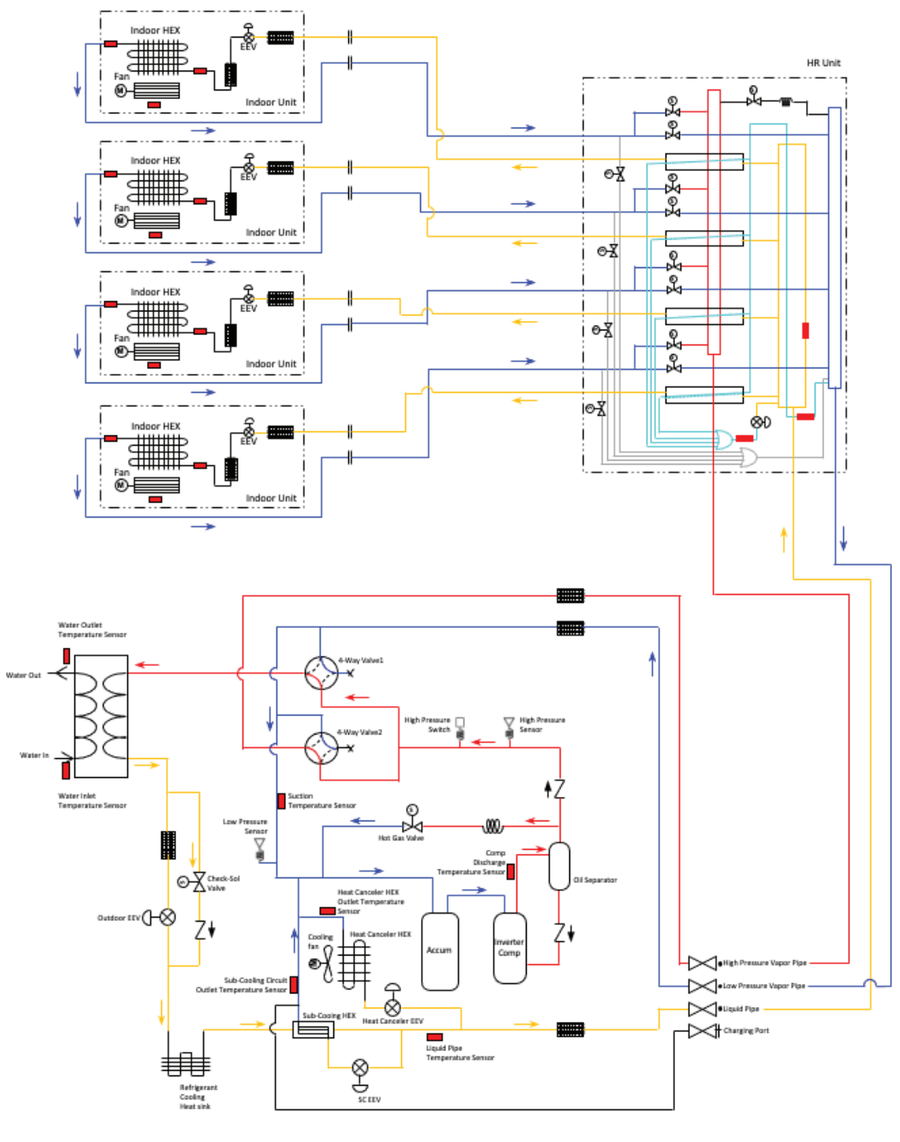


Remarks					
	Check Valve	EEV	Solenoid Valve	Pressure Sensor	Pressure Switch
	Strainer	Temperature Sensor	SVC Valve		

MULTI V WATER V

REFRIGERANT FLOW DIAGRAMS

Multi V Water V Heat Recovery Config. - Oil Return
575V 6/8/10/12/16 Ton



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

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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.

Figure 6: Sound Pressure Measurement Location.

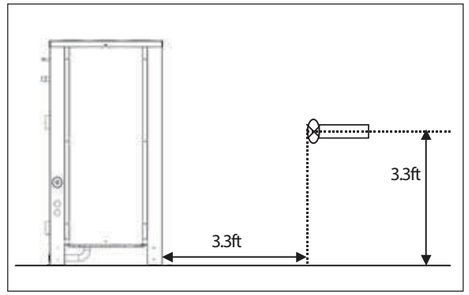


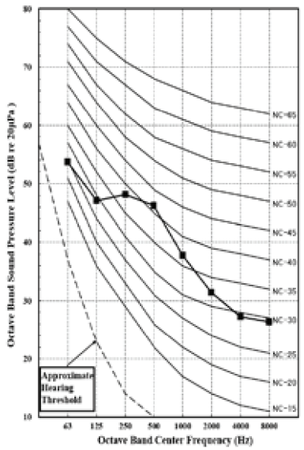
Table 6: Multi V Water V 575V ODU Sound Pressure Levels.

575 V	Sound Pressure Level (dB)A
ARWM072CAS5 6.0 ton	46
ARWM096CAS5 8.0 ton	48
ARWM121CAS5 10.0 ton	54
ARWM144CAS5 12.0 ton	54
ARWM192CAS5 16.0 ton	58
ARWM240CAS5 20.0 ton	55
ARWM288CAS5 24.0 ton	57
ARWM336CAS5 28.0 ton	59
ARWM432CAS5 36.0 ton	59
ARWM480CAS5 40.0 ton	61
ARWM576CAS5 48.0 ton	63

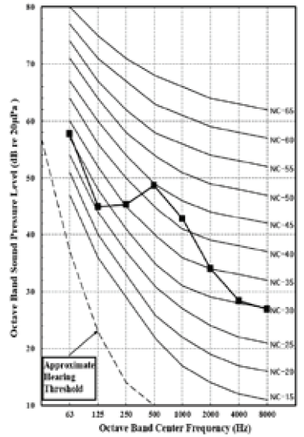
ACOUSTIC DATA
Sound Pressure Levels

Multi V Water V 575V

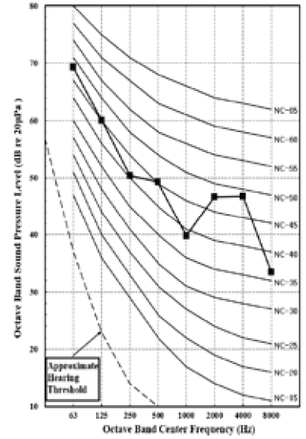
ARWM072CAS5



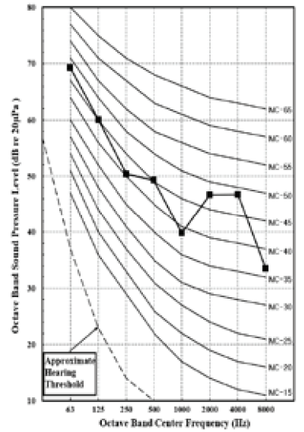
ARWM096CAS5



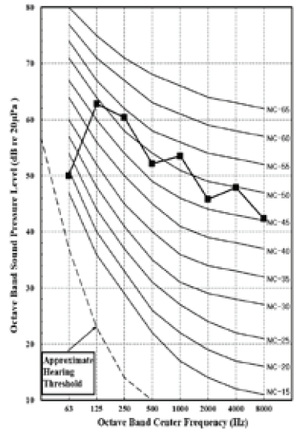
ARWM121CAS5



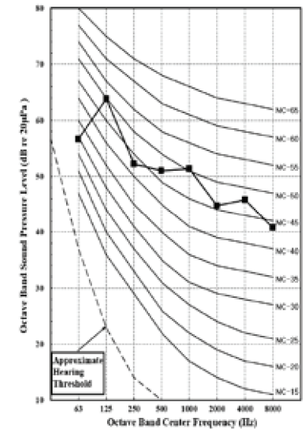
ARWM144CAS5



ARWM192CAS5



ARWM240CAS5

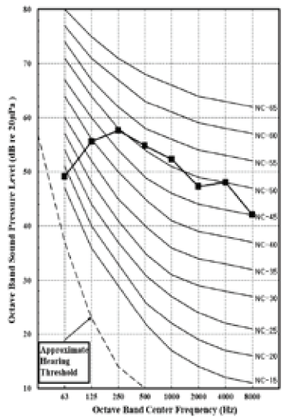


ACOUSTIC DATA

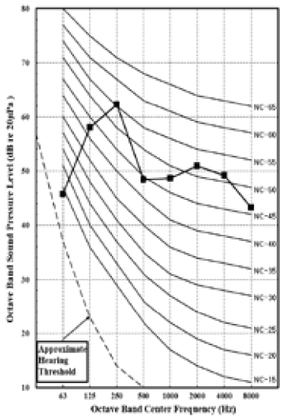
Sound Pressure Levels

Multi V Water V 575V continued.

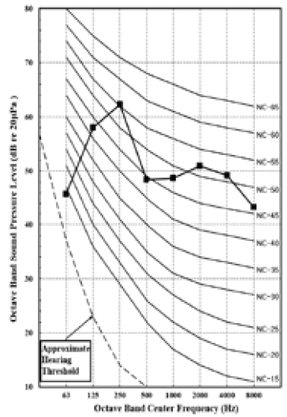
ARWM288CAS5



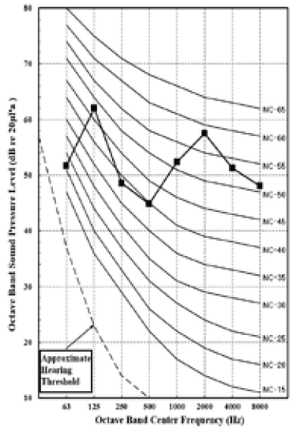
ARWM336CAS5



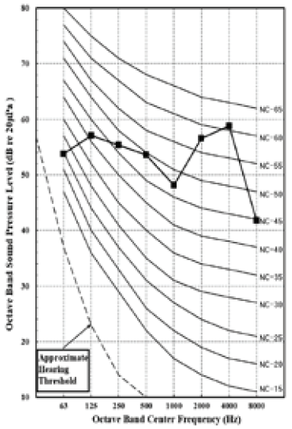
ARWM432CAS5



ARWM480CAS5



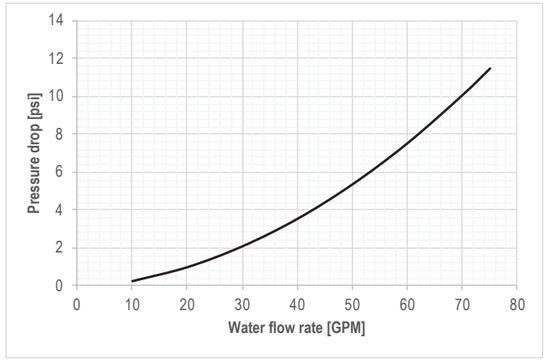
ARWM576CAS5



HEAD LOSS BY WATER FLOW

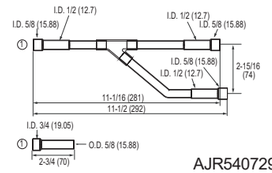
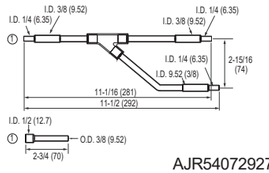
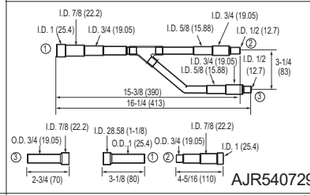
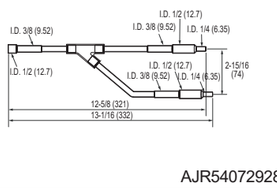
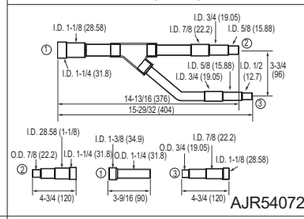
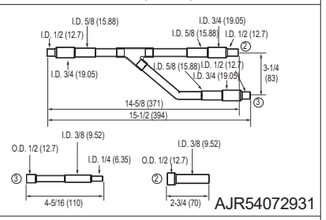
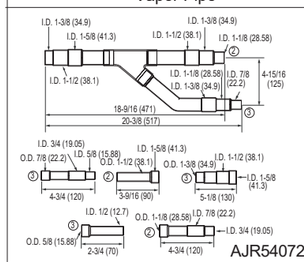
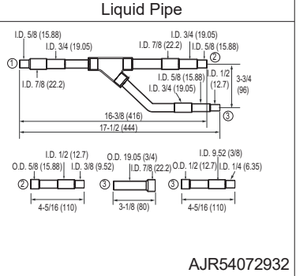
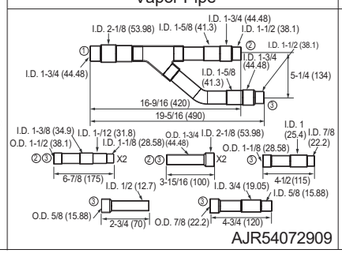
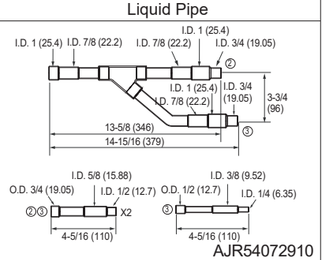
Multi V Water V 575V Systems

Multi V Water V 575V Models:
ARWM072CAS5, ARWM096CAS5, ARWM-121CAS5, ARWM144CAS5, ARWM192CAS5



Indoor Unit Y-Branches for Heat Pump Configuration

(Unit: Inch [mm])

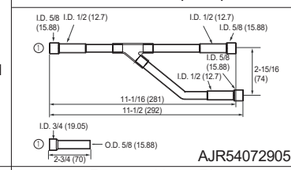
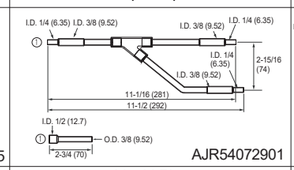
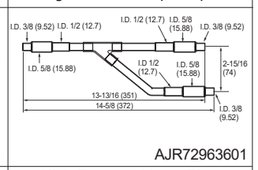
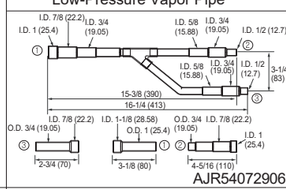
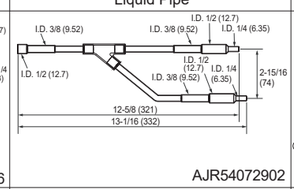
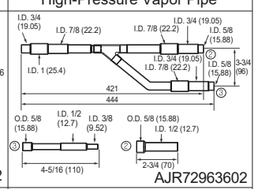
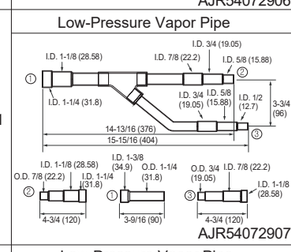
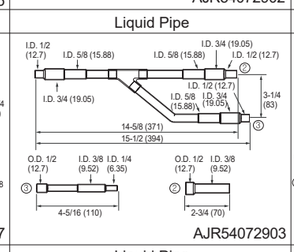
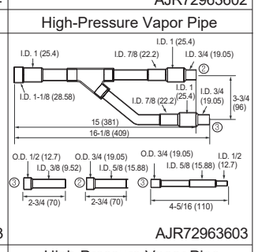
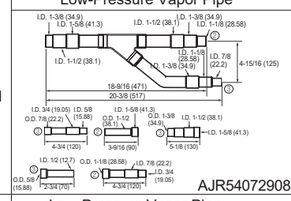
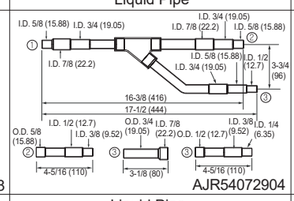
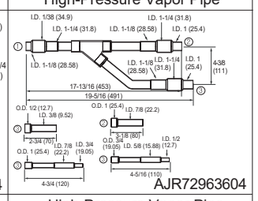
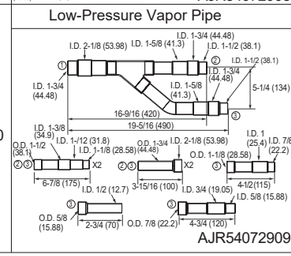
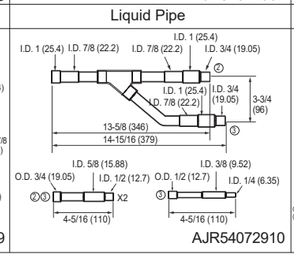
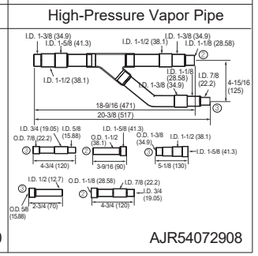
Models	Pipe	
	Vapor Pipe	Liquid Pipe
ARBLN01621	 AJR54072929	 AJR54072927
ARBLN03321	 AJR54072930	 AJR54072928
ARBLN07121	 AJR54072933	 AJR54072931
ARBLN14521	 AJR54072908	 AJR54072932
ARBLN23220	 AJR54072909	 AJR54072910

MULTI V WATER V

ACCESSORIES
Indoor Unit Y-Branches

Indoor Unit Y-branches for Heat Recovery Configuration

(Unit: Inch [mm])

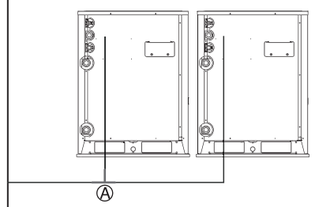
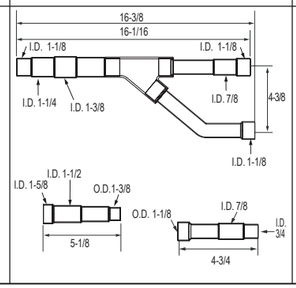
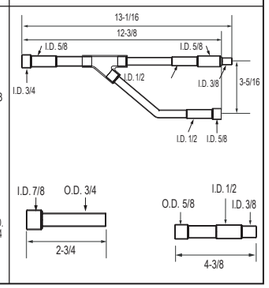
Models	Pipe		
	Low-Pressure Vapor Pipe	Liquid Pipe	High-Pressure Vapor Pipe
ARBLB01621	 AJR54072905	 AJR54072901	 AJR72963601
ARBLB03321	 AJR54072906	 AJR54072902	 AJR72963602
ARBLB07121	 AJR54072907	 AJR54072903	 AJR72963603
ARBLB14521	 AJR54072908	 AJR54072904	 AJR72963604
ARBLB23220	 AJR54072909	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

MULTI V WATER V

Outdoor Unit Y-branches for Heat Pump Configuration

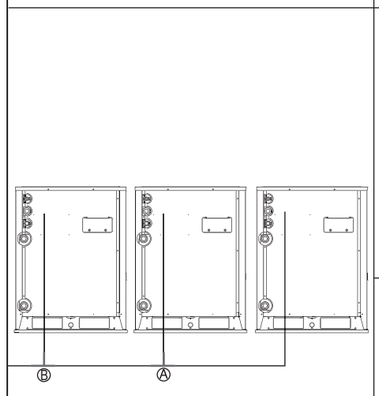
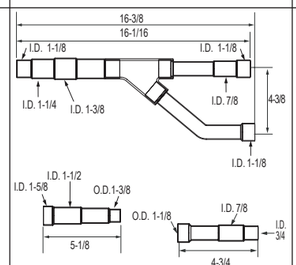
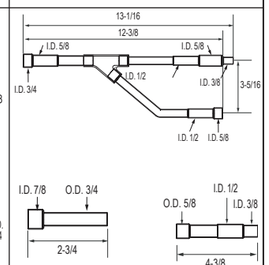
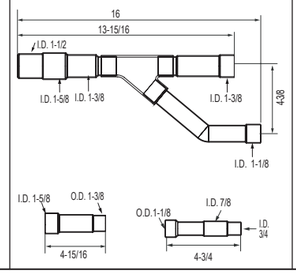
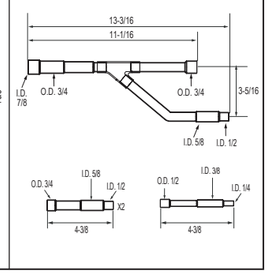
For Dual-Frame Systems

Unit: inch

Combination	Multi-frame Connector	Vapor pipe	Liquid pipe
	Ⓐ ARCNN21		

For Triple-Frame Systems

Unit: inch

Combination specification	Multi-frame Connector	Vapor pipe	Liquid pipe
	Ⓐ ARCNN21		
	Ⓑ ARCNN31		

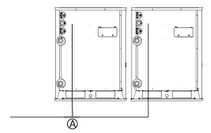
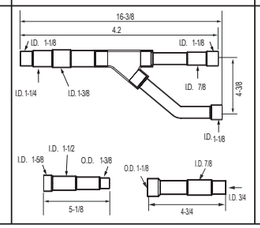
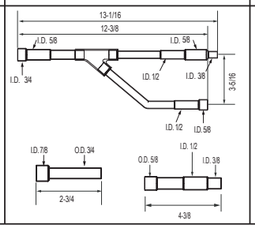
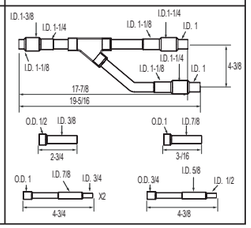
ACCESSORIES
Outdoor Unit Y-Branches

MULTI V WATER V

Outdoor Unit Y-branches for Heat Recovery Configuration

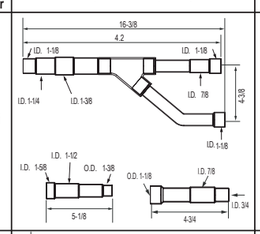
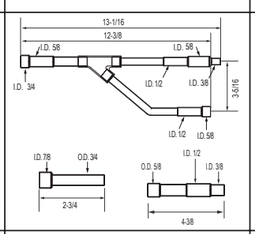
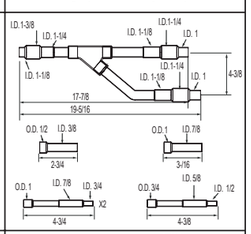
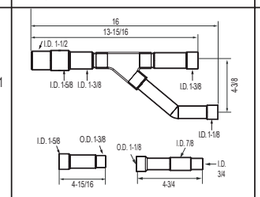
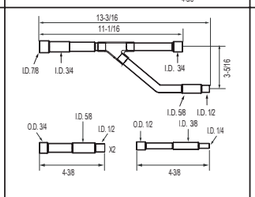
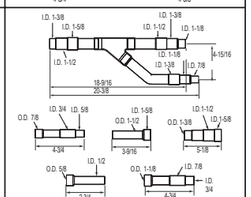
For Dual-Frame Systems

Unit: inch

Combination specification	Multi-frame Connector	Low-pressure Vapor Pipe	Liquid Pipe	High-pressure Vapor Pipe
	Ⓐ ARCNB21			

For Triple-Frame Systems

Unit: inch

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

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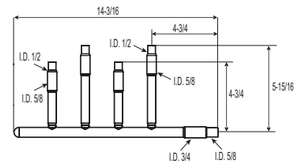
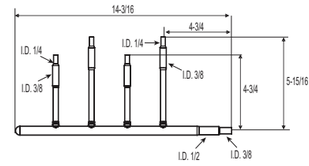
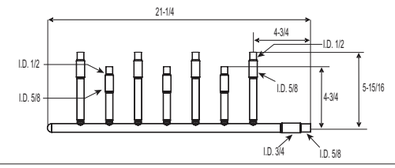
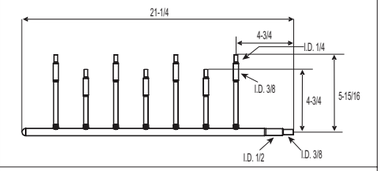
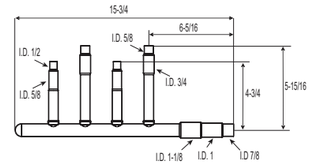
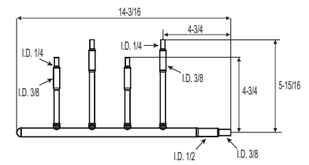
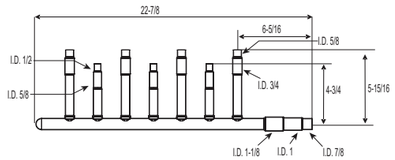
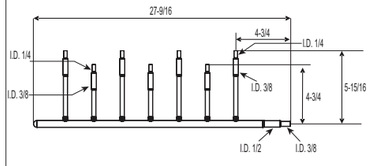
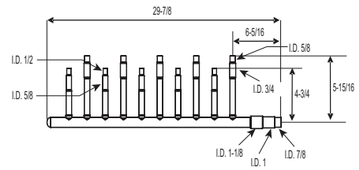
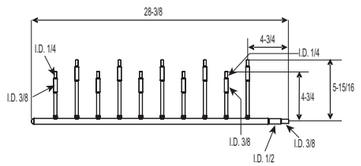
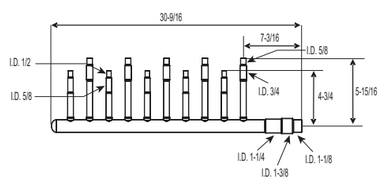
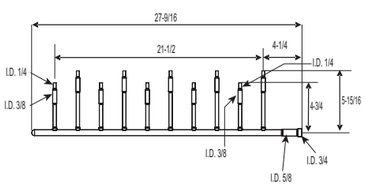
Headers for Heat Pump and Heat Recovery Configuration

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		

- 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 7: Header.

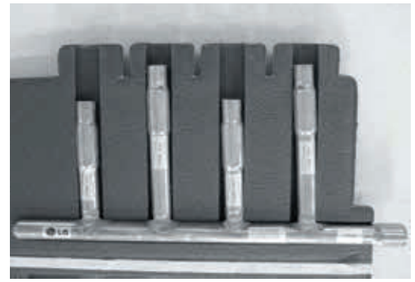


Table 7: Nominal Capacity Range.

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 8: 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 9: Insulation Jacket Properties.

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

Table 10: Fitting Properties.

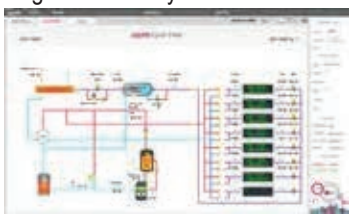
Material	Copper
Design Pressure	550 psig

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
- 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

Figure 8: MV Cycleview.



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

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:

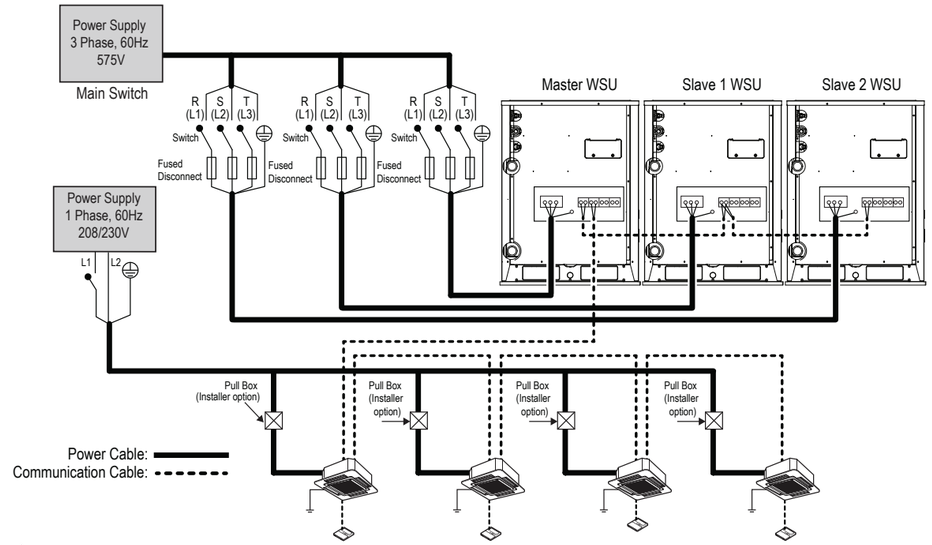
- CPU: Pentium® IV 1.6 GHz
- Operating System: Windows® NT/2000/XP/Vista
- Main Memory: 256 MB
- Hard Disk: 600 MB when operating
- Web Browser: Internet Explorer® 5.0

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.

ELECTRICAL CONNECTIONS

SYSTEM FOR HEAT PUMP CONFIGURATION, 575V

Figure 9: Example of a Typical Heat Pump Configuration Power Wiring and Communications Cable Schematic.

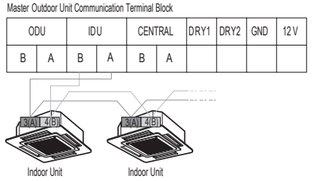


⚠WARNING

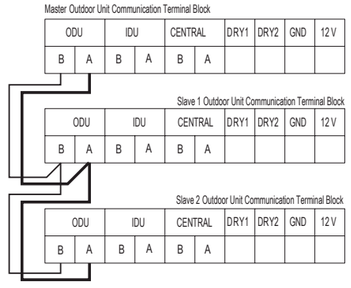
- *Ground wiring is required to prevent accidental electrical shock during current leakage, communication problems from electrical noise, and motor current leakage. ⃠ Do not connect the ground line to the pipes. There is risk of fire, electric shock, explosion, physical injury or death.*
- *Install a main shutoff switch that interrupts all power sources simultaneously. There is risk of fire, electric shock, explosion, physical injury or death.*
- *Communication cable between Master ODU to Slave ODU(s), and Master ODU to IDUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Master 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.*

Heat Pump Operation

Communications Cable Between Master Outdoor Unit and Indoor Unit



Communications Cable Between Master Outdoor Unit and Slave Outdoor Unit(s)

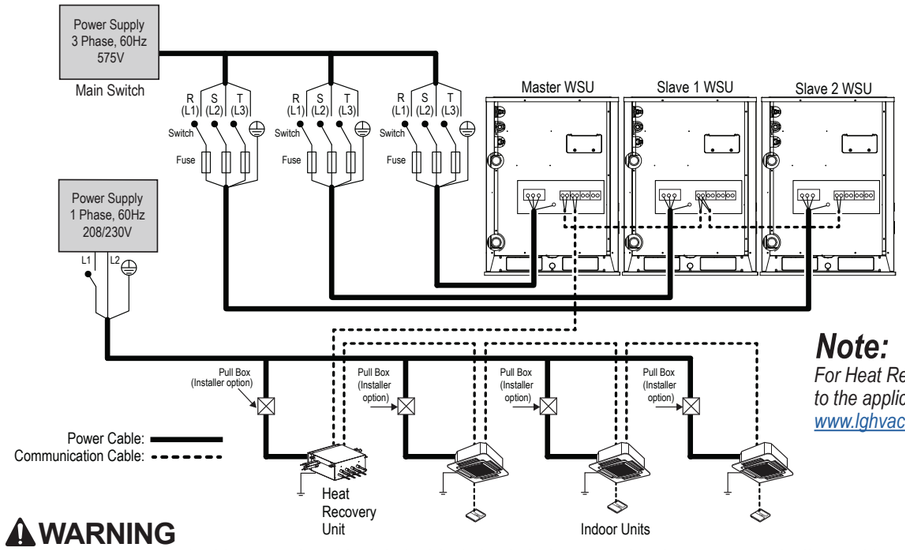


Note:

- *Make sure that the terminal numbers of master water source unit and slave 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 CONFIGURATION, 575V

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



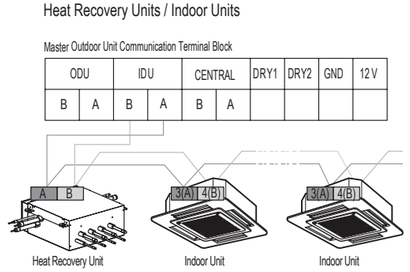
Note:
For Heat Recovery Unit information, refer to the applicable Engineering Manual on www.lghvac.com.

⚠WARNING

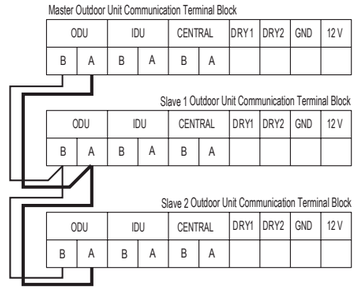
- *Ground wiring is required to prevent accidental electrical shock during current leakage, communication problems from electrical noise, and motor current leakage. ⃠ Do not connect the ground line to the pipes. There is risk of fire, electric shock, explosion, physical injury or death.*
- *Install a main shutoff switch that interrupts all power sources simultaneously. There is risk of fire, electric shock, explosion, physical injury or death.*
- *Communication cable between Master ODU to Slave ODU(s), and Master ODU to IDUs / HRUs to be 18 AWG, 2-conductor, twisted, stranded, shielded. Ensure the communication cable shield is properly grounded to the Master 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.*

Heat Recovery Operation

Communications Cable Between Master Outdoor Unit and Heat Recovery Units / Indoor Units



Communications Cable Between Master Outdoor Unit and Slave Outdoor Unit(s)



Note:

- *Make sure that the terminal numbers of master water source unit and slave 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.*

DIP SWITCH SETTINGS FOR USE WITH GEN 4 INDOOR UNITS

Generation 4 Equipment

The latest versions of 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. The "System Component Combinations and Operation Status" table lists how combining different components will affect system operation. The "Serial Numbers or Air / Water Source Units with Gen 4 or Higher Software" table lists the serial numbers of air and water source units that have Gen 4 or higher software. 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 3: Location and Setting of Outdoor Unit DIP Switch 3.

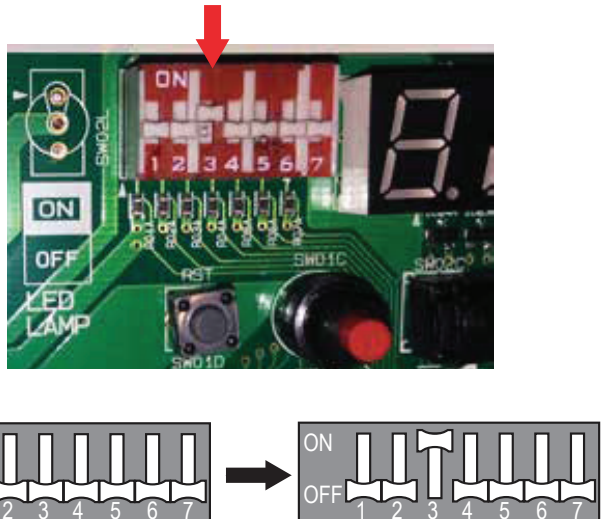


Table 1: System Component Combinations and Operation Status.

Air / Water Source Units*	Indoor Unit(s)**	Heat Recovery Unit(s)	Outdoor Unit DIP Switch No. 3	Operation Status
Gen 4 or Higher	Gen 4 ONLY	Model 2A ONLY	Must be ON	System will operate WITH Gen. 4 indoor unit features.
Gen 4 or Higher	Gen 4 ONLY	Model 2A ONLY	OFF	System will operate but WITHOUT Gen. 4 indoor unit features.
Gen 4 or Higher	Gen 4 ONLY	Any combination of Models 1A, 2A	Must be OFF (factory default)	Does NOT include Gen. 4 features. System will not operate if DIP Switch No. 3 is ON, and an error code will be generated.
Gen 4 or Higher	Any combination of Gen 2 and Gen 4	Model 2A ONLY	Must be OFF (factory default)	
Gen 4 or Higher	Any combination of Gen 2 and Gen 4	Any combination of Models 1A, 2A	Must be OFF (factory default)	
Gen 2	Any combination of Gen 2 and Gen 4	Any combination of Models 0A****, 1A, 2A	N/A***	Does not include Gen. 4 features.

*Gen 4 or Higher Air / Water Source Units = Multi V 5, Multi V IV or Multi V Water IV with Gen 4 or Higher software (see table below for Gen 4 or higher serial numbers) or Multi V S.

Gen 2 Air / Water Source Units = Multi V II, Multi V III, Multi V IV without Gen. 4 software, Multi V Water II, Multi V Water IV without Gen. 4 software, Multi V Mini, Multi V Water Mini, or Multi V Space II.

**Gen 4 Indoor Units model numbers end in "4"; Gen 2 Indoor Units model numbers end in "2" or an "A", including Hydro Kit.

***DIP Switch No. 3 on Gen 2 air / water source units is not related to Gen 4 features as it is with Gen 4 air / water source units.

****0A Model Heat Recovery units are not for use with Multi V 5, Multi V IV, Multi V Water IV, or Multi V III heat recovery systems.

Table 2: Serial Numbers of Air / Water Source Units with Gen 4 or Higher Software.

Air / Water Source Unit Model Type	Multi V Air Source Heat Pump	Multi V Air Source Heat Recovery	Multi V IV Water Source Heat Pump	Multi V IV Water Source Heat Recovery
Serial Number of Air / Water Source Units with Gen 4 or Higher Software	502********* and Higher	503********* and Higher	504********* and Higher	

WATER LOOP CIRCUIT DESIGN

Water Design Guide on page 46
Water Circuit Installation on page 50

Design Steps

A Multi V Water 5 575V system requires a water cooling/heating source. This year-round heating and cooling system must have a two-pipe closed- loop water circuit that circulates water continuously and maintains the temperature of water entering the Multi V Water 5 575V system between 23°F and 113°F when the Multi V Water 5 575V system is in Cooling mode or Synchronous mode (synchronous mode applies to heat recovery systems only). In Heating mode, water temperature must be maintained between 14°F and 113°F. See the Multi V Water 5 575V Performance Data Manual for performance at different entering water temperatures.

When entering water temperature is below 59°F, the LG variable water flow control kit Model No. PWFCKN000 is required. At the high end of this temperature range, a heat rejecter (cooling tower, dry cooler, geothermal well) is required to remove heat, while at the low end of the temperature range, an auxiliary heat source (boiler, solar panel, geothermal well) must add heat.

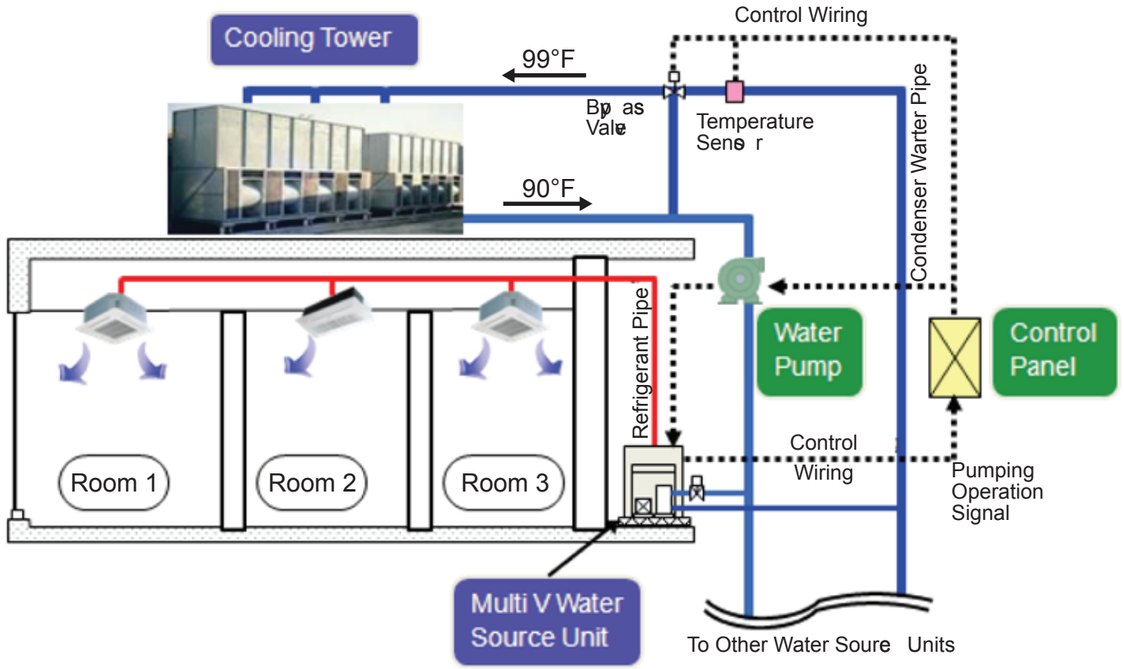
Piping, pumps, and accessories must be sized to provide adequate water flow to the water source unit.

Design Schematic

The Water Source Units have factory-installed, stainless-steel plate heat exchangers. To protect these heat exchangers, it is recommended to use closed cooling towers. If open cooling towers or other open loop systems are used, an intermediate heat exchanger must be added to protect the water source unit from contaminants and debris in the water system that may foul or clog the heat exchanger. Open loop systems without an intermediate heat exchanger are not recommended due to risk of freezing, reduction of flow due to scaling or clogging, or other potential problems caused by improper water quality.

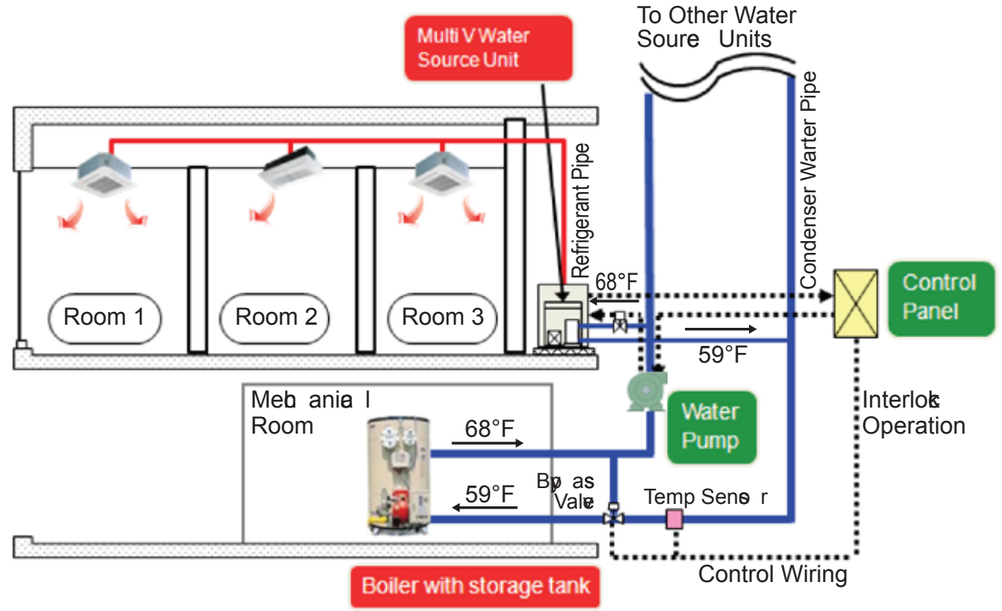
Water Cooling Cycle Diagram

Figure 12: Water Cooling Cycle Diagram



Water Heating Cycle Diagram

Figure 13: Water Heating Cycle Diagram



Expansion Tank

All closed loop systems must have a bladder type expansion tank installed. The expansion tank will protect the equipment from excess pressures due to expansion of water in the loop.

Heat Source and Storage Tank

There are several sources for heat that can be used for this system. They include the following:

- Electric boiler
- Gas boiler
- Solar heat with storage tanks
- Geothermal fields
- Steam heat from remote central plant

If floor space is available, a heat storage tank can be installed to compensate for the thermal flux of the system. The heat storage tank can store surplus heat or store heat during the night when electric rates are lower. Closed type storage tanks are recommended to prevent contamination of the water system.

Piping System

The following field supplied components must be installed at each Multi V Water 5 575V Water Source Unit.

- Flow switch at outlet in the horizontal pipe. Wire the flow switch to communication terminals and set to shut off the WSU if flow falls below 50% of WSU design flow. The flow switch must be the normally open type. The flow switch must be installed within at least five (5) pipe diameters downstream and at least three (3) pipe diameters upstream of elbows, valves, or reducers which can cause turbulence and lead to flow switch flutter.
- Strainer with minimum 50 mesh screen at inlet. Clean the mesh screen twenty-four (24) hours after startup, and then clean regularly to prevent water flow blockage.
- A water balancing valve, circuit setter, or flow control valve to regulate proper water flow to each WSU.

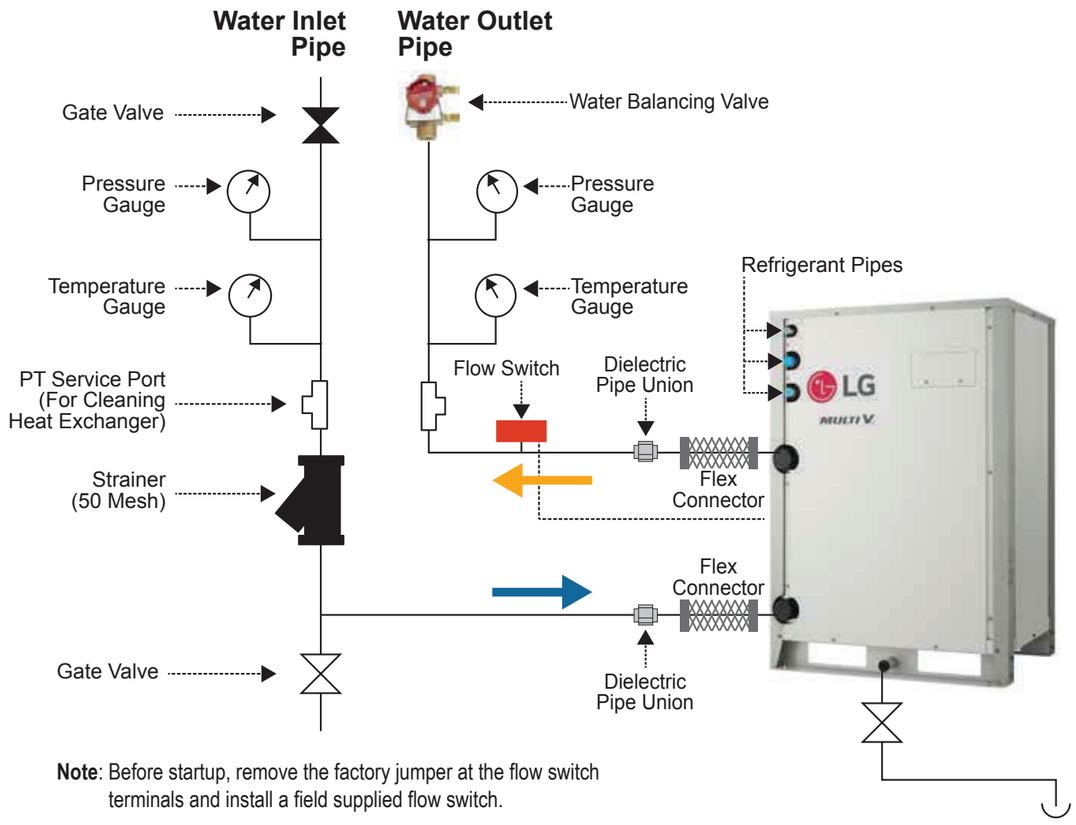
Piping System, continued

- Dielectric pipe unions to prevent the possibility of galvanic corrosion.
- Pressure gauge at inlet and outlet.
- Thermometers at inlet and outlet.
- Flexible connectors at inlet and outlet.
- Shutoff valves at the inlet and outlet to permit service of the WSU.
- Condensate drain trap per local code.
- Service port with hose connections at inlet and outlet to flush the WSU heat exchanger when isolated from the water loop system.

Other considerations:

- Inhibitors must be used in the water loop, especially if water temperature operates above 104°F.
- Maintain water quality requirements.

Figure 14: WSU Water and Refrigerant Connections Diagram



Note: Before startup, remove the factory jumper at the flow switch terminals and install a field supplied flow switch.

Freeze Protection

The piping system must be protected from freezing during winter conditions. Heating mode of the water source unit will reduce water loop temperature. The addition of antifreeze may lower the performance of the water source unit due to reduced heat transfer and added pressure drop. LATS system design software has options to add antifreeze and calculate reduced capacity. To manually calculate capacity reduction, follow these steps:

1. Find the appropriate system cooling or heating correction factor in the following Table.
2. Multiply the cooling or heating correction factor by the water source unit capacity to find the NET water source unit capacity.
3. Apply the appropriate system pressure drop correction factor from the Table below and multiply by the water source unit pressure drop to find the net water source unit pressure drop.

Table 28: Antifreeze Correction Factors

Antifreeze Type	Item	Antifreeze % by weight				
		10%	20%	30%	40%	50%
Methanol	Cooling	0.998	0.997	0.995	0.993	0.992
	Heating	0.995	0.99	0.985	0.979	0.974
	Pressure Drop	1.023	1.067	1.091	1.122	1.160
Ethylenel Glycol	Cooling	0.996	0.991	0.987	0.983	0.979
	Heating	0.993	0.985	0.997	0.969	0.961
	Pressure Drop	1.024	1.068	1.124	1.188	1.263
Propylene Glycol	Cooling	0.993	0.987	0.98	0.974	0.968
	Heating	0.986	0.973	0.96	0.948	0.935
	Pressure Drop	1.040	1.098	1.174	1.273	1.405

Water Quality Requirements

Impurities in the water can influence the performance and life expectancy of the water source unit. Use a local water treatment professional to test and treat the water. Use inhibitors in the water loop, especially if the water temperature is operated above 104°F. Ensure all air is purged from the system. Maintain the following levels:

Table 29: Water Test Levels

Item	Closed Type System		Effect	
	Circulating Water	Supplemented Water	Corrosion	Scale
Basic Items:				
pH [77° F]	7.0 ~ 8.0	7.0 ~ 8.0	O	O
Conductivity [77° F] mS/m	Below 30	Below 30	O	O
Chlorine ions (mg Cl^-/L)	Below 50	Below 50	O	–
Sulfate ions (mg SO_4^{2-}2/L)	Below 50	Below 50	O	O
Acid consumption (pH4.8) (mg$CaCO_3$/L)	Below 50	Below 50	–	O
Total Hardness (mg $CaCO_3$/L)	Below 70	Below 70	–	O
Calcium Hardness (mg $CaCO_3$/L)	Below 50	Below 50	–	O
Ionic-static silica (mg SiO_2/L)	Below 30	Below 30	–	O
Reference Items:				
Iron (mg Fe/L)	Below 1.0	Below 0.3	O	O
Copper (mg Cu/L)	Below 1.0	Below 0.1	O	–
Sulfate ion (mg SO_4^{2-}/L)	Must not be detected	Must not be detected	O	–
Ammonium ion (mg NH_4^+)L	Below 0.3	Below 0.1	O	–
Residual chlorine (mg CL/L)	Below 0.25	Below 0.3	O	–
Free carbon dioxide (mg CO_2/L)	Below 0.4	Below 4.0	O	–
Stability index	–	–	O	O

O = possibility of occurrence

Pipe Insulation

Water pipe insulation is suggested in the following conditions:

- Where water pipe is subject to freezing.
- Water pipe where water can condense on surface of pipe from ambient room temperatures higher than temperature of water in the pipe. If water temperature is maintained at 68°F in winter and 86°F in summer, insulation will not be required.
- On boiler water pipes to save energy losses from heat source.
- On condensate drain lines.
- Where required by local code.

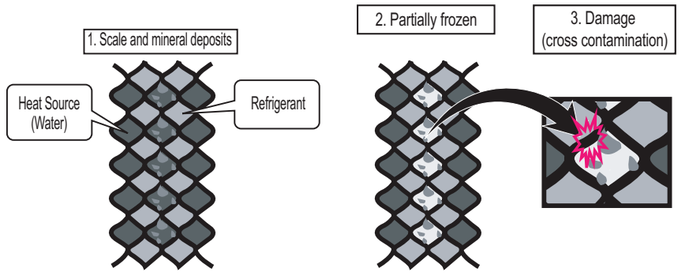
Device Protection Details

Strainer on Water Pipe

To protect the water source unit, a strainer with ≥50 mesh must be installed on the water source unit inlet piping. If not installed, the heat exchanger can be damaged by particles in the water supply.

1. The water-supply circuitry within the plate-type heat exchanger is comprised of many small paths / channels.
2. If a strainer with 50 mesh or more is not included, foreign particles can partially block the water flow.
3. When the system operates in heating, the plate-type heat exchanger functions as an evaporator, therefore, the temperature of the coolant supply drops the temperature of the heat-source water supply, which can result in ice forming in the water circuitry.
4. As heating operation progresses, the channels can be partially frozen, which may damage the plate-type heat exchanger.
5. If the heat exchanger is damaged, the coolant supply and the heat source water supply will mix, and the system will not function.

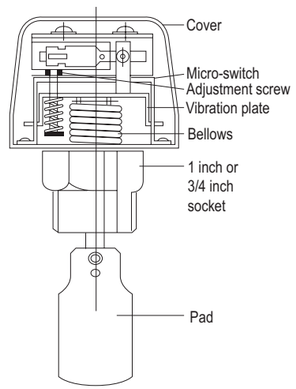
Figure 15: Potential Heat Exchanger Damage.



Flow Switch

- It is recommended to install a flow switch on the water pipes that are connected to the WSU.
- Flow switch must be rated for 208-230V and be a normally open type. Flow switch will perform as the first protection device when heated water is not supplied. If the required water level is not present after installing the flow switch, the water source unit will display a CH24 error code and will stop operating.
- When setting the flow switch, it is recommended to use the default set value of the water source unit to satisfy the minimum flow rate. Minimum flow rate range is 50%. When installing the Variable Water Flow Control Kit, set minimum water flow to 40% of nominal flow rate.
- Select a flow switch following the pressure specification of the water supply system.

Figure 16: Flow Switch Schematic.



Note:

- *If the set value does not satisfy the minimum flow rate, or if the set value is changed by the user arbitrarily, it can result in performance deterioration or system failure.*
- *If the water source unit operates with a hard water supply, the heat exchanger can be damaged or system failure can occur.*
- *If the water source unit displays a CH24 or CH180 error code, it is possible that the interior of the plate-type heat exchanger is partially frozen. If this occurs, resolve the partial freezing issue and then operate the water source unit again. Causes of partial freezing may be insufficient heat water flow rate, water not supplied, insufficient coolant, foreign particles inside plate-type heat exchanger.*

WATER CIRCUIT INSTALLATION
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Flow Switch, continued.

- The flow switch must be installed at the horizontal pipe of the water source unit's heat water-supply outlet. Verify the direction of the water flow before installation. (Picture 1)
- Remove the jumper wire and connect to the communication terminals (4[A] and 4[B]) of the water source unit's control box. (Pictures 2, 3) Open the flow switch cover and check the wiring diagrams before connecting the wires. Wiring methods can vary by flow switch manufacturer.
- If necessary (and after consulting with an LG representative), use the flow rate detection contact to adjust flow rate to within the minimum range. (Picture 4)
  Minimum flow rate range of this product is 50%. Adjust the flow switch to the contact point when the flow rate reaches 50%. Minimum flow rate range is 50%. When installing the Variable Water Flow Control Kit, set minimum water flow to 40% of nominal flow rate.

Note:

- *If the unit operates while the flow switch contact point is out of the permitted range, it can result in performance deterioration or system failure.*
- *A normally open type of flow switch must be used.*

⚠WARNING

The information contained in this section is intended for use by an industry-qualified, experienced, certified electrician familiar with the NEC who is equipped with the proper tools and test instruments.
Failure to carefully read and follow all instructions in this manual can result in personal injury or death.

All electric work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the NEC, and the instructions given in this manual.
If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

Refer to local, state, and federal codes, and use power wires of sufficient current capacity and rating.
Wires that are too small may generate heat and cause a fire, and physical injury or death.

Secure all field wiring connections with appropriate wire strain relief.
Improperly securing wires will create undue stress on equipment power lugs. Inadequate connections may generate heat, cause a fire, and physical injury or death.

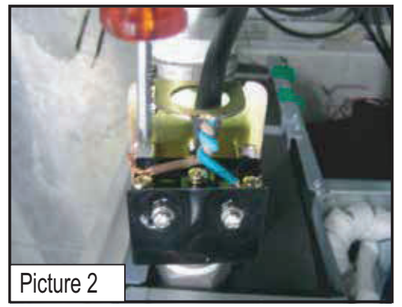
Ensure the system is connected to a dedicated power source that provides adequate power.
If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

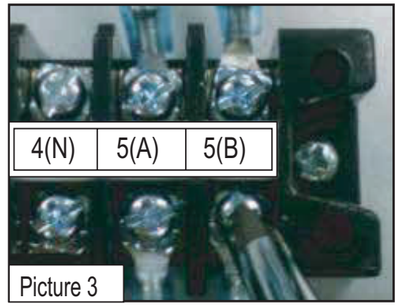
Properly tighten all power connections.
Loose wiring may overheat at connection points, causing a fire, physical injury or death.

⃠ Do not change the settings of the protection devices.
If the protection devices have been bypassed or is forced to operate improperly, or parts other than those specified by LG are used, there is risk of fire, electric shock, explosion, and physical injury or death.

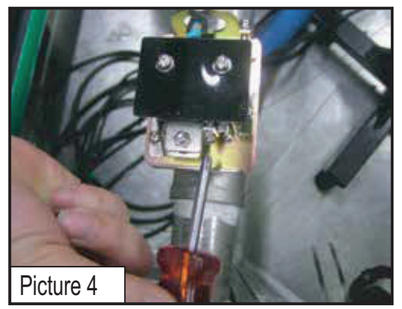
Figure 17: Flow Switch Install Steps.


Picture 1


Picture 2



Picture 3


Picture 4

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Solenoid Valves (Optional)

Solenoid valves may be installed to shut off water flow to the water source unit when the unit turns off. Solenoid valves are field supplied, must be rated for 208-230V, and must be wired to terminals L1 and L2 on the water source unit PCB as shown in the following figure.

Note:

Field-supplied solenoid valve must be a normally closed type.

⚠DANGER

High voltage electricity is required to operate this system. Adhere to the U.S. National Electric Code NEC and these instructions when wiring.
Improper connections and inadequate grounding can cause accidental injury or death.

Always ground the unit following local, state, and NEC codes.
There is risk of fire, electric shock, and physical injury or death.

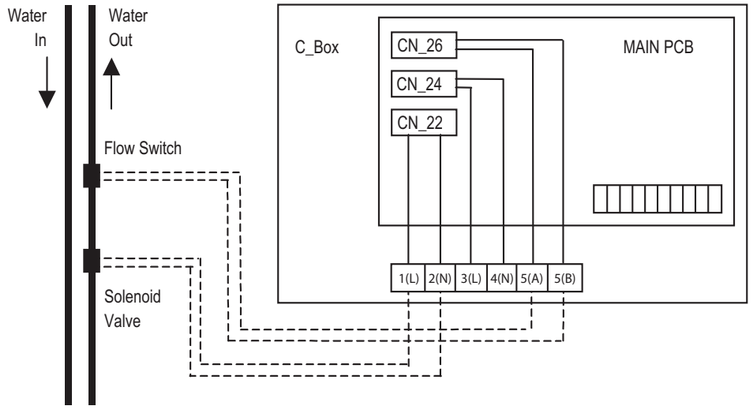
Remove water source unit input power before performing this procedure.
Electrical shock can cause physical injury or death.

Properly size all circuit breakers or fuses.
There is risk of fire, electric shock, explosion, physical injury or death.

⃠ **Do not share the electrical circuit with other devices.**
There is risk of fire, electric shock, and physical injury or death due to heat generation.

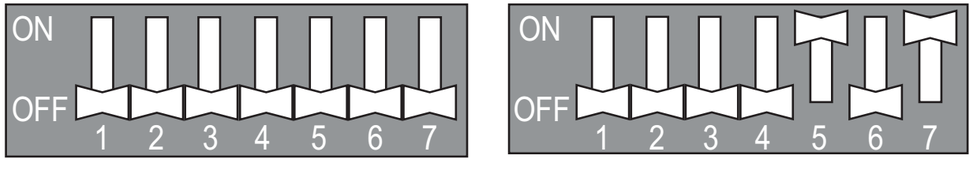
⃠ **Do not use damaged or loose power wiring.** ⃠ **Do not modify or extend the outdoor unit's power wiring randomly. Ensure that the power wiring will not be pulled nor weight be placed on the power wiring during operation.**
There is risk of fire, electric shock, and physical injury or death.

Figure 18: Flow Switch and Solenoid Valve Wiring



Remove water source unit power and set the PCB DIP switches as shown in the following figure.

Figure 19: WSU DIP Switch Settings for Solenoid Valve Control by WSU



Variable Water Flow Valve Control Kit PWFCKN000 (Optional)

When entering water temperature is lower than 59ºF, variable water flow control kit PWFCKN000 is required. LG recommends installing a variable water flow control kit on each water source unit.

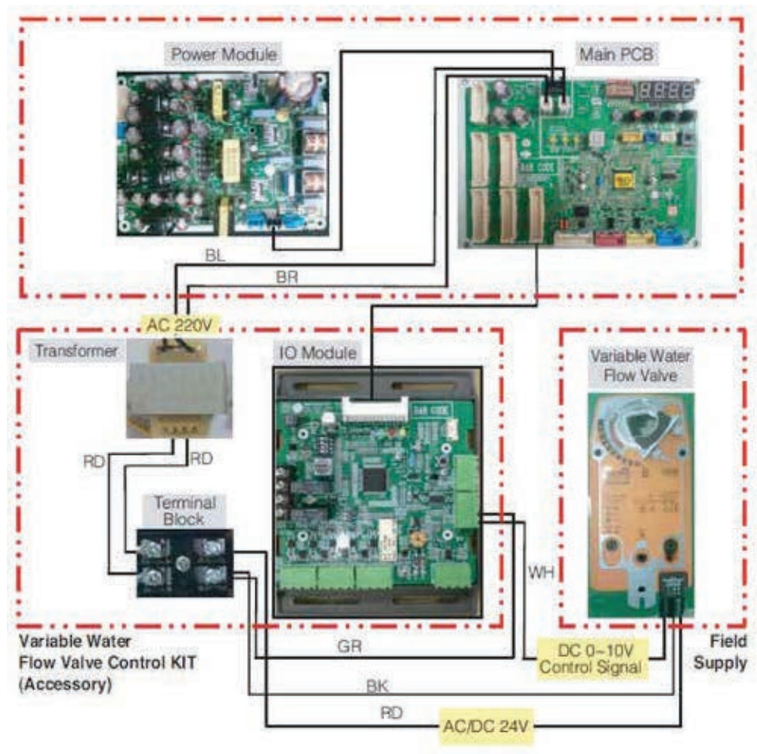
Note:

- *Field-supplied modulating water control valve must be 24V, normally-closed.*
- *Minimum flow rate cannot be less than 40% of normal flow rate.*
- *Variable flow control kit sends 0–10 volt signal to the modulating valve. 10 volts is full open valve position. As building load drops and compressor slows, the signal reduces to close the valve. 1 volt is the minimum flow position of 40% of rated flow. Zero volts is valve fully closed.*

Variable Water Flow Valve Control Kit Installation Steps

1. Remove power from the water source unit.
2. Install the transformer, I/O module, and terminal block inside the water source unit chassis. Secure components with screws.
3. Connect component wiring as shown in the following fFigure 20.
4. Position DIP switch 5 (function 4) to the ON position.
5. Reconnect water source unit power.

Figure 20: Variable Water Flow Valve Control Kit



BL=blue; BR=brown; RD=red; BK=black; WH=white; GR=green

⚠DANGER

High voltage electricity is required to operate this system. Adhere to the U.S. National Electric Code NEC and these instructions when wiring.
Improper connections and inadequate grounding can cause accidental injury or death.

Always ground the unit following local, state, and NEC codes.
There is risk of fire, electric shock, and physical injury or death.

Remove water source unit input power before performing this procedure.
Electrical shock can cause physical injury or death.

Properly size all circuit breakers or fuses.
There is risk of fire, electric shock, explosion, physical injury or death.

⃠ **Do not share the electrical circuit with other devices.**
There is risk of fire, electric shock, and physical injury or death due to heat generation.

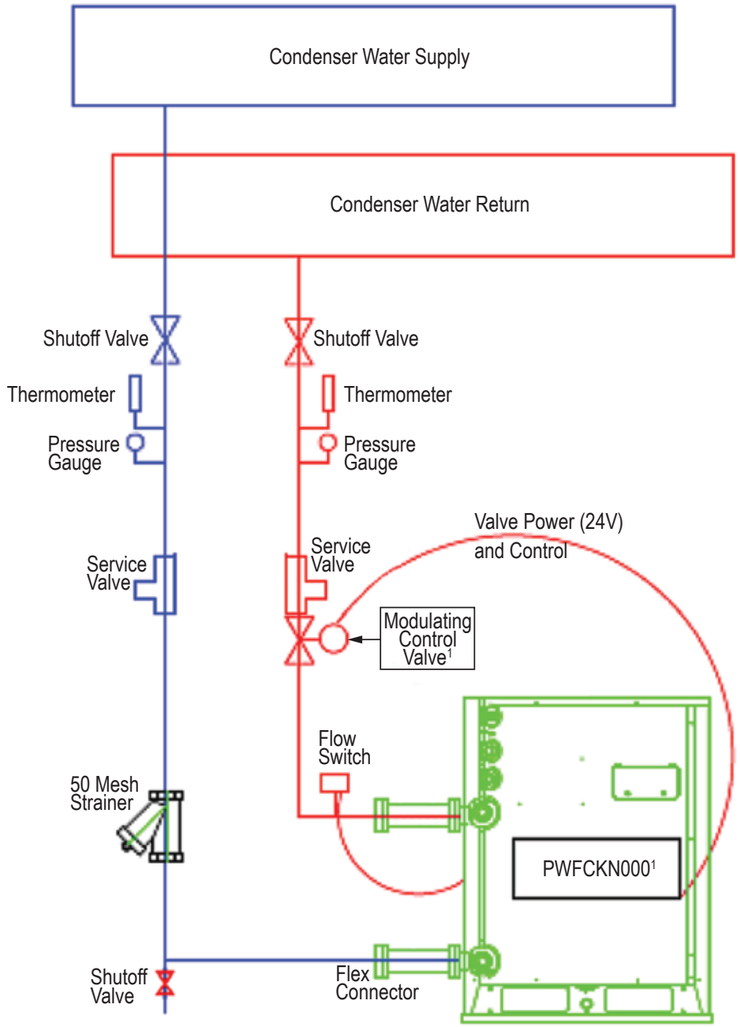
⃠ **Do not use damaged or loose power wiring.** ⃠ **Do not modify or extend the outdoor unit's power wiring randomly. Ensure that the power wiring will not be pulled nor weight be placed on the power wiring during operation.**
There is risk of fire, electric shock, and physical injury or death.

Configuring Variable Water Flow Valve Control Kit for each WSU

LG recommends installing a variable water flow valve control kit on each water source unit. Refer to the figures on the following pages for single, dual, and triple frame configurations.

Variable Water Flow Valve Control Kit for Single Frame

Figure 21: Variable Water Flow Valve Control Kit for Single Frame



[1]Variable Water Flow Valve Control Kit PWFCKN000 controls operation of the field-supplied Modulating Control Valve. The valve must be 24 volt, normally-closed.

WATER CIRCUIT INSTALLATION
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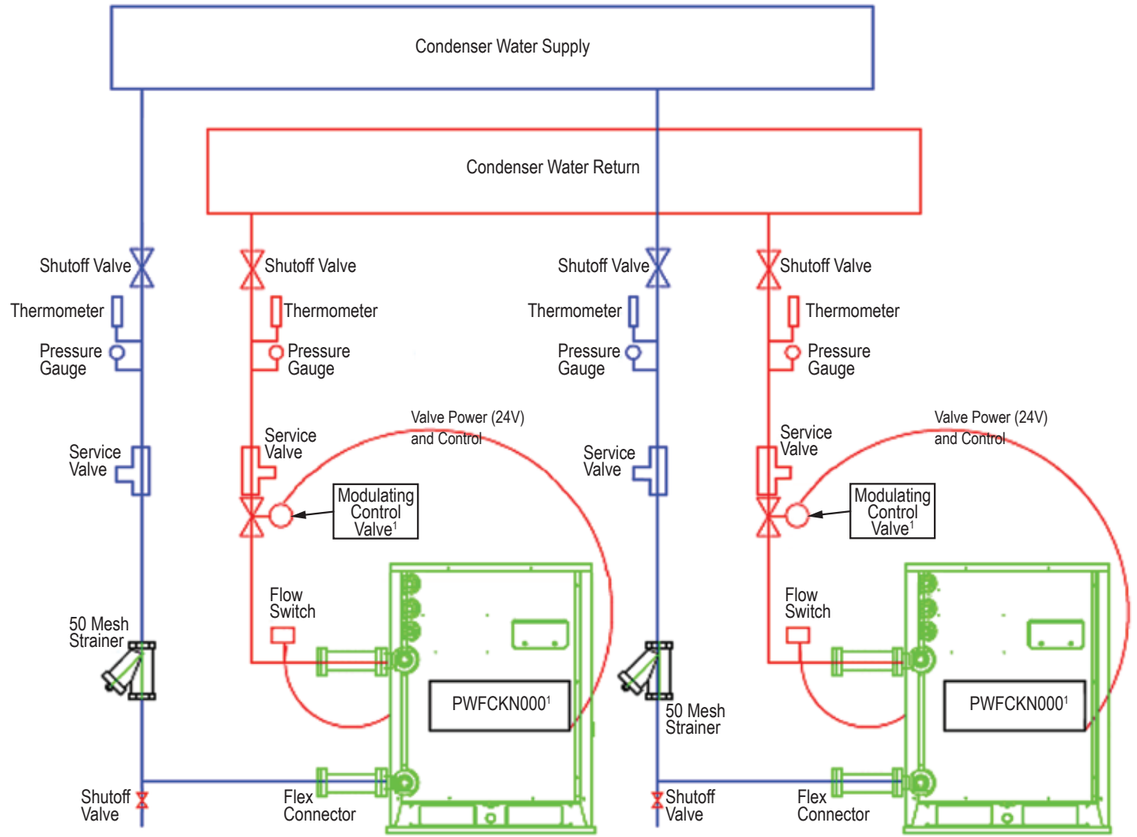
Variable Water Flow Valve Control Kit for Dual Frame

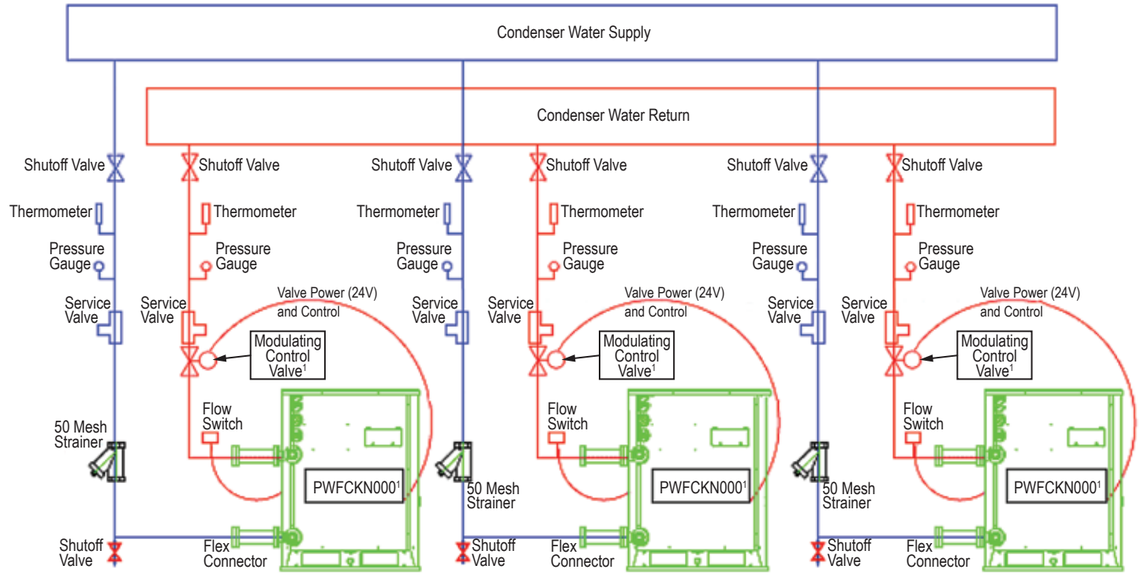
Figure 22: Variable Water Flow Valve Control Kits for Dual Frame



[1]Variable Water Flow Valve Control Kit PWFCKN000 controls operation of the field-supplied Modulating Control Valve. The valve must be 24 volt, normally-closed.

Variable Water Flow Valve Control Kit for Triple Frame

Figure 23: Variable Water Flow Valve Control Kits for Triple Frame



¹Variable Water Flow Valve Control Kit PWFCKN000 controls operation of the field-supplied Modulating Control Valve. The valve must be 24 volt, normally-closed.

Water Piping System Installation

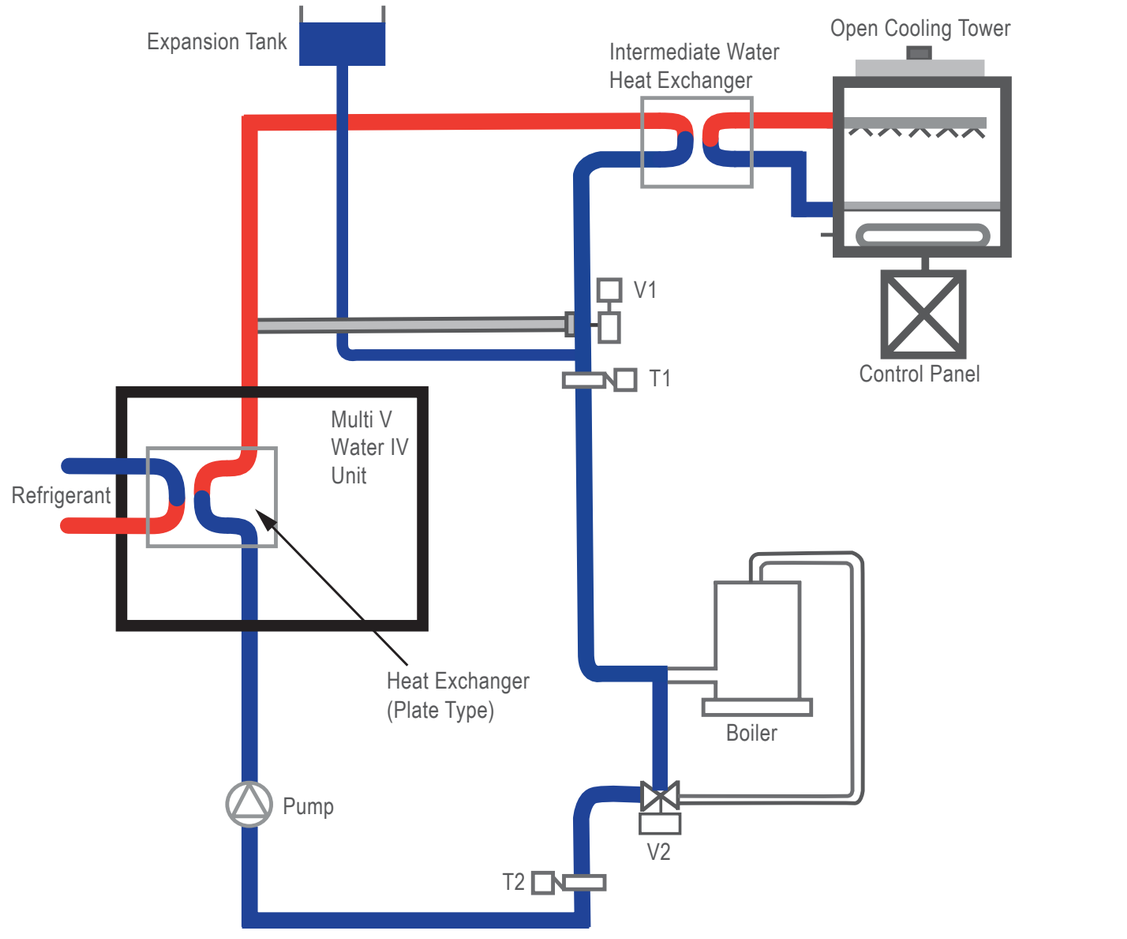
If water temperature is maintained at 68°F in winter and 86°F in summer, insulation is not required. Water pipe insulation is suggested if the following conditions exist:

- Water pipe is subject to freezing.
- Water pipe is located where water can condense on the surface of the pipe from ambient room temperatures higher than the temperature of the water in the pipe.
- Boiler piping (to save energy losses from the boiler).
- Where required by local codes.

Open Tower Design Schematic

When using an open cooling tower or open geothermal wells, an intermediate heat exchanger is recommended to be installed to protect the water source unit from contamination.

Figure 24: Open Tower Design Schematic – Requires Intermediate Heat Exchanger



PIPING LIMITATIONS AND PLACEMENT CONSIDERATIONS

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

Figure 25: Typical Heat Pump System Building Layout with Piping Limitations.

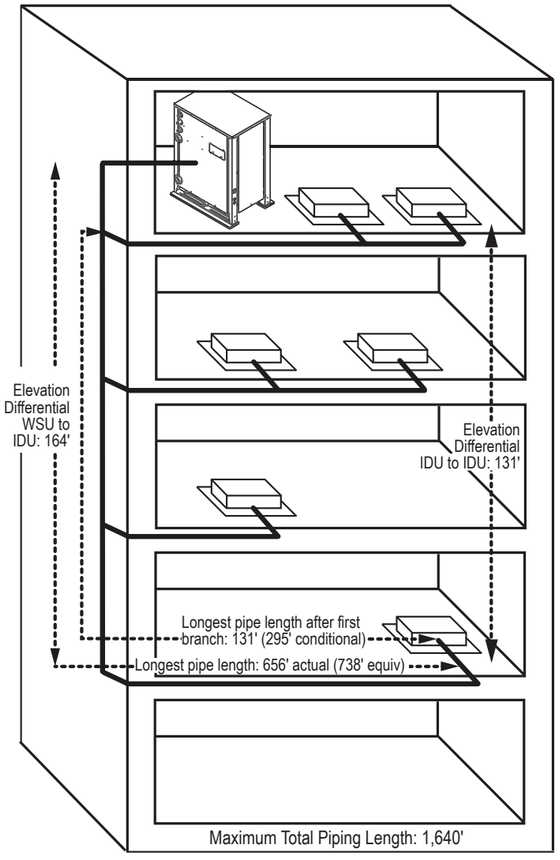


Table 30: Piping Limitations for Heat Pump Operation.

Length	Total pipe length	Longest actual pipe length	Equivalent pipe length[1]
	A + ΣB + ΣC ≤ 1,640 feet	≤656 feet	≤738 feet
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.*

PIPING LIMITATIONS

For Systems Designed for Heat Pump Configuration

Following pages present Multi V Water V 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

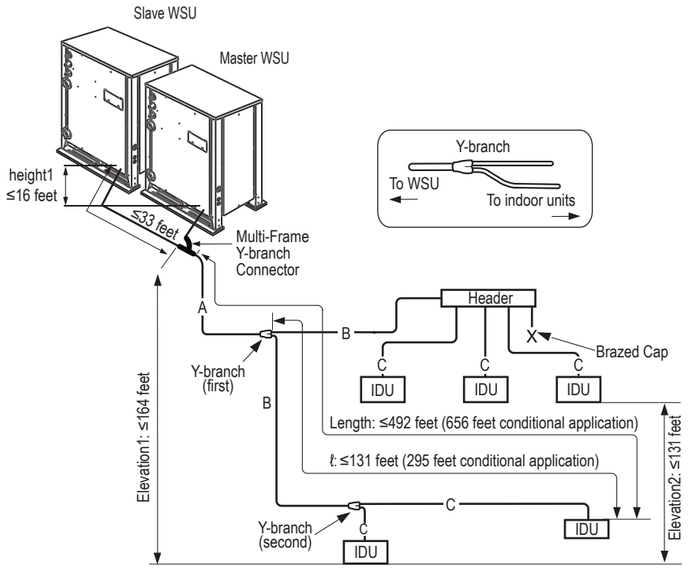
WSU: Water Source Unit

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



Note:

- *Always reference the LATS Multi V software report.*
- *Larger-capacity units must be the master in a multi-frame system.*
- *Master water source unit capacity must be greater than or equal to the slave 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 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 31: 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	3/4	1/2	3/4
8	3/8	7/8	1/2	7/8
10	1/2	1-1/8	5/8	1-1/8
12	1/2	1-1/8	5/8	1-1/8
16	5/8	1-1/8	3/4	1-1/8
20	5/8	1-3/8	3/4	1-3/8
24	3/4	1-3/8	7/8	1-3/8
28	3/4	1-3/8	7/8	1-3/8
36	3/4	1-5/8	7/8	1-5/8
40	3/4	1-5/8	7/8	1-5/8
48	3/4	1-5/8	7/8	1-5/8

PIPING LIMITATIONS

For Systems Designed for Heat Pump Configuration

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

Table 32: Pipe Diameters (B) from Y-branch to Y-branch / Header.

Downstream Total Capacity of IDUs (Btu/h)	Liquid pipe (inches OD)	Vapor pipe (inches OD)
≤19,100	1/4Ø	1/2Ø
≤54,600	3/8Ø	5/8Ø
≤76,400	3/8Ø	3/4Ø
≤114,700	3/8Ø	7/8Ø
≤172,000	1/2Ø	1-1/8Ø
≤229,300	5/8Ø	1-1/8Ø
≤248,400	5/8Ø	1-3/8Ø
≤344,000	3/4Ø	1-3/8Ø
≤592,500	3/4Ø	1-5/8Ø

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

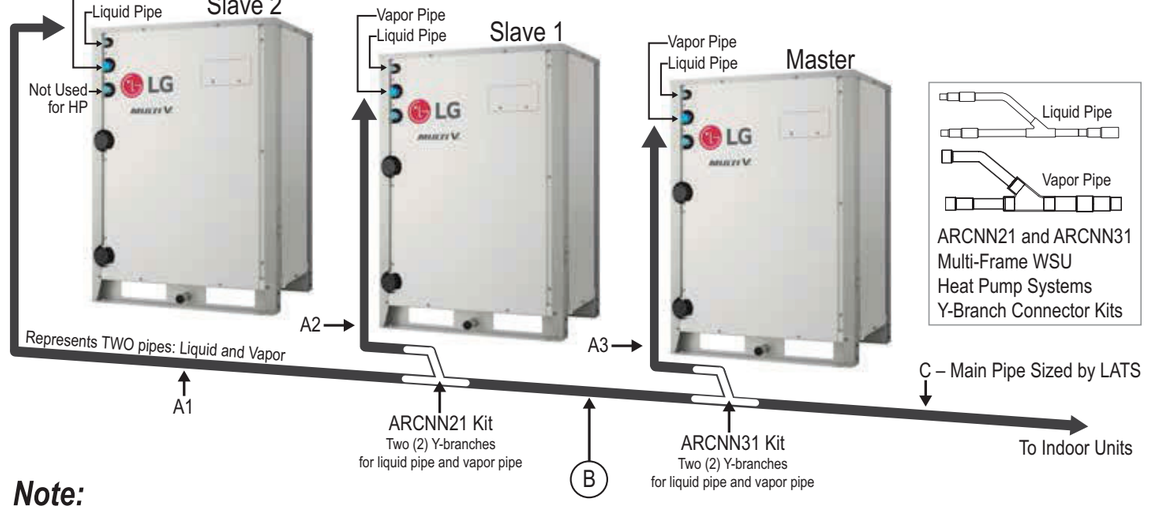
Table 33: Indoor Unit Connecting Pipe from Branch (C).

Indoor Unit Capacity[1]	Liquid pipe (inches OD)	Vapor pipe (inches OD)
≤19,100	1/4Ø	1/2Ø
≤54,600	3/8Ø	5/8Ø
≤76,400	3/8Ø	3/4Ø
≤95,900	3/8Ø	7/8Ø

[1]9,600-24,200 Btu/h 4-way 3 feet x 3 feet Cassette and 15,400-24,200 Btu/h High Static Ducted indoor units have 3/8Ø (liquid) and 5/8Ø (vapor).

Triple-Frame Heat Pump Water Source Unit Connections

Figure 26: 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.*

Note:

- *Always reference the LATS Multi V software report.*
- *Larger-capacity water source units must be the master in a multi-frame system.*
- *Master water source unit capacity must be greater than or equal to the slave1 water source unit capacity, and, where applicable, slave1 water source unit capacity must be greater than or equal to the slave2 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 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.*

PIPING LIMITATIONS

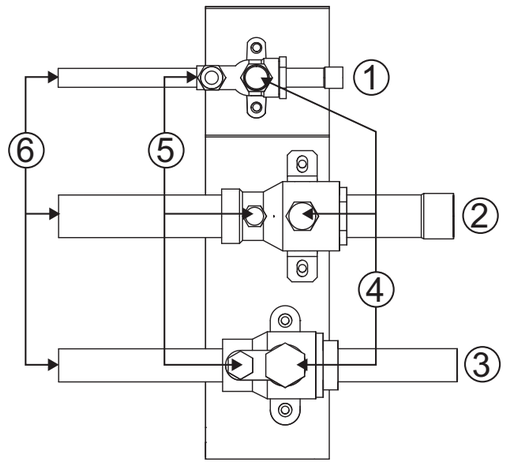
For Systems Designed for Heat Pump Configuration

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

Heat Pump Outdoor Unit Service Port Detail

Table 34: Heat Pump Triple-Frame Connection Pipe Sizes.

1. Liquid piping service port (back seated type with right hand thread).
2. Service port NOT used for heat pump systems. Keep closed and capped.
3. Vapor piping service port (back seated type with right hand thread).
4. Stem head access with factory-provided cap.
5. Schrader ports with factory-provided cap.
6. Service port piping to connect to field piping.



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 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 must be multiplied by two: A+(ΣBx2)+ΣC ≤1,640 feet.
- Length of pipe (C) from each indoor unit to the closest Y-branch or header ≤ 131 ft.
- [Length of pipe from water source unit to farthest indoor unit (A+B+C)] - [Length of pipe from water source unit to closest indoor unit (A+B+C)] ≤131 feet.

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:

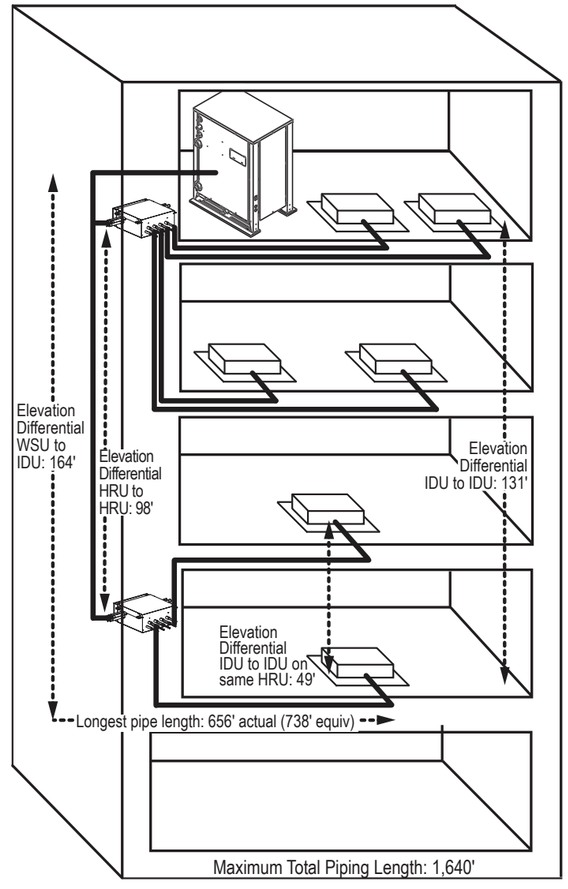
1. Main pipe (A) diameters on a 20-ton water source unit: 1-1/8 inches (vapor) and 5/8 inches (liquid).
2. Pipe diameters between first and second branches, however, are: 1-3/8 (vapor) and 3/4 (liquid) (connected downstream indoor unit capacity is 20 tons).
3. If main pipe (A) diameters of a 20-ton water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

PIPING LIMITATIONS

For Systems Designed for Heat Recovery Configuration

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

Figure 27: Typical Heat Recovery System Building Layout with Piping Limitations.



Note:

For Heat Recovery Unit information, refer to the applicable Engineering Manual on www.lghvac.com.

PIPING LIMITATIONS

For Systems Designed for Heat Recovery Configuration

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

Table 35: Piping Limitations for Heat Recovery Operation.

Length	Total pipe length	Longest actual pipe length	Equivalent pipe length[1]
	A + ΣB + ΣC ≤ 1,640 feet	≤656 feet	≤738 feet
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 feet	
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.*

Note:

For Heat Recovery Unit information, refer to the applicable Engineering Manual on www.lghvac.com.

PIPING LIMITATIONS

For Systems Designed for Heat Recovery Configuration

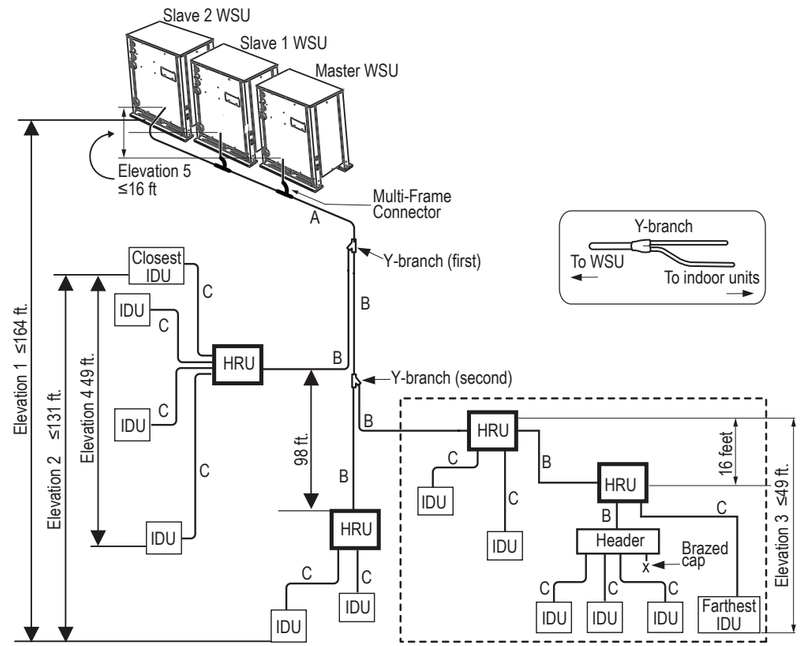
Following pages present Multi V Water V piping limitations and are for illustrative purposes only. Designers MUST use LATS when designing LG VRF systems.

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

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.

Figure 28: Heat Recovery Triple-Frame Connections.



Note:

- *Always reference the LATS Multi V software report.*
- *Largest capacity WSU must be the master in a multi-frame system.*
- *Master WSU capacity must be greater than or equal to the slave1 WSU capacity, and, where applicable, slave1 WSU capacity must be greater than or equal to the slave2 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 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 ≤192,400 Btu/h.*
- *If large capacity indoor units (>12,000 Btu/h with piping sizes >5/8Ø / 3/8Ø) are installed, the valve group setting must be used. (Refer to the PCB of the heat recovery unit for the valve group control setting.)*

PIPING LIMITATIONS

For Systems Designed for Heat Recovery Configuration

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

Table 36: 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	3/4	5/8
8	3/8	7/8	3/4	1/2	7/8	3/4
10	1/2	1-1/8	3/4	5/8	1-1/8	3/4
12	1/2	1-1/8	7/8	5/8	1-1/8	7/8
16	5/8	1-1/8	1-1/8	3/4	1-1/8	1-1/8
20	5/8	1-3/8	1-1/8	3/4	1-3/8	1-1/8
24	3/4	1-3/8	1-1/8	7/8	1-3/8	1-1/8
28	3/4	1-3/8	1-1/8	7/8	1-3/8	1-1/8
36	3/4	1-5/8	1-1/8	7/8	1-5/8	1-1/8
40	3/4	1-5/8	1-1/8	7/8	1-5/8	1-1/8
48	3/4	1-5/8	1-1/8	7/8	1-5/8	1-1/8

Table 7: Refrigerant Pipe (B) Diameters 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	1/4Ø	1/2Ø	3/8Ø
≤54,600	3/8Ø	5/8Ø	1/2Ø
≤76,400	3/8Ø	3/4Ø	5/8Ø
≤114,700	3/8Ø	7/8Ø	3/4Ø
≤172,000	1/2Ø	1-1/8Ø	7/8Ø
≤229,300	5/8Ø	1-1/8Ø	7/8Ø
≤248,400	5/8Ø	1-3/8Ø	1-1/8Ø
≤344,000	3/4Ø	1-3/8Ø	1-1/8Ø
≤592,500	3/4Ø	1-5/8Ø	1-3/8Ø

Table 8: Indoor Unit Connecting Pipe from Branch (C).

Indoor Unit Capacity[1]	Liquid pipe (inches OD)	Vapor pipe (inches OD)
≤19,100	1/4Ø	1/2Ø
≤54,600	3/8Ø	5/8Ø
≤76,400	3/8Ø	3/4Ø
≤95,900	3/8Ø	7/8Ø

[1]9,600-24,200 Btu/h 4-way 3 feet x 3 feet Cassette and 15,400-24,200 Btu/h High Static Ducted IDUs have 3/8Ø (liquid) and 5/8Ø (vapor).

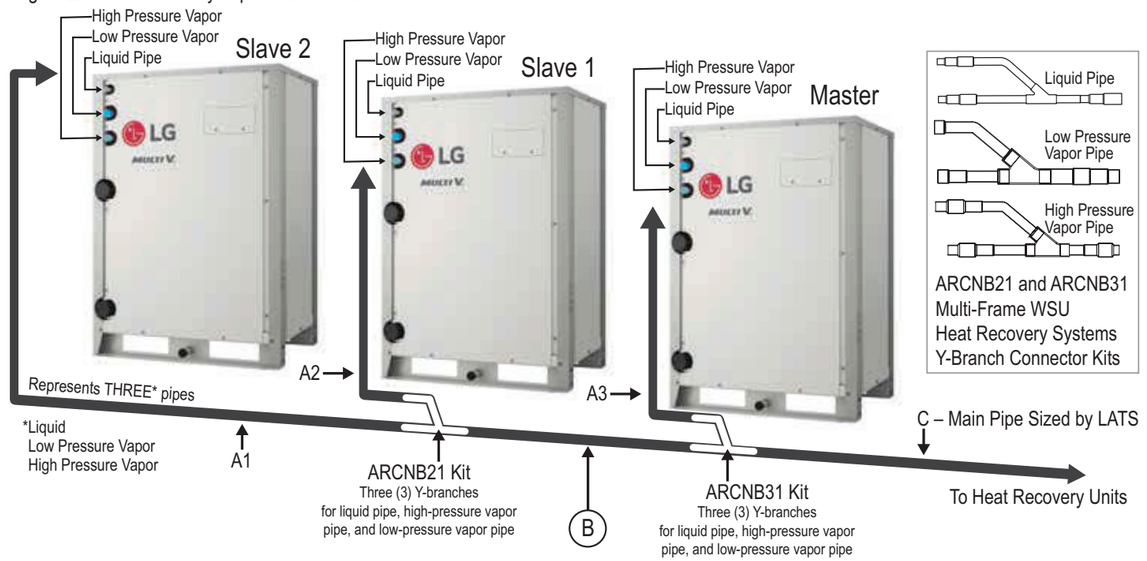
PIPING LIMITATIONS

For Systems Designed for Heat Recovery Configuration

Following pages present Multi V Water V 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 29: 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.*
- *Larger-capacity water source units must be the master in a multi-frame system.*
- *Master water source unit capacity must be greater than or equal to the slave1 water source unit capacity, and, where applicable, slave1 water source unit capacity must be greater than or equal to the slave2 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 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.*

PIPING LIMITATIONS

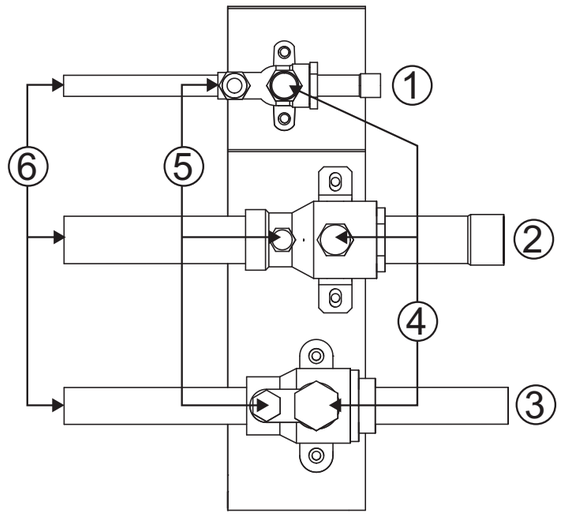
For Systems Designed for Heat Recovery Configuration

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

Heat Recovery Outdoor Unit Service Port Detail

Table 37: Heat Recovery Triple-Frame Connection Pipe Sizes.

1. Liquid piping service port (back seated type with right hand thread).
2. Service port NOT used for heat pump systems. Keep closed and capped.
3. Vapor piping service port (back seated type with right hand thread).
4. Stem head access with factory-provided cap.
5. Schrader ports with factory-provided cap.
6. Service port piping to connect to field piping.



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 / high 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.
- Length of pipe (C) from each indoor unit to the closest Y-branch, header, or heat recovery unit ≤131 feet.
- [Length of pipe from water source unit to farthest indoor unit (A+B+C)] - [Length of pipe from water source unit to closest indoor unit (A+B+C)] ≤131 feet.

REFRIGERANT PIPING FOR SEPARATED WATER SOURCE UNITS

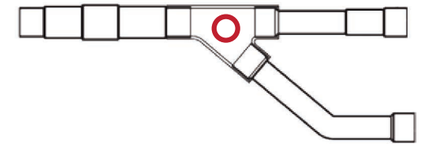
Dual-frame and triple-frame systems must be installed with all water source units located next to each other. In conditions where the dual-frame or triple-frame water source units need to be separated, the following rules must be followed.

⃠ 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.

Figure 30: Y-branch Measurement Location.

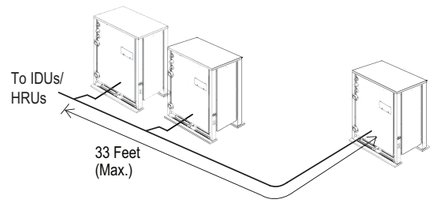


Maximum pipe length

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

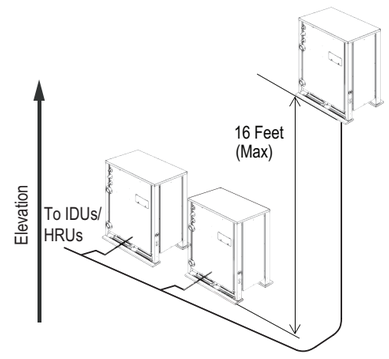


Elevation difference

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 34: Elevation Difference Between WSUs.



Trapping

1. When required, all traps must be inverted type traps ≥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 ≥8" in a vertical direction up the horizontal pipe it elevates from.

Figure 32: Traps for Multi V Water V Units

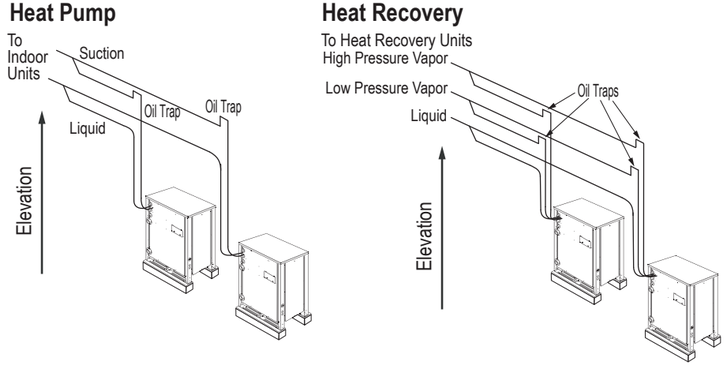
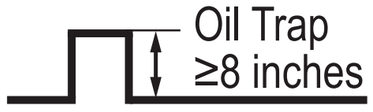


Figure 33: Close Up of An Inverted Oil Trap.



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).
   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), and before the pipe toward the outdoor unit turns downward.

Figure 36: Inverted Trap Applications.

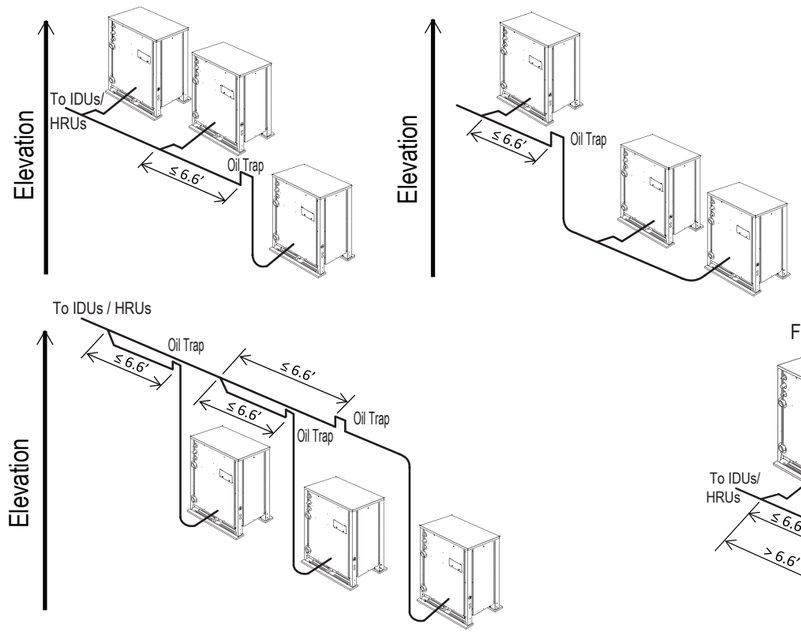
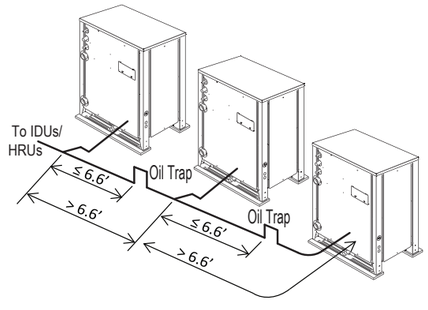


Figure 35: Examples of Inverted Traps.

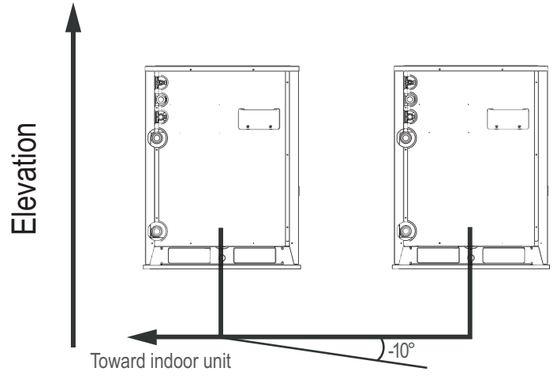


Pipe Slope

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 37: Allowable Pipe Slope.



PLACEMENT CONSIDERATIONS

Water Source Unit(s)

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 32–104°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 placement considerations for Heat Recovery Units, refer to the applicable Engineering Manual on www.lgvrf.ca.

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.

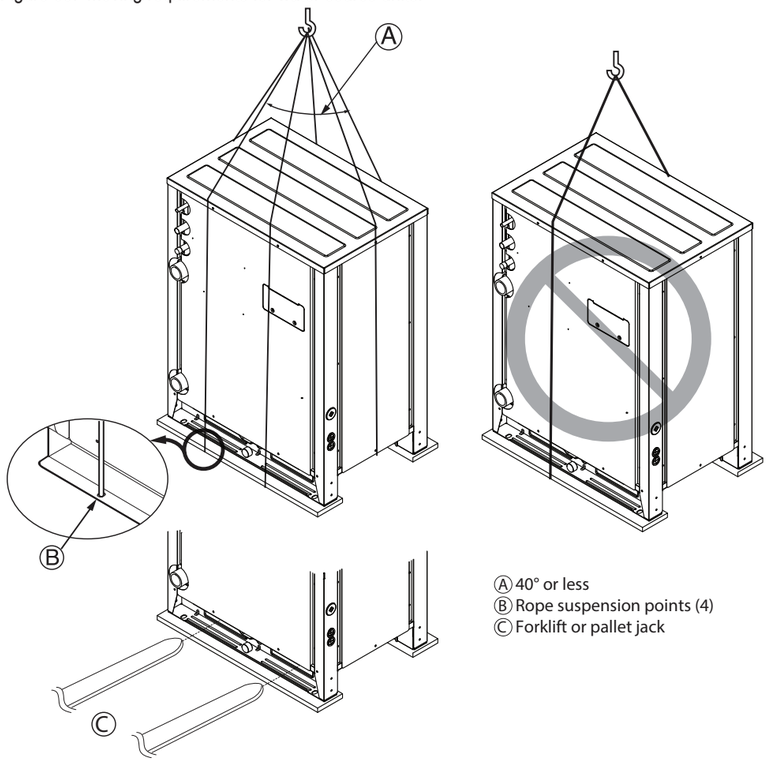
⚠WARNING

- *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 38: Moving requirements for water source units.



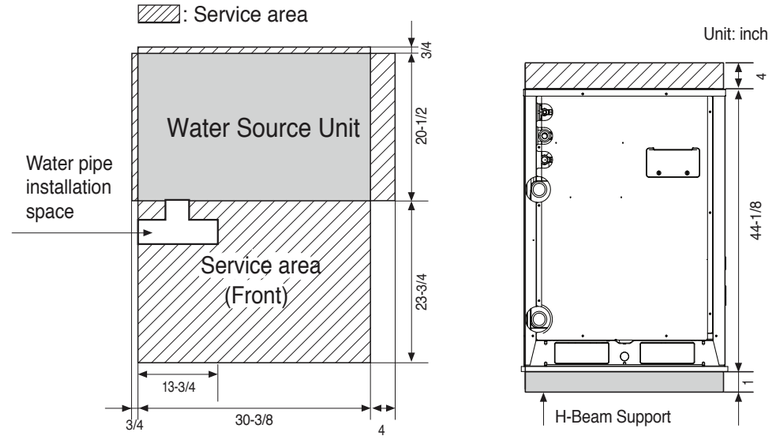
INSTALLATION CONSIDERATIONS

Single Frame and Dual Frame Installation

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 39: Single Frame Installation.



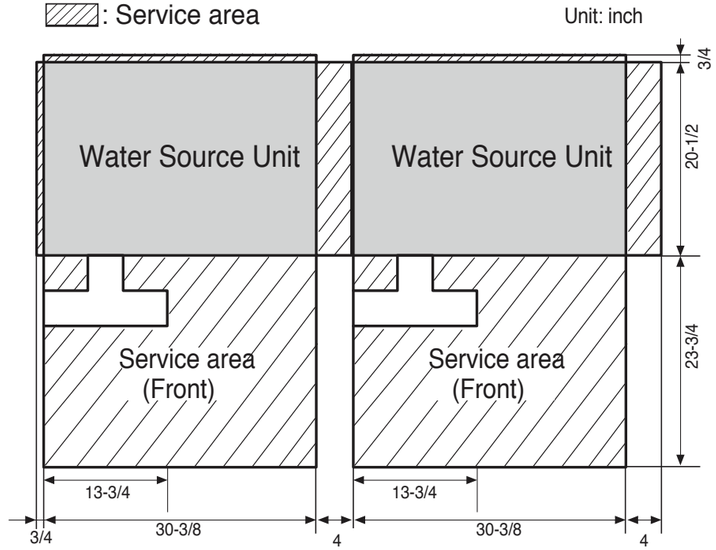
Note:

- *Consult with LG Electronics, Canada 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 40: 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..*

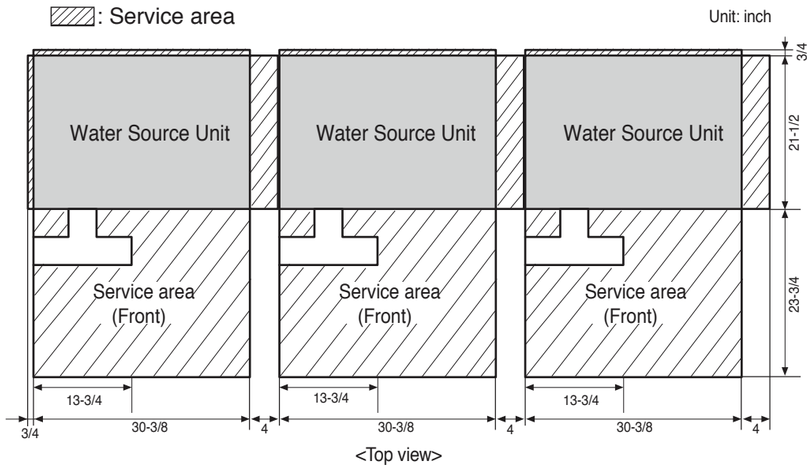
INSTALLATION CONSIDERATIONS

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 41: Triple Frame Installation.



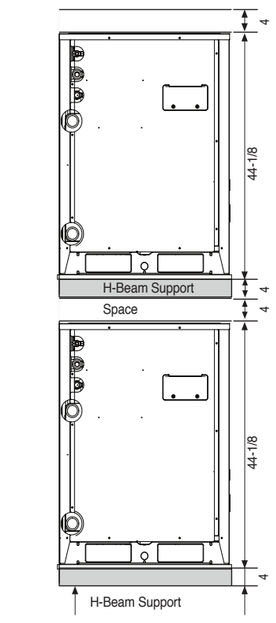
Note:

- *Consult with LG Electronics, Canada 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 frame water source units as shown on right.

Figure 42: Stacked Frame Installation.

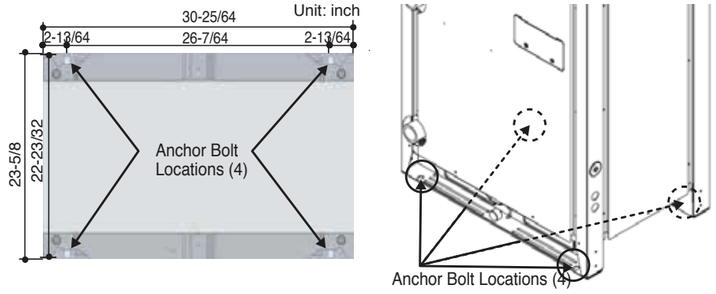


Front View

Anchor bolt locations

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

Figure 43: 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..*

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, visit www.lgvrf.ca.

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