LG
Life's Good

MULTI V™ WATER MINI

ENGINEERING MANUAL

Variable Refrigerant Flow
Water-Source Units

3.0, 4.0, and 4.4 Tons

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LG Electronics, Inc. is a global leader and technology innovator in consumer electronics, mobile communications, and home appliances, employing more than 213,000 people in 60 plus countries worldwide. LG Electronics, Inc. comprises five business units—Home Entertainment, Mobile Communications, Air Conditioning, Business Solutions, and Home Appliance. LG is one of the world's leading producers of flat panel televisions, audio and video products, mobile handsets, air conditioners, and washing machines. LG's commercial air conditioning business unit was established in 1968 and has built its lineup of residential and commercial products to include VRF, Multi F, Duct-Free Split systems, packaged terminal air conditioners (PTACs), and room air conditioners. In 2011, the air conditioning and energy solutions business unit grew to include LED lighting and solar products. For more information, visit www.lg-vrf.com.

Variable Refrigerant Flow (VRF) Technology

In the early 1980s, VRF technology was introduced to the world as an alternative method of cooling and heating in commercial structures, and is designed to minimize utility consumption. VRF systems have become the system of choice for designers internationally because these systems offer better comfort at lower costs when compared to traditional boiler/chiller/Variable Air Volume (VAV) air handler systems. Today, VRF is gaining popularity in the United States.

LG Multi V Water Mini systems offer the opportunity to minimize ductwork in the same configuration. The system offers zoning without the need for zone damper systems. The LG Multi V Water Mini system's advanced controls provide exceptional temperature control, and can rapidly adapt system operating parameters to the ever-changing building load. The LG Multi V Water Mini system is easy to design, install, and maintain. The modular design allows occupants to control their environmental condition, providing individualized control of the set-point temperature and allowing occupants to condition only the occupied zones.

Quality Commitment

LG is committed to the success of every Multi V project by providing the best industry technical support during project engineering, installation, and commissioning. LG offers a variety of resources for engineers, architects, installers, and servicers on Multi V installation. Classes are conducted at LG's training centers and in field locations at various times throughout the year and upon special request.

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PRODUCT DATA

Benefits of Multi V Water Mini Systems

- Maximized individual occupant control requirements
- Long refrigerant piping lengths
- High refrigerant piping elevation differences
- Maximum flexibility
- Quiet and comfortable environment
- Geothermal ready

Multi V Water Mini

Multi V Water Mini variable refrigerant flow systems are among the industry's best with vertical rise and piping lengths, providing the designer with the most freedom and flexibility while engineering the refrigerant pipe system. Multi V Water Mini, available in 208–230 volt/1 phase, ranges in size from 3 to 4.4 nominal tons. A Multi V Water Mini system consists of a water source heat pump, indoor units, and a field-supplied refrigerant pipe system incorporating LG-supplied Y-Branches and Header kits. Multi V Water Mini heat pumps are best suited for applications with thermal zones that require heating at the same time or cooling at the same time, like perimeter zones with the same exposure.

Adaptable and Flexible

Multi V Water Mini units can be adapted to a wide range of building types and sizes such as schools, hotels, hospitals, offices, and residences. Their light weight and small footprint allows them to be moved without expensive cranes, easily fitting into most service elevators, and set in place with minimal requirements for structural reinforcements. Its modular design means that Multi V Water Mini can be commissioned in stages so tenants can move in as each floor (or even each room) is completed.

The split system allows you to minimize components by reaching an area of the building that might otherwise require a second system. The Multi V Water Mini system is capable of the long piping lengths and large elevation differences, allowing maximum flexibility in the placement of the condensing units and indoor units. Whether your building is a high rise condominium, a hotel, or a sprawling school or office complex, this system will reach even the farthest corners and elevations.

Smaller Chases and Plenums

The LG Multi Water Mini system uses refrigerant piping to move heat resulting in smaller space requirements compared to water piping or air ducts. This helps reduce the overall construction and material cost of your building and gives back leasable space. Flexible and logical placement of system components, shorter pipe lengths, and fewer joints lowers installed cost and minimizes potential for leaking.

Intuitive Design

The LATS Multi V design and layout software provides an intuitive method of laying out a Multi V Water Mini refrigerant pipe system. LATS Multi V checks piping lengths and elevations, and it assists with the sizing of indoor and water source units by calculating component capacity based on design conditions. LATS Multi V is the industry's only software that can import AutoCAD™ drawings and lay out the Multi V system to scale. When the designer finishes the AutoCAD™ system layout, all of the piping lengths will be calculated, and a drawing file with the Multi V system will be available for export and integration into the building drawing set.

Energy Modeling

LG stands behind efficiency and performance. Check www.lg-vrf.com for modeling guides for various energy modeling software including Trane Trace, eQuest, and Energy Pro.

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PRODUCT FEATURES AND BENEFITS

Quiet Operation and Integrated Controls

Low Sound Levels

LG customers often ask if the unit is running after commissioning is complete. When Multi V Water Mini units operate fully loaded, they are one of the quietest levels in the industry. The sound is almost undetectable during off-peak operation.

All rotating components are soft-started by the controller using a digitally controlled inverter, 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!

Precision Load Matching

Unlike traditional air conditioning control systems that use thermostatic controls to maintain room temperatures, LG Multi V controls continuously vary the indoor unit fan speed and refrigerant flow. The water source unit responds by varying the compressor speed as needed to meet the indoor unit's demand. As a result, the Multi V Water Mini system delivers precise space temperature control without overshooting the set-point. Temperature drift in the thermal zone is minimized, because the fan speed and refrigerant volume are controlled together precisely matching the load.

Advanced Compressor Technology

Oil Management

The oil injection mechanism ensures a reliable oil film on moving parts even at the lowest speeds, which enables the inverter compressor to safely operate at speeds as low as 30 Hz. The following oil return system brings oil back to the compressor once the oil leaves the compressor, so oil migration is no longer a concern.

1. The compressor discharge is specially designed to minimize the amount of oil leaving the compressor.
2. Oil return algorithms flush the oil from the system back to the compressor.

Inverter Driven

The rotary compressor is optimized around the R410A model to maximize compressor efficiency, which reduces power consumption and lowers utility bills. The latest inverter technology allows the LG Multi V Water Mini to precisely match the load, which prevents constant cycling and results in tight temperature control and optimized efficiency. Occupants remain comfortable while utility costs are reduced.

Simplified Installation

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

System integration with existing building management systems (based on BACnet® or LonWorks®) has never been easier. Because all of the Multi V Water Mini system components are engineered and provided by LG, the system components and controls come pre-engineered and do not need any custom programming from third-party contractors.

Operating Range and Size

Operating Range (3–4.4 Tons)

The water source unit can operate from 23°F–113°F entering water temperature in cooling mode, and 23°F–113°F entering water temperature in heating mode. The connected indoor unit combination ratio range is 50%–130%.

Compact Size

All three capacities—3, 4, and 4.4 tons—have the same 20-5/8" H x 13-1/8" W cabinet. Multiple units can be stacked using an independent racking system, giving back valuable floor space.

MULTI V WATER MINI

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UNIT NOMENCLATURE

Water Mini Unit and Indoor Units

Water Source Units (WSU)

AR | W | N | 038 | G | A | 2

Family
AR = Multi V (Refrigerant R410A)

Condenser
W = Water Source

Type
N = Heat Pump

Nominal Cooling Capacity in Btu/h
038 = 38,200 048 = 47,800 053 = 52,900

Electrical Ratings
G = 208–230V / 60Hz / 1Ø

Basic Function = A

Generation
2 = Second

Indoor Units (IDU)

ARN | U | 07 | 3 | TJ | A | 2

Family
ARN = Multi V Indoor Unit
(Refrigerant R410A)

Type
U = DC Inverter Heat Pump

Nominal Capacity
(Nominal cooling capacity in Btu/h)

05 = 5,000	15 = 15,000	30 = 30,000	54 = 54,000
07 = 7,000	18 = 18,000	36 = 36,000	76 = 76,000
09 = 9,000	24 = 24,000	42 = 42,000	96 = 96,000
12 = 12,000	28 = 28,000	48 = 48,000	

Electrical Ratings
3 = 208–230V / 60Hz / 1Ø

Model

B1 = Ducted (low static, convertible)	CF = Floor Standing (large frame)	TM = 4-Way Ceiling Cassette (3' x 3')
B2 = Ducted (low static, convertible)	NJ = Vertical / Horizontal AHU	TN = 4-Way Ceiling Cassette (3' x 3')
B3 = Ducted (low static, bottom return)	NK = Vertical / Horizontal AHU	TP = 4-Way Ceiling Cassette (3' x 3')
B4 = Ducted (low static, bottom return)	S5 = Standard Wall Mounted	TQ = 4-Way Ceiling Cassette (2' x 2')
B8 = Ducted (high static)	S8 = Wall Mounted/Mirror	TR = 4-Way Ceiling Cassette (2' x 2')
BG = Ducted (high static)	SEL = Standard Wall Mounted	VE = Convertible Surface Mounted
BH = Ducted (high static)	SER = Wall Mounted/Mirror	VJ = Ceiling Suspended
BR = Ducted (high static)	TJ = 1-Way Ceiling Cassette	
CE = Floor Standing (small frame)	TL = 2-Way Ceiling Cassette	

Feature

A = Basic	L = Neo Plasma
C = Plasma Filter	R = Mirror and Neo Plasma
G = Low Static	U = Uncased

Generation
2 = Second

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GENERAL DATA

Specifications and Electrical Data

Table 1: General Data—ARWN038GA2, ARWN048GA2, ARWN053GA2 Water Mini Units.

	3.0 Ton	4.0 Ton	4.4 Ton
Model Number	ARWN038GA2	ARWN048GA2	ARWN053GA2
Nominal Capacity / Input Power			
Cooling Capacity (Btu/h)[1]	38,200	47,800	52,900
Cooling Input Power (kW)	2.1	2.7	3.2
Heating Capacity (Btu/h)[1]	42,600	54,600	61,400
Heating Input Power (kW)	2.2	2.9	3.5
Compressor			
Type	Inverter Rotary	Inverter Rotary	Inverter Rotary
Power Supply (volt/hz/phase)[2]	208-230 / 60 / 1	208-230 / 60 / 1	208-230 / 60 / 1
MCA (A)	26	26.5	27
MOP (A)	45	45	45
System Data			
Sound Pressure (dBA)[3]	52	53	54
Heat Rejected to Equipment Room (Btu/h)	512	512	512
Net Weight (lbs.)	168	168	168
Shipping Weight (lbs.)	181	181	181
Dimensions (W x H x D)	20-5/8 x 42-1/2 x 13-1/8	20-5/8 x 42-1/2 x 13-1/8	20-5/8 x 42-1/2 x 13-1/8
Max. Qty Indoor Units	6	8	9
Refrigerant Piping Connections[4]			
Vapor Line OD (in.)	3/4 Braze	3/4 Braze	3/4 Braze
Liquid Line OD (in.)	3/8 Braze	3/8 Braze	3/8 Braze
Expansion Device	Electronically Controlled (EEV)	Electronically Controlled (EEV)	Electronically Controlled (EEV)
Factory Refrigerant Charge (R410A [lbs.])	2.2	2.2	2.2
Water Side			
Heat Exchanger	Stainless Steel Plate	Stainless Steel Plate	Stainless Steel Plate
Water Volume in Heat Exchanger (gal.)	0.2	0.2	0.2
Water Inlet/Outlet Connection Size (in)	1-1/4 FPT	1-1/4 FPT	1-1/4 FPT
Nominal Flow Rate Total (GPM)	10.6	13.2	15.9
Range of Flow (GPM)	5.5-13.3	6.9-16.5	8.3-19.9
Entering water temp. range (°F)– Cooling[6]	23-113	23-113	23-113
Entering water temp. range (°F)– Heating	23-113	23-113	23-113
Total Heat of Rejection (Btu/h)	44,330	55,550	56,640
Total Heat of Absorption (Btu/h)	35,087	44,697	49,448
Pressure Drop (ft)	4.7	6.9	9.5
Maximum Water Pressure (psi)	640	640	640
ΔT (°F)[5]	8	8	7

[1]Cooling – Indoor 80°F DB/66°F WB, Water Temp. Entering 86°F; Heating- Indoor 68°F DB, Water Temp. Entering 68°F.

[2]Voltage tolerance is ±10%.

[3]Sound pressure levels as tested in anechoic chamber under ISO Standard 3745.

[4]Refer to the Refrigerant Piping Section of this manual for correct line sizing. Contractor MUST use LG manufactured Y-branch fittings only. Designer must verify refrigerant piping design configuration using LG's computerized refrigerant piping CAD/calculation (LATS) Software to layout and design the refrigerant piping system.

[5]Calculated from ΔT = Total Heat of Rejection / (Nominal flow rate x 500).

[6]Entering water temp. between 23F and 59F require a variable water flow control kit (PRVC1)

Nominal Tons	Unit Model No.	Compressor Qty.	Compressor Motor RLA	MSC	MCA	MOP
3.0	ARWN038GA2	1	20.8	-	26	45
4.0	ARWN048GA2	1	21.2	-	26.5	45
4.4	ARWN053GA2	1	21.6	-	27	45

MCA = Minimum Circuit Ampacity.

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

Allowable voltage range is between 208–230 volts only (tolerance is 10%).

Maximum allowable voltage imbalance is 2%.

Power wiring to be sized to meet local or NEC codes.

Measurements are taken with no attenuation and units operating at full load nominal operating condition.

Measurements are taken 4.9 feet above the finished floor and a distance of 3.3 feet from the face of the fan discharge.

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Table 2: Summary Data—Wall-Mounted / Ceiling Cassette Indoor Units.

Unit / Type[1]	ARNU*****[2]	Nominal Capacity Btu/h	
		Cooling[3]	Heating[3]
Wall Mounted–ART COOL™ Mirror 	073 SER2	7,500	8,500
	093 SER2	9,600	10,900
	123 SER2	12,300	13,600
	153 SER2	15,400	17,100
	183 S8R2	19,100	21,500
	243 S8R2	24,200	27,300
Wall Mounted–Standard Finish 	073 SEL2	7,500	8,500
	093 SEL2	9,600	10,900
	123 SEL2	12,300	13,600
	153 SEL2	15,400	17,100
	183 S5L2	19,100	21,500
	243 S5L2	24,200	27,300
Ceiling Cassette–1 Way 	073 TJC2	7,500	8,500
	093 TJC2	9,600	10,900
	123 TJC2	12,300	13,600
Ceiling Cassette–2 Way 	183 TLC2	19,100	21,500
	243 TLC2	24,200	27,300
Ceiling Cassette–4 Way (2' x 2') 	053 TRC2	5,500	6,100
	073 TRC2	7,500	8,500
	093 TRC2	9,600	10,900
	123 TRC2	12,300	13,600
	153 TQC2	15,400	17,100
	183 TQC2	19,100	21,500
Ceiling Cassette–4 Way (3' x 3') 	093 TPAA	9,600	10,900
	123 TPAA	12,300	13,600
	153 TPAA	15,400	17,100
	183 TNAA	19,100	21,500
	243 TNAA	24,200	27,300
	243 TPC2	24,200	27,300
	283 TPC2	28,000	31,500
	363 TNC2	36,200	40,600
	423 TMC2	42,000	43,800
	483 TMC2	48,100	51,200

[1]All indoor units require 208–230V/60Hz/1Ph and an AWG18-2 communication cable. Reference LG's Multi V Indoor Unit Engineering Manual for complete detailed engineering data and selection procedures.

[2]Model number shows nominal capacity and frame size designator.

[3]Nominal cooling capacity rating obtained with air entering the indoor unit at 80ºF dry bulb (DB) and 67ºF wet bulb (WB) and outdoor ambient conditions of 95ºF dry bulb (DB) and 75ºF wet bulb (WB). Nominal heating capacity rating obtained with air entering the indoor unit at 70ºF dry bulb (DB) and 59ºF wet bulb (WB) and outdoor ambient conditions of 47ºF dry bulb (DB) and 43ºF wet bulb (WB).

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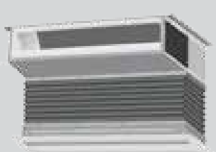
GENERAL DATA

Indoor Unit Specifications

Table 3: Summary Data—Recessed Mounted Indoor Units.

Unit / Type[1]	ARNU***[2]	Nominal Capacity Btu/h	
		Cooling[3]	Heating[3]
Ducted High Static 	073 BHA2	7,500	8,500
	093 BHA2	9,600	10,900
	123 BHA2	12,300	13,600
	153 BHA2	15,400	17,100
	183 BHA2	19,100	21,500
	243 BHA2	24,200	27,300
	153 BGA2	15,400	17,100
	183 BGA2	19,100	21,500
	243 BGA2	24,200	27,300
	283 BGA2	28,000	31,500
	363 BGA2	36,200	40,600
	423 BGA2	42,000	43,800
	483 BRA2	48,100	51,200
	543 BRA2	54,000	61,400
	763 B8A2	76,400	86,000
	963 B8A2	95,900	107,500
Ducted Low Static–Convertible 	073 B1G2	7,500	8,500
	093 B1G2	9,600	10,900
	123 B1G2	12,300	13,600
	153 B1G2	15,400	17,100
	183 B2G2	19,100	21,500
	243 B2G2	24,200	27,300
Ducted Low Static–Bottom Return 	073 B3G2	7,500	8,500
	093 B3G2	9,600	10,900
	123 B3G2	12,300	13,600
	153 B3G2	15,400	17,100
	183 B4G2	19,100	21,500
	243 B4G2	24,200	27,300
Vertical / Horizontal Air Handling Unit	123 NJ2	12,000	13,500
	183 NJA2	18,000	20,000
	243 NJA2	24,000	27,000
	303 NJA2	30,000	34,000
	363 NJA2	36,000	40,000
	423 NKA2	42,000	46,000
	483 NKA2	48,000	54,000
	543 NKA2	54,000	60,000

[1]All indoor units require 208–230V/60Hz/1Ph and an AWG18-2 communication cable. Reference LG's Multi V Indoor Unit Engineering Manual for complete detailed engineering data and selection procedures.

[2]Model number shows nominal capacity and frame size designator.

[3] Nominal cooling capacity rating obtained with air entering the indoor unit at 80ºF dry bulb (DB) and 67ºF wet bulb (WB) and outdoor ambient conditions of 95ºF dry bulb (DB) and 75ºF wet bulb (WB). Nominal heating capacity rating obtained with air entering the indoor unit at 70ºF dry bulb (DB) and 59ºF wet bulb (WB) and outdoor ambient conditions of 47ºF dry bulb (DB) and 43ºF wet bulb (WB).

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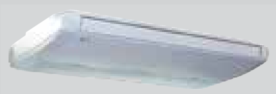
GENERAL DATA

Indoor Unit Specifications

Table 4: Summary Data—Surface Mounted / Floor Standing Indoor Units.

Unit / Type[1]	ARNU****[2]	Nominal Capacity Btu/h	
		Cooling[3]	Heating[3]
Ceiling Suspended 	183VJA2	19,100	21,500
	243VJA2	24,200	27,300
Convertible Surface Mounted 	093VEA2	9,600	10,900
	123VEA2	12,300	13,600
Floor Standing–with Case 	073 CEA2	7,500	8,500
	093 CEA2	9,600	10,900
	123 CEA2	12,300	13,600
	153 CEA2	15,400	17,100
	183 CFA2	19,100	21,500
	243 CFA2	24,200	27,300
Floor Standing–without case 	073 CEU2	7,500	8,500
	093 CEU2	9,600	10,900
	123 CEU2	12,300	13,600
	153 CEU2	15,400	17,100
	183 CFU2	19,100	21,500
	243 CFU2	24,200	27,300

[1]All indoor units require 208–230V/60Hz/1Ph and an AWG18-2 communication cable. Reference LG's Multi V Indoor Unit Engineering Manual for complete detailed engineering data and selection procedures.

[2]Model # shows nominal capacity and frame size designator.

[3]Nominal cooling capacity rating obtained with air entering the indoor unit at 80°F dry bulb (DB) and 67°F wet bulb (WB) and outdoor ambient conditions of 95°F dry bulb (DB) and 75°F wet bulb (WB). Nominal heating capacity rating obtained with air entering the indoor unit at 70°F dry bulb (DB) and 59°F wet bulb (WB) and outdoor ambient conditions of 47°F dry bulb (DB) and 43°F wet bulb (WB).

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Table 5: Indoor Units—Controls and Options.

	Indoor Unit Type	Wall Mounted—Standard Finish	Wall Mounted—ART COOL™ Mirror	1-Way Cassette	2-Way Cassette	4-Way Cassette		Ducted High Static	Ducted Low Static-Convertible	Ducted Low Static—Bottom Return	Vert.-Horiz. AHU (NJ)	Vert.-Horiz. AHU (NK)	Ceiling Suspended	Convertible Surface Mount	Floor Mount—Cased	Floor Mount—Uncased
	Nominal Chassis Size (MBH)	7–24	7–24	7–12	18–24	5–18	24–48	7–96	7–24	7–24	1–3	3.5–4.5	18–24	9–12	7–24	7–24
Airflow	Air supply outlets	1	1	1	2	4	4	1	1	1	1	1	1	1	1	1
Airflow	Airflow direction (left/right)	manual / auto	auto										manual	manual		
Airflow	Auto airflow direction (up/down)	√	√	√	√	√	√						√	√		
Airflow	Fan speed (Heating mode) (qty.)	(3)	(3)	(4)	(4)	(4)	(4)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Airflow	Fan speed (Cooling mode) (qty.)	(4)	(4)	(5)	(5)	(5)	(5)	(3)	(3)	(3)	(3)	(3)	(4)	(4)	(3)	(3)
Airflow	Fan speed (Fan mode) (qty.)	(3)	(3)	(4)	(4)	(4)	(4)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Airflow	Chaos swing (random louver swing)	√	√													
Airflow	Chaos wind (random fan speed)	√	√	√	√	√	√						√	√		
Airflow	Jet-cool (power cooling)	√	√	√	√	√	√						√	√		
Operation	E.S.P. control			√	√	√	√	√	√	√	√	√			√	√
Operation	High ceiling			√	√	√	√						√	√		
Operation	Auto-restart after power restore	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Hot Start	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Diagnostics	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Soft Dry (dehumidification)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Auto changeover (HR)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Auto clean (coil dry)	√	√													
Operation	Child lock	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Forced operation	√	√	√	√	√	√						√	√		
Operation	Group control – Requires the use of one Group control Cable Kit (PZCWRCG3) for every additional indoor unit	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Sleep mode	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Timer (on/off)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Weekly schedule	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Two thermistor control	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Operation	Test operation mode	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Filter	Plasma[2]	√	√	√	√[5]	√[5]	√[5]									
Filter	Washable anti-fungal[1]	√	√	√	√	√	√	√	√	√			√	√	√	√
Controllers	7-day programmable controller	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Controllers	Simple controller w/mode	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Controllers	Simple controller w/o mode	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Controllers	Wireless hand held controller	o	o	o	o	o	o	o[3]	o[3]	o[3]			o	o	o[3]	o[3]
Others	Condensate lift			√	√	√	√	√	√	√						
Others	Ventilation air			√		√[4]	√[4]	√	√	√						
Others	Casing	√	√	√	√	√	√						√	√	√	
Others	Standard grille			√	√	√	√									
Others	Auto elevation grille						√[5]									
Others	Color Panels (qty.)		(3)													
Others	Suction grille									o						
Others	Suction canvas									o						
Others	Aux. Heat Kit										√	√				

[1]Primary washable filters.

[2]Secondary plasma filters. Not available with ARNU093-153TPAA, ARNU183-243TNAA.

[3]Requires 7-day programmable zone controller.

[4]Requires ventilation kit PTVK430 (For TR, TQ frames) or PTVK410+PTVK420 (For TP, TN, TM frames)(Temperature, humidity, and volume limitations apply).

[5]Requires standard grille.

√ = Standard feature

o = Unit option

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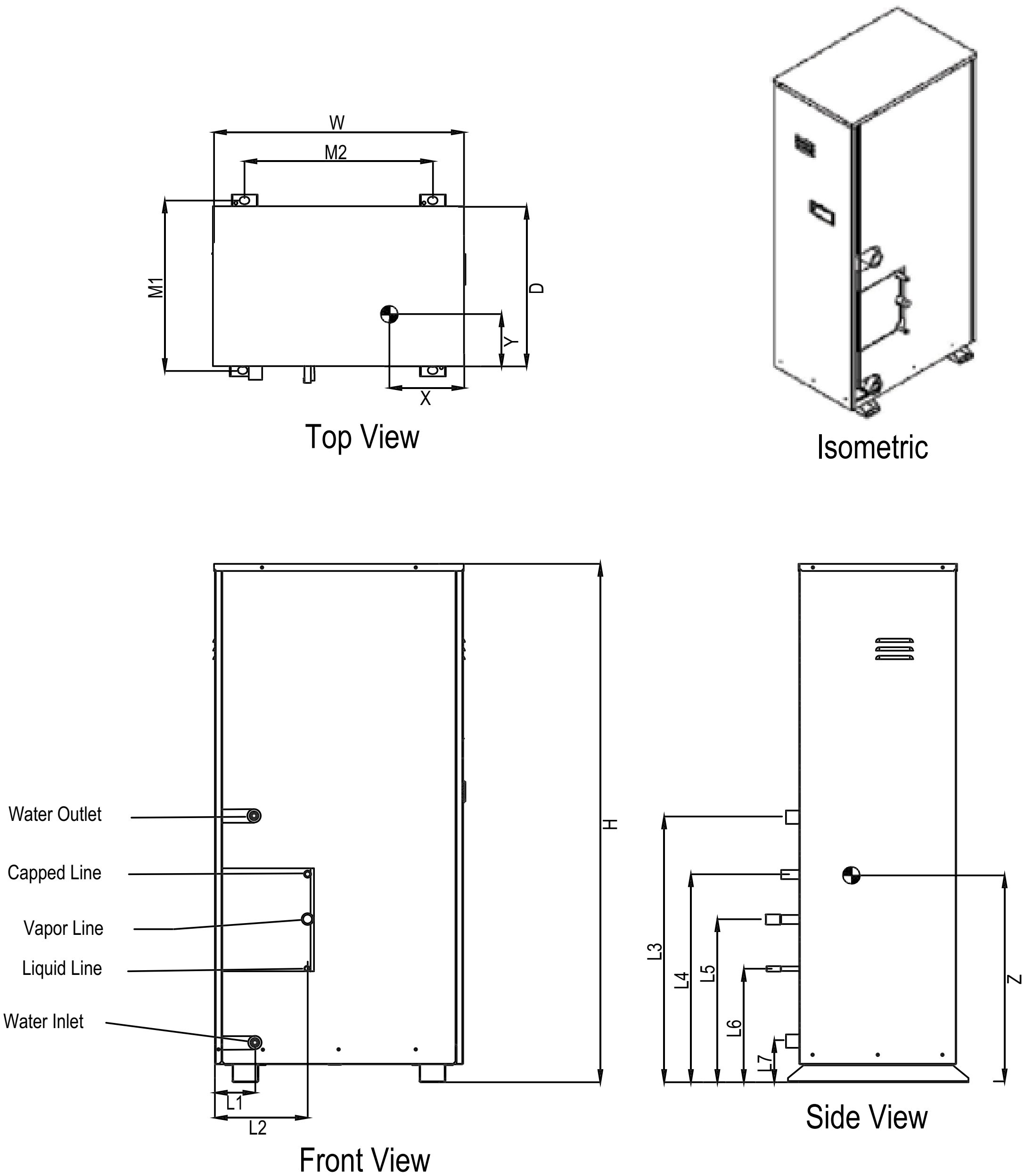
DIMENSIONS

ARWN038GA2, ARWN048GA2, ARWN053GA2

Figure 1: ARWN038GA2, ARWN048GA2, ARWN053GA2 Dimensions.



W	20-5/8″
D	13-1/8″
H	42-1/2″
L1	3-5/16″
L2	7-5/8″
L3	21-13/16″
L4	17-1/16″
L5	13-5/8″
L6	9-5/16″
L7	3-7/16″
L8	23-11-16″
M1	13-15/16″
M2	15-1/4

X	8-5/16″
Y	4-7/16
Z	15-7/8

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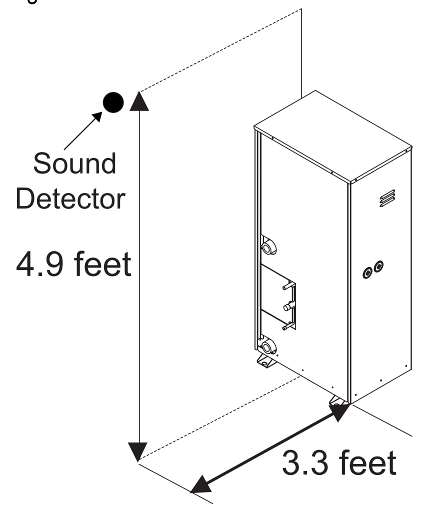
Table 6: Water Mini Unit Sound Levels.

Model (208-230V/60Hz/1Ø)	Sound Levels dB(A)	
	Cooling	Heating
ARWN038GA2	50	52
ARWN048GA2	51	53
ARWN053GA2	52	54

- Measurement taken 4.9' 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.

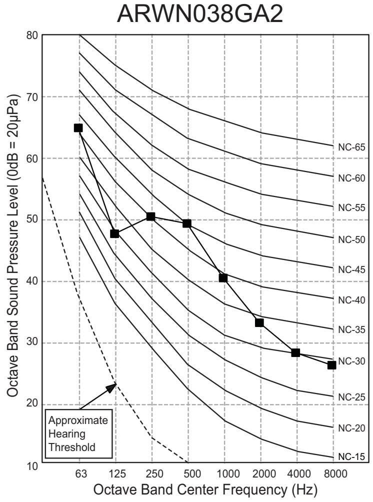
Figure 2: Sound Level Measurement Location.



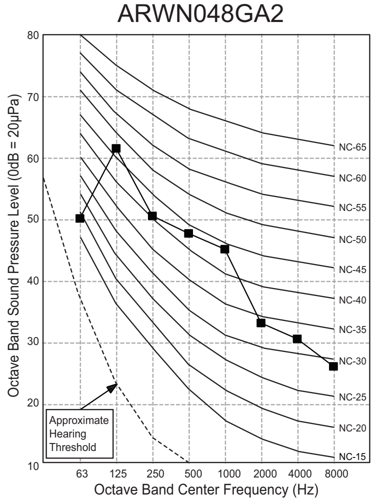
Sound Pressure Levels

Cooling

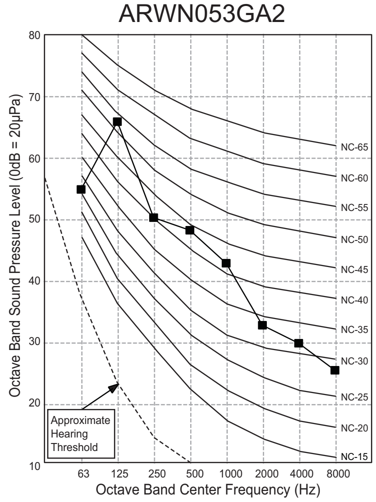
ARWN038GA2



ARWN048GA2

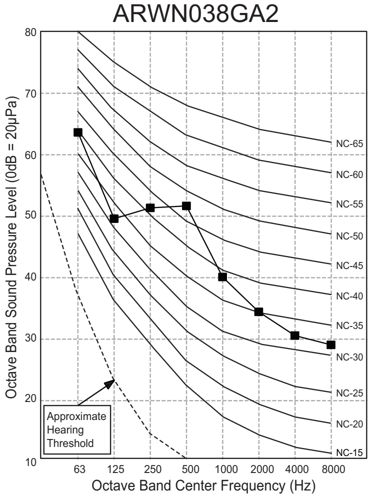


ARWN053GA2

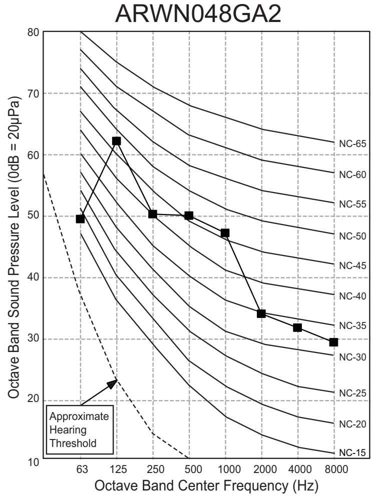


Heating

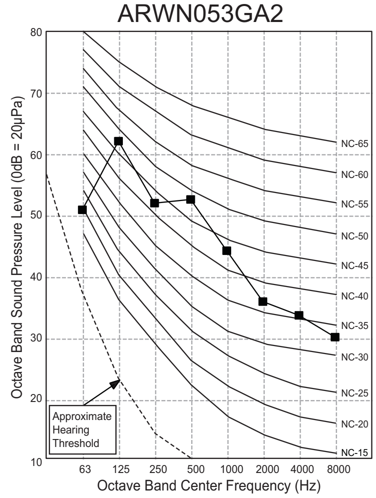
ARWN038GA2



ARWN048GA2



ARWN053GA2



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REFRIGERANT FLOW DIAGRAMS

Cooling Mode

ARWN038GA2, ARWN048GA2, ARWN053GA2

Figure 3: ARWN038GA2, ARWN048GA2, ARWN053GA2—Cooling Mode.

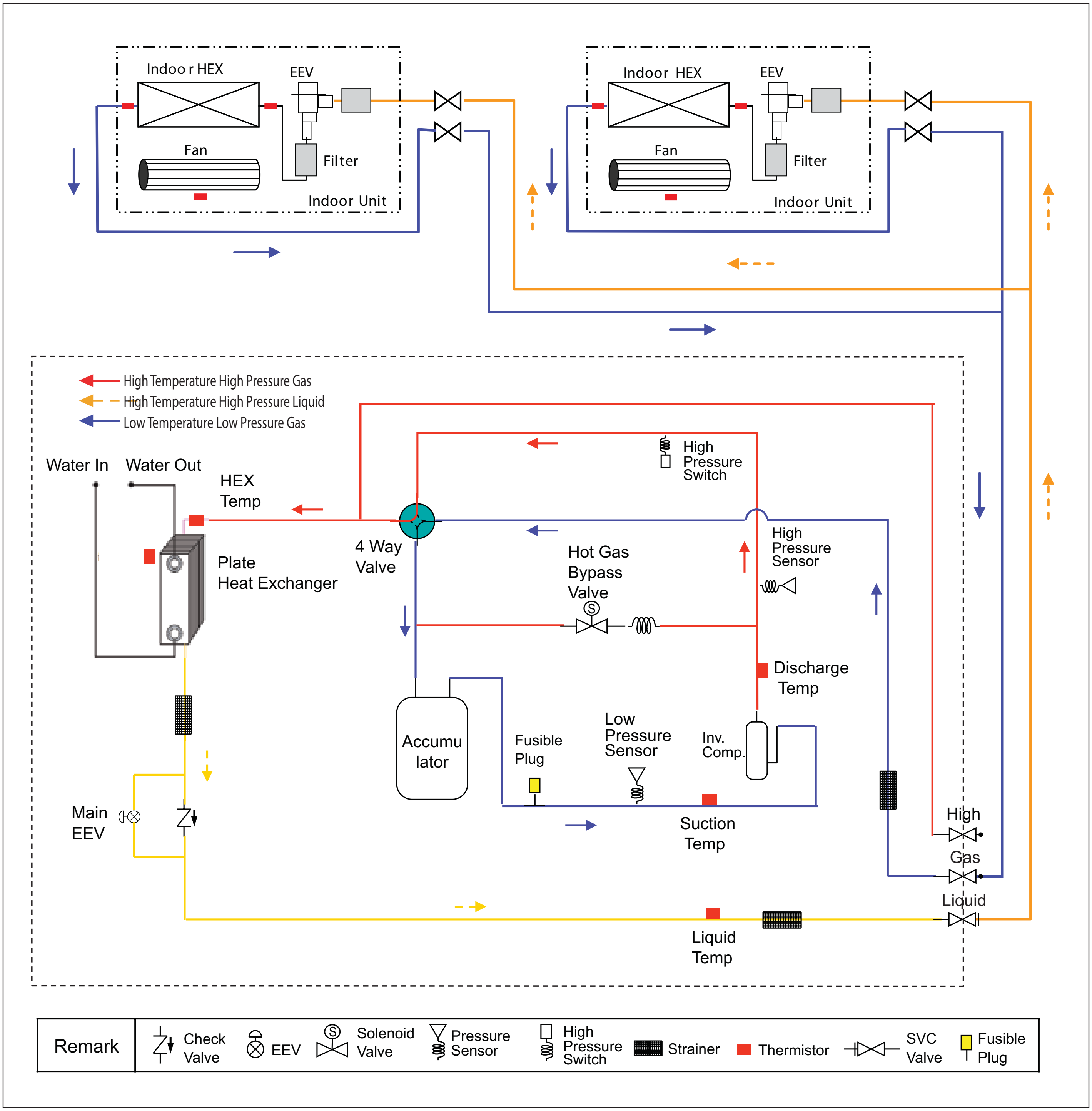

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Figure 4: ARWN038GA2, ARWN048GA2, ARWN053GA2—Heating Mode.

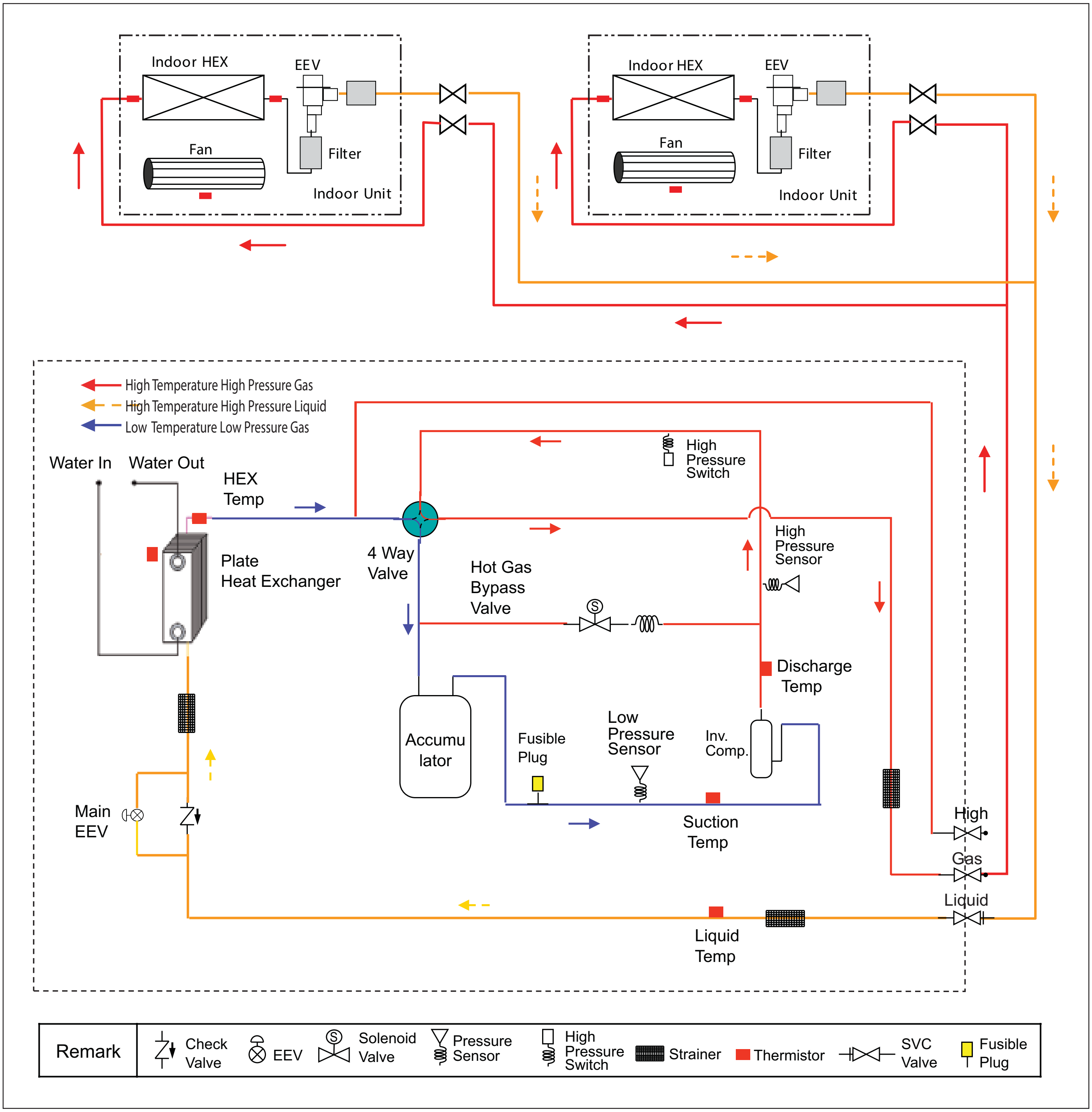

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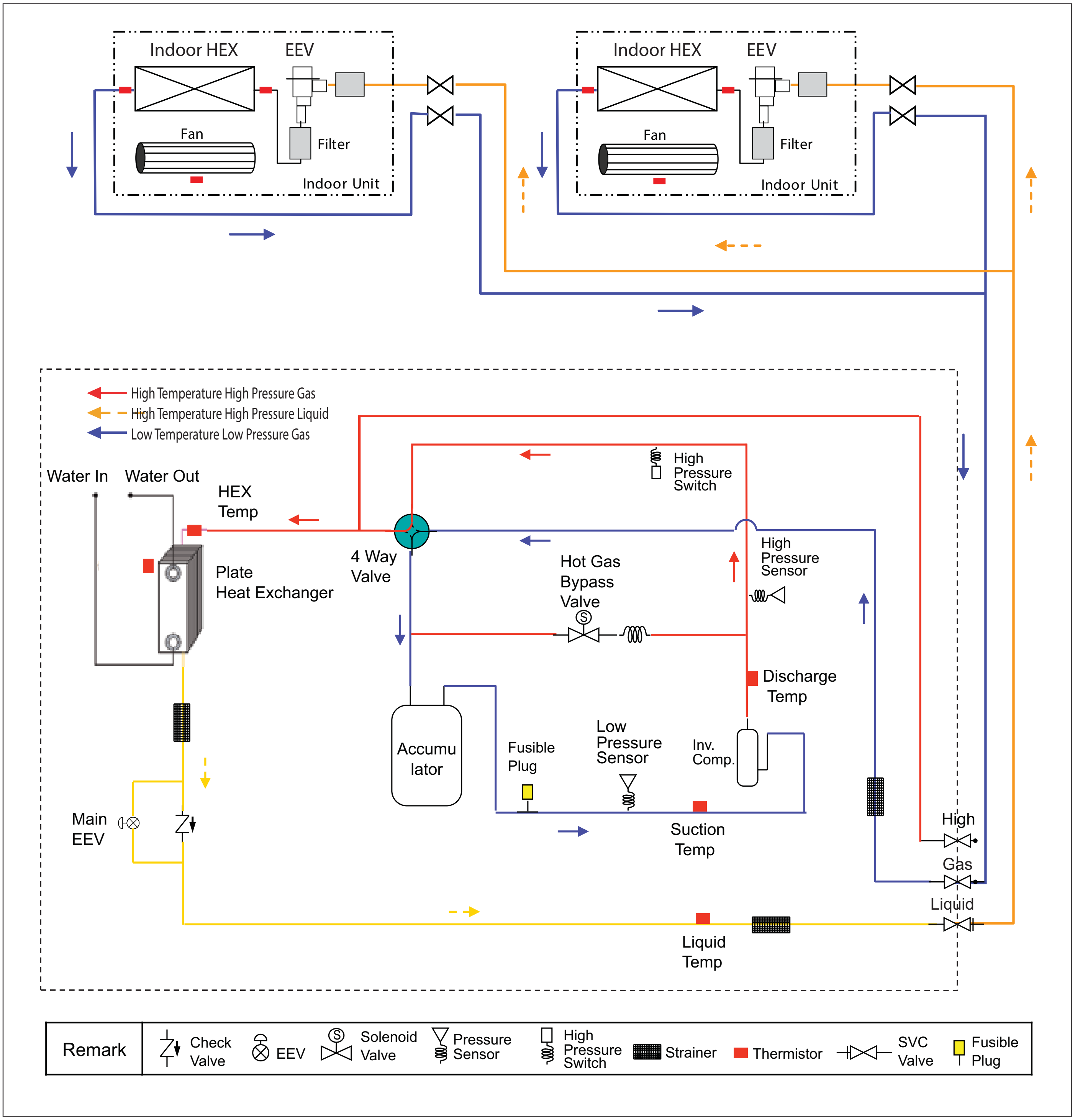
Figure 5: ARWN038GA2, ARWN048GA2, ARWN053GA2—Oil Return.



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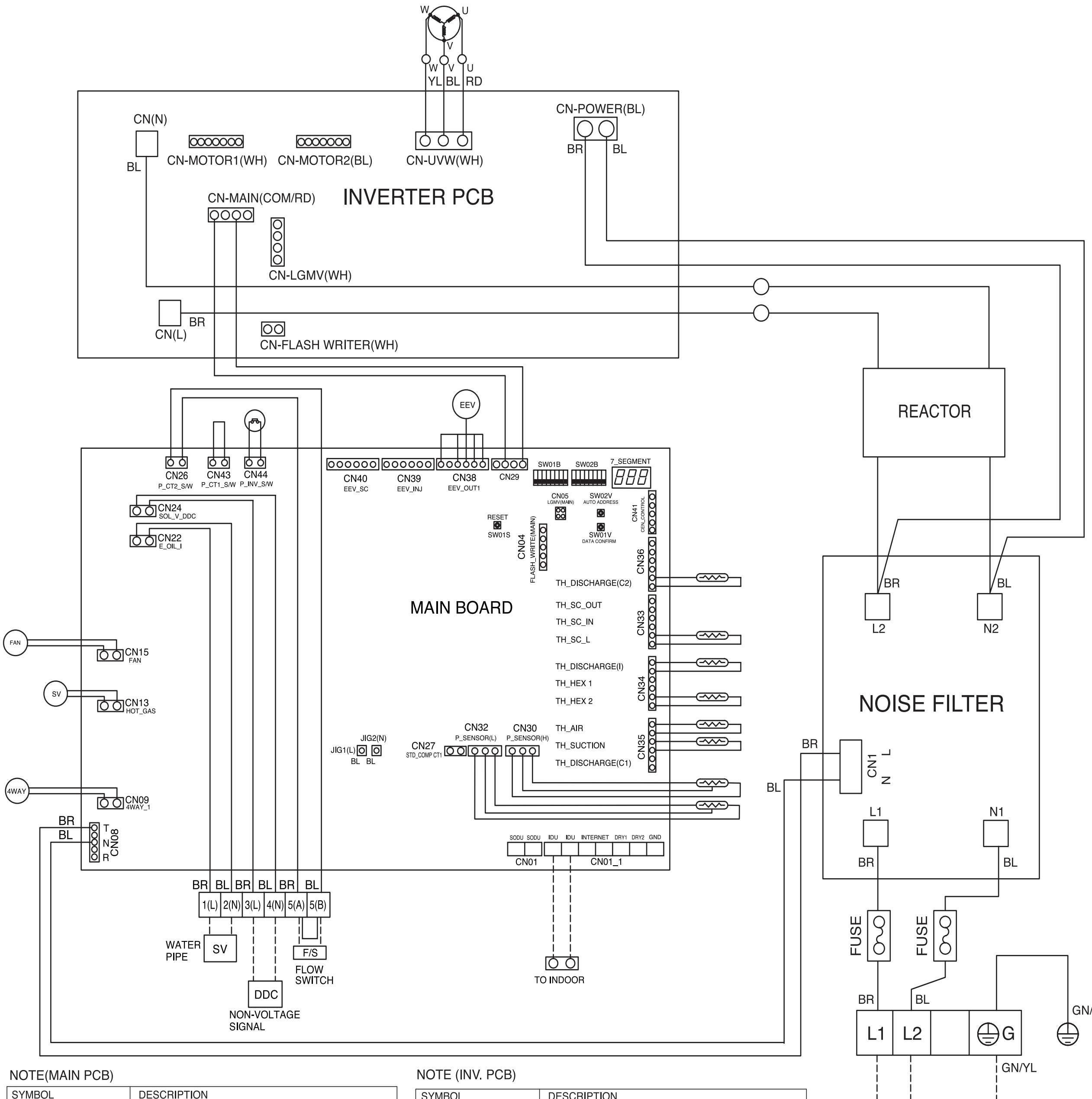
WIRING DIAGRAM

ARWN038GA2, ARWN048GA2, ARWN053GA2

Figure 6: ARWN038GA2, ARWN048GA2, ARWN053GA2 Wiring Diagram.



NOTE(MAIN PCB)

SYMBOL	DESCRIPTION
CN04	TERMINAL FOR ON-BOARDING
CN05	TERMINAL FOR LGMV JIG
CN08	AC POWER
CN09	4WAY REVERSING VALVE
CN10	INVERTER COMP CRANK HEATER
CN13	HOT GAS BYPASS VALVE
CN15	AC POWER TO FAN
CN29	TRANSMISSION WITH INVERTER PCB
CN30	HIGH PRESSURE SENSOR
CN32	LOW PRESSURE SENSOR
SW01S	RESET BUTTON
SW02V	AUTO ADDRESSING BUTTON
CN33(SC_L)	SUBCOOLING LIQUID PIPE THERMISTOR
CN34(DIACHARGE(I))	INVERTER COMP. DISCHARGE PIPE THERMISTOR
CN34(HEX1)	CONDENSOR PIPE THERMISTOR 1
CN35(AIR)	OUTDOOR AIR THERMISTOR
CN35(SUCTION)	SUCTION PIPE THERMISTOR
CN36(DIACHARGE(C2))	TH_WATER
CN38	ELECTRIC EXPANSION VALVE(MAIN)
CN40	ELECTRIC EXPANSION VALVE(SUBCOOLING)
CN41	TERMINAL FOR CENTRAL CONTROL UNIT

NOTE (INV. PCB)

SYMBOL	DESCRIPTION
CN-MAIN	TRANSMISSION WITH MAIN PCB
CN-FLASH-WRITER	TERMINAL FOR ON-BOARDING
CN-POWER	AC POWER
CN-LGMV	TERMINAL FOR LGMV JIG
CN-UVW	TERMINAL FOR L U.V.W OUTPUT
CN(L)	LIVE INPUT
CN(N)	NEUTRAL INPUT
CN-MOTOR1	TRANSMISSION & POWER INPUT OF FAN MOTOR1
CN-MOTOR2	TRANSMISSION & POWER INPUT OF FAN MOTOR2

COLOR

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

NOTES

1. THIS WIRING DIAGRAM IS APPLIED ONLY TO THE MAIN CONTROL BOX.
2. — — — — — — — — — — — : FIELD WIRING

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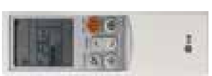
ACCESSORIES

Table 7: Summary Data—Zone Controllers.

Zone Controller	Name	Model No.	Case Color	Max. Wire Length (ft.)	Description
 	Simple Controller with Mode Selection	PQRCVCL0Q	Black	164	Allows control of indoor unit on/off, operation mode, fan speed, and temperature setpoint for up to 16 indoor units.
		PQRCVCL0QW	White		
 	Simple Controller without Mode Selection	PQRCHCA0Q	Black	164	Allows control of indoor unit on/off, fan speed, and temperature setpoint for up to 16 indoor units.
		PQRCHCA0QW	White		
	LG Programmable Thermostat	PREMTB10U	White	164	Allows control of indoor unit on/off, operation mode, occupied and unoccupied temperature setpoints, fan speed, and airflow direction for up to 16 indoor units. Programmable schedule with 5 events per day with control of occupied/ unoccupied, on/off, mode, setpoints and fan speed. Advanced functions include two setpoint autochangoever, minimum difference between setpoints, setback and timed override.
	Wireless Handheld	PQWRHDF0	Ivory	—	Allows control of indoor unit on/off, operation mode, fan speed, and temperature setpoint. Also provides subfunction control.
	Wall-Mounted Remote Temperature Sensor	PQRSTA0	Ivory	50	Allows remote temperature measurement for cassette and ducted indoor units.

Before specifying or placing an order, refer to the V-Net Network Solutions Engineering Product Data Book, and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

For information on controller capatibility, refer to the Controls and Options Table on page 13.

Table 8: Summary Data—Zone Controller Communication Cables.

Communication Cable	Name	Model No.	Max. Wire Length (ft.)	Description
	Wired Remote Group Control Cable Assembly	PZCWRCG3	32	Required when grouping multiple indoor units with a single zone controller.
	Wired Remote / Group Control Extension Cable	PZCWRC1	32	Increases the distance between a remote controller and an indoor unit, or between indoor units in a control group.

Before specifying or placing an order, refer to the V-Net Network Solutions Engineering Product Data Book, and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

For information on controller capatibility, refer to the Controls and Options Table on page 13.

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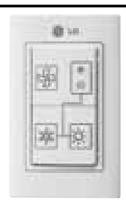
Table 9: Summary Data—Specialty Application Devices.

Specialty Application Device	Name	Model No.	Connects To	Application	Binary Signals Input / Output	Description
	Dry Contact Unit 24 VAC	PQDSB1	Indoor Unit	ON / OFF, Run Status, Error Status	1 / 2	Enables the indoor unit to be controlled and monitored by third-party controls using binary inputs and outputs.
	Dry Contact Unit for Communication	PQDSBCGCD0		ON / OFF, Mode, Controller Lock, Power Save, Run Status, Error Status	2 / 2	
	Dry Contact Unit for Thermostat	PQDSBNGCM1		ON / OFF, Thermo ON / OFF, Mode, Fan Speed, Run Status, Error Status	—	Enables the indoor unit to be controlled and monitored by a third-party thermostat or controller.
	Digital Output (DO) Kit	PQNFP00T0	Comm. BUS	ON / OFF	0 / 1	One 25A DPST normally open relay. Used with central controller to control third-party device manually or by schedule.
	Auxiliary Heater Relay Kit	PRARH0	Indoor Unit	Third-party Supplemental Heat Control	0 /1	Adds coordinated control of an external heater with normal heat pump operations. Contact energizes at 2.7°F below setpoint. De-energizes at 2.7°F above setpoint.
		PRARS0				
	Power Distribution Indicator (PDI)	PQNUD1S01	Comm. BUS	Energy Consumption Monitoring	--	Monitors total water source unit power consumption and distributes per indoor unit based on weighted calculation.
	Mode Selector Switch	PRDSBM	Outdoor Unit	Multi V Heat Pumps Only	—	Locks outdoor unit into Heat, Cool, or Fan mode.

Before specifying or placing an order, refer to the V-Net Network Solutions Engineering Product Data Book, and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

For information on controller capability, refer to the Controls and Options Table on page 13.

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Table 10: Summary Data—Central Controllers (Connect to the Outdoor Unit Terminals Internet A, Internet B).

Central Controller	Name	Model No.	Devices per Controller	Systems per Comm. BUS	Devices per Comm. BUS	No. of Comm. BUS ports	Binary Signals Input / Output	Power / Connection	Description
	AC Smart Premium	PQCSW421E0A	128	16	128	1	2 DI / 2 DO	24 VAC	Provides for scheduling, autochangeover, setback, remote controller lock, setpoint range limit, run time limit, web access, email alarm notification, visual floorplan navigation, peak/demand control, software device interlocking, PDI integration, and AC Manager Plus integration advanced functionality in addition to basic unit control and monitoring.
	AC Ez	PQCSZ250S0	32	16	256	1	—	12 VDC / Outdoor Unit	Provides for scheduling in addition to basic indoor unit control and monitoring.
	Advanced Control Platform (ACP) Standard	PQCPA11A0E	256	16	64 (128 with PDI Premium)	4	2 / 2	24 VAC	Provides for scheduling, remote controller lock, setpoint range limit, web access, peak / demand control, PDI integration, and AC Manager Plus integration advanced functionality in addition to basic unit control and monitoring.
	Advanced Control Platform (ACP) Premium	PQCPB11A0E	256	16	64 (128 with PDI Premium)		10 / 4	24 VAC	

Before specifying or placing an order, refer to the V-Net Network Solutions Engineering Product Data Book, and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

For information on controller capatibility, refer to the Controls and Options Table on page 13.

Table 11: Summary Data—Integration Solutions (Connect to Outdoor Unit Terminals Internet A, Internet B).

Central Controller	Name	Model No.	Devices per Controller	Systems per Comm. BUS	Devices per Comm. BUS	No. of Comm. BUS ports	Binary Signals Input / Output	Power / Connection	Description
	BACnet® Gateway	PQNFB17C1	256	16	64 (128 with PDI Premium)	4	10 / 4	24 VAC	Allow integration of LG equipment for control and monitoring by open protocol BACnet and LonWorks building automation and controls systems.
	LonWorks® Gateway	PLNWKB100	64	16	64 (128 with PDI Premium)	1	2 / 2	24 VAC	

Before specifying or placing an order, refer to the V-Net Network Solutions Engineering Product Data Book, and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

For information on controller capatibility, refer to the Controls and Options Table on page 13.

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LG Monitoring View (LGMV) Diagnostic Software

LGMV software allows the service technician or commissioning agent to connect a computer USB port to the water source unit (WSU) main printed circuit board (PCB) using an accessory cable without the need for a separate interface device. The monitoring 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 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
- Upper outdoor coil pipe temperature
- Lower outdoor coil pipe temperature
- Liquid line pipe temperature
- Subcooler inlet temperature
- Subcooler outlet temperature
- 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 number
- Site name
- Total number of connected IDUs
- Communication indicator
- IDU capacity
- IDU operating mode
- IDU fan speed
- IDU EEV position
- IDU room temperature
- IDU inlet pipe temperature
- IDU outlet pipe temperature
- IDU error code

MV Real-time Data Screen.

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

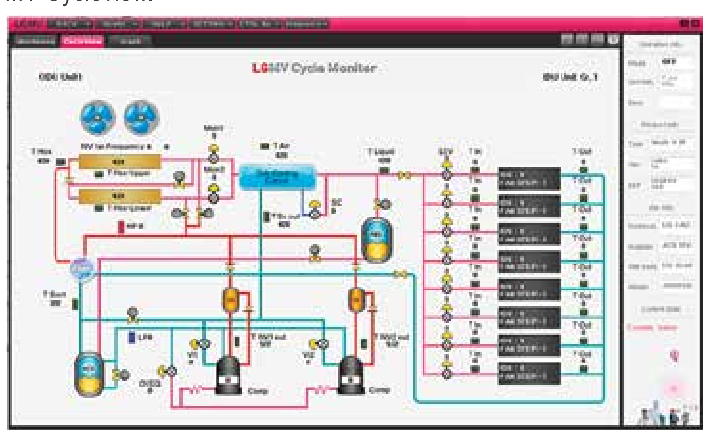
1. Cycleview: Graphic of internal components including:
   - Compressors showing actual speeds
   - EEVs
   - IDUs
   - Temperature and pressure sensors
   - Four-way reversing valve

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 FTN: Enables user to turn on IDUs in 1.8°F increments.

4. Useful Tab
   - Unit Conversion: Converts metric values to imperial values.

MV Cycleview.



⚠ *Note:*

Images on these pages are examples of LGMV screenshots. Actual images may differ depending on the version of the software and the units installed.

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LG Monitoring View (LGMV) Diagnostic Software, continued.

5. Data
   - Data Saving Start: Recording of real time data to a separate file created to be stored on the user's computer.
   - Data Loading Start: Recorded data from a saved ".CSV" file can be loaded to create an LGMV session.

6. Monitoring
   - Electrical: The lower half of main screen is changed to show Inverter Compressor Amps, Volts, Power Hz, Inverter control board fan Hz.

MV Control Indoor Units Screen.

Error Codes

LGMV software helps the service technician or commissioning agent to troubleshoot system operation issues by displaying malfunction codes. These error codes can be seen on the main screen of the LGMV software program. For an overview of Water Mini error codes, see page 79. For detailed information on how to troubleshoot individual error codes, see the Water Mini Service Manual.

Error Code Screen.

The software is available in a high version with all of the features listed above. The low version has all features as the high version without Target High Pressure and Target Low Pressure values shown on main screen.

In lieu of connecting to the WSU, user has the option to connect to IDU with the use of a USB to RS-485 connector kit. When connected through IDU, 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
- Main Memory: 1G
- Operating System: Windows® XP/Vista/7 32 bit (recommended), 64 bit
- Hard Disk: 600 MB when operating
- MS Office 2003, 2007 (recommended) for select reporting functions

⚠ *Note:*

Images on these pages are examples of LGMV screenshots. Actual images may differ depending on the version of the software and the units installed.

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PERFORMANCE DATA

Table 12: Cooling Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
130	23	2.8	35.4	0.70	38.4	0.82	41.9	0.96	45.5	1.08	46.8	1.11	48.7	1.13	50.0	1.14
	32	3.2	35.4	0.70	38.4	0.82	41.9	0.96	45.5	1.08	46.8	1.11	48.7	1.13	50.0	1.14
	41	3.6	35.4	0.70	38.4	0.82	41.9	0.96	45.5	1.08	46.8	1.11	48.7	1.13	50.0	1.14
	50	5.5	35.52	0.69	38.47	0.81	41.86	0.95	45.49	1.06	46.89	1.09	48.73	1.12	50.08	1.14
		10.6	35.52	0.64	38.47	0.75	41.86	0.88	45.49	0.99	46.89	1.02	48.73	1.04	50.08	1.07
		13.3	35.52	0.62	38.47	0.74	41.86	0.87	45.49	0.97	46.89	1.00	48.73	1.03	50.08	1.04
	59	5.5	34.93	0.91	37.84	1.07	41.19	1.24	44.77	1.40	46.13	1.43	47.92	1.47	49.27	1.49
		10.6	34.93	0.84	37.84	0.99	41.19	1.16	44.77	1.31	46.13	1.34	47.92	1.37	49.27	1.40
		13.3	34.93	0.82	37.84	0.98	41.19	1.14	44.77	1.28	46.13	1.31	47.92	1.35	49.27	1.37
	67	5.5	34.42	1.11	37.28	1.29	40.59	1.50	44.14	1.69	45.45	1.73	47.20	1.77	48.56	1.81
		10.6	34.42	1.02	37.28	1.21	40.59	1.41	44.14	1.58	45.45	1.62	47.20	1.67	48.56	1.70
		13.3	34.42	0.99	37.28	1.18	40.59	1.38	44.14	1.55	45.45	1.59	47.20	1.63	48.56	1.66
	75	5.5	34.42	1.37	37.28	1.59	40.59	1.85	44.14	2.09	45.45	2.14	47.20	2.19	48.56	2.23
		10.6	34.42	1.26	37.28	1.49	40.59	1.73	44.14	1.95	45.45	2.00	47.20	2.06	48.56	2.09
		13.3	34.42	1.22	37.28	1.46	40.59	1.70	44.14	1.91	45.45	1.96	47.20	2.01	48.56	2.05
	85	5.5	34.42	1.64	37.28	1.91	40.59	2.22	44.14	2.51	45.45	2.57	47.20	2.63	48.56	2.67
		10.6	34.42	1.50	37.28	1.79	40.59	2.08	44.14	2.34	45.45	2.40	47.20	2.46	48.56	2.51
		13.3	34.42	1.46	37.28	1.75	40.59	2.04	44.14	2.30	45.45	2.36	47.20	2.42	48.56	2.46
	95	5.5	30.99	1.65	33.54	1.93	36.53	2.25	39.71	2.53	40.91	2.60	42.50	2.66	43.70	2.70
		10.6	30.99	1.52	33.54	1.80	36.53	2.10	39.71	2.37	40.91	2.43	42.50	2.49	43.70	2.54
		13.3	30.99	1.48	33.54	1.77	36.53	2.06	39.71	2.32	40.91	2.38	42.50	2.44	43.70	2.48
	104	5.5	27.52	1.75	29.84	2.04	32.46	2.37	35.29	2.67	36.37	2.73	37.76	2.80	38.84	2.85
		10.6	27.52	1.61	29.84	1.91	32.46	2.22	35.29	2.50	36.37	2.56	37.76	2.63	38.84	2.68
		13.3	27.52	1.56	29.84	1.86	32.46	2.17	35.29	2.45	36.37	2.51	37.76	2.58	38.84	2.62
	113	5.5	24.06	1.84	26.13	2.14	28.40	2.50	30.87	2.81	31.83	2.87	33.02	2.94	33.98	3.00
		10.6	24.06	1.69	26.13	2.01	28.40	2.34	30.87	2.63	31.83	2.70	33.02	2.77	33.98	2.82
		13.3	24.06	1.64	26.13	1.96	28.40	2.28	30.87	2.58	31.83	2.64	33.02	2.71	33.98	2.76
120	23	2.8	33.6	0.67	36.4	0.78	39.6	0.91	43.1	1.03	44.4	1.06	46.1	1.08	47.4	1.10
	32	3.2	33.6	0.67	36.4	0.78	39.6	0.91	43.1	1.03	44.4	1.06	46.1	1.08	47.4	1.10
	41	3.6	33.6	0.67	36.4	0.78	39.6	0.91	43.1	1.03	44.4	1.06	46.1	1.08	47.4	1.10
	50	5.5	33.62	0.66	36.37	0.77	39.64	0.89	43.07	1.01	44.35	1.04	46.11	1.06	47.38	1.07
		10.6	33.62	0.60	36.37	0.72	39.64	0.84	43.07	0.94	44.35	0.96	46.11	0.99	47.38	1.01
		13.3	33.62	0.59	36.37	0.70	39.64	0.82	43.07	0.92	44.35	0.95	46.11	0.97	47.38	0.99
	59	5.5	33.22	0.87	35.97	1.02	39.20	1.19	42.58	1.34	43.86	1.37	45.57	1.40	46.84	1.43
		10.6	33.22	0.80	35.97	0.95	39.20	1.11	42.58	1.25	43.86	1.28	45.57	1.31	46.84	1.34
		13.3	33.22	0.78	35.97	0.93	39.20	1.09	42.58	1.22	43.86	1.26	45.57	1.29	46.84	1.31
	67	5.5	32.86	1.07	35.61	1.24	38.80	1.44	42.14	1.63	43.42	1.67	45.09	1.71	46.37	1.74
		10.6	32.86	0.98	35.61	1.16	38.80	1.35	42.14	1.52	43.42	1.56	45.09	1.60	46.37	1.63
		13.3	32.86	0.95	35.61	1.14	38.80	1.32	42.14	1.49	43.42	1.53	45.09	1.57	46.37	1.59
	75	5.5	32.86	1.31	35.61	1.53	38.80	1.78	42.14	2.00	43.42	2.05	45.09	2.10	46.37	2.14
		10.6	32.86	1.20	35.61	1.43	38.80	1.66	42.14	1.87	43.42	1.92	45.09	1.97	46.37	2.01
		13.3	32.86	1.17	35.61	1.40	38.80	1.63	42.14	1.83	43.42	1.88	45.09	1.93	46.37	1.96
	85	5.5	32.86	1.58	35.61	1.85	38.80	2.15	42.14	2.42	43.42	2.48	45.09	2.54	46.37	2.58
		10.6	32.86	1.46	35.61	1.73	38.80	2.01	42.14	2.26	43.42	2.32	45.09	2.38	46.37	2.42
		13.3	32.86	1.41	35.61	1.69	38.80	1.97	42.14	2.22	43.42	2.27	45.09	2.33	46.37	2.37
	95	5.5	30.07	1.62	32.58	1.89	35.49	2.20	38.56	2.48	39.71	2.54	41.27	2.60	42.42	2.65
		10.6	30.07	1.49	32.58	1.77	35.49	2.06	38.56	2.32	39.71	2.37	41.27	2.44	42.42	2.48
		13.3	30.07	1.45	32.58	1.73	35.49	2.02	38.56	2.27	39.71	2.33	41.27	2.39	42.42	2.43
	104	5.5	27.29	1.74	29.56	2.03	32.19	2.37	35.01	2.67	36.05	2.73	37.44	2.80	38.48	2.85
		10.6	27.29	1.61	29.56	1.90	32.19	2.22	35.01	2.49	36.05	2.55	37.44	2.62	38.48	2.67
		13.3	27.29	1.56	29.56	1.86	32.19	2.17	35.01	2.45	36.05	2.51	37.44	2.57	38.48	2.61
	113	5.5	24.50	1.87	26.53	2.18	28.88	2.54	31.47	2.85	32.38	2.92	33.62	3.00	34.54	3.05
		10.6	24.50	1.72	26.53	2.04	28.88	2.37	31.47	2.67	32.38	2.73	33.62	2.81	34.54	2.87
		13.3	24.50	1.67	26.53	1.99	28.88	2.33	31.47	2.62	32.38	2.69	33.62	2.76	34.54	2.79

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 13: Cooling Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB 57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
110	23	2.8	31.7	0.64	34.3	0.74	37.3	0.85	40.6	0.97	41.8	0.98	43.5	1.02	44.6	1.03
	32	3.2	31.7	0.64	34.3	0.74	37.3	0.85	40.6	0.97	41.8	0.98	43.5	1.02	44.6	1.03
	41	3.6	31.7	0.64	34.3	0.74	37.3	0.85	40.6	0.97	41.8	0.98	43.5	1.02	44.6	1.03
	50	5.5	31.69	0.62	34.36	0.72	37.39	0.85	40.61	0.95	41.81	0.97	43.49	1.00	44.64	1.02
		10.6	31.69	0.57	34.36	0.68	37.39	0.79	40.61	0.89	41.81	0.91	43.49	0.94	44.64	0.95
		13.3	31.69	0.56	34.36	0.66	37.39	0.77	40.61	0.87	41.81	0.89	43.49	0.92	44.64	0.93
	59	5.5	31.51	0.83	34.14	0.97	37.16	1.13	40.39	1.28	41.59	1.31	43.22	1.34	44.41	1.36
		10.6	31.51	0.77	34.14	0.91	37.16	1.06	40.39	1.19	41.59	1.22	43.22	1.25	44.41	1.28
		13.3	31.51	0.75	34.14	0.89	37.16	1.04	40.39	1.17	41.59	1.20	43.22	1.23	44.41	1.25
	67	5.5	31.35	1.02	33.94	1.19	36.97	1.39	40.19	1.56	41.39	1.60	42.98	1.64	44.21	1.67
		10.6	31.35	0.94	33.94	1.11	36.97	1.30	40.19	1.46	41.39	1.50	42.98	1.53	44.21	1.56
		13.3	31.35	0.92	33.94	1.09	36.97	1.27	40.19	1.43	41.39	1.47	42.98	1.51	44.21	1.53
	75	5.5	31.35	1.25	33.94	1.46	36.97	1.70	40.19	1.91	41.39	1.96	42.98	2.01	44.21	2.04
		10.6	31.35	1.15	33.94	1.37	36.97	1.59	40.19	1.79	41.39	1.83	42.98	1.88	44.21	1.92
		13.3	31.35	1.12	33.94	1.34	36.97	1.56	40.19	1.76	41.39	1.80	42.98	1.85	44.21	1.87
	85	5.5	31.35	1.52	33.94	1.78	36.97	2.07	40.19	2.33	41.39	2.39	42.98	2.45	44.21	2.49
		10.6	31.35	1.40	33.94	1.66	36.97	1.94	40.19	2.18	41.39	2.24	42.98	2.29	44.21	2.33
		13.3	31.35	1.37	33.94	1.63	36.97	1.90	40.19	2.14	41.39	2.19	42.98	2.25	44.21	2.28
	95	5.5	29.20	1.59	31.63	1.85	34.46	2.15	37.44	2.43	38.56	2.48	40.07	2.54	41.19	2.59
		10.6	29.20	1.46	31.63	1.73	34.46	2.01	37.44	2.27	38.56	2.32	40.07	2.38	41.19	2.43
		13.3	29.20	1.42	31.63	1.69	34.46	1.97	37.44	2.22	38.56	2.28	40.07	2.34	41.19	2.37
	104	5.5	27.05	1.74	29.32	2.03	31.91	2.37	34.69	2.66	35.73	2.73	37.12	2.79	38.16	2.85
		10.6	27.05	1.60	29.32	1.90	31.91	2.21	34.69	2.49	35.73	2.55	37.12	2.62	38.16	2.67
		13.3	27.05	1.56	29.32	1.86	31.91	2.17	34.69	2.44	35.73	2.51	37.12	2.57	38.16	2.60
	113	5.5	24.90	1.89	27.01	2.22	29.36	2.58	31.95	2.90	32.90	2.97	34.18	3.05	35.13	3.10
		10.6	24.90	1.74	27.01	2.07	29.36	2.41	31.95	2.71	32.90	2.78	34.18	2.85	35.13	2.91
		13.3	24.90	1.70	27.01	2.02	29.36	2.36	31.95	2.66	32.90	2.73	34.18	2.80	35.13	2.83
100	23	2.8	29.8	0.59	32.3	0.70	35.1	0.81	38.2	0.90	39.4	0.93	40.9	0.96	42.0	0.98
	32	3.2	29.8	0.59	32.3	0.70	35.1	0.81	38.2	0.90	39.4	0.93	40.9	0.96	42.0	0.98
	41	3.6	29.8	0.59	32.3	0.70	35.1	0.81	38.2	0.90	39.4	0.93	40.9	0.96	42.0	0.98
	50	5.5	29.80	0.59	32.26	0.69	35.13	0.79	38.20	0.90	39.36	0.91	40.87	0.94	42.02	0.96
		10.6	29.80	0.54	32.26	0.64	35.13	0.74	38.20	0.84	39.36	0.86	40.87	0.88	42.02	0.90
		13.3	29.80	0.52	32.26	0.62	35.13	0.72	38.20	0.82	39.36	0.84	40.87	0.86	42.02	0.87
	59	5.5	29.80	0.80	32.26	0.93	35.13	1.08	38.20	1.22	39.36	1.24	40.87	1.28	42.02	1.30
		10.6	29.80	0.73	32.26	0.87	35.13	1.01	38.20	1.14	39.36	1.16	40.87	1.19	42.02	1.22
		13.3	29.80	0.71	32.26	0.85	35.13	0.99	38.20	1.11	39.36	1.14	40.87	1.17	42.02	1.18
	67	5.5	29.80	0.98	32.26	1.14	35.13	1.33	38.20	1.50	39.36	1.53	40.87	1.57	42.02	1.60
		10.6	29.80	0.90	32.26	1.07	35.13	1.25	38.20	1.40	39.36	1.43	40.87	1.47	42.02	1.50
		13.3	29.80	0.87	32.26	1.05	35.13	1.22	38.20	1.37	39.36	1.41	40.87	1.44	42.02	1.46
	75	5.5	29.80	1.19	32.26	1.39	35.13	1.62	38.20	1.83	39.36	1.87	40.87	1.92	42.02	1.95
		10.6	29.80	1.10	32.26	1.30	35.13	1.52	38.20	1.71	39.36	1.75	40.87	1.79	42.02	1.83
		13.3	29.80	1.07	32.26	1.28	35.13	1.49	38.20	1.67	39.36	1.71	40.87	1.76	42.02	1.78
	85	5.5	29.80	1.47	32.26	1.71	35.13	2.00	38.20	2.25	39.36	2.30	40.87	2.36	42.02	2.40
		10.6	29.80	1.35	32.26	1.60	35.13	1.86	**38.20**	**2.10**	39.36	2.15	40.87	2.21	42.02	2.25
		13.3	29.80	1.31	32.26	1.57	35.13	1.83	38.20	2.06	39.36	2.11	40.87	2.16	42.02	2.19
	95	5.5	28.32	1.55	30.67	1.81	33.38	2.10	36.29	2.37	37.36	2.43	38.84	2.49	39.91	2.53
		10.6	28.32	1.43	30.67	1.69	33.38	1.97	36.29	2.22	37.36	2.27	38.84	2.33	39.91	2.37
		13.3	28.32	1.39	30.67	1.65	33.38	1.93	36.29	2.18	37.36	2.23	38.84	2.28	39.91	2.31
	104	5.5	26.81	1.74	29.04	2.03	31.63	2.36	34.38	2.66	35.41	2.72	36.81	2.79	37.80	2.84
		10.6	26.81	1.60	29.04	1.90	31.63	2.21	34.38	2.49	35.41	2.55	36.81	2.61	37.80	2.66
		13.3	26.81	1.56	29.04	1.86	31.63	2.16	34.38	2.44	35.41	2.50	36.81	2.56	37.80	2.59
	113	5.5	25.29	1.93	27.41	2.25	29.87	2.62	32.46	2.95	33.46	3.02	34.77	3.09	35.69	3.15
		10.6	25.29	1.77	27.41	2.10	29.87	2.45	32.46	2.76	33.46	2.82	34.77	2.89	35.69	2.95
		13.3	25.29	1.73	27.41	2.06	29.87	2.40	32.46	2.70	33.46	2.77	34.77	2.84	35.69	2.87

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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PERFORMANCE DATA

MULTI V. WATER MINI

Cooling Capacity

ARWN038GA2

Table 14: Cooling Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
90	23	2.8	26.8	0.51	29.0	0.60	31.6	0.69	34.4	0.78	35.4	0.80	36.8	0.83	37.8	0.84
	32	3.2	26.8	0.51	29.0	0.60	31.6	0.69	34.4	0.78	35.4	0.80	36.8	0.83	37.8	0.84
	41	3.6	26.8	0.51	29.0	0.60	31.6	0.69	34.4	0.78	35.4	0.80	36.8	0.83	37.8	0.84
	50	5.5	26.81	0.50	29.04	0.58	31.63	0.68	34.38	0.77	35.41	0.79	36.81	0.80	37.80	0.83
		10.6	26.81	0.47	29.04	0.55	31.63	0.64	34.38	0.73	35.41	0.74	36.81	0.76	37.80	0.77
		13.3	26.81	0.45	29.04	0.53	31.63	0.63	34.38	0.70	35.41	0.73	36.81	0.75	37.80	0.75
	59	5.5	26.81	0.68	29.04	0.80	31.63	0.93	34.38	1.05	35.41	1.07	36.81	1.10	37.80	1.12
		10.6	26.81	0.63	29.04	0.75	31.63	0.87	34.38	0.98	35.41	1.00	36.81	1.03	37.80	1.05
		13.3	26.81	0.61	29.04	0.73	31.63	0.85	34.38	0.96	35.41	0.98	36.81	1.01	37.80	1.02
	67	5.5	26.81	0.84	29.04	0.98	31.63	1.14	34.38	1.29	35.41	1.32	36.81	1.35	37.80	1.38
		10.6	26.81	0.78	29.04	0.92	31.63	1.07	34.38	1.20	35.41	1.23	36.81	1.26	37.80	1.29
		13.3	26.81	0.75	29.04	0.90	31.63	1.05	34.38	1.18	35.41	1.21	36.81	1.24	37.80	1.26
	75	5.5	26.81	1.03	29.04	1.20	31.63	1.40	34.38	1.57	35.41	1.61	36.81	1.65	37.80	1.68
		10.6	26.81	0.95	29.04	1.12	31.63	1.31	34.38	1.47	35.41	1.50	36.81	1.55	37.80	1.57
		13.3	26.81	0.92	29.04	1.10	31.63	1.28	34.38	1.44	35.41	1.48	36.81	1.52	37.80	1.53
	85	5.5	26.81	1.26	29.04	1.47	31.63	1.72	34.38	1.94	35.41	1.98	36.81	2.03	37.80	2.07
		10.6	26.81	1.16	29.04	1.38	31.63	1.61	34.38	1.81	35.41	1.85	36.81	1.90	37.80	1.93
		13.3	26.81	1.13	29.04	1.35	31.63	1.57	34.38	1.77	35.41	1.82	36.81	1.86	37.80	1.88
	95	5.5	26.09	1.37	28.24	1.59	30.75	1.85	33.42	2.09	34.42	2.13	35.77	2.19	36.77	2.23
		10.6	26.09	1.25	28.24	1.49	30.75	1.73	33.42	1.95	34.42	2.00	35.77	2.05	36.77	2.09
		13.3	26.09	1.22	28.24	1.46	30.75	1.70	33.42	1.91	34.42	1.96	35.77	2.01	36.77	2.03
	104	5.5	25.33	1.57	27.45	1.83	29.87	2.13	32.46	2.40	33.46	2.45	34.73	2.51	35.73	2.56
		10.6	25.33	1.44	27.45	1.71	29.87	1.99	32.46	2.24	33.46	2.30	34.73	2.35	35.73	2.40
		13.3	25.33	1.40	27.45	1.67	29.87	1.95	32.46	2.20	33.46	2.25	34.73	2.31	35.73	2.33
	113	5.5	24.58	1.77	26.65	2.06	29.00	2.40	31.51	2.71	32.50	2.77	33.70	2.84	34.69	2.89
		10.6	24.58	1.63	26.65	1.93	29.00	2.25	31.51	2.53	32.50	2.60	33.70	2.66	34.69	2.71
		13.3	24.58	1.58	26.65	1.89	29.00	2.21	31.51	2.48	32.50	2.54	33.70	2.61	34.69	2.64
80	23	2.8	23.8	0.43	25.8	0.50	28.1	0.58	30.6	0.66	31.5	0.67	32.7	0.70	33.6	0.70
	32	3.2	23.8	0.43	25.8	0.50	28.1	0.58	30.6	0.66	31.5	0.67	32.7	0.70	33.6	0.70
	41	3.6	23.8	0.43	25.8	0.50	28.1	0.58	30.6	0.66	31.5	0.67	32.7	0.70	33.6	0.70
	50	5.5	23.82	0.43	25.81	0.49	28.12	0.57	30.55	0.65	31.47	0.66	32.70	0.68	33.62	0.68
		10.6	23.82	0.39	25.81	0.47	28.12	0.54	30.55	0.60	31.47	0.62	32.70	0.63	33.62	0.64
		13.3	23.82	0.38	25.81	0.45	28.12	0.53	30.55	0.59	31.47	0.60	32.70	0.62	33.62	0.63
	59	5.5	23.82	0.57	25.81	0.67	28.12	0.78	30.55	0.88	31.47	0.90	32.70	0.92	33.62	0.93
		10.6	23.82	0.53	25.81	0.63	28.12	0.73	30.55	0.82	31.47	0.84	32.70	0.86	33.62	0.87
		13.3	23.82	0.51	25.81	0.61	28.12	0.71	30.55	0.80	31.47	0.82	32.70	0.84	33.62	0.85
	67	5.5	23.82	0.71	25.81	0.83	28.12	0.96	30.55	1.08	31.47	1.11	32.70	1.13	33.62	1.16
		10.6	23.82	0.65	25.81	0.77	28.12	0.90	30.55	1.01	31.47	1.04	32.70	1.06	33.62	1.08
		13.3	23.82	0.63	25.81	0.75	28.12	0.88	30.55	0.99	31.47	1.02	32.70	1.04	33.62	1.05
	75	5.5	23.82	0.86	25.81	1.01	28.12	1.17	30.55	1.32	31.47	1.35	32.70	1.38	33.62	1.41
		10.6	23.82	0.79	25.81	0.94	28.12	1.10	30.55	1.23	31.47	1.26	32.70	1.29	33.62	1.32
		13.3	23.82	0.77	25.81	0.92	28.12	1.07	30.55	1.21	31.47	1.24	32.70	1.27	33.62	1.28
	85	5.5	23.82	1.06	25.81	1.23	28.12	1.44	30.55	1.62	31.47	1.66	32.70	1.70	33.62	1.73
		10.6	23.82	0.98	25.81	1.16	28.12	1.35	30.55	1.52	31.47	1.55	32.70	1.59	33.62	1.62
		13.3	23.82	0.95	25.81	1.13	28.12	1.32	30.55	1.49	31.47	1.52	32.70	1.56	33.62	1.58
	95	5.5	23.82	1.18	25.81	1.37	28.12	1.60	30.55	1.80	31.47	1.85	32.70	1.89	33.62	1.92
		10.6	23.82	1.08	25.81	1.28	28.12	1.50	30.55	1.68	31.47	1.73	32.70	1.77	33.62	1.80
		13.3	23.82	1.05	25.81	1.26	28.12	1.47	30.55	1.65	31.47	1.69	32.70	1.74	33.62	1.75
	104	5.5	23.82	1.40	25.81	1.63	28.12	1.89	30.55	2.13	31.47	2.18	32.70	2.24	33.62	2.28
		10.6	23.82	1.28	25.81	1.52	28.12	1.77	30.55	2.00	31.47	2.04	32.70	2.09	33.62	2.13
		13.3	23.82	1.25	25.81	1.49	28.12	1.73	30.55	1.95	31.47	2.00	32.70	2.06	33.62	2.07
	113	5.5	23.82	1.61	25.81	1.88	28.12	2.19	30.55	2.47	31.47	2.52	32.70	2.59	33.62	2.63
		10.6	23.82	1.48	25.81	1.76	28.12	2.04	30.55	2.31	31.47	2.36	32.70	2.42	33.62	2.46
		13.3	23.82	1.44	25.81	1.72	28.12	2.00	30.55	2.26	31.47	2.31	32.70	2.37	33.62	2.40

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 15: Cooling Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
70	23	2.8	20.9	0.36	22.6	0.41	24.6	0.49	26.7	0.55	27.5	0.55	28.6	0.57	29.4	0.58
	32	3.2	20.9	0.36	22.6	0.41	24.6	0.49	26.7	0.55	27.5	0.55	28.6	0.57	29.4	0.58
	41	3.6	20.9	0.36	22.6	0.41	24.6	0.49	26.7	0.55	27.5	0.55	28.6	0.57	29.4	0.58
	50	5.5	20.87	0.35	22.59	0.41	24.62	0.47	26.73	0.53	27.52	0.55	28.60	0.57	29.40	0.57
		10.6	20.87	0.32	22.59	0.38	24.62	0.44	26.73	0.51	27.52	0.52	28.60	0.53	29.40	0.54
		13.3	20.87	0.32	22.59	0.37	24.62	0.44	26.73	0.49	27.52	0.50	28.60	0.52	29.40	0.52
	59	5.5	20.87	0.48	22.59	0.56	24.62	0.65	26.73	0.73	27.52	0.75	28.60	0.77	29.40	0.78
		10.6	20.87	0.44	22.59	0.52	24.62	0.60	26.73	0.68	27.52	0.70	28.60	0.72	29.40	0.73
		13.3	20.87	0.43	22.59	0.51	24.62	0.59	26.73	0.67	27.52	0.68	28.60	0.70	29.40	0.71
	67	5.5	20.87	0.59	22.59	0.69	24.62	0.80	26.73	0.90	27.52	0.92	28.60	0.94	29.40	0.96
		10.6	20.87	0.54	22.59	0.64	24.62	0.75	26.73	0.84	27.52	0.86	28.60	0.88	29.40	0.90
		13.3	20.87	0.53	22.59	0.63	24.62	0.73	26.73	0.83	27.52	0.84	28.60	0.87	29.40	0.87
	75	5.5	20.87	0.72	22.59	0.84	24.62	0.97	26.73	1.10	27.52	1.12	28.60	1.15	29.40	1.17
		10.6	20.87	0.66	22.59	0.78	24.62	0.91	26.73	1.02	27.52	1.05	28.60	1.08	29.40	1.10
		13.3	20.87	0.64	22.59	0.77	24.62	0.89	26.73	1.01	27.52	1.03	28.60	1.05	29.40	1.07
	85	5.5	20.87	0.88	22.59	1.03	24.62	1.20	26.73	1.35	27.52	1.38	28.60	1.41	29.40	1.44
		10.6	20.87	0.81	22.59	0.96	24.62	1.12	26.73	1.26	27.52	1.29	28.60	1.32	29.40	1.35
		13.3	20.87	0.79	22.59	0.94	24.62	1.10	26.73	1.23	27.52	1.27	28.60	1.30	29.40	1.31
	95	5.5	20.87	0.98	22.59	1.14	24.62	1.33	26.73	1.50	27.52	1.53	28.60	1.57	29.40	1.60
		10.6	20.87	0.90	22.59	1.07	24.62	1.24	26.73	1.40	27.52	1.43	28.60	1.47	29.40	1.50
		13.3	20.87	0.87	22.59	1.04	24.62	1.22	26.73	1.37	27.52	1.41	28.60	1.44	29.40	1.46
	104	5.5	20.87	1.16	22.59	1.35	24.62	1.58	26.73	1.77	27.52	1.82	28.60	1.86	29.40	1.89
		10.6	20.87	1.07	22.59	1.26	24.62	1.47	26.73	1.66	27.52	1.70	28.60	1.74	29.40	1.77
		13.3	20.87	1.04	22.59	1.24	24.62	1.44	26.73	1.62	27.52	1.67	28.60	1.71	29.40	1.73
	113	5.5	20.87	1.34	22.59	1.56	24.62	1.82	26.73	2.05	27.52	2.10	28.60	2.15	29.40	2.19
		10.6	20.87	1.23	22.59	1.46	24.62	1.71	26.73	1.92	27.52	1.97	28.60	2.01	29.40	2.05
		13.3	20.87	1.20	22.59	1.43	24.62	1.66	26.73	1.88	27.52	1.92	28.60	1.98	29.40	1.99
60	23	2.8	17.9	0.29	19.4	0.34	21.1	0.39	22.9	0.44	23.6	0.45	24.5	0.46	25.2	0.47
	32	3.2	17.9	0.29	19.4	0.34	21.1	0.39	22.9	0.44	23.6	0.45	24.5	0.46	25.2	0.47
	41	3.6	17.9	0.29	19.4	0.34	21.1	0.39	22.9	0.44	23.6	0.45	24.5	0.46	25.2	0.47
	50	5.5	17.89	0.28	19.36	0.32	21.07	0.37	22.90	0.43	23.62	0.44	24.54	0.45	25.21	0.45
		10.6	17.89	0.26	19.36	0.30	21.07	0.36	22.90	0.40	23.62	0.41	24.54	0.42	25.21	0.43
		13.3	17.89	0.24	19.36	0.30	21.07	0.35	22.90	0.39	23.62	0.40	24.54	0.41	25.21	0.42
	59	5.5	17.89	0.38	19.36	0.44	21.07	0.51	22.90	0.58	23.62	0.60	24.54	0.61	25.21	0.62
		10.6	17.89	0.35	19.36	0.41	21.07	0.48	22.90	0.54	23.62	0.56	24.54	0.57	25.21	0.58
		13.3	17.89	0.34	19.36	0.41	21.07	0.47	22.90	0.53	23.62	0.54	24.54	0.56	25.21	0.57
	67	5.5	17.89	0.47	19.36	0.55	21.07	0.64	22.90	0.72	23.62	0.74	24.54	0.75	25.21	0.77
		10.6	17.89	0.43	19.36	0.51	21.07	0.60	22.90	0.67	23.62	0.69	24.54	0.70	25.21	0.72
		13.3	17.89	0.42	19.36	0.50	21.07	0.58	22.90	0.66	23.62	0.67	24.54	0.69	25.21	0.70
	75	5.5	17.89	0.57	19.36	0.67	21.07	0.78	22.90	0.87	23.62	0.89	24.54	0.92	25.21	0.93
		10.6	17.89	0.53	19.36	0.62	21.07	0.72	22.90	0.82	23.62	0.84	24.54	0.86	25.21	0.87
		13.3	17.89	0.51	19.36	0.61	21.07	0.71	22.90	0.80	23.62	0.82	24.54	0.84	25.21	0.85
	85	5.5	17.89	0.70	19.36	0.82	21.07	0.95	22.90	1.07	23.62	1.10	24.54	1.13	25.21	1.15
		10.6	17.89	0.65	19.36	0.77	21.07	0.89	22.90	1.01	23.62	1.03	24.54	1.05	25.21	1.07
		13.3	17.89	0.63	19.36	0.75	21.07	0.87	22.90	0.99	23.62	1.01	24.54	1.04	25.21	1.05
	95	5.5	17.89	0.78	19.36	0.91	21.07	1.06	22.90	1.19	23.62	1.22	24.54	1.25	25.21	1.28
		10.6	17.89	0.72	19.36	0.85	21.07	0.99	22.90	1.12	23.62	1.14	24.54	1.17	25.21	1.19
		13.3	17.89	0.70	19.36	0.83	21.07	0.97	22.90	1.10	23.62	1.12	24.54	1.15	25.21	1.16
	104	5.5	17.89	0.92	19.36	1.08	21.07	1.26	22.90	1.41	23.62	1.45	24.54	1.48	25.21	1.51
		10.6	17.89	0.85	19.36	1.01	21.07	1.17	22.90	1.32	23.62	1.35	24.54	1.39	25.21	1.41
		13.3	17.89	0.83	19.36	0.99	21.07	1.15	22.90	1.29	23.62	1.33	24.54	1.36	25.21	1.38
	113	5.5	17.89	1.07	19.36	1.24	21.07	1.45	22.90	1.64	23.62	1.67	24.54	1.71	25.21	1.75
		10.6	17.89	0.99	19.36	1.17	21.07	1.36	22.90	1.52	23.62	1.56	24.54	1.61	25.21	1.64
		13.3	17.89	0.95	19.36	1.14	21.07	1.33	22.90	1.49	23.62	1.53	24.54	1.57	25.21	1.59

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 16: Cooling Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
50	23	2.8	14.9	0.21	16.1	0.25	17.6	0.30	19.1	0.33	19.7	0.33	20.4	0.34	21.0	0.35
	32	3.2	14.9	0.21	16.1	0.25	17.6	0.30	19.1	0.33	19.7	0.33	20.4	0.34	21.0	0.35
	41	3.6	14.9	0.21	16.1	0.25	17.6	0.30	19.1	0.33	19.7	0.33	20.4	0.34	21.0	0.35
	50	5.5	14.90	0.21	16.13	0.24	17.57	0.29	19.12	0.32	19.68	0.32	20.43	0.34	20.99	0.34
		10.6	14.90	0.19	16.13	0.23	17.57	0.27	19.12	0.30	19.68	0.31	20.43	0.31	20.99	0.32
		13.3	14.90	0.18	16.13	0.23	17.57	0.26	19.12	0.29	19.68	0.30	20.43	0.31	20.99	0.31
	59	5.5	14.90	0.28	16.13	0.33	17.57	0.39	19.12	0.43	19.68	0.44	20.43	0.45	20.99	0.46
		10.6	14.90	0.26	16.13	0.31	17.57	0.36	19.12	0.41	19.68	0.42	20.43	0.42	20.99	0.43
		13.3	14.90	0.25	16.13	0.30	17.57	0.35	19.12	0.40	19.68	0.41	20.43	0.42	20.99	0.42
	67	5.5	14.90	0.35	16.13	0.41	17.57	0.47	19.12	0.53	19.68	0.55	20.43	0.56	20.99	0.57
		10.6	14.90	0.32	16.13	0.38	17.57	0.44	19.12	0.50	19.68	0.51	20.43	0.53	20.99	0.53
		13.3	14.90	0.31	16.13	0.37	17.57	0.44	19.12	0.49	19.68	0.50	20.43	0.51	20.99	0.52
	75	5.5	14.90	0.42	16.13	0.50	17.57	0.58	19.12	0.65	19.68	0.67	20.43	0.68	20.99	0.69
		10.6	14.90	0.39	16.13	0.47	17.57	0.54	19.12	0.61	19.68	0.62	20.43	0.64	20.99	0.65
		13.3	14.90	0.38	16.13	0.45	17.57	0.53	19.12	0.60	19.68	0.61	20.43	0.63	20.99	0.63
	85	5.5	14.90	0.53	16.13	0.61	17.57	0.71	19.12	0.80	19.68	0.82	20.43	0.84	20.99	0.86
		10.6	14.90	0.48	16.13	0.57	17.57	0.66	19.12	0.75	19.68	0.77	20.43	0.79	20.99	0.80
		13.3	14.90	0.47	16.13	0.56	17.57	0.65	19.12	0.74	19.68	0.75	20.43	0.77	20.99	0.78
	95	5.5	14.90	0.58	16.13	0.68	17.57	0.79	19.12	0.89	19.68	0.91	20.43	0.93	20.99	0.95
		10.6	14.90	0.54	16.13	0.63	17.57	0.74	19.12	0.83	19.68	0.85	20.43	0.87	20.99	0.89
		13.3	14.90	0.52	16.13	0.62	17.57	0.72	19.12	0.82	19.68	0.84	20.43	0.86	20.99	0.87
	104	5.5	14.90	0.69	16.13	0.80	17.57	0.94	19.12	1.05	19.68	1.08	20.43	1.11	20.99	1.13
		10.6	14.90	0.63	16.13	0.75	17.57	0.87	19.12	0.99	19.68	1.01	20.43	1.04	20.99	1.05
		13.3	14.90	0.62	16.13	0.74	17.57	0.86	19.12	0.97	19.68	0.99	20.43	1.02	20.99	1.02
	113	5.5	14.90	0.80	16.13	0.93	17.57	1.08	19.12	1.22	19.68	1.25	20.43	1.28	20.99	1.30
		10.6	14.90	0.73	16.13	0.87	17.57	1.01	19.12	1.14	19.68	1.17	20.43	1.20	20.99	1.22
		13.3	14.90	0.71	16.13	0.85	17.57	0.99	19.12	1.12	19.68	1.14	20.43	1.17	20.99	1.18

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 17: Cooling Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
130	23	3.6	44.4	0.91	48.1	1.06	52.4	1.24	56.9	1.39	58.7	1.42	61.0	1.47	62.7	1.49
	32	4.0	44.4	0.91	48.1	1.06	52.4	1.24	56.9	1.39	58.7	1.42	61.0	1.47	62.7	1.49
	41	4.6	44.4	0.91	48.1	1.06	52.4	1.24	56.9	1.39	58.7	1.42	61.0	1.47	62.7	1.49
	50	6.9	44.44	0.89	48.14	1.04	52.38	1.22	56.92	1.37	58.67	1.40	60.97	1.44	62.67	1.46
		13.2	44.44	0.83	48.14	0.97	52.38	1.13	56.92	1.28	58.67	1.31	60.97	1.34	62.67	1.37
		16.5	44.44	0.80	48.14	0.96	52.38	1.11	56.92	1.25	58.67	1.29	60.97	1.32	62.67	1.34
	59	6.9	43.71	1.17	47.35	1.37	51.54	1.60	56.02	1.79	57.72	1.84	59.96	1.89	61.66	1.92
		13.2	43.71	1.08	47.35	1.28	51.54	1.49	56.02	1.68	57.72	1.72	59.96	1.76	61.66	1.80
		16.5	43.71	1.05	47.35	1.25	51.54	1.46	56.02	1.64	57.72	1.69	59.96	1.73	61.66	1.76
	67	6.9	43.06	1.42	46.65	1.66	50.79	1.93	55.23	2.17	56.87	2.23	59.06	2.28	60.76	2.32
		13.2	43.06	1.31	46.65	1.55	50.79	1.81	55.23	2.03	56.87	2.08	59.06	2.14	60.76	2.18
		16.5	43.06	1.27	46.65	1.52	50.79	1.77	55.23	2.00	56.87	2.04	59.06	2.10	60.76	2.14
	75	6.9	43.06	1.76	46.65	2.04	50.79	2.38	55.23	2.69	56.87	2.75	59.06	2.82	60.76	2.86
		13.2	43.06	1.62	46.65	1.91	50.79	2.23	55.23	2.51	56.87	2.57	59.06	2.64	60.76	2.69
		16.5	43.06	1.57	46.65	1.87	50.79	2.18	55.23	2.46	56.87	2.52	59.06	2.59	60.76	2.63
	85	6.9	43.06	2.11	46.65	2.45	50.79	2.86	55.23	3.22	56.87	3.30	59.06	3.38	60.76	3.44
		13.2	43.06	1.93	46.65	2.30	50.79	2.68	55.23	3.01	56.87	3.09	59.06	3.17	60.76	3.23
		16.5	43.06	1.88	46.65	2.25	50.79	2.62	55.23	2.95	56.87	3.03	59.06	3.11	60.76	3.16
	95	6.9	38.78	2.13	41.97	2.48	45.71	2.89	49.69	3.25	51.19	3.34	53.18	3.42	54.68	3.48
		13.2	38.78	1.96	41.97	2.32	45.71	2.70	49.69	3.05	51.19	3.12	53.18	3.20	54.68	3.27
		16.5	38.78	1.90	41.97	2.27	45.71	2.65	49.69	2.98	51.19	3.06	53.18	3.14	54.68	3.19
	104	6.9	34.44	2.25	37.33	2.62	40.62	3.05	44.16	3.43	45.51	3.51	47.25	3.60	48.60	3.67
		13.2	34.44	2.06	37.33	2.45	40.62	2.85	44.16	3.21	45.51	3.29	47.25	3.38	48.60	3.45
		16.5	34.44	2.01	37.33	2.40	40.62	2.79	44.16	3.15	45.51	3.23	47.25	3.31	48.60	3.37
	113	6.9	30.11	2.37	32.70	2.75	35.54	3.21	38.63	3.61	39.83	3.69	41.32	3.78	42.52	3.86
		13.2	30.11	2.17	32.70	2.58	35.54	3.00	38.63	3.38	39.83	3.47	41.32	3.56	42.52	3.63
		16.5	30.11	2.11	32.70	2.52	35.54	2.94	38.63	3.31	39.83	3.40	41.32	3.49	42.52	3.55
120	23	3.6	42.1	0.86	45.5	1.01	49.6	1.17	53.9	1.31	55.5	1.36	57.7	1.39	59.3	1.40
	32	4.0	42.1	0.86	45.5	1.01	49.6	1.17	53.9	1.31	55.5	1.36	57.7	1.39	59.3	1.40
	41	4.6	42.1	0.86	45.5	1.01	49.6	1.17	53.9	1.31	55.5	1.36	57.7	1.39	59.3	1.40
	50	6.9	42.07	0.85	45.51	0.99	49.61	1.15	53.90	1.29	55.49	1.33	57.69	1.36	59.29	1.38
		13.2	42.07	0.78	45.51	0.93	49.61	1.08	53.90	1.21	55.49	1.24	57.69	1.27	59.29	1.30
		16.5	42.07	0.75	45.51	0.90	49.61	1.06	53.90	1.18	55.49	1.22	57.69	1.25	59.29	1.27
	59	6.9	41.57	1.12	45.01	1.31	49.05	1.52	53.28	1.72	54.88	1.76	57.02	1.80	58.62	1.83
		13.2	41.57	1.03	45.01	1.22	49.05	1.43	53.28	1.61	54.88	1.64	57.02	1.69	58.62	1.72
		16.5	41.57	1.00	45.01	1.20	49.05	1.40	53.28	1.57	54.88	1.62	57.02	1.65	58.62	1.68
	67	6.9	41.12	1.37	44.56	1.60	48.55	1.86	52.73	2.09	54.33	2.14	56.42	2.19	58.02	2.23
		13.2	41.12	1.26	44.56	1.49	48.55	1.74	52.73	1.96	54.33	2.01	56.42	2.06	58.02	2.10
		16.5	41.12	1.22	44.56	1.46	48.55	1.70	52.73	1.92	54.33	1.97	56.42	2.02	58.02	2.05
	75	6.9	41.12	1.68	44.56	1.96	48.55	2.29	52.73	2.57	54.33	2.63	56.42	2.70	58.02	2.75
		13.2	41.12	1.55	44.56	1.83	48.55	2.14	52.73	2.41	54.33	2.46	56.42	2.53	58.02	2.58
		16.5	41.12	1.50	44.56	1.79	48.55	2.09	52.73	2.36	54.33	2.42	56.42	2.48	58.02	2.52
	85	6.9	41.12	2.03	44.56	2.37	48.55	2.76	52.73	3.11	54.33	3.18	56.42	3.26	58.02	3.32
		13.2	41.12	1.87	44.56	2.22	48.55	2.58	52.73	2.91	54.33	2.98	56.42	3.06	58.02	3.11
		16.5	41.12	1.82	44.56	2.17	48.55	2.53	52.73	2.85	54.33	2.92	56.42	3.00	58.02	3.04
	95	6.9	37.63	2.08	40.77	2.43	44.41	2.83	48.25	3.19	49.69	3.26	51.64	3.34	53.08	3.40
		13.2	37.63	1.91	40.77	2.27	44.41	2.65	48.25	2.98	49.69	3.05	51.64	3.13	53.08	3.19
		16.5	37.63	1.86	40.77	2.22	44.41	2.59	48.25	2.92	49.69	2.99	51.64	3.07	53.08	3.12
	104	6.9	34.14	2.24	36.98	2.61	40.27	3.05	43.81	3.43	45.11	3.51	46.85	3.60	48.15	3.66
		13.2	34.14	2.06	36.98	2.44	40.27	2.85	43.81	3.21	45.11	3.28	46.85	3.37	48.15	3.44
		16.5	34.14	2.01	36.98	2.39	40.27	2.79	43.81	3.14	45.11	3.23	46.85	3.31	48.15	3.36
	113	6.9	30.65	2.40	33.20	2.80	36.14	3.26	39.38	3.67	40.52	3.76	42.07	3.85	43.21	3.92
		13.2	30.65	2.21	33.20	2.62	36.14	3.05	39.38	3.43	40.52	3.51	42.07	3.61	43.21	3.68
		16.5	30.65	2.15	33.20	2.56	36.14	2.99	39.38	3.37	40.52	3.46	42.07	3.54	43.21	3.59

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 18: Cooling Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
110	23	3.6	39.7	0.82	43.0	0.94	46.8	1.11	50.8	1.24	52.3	1.27	54.4	1.31	55.9	1.33
	32	4.0	39.7	0.82	43.0	0.94	46.8	1.11	50.8	1.24	52.3	1.27	54.4	1.31	55.9	1.33
	41	4.6	39.7	0.82	43.0	0.94	46.8	1.11	50.8	1.24	52.3	1.27	54.4	1.31	55.9	1.33
	50	6.9	39.65	0.80	43.00	0.93	46.78	1.09	50.82	1.22	52.32	1.25	54.42	1.29	55.86	1.31
		13.2	39.65	0.73	43.00	0.87	46.78	1.01	50.82	1.14	52.32	1.18	54.42	1.20	55.86	1.22
		16.5	39.65	0.72	43.00	0.85	46.78	0.99	50.82	1.12	52.32	1.14	54.42	1.18	55.86	1.19
	59	6.9	39.43	1.07	42.72	1.25	46.50	1.46	50.54	1.64	52.04	1.68	54.08	1.72	55.58	1.75
		13.2	39.43	0.98	42.72	1.17	46.50	1.36	50.54	1.53	52.04	1.57	54.08	1.61	55.58	1.64
		16.5	39.43	0.96	42.72	1.14	46.50	1.33	50.54	1.50	52.04	1.54	54.08	1.58	55.58	1.60
	67	6.9	39.23	1.31	42.47	1.53	46.25	1.78	50.29	2.01	51.79	2.06	53.78	2.11	55.33	2.15
		13.2	39.23	1.21	42.47	1.43	46.25	1.67	50.29	1.88	51.79	1.92	53.78	1.97	55.33	2.01
		16.5	39.23	1.18	42.47	1.40	46.25	1.63	50.29	1.84	51.79	1.89	53.78	1.94	55.33	1.96
	75	6.9	39.23	1.61	42.47	1.88	46.25	2.18	50.29	2.46	51.79	2.52	53.78	2.58	55.33	2.63
		13.2	39.23	1.48	42.47	1.76	46.25	2.04	50.29	2.30	51.79	2.36	53.78	2.42	55.33	2.46
		16.5	39.23	1.44	42.47	1.72	46.25	2.00	50.29	2.26	51.79	2.31	53.78	2.37	55.33	2.40
	85	6.9	39.23	1.96	42.47	2.29	46.25	2.66	50.29	3.00	51.79	3.07	53.78	3.14	55.33	3.20
		13.2	39.23	1.80	42.47	2.14	46.25	2.49	50.29	2.80	51.79	2.87	53.78	2.95	55.33	3.00
		16.5	39.23	1.76	42.47	2.09	46.25	2.44	50.29	2.75	51.79	2.82	53.78	2.89	55.33	2.93
	95	6.9	36.54	2.04	39.58	2.38	43.11	2.77	46.85	3.12	48.25	3.19	50.14	3.27	51.54	3.33
		13.2	36.54	1.88	39.58	2.22	43.11	2.59	46.85	2.92	48.25	2.98	50.14	3.06	51.54	3.12
		16.5	36.54	1.82	39.58	2.17	43.11	2.54	46.85	2.86	48.25	2.93	50.14	3.00	51.54	3.04
	104	6.9	33.84	2.24	36.68	2.61	39.92	3.04	43.41	3.42	44.71	3.51	46.45	3.59	47.75	3.66
		13.2	33.84	2.06	36.68	2.44	39.92	2.84	43.41	3.20	44.71	3.28	46.45	3.37	47.75	3.43
		16.5	33.84	2.00	36.68	2.39	39.92	2.79	43.41	3.14	44.71	3.22	46.45	3.30	47.75	3.34
	113	6.9	31.15	2.43	33.79	2.85	36.73	3.32	39.97	3.73	41.17	3.82	42.77	3.92	43.96	3.99
		13.2	31.15	2.24	33.79	2.66	36.73	3.10	39.97	3.49	41.17	3.57	42.77	3.67	43.96	3.74
		16.5	31.15	2.18	33.79	2.60	36.73	3.04	39.97	3.42	41.17	3.51	42.77	3.60	43.96	3.64
100	23	3.6	37.3	0.77	40.4	0.90	44.0	1.03	47.8	1.17	49.2	1.19	51.1	1.23	52.6	1.25
	32	4.0	37.3	0.77	40.4	0.90	44.0	1.03	47.8	1.17	49.2	1.19	51.1	1.23	52.6	1.25
	41	4.6	37.3	0.77	40.4	0.90	44.0	1.03	47.8	1.17	49.2	1.19	51.1	1.23	52.6	1.25
	50	6.9	37.28	0.76	40.37	0.88	43.96	1.01	47.80	1.16	49.25	1.17	51.14	1.21	52.58	1.23
		13.2	37.28	0.70	40.37	0.82	43.96	0.96	47.80	1.08	49.25	1.10	51.14	1.13	52.58	1.16
		16.5	37.28	0.67	40.37	0.80	43.96	0.93	47.80	1.06	49.25	1.08	51.14	1.11	52.58	1.12
	59	6.9	37.28	1.02	40.37	1.19	43.96	1.38	47.80	1.56	49.25	1.60	51.14	1.64	52.58	1.67
		13.2	37.28	0.94	40.37	1.11	43.96	1.30	47.80	1.46	49.25	1.49	51.14	1.53	52.58	1.56
		16.5	37.28	0.91	40.37	1.09	43.96	1.27	47.80	1.43	49.25	1.47	51.14	1.50	52.58	1.52
	67	6.9	37.28	1.26	40.37	1.47	43.96	1.71	47.80	1.92	49.25	1.97	51.14	2.02	52.58	2.05
		13.2	37.28	1.16	40.37	1.37	43.96	1.60	47.80	1.80	49.25	1.84	51.14	1.89	52.58	1.92
		16.5	37.28	1.12	40.37	1.35	43.96	1.57	47.80	1.76	49.25	1.81	51.14	1.86	52.58	1.88
	75	6.9	37.28	1.53	40.37	1.79	43.96	2.08	47.80	2.35	49.25	2.41	51.14	2.46	52.58	2.51
		13.2	37.28	1.41	40.37	1.67	43.96	1.95	47.80	2.19	49.25	2.25	51.14	2.30	52.58	2.35
		16.5	37.28	1.37	40.37	1.64	43.96	1.91	47.80	2.15	49.25	2.20	51.14	2.26	52.58	2.29
	85	6.9	37.28	1.89	40.37	2.20	43.96	2.57	47.80	2.89	49.25	2.96	51.14	3.03	52.58	3.09
		13.2	37.28	1.74	40.37	2.06	43.96	2.40	**47.80**	**2.70**	49.25	2.76	51.14	2.84	52.58	2.89
		16.5	37.28	1.69	40.37	2.02	43.96	2.35	47.80	2.65	49.25	2.71	51.14	2.78	52.58	2.81
	95	6.9	35.44	1.99	38.38	2.32	41.77	2.70	45.41	3.05	46.75	3.12	48.60	3.20	49.94	3.25
		13.2	35.44	1.83	38.38	2.17	41.77	2.53	45.41	2.85	46.75	2.92	48.60	2.99	49.94	3.05
		16.5	35.44	1.78	38.38	2.13	41.77	2.48	45.41	2.80	46.75	2.86	48.60	2.94	49.94	2.97
	104	6.9	33.54	2.24	36.34	2.61	39.58	3.04	43.02	3.42	44.31	3.50	46.06	3.59	47.30	3.65
		13.2	33.54	2.05	36.34	2.44	39.58	2.84	43.02	3.20	44.31	3.27	46.06	3.36	47.30	3.42
		16.5	33.54	2.00	36.34	2.39	39.58	2.78	43.02	3.13	44.31	3.21	46.06	3.29	47.30	3.33
	113	6.9	31.65	2.48	34.29	2.89	37.38	3.37	40.62	3.79	41.87	3.88	43.51	3.98	44.66	4.05
		13.2	31.65	2.28	34.29	2.70	37.38	3.15	40.62	3.54	41.87	3.63	43.51	3.72	44.66	3.79
		16.5	31.65	2.22	34.29	2.65	37.38	3.09	40.62	3.47	41.87	3.56	43.51	3.65	44.66	3.69

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 19: Cooling Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
90	23	3.6	33.5	0.66	36.3	0.76	39.6	0.89	43.0	1.01	44.3	1.03	46.1	1.05	47.3	1.08
	32	4.0	33.5	0.66	36.3	0.76	39.6	0.89	43.0	1.01	44.3	1.03	46.1	1.05	47.3	1.08
	41	4.6	33.5	0.66	36.3	0.76	39.6	0.89	43.0	1.01	44.3	1.03	46.1	1.05	47.3	1.08
	50	6.9	33.54	0.64	36.34	0.75	39.58	0.88	43.02	0.99	44.31	1.01	46.06	1.03	47.30	1.06
		13.2	33.54	0.60	36.34	0.71	39.58	0.82	43.02	0.93	44.31	0.95	46.06	0.98	47.30	0.99
		16.5	33.54	0.58	36.34	0.69	39.58	0.81	43.02	0.90	44.31	0.93	46.06	0.96	47.30	0.96
	59	6.9	33.54	0.88	36.34	1.02	39.58	1.19	43.02	1.35	44.31	1.37	46.06	1.41	47.30	1.44
		13.2	33.54	0.81	36.34	0.96	39.58	1.11	43.02	1.26	44.31	1.29	46.06	1.32	47.30	1.35
		16.5	33.54	0.79	36.34	0.94	39.58	1.09	43.02	1.23	44.31	1.26	46.06	1.30	47.30	1.31
	67	6.9	33.54	1.08	36.34	1.26	39.58	1.47	43.02	1.66	44.31	1.70	46.06	1.74	47.30	1.77
		13.2	33.54	1.00	36.34	1.18	39.58	1.37	43.02	1.55	44.31	1.59	46.06	1.62	47.30	1.66
		16.5	33.54	0.97	36.34	1.16	39.58	1.35	43.02	1.52	44.31	1.56	46.06	1.60	47.30	1.62
	75	6.9	33.54	1.32	36.34	1.54	39.58	1.79	43.02	2.02	44.31	2.07	46.06	2.12	47.30	2.16
		13.2	33.54	1.22	36.34	1.44	39.58	1.68	43.02	1.89	44.31	1.93	46.06	1.99	47.30	2.02
		16.5	33.54	1.18	36.34	1.41	39.58	1.64	43.02	1.85	44.31	1.90	46.06	1.95	47.30	1.97
	85	6.9	33.54	1.62	36.34	1.89	39.58	2.21	43.02	2.49	44.31	2.55	46.06	2.61	47.30	2.66
		13.2	33.54	1.49	36.34	1.77	39.58	2.06	43.02	2.32	44.31	2.38	46.06	2.44	47.30	2.48
		16.5	33.54	1.45	36.34	1.74	39.58	2.02	43.02	2.28	44.31	2.33	46.06	2.40	47.30	2.42
	95	6.9	32.65	1.76	35.34	2.04	38.48	2.38	41.82	2.68	43.06	2.74	44.76	2.81	46.01	2.86
		13.2	32.65	1.61	35.34	1.91	38.48	2.23	41.82	2.51	43.06	2.57	44.76	2.63	46.01	2.68
		16.5	32.65	1.57	35.34	1.87	38.48	2.18	41.82	2.46	43.06	2.52	44.76	2.58	46.01	2.61
	104	6.9	31.70	2.02	34.34	2.35	37.38	2.73	40.62	3.08	41.87	3.15	43.46	3.23	44.71	3.29
		13.2	31.70	1.85	34.34	2.19	37.38	2.56	40.62	2.88	41.87	2.95	43.46	3.02	44.71	3.08
		16.5	31.70	1.80	34.34	2.15	37.38	2.51	40.62	2.83	41.87	2.89	43.46	2.97	44.71	3.00
	113	6.9	30.75	2.28	33.35	2.65	36.29	3.09	39.43	3.48	40.67	3.56	42.17	3.65	43.41	3.71
		13.2	30.75	2.09	33.35	2.48	36.29	2.89	39.43	3.25	40.67	3.34	42.17	3.41	43.41	3.48
		16.5	30.75	2.03	33.35	2.43	36.29	2.84	39.43	3.19	40.67	3.26	42.17	3.36	43.41	3.39
80	23	3.6	29.8	0.56	32.3	0.64	35.2	0.74	38.2	0.85	39.4	0.86	40.9	0.89	42.1	0.89
	32	4.0	29.8	0.56	32.3	0.64	35.2	0.74	38.2	0.85	39.4	0.86	40.9	0.89	42.1	0.89
	41	4.6	29.8	0.56	32.3	0.64	35.2	0.74	38.2	0.85	39.4	0.86	40.9	0.89	42.1	0.89
	50	6.9	29.81	0.55	32.30	0.63	35.19	0.73	38.23	0.84	39.38	0.85	40.92	0.87	42.07	0.88
		13.2	29.81	0.50	32.30	0.60	35.19	0.69	38.23	0.77	39.38	0.80	40.92	0.81	42.07	0.83
		16.5	29.81	0.49	32.30	0.58	35.19	0.68	38.23	0.76	39.38	0.77	40.92	0.80	42.07	0.81
	59	6.9	29.81	0.74	32.30	0.86	35.19	1.00	38.23	1.13	39.38	1.15	40.92	1.18	42.07	1.20
		13.2	29.81	0.68	32.30	0.81	35.19	0.94	38.23	1.05	39.38	1.08	40.92	1.10	42.07	1.12
		16.5	29.81	0.66	32.30	0.79	35.19	0.92	38.23	1.03	39.38	1.06	40.92	1.08	42.07	1.09
	67	6.9	29.81	0.91	32.30	1.06	35.19	1.23	38.23	1.39	39.38	1.42	40.92	1.46	42.07	1.49
		13.2	29.81	0.83	32.30	0.99	35.19	1.15	38.23	1.30	39.38	1.33	40.92	1.36	42.07	1.39
		16.5	29.81	0.81	32.30	0.97	35.19	1.13	38.23	1.27	39.38	1.31	40.92	1.34	42.07	1.35
	75	6.9	29.81	1.11	32.30	1.29	35.19	1.50	38.23	1.69	39.38	1.74	40.92	1.78	42.07	1.81
		13.2	29.81	1.02	32.30	1.21	35.19	1.41	38.23	1.59	39.38	1.62	40.92	1.66	42.07	1.69
		16.5	29.81	0.99	32.30	1.18	35.19	1.38	38.23	1.55	39.38	1.59	40.92	1.63	42.07	1.65
	85	6.9	29.81	1.36	32.30	1.59	35.19	1.85	38.23	2.08	39.38	2.13	40.92	2.18	42.07	2.23
		13.2	29.81	1.25	32.30	1.49	35.19	1.73	38.23	1.95	39.38	2.00	40.92	2.04	42.07	2.08
		16.5	29.81	1.22	32.30	1.45	35.19	1.69	38.23	1.91	39.38	1.96	40.92	2.01	42.07	2.03
	95	6.9	29.81	1.51	32.30	1.76	35.19	2.05	38.23	2.31	39.38	2.37	40.92	2.43	42.07	2.47
		13.2	29.81	1.39	32.30	1.65	35.19	1.92	38.23	2.16	39.38	2.22	40.92	2.27	42.07	2.31
		16.5	29.81	1.35	32.30	1.62	35.19	1.89	38.23	2.12	39.38	2.17	40.92	2.23	42.07	2.25
	104	6.9	29.81	1.79	32.30	2.09	35.19	2.43	38.23	2.74	39.38	2.81	40.92	2.88	42.07	2.93
		13.2	29.81	1.65	32.30	1.95	35.19	2.28	38.23	2.57	39.38	2.62	40.92	2.69	42.07	2.74
		16.5	29.81	1.60	32.30	1.91	35.19	2.23	38.23	2.51	39.38	2.57	40.92	2.64	42.07	2.67
	113	6.9	29.81	2.07	32.30	2.42	35.19	2.82	38.23	3.17	39.38	3.24	40.92	3.33	42.07	3.38
		13.2	29.81	1.90	32.30	2.26	35.19	2.63	38.23	2.97	39.38	3.03	40.92	3.11	42.07	3.16
		16.5	29.81	1.85	32.30	2.21	35.19	2.57	38.23	2.90	39.38	2.97	40.92	3.05	42.07	3.08

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 20: Cooling Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB														
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
70	23	3.6	26.1	0.46	28.3	0.53	30.8	0.62	33.4	0.69	34.4	0.72	35.8	0.74	36.8	0.74
	32	4.0	26.1	0.46	28.3	0.53	30.8	0.62	33.4	0.69	34.4	0.72	35.8	0.74	36.8	0.74
	41	4.6	26.1	0.46	28.3	0.53	30.8	0.62	33.4	0.69	34.4	0.72	35.8	0.74	36.8	0.74
	50	6.9	26.12	0.45	28.26	0.52	30.80	0.61	33.45	0.69	34.44	0.71	35.79	0.73	36.78	0.73
		13.2	26.12	0.42	28.26	0.49	30.80	0.57	33.45	0.65	34.44	0.66	35.79	0.68	36.78	0.69
		16.5	26.12	0.41	28.26	0.48	30.80	0.56	33.45	0.63	34.44	0.64	35.79	0.66	36.78	0.67
	59	6.9	26.12	0.61	28.26	0.71	30.80	0.83	33.45	0.94	34.44	0.96	35.79	0.98	36.78	1.00
		13.2	26.12	0.56	28.26	0.67	30.80	0.78	33.45	0.88	34.44	0.90	35.79	0.92	36.78	0.94
		16.5	26.12	0.55	28.26	0.65	30.80	0.76	33.45	0.86	34.44	0.88	35.79	0.90	36.78	0.91
	67	6.9	26.12	0.76	28.26	0.88	30.80	1.03	33.45	1.16	34.44	1.18	35.79	1.21	36.78	1.23
		13.2	26.12	0.69	28.26	0.82	30.80	0.96	33.45	1.08	34.44	1.10	35.79	1.13	36.78	1.15
		16.5	26.12	0.68	28.26	0.81	30.80	0.94	33.45	1.06	34.44	1.08	35.79	1.11	36.78	1.12
	75	6.9	26.12	0.92	28.26	1.08	30.80	1.25	33.45	1.41	34.44	1.44	35.79	1.48	36.78	1.50
		13.2	26.12	0.85	28.26	1.00	30.80	1.17	33.45	1.32	34.44	1.35	35.79	1.38	36.78	1.41
		16.5	26.12	0.82	28.26	0.98	30.80	1.15	33.45	1.29	34.44	1.32	35.79	1.35	36.78	1.37
	85	6.9	26.12	1.13	28.26	1.32	30.80	1.54	33.45	1.73	34.44	1.77	35.79	1.82	36.78	1.85
		13.2	26.12	1.04	28.26	1.23	30.80	1.44	33.45	1.62	34.44	1.66	35.79	1.70	36.78	1.73
		16.5	26.12	1.01	28.26	1.21	30.80	1.41	33.45	1.59	34.44	1.63	35.79	1.67	36.78	1.69
	95	6.9	26.12	1.26	28.26	1.47	30.80	1.71	33.45	1.92	34.44	1.97	35.79	2.02	36.78	2.05
		13.2	26.12	1.16	28.26	1.37	30.80	1.60	33.45	1.80	34.44	1.84	35.79	1.89	36.78	1.92
		16.5	26.12	1.12	28.26	1.34	30.80	1.57	33.45	1.76	34.44	1.81	35.79	1.86	36.78	1.88
	104	6.9	26.12	1.49	28.26	1.74	30.80	2.03	33.45	2.28	34.44	2.33	35.79	2.39	36.78	2.43
		13.2	26.12	1.37	28.26	1.62	30.80	1.89	33.45	2.13	34.44	2.18	35.79	2.24	36.78	2.28
		16.5	26.12	1.33	28.26	1.59	30.80	1.85	33.45	2.09	34.44	2.14	35.79	2.20	36.78	2.22
	113	6.9	26.12	1.72	28.26	2.01	30.80	2.34	33.45	2.64	34.44	2.70	35.79	2.76	36.78	2.82
		13.2	26.12	1.58	28.26	1.88	30.80	2.19	33.45	2.46	34.44	2.53	35.79	2.58	36.78	2.64
		16.5	26.12	1.54	28.26	1.84	30.80	2.14	33.45	2.41	34.44	2.47	35.79	2.54	36.78	2.56
60	23	3.6	22.4	0.36	24.2	0.42	26.4	0.49	28.7	0.56	29.6	0.58	30.7	0.58	31.6	0.59
	32	4.0	22.4	0.36	24.2	0.42	26.4	0.49	28.7	0.56	29.6	0.58	30.7	0.58	31.6	0.59
	41	4.6	22.4	0.36	24.2	0.42	26.4	0.49	28.7	0.56	29.6	0.58	30.7	0.58	31.6	0.59
	50	6.9	22.38	0.36	24.22	0.42	26.37	0.48	28.66	0.55	29.56	0.57	30.70	0.57	31.55	0.58
		13.2	22.38	0.33	24.22	0.39	26.37	0.46	28.66	0.51	29.56	0.52	30.70	0.54	31.55	0.55
		16.5	22.38	0.31	24.22	0.39	26.37	0.45	28.66	0.51	29.56	0.51	30.70	0.53	31.55	0.54
	59	6.9	22.38	0.49	24.22	0.57	26.37	0.66	28.66	0.75	29.56	0.77	30.70	0.78	31.55	0.80
		13.2	22.38	0.45	24.22	0.53	26.37	0.62	28.66	0.70	29.56	0.71	30.70	0.73	31.55	0.75
		16.5	22.38	0.43	24.22	0.52	26.37	0.61	28.66	0.68	29.56	0.70	30.70	0.72	31.55	0.73
	67	6.9	22.38	0.60	24.22	0.70	26.37	0.82	28.66	0.92	29.56	0.95	30.70	0.96	31.55	0.98
		13.2	22.38	0.55	24.22	0.66	26.37	0.77	28.66	0.86	29.56	0.88	30.70	0.90	31.55	0.92
		16.5	22.38	0.54	24.22	0.64	26.37	0.75	28.66	0.84	29.56	0.86	30.70	0.89	31.55	0.90
	75	6.9	22.38	0.73	24.22	0.86	26.37	1.00	28.66	1.12	29.56	1.15	30.70	1.18	31.55	1.20
		13.2	22.38	0.68	24.22	0.80	26.37	0.93	28.66	1.05	29.56	1.08	30.70	1.10	31.55	1.12
		16.5	22.38	0.66	24.22	0.78	26.37	0.91	28.66	1.03	29.56	1.06	30.70	1.08	31.55	1.09
	85	6.9	22.38	0.90	24.22	1.05	26.37	1.22	28.66	1.38	29.56	1.41	30.70	1.45	31.55	1.48
		13.2	22.38	0.83	24.22	0.98	26.37	1.15	28.66	1.29	29.56	1.32	30.70	1.35	31.55	1.38
		16.5	22.38	0.81	24.22	0.96	26.37	1.12	28.66	1.27	29.56	1.30	30.70	1.33	31.55	1.35
	95	6.9	22.38	1.00	24.22	1.17	26.37	1.36	28.66	1.53	29.56	1.57	30.70	1.61	31.55	1.64
		13.2	22.38	0.92	24.22	1.09	26.37	1.27	28.66	1.44	29.56	1.47	30.70	1.50	31.55	1.53
		16.5	22.38	0.90	24.22	1.07	26.37	1.25	28.66	1.41	29.56	1.44	30.70	1.48	31.55	1.49
	104	6.9	22.38	1.19	24.22	1.38	26.37	1.62	28.66	1.82	29.56	1.86	30.70	1.90	31.55	1.94
		13.2	22.38	1.09	24.22	1.30	26.37	1.51	28.66	1.70	29.56	1.74	30.70	1.78	31.55	1.82
		16.5	22.38	1.06	24.22	1.27	26.37	1.48	28.66	1.66	29.56	1.71	30.70	1.75	31.55	1.77
	113	6.9	22.38	1.37	24.22	1.60	26.37	1.87	28.66	2.10	29.56	2.15	30.70	2.20	31.55	2.25
		13.2	22.38	1.27	24.22	1.50	26.37	1.75	28.66	1.96	29.56	2.01	30.70	2.06	31.55	2.10
		16.5	22.38	1.22	24.22	1.47	26.37	1.71	28.66	1.92	29.56	1.97	30.70	2.02	31.55	2.04

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 21: Cooling Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
50	23	3.6	18.6	0.27	20.2	0.31	22.0	0.38	23.9	0.41	24.6	0.42	25.6	0.44	26.3	0.44
	32	4.0	18.6	0.27	20.2	0.31	22.0	0.38	23.9	0.41	24.6	0.42	25.6	0.44	26.3	0.44
	41	4.6	18.6	0.27	20.2	0.31	22.0	0.38	23.9	0.41	24.6	0.42	25.6	0.44	26.3	0.44
	50	6.9	18.64	0.26	20.19	0.31	21.98	0.37	23.92	0.41	24.62	0.42	25.57	0.43	26.27	0.44
		13.2	18.64	0.24	20.19	0.29	21.98	0.34	23.92	0.39	24.62	0.40	25.57	0.40	26.27	0.41
		16.5	18.64	0.24	20.19	0.29	21.98	0.33	23.92	0.38	24.62	0.38	25.57	0.39	26.27	0.39
	59	6.9	18.64	0.36	20.19	0.42	21.98	0.50	23.92	0.55	24.62	0.57	25.57	0.58	26.27	0.59
		13.2	18.64	0.33	20.19	0.40	21.98	0.46	23.92	0.52	24.62	0.54	25.57	0.54	26.27	0.55
		16.5	18.64	0.32	20.19	0.39	21.98	0.45	23.92	0.51	24.62	0.52	25.57	0.54	26.27	0.54
	67	6.9	18.64	0.45	20.19	0.53	21.98	0.61	23.92	0.68	24.62	0.70	25.57	0.72	26.27	0.73
		13.2	18.64	0.41	20.19	0.49	21.98	0.57	23.92	0.64	24.62	0.66	25.57	0.68	26.27	0.68
		16.5	18.64	0.40	20.19	0.48	21.98	0.56	23.92	0.63	24.62	0.65	25.57	0.66	26.27	0.67
	75	6.9	18.64	0.54	20.19	0.64	21.98	0.74	23.92	0.84	24.62	0.86	25.57	0.88	26.27	0.89
		13.2	18.64	0.50	20.19	0.60	21.98	0.69	23.92	0.78	24.62	0.80	25.57	0.82	26.27	0.84
		16.5	18.64	0.49	20.19	0.58	21.98	0.68	23.92	0.77	24.62	0.79	25.57	0.81	26.27	0.81
	85	6.9	18.64	0.68	20.19	0.79	21.98	0.92	23.92	1.03	24.62	1.06	25.57	1.08	26.27	1.10
		13.2	18.64	0.62	20.19	0.73	21.98	0.85	23.92	0.96	24.62	0.98	25.57	1.01	26.27	1.03
		16.5	18.64	0.60	20.19	0.72	21.98	0.84	23.92	0.95	24.62	0.97	25.57	0.99	26.27	1.00
	95	6.9	18.64	0.75	20.19	0.87	21.98	1.02	23.92	1.14	24.62	1.17	25.57	1.20	26.27	1.22
		13.2	18.64	0.69	20.19	0.81	21.98	0.95	23.92	1.07	24.62	1.09	25.57	1.12	26.27	1.14
		16.5	18.64	0.67	20.19	0.80	21.98	0.93	23.92	1.05	24.62	1.08	25.57	1.10	26.27	1.11
	104	6.9	18.64	0.89	20.19	1.03	21.98	1.21	23.92	1.35	24.62	1.39	25.57	1.42	26.27	1.45
		13.2	18.64	0.81	20.19	0.96	21.98	1.12	23.92	1.27	24.62	1.30	25.57	1.33	26.27	1.35
		16.5	18.64	0.79	20.19	0.95	21.98	1.10	23.92	1.24	24.62	1.27	25.57	1.31	26.27	1.32
	113	6.9	18.64	1.03	20.19	1.19	21.98	1.39	23.92	1.57	24.62	1.61	25.57	1.64	26.27	1.67
		13.2	18.64	0.94	20.19	1.11	21.98	1.30	23.92	1.47	24.62	1.50	25.57	1.54	26.27	1.57
		16.5	18.64	0.91	20.19	1.09	21.98	1.28	23.92	1.44	24.62	1.47	25.57	1.51	26.27	1.52

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 22: Cooling Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
130	23	4.3	49.2	1.08	53.3	1.25	58.0	1.46	63.0	1.65	64.9	1.69	67.4	1.73	69.3	1.76
	32	4.8	49.2	1.08	53.3	1.25	58.0	1.46	63.0	1.65	64.9	1.69	67.4	1.73	69.3	1.76
	41	5.5	49.2	1.08	53.3	1.25	58.0	1.46	63.0	1.65	64.9	1.69	67.4	1.73	69.3	1.76
	50	8.3	49.18	1.05	53.27	1.24	57.97	1.44	62.99	1.62	64.93	1.66	67.48	1.71	69.35	1.73
		15.9	49.18	0.98	53.27	1.15	57.97	1.34	62.99	1.51	64.93	1.56	67.48	1.59	69.35	1.63
		19.9	49.18	0.95	53.27	1.13	57.97	1.32	62.99	1.48	64.93	1.52	67.48	1.56	69.35	1.58
	59	8.3	48.38	1.39	52.40	1.62	57.04	1.89	62.00	2.13	63.88	2.18	66.36	2.23	68.23	2.27
		15.9	48.38	1.28	52.40	1.51	57.04	1.77	62.00	1.99	63.88	2.04	66.36	2.09	68.23	2.14
		19.9	48.38	1.25	52.40	1.49	57.04	1.73	62.00	1.95	63.88	2.00	66.36	2.05	68.23	2.09
	67	8.3	47.66	1.69	51.63	1.97	56.21	2.29	61.12	2.58	62.94	2.64	65.37	2.70	67.24	2.75
		15.9	47.66	1.55	51.63	1.84	56.21	2.14	61.12	2.41	62.94	2.47	65.37	2.54	67.24	2.59
		19.9	47.66	1.51	51.63	1.80	56.21	2.10	61.12	2.37	62.94	2.42	65.37	2.49	67.24	2.53
	75	8.3	47.66	2.08	51.63	2.42	56.21	2.82	61.12	3.18	62.94	3.26	65.37	3.34	67.24	3.39
		15.9	47.66	1.91	51.63	2.27	56.21	2.64	61.12	2.97	62.94	3.05	65.37	3.13	67.24	3.19
		19.9	47.66	1.86	51.63	2.22	56.21	2.59	61.12	2.91	62.94	2.99	65.37	3.07	67.24	3.12
	85	8.3	47.66	2.50	51.63	2.91	56.21	3.39	61.12	3.82	62.94	3.91	65.37	4.01	67.24	4.07
		15.9	47.66	2.29	51.63	2.72	56.21	3.17	61.12	3.57	62.94	3.66	65.37	3.75	67.24	3.83
		19.9	47.66	2.23	51.63	2.66	56.21	3.10	61.12	3.50	62.94	3.59	65.37	3.68	67.24	3.74
	95	8.3	42.92	2.52	46.45	2.94	50.58	3.43	55.00	3.86	56.65	3.95	58.86	4.05	60.51	4.12
		15.9	42.92	2.32	46.45	2.75	50.58	3.21	55.00	3.61	56.65	3.70	58.86	3.79	60.51	3.87
		19.9	42.92	2.26	46.45	2.69	50.58	3.14	55.00	3.54	56.65	3.63	58.86	3.72	60.51	3.78
	104	8.3	38.12	2.66	41.32	3.10	44.96	3.62	48.87	4.07	50.36	4.17	52.29	4.27	53.78	4.35
		15.9	38.12	2.45	41.32	2.90	44.96	3.38	48.87	3.81	50.36	3.90	52.29	4.01	53.78	4.09
		19.9	38.12	2.38	41.32	2.84	44.96	3.31	48.87	3.73	50.36	3.83	52.29	3.93	53.78	3.99
	113	8.3	33.32	2.81	36.19	3.26	39.33	3.81	42.75	4.28	44.07	4.38	45.73	4.49	47.05	4.58
		15.9	33.32	2.57	36.19	3.06	39.33	3.56	42.75	4.00	44.07	4.11	45.73	4.22	47.05	4.30
		19.9	33.32	2.50	36.19	2.99	39.33	3.48	42.75	3.93	44.07	4.03	45.73	4.13	47.05	4.21
120	23	4.3	46.5	1.02	50.4	1.19	54.9	1.38	59.6	1.56	61.5	1.60	63.9	1.64	65.6	1.67
	32	4.8	46.5	1.02	50.4	1.19	54.9	1.38	59.6	1.56	61.5	1.60	63.9	1.64	65.6	1.67
	41	5.5	46.5	1.02	50.4	1.19	54.9	1.38	59.6	1.56	61.5	1.60	63.9	1.64	65.6	1.67
	50	8.3	46.56	1.00	50.37	1.18	54.90	1.36	59.65	1.53	61.42	1.58	63.85	1.62	65.61	1.64
		15.9	46.56	0.92	50.37	1.10	54.90	1.28	59.65	1.43	61.42	1.47	63.85	1.51	65.61	1.54
		19.9	46.56	0.89	50.37	1.06	54.90	1.25	59.65	1.40	61.42	1.45	63.85	1.48	65.61	1.51
	59	8.3	46.00	1.33	49.81	1.55	54.28	1.81	58.97	2.03	60.73	2.09	63.10	2.14	64.87	2.17
		15.9	46.00	1.22	49.81	1.45	54.28	1.69	58.97	1.90	60.73	1.95	63.10	2.00	64.87	2.04
		19.9	46.00	1.19	49.81	1.42	54.28	1.66	58.97	1.86	60.73	1.91	63.10	1.96	64.87	1.99
	67	8.3	45.51	1.62	49.31	1.89	53.73	2.20	58.36	2.48	60.13	2.54	62.44	2.60	64.21	2.65
		15.9	45.51	1.49	49.31	1.77	53.73	2.06	58.36	2.32	60.13	2.38	62.44	2.44	64.21	2.49
		19.9	45.51	1.45	49.31	1.73	53.73	2.02	58.36	2.27	60.13	2.33	62.44	2.39	64.21	2.43
	75	8.3	45.51	1.99	49.31	2.33	53.73	2.71	58.36	3.05	60.13	3.12	62.44	3.20	64.21	3.26
		15.9	45.51	1.83	49.31	2.17	53.73	2.53	58.36	2.85	60.13	2.92	62.44	2.99	64.21	3.06
		19.9	45.51	1.78	49.31	2.13	53.73	2.48	58.36	2.79	60.13	2.86	62.44	2.94	64.21	2.98
	85	8.3	45.51	2.41	49.31	2.81	53.73	3.27	58.36	3.69	60.13	3.77	62.44	3.87	64.21	3.94
		15.9	45.51	2.22	49.31	2.63	53.73	3.06	58.36	3.45	60.13	3.53	62.44	3.62	64.21	3.69
		19.9	45.51	2.15	49.31	2.57	53.73	2.99	58.36	3.38	60.13	3.46	62.44	3.55	64.21	3.61
	95	8.3	41.65	2.47	45.12	2.88	49.15	3.35	53.40	3.78	55.00	3.87	57.15	3.96	58.75	4.03
		15.9	41.65	2.27	45.12	2.69	49.15	3.14	53.40	3.53	55.00	3.62	57.15	3.71	58.75	3.78
		19.9	41.65	2.21	45.12	2.63	49.15	3.07	53.40	3.46	55.00	3.55	57.15	3.64	58.75	3.70
	104	8.3	37.79	2.66	40.93	3.10	44.57	3.61	48.49	4.06	49.92	4.16	51.85	4.26	53.29	4.34
		15.9	37.79	2.45	40.93	2.90	44.57	3.38	48.49	3.80	49.92	3.89	51.85	3.99	53.29	4.07
		19.9	37.79	2.38	40.93	2.83	44.57	3.31	48.49	3.73	49.92	3.82	51.85	3.92	53.29	3.98
	113	8.3	33.92	2.85	36.74	3.31	39.99	3.87	43.58	4.35	44.85	4.45	46.56	4.57	47.83	4.65
		15.9	33.92	2.62	36.74	3.10	39.99	3.62	43.58	4.07	44.85	4.17	46.56	4.27	47.83	4.37
		19.9	33.92	2.55	36.74	3.03	39.99	3.54	43.58	3.99	44.85	4.10	46.56	4.20	47.83	4.26

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 23: Cooling Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
110	23	4.3	43.9	0.97	47.5	1.12	51.8	1.31	56.3	1.47	57.9	1.51	60.2	1.54	61.9	1.58
	32	4.8	43.9	0.97	47.5	1.12	51.8	1.31	56.3	1.47	57.9	1.51	60.2	1.54	61.9	1.58
	41	5.5	43.9	0.97	47.5	1.12	51.8	1.31	56.3	1.47	57.9	1.51	60.2	1.54	61.9	1.58
	50	8.3	43.88	0.95	47.58	1.10	51.78	1.29	56.24	1.45	57.90	1.48	60.22	1.53	61.82	1.55
		15.9	43.88	0.87	47.58	1.03	51.78	1.20	56.24	1.35	57.90	1.39	60.22	1.43	61.82	1.45
		19.9	43.88	0.85	47.58	1.01	51.78	1.17	56.24	1.33	57.90	1.35	60.22	1.40	61.82	1.42
	59	8.3	43.63	1.27	47.27	1.48	51.47	1.73	55.93	1.94	57.59	1.99	59.85	2.04	61.51	2.07
		15.9	43.63	1.17	47.27	1.38	51.47	1.61	55.93	1.82	57.59	1.86	59.85	1.91	61.51	1.94
		19.9	43.63	1.14	47.27	1.35	51.47	1.58	55.93	1.78	57.59	1.82	59.85	1.87	61.51	1.90
	67	8.3	43.41	1.55	47.00	1.82	51.19	2.11	55.66	2.38	57.31	2.44	59.52	2.50	61.23	2.54
		15.9	43.41	1.43	47.00	1.70	51.19	1.98	55.66	2.23	57.31	2.28	59.52	2.34	61.23	2.38
		19.9	43.41	1.39	47.00	1.66	51.19	1.94	55.66	2.18	57.31	2.24	59.52	2.30	61.23	2.33
	75	8.3	43.41	1.90	47.00	2.22	51.19	2.59	55.66	2.91	57.31	2.98	59.52	3.06	61.23	3.11
		15.9	43.41	1.75	47.00	2.08	51.19	2.42	55.66	2.73	57.31	2.79	59.52	2.86	61.23	2.92
		19.9	43.41	1.70	47.00	2.03	51.19	2.37	55.66	2.67	57.31	2.74	59.52	2.81	61.23	2.85
	85	8.3	43.41	2.32	47.00	2.71	51.19	3.15	55.66	3.55	57.31	3.64	59.52	3.73	61.23	3.79
		15.9	43.41	2.14	47.00	2.53	51.19	2.95	55.66	3.32	57.31	3.41	59.52	3.49	61.23	3.55
		19.9	43.41	2.08	47.00	2.48	51.19	2.89	55.66	3.26	57.31	3.34	59.52	3.42	61.23	3.47
	95	8.3	40.43	2.42	43.80	2.82	47.71	3.28	51.85	3.70	53.40	3.78	55.49	3.87	57.04	3.95
		15.9	40.43	2.22	43.80	2.63	47.71	3.07	51.85	3.46	53.40	3.54	55.49	3.63	57.04	3.70
		19.9	40.43	2.16	43.80	2.58	47.71	3.01	51.85	3.39	53.40	3.47	55.49	3.56	57.04	3.61
	104	8.3	37.45	2.65	40.60	3.10	44.18	3.61	48.05	4.06	49.48	4.15	51.41	4.26	52.84	4.34
		15.9	37.45	2.44	40.60	2.89	44.18	3.37	48.05	3.79	49.48	3.89	51.41	3.99	52.84	4.06
		19.9	37.45	2.37	40.60	2.83	44.18	3.30	48.05	3.72	49.48	3.82	51.41	3.91	52.84	3.96
	113	8.3	34.48	2.89	37.40	3.38	40.65	3.93	44.24	4.42	45.56	4.53	47.33	4.64	48.65	4.73
		15.9	34.48	2.66	37.40	3.15	40.65	3.67	44.24	4.13	45.56	4.23	47.33	4.35	48.65	4.43
		19.9	34.48	2.58	37.40	3.08	40.65	3.60	44.24	4.05	45.56	4.16	47.33	4.27	48.65	4.31
100	23	4.3	41.3	0.91	44.7	1.06	48.7	1.24	52.9	1.39	54.5	1.42	56.6	1.46	58.2	1.48
	32	4.8	41.3	0.91	44.7	1.06	48.7	1.24	52.9	1.39	54.5	1.42	56.6	1.46	58.2	1.48
	41	5.5	41.3	0.91	44.7	1.06	48.7	1.24	52.9	1.39	54.5	1.42	56.6	1.46	58.2	1.48
	50	8.3	41.26	0.90	44.68	1.05	48.65	1.20	52.90	1.37	54.50	1.39	56.60	1.44	58.20	1.46
		15.9	41.26	0.83	44.68	0.97	48.65	1.13	52.90	1.28	54.50	1.31	56.60	1.34	58.20	1.37
		19.9	41.26	0.80	44.68	0.95	48.65	1.10	52.90	1.25	54.50	1.28	56.60	1.31	58.20	1.32
	59	8.3	41.26	1.21	44.68	1.41	48.65	1.64	52.90	1.85	54.50	1.89	56.60	1.94	58.20	1.98
		15.9	41.26	1.11	44.68	1.32	48.65	1.54	52.90	1.73	54.50	1.77	56.60	1.82	58.20	1.85
		19.9	41.26	1.08	44.68	1.29	48.65	1.50	52.90	1.70	54.50	1.74	56.60	1.78	58.20	1.80
	67	8.3	41.26	1.49	44.68	1.74	48.65	2.03	52.90	2.28	54.50	2.34	56.60	2.39	58.20	2.43
		15.9	41.26	1.37	44.68	1.63	48.65	1.90	52.90	2.13	54.50	2.18	56.60	2.24	58.20	2.28
		19.9	41.26	1.33	44.68	1.59	48.65	1.86	52.90	2.09	54.50	2.14	56.60	2.20	58.20	2.22
	75	8.3	41.26	1.82	44.68	2.12	48.65	2.47	52.90	2.78	54.50	2.85	56.60	2.92	58.20	2.97
		15.9	41.26	1.67	44.68	1.98	48.65	2.31	52.90	2.60	54.50	2.66	56.60	2.73	58.20	2.78
		19.9	41.26	1.63	44.68	1.94	48.65	2.26	52.90	2.55	54.50	2.61	56.60	2.68	58.20	2.71
	85	8.3	41.26	2.23	44.68	2.61	48.65	3.04	52.90	3.42	54.50	3.50	56.60	3.59	58.20	3.66
		15.9	41.26	2.06	44.68	2.44	48.65	2.84	**52.90**	**3.20**	54.50	3.27	56.60	3.36	58.20	3.42
		19.9	41.26	2.00	44.68	2.39	48.65	2.78	52.90	3.14	54.50	3.22	56.60	3.30	58.20	3.33
	95	8.3	39.22	2.36	42.47	2.75	46.23	3.21	50.25	3.61	51.74	3.70	53.78	3.79	55.27	3.86
		15.9	39.22	2.17	42.47	2.58	46.23	3.00	50.25	3.38	51.74	3.46	53.78	3.55	55.27	3.61
		19.9	39.22	2.11	42.47	2.52	46.23	2.94	50.25	3.31	51.74	3.39	53.78	3.48	55.27	3.51
	104	8.3	37.12	2.65	40.21	3.09	43.80	3.60	47.60	4.05	49.04	4.15	50.97	4.25	52.35	4.33
		15.9	37.12	2.43	40.21	2.89	43.80	3.37	47.60	3.79	49.04	3.88	50.97	3.98	52.35	4.05
		19.9	37.12	2.37	40.21	2.83	43.80	3.30	47.60	3.71	49.04	3.81	50.97	3.90	52.35	3.94
	113	8.3	35.03	2.94	37.95	3.43	41.37	3.99	44.96	4.49	46.34	4.60	48.16	4.71	49.42	4.79
		15.9	35.03	2.70	37.95	3.21	41.37	3.73	44.96	4.20	46.34	4.30	48.16	4.41	49.42	4.49
		19.9	35.03	2.63	37.95	3.14	41.37	3.66	44.96	4.11	46.34	4.22	48.16	4.33	49.42	4.37

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 24: Cooling Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
90	23	4.3	37.1	0.78	40.2	0.91	43.8	1.06	47.6	1.20	49.0	1.22	51.0	1.25	52.4	1.28
	32	4.8	37.1	0.78	40.2	0.91	43.8	1.06	47.6	1.20	49.0	1.22	51.0	1.25	52.4	1.28
	41	5.5	37.1	0.78	40.2	0.91	43.8	1.06	47.6	1.20	49.0	1.22	51.0	1.25	52.4	1.28
	50	8.3	37.12	0.76	40.21	0.89	43.80	1.04	47.60	1.18	49.04	1.20	50.97	1.23	52.35	1.26
		15.9	37.12	0.71	40.21	0.84	43.80	0.97	47.60	1.11	49.04	1.13	50.97	1.16	52.35	1.18
		19.9	37.12	0.69	40.21	0.81	43.80	0.96	47.60	1.07	49.04	1.11	50.97	1.14	52.35	1.14
	59	8.3	37.12	1.04	40.21	1.21	43.80	1.41	47.60	1.59	49.04	1.63	50.97	1.67	52.35	1.70
		15.9	37.12	0.96	40.21	1.14	43.80	1.32	47.60	1.49	49.04	1.53	50.97	1.57	52.35	1.59
		19.9	37.12	0.93	40.21	1.11	43.80	1.30	47.60	1.46	49.04	1.50	50.97	1.54	52.35	1.55
	67	8.3	37.12	1.29	40.21	1.50	43.80	1.74	47.60	1.97	49.04	2.01	50.97	2.06	52.35	2.10
		15.9	37.12	1.18	40.21	1.40	43.80	1.63	47.60	1.83	49.04	1.88	50.97	1.93	52.35	1.97
		19.9	37.12	1.15	40.21	1.37	43.80	1.60	47.60	1.80	49.04	1.85	50.97	1.89	52.35	1.91
	75	8.3	37.12	1.57	40.21	1.83	43.80	2.13	47.60	2.39	49.04	2.45	50.97	2.51	52.35	2.56
		15.9	37.12	1.44	40.21	1.71	43.80	1.99	47.60	2.24	49.04	2.29	50.97	2.35	52.35	2.39
		19.9	37.12	1.40	40.21	1.67	43.80	1.95	47.60	2.19	49.04	2.25	50.97	2.31	52.35	2.33
	85	8.3	37.12	1.93	40.21	2.25	43.80	2.62	47.60	2.95	49.04	3.02	50.97	3.09	52.35	3.15
		15.9	37.12	1.77	40.21	2.10	43.80	2.45	47.60	2.75	49.04	2.82	50.97	2.89	52.35	2.94
		19.9	37.12	1.72	40.21	2.06	43.80	2.39	47.60	2.70	49.04	2.77	50.97	2.84	52.35	2.87
	95	8.3	36.13	2.08	39.11	2.42	42.58	2.82	46.28	3.18	47.66	3.25	49.54	3.33	50.91	3.39
		15.9	36.13	1.91	39.11	2.26	42.58	2.64	46.28	2.97	47.66	3.04	49.54	3.12	50.91	3.18
		19.9	36.13	1.86	39.11	2.22	42.58	2.58	46.28	2.91	47.66	2.99	49.54	3.06	50.91	3.09
	104	8.3	35.08	2.39	38.01	2.78	41.37	3.24	44.96	3.65	46.34	3.74	48.10	3.83	49.48	3.90
		15.9	35.08	2.19	38.01	2.60	41.37	3.03	44.96	3.41	46.34	3.50	48.10	3.58	49.48	3.65
		19.9	35.08	2.13	38.01	2.55	41.37	2.97	44.96	3.35	46.34	3.43	48.10	3.52	49.48	3.55
	113	8.3	34.03	2.70	36.90	3.14	40.16	3.66	43.63	4.13	45.01	4.22	46.67	4.33	48.05	4.40
		15.9	34.03	2.48	36.90	2.94	40.16	3.43	43.63	3.85	45.01	3.95	46.67	4.05	48.05	4.13
		19.9	34.03	2.41	36.90	2.88	40.16	3.36	43.63	3.78	45.01	3.87	46.67	3.98	48.05	4.02
80	23	4.3	33.0	0.66	35.7	0.76	38.9	0.89	42.3	1.00	43.6	1.02	45.3	1.05	46.5	1.07
	32	4.8	33.0	0.66	35.7	0.76	38.9	0.89	42.3	1.00	43.6	1.02	45.3	1.05	46.5	1.07
	41	5.5	33.0	0.66	35.7	0.76	38.9	0.89	42.3	1.00	43.6	1.02	45.3	1.05	46.5	1.07
	50	8.3	32.99	0.65	35.74	0.75	38.94	0.87	42.31	0.99	43.58	1.01	45.29	1.03	46.56	1.04
		15.9	32.99	0.59	35.74	0.71	38.94	0.82	42.31	0.92	43.58	0.95	45.29	0.96	46.56	0.98
		19.9	32.99	0.58	35.74	0.69	38.94	0.80	42.31	0.90	43.58	0.92	45.29	0.95	46.56	0.96
	59	8.3	32.99	0.87	35.74	1.02	38.94	1.18	42.31	1.34	43.58	1.37	45.29	1.40	46.56	1.42
		15.9	32.99	0.80	35.74	0.95	38.94	1.11	42.31	1.25	43.58	1.28	45.29	1.31	46.56	1.33
		19.9	32.99	0.78	35.74	0.93	38.94	1.09	42.31	1.22	43.58	1.25	45.29	1.29	46.56	1.30
	67	8.3	32.99	1.07	35.74	1.26	38.94	1.46	42.31	1.65	43.58	1.69	45.29	1.73	46.56	1.76
		15.9	32.99	0.99	35.74	1.17	38.94	1.37	42.31	1.54	43.58	1.58	45.29	1.62	46.56	1.65
		19.9	32.99	0.96	35.74	1.15	38.94	1.34	42.31	1.51	43.58	1.55	45.29	1.59	46.56	1.60
	75	8.3	32.99	1.31	35.74	1.53	38.94	1.78	42.31	2.01	43.58	2.06	45.29	2.11	46.56	2.14
		15.9	32.99	1.21	35.74	1.43	38.94	1.67	42.31	1.88	43.58	1.92	45.29	1.97	46.56	2.01
		19.9	32.99	1.17	35.74	1.40	38.94	1.63	42.31	1.84	43.58	1.89	45.29	1.94	46.56	1.95
	85	8.3	32.99	1.61	35.74	1.88	38.94	2.19	42.31	2.47	43.58	2.53	45.29	2.59	46.56	2.64
		15.9	32.99	1.49	35.74	1.76	38.94	2.05	42.31	2.31	43.58	2.37	45.29	2.42	46.56	2.47
		19.9	32.99	1.45	35.74	1.72	38.94	2.01	42.31	2.26	43.58	2.32	45.29	2.38	46.56	2.41
	95	8.3	32.99	1.79	35.74	2.09	38.94	2.43	42.31	2.74	43.58	2.81	45.29	2.88	46.56	2.93
		15.9	32.99	1.65	35.74	1.95	38.94	2.28	42.31	2.57	43.58	2.63	45.29	2.69	46.56	2.74
		19.9	32.99	1.61	35.74	1.91	38.94	2.23	42.31	2.51	43.58	2.58	45.29	2.65	46.56	2.67
	104	8.3	32.99	2.13	35.74	2.48	38.94	2.89	42.31	3.25	43.58	3.33	45.29	3.41	46.56	3.47
		15.9	32.99	1.95	35.74	2.31	38.94	2.70	42.31	3.04	43.58	3.11	45.29	3.19	46.56	3.25
		19.9	32.99	1.90	35.74	2.27	38.94	2.64	42.31	2.98	43.58	3.05	45.29	3.13	46.56	3.16
	113	8.3	32.99	2.46	35.74	2.87	38.94	3.34	42.31	3.76	43.58	3.84	45.29	3.94	46.56	4.01
		15.9	32.99	2.26	35.74	2.67	38.94	3.11	42.31	3.51	43.58	3.59	45.29	3.69	46.56	3.75
		19.9	32.99	2.19	35.74	2.62	38.94	3.05	42.31	3.44	43.58	3.53	45.29	3.62	46.56	3.65

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 25: Cooling Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
70	23	4.3	28.9	0.54	31.3	0.64	34.1	0.74	37.0	0.83	38.1	0.85	39.6	0.87	40.7	0.89
	32	4.8	28.9	0.54	31.3	0.64	34.1	0.74	37.0	0.83	38.1	0.85	39.6	0.87	40.7	0.89
	41	5.5	28.9	0.54	31.3	0.64	34.1	0.74	37.0	0.83	38.1	0.85	39.6	0.87	40.7	0.89
	50	8.3	28.90	0.53	31.28	0.62	34.09	0.72	37.01	0.81	38.12	0.84	39.61	0.86	40.71	0.87
		15.9	28.90	0.50	31.28	0.58	34.09	0.68	37.01	0.77	38.12	0.79	39.61	0.81	40.71	0.82
		19.9	28.90	0.48	31.28	0.57	34.09	0.67	37.01	0.75	38.12	0.76	39.61	0.79	40.71	0.80
	59	8.3	28.90	0.73	31.28	0.85	34.09	0.98	37.01	1.11	38.12	1.14	39.61	1.17	40.71	1.18
		15.9	28.90	0.67	31.28	0.79	34.09	0.92	37.01	1.04	38.12	1.06	39.61	1.09	40.71	1.11
		19.9	28.90	0.65	31.28	0.77	34.09	0.90	37.01	1.02	38.12	1.04	39.61	1.07	40.71	1.08
	67	8.3	28.90	0.90	31.28	1.05	34.09	1.22	37.01	1.37	38.12	1.40	39.61	1.43	40.71	1.46
		15.9	28.90	0.82	31.28	0.98	34.09	1.14	37.01	1.28	38.12	1.31	39.61	1.34	40.71	1.37
		19.9	28.90	0.80	31.28	0.95	34.09	1.11	37.01	1.26	38.12	1.29	39.61	1.32	40.71	1.33
	75	8.3	28.90	1.09	31.28	1.27	34.09	1.48	37.01	1.67	38.12	1.71	39.61	1.75	40.71	1.78
		15.9	28.90	1.01	31.28	1.19	34.09	1.39	37.01	1.56	38.12	1.60	39.61	1.64	40.71	1.67
		19.9	28.90	0.98	31.28	1.17	34.09	1.36	37.01	1.53	38.12	1.57	39.61	1.61	40.71	1.62
	85	8.3	28.90	1.34	31.28	1.57	34.09	1.82	37.01	2.05	38.12	2.10	39.61	2.15	40.71	2.19
		15.9	28.90	1.23	31.28	1.46	34.09	1.70	37.01	1.92	38.12	1.97	39.61	2.02	40.71	2.05
		19.9	28.90	1.20	31.28	1.43	34.09	1.67	37.01	1.88	38.12	1.93	39.61	1.98	40.71	2.00
	95	8.3	28.90	1.49	31.28	1.74	34.09	2.03	37.01	2.28	38.12	2.34	39.61	2.39	40.71	2.43
		15.9	28.90	1.37	31.28	1.63	34.09	1.89	37.01	2.13	38.12	2.18	39.61	2.24	40.71	2.28
		19.9	28.90	1.33	31.28	1.59	34.09	1.86	37.01	2.09	38.12	2.14	39.61	2.20	40.71	2.22
	104	8.3	28.90	1.77	31.28	2.06	34.09	2.40	37.01	2.70	38.12	2.77	39.61	2.83	40.71	2.89
		15.9	28.90	1.62	31.28	1.93	34.09	2.25	37.01	2.53	38.12	2.59	39.61	2.65	40.71	2.70
		19.9	28.90	1.58	31.28	1.89	34.09	2.19	37.01	2.47	38.12	2.54	39.61	2.61	40.71	2.63
	113	8.3	28.90	2.04	31.28	2.38	34.09	2.77	37.01	3.13	38.12	3.19	39.61	3.27	40.71	3.34
		15.9	28.90	1.87	31.28	2.22	34.09	2.60	37.01	2.92	38.12	2.99	39.61	3.06	40.71	3.13
		19.9	28.90	1.82	31.28	2.18	34.09	2.53	37.01	2.86	38.12	2.93	39.61	3.01	40.71	3.03
60	23	4.3	24.8	0.44	26.8	0.50	29.2	0.59	31.7	0.66	32.7	0.68	33.9	0.69	34.9	0.71
	32	4.8	24.8	0.44	26.8	0.50	29.2	0.59	31.7	0.66	32.7	0.68	33.9	0.69	34.9	0.71
	41	5.5	24.8	0.44	26.8	0.50	29.2	0.59	31.7	0.66	32.7	0.68	33.9	0.69	34.9	0.71
	50	8.3	24.77	0.42	26.81	0.49	29.18	0.57	31.72	0.65	32.71	0.67	33.98	0.68	34.92	0.69
		15.9	24.77	0.39	26.81	0.46	29.18	0.54	31.72	0.61	32.71	0.62	33.98	0.64	34.92	0.65
		19.9	24.77	0.37	26.81	0.46	29.18	0.53	31.72	0.60	32.71	0.61	33.98	0.63	34.92	0.64
	59	8.3	24.77	0.58	26.81	0.67	29.18	0.78	31.72	0.89	32.71	0.91	33.98	0.93	34.92	0.94
		15.9	24.77	0.53	26.81	0.63	29.18	0.74	31.72	0.83	32.71	0.85	33.98	0.87	34.92	0.89
		19.9	24.77	0.51	26.81	0.62	29.18	0.72	31.72	0.81	32.71	0.83	33.98	0.85	34.92	0.86
	67	8.3	24.77	0.71	26.81	0.83	29.18	0.97	31.72	1.09	32.71	1.12	33.98	1.14	34.92	1.17
		15.9	24.77	0.66	26.81	0.78	29.18	0.91	31.72	1.02	32.71	1.05	33.98	1.07	34.92	1.09
		19.9	24.77	0.64	26.81	0.76	29.18	0.89	31.72	1.00	32.71	1.02	33.98	1.05	34.92	1.06
	75	8.3	24.77	0.87	26.81	1.02	29.18	1.18	31.72	1.33	32.71	1.36	33.98	1.39	34.92	1.42
		15.9	24.77	0.80	26.81	0.95	29.18	1.10	31.72	1.25	32.71	1.27	33.98	1.31	34.92	1.33
		19.9	24.77	0.78	26.81	0.93	29.18	1.08	31.72	1.22	32.71	1.25	33.98	1.28	34.92	1.30
	85	8.3	24.77	1.07	26.81	1.25	29.18	1.45	31.72	1.63	32.71	1.67	33.98	1.71	34.92	1.75
		15.9	24.77	0.98	26.81	1.17	29.18	1.36	31.72	1.53	32.71	1.57	33.98	1.61	34.92	1.63
		19.9	24.77	0.95	26.81	1.14	29.18	1.33	31.72	1.50	32.71	1.54	33.98	1.58	34.92	1.59
	95	8.3	24.77	1.19	26.81	1.39	29.18	1.62	31.72	1.82	32.71	1.86	33.98	1.91	34.92	1.94
		15.9	24.77	1.09	26.81	1.30	29.18	1.51	31.72	1.70	32.71	1.74	33.98	1.78	34.92	1.82
		19.9	24.77	1.06	26.81	1.27	29.18	1.48	31.72	1.67	32.71	1.71	33.98	1.75	34.92	1.77
	104	8.3	24.77	1.41	26.81	1.64	29.18	1.91	31.72	2.15	32.71	2.21	33.98	2.26	34.92	2.30
		15.9	24.77	1.30	26.81	1.54	29.18	1.79	31.72	2.01	32.71	2.06	33.98	2.11	34.92	2.15
		19.9	24.77	1.26	26.81	1.50	29.18	1.75	31.72	1.97	32.71	2.02	33.98	2.07	34.92	2.10
	113	8.3	24.77	1.62	26.81	1.89	29.18	2.21	31.72	2.49	32.71	2.55	33.98	2.61	34.92	2.66
		15.9	24.77	1.50	26.81	1.78	29.18	2.07	31.72	2.32	32.71	2.38	33.98	2.45	34.92	2.49
		19.9	24.77	1.45	26.81	1.74	29.18	2.03	31.72	2.27	32.71	2.34	33.98	2.39	34.92	2.42

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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PERFORMANCE DATA

MULTI V WATER MINI

Cooling Capacity

ARWN053GA2

Table 26: Cooling Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F WB													
			57		61		64		67		70		73		76	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
50	23	4.3	20.6	0.33	22.3	0.37	24.3	0.44	26.5	0.49	27.3	0.51	28.3	0.51	29.1	0.53
	32	4.8	20.6	0.33	22.3	0.37	24.3	0.44	26.5	0.49	27.3	0.51	28.3	0.51	29.1	0.53
	41	5.5	20.6	0.33	22.3	0.37	24.3	0.44	26.5	0.49	27.3	0.51	28.3	0.51	29.1	0.53
	50	8.3	20.63	0.31	22.34	0.37	24.33	0.44	26.48	0.48	27.25	0.49	28.30	0.51	29.07	0.52
		15.9	20.63	0.29	22.34	0.35	24.33	0.41	26.48	0.46	27.25	0.47	28.30	0.47	29.07	0.48
		19.9	20.63	0.28	22.34	0.35	24.33	0.40	26.48	0.45	27.25	0.45	28.30	0.47	29.07	0.47
	59	8.3	20.63	0.43	22.34	0.50	24.33	0.59	26.48	0.66	27.25	0.67	28.30	0.69	29.07	0.70
		15.9	20.63	0.39	22.34	0.47	24.33	0.55	26.48	0.62	27.25	0.63	28.30	0.65	29.07	0.66
		19.9	20.63	0.38	22.34	0.46	24.33	0.54	26.48	0.61	27.25	0.62	28.30	0.63	29.07	0.64
	67	8.3	20.63	0.53	22.34	0.62	24.33	0.72	26.48	0.81	27.25	0.83	28.30	0.85	29.07	0.87
		15.9	20.63	0.49	22.34	0.58	24.33	0.67	26.48	0.76	27.25	0.78	28.30	0.80	29.07	0.81
		19.9	20.63	0.47	22.34	0.57	24.33	0.66	26.48	0.75	27.25	0.77	28.30	0.78	29.07	0.79
	75	8.3	20.63	0.65	22.34	0.75	24.33	0.88	26.48	0.99	27.25	1.02	28.30	1.04	29.07	1.06
		15.9	20.63	0.59	22.34	0.71	24.33	0.82	26.48	0.93	27.25	0.95	28.30	0.97	29.07	0.99
		19.9	20.63	0.58	22.34	0.69	24.33	0.81	26.48	0.91	27.25	0.93	28.30	0.95	29.07	0.97
	85	8.3	20.63	0.80	22.34	0.93	24.33	1.09	26.48	1.22	27.25	1.25	28.30	1.28	29.07	1.30
		15.9	20.63	0.73	22.34	0.87	24.33	1.01	26.48	1.14	27.25	1.17	28.30	1.20	29.07	1.22
		19.9	20.63	0.71	22.34	0.85	24.33	0.99	26.48	1.12	27.25	1.15	28.30	1.18	29.07	1.19
	95	8.3	20.63	0.89	22.34	1.03	24.33	1.21	26.48	1.35	27.25	1.39	28.30	1.42	29.07	1.45
		15.9	20.63	0.82	22.34	0.97	24.33	1.13	26.48	1.27	27.25	1.30	28.30	1.33	29.07	1.35
		19.9	20.63	0.79	22.34	0.95	24.33	1.10	26.48	1.25	27.25	1.27	28.30	1.31	29.07	1.32
	104	8.3	20.63	1.05	22.34	1.22	24.33	1.43	26.48	1.61	27.25	1.65	28.30	1.69	29.07	1.71
		15.9	20.63	0.97	22.34	1.14	24.33	1.33	26.48	1.50	27.25	1.54	28.30	1.58	29.07	1.61
		19.9	20.63	0.94	22.34	1.12	24.33	1.31	26.48	1.47	27.25	1.51	28.30	1.55	29.07	1.56
	113	8.3	20.63	1.22	22.34	1.41	24.33	1.65	26.48	1.86	27.25	1.90	28.30	1.95	29.07	1.98
		15.9	20.63	1.11	22.34	1.32	24.33	1.54	26.48	1.74	27.25	1.78	28.30	1.82	29.07	1.86
		19.9	20.63	1.08	22.34	1.29	24.33	1.51	26.48	1.70	27.25	1.74	28.30	1.79	29.07	1.80

TC = Total Cooling Capacity (MBh). Cooling capacities are based on air entering the indoor unit at 80.6°F dry bulb (DB) / 66.2°F wet bulb (WB), and the water entering at 86°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water-source unit.

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Table 27: Heating Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
130	23	5.5	21.30	2.42	21.14	2.29	21.02	2.13	20.73	2.07	20.98	2.02	20.41	1.81
		10.6	24.09	2.59	23.89	2.46	23.77	2.31	23.45	2.25	23.73	2.18	23.12	1.96
		13.3	26.65	2.75	26.40	2.63	26.24	2.49	25.92	2.43	26.24	2.36	25.55	2.11
	32	5.5	37.01	3.27	36.16	3.17	35.39	3.07	34.62	2.98	34.74	2.90	33.16	2.60
		10.6	37.90	3.30	36.97	3.20	36.20	3.10	35.43	3.02	35.55	2.93	33.97	2.63
		13.3	38.47	3.30	37.54	3.20	36.77	3.10	35.96	3.02	36.08	2.93	34.46	2.63
	41	5.5	53.17	3.52	52.28	3.43	51.10	3.35	49.81	3.25	48.47	3.16	45.80	2.83
		10.6	53.90	3.58	52.64	3.49	51.14	3.41	49.81	3.32	48.47	3.22	45.80	2.89
		13.3	54.22	3.60	52.80	3.52	51.14	3.44	49.81	3.34	48.47	3.25	45.80	2.91
	50	5.5	53.37	3.18	52.44	3.08	51.14	3.03	49.81	2.95	48.47	2.85	45.80	2.57
		10.6	54.63	3.16	53.41	3.09	51.95	3.05	50.62	2.95	49.20	2.84	46.53	2.56
		13.3	54.91	3.20	53.78	3.14	52.28	3.06	50.86	2.96	49.52	2.89	46.81	2.69
	59	5.5	53.57	2.84	52.60	2.74	51.14	2.71	49.81	2.65	48.47	2.54	45.80	2.31
		10.6	55.32	2.73	54.18	2.69	52.76	2.69	51.43	2.58	49.93	2.46	47.26	2.24
		13.3	55.60	2.80	54.71	2.75	53.41	2.69	51.95	2.58	50.62	2.53	47.82	2.46
	68	5.5	55.60	2.62	54.59	2.51	53.13	2.45	51.67	2.39	50.21	2.34	47.26	2.24
		10.6	57.34	2.54	56.33	2.50	54.75	2.45	53.29	2.43	51.95	2.40	49.00	2.16
		13.3	57.58	2.54	56.73	2.50	55.40	2.46	53.82	2.43	52.36	2.40	49.40	2.30
	77	5.5	58.23	2.50	56.73	2.44	55.40	2.39	54.34	2.35	53.13	2.31	50.09	2.16
		10.6	58.23	2.46	56.73	2.42	55.40	2.35	54.34	2.31	53.13	2.27	50.09	2.12
		13.3	58.23	2.43	56.73	2.36	55.40	2.31	54.34	2.27	53.13	2.24	50.09	2.09
	86	5.5	58.23	2.43	56.73	2.32	55.40	2.29	54.34	2.24	53.13	2.20	50.09	2.05
		10.6	58.23	2.35	56.73	2.31	55.40	2.24	54.34	2.20	53.13	2.12	50.09	1.97
		13.3	58.23	2.31	56.73	2.24	55.40	2.20	54.34	2.16	53.13	2.12	50.09	1.97
	95	5.5	58.23	2.31	56.73	2.24	55.40	2.20	54.34	2.12	53.13	2.05	50.09	1.89
		10.6	58.23	2.24	56.73	2.19	55.40	2.16	54.34	2.09	53.13	2.01	50.09	1.82
		13.3	58.23	2.24	56.73	2.17	55.40	2.12	54.34	2.05	53.13	1.97	50.09	1.82
	104	5.5	58.23	2.24	56.73	2.17	55.40	2.12	54.34	2.05	53.13	1.97	50.09	1.78
		10.6	58.23	2.16	56.73	2.11	55.40	2.05	54.34	1.97	53.13	1.89	50.09	1.71
		13.3	58.23	2.12	56.73	2.08	55.40	2.05	54.34	1.97	53.13	1.89	50.09	1.71
	113	5.5	58.23	2.16	56.73	2.09	55.40	2.05	54.34	1.97	53.13	1.89	50.09	1.67
		10.6	58.23	2.09	56.73	2.04	55.40	1.93	54.34	1.86	53.13	1.78	50.09	1.59
		13.3	58.23	2.01	56.73	1.99	55.40	1.97	54.34	1.89	53.13	1.82	50.09	1.59
120	23	5.5	20.25	2.42	20.09	2.29	19.96	2.13	19.72	2.04	19.88	1.98	19.36	1.78
		10.6	22.92	2.59	22.72	2.46	22.60	2.31	22.31	2.22	22.51	2.15	21.91	1.93
		13.3	25.31	2.75	25.11	2.63	24.94	2.49	24.66	2.39	24.86	2.32	24.18	2.08
	32	5.5	35.19	3.27	34.34	3.17	33.61	3.07	32.92	2.94	32.92	2.85	31.42	2.55
		10.6	36.00	3.30	35.15	3.20	34.42	3.10	33.69	2.97	33.69	2.89	32.19	2.58
		13.3	36.57	3.30	35.72	3.20	34.95	3.10	34.22	2.97	34.18	2.89	32.68	2.58
	41	5.5	50.62	3.52	49.77	3.43	48.59	3.35	47.42	3.20	45.92	3.11	43.41	2.79
		10.6	51.35	3.58	50.13	3.49	48.59	3.41	47.42	3.27	45.92	3.18	43.41	2.84
		13.3	51.63	3.60	49.85	3.52	48.59	3.44	47.42	3.29	45.92	3.20	43.41	2.86
	50	5.5	50.86	3.16	49.89	3.07	48.59	3.01	47.42	2.91	45.92	2.81	43.41	2.53
		10.6	51.79	3.20	50.70	3.12	49.12	3.05	47.95	2.93	46.41	2.80	43.86	2.54
		13.3	52.08	3.19	50.54	3.12	49.32	3.06	48.15	2.94	46.61	2.81	44.06	2.63
	59	5.5	51.06	2.80	50.05	2.71	48.59	2.67	47.42	2.62	45.92	2.50	43.41	2.27
		10.6	52.24	2.82	51.27	2.74	49.69	2.69	48.47	2.58	46.85	2.43	44.34	2.24
		13.3	52.52	2.78	51.23	2.71	50.09	2.69	48.88	2.58	47.26	2.43	44.75	2.39
	68	5.5	52.52	2.51	51.51	2.41	49.93	2.35	48.59	2.31	47.01	2.27	44.46	2.15
		10.6	53.86	2.51	52.72	2.45	51.02	2.39	49.81	2.35	48.19	2.27	45.52	2.12
		13.3	54.10	2.49	52.68	2.43	51.43	2.39	50.09	2.35	48.47	2.27	45.80	2.20
	77	5.5	54.75	2.36	53.13	2.26	51.43	2.22	50.33	2.16	49.00	2.12	46.33	1.97
		10.6	54.87	2.33	53.13	2.24	51.43	2.20	50.33	2.12	49.00	2.09	46.33	1.93
		13.3	55.03	2.24	53.13	2.18	51.43	2.16	50.33	2.12	49.00	2.05	46.33	1.93
	86	5.5	55.03	2.25	53.13	2.15	51.43	2.09	50.33	2.01	49.00	1.97	46.33	1.82
		10.6	55.03	2.18	53.13	2.09	51.43	2.05	50.33	1.97	49.00	1.89	46.33	1.78
		13.3	55.03	2.11	53.13	2.05	51.43	2.01	50.33	1.97	49.00	1.89	46.33	1.75
	95	5.5	55.03	2.14	53.13	2.03	51.43	1.97	50.33	1.89	49.00	1.82	46.33	1.67
		10.6	55.03	2.02	53.13	1.96	51.43	1.89	50.33	1.82	49.00	1.75	46.33	1.63
		13.3	55.03	1.99	53.13	1.94	51.43	1.89	50.33	1.82	49.00	1.75	46.33	1.59
	104	5.5	55.03	2.06	53.13	1.93	51.43	1.86	50.33	1.78	49.00	1.71	46.33	1.55
		10.6	55.03	1.90	53.13	1.84	51.43	1.78	50.33	1.71	49.00	1.63	46.33	1.52
		13.3	55.03	1.88	53.13	1.82	51.43	1.78	50.33	1.71	49.00	1.63	46.33	1.48
	113	5.5	55.03	1.99	53.13	1.84	51.43	1.75	50.33	1.67	49.00	1.59	46.33	1.44
		10.6	55.03	1.79	53.13	1.73	51.43	1.67	50.33	1.59	49.00	1.52	46.33	1.40
		13.3	55.03	1.76	53.13	1.70	51.43	1.67	50.33	1.59	49.00	1.52	46.33	1.36

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 28: Heating Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
110	23	5.5	19.15	2.45	19.03	2.29	18.91	2.13	18.71	2.04	18.75	1.98	18.34	1.78
		10.6	21.66	2.62	21.54	2.46	21.42	2.31	21.18	2.22	21.18	2.15	20.77	1.93
		13.3	23.93	2.79	23.77	2.63	23.65	2.49	23.41	2.39	23.41	2.32	22.92	2.08
	32	5.5	33.29	3.31	32.56	3.17	31.87	3.07	31.26	2.94	30.98	2.85	29.80	2.55
		10.6	34.06	3.34	33.33	3.20	32.60	3.10	31.99	2.97	31.71	2.89	30.49	2.58
		13.3	34.58	3.34	33.85	3.20	33.12	3.10	32.48	2.97	32.19	2.89	30.94	2.58
	41	5.5	48.43	3.56	47.22	3.43	46.04	3.35	44.99	3.20	43.25	3.11	41.14	2.79
		10.6	49.08	3.63	47.58	3.49	46.08	3.41	44.99	3.27	43.25	3.18	41.14	2.84
		13.3	49.36	3.65	47.70	3.52	46.08	3.44	44.99	3.29	43.25	3.20	41.14	2.86
	50	5.5	48.63	3.19	47.38	3.08	46.04	3.02	44.99	2.91	43.25	2.81	41.14	2.53
		10.6	49.36	3.21	47.86	3.12	46.33	3.05	45.27	2.93	43.53	2.80	41.34	2.54
		13.3	49.65	3.21	48.07	3.12	46.49	3.04	45.35	2.92	43.61	2.81	41.47	2.57
	59	5.5	48.80	2.81	47.50	2.74	46.08	2.69	44.99	2.62	43.25	2.50	41.14	2.27
		10.6	49.61	2.80	48.19	2.74	46.61	2.69	45.52	2.58	43.81	2.43	41.55	2.24
		13.3	49.89	2.78	48.43	2.71	46.85	2.65	45.68	2.54	43.94	2.43	41.79	2.27
	68	5.5	49.77	2.44	48.31	2.37	46.73	2.31	45.52	2.27	43.81	2.20	41.55	2.06
		10.6	50.82	2.45	48.96	2.37	47.26	2.31	46.20	2.27	44.34	2.16	42.20	2.05
		13.3	51.10	2.45	49.36	2.37	47.54	2.31	46.33	2.24	44.58	2.16	42.32	2.05
	77	5.5	51.14	2.21	49.52	2.12	47.54	2.09	46.49	2.01	44.87	1.93	42.48	1.78
		10.6	51.55	2.19	49.52	2.09	47.54	2.05	46.49	1.97	44.87	1.89	42.48	1.78
		13.3	51.79	2.19	49.52	2.09	47.54	2.01	46.49	1.97	44.87	1.86	42.48	1.75
	86	5.5	51.79	2.01	49.52	1.93	47.54	1.86	46.49	1.82	44.87	1.71	42.48	1.59
		10.6	51.79	1.97	49.52	1.89	47.54	1.82	46.49	1.78	44.87	1.67	42.48	1.55
		13.3	51.79	1.96	49.52	1.86	47.54	1.78	46.49	1.75	44.87	1.67	42.48	1.55
	95	5.5	51.79	1.89	49.52	1.78	47.54	1.71	46.49	1.63	44.87	1.55	42.48	1.44
		10.6	51.79	1.82	49.52	1.75	47.54	1.67	46.49	1.59	44.87	1.52	42.48	1.40
		13.3	51.79	1.77	49.52	1.71	47.54	1.63	46.49	1.59	44.87	1.52	42.48	1.40
	104	5.5	51.79	1.78	49.52	1.71	47.54	1.59	46.49	1.52	44.87	1.44	42.48	1.33
		10.6	51.79	1.71	49.52	1.63	47.54	1.52	46.49	1.48	44.87	1.40	42.48	1.29
		13.3	51.79	1.68	49.52	1.59	47.54	1.52	46.49	1.44	44.87	1.36	42.48	1.25
	113	5.5	51.79	1.67	49.52	1.63	47.54	1.48	46.49	1.40	44.87	1.33	42.48	1.21
		10.6	51.79	1.59	49.52	1.52	47.54	1.36	46.49	1.36	44.87	1.29	42.48	1.18
		13.3	51.79	1.59	49.52	1.48	47.54	1.40	46.49	1.29	44.87	1.21	42.48	1.10
100	23	5.5	18.10	2.45	17.98	2.32	17.90	2.13	17.74	2.04	17.57	1.95	17.25	1.78
		10.6	20.49	2.62	20.37	2.49	20.25	2.31	20.04	2.22	19.88	2.12	19.56	1.93
		13.3	22.64	2.79	22.47	2.66	22.35	2.49	22.15	2.39	21.99	2.29	21.58	2.08
	32	5.5	31.46	3.31	30.78	3.21	30.13	3.07	29.60	2.94	29.07	2.81	28.06	2.55
		10.6	32.19	3.34	31.50	3.24	30.82	3.10	30.29	2.97	29.76	2.84	28.71	2.58
		13.3	32.68	3.34	31.99	3.24	31.30	3.10	30.74	2.97	30.21	2.84	29.16	2.58
	41	5.5	46.33	3.56	44.71	3.48	43.49	3.35	42.60	3.20	40.58	3.07	38.71	2.79
		10.6	46.97	3.63	45.03	3.54	43.53	3.41	42.60	3.27	40.58	3.13	38.71	2.84
		13.3	47.26	3.65	45.15	3.56	43.53	3.44	42.60	3.29	40.58	3.15	38.71	2.86
	50	5.5	46.53	3.19	44.83	3.11	43.53	3.02	42.60	2.91	40.58	2.76	38.71	2.53
		10.6	46.97	3.25	45.07	3.15	43.53	3.05	42.60	2.93	40.58	2.78	38.71	2.54
		13.3	47.30	3.24	45.27	3.15	43.53	3.04	42.60	2.92	40.58	2.77	38.71	2.53
	59	5.5	46.73	2.81	44.99	2.75	43.53	2.69	42.60	2.62	40.58	2.46	38.71	2.27
		10.6	46.97	2.87	45.11	2.76	43.53	2.69	42.60	2.58	40.58	2.43	38.71	2.24
		13.3	47.38	2.82	45.35	2.74	43.53	2.65	42.60	2.54	40.58	2.39	38.71	2.20
	68	5.5	47.09	2.40	45.23	2.33	43.53	2.27	42.60	2.24	40.58	2.09	38.71	1.97
		10.6	47.78	2.45	45.35	2.34	**43.53**	**2.27**	42.60	2.20	40.58	2.05	38.71	1.89
		13.3	48.07	2.40	45.76	2.32	43.53	2.24	42.60	2.16	40.58	2.01	38.71	1.86
	77	5.5	47.66	2.09	45.92	2.02	43.53	1.93	42.60	1.86	40.58	1.75	38.71	1.59
		10.6	48.35	2.10	45.92	1.97	43.53	1.89	42.60	1.82	40.58	1.71	38.71	1.59
		13.3	48.59	2.05	45.92	1.96	43.53	1.86	42.60	1.78	40.58	1.71	38.71	1.55
	86	5.5	48.59	1.89	45.92	1.75	43.53	1.63	42.60	1.59	40.58	1.48	38.71	1.40
		10.6	48.59	1.86	45.92	1.71	43.53	1.62	42.60	1.55	40.58	1.48	38.71	1.36
		13.3	48.59	1.82	45.92	1.71	43.53	1.59	42.60	1.55	40.58	1.44	38.71	1.36
	95	5.5	48.59	1.75	45.92	1.59	43.53	1.44	42.60	1.40	40.58	1.33	38.71	1.21
		10.6	48.59	1.67	45.92	1.52	43.53	1.42	42.60	1.36	40.58	1.29	38.71	1.18
		13.3	48.59	1.67	45.92	1.52	43.53	1.40	42.60	1.36	40.58	1.29	38.71	1.18
	104	5.5	48.59	1.63	45.92	1.48	43.53	1.29	42.60	1.25	40.58	1.18	38.71	1.10
		10.6	48.59	1.55	45.92	1.40	43.53	1.27	42.60	1.21	40.58	1.14	38.71	1.06
		13.3	48.59	1.52	45.92	1.40	43.53	1.25	42.60	1.21	40.58	1.14	38.71	1.06
	113	5.5	48.59	1.52	45.92	1.36	43.53	1.14	42.60	1.10	40.58	1.02	38.71	0.98
		10.6	48.59	1.44	45.92	1.29	43.53	1.12	42.60	1.06	40.58	0.98	38.71	0.95
		13.3	48.59	1.36	45.92	1.29	43.53	1.10	42.60	1.06	40.58	0.98	38.71	0.95

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 29: Heating Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
90	23	5.5	17.09	2.28	16.56	2.08	16.08	1.83	15.95	1.75	15.83	1.68	15.55	1.51
		10.6	19.36	2.43	18.75	2.23	18.18	1.99	18.06	1.89	17.94	1.83	17.57	1.64
		13.3	21.38	2.58	20.69	2.39	20.09	2.15	19.92	2.04	19.80	1.97	19.44	1.77
	32	5.5	29.72	3.06	28.35	2.87	27.05	2.64	26.65	2.51	26.20	2.42	25.23	2.17
		10.6	30.41	3.09	28.99	2.90	27.70	2.66	27.25	2.54	26.81	2.45	25.84	2.20
		13.3	30.86	3.09	29.44	2.90	28.14	2.66	27.66	2.54	27.25	2.45	26.24	2.20
	41	5.5	41.79	3.29	40.37	3.11	39.12	2.87	38.31	2.74	36.61	2.64	34.87	2.37
		10.6	41.95	3.35	40.25	3.16	39.12	2.93	38.31	2.80	36.61	2.69	34.87	2.42
		13.3	42.20	3.37	40.37	3.18	39.12	2.95	38.31	2.82	36.61	2.71	34.87	2.44
	50	5.5	41.95	2.89	40.49	2.75	39.12	2.59	38.31	2.49	36.61	2.38	34.87	2.15
		10.6	41.87	2.90	40.29	2.76	39.12	2.60	38.31	2.50	36.61	2.37	34.87	2.16
		13.3	42.15	2.89	40.41	2.76	39.12	2.60	38.31	2.49	36.61	2.38	34.87	2.16
	59	5.5	42.11	2.49	40.62	2.40	39.12	2.31	38.31	2.24	36.61	2.12	34.87	1.93
		10.6	41.83	2.45	40.33	2.36	39.12	2.27	38.31	2.20	36.61	2.05	34.87	1.89
		13.3	42.11	2.42	40.45	2.33	39.12	2.24	38.31	2.16	36.61	2.05	34.87	1.89
	68	5.5	42.40	2.11	40.78	2.05	39.12	1.97	38.31	1.89	36.61	1.82	34.87	1.71
		10.6	42.24	2.11	40.45	2.02	39.12	1.93	38.31	1.86	36.61	1.75	34.87	1.63
		13.3	42.36	2.08	40.58	2.01	39.12	1.93	38.31	1.86	36.61	1.75	34.87	1.63
	77	5.5	43.25	1.84	41.39	1.75	39.12	1.67	38.31	1.59	36.61	1.52	34.87	1.40
		10.6	43.65	1.83	41.39	1.73	39.12	1.63	38.31	1.59	36.61	1.48	34.87	1.36
		13.3	43.81	1.78	41.39	1.69	39.12	1.63	38.31	1.55	36.61	1.48	34.87	1.36
	86	5.5	43.81	1.67	41.39	1.55	39.12	1.44	38.31	1.40	36.61	1.33	34.87	1.21
		10.6	43.81	1.63	41.39	1.52	39.12	1.40	38.31	1.36	36.61	1.29	34.87	1.21
		13.3	43.81	1.59	41.39	1.48	39.12	1.40	38.31	1.36	36.61	1.29	34.87	1.18
	95	5.5	43.81	1.52	41.39	1.40	39.12	1.29	38.31	1.25	36.61	1.18	34.87	1.10
		10.6	43.81	1.48	41.39	1.36	39.12	1.25	38.31	1.21	36.61	1.14	34.87	1.06
		13.3	43.81	1.44	41.39	1.33	39.12	1.21	38.31	1.18	36.61	1.14	34.87	1.06
	104	5.5	43.81	1.40	41.39	1.29	39.12	1.14	38.31	1.10	36.61	1.06	34.87	0.98
		10.6	43.81	1.33	41.39	1.25	39.12	1.10	38.31	1.06	36.61	1.02	34.87	0.95
		13.3	43.81	1.33	41.39	1.25	39.12	1.10	38.31	1.06	36.61	1.02	34.87	0.95
	113	5.5	43.81	1.29	41.39	1.18	39.12	0.98	38.31	0.95	36.61	0.95	34.87	0.87
		10.6	43.81	1.18	41.39	1.14	39.12	0.95	38.31	0.91	36.61	0.91	34.87	0.84
		13.3	43.81	1.21	41.39	1.18	39.12	0.98	38.31	0.95	36.61	0.91	34.87	0.84
80	23	5.5	16.16	1.63	15.14	1.57	14.33	1.50	14.17	1.45	14.09	1.38	13.81	1.27
		10.6	18.26	1.77	17.13	1.70	16.20	1.63	16.04	1.57	15.95	1.50	15.63	1.38
		13.3	20.21	1.91	18.91	1.84	17.90	1.76	17.70	1.70	17.62	1.62	17.25	1.49
	32	5.5	28.06	2.35	25.88	2.25	24.09	2.16	23.65	2.09	23.32	1.99	22.43	1.83
		10.6	28.75	2.38	26.48	2.28	24.66	2.18	24.22	2.11	23.89	2.01	22.96	1.85
		13.3	29.16	2.38	26.89	2.28	25.07	2.18	24.58	2.11	24.26	2.01	23.32	1.85
	41	5.5	38.67	2.56	36.49	2.46	34.83	2.35	34.06	2.27	32.60	2.17	30.98	2.00
		10.6	39.00	2.62	36.77	2.51	34.87	2.40	34.06	2.32	32.60	2.21	30.98	2.04
		13.3	39.00	2.63	36.73	2.53	34.87	2.42	34.06	2.34	32.60	2.23	30.98	2.05
	50	5.5	38.83	2.34	36.61	2.24	34.83	2.13	34.06	2.07	32.60	1.96	30.98	1.81
		10.6	39.00	2.33	36.77	2.22	34.87	2.13	34.06	2.07	32.60	1.96	30.98	1.82
		13.3	39.00	2.32	36.73	2.23	34.87	2.14	34.06	2.06	32.60	1.95	30.98	1.80
	59	5.5	39.00	2.12	36.73	2.01	34.87	1.89	34.06	1.86	32.60	1.75	30.98	1.63
		10.6	39.00	2.05	36.73	1.93	34.87	1.86	34.06	1.82	32.60	1.71	30.98	1.59
		13.3	39.00	2.01	36.73	1.93	34.87	1.86	34.06	1.78	32.60	1.67	30.98	1.55
	68	5.5	39.00	1.78	36.73	1.71	34.87	1.63	34.06	1.59	32.60	1.52	30.98	1.40
		10.6	39.00	1.75	36.73	1.67	34.87	1.63	34.06	1.55	32.60	1.48	30.98	1.36
		13.3	39.00	1.71	36.73	1.63	34.87	1.59	34.06	1.55	32.60	1.44	30.98	1.36
	77	5.5	39.00	1.59	36.73	1.48	34.87	1.40	34.06	1.36	32.60	1.29	30.98	1.21
		10.6	39.00	1.55	36.73	1.44	34.87	1.40	34.06	1.33	32.60	1.25	30.98	1.18
		13.3	39.00	1.52	36.73	1.44	34.87	1.36	34.06	1.33	32.60	1.25	30.98	1.18
	86	5.5	39.00	1.40	36.73	1.33	34.87	1.25	34.06	1.21	32.60	1.14	30.98	1.06
		10.6	39.00	1.36	36.73	1.29	34.87	1.21	34.06	1.18	32.60	1.10	30.98	1.02
		13.3	39.00	1.36	36.73	1.29	34.87	1.21	34.06	1.18	32.60	1.10	30.98	1.02
	95	5.5	39.00	1.29	36.73	1.21	34.87	1.10	34.06	1.06	32.60	1.02	30.98	0.95
		10.6	39.00	1.25	36.73	1.18	34.87	1.06	34.06	1.06	32.60	0.98	30.98	0.95
		13.3	39.00	1.25	36.73	1.14	34.87	1.06	34.06	1.02	32.60	0.98	30.98	0.91
	104	5.5	39.00	1.21	36.73	1.10	34.87	0.98	34.06	0.98	32.60	0.91	30.98	0.87
		10.6	39.00	1.14	36.73	1.06	34.87	0.98	34.06	0.95	32.60	0.91	30.98	0.84
		13.3	39.00	1.14	36.73	1.06	34.87	0.95	34.06	0.95	32.60	0.91	30.98	0.84
	113	5.5	39.00	1.14	36.73	0.98	34.87	0.87	34.06	0.91	32.60	0.80	30.98	0.80
		10.6	39.00	1.02	36.73	0.95	34.87	0.91	34.06	0.84	32.60	0.84	30.98	0.72
		13.3	39.00	1.02	36.73	0.98	34.87	0.84	34.06	0.87	32.60	0.84	30.98	0.76

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 30: Heating Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
70	23	5.5	14.09	1.40	13.24	1.33	12.51	1.29	12.39	1.22	12.31	1.17	12.11	1.07
		10.6	15.95	1.52	14.98	1.45	14.13	1.40	14.01	1.32	13.93	1.27	13.69	1.16
		13.3	17.66	1.64	16.56	1.56	15.63	1.51	15.51	1.42	15.39	1.37	15.10	1.25
	32	5.5	24.54	2.01	22.68	1.92	21.06	1.85	20.69	1.75	20.37	1.69	19.64	1.53
		10.6	25.11	2.04	23.20	1.94	21.54	1.88	21.18	1.76	20.85	1.71	20.09	1.55
		13.3	25.47	2.04	23.57	1.94	21.87	1.88	21.50	1.76	21.18	1.71	20.41	1.55
	41	5.5	33.77	2.20	31.99	2.09	30.41	2.02	29.76	1.91	28.43	1.84	27.09	1.67
		10.6	34.06	2.24	32.23	2.13	30.45	2.07	29.76	1.94	28.43	1.88	27.09	1.71
		13.3	34.06	2.25	32.19	2.15	30.45	2.08	29.76	1.96	28.43	1.89	27.09	1.72
	50	5.5	33.89	2.01	32.07	1.90	30.45	1.83	29.76	1.73	28.43	1.66	27.09	1.52
		10.6	34.06	1.99	32.19	1.88	30.45	1.81	29.76	1.73	28.43	1.66	27.09	1.52
		13.3	34.06	2.00	32.19	1.89	30.45	1.82	29.76	1.74	28.43	1.65	27.09	1.52
	59	5.5	34.06	1.82	32.19	1.71	30.45	1.63	29.76	1.55	28.43	1.48	27.09	1.36
		10.6	34.06	1.75	32.19	1.63	30.45	1.55	29.76	1.52	28.43	1.44	27.09	1.33
		13.3	34.06	1.75	32.19	1.63	30.45	1.55	29.76	1.52	28.43	1.40	27.09	1.33
	68	5.5	34.06	1.52	32.19	1.44	30.45	1.40	29.76	1.36	28.43	1.29	27.09	1.21
		10.6	34.06	1.48	32.19	1.40	30.45	1.36	29.76	1.33	28.43	1.25	27.09	1.18
		13.3	34.06	1.48	32.19	1.40	30.45	1.36	29.76	1.29	28.43	1.25	27.09	1.14
	77	5.5	34.06	1.36	32.19	1.29	30.45	1.21	29.76	1.18	28.43	1.10	27.09	1.02
		10.6	34.06	1.33	32.19	1.25	30.45	1.18	29.76	1.14	28.43	1.10	27.09	1.02
		13.3	34.06	1.29	32.19	1.21	30.45	1.18	29.76	1.14	28.43	1.06	27.09	1.02
	86	5.5	34.06	1.21	32.19	1.14	30.45	1.06	29.76	1.02	28.43	0.98	27.09	0.91
		10.6	34.06	1.18	32.19	1.10	30.45	1.02	29.76	1.02	28.43	0.95	27.09	0.91
		13.3	34.06	1.18	32.19	1.10	30.45	1.02	29.76	0.98	28.43	0.95	27.09	0.91
	95	5.5	34.06	1.10	32.19	1.02	30.45	0.95	29.76	0.95	28.43	0.87	27.09	0.84
		10.6	34.06	1.06	32.19	0.98	30.45	0.95	29.76	0.91	28.43	0.87	27.09	0.80
		13.3	34.06	1.06	32.19	0.98	30.45	0.91	29.76	0.91	28.43	0.87	27.09	0.80
	104	5.5	34.06	1.02	32.19	0.95	30.45	0.87	29.76	0.84	28.43	0.80	27.09	0.76
		10.6	34.06	0.98	32.19	0.91	30.45	0.84	29.76	0.84	28.43	0.80	27.09	0.72
		13.3	34.06	0.98	32.19	0.91	30.45	0.84	29.76	0.80	28.43	0.76	27.09	0.72
	113	5.5	34.06	0.95	32.19	0.87	30.45	0.80	29.76	0.72	28.43	0.72	27.09	0.68
		10.6	34.06	0.91	32.19	0.84	30.45	0.72	29.76	0.76	28.43	0.72	27.09	0.64
		13.3	34.06	0.91	32.19	0.84	30.45	0.76	29.76	0.68	28.43	0.64	27.09	0.64
60	23	5.5	12.11	1.14	11.34	1.09	10.73	1.05	10.61	0.98	10.57	0.96	10.37	0.86
		10.6	13.73	1.24	12.84	1.19	12.15	1.14	12.03	1.06	11.99	1.04	11.74	0.93
		13.3	15.14	1.33	14.17	1.28	13.44	1.23	13.28	1.15	13.24	1.13	12.96	1.00
	32	5.5	21.06	1.64	19.40	1.58	18.10	1.51	17.74	1.40	17.49	1.38	16.85	1.24
		10.6	21.54	1.65	19.84	1.59	18.55	1.53	18.14	1.42	17.90	1.40	17.21	1.25
		13.3	21.87	1.65	20.17	1.59	18.83	1.53	18.42	1.42	18.18	1.40	17.49	1.25
	41	5.5	28.99	1.78	27.33	1.72	26.16	1.65	25.51	1.53	24.42	1.51	23.24	1.35
		10.6	29.24	1.82	27.54	1.75	26.16	1.68	25.51	1.56	24.42	1.54	23.24	1.37
		13.3	29.24	1.84	27.50	1.76	26.16	1.69	25.51	1.58	24.42	1.55	23.24	1.38
	50	5.5	29.12	1.63	27.41	1.56	26.16	1.49	25.51	1.39	24.42	1.36	23.24	1.22
		10.6	29.24	1.63	27.54	1.56	26.16	1.49	25.51	1.41	24.42	1.36	23.24	1.24
		13.3	29.24	1.64	27.50	1.55	26.16	1.47	25.51	1.39	24.42	1.35	23.24	1.22
	59	5.5	29.24	1.48	27.50	1.40	26.16	1.33	25.51	1.25	24.42	1.21	23.24	1.10
		10.6	29.24	1.44	27.50	1.36	26.16	1.29	25.51	1.25	24.42	1.18	23.24	1.10
		13.3	29.24	1.44	27.50	1.33	26.16	1.25	25.51	1.21	24.42	1.14	23.24	1.06
	68	5.5	29.24	1.29	27.50	1.21	26.16	1.14	25.51	1.10	24.42	1.06	23.24	0.98
		10.6	29.24	1.25	27.50	1.18	26.16	1.10	25.51	1.06	24.42	1.02	23.24	0.95
		13.3	29.24	1.25	27.50	1.18	26.16	1.10	25.51	1.06	24.42	1.02	23.24	0.95
	77	5.5	29.24	1.14	27.50	1.06	26.16	0.98	25.51	0.98	24.42	0.91	23.24	0.87
		10.6	29.24	1.10	27.50	1.02	26.16	0.98	25.51	0.95	24.42	0.91	23.24	0.84
		13.3	29.24	1.10	27.50	1.02	26.16	0.95	25.51	0.95	24.42	0.91	23.24	0.84
	86	5.5	29.24	1.02	27.50	0.95	26.16	0.91	25.51	0.87	24.42	0.84	23.24	0.80
		10.6	29.24	0.98	27.50	0.91	26.16	0.87	25.51	0.84	24.42	0.80	23.24	0.76
		13.3	29.24	0.98	27.50	0.91	26.16	0.87	25.51	0.84	24.42	0.80	23.24	0.76
	95	5.5	29.24	0.91	27.50	0.87	26.16	0.80	25.51	0.80	24.42	0.76	23.24	0.72
		10.6	29.24	0.91	27.50	0.84	26.16	0.80	25.51	0.76	24.42	0.72	23.24	0.68
		13.3	29.24	0.91	27.50	0.84	26.16	0.76	25.51	0.76	24.42	0.72	23.24	0.68
	104	5.5	29.24	0.84	27.50	0.80	26.16	0.72	25.51	0.72	24.42	0.68	23.24	0.64
		10.6	29.24	0.84	27.50	0.76	26.16	0.72	25.51	0.68	24.42	0.64	23.24	0.64
		13.3	29.24	0.84	27.50	0.76	26.16	0.72	25.51	0.68	24.42	0.64	23.24	0.64
	113	5.5	29.24	0.76	27.50	0.72	26.16	0.64	25.51	0.64	24.42	0.61	23.24	0.57
		10.6	29.24	0.76	27.50	0.68	26.16	0.64	25.51	0.61	24.42	0.57	23.24	0.61
		13.3	29.24	0.76	27.50	0.68	26.16	0.68	25.51	0.61	24.42	0.57	23.24	0.61

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 31: Heating Capacity—ARWN038GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
50	23	5.5	10.08	0.91	9.48	0.86	8.95	0.81	8.83	0.77	8.79	0.72	8.63	0.68
		10.6	11.38	0.98	10.69	0.93	10.12	0.88	10.00	0.84	9.96	0.78	9.76	0.74
		13.3	12.59	1.06	11.82	1.00	11.18	0.95	11.05	0.90	10.97	0.84	10.81	0.80
	32	5.5	17.49	1.30	16.20	1.24	15.06	1.16	14.74	1.11	14.54	1.04	14.01	0.98
		10.6	17.90	1.31	16.56	1.25	15.43	1.18	15.10	1.12	14.90	1.05	14.33	0.99
		13.3	18.18	1.31	16.81	1.25	15.63	1.18	15.35	1.12	15.10	1.05	14.58	0.99
	41	5.5	24.09	1.42	22.84	1.35	21.75	1.27	21.22	1.21	20.29	1.13	19.36	1.07
		10.6	24.30	1.45	23.00	1.37	21.79	1.30	21.22	1.23	20.29	1.15	19.36	1.09
		13.3	24.30	1.46	22.96	1.38	21.79	1.31	21.22	1.24	20.29	1.16	19.36	1.10
	50	5.5	24.22	1.30	22.88	1.22	21.75	1.15	21.22	1.10	20.29	1.02	19.36	0.97
		10.6	24.30	1.29	23.00	1.22	21.79	1.14	21.22	1.09	20.29	1.03	19.36	0.96
		13.3	24.30	1.30	22.96	1.22	21.79	1.15	21.22	1.09	20.29	1.02	19.36	0.96
	59	5.5	24.30	1.18	22.96	1.10	21.79	1.02	21.22	0.98	20.29	0.91	19.36	0.87
		10.6	24.30	1.14	22.96	1.06	21.79	0.98	21.22	0.95	20.29	0.91	19.36	0.84
		13.3	24.30	1.14	22.96	1.06	21.79	0.98	21.22	0.95	20.29	0.87	19.36	0.84
	68	5.5	24.30	1.02	22.96	0.95	21.79	0.91	21.22	0.87	20.29	0.84	19.36	0.76
		10.6	24.30	0.98	22.96	0.91	21.79	0.87	21.22	0.84	20.29	0.80	19.36	0.76
		13.3	24.30	0.98	22.96	0.91	21.79	0.87	21.22	0.84	20.29	0.80	19.36	0.76
	77	5.5	24.30	0.91	22.96	0.84	21.79	0.80	21.22	0.76	20.29	0.72	19.36	0.68
		10.6	24.30	0.87	22.96	0.84	21.79	0.76	21.22	0.76	20.29	0.72	19.36	0.68
		13.3	24.30	0.87	22.96	0.84	21.79	0.76	21.22	0.76	20.29	0.72	19.36	0.68
	86	5.5	24.30	0.84	22.96	0.76	21.79	0.72	21.22	0.68	20.29	0.68	19.36	0.64
		10.6	24.30	0.80	22.96	0.72	21.79	0.68	21.22	0.68	20.29	0.64	19.36	0.61
		13.3	24.30	0.80	22.96	0.72	21.79	0.68	21.22	0.68	20.29	0.64	19.36	0.61
	95	5.5	24.30	0.76	22.96	0.68	21.79	0.64	21.22	0.64	20.29	0.61	19.36	0.57
		10.6	24.30	0.72	22.96	0.68	21.79	0.64	21.22	0.61	20.29	0.61	19.36	0.57
		13.3	24.30	0.72	22.96	0.68	21.79	0.64	21.22	0.61	20.29	0.61	19.36	0.57
	104	5.5	24.30	0.68	22.96	0.64	21.79	0.61	21.22	0.57	20.29	0.57	19.36	0.53
		10.6	24.30	0.64	22.96	0.61	21.79	0.57	21.22	0.57	20.29	0.53	19.36	0.53
		13.3	24.30	0.64	22.96	0.61	21.79	0.57	21.22	0.57	20.29	0.53	19.36	0.53
	113	5.5	24.30	0.61	22.96	0.61	21.79	0.57	21.22	0.49	20.29	0.53	19.36	0.49
		10.6	24.30	0.57	22.96	0.53	21.79	0.49	21.22	0.53	20.29	0.45	19.36	0.49
		13.3	24.30	0.57	22.96	0.53	21.79	0.49	21.22	0.53	20.29	0.45	19.36	0.49

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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PERFORMANCE DATA

Heating Capacity

ARWN048GA2

Table 32: Heating Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
130	23	6.9	27.30	3.19	27.09	3.01	26.94	2.81	26.57	2.73	26.88	2.66	26.16	2.38
		13.2	30.88	3.41	30.62	3.24	30.47	3.05	30.05	2.96	30.41	2.88	29.64	2.58
		16.5	34.15	3.63	33.84	3.46	33.63	3.29	33.22	3.20	33.63	3.11	32.75	2.79
	32	6.9	47.44	4.31	46.35	4.18	45.36	4.04	44.38	3.93	44.53	3.82	42.51	3.42
		13.2	48.58	4.35	47.39	4.22	46.40	4.09	45.41	3.98	45.57	3.86	43.55	3.46
		16.5	49.31	4.35	48.11	4.22	47.13	4.09	46.09	3.98	46.24	3.86	44.17	3.46
	41	6.9	68.15	4.64	67.00	4.52	65.50	4.41	63.84	4.29	62.13	4.17	58.70	3.73
		13.2	69.08	4.72	67.47	4.61	65.55	4.50	63.84	4.37	62.13	4.25	58.70	3.81
		16.5	69.50	4.75	67.68	4.64	65.55	4.53	63.84	4.40	62.13	4.28	58.70	3.84
	50	6.9	68.41	4.19	67.21	4.06	65.55	3.99	63.84	3.89	62.13	3.76	58.70	3.39
		13.2	70.01	4.16	68.46	4.08	66.59	4.02	64.88	3.89	63.06	3.75	59.63	3.38
		16.5	70.38	4.22	68.92	4.14	67.00	4.04	65.19	3.90	63.48	3.81	60.00	3.54
	59	6.9	68.67	3.75	67.42	3.61	65.55	3.58	63.84	3.50	62.13	3.35	58.70	3.05
		13.2	70.90	3.60	69.44	3.55	67.63	3.55	65.91	3.40	63.99	3.25	60.57	2.95
		16.5	71.26	3.69	70.12	3.63	68.46	3.55	66.59	3.40	64.88	3.34	61.30	3.25
	68	6.9	71.26	3.45	69.96	3.31	68.09	3.24	66.23	3.15	64.36	3.09	60.57	2.95
		13.2	73.49	3.35	72.19	3.30	70.17	3.23	68.30	3.20	66.59	3.17	62.80	2.85
		16.5	73.80	3.35	72.71	3.30	71.00	3.25	68.98	3.20	67.11	3.17	63.32	3.03
	77	6.9	74.63	3.30	72.71	3.21	71.00	3.15	69.65	3.10	68.09	3.05	64.20	2.85
		13.2	74.63	3.25	72.71	3.19	71.00	3.10	69.65	3.05	68.09	3.00	64.20	2.80
		16.5	74.63	3.20	72.71	3.11	71.00	3.05	69.65	3.00	68.09	2.95	64.20	2.75
	86	6.9	74.63	3.20	72.71	3.06	71.00	3.02	69.65	2.95	68.09	2.90	64.20	2.70
		13.2	74.63	3.10	72.71	3.04	71.00	2.95	69.65	2.90	68.09	2.80	64.20	2.60
		16.5	74.63	3.05	72.71	2.96	71.00	2.90	69.65	2.85	68.09	2.80	64.20	2.60
	95	6.9	74.63	3.05	72.71	2.96	71.00	2.90	69.65	2.80	68.09	2.70	64.20	2.50
		13.2	74.63	2.95	72.71	2.89	71.00	2.85	69.65	2.75	68.09	2.65	64.20	2.40
		16.5	74.63	2.95	72.71	2.86	71.00	2.80	69.65	2.70	68.09	2.60	64.20	2.40
	104	6.9	74.63	2.95	72.71	2.86	71.00	2.80	69.65	2.70	68.09	2.60	64.20	2.35
		13.2	74.63	2.85	72.71	2.79	71.00	2.70	69.65	2.60	68.09	2.50	64.20	2.25
		16.5	74.63	2.80	72.71	2.74	71.00	2.70	69.65	2.60	68.09	2.50	64.20	2.25
	113	6.9	74.63	2.85	72.71	2.76	71.00	2.70	69.65	2.60	68.09	2.50	64.20	2.20
		13.2	74.63	2.75	72.71	2.69	71.00	2.55	69.65	2.45	68.09	2.35	64.20	2.10
		16.5	74.63	2.65	72.71	2.62	71.00	2.60	69.65	2.50	68.09	2.40	64.20	2.10
120	23	6.9	25.95	3.19	25.74	3.01	25.59	2.81	25.28	2.69	25.48	2.62	24.81	2.34
		13.2	29.38	3.41	29.12	3.24	28.96	3.05	28.60	2.92	28.86	2.84	28.08	2.54
		16.5	32.44	3.63	32.18	3.46	31.97	3.29	31.61	3.15	31.87	3.06	30.98	2.74
	32	6.9	45.10	4.31	44.01	4.18	43.08	4.04	42.20	3.87	42.20	3.76	40.28	3.37
		13.2	46.14	4.35	45.05	4.22	44.12	4.09	43.18	3.92	43.18	3.80	41.26	3.41
		16.5	46.87	4.35	45.78	4.22	44.79	4.09	43.86	3.92	43.80	3.80	41.88	3.41
	41	6.9	64.88	4.64	63.79	4.52	62.28	4.41	60.78	4.22	58.86	4.10	55.64	3.68
		13.2	65.81	4.72	64.25	4.61	62.28	4.50	60.78	4.31	58.86	4.19	55.64	3.75
		16.5	66.17	4.75	63.89	4.64	62.28	4.53	60.78	4.34	58.86	4.22	55.64	3.77
	50	6.9	65.19	4.16	63.94	4.05	62.28	3.96	60.78	3.84	58.86	3.70	55.64	3.33
		13.2	66.38	4.22	64.98	4.11	62.96	4.02	61.45	3.86	59.48	3.69	56.21	3.35
		16.5	66.74	4.20	64.77	4.11	63.22	4.04	61.71	3.87	59.74	3.71	56.47	3.46
	59	6.9	65.45	3.69	64.15	3.58	62.28	3.52	60.78	3.45	58.86	3.30	55.64	3.00
		13.2	66.95	3.72	65.71	3.61	63.68	3.55	62.13	3.40	60.05	3.20	56.83	2.95
		16.5	67.32	3.66	65.65	3.58	64.20	3.55	62.64	3.40	60.57	3.20	57.35	3.15
	68	6.9	67.32	3.31	66.02	3.18	63.99	3.10	62.28	3.05	60.26	3.00	56.99	2.84
		13.2	69.03	3.31	67.58	3.23	65.40	3.15	63.84	3.10	61.76	2.99	58.34	2.80
		16.5	69.34	3.28	67.52	3.20	65.91	3.15	64.20	3.10	62.13	3.00	58.70	2.90
	77	6.9	70.17	3.12	68.09	2.98	65.91	2.92	64.51	2.85	62.80	2.80	59.37	2.60
		13.2	70.33	3.07	68.09	2.96	65.91	2.90	64.51	2.80	62.80	2.75	59.37	2.55
		16.5	70.53	2.96	68.09	2.88	65.91	2.85	64.51	2.80	62.80	2.70	59.37	2.55
	86	6.9	70.53	2.97	68.09	2.83	65.91	2.75	64.51	2.65	62.80	2.60	59.37	2.40
		13.2	70.53	2.87	68.09	2.76	65.91	2.70	64.51	2.60	62.80	2.50	59.37	2.35
		16.5	70.53	2.78	68.09	2.70	65.91	2.65	64.51	2.60	62.80	2.50	59.37	2.30
	95	6.9	70.53	2.82	68.09	2.68	65.91	2.60	64.51	2.50	62.80	2.40	59.37	2.20
		13.2	70.53	2.66	68.09	2.58	65.91	2.50	64.51	2.40	62.80	2.30	59.37	2.15
		16.5	70.53	2.63	68.09	2.56	65.91	2.50	64.51	2.40	62.80	2.30	59.37	2.10
	104	6.9	70.53	2.72	68.09	2.55	65.91	2.45	64.51	2.35	62.80	2.25	59.37	2.05
		13.2	70.53	2.51	68.09	2.43	65.91	2.35	64.51	2.25	62.80	2.15	59.37	2.00
		16.5	70.53	2.48	68.09	2.40	65.91	2.35	64.51	2.25	62.80	2.15	59.37	1.95
	113	6.9	70.53	2.62	68.09	2.42	65.91	2.30	64.51	2.20	62.80	2.10	59.37	1.90
		13.2	70.53	2.36	68.09	2.28	65.91	2.20	64.51	2.10	62.80	2.00	59.37	1.85
		16.5	70.53	2.33	68.09	2.24	65.91	2.20	64.51	2.10	62.80	2.00	59.37	1.80

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 33: Heating Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
110	23	6.9	24.55	3.24	24.39	3.01	24.24	2.81	23.98	2.69	24.03	2.62	23.51	2.34
		13.2	27.77	3.45	27.61	3.24	27.46	3.05	27.14	2.92	27.14	2.84	26.63	2.54
		16.5	30.67	3.68	30.47	3.46	30.31	3.29	30.00	3.15	30.00	3.06	29.38	2.74
	32	6.9	42.66	4.36	41.73	4.18	40.85	4.04	40.07	3.87	39.70	3.76	38.20	3.37
		13.2	43.65	4.40	42.71	4.22	41.78	4.09	41.00	3.92	40.64	3.80	39.08	3.41
		16.5	44.32	4.40	43.39	4.22	42.46	4.09	41.62	3.92	41.26	3.80	39.65	3.41
	41	6.9	62.07	4.70	60.52	4.52	59.01	4.41	57.66	4.22	55.43	4.10	52.73	3.68
		13.2	62.90	4.78	60.98	4.61	59.06	4.50	57.66	4.31	55.43	4.19	52.73	3.75
		16.5	63.27	4.81	61.14	4.64	59.06	4.53	57.66	4.34	55.43	4.22	52.73	3.77
	50	6.9	62.33	4.20	60.72	4.06	59.01	3.98	57.66	3.84	55.43	3.70	52.73	3.33
		13.2	63.27	4.23	61.35	4.11	59.37	4.02	58.03	3.86	55.79	3.69	52.99	3.35
		16.5	63.63	4.23	61.61	4.11	59.58	4.01	58.13	3.85	55.90	3.71	53.15	3.39
	59	6.9	62.54	3.71	60.88	3.61	59.06	3.55	57.66	3.45	55.43	3.30	52.73	3.00
		13.2	63.58	3.69	61.76	3.61	59.74	3.55	58.34	3.40	56.16	3.20	53.25	2.95
		16.5	63.94	3.66	62.07	3.58	60.05	3.50	58.54	3.35	56.31	3.20	53.56	3.00
	68	6.9	63.79	3.21	61.92	3.13	59.89	3.05	58.34	3.00	56.16	2.90	53.25	2.72
		13.2	65.14	3.24	62.75	3.13	60.57	3.05	59.22	3.00	56.83	2.85	54.08	2.70
		16.5	65.50	3.24	63.27	3.13	60.93	3.05	59.37	2.95	57.14	2.85	54.24	2.70
	77	6.9	65.55	2.91	63.48	2.80	60.93	2.75	59.58	2.65	57.51	2.55	54.44	2.35
		13.2	66.07	2.89	63.48	2.75	60.93	2.70	59.58	2.60	57.51	2.50	54.44	2.35
		16.5	66.38	2.89	63.48	2.76	60.93	2.65	59.58	2.60	57.51	2.45	54.44	2.30
	86	6.9	66.38	2.65	63.48	2.55	60.93	2.45	59.58	2.40	57.51	2.25	54.44	2.10
		13.2	66.38	2.60	63.48	2.50	60.93	2.40	59.58	2.35	57.51	2.20	54.44	2.05
		16.5	66.38	2.58	63.48	2.45	60.93	2.35	59.58	2.30	57.51	2.20	54.44	2.05
	95	6.9	66.38	2.50	63.48	2.35	60.93	2.25	59.58	2.15	57.51	2.05	54.44	1.90
		13.2	66.38	2.40	63.48	2.30	60.93	2.20	59.58	2.10	57.51	2.00	54.44	1.85
		16.5	66.38	2.34	63.48	2.25	60.93	2.15	59.58	2.10	57.51	2.00	54.44	1.85
	104	6.9	66.38	2.35	63.48	2.25	60.93	2.10	59.58	2.00	57.51	1.90	54.44	1.75
		13.2	66.38	2.25	63.48	2.15	60.93	2.00	59.58	1.95	57.51	1.85	54.44	1.70
		16.5	66.38	2.22	63.48	2.10	60.93	2.00	59.58	1.90	57.51	1.80	54.44	1.65
	113	6.9	66.38	2.20	63.48	2.15	60.93	1.95	59.58	1.85	57.51	1.75	54.44	1.60
		13.2	66.38	2.10	63.48	2.00	60.93	1.80	59.58	1.80	57.51	1.70	54.44	1.55
		16.5	66.38	2.10	63.48	1.95	60.93	1.85	59.58	1.70	57.51	1.60	54.44	1.45
100	23	6.9	23.20	3.24	23.04	3.06	22.94	2.81	22.73	2.69	22.53	2.57	22.11	2.34
		13.2	26.26	3.45	26.11	3.28	25.95	3.05	25.69	2.92	25.48	2.80	25.07	2.54
		16.5	29.01	3.68	28.81	3.51	28.65	3.29	28.39	3.15	28.18	3.01	27.66	2.74
	32	6.9	40.33	4.36	39.44	4.23	38.61	4.04	37.94	3.87	37.27	3.71	35.97	3.37
		13.2	41.26	4.40	40.38	4.28	39.50	4.09	38.82	3.92	38.15	3.75	36.80	3.41
		16.5	41.88	4.40	41.00	4.28	40.12	4.09	39.39	3.92	38.72	3.75	37.37	3.41
	41	6.9	59.37	4.70	57.30	4.59	55.74	4.41	54.60	4.22	52.00	4.04	49.62	3.68
		13.2	60.21	4.78	57.71	4.67	55.79	4.50	54.60	4.31	52.00	4.13	49.62	3.75
		16.5	60.57	4.81	57.87	4.70	55.79	4.53	54.60	4.34	52.00	4.15	49.62	3.77
	50	6.9	59.63	4.20	57.45	4.10	55.79	3.98	54.60	3.84	52.00	3.64	49.62	3.33
		13.2	60.21	4.28	57.77	4.16	55.79	4.02	54.60	3.86	52.00	3.66	49.62	3.35
		16.5	60.62	4.26	58.03	4.16	55.79	4.01	54.60	3.85	52.00	3.65	49.62	3.33
	59	6.9	59.89	3.71	57.66	3.63	55.79	3.55	54.60	3.45	52.00	3.25	49.62	3.00
		13.2	60.21	3.78	57.82	3.64	55.79	3.55	54.60	3.40	52.00	3.20	49.62	2.95
		16.5	60.72	3.72	58.13	3.61	55.79	3.50	54.60	3.35	52.00	3.15	49.62	2.90
	68	6.9	60.36	3.17	57.97	3.08	55.79	3.00	54.60	2.95	52.00	2.75	49.62	2.60
		13.2	61.24	3.23	58.13	3.09	**55.79**	**3.00**	54.60	2.90	52.00	2.70	49.62	2.50
		16.5	61.61	3.17	58.65	3.06	55.79	2.95	54.60	2.85	52.00	2.65	49.62	2.45
	77	6.9	61.09	2.76	58.86	2.66	55.79	2.55	54.60	2.45	52.00	2.30	49.62	2.10
		13.2	61.97	2.77	58.86	2.60	55.79	2.50	54.60	2.40	52.00	2.25	49.62	2.10
		16.5	62.28	2.71	58.86	2.58	55.79	2.45	54.60	2.35	52.00	2.25	49.62	2.05
	86	6.9	62.28	2.50	58.86	2.30	55.79	2.15	54.60	2.10	52.00	1.95	49.62	1.85
		13.2	62.28	2.45	58.86	2.25	55.79	2.13	54.60	2.05	52.00	1.95	49.62	1.80
		16.5	62.28	2.40	58.86	2.25	55.79	2.10	54.60	2.05	52.00	1.90	49.62	1.80
	95	6.9	62.28	2.30	58.86	2.10	55.79	1.90	54.60	1.85	52.00	1.75	49.62	1.60
		13.2	62.28	2.20	58.86	2.00	55.79	1.88	54.60	1.80	52.00	1.70	49.62	1.55
		16.5	62.28	2.20	58.86	2.00	55.79	1.85	54.60	1.80	52.00	1.70	49.62	1.55
	104	6.9	62.28	2.15	58.86	1.95	55.79	1.70	54.60	1.65	52.00	1.55	49.62	1.45
		13.2	62.28	2.05	58.86	1.85	55.79	1.68	54.60	1.60	52.00	1.50	49.62	1.40
		16.5	62.28	2.00	58.86	1.85	55.79	1.65	54.60	1.60	52.00	1.50	49.62	1.40
	113	6.9	62.28	2.00	58.86	1.80	55.79	1.50	54.60	1.45	52.00	1.35	49.62	1.30
		13.2	62.28	1.90	58.86	1.70	55.79	1.48	54.60	1.40	52.00	1.30	49.62	1.25
		16.5	62.28	1.80	58.86	1.70	55.79	1.45	54.60	1.40	52.00	1.30	49.62	1.25

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 34: Heating Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
90	23	6.9	21.90	3.00	21.23	2.74	20.60	2.41	20.45	2.30	20.29	2.22	19.93	1.99
		13.2	24.81	3.20	24.03	2.94	23.30	2.62	23.15	2.50	22.99	2.41	22.53	2.16
		16.5	27.40	3.41	26.52	3.15	25.74	2.83	25.54	2.69	25.38	2.60	24.91	2.33
	32	6.9	38.10	4.03	36.33	3.78	34.67	3.47	34.15	3.31	33.58	3.19	32.33	2.86
		13.2	38.98	4.07	37.16	3.83	35.50	3.51	34.93	3.35	34.36	3.23	33.11	2.89
		16.5	39.55	4.07	37.73	3.83	36.07	3.51	35.45	3.35	34.93	3.23	33.63	2.89
	41	6.9	53.56	4.34	51.75	4.09	50.14	3.79	49.10	3.61	46.92	3.48	44.69	3.12
		13.2	53.77	4.41	51.59	4.17	50.14	3.86	49.10	3.69	46.92	3.55	44.69	3.18
		16.5	54.08	4.44	51.75	4.20	50.14	3.89	49.10	3.71	46.92	3.58	44.69	3.21
	50	6.9	53.77	3.81	51.90	3.63	50.14	3.42	49.10	3.28	46.92	3.14	44.69	2.83
		13.2	53.67	3.83	51.64	3.64	50.14	3.43	49.10	3.29	46.92	3.13	44.69	2.84
		16.5	54.03	3.81	51.80	3.63	50.14	3.42	49.10	3.28	46.92	3.14	44.69	2.85
	59	6.9	53.98	3.29	52.06	3.17	50.14	3.05	49.10	2.95	46.92	2.80	44.69	2.55
		13.2	53.61	3.24	51.69	3.12	50.14	3.00	49.10	2.90	46.92	2.70	44.69	2.50
		16.5	53.98	3.19	51.85	3.07	50.14	2.95	49.10	2.85	46.92	2.70	44.69	2.50
	68	6.9	54.34	2.79	52.26	2.70	50.14	2.60	49.10	2.50	46.92	2.40	44.69	2.25
		13.2	54.13	2.79	51.85	2.67	50.14	2.55	49.10	2.45	46.92	2.30	44.69	2.15
		16.5	54.29	2.74	52.00	2.65	50.14	2.55	49.10	2.45	46.92	2.30	44.69	2.15
	77	6.9	55.43	2.43	53.04	2.30	50.14	2.20	49.10	2.10	46.92	2.00	44.69	1.85
		13.2	55.95	2.41	53.04	2.28	50.14	2.15	49.10	2.10	46.92	1.95	44.69	1.80
		16.5	56.16	2.35	53.04	2.23	50.14	2.15	49.10	2.05	46.92	1.95	44.69	1.80
	86	6.9	56.16	2.20	53.04	2.05	50.14	1.90	49.10	1.85	46.92	1.75	44.69	1.60
		13.2	56.16	2.15	53.04	2.00	50.14	1.85	49.10	1.80	46.92	1.70	44.69	1.60
		16.5	56.16	2.10	53.04	1.95	50.14	1.85	49.10	1.80	46.92	1.70	44.69	1.55
	95	6.9	56.16	2.00	53.04	1.85	50.14	1.70	49.10	1.65	46.92	1.55	44.69	1.45
		13.2	56.16	1.95	53.04	1.80	50.14	1.65	49.10	1.60	46.92	1.50	44.69	1.40
		16.5	56.16	1.90	53.04	1.75	50.14	1.60	49.10	1.55	46.92	1.50	44.69	1.40
	104	6.9	56.16	1.85	53.04	1.70	50.14	1.50	49.10	1.45	46.92	1.40	44.69	1.30
		13.2	56.16	1.75	53.04	1.65	50.14	1.45	49.10	1.40	46.92	1.35	44.69	1.25
		16.5	56.16	1.75	53.04	1.65	50.14	1.45	49.10	1.40	46.92	1.35	44.69	1.25
	113	6.9	56.16	1.70	53.04	1.55	50.14	1.30	49.10	1.25	46.92	1.25	44.69	1.15
		13.2	56.16	1.55	53.04	1.50	50.14	1.25	49.10	1.20	46.92	1.20	44.69	1.10
		16.5	56.16	1.60	53.04	1.55	50.14	1.30	49.10	1.25	46.92	1.20	44.69	1.10
80	23	6.9	20.71	2.15	19.41	2.07	18.37	1.98	18.17	1.91	18.06	1.82	17.70	1.68
		13.2	23.41	2.34	21.95	2.24	20.76	2.15	20.55	2.07	20.45	1.98	20.03	1.82
		16.5	25.90	2.52	24.24	2.42	22.94	2.32	22.68	2.24	22.58	2.13	22.11	1.96
	32	6.9	35.97	3.10	33.16	2.97	30.88	2.85	30.31	2.75	29.90	2.62	28.75	2.41
		13.2	36.85	3.13	33.94	3.01	31.61	2.88	31.04	2.78	30.62	2.65	29.43	2.44
		16.5	37.37	3.13	34.46	3.01	32.13	2.88	31.50	2.78	31.09	2.65	29.90	2.44
	41	6.9	49.57	3.38	46.76	3.25	44.63	3.10	43.65	3.00	41.78	2.86	39.70	2.63
		13.2	49.98	3.45	47.13	3.31	44.69	3.17	43.65	3.06	41.78	2.92	39.70	2.69
		16.5	49.98	3.47	47.07	3.33	44.69	3.19	43.65	3.08	41.78	2.94	39.70	2.70
	50	6.9	49.77	3.09	46.92	2.95	44.63	2.80	43.65	2.72	41.78	2.58	39.70	2.39
		13.2	49.98	3.07	47.13	2.93	44.69	2.81	43.65	2.73	41.78	2.58	39.70	2.39
		16.5	49.98	3.06	47.07	2.94	44.69	2.82	43.65	2.71	41.78	2.57	39.70	2.38
	59	6.9	49.98	2.80	47.07	2.65	44.69	2.50	43.65	2.45	41.78	2.30	39.70	2.15
		13.2	49.98	2.70	47.07	2.55	44.69	2.45	43.65	2.40	41.78	2.25	39.70	2.10
		16.5	49.98	2.65	47.07	2.55	44.69	2.45	43.65	2.35	41.78	2.20	39.70	2.05
	68	6.9	49.98	2.35	47.07	2.25	44.69	2.15	43.65	2.10	41.78	2.00	39.70	1.85
		13.2	49.98	2.30	47.07	2.20	44.69	2.15	43.65	2.05	41.78	1.95	39.70	1.80
		16.5	49.98	2.25	47.07	2.15	44.69	2.10	43.65	2.05	41.78	1.90	39.70	1.80
	77	6.9	49.98	2.10	47.07	1.95	44.69	1.85	43.65	1.80	41.78	1.70	39.70	1.60
		13.2	49.98	2.05	47.07	1.90	44.69	1.85	43.65	1.75	41.78	1.65	39.70	1.55
		16.5	49.98	2.00	47.07	1.90	44.69	1.80	43.65	1.75	41.78	1.65	39.70	1.55
	86	6.9	49.98	1.85	47.07	1.75	44.69	1.65	43.65	1.60	41.78	1.50	39.70	1.40
		13.2	49.98	1.80	47.07	1.70	44.69	1.60	43.65	1.55	41.78	1.45	39.70	1.35
		16.5	49.98	1.80	47.07	1.70	44.69	1.60	43.65	1.55	41.78	1.45	39.70	1.35
	95	6.9	49.98	1.70	47.07	1.60	44.69	1.45	43.65	1.40	41.78	1.35	39.70	1.25
		13.2	49.98	1.65	47.07	1.55	44.69	1.40	43.65	1.40	41.78	1.30	39.70	1.25
		16.5	49.98	1.65	47.07	1.50	44.69	1.40	43.65	1.35	41.78	1.30	39.70	1.20
	104	6.9	49.98	1.60	47.07	1.45	44.69	1.30	43.65	1.30	41.78	1.20	39.70	1.15
		13.2	49.98	1.50	47.07	1.40	44.69	1.30	43.65	1.25	41.78	1.20	39.70	1.10
		16.5	49.98	1.50	47.07	1.40	44.69	1.25	43.65	1.25	41.78	1.20	39.70	1.10
	113	6.9	49.98	1.50	47.07	1.30	44.69	1.15	43.65	1.20	41.78	1.05	39.70	1.05
		13.2	49.98	1.35	47.07	1.25	44.69	1.20	43.65	1.10	41.78	1.10	39.70	0.95
		16.5	49.98	1.35	47.07	1.30	44.69	1.10	43.65	1.15	41.78	1.10	39.70	1.00

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 35: Heating Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
70	23	6.9	18.06	1.85	16.97	1.76	16.04	1.70	15.88	1.60	15.78	1.55	15.52	1.41
		13.2	20.45	2.00	19.20	1.91	18.11	1.85	17.96	1.74	17.85	1.67	17.54	1.52
		16.5	22.63	2.16	21.23	2.06	20.03	1.99	19.88	1.87	19.72	1.81	19.36	1.64
	32	6.9	31.45	2.65	29.06	2.53	26.99	2.45	26.52	2.30	26.11	2.22	25.17	2.02
		13.2	32.18	2.68	29.74	2.55	27.61	2.48	27.14	2.33	26.73	2.25	25.74	2.04
		16.5	32.65	2.68	30.21	2.55	28.03	2.48	27.56	2.33	27.14	2.25	26.16	2.04
	41	6.9	43.29	2.89	41.00	2.76	38.98	2.67	38.15	2.51	36.43	2.42	34.72	2.20
		13.2	43.65	2.95	41.31	2.81	39.03	2.72	38.15	2.56	36.43	2.48	34.72	2.25
		16.5	43.65	2.97	41.26	2.83	39.03	2.74	38.15	2.58	36.43	2.49	34.72	2.26
	50	6.9	43.44	2.65	41.11	2.50	39.03	2.41	38.15	2.28	36.43	2.19	34.72	2.00
		13.2	43.65	2.63	41.26	2.48	39.03	2.39	38.15	2.28	36.43	2.19	34.72	2.00
		16.5	43.65	2.64	41.26	2.49	39.03	2.40	38.15	2.29	36.43	2.17	34.72	2.01
	59	6.9	43.65	2.40	41.26	2.25	39.03	2.15	38.15	2.05	36.43	1.95	34.72	1.80
		13.2	43.65	2.30	41.26	2.15	39.03	2.05	38.15	2.00	36.43	1.90	34.72	1.75
		16.5	43.65	2.30	41.26	2.15	39.03	2.05	38.15	2.00	36.43	1.85	34.72	1.75
	68	6.9	43.65	2.00	41.26	1.90	39.03	1.85	38.15	1.80	36.43	1.70	34.72	1.60
		13.2	43.65	1.95	41.26	1.85	39.03	1.80	38.15	1.75	36.43	1.65	34.72	1.55
		16.5	43.65	1.95	41.26	1.85	39.03	1.80	38.15	1.70	36.43	1.65	34.72	1.50
	77	6.9	43.65	1.80	41.26	1.70	39.03	1.60	38.15	1.55	36.43	1.45	34.72	1.35
		13.2	43.65	1.75	41.26	1.65	39.03	1.55	38.15	1.50	36.43	1.45	34.72	1.35
		16.5	43.65	1.70	41.26	1.60	39.03	1.55	38.15	1.50	36.43	1.40	34.72	1.35
	86	6.9	43.65	1.60	41.26	1.50	39.03	1.40	38.15	1.35	36.43	1.30	34.72	1.20
		13.2	43.65	1.55	41.26	1.45	39.03	1.35	38.15	1.35	36.43	1.25	34.72	1.20
		16.5	43.65	1.55	41.26	1.45	39.03	1.35	38.15	1.30	36.43	1.25	34.72	1.20
	95	6.9	43.65	1.45	41.26	1.35	39.03	1.25	38.15	1.25	36.43	1.15	34.72	1.10
		13.2	43.65	1.40	41.26	1.30	39.03	1.25	38.15	1.20	36.43	1.15	34.72	1.05
		16.5	43.65	1.40	41.26	1.30	39.03	1.20	38.15	1.20	36.43	1.15	34.72	1.05
	104	6.9	43.65	1.35	41.26	1.25	39.03	1.15	38.15	1.10	36.43	1.05	34.72	1.00
		13.2	43.65	1.30	41.26	1.20	39.03	1.10	38.15	1.10	36.43	1.05	34.72	0.95
		16.5	43.65	1.30	41.26	1.20	39.03	1.10	38.15	1.05	36.43	1.00	34.72	0.95
	113	6.9	43.65	1.25	41.26	1.15	39.03	1.05	38.15	0.95	36.43	0.95	34.72	0.90
		13.2	43.65	1.20	41.26	1.10	39.03	0.95	38.15	1.00	36.43	0.95	34.72	0.85
		16.5	43.65	1.20	41.26	1.10	39.03	1.00	38.15	0.90	36.43	0.85	34.72	0.85
60	23	6.9	15.52	1.50	14.53	1.44	13.75	1.39	13.60	1.29	13.55	1.27	13.29	1.13
		13.2	17.59	1.63	16.45	1.57	15.57	1.50	15.41	1.40	15.36	1.38	15.05	1.23
		16.5	19.41	1.75	18.17	1.69	17.23	1.62	17.02	1.51	16.97	1.48	16.61	1.32
	32	6.9	26.99	2.16	24.86	2.08	23.20	1.99	22.73	1.85	22.42	1.82	21.59	1.63
		13.2	27.61	2.18	25.43	2.10	23.77	2.02	23.25	1.87	22.94	1.85	22.06	1.64
		16.5	28.03	2.18	25.85	2.10	24.13	2.02	23.62	1.87	23.30	1.85	22.42	1.64
	41	6.9	37.16	2.35	35.03	2.26	33.53	2.17	32.70	2.02	31.30	1.99	29.79	1.77
		13.2	37.47	2.40	35.29	2.31	33.53	2.22	32.70	2.06	31.30	2.03	29.79	1.81
		16.5	37.47	2.42	35.24	2.33	33.53	2.23	32.70	2.08	31.30	2.04	29.79	1.82
	50	6.9	37.32	2.15	35.14	2.06	33.53	1.96	32.70	1.84	31.30	1.79	29.79	1.61
		13.2	37.47	2.15	35.29	2.06	33.53	1.96	32.70	1.86	31.30	1.79	29.79	1.63
		16.5	37.47	2.16	35.24	2.04	33.53	1.94	32.70	1.84	31.30	1.77	29.79	1.61
	59	6.9	37.47	1.95	35.24	1.85	33.53	1.75	32.70	1.65	31.30	1.60	29.79	1.45
		13.2	37.47	1.90	35.24	1.80	33.53	1.70	32.70	1.65	31.30	1.55	29.79	1.45
		16.5	37.47	1.90	35.24	1.75	33.53	1.65	32.70	1.60	31.30	1.50	29.79	1.40
	68	6.9	37.47	1.70	35.24	1.60	33.53	1.50	32.70	1.45	31.30	1.40	29.79	1.30
		13.2	37.47	1.65	35.24	1.55	33.53	1.45	32.70	1.40	31.30	1.35	29.79	1.25
		16.5	37.47	1.65	35.24	1.55	33.53	1.45	32.70	1.40	31.30	1.35	29.79	1.25
	77	6.9	37.47	1.50	35.24	1.40	33.53	1.30	32.70	1.30	31.30	1.20	29.79	1.15
		13.2	37.47	1.45	35.24	1.35	33.53	1.30	32.70	1.25	31.30	1.20	29.79	1.10
		16.5	37.47	1.45	35.24	1.35	33.53	1.25	32.70	1.25	31.30	1.20	29.79	1.10
	86	6.9	37.47	1.35	35.24	1.25	33.53	1.20	32.70	1.15	31.30	1.10	29.79	1.05
		13.2	37.47	1.30	35.24	1.20	33.53	1.15	32.70	1.10	31.30	1.05	29.79	1.00
		16.5	37.47	1.30	35.24	1.20	33.53	1.15	32.70	1.10	31.30	1.05	29.79	1.00
	95	6.9	37.47	1.20	35.24	1.15	33.53	1.05	32.70	1.05	31.30	1.00	29.79	0.95
		13.2	37.47	1.20	35.24	1.10	33.53	1.05	32.70	1.00	31.30	0.95	29.79	0.90
		16.5	37.47	1.20	35.24	1.10	33.53	1.00	32.70	1.00	31.30	0.95	29.79	0.90
	104	6.9	37.47	1.10	35.24	1.05	33.53	0.95	32.70	0.95	31.30	0.90	29.79	0.85
		13.2	37.47	1.10	35.24	1.00	33.53	0.95	32.70	0.90	31.30	0.85	29.79	0.85
		16.5	37.47	1.10	35.24	1.00	33.53	0.95	32.70	0.90	31.30	0.85	29.79	0.85
	113	6.9	37.47	1.00	35.24	0.95	33.53	0.85	32.70	0.85	31.30	0.80	29.79	0.75
		13.2	37.47	1.00	35.24	0.90	33.53	0.85	32.70	0.80	31.30	0.75	29.79	0.80
		16.5	37.47	1.00	35.24	0.90	33.53	0.90	32.70	0.80	31.30	0.75	29.79	0.80

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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PERFORMANCE DATA

Heating Capacity

ARWN048GA2

Table 36: Heating Capacity—ARWN048GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
50	23	6.9	12.92	1.19	12.14	1.13	11.47	1.07	11.31	1.01	11.26	0.95	11.05	0.90
		13.2	14.58	1.29	13.70	1.23	12.98	1.16	12.82	1.10	12.77	1.03	12.51	0.97
		16.5	16.14	1.40	15.16	1.32	14.32	1.25	14.17	1.19	14.07	1.11	13.86	1.05
	32	6.9	22.42	1.72	20.76	1.63	19.31	1.54	18.89	1.46	18.63	1.37	17.96	1.29
		13.2	22.94	1.73	21.23	1.64	19.77	1.56	19.36	1.48	19.10	1.39	18.37	1.31
		16.5	23.30	1.73	21.54	1.64	20.03	1.56	19.67	1.48	19.36	1.39	18.68	1.31
	41	6.9	30.88	1.87	29.27	1.77	27.87	1.67	27.20	1.59	26.00	1.49	24.81	1.41
		13.2	31.14	1.91	29.48	1.81	27.92	1.71	27.20	1.62	26.00	1.52	24.81	1.44
		16.5	31.14	1.92	29.43	1.82	27.92	1.72	27.20	1.63	26.00	1.54	24.81	1.45
	50	6.9	31.04	1.71	29.32	1.61	27.87	1.51	27.20	1.45	26.00	1.34	24.81	1.28
		13.2	31.14	1.70	29.48	1.61	27.92	1.50	27.20	1.44	26.00	1.36	24.81	1.27
		16.5	31.14	1.71	29.43	1.61	27.92	1.51	27.20	1.44	26.00	1.34	24.81	1.27
	59	6.9	31.14	1.55	29.43	1.45	27.92	1.35	27.20	1.30	26.00	1.20	24.81	1.15
		13.2	31.14	1.50	29.43	1.40	27.92	1.30	27.20	1.25	26.00	1.20	24.81	1.10
		16.5	31.14	1.50	29.43	1.40	27.92	1.30	27.20	1.25	26.00	1.15	24.81	1.10
	68	6.9	31.14	1.35	29.43	1.25	27.92	1.20	27.20	1.15	26.00	1.10	24.81	1.00
		13.2	31.14	1.30	29.43	1.20	27.92	1.15	27.20	1.10	26.00	1.05	24.81	1.00
		16.5	31.14	1.30	29.43	1.20	27.92	1.15	27.20	1.10	26.00	1.05	24.81	1.00
	77	6.9	31.14	1.20	29.43	1.10	27.92	1.05	27.20	1.00	26.00	0.95	24.81	0.90
		13.2	31.14	1.15	29.43	1.10	27.92	1.00	27.20	1.00	26.00	0.95	24.81	0.90
		16.5	31.14	1.15	29.43	1.10	27.92	1.00	27.20	1.00	26.00	0.95	24.81	0.90
	86	6.9	31.14	1.10	29.43	1.00	27.92	0.95	27.20	0.90	26.00	0.90	24.81	0.85
		13.2	31.14	1.05	29.43	0.95	27.92	0.90	27.20	0.90	26.00	0.85	24.81	0.80
		16.5	31.14	1.05	29.43	0.95	27.92	0.90	27.20	0.90	26.00	0.85	24.81	0.80
	95	6.9	31.14	1.00	29.43	0.90	27.92	0.85	27.20	0.85	26.00	0.80	24.81	0.75
		13.2	31.14	0.95	29.43	0.90	27.92	0.85	27.20	0.80	26.00	0.80	24.81	0.75
		16.5	31.14	0.95	29.43	0.90	27.92	0.85	27.20	0.80	26.00	0.80	24.81	0.75
	104	6.9	31.14	0.90	29.43	0.85	27.92	0.80	27.20	0.75	26.00	0.75	24.81	0.70
		13.2	31.14	0.85	29.43	0.80	27.92	0.75	27.20	0.75	26.00	0.70	24.81	0.70
		16.5	31.14	0.85	29.43	0.80	27.92	0.75	27.20	0.75	26.00	0.70	24.81	0.70
	113	6.9	31.14	0.80	29.43	0.80	27.92	0.75	27.20	0.65	26.00	0.70	24.81	0.65
		13.2	31.14	0.75	29.43	0.70	27.92	0.65	27.20	0.70	26.00	0.60	24.81	0.65
		16.5	31.14	0.75	29.43	0.70	27.92	0.65	27.20	0.70	26.00	0.60	24.81	0.65

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 37: Heating Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
130	23	8.3	30.70	3.86	30.47	3.64	30.29	3.39	29.88	3.29	30.23	3.21	29.42	2.88
		15.9	34.73	4.12	34.44	3.91	34.26	3.68	33.79	3.57	34.20	3.48	33.33	3.12
		19.9	38.40	4.38	38.05	4.18	37.82	3.97	37.35	3.86	37.82	3.75	36.83	3.36
	32	8.3	53.35	5.20	52.12	5.04	51.01	4.88	49.90	4.74	50.08	4.61	47.80	4.13
		15.9	54.63	5.25	53.29	5.09	52.18	4.93	51.07	4.80	51.24	4.66	48.97	4.18
		19.9	55.45	5.25	54.10	5.09	53.00	4.93	51.83	4.80	52.00	4.66	49.67	4.18
	41	8.3	76.63	5.60	75.35	5.46	73.66	5.32	71.79	5.17	69.86	5.03	66.01	4.50
		15.9	77.68	5.70	75.87	5.56	73.72	5.43	71.79	5.28	69.86	5.13	66.01	4.60
		19.9	78.15	5.73	76.11	5.60	73.72	5.47	71.79	5.32	69.86	5.17	66.01	4.63
	50	8.3	76.93	5.06	75.58	4.90	73.72	4.82	71.79	4.70	69.86	4.54	66.01	4.09
		15.9	78.73	5.02	76.98	4.92	74.88	4.85	72.96	4.69	70.91	4.52	67.06	4.08
		19.9	79.14	5.09	77.51	4.99	75.35	4.87	73.31	4.71	71.38	4.60	67.47	4.27
	59	8.3	77.22	4.52	75.82	4.35	73.72	4.32	71.79	4.22	69.86	4.04	66.01	3.68
		15.9	79.73	4.34	78.09	4.28	76.05	4.28	74.12	4.10	71.96	3.92	68.11	3.56
		19.9	80.14	4.45	78.85	4.38	76.98	4.28	74.88	4.10	72.96	4.03	68.93	3.92
	68	8.3	80.14	4.16	78.68	3.99	76.57	3.91	74.47	3.80	72.37	3.72	68.11	3.56
		15.9	82.64	4.04	81.19	3.98	78.91	3.89	76.81	3.86	74.88	3.82	70.62	3.44
		19.9	83.00	4.04	81.77	3.98	79.84	3.92	77.57	3.86	75.47	3.82	71.21	3.66
	77	8.3	83.93	3.98	81.77	3.87	79.84	3.80	78.33	3.74	76.57	3.68	72.20	3.44
		15.9	83.93	3.92	81.77	3.85	79.84	3.74	78.33	3.68	76.57	3.62	72.20	3.38
		19.9	83.93	3.86	81.77	3.75	79.84	3.68	78.33	3.62	76.57	3.56	72.20	3.32
	86	8.3	83.93	3.86	81.77	3.69	79.84	3.64	78.33	3.56	76.57	3.50	72.20	3.26
		15.9	83.93	3.74	81.77	3.67	79.84	3.56	78.33	3.50	76.57	3.38	72.20	3.14
		19.9	83.93	3.68	81.77	3.57	79.84	3.50	78.33	3.44	76.57	3.38	72.20	3.14
	95	8.3	83.93	3.68	81.77	3.57	79.84	3.50	78.33	3.38	76.57	3.26	72.20	3.01
		15.9	83.93	3.56	81.77	3.49	79.84	3.44	78.33	3.32	76.57	3.19	72.20	2.89
		19.9	83.93	3.56	81.77	3.45	79.84	3.38	78.33	3.26	76.57	3.14	72.20	2.89
	104	8.3	83.93	3.56	81.77	3.45	79.84	3.38	78.33	3.26	76.57	3.14	72.20	2.83
		15.9	83.93	3.44	81.77	3.36	79.84	3.26	78.33	3.14	76.57	3.01	72.20	2.71
		19.9	83.93	3.38	81.77	3.31	79.84	3.26	78.33	3.14	76.57	3.01	72.20	2.71
	113	8.3	83.93	3.44	81.77	3.33	79.84	3.26	78.33	3.14	76.57	3.01	72.20	2.65
		15.9	83.93	3.32	81.77	3.24	79.84	3.08	78.33	2.96	76.57	2.83	72.20	2.53
		19.9	83.93	3.19	81.77	3.16	79.84	3.14	78.33	3.01	76.57	2.89	72.20	2.53
120	23	8.3	29.18	3.86	28.95	3.64	28.77	3.39	28.42	3.25	28.66	3.16	27.90	2.83
		15.9	33.03	4.12	32.74	3.91	32.57	3.68	32.16	3.52	32.45	3.43	31.58	3.07
		19.9	36.48	4.38	36.19	4.18	35.95	3.97	35.54	3.81	35.84	3.69	34.84	3.31
	32	8.3	50.72	5.20	49.49	5.04	48.44	4.88	47.45	4.67	47.45	4.54	45.29	4.06
		15.9	51.89	5.25	50.66	5.09	49.61	4.93	48.56	4.73	48.56	4.59	46.40	4.11
		19.9	52.70	5.25	51.48	5.09	50.37	4.93	49.32	4.73	49.26	4.59	47.10	4.11
	41	8.3	72.96	5.60	71.73	5.46	70.04	5.32	68.35	5.10	66.19	4.95	62.57	4.44
		15.9	74.01	5.70	72.26	5.56	70.04	5.43	68.35	5.20	66.19	5.05	62.57	4.52
		19.9	74.42	5.73	71.85	5.60	70.04	5.47	68.35	5.24	66.19	5.09	62.57	4.55
	50	8.3	73.31	5.02	71.91	4.89	70.04	4.79	68.35	4.63	66.19	4.47	62.57	4.02
		15.9	74.65	5.09	73.07	4.96	70.80	4.85	69.10	4.65	66.89	4.45	63.21	4.04
		19.9	75.06	5.07	72.84	4.96	71.09	4.87	69.40	4.67	67.18	4.47	63.50	4.18
	59	8.3	73.60	4.45	72.14	4.32	70.04	4.25	68.35	4.16	66.19	3.98	62.57	3.62
		15.9	75.29	4.49	73.89	4.35	71.61	4.28	69.86	4.10	67.53	3.86	63.91	3.56
		19.9	75.70	4.42	73.83	4.32	72.20	4.28	70.45	4.10	68.11	3.86	64.49	3.80
	68	8.3	75.70	3.99	74.24	3.84	71.96	3.74	70.04	3.68	67.76	3.62	64.08	3.43
		15.9	77.63	3.99	75.99	3.89	73.54	3.80	71.79	3.74	69.45	3.61	65.60	3.38
		19.9	77.98	3.96	75.93	3.86	74.12	3.80	72.20	3.74	69.86	3.62	66.01	3.50
	77	8.3	78.91	3.76	76.57	3.59	74.12	3.52	72.55	3.44	70.62	3.38	66.77	3.14
		15.9	79.08	3.71	76.57	3.57	74.12	3.50	72.55	3.38	70.62	3.32	66.77	3.08
		19.9	79.32	3.57	76.57	3.48	74.12	3.44	72.55	3.38	70.62	3.26	66.77	3.08
	86	8.3	79.32	3.58	76.57	3.41	74.12	3.32	72.55	3.19	70.62	3.14	66.77	2.89
		15.9	79.32	3.46	76.57	3.33	74.12	3.26	72.55	3.14	70.62	3.01	66.77	2.83
		19.9	79.32	3.35	76.57	3.26	74.12	3.19	72.55	3.14	70.62	3.01	66.77	2.78
	95	8.3	79.32	3.40	76.57	3.23	74.12	3.14	72.55	3.01	70.62	2.89	66.77	2.65
		15.9	79.32	3.21	76.57	3.11	74.12	3.01	72.55	2.89	70.62	2.78	66.77	2.60
		19.9	79.32	3.17	76.57	3.09	74.12	3.01	72.55	2.89	70.62	2.78	66.77	2.53
	104	8.3	79.32	3.28	76.57	3.08	74.12	2.96	72.55	2.83	70.62	2.71	66.77	2.47
		15.9	79.32	3.03	76.57	2.93	74.12	2.83	72.55	2.71	70.62	2.60	66.77	2.41
		19.9	79.32	2.99	76.57	2.89	74.12	2.83	72.55	2.71	70.62	2.60	66.77	2.35
	113	8.3	79.32	3.16	76.57	2.92	74.12	2.78	72.55	2.65	70.62	2.53	66.77	2.29
		15.9	79.32	2.84	76.57	2.75	74.12	2.65	72.55	2.53	70.62	2.41	66.77	2.23
		19.9	79.32	2.81	76.57	2.70	74.12	2.65	72.55	2.53	70.62	2.41	66.77	2.17

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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PERFORMANCE DATA

MULTI V WATER MINI

Heating Capacity

ARWN053GA2

Table 38: Heating Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
110	23	8.3	27.61	3.91	27.43	3.64	27.26	3.39	26.96	3.25	27.02	3.16	26.44	2.83
		15.9	31.23	4.17	31.05	3.91	30.88	3.68	30.52	3.52	30.52	3.43	29.94	3.07
		19.9	34.49	4.44	34.26	4.18	34.09	3.97	33.73	3.81	33.73	3.69	33.03	3.31
	32	8.3	47.98	5.27	46.93	5.04	45.93	4.88	45.06	4.67	44.65	4.54	42.96	4.06
		15.9	49.08	5.32	48.03	5.09	46.98	4.93	46.11	4.73	45.70	4.59	43.95	4.11
		19.9	49.84	5.32	48.79	5.09	47.74	4.93	46.81	4.73	46.40	4.59	44.59	4.11
	41	8.3	69.80	5.67	68.05	5.46	66.36	5.32	64.84	5.10	62.33	4.95	59.30	4.44
		15.9	70.74	5.77	68.58	5.56	66.42	5.43	64.84	5.20	62.33	5.05	59.30	4.52
		19.9	71.15	5.81	68.75	5.60	66.42	5.47	64.84	5.24	62.33	5.09	59.30	4.55
	50	8.3	70.10	5.07	68.29	4.90	66.36	4.80	64.84	4.63	62.33	4.47	59.30	4.02
		15.9	71.15	5.11	68.99	4.96	66.77	4.85	65.25	4.65	62.74	4.45	59.59	4.04
		19.9	71.56	5.11	69.28	4.96	67.00	4.84	65.37	4.64	62.86	4.47	59.77	4.09
	59	8.3	70.33	4.47	68.46	4.35	66.42	4.28	64.84	4.16	62.33	3.98	59.30	3.62
		15.9	71.50	4.45	69.45	4.35	67.18	4.28	65.60	4.10	63.15	3.86	59.88	3.56
		19.9	71.91	4.42	69.80	4.32	67.53	4.22	65.84	4.04	63.33	3.86	60.23	3.62
	68	8.3	71.73	3.87	69.63	3.77	67.35	3.68	65.60	3.62	63.15	3.50	59.88	3.28
		15.9	73.25	3.91	70.56	3.77	68.11	3.68	66.59	3.62	63.91	3.44	60.82	3.26
		19.9	73.66	3.91	71.15	3.77	68.52	3.68	66.77	3.56	64.26	3.44	60.99	3.26
	77	8.3	73.72	3.51	71.38	3.38	68.52	3.32	67.00	3.19	64.67	3.08	61.22	2.83
		15.9	74.30	3.49	71.38	3.32	68.52	3.26	67.00	3.14	64.67	3.01	61.22	2.83
		19.9	74.65	3.49	71.38	3.33	68.52	3.19	67.00	3.14	64.67	2.96	61.22	2.78
	86	8.3	74.65	3.19	71.38	3.08	68.52	2.96	67.00	2.89	64.67	2.71	61.22	2.53
		15.9	74.65	3.14	71.38	3.01	68.52	2.89	67.00	2.83	64.67	2.65	61.22	2.47
		19.9	74.65	3.11	71.38	2.96	68.52	2.83	67.00	2.78	64.67	2.65	61.22	2.47
	95	8.3	74.65	3.01	71.38	2.83	68.52	2.71	67.00	2.60	64.67	2.47	61.22	2.29
		15.9	74.65	2.89	71.38	2.78	68.52	2.65	67.00	2.53	64.67	2.41	61.22	2.23
		19.9	74.65	2.82	71.38	2.71	68.52	2.60	67.00	2.53	64.67	2.41	61.22	2.23
	104	8.3	74.65	2.83	71.38	2.71	68.52	2.53	67.00	2.41	64.67	2.29	61.22	2.11
		15.9	74.65	2.71	71.38	2.60	68.52	2.41	67.00	2.35	64.67	2.23	61.22	2.05
		19.9	74.65	2.68	71.38	2.53	68.52	2.41	67.00	2.29	64.67	2.17	61.22	1.99
	113	8.3	74.65	2.65	71.38	2.60	68.52	2.35	67.00	2.23	64.67	2.11	61.22	1.93
		15.9	74.65	2.53	71.38	2.41	68.52	2.17	67.00	2.17	64.67	2.05	61.22	1.87
		19.9	74.65	2.53	71.38	2.35	68.52	2.23	67.00	2.05	64.67	1.93	61.22	1.75
100	23	8.3	26.09	3.91	25.91	3.69	25.80	3.39	25.56	3.25	25.33	3.11	24.86	2.83
		15.9	29.53	4.17	29.36	3.96	29.18	3.68	28.89	3.52	28.66	3.38	28.19	3.07
		19.9	32.63	4.44	32.39	4.24	32.22	3.97	31.93	3.81	31.69	3.64	31.11	3.31
	32	8.3	45.35	5.27	44.36	5.11	43.42	4.88	42.66	4.67	41.91	4.47	40.45	4.06
		15.9	46.40	5.32	45.41	5.16	44.42	4.93	43.66	4.73	42.90	4.52	41.38	4.11
		19.9	47.10	5.32	46.11	5.16	45.12	4.93	44.30	4.73	43.54	4.52	42.02	4.11
	41	8.3	66.77	5.67	64.43	5.53	62.68	5.32	61.40	5.10	58.48	4.88	55.80	4.44
		15.9	67.70	5.77	64.90	5.63	62.74	5.43	61.40	5.20	58.48	4.98	55.80	4.52
		19.9	68.11	5.81	65.08	5.67	62.74	5.47	61.40	5.24	58.48	5.01	55.80	4.55
	50	8.3	67.06	5.07	64.61	4.95	62.74	4.80	61.40	4.63	58.48	4.40	55.80	4.02
		15.9	67.70	5.17	64.96	5.02	62.74	4.85	61.40	4.65	58.48	4.42	55.80	4.04
		19.9	68.17	5.15	65.25	5.02	62.74	4.84	61.40	4.64	58.48	4.40	55.80	4.02
	59	8.3	67.35	4.47	64.84	4.38	62.74	4.28	61.40	4.16	58.48	3.92	55.80	3.62
		15.9	67.70	4.56	65.02	4.39	62.74	4.28	61.40	4.10	58.48	3.86	55.80	3.56
		19.9	68.29	4.49	65.37	4.35	62.74	4.22	61.40	4.04	58.48	3.80	55.80	3.50
	68	8.3	67.88	3.82	65.19	3.71	62.74	3.62	61.40	3.56	58.48	3.32	55.80	3.14
		15.9	68.87	3.89	65.37	3.72	**62.74**	**3.62**	61.40	3.50	58.48	3.26	55.80	3.01
		19.9	69.28	3.82	65.95	3.69	62.74	3.56	61.40	3.44	58.48	3.19	55.80	2.96
	77	8.3	68.70	3.33	66.19	3.21	62.74	3.08	61.40	2.96	58.48	2.78	55.80	2.53
		15.9	69.69	3.34	66.19	3.14	62.74	3.01	61.40	2.89	58.48	2.71	55.80	2.53
		19.9	70.04	3.27	66.19	3.11	62.74	2.96	61.40	2.83	58.48	2.71	55.80	2.47
	86	8.3	70.04	3.01	66.19	2.78	62.74	2.60	61.40	2.53	58.48	2.35	55.80	2.23
		15.9	70.04	2.96	66.19	2.71	62.74	2.57	61.40	2.47	58.48	2.35	55.80	2.17
		19.9	70.04	2.89	66.19	2.71	62.74	2.53	61.40	2.47	58.48	2.29	55.80	2.17
	95	8.3	70.04	2.78	66.19	2.53	62.74	2.29	61.40	2.23	58.48	2.11	55.80	1.93
		15.9	70.04	2.65	66.19	2.41	62.74	2.26	61.40	2.17	58.48	2.05	55.80	1.87
		19.9	70.04	2.65	66.19	2.41	62.74	2.23	61.40	2.17	58.48	2.05	55.80	1.87
	104	8.3	70.04	2.60	66.19	2.35	62.74	2.05	61.40	1.99	58.48	1.87	55.80	1.75
		15.9	70.04	2.47	66.19	2.23	62.74	2.03	61.40	1.93	58.48	1.81	55.80	1.69
		19.9	70.04	2.41	66.19	2.23	62.74	1.99	61.40	1.93	58.48	1.81	55.80	1.69
	113	8.3	70.04	2.41	66.19	2.17	62.74	1.81	61.40	1.75	58.48	1.63	55.80	1.57
		15.9	70.04	2.29	66.19	2.05	62.74	1.78	61.40	1.69	58.48	1.57	55.80	1.51
		19.9	70.04	2.17	66.19	2.05	62.74	1.75	61.40	1.69	58.48	1.57	55.80	1.51

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 39: Heating Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
90	23	8.3	24.63	3.62	23.87	3.31	23.17	2.91	23.00	2.78	22.82	2.68	22.41	2.40
		15.9	27.90	3.87	27.02	3.55	26.21	3.16	26.03	3.01	25.86	2.91	25.33	2.61
		19.9	30.82	4.11	29.82	3.80	28.95	3.41	28.72	3.25	28.54	3.13	28.02	2.81
	32	8.3	42.84	4.87	40.86	4.57	38.99	4.19	38.40	4.00	37.76	3.85	36.36	3.46
		15.9	43.83	4.92	41.79	4.62	39.92	4.24	39.28	4.04	38.64	3.89	37.24	3.49
		19.9	44.47	4.92	42.43	4.62	40.56	4.24	39.86	4.04	39.28	3.89	37.82	3.49
	41	8.3	60.23	5.23	58.19	4.94	56.38	4.57	55.21	4.36	52.76	4.20	50.25	3.77
		15.9	60.47	5.33	58.01	5.03	56.38	4.66	55.21	4.45	52.76	4.29	50.25	3.84
		19.9	60.82	5.36	58.19	5.07	56.38	4.70	55.21	4.48	52.76	4.32	50.25	3.87
	50	8.3	60.47	4.60	58.37	4.38	56.38	4.12	55.21	3.96	52.76	3.79	50.25	3.42
		15.9	60.35	4.62	58.07	4.40	56.38	4.14	55.21	3.97	52.76	3.77	50.25	3.43
		19.9	60.76	4.60	58.25	4.39	56.38	4.13	55.21	3.96	52.76	3.79	50.25	3.44
	59	8.3	60.70	3.97	58.54	3.82	56.38	3.68	55.21	3.56	52.76	3.38	50.25	3.08
		15.9	60.29	3.91	58.13	3.76	56.38	3.62	55.21	3.50	52.76	3.26	50.25	3.01
		19.9	60.70	3.85	58.31	3.71	56.38	3.56	55.21	3.44	52.76	3.26	50.25	3.01
	68	8.3	61.11	3.36	58.77	3.26	56.38	3.14	55.21	3.01	52.76	2.89	50.25	2.71
		15.9	60.87	3.36	58.31	3.22	56.38	3.08	55.21	2.96	52.76	2.78	50.25	2.60
		19.9	61.05	3.31	58.48	3.19	56.38	3.08	55.21	2.96	52.76	2.78	50.25	2.60
	77	8.3	62.33	2.93	59.65	2.78	56.38	2.65	55.21	2.53	52.76	2.41	50.25	2.23
		15.9	62.92	2.91	59.65	2.75	56.38	2.60	55.21	2.53	52.76	2.35	50.25	2.17
		19.9	63.15	2.83	59.65	2.69	56.38	2.60	55.21	2.47	52.76	2.35	50.25	2.17
	86	8.3	63.15	2.65	59.65	2.47	56.38	2.29	55.21	2.23	52.76	2.11	50.25	1.93
		15.9	63.15	2.60	59.65	2.41	56.38	2.23	55.21	2.17	52.76	2.05	50.25	1.93
		19.9	63.15	2.53	59.65	2.35	56.38	2.23	55.21	2.17	52.76	2.05	50.25	1.87
	95	8.3	63.15	2.41	59.65	2.23	56.38	2.05	55.21	1.99	52.76	1.87	50.25	1.75
		15.9	63.15	2.35	59.65	2.17	56.38	1.99	55.21	1.93	52.76	1.81	50.25	1.69
		19.9	63.15	2.29	59.65	2.11	56.38	1.93	55.21	1.87	52.76	1.81	50.25	1.69
	104	8.3	63.15	2.23	59.65	2.05	56.38	1.81	55.21	1.75	52.76	1.69	50.25	1.57
		15.9	63.15	2.11	59.65	1.99	56.38	1.75	55.21	1.69	52.76	1.63	50.25	1.51
		19.9	63.15	2.11	59.65	1.99	56.38	1.75	55.21	1.69	52.76	1.63	50.25	1.51
	113	8.3	63.15	2.05	59.65	1.87	56.38	1.57	55.21	1.51	52.76	1.51	50.25	1.39
		15.9	63.15	1.87	59.65	1.81	56.38	1.51	55.21	1.45	52.76	1.45	50.25	1.33
		19.9	63.15	1.93	59.65	1.87	56.38	1.57	55.21	1.51	52.76	1.45	50.25	1.33
80	23	8.3	23.29	2.60	21.83	2.50	20.66	2.39	20.43	2.31	20.31	2.20	19.90	2.03
		15.9	26.32	2.82	24.69	2.71	23.35	2.59	23.11	2.50	23.00	2.39	22.53	2.20
		19.9	29.12	3.04	27.26	2.92	25.80	2.80	25.51	2.70	25.39	2.58	24.86	2.37
	32	8.3	40.45	3.74	37.30	3.59	34.73	3.44	34.09	3.32	33.62	3.16	32.33	2.91
		15.9	41.44	3.78	38.17	3.63	35.54	3.48	34.90	3.36	34.44	3.20	33.09	2.94
		19.9	42.02	3.78	38.75	3.63	36.13	3.48	35.43	3.36	34.96	3.20	33.62	2.94
	41	8.3	55.74	4.07	52.59	3.92	50.19	3.74	49.08	3.62	46.98	3.45	44.65	3.18
		15.9	56.21	4.16	53.00	3.99	50.25	3.82	49.08	3.69	46.98	3.52	44.65	3.24
		19.9	56.21	4.19	52.94	4.02	50.25	3.85	49.08	3.72	46.98	3.54	44.65	3.26
	50	8.3	55.97	3.72	52.76	3.56	50.19	3.38	49.08	3.29	46.98	3.11	44.65	2.88
		15.9	56.21	3.71	53.00	3.54	50.25	3.39	49.08	3.29	46.98	3.12	44.65	2.89
		19.9	56.21	3.69	52.94	3.55	50.25	3.40	49.08	3.28	46.98	3.10	44.65	2.87
	59	8.3	56.21	3.38	52.94	3.19	50.25	3.01	49.08	2.96	46.98	2.78	44.65	2.60
		15.9	56.21	3.26	52.94	3.08	50.25	2.96	49.08	2.89	46.98	2.71	44.65	2.53
		19.9	56.21	3.19	52.94	3.08	50.25	2.96	49.08	2.83	46.98	2.65	44.65	2.47
	68	8.3	56.21	2.83	52.94	2.71	50.25	2.60	49.08	2.53	46.98	2.41	44.65	2.23
		15.9	56.21	2.78	52.94	2.65	50.25	2.60	49.08	2.47	46.98	2.35	44.65	2.17
		19.9	56.21	2.71	52.94	2.60	50.25	2.53	49.08	2.47	46.98	2.29	44.65	2.17
	77	8.3	56.21	2.53	52.94	2.35	50.25	2.23	49.08	2.17	46.98	2.05	44.65	1.93
		15.9	56.21	2.47	52.94	2.29	50.25	2.23	49.08	2.11	46.98	1.99	44.65	1.87
		19.9	56.21	2.41	52.94	2.29	50.25	2.17	49.08	2.11	46.98	1.99	44.65	1.87
	86	8.3	56.21	2.23	52.94	2.11	50.25	1.99	49.08	1.93	46.98	1.81	44.65	1.69
		15.9	56.21	2.17	52.94	2.05	50.25	1.93	49.08	1.87	46.98	1.75	44.65	1.63
		19.9	56.21	2.17	52.94	2.05	50.25	1.93	49.08	1.87	46.98	1.75	44.65	1.63
	95	8.3	56.21	2.05	52.94	1.93	50.25	1.75	49.08	1.69	46.98	1.63	44.65	1.51
		15.9	56.21	1.99	52.94	1.87	50.25	1.69	49.08	1.69	46.98	1.57	44.65	1.51
		19.9	56.21	1.99	52.94	1.81	50.25	1.69	49.08	1.63	46.98	1.57	44.65	1.45
	104	8.3	56.21	1.93	52.94	1.75	50.25	1.57	49.08	1.57	46.98	1.45	44.65	1.39
		15.9	56.21	1.81	52.94	1.69	50.25	1.57	49.08	1.51	46.98	1.45	44.65	1.33
		19.9	56.21	1.81	52.94	1.69	50.25	1.51	49.08	1.51	46.98	1.45	44.65	1.33
	113	8.3	56.21	1.81	52.94	1.57	50.25	1.39	49.08	1.45	46.98	1.27	44.65	1.27
		15.9	56.21	1.63	52.94	1.51	50.25	1.45	49.08	1.33	46.98	1.33	44.65	1.15
		19.9	56.21	1.63	52.94	1.57	50.25	1.33	49.08	1.39	46.98	1.33	44.65	1.20

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 40: Heating Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
			MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW	MBh	kW
70	23	8.3	20.31	2.23	19.09	2.12	18.03	2.05	17.86	1.93	17.74	1.87	17.45	1.70
		15.9	23.00	2.41	21.60	2.30	20.37	2.23	20.19	2.10	20.08	2.02	19.73	1.84
		19.9	25.45	2.61	23.87	2.48	22.53	2.40	22.35	2.26	22.18	2.18	21.77	1.98
	32	8.3	35.37	3.20	32.68	3.05	30.35	2.95	29.82	2.78	29.36	2.68	28.31	2.44
		15.9	36.19	3.24	33.44	3.08	31.05	2.99	30.52	2.81	30.06	2.71	28.95	2.46
		19.9	36.71	3.24	33.97	3.08	31.52	2.99	30.99	2.81	30.52	2.71	29.42	2.46
	41	8.3	48.68	3.49	46.11	3.33	43.83	3.22	42.90	3.03	40.97	2.93	39.05	2.66
		15.9	49.08	3.56	46.46	3.39	43.89	3.29	42.90	3.09	40.97	2.99	39.05	2.71
		19.9	49.08	3.59	46.40	3.42	43.89	3.31	42.90	3.11	40.97	3.01	39.05	2.73
	50	8.3	48.85	3.19	46.23	3.02	43.89	2.91	42.90	2.75	40.97	2.64	39.05	2.41
		15.9	49.08	3.17	46.40	2.99	43.89	2.88	42.90	2.75	40.97	2.64	39.05	2.41
		19.9	49.08	3.18	46.40	3.01	43.89	2.89	42.90	2.76	40.97	2.62	39.05	2.42
	59	8.3	49.08	2.89	46.40	2.71	43.89	2.60	42.90	2.47	40.97	2.35	39.05	2.17
		15.9	49.08	2.78	46.40	2.60	43.89	2.47	42.90	2.41	40.97	2.29	39.05	2.11
		19.9	49.08	2.78	46.40	2.60	43.89	2.47	42.90	2.41	40.97	2.23	39.05	2.11
	68	8.3	49.08	2.41	46.40	2.29	43.89	2.23	42.90	2.17	40.97	2.05	39.05	1.93
		15.9	49.08	2.35	46.40	2.23	43.89	2.17	42.90	2.11	40.97	1.99	39.05	1.87
		19.9	49.08	2.35	46.40	2.23	43.89	2.17	42.90	2.05	40.97	1.99	39.05	1.81
	77	8.3	49.08	2.17	46.40	2.05	43.89	1.93	42.90	1.87	40.97	1.75	39.05	1.63
		15.9	49.08	2.11	46.40	1.99	43.89	1.87	42.90	1.81	40.97	1.75	39.05	1.63
		19.9	49.08	2.05	46.40	1.93	43.89	1.87	42.90	1.81	40.97	1.69	39.05	1.63
	86	8.3	49.08	1.93	46.40	1.81	43.89	1.69	42.90	1.63	40.97	1.57	39.05	1.45
		15.9	49.08	1.87	46.40	1.75	43.89	1.63	42.90	1.63	40.97	1.51	39.05	1.45
		19.9	49.08	1.87	46.40	1.75	43.89	1.63	42.90	1.57	40.97	1.51	39.05	1.45
	95	8.3	49.08	1.75	46.40	1.63	43.89	1.51	42.90	1.51	40.97	1.39	39.05	1.33
		15.9	49.08	1.69	46.40	1.57	43.89	1.51	42.90	1.45	40.97	1.39	39.05	1.27
		19.9	49.08	1.69	46.40	1.57	43.89	1.45	42.90	1.45	40.97	1.39	39.05	1.27
	104	8.3	49.08	1.63	46.40	1.51	43.89	1.39	42.90	1.33	40.97	1.27	39.05	1.20
		15.9	49.08	1.57	46.40	1.45	43.89	1.33	42.90	1.33	40.97	1.27	39.05	1.15
		19.9	49.08	1.57	46.40	1.45	43.89	1.33	42.90	1.27	40.97	1.20	39.05	1.15
	113	8.3	49.08	1.51	46.40	1.39	43.89	1.27	42.90	1.15	40.97	1.15	39.05	1.09
		15.9	49.08	1.45	46.40	1.33	43.89	1.15	42.90	1.20	40.97	1.15	39.05	1.02
		19.9	49.08	1.45	46.40	1.33	43.89	1.20	42.90	1.09	40.97	1.02	39.05	1.02
60	23	8.3	17.45	1.81	16.34	1.74	15.47	1.67	15.29	1.55	15.23	1.53	14.94	1.37
		15.9	19.79	1.97	18.50	1.89	17.51	1.82	17.33	1.68	17.28	1.66	16.93	1.48
		19.9	21.83	2.11	20.43	2.04	19.38	1.96	19.14	1.82	19.09	1.79	18.68	1.60
	32	8.3	30.35	2.60	27.96	2.51	26.09	2.40	25.56	2.23	25.21	2.20	24.28	1.97
		15.9	31.05	2.63	28.60	2.53	26.73	2.43	26.15	2.26	25.80	2.23	24.81	1.98
		19.9	31.52	2.63	29.07	2.53	27.14	2.43	26.56	2.26	26.21	2.23	25.21	1.98
	41	8.3	41.79	2.84	39.40	2.73	37.70	2.62	36.77	2.44	35.19	2.40	33.50	2.14
		15.9	42.14	2.89	39.69	2.79	37.70	2.68	36.77	2.49	35.19	2.45	33.50	2.18
		19.9	42.14	2.92	39.63	2.81	37.70	2.70	36.77	2.51	35.19	2.46	33.50	2.20
	50	8.3	41.96	2.60	39.51	2.48	37.70	2.36	36.77	2.21	35.19	2.16	33.50	1.95
		15.9	42.14	2.60	39.69	2.48	37.70	2.36	36.77	2.24	35.19	2.16	33.50	1.97
		19.9	42.14	2.60	39.63	2.46	37.70	2.34	36.77	2.21	35.19	2.14	33.50	1.95
	59	8.3	42.14	2.35	39.63	2.23	37.70	2.11	36.77	1.99	35.19	1.93	33.50	1.75
		15.9	42.14	2.29	39.63	2.17	37.70	2.05	36.77	1.99	35.19	1.87	33.50	1.75
		19.9	42.14	2.29	39.63	2.11	37.70	1.99	36.77	1.93	35.19	1.81	33.50	1.69
	68	8.3	42.14	2.05	39.63	1.93	37.70	1.81	36.77	1.75	35.19	1.69	33.50	1.57
		15.9	42.14	1.99	39.63	1.87	37.70	1.75	36.77	1.69	35.19	1.63	33.50	1.51
		19.9	42.14	1.99	39.63	1.87	37.70	1.75	36.77	1.69	35.19	1.63	33.50	1.51
	77	8.3	42.14	1.81	39.63	1.69	37.70	1.57	36.77	1.57	35.19	1.45	33.50	1.39
		15.9	42.14	1.75	39.63	1.63	37.70	1.57	36.77	1.51	35.19	1.45	33.50	1.33
		19.9	42.14	1.75	39.63	1.63	37.70	1.51	36.77	1.51	35.19	1.45	33.50	1.33
	86	8.3	42.14	1.63	39.63	1.51	37.70	1.45	36.77	1.39	35.19	1.33	33.50	1.27
		15.9	42.14	1.57	39.63	1.45	37.70	1.39	36.77	1.33	35.19	1.27	33.50	1.20
		19.9	42.14	1.57	39.63	1.45	37.70	1.39	36.77	1.33	35.19	1.27	33.50	1.20
	95	8.3	42.14	1.45	39.63	1.39	37.70	1.27	36.77	1.27	35.19	1.20	33.50	1.15
		15.9	42.14	1.45	39.63	1.33	37.70	1.27	36.77	1.20	35.19	1.15	33.50	1.09
		19.9	42.14	1.45	39.63	1.33	37.70	1.20	36.77	1.20	35.19	1.15	33.50	1.09
	104	8.3	42.14	1.33	39.63	1.27	37.70	1.15	36.77	1.15	35.19	1.09	33.50	1.02
		15.9	42.14	1.33	39.63	1.20	37.70	1.15	36.77	1.09	35.19	1.02	33.50	1.02
		19.9	42.14	1.33	39.63	1.20	37.70	1.15	36.77	1.09	35.19	1.02	33.50	1.02
	113	8.3	42.14	1.20	39.63	1.15	37.70	1.02	36.77	1.02	35.19	0.97	33.50	0.90
		15.9	42.14	1.20	39.63	1.09	37.70	1.02	36.77	0.97	35.19	0.90	33.50	0.97
		19.9	42.14	1.20	39.63	1.09	37.70	1.09	36.77	0.97	35.19	0.90	33.50	0.97

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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Table 41: Heating Capacity—ARWN053GA2.

Combination Ratio (%) (Capacity Index)	Inlet Water Temp. (°F)	Water flow rate (GPM)	Indoor Air Temp. °F DB											
			61		65		68		70		72		75	
			TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW	TC MBh	PI kW
50	23	8.3	14.53	1.44	13.66	1.37	12.90	1.29	12.72	1.22	12.67	1.15	12.43	1.09
		15.9	16.40	1.56	15.41	1.48	14.59	1.40	14.42	1.33	14.36	1.25	14.07	1.17
		19.9	18.15	1.68	17.04	1.60	16.11	1.51	15.93	1.43	15.82	1.34	15.58	1.27
	32	8.3	25.21	2.07	23.35	1.97	21.71	1.85	21.24	1.76	20.95	1.65	20.19	1.56
		15.9	25.80	2.09	23.87	1.98	22.24	1.88	21.77	1.78	21.48	1.67	20.66	1.58
		19.9	26.21	2.09	24.22	1.98	22.53	1.88	22.12	1.78	21.77	1.67	21.01	1.58
	41	8.3	34.73	2.26	32.92	2.14	31.34	2.02	30.58	1.92	29.24	1.80	27.90	1.70
		15.9	35.02	2.30	33.15	2.18	31.40	2.07	30.58	1.96	29.24	1.83	27.90	1.73
		19.9	35.02	2.32	33.09	2.20	31.40	2.08	30.58	1.97	29.24	1.85	27.90	1.75
	50	8.3	34.90	2.07	32.98	1.95	31.34	1.83	30.58	1.75	29.24	1.62	27.90	1.54
		15.9	35.02	2.05	33.15	1.94	31.40	1.82	30.58	1.73	29.24	1.64	27.90	1.53
		19.9	35.02	2.07	33.09	1.95	31.40	1.82	30.58	1.74	29.24	1.62	27.90	1.53
	59	8.3	35.02	1.87	33.09	1.75	31.40	1.63	30.58	1.57	29.24	1.45	27.90	1.39
		15.9	35.02	1.81	33.09	1.69	31.40	1.57	30.58	1.51	29.24	1.45	27.90	1.33
		19.9	35.02	1.81	33.09	1.69	31.40	1.57	30.58	1.51	29.24	1.39	27.90	1.33
	68	8.3	35.02	1.63	33.09	1.51	31.40	1.45	30.58	1.39	29.24	1.33	27.90	1.20
		15.9	35.02	1.57	33.09	1.45	31.40	1.39	30.58	1.33	29.24	1.27	27.90	1.20
		19.9	35.02	1.57	33.09	1.45	31.40	1.39	30.58	1.33	29.24	1.27	27.90	1.20
	77	8.3	35.02	1.45	33.09	1.33	31.40	1.27	30.58	1.20	29.24	1.15	27.90	1.09
		15.9	35.02	1.39	33.09	1.33	31.40	1.20	30.58	1.20	29.24	1.15	27.90	1.09
		19.9	35.02	1.39	33.09	1.33	31.40	1.20	30.58	1.20	29.24	1.15	27.90	1.09
	86	8.3	35.02	1.33	33.09	1.20	31.40	1.15	30.58	1.09	29.24	1.09	27.90	1.02
		15.9	35.02	1.27	33.09	1.15	31.40	1.09	30.58	1.09	29.24	1.02	27.90	0.97
		19.9	35.02	1.27	33.09	1.15	31.40	1.09	30.58	1.09	29.24	1.02	27.90	0.97
	95	8.3	35.02	1.20	33.09	1.09	31.40	1.02	30.58	1.02	29.24	0.97	27.90	0.90
		15.9	35.02	1.15	33.09	1.09	31.40	1.02	30.58	0.97	29.24	0.97	27.90	0.90
		19.9	35.02	1.15	33.09	1.09	31.40	1.02	30.58	0.97	29.24	0.97	27.90	0.90
	104	8.3	35.02	1.09	33.09	1.02	31.40	0.97	30.58	0.90	29.24	0.90	27.90	0.84
		15.9	35.02	1.02	33.09	0.97	31.40	0.90	30.58	0.90	29.24	0.84	27.90	0.84
		19.9	35.02	1.02	33.09	0.97	31.40	0.90	30.58	0.90	29.24	0.84	27.90	0.84
	113	8.3	35.02	0.97	33.09	0.97	31.40	0.90	30.58	0.79	29.24	0.84	27.90	0.79
		15.9	35.02	0.90	33.09	0.84	31.40	0.79	30.58	0.84	29.24	0.72	27.90	0.79
		19.9	35.02	0.90	33.09	0.84	31.40	0.79	30.58	0.84	29.24	0.72	27.90	0.79

TC = Total Heating Capacity (MBh). Heating capacities are based on air entering the indoor unit at 68°F dry bulb (DB) / 59°F wet bulb (WB), and the water entering at 68°F.

PI = Power input (KW).

Power input (KW) includes compressor(s) and controls.

Test condition based on 25 feet of equivalent refrigerant piping and no change in elevation between indoor unit and water source unit.

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APPLICATION GUIDELINES

Note:

The following procedure does not replace LG's LATS Multi V complimentary selection software, but should instead be used in conjunction with it. Contact your LG representative to obtain a copy of the software and the user's manual.

Always use LATS Multi V Software

To properly select, size, and verify that the Multi V system components are optimized, follow the recommendations and instructions provided in this section:

- Zone the building.
- Determine the ventilation method.
- Select the indoor unit(s).
- Select the water source unit(s).
- Perform system sizing checks.
  - Calculate the Corrected Capacity Ratio (CCR).
  - Determine the System Combination Ratio (CR).

When using the LATS Multi V software, the default indoor design day conditions of 80.6°F DB / 67°F WB in cooling mode, and 68°F DB / 56.7°F WB in heating mode may need to be adjusted to reflect the designer's preferred entering coil design temperature.

Note:

These indoor room temperature values are the entering coil temperatures.

Note:

Data provided in the LATS tree mode diagram or report file is not valid until the "Auto-Piping" and "System Check" routines are run without errors. Errors will be reported immediately in pop-up dialog boxes or red lines surrounding indoor unit(s) and / or along pipe segments. If errors are indicated, modify the pipe system design and/or system components and re-run LATS.

Zone the Building

Multi V Water Mini is a two-pipe heat pump system that can cool or heat, but not both simultaneously. When designing a heat pump system, the designer typically combines spaces with similar load profiles located near or adjacent to each other into "thermal zones." After combining like spaces into thermal zones that will be served by a single (or grouped) indoor unit(s), calculate the peak cooling and heating loads for each thermal zone.

Determine the Ventilation Method

Decide how ventilation air will be introduced to each space. Some models of Multi V indoor units have field-installed accessories available to accommodate the direct connection of ventilation ductwork to the unit. It is recommended, however, that additional considerations be assessed and understood when using direct connection accessories. For more information, contact your LG applied equipment representative or visit www.lg-vrf.com for technical product information.

Note:

In all cases, LG recommends ducting pre-treated room neutral, ventilation air directly to the space. If the ventilation air is not tempered to room neutral conditions before introduction to the conditioned space, remember to add the ventilation air load(s) to the space load before sizing the indoor unit(s). Local codes or other professional design guidelines, such as ASHRAE 62.1, will dictate the volume of ventilation air required.

It may be prudent to oversize the dedicated outdoor air system considering there will be a few days of the year when weather conditions exceed the design day conditions. This will minimize the possibility of ventilation air conditions causing the space temperature to drift outside design day parameters in the case where a decoupled outside air system is used, or the indoor unit's entering air temperature falls outside the approved design temperature range if a coupled outside air system is used.

Select the Indoor Unit(s)

The building sensible cooling load is typically the critical load to satisfy. In coastal areas or humid applications, such as high occupancy spaces, both the latent and sensible cooling loads should be considered. In areas where the cooling and heating loads are similar or the heating load may exceed the total cooling load, the designer should verify the indoor unit selection satisfies both the heating and cooling requirements.

Determine how many indoor units will be required. Refer to Table 43 to obtain the maximum number of indoor units allowed on Multi V Water Mini Heat Pump units. If the quantity of indoor units exceeds the maximum allowed for the water source model selected, consider increasing the size of the water source unit, or split the indoor units into two groups served by separate water source units.

Calculate the entering mixed air conditions for each indoor unit. The mixed-air temperature must be between 57°F and 76°F WB in Cooling mode, and between 59°F and 80°F DB in Heating mode.

Note:

When the indoor unit entering air temperature is outside the cataloged operational limits, the system may continue to operate, however performance abnormalities may occur. These may include frost accumulating on the coil, low or high suction temperature, low or high head pressure, low or high discharge temperature, or complete system shutdown.

To calculate the indoor unit entering mixed air temperature:

$$MAT = \frac{(RAT \times \%RA) + (OAT \times \%OA)}{100}$$

Where:

MAT = Mixed air temperature

RAT = Return air temperature

OAT = Outdoor air temperature

%RA = Percentage of return air

%OA = Percentage of outdoor air

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Indoor unit nominal cooling capacity ratings, among other parameters, are based on an entering air condition of 80°F DB / 67°F WB and a 95°F DB outdoor ambient temperature. Nominal heating capacity ratings are based on an indoor unit entering air condition of 70°F DB and an outdoor ambient air temperature of 47°F DB / 43°F WB.

Capacity Correction

The *corrected* cooling/heating capacity is different from the nominal cooling/heating capacity. The corrected capacity reported by LATS includes the effect design ambient operating conditions has on the system's cooling capability.

Altitude Correction

On water source systems, the impact of air density must be considered on systems installed at a significant altitude above sea level. LATS does not derate indoor unit capacity for high altitude applications. Locally accepted altitude correction factors must be applied manually to indoor unit capacities.

Minimum Air Change Requirements

Avoid oversizing indoor units in an attempt to increase the air exchange rate in the space. VRF systems are designed for minimum airflow over the coil to maximize latent capacity while cooling, maintain a comfortable, consistent discharge air temperature while heating, and minimize fan motor power consumption. In extreme cases, oversizing indoor units may compromise the water source unit's ability to effectively match the space load(s).

Check the Indoor Unit Selection(s)

Verify the sensible (and total) corrected cooling capacity. For each indoor unit, the corrected capacity must be at least equal to the sum of the appropriate cooling design day space load(s) (plus ventilation load, if applicable) for the space(s) served by the indoor unit.

Verify the corrected heating capacity. For each indoor unit, the corrected capacity must be at least equal to the sum of the heating design day space load (plus ventilation load, if applicable) for all spaces served by the indoor unit.

Select the Water-Source Unit

After all indoor units are properly sized to offset the applicable loads in each space, begin the selection of the water source unit by choosing a size that meets both the block load cooling requirement and the block load heating requirement.

⚠ Note:

In LATS always run the Auto-Pipe and System Check features following any change in the water source unit selection to verify the system design is acceptable.

The water source unit is capable of operating between 50°F and 113°F (entering water temperature) in the Cooling mode and between 23°F and 113°F (entering water temperature) in the Heating mode. Refer to the capacity data tables starting on page 25 to obtain the nominal unit capacity for heating and cooling. Assume a 100% CR at this point. See "Determine the System Combination Ratio (CR)".

Capacity Correction

A capacity correction factor may apply to account for the length of the system's liquid pipe and elevation difference between the water source unit and the indoor unit(s). If the water source units corrected cooling capacity was derived from the LATS report, the elevation difference correction factor has already been applied. If the corrected cooling capacity was found using corrected capacity tables found in the Performance Data section, apply the appropriate elevation difference factor found in Table 44 (choice of table depends on the architecture of the system design). Multiply the water source unit corrected cooling capacity by the elevation difference correction factor.

Check the Water Source Unit Selection(s)

After applying the appropriate correction factors to the water source unit, verify the corrected cooling capacity is at least equal to the block building load, and the corrected heating capacity is at least equal to the block heating loads.

System Sizing Checks

Calculate the Corrected Capacity Ratio (CCR)

The system's CCR is defined as the sum of the space loads divided by the water source unit corrected capacity after all applicable correction factors are applied. Calculate this ratio for both the cooling and heating design days.

$$CCR\%_{(Clg)} = \left(\frac{\text{Total Cooling Load}}{\text{Corrected Water-Source Unit Capacity}} \right) \times 100 \leq 100\%$$

$$CCR\%_{(Htg)} = \left(\frac{\text{Heating Load}}{\text{Corrected Water-Source Unit Capacity}} \right) \times 100 \leq 100\%$$

The water source unit selected should be large enough to offset the total block cooling load for all spaces served by the VRF system during the peak cooling load hour on the cooling design day (account for ventilation air cooling load if the ventilation air has not been pretreated to room neutral conditions).

The corrected cooling capacity ratio (CCR% [clg]) should never exceed 100% plus building diversity. If it does, increase the size of the water source unit or change the system design by moving some of the building load and associated indoor unit(s) to another Multi V system.

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The water source unit should also be large enough to offset the sum of the building's space heating loads without considering building diversity. In the heating season, it is typical that all spaces served by the system will peak simultaneously in the early morning, thus building diversity should never be considered. If the corrected heating capacity ratio (CCR% [htg]) exceeds 100%, increase the size of the water source unit or change the system design by moving some of the building load to another Multi V system.

Determine the System Combination Ratio (CR)

The system CR compares the nominal capacity of all connected indoor with the nominal capacity of the water source unit serving them. Locate nominal capacity for indoor is a ratio that compares the nominal capacity of the connected indoor units to the water source unit's nominal capacity. See the “General Data” section (page 9) for the nominal capacity of water source heat pump units, see the Multi V Indoor Unit Engineering manual for their respective General Data sections.

For example,

A VRF system has a water source unit with a nominal capacity of C and four indoor units having nominal capacity ratings of W, X, Y, and Z respectively, the CR would be determined as follows:

$$CR\% = \left(\frac{W + X + Y + Z}{C} \right) \times 100$$

⚠ *Note:*

The system will not commission, start or operate unless the CR is between 50% and 130%.

If the CR is over 100%, the designer is under-sizing the water source unit relative to the combined nominal capacity of the connected indoor units. In some applications, undersizing of the outdoor unit is prudent as it reduces the initial equipment investment and will properly perform as long as the designer:

1. Knows the indoor unit(s) are oversized relative to the actual load(s) in the spaces served.
2. Knows the space loads will peak at different times of the day (i.e., building has “load diversity”).

In some designs, oversized indoor units may be unavoidable in the case where the smallest size indoor unit available from LG is larger than what is necessary to satisfy the space load. This scenario may occur when an indoor unit selection one size down from the selected unit is slightly short of fulfilling the design load requirements, and the designer must choose the next largest size unit.

⚠ *Note:*

If the water source unit is properly sized to offset the building's total cooling block load and the system's combination ratio is above 130%, indoor units are likely oversized. In applications where all indoor units are “right-sized” and there is no building diversity, the system's CR will likely be ≤100%.

If the CR is above 130%, review the indoor unit choices and downsize, or select a larger water source unit. Consider moving indoor units to another Multi V, Multi F, or Duct-Free Split system if the water source unit size cannot be increased. Contact your LG sales representative for more options or engineering ideas.

If the CR falls below 50%, select a smaller water-source unit or consider adding more or larger indoor unit(s) to the system. This situation is common on multi-phase projects where the design calls for the majority of indoor units be added to the system at a later date. To raise the CR above the minimum 50% requirement:

1. Consider including additional indoor units on the first phase.
2. Design two smaller systems in lieu of a single larger system. Connect all “first phase” indoor units to the water source unit being installed on the first phase, and delay the installation of the additional water source unit until a later date.

Conclusions and Recommendations

- Always use LATS Multi V system design software to check a design.
- Validate that each indoor unit is appropriately sized.
- Using the indoor unit's corrected capacity for cooling and heating provided by LATS and apply a correction factor for altitude, if appropriate.
- Verify that the water source unit selection for each system is properly sized. Verify that the corrected capacity for cooling and heating provided by LATS is sufficient to offset the block building space load after applying additional correction factors for capacity.
- For each Multi V system, calculate the cooling and heating design days:

1. Corrected Capacity Ratio (CCR).
2. Combination Ratio (CR).

After these system checks are complete and design limitations are adhered, the system's indoor and water source components should be properly sized and the system's performance should now be optimized. The VRF system component size selections should be acceptable. At any time, if further system design assistance is needed or you have a unique application you would like to discuss, contact your LG applied equipment representative for assistance.

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Operating Temperature Ranges

Table 42: Published Operating Temperature Ranges for LG Multi Water Mini Products[1].

Operation	Cooling (°F DB)[2]	Heating (°F WB)
Entering Water Temperature	23 – 113	23 – 113

[1]Equivalent pipe length distance between water source and indoor units is 25 feet and no elevation difference between water source and indoor units.

[2]Variable water flow control kit (PRVC1) required when entering water temperature is between 23°F and 59°F.

Water Source Unit / Indoor Unit Matching Limitations

Table 43: Water Source Unit / Indoor Unit Matching Limitations.

Water Source Unit		Indoor Unit		
		Maximum Quantity	Sum of Indoor Unit Nominal Cooling Capacities (Btu/h)	
Model	Nominal Cooling (Btu/h)		Minimum Capacity (Btu/h) (50%)[1]	Maximum Capacity (Btu/h) (130%)[2]
ARWN038GA2	38,200	6	19,100	49,660
ARWN048GA2	47,800	8	23,900	62,140
ARWN053GA2	52,900	9	26,450	68,770

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

Water Source Unit—Cooling / Heating Correction Factors

For each water source unit, calculate the equivalent length of the liquid line from the water source unit to the farthest indoor unit. Determine the elevation difference of farthest indoor unit above or below the water source unit. Find corresponding cooling capacity correction factor in Table 44. Multiply the cooling correction factor by the standard cooling capacity. The resultant is the NET cooling capacity. Repeat for NET heating capacity.

⚠ Note:

The correction factors shown below are calculated in the LATS Multi V software program. These factors are only to be used when performing manual calculations.

Table 44: ARWN038GA2, ARWN048GA2, ARWN053GA2—Cooling Correction Factors.

Elevation Differences (feet)	Equivalent Pipe Length (ELF)*							
	25	33	66	98	131	164	197	>230
Indoor Units Above Water Source Unit (feet)								
0	1	0.99	0.96	0.93	0.91	0.90	0.87	0.85
25	1	0.99	0.96	0.93	0.91	0.90	0.87	0.85
33	-	0.99	0.96	0.93	0.91	0.90	0.87	0.85
66	-	-	0.96	0.93	0.91	0.90	0.87	0.85
98	-	-	-	0.93	0.91	0.90	0.87	0.85
Water Source Unit Above Indoor Units (feet)								
0	1	0.99	0.96	0.93	0.91	0.90	0.90	0.85
25	1	0.99	0.96	0.93	0.91	0.90	0.90	0.85
33	-	0.99	0.96	0.93	0.91	0.90	0.90	0.85
66	-	-	0.96	0.93	0.91	0.90	0.90	0.85
98	-	-	-	0.93	0.91	0.90	0.90	0.85

[1]ELF = Equivalent Pipe Length in Feet—Sum of the actual pipe length plus allocations for pressure drop through elbows, valves, and other fittings in equivalent length.

⚠ Note:

Heating Correction Factor for ARWN038GA2 / ARWN048GA2 / ARWN053GA2 models is 1.0 for all equivalent lengths and elevation differences.

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Building Ventilation Design Options

ASHRAE 62.1-2010 and local codes specify the minimum volume of outdoor air that must be provided to an occupied space. Outdoor air is required to minimize adverse health effects, and it provides acceptable indoor air quality for building occupants. The five methods of accomplishing this with LG Multi V Water Mini systems are summarized here.

Note:

Disclaimer

Although we believe that these building ventilation methods have been portrayed accurately, none of the methods have been tested, verified, or evaluated by LG Electronics, U.S.A., Inc., In all cases, the designer, installer, and contractor should understand if the suggested method is used, it is used at their own risk. LG Electronics U.S.A., Inc., takes no responsibility and offers no warranty, expressed or implied, of merchantability or fitness of purpose if this method fails to perform as stated or intended.

- *For a complete copy of Standard 62.1-2010, refer to the American Standard of Heating and Air Conditioning Engineers (ASHRAE) website at www.ashrae.org.*
- *For more information on how to properly size a ventilation air pretreatment system, refer to the article, "Selecting DOAS Equipment with Reserve Capacity" by John Murphy, published in the ASHRAE Journal, April 2010.*

Method 1: Decoupled Dedicated Outdoor Air System (DDOAS)

Provide a separate, dedicated outdoor-air system designed to filter, condition, and dehumidify ventilation air and deliver it directly to the conditioned space through a separate register or grille. This approach requires a separate independent ventilation duct system not associated with the Multi V Water Mini system.

Note:

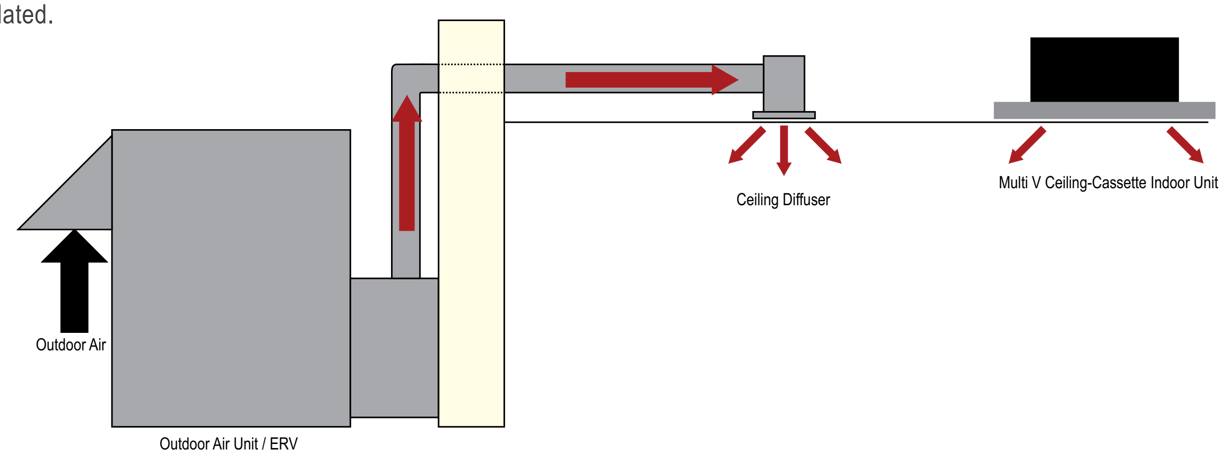
LG recommends using the DDOAS method in all installations where appropriate.

Advantages

- Does not add additional heating or cooling loads to indoor units.
- May be used with a full lineup of the indoor units.
- If the outdoor air unit fails, the resulting untreated air will be readily noticed by the occupants.
- The outdoor air unit may supply “neutral” air to the occupant space even when the Multi V indoor unit fan changes speed or cycles on and off. DDOAS controls do not have to be interlocked with the Multi V Water Mini system.
- In lieu of installing localized smaller outside air treatment equipment throughout the building, this method centralizes the ventilation air source making service and filter changes easier and less disruptive for the building occupants.
- Indoor unit operation and performance will not be affected by the condition of outdoor air.
- Third-party demand control ventilation controls are more readily accommodated.

Disadvantages

- Ceiling space is required to accommodate ductwork between the centralized outdoor air unit and ceiling diffusers.



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BUILDING VENTILATION DESIGN OPTIONS

Method 2: Unconditioned Outdoor Air (Non-Ducted, Natural Ventilation)

Natural ventilation devices, such as operable windows or louvers may be used to ventilate the building when local code permits. The open area of a window or the free area of a louver must meet the minimum percentage of the net occupied floor area.

Advantages

- Occupants control the volume of the ventilation air manually.
- Useful for historic buildings that have no ceiling space available for outdoor air ductwork.
- May be used with the full lineup of Multi V indoor units.

Disadvantages

- In some locations, it may be difficult to control humidity levels when windows are open.
- Thermal comfort levels may be substandard when windows are open.
- Indoor units may have to be oversized to account for the added heating and cooling loads when windows are open.
- Provides outdoor air to perimeter spaces only. Additional mechanical ventilation system may be required to satisfy requirements for interior spaces.
- Outdoor air loads may be difficult to calculate since the quantity of outdoor air is not regulated.
- May affect indoor unit proper operation when open.

Method 3: Unconditioned Outdoor Air Ducted to Indoor Units

Untreated outdoor air is channeled through a duct system that is piped to the return air duct on Multi V concealed indoor units or to the frame of Multi V 1-way and 4-way cassettes.

⚠ *Note:*

Outside air may flow backward through the return air-filter grille when the indoor unit fan speed slows or stops in response to changes in the space load. This may result in captured particulate on the filter media being blown back into the conditioned space.

Advantages

- May require less ductwork if indoor units are placed near outdoor walls or a roof deck.
- Controls must be interlocked to shut off the outdoor air supply fan when the space is unoccupied.
- Third-party demand-control ventilation controls may be installed to regulate outdoor intake based on the CO_2 levels of the occupied space.

Disadvantages

- Fan(s) will be required to push outdoor air to the indoor unit. Indoor units are engineered for low sound levels and are not designed to overcome the added static pressure caused by the outdoor air source ductwork.
- Ventilation air must be pre-filtered before mixing with the return air stream. LG indoor cassette models are configured to introduce the ventilation air downstream of the return air filter media.
- Ducted, 1-way, and 4-way cassette models are the only indoor units that accept the connection of an outdoor air duct to the unit case.
- Mixed air conditions must be between a minimum of 59°F DB while operating in heating and a maximum of 76°F WB while operating in cooling. Depending on the ventilation air volume requirement, the location choices are limited where untreated outside air may be introduced to the building using this method.
- Larger indoor units may be required to satisfy for additional outdoor air.
- Motorized dampers may be required to prevent outdoor air flow through the indoor unit when the indoor unit is not operating.
- An LG Dry Contact adapter may be necessary to interlock the motorized damper with the indoor unit.
- While operating in heating, the untreated outdoor air may delay the start of the indoor unit fan impacting building comfort.
- In most cases, in lieu of using the factory mounted return-air thermistor on indoor units, a remote wall temperature sensor or zone controller will be needed for each indoor unit to provide an accurate reading of the conditioned area temperature.

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Method 4: Unconditioned Outdoor Air (Non-Ducted, Fan Assisted Ventilation)

When approved by local codes, the fan assisted ventilation method uses exhaust fans to remove air from the building, and outdoor air is drawn into occupied spaces through a wall louver or gravity roof intake hood. Supply fans can also be used to push the outdoor air into the space and building positive pressure will vent the exhaust air through louvers or roof-mounted exhaust hoods. Outdoor air is neither cooled nor heated before entering the building.

Note:

This may result in loss of building pressurization control, increasing infiltration loads with adverse effects.

Advantages

- Outdoor air may be manually controlled by the occupant or automatic controls may be installed to open/close outdoor air dampers or to turn on/off ventilation fans.
- Useful for large open spaces like warehouses, garages, and workshops.
- Outdoor air volume is a known quantity. Air loads may be easier to calculate since fans will regulate the amount of outdoor air.
- May be used with a full lineup of Multi V indoor units.

Disadvantages

- It may be difficult to control humidity levels while outdoor air louvers/hoods are opened.
- Thermal comfort levels may be substandard when louvers/hoods are opened.
- Indoor units may have to be oversized to account for the added heating/cooling loads when louvers/hoods are open.
- Hot, cold, and/or humid areas may be present if the outdoor air is not evenly distributed to the different spaces.

Method 5: Coupled Dedicated Outdoor Air (CDOA)

A separate, dedicated outdoor air system delivers air directly to a Multi V indoor unit or to the return air duct system. After mixing with the return air stream, ventilation air passes through the indoor unit and into the conditioned space. The pretreatment system is capable of filtering, conditioning, and dehumidifying outdoor air to room neutral conditions.

Note:

Outside air may flow backward through the return air-filter grille when the indoor unit fan speed is reduced or stops when the space load is satisfied. This may result in captured particulate on the filter media being blown back into the conditioned space.

Advantages

- Separate ceiling registers or grilles for introduction of the outside air to the conditioned space may be avoided.

Disadvantages

- Ducted, 1-way, and 4-way cassette indoor units are the only models designed for direct connection of an outside air duct.
- The building occupant may not notice the outdoor air pretreatment system has malfunctioned until the unconditioned outdoor air exceeds the indoor unit mixed air limits of 59°F DB for heating and 76°F WB for cooling.
- If the coil entering air condition limitation is exceeded, the indoor unit may malfunction and ceases to operate.
- If the outdoor air unit cooling or heating system fails, the malfunction may be masked by the indoor unit ramping up operating parameters to compensate for the failure.
- Motorized dampers may be required to prevent outdoor air from entering the indoor unit while the indoor unit has cycled off.
- An LG Dry Contact adapter is necessary to interlock the motorized damper with the indoor unit fan operation.
- In lieu of using the factory mounted return-air thermistor, a remote wall temperature sensor or zone controller may be required to provide an accurate conditioned space temperature reading.

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Selecting the Best Location

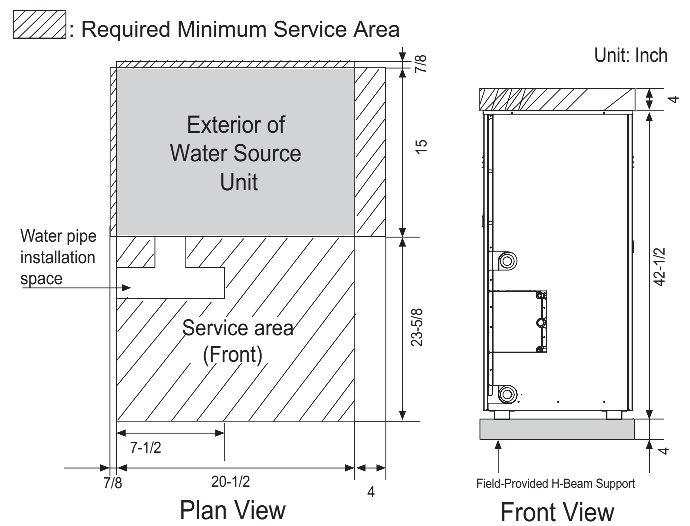
The water source unit must be installed indoors in a mechanical room. The mechanical room must be designed such that equipment vibration or noise does not affect surrounding rooms, and is properly ventilated or conditioned to maintain temperature range. Mechanical room temperature is required to be maintained between 32°F and 104°F. The water source unit will reject heat to the mechanical room. See the “General Data” on page 9 for heat rejected to the equipment room.

- The water source unit must also be located where the refrigerant pipe distance does not exceed the design limits. Location of the water source unit should be strategically located in the building to minimize refrigerant piping materials, labor, and refrigerant.
- The underlying structure or foundation must be designed per local codes and support the weight of the unit. Units can be stacked above each other as long as each water source unit is independently supported. Minimum clearances must be maintained either per recommendations shown in Figure 7 or local codes, whichever is greater. Include enough space in the installation area for service access.
- The mechanical room floor must be waterproof. Periodic flushing of the water heat exchanger will be required, and a floor drain will help facilitate this maintenance.
- Avoid exposing the water source unit to oil, steam, combustible gases, sulfur, or other corrosive environments. Avoid exposure to electromagnetic waves from equipment including, but not limited to, generators, MRI equipment, or other equipment that emits electromagnetic waves.
- When piping, towers, or other system components that contain water are exposed to areas where the temperature may fall below 32°F, antifreeze solution must be used. Freezing of the heat source water will damage the plate heat exchanger. Antifreeze solution includes proper mixtures of ethylene glycol, propylene glycol, or methanol to the water to prevent freezing. Addition of water heater/boiler to maintain minimum temperatures should be considered.

Installation Space

When installing the water source unit, consider service / minimum allowable space requirements as illustrated.

Figure 7: Required Minimum Space for Water Mini Unit Installation.



Mounting Platform

The underlying structure or foundation must be designed to support the weight of the unit. Avoid placing the unit in a low lying area where water may accumulate.

General Mounting

Securely attach the water source unit to a concrete pad, base rails, or other mounting platform that is securely anchored to the building structure. Refer to dimensional drawings in the “Product Data” section on page 14, and follow the applicable local code for clearance, mounting, anchor, and vibration attenuation requirements.

- Corners must be firmly attached, otherwise, the support will bend.
- Use a 7/16 inch or 1/2 inch diameter J-bolt. Use a hexagon nut with a spring washer.
- Include anti-vibration material.
- Include enough space for refrigerant piping and electrical wiring when installing through the bottom of the unit.
- Use an H-beam or concrete support.

Figure 8: Location of the Anchor Bolts.

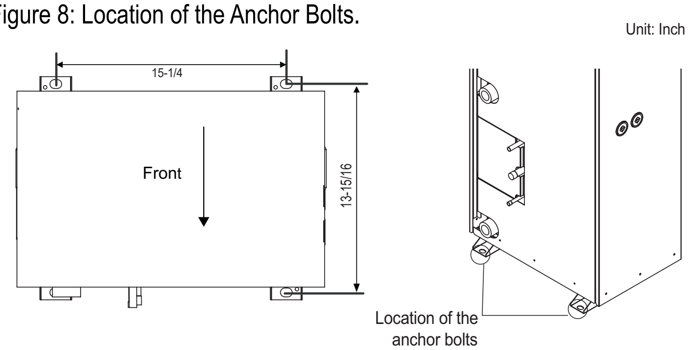
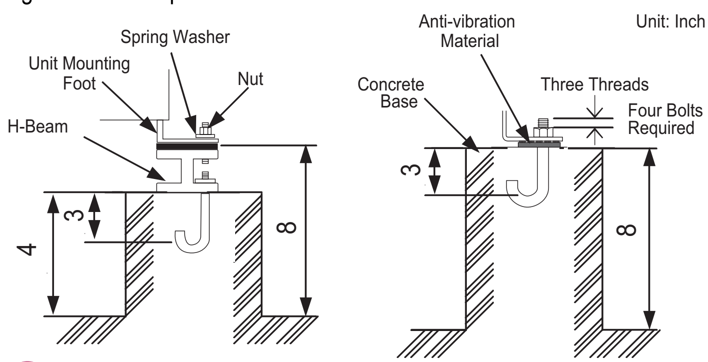


Figure 9: Close up of Anchor Bolts.



⚠ Note:

All referenced materials are to be field-supplied. Images are not to scale, are for reference only, and are not intended to be used for design purposes.

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REFRIGERANT PIPING DESIGN & LAYOUT BEST PRACTICES

REFRIGERANT PIPING DESIGN

LATS Multi V Piping Design Software

The proper design and installation of the refrigerant piping system is a critical element of the Multi V system. Multi V Water Mini requires two pipes between system components – a liquid line and a vapor line. A properly designed refrigerant piping system ensures that refrigerant is delivered to the evaporator coil's electronic expansion valve (EEV) in a pure liquid state free of gas bubbles. A proper design also ensures a sufficient refrigerant gas flow rate in the vapor line that eliminates the possibility of refrigeration oil from collecting in the vapor lines.

Using LATS Multi V

LG's LATS Multi V software makes designing the refrigerant system easy. LATS Multi V is a Windows®-based application that assists the engineer in the design of the refrigeration distribution pipe system, verifies the design complies with pipe design limitations, applies capacity correction factors, and calculates the system refrigerant charge. The piping system can be entered manually into LATS from a one-line pipe diagram. The piping system can be engineered manually using the procedure outlined in the "Manual Layout Procedure" on page 74, however, the preferred method is to design the system using LG's LATS Multi V software. **To ensure that the refrigerant piping design meets LG's quality standards, a LATS refrigerant piping design must be provided with every Multi V Water Mini order. Following the installation, if any changes or variations to the design are necessary, a new LATS file must be created and provided to LG prior to system commissioning to ensure the proper pipe size has not changed.**

Adjusting LATS Multi V Output for Altitude

When a system is installed at elevations significantly above sea level, the designer must also consider the impact air density has on the capacity of the indoor and water source units. An Altitude Correction Factor must be manually applied to the indoor and water source unit data provided in the LATS report. LATS does not derate indoor unit capacity for high altitude applications. Locally accepted altitude correction factors must be applied manually to indoor unit capacities.

Design Choices

LATS Multi V software is flexible, offering the HVAC system engineer a choice of two design methods: CAD mode and Tree mode.

CAD Mode

Using the CAD mode, the refrigerant pipe design and layout work is performed concurrently. Import a copy of a plan view drawing (.dwg format) for floor of the structure into LATS Multi V software. Multi V Water Mini units and indoor units can be selected from drag and drop lists and placed on the floor plan drawing(s), and interconnecting pipes between system components will be drafted directly on the drawing set. LATS will size the refrigerant piping, certify the design, and provide a detailed materials report and system schematic. Use the export feature to create a CAD file (.dxf format) that can subsequently be imported into the building design drawings.

- Import the building's architectural CAD (.dwg format).
- Import building loads from an external file (.xls format).
- Layout refrigerant piping directly onto an overlay of the building drawing.
- Automatically calculates pipe segment lengths based on drawing layout.
- Creates an export image file for import to the building drawing set (.dxf format).
- Generates a system engineering report (.xls format).

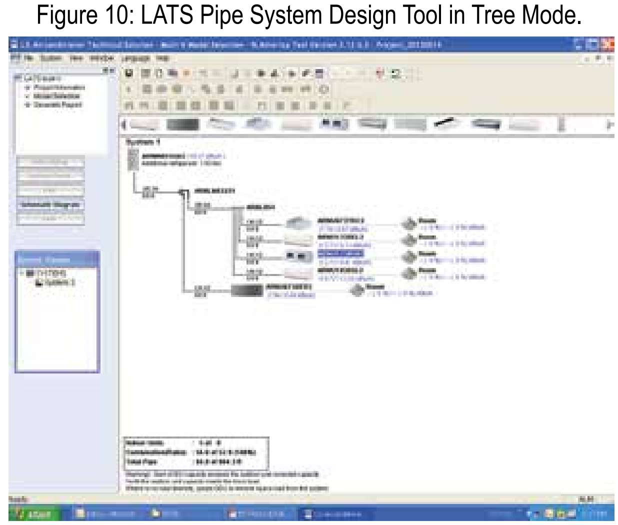
Tree Mode

Using the TREE mode, the engineer can quickly create a one-line schematic drawing of the Multi V Water Mini system. Integration of the engineered pipe system into the building drawings is done later by the draftsperson using standard drafting software tools.

- Import building loads from an external file (.xls format).
- System components selected using an easy drag and drop process.
- Automatically analyzes and checks the design complies with most piping design limitations.
- Sizes refrigerant piping.
- Generates a system engineering report (.xls format).

In either case, LATS Multi V software generates a report file (.xls format) containing project design parameters, cooling and heating design day system component performance, and capacity data. The report calculates the system combination ratio, calculates the system refrigerant charge, and provides detailed bill of material information including a list of Multi V units, air handlers, control devices, accessories, refrigerant pipe sizes segregated by building, by system, by pipe size, and by pipe segments.

Figure 10: LATS Pipe System Design Tool in Tree Mode.



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Device Connection Limitations

- The minimum number of connected and operating indoor units to a Multi V Water Mini system is one, taking into consideration of the minimum combination ratio.
- The maximum number of indoor units on a Multi V Water Mini heat pump system is:

ARWN038GA2 = 6   ARWN048GA2 = 8   ARWN053GA2 = 9

One of the most critical elements of a Multi V Water Mini system is the refrigerant piping. The table below lists pipe length limits that must be followed in the design of a Multi V Water Mini refrigerant pipe system:

Table 45: Multi V Water Mini Liquid Refrigerant Pipe Design Limitations.

Pipe Length (ELF = Equivalent Length of pipe in Feet)	Longest total equivalent piping length	≤475.7 feet
	Longest distance from water source unit to indoor unit	230 feet (Actual) 295.2 feet (Equivalent)
	Distance between fittings and indoor units	≥20 inches
	Distance between fittings and Y-branches	≥20 inches
	Distance between two Y-branches	≥20 inches
	Distance between Header and indoor units	≥20 inches
	Minimum distance between indoor unit to any Y-branch	3 feet from indoor unit to Y-branch
	Maximum distance between first Y-branch to farthest indoor unit	≤ 131 feet
Elevation (All Elevation Limitations are Measured in Actual Feet)	If water source unit is above or below indoor unit	≤ 98.4 feet
	Between any two indoor units	≤ 49 feet

Table 46: Equivalent Piping Length for Y-branches, Headers, and Typical Refrigeration Elbows.

Component	Size (Inches)													
	1/4	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	2-1/8
Elbow (ft.)	0.5	0.6	0.7	0.8	1.2	1.3	1.5	1.6	1.8	2.0	2.1	2.3	2.5	2.8
Y-branch (ft.)[1]	1.6													
Header (ft.)	3.3													

[1]Kit contains two Y-branches: one for liquid and one for vapor.

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REFRIGERANT PIPING DESIGN

Pipe Sizing

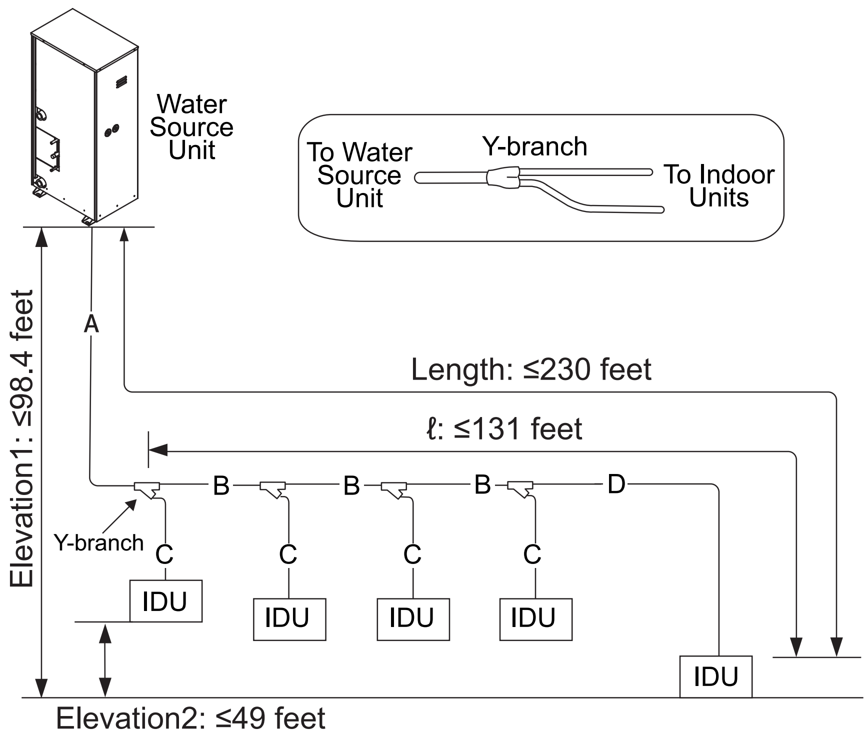
The following is an example of manual pipe size calculations. Designers are highly encouraged to use LATS instead of manual calculations.

Water Mini System Using Y-branches

Example: Five (5) indoor units connected

Water Source Units (WSU).
IDU: Indoor Units.
A: Main Pipe from Water Source Unit to Y-branch.
B: Y-branch to Y-branch.
C: Y-branch to Indoor Unit.
D: Y-branch to Farthest Indoor Unit.

⚠ Note:
Always reference the LATS Multi V software report.



⚠ Note:
See pages 71-72 for refrigerant pipe diameter and pipe length tables.

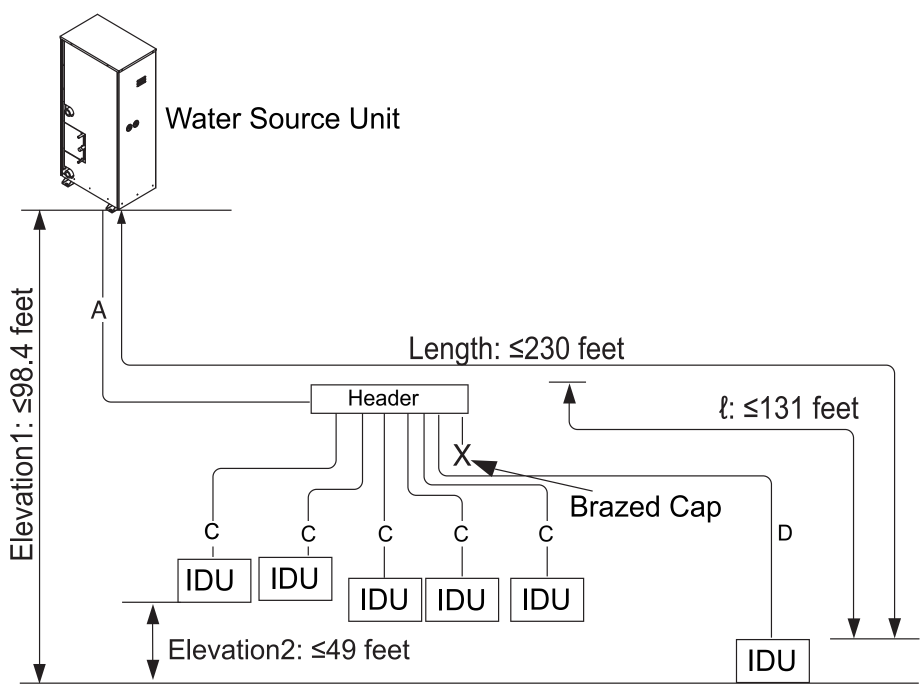
Water Mini System Using a Header

Example: Six (6) indoor units connected

Water Source Units (WSU).
IDU: Indoor Units.
Header.
A: Main Pipe from Water Source Unit to Header.
C: Header to Indoor Unit.
D: To Farthest Indoor Unit.

⚠ Note:

- *Indoor units should be installed at a lower position than the Header.*
- *Y-branch pipes cannot be used after Headers.*
- *Install the Header 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.*
- *Always reference the LATS Multi V software report.*



⚠ Note:
See pages 71-72 for refrigerant pipe diameter and pipe length tables.

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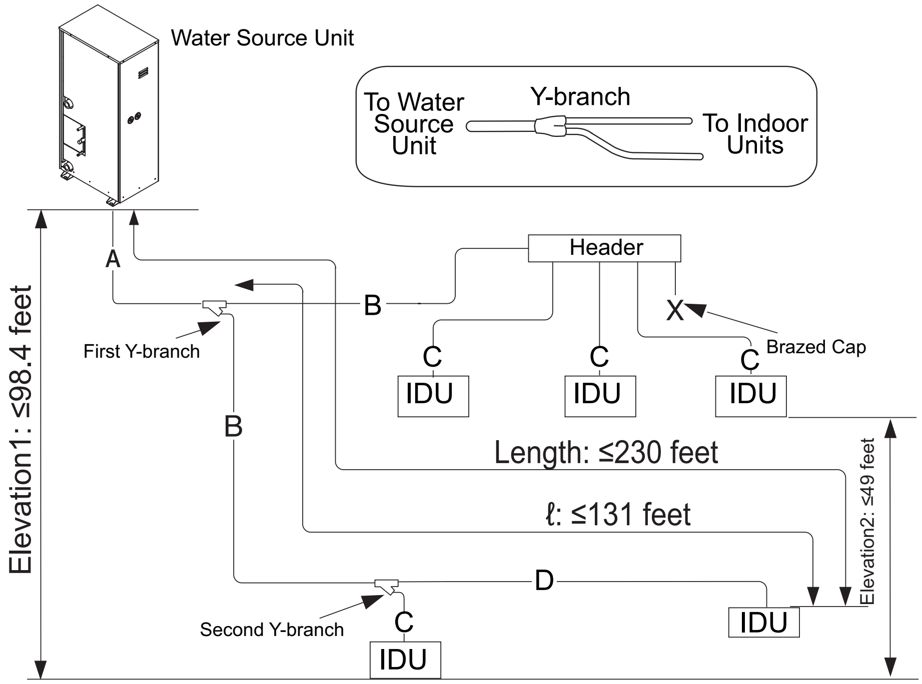
The following is an example of manual pipe size calculations. Designers are highly encouraged to use LATS instead of manual calculations.

Water Mini System Using Y-branches and Header

Example: Five (5) indoor units connected

Water Source Units (WSU).
IDU: Indoor Units.
Y-branches.
Header.
A: Main Pipe from First Y-branch.
B: Pipe from Y-branch to Y-branch or Header.
C: Pipe from Y-branch or Header to Indoor Unit.
D: Pipe to Farthest Indoor Unit.



⚠ Note:

- *Indoor units should be installed at a lower position than the Header.*
- *Y-branch pipes cannot be used after Headers.*
- *Install the Header 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.*
- *Always reference the LATS Multi V software report.*

Table 47: Pipe Capabilities.

Length	Total pipe length	Longest actual pipe length	Longest Equivalent pipe length[1]
	A + ΣB + ΣC + D ≤475.7 feet	A + B + D ≤230 feet	A + B + D ≤295.2 feet
ℓ	Longest pipe length after first branch		
	B + D ≤ 131 feet		
Elevation1	Elevation differential (Water source unit ↔ Indoor unit)		
	≤ 98.4 feet		
Elevation2	Elevation differential (Indoor unit ↔ Indoor unit)		
	≤ 49 feet		
Distance between fittings and indoor units	≥20 inches		
Distance between fittings and Y-branches	≥20 inches		
Distance between two Y-branches	≥20 inches		
Distance between Header and indoor units	≥20 inches		

[1]For calculation purposes, assume equivalent pipe length of Y-branch is 1.6 feet, and equivalent pipe length of header is 3.3 feet.

Table 48: Refrigerant Pipe Diameter (B) from Y-branch to Y-branch / Header.

Downstream Total Capacity of Indoor Units (Btu/h)	Liquid Pipe (Inches O.D.)	Vapor Pipe (Inches O.D.)
≤19,100	Ø1/4	Ø1/2
< 54,600	Ø3/8	Ø5/8
≤76,400	Ø3/8	Ø3/4

⚠ Note:

- *Connection piping from branch to branch cannot exceed the main pipe diameter (A) used by the water source unit.*
- *Y-branches and other header branches cannot be installed downstream of the initial header branch.*

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Pipe Sizing

The following is an example of manual pipe size calculations. Designers are highly encouraged to use LATS instead of manual calculations.

Selecting the Refrigerant Piping

Example: Five (5) indoor units connected

Water Source Units (WSU).

IDU: Indoor Units.

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

B: Branch Piping.

C: Branch Piping to Indoor Unit (IDU).

Figure 11: Selecting Refrigerant Piping.

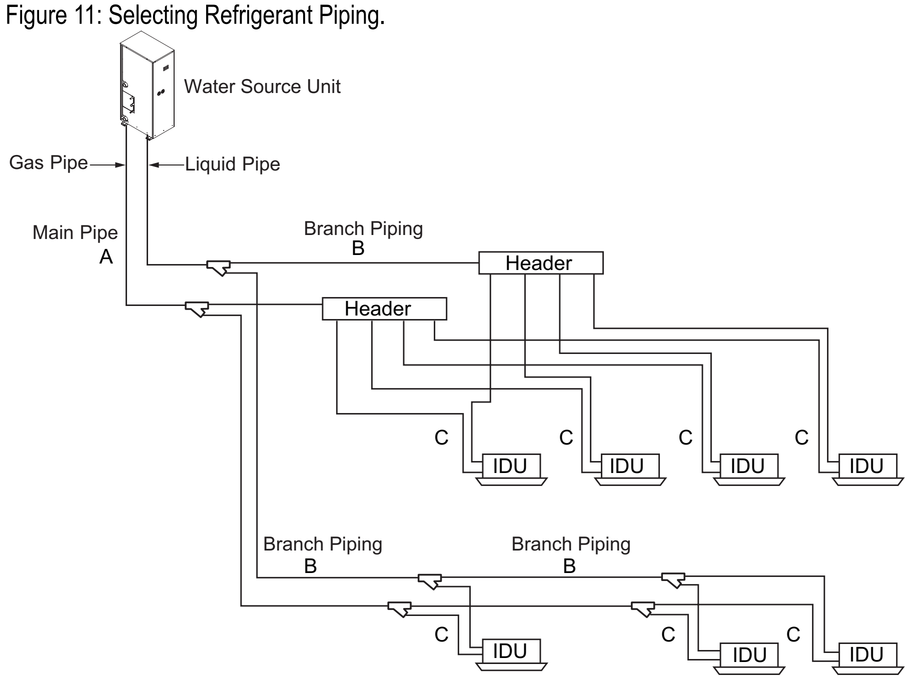

Table 49: Size of Main Pipe (A) (From Water Source Unit to Y-branches).

Water Source Unit Capacity (Btu/h)	Liquid Pipe (Inches O.D.)	Gas Pipe (Inches O.D.)
37,500	Ø3/8	Ø5/8
49,500	Ø3/8	Ø5/8
54,600	Ø3/8	Ø3/4

Table 50: Size of Branch Piping (B) to Branch Piping (B).

Indoor Unit Capacity (Btu/h)	Liquid Pipe (Inches O.D.)	Gas Pipe (Inches O.D.)
19,100	Ø1/4	Ø1/2
54,600	Ø3/8	Ø5/8
76,400	Ø3/8	Ø3/4

Table 51: Size of Branch Piping to Indoor Unit (C).

Indoor Unit Capacity (Btu/h)	Liquid Pipe (Inches O.D.)	Gas Pipe (Inches O.D.)
19,100	Ø1/4	Ø1/2
54,600	Ø3/8	Ø5/8

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Creating a Balanced Piping System

Unlike designing duct-work or chilled and hot water pipe systems where balancing dampers, ball valves, orifices, circuit setters, or other flow control devices can be installed to modify or balance the flow of cooling medium, these cannot be used in a VRF system. Therefore, variable refrigerant flow systems have to be designed to be "self balanced." Balanced liquid refrigerant distribution is solely dependent on the designer choosing the correct pipe size for each segment. Pipe sizing considerations include pipe length, pipe segment pressure drop relative to other pipe segments in the system, type and quantity of elbows, bends present, fitting installation orientation, and end use device elevation differences.

⚠ *Note:*

It is imperative the designer avoids creating excessive pressure drop. When liquid refrigerant is subjected to excessive pressure drop, liquid refrigerant will change state and "flash" to vapor. Vapor present in a stream of liquid refrigerant before reaching the electronic expansion valve (EEV) results in a loss of system control and causes damage to the valve. The pipe system must be designed in a manner that avoids the creation of unwanted vapor.

Refrigerant Piping System Verification

To ensure that the refrigerant piping design is suitable for the system, a LATS refrigerant piping design software report must be provided with every Multi V Water Mini order. Following the installation, if any changes or variations to the design were necessary, an "as-built" LATS piping design software report must be provided to LG prior to system commissioning.

Systems that are close to the standard application limits may be converted into a conditional application by field changes to pipe equivalent lengths. User should always check the LATS report actual pipe layout versus pipe limits. The user may want to increase pipe lengths when conditions close to the standard application limits are present, forcing increased pipe diameters seen in conditional applications to be used and avoiding pipe changes due to field installation variations.

⚠ *Note:*

Any field changes, such as re-routing, shortening or lengthening a pipe segment, adding or eliminating elbows and/or fittings, re-sizing, adding, or eliminating indoor units, changing the mounting height or moving the location of a device or fitting during installation on should be done with caution and ALWAYS VERIFIED in LATS MULTI V SOFTWARE before supplies are purchased or installed. Doing so ensures profitable installation, eliminates rework, and ensures easier system commissioning.

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1. Choose the location of the indoor units on the building drawing.

2. Choose the location of all Y-branch fittings and header fittings, if possible, and draw them on the building drawings. Verify that all fittings are positioned per the guideline limitations set forth in "Y-branch Kits" on page 75 and "Header Kits" on page 76.

3. Plan the route for interconnecting piping. Draw a one-line depiction of the pipe route chosen on the building drawings.

4. Calculate the actual length of each pipe segment and note it on the drawing.

5. Using the data obtained while selecting the system components on pages 78-79, list the nominal cooling capacity next to each indoor unit on the drawing.

6. Starting at the indoor unit located farthest from the water source unit, sum the connected nominal capacity of all indoor units served by the pipe segment for each branch and runout pipe. Record these values next to each segment on the drawing.

7. Use tables on pages 70-72 to determine the pipe size of the liquid and vapor lines of all pipes.

8. Starting at the indoor unit located farthest from the water source unit, sum the capacity of liquid line pipe segments located between the indoor unit(s) and each Y-branch fitting and header fitting. Record these values next to each Y-branch and header on the drawing.

9. Use tables on pages 70-72 to verify the pipe size of the liquid and vapor line(s) of all pipes.

10. Refer to Cut-Sheets, “Y-branch Kits” on page 89, and “Header Kits” on pages 90-91 to determine the part number of each Y-branch and header needed based on the connected downstream nominal capacity served.

11. Calculate the equivalent pipe length in feet of each pipe segment. Y-branch and header equivalent lengths should be totaled with the upstream segment only. Use equivalent pipe length data when it is provided with the field purchased fittings. If not available, use the data provided on page 69 to estimate the equivalent length of field-provided pipe and fittings for each segment. Y-branch and header equivalent lengths are also found in the Cut-Sheets on pages 89-91. Equivalent lengths should be totaled with the upstream segment only.

12. Verify if the equivalent pipe length complies with the limitations in “Multi V Water Mini Refrigerant Piping System Limitations” Table on page 69. If the limitations are exceeded, either reroute the pipe or change the location of the Y-branch fittings, header fittings, and / or indoor unit locations so the design conforms with all limitations.

13. If adjusted as per Step 12 above, verify again if the length of the design complies with the limitations set in “Multi V Water Mini Refrigerant Piping System Limitations” on page 69.

14. Verify that the manually sized pipe design is acceptable using LATS Multi V. When entering the length of pipe segments in LATS Multi V software, enter the equivalent pipe length. Account for the additional pressure drop created by elbows, valves, and other fittings present in each segment by adding their respective equivalent pipe length to the actual pipe length.

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REFRIGERANT PIPING DESIGN

LG Engineered Y-branch Kits and Header Kits

LG Y-branch and Header kits are highly engineered devices designed to evenly divide the flow of refrigerant, and are used to join one pipe segment to two or more segments.

No Substitutions
Only LG supplied Y-branch and Header fittings can be used to join one pipe segment to two or more segments. Third-party or field-fabricated Tee's, Y-fittings, Headers, or other branch fittings are not qualified for use with LG Multi V Water Mini systems. The only field-provided fittings allowed in a Multi V Water Mini piping system are 45° and 90° elbows.

LG Y-branch kits consist of:
- Y-branches (liquid line, vapor lines).
- Reducer fittings as applicable.
- Molded clam-shell type insulation covers.

LG Header kits consist of:
- Two Headers (one liquid line, one vapor line).
- Reducer fittings as applicable.
- Molded clam-shell type insulation covers.

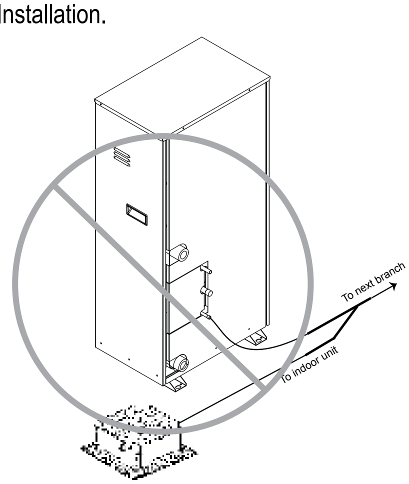
Y-Branch Kits

LG supplied Y-branches must be used at each transition. Field-supplied "T" fittings or "Y" branches are not acceptable. Each LG supplied Y-branch kit comes with two (2) Y-branches for indoor units, step-down pipe reducers, and insulation covers.

Y-branches may be installed in horizontal or vertical configurations. When installed vertically, position the Y-branch so the straight-through leg is ±3° of plumb. See Figure 13. When installed horizontally, position the Y-branch so the take-off leg is level and shares the same horizontal plane as the straight-through leg 5° rotation as shown in Figure 14.

There is no limitation on the number of Y-branches that can be installed, but there is a limitation on the number of indoor units connected to a single water source unit. See Table 43 on page 61.

Figure 16: Diagram of an Incorrect Y-branch Installation.



Y-branches should always be installed with the single port facing the water source unit, the two-port end facing indoor units (see Figure 12. Do not install Y-branches backwards as shown in Figure 16. Refrigerant flow cannot make U-turns through Y-branches. The first Y-branch kit must be located at least three (3) feet from the water source unit. Provide a minimum of 20 inches between a Y-branch and any other fittings or indoor unit piped in series.

It is recommended that when a Y-branch is located in a pipe chase or other concealed space, access doors should be provided for inspection access.

The equivalent pipe length of each Y-branch (1.6') must be added to each pipe segment entered into LATS piping design software.

Y-branch Insulation

Each Y-branch kit comes with clam-shell type peel-and-stick insulation jackets molded to fit the Y-branch fittings as shown in Figure 15—one for the liquid line, one for the vapor line.

- Check the fit of the Y-branch clam-shell insulation jacket after the Y-branch is installed.
- Mark the pipe where the insulation jacket ends.
- Remove the jacket.
- Install field-provided insulation on the three (3) pipes first.
- Peel the adhesive glue protector slip and install the clam-shell jacket over the fitting.

Figure 12: Y-branch Connections.

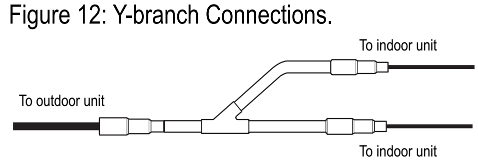


Figure 13: Y-branch Installation Alignment Specification.

Vertical up configuration. Vertical down configuration.

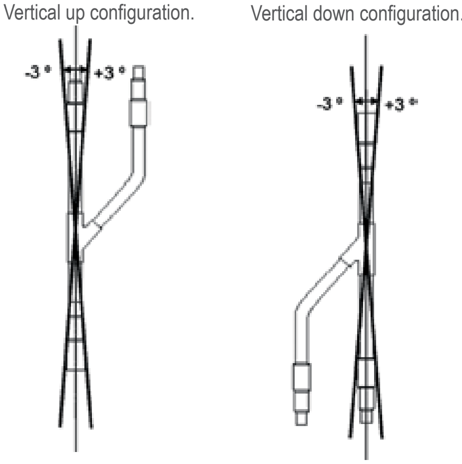


Figure 14: Horizontal Configuration End View.

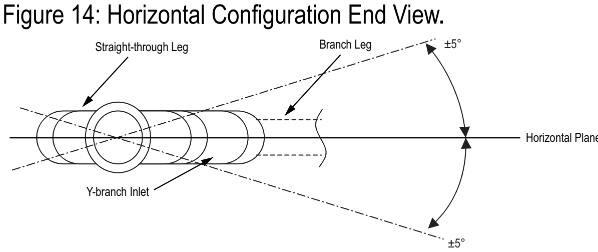
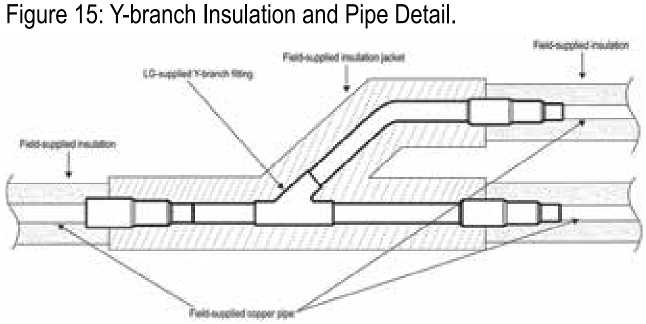


Figure 15: Y-branch Insulation and Pipe Detail.



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Header Kits

Note:

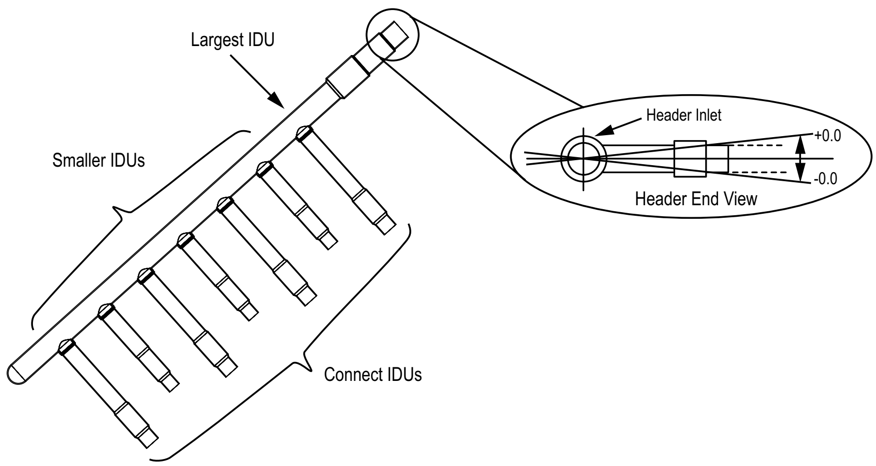
Install Correctly

- *Y-branches can be installed upstream between the Header and the water source unit, but a Y-branch cannot be installed between a header and an indoor unit.*
- *To avoid the potential of uneven refrigerant distribution through a header fitting, minimize the difference in equivalent pipe length between the header fitting and each connected indoor unit.*

Header kits are intended for use where multiple indoor units are in the same vicinity and it would be better to "home-run" the run-out pipes back to a centralized location. If connecting multiple indoor units that are far apart, Y-branches may be more economical. See pages 90-91 for Header kit specifications and capacities.

Y-branches can be installed upstream between the Header and the water source unit, but a Y-branch cannot be installed between a Header and an indoor unit. Headers must be installed in a horizontal and level position with the distribution ports of the fitting in the same horizontal plane as the straight-through branch as shown in Figure 17.

Figure 17: Header Kit—Horizontal Rotation Limit (Must be Installed Level with No Rotation).



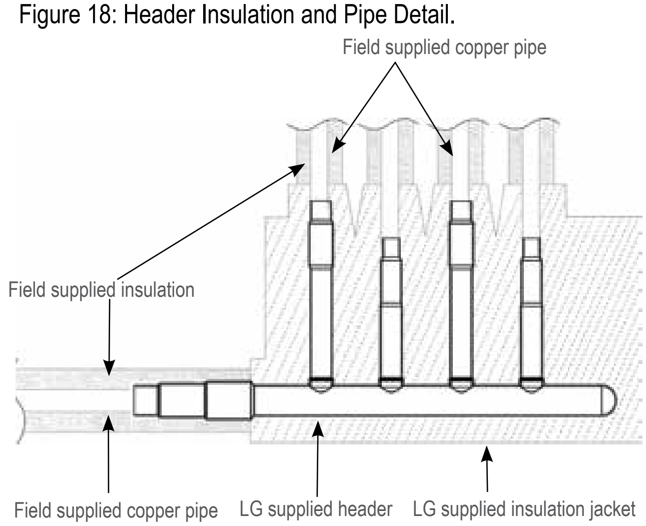
When connecting indoor units to a Header, always connect the unit with the largest nominal capacity to the port closest to the water source unit. Then install the next largest indoor unit to the next port, working down to the smallest indoor unit. Do not skip ports. See Figure 18.

All indoor units must be mounted at an elevation below the Header fitting. All indoor units connected to a single Header fitting should be located with an elevation difference between indoor units that does not exceed 49 feet. If indoor units are located at an elevation the same as or above the Header fitting, do not use a Header. Instead, install a Y-branch fitting between the water source unit and the Header fitting, and connect the elevated indoor unit to the Y-branch.

Header Insulation

Each Header kit comes with clam-shell type peel and stick insulation jackets molded to fit the Header fittings—one for the liquid line and one for the vapor line. See Figure 18.

Figure 18: Header Insulation and Pipe Detail.



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REFRIGERANT CHARGE

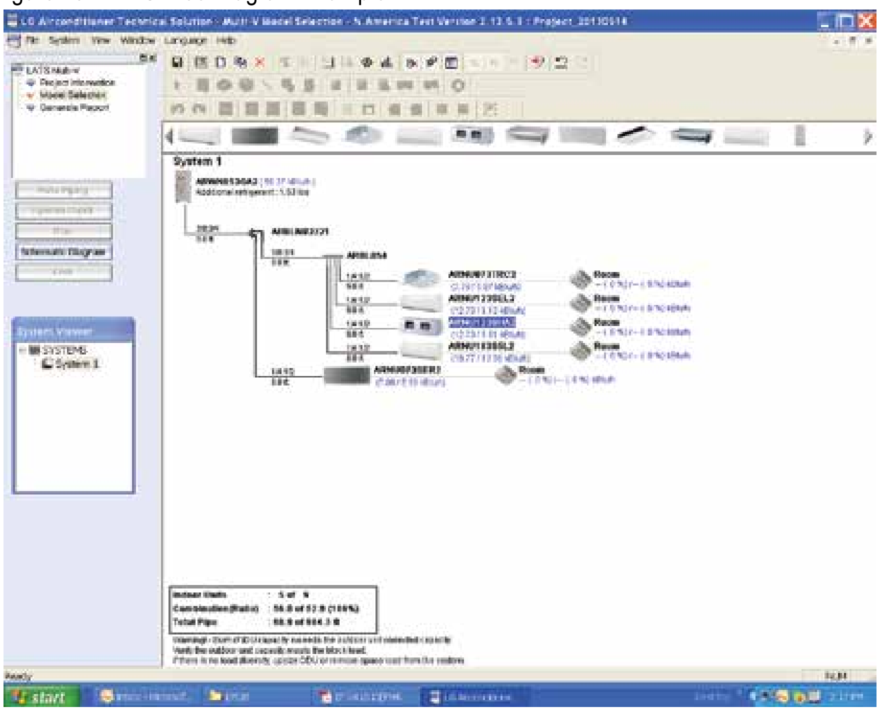
Refrigerant Charge Calculation

⚠ *Note:*
Consider refrigerant safety in all designs. Refer to “ASHRAE Standards Summary” on page 87 for information on ASHRAE Standards 15 and 34.

LG Multi V Water Mini units ship from the factory with a charge of R410A refrigerant. This charge serves as the base charge and will not be sufficient for the system to operate. A trim charge will need to be added after the system is installed that is based on system design. LATS Multi V piping design software will calculate the size of the refrigerant piping and calculate the refrigerant charge; this added trim refrigerant charge is shown on the LATS Multi V output.

The example LATS Multi V design software report below shows both the base charge and the calculated trim charge. The information used in the tables below are obtained from a LATS-generated report.

Figure 19: LATS Tree Diagram Example.



Determining the Total System Charge (Refer to Table 52)

1. Using the LATS Tree diagram, document the linear feet of straight liquid piping and the quantity and type of each fitting by pipe diameter into System Refrigerant Charge Calculator (page 78).

2. Calculate the total linear feet of liquid line piping in the system. It is imperative to know the “as-built” physical length of each segment of liquid line to calculate the total refrigerant charge required. An accurate “as built” field-verified piping diagram is required to verify within LATS that piping is within limits, proper pipe sizing, and refrigerant charge. Record the values on lines 1–7.

3. Count the number of indoor units. Group them by model type and nominal capacity as indicated in the description field on lines 8–33. Record the quantity of units in each group, multiply each by their specific correction factor, and add the sum in the Total (lbs.) column.

4. Sum the total values on lines 1-33 and place in the field labeled "Additional Refrigerant Charge Required" on line 34.

5. Record the quantity of each water source unit frame, and transfer its amount of Water Source Unit Factory Refrigerant Charge to the "Total" column.

6. Add the Additional Refrigerant Charge Required to the Water Source Unit Factory Refrigerant Charge. This is the Total System Charge. Record on line 36.

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REFRIGERANT CHARGE

Refrigerant Charge Calculation

Table 52: System 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	Wall Mounted + Art Cool Mirror	SE	7k to 15k		0.53	
9	Wall Mounted + Art Cool Mirror	S8, S5	18k to 24k		0.62	
10	1-Way Cassette	TJ	7k to 12k		0.44	
11	2-Way Cassette	TL	18k to 24k		0.35	
12	4-Way 2' x 2' Cassette	TR	5k to 7k		0.40	
13	4-Way 2' x 2' Cassette	TR	9k to 12k		0.55	
14	4-Way 2' x 2' Cassette	TQ	15k to 18k		0.71	
15	4-Way 3' x 3' Cassette	TN	9k to 15k		1.06	
16	4-Way 3' x 3' Cassette	TM	18k to 24k		1.41	
17	4-Way 3' x 3' Cassette	TP	24k to 28k		1.06	
18	4-Way 3' x 3' Cassette	TN	36k		1.41	
19	4-Way 3' x 3' Cassette	TM	42k to 48k		1.41	
20	High Static Ducted	BH	7k to 24k		0.57	
21	High Static Ducted	BG	15k to 42k		0.97	
22	High Static Ducted	BR	48k to 54k		1.37	
23	High Static Ducted	B8	76k to 95k		2.20	
24	Low Static Ducted, Low Static Ducted Bottom Return	B1, B3	7k to 15k		0.37	
25	Low Static Ducted, Low Static Ducted Bottom Return	B2, B4	18k to 24k		0.82	
26	Vertical / Horizontal Air Handling Unit	NJ	12k to 24k		1.04	
27	Vertical / Horizontal Air Handling Unit	NJ	30k		1.04	
28	Vertical / Horizontal Air Handling Unit	NJ	36k		1.57	
29	Vertical / Horizontal Air Handling Unit	NK	42k to 54k		2.00	
30	Ceiling Suspended	VJ	18k to 24k		0.77	
31	Convertible Surface Mount—Ceiling/Wall	VE	9k to 12k		0.22	
32	Floor Standing	CE (U)	7k to 15k		0.37	
33	Floor Standing	CF (U)	18k to 24k		0.82	
34	**Additional Refrigerant Charge Required**					
35a-c	Water Source Unit Factory Refrigerant Charge	36a ARWN038GA2	38,200		2.2	
		36b ARWN048GA2	47,800		2.2	
		36c ARWN053GA2	52,900		2.2	
36	**Total System Charge: Sum of Additional Refrigerant Charge Required and Total Factory Refrigerant Charge**					

[1]CF (Ref.) = Correction Factor for Refrigerant Charge.

[2]For refrigerant charge purposes, consider only the liquid line; ignore the vapor line(s).

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Table 53: Total Water Source Unit Refrigerant Charge.

Nominal Tons	Model Number	Refrigerant Charge
3.0	ARWN038GA2	2.2
4.0	ARWN048GA2	2.2
4.4	ARWN053GA2	2.2

Refrigerant Charge for Standard Conditions

Calculations for additional refrigerant charge should take into account piping length.

Product Charge (lbs.)

Additional Charge (lbs.) = Length (ft.) of Ø3/8-inch Liquid Pipe x 0.041 (lbs./ft.)
+ Length (ft.) of Ø1/4-inch Liquid Pipe x 0.015 (lbs./ft.)
+ Correction Factor of Water Source Unit
+ Correction Factor of Indoor Unit(s)

Total Charge (lbs.) = Product Charge (lbs.) + Additional Charge (lbs.)

⚠ Note:
If the result is a negative number, refrigerant does not need to be added.

Example: Four-Ton Water Source Unit.

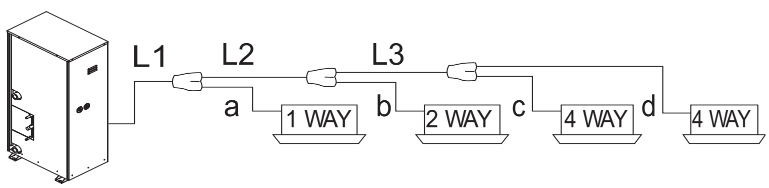

Table 54: Refrigerant Charge Example.

Piping Section	Piping Dia. (in.)	Piping Length (ft.)	Piping Section	Piping Dia. (in.)	Piping Length (ft.)
L1	Ø3/8	30	a	Ø3/8	9
L2	Ø3/8	30	b	Ø1/4	9
L3	Ø3/8	15	c	Ø1/4	12
			d	Ø1/4	15

Additional Refrigerant Charge Amount R (lbs.)
= (L_x x 0.015 [lbs. / ft.]) + (L_y x 0.041 [lbs. / ft.]) + Water Source Unit Correction Factor + Indoor Unit Correction Factor
= (36 x 0.015 [lbs. / ft.]) + (84 x 0.041[lbs. / ft.]) + 0 + 0.33 + 0.35 + 0.40 + 1.06
= 6.124
L_x: Actual Total Length of Liquid Piping Ø1/4 (ft.)
L_y: Actual Total Length of Liquid Piping Ø3/8 (ft.)

Table 55: Multi V Indoor Unit Correction Factors.

Indoor Unit Type	Capacity (Btu/h)												
	5k	7k	9k	12k	15k	18k	24k	28k	30k	36k	42k	48k	54k
Ceiling Concealed Ducted (Low Static)		0.37	0.37	0.37	0.37	0.82	0.82						
Ceiling Concealed Ducted (High Static)		0.57	0.57	0.57	0.57 0.97[1]	0.57 0.97[1]	0.57 0.97[1]	0.97		0.97	0.97	1.37	1.37
Wall Mounted (ART COOL Mirror)		0.53	0.53	0.53	0.53	0.62	0.62						
One-Way Ceiling Cassette		0.44	0.44	0.44									
Two-Way Ceiling Cassette						0.35	0.35						
Four-Way Ceiling Cassette	0.40	0.40	0.55 1.17[2]	0.55 1.17[2]	0.71 1.17[2]	0.71 1.48[2]	1.06 1.48[2]	1.06		1.41	1.41	1.41	
Floor Standing		0.37	0.37	0.37	0.37	0.82	0.82						
Convertible Surface Mounted			0.22	0.22									
Ceiling Suspended						0.77	0.77						
Vertical Air Handler Unit				1.04		1.04	1.04		1.04	1.57	2.00	2.00	2.00

[1]Use only ARNU153BGA2, ARNU183BGA2, and ARNU243BGA2.
[2]Use only ARNU093TPAA, ARNU123TPAA, ARNU153TPAA, ARNU183TNAA, and ARNU243TNAA.

⚠ Note:
Fill in the label on the water-source unit about the quantity of the fluorinated greenhouse gases:
1. Manufacturing site (See Model Name label).
2. Installation site (If possible, place next to the service ports for reference when adding or removing refrigerant during service or maintenance).
3. Total refrigerant charge (include any additional amount).

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INSTALLATION & LAYOUT BEST PRACTICES

Selecting Field-Supplied Copper Tubing

Copper is the only approved refrigerant pipe material for use with LG Multi V commercial air conditioning products, and LG recommends hard-drawn rigid type “K” or “L”, or annealed-tempered, copper pipe.

- Drawn temper (rigid) ACR copper tubing is available in sizes 3/8 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).
- Annealed temper (soft) ACR copper tubing is available in sizes 1/4 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).

Tube wall thickness should meet local code requirements and be approved for an operating pressure of 551 psi. If local code does not specify wall thickness, LG suggests using tube thickness per table below. When bending tubing, use the largest radii possible to reduce the equivalent length of installed pipe; also, bending radii greater than ten (10) pipe diameters can minimize pressure drop. Be sure no traps or sags are present when rolling out soft copper tubing coils.

Table 56: ACR Copper Tubing Material.

Type	Seamless Phosphorous Deoxidized
Class	UNS C12200 DHP
Straight Lengths	H58 Temper
Coils	O60 Temper

Table 57: Piping Tube Thicknesses.

OD. (in.)	1/4	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8
Material	Rigid Type “K” or “L” and Soft ACR Acceptable			Rigid Type “K” or “L” Only					
Min. Bend Radius (in.)	.563	.9375	1.5	2.25	3.0	3.0	3.5	4.0	4.5
Min. Wall Thickness (in.)	.030	.030	.035	.040	.042	.045	.050	.050	.050

Copper Expansion and Contraction

Under normal operating conditions, the vapor pipe temperature of a Multi V Water Mini system can vary as much as 280°F. With this large variance in pipe temperature, the designer must consider pipe expansion and contraction to avoid pipe and fitting fatigue failures.

Refrigerant pipe along with the insulation jacket form a cohesive unit that expands and contracts together. During system operation, thermal heat transfer occurs between the pipe and the surrounding insulation.

If the pipe is mounted in free air space, no natural restriction to movement is present if mounting clamps are properly spaced and installed. When the refrigerant pipe is mounted underground in a utility duct stacked among other pipes, natural restriction to linear movement is present. In extreme cases, the restrictive force of surface friction between insulating jackets could become so great that natural expansion ceases and the pipe is “fixed” in place. In this situation, opposing force caused by change in refrigerant fluid/vapor temperature can lead to pipe/fitting stress failure.

The refrigerant pipe support system must be engineered to allow free expansion to occur. When a segment of pipe is mounted between two fixed points, provisions must be provided to allow pipe expansion to naturally occur. The most common method is the inclusion of expansion Loop or U-bends. See Figure 20 on page 82. Each segment of pipe has a natural fixed point where no movement occurs. This fixed point is located at the center point of the segment assuming the entire pipe is insulated in a similar fashion. The natural fixed point of the pipe segment is typically where the expansion Loop or U-bend should be. Linear pipe expansion can be calculated using the following formula:

$LE = C \times L \times (T_r - T_a) \times 12$

LE	=	Anticipated linear tubing expansion (in.)
C	=	Constant (For copper = 9.2×10^{-6} in./in.°F)
L	=	Length of pipe (ft.)
T_R	=	Refrigerant pipe temperature (°F)
T_a	=	Ambient air temperature (°F)
12	=	Inches to feet conversion (12 in./ft.)

1. From Table 46, find the row corresponding with the actual length of the straight pipe segment.
2. Estimate the minimum and maximum temperature of the pipe. In the column showing the minimum pipe temperature, look up the anticipated expansion distance. Do the same for the maximum pipe temperature.
3. Calculate the difference in the two expansion distance values. The result will be the anticipated change in pipe length.

General Example:

A Multi V system is installed and the design shows that there is a 260 feet straight segment of tubing between a Y-branch and an indoor unit. In heating, this pipe transports hot gas vapor to the indoor units at 120°F. In cooling, the same tube is a suction line returning refrigerant vapor to the outdoor unit at 40°F. Look up the copper tubing expansion at each temperature and calculate the difference.

Vapor Line

Transporting Hot Vapor: 260 ft. pipe at 120°F = 3.64 in.
Transporting Suction Vapor: 260 ft. pipe at 40°F = 1.04 in.
Anticipated Change in Length: 3.64 in. – 1.04 in. = 2.60 in.

Liquid Line

The liquid temperature remains the same temperature; only the direction of flow will reverse. Therefore, no significant change in length of the liquid line is anticipated.

When creating an expansion joint, the joint height should be a minimum of two times the joint width. Although different types of expansion arrangements are available, the data for correctly sizing an Expansion Loop is provided in Table 59. Use soft copper with long radius bends on longer runs or long radius elbows for shorter pipe segments. Using the anticipated linear expansion (LE) distance calculated, look up the Expansion Loop or U-bend minimum design dimensions. If other types of expansion joints are chosen, design per ASTM B-88 Standards.

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Table 58: Linear Thermal Expansion of Copper Tubing in Inches.

Pipe Length[1]	Fluid Temperature °F																			
	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°	130°
10	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.13	0.14	0.15	0.15
20	0.08	0.08	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.26	0.28	0.29	0.30
30	0.12	0.12	0.15	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.33	0.32	0.35	0.39	0.42	0.44	0.45
40	0.16	0.16	0.20	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.43	0.46	0.52	0.56	0.58	0.60
50	0.20	0.20	0.25	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.54	0.58	0.65	0.70	0.73	0.75
60	0.24	0.24	0.30	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.65	0.69	0.78	0.84	0.87	0.90
70	0.28	0.28	0.35	0.42	0.46	0.49	0.53	0.56	0.60	0.63	0.67	0.70	0.74	0.77	0.76	0.81	0.91	0.98	1.02	1.05
80	0.32	0.32	0.40	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.86	0.92	1.04	1.12	1.16	1.20
90	0.36	0.36	0.45	0.54	0.59	0.63	0.68	0.72	0.77	0.81	0.86	0.90	0.95	0.99	0.97	1.04	1.17	1.26	1.31	1.35
100	0.40	0.40	0.50	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.08	1.15	1.30	1.40	1.45	1.50
120	0.48	0.48	0.60	0.72	0.78	0.84	0.90	0.96	1.02	1.08	1.14	1.20	1.26	1.32	1.30	1.38	1.56	1.68	1.74	1.80
140	0.56	0.56	0.70	0.84	0.91	0.98	1.05	1.12	1.19	1.26	1.33	1.40	1.47	1.54	1.51	1.61	1.82	1.96	2.03	2.10
160	0.64	0.64	0.80	0.96	1.04	1.12	1.20	1.28	1.36	1.44	1.52	1.60	1.68	1.76	1.73	1.84	2.08	2.24	2.32	2.40
180	0.72	0.72	0.90	1.08	1.17	1.26	1.35	1.44	1.53	1.62	1.71	1.80	1.89	1.98	1.94	2.07	2.34	2.52	2.61	2.70
200	0.80	0.80	1.00	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.16	2.30	2.60	2.80	2.90	3.00
220	0.88	0.88	1.10	1.32	1.43	1.54	1.65	1.76	1.87	1.98	2.09	2.20	2.31	2.42	2.38	2.53	2.86	3.08	3.19	3.30
240	0.96	0.96	1.20	1.44	1.56	1.68	1.80	1.92	2.04	2.16	2.28	2.40	2.52	2.64	2.59	2.76	3.12	3.36	3.48	3.60
260	1.04	1.04	1.30	1.56	1.69	1.82	1.95	2.08	2.21	2.34	2.47	2.60	2.73	2.86	2.81	2.99	3.38	3.64	3.77	3.90
280	1.12	1.12	1.40	1.68	1.82	1.96	2.10	2.24	2.38	2.52	2.66	2.80	2.94	3.08	3.02	3.22	3.64	3.92	4.06	4.20
300	1.20	1.20	1.50	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	3.00	3.15	3.30	3.24	3.45	3.90	4.20	4.35	4.50
320	1.28	1.28	1.60	1.92	2.08	2.24	2.40	2.56	2.72	2.88	3.04	3.20	3.36	3.52	3.46	3.68	4.16	4.48	4.64	4.80
340	1.36	1.36	1.70	2.04	2.21	2.38	2.55	2.72	2.89	3.06	3.23	3.40	3.57	3.74	3.67	3.91	4.42	4.76	4.93	5.10
360	1.44	1.44	1.80	2.16	2.34	2.52	2.70	2.88	3.06	3.24	3.42	3.60	3.78	3.96	3.89	4.14	4.68	5.04	5.22	5.40
380	1.52	1.52	1.90	2.28	2.47	2.66	2.85	3.04	3.23	3.42	3.61	3.80	3.99	4.18	4.10	4.37	4.94	5.32	5.51	5.70
400	1.60	1.60	2.00	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80	4.00	4.20	4.40	4.32	4.60	5.20	5.60	5.80	6.00
420	1.68	1.68	2.10	2.52	2.73	2.94	3.15	3.36	3.57	3.78	3.99	4.20	4.41	4.62	4.54	4.83	5.46	5.88	6.09	6.30
440	1.76	1.76	2.20	2.64	2.86	3.08	3.30	3.52	3.74	3.96	4.18	4.40	4.62	4.84	4.75	5.06	5.72	6.16	6.38	6.60
460	1.84	1.84	2.30	2.76	2.99	3.22	3.45	3.68	3.91	4.14	4.37	4.60	4.83	5.06	4.97	5.29	5.98	6.44	6.67	6.90
480	1.92	1.92	2.40	2.88	3.12	3.36	3.60	3.84	4.08	4.32	4.56	4.80	5.04	5.28	5.18	5.52	6.24	6.72	6.96	7.20
500	2.00	2.00	2.50	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.40	5.75	6.50	7.00	7.25	7.50

[1]Pipe length baseline temperature = 0°F. "Expansion of Carbon, Copper and Stainless Steel Pipe," *The Engineers' Toolbox*, www.engineeringtoolbox.com.

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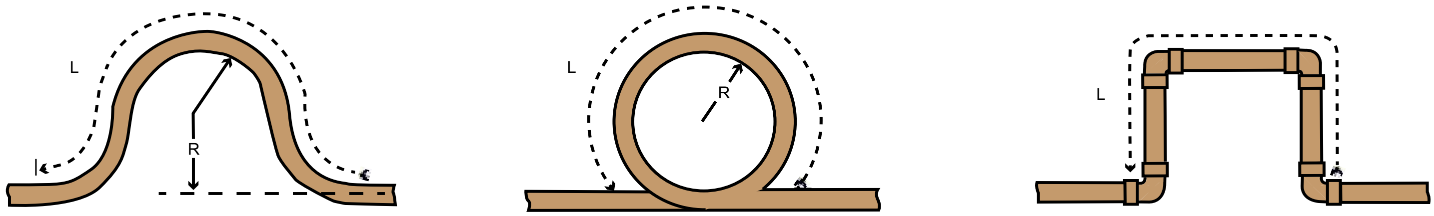
Selecting Field-Supplied Copper Tubing

Figure 20: Coiled Expansion Loops and Offsets.



Large Tubing U-bend (>3/4 in.) Loop Small Tubing U-bend (<3/4 in.)

Table 59: Radii of Coiled Expansion Loops and Developed Lengths of Expansion Offsets.

Anticipated Linear Expansion (LE) (inches)		Nominal Tube Size (O.D.) inches						
		1/4	3/8	1/2	3/4	1	1-1/4	1-1/2
1/2	R[1]	6	7	8	9	11	12	13
	L[2]	38	44	50	59	67	74	80
1	R[1]	9	10	11	13	15	17	18
	L[2]	54	63	70	83	94	104	113
1-1/2	R[1]	11	12	14	16	18	20	22
	L[2]	66	77	86	101	115	127	138
2	R[1]	12	14	16	19	21	23	25
	L[2]	77	89	99	117	133	147	160
2-1/2	R[1]	14	16	18	21	24	26	29
	L[2]	86	99	111	131	149	165	179
3	R[1]	15	17	19	23	26	29	31
	L[2]	94	109	122	143	163	180	196
3-1/2	R[1]	16	19	21	25	28	31	34
	L[2]	102	117	131	155	176	195	212
4	R[1]	17	20	22	26	30	33	36
	L[2]	109	126	140	166	188	208	226

[1]R = Centerline Length of Pipe.
[2]L = Centerline Minimum Radius (inches).

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Definitions

Main: The piping segment between the water source unit and the first Y-branch.

Branch: A segment of pipe between two Y-branches.

Run-out: The segment of pipe connecting an indoor unit to a Y-branch.

Physical Pipe Length: Actual length of straight segment(s) of pipe.

Equivalent Pipe Length: Actual length of pipe plus equivalent lengths of elbows, Y-branches, and valves.

Layout Procedure

1. Draft a one-line diagram of the proposed piping system connecting the water source unit to the indoor units. Follow the pipe limitations listed on page 71.
2. Calculate the physical length of each pipe segment and note it on the drawing.
3. Calculate the equivalent pipe length of each pipe segment.
4. Input the pipe lengths into the LATS software and perform “Auto Pipe Sizing” check and “System Check”. LATS will automatically calculate pipe sizes.

Using Elbows

Field-supplied elbows are acceptable as long as they are designed for use with R410A refrigerant. The designer, however, should be cautious with the quantity and size of fittings used, and must account for the additional pressure losses in equivalent pipe length calculation for each branch. The equivalent pipe length of each elbow must be added to each pipe segment in the LATS program. See Table 46 for equivalent lengths.

Field-Provided Isolation Ball Valves

LG recommends installing field-supplied ball valves with Schrader ports at each indoor unit. Full-port isolation ball valves with Schrader ports (positioned between valve and indoor unit) rated for use with R410A refrigerant may be used on both the liquid and vapor lines.

If valves are not installed and a single indoor unit needs to be removed or repaired, the entire system must be shut down and evacuated. If isolation ball valves are installed, and an indoor unit needs to be repaired, the unaffected indoor units can remain operational with readdressing and the proper combination ratio (See “Determine the System Combination Ratio [CR]” on page 60). Reclamation of refrigerant, then, can be restricted to a single indoor unit.

Position valves with a minimum distance of three (3) to six (6) inches of pipe on either side of the valve, and placed between six (6) and twelve (12) inches from the first upstream Y-branch or header. If ball valves are installed away from the first upstream Y-branch or header and closer to the indoor unit, oil may accumulate where it cannot be returned to the water source unit and may cause a shortage of oil in the compressor.

Valves shall be easily accessible for service. If necessary, install drywall access doors or removable ceiling panels, and position the valves to face the access door or ceiling panel opening. Mount valves with adequate space between them to allow for placement of adequate pipe insulation around the valves. Recommended best practice is to clearly label and document locations of all service valves, Y-branches, and headers. The equivalent pipe length of each ball valve must be added to each pipe segment entered into LATS program. See Table 46 for equivalent lengths of ball valves.

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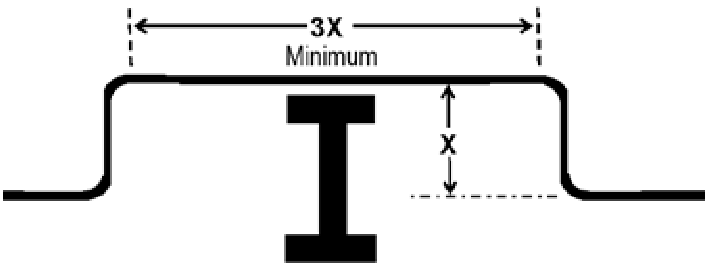
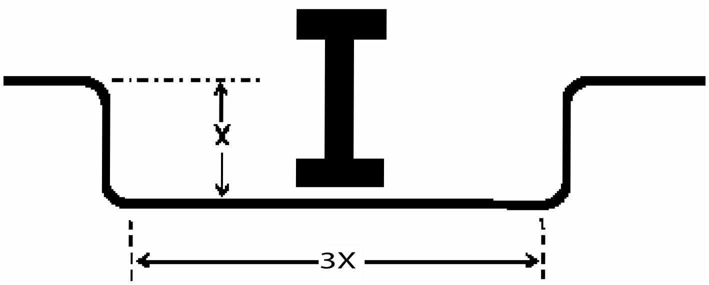
Obstacles

When an obstacle, such as an I-beam or concrete T, is in the path of the planned refrigerant pipe run, it is best practice to route the pipe over the obstacle. If adequate space is not available to route the insulated pipe over the obstacle, then route the pipe under the obstacle. In either case, it is imperative the horizontal section of pipe above or below the obstacle be a minimum of three (3) times greater than the longest vertical rise (or fall) distance.

Figure 21: Installing Piping Above and Below an Obstacle.



Above an obstacle.



Below an obstacle.

Pipe Slope

The horizontal pipe slope cannot exceed 5° up or down.

In-line Refrigeration Components

Components such as oil traps, solenoid valves, filter-dryers, sight glasses, tee fittings, and other after-market accessories are not permitted on the refrigerant piping system between the water source units and the indoor units.

Multi V Water Mini systems are provided with redundant systems that assure oil is properly returned to the compressor. Sight-glasses and solenoid valves may cause vapor to form in the liquid stream. Over time, dryers may deteriorate and introduce debris into the system.

The designer and installer should verify the refrigerant piping system is free of traps, sagging pipes, sight glasses, filter dryers, etc.

No Pipe Size Substitutions

Use only the pipe size selected by the LATS Multi V pipe system design software. Using a different size may result in a system malfunction or failure to operate at all.

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Pipe Supports

A properly installed pipe system should be adequately supported to avoid pipe sagging. Sagging pipes become oil traps that lead to equipment malfunction.

Pipe supports should never touch the pipe wall; supports shall be installed outside (around) the primary pipe insulation jacket (see Figure 22). Insulate the pipe first because pipe supports shall be installed outside (around) the primary pipe insulation jacket. Clevis hangers should be used with shields between the hangers and insulation. Field-provided pipe supports should be designed to meet local codes. If allowed by code, use fiber straps or split-ring hangers suspended from the ceiling on all-thread rods (fiber straps or split ring hangers can be used as long as they do not compress the pipe insulation). Place a second layer of insulation over the pipe insulation jacket to prevent chafing and compression of the primary insulation within the confines of the support pipe clamp.

A properly installed pipe system will have sufficient supports to avoid pipes from sagging during the life of the system. As necessary, place supports closer for segments where potential sagging could occur. Maximum spacing of pipe supports shall meet local codes.

If local codes do not specify pipe support spacing, pipe shall be supported:

- Maximum of five feet (5') on center for straight segments of pipe up to 3/4" outside diameter size.
- Maximum of six feet (6') on center for pipe up to one inch (1") outside diameter size.
- Maximum of eight feet (8') on center for pipe up to two inches (2") outside diameter size.

Wherever the pipe changes direction, place a hanger within twelve (12) inches on one side and within twelve to nineteen (12 to 19) inches of the bend on the other side as shown in Figure 23. Support piping at indoor units as shown in Figure 24. Support Y-branch and Header fittings as shown in Figures 25 and 26.

Figure 22: Pipe Hanger Details.

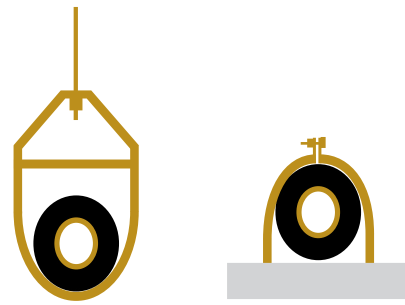


Figure 23: Typical Pipe Support Location—Change in Pipe Direction.

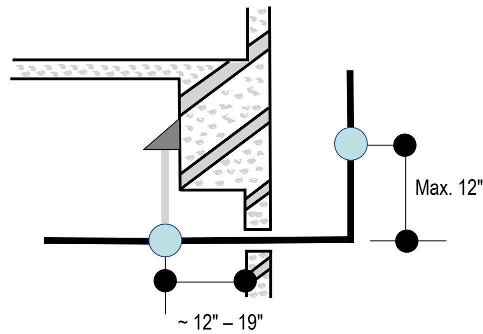


Figure 24: Pipe Support at Indoor Unit.

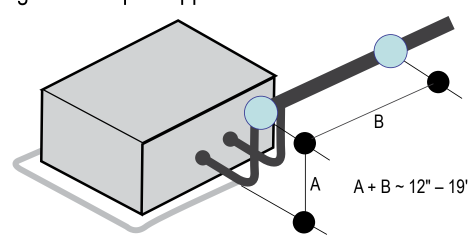


Figure 25: Pipe Support at Y-branch Fitting.

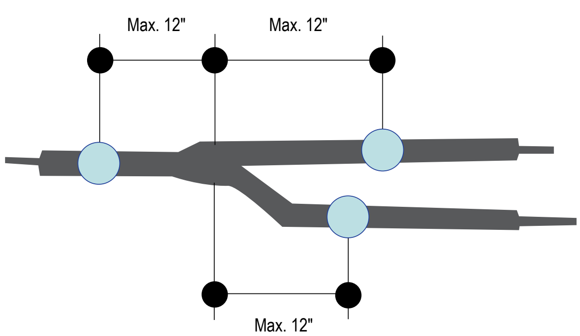
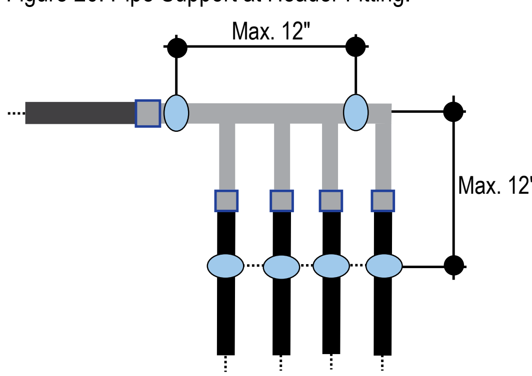


Figure 26: Pipe Support at Header Fitting.



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Refrigerant Piping System Layout

⚠ *Note:*
Avoid Pipe Damage
- *When routing field-provided piping, take care to avoid causing damage due to vibration.*
- *Correctly route the piping so it does not make contact with the compressor casing, terminal cover, or mounting bolts. Allow room for field installation.*
- *Properly insulate the liquid and vapor lines separately up to the point of connection inside the confines of the unit frame.*
- *See Table 60 for water source unit connection types.*

Refrigerant piping is connected through the access holes on the front panel of the Multi V Water Mini unit.
- Use nitrogen at 2.8 psi flow during welding.
- If nitrogen was not used during welding, oxidized contaminants may build inside the piping and effect valve and condenser operation.

Figure 27: Refrigerant Pipe Connections.

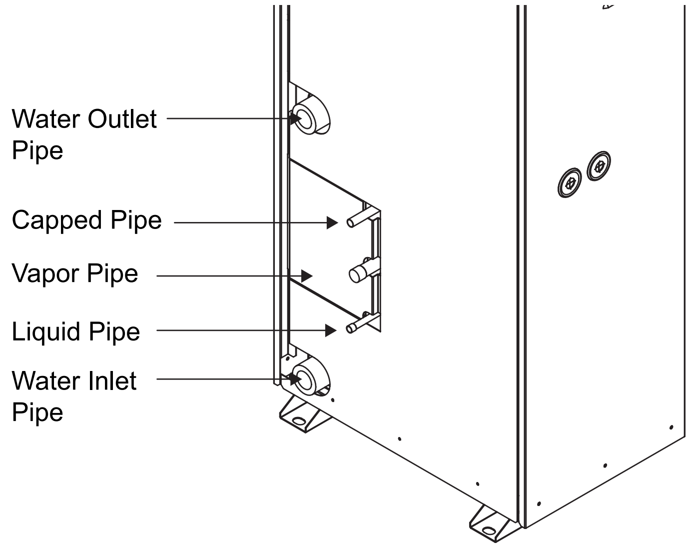


Table 60: Pipe Connections.

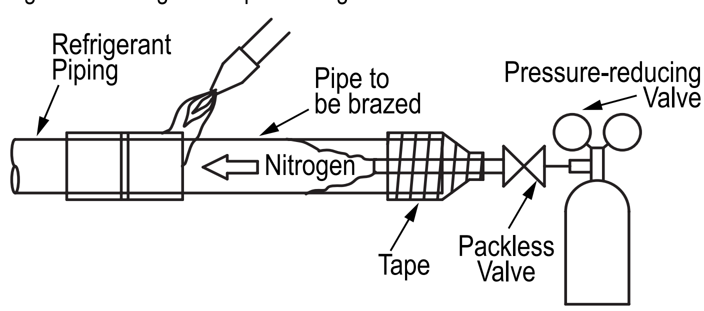
Model No.	Liquid Pipe Connection (Inches)	Vapor Pipe Connection (Inches)	Water Inlet Pipe Connection (Inches)	Water Outlet Pipe Connection (Inches)
ARWN038GA2	3/8	3/4	1-1/4	1-1/4
ARWN048GA2	3/8	3/4	1-1/4	1-1/4
ARWN053GA2	3/8	3/4	1-1/4	1-1/4

Installation of Refrigerant Piping / Brazing Practices

⚠ *Note:*
It is imperative to keep the piping system free of contaminants and debris such as copper burrs, slag, or carbon dust during installation.

1. All joints are brazed in the field. Multi V Water Mini refrigeration system components contain very small capillary tubes, small orifices, electronic expansion valves, oil separators, and heat exchangers that can easily become blocked. Proper system operation depends on the installer using best practices and utmost care while assembling the piping system.
   - Store pipe stock in a dry place; keep stored pipe capped and clean.
   - Blow clean all pipe sections with dry nitrogen before assembly.

Figure 28: Refrigerant Pipe Brazing.



2. Proper system operation depends on the installer using best practices and the utmost care while assembling the piping system.
   - Use adapters to assemble different sizes of pipe.
   - Do not use flux, soft solder, or anti-oxidant agents.
   - Use a tubing cutter, do not use a saw to cut pipe. De-bur and clean all cuts before assembly.
3. Brazing joints:
   - Use a dry nitrogen purge operating at a minimum pressure of three (3) psig and maintain a steady flow.
   - Use a 15% silver phosphorous copper brazing alloy to avoid overheating and produce good flow.
   - Protect isolation valves, electronic expansion valves, and other heat-sensitive control components from excessive heat with a wet rag or heat barrier spray.

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Refrigerant Safety Standards

ASHRAE Standards 15-2010 and 34-2010 address refrigerant safety and the maximum allowable concentration of refrigerant in an occupied space. Refrigerant will dissipate into the atmosphere, but a certain volume of air is required to safely dissipate the refrigerant. For R410A refrigerant, the maximum allowable concentration of refrigerant is 26 lbs./1,000 cubic feet of occupied spaces. Buildings with 24-hour occupancy allow half of that concentration.[1]

If a VRF system develops a refrigerant leak, the entire refrigerant charge of the system will dump into the area where the leak occurs. To meet ASHRAE Standards 15-2010 and 34-2010, the smallest room volume on the system must be calculated and compared to the maximum allowable concentration. If the concentration level is higher than allowed, the following are some design suggestions to eliminate the problem:

• Add transfer grilles in the ceiling or walls of the smaller rooms to increase the volume of the room.

• Remove the smallest space from the system and serve it with a smaller mini-split system.

[1]Information about ASHRAE Standard 15-2010 / 34-2010 and addenda current as of the date of this publication.

Refrigerant Piping System Insulation

All refrigerant piping including Y-branch and Header connections, field-provided isolation ball valves, service valves, and elbows must be completely insulated using closed cell pipe insulation.

To prevent heat loss/heat gain through the refrigerant piping, all refrigerant piping including liquid lines and vapor lines shall be insulated separately. Insulation must be a minimum 1/2" thick, and thickness may need to be increased based on ambient conditions and local codes.

All insulation joints shall be glued with no air gaps. Insulation material must fit snugly against the refrigeration pipe with no air space between it and the pipe. Also, ensure that there is no gap in the joint between the indoor unit and the insulation material. Insulation passing through pipe hangers, inside conduit, and/or sleeves must not be compressed. Protect insulation inside hangers and supports with a second layer. All pipe insulation exposed to the sun and outdoor elements shall be properly protected with PVC, aluminum vapor barrier, or alternatively placed in a weather-resistant enclosure such as a pipe rack with a top cover; and meet local codes. Pay special attention to insulating the pipes installed in the ceiling plenum.

LG-provided Y-branches are shipped from the factory with pre-formed peel-and-stick foam insulation jackets, with a 1.84 lb./ft.^{3} density, 1/2" thickness, and meet UL94 MF-1 flammability.

The design engineer should perform calculations to determine if the factory-supplied insulation jackets are sufficient to meet local codes and avoid sweating. Maximum refrigerant piping temperature is +227°F; minimum refrigerant piping temperature is -4°F. Add additional insulation if necessary. Check the fit of the insulation jacket after the header fitting and all run-out pipes are installed. Mark all pipes at the point where the insulation jacket ends. Remove the jacket. Install field provided insulation on the run-out and main trunk pipes first. Install the LG-provided insulation plugs on the ends of all unused header ports. Peel the adhesive glue protector slip from the insulation jacket and install the clam-shell jacket over the fitting.

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Minimum Refrigerant Pipe Ethylene Propylene Diene Methylene (EPDM) Insulation Wall Thickness Requirements

⚠ Note:

Follow locals codes when selecting EPDM insulation wall thickness.

Table 61: Insulation Guidelines for Typical and Special Circumstances.

<table>
<tr><th colspan="2" rowspan="2">Classification</th><th colspan="2">Air-conditioned location</th><th colspan="2">Non-air conditioned location</th></tr>
<tr><th>1. Typical location</th><th>2. Special location</th><th>3. Typical location</th><th>4. Special location</th></tr>
<tr><td rowspan="3">Liquid pipe</td><td>ø1/4 inches</td><td rowspan="2">1/2 inches</td><td rowspan="2">1/2 inches</td><td rowspan="2">1/2 inches</td><td rowspan="2">1/2 inches</td></tr>
<tr><td>ø3/8 inches</td></tr>
<tr><td>≥ø1/2 inches</td><td>1/2 inches</td><td>1/2 inches</td><td>1/2 inches</td><td>1/2 inches</td></tr>
<tr><td rowspan="11">Vapor pipe</td><td>ø3/8 inches</td><td rowspan="6">1/2 inches</td><td rowspan="7">3/4 inches</td><td rowspan="7">3/4 inches</td><td rowspan="11">1 inch</td></tr>
<tr><td>ø1/2 inches</td></tr>
<tr><td>ø5/8 inches</td></tr>
<tr><td>ø3/4 inches</td></tr>
<tr><td>ø7/8 inches</td></tr>
<tr><td>ø1 inch</td></tr>
<tr><td>ø1-1/8 inches</td><td rowspan="5">3/4 inches</td></tr>
<tr><td>ø1-1/4 inches</td><td rowspan="4">1 inches</td><td rowspan="4">1 inch</td></tr>
<tr><td>ø1-3/8 inches</td></tr>
<tr><td>ø1-1/2 inches</td></tr>
<tr><td>ø1-3/4 inches</td></tr>
</table>

1. Typical location: When the piping passes through an indoor area where the indoor unit operates.

• Apartment, classroom, office, mall, hospital, etc.

2. Special location

1. When the location is air conditioned, but there is severe temperature/humidity difference due to high ceilings

• Church, auditorium, theater, lobby, etc.

2. When the location is air conditioned, but internal temperature/humidity are high

• Bathroom, swimming pool, locker room, etc.

3. Typical location: When the piping passes through an indoor area where the indoor unit does not operate.

• Hallway or a dormitory or school, etc.

4. Substandard condition: If conditions 1 and 2 below are present.

1. When the piping passes through an indoor area where the indoor unit does not operate.
2. When the humidity is high and there is no air flow in the location where the piping is installed.
    • The thickness of the above insulation material is based on heat conductivity of 0.61 Btu/in/h/ft^2/°F.

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- LG indoor unit Y-branch fittings must be used with LG systems and be properly installed following the instructions in the applicable LG manual. Field-supplied branch fittings are not permitted.
- Kit components must be kept free of debris and dry before installation.
- All Y-branch kits include a clam shell, peel-and-stick insulation jacket.

⚠ Note:

- *Design pressure is 551 psig.*
- *All dimensions in inches. Tolerance ±1/4 inch.*
- *Images are not to scale.*

Table 62: Nominal Capacity Range (Btu/h).

Model	Fitting Capacity
ARBLN01621	≤72,000 connected capacity
ARBLN03321	≤144,000 connected capacity

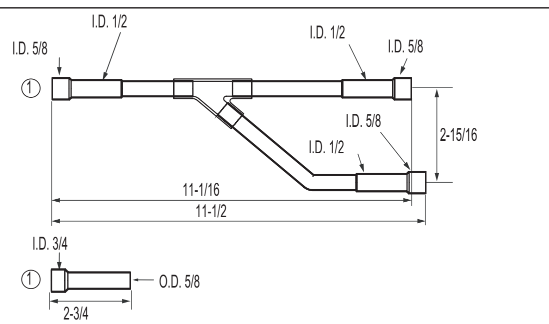
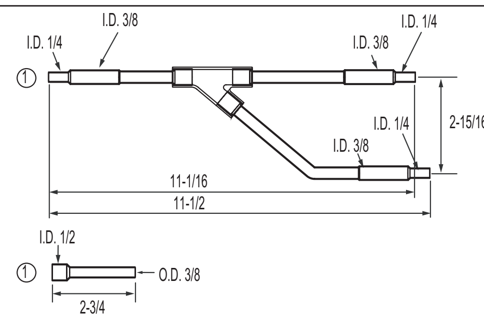
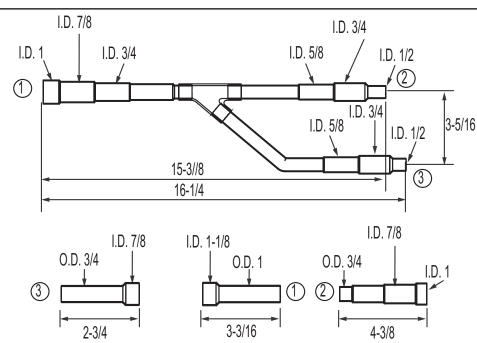
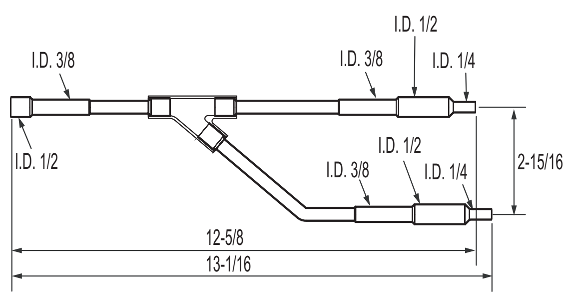
⚠ Note:
Always verify size of the Y-branch in LATS.

Table 63: Insulation Jacket Properties.

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

Table 64: Y-branch Table.

Unit: Inch

<table>
<tr><th>Models</th><th>Vapor pipe</th><th>Liquid pipe</th></tr>
<tr><td>ARBLN01621</td><td>
</td><td>
</td></tr>
<tr><td>ARBLN03321</td><td>
</td><td>
</td></tr>
</table>

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Header Kits

- 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 66).

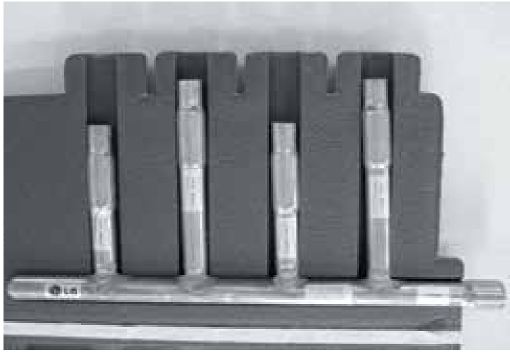

Table 65: Nominal Capacity Range.

Model	Port Capacity
ARBL054 (4 branch)	≤54,300 per port
ARBL057 (7 branch)	≤54,300 per port
ARBL1010 (10 branch)	≤76,300 per port
ARBL104 (4 branch)	≤76,300 per port
ARBL107 (7 branch)	<76,300 per port
ARBL2010 (10 branch)	≤76,300 per port

⚠ Note:
Always verify size of the Header in LATS.

Table 66: Plugging Tubes and Plugging Tube Insulation Amounts.

Header Kits	Plugging Tubes			Insulation for Plugging Tubes
	1/4Ø	1/2Ø	5/8Ø	
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

⚠ Note:
- *All dimensions in inches.*
- *Tolerance ±1/4 inch.*
- *Images are not to scale.*

Table 67: Insulation Jacket Properties.

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

Table 68: Fitting Properties.

Material	Copper
Design Pressure	551 psig

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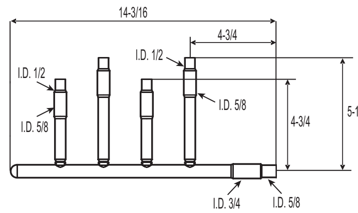
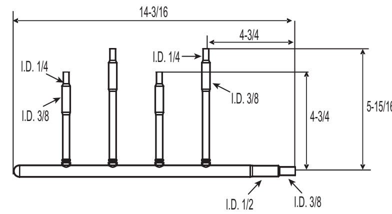
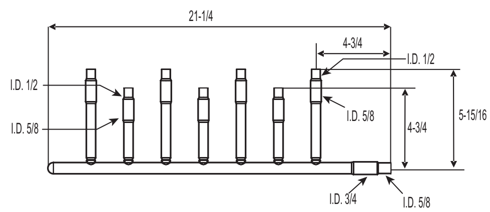
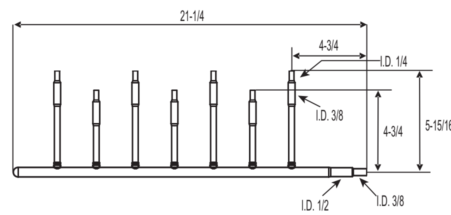
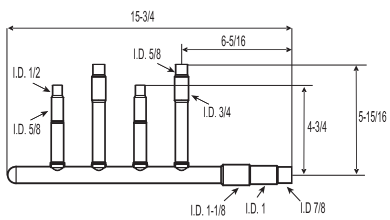
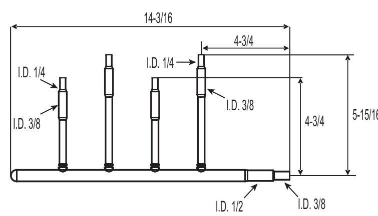
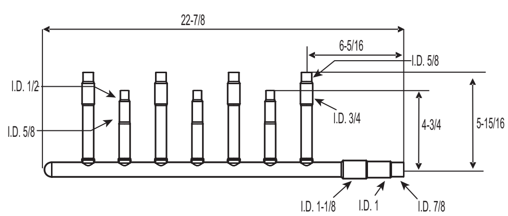
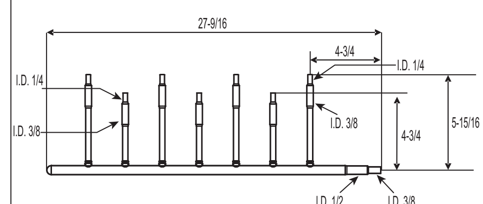
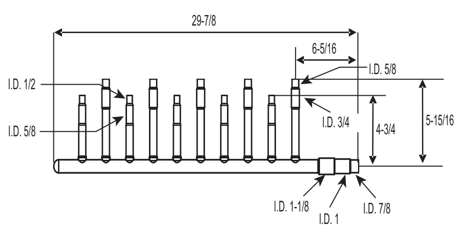
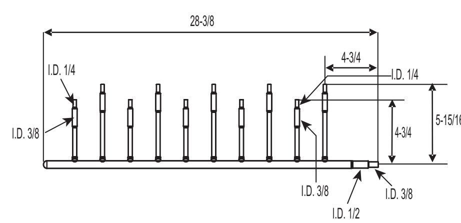
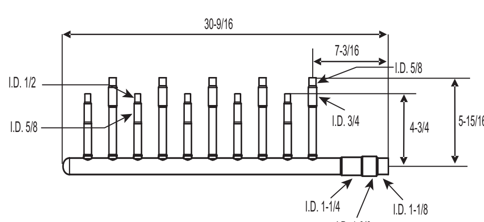
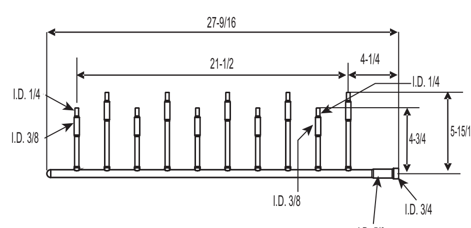
Table 69: Header Table.

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		

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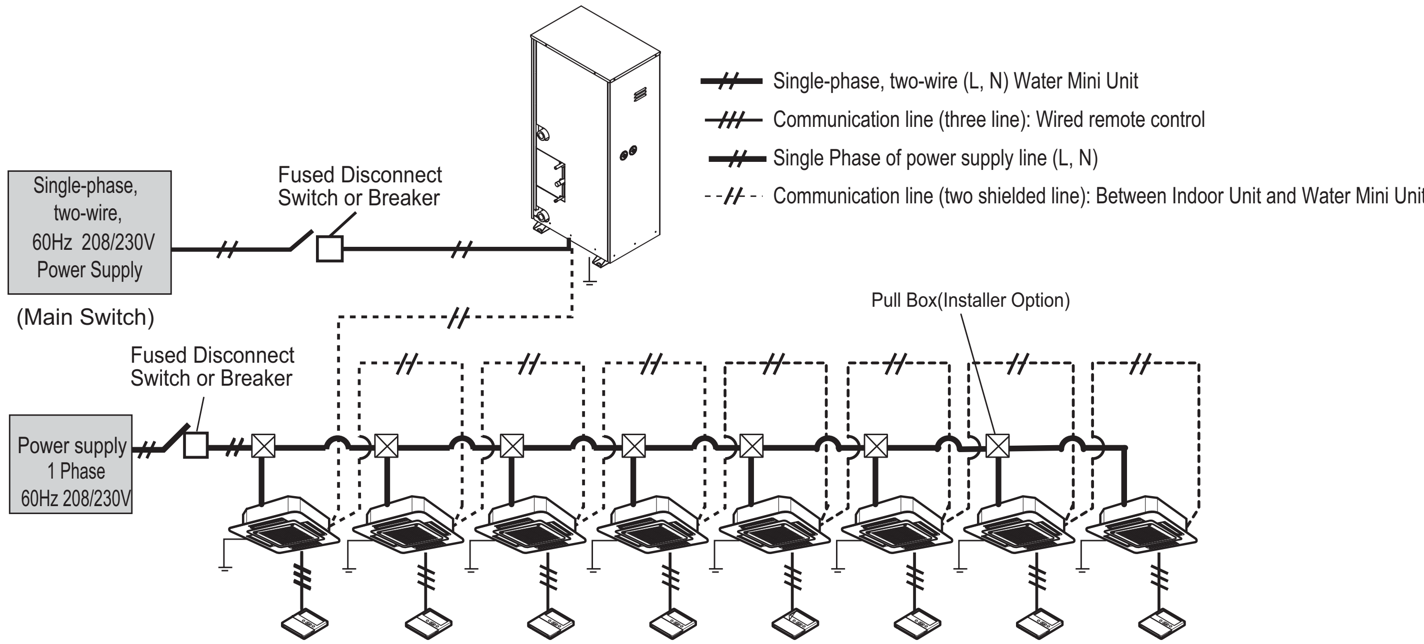
ELECTRICAL CONNECTIONS

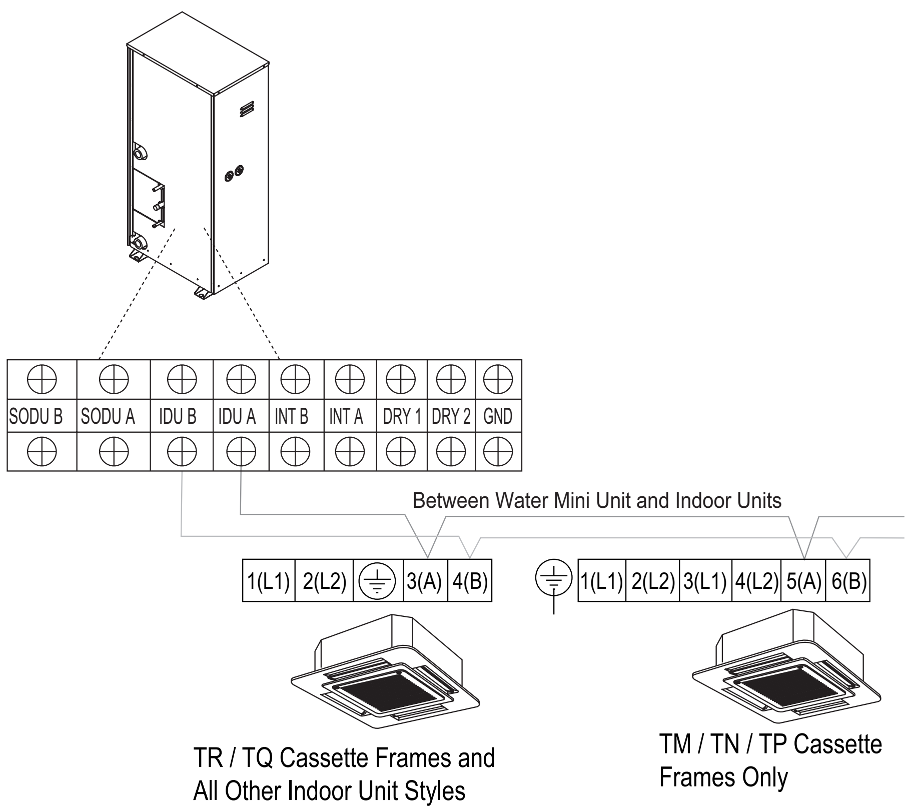
Power Wiring (208-230V)



⚠ 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. Ground the communication control cable at the outdoor unit only.*
- *Install a main shutoff switch that interrupts all power sources simultaneously.*

Water Source Unit and Indoor Unit Communication Terminals



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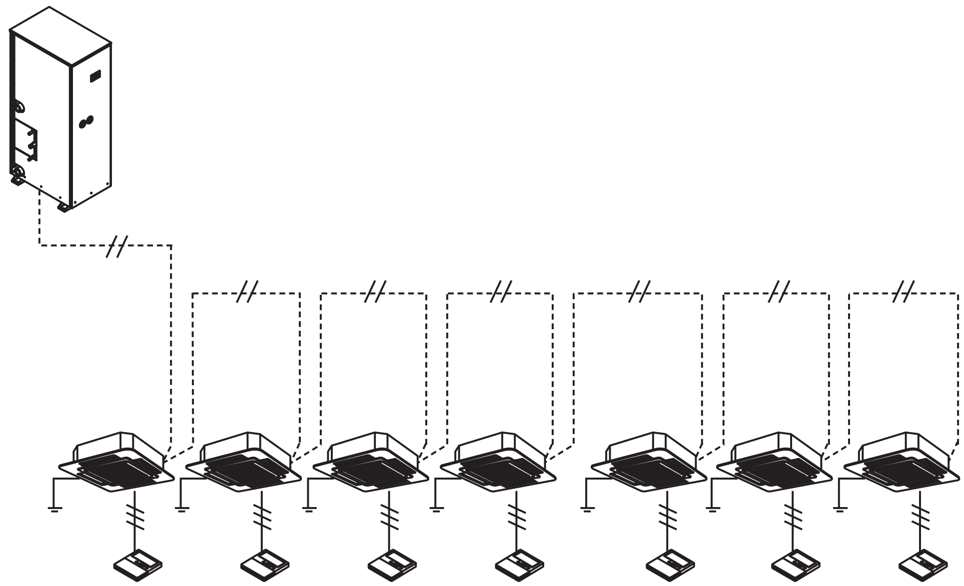
Low Voltage Wiring

- For indoor unit low voltage (communications cable), use two-conductor, stranded and shielded wire grounded at the water source unit.
- Connect communications cable between indoor units using a daisy chain configuration only. STAR or HOME RUN communications cable configurations are not permitted.

Figure 29: Multi V Water Mini System—Daisy-Chain Communications Cable Configuration.



⚠ *Note:*

- *Stranded and shielded communication cable must be a minimum of 18 AWG or sized per local code (whichever is greater). Ground the communication control cable at the water source unit only.*
- *Do not route communications cable and power wiring in the same conduit.*
- *Power wiring and communication cables must be routed in a manner that keeps them a minimum of two (2) inches apart.*

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WATER LOOP CIRCUIT DESIGN

WATER CIRCUIT INSTALLATION

Water Circuit Design

Design Steps

The Multi V Water Mini unit requires a water cooling / heating source. This year-round heating and cooling system uses a two (2) pipe closed loop water circuit that circulates water continuously and maintains water temperature between 23°F and 113°F for cooling mode (Variable water flow control kit [PRVC1] required when entering water temperature is between 23°F and 59°F), 23°F and 113°F for heating mode. See capacity tables for performance at different entering water temperatures. At the high end of this temperature range, heat is rejected through a cooling tower (dry cooler or geothermal well), while at the low end of the temperature range an auxiliary heat source like a boiler, solar panel, or geothermal well adds heat.

Piping, pumps, and accessories must be sized to provide adequate water flow to the water cooled unit based on nominal flow rates listed per model number.

Design Schematic

The Multi V Water Mini 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 should be added to protect the water cooled unit from contaminants and debris in the water system that may 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.

Figure 30: Cooling Cycle Diagram.

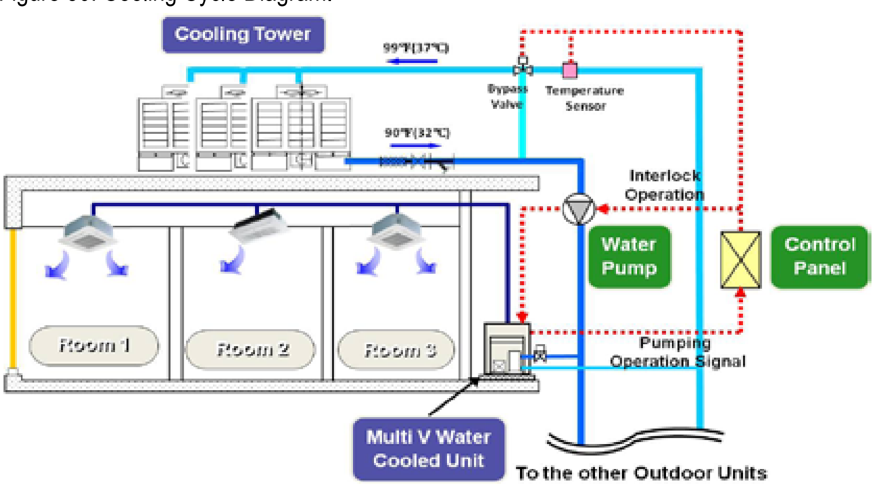

Figure 31: Heating Cycle Diagram.

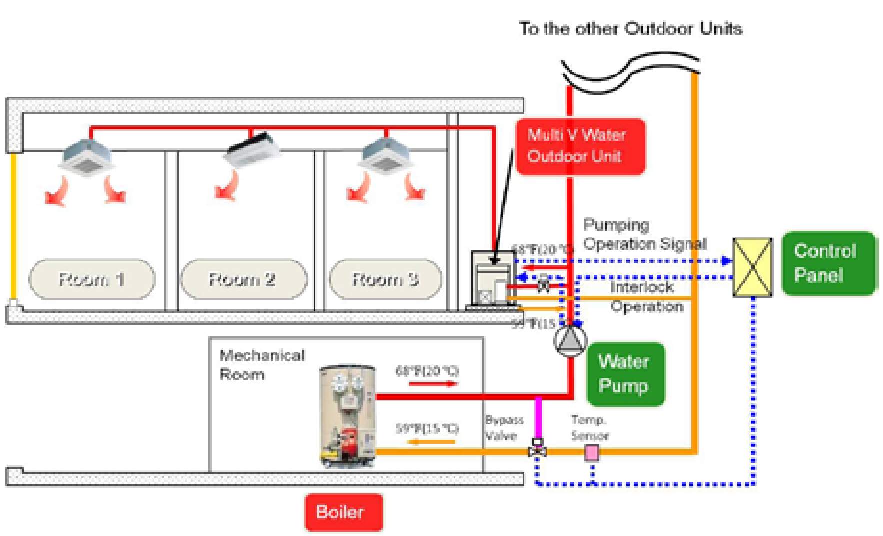

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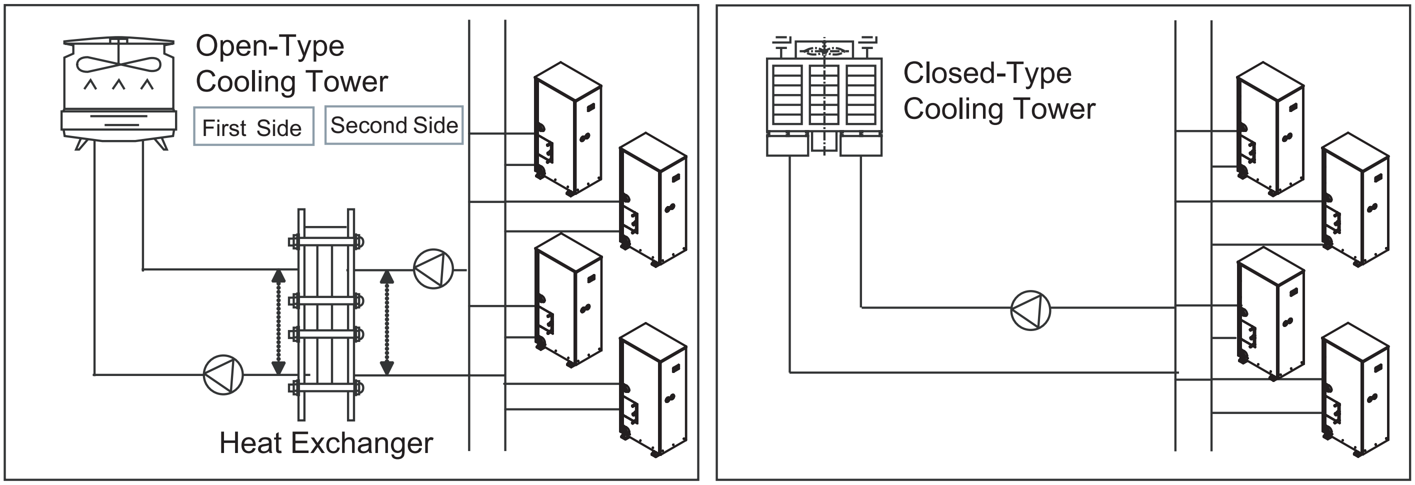
Figure 32: Open-Type and Closed-Type Tower Design Schematic.



Open-Type Cooling Tower + Heat Exchanger

Heat exchanger is installed between the cooling tower and water source unit system piping, and the temperature difference between the first and second sides is maintained constantly.

Closed-Type Cooling Tower

Heat-source water of the cooling tower is supplied directly to the water source unit system.

⚠ *Note:*

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.

Expansion Tank

All closed loop systems should have a bladder type expansion tank installed. The expansion tank will protect the equipment from excess pressures due to expansion and contraction of water in the loop as the temperature changes.

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
- Ground source heat
- Steam heat from remote central plant

To deal with thermal flux of the system, if floor space is allowed, a heat storage tank can be installed. The heat storage tank can store surplus heat or store heat at nighttime when electric rates are lower. Closed type storage tanks are recommended to prevent contamination of the water system.

Geothermal Water Circuit Design

In lieu of a cooling tower / boiler, Multi V Water Mini units may use a geothermal system that is properly sized to match the water cooled unit capacity. This year round heating and cooling system will utilize a two (2) pipe closed loop water circuit that circulates water continuously, maintaining water temperatures between 23°F and 113°F for heating, 23°F and 113°F for cooling (Variable water flow control kit [PRVC1] required when entering water temperature is between 23°F and 59°F). When the Multi V Water Mini unit is in cooling mode, heat is rejected to the geothermal system. When the Multi V Water Mini unit is in heating mode, heat is absorbed from the geothermal system.

Multi V Water Mini units have factory-installed stainless steel plate heat exchangers. To protect these heat exchangers, it is recommended to use closed geothermal water loops. Should open geothermal systems be used, an intermediate heat exchanger should be installed to isolate Multi V Water Mini units from contaminants in the water system. Open geothermal loops may contain minerals, biological contaminants, corrosive agents, or other substances which can cause scale, fouling or corrosion, that could degrade performance or shorten the life of the heat exchanger and unit.

Antifreeze can be used for all geothermal applications. Refer to antifreeze information on page 99 for recommended levels of antifreeze and correction factors.

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WATER CIRCUIT INSTALLATION

Piping System Specifications

Piping System

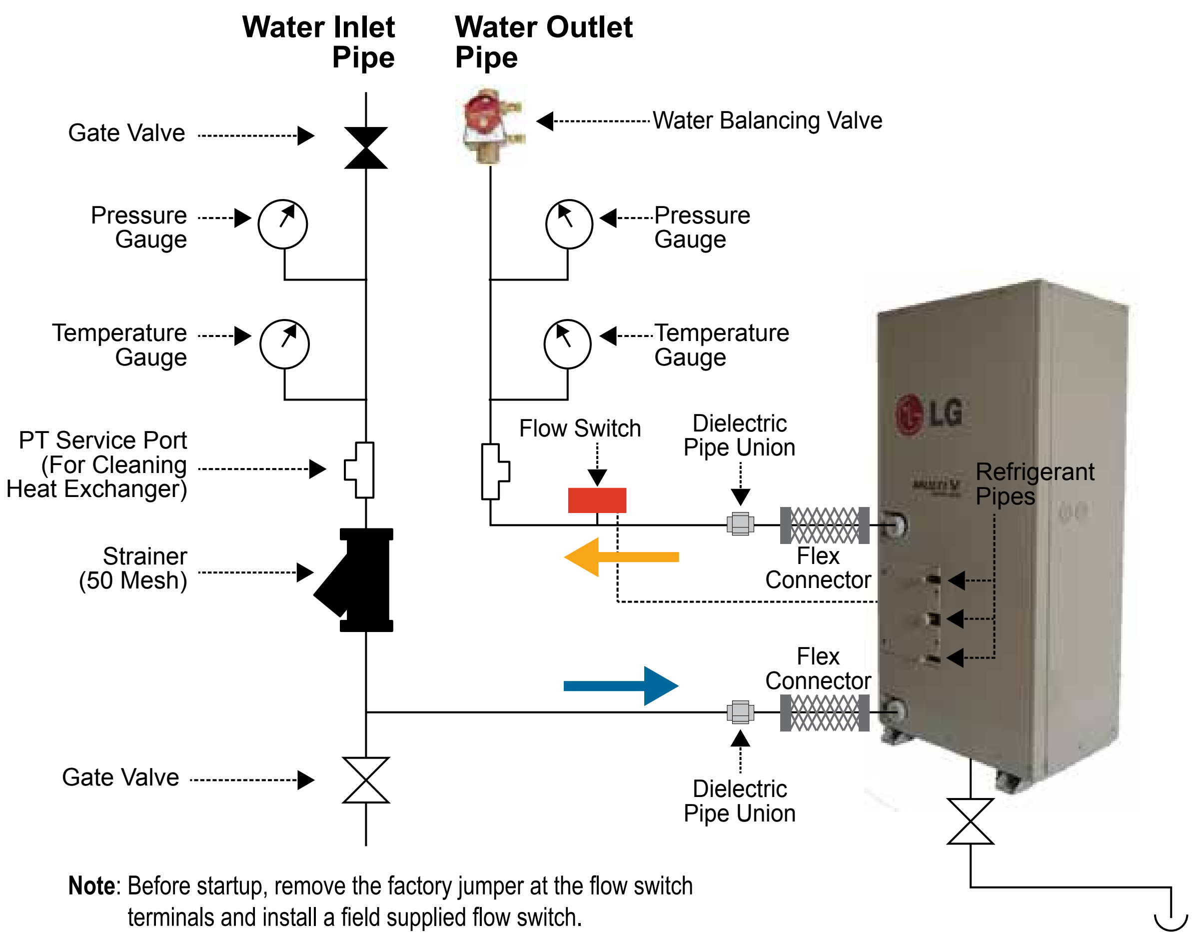
As shown on the "Typical connections for water cooled units" diagram below, the following components should be installed at each Multi V Water Mini unit (field supplied):

- 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-closed 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.
- Dielectric pipe unions to prevent the possibility of galvanic corrosion.
- Pressure gauges 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 should be used in the water loop, especially if water temperature operates above 104°F.
- Maintain water quality requirements.

Figure 33: Typical Connections for Water Cooled Units (All Components Shown Here are Field-supplied).



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

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Freeze Protection

The piping system shall be protected from freezing during winter conditions. Heating mode of the water cooled unit will reduce water loop temperature and methods should be taken to prevent freezing of the loop water. In applications with leaving water temperatures below 40°F, freeze protection should be considered. Use of ethylene glycol, propylene glycol, or methanol is acceptable. Manufacturers recommended levels of concentration should be followed, however, the addition of antifreeze may lower the performance of the water cooled unit due to reduced heat transfer and added pressure drop.

1. Find the corresponding correction factor from table below.
2. Multiply by the water cooled unit capacity to find the net water cooled unit capacity.
3. Apply the corresponding pressure drop correction factor from table below, and multiply by the water cooled unit pressure drop to find the net water cooled unit pressure drop.

Table 70: 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	0.995	0.979	0.974
	Pressure Drop	1.023	1.057	1.091	1.122	1.160
Ethylene 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

Figure 34: Cooling Capacity Correction Factor Chart.

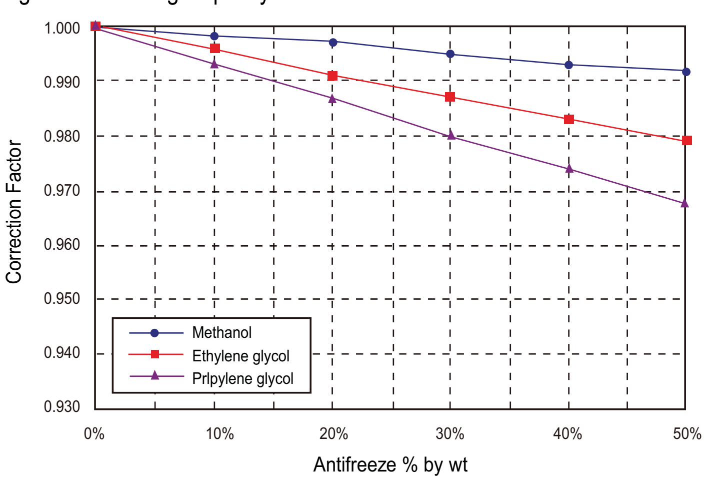
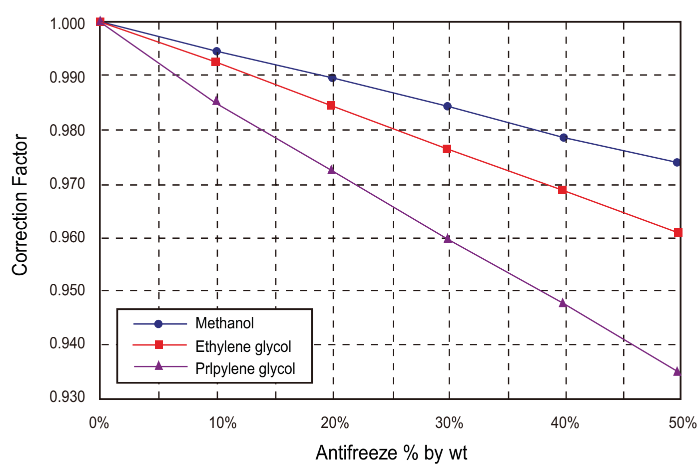


Figure 35: Heating Capacity Correction Factor Chart.



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Water Quality Requirements

Impurities in the water can influence the performance and life expectancy of the water cooled unit. The water should be tested and treated using a local water treatment professional. The following levels should be maintained:

	Closed Type System		Effect	
	Circulating Water	Supplemented Water	Corrosion[1]	Scale[1]
Basic Item				
pH (77°F)	7.0 ~ 8.0	7.0 ~ 8.0	●	●
Conductivity (77°F) mS/m	Below 30	Below 30	●	●
Chlorine ions (mg Cl^-/ℓ)	Below 50	Below 50	●	
Sulfate ions (mg SO_4^{2}/ℓ)	Below 50	Below 50	●	●
Acid consumption (pH4.8) (mg$CaCO_3$/ℓ)	Below 50	Below 50		●
Total Hardness (mg $CaCO_3$/ℓ)	Below 70	Below 70		●
Calcium Hardness (mg $CaCO_3$/ℓ)	Below 50	Below 50		●
Ionic-static silica (mg SiO_2/ℓ)	Below 30	Below 30		●
Reference Item				
Iron (mg Fe/ℓ)	Below 1.0	Below 0.3	●	●
Copper (mg Cu/ℓ)	Below 1.0	Below 0.1	●	
Sulfate ion (mg SO42/ℓ)	Must not be detected	Must not be detected	●	
Ammonium ion (mg NH4+)ℓ	Below 0.3	Below 0.1	●	
Residual chlorine (mg Cl/ℓ)	Below 0.25	Below 0.3	●	
Free carbon dioxide (mg CO2/ℓ)	Below 0.4	Below 4.0	●	
Stability index			●	●

[1]The "●" mark for corrosion and scale means that there is a possibility of occurrence.

⚠ *Note:*

- *Inhibitors should be used in the water loop, especially if water temperature operates above 104°F.*
- *Air shall be purged from the system.*

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Pipe Insulation

Water pipe insulation is suggested in the following conditions:

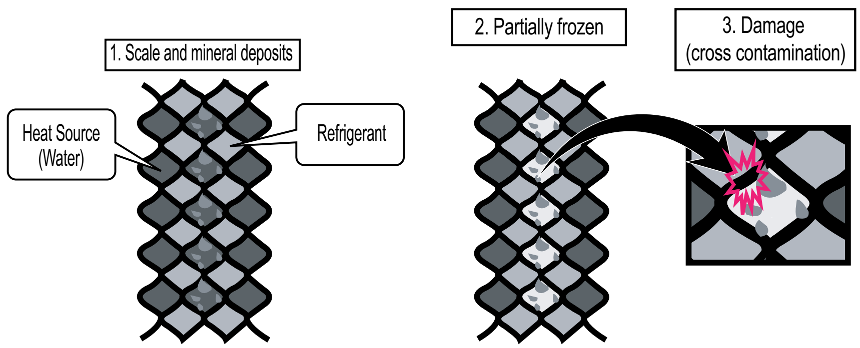
- Where water pipe is subject to freezing.
- Water pipe where water can condense on surface of pipe from ambient room temperatures higher than temperature of water in the pipe. If water temperature is maintained at 68°F in winter and 86°F in summer, insulation will not be required.
- On boiler water 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.

Figure 36: Potential Heat Exchanger Damage.

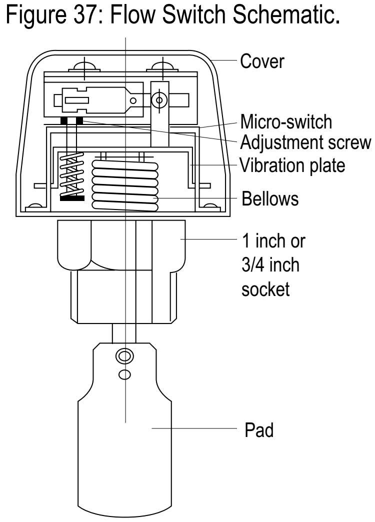


1. The water-supply circuitry within the plate-type heat exchanger is comprised of many small paths / channels.
2. If a strainer with 50 mesh or more is not included, foreign particles can partially block the water flow.
3. When the system operates in heating, the plate-type heat exchanger functions 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.

Flow switch

- It is recommended to install a flow switch on the water pipes that are connected to the water-source unit.
- Flow switch should be rated for 208-230V and be a normally closed 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%; Reference flow rate: 3-ton - 10.6 gpm, 4-ton - 13.2 gpm, 4.4-ton - 15.9 gpm.)
- Select a flow switch following the pressure specification of the water supply system.

Figure 37: 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: Insufficient heat water flow rate, water not supplied, insufficient coolant, foreign particles inside plate-type heat exchanger.)*

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WATER CIRCUIT INSTALLATION

Flow Switches and Solenoid Valve Wiring

See diagrams below for suggested flow switch wiring. Also shown is wiring for solenoid valves (optional) to turn water flow on / off to the unit.

Figure 38: Water Solenoid Valve Controlled by Building Management System (BMS).

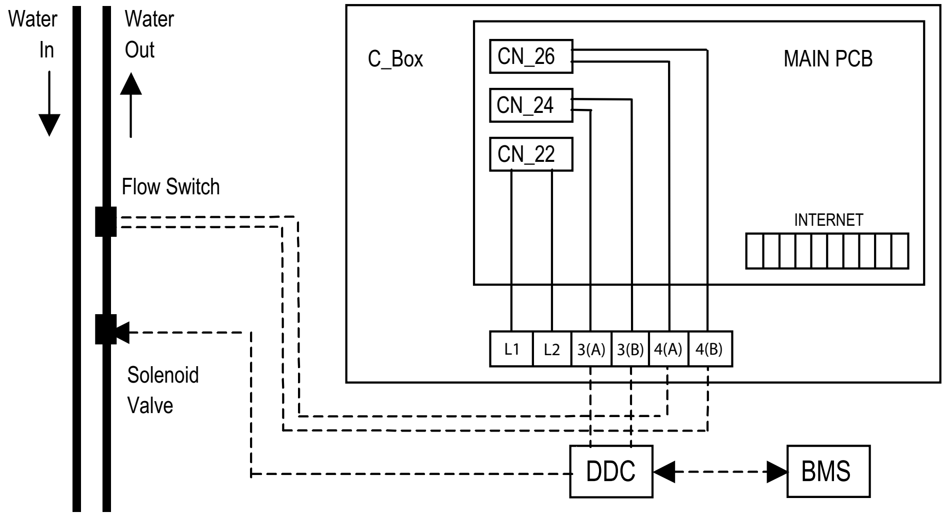


Figure 39: Water Solenoid Valve Controlled by Water Source Unit.

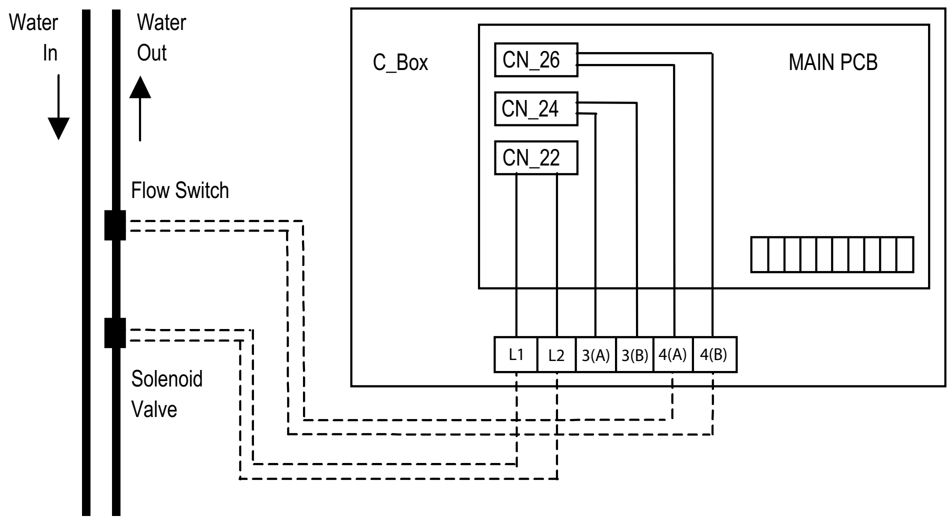
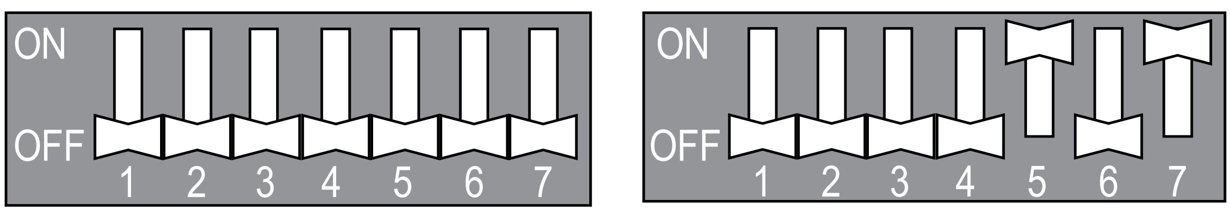


Figure 40: Set the DIP switches as below and turn on the power (For water solenoid valve controlled by water source unit).



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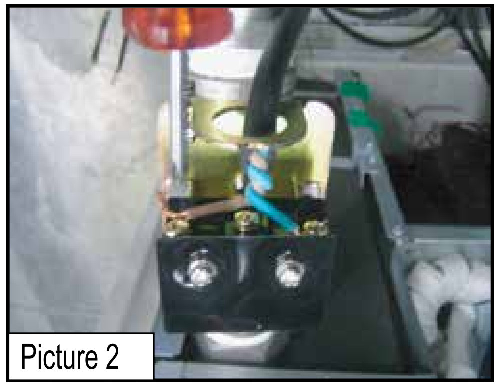
WATER CIRCUIT INSTALLATION

Flow Switches and Solenoid Valves

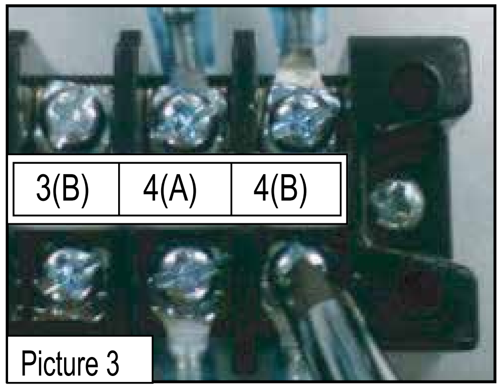
- The flow switch must be installed at the horizontal pipe of the water source unit's heat water-supply outlet. Verify the direction of the water flow before installation. (Picture 1)
- Remove the jumper wire and connect to the communication terminals (4[A] and 4[B]) of the water source unit's control 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%; Reference flow rate: 3-ton - 10.6 gpm, 4-ton - 13.2 gpm, 4.4-ton - 15.9 gpm.)


Picture 1

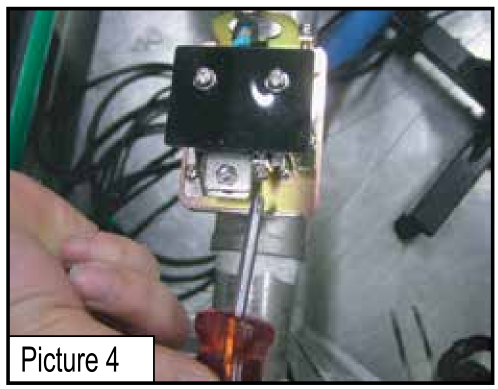

Picture 2

Note:

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



Picture 3


Picture 4

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.

Note:

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

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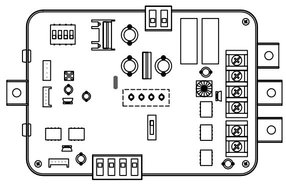
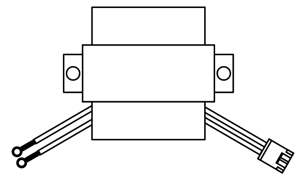
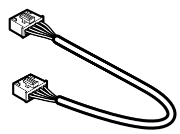
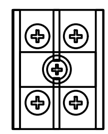
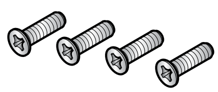
WATER CIRCUIT INSTALLATION

Variable Water Flow Control Kit (Model No. PRVC1) allows connection of Multi V Water Mini units to a variable pumping condenser water systems. The control board, transformer, and wiring provide connections to a field-supplied modulating water valve.

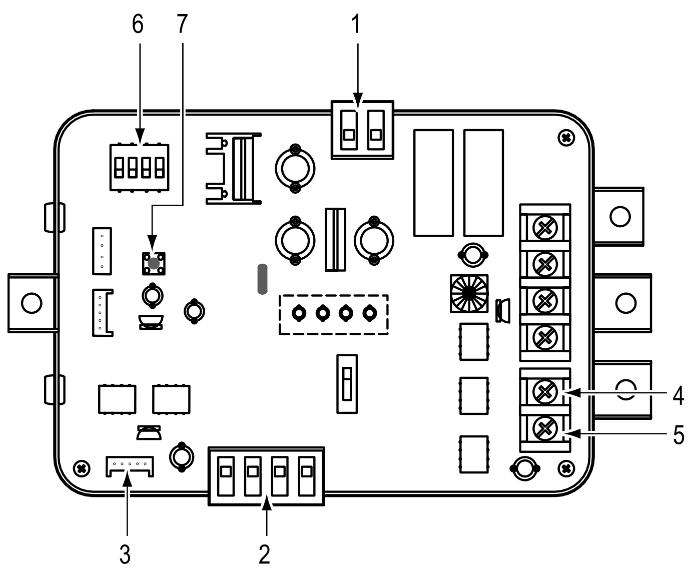
Variable Water Flow Control Kit Parts (included)

 Variable Water Flow Control PCB	 Transformer
 Cable Assembly	 Terminal Block Assembly
 Screws	

Variable Water Flow Control Kit PCB

1. CN_PWR: Power input terminal (DC 12V)
2. CN_AO: Signal output terminal to control a water flow control valve (DC 0~10V)
3. CN_OUT: Water-source unit connector
4. BUS_A: RS-485 (+) terminal
5. BUS_B: RS-485 (-) terminal
6. SWDIP: Switch to select main function
7. SW1: Reset switch

Figure 41: Variable Water Flow Control Kit PCB Diagram.



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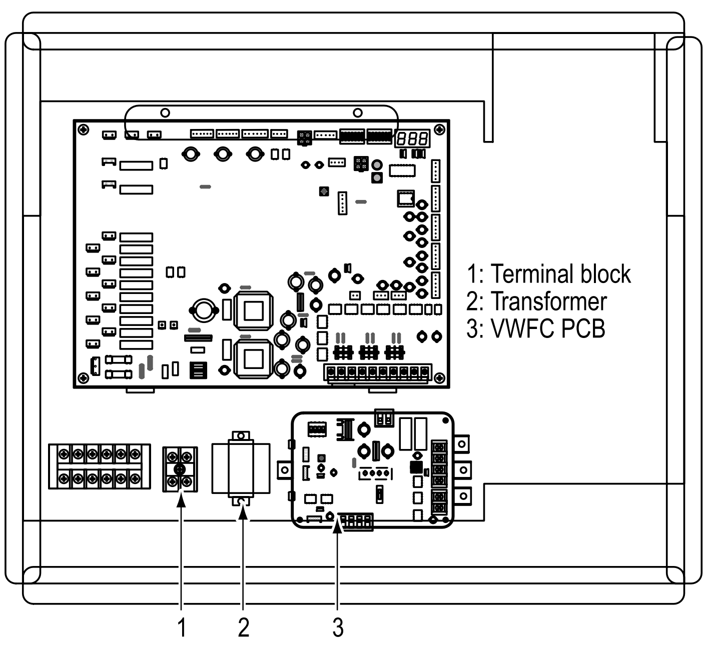
Installation

1. Shut off the main power to the water source unit.
2. Install the Variable Water Flow Control (VWFC) PCB in the control box by using the included screws.
3. Install the transformer in the control box by using the included screws.
4. Install the terminal block in the control box by using the included screws.
5. Connect the Main PCB (CN41) to the VWFC (CN_OUT) by using the cable assembly.
6. Connect the blue wire of transformer to the Main PCB (JIG1[L], JIG2[N]).
7. Connect the red wire of transformer to the terminal block (two-pin, yellow terminal block).
8. Connect a power cable (DC 12V) to CN_PWR (12V, GND) of the VWFC.
9. Connect a signal cable (DC 0~10V) of the water flow control valve to CN_AO (AO_01[A+], GND[A-]) of the VWFC.
10. Case of two water flow control valve, Connect a signal cable (DC 0~10V) of water flow control valve to CN_AO (AO_02[B+], GND[B-]) of VWFC.
11. Connect a power cable (AC 24V) of the water flow control valve to the terminal block (two-pin, yellow terminal block, max. current 0.42A).
12. Connect the RS-485 communication cable to CN_COMM (BUS_A, BUS_B) of VWFC.
13. Set the main function dip switch of the VWFC PCB.
14. Set the dip switch of the water source unit main PCB.
15. Turn on the main power to the water source unit.
16. Check the signal of water flow control valve to CN_AO (AO_01, GND) of VWFC, and check the water flow rate.

Figure 42: Control Kit Within the Water Mini Unit.



Note:
- *Install the product on a flat surface with the enclosed screws, otherwise, the VWFC PCB may not be anchored properly.*
- *Do not damage the case of the Variable Water Flow Control Kit as it may cause the PCB to malfunction.*

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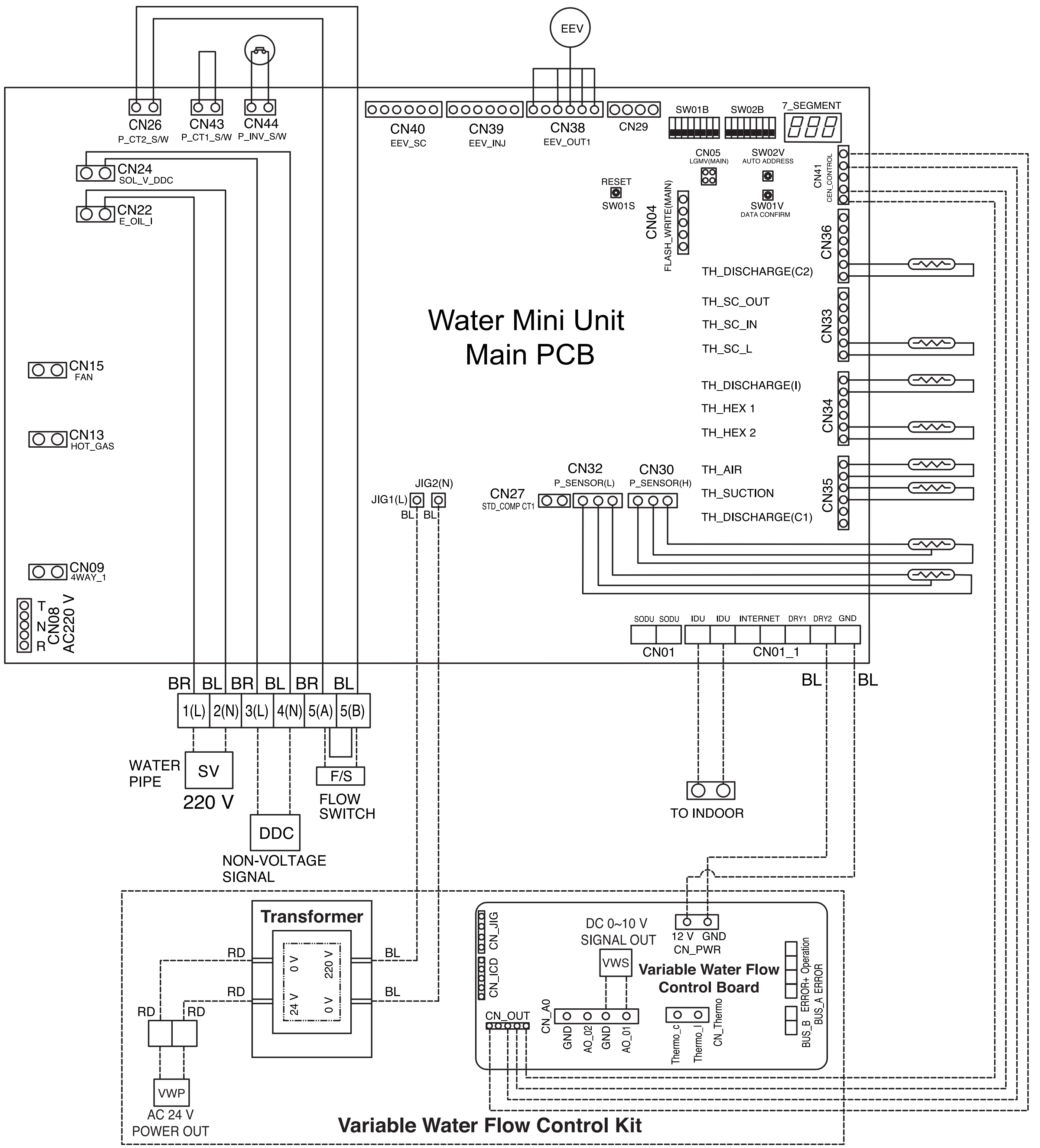
Variable Water Flow Control Kit Wiring Diagram

Figure 43: Variable Water Flow Control Kit Wiring Diagram.



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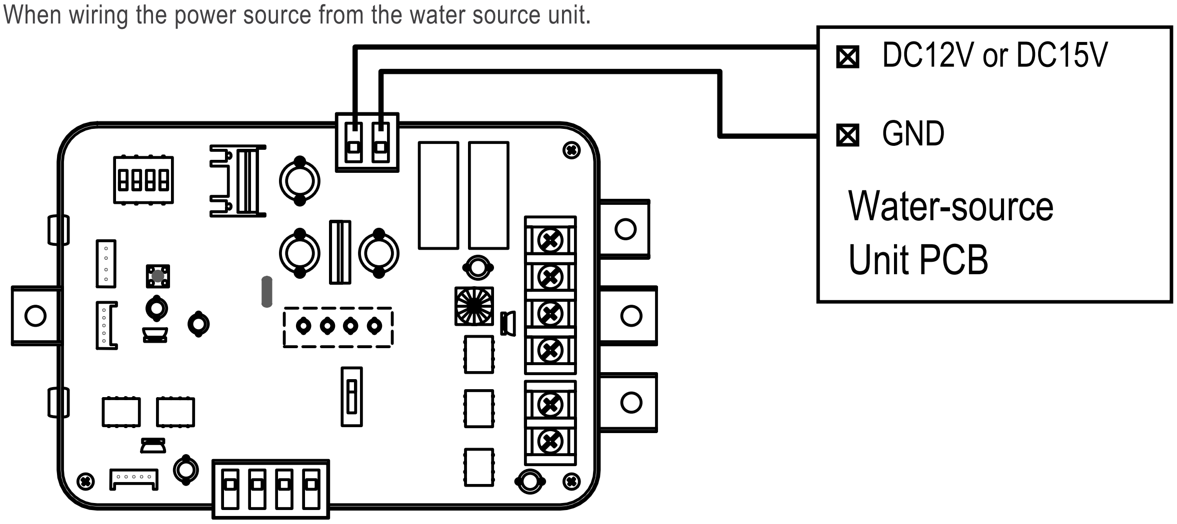
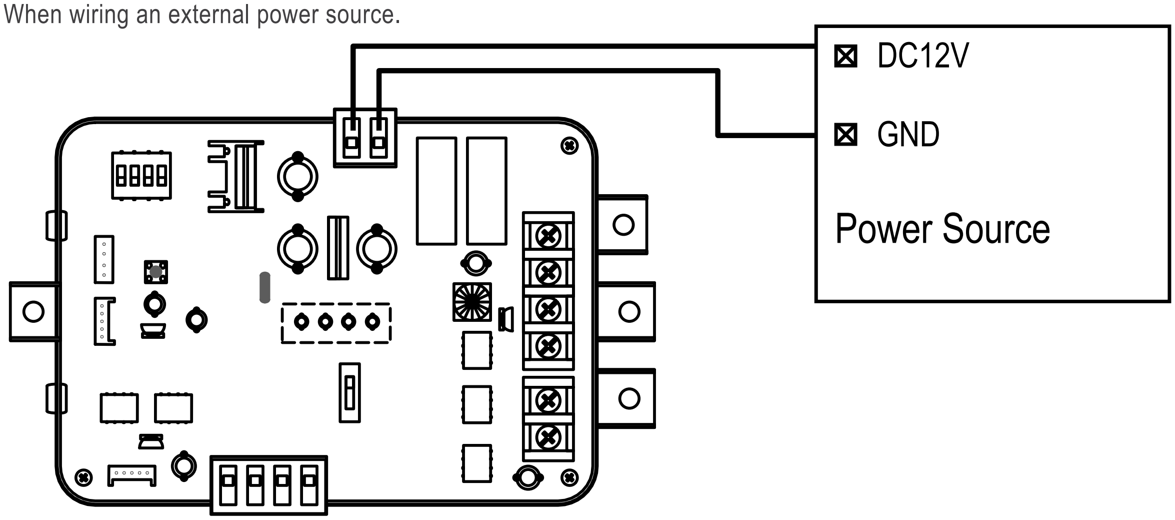
Variable Water Flow Control Kit Power Source Input

When wiring the power source from the water source unit.



When wiring an external power source.



Note:

- *The Variable Water Flow Control Kit can accept only DC power input. Do not use 220VAC power input as it will damage the unit.*
- *The use of an external power source is recommended.*

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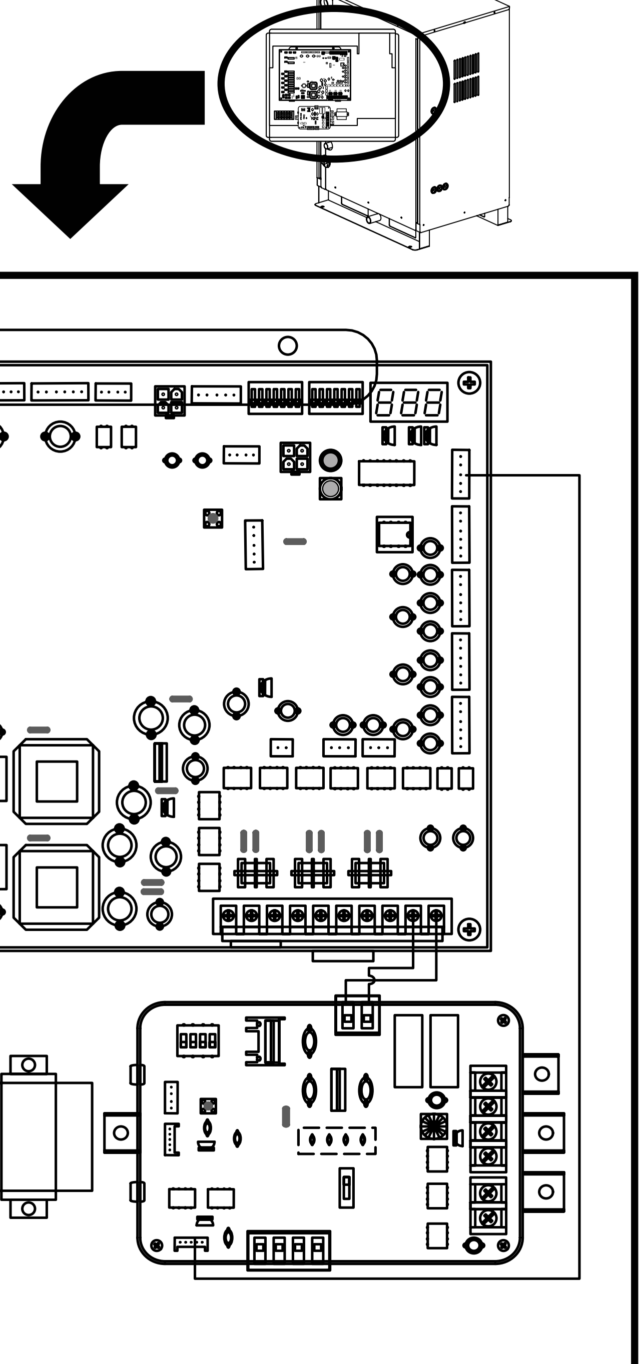
Wiring for the Variable Water Flow Control Kit Power Source PCB and Transformer

Figure 44: Variable Water Flow Control Kit Power Source PCB and Transformer Wiring.



⚠ Note:

- *PCB and transformer can accept only DC 12V power input. Do not use AC power input as it will damage the unit.*
- *AWG 23 wiring is recommended for the power (DC 12V) line.*

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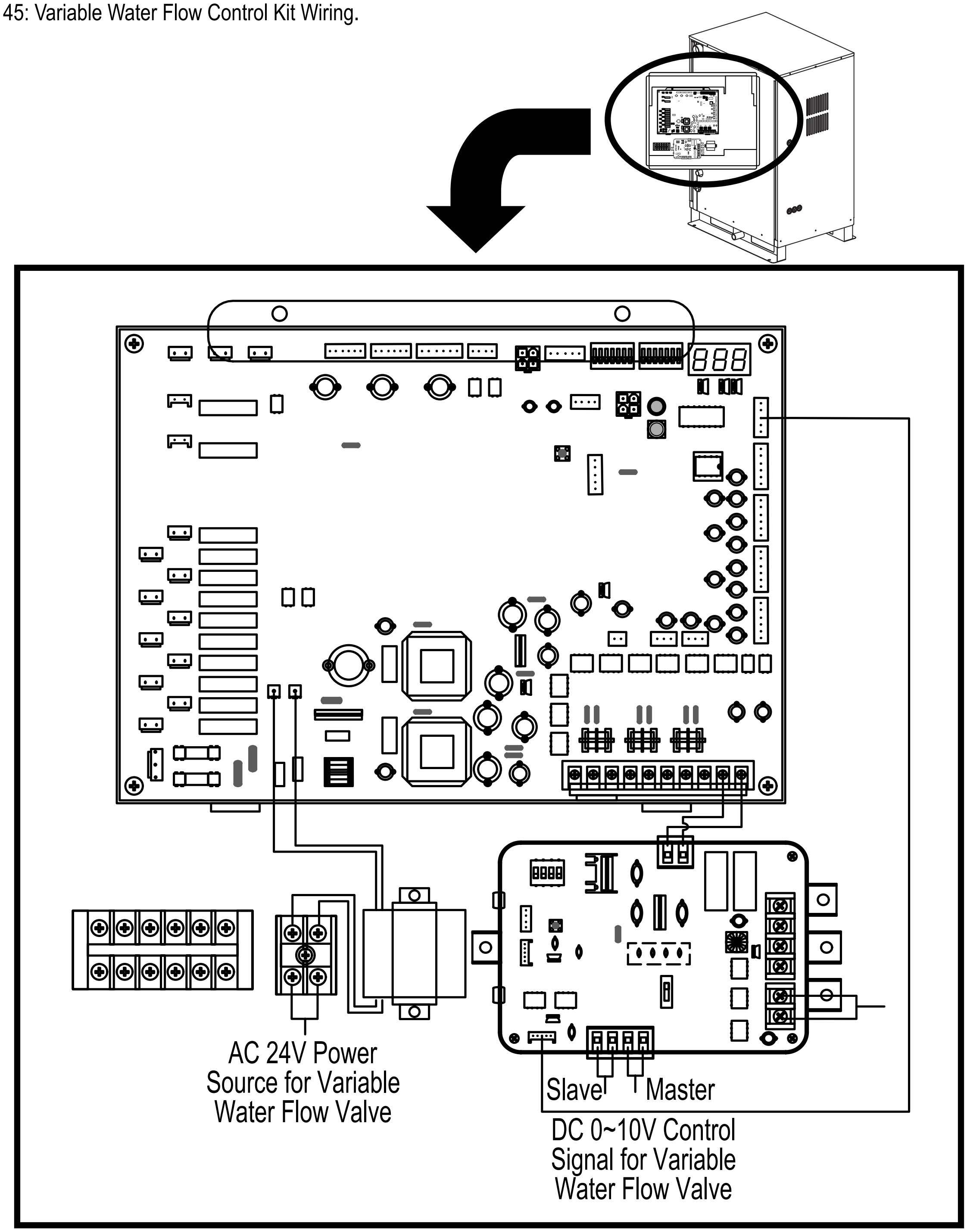
Wiring for the Variable Water Flow Control Kit Valve

Figure 45: Variable Water Flow Control Kit Wiring.



Note:

- *The Variable Water Flow Control Kit can control a maximum of two valves. If only one valve is present, then the slave signal connector must not be used.*
- *AWG 23 wiring is recommended for the power (AC 12V) line and signal (DC 0~10V) line.*

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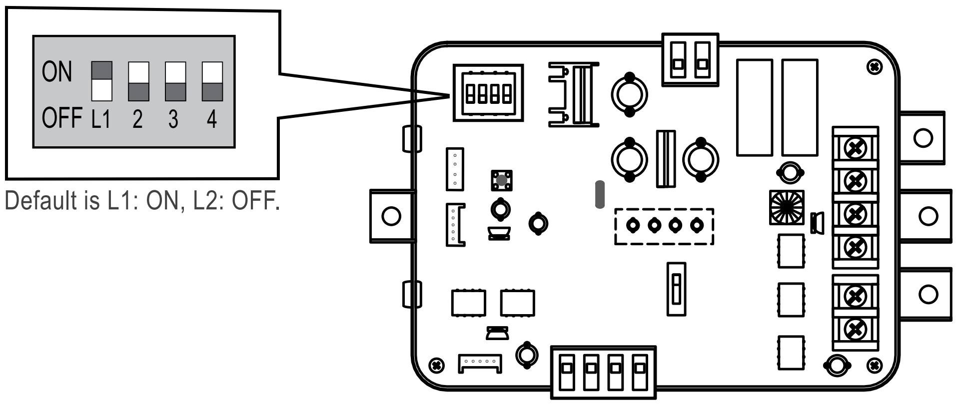
Variable Water Flow Control Kit DIP Switch Settings

Using 'SWDIP', select the control function using the DIP switches as described below.

Figure 46: DIP Switch Setting.



Default is L1: ON, L2: OFF.

Table 71: Output Signal Setting.

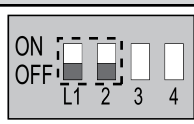
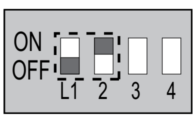
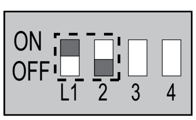
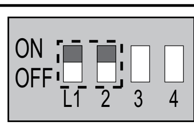
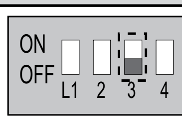
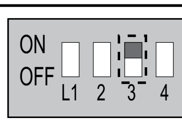
DIP Switch Setting	Function
	Control signal : DC 0V(OFF), DC 8~10V(ON)
	Control signal : DC 0V(OFF), DC 6~10V(ON)
	Control signal : DC 0V(OFF), DC 4~10V(ON) Default status
	Control signal : DC 0V(OFF), DC 2~10V(ON)

Table 72: RS-485 Communication Function Setting.

DIP Switch Setting	Function
	RS-485 communication function enable
	RS-485 communication function disable

⚠ *Note:*

- *After the DIP switch is changed, the reset switch must be pressed to reflect the setting.*
- *Before operating the water source unit, check the water flow rate and the PCB voltage signal.*
- *Minimum flow rate recommended 40% of rated flow rate; if the flow rate is lower, it will damage the water source unit.*

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Water Source Unit DIP Switch Settings

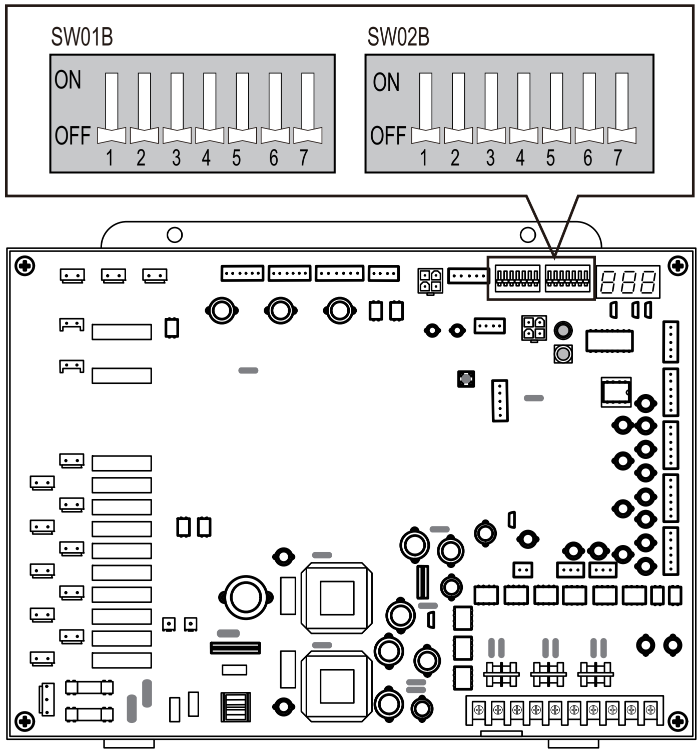
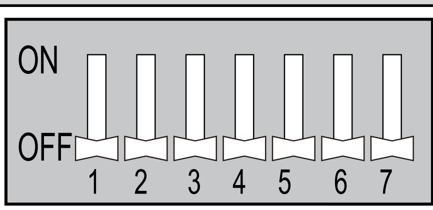
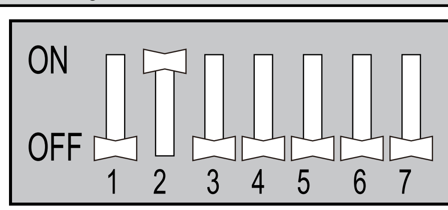


Table 73: Water Source Unit DIP Switch Settings.

DIP Switch Setting		Function
		Variable Water Flow Control Mode

Note:

- *After the DIP switch is changed, the reset switch must be pressed to reflect the setting.*
- *Before operating the water source unit, check the water flow rate and the PCB voltage signal.*
- *Minimum flow rate recommended 40% of rated flow rate; if the flow rate is lower, it will damage the water source unit.*

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MECHANICAL SPECIFICATIONS

Multi V™ Water Mini Units

General

The LG Multi V Water Mini system consists of a water source unit, one or more indoor units, integrated system controls, and interconnecting field-provided refrigerant pipe containing various fittings including Y-branch and Header kits supplied by LG. LG components are manufactured in a facility that meets or exceeds International Organization for Standardization (ISO) 9001 and 14001. The units are listed by Intertek (ETL) and bear the ETL label, and are certified to AHRI Standard 1230.

Frame

The frame is constructed with galvanized steel and finished with baked enamel paint.

Casing

The water-source unit case is constructed from 20-gauge metal, and is cleaned and finished with baked enamel finish. Paint color is "warm gray."

Refrigeration System

The refrigeration system consists of a single refrigerant circuit and uses R410A refrigerant. The water source unit is provided with factory installed components, including a refrigerant strainer, check valves, accumulator, hot gas bypass valve, four-way reversing valve, electronic expansion valve (EEV), high and low side charging ports, service valves, and interconnecting piping. The unit comes factory charged with R410A refrigerant.

Refrigeration Oil Control

The refrigeration oil level in the compressor is maintained using a control system. The water source unit microprocessor is programmed to flush the refrigerant piping for a minimum period of three (3) minutes after three (3) hours of compressor operation.

Compressor

The water source units are equipped with one hermetic, digitally controlled, inverter driven, rotary compressor, which is manufactured by LG. The frequency inverter is capable of providing a modulation range from 30Hz–100Hz. The compressor motor is suction gas-cooled and has an acceptable voltage range of ±10% of nameplate voltage. The compressor is equipped with a crankcase heater.

An external pressure sensor and an external temperature sensor are provided to protect the compressor from damage caused by over / under temperature or over / under pressure conditions. The compressor is provided with a positive displacement oil pump providing sufficient oil film on all bearing surfaces across the entire inverter modulation range. The compressor refrigerant oil is polyvinyl ether (PVE) having no hygroscopic properties. The compressor is wrapped with a heat resistant, sound attenuating blanket and mounted on rubber isolation grommets.

Figure 47: Multi V Water Mini Unit.

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.

Controls

Water source units are factory wired with electrical control components, printed circuit boards, thermistors, sensors, terminal blocks, and lugs for power wiring. The control wiring circuit is low voltage and includes a control power transformer, fuses, and interconnecting wiring harness with plug connectors. Microprocessor-based algorithms provide component protection, soft-start capability, and refrigerant system pressure and temperature control. The unit is designed to provide continuous compressor operation with an entering water temperature range of 23°F to 113°F for cooling mode (Variable water flow control kit [PRVC1] required when entering water temperature is between 23°F and 59°F), and 23°F to 113°F for heating mode. When the system is started, the connected indoor units are automatically assigned an electronic address by the water source unit's microprocessor. Additionally, each indoor unit is capable of accepting a manual assignment of a secondary address that, if used, provides unit tag identification when integrating with LG V-Net control devices.

The water source unit microprocessor is provided with a three-digit, LED display that communicates active system information and / or malfunction codes. The microprocessor has an algorithm that actively verifies the operational condition of system sensors and thermistors. A power conditioning circuit is provided and designed to protect the unit's inverter compressor and controls from phase failure, over / under-voltage condition, and to prevent transmission of power irregularities to the supply power source.

For indoor unit mechanical specifications, see the Multi V Indoor Unit Engineering Manual at www.lg-vrf.com.

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ACRONYMS

Table 74: Table of Acronyms.

%OA	Percentage Outdoor Air	IAQ	Indoor Air Quality
%RA	Percentage Return Air	IDU	Indoor Unit
ABS	Acrylonitrile Butadiene Styrene	IEQ	Indoor Environmental Quality
AC	Air Conditioner	IUCF	Indoor Unit Correction Factor
ACP	Advanced Control Platform	KTL	Korea Testing Laboratories
ARI	Air Conditioning and Refrigeration Institute	LATS	LG Air Conditioning Technical Solution
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning	LEED	Leadership in Energy and Environmental Design
AHU	Air Handling Unit	LGAP	LG Air Conditioner Protocol
AWG	American Wire Gauge	MAT	Mixed Air Temperature
BLDC	Building	MBh	Thousands BTUs per hour
Btu/h	British Thermal Units per hour	MCA	Maximum Circuit Ampacity
CCR	Corrected Capacity Ratio	MFS	Maximum Fuse Size
CDOA	Coupled Dedicated Outdoor Air	NC	Normally Closed
CFM	Cubic Feet per Minute	NEC	National Electrical Code
COP	Coefficient Of Performance	NO	Normally Open
CR	Combination Ratio	OAT	Outdoor Air Temperature
DB	Dry Bulb	ODU	Outdoor Unit
dB(A)	Decibels with “A” frequency weighting	OUCF	Outdoor Unit Correction Factor
DDOAS	Decoupled Dedicated Outdoor Air	PDI	Power Distribution Integrator
DI	Digital Input	PI	Power Input
DO	Digital Output	PR	Prerequisite (LEED Related)
EEV	Electronic Expansion Valve	PTAC	Packaged Terminal Air Conditioner
ELF	Equivalent Length in Feet	PVE	Polyvinyl Ether
EPDM	Ethylene Propylene Diene M-Class Rubber	RAT	Return Air Temperature
ESP	External Static Pressure	RCL	Refrigerant Concentration Limit
ETL	Electronic Testing Laboratories	VAH	Vertical Air Handler
GPM	Gallons Per Minute	VAV	Variable Air Volume
HACR	Heating, Air Conditioning, and Refrigeration	VRF	Variable Refrigerant Flow
H/M/L	High/Medium/Low	VRP	Ventilation Rate Procedure

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