MULTI V™
HYDRO KIT HIGH TEMPERATURE (K3) ENGINEERING MANUAL

42,000 Btu/h | 76,000 Btu/h

Variable Refrigerant Flow Indoor Units

PROPRIETARY DATA NOTICE

A summary list of safety precautions is on page 3.

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

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TABLE OF SYMBOLS

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

UNIT NOMENCLATURE

ARN	H	42	3	K3	A	4

Family
ARN = Multi V Indoor Unit
(Refrigerant R410A)

Type
H = Hydro Kit

Nominal Cooling Capacity in Btu/h
42 = 42,000
76 = 76,000
96 = 96,000

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

Model
K2 = Hydro Kit Water Heater / Cooler
K3 = Hydro Kit High Temp Water Heater

Feature
A = Basic

Generation
4 = Fourth

PRODUCT DATA

Hydro Kit Wall Mounted Controller

Every Hydro Kit is shipped with a Hydro Kit controller.

Versatile Control Strategies

The Hydro Kit operation can be controlled based on the temperature of the leaving water, hot water tank temperature, or the temperature of the conditioned space. The Hydro Kit interfaces with a wide selection of field-provided thermostats and sensors. To control the Hydro Kit operation based on conditioned space temperature, LG provides the designer connectivity for one of three types of sensing devices; field provided 208-230 VAC, LG remote wall-mounted room sensors, or field-provided mechanical-type thermostats.

User Functions

- On / Off
- Set water storage tank temperature
- Set leaving water temperature.
- Set freeze protection temperature
- Diagnostics error code displayed
- Schedule override: User interface provides a button that makes water tank storage heating a priority over comfort heating.
- Celsius or Fahrenheit display
- Hydronic heat circulating pump test run / enable / disable

Outdoor Air Temperature Reset

The Hydro Kit controller can monitor changes in the outside ambient air temperature and reset the temperature of the water circulating through the heating system to lower system operating cost and maintain room temperature.

Scheduling

This energy saving feature can be used to control the Hydro Kit's hours of operation and system priority. The Hydro Kit wall-mounted controller has a convenient seven-day scheduling program that provides the system user with the flexibility to assign which days and hours of a week Hydro Kit operation is enabled / disabled. The user can also assign which days, or hours of each day, storage tank hot water heating has priority and which hours conditioned space heating has priority.

Multi V Equipment Compatibility

The Hydro Kit controller shares the same communications bus with other Multi V indoor units.

ARNH-K3A4 Hydro Kit models are fully compatible with Multi V 5, Multi V Water 5, and Multi V S (48kBtu/h ~ 96kBtu/h for ARNH423K3A4 and 96kBtu/h for ARNH763K3A4). ARNH-K3A4 Hydro Kit models are compatible with Multi V IV Air-Source units. ARNH-K3A4 Hydro Kit models can be used with related central control products including AC Smart, ACP, and others.

Note:

The ARNH-K3A4 Hydro Kits can be used with outdoor units manufactured after April 2019 communicating at a baud rate of 9,600 bps (Gen4 features are operational). Before April 2019, outdoor units communicate at a baud rate of 1,200 bps. For more information, review the specific outdoor unit Engineering and Installation Manuals, or contact your LG Sales Representative.

ARNH-K3A4 Hydro Kit models ARE NOT compatible with Multi V Mini, Multi V Plus II, Multi V Sync II, Multi V Space, Multi V Water II, Multi V Water Mini, single-zone, or multi-zone products.

BMS System Integration

Operating data is passed to the BMS host computer through the LG BACNet or LONWorks gateway products sold separately. All LG BMS gateway devices are IP addressable and can be accessed via the internet from any computer.

Convenient Terminal Strip

The Hydro Kit's third-party accessories terminal strip provides the installer with screw terminals for connecting field-supplied accessories such as circulating pumps, isolation and flow control valves.

Heat Exchanger with Strainer

Each unit is provided with a heavy duty, compact, brazed-plate and frame stainless steel heat exchanger. With a waterside working pressure rating of 640 psig, concerns related to the working pressure are greatly reduced.

LG provides a 50 mesh strainer for field installation with each Hydro Kit, so customers can be assured the exchanger is properly protected against large particulate build up blocking the heat exchanger channels. The strainer core is completely serviceable.

Hydro Kit Compatibility

ARNH-K3A4 Hydro Kit models are fully compatible with Multi V 5, Multi V Water 5, and Multi V S (48kBtu/h ~ 96kBtu/h for ARNH423K3A4 and 96kBtu/h for ARNH763K3A4). ARNH-K3A4 Hydro Kit models are compatible with Multi V IV Air-Source units, but without Gen4 features.

Note:

The ARNH-K3A4 Hydro Kits can be used with outdoor units manufactured after April 2019 communicating at a baud rate of 9,600 bps (Gen4 features are operational). Before April 2019, outdoor units communicate at a baud rate of 1,200 bps. For more information, review the specific outdoor unit Engineering and Installation Manuals, or contact your LG Sales Representative.

ARNH-K3A4 Hydro Kit models ARE NOT compatible with Multi V Mini, Multi V Plus II, Multi V Sync II, Multi V Space, Multi V Water II, Multi V Water Mini, single-zone, or multi-zone products.

Table 1: Hydro Kit Functions.

Features		ARNH423K3A4	ARNH763K3A4
Unit Contr Based Func.	Self Diagnosis	√	√
	Auto Start	√	√
	Manual or Auto Restart[1]	√	√
	Child Lock	√	√
	Group Control[2,3]	√ (PZCWRCG3)	√ (PZCWRCG3)
	Timer (on/off)	√	√
	Timer (weekly)	√	√
BMS Integr.	Hydro Kit Wall Mounted Controller	√	√
	Network Solution (LGAP)	√	√
	Remote Enable/Disable via LG Dry Contact[3]	√ (PDRYCB320 / PDRYCB100)	√ (PDRYCB320 / PDRYCB100)
	Power Distribution Indicator (PDI) Interface	√	√
Options	Remote Temperature Sensor[3]	√ (ZRTBS01)	√ (ZRTBS01)
Hydro Kit Based Functions	Water Pump ON/ OFF Control	√	√
	Factory Mounted Flow Switch	√	√
	Conventional Line Voltage (208-230V) Thermostat Interface[1]	√	√
	Conventional Mechanical Thermostat Interface[3]	√	√
	Wi-Fi Module[3]	√ (PWFMDD200)	√ (PWFMDD200)
	Indirect Tank Water Pre-Heating	√	√
	Storage Tank Heating Operation Timer	√	√
	Water Temperature Reset	√	√
	Overheating Protection	√	√
	Emergency Heating Operation	√	√
	Plate Heat Exchanger Antifreeze Control	√	√
	Water Pump Forced Operation	√	√
	Autoset According to Ambient Temperature (For Heating Operation)	√	√
	Water Piping Anti-Overheat	√	√
	Emergency Operation	√	√
	Quick Domestic Hot Water Tank Heating	√	√
	One-Point Dry Contact Input (CN-EXT)	√	√
	ODU Cycle Priority (Heating Priority)	√	√

KEY:
√: Available.

[1]Manual restart is not available when the Hydro Kit is configured for conditioned space control, using a conventional thermostat.

[2]Each Hydro Kit unit group must be connected to the same outdoor unit. Hydro Kit units within the same group must have the same DIP switch settings. The only DIP switch that can differ is the group control setting switch, where one Hydro Kit will be the main and the remaining Hydro Kit units will be subs.

[3]Sold separately and field installed.

High Temperature Hydro Kit

General

The Hydro Kit can be used in conjunction with three-phase Multi V Heat Pump and Heat Recovery air-source and water-source units, and Multi V S systems (after November 2019). Multi V systems consist of an air-source unit or water-source unit, one or more indoor units or Hydro Kits, integrated system controls, and an interconnecting field-provided refrigerant pipe network containing various fittings including Y-branch kits 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 CSA and bear the CSA listed mark.

Casing

The Hydro Kit case is comprised of a 14-gauge coated metal frame with 20-gauge sheet metal panels. Exterior panels are cleaned and finished with a weather resistant baked enamel finish. A removable front corner panel is provided to allow access to all major components and control devices. All refrigerant and water pipe connections are on the right side of the unit.

Hydro Kit Refrigerant to Water Heat Exchanger

The water heat exchanger is a stainless steel, type SUS316, refrigerant / water plate heat exchanger designed to operate at a maximum working pressure of 640 psig. The heat exchanger waterside volume is 0.58 gallons for both the ARNH423K3A4 and the ARNH763K3A4.

Heat Exchanger Protection

- Factory provided 50-mesh strainer
- Internal, factory installed, flow switch
- Heat exchanger freeze protection algorithm
- Overheating protection algorithm

Microprocessor Controls

The Hydro Kit includes an integrated microprocessor controller capable of performing functions necessary to control Hydro Kit operations based on the leaving water and / or hot water tank temperature setpoint. Entering and leaving water pipe temperature sensors are factory-mounted internally to the unit case. A factory provided remote (wall-mounted) Hydro Kit controller and a hot water tank sensor / well are included for field installation. The Hydro Kit operation can be optionally controlled by sensing the conditioned space air temperature using an LG-provided remote temperature sensor (sold separately) or a field-provided manual changeover conventional thermostat.

Hydro Kit Controller

The remote wall-mounted Hydro Kit controller is provided with every unit. Power for the controller is provided via the communications cable from the Hydro Kit unit. The controller has a white resin case with a backlit LCD screen that displays the temperature setpoint, unit run-status and mode of operation (heating). User can control unit on / off, temperature adjustment, water tank heating on / off, mode selection and view temperature. The controller is used to program the Hydro Kit microprocessor resident operating parameters. Scheduling information resides on the controller.

Water Storage Tank Sensor and Well

The Hydro Kit is provided with a stainless steel 1/2 MPT hot water storage tank sensor-well that must be field installed in the wall of the indirect water storage tank (if the tank does not include one already). The sensor comes with a 39-foot cable with plug connectors.

Field Provided Components Interface

The Hydro Kit is equipped with a factory mounted terminal block with screw type connectors provided to connect waterside control devices and accessories including:

- 208-230V Pump on/off control interface
- Power / control interface for a conventional 208-230 VAC or mechanical type conditioned space temperature sensing thermostat
- Power/control interface for a three-way valve to switch water flow duty between heating the water tank and the indirect water storage conditioned space hydronic heating / cooling equipment.

Communications Cable

All communication cable to be a minimum of 18 AWG, 2-conductor, stranded, and shielded cable (RS-485). Cable insulation must be per project requirements.

External Control Component Connectivity

The Hydro Kit is equipped with a factory-mounted terminal block with screw type connectors provided to connect waterside control devices and accessories.

- 208-230V water pump on / off interface
- Power and control interface for a conventional 208-230 VAC or mechanical type conditioned space temperature sensing thermostat

Control Functions

- Display: Degrees Fahrenheit or Celsius
- Auto restart
- Heating water temperature setpoint
- Heating water temperature deadband
- Indirect water storage tank heating operation timer (disable / enable adjustable from 0 to 10 hours)
- Enable / disable indirect water storage heating operation (requires a field-provided two-way valve)
- Outdoor air temperature based heating water temperature reset
- Water circuit pump on / off control
- Emergency operation (external sensor failure override)
- Group control (up to 16 Hydro Kits may be controlled by a single Hydro Kit controller)
- Radiant floor system condensation prevention (requires a field-provided three-way valve)
- Water pump forced operation
- Self diagnostics
- Child lock

K3 Heating System

The high temperature heating only Hydro Kit (K3 Frame) uses a two-stage cascade heating system. The first stage heat is extracted from the Multi V R-410A refrigerant piping system and transferred to the Hydro Kits second stage R-134A refrigerant circuit. Energy is then transferred to/from the Hydro kit water circuit.

Noise Attenuation

The high temperature heating only Hydro Kit (K3 frame) includes a sound adsorbing insulating blanket around the compressor. A foamed polystyrene pad is provided inside the compressor compartment cabinet. The compressor is wrapped with a heat resistant, sound attenuating blanket and mounted on rubber isolation grommets.

R134A Refrigerant Circuit

The high temperature heating only Hydro Kit (K3 frame) is equipped with a single refrigeration circuit with 5.1 lbs. of refrigerant R134A for ARNH423K3A4, and 6.6 lbs. of refrigerant R134A for ARNH763K3A4.t R134A. The Hydro Kit is provided with factory installed components, including a refrigerant strainer, accumulator, electronically controlled expansion valve (EEV), high and low side charging ports, and interconnecting piping.

Single Inverter Compressor

The high temperature heating only Hydro Kit (K3 frame) is equipped with one hermetic, digitally-controlled, inverter driven, twin rotary compressor. The compressor is specifically designed for the refrigerant provided and is manufactured by LG. The frequency inverter is designed by LG and is capable of providing a modulation range from 20Hz–95Hz in 1 Hz increments. The compressor motor is suction gas-cooled, and has under/over current protection. The incoming power voltage fluctuation can be ±10% of nameplate voltage.

External suction and discharge temperature and pressure sensors 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 Teflon® coated bearing surfaces across the entire inverter modulation range. The compressor is factory charged with Polyvinylether (PVE) refrigeration oil having no hygroscopic properties.

Table 2: Hydro Kit Specifications Table.

		Hydro Kit	
		ARNH423K3A4	ARNH763K3A4
Capacity Index		**42**	**76**
Heating Mode Performance			
Rated Capacity[1] (Btu/h)		47,000	86,000
Entering Water Temp Range (°F)		50 - 158	50 - 158
Leaving Water Temp Range (°F)		86 - 176	86 - 176
Indoor Air Temp Setpoint Range (°F)		60 - 86	60 - 86
Hot Water Tank Setpoint Range (°F)		86 - 176	86 - 176
Unit Data			
Sound Pressure[2] dB(A) Heating		44	46
Net Unit Weight (lbs)		189.6	198.4
Shipping Weight (lbs)		207.2	216.1
Heat Rejected to Equipment Room (Btu/h)		Negligible	Negligible
Oil Type		FVC68D (PVE)	FVC68D (PVE)
Heat Exchanger			
Refrigerant to Refrigerant	**Type x Quantity**	Brazed Plate x 1	Brazed Plate x 1
	No. of Plates	50	60
	Refrigerant Type (Primary)	R410A	R410A
	Refrigerant Control	EEV	EEV
Refrigerant to Water	**Type x Quantity**	Brazed Plate x 1	Brazed Plate x 1
	No. of Plates	26	48
	Refrigerant Type (Secondary)	R134A	R134A
	Refrigerant Control	EEV	EEV
	Precharged Amount (lbs.)	5.1	6.6
Rated Water Flow (GPM)		5.2	9.5
Rated Pressure Drop[3] (ft-wg)		1.7	6.7
Range of Flow (GPM)		5.2 - 10.6	5.3 - 19
Waterside Volume (US Gallons)		0.58	0.58
Water Side Design Pressure (psig)		640	640
Compressor			
Inverter x Quantity		Twin Rotary x 1	Twin Rotary x 1
Motor Output (W)		25	25
Oil / Type		PVE (FVC68D)	PVE (FVC68D)
Piping			
Liquid Line (in, OD)		3/8 Braze	3/8 Braze
Vapor Line (in, OD)		5/8 Braze	3/4 Braze
Water Inlet/Outlet (in, O.D.)		1-MPT	1-MPT

[1]All capacities are net with a Combination Ratio between 95–100%.

[2]Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745.

[3]Water only (no antifreeze).

"The combination ratio range for dedicated use (all Hydro Kit units) is 50% - 100%. The combination ratio range for mixed use (Hydro Kit mixed with indoor units) is 50% - 130%.

ELECTRICAL & SOUND PRESSURE DATA

Electrical Data

Table 3: Hydro Kit Unit Electrical Data.

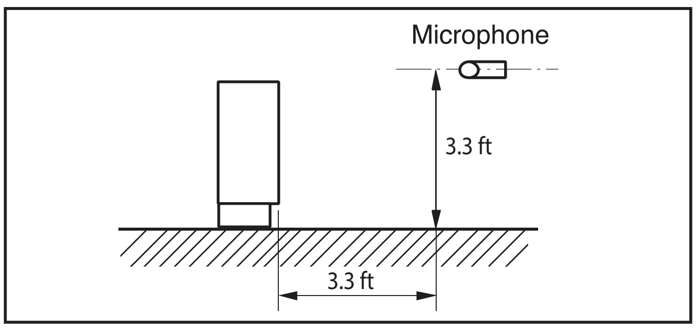
Model	Voltage Range	MCA	MOP	Rated Amps (A)	Power Supply			Power Input (kW)
					Hz	Volts	Phase	Heating
ARNH423K3A4	187-253	18.2	25	12	60	208-230	1	2.3
ARNH763K3A4		26.2	30	27				5

MCA = Minimum Circuit Ampacity MOP = Maximum Overcurrent Protection

Power wiring cable is field provided and must comply with the applicable local and national codes.

Sound Pressure Level Data

Figure 1: Sound Pressure Measurement Location.



- Measurement taken 3.3' above finished floor, and at a distance of 3.3' from face of unit.
- Measurements taken with no attenuation and units operating at full load normal operating condition.
- Sound level will vary depending on a range of factors such as construction (acoustic absorption coefficient) of particular area in which the equipment is installed.
- Sound pressure levels are measured in dB(A)±1.
- Tested in anechoic chamber per ISO Standard 3745.

Table 4: Hydro Kit Unit Sound Pressure Level.

Models	Sound Pressure Level dB (A)
ARNH423K3A4	44
ARNH763K3A4	46

Figure 2: ARNH423K3A4 Sound Pressure Level Diagram.

ARNH423K3A4

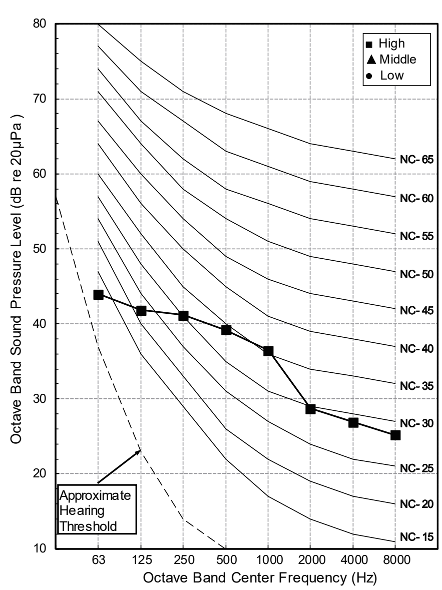
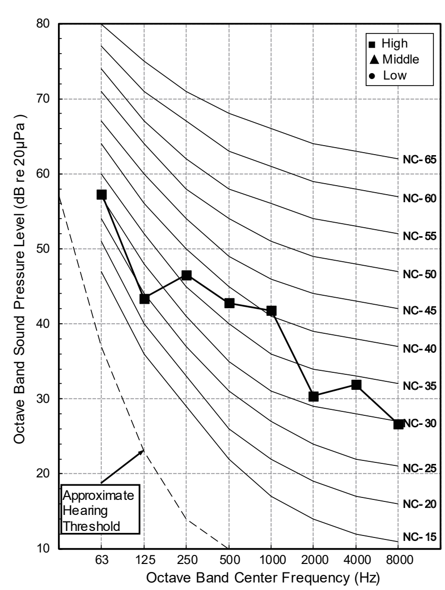


Figure 3: ARNH763K3A4 Sound Pressure Level Diagram.

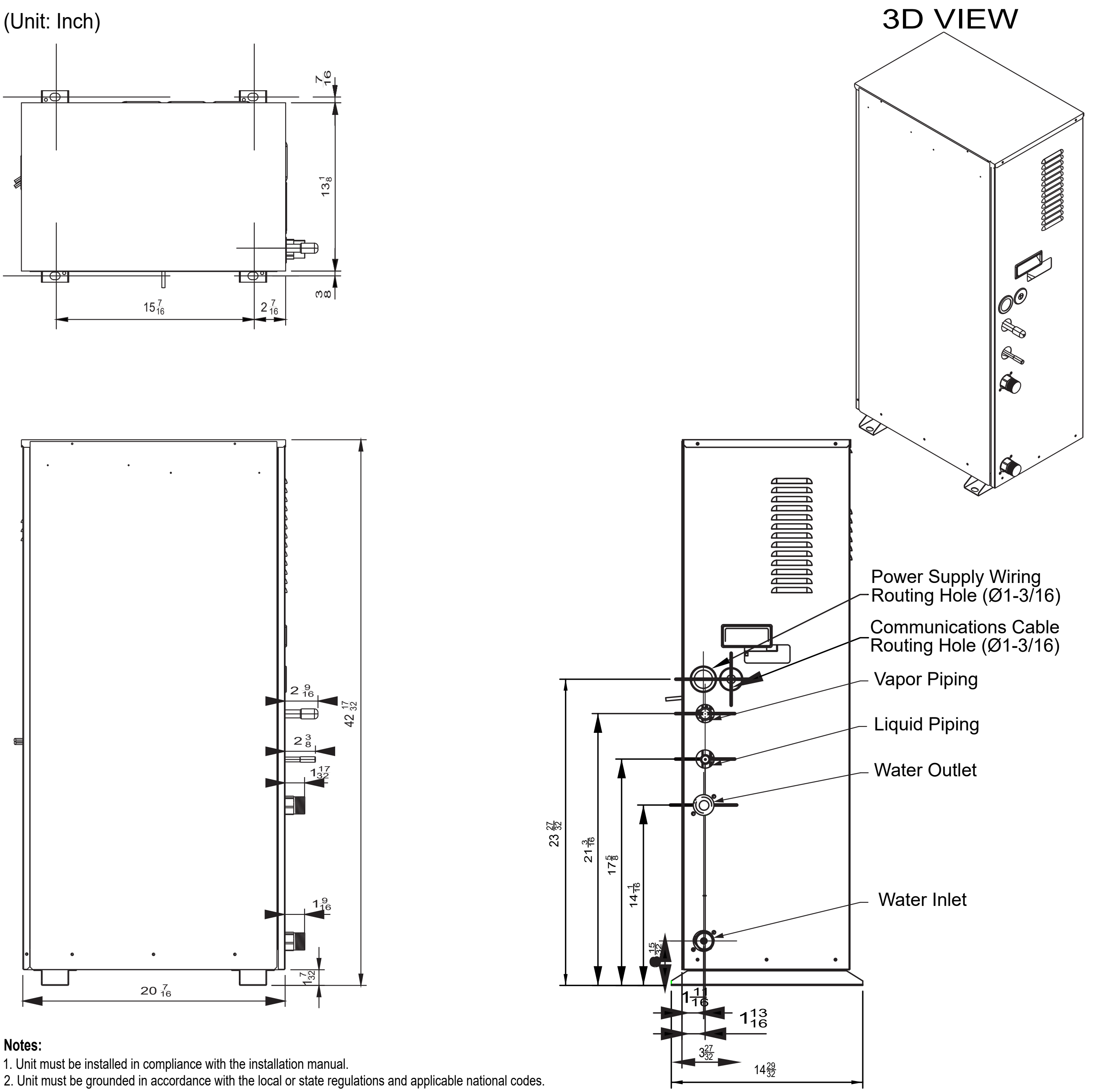
ARNH763K3A4



DIMENSIONS

ARNH423K3A4

(Unit: Inch)



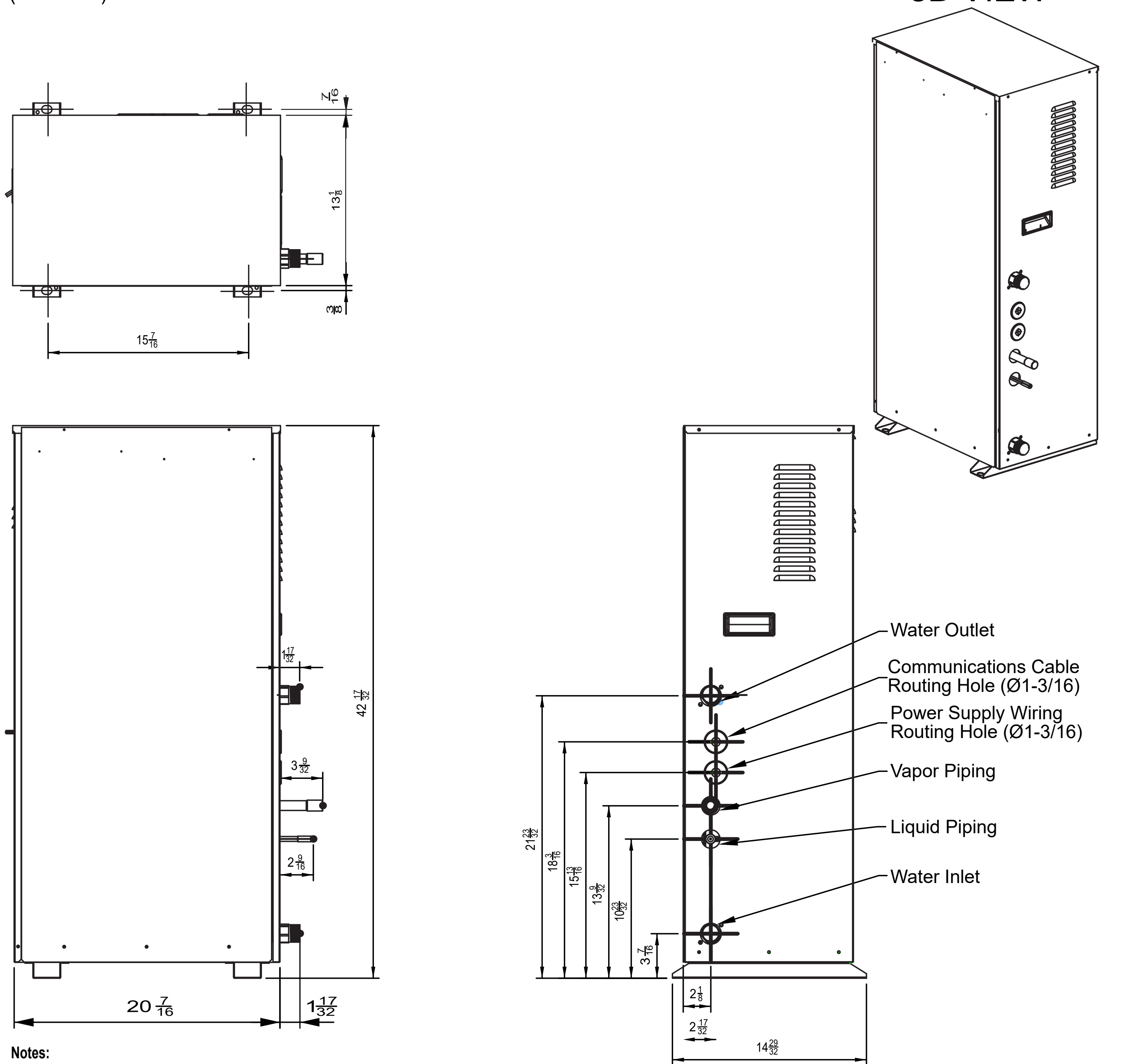
Notes:

1. Unit must be installed in compliance with the installation manual.
2. Unit must be grounded in accordance with the local or state regulations and applicable national codes.
3. All field-supplied electrical components and materials must comply with the local, state, and national codes.

DIMENSIONS

ARNH763K3A4

(Unit: Inch)



Notes:
1. Unit must be installed in compliance with the installation manual.
2. Unit must be grounded in accordance with the local or state regulations and applicable national codes.
3. All field-supplied electrical components and materials must comply with the local, state, and national codes.

INSTALLATION / CLEARANCE REQUIREMENTS

Selecting the Best Location

DANGER

To avoid the possibility of fire, ⃠ do not install the unit in an area where combustible gas will generate, flow, stagnate, or leak. Failure to do so will cause serious bodily injury or death. Before beginning installation, read the safety summary at the beginning of this manual.

Select a location for installing Hydro Kits that meets the following conditions:

Do's

- Install the Hydro Kit indoors.
- Where the floor is solid and has enough structural strength to bear four times the weight of the Hydro Kit.
- Use a level indicator to ensure the unit is installed on a level plane.
- Place the Hydro Kit where drainage can be obtained easily, and to minimize the length of the condensate drain piping.
- Include enough space for service access.
- Locate the Hydro Kit in a location where it can be easily connected to the outdoor unit / heat recovery unit.

⃠ Do Not's

- *Do not install the unit near high-frequency generators.*
- *Do not install the unit where it will be subjected to direct thermal radiation from other heat sources.*
- *Do not install the unit in a location where acidic solution and spray (sulfur) are often used.*
- *Do not use the unit in environments where sulfuric gas is present.*
- *Do not install the unit near a heat or steam source, or where considerable amounts of oil, iron powder, or flour are used. (These materials will generate condensate, cause a reduction in heat exchanger efficiency, or the drain to malfunction. If this is a potential problem, install a ventilation fan large enough to vent out these materials.)*
- *Do not install the unit near a doorway.*

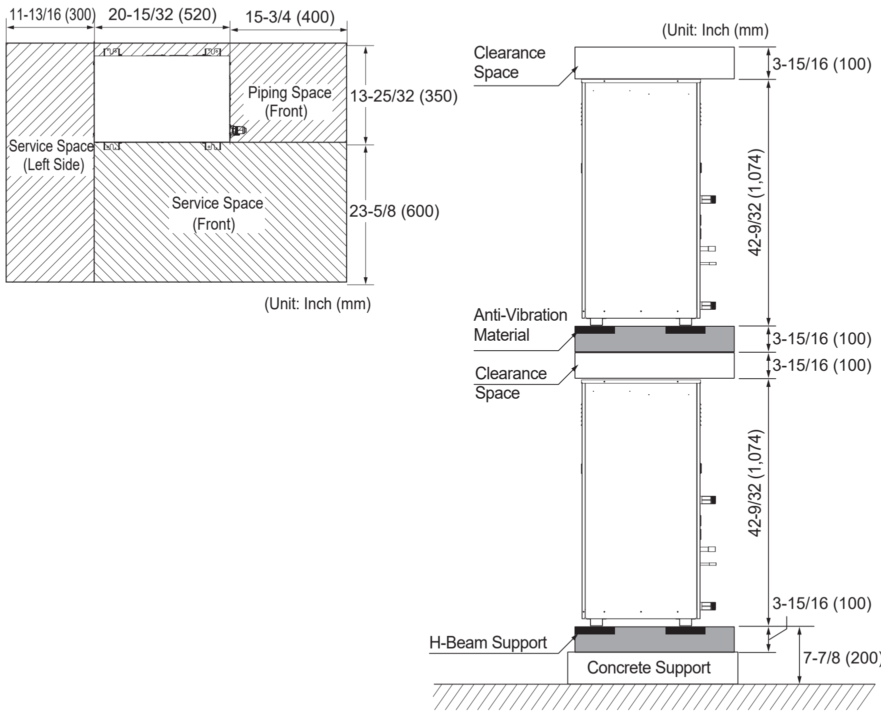
The unit will be damaged, will malfunction, and / or will not operate as designed if installed in any of the conditions listed.

Note:

- *Hydro Kits must not be placed in an environment where the Hydro Kits will be exposed to harmful volatile organic compounds (VOCs) or in environments where there is improper air make up or supply or inadequate ventilation. If there are concerns about VOCs in the environment where the Hydro Kits are installed, proper air make up or supply and/or adequate ventilation must be provided. Additionally, in buildings where Hydro Kits will be exposed to VOCs, consider a third party factory-applied epoxy coating to the coils for each Hydro Kit where the entire coil is dipped, not sprayed.*
- *If the unit is installed near a body of water, the installation parts are at risk of corroding. Appropriate anti-corrosion methods must be taken for the unit and all installation parts.*

CLEARANCE AND FOUNDATION REQUIREMENTS

Figure 4: Clearance Requirements.



Foundation

- Tightly attach the Hydro Kit with bolts as shown below so that the unit will not fall.
- Noise and vibration could transfer to the floor or walls, so install rubber anti-vibration isolation pads between the mounting feet and the base. The base pad must be more than 8 inches (200 mm).

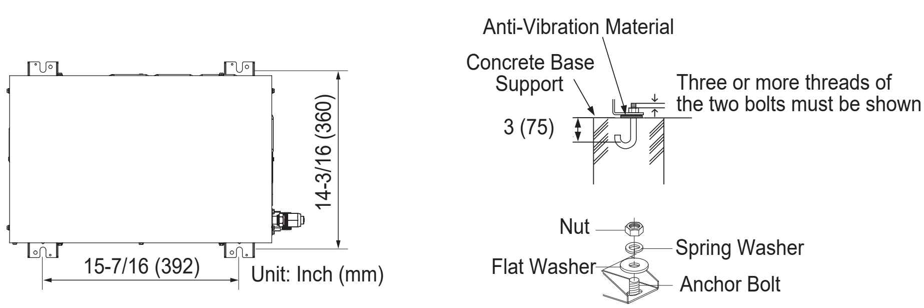
WARNING

- *Ensure that the floor / chosen location has enough strength to support the weight of the Hydro Kit. If it does not have sufficient strength, the Hydro Kit will fall and cause physical injury or death.*
- *Ensure the Hydro Kit is firmly attached to the foundation. Any deficiency in installation will cause unit to fall, resulting in physical injury or death.*

Note:

- *Ensure that the floor / chosen location has enough strength to support the weight of the Hydro Kit. If it does not have sufficient strength, the Hydro Kit will fall and cause damage to the unit.*
- *Ensure the Hydro Kit is firmly attached to the foundation. Any deficiency in installation will cause unit to fall, resulting in damage to the unit.*

Figure 5: Foundation Requirements.



PIPING DIAGRAM

ARNH423K3A4, ARNH763K3A4

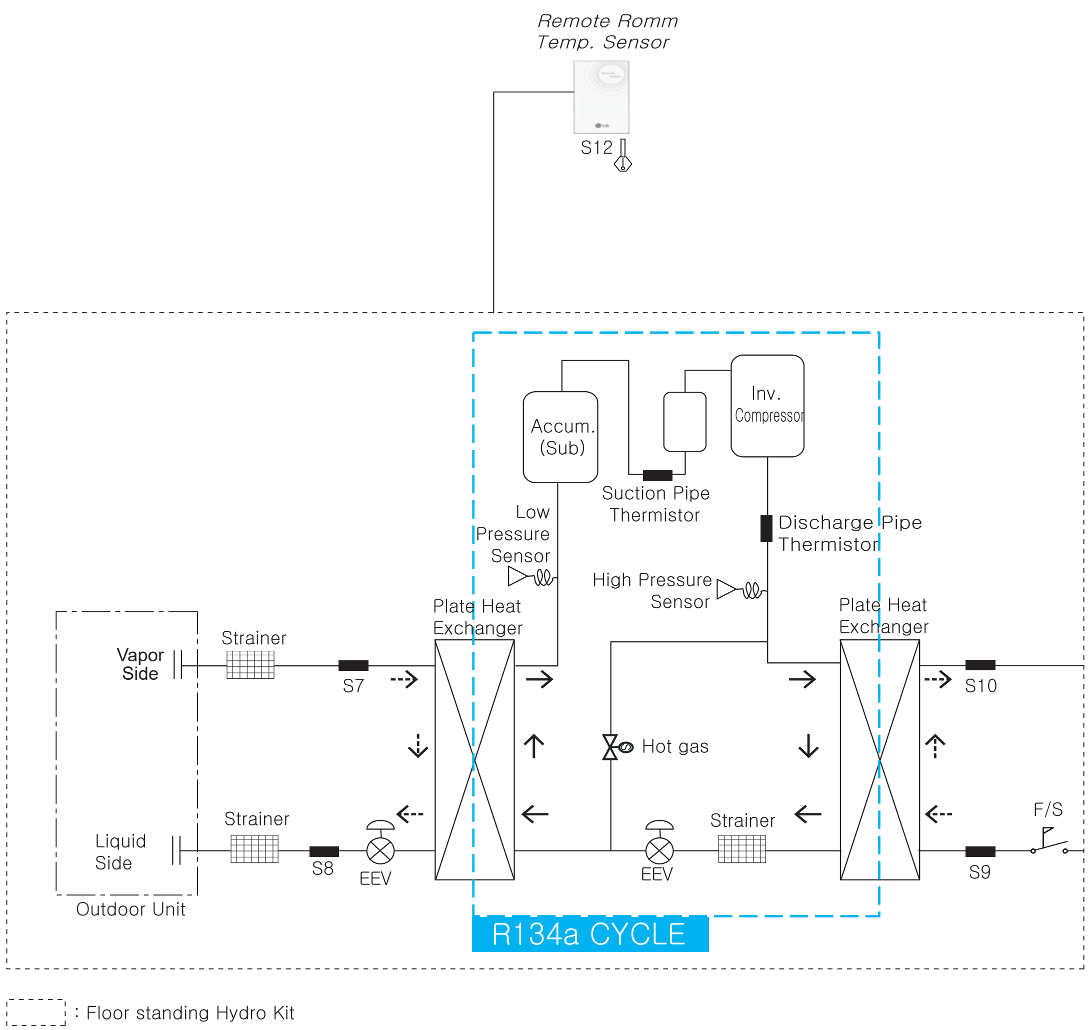


Table 5: High Temperature Hydro Kit Piping Schematic Legend.

Description	Schematic Label	PCB Connector	Remarks
Vapor Line Temperature Sensor	S7	CN_PIPE/OUT	Multi V Refrigerant Cycle
Liquid Line Temperature Sensor	S8	CN_PIPE/IN	
Water Inlet Temperature Sensor	S9	CN_TH3 (WATER IN) (PHEX OUT) (WATER OUT)	Water Inlet S9 and Water Outlet S10 sensors are connected to 6-pin Connector CN_TH3
Water Outlet Temperature Sensor	S10		
Flow Switch	F/S	CN_FLOW1	Monitors water flow in the system.
Remote Room Air Temperature Sensor* (Room 1 / Direct Circuit)	S12	CN_ROOM	Optional Accessory (Sold Separately)
Controller	CTR/PNL	CN_REMO	Not Displayed in Refrigerant Diagram; Included in High Temperature Hydro Kit.

*Remote Room Air Temperature Sensor is an optional accessory and is sold separately based on design requirements.

WIRING DIAGRAM

ARNH423K3A4, ARNH763K3A4

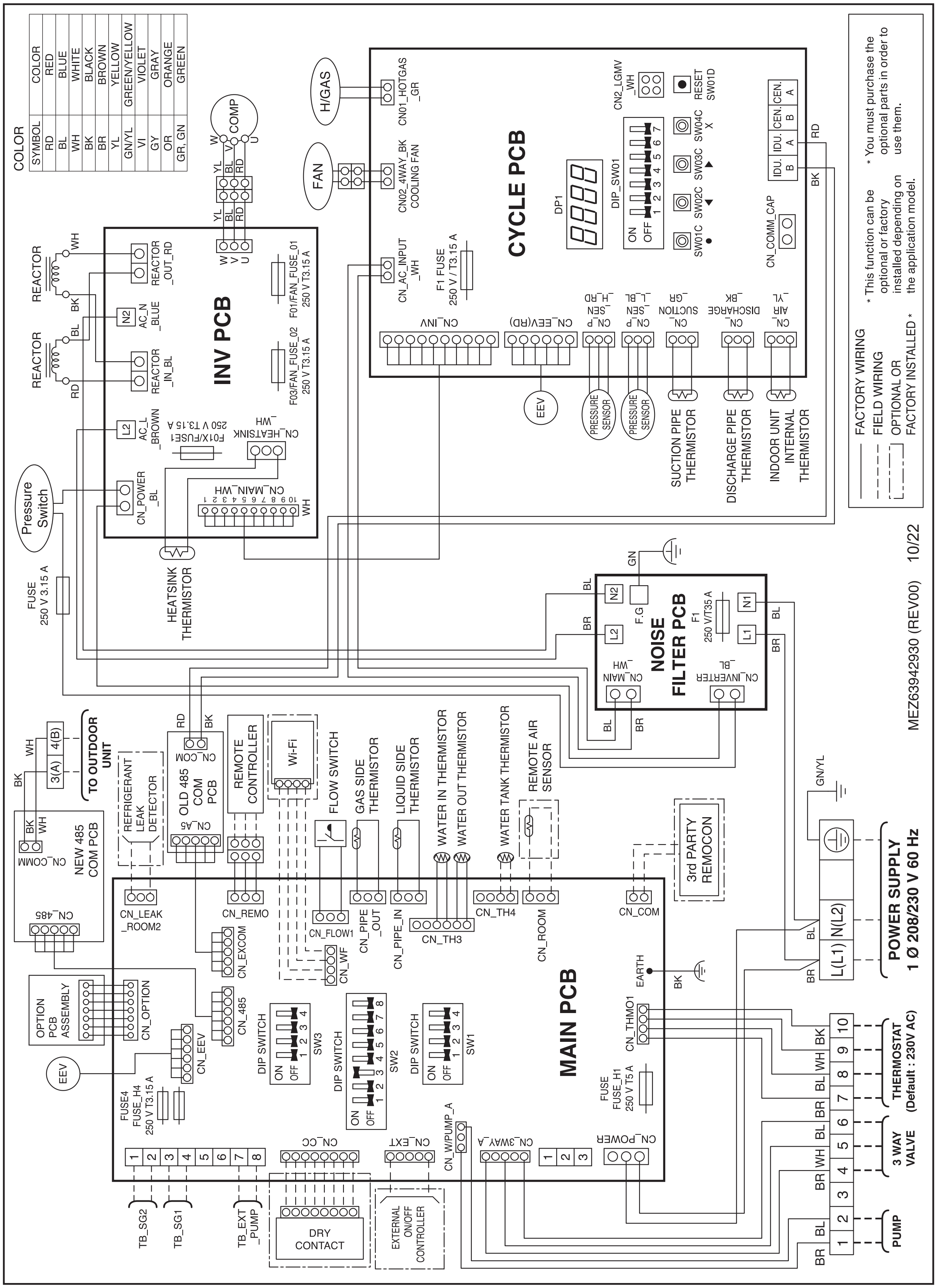


Table 6: LG Included Accessories.

Accessory	Model No.	Connection	Description	Use
Hydro Kit Unit Controller[1]	AKB74855309	CN-REMO	Remote wall mounted controller	Schedules, sets operational parameters and monitors system
Indirect Water Storage Tank Sensor Well	MEG61846102	Indirect Heating Tank Wall	Mounting for the indirect water tank storage temperature sensor complete with 39 feet of cable with plug connector	
Hot Water Storage Tank Sensor[1,2]	EBG61325701	CN-TH4	Water storage tank sensor	Monitors the Hydro Kit indirect water storage tank temperature
Water Circuit Strainer[3]	MJC57132402	Inlet Pipe	50 Mesh; install on inlet pipe to heat exchanger	Keeps large particulate from entering the heat exchanger

[1]Must use LG provided communications cable. [2]Must have contacts rated for 208-230/60/1. [3]1" FPT both ends.

Table 7: LG Optional Accessories (sold separately).

Accessory	Model No.	Connection	Description	Use
Group Control Cable Kit[1]	PZCWRCG3	---	0.82 foot cable	Allows for group control of Hydro Kits
Extension Cable[1]	PZCWRC1	---	33 foot extension cable assembly	Extends the length of the Hydro Kit Unit Controller communications cable beyond 33 feet (cannot be used to extend tank sensor cable length)
Remote Temperature Sensor	ZRTBS01	CN-ROOM	Sensor with 50 foot communications cable and plug connector	Monitors and/or controls (optional) the Hydro Kit based on air temperature
Dry Contact	PDRYCB320 / PDRYCB100	CN-CC	Mounts inside the unit cabinet and provides a external binary signal control interface	Enables/disables operation from an external signal
Wi-Fi Module	PWFMDD200	CN-WF	Connect for Wi-Fi capabilities	Enables Wi-Fi capabilities.

[1]Must use LG provided communications cable.

Note

Maximum combined current draw of all connected accessories must be equal to or less than 5 Amps@ 208-230/60/1. Refer to wiring diagrams for detailed terminal block information.

Table 8: Third-Party Accessories (Sold Separately).

Accessory	Connections	Voltage Options	Description	Use
Hydro Kit Circuit Water Pump Interlock	TB-1,2	208-230/60/1	Hydro Kit water circuit circulating pump interlock (use a field-provided pilot relay)	Provides pump On / Off control based on Hydro Kit control logic
208-230/60/1 Conventional Thermostat[1]	TB-7,8,10 and Harness Wire Change (C and A to B and C)	208-230/60/1	Single stage heating manual changeover	Monitors and / or controls (optional) the Hydro Kit based on the conditioned space temperature.
Mechanical Thermostat	TB-7,10 and Harness Wire Change (C and A to B and C)	---	Single stage heating only	Monitors and / or controls (optional) the Hydro Kit based on the conditioned space temperature.
Hydro Kit Circuit 3-Way Diverting Valve	TB-4,5,6	208-230/60/1	Valve (A) 208-230/60/1 3-wire SPDT	Diverting valve - circulates water to / from the comfort conditioning equipment and the Hydro kit water storage tank.

TB = Terminal Block
SPDT = Single Pole Double Throw

[1]Must have contacts rated for 208-230/60/1.

Table 9: Features Requiring Third-Party Accessories (sold separately).

Accessory	Connections	Voltage Options	Description	Use
External On / Off Control	CN_EXT	Non-Voltage (Digital Input)	External on / off connection	On / off operation with external device.
External Pump	TB EXT_PUMP	Non-Voltage [output] / 1 A	External pump connection	Interlock with external pump by relay

Note

Maximum combined current draw of all connected accessories must be equal to or less than 5 Amps@ 208-230/60/1. Refer to wiring diagrams for detailed terminal block information.

Table 10: LG Optional Central Controllers / Gateways (Sold Separately).

Controller / Controller Accessory	Model No.
LG MultiSITE™ Communications Manager	PBACNBTR0A
AC Smart™ 5	PACS5A000
ACP 5	PACP5A000
ACP BACnet® Gateway	PQNFB17C0
ACP LonWorks®	PLNWKB100
Simple Dry Contact	PDRYCB100
Dry Contact For Third-Party Thermostat	PDRYCB320
Remote Temperature Sensor	ZRTBS01
Wi-Fi Module	PWFMDD200
Group Control Cable Kit	PZCWRCG3
Extension Cable	PZCWRC1
Premium Power Distribution Indicator (PDI)	PQNUD1S41

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BACnet® is a registered trademark of ASHRAE.

SELECTION PROCESS FOR AIR-SOURCE SYSTEMS (MULTI V 5 AND MULTI V S)

Capacity Correction Factor by Temperature

Capacity Calculation Methods

Hydro Kit Capacity + Indoor Unit Capacity = Total Capacity

Q_{ODU} x (I_{HK} / I_{TOTAL}) x F_{TC,T_HK} x F_{TC,W_HK} x F_{TC,C_HK} x F_{TC,P_ODU} x F_{TC,D_ODU} = Hydro Kit Capacity

Q_{ODU} = Air-source outdoor unit capacity by outdoor air temperature and capacity ratio at standard indoor temperature. Standard indoor temperature is 80.6°F DB / 66.2°F WB on cooling mode, 68°F DB on heating mode. Refer to the Multi V 5 or Multi V S capacity tables.

F_{TC,T_HK} = Capacity Correction Factor by Outdoor Air Temperature (See Figure 6, Page 23).

F_{TC,W_HK} = Capacity Correction Factor by Water Flow Rate (See Figure 7, Page 23).

F_{TC,C_HK} = Capacity Correction Factor by Combination Ratio (See Figure 17, Page 28).

F_{TC,P_ODU} = Capacity Correction Factor by Refrigerant Piping Length (Refer to the correction factors of the outdoor unit. For Hydro Kit applications, it will always be one [1]).

F_{TC,D_ODU} = Capacity Correction Factor by Defrost Operation (Air-Source Units Only; Refer to the correction factors of the outdoor unit) (See Table 12, Page 24).

I_{HK} = Capacity Index for Hydro Kit (See Table 2, Page 10).

I_{TOTAL} = Sum of Capacity Index for Hydro Kits Combined with Indoor Units (See Table 14, Page 28).

Power Input Calculation Methods

Hydro Kit Power Input + Indoor Unit Power Input = Total Power Input

(PI_{ODU} x [I_{HK} / I_{TOTAL}] x $F_{PI,T\_HK(O)}$ x $F_{PI,W\_HK(O)}$]) + (PI_{HK} x $F_{PI,T\_HK(H)}$ x $F_{PI,W\_HK(H)}$) x F_{PI,C_HK} = Hydro Kit Power Input

PI_{ODU} = Air-source outdoor unit power input by outdoor air temperature and capacity ratio at standard indoor temperature. Standard indoor temperature is 80.6°F DB / 66.2°F WB on cooling mode, 68°F DB on heating mode.

PI_{HK}= Hydro Kit Nominal Power Input (See Table 3, Page 11).

$F_{PI,T\_HK(O)}$ = Power Input Correction Factor (Outdoor Unit) by Outdoor Air Temperature (See Figure 9, Page 25).

$F_{PI,W\_HK(O)}$ = Power Input Correction Factor (Outdoor Unit) by Water Flow Rate (See Figure 11, Page 25).

$F_{PI,T\_HK(H)}$ = Power Input Correction Factor (Hydro Kit) by Outdoor Air Temperature (See Figure 10, Page 25).

$F_{PI,W\_HK(H)}$ = Power Input Correction Factor (Hydro Kit) by Water Flow Rate (See Figure 12, Page 25).

F_{PI,C_HK} = Power Input Correction Factor by Combination Ratio (See Figure 18, Page 28).

I_{HK} = Capacity Index for Hydro Kit (See Table 2, Page 10).

I_{TOTAL} = Sum of Capacity Index for Hydro Kits Combined with Indoor Units (See Table 14, Page 28).

When calculating at maximum and minimum temperatures of the outdoor unit capacity range and power input, use the same temperature values for both.

For example, when calculating Heating PI with capacity table of Multi V 5 Heat Pump at 59°F DB, use the same value of PI at 59°F DB.

To apply and choose a Hydro Kit for use with Multi V 5 and Multi V S (except 24K unit) Air-Source systems, the designer needs to know the corrected heating capacity (Btu/h), the heating power input (kW), water pressure drop through the heat exchanger (ft.-w.g.), and combination ratio limits. The following pages present the necessary steps and processes to obtain all the information needed.

Note:

The ARNH-K3A4 Hydro Kits can be used with outdoor units manufactured after April 2019 communicating at a baud rate of 9,600 bps (Gen4 features are operational). Before April 2019, outdoor units communicate at a baud rate of 1,200 bps. For more information, review the specific outdoor unit Engineering and Installation Manuals, or contact your LG Sales Representative.

Calculating Corrected Heating Capacity

To obtain the corrected heating capacity at design conditions, first see the “Hydro Kit Specifications Table” on page 10, and find the rated heating capacity of the chosen Hydro Kit. Use the charts on the following pages for the four (4) additional factors needed to determine the corrected heating capacity:

- Factor A = Outdoor Ambient Air DB Temperature (°F) (Multi V 5 or Multi V S Air-Source).
- Factor B = Water Flow Rate (GPM).
- Factor C = Antifreeze Additive (% by Weight).
- Factor D = Outdoor Unit Coil Frost Accumulation.

Then, to calculate, use:

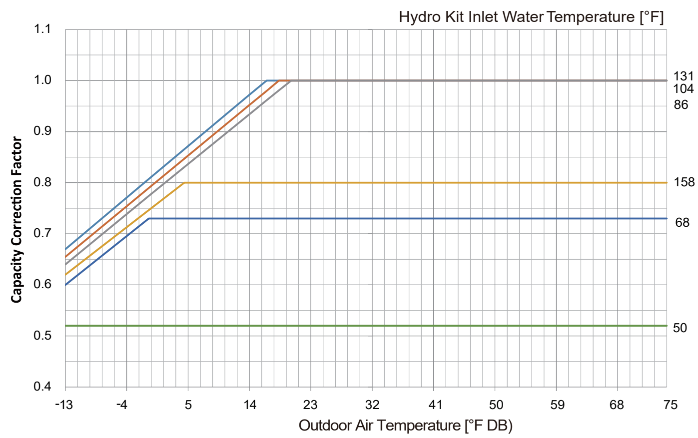
Rated Capacity (Btu/h) x Factor A x Factor B x Factor C x Factor D = Corrected Heating Capacity (Btu/h).

Heating Capacity Correction Charts for Multi V 5 and Multi V S Air-Source Units

Factor A: Outdoor Ambient Air DB Temperature (°F)

1. Find the design outdoor air temperature on the chart.
2. Find the Hydro Kit inlet water temperature.
3. Use the intersecting datapoint to find the heating capacity correction factor by air-source ambient air temperature.

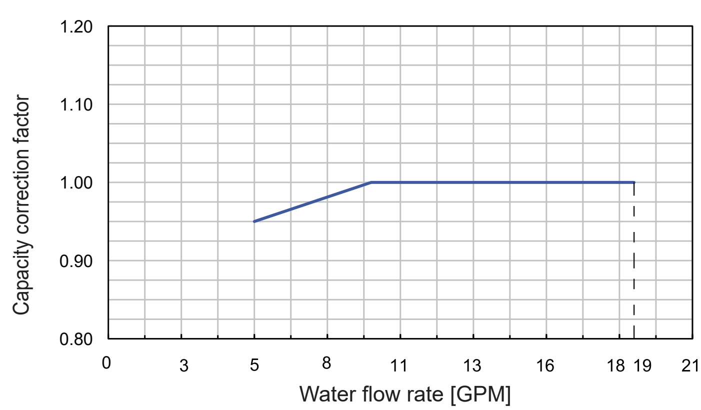
Figure 6: Multi V 5 and Multi V S Heating Capacity Correction Factor Chart.



Factor B: Water Flow Rate (GPM)

1. Find the heating design water flow rate (GPM) on the chart for the proposed Hydro Kit model at right.
2. Find the Hydro Kit water flow rate.
3. Use the intersecting datapoint to find the heating capacity correction factor by water flow rate.

Figure 7: ARNH423K3A4 and ARNH763K3A4 Water Flow Rate Heating Capacity Correction Factor.



Note:

Water Flow Rate Ranges: ARNH423K3A4 is 5.2 to 10.6 GPM, ARNH763K3A4 is 5.2 to 19 GPM.

SELECTION PROCESS

Hydro Kits with Multi V 5 and Multi V S Air-Source Systems

Applying Heating Capacity and Power Input Correction Factors

Factor C: Antifreeze Additive (% by Weight)

If the water flowing through the Hydro Kit heat exchanger has the potential to freeze, an antifreeze agent such as ethylene glycol, propylene glycol, or methanol must be added to the water circuit. The antifreeze will reduce the ability of the Hydro Kit to exchange heat energy, and this reduction must be taken into account.

1. Find the antifreeze percent by weight on the chart.
2. Find the antifreeze being considered.
3. Use the intersecting datapoint to find the heating capacity correction factor. See also table below for heating capacity correction factor datapoints at specific antifreeze concentration level percentages.

Figure 8: Heating Capacity Correction Factor by Water Flow Rate.

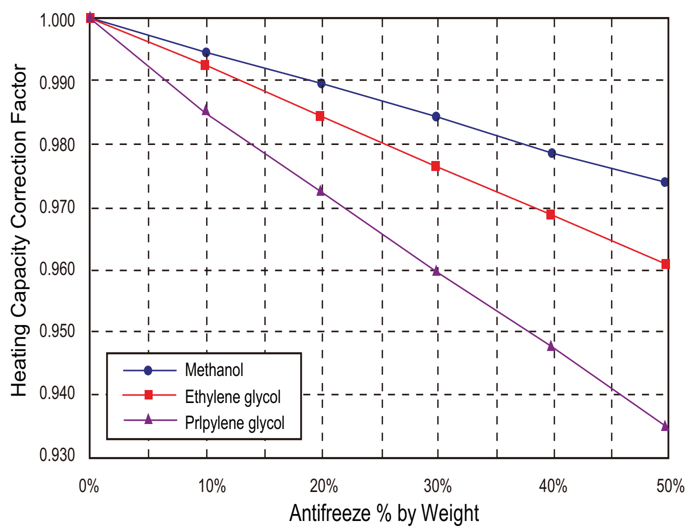


Table 11: Heating Capacity Correction by % Antifreeze Chart.

Type	Description	Antifreeze Concentration Level (% by Weight)				
		10%	20%	30%	40%	50%
Methanol	Heating	0.995	0.990	0.985	0.979	0.974
	Pressure Drop	1.023	1.057	1.091	1.122	1.160
Ethylene Glycol	Heating	0.993	0.985	0.977	0.969	0.961
	Pressure Drop	1.024	1.068	1.124	1.188	1.263
Propylene Glycol	Heating	0.966	0.973	0.960	0.948	0.935
	Pressure Drop	1.040	1.098	1.174	1.273	1.405

Factor D: Outdoor Unit Coil Frost Accumulation.

For air-source systems only. Calculate the Frost Accumulation Correction Factor using the information in the table at right. Applies to both Hydro Kit models.

Table 12: Outdoor Unit Frost Accumulation Capacity Correction Factor.

Coil Inlet Air Temp DB (°F)	19.4	23.0	26.6	32.0	37.4	41.0	44.6
Capacity Correction Factor	0.98	0.95	0.93	0.86	0.93	0.96	1.0

Calculating Corrected Heating Power Input

To obtain the corrected heating power input, first see the “Hydro Kit Electrical Data Table” on page 11, and find the rated heating power input of the chosen Hydro Kit. Use the charts on the following pages for the additional factors needed to determine the corrected heating power input:

- Factor E = Outdoor Ambient Air DB Temperature (°F) (Multi V 5 or Multi V S Air-Source).
- Factor F = Outdoor Ambient Air WB Temperature (°F) (R134A Circuit)
- Factor G = Water Flow Rate (GPM) (Outdoor Unit)
- Factor H = Water Flow Rate (GPM) (R134A Circuit)

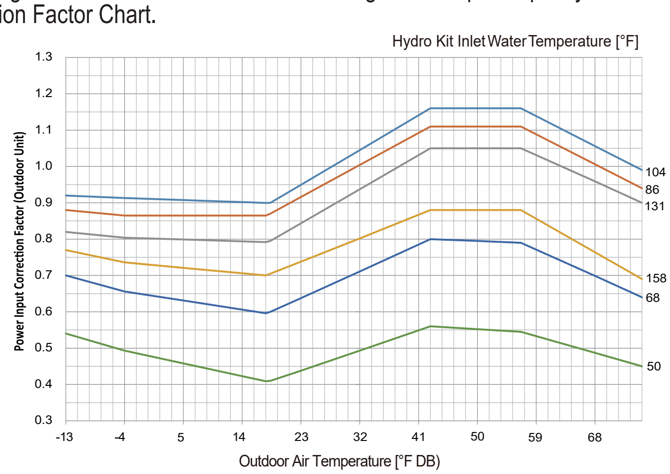
Then, to calculate, use: Rated Power Input (kW) x Factor E x Factor F x Factor G x Factor H = Corrected Heating Power Input (kW).

Heating Power Input Charts for Multi V 5 and Multi V S Air-Source Units

Factor E: Outdoor Ambient Air DB Temperature (°F) (ODU)

1. Find the design outdoor air temperature.
2. Find the Hydro Kit inlet water temperature.
3. Use the intersecting datapoint to find the heating power input correction factor.

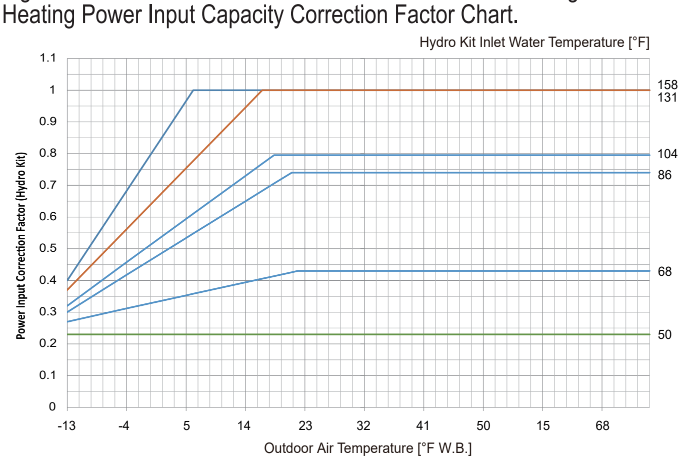
Figure 9: Multi V 5 and Multi V S Heating Power Input Capacity Correction Factor Chart.



Factor F: Outdoor Ambient Air WB Temperature (°F) (R134A Circuit)

1. Find the design outdoor air temperature.
2. Find the Hydro Kit inlet water temperature.
3. Use the intersecting datapoint to find the R134A heating power input correction factor.

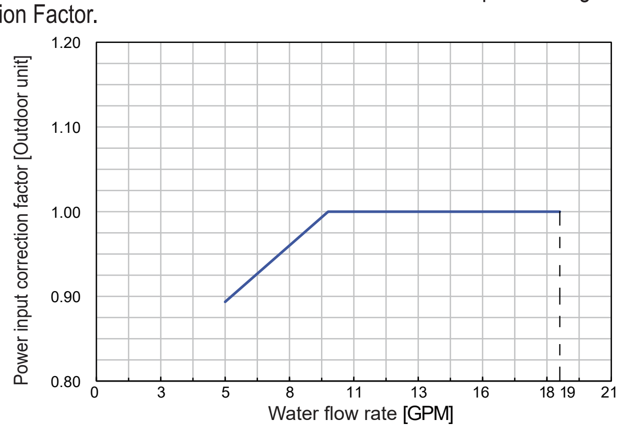
Figure 10: ARNH423K3A4 and ARNH763K3A4 R134A Refrigerant Circuit Heating Power Input Capacity Correction Factor Chart.



Factor G: Water Flow Rate (GPM) (ODU)

1. Find the heating design water flow rate (GPM) on the chart for the proposed Hydro Kit model.
2. Find the Hydro Kit water flow rate.
3. Use the intersecting datapoint to find the heating power input correction factor by water flow rate.

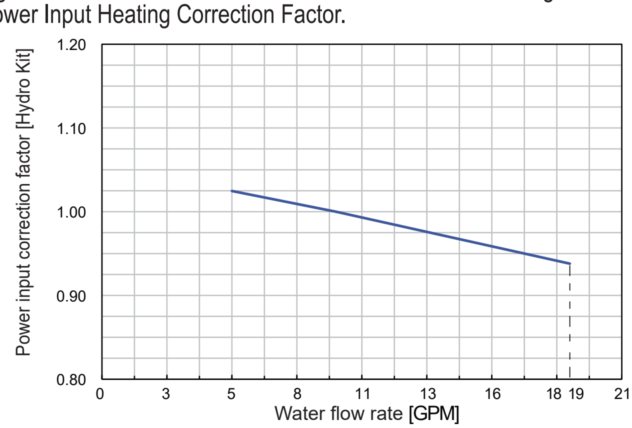
Figure 11: Multi V 5 and Multi V S Water Flow Power Input Heating Correction Factor.



Factor H: Water Flow Rate (GPM) (R134A Circuit)

1. Find the heating design water flow rate (GPM) on the chart for the proposed Hydro Kit model.
2. Find the Hydro Kit water flow rate.
3. Use the intersecting datapoint to find the R134A heating power input correction factor by water flow rate.

Figure 12: ARNH423K3A4 and ARNH763K3A4 R134A Refrigerant Circuit Power Input Heating Correction Factor.



Note:

Water Flow Rate Ranges: ARNH423K3A4 is 5.2 to 10.6 GPM, ARNH763K3A4 is 5.2 to 19 GPM.

Calculating the Heat Exchanger Water Pressure Drop

To obtain the Hydro Kit Water Pressure Drop (with antifreeze), use:

Water Pressure Drop x Factor P = Antifreeze / Water Solution Heat Exchanger Waterside Pressure Drop (ft.-w.g.)

Where Factor P = Antifreeze Additive (% by Weight) Waterside Pressure Drop Correction Factor

Determine the system design water flow rate. Because the pump must be sized for the worst case scenario, choose the highest flow rate through the heat exchanger - cooling or heating mode.

1. Find the design water flow (GPM) on the chart for the proposed Hydro Kit model below.
2. Find the Hydro Kit flow rate.
3. Use the intersecting datapoint to find the waterside pressure drop through the heat exchanger using water without any antifreeze.
4. If the application warrants antifreeze, apply the antifreeze pressure drop correction factor found in the table below.
5. Find the type of antifreeze used, and find the percentage of antifreeze by weight for the solution. The intersecting datapoint is the “Anti-freeze Additive (% by Weight) Waterside Pressure Drop Correction Factor” to be used in the formula above.

Figure 13: ARNH423K3A4 Hydro Kit Heat Exchanger Water Pressure Drop.

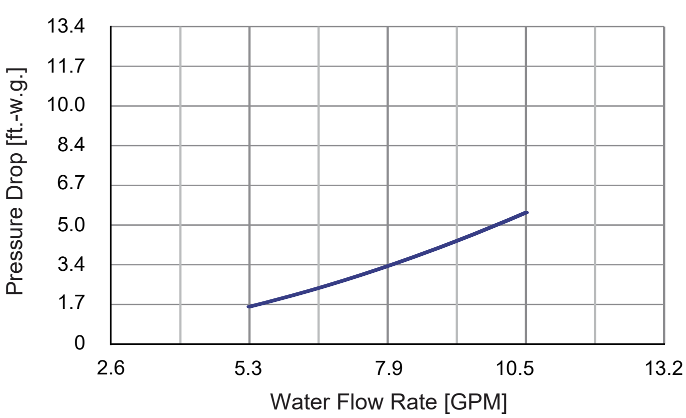


Figure 14: ARNH763K3A4 Hydro Kit Heat Exchanger Water Pressure Drop.

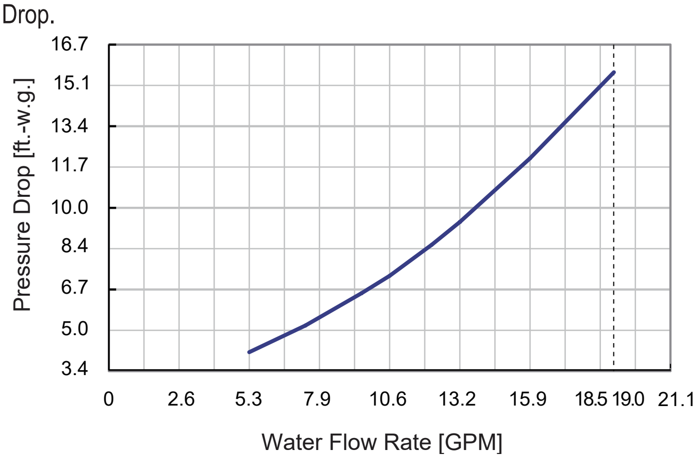


Table 13: Water Pressure Drop Correction Factors.

Type	Description	Antifreeze Concentration Level (% by Weight)				
		10%	20%	30%	40%	50%
Methanol	Heating	0.995	0.990	0.985	0.979	0.974
	Pressure Drop	1.023	1.057	1.091	1.122	1.160
Ethylene Glycol	Heating	0.993	0.985	0.977	0.969	0.961
	Pressure Drop	1.024	1.068	1.124	1.188	1.263
Propylene Glycol	Heating	0.966	0.973	0.960	0.948	0.935
	Pressure Drop	1.040	1.098	1.174	1.273	1.405

Operation Limits

The Hydro Kit's outdoor ambient temperature operational limitations are defined by the Multi V outdoor unit serving the system. For more information on operation limits, refer to the Multi V 5 or Multi V S Outdoor Engineering Manuals.

Heating Operation Limits

Figure 15: ARNH423K3A4 and ARNH763K3A4 Heating Operation Limits with Multi V 5 or Multi V S Heat Pump Outdoor Units.

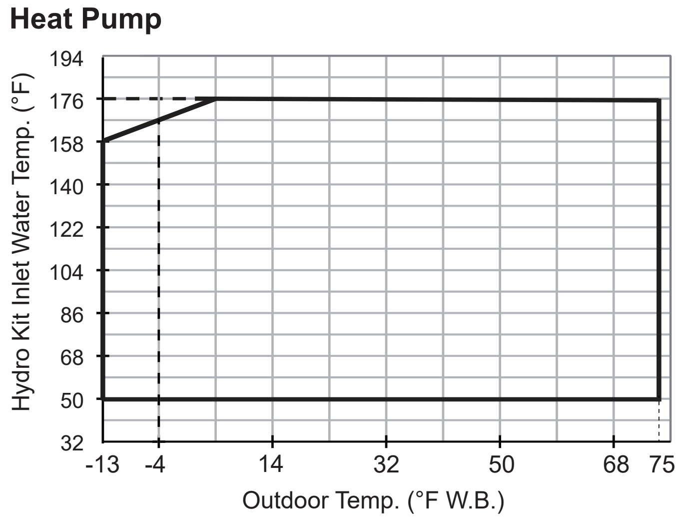
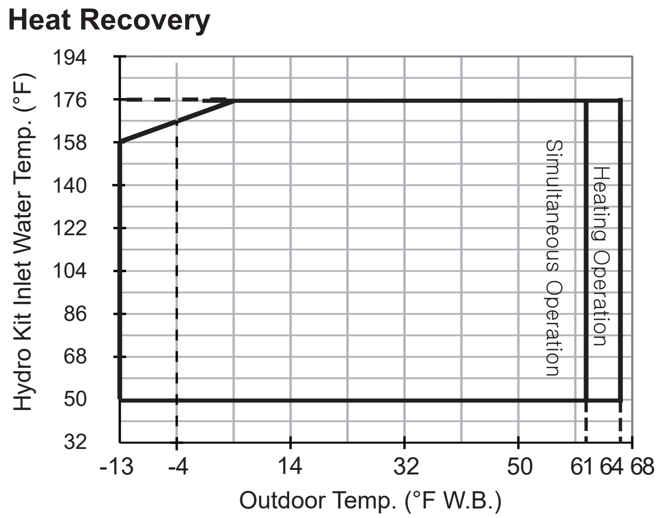


Figure 16: ARNH423K3A4 and ARNH763K3A4 Heating Operation Limits with Multi V 5 or Multi V S Heat Recovery Outdoor Units.



Note

- *If a system has all Hydro Kits, the maximum outdoor temperature operation limit is 95°F.*
- *Simultaneous operation means that some indoor units are operating in heating.*

Combination Ratio Limits

See the charts below for capacity correction and power input correction factors when the combination ratio of Hydro Kits to total combination capacity is considered. See tables below for the maximum combination ratios of systems with all Hydro Kits or Hydro Kits combined with indoor units.

Figure 17: ARNH423K3A4 and ARNH763K3A4 Capacity Correction Factor of Hydro Kits to Total Combination Capacity.

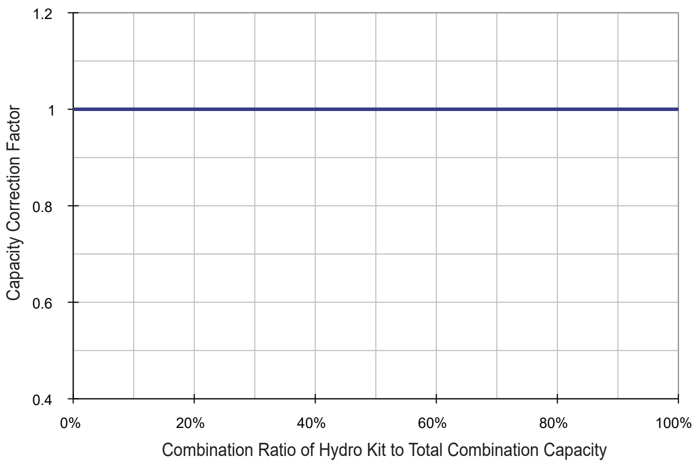


Figure 18: ARNH423K3A4 and ARNH763K3A4 Power Input Correction Factor of Hydro Kits to Total Combination Capacity.

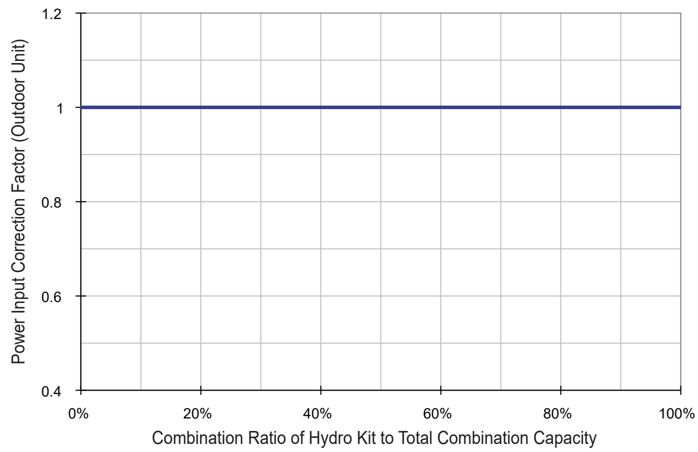


Table 14: Maximum Combination Ratios of Hydro Kits With or Without Indoor Units.

Maximum Combination Ratio (Heat Pump, Heat Recovery)	
Hydro Kit Only	**Hydro Kit + Indoor Unit**
50% - 100%	50% - 130%

1. If the combination ratio of operating indoor units ratio to the outdoor unit rated capacity is more than 130%, the airflow rate or the capacity of all indoor units and the hydro kit reduces to the lower range of operation.
2. The total capacity index of indoor units combined with Hydro Kits corresponds to the maximum combination ratio of the outdoor unit, but the capacity index of just Hydro Kits cannot be more than 100% of the capacity index of the outdoor unit.
3. Hydro Kits cannot be combined with Multi V S 24k outdoor units.

SELECTION PROCESS FOR WATER-SOURCE SYSTEMS (MULTI V WATER 5)

Applying Correction Factors on page 30
Operation Limits on page 35

Capacity Correction Factor by Temperature

Capacity Calculation Methods

Hydro Kit Capacity + Indoor Unit Capacity = Total Capacity

Q_{ODU} x (I_{HK} / I_{TOTAL}) x F_{TC,T_HK} x F_{TC,W_HK} x F_{TC,C_HK} x F_{TC,P_ODU} = Hydro Kit Capacity

Q_{ODU} = Water-source unit capacity by outside inlet water temperature and capacity ratio at standard indoor temperature. Standard indoor temperature is 80.6°F DB / 66.2°F WB on cooling mode, 68°F DB on heating mode. Refer to the capacity tables of the Multi V Water 5 water-source unit.

F_{TC,T_HK} = Capacity Correction Factor by Water Inlet Temperature (See Figure 19, Page 31).

F_{TC,W_HK} = Capacity Correction Factor by Water Flow Rate (See Figure 20, Page 31).

F_{TC,C_HK} = Capacity Correction Factor by Combination Ratio (See Figure 29, Page 36).

F_{TC,P_ODU} = Capacity Correction Factor by Refrigerant Piping Length (Refer to the correction factors of the water-source unit. For Hydro Kit applications, it will always be one [1]).

I_{HK} = Capacity Index for Hydro Kit (See Table 2, Page 10).

I_{TOTAL} = Sum of Capacity Index for Hydro Kits Combined with Indoor Units (See Table 17, Page 36).

Power Input Calculation Methods

Hydro Kit Power Input + Indoor Unit Power Input = Total Power Input

(PI_{ODU} x [I_{HK} / I_{TOTAL}] x $F_{PI,T\_HK(O)}$ x $F_{PI,W\_HK(O)}$]) + (PI_{HK} x $F_{PI,T\_HK(H)}$ x $F_{PI,W\_HK(H)}$) x F_{PI,C_HK} = Hydro Kit Power Input

PI_{ODU} = Water-source unit power input by outside inlet water temperature and capacity ratio at standard indoor temperature. Standard indoor temperature is 80.6°F DB / 66.2°F WB on cooling mode, 68°F DB on heating mode.

PI_{HK}= Hydro Kit Nominal Power Input (See Table 3, Page 11).

$F_{PI,T\_HK(O)}$ = Power Input Correction Factor (Water-source Unit) by Water Inlet Temperature (See Figure 22, Page 33).

$F_{PI,W\_HK(O)}$ = Power Input Correction Factor (Water-source Unit) by Water Flow Rate (See Figure 24, Page 33).

$F_{PI,T\_HK(H)}$ = Power Input Correction Factor (Hydro Kit) by Water Inlet Temperature (See Figure 23, Page 33).

$F_{PI,W\_HK(H)}$ = Power Input Correction Factor (Hydro Kit) by Water Flow Rate (See Figure 25, Page 33).

F_{PI,C_HK} = Power Input Correction Factor by Combination Ratio (See Figure 30, Page 36).

I_{HK} = Capacity Index for Hydro Kit (See Table 2, Page 10).

I_{TOTAL} = Sum of Capacity Index for Hydro Kits Combined with Indoor Units (See Table 17, Page 36).

When calculating at maximum and minimum temperatures of the outdoor unit capacity range and power input, use the same temperature values for both.

For example, when calculating Heating PI with capacity table of Multi V Water 5 Water Heat Pump at 59°F DB, use the same value of PI at 59°F DB.

To apply and choose a Hydro Kit for use with Multi V Water 5 Water-Source systems, the designer needs to know the corrected heating capacity (Btu/h), the heating power input (kW), water pressure drop through the heat exchanger (ft.-w.g.), and combination ratio limits. The following pages present the necessary steps and processes to obtain all the information needed.

Note:

The ARNH-K3A4 Hydro Kits can be used with outdoor units manufactured after April 2019 communicating at a baud rate of 9,600 bps (Gen4 features are operational). Before April 2019, outdoor units communicate at a baud rate of 1,200 bps. For more information, review the specific outdoor unit Engineering and Installation Manuals, or contact your LG Sales Representative.

Calculating Corrected Heating Capacity

To obtain the corrected heating capacity at design conditions, first see the "Hydro Kit Specifications Table" on page 10, and find the rated heating capacity of the chosen Hydro Kit. Use the charts on the following pages for the three (3) additional factors needed to determine the corrected heating capacity:

- Factor A = Inlet Water Temperature (°F) (Multi V 5 Water-Source).
- Factor B = Water Flow Rate (GPM).
- Factor C = Antifreeze Additive (% by Weight).

Then, to calculate, use:

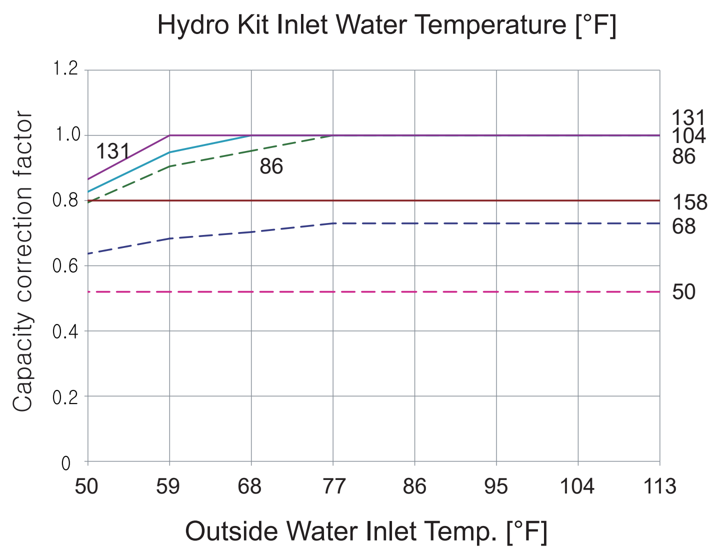
Rated Capacity (Btu/h) x Factor A x Factor B x Factor C = Corrected Heating Capacity (Btu/h).

Heating Capacity Correction Charts for Multi V Water 5 Water-Source Units

Factor A: Inlet Water Temperature (°F)

1. Find the water inlet temperature on the chart.
2. Find the Hydro Kit inlet water temperature.
3. Use the intersecting datapoints to find the heating capacity correction factor by water-source inlet water temperature.

Figure 19: Multi V Water 5 Water-Source Heating Capacity Correction Factor Chart.



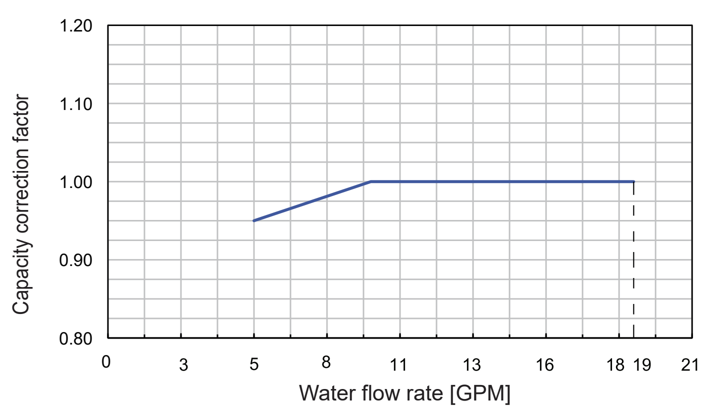
Factor B: Water Flow Rate (GPM)

1. Find the heating design water flow rate (GPM) on the chart for the proposed Hydro Kit model at right.
2. Find the Hydro Kit water flow rate.
3. Use the intersecting datapoint to find the heating capacity correction factor by water flow rate.

Note:

Water Flow Rate Ranges: ARNH423K3A4 is 5.2 to 10.6 GPM, ARNH763K3A4 is 5.2 to 19 GPM.

Figure 20: ARNH423K3A4 and ARNH763K3A4 Water Flow Rate Heating Capacity Correction Factor.



Factor C: Antifreeze Additive (% by Weight)

If the water flowing through the Hydro Kit heat exchanger has the potential to freeze, an antifreeze agent such as ethylene glycol, propylene glycol, or methanol must be added to the water circuit. The antifreeze will reduce the ability of the Hydro Kit to exchange heat energy, and this reduction must be taken into account.

1. Find the antifreeze percent by weight on the chart.
2. Find the antifreeze being considered.
3. Use the intersecting datapoint to find the heating capacity correction factor. See also table below for heating capacity correction factor datapoints at specific antifreeze concentration level percentages.

Figure 21: Heating Capacity Correction Factor by Water Flow Rate.

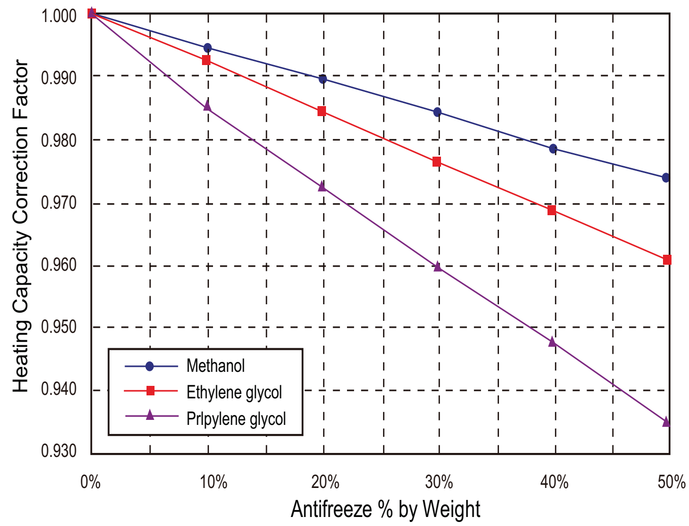


Table 15: Heating Capacity Correction by % Antifreeze Chart.

Type	Description	Antifreeze Concentration Level (% by Weight)				
		10%	20%	30%	40%	50%
Methanol	Heating	0.995	0.990	0.985	0.979	0.974
	Pressure Drop	1.023	1.057	1.091	1.122	1.160
Ethylene Glycol	Heating	0.993	0.985	0.977	0.969	0.961
	Pressure Drop	1.024	1.068	1.124	1.188	1.263
Propylene Glycol	Heating	0.966	0.973	0.960	0.948	0.935
	Pressure Drop	1.040	1.098	1.174	1.273	1.405

Calculating Corrected Heating Power Input

To obtain the corrected heating power input, first see the “Hydro Kit Electrical Data Table” on page 11, and find the rated heating power input of the chosen Hydro Kit. Use the charts on the following pages for the additional factors needed to determine the corrected heating power input:

- Factor D = Inlet Water Temperature (°F) (Multi V 5 Water-Source)
- Factor E = Inlet Water Temperature (°F) (R134A Circuit)
- Factor F: Water Flow Rate (GPM) (Water-Source Unit).
- Factor G: Water Flow Rate (GPM) (R134A)

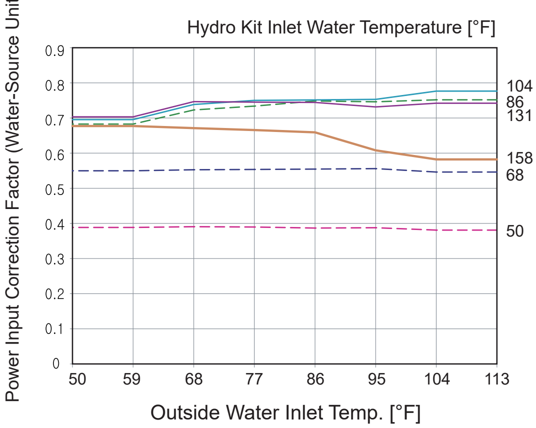
Then, to calculate, use: Rated Power Input (kW) x Factor D x Factor E x Factor F x Factor G= Corrected Heating Power Input (kW)

Heating Power Input Charts for Multi V Water 5 Water-Source Units

Factor D: Inlet Water Temperature (°F) (WSU)

1. Find the design water inlet temperature.
2. Find the Hydro Kit inlet water temperature.
3. Use the intersecting datapoint to find the heating power input correction factor.

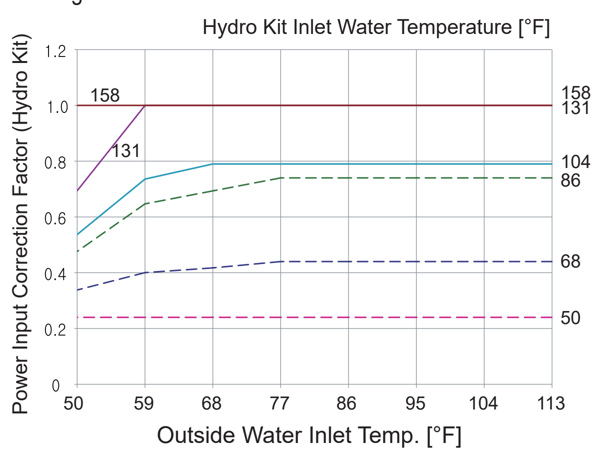
Figure 22: Multi V Water 5 Water-Source Heating Power Input Capacity Correction Factor Chart.



Factor E: Inlet Water Temperature (°F) (R134A Circuit)

1. Find the design water inlet temperature.
2. Find the Hydro Kit inlet water temperature.
3. Use the intersecting datapoint to find the R134A heating power input correction factor.

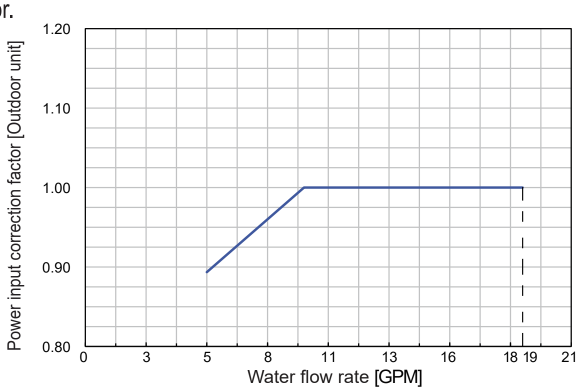
Figure 23: ARNH423K3A4 and ARNH763K3A4 Water Flow Rate Power Input Heating Correction Factor.



Factor F: Water Flow Rate (GPM) (WSU)

1. Find the heating design water flow rate (GPM) on the chart for the proposed Hydro Kit model.
2. Find the Hydro Kit water flow rate.
3. Use the intersecting datapoint to find the heating power input correction factor by water flow rate.

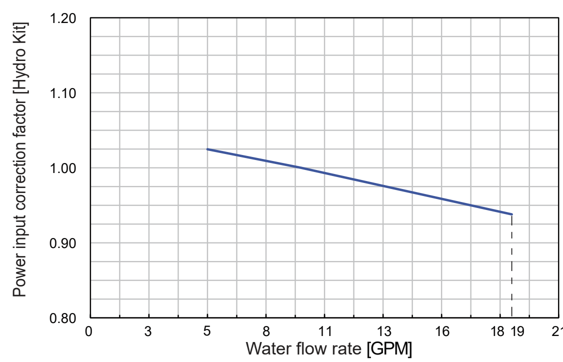
Figure 24: Multi V Water 5 Water Flow Power Input Heating Correction Factor.



Factor G: Water Flow Rate (GPM) (R134A Circuit)

1. Find the heating design water flow rate (GPM) on the chart for the proposed Hydro Kit model.
2. Find the Hydro Kit water flow rate.
3. Use the intersecting datapoint to find the heating power input correction factor by water flow rate.

Figure 25: ARNH423K3A4 and ARNH763K3A4 Water Flow Rate R134A Power Input Heating Correction Factor.



Note:

Water Flow Rate Ranges: ARNH423K3A4 is 5.2 to 10.6 GPM, ARNH763K3A4 is 5.2 to 19 GPM.

Calculating the Heat Exchanger Water Pressure Drop

To obtain the Hydro Kit Water Pressure Drop (with antifreeze), use:

Water Pressure Drop x Factor P = Antifreeze / Water Solution Heat Exchanger Waterside Pressure Drop (ft.-w.g.)

Where Factor P = Antifreeze Additive (% by Weight) Waterside Pressure Drop Correction Factor

Determine the system design water flow rate. Because the pump must be sized for the worst case scenario, choose the highest flow rate through the heat exchanger - cooling or heating mode.

1. Find the design water flow (GPM) on the chart for the proposed Hydro Kit model below.
2. Find the Hydro Kit flow rate.
3. Use the intersecting datapoint to find the waterside pressure drop through the heat exchanger using water without any antifreeze.
4. If the application warrants antifreeze, apply the antifreeze pressure drop correction factor found in the table below.
5. Find the type of antifreeze used, and find the percentage of antifreeze by weight for the solution. The intersecting datapoint is the "Anti-freeze Additive (% by Weight) Waterside Pressure Drop Correction Factor" to be used in the formula above.

Figure 26: ARNH423K3A4 Hydro Kit Heat Exchanger Water Pressure Drop.

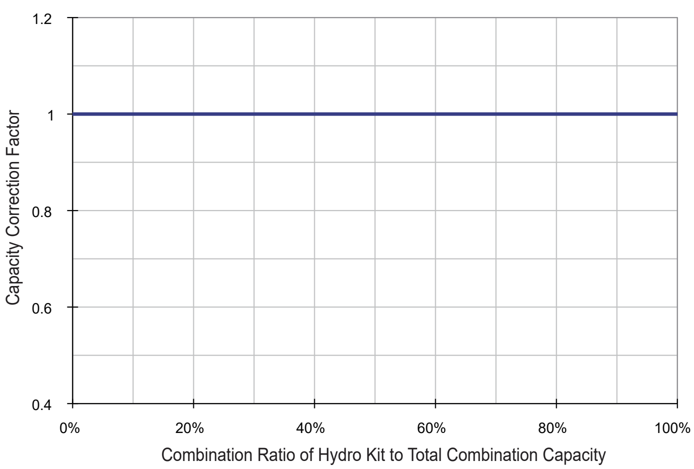


Figure 27: ARNH763K3A4 Hydro Kit Heat Exchanger Water Pressure Drop.

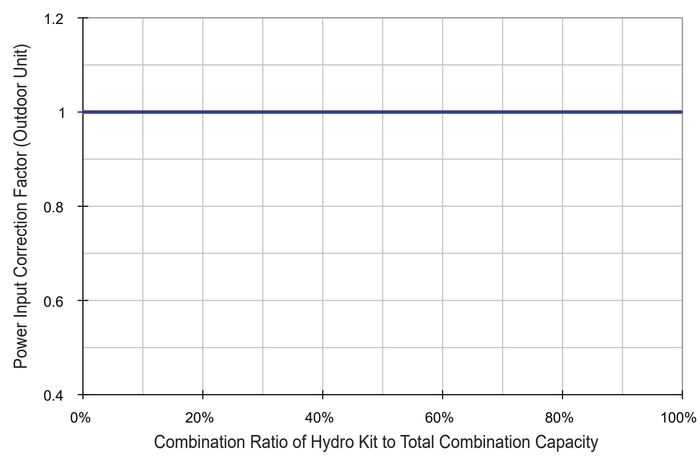


Table 16: Water Pressure Drop Correction Factors.

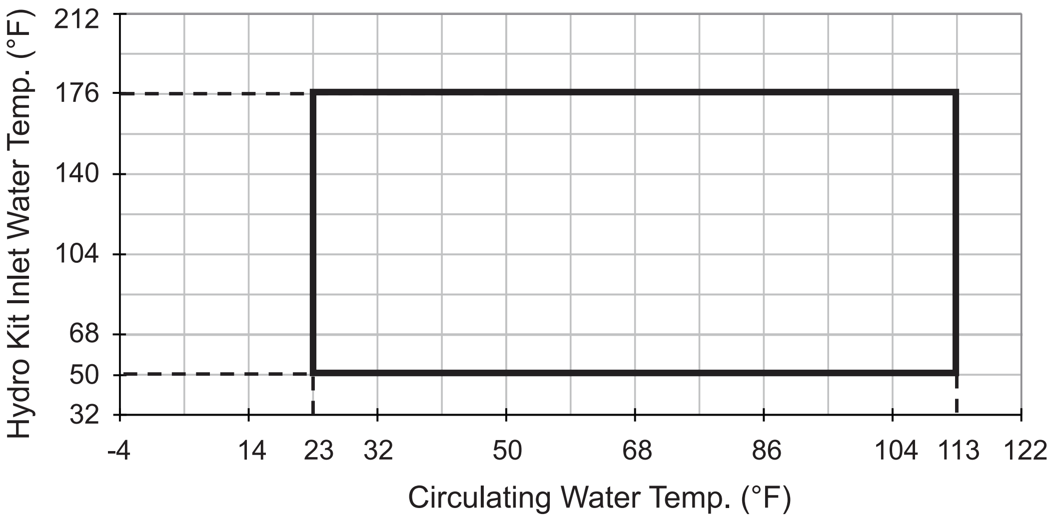
Type	Description	Antifreeze Concentration Level (% by Weight)				
		10%	20%	30%	40%	50%
Methanol	Heating	0.995	0.990	0.985	0.979	0.974
	Pressure Drop	1.023	1.057	1.091	1.122	1.160
Ethylene Glycol	Heating	0.993	0.985	0.977	0.969	0.961
	Pressure Drop	1.024	1.068	1.124	1.188	1.263
Propylene Glycol	Heating	0.966	0.973	0.960	0.948	0.935
	Pressure Drop	1.040	1.098	1.174	1.273	1.405

Operation Limits

The Hydro Kit's condenser circuit water temperature operational limitations are defined by the Multi V outdoor unit serving the system. For more information on operation limits, refer to the Multi V Water 5 Water-Source Engineering Manual.

Heating Operation Limits

Figure 28: ARNH423K3A4 and ARNH763K3A4 Heating Operation Limits for Multi V Water 5 Heat Pump and Heat Recovery Units.



Combination Ratio Limits

See the charts below for capacity correction and power input correction factors when the combination ratio of Hydro Kits to total combination capacity is considered. See table below for the maximum combination ratios of systems with all Hydro Kits or Hydro Kits combined with indoor units.

Figure 29: ARNH423K3A4 and ARNH763K3A4 Capacity Correction Factor of Hydro Kits to Total Combination Capacity.

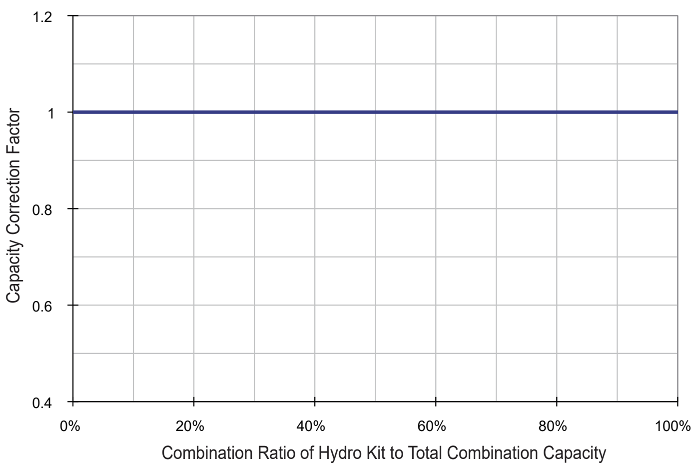


Figure 30: ARNH423K3A4 and ARNH763K3A4 Power Input Correction Factor of Hydro Kits to Total Combination Capacity.

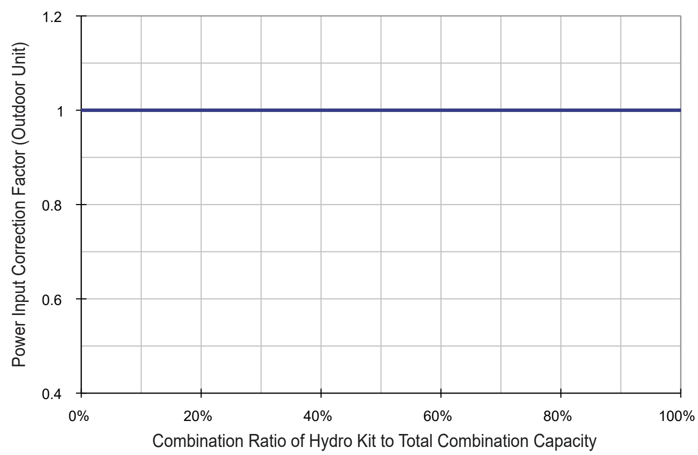


Table 17: Maximum Combination Ratios of Hydro Kits With or Without Indoor Units.

Maximum Combination Ratio (Heat Pump, Heat Recovery)	
Hydro Kit Only	Hydro Kit + Indoor Unit
50% - 100%	50% - 130%

1. If the combination ratio of operating indoor units ratio to the outdoor unit rated capacity is more than 130%, the airflow rate or the capacity of all indoor units and the hydro kit reduces to the lower range of operation.
2. The total capacity index of indoor units combined with Hydro Kits corresponds to the maximum combination ratio of the outdoor unit, but the capacity index of just Hydro Kits cannot be more than 100% of the capacity index of the outdoor unit.
3. Hydro Kits cannot be combined with Multi V S 24k outdoor units.

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