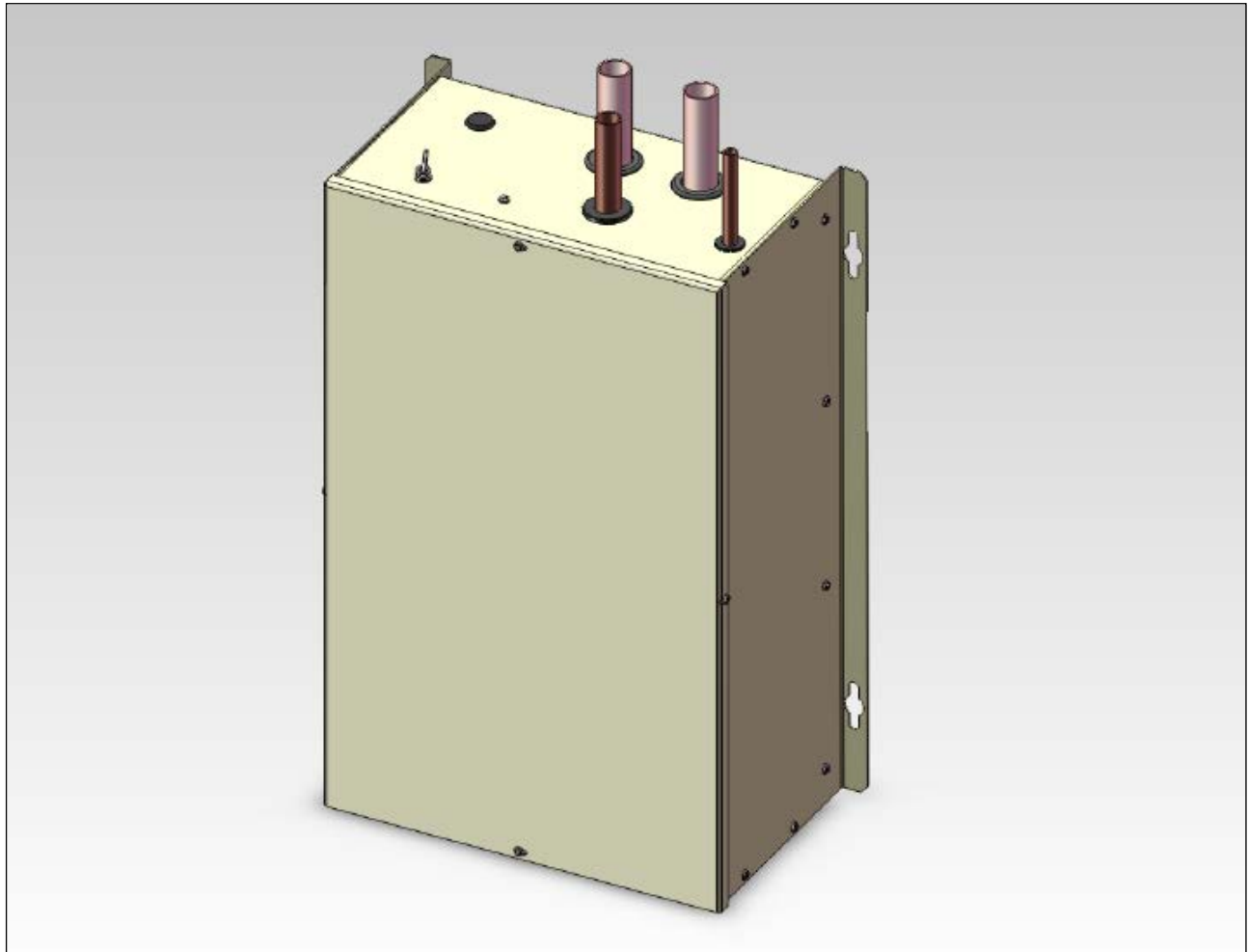




EARTHLINKED
TECHNOLOGIES

EarthLinked®
Domestic Water Module
Installation, Operation & Maintenance Manual





ETL LISTED
CONFORMS TO
UL STD 1995
US CERTIFIED TO CAN/CSA
STD C22.2 NO. 236-05



COMPLIES WITH
IEC 60204-1
IEC 60335-2-40
IEC 61000-3-11

Disclaimer

This manual contains instructions for the EarthLinked® Domestic Water Module which is combined with other EarthLinked® system components, field specified water heaters, water storage tanks and associated fittings, controls and piping.

Proper installation and servicing of the EarthLinked® Domestic Water Module is essential to its reliable performance. All EarthLinked® systems and components must be installed and serviced by an authorized, trained technician who has successfully completed the training class and passed the final examination. Installation and service must be made in accordance with the instructions set forth in this manual and the *EarthLinked® Technical Manual*. Failure to provide installation and service by an authorized, trained installer in a manner consistent with the subject manuals will nullify the limited warranty coverage for the system.

EarthLinked® Technologies manufactures and sells only the EarthLinked® system components and the performance information contained herein is based on performance of EarthLinked® Technologies' supplied Products.

Therefore, EarthLinked® Technologies shall not be liable for any defect, unsatisfactory performance, damage or loss, whether direct or consequential, relative to the design, manufacture, construction, application or installation of the above mentioned field specified items.

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CSI # 23 80 00

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IMPORTANT!

Proper installation and servicing of the EarthLinked® Hydronic Water Module is essential to its reliable performance. All EarthLinked® systems and components must be installed and serviced by an authorized, trained technician who has successfully completed the training class and passed the final examination. Installation and service must be made in accordance with the instructions set forth in this manual and the *EarthLinked® Heating and Cooling Installation, Operation and Maintenance Manual*. Failure to provide installation and service by an authorized, trained technician in a manner consistent with the subject manuals will nullify the limited warranty coverage for the system.



WARNING

The domestic water module (DWM) must be isolated from the water system when the system undergoes a “superchlorination” or “shock chlorination” flushing process. Closing the isolation valves as shown in Figure 3 prior to initiating the system flushing process isolates the DWM. The water entering the DWM after the system flush must not exceed a chlorine level consistent with local municipal standards. Failure to isolate the DWM will damage the heat exchanger and circulating pump, causing system failure. Allowing highly chlorinated water to enter the DWM will void the EarthLinked® Limited Warranty.

1. Inspection/Pre-Installation

A. Inspection

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Reference EarthLinked® matching system component model numbers in Figure 1. Make sure all units have been received and model numbers are the same as those ordered.

Compressor Unit	Domestic Water Module
-018, -024, -030, -036	DWM-1836
-042, -048	DWM-4248
-060, -068, -072	DWM-6072

Figure 1. Matching Component Model Numbers

Inspect the carton or crating of each unit, and inspect each unit for damage. Assure the carrier makes proper notation of any shortages or damage on all copies of the freight bill and he completes a common carrier inspection report. Concealed damage not discovered during unloading must be reported to the carrier within 15 days of receipt of shipment. **If not filed within 15 days, the freight company can deny the claim without recourse. Note: it is the responsibility of the purchaser to file all necessary claims with the carrier.**

Equipment should be stored in its packaging in a clean, dry area. Store equipment in an upright position at all times. Equipment is to be stacked in accordance with the notation on the packaging. **DO NOT remove equipment from shipping cartons until equipment is required for installation.**

Cover equipment on the job site with either shipping cartons, vinyl film or an equivalent protective covering. In areas where painting, plastering and/or spraying has not been completed, all due precautions must be taken to avoid physical damage to the equipment and contamination by foreign material. Physical damage and contamination may prevent proper start-up and may result in costly equipment clean up. Examine all equipment before installing.



WARNING

WEAR ADEQUATE PROTECTIVE CLOTHING AND PRACTICE ALL APPLICABLE SAFETY PRECAUTIONS WHILE INSTALLING THIS EQUIPMENT. FAILURE TO DO SO MAY RESULT IN EQUIPMENT AND/OR PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

B. Pre-Installation

Prior to installing the Domestic Water Module and other EarthLinked® space heating and cooling system above-ground components, you will need tools and equipment listed in Section 8 to properly install the system.

Installation of the Domestic Water Module must be done in accordance with this manual and the *EarthLinked® Heating and Cooling Installation, Operation and Maintenance Manual*.

Prepare the Domestic Water Module (DWM) for installation as follows:

Compare the data on the unit nameplate or packaging with ordering and shipping information to verify the correct unit has been shipped (See Figure 1.)

Keep the DWM covered with the packaging until installation is begun and all plastering, painting, etc. is finished.

Verify refrigerant tubing is free of kinks or dents.

Inspect all electrical connections. Connections must be clean and tight at the terminals.



IMPORTANT!

To avoid equipment damage, DO NOT use this equipment as a source of heating or cooling during the construction process. The mechanical components may become clogged with construction dirt and debris which may cause system damage.

2. General System Layout

Guidelines for the general layout of the Domestic Water Module and other EarthLinked® system components are shown in Figure 2.

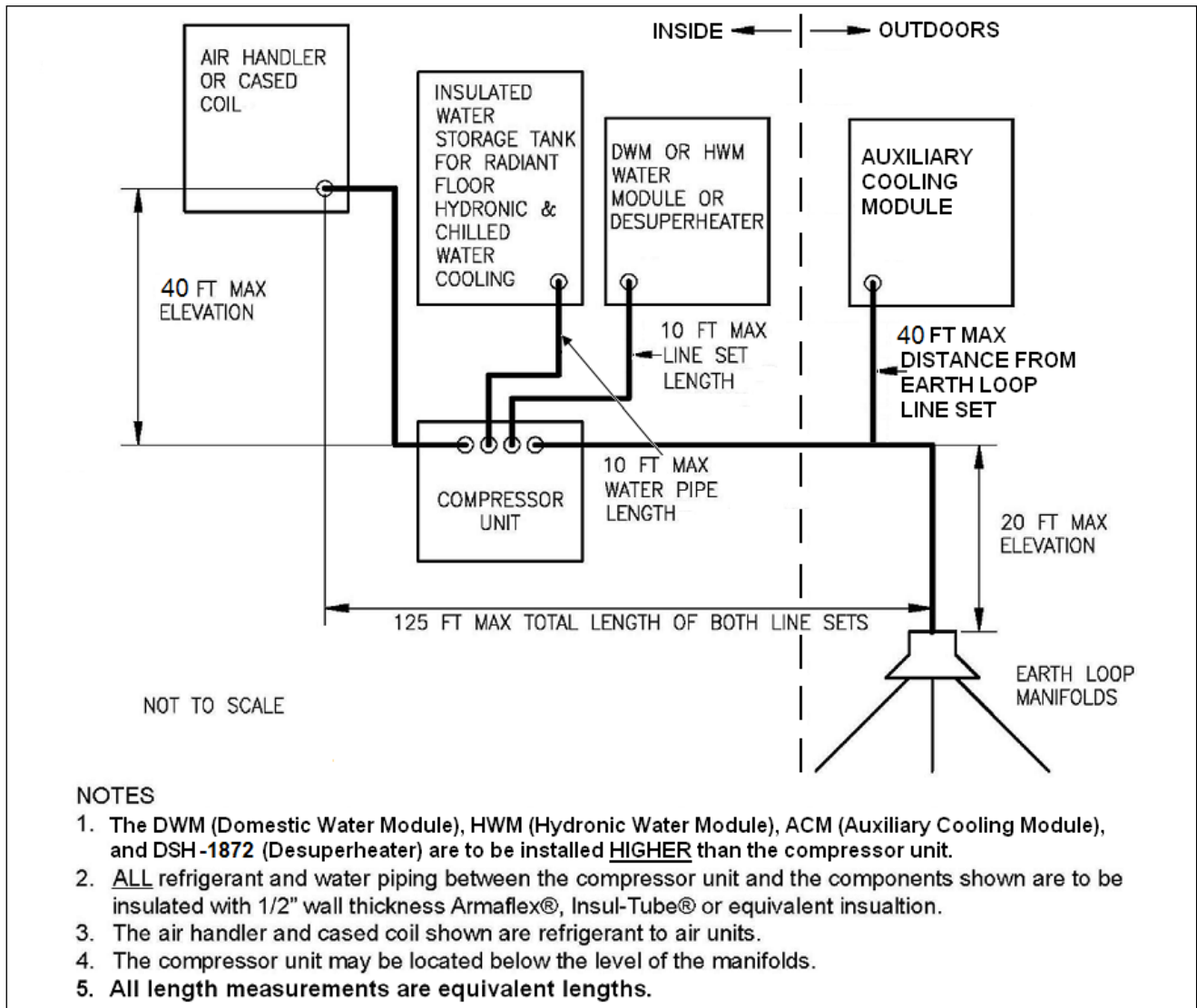


Figure 2. General System Layout

3. Application

A. General

A typical Domestic Water Module application is shown in Figure 3.



IMPORTANT

The Domestic Water Module will heat water to a maximum of 110°F. If higher water temperatures are required, a booster water heater is required.

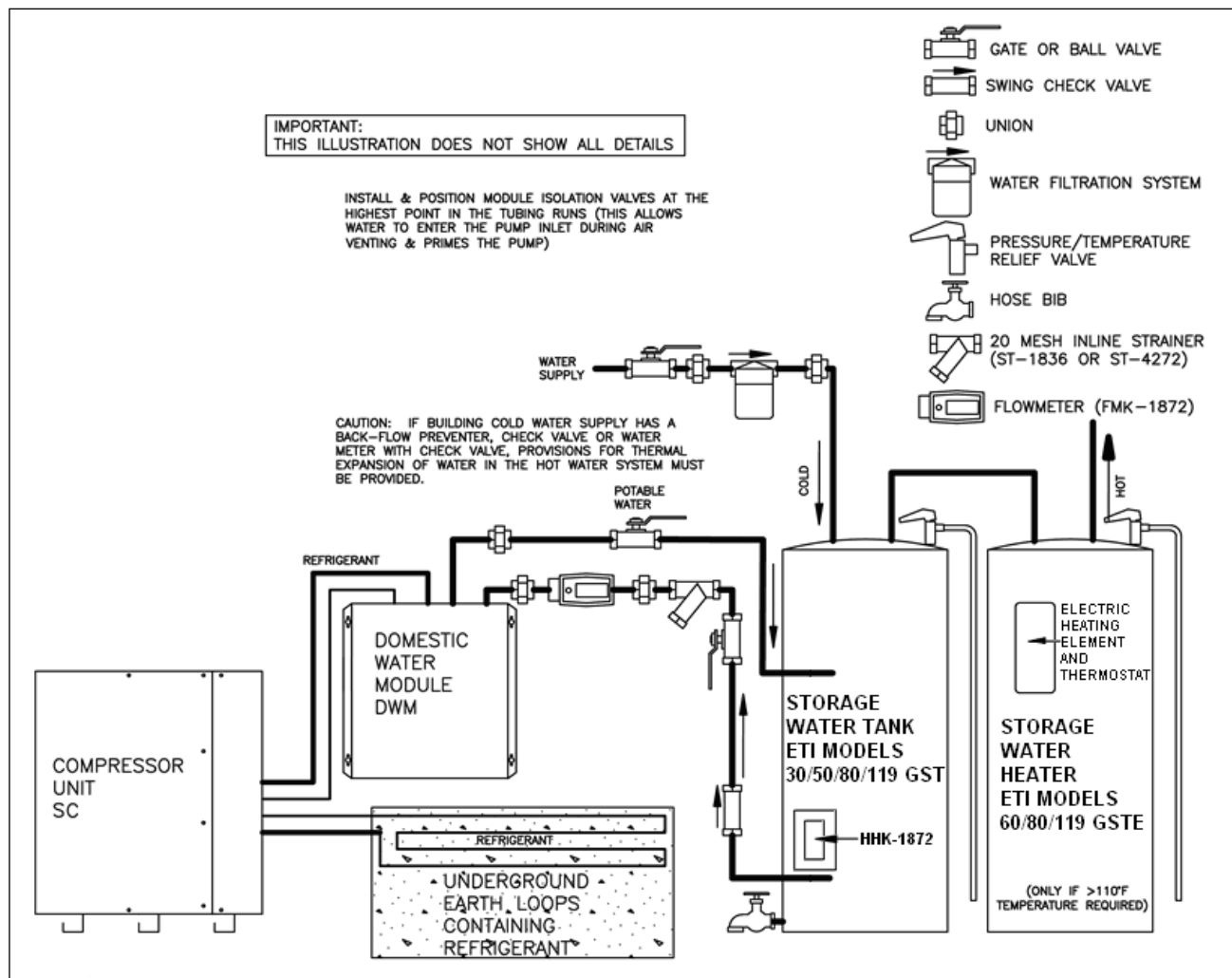


Figure 3. Typical DWM Application: Water Filtration System, Strainer and Water Piping Details

Essential water fittings are shown in Figure 3. However, all installations must be consistent with applicable codes.

The following guidelines apply to DWMs applied in any system.



IMPORTANT

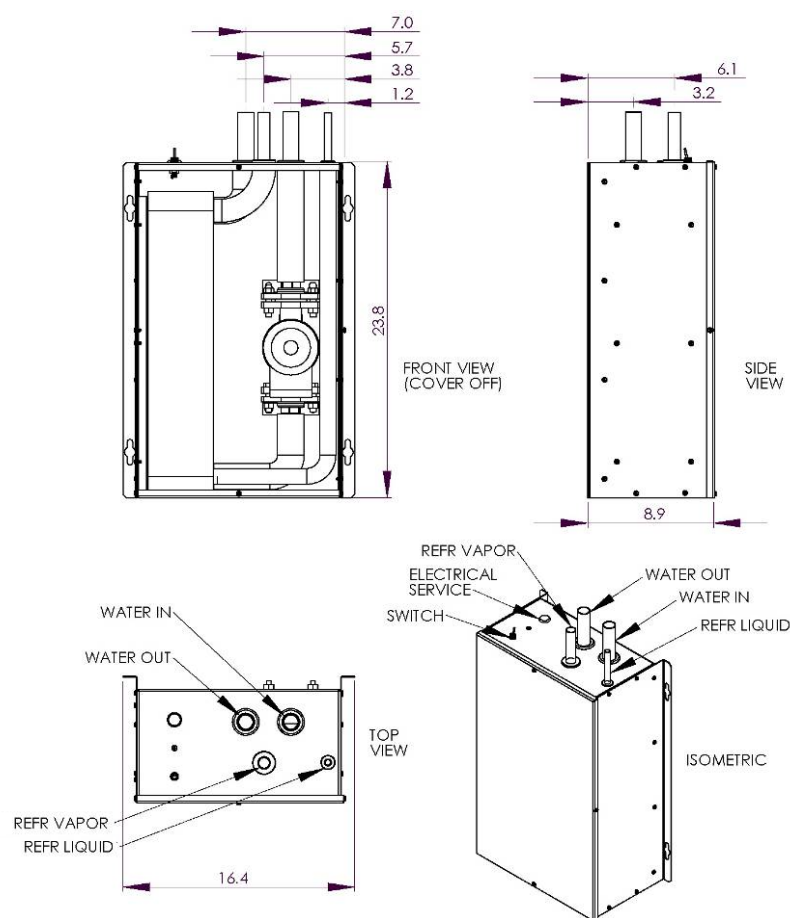
The Domestic Water Module is to be mounted on a wall or fixed rigidly in place no more than 10 FEET AWAY FROM AND ABOVE THE COMPRESSOR UNIT.

The Domestic Water Module is to be located no more than 10 FEET AWAY FROM THE WATER STORAGE TANK.

Orient the Domestic Water Module with “pipes up” only.

All interconnecting lines between the Domestic Water Module, water storage tank and compressor unit are to be insulated with 1/2” wall thickness Armaflex®, Insul-Lock® or the equivalent. The Domestic Water Module is to be mounted lower than the isolation valves that connect to the water storage tank. Storage tanks used with the Domestic Water Module shall UL listed.

The dimensions, port locations and connections and performance of the DWM are illustrated in Figure 4.



DWM Recovery Rate 60°F Temperature Rise*		
Compressor Model	DWM Model	Recovery Rate, US Gal/Hr
		R-410A
-024	-1836	50
-036	-1836	74
-048	-4248	101
-060	-6072	117
-068	-6072	127
*60°F Earth Temperature, H-5 Earth Loop, 40°F Entering Water Temp, 100°F Leaving Water Temp.		

DWM Model	TUBING CONNECTION SIZES (INCHES O.D.)				LINE SET SIZES (INCHES O.D.)	
	WATER IN	WATER OUT	REFR. VAPOR	REFR. LIQUID	REFR. VAPOR	REFR. LIQUID
DWM-1836	7/8	7/8	7/8	1/2	1/2	3/8
DWM-4248	1-1/8	1-1/8	7/8	1/2	5/8	1/2
DWM-6072	1-1/8	1-1/8	7/8	1/2	3/4	1/2

Figure 4. Domestic Water Module (DWM)

B. Freeze Protection



WARNING!

Installation and operation of the Domestic Water Module and associated water piping shall be in an environment that is maintained at a temperature above 40°F at all times. Failure to install the Domestic Water Module consistent with this will nullify the EarthLinked® System Warranty.

C. Water Pipe Plumbing and Fittings

Figure 5 lists the minimum nominal Type L hard copper pipe fitting and strainer sizes for the interconnecting piping between the domestic water module (DWM) and the water storage tank shown in Figure 3.



IMPORTANT!

Distance between DWM and the water storage tank shall be no more than 10 ft.

Compressor Unit Size & Capacity, BTUH	DWM Model	Minimum Nominal Type L Hard Copper Pipe and Fittings, Inches	ETI	
			Strainer Model, Size	Flowmeter Model , Size
-018 (18,000)	-1836	3/4	ST-1836 1 in. FPT	FM-1872 1in. FPT
-024 (24,000)		3/4		
-030 (30,000)		1		
-036 (36,000)		1		
-042 (42,000)	-4248	1-1/2	ST-4272 1-1/2 in. FPT	
-048 (48,000)		1-1/2		
-060 (60,000)	-6072	1-1/2		
-068 (68,000)		1-1/2		
-072 (72,000)		1-1/2		

Figure 5. DWM Minimum Water Pipe, Fitting and Strainer Sizes to Water Tank

The 20 mesh inline strainers are to be installed immediately upstream of the water inlet to the DWM as shown in Figure 3, to prevent particulate matter from restricting water flow through the brazed plate heat exchanger.

The flowmeter in Figures 3 and 5 is necessary to measure water flow rate when the DWM is operating. This is important to determine when maintenance to the system is to be performed. Minimum water flow rates through the DWM heat exchanger, when operating normally are shown in Figure 6.

Compressor Unit Model/Size	DWM Model	Minimum Flow, GPM
-018	-1836	3.0
-024		4.0
-030		5.0
-036		6.0
-042	-4248	7.0
-048		8.0
-060	-6072	10.0
-068		12.0
-072		12.0

Figure 6. Minimum DWM Water Flow Rates

The ETI flowmeter kit model FMK-1872 (or equivalent) is recommended for field installation with the DWM to (1) determine proper flow rate for optimum performance and (2) provide data to indicate when maintenance to the strainer or DWM heat exchanger is required.

D. Storage Water Heater and Tank

The Domestic Water Module provides hot water at 110°F (maximum) for storage in a properly sized, insulated storage water tank as shown in Figure 3. If a higher water temperature is required, a storage water heater shown in Figure 3 can be installed to heat the 110°F water coming out of the storage water tank to the desired temperature.

See the Section 9 Storage Water Heater and Storage Water Tank Sizing Guide to properly size these components for the residential or small commercial application.

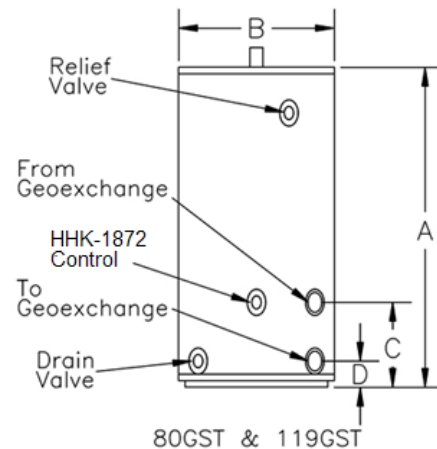
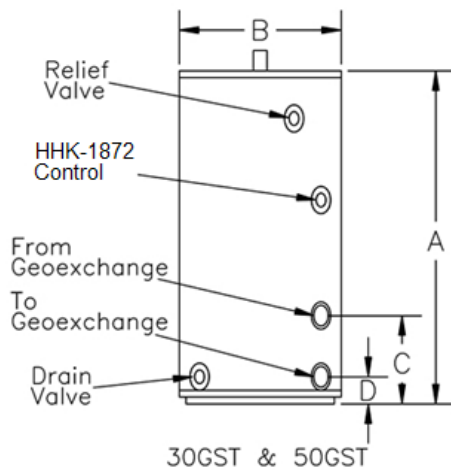
ETI provides a full line of insulated water storage tanks in 30, 50, 80 and 119 US Gallon capacities. ETI Water Storage Tanks are illustrated in Figure 7a. See the price pages for the GST Series Storage Water Tanks.

ETI also provides a full line of storage water heaters in 60, 80 and 119 US Gallon capacities. These water heaters are designed to match the EarthLinked® Domestic Water Module Heating System and provide 4.5 kW of water heating booster power to bring the 110°F heated water up to the desired temperature. ETI Water Storage Heaters are illustrated in Figure 7b. See the price pages for the GSTE Series Storage Water Heaters.

EarthLinked® 30, 50, 80 and 119 gallon storage water tanks are designed for commercial and residential applications where water storage is required. These are approved for use with EarthLinked® systems to store heated potable water.

The insulated, glass-lined tanks have large 2" NPT geoexchange connections to provide maximum heat exchange efficiency.

MODEL	STORAGE, US GAL.	GEO CONN., NPT	HOT CONN., NPT	RELIEF VALVE CONN., NPT	DIMENSIONS, INCHES				SHIPPING WT., LBS
					A	B	C	D	
30GST	30	2"	2"	3/4"	39-1/2	20	11-1/4	4-3/8	145
50GST	50	2"	2"	3/4"	48-1/2	22	11	4-1/4	195
80GST	80	2"	2"	3/4"	60-1/2	24	22	7	240
119GST	119	2"	2"	1"	65-1/2	28	22	7	350



When the GST Series Water Storage Tank is used with the Domestic Water Module Water Heating System, the hot water output from the Domestic Water Module is connected to the "From Geoexchange" port on the water tank. The input to the Domestic Water Module is connected to the "To Geoexchange" port on the water tank. The cold water supply is teed into this connecting line. The leaving hot water connection is on the top of the storage tank.

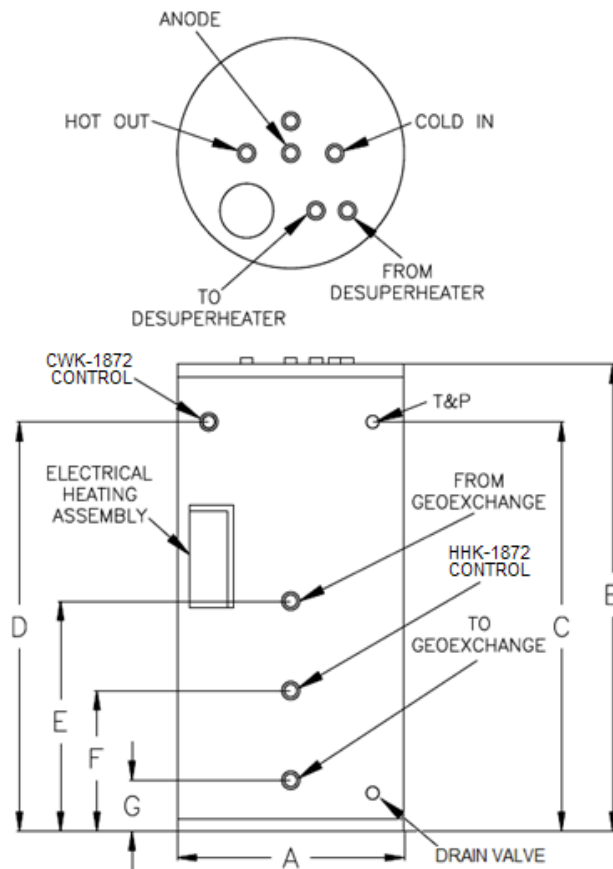
The HHK-1872 Temperature control is field wired to the compressor unit and set at the desired hot water temperature, up to a maximum of 110°F.

Figure 7a. ETI Series GST Storage Water Tanks

EarthLinked® 60, 80 and 119 gallon storage water heaters are designed for applications where water storage plus supplementary electric heat are required. These are approved for potable water.

The insulated, glass-lined tank contains a 4500 watt element to provide electric heat backup in domestic water heating (DWM) systems, or operate as the storage water heater in systems containing an EarthLinked® desuperheater.

MODEL	STORAGE, US GAL.	GEO CONN., NPT	DESUPER CONN., NPT	HOT/COLD CONN., NPT	DIMENSIONS, INCHES							SHIPPING WT., LBS
					A	B	C	D	E	F	G	
60GSTE	60	1-1/2"	1"	1"	22	60	52-1/4	53	29-1/4	17	4-1/4	235
80GSTE	80	1-1/2"	1"	1"	24	62-3/4	56	57	30-1/4	18	5-1/4	252
119GSTE	119	1-1/2"	1"	1"	29	64	56-1/2	57-3/4	32-1/2	15	7-1/2	382



When the GSTE Series Water Storage Heater is used in series with the GST Series Water Storage Tank, as illustrated in Figure 3, all of the ports on the side and top of the water heater are plugged except the "Cold In" which is connected to the hot water output from the storage tank; and the "Hot Out", which is the leaving hot water supply. The thermostat behind the "Electrical Heating Assembly" panel is employed to set the hot water temperature.

If the GSTE Storage Water Heater is used as a Storage Water Tank (with an inactive electric heating emergency backup), the hot water outlet from the Domestic Water Module is connected to the "From Geoexchange" port and the inlet to the Domestic Water Module is connected to the "To Geoexchange" port. The cold water supply enters the top of the water heater at "Cold In". The leaving hot water connection is "Hot Out". The two desuperheater ports on top of the tank and the "CWK-1872" port on the side of the tank are plugged.

The HHK-1872 control is set for the hot water temperature, the maximum being 100°F.

Figure 7b. ETI Series GSTE Storage Water Heaters

E. Filtration and Water Quality

The inclusion of a water filtration system in all applications of the DWM is necessary. The water filtration system reduces the potential for silt, dirt, rust and other particulate matter from entering the heated water system. The water filtration system is illustrated in Figure 3 with additional necessary fittings for the DWM installation.

Recommended water filtration systems are listed and illustrated in Figure 8.

FILTRATION SYSTEM MODEL	REPLACEMENT CARTRIDGE MODEL	DIMENSIONS & CONNECTIONS	RETAIL SOURCE
Whirlpool WHCF-DWHBB	WHCF-GD25BB (25 micron)	13-1/4 x 7-1/2 x 7-1/2" 1" FPT	Lowes
General Electric GNWH35F	FXHSC (30 micron)	14 x 8 x 8" 1" FPT	Home Depot

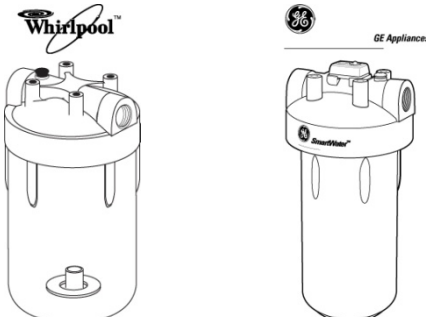



Figure 8. Recommended Water Filtration Systems

When specifying a Domestic Water Module to provide heated potable water, it is important to ensure that the water is not hard, and to have the water analyzed and treated as appropriate for several factors that affect the quality of potable water.



IMPORTANT!

High quality water will ensure minimal DWM heat exchanger maintenance.

Figure 9 illustrates the relative hardness of ground water in the contiguous USA.

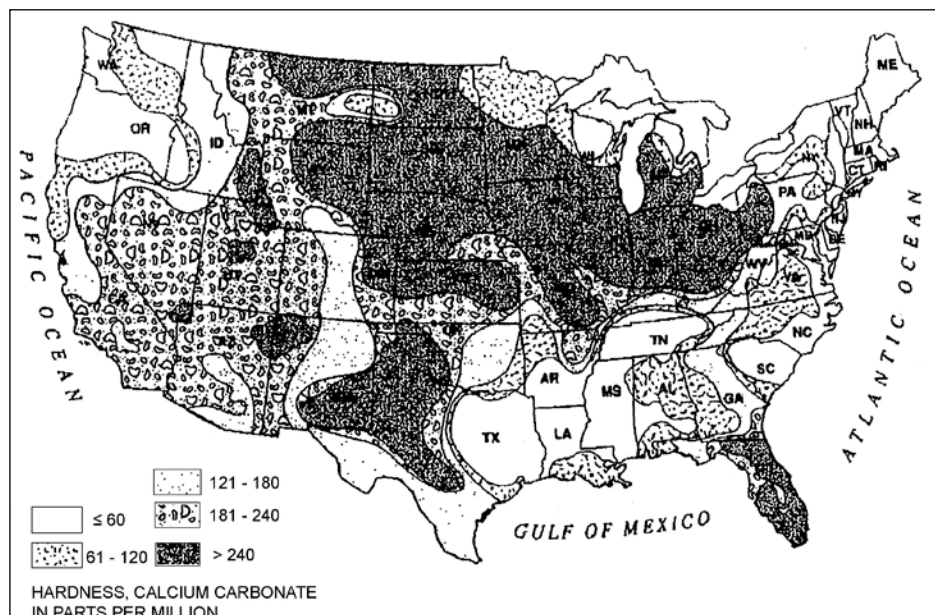


Figure 9. Hardness of Ground Water – Contiguous USA

Figure 10 provides additional information concerning the factors that affect the quality of potable water, including water hardness.



IMPORTANT!
**THE SERVICES OF A QUALIFIED WATER TREATMENT SPECIALIST ARE
 REQUIRED FOR THE APPROPRIATE WATER ANALYSIS AND TREATMENT.**

Water Quality Parameter	Acceptable Range	Comments
Corrosion pH	9 – 10.5	Acidity/Alkalinity: Below 9.0, steel will corrode. Above 10.5, brass and copper will corrode.
Scaling: Hardness, Calcium and Magnesium Carbonate	Total Hardness: 20 – 80 ppm*	Scaling Potential: Should check the Ryznar Stability Index and Langelier Saturation Index at the domestic water module leaving water temperature. See DWM System Maintenance, Section 6.
	Ryznar Stability Index: 6.0 to 7.5	
	Langelier Saturation Index: -0.5 to +0.5	
Corrosion:		
Hydrogen Sulfide	<0.5 ppm	Rotten egg smell appears at 0.5 ppm
Sulfates	<125 ppm	For cupronickel
Chlorine	<0.5 ppm	
Chlorides	<2.0 ppm	For copper at 10°C
Carbon Dioxide	<75 ppm	
Ammonia	<0.5 ppm	
Ammonia Chloride/Nitrate/Hydroxide/Sulfate	<0.5 ppm	
Total Dissolved Solids (TDS)	<1000 ppm	
Iron Fouling:		
Iron Fe ²⁺ (Ferrous)		If Fe ²⁺ > 0.2 ppm, with pH 6 to 8, O ₂ < 5 ppm, check for Iron Bacteria
Iron Fouling		Above this level deposition occurs
Erosion & Clogging		Install ETI - supplied 20 mesh inline strainer. Size in accordance with Figure 6 in this manual.
*Water Hardness (as calcium) <ul style="list-style-type: none"> • Soft: 0 – 20 ppm • Moderately Soft: 20 – 40 ppm • Slightly Hard: 40 – 60 ppm • Moderately Hard: 60 – 80 ppm • Hard: 80 – 120 ppm • Very Hard: >120 ppm 		

Figure10. Water Quality Parameters for Domestic (Potable) Water Heating



IMPORTANT!
THE SERVICES OF A QUALIFIED WATER TREATMENT SPECIALIST ARE REQUIRED FOR THE APPROPRIATE WATER ANALYSIS AND TREATMENT.

F. Refrigerant Piping

Refrigerant piping connections and line set sizes are listed in Figure 4.

4. Field Wiring

Field wiring for the Domestic Water Module to the SC compressor unit with a booster storage water heater, as shown in Figure 3, is illustrated in Figure 11. The heat sense bulb is Figure 11 is HHK-1872 Temperature Controller.

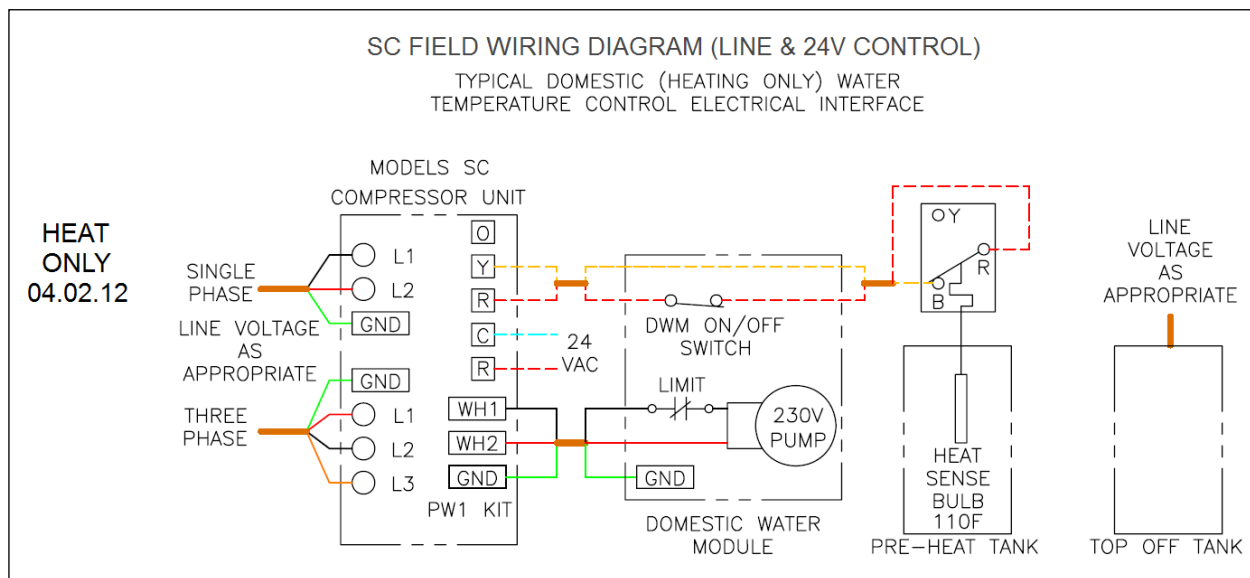


Figure 11. Field Wiring for SC Compressor Unit with DWM

5. Start-Up



IMPORTANT

PRIOR TO IMPLEMENTING THE FOLLOWING DOMESTIC WATER MODULE START-UP PROCEDURE, BE SURE THAT THE EARTHLINKED® SYSTEM HAS BEEN PROPERLY PREPARED FOR START-UP. REFERENCE THE *EARTHLINKED® HEATING AND COOLING INSTALLATION, OPERATION AND MAINTENANCE MANUAL*.

The following conditions must be met before starting the DWM:

- The toggle switch on the DWM cabinet must be “OFF”.
- The system has been charged according to instructions.
- Heating elements in the hot water storage tank are “OFF”.
- Temperature of water in hot water storage tank is less than 100°F.
- DWM pump is primed and tank water pressure is normal.
- Gauge manifold is connected to high pressure connection on the compressor unit.
- The water storage tank temperature controller is adjusted to the highest desired water temperature setting (110°F maximum).
- An accurate temperature sensor is connected at the “Water Out” connection of the DWM and insulated from ambient air temperature.



IMPORTANT

The EarthLinked® system with DWM will heat water up to a maximum of 110°F. The objective in starting the DWM is to achieve the desired hot water temperature, and not exceed 475 psig discharge pressure (for R-410A) and not to exceed 350 psig discharge pressure (for R-407C).

The DWM start-up steps are as follows:

1. Turn the DWM toggle switch to “ON”.
2. Start system running and monitor compressor discharge pressure and DWM “Water Out” temperature as water temperature rises.
3. If compressor discharge pressure reaches 475 psig (R-410A) or 350 psig (R-407C) before desired hot water temperature is achieved, adjust the storage water tank temperature controller setting to turn the compressor off, or (next):
4. When “Water Out” temperature, is achieved (pressure < 475 psig for R-410A or < 350 psig for R-407C), adjust storage water tank temperature controller to turn compressor unit “OFF”. Reference Figures 12 and 13.



IMPORTANT

The DWM “Water Out” temperature is approximately 5°F higher than actual hot water temperature in water storage tank.

5. The storage water tank temperature controller setting should be verified by draining some hot water from the tank and cycling the system again.

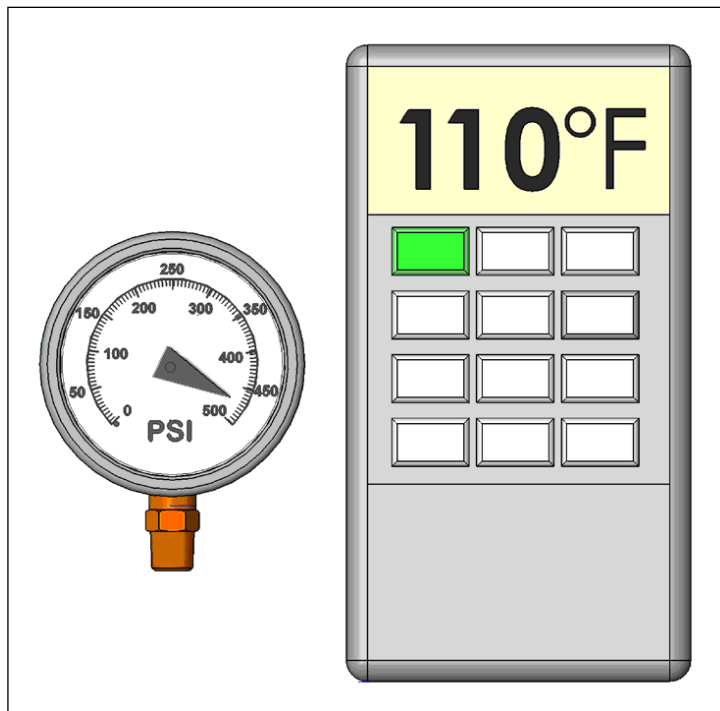


Figure 12. Maximum Operating Conditions (R-410A)

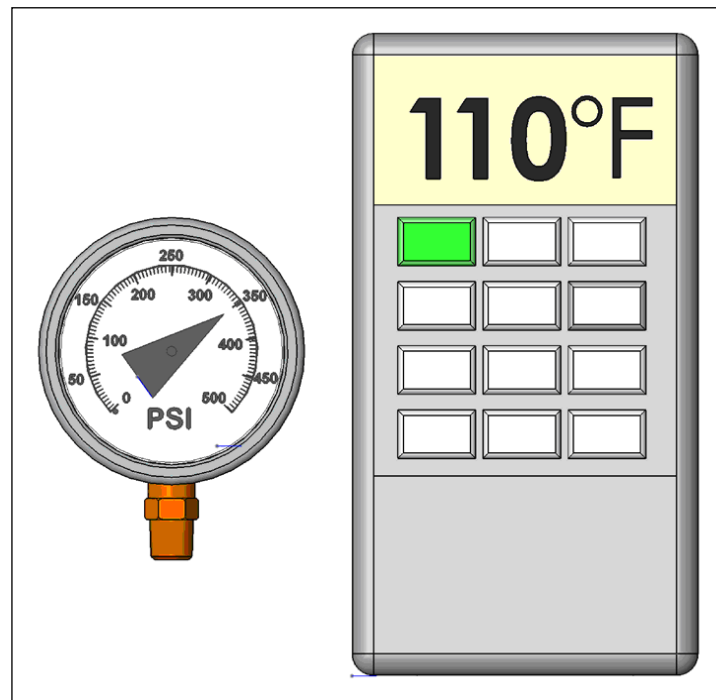


Figure 13. Maximum Operating Conditions (R-407C)



IMPORTANT

If the hot storage water tank temperature controller is adjusted for a high temperature setting, compressor discharge pressure should be checked and the storage water tank temperature controller adjusted appropriately to ensure that compressor discharge pressure does not exceed 475 psig for R-410A or 350 psig for R-407C. See Figures 12 and 13.

6. Heat Exchanger Maintenance Procedure



WARNING

The Domestic water module (DWM) must be isolated from the water system when the system undergoes a “superchlorination” or “shock chlorination” flushing process. Closing the isolation valves as shown in Figure 6 prior to initiating the system flushing process isolates the DWM. The water entering the DWM after the system flush must not exceed a chlorine level consistent with local municipal water purification standards. Failure to isolate the DWM will damage the heat exchanger and circulating pump, causing system failure. Allowing highly chlorinated water to enter the DWM will void the EarthLinked® Limited Warranty

A compact brazed heat exchanger is utilized in the Domestic Water Module (DWM).

The water flow rate designed into each of these heat exchangers is 2 or more gallons per minute per ton of nominal system capacity.

The acceptable water flow rate range for each system is shown in Figure 11. While it is important for the proper performance of the heat exchanger to maintain water flow rate between the minimum and maximum shown, **it is CRITICAL that the flow rate not drop below the minimum.**

COMPRESSOR UNIT SIZE & CAPACITY, BTUH	HWM MODELS	MIN. WATER FLOW RATE, GPM
-018 (18,000)	-1836	3.0
-024 (24,000)	-1836	4.0
-030 (30,000)	-1836	5.0
-036 (36,000)	-1836	6.0
-042 (42,000)	-4248	7.0
-048 (48,000)	-4248	8.0
-060 (60,000)	-6072	10.0
-068 (68,000)	-6072	12.0
-072 (72,000)	-6072	12.0

Figure 14. Minimum DWM Water Flow Rates

If the water hardness test conducted at installation indicates a total hardness greater than 60 ppm, the heat exchanger water flow rate should be checked after the first year of operation to determine if water flow rate is within the normal operating range.



IMPORTANT!

Before checking flow rate through HWM heat exchanger, be certain that the strainer screen is clean.

To test the water flow rate of the domestic water module, average three water flow rate readings when DWM is in continuous operation as shown in Figure 15.

Check water flow rate against the minimum rates shown in Figure 14.

If the water flow rates are less than those listed in Figure 14, above, the heat exchanger is to be cleaned by setting the system up as noted in Figure 16.

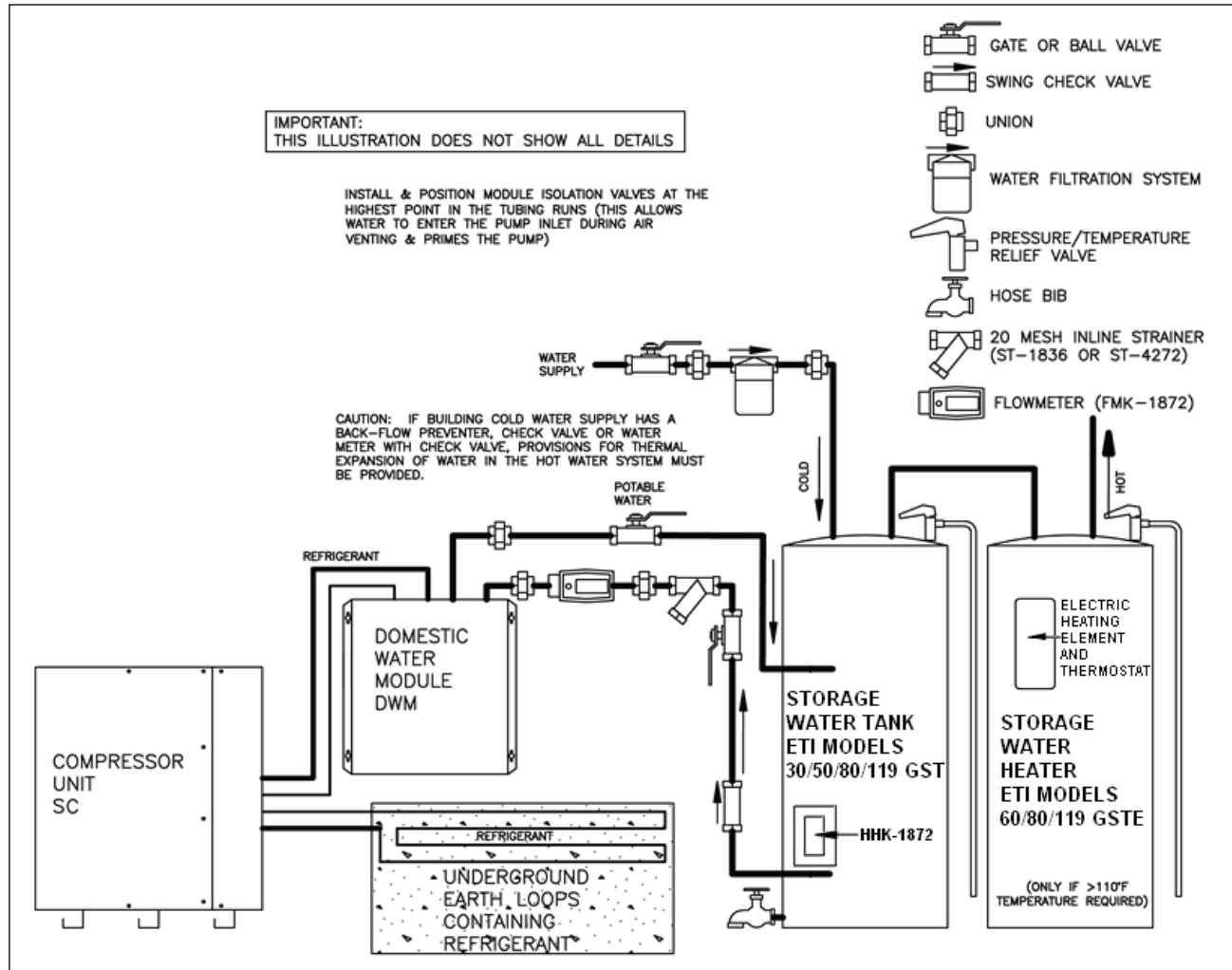


Figure 15. Water Flow Test Set-up



IMPORTANT!
Be sure gate valves (5) and (6) are tightly shut before cleaning the heat exchanger.

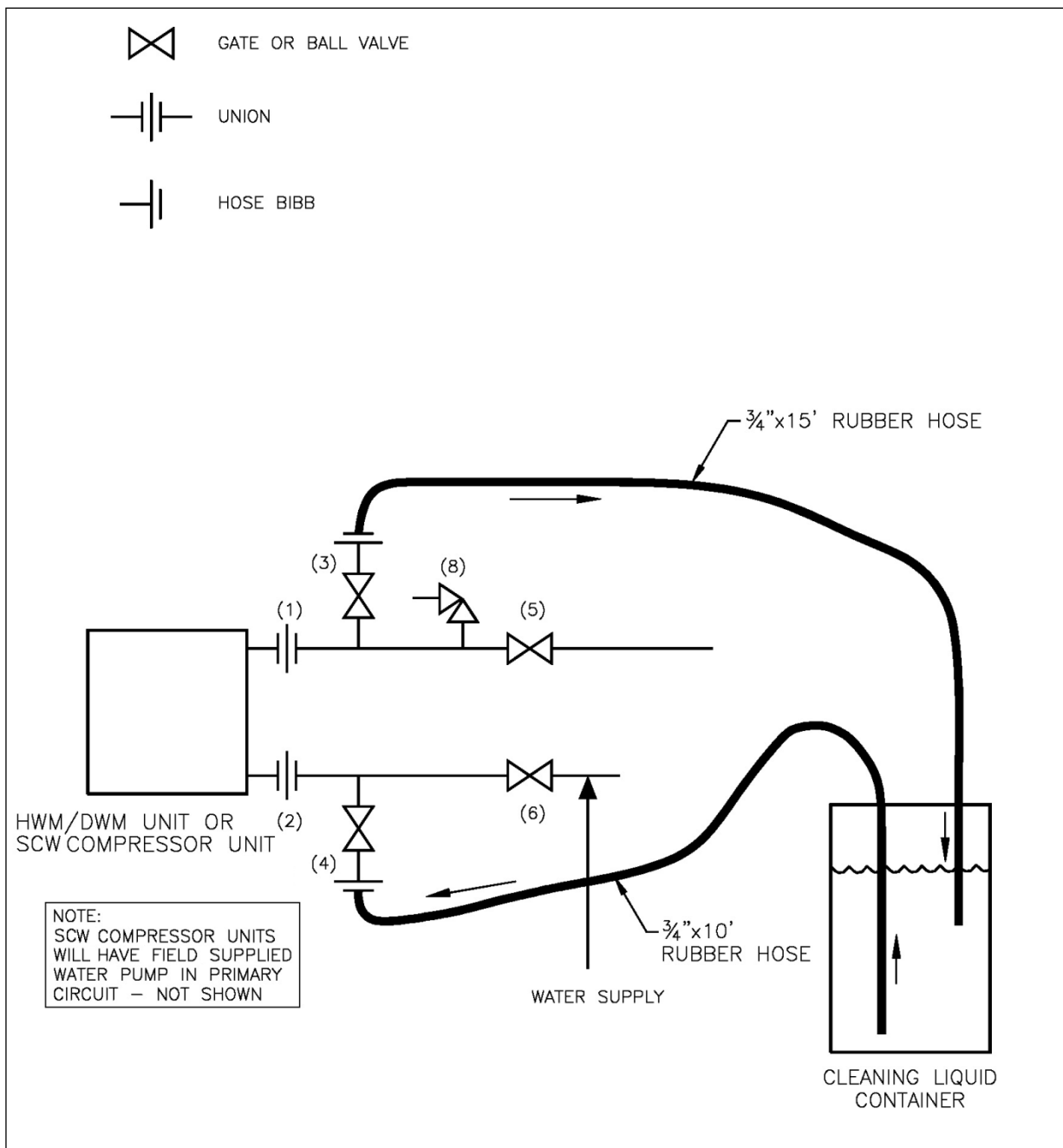


Figure 16. DWM Heat Exchanger Cleaning Set-up

Disconnect power from DWM and be sure pump is off.

Mix heat exchanger cleaning solution in a 55 gallon drum can be sealed and disposed of in accordance with local and federal chemical waste regulations, when the cleaning process is completed.

The concentrated cleaning solution for the heat exchanger cleaning process is liquid ice machine cleaner which is available at any distributor who handles ice machine supplies (Johnstone Supply, W.W. Grainger, etc).

Two gallons of concentrated liquid ice machine cleaner are recommended for each heat exchanger cleaning. Recommended brands and manufacturer order numbers are:

Virginia KMP (1 Gallon), Mfr. H419

Nu-Calgon (1 Gallon), Mfr. 4207-48



IMPORTANT

Use splash goggles, wear appropriate clothing to prevent skin exposure, and rubber gloves while handling cleaning solution. Have good ventilation if vapors, mists or dusts are formed. Have eye wash and shower in area.

FIRST AID

Wash skin and eyes thoroughly with water after contact. If swallowed give water or milk to drink and ice to suck. DO NOT induce vomiting. Get medical attention.

SPILLS

Cover spill with soda ash or inert material, then place in a chemical waste container. Dispose of in a manner consistent with federal and local law.



IMPORTANT

ALWAYS pour concentrated cleaning solution into water.

Mix 1 gallon of concentrated liquid ice machine cleaner per 15 gallons of water in a 55 gallon drum as shown in Figure 16.

Connect the 3/4" ID x 15' heavy duty hose to the hose bibb on gate valve (3) and return to the container holding the cleaning solution. Connect the 3/4" ID x 10' heavy duty hose to the hose bibb on gate valve (4) and run near to the bottom of the container holding cleaning solution. See Figure 16.

Start the closed circuit cleaning by ensuring that gate valves (5) and (6) are tightly shut and then energize the DWM water circulating pump.

Circulate the cleaning solution through the DWM closed circuit for approximately an hour or until there is no further change in the color of the cleaning solution.

When cleaning process is completed, turn off the water circulating pump and close gate valve (4). Disconnect hose from hose bibb on gate valve (4) and drain cleaning solution into drum. Safely dispose of hose.

Slowly open gate valve (6) to flush the heat exchanger water system clear of cleaning solution. The flushed mixture is routed into the 55 gallon drum. Approximately 20 gallons of water flushed through the system will ensure cleaning solution has been thoroughly flushed out of the system and into the drum.

Close gate valve (3) and remove the hose from the hose bibb on gate valve (3), draining residual water into the drum.

Safely dispose of hose. Close and seal drum and safely dispose of drum containing used cleaning solution.

Re-open gate valve (5) as appropriate.

Reconnect power to the DWM in the normal operational mode.



Establish a schedule for regular maintenance of the DWM heat exchanger, based on the results of the first heat exchanger cleaning.

7. Water Filtration System and Strainer Maintenance Procedure

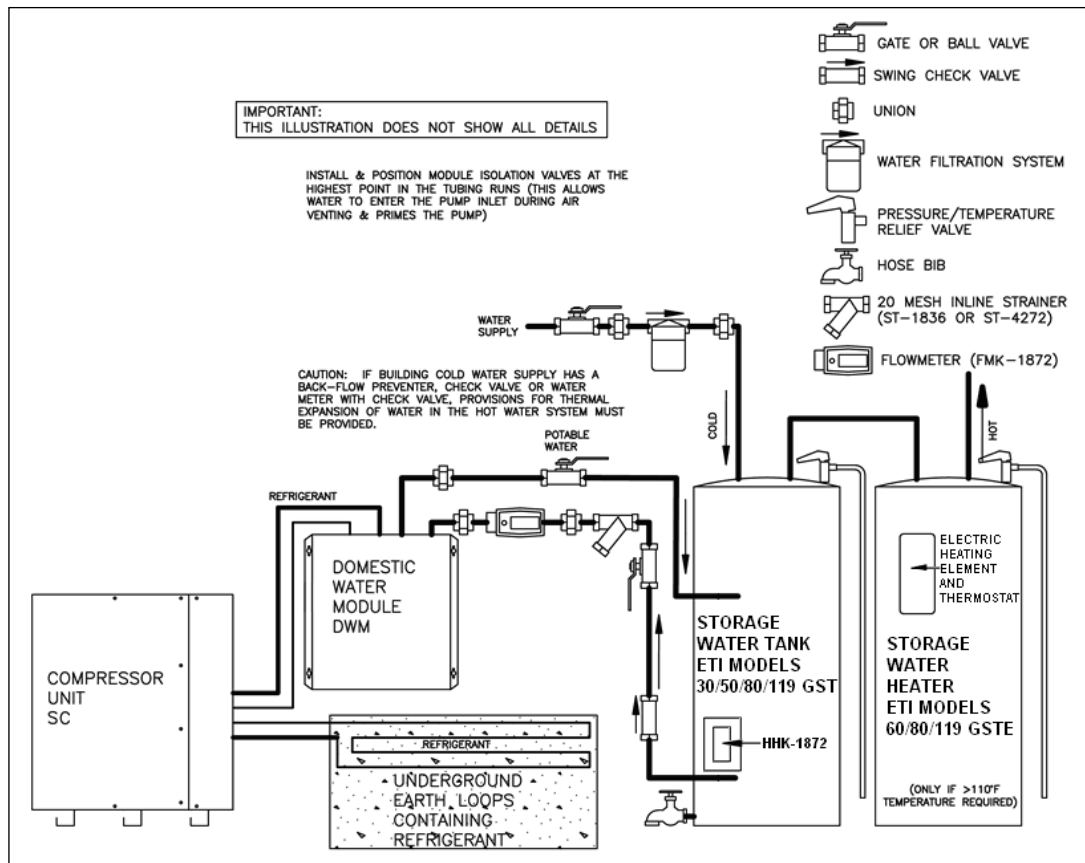
For EarthLinked® Heating and Cooling systems that utilize the Domestic Water Module (DWM) to heat potable water, **the filtration system is to be checked at least every 3 months to determine if the cartridge is to be replaced.**

Figure 6 illustrates the recommended filters to be used with the DWM, and includes the replacement cartridges. Figure 6 is repeated below.

FILTRATION SYSTEM MODEL	REPLACEMENT CARTRIDGE MODEL	DIMENSIONS & CONNECTIONS	RETAIL SOURCE
Whirlpool WHCF-DWHBB	WHCF-GD25BB (25 micron)	13-1/4 x 7-1/2 x 7-1/2" 1" FPT	Lowes
General Electric GNWH35F	FXHSC (30 micron)	14 x 8 x 8" 1" FPT	Home Depot

Recommended Water Filtration Systems



Typical DWM Application showing Water Filtration System, Strainer and Water Piping Details

The strainer (see previous page) should also be checked periodically to determine if it requires service. The strainer bowl is transparent and easy to see the amount of particulate matter that has built up on the 20 mesh screen.

As appropriate, clean or replace the 20 mesh screen after relieving the water pressure of the system.

When the water filtration system is being checked, cleaning sediment from the insulated storage water tank may be in order.

The tank drain valve is shown on the previous page exits the tank at the lowest point, sharing the return water line to the DWM.

To drain sediment from the tank, do the following:

1. Turn electrical supply to compressor unit and DWM "OFF".
2. CLOSE the cold water inlet valve to the storage water tank.
3. OPEN a nearby hot water faucet and leave open while draining the storage water tank.
4. Connect a hose to the drain valve and terminate to an adequate drain.
5. OPEN the storage water tank drain valve to enable tank to drain.
6. After visible sediment has drained, and water is clear, close the drain valve and nearby hot water faucet.
7. Reopen the cold water supply to the storage water tank.
8. Allow air to exit by opening the nearest hot water faucet. Allow water to run until a constant flow is obtained.
9. Close hot water faucet and re-energize power to compressor unit and DWM.

8. Tools and Equipment

The purpose of the following list is to highlight key pieces of equipment, tools and materials necessary for the installation, maintenance and servicing of EarthLinked® Heating and Cooling System HVAC (above ground) equipment.

The professional HVAC technician is expected to have a compliment of standard tools for the general servicing of refrigeration equipment.

Equipment, Tools and Materials

<u>ITEM</u>	<u>DESCRIPTION</u>
1.	Vacuum Pump (6 CFM minimum capacity)
2.	Evacuation Manifold (for vacuum pump)
3.	Digital Vacuum (micron) Gauge
4.	Charging/Evacuating Manifold for R-410A and R-407C (quantity of 2)
5.	Charging/Hi-Vacuum Hoses (black, quantity of 6)
6.	Digital Refrigerant Scale
7.	Digital Thermometer
8.	Digital Sling Psychrometer
9.	Air Flow Meter (for air handlers)
10.	Nitrogen Tank with 0 – 600 psig Regulator and Handtruck
11.	Oxy-acetylene Welding Torch Set
12.	15% Silver Brazing Alloy
13.	Refrigerant Recovery Unit (1/2 #/minute minimum vapor capacity)
14.	Recovery Cylinder (50# capacity)
15.	Halogen Leak Detector
16.	Digital VOM
17.	Digital Clamp-on Ammeter
18.	Digital Water Flowmeter (3 to 30 gpm)
19.	Tubing Cutters
20.	Tubing Benders
21.	Nut Driver
22.	Cordless Drill (3/8")
23.	Swaging Kit
24.	Deburring Tool
25.	Drill Bit Set
26.	Inspection Mirror

9. Domestic Storage Water Heater and Storage Water Tank Sizing

The following procedure as detailed in LIT-153 is for sizing the hot water storage tank used in conjunction with the EarthLinked® domestic water module (DWM) and compressor unit for residential application.

The sizing procedure is based on the HUD-FHA Minimum Water Heater Capacities for One and Two Family Living Units, using electric water heaters. The source is the 2007 *ASHRAE Handbook-HVAC Applications*, Service Water Heating, page 49.13.

Residential storage water heaters and storage water tanks are commercially available in capacities of 30, 40, 50, 55, 66 and 80 US Gallons. The water heaters utilized as hot water storage tanks are to be UL listed as a storage water heater.

The water heater is to be of standard height (not low boy, utility, table top or compact configurations) with at least one electric heating element (upper).



WARNING

Domestic water piping to and from any EarthLinked® Domestic Water Module must be freeze protected. Failure of the installer to do so may result in equipment and property damage.

EarthLinked® RESIDENTIAL STORAGE WATER TANK/HEATER SIZING WORKSHEET



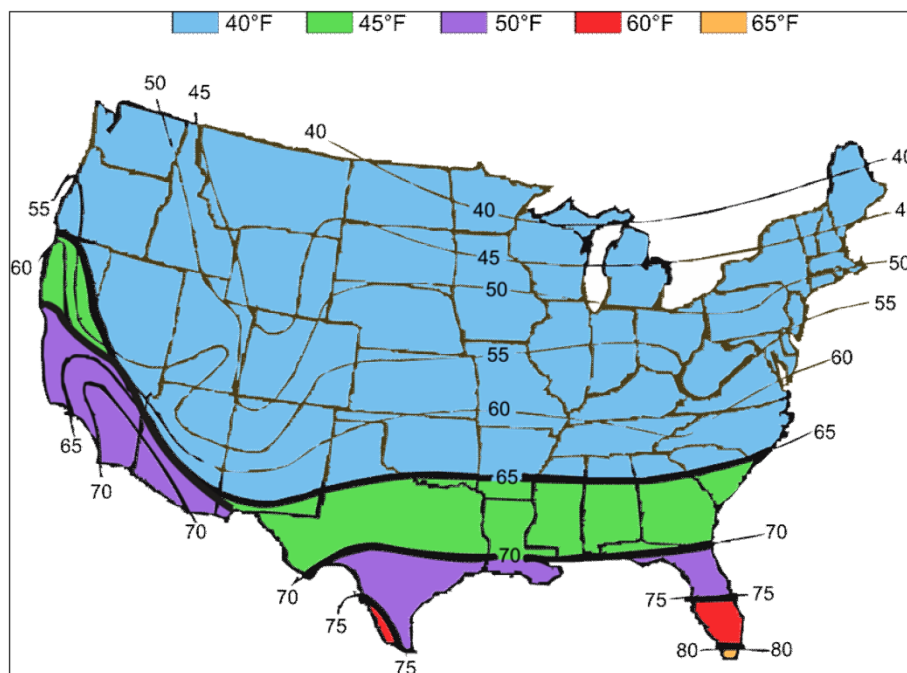
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This worksheet is for sizing a storage water tank or storage water heater for a residential application, when used in conjunction with an EarthLinked® heating and cooling system equipped with a domestic water module (DWM) or desuperheater (DSH-1872) for potable water heating.

ETI GST Series storage water tanks are available in 30, 50, 80 and 119 US Gallon capacities. ETI GSTE Series storage water heaters are available in 60, 80 and 119 US gallon capacities.

The storage water tank and storage water heater sizing procedure is as follows:

1. Determine, from the map below, the local earth temperature at the residence site. If the location falls between temperature lines, choose the lower temperature.



*Earth Temperature Lines and Lowest Municipal Water Supply Temperatures
For
Contiguous United States and Southern Canada*

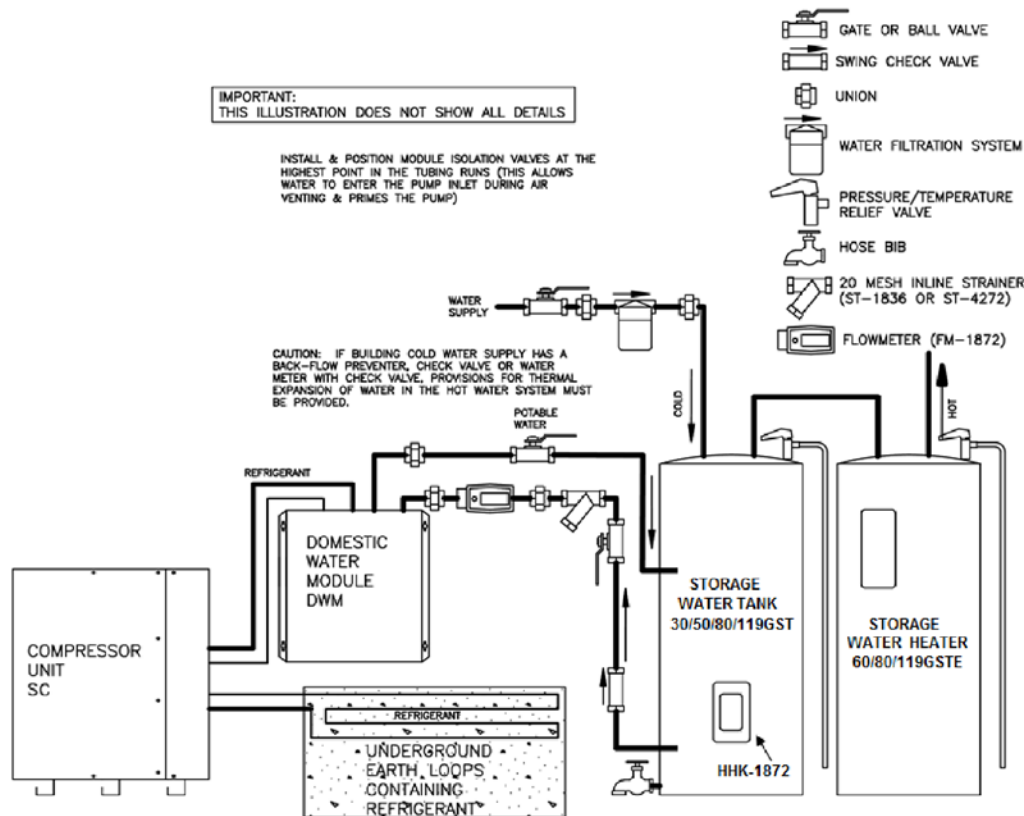
Site Location: _____ city _____ state/prov. Earth Temp.: _____ °F

EarthLinked® RESIDENTIAL STORAGE WATER TANK/HEATER SIZING WORKSHEET



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3. Determine the entering cold water temperature (EWT). The lowest EWT from any source and for any location is 40°F. If the domestic water supply is an on-site well, the EWT is the same as the local earth temperature determined in 1. If the water is from a municipal supply fed by surface water such as rivers, lakes or reservoirs, the EWT is the lowest average monthly air temperature (but not lower than 40°F). The lowest average monthly air temperature is accessed at www.weatherreports.com. Enter city/state and click on "other averages" under the local weather conditions.
4. Entering (cold) water temperature (EWT): _____ °F
5. Determine the hot water temperature leaving the EarthLinked® compressor unit (LWT) and entering the storage water tank. **This temperature (LWT), cannot exceed 110°F.** If a higher hot water temperature is required, a storage water heater, as shown in the illustration below, will be required to increase the hot water temperature above 110°F.
6. EarthLinked® leaving (hot) water temperature (LWT): _____ °F (do not exceed 110°F)
7. Water temperature rise (LWT – EWT): _____ °F



Typical DWM Application Showing Water Filtration System and Water Piping Details

EarthLinked® RESIDENTIAL STORAGE WATER TANK/HEATER SIZING WORKSHEET



EARTHLINKED
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8. Determine the EarthLinked® compressor unit and domestic water module (DWM) combination that is being applied to the residence from the following table:

MATCHING EARTHLINKED® COMPONENTS	
COMPRESSOR UNIT MODEL	DOMESTIC WATER MODULE MODEL DWM
-024	-1836
-036	-1836
-048	-4248
-060	-6072
-068	-6072

9. Component selected:

Compressor Unit - _____ ; DWM - _____

10. To determine the minimum size for the storage water tank or heater, follow these steps:

- Enter the table for the EarthLinked® system components selected in 9.
- Go to the column for the number of baths and bedrooms.*
- Go to the line for the local earth temperatures (see 2.); and the water temperature rise (see 7).
- The storage tank size is where the appropriate column and line meet. Interpolate as necessary.

*Tables were developed on the basis of HUD-FHA Minimum Water Heater Capacities for One and Two Family Living Units using Electric Water Heaters. Source is 2007 ASHRAE Handbook – HVAC Applications, Service Water Heating, page 49, 13.

MINIMUM HOT WATER STORAGE SIZE, US GALLONS
COMP. UNIT: -024; DWM-1836

NUMBER OF BATHS			1 to 1.5			2 to 2.5				3 to 3.5			
NUMBER OF BEDROOMS			1	2	3	2	3	4	5	3	4	5	6
1 ST HOUR DRAW (ELEC. WATER HEATER)			30	44	58	58	72	72	88	72	88	88	102
EARTHLINKED SYSTEM	LOCAL EARTH TEMP., °F	WATER TEMP. RISE, °F	MIN. WATER HEATER TANK SIZE, US GALLONS										
-024 COMPRESSOR UNIT (24,000 BUTH) & DWM-1836	40	40	30	30	50	50	66	66	80	66	80	80	NA
		60	30	40	50	50	66	66	NA	66	NA	NA	NA
		80	30	40	66	66	80	80	NA	80	NA	NA	NA
	50	40	30	30	40	40	55	55	80	55	80	80	NA
		60	30	30	50	50	66	66	NA	66	NA	NA	NA
		80	30	40	55	55	80	80	NA	80	NA	NA	NA
	60	40	30	30	30	30	55	55	66	55	66	66	NA
		60	30	30	50	50	66	66	80	66	80	80	NA
		80	30	40	55	55	66	66	NA	66	NA	NA	NA

EarthLinked® RESIDENTIAL STORAGE WATER TANK/HEATER SIZING WORKSHEET



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TECHNOLOGIES

MINIMUM HOT WATER STORAGE SIZE, US GALLONS COMP. UNIT: -036; DWM-1836

NUMBER OF BATHS			1 to 1.5			2 to 2.5				3 to 3.5			
NUMBER OF BEDROOMS			1	2	3	2	3	4	5	3	4	5	6
1 ST HOUR DRAW (ELEC. WATER HEATER)			30	44	58	58	72	72	88	72	88	88	102
EARTHLINKED SYSTEM	LOCAL EARTH TEMP., °F	WATER TEMP. RISE, °F	MIN. WATER HEATER TANK SIZE, US GALLONS										
-036 COMPRESSOR UNIT (36,000 BUTH) & DWM-1836	40	40	30	30	30	30	50	50	66	50	66	66	80
		60	30	30	40	40	55	55	80	55	80	80	NA
		80	30	30	50	50	66	66	NA	66	NA	NA	NA
	50	40	30	30	30	30	40	40	55	40	55	55	80
		60	30	30	40	40	55	55	80	55	80	80	NA
		80	30	30	50	50	66	66	80	66	80	80	NA
	60	40	30	30	30	30	30	30	50	30	50	50	66
		60	30	30	30	30	30	50	66	50	66	66	NA
		80	30	30	40	40	55	55	80	55	80	80	NA

MINIMUM HOT WATER STORAGE SIZE, US GALLONS COMP. UNIT: -048; DWM-4248

NUMBER OF BATHS			1 to 1.5			2 to 2.5				3 to 3.5			
NUMBER OF BEDROOMS			1	2	3	2	3	4	5	3	4	5	6
1 ST HOUR DRAW (ELEC. WATER HEATER)			30	44	58	58	72	72	88	72	88	88	102
EARTHLINKED SYSTEM	LOCAL EARTH TEMP., °F	WATER TEMP. RISE, °F	MIN. WATER HEATER TANK SIZE, US GALLONS										
-048 COMPRESSOR UNIT (48,000 BUTH) & DWM-4248	40	40	30	30	30	30	30	50	50	30	50	50	66
		60	30	30	30	30	50	50	66	50	66	66	NA
		80	30	30	40	40	55	55	80	55	80	80	NA
	50	40	30	30	30	30	30	30	40	30	40	40	55
		60	30	30	30	30	40	40	66	40	66	66	80
		80	30	30	40	40	55	55	80	55	80	80	NA
	60	40	30	30	30	30	30	30	30	30	30	30	50
		60	30	30	30	30	40	40	55	40	55	55	80
		80	30	30	30	30	50	50	66	50	66	66	NA

MINIMUM HOT WATER STORAGE SIZE, US GALLONS COMP. UNIT: -060; DWM-6072

NUMBER OF BATHS			1 to 1.5			2 to 2.5				3 to 3.5			
NUMBER OF BEDROOMS			1	2	3	2	3	4	5	3	4	5	6
1 ST HOUR DRAW (ELEC. WATER HEATER)			30	44	58	58	72	72	88	72	88	88	102
EARTHLINKED SYSTEM	LOCAL EARTH TEMP., °F	WATER TEMP. RISE, °F	MIN. WATER HEATER TANK SIZE, US GALLONS										
-060 COMPRESSOR UNIT (60,000 BUTH) & DWM-6072	40	40	30	30	30	30	30	30	40	30	40	40	55
		60	30	30	30	30	40	40	66	40	66	66	80
		80	30	30	30	30	55	55	80	55	80	80	NA
	50	40	30	30	30	30	30	30	30	30	30	30	40
		60	30	30	30	30	30	30	50	30	50	50	66
		80	30	30	30	30	40	40	66	40	66	66	80
	60	40	30	30	30	30	30	30	30	30	30	30	30
		60	30	30	30	30	30	30	40	30	40	40	55
		80	30	30	30	30	30	30	55	30	55	55	80

EarthLinked® RESIDENTIAL STORAGE WATER TANK/HEATER SIZING WORKSHEET



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MINIMUM HOT WATER STORAGE SIZE, US GALLONS COMP. UNIT: -068; DWM-6072

NUMBER OF BATHS			1 to 1.5			2 to 2.5				3 to 3.5			
NUMBER OF BEDROOMS			1	2	3	2	3	4	5	3	4	5	6
1 ST HOUR DRAW (ELEC. WATER HEATER)			30	44	58	58	72	72	88	72	88	88	102
EARTHLINKED SYSTEM	LOCAL EARTH TEMP., °F	WATER TEMP. RISE, °F	MIN. WATER HEATER TANK SIZE, US GALLONS										
-068 COMPRESSOR UNIT (72,000 BUTH) & DWM-6072	40	40	30	30	30	30	30	30	30	30	30	30	40
		60	30	30	30	30	30	30	50	30	50	50	66
		80	30	30	30	30	50	50	66	50	66	66	80
	50	40	30	30	30	30	30	30	30	30	30	30	30
		60	30	30	30	30	30	30	40	30	40	40	55
		80	30	30	30	30	40	40	55	40	55	55	80
	60	40	30	30	30	30	30	30	30	30	30	30	30
		60	30	30	30	30	30	30	30	30	30	30	50
		80	30	30	30	30	30	30	50	30	50	50	66