Algas-SDI™

...Innovative liquid vaporizing and gas mixing solutions

HYDREXX

Circulating Hot Water or Steam Heated Vaporizers

Operation & Maintenance Manual

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ECLIPSE
Innovative Thermal Solutions

WARNING

Read the OPERATION MANUAL before operating this equipment.

- **NOTE: Algas-SDI reserves the right to use alternate manufacturers' components as vendor delivery applicability dictates. Vendors have supplied literature contained in the Operation Manual. Please check to be sure supplied data matches your configuration. Contact Algas-SDI if any questions exist.**
- **This equipment uses LPG-a flammable fuel handled under pressure. Inherent hazards exist and a thorough understanding of the equipment is required to allow safe operation and maintenance.**
- **Allow only a TRAINED and FULLY QUALIFIED PERSON to service this equipment.**
- **Any time a component must be replaced, use the same type, model, etc. DO NOT SUBSTITUTE! The consequence from such actions are unpredictable and may lead to dire consequences. When components are replaced with components not approved for use in our CE listed equipment, the CE listing becomes void for that unit.**

WARRANTY REGISTRATION

To register your new equipment: Visit **Algas-SDI's** web site at: algas-sdi.com, then click on the "Tech Support" button. Select online Registration or print out the Acrobat Warranty Registration.

OR

Fill out the Warranty Registration information on the last page of this manual. Then make a photocopy and mail to the address shown at the bottom.

WARRANTY, COPYRIGHTS AND APPROVALS

WARRANTY

Algas-SDI International, LLC **(ASDI**) warrants that the equipment is free of defects in materials and workmanship under normal use and service. **ASDI** agrees to repair or replace, at our option, without charge f.o.b. factory, any part which has proven defective to the satisfaction of Algas-SDI International, LLC within one (1) year from the date of the original installation or within 18 months from the date of shipment, whichever is earlier. Equipment, which in the opinion of **ASDI**, has been damaged by improper installation or operation, or has been abused or tampered with in any way, will not be accepted for return under warranty.

Algas-SDI International, LLC will not accept back charges for work performed by others upon or in conjunction with **ASDI** equipment, unless prior authorization is given by means of an Algas-SDI International, LLC purchase order. Algas-SDI International, LLC will not be liable by reason of shutdown, non-operation or increased expense of operation of other equipment, or any other loss or damage of any nature, whether direct or consequential, arising from any cause whatsoever.

Algas-SDI International, LLC makes NO other warranty of any kind, whatsoever expressed or implied; and all warranties of merchantability and fitness for a particular purpose are hereby disclaimed by Algas-SDI International, LLC and excluded from these terms of sale. No person has any authority to bind Algas-SDI International, LLC to any representation or warranty other than this warranty.

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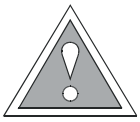
APPROVALS

CE

SYMBOLS AND CONVENTIONS

Special symbols are used to denote hazardous or important information. You should familiarize yourself with their meaning and take special notice of the indicated information.
Please read the following explanations thoroughly.



GENERAL WARNING OR CAUTION

This symbol indicates hazards or unsafe practices, which can result in damage to the equipment or cause personal injury. Use care and follow the instructions given.

FLAMMABLE GAS HAZARD

This symbol indicates a potential hazard, which can result in severe personal injury or death. Use extreme care and follow the instructions given.

ASDI CONTACT NUMBERS

If you have questions, need help with your equipment, or want information on other products, contact Algas-SDI at:

Telephone: **206.789.5410**

Facsimile: **206.789.5414**

Email: **sales@algas-sdi.com**

Internet: **http://www.algas-sdi.com**

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HYDREXX HX320 full capacity chart for 100% water and 70% water/30% glycol

HYDREXX HX500 full capacity chart for 100% water and 70% water/30% glycol

HYDREXX Saturated Steam Vaporizer Data Sheet

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HYDREXX Vaporizer Spare Parts and Accessories

HYDREXX Series Vaporizer Equipment Drawing

HYDREXX Series Vaporizer Installation Drawing

Warranty registration

Warranty Registration - Refer to the nameplate on the unit to fill out the product registration. Please photocopy and mail to address shown.

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Introduction 1

DESCRIPTION

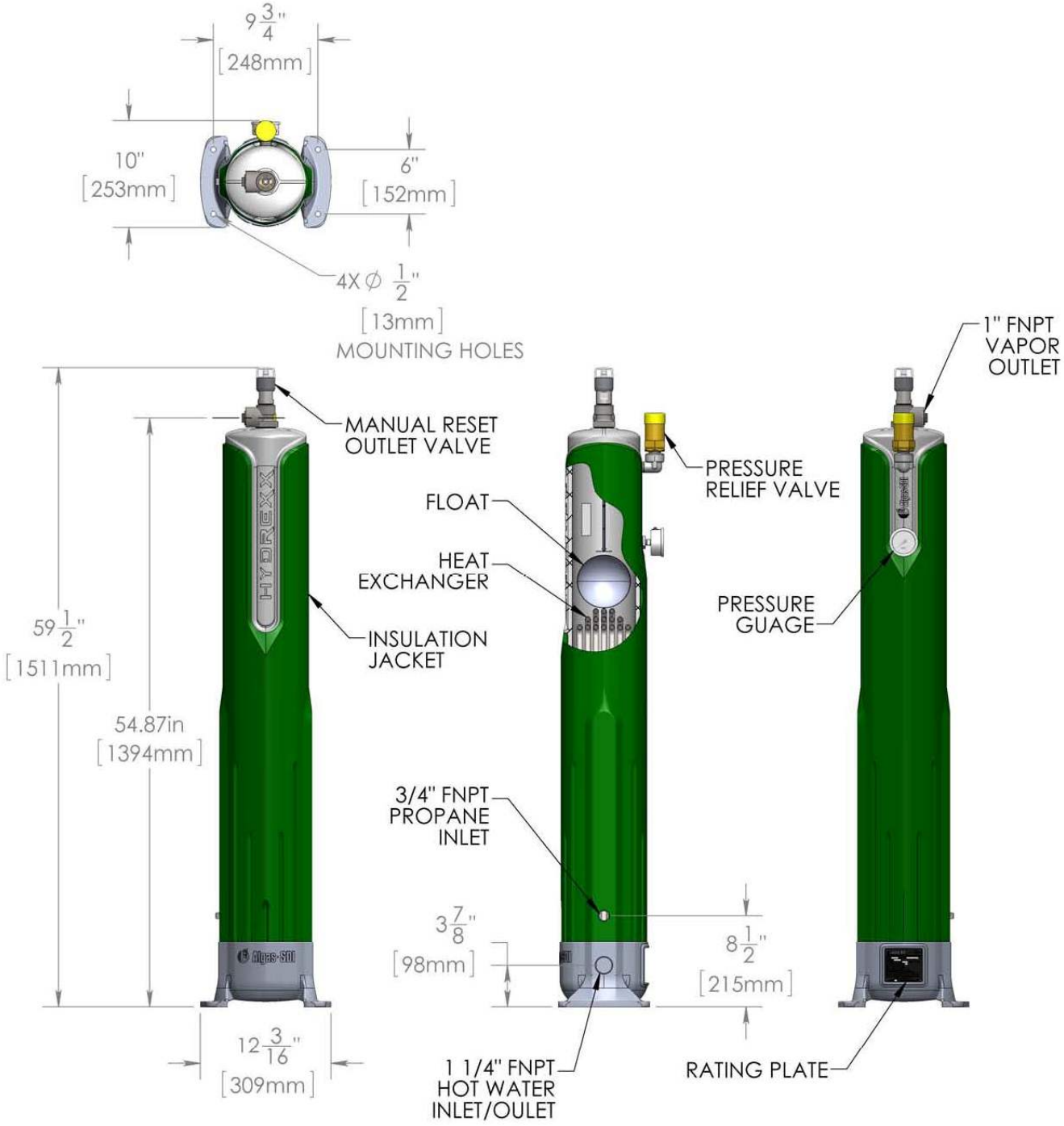
The **HYDREXX** LPG vaporizer heats LPG, consisting primarily of propane and butane, and transforms it from a liquid to a vapor. The **HYDREXX** vaporizer is "indirect fired", meaning no open flame is involved with the heating process. The unit complies with Class I, Division I, Group D and Zone 1 requirements as specified in NFPA Pamphlet 70 and 58. The dimensional drawing (see Figure 1) identifies various components of the **HYDREXX** vaporizer. The **HYDREXX** LPG vaporizers use hot water or steam from a wall/floor mount hydronic boiler or plant source to convert LPG into vapor.

Referring to Figure 1: Description of Operation, how water or dry saturated steam or hot water enters the inlet chamber, and passes through the heat exchanger tubes where the heat is transferred to the LPG. Steam condensate or cooled water, exits the vaporizer through the outlet chamber. LPG from a storage system enters the heat exchanger shell and makes contact with the heat exchanger tubes, causing boiling of the LPG thus allowing vapor to rise to the vapor space, above the liquid level. The vaporized LPG exits through the vapor outlet at the Liqui-SAFE valve. The Liqui-SAFE Valve is specially developed to prevent liquid from going downstream. In case of abnormal pressure build up, over-pressure relieves to the atmosphere through a 250 psig (17.58 kg/cm^2) pressure relief valve.

HYDREXX Vaporizer can be configured for many applications:

- Standard configuration for Class I, Division 1, Group D and Zone 1 or 2 Areas for use with Propane and LPG applications, CE approvals.
- HYDREXX vaporizer can be manifolded together for increased capacity on a single skid. Consult Algas-SDI for Configuration information.
- HYDREXX vaporizer can be packaged with an Algas-SDI mixing system on a single skid. Consult Algas-SDI for Configuration information.
- For customizing the HYDREXX vaporizer to your requirements consult Algas-SDI for information.

Figure 1 – HYDREXX HX 160, HX 320 and HX500 Dimensional Drawing

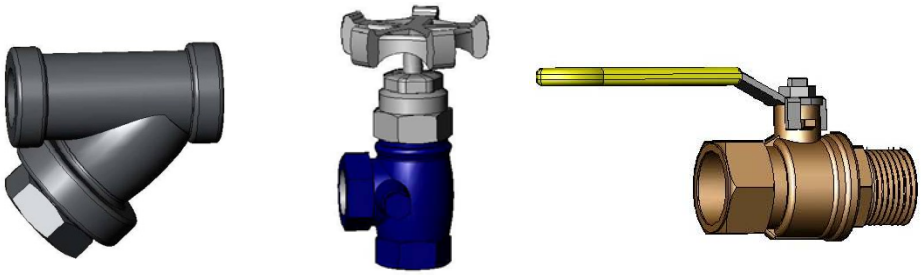


HYDREXX VAPORIZER OPTIONS

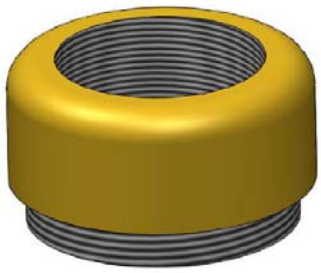
Your HYDREXX vaporizer may be equipped with one or several of the factory options. All the options can be integrated to your HYDREXX vaporizer and are designed to enhance convenience for the end user.

Below is a brief introduction to the options available for the HYDREXX vaporizer. Contact Algas-SDI for more information if required.

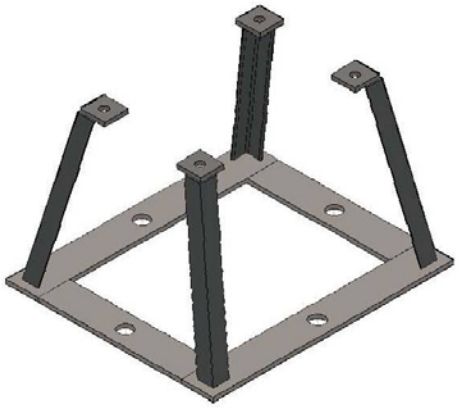
1) ***Valve and Strainer Package*** – Includes strainer with magnetic plug, inlet shut-off angle valve, hydrostatic relief valve, outlet shut-off ball valve and outlet pressure gauge. Ships loose. All items not shown below.



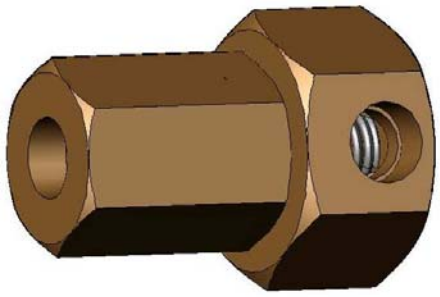
2) ***Pipe Away Adapter –*** Allows the user to pipe the relief valve away from the vaporizer. First relief valve P/N 34876 made by REGO. 1”FNPT pipe connection.



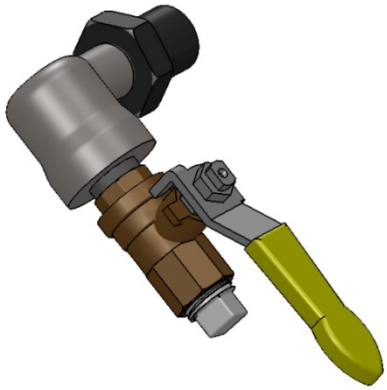
3) ***HYDREXX Stand –*** Elevates HYDREXX Vaporizer 1 foot off the ground for ease of installing connection points and removes the vaporizer from elements i.e. snow and mud. Hardware to mount HYDREXX to stand is included. Ships loose.



4) ***Economy*** **valve** – Allows the customer to use propane storage tank vaporization when the storage tank can provide enough vaporization and pressure to satisfy the load requirements.



5) ***Drain valve kit*** – Enables the user to drain the oils, heavy ends, and other impurities that can collect over time in the vaporizer heat exchanger. Kit available factory or field installed.



6) ***Stabilaire Pump Package*** – Consult factory

7) ***Contaminant Separator (Filtaire)*** – The Algas-SDI Filtaire™ is a filtering device design to trap heavy hydrocarbons commonly present in LPG gas vapor. It also traps other materials, which may be in gas due to storage conditions and internal condition of the equipment.

8) ***Balancing orifice –*** When manifolding two or more vaporizers together a balancing orifice must be used.

Liquid Passage Prevention System 2

Your New HYDREXX vaporizer is designed to be reliable and user friendly. Liquid Passage Prevention System allows you to quickly determine the status of your vaporizer.

Figure 2 – Liquid Passage Prevention System

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INSTALLATION 3

GENERAL REQUIREMENTS

Install HYDREXX vaporizer on a level firm base at least 6" above grade and secure it through the four ½" holes. Protect the equipment against damage by moving vehicles by use of an appropriate barrier. Consult state, provincial, insurance carriers, and local authorities for installation requirements. Clean all foreign material from all pipelines prior to making final connections. All joints require a pipe sealant approved for LPG, depending on type of service. Test for leaks using an inert gas, such as compressed carbon dioxide or nitrogen, at 1½ times the working pressure or as required by applicable codes. Check all connections using an appropriate leak detection solution or device. Even very small leaks are unacceptable. Eliminate all leaks prior to operation.

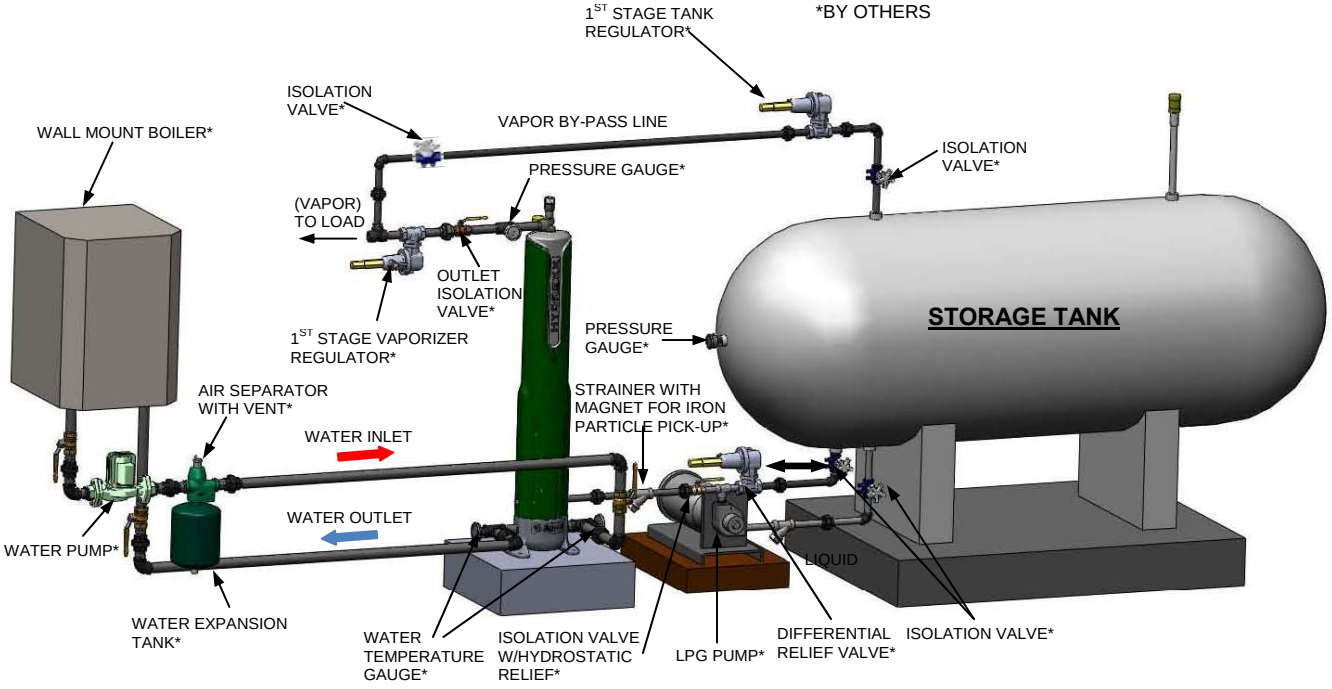
Install in accordance with NFPA 58 and local applicable codes and regulations as required.

Figure 3 - Typical HYDREXX Installation Drawing with Wall Mount Boiler, Pump & Vapor Bypass

NOTES

1. LIQUID PIPING LOSSES BETWEEN VAPORIZER AND THE TANK MUST NOT EXCEED HYDROSTATIC HEAD WHEN THE PUMP IS SHUT OFF.
2. INSTALL VAPORIZER 1ST STAGE REGULATOR UPSTREAM OF THE TANK VAPOR PRESSURE CONNECTION POINT.
3. SET 1ST STAGE VAPORIZER REULATOR 2-4 PSIG HIGHER THAN TANK VAPOR PRESSURE REGULATOR SET-POINT.
4. NO CHECK VALVES IN LIQUID LINE. LIQUID MUST BE ABLE TO FLOW IN BOTH DIRECTIONS.

*BY OTHERS



Note: The vapor bypass line is not required except when you have the Economy Operation option. In other installations, it is recommended because it will provide vapor from the tank to the load in case of vaporizer failure or power failure but it is not required. Vaporizer will operate properly without the bypass.

Figure 4 - Typical HYDREXX Installation Drawing with Wall Mount Boiler, Vapor Bypass and no Pump

NOTES

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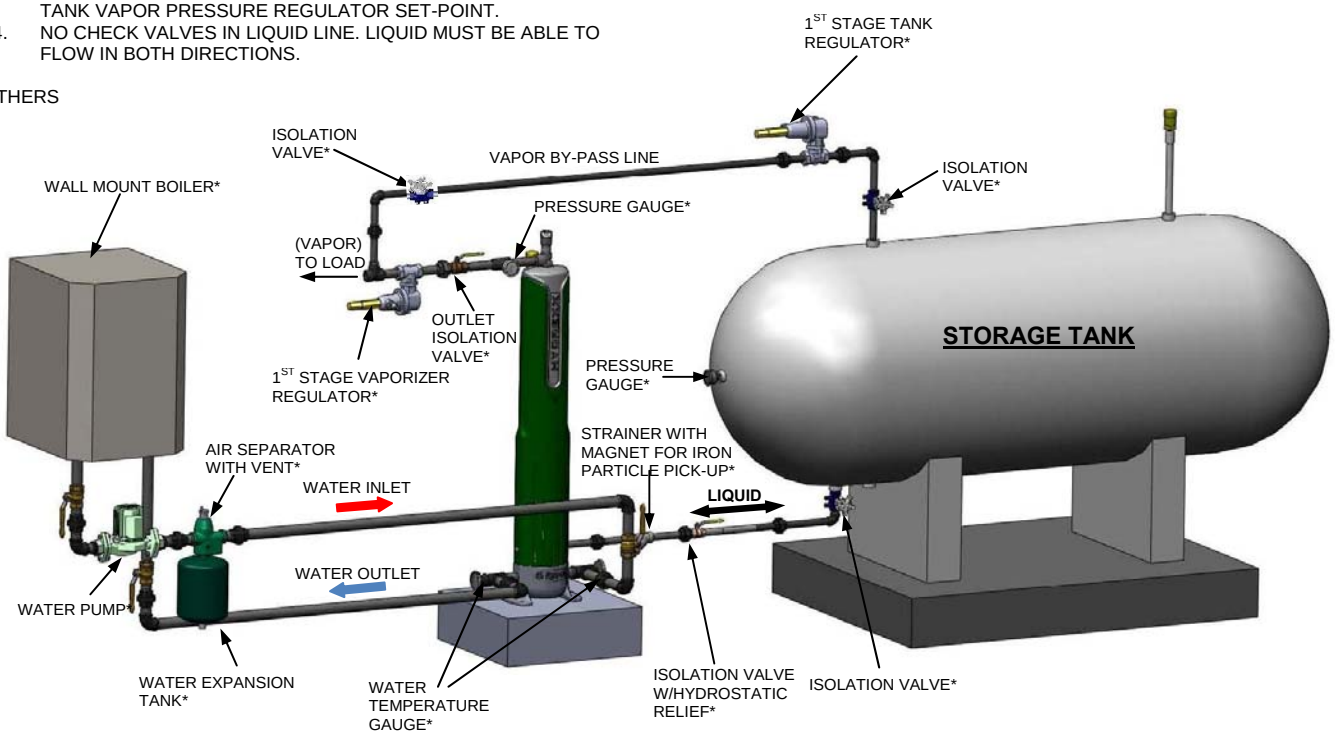


LIQUID LINE

Size the liquid line from the storage tank to the vaporizer to supply the vaporizer at full capacity with a minimal pressure drop. A liquid line-sizing chart is provided in **Table 2.** Install a liquid line strainer with magnet for iron particle pickup at the vaporizer inlet.

CAUTION

A liquid pump must be installed if the pressure drop in the liquid line between the vaporizer and the tank exceeds the hydrostatic liquid head in the storage tank. ONE FOOT OF LIQUID PROPANE EQUALS .21 PSI! Liquid line frosting is a sure indication of too much pressure drop in the liquid line.

LIQUID PUMP

Is a Liquid Pump necessary? What are your vapor pressure requirements?

Pressure in the storage tank depends on temperature See **Table 1**. A good "rule of thumb" for determining when a Liquid Pump is necessary is this: If the storage pressure will not always exceed the required distribution pressure by 5 psig (0.35 kg/cm2), a pump is necessary. Install an ASDI STABILAIRE Liquid Pump in the liquid line close to the storage tank. To prevent cavitation, place the liquid strainer at least five feet upstream of the pump inlet. Typically a pump is not

required unless a mixing system is used or temperature at the installation will be extremely low, causing the pressure to drop below the required process pressure.

VAPOR LINE

Install an appropriate regulator immediately downstream of the vapor outlet. Pipe from the outlet port of the regulator to the distribution system. Further reduction of downstream pressure requires a "Second Stage" regulator close to the consuming equipment. Properly sized piping and regulators will insure satisfactory service.

NOTE

For safety reasons both FIRST and SECOND stage regulators must be 250 psig (17.58 cm/kg^2) inlet pressure rated!

SAFETY RELIEF VALVE

If the vaporizer is to be installed within an enclosure or building, VENT THE SAFETY RELIEF VALVE OUTSIDE THE ENCLOSURE AND REDIRECT THE DISCHARGE UPWARD. A pipe-away adapter must be used at the relief valve. Always install a rain-cap or similar device to prevent water and other debris from entering the relief discharge. If water enters, it may freeze and prevent the relief valve from proper discharge, creating a potentially hazardous situation.

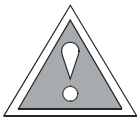
HOT WATER SUPPLY

Treated hot water for the HYDREXX is recommended as it will prevent customer installed components in the system from corroding and causing possible damage to the pump or boiler. HYDREXX uses a stainless steel heat exchanger which is itself not affected by corrosion. ***See Appendix A*** for suggested boiler water treatment specifications.

If the hot water is to be returned to the boiler such as in a closed system a phase separator must be used so there is no possibility of LPG entering the boiler.

See ***Appendix A*** charts for required hot water flow and temperature at the vaporizer inlet. Failure to provide specified flow and temperature will reduce vaporizer capacity and can lead to tripping of the Liqui-SAFE outlet valve.

WARNING (HOT WATER ONLY)

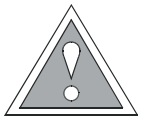


Do not use untreated boiler water in the vaporizer. Have the water quality tested and take appropriate action for water treatment.

STEAM SUPPLY

Install a steam pressure gauge in the input line near the vaporizer. Use the gauge to check the operation and when used with the steam temperature gauge, to determine the quality of the steam. ***Refer to the Saturated Steam Table 4.***

Steam condensate must be piped to a dry well or drain. Do not return the condensate directly to the boiler. If the condensate is to be returned to the boiler, a vented condensate manifold return with a phase separator must be used so there is no possibility of LPG going to the boiler. The LPG from the separator must be vented to a safe location. The condensate manifold must include a shut-off valve, strainer, blow-down valve and steam trap in addition to the separator. Remove the plug from the condensate drain valve before the system is started to facilitate “blow down”.



WARNING (STEAM ONLY)

Contact Algas-SDI before using a pressure reducing valve.

Table 1 – Liquid Temperature vs. Tank Pressure Chart

Liquid Temperature		Propane Tank Gauge Pressure		Butane Tank Gauge Pressure		Ammonia Tank Gauge Pressure	
°F	°C	PSI	kPa	PSI	kPa	PSI	kPa
-43.73	-41.65	0	0				
-40	-39.6	1.39	9.62				
-30	-36.85	3.42	23.59				
-30	-34.1	5.64	38.88				
-25	-31.35	8.06	55.57			1.23	8.511
-20	-28.6	10.69	73.75			3.54	24.401
-15	-25.85	13.56	93.50			6.16	42.648
-10	-23.1	16.67	114.91	**NOTE:** Below 30°F or -10°C, Butane is a liquid at normal atmospheric pressure.		8.97	61.834
-5	-20.35	20.02	136.06			12.22	84.23
0	-17.6	23.65	163.05			15.62	107.71
5	-14.85	27.55	189.96			19.57	134.89
10	-12.1	31.75	218.88			23.69	163.32
15	-9.35	36.25	249.92			28.42	195.98
20	-6.6	41.07	283.15			33.37	230.05
25	-3.85	46.22	318.69			39.00	268.90
30	-1.1	51.72	356.67			44.87	309.35
35	1.65	57.59	397.04	1.25	8.62	51.51	355.17
40	4.4	63.83	440.06	2.92	20.13	58.42	402.78
45	7.15	70.46	485.77	4.82	33.23	66.04	455.29
50	9.9	77.49	534.27	6.85	47.23	74.25	511.96
55	12.65	84.95	585.68	9	62.05	83.11	572.99
60	15.4	92.84	640.08	11.32	78.05	92.62	638.61
65	18.15	101.18	697.60	13.82	95.29	102.84	709.06
70	20.9	109.99	758.34	16.5	113.76	113.78	784.49
75	23.65	119.28	822.40	19.3	133.07	125.49	865.22
80	26.4	129.07	889.91	22.44	154.72	137.99	951.41
85	29.15	139.74	963.45	25.81	177.95	151.33	1043.38
90	31.9	150.22	1035.7	29.21	201.4	165.54	1141.36
95	34.65	161.60	1114.21	32.67	225.25	181.12	1248.78
100	37.4	173.56	1196.64	36.67	252.83	196.70	1356.19
105	40.15	186.09	1283.10	41.02	282.82	214.24	1477.09
110	42.9	199.24	1373.72	46.57	321.09	231.77	1597.99
115	45.65	213.00	1468.63	50.28	346.67	251.42	1733.45
120	48.4	227.41	1567.96	55.28	381.14	271.06	1868.89
125	51.15	242.48	1671.86	60.53	417.34	292.97	2019.96
130	53.9	258.23	1780.47	66.13	455.95	314.88	2171.02
135	56.65	274.69	1893.93	72.13	497.32	339.21	2338.77
140	59.4	291.88	2012.4	78.17	538.96	363.54	2506.52

Table 2 – LPG liquid line sizing chart (Minimum Pipe Size)

Capacity of units			Distance from storage to vaporizer - feet (meters)*							
MMBTU (Kcal)	Kg	LBS (GPH)	25 (8)	50 (15)	75 (23)	100 (31)	150 (36)	200 (61)	300 (92)	400 (122)
1.146 (288,792)	25	55 (12.5)	½"	½"	½"	½"	½"	¾"	¾"	¾"
2.292 (557,584)	50	110 (25)	½"	½"	½"	¾"	¾"	1"	1"	1"
4.584 (1,155,168)	100	220 (50)	½"	¾"	¾"	¾"	1"	1"	1"	1¼‘
7.280 (1,834,537)	160	352 (80)	¾"	¾"	1"	1"	1"	1¼‘	1¼‘	1¼‘
10.920 (2,751,806)	240	530 (120)	1"	1"	1¼‘	1¼‘	1¼‘	1½ "	1½ "	1½ "
14.665 (3,668,800)	320	530 (160)	1"	1"	1¼‘	1¼‘	1¼‘	1½ "	1½ "	1½ "

Table 3 – Equivalent Pipe Length of Various Valves and Fittings (Length in Feet/Meters)

Size/description	½" (1.27 cm)	¾" (1.91 cm)	1" (2.54 cm)	1 ¼" (3.18 cm)	1 ½" (3.81 cm)
Globe Valve	15.5/4.72	21/6.40	27/8.23	36/10.97	43/13.11
Gate Valve	0.6/0.18	0.8/0.24	1/0.30	1.4/0.43	1.6/0.49
Angle Valve	8/2.44	11/3.35	14/4.23	18/5.49	21/6.40
Elbow, 90	1.4/0.43	1.9/0.58	2.4/0.73	3.2/0.98	3.8/1.19
Elbow, 45	0.7/0.21	1/0.30	1.2/0.37	1.6/0.49	2/0.61
Elbow, 90 STR	2.3/0.70	3.1/0.94	4/1.22	5.3/1.62	6.3/1.92
Tee	2.7/0.82	3.7/1.13	4.8/1.46	6.4/1.95	7.5/2.29

Table 4 – *Saturated Steam Pressure*

ABSOLUTE PRESSURE		TEMPERATURE (T) (°F)	HEAT of the LIQUID (BTU/LB)	LATENT HEAT of VAPORIZATION (BTU/LB)	TOTAL HEAT of STEAM (Hg) (BTU/LB)	SPECIFIC VOLUME (V) (Cu. Ft. per LB)
ABSOLUTE	GAUGE					
30.0	15.3	250.33	218.82	945.3	1164.1	13.746
35.0	20.3	259.28	227.91	939.2	1167.1	11.898
40.0	25.3	267.25	236.03	933.7	1169.7	10.498
45.0	30.3	274.44	243.36	928.6	1172.0	9.401
50.0	35.3	281.01	250.09	924.0	1174.1	8.515
55.0	40.3	287.07	256.30	919.6	1175.9	7.787
60.0	45.3	292.71	262.09	915.5	1177.6	7.175
65.0	50.3	297.97	267.50	911.6	1179.1	6.655
70.0	55.3	302.92	272.61	907.9	1180.6	6.206
75.0	60.3	307.60	277.43	904.5	1181.9	5.816
80.0	65.3	312.03	282.02	901.1	1183.1	5.472
85.0	70.3	316.25	286.39	897.8	1184.2	5.168
90.0	75.3	320.27	290.56	894.7	1185.3	4.896
95.0	80.3	324.12	294.56	891.7	1186.2	4.652
100.0	85.3	327.81	298.40	888.8	1187.2	4.432
105.0	90.3	331.36	302.10	886.0	1188.1	4.232
110.0	95.3	334.77	305.66	883.2	1188.9	4.049
115.0	100.3	338.07	309.11	880.6	1189.7	3.882
120.0	105.3	341.25	312.44	877.9	1190.4	3.728
125.0	110.3	344.33	315.68	875.4	1191.1	3.587
130.0	115.3	347.32	318.81	872.9	1191.7	3.455
135.0	120.3	350.21	321.85	870.6	1192.4	3.333
140.0	125.3	353.02	324.82	868.2	1193.0	3.220
145.0	130.3	355.76	327.70	865.8	1193.5	3.114
150.0	135.3	358.42	330.51	863.6	1194.1	3.015
160.0	145.3	363.53	335.93	859.2	1195.1	2.834
170.0	155.3	368.41	341.09	854.9	1196.0	2.675
180.0	165.3	373.06	346.03	850.8	1196.9	2.532
190.0	175.3	377.51	350.79	846.8	1197.6	2.404
200.0	185.3	381.79	355.36	843.0	1198.4	2.288
210.0	195.3	385.90	359.77	839.2	1199.0	2.183
220.0	205.3	389.86	364.02	835.6	1199.6	2.087
230.0	215.3	393.68	368.13	832.0	1200.1	1.999
240.0	225.3	397.37	372.12	828.5	1200.6	1.918
250.0	235.3	400.95	376.00	825.1	1201.1	1.844

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OPERATION 4

GENERAL

Hot water or dry saturated steam enters the inlet chamber, and passes through the stainless heat exchanger tubes where the heat is transferred to the LPG. Steam condensate or cooled water, exits the vaporizer through the outlet chamber. LPG from a storage system enters the heat exchanger shell and makes contact with the heat exchanger tubes, causing boiling of the LPG thus allowing vapor to rise to the vapor space, above the liquid level. The vaporized LPG exits through the vapor outlet at the Liqui-SAFE valve.

OPERATING INSTRUCTIONS

1) Complete the installation and leak test.

2) Check hot water or saturated steam temperature and flow to verify proper operation of the vaporizer.

3) This unit will not be damaged by operating the unit in a “dry” condition. It is not necessary to have liquid in the unit for testing or evaluation.

4) Typical operating temperature range for water is between 150ºF-180ºF and for steam up to 396ºF. Use caution when working around vaporizer.

STARTING THE VAPORIZER – HOT WATER VERSION

CAUTION

Do not start the vaporizer when both inlet and outlet isolation valves are closed. Pressure can build in the vaporizer during startup and blow the relief valve.

1) Close the HYDREXX outlet isolation valve.

2) Open the HYDREXX water inlet and outlet valves.

3) Open a downstream valve to purge air from the water lines.

4) Start the water circulation pump, boiler and close the purge valve when all the air has been removed.

5) Adjust water inlet temperature and flow according to charts in ***Appendix A***.

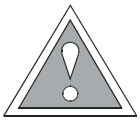
6) Open all valves between the storage tank and the vaporizer to allow liquid flow to and from the vaporizer. Wait approximately 2 minutes so that excess LPG is pushed back to the storage tank.

7) Check the system for leaks.

8) Carefully press the Button on top of the Liqui-SAFE™ valve all the way down and SLOWLY release it. A latch mechanism inside the Liqui-SAFE™ valve will keep the Red Flag in the down position, indicating the valve is open and in operating position.

9) HYDREXX vaporizer is now ready to supply vapor. Slowly open the outlet isolation valve to pressurize the supply piping. Then, fully open the outlet isolation valve to allow vapor to flow to the load.

STARTING THE VAPORIZER – STEAM VERSION



CAUTION

Do not start the vaporizer when both inlet and outlet isolation valves are closed. Pressure can build in the vaporizer during startup and blow the relief valve.

1) Close the HYDREXX outlet isolation valve.
2) Check steam pressure from boiler.
3) Open the vaporizer steam inlet valve.
4) Open the vaporizer steam inlet strainer blowdown valve.
5) Blow the steam line down until no water is present, only saturated steam.
6) Open the condensate return line when only steam is in the system.
7) Open all valves between the storage tank and the vaporizer to allow liquid flow to and from the vaporizer. Wait approximately 2 minutes so that excess LPG is pushed back to the storage tank.
8) Check the system for leaks.
9) Carefully press Button on top of the Liqui-SAFE™ valve all the way down and SLOWLY release it. A latch mechanism inside the Liqui-SAFE™ valve will keep the Red Flag in the down position indicating the valve is open and in operating position.
10) HYDREXX vaporizer is now ready to supply vapor. Slowly open the outlet isolation valve to pressurize the supply piping. Then, fully open the outlet isolation valve to allow vapor to flow to the load.

STEAM CONSUMPTION

To estimate steam consumption, use this rule: One pound of steam is required to vaporizer one gallon of LPG or 0.1 kg of steam is required to vaporize 1 liter of LPG.

STEAM REQUIREMENT

The steam fired vaporizer is designed to utilize the heat in dry saturated steam. The vaporizer derives the energy necessary for vaporization from the change of steam to water. For proper performance, the steam must be **DRY** and **SATURATED, NOT "superheated" or "wet".** Superheated steam results whenever higher pressure steam is regulated to a lower pressure.

If "superheated steam" is used in the vaporizer, the efficiency of the vaporizer is impaired causing a significant loss in vaporizing capacity.

The lower the steam pressure the better, however the pressure must remain within the operating range of the steam trap.

STEAM TEMPERATURE

LPG vapor temperature should be kept at or below 392° F (200°C). System components are designed for a maximum operating temperature of 392° F (200°C).

NOTE

Do not use a pressure reducing valve without first contacting the factory.

STANDBY CONDITION

Once the **HYDREXX** has been started perform the following procedure to place the unit in a state of readiness or standby condition:

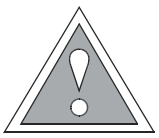
1. Close the vapor outlet valve.
2. Leave open all LPG valves from the storage system and pumps to the vaporizer liquid propane inlet.
3. Leave open all hot water or steam valves.
4. The vaporizer is ready to operate. All that is needed to activate it is to open the vapor outlet valve and push the start button.

STOPPING THE VAPORIZER

1) Close the outlet isolation valve.
2) Shut down boiler and circulation pump.
3) Leave LPG valves to the storage tank open to relieve any pressure buildup.

PURGING THE VAPORIZER

Purging procedure should be followed anytime a vaporizer needs to be maintained, serviced, relocated or shut down for any other reason.



CAUTION

Prior to purging the vaporizer, ensure that there are no closed ball valves or back check valves restricting the flow of liquid to the tank.

1) Close the valve at the outlet of the vaporizer.
2) If the vaporizer is not operating, start the vaporizer.
3) Allow at most 5 minutes for vaporizer to heat up and push most of the remaining liquid back into the tank.
4) Close the tank liquid outlet valve.
5) Open the vaporizer outlet valve and flare or allow attached equipment to consume remaining gas in the line.

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MAINTENANCE 5

GENERAL REQUIREMENTS

HYDREXX vaporizer is designed for long term trouble free operation. Because of the nature of its use, and the severe duty it receives, it is important to provide scheduled maintenance. A list of RECOMMENDED SPARE PARTS is located in the back of this manual.

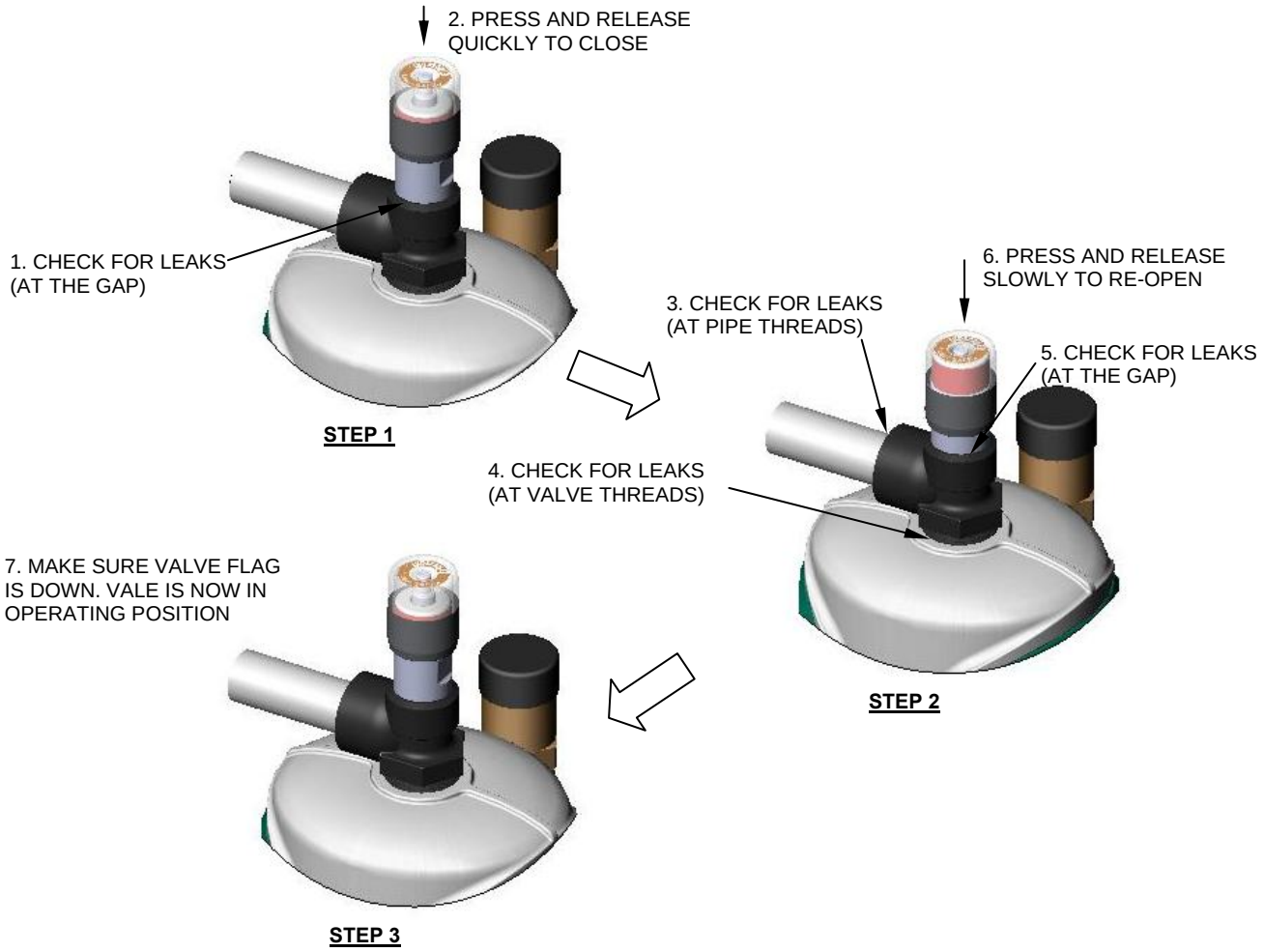
Item	3 Months	6 Months	Annual
Inlet strainer	During initial operation remove accumulated debris every 3 months or sooner. Establish cleaning schedule according to the amount of debris present.	Inspect and remove debris.	Inspect and remove debris.
Safety relief valve			Visually check. Replace if leakage is observed. Relief valve is not serviceable in the field. Be sure it is covered with an appropriate plastic or rubber cap to prevent rain and debris from entering.
Air separator	During initial operation remove accumulated debris every 3 months or sooner. Establish cleaning schedule according to the amount of debris present.	Inspect and remove debris.	Inspect and remove debris.
Liqui-SAFE valve		Conduct performance check every 6 months.	Replace Liqui-SAFE valve o-rings every two years. Liqui-SAFE valve is not serviceable in the field.
Heavy ends drain	Check heat exchanger for possible heavy ends accumulation. To do this you must have heavy ends drain kit installed. Ensure there are no sources of ignition within 25ft. Remove drain valve plug and slowly open the drain valve. After draining heavy ends, close the valve and re-install plug. **NOTE:** In areas of poor gas quality this maintenance procedure should be performed every other week.		
Steam condensate strainer	Remove both strainers, clean and re-install	Inspect and remove debris.	Inspect and remove debris.

Liqui-SAFE™ valve – Performance check (Every 6 months)

I Latch operation. – While the valve is in the open position and the Red Flag is down, press Button and release QUICKLY. This will cause the valve to close and the Red Flag should pop up. Carefully press the Button again all the way down and release SLOWLY. The valve will stay open.

II Leak detection. – Follow the instructions in "I" to manually open and close the valve. Perform leak tests in both conditions. If a leak is detected at the Valve Body (Step 1) when the valve is open, replace the Valve Body O-ring (This can be performed in the field. See below.) If a leak is detected in Step 5 when the valve is closed (see Figure 5), follow the "Liqui-SAFE™ valve – Service Instructions" and change all the o-rings. (This service should not be performed in the field.)

Figure 5 – Follow 1 to 7 below to check the Liqui-SAFE™ valve operation



WARNING

Extreme caution must be taken due to the potential of flammable vapors being exposed to the atmosphere creating an ignition. Do not operate any equipment that may create a spark from this point.

Liqui–SAFE™ Valve – Service Instructions

There are four (4) o-rings in the Liqui-SAFE™ valve and these are the Button Post o-ring, Valve Body o-ring, Valve Seat o-ring and Valve Stem Base o-ring. In order to keep the valve working at its peak conditions, replacement of all the o-rings according to the maintenance schedule is strongly recommended. Due to the complexity of the valve and the number of parts involved, this service should NOT be done in the field. Follow the 7 Steps below to service the Liqui-SAFE™ valve. Clean all the metal parts with WD-40. Re-assemble all the parts. Simulate the tripping action of the valve and verify the tripping force applied on the Extension Stem is between 0.2 lbf (0.89 N) and 0.5 lbf (2.22 N).

Figure 6A – STEP 1 – Be sure that the Liqui-SAFE™ valve is in the close position as shown

Figure 6B – STEP 2 – Unscrew reset button base and remove the spring

Figure 6C – STEP 3 – Replace button post internal o-ring

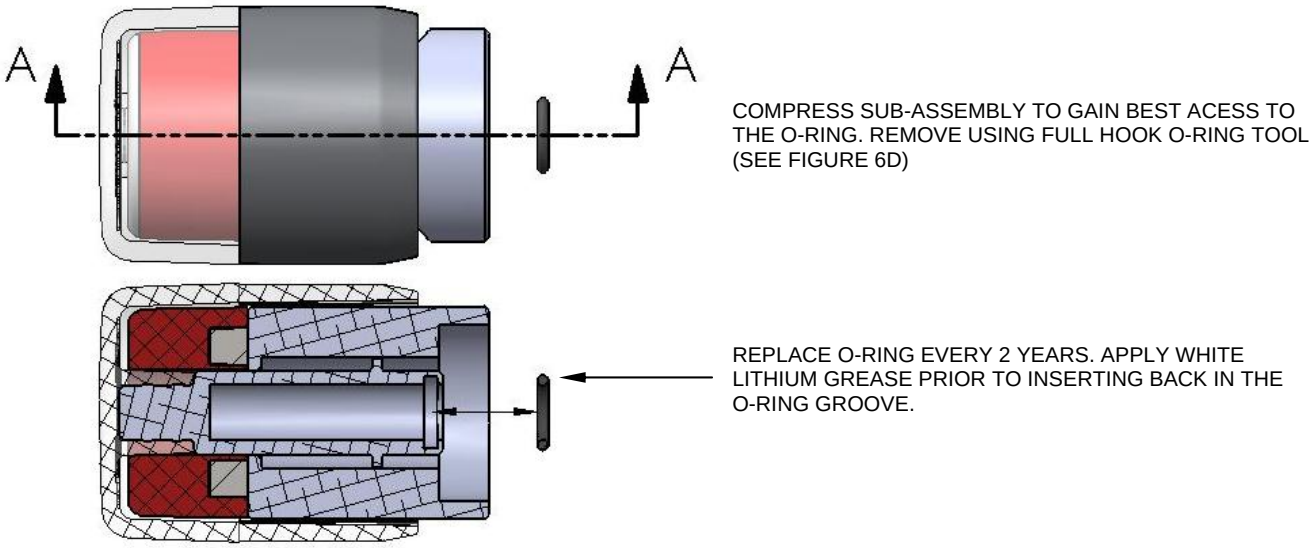
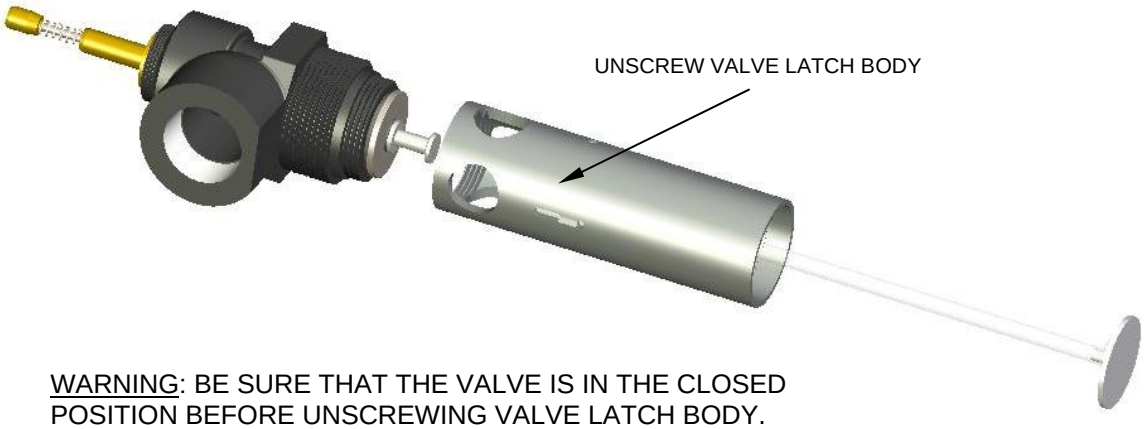
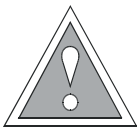


Figure 6D – Full hook o-ring tool

Figure 6E – STEP 4 – Unscrew valve latch body





WARNING: BE SURE THAT THE VALVE IS IN THE CLOSED POSITION BEFORE UNSCREWING VALVE LATCH BODY. **FAILING TO DO SO MAY RESULT IN PERMANENTLY DAMAGING THE LATCH!**

Figure 6F – STEP 5 – Replace valve body static o-ring

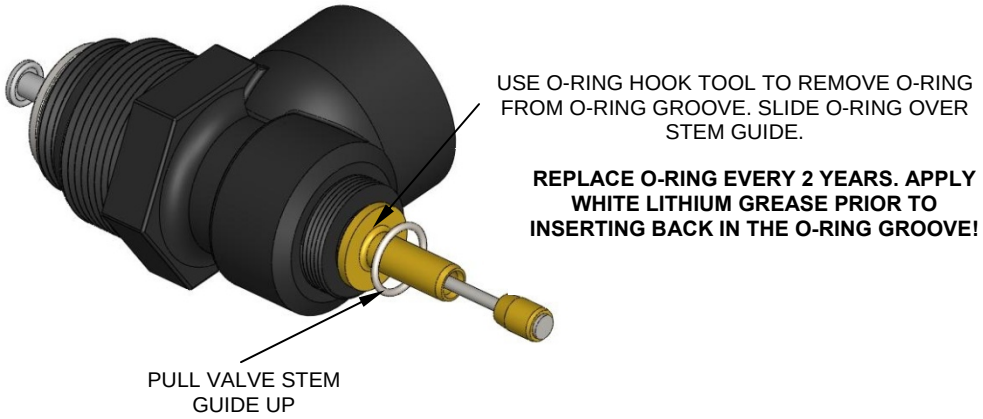
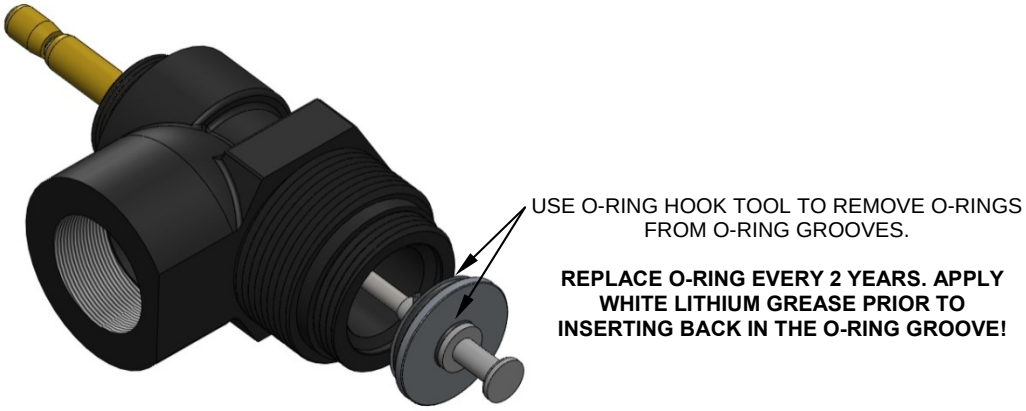


Figure 6G – STEP 6 – Replace valve seat and valve stem base o-rings.



IMPORTANT:

- Always perform a functional check and leak test (see *Figure 5*) of the re-assembled valve to ensure that it actuates per design and that valve seat o-ring seals properly against the valve body. A proper seal is present when the large valve seat o-ring shown in Figure 6G is sealing along the entire surface on the bottom face of the valve body.

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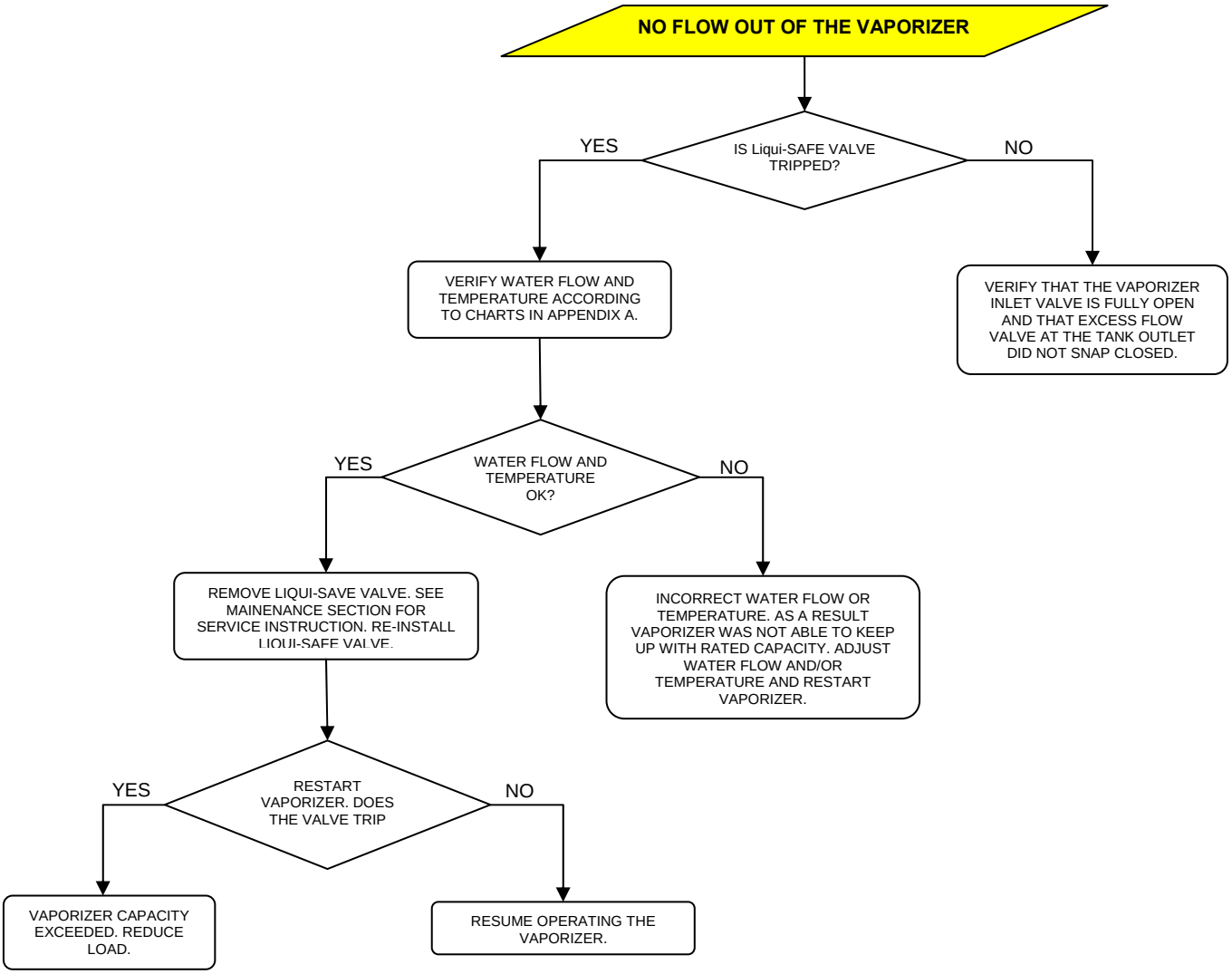
TROUBLESHOOTING 6

General Requirements

FOLLOW TROUBLESHOOTING GUIDE BELOW TO IDENTIFY THE PROBLEM:



APPENDIX A

TECHNICAL INFORMATION

HYDREXX Circulating Hot Water Vaporizer Data Sheet
LPG Systems

Refer to Nameplate on unit for the model then look up specific information on the tables below.

General Specifications: Applies to circulating hot water units

Operating Temperature: 65-82ºC 150-180ºF

Water/Glycol content: Propylene Glycol 50% maximum for Propane (30% recommended) and 100% water for Butane

Connections: ¾" FNPT – Inlet; 1" FNPT – Outlet

Type of Service: LPG Vaporization

ASME Pressure Vessel: 250 PSIG MAWP

Heat Exchanger Area:	5 ft^2 / 0.464 m^2	HX160
	10 ft^2 / 0.929 m^2	HX320
	13 ft^2 / 1.208 m^2	HX500
Dry Weight:	95 lbs / 43.1 kg	HX160
	95 lbs / 43.1 kg	HX320
	95 lbs / 43.1 kg	HX500

Other: Meets NFPA Pamphlet 58 requirements and may be installed per indirect fired vaporizers limitations in Class I, Div 1 and Zone 1 or 2 Locations.

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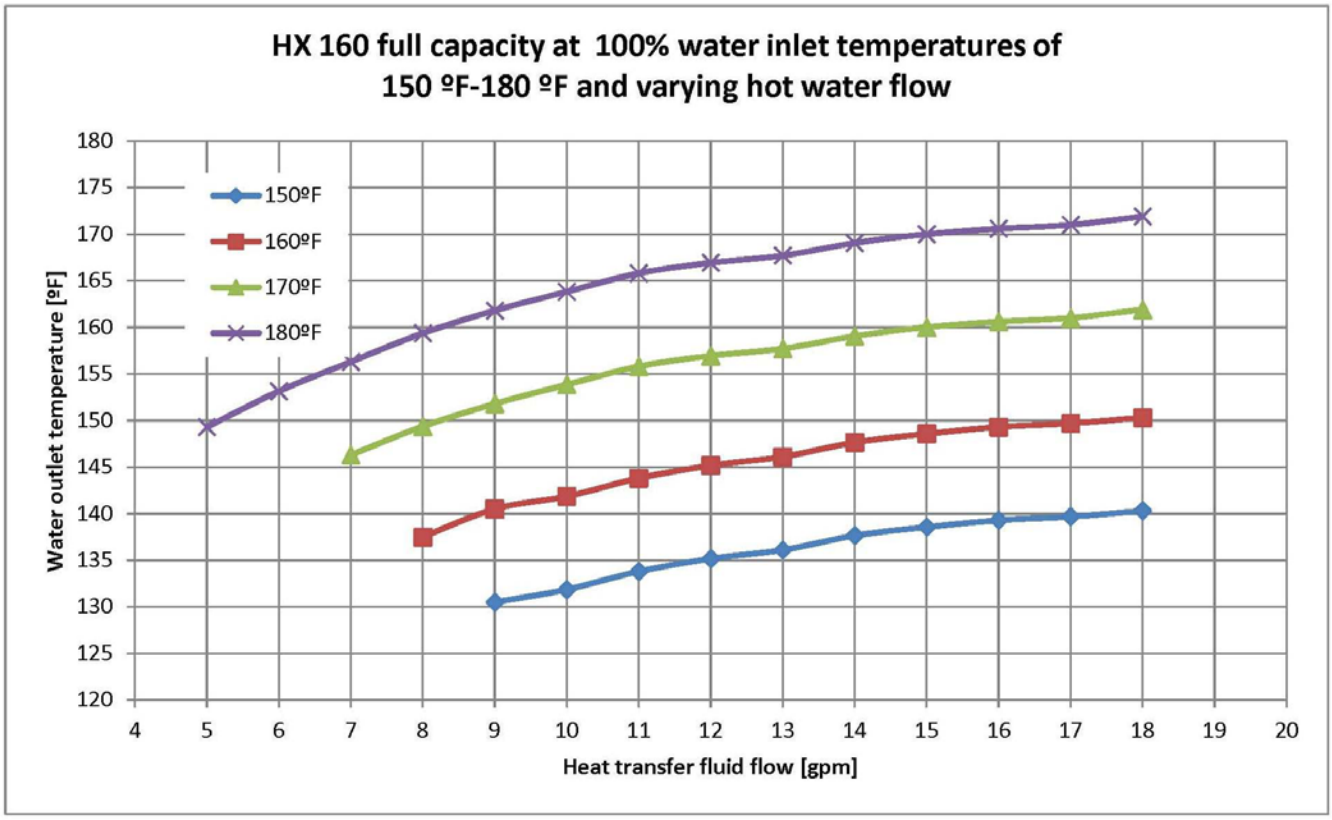
HX 160 full capacity at 100% water inlet temperatures of
150 ºF-180 ºF and varying hot water flow
Water outlet temperature [ºF]
Heat transfer fluid flow [gpm]
150ºF
160ºF
170ºF
180ºF
180
175
170
165
160
155
150
145
140
135
130
125
120
4
5
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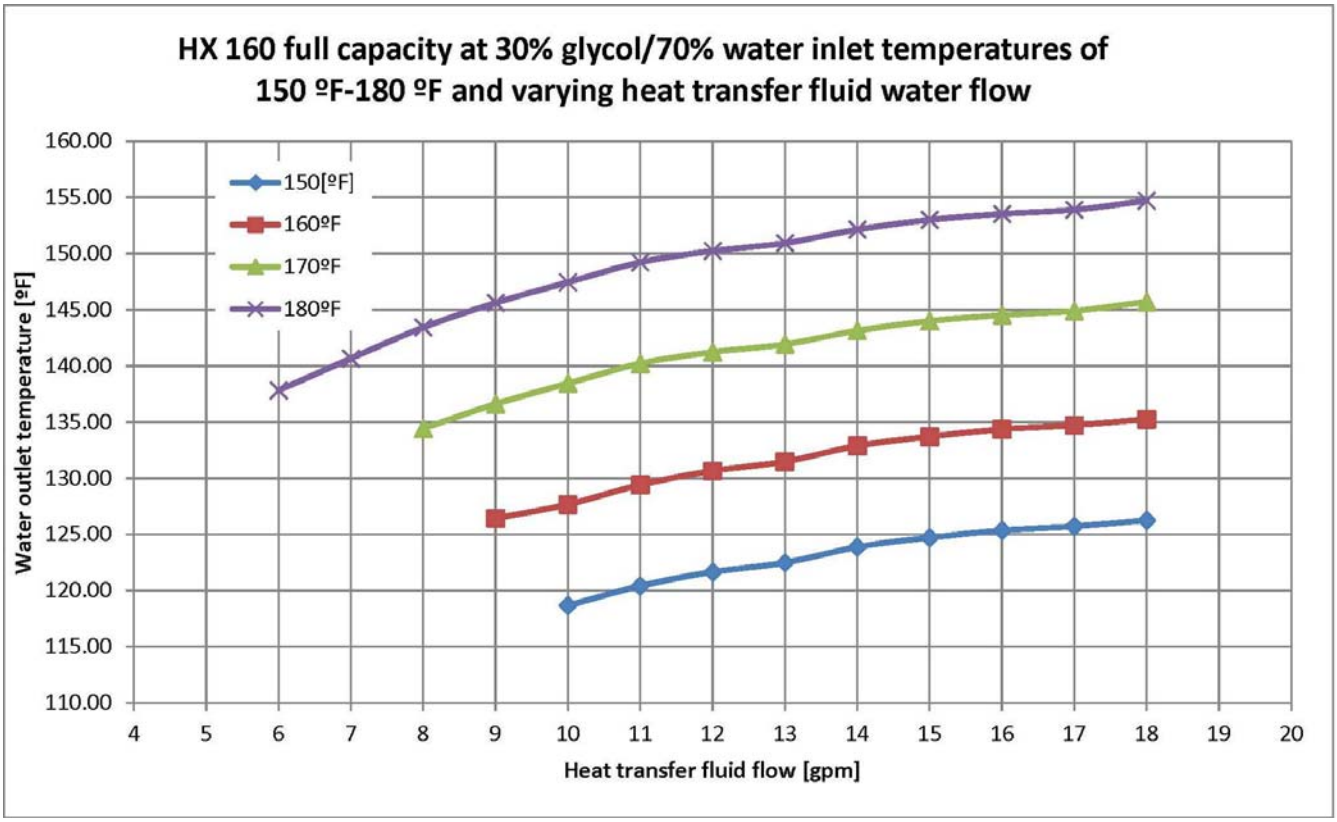
HX 160 full capacity at 30% glycol/70% water inlet temperatures of
150 ºF-180 ºF and varying heat transfer fluid water flow
Water outlet temperature [ºF]
Heat transfer fluid flow [gpm]
150[ºF]
160ºF
170ºF
180ºF
160.00
155.00
150.00
145.00
140.00
135.00
130.00
125.00
120.00
115.00
110.00
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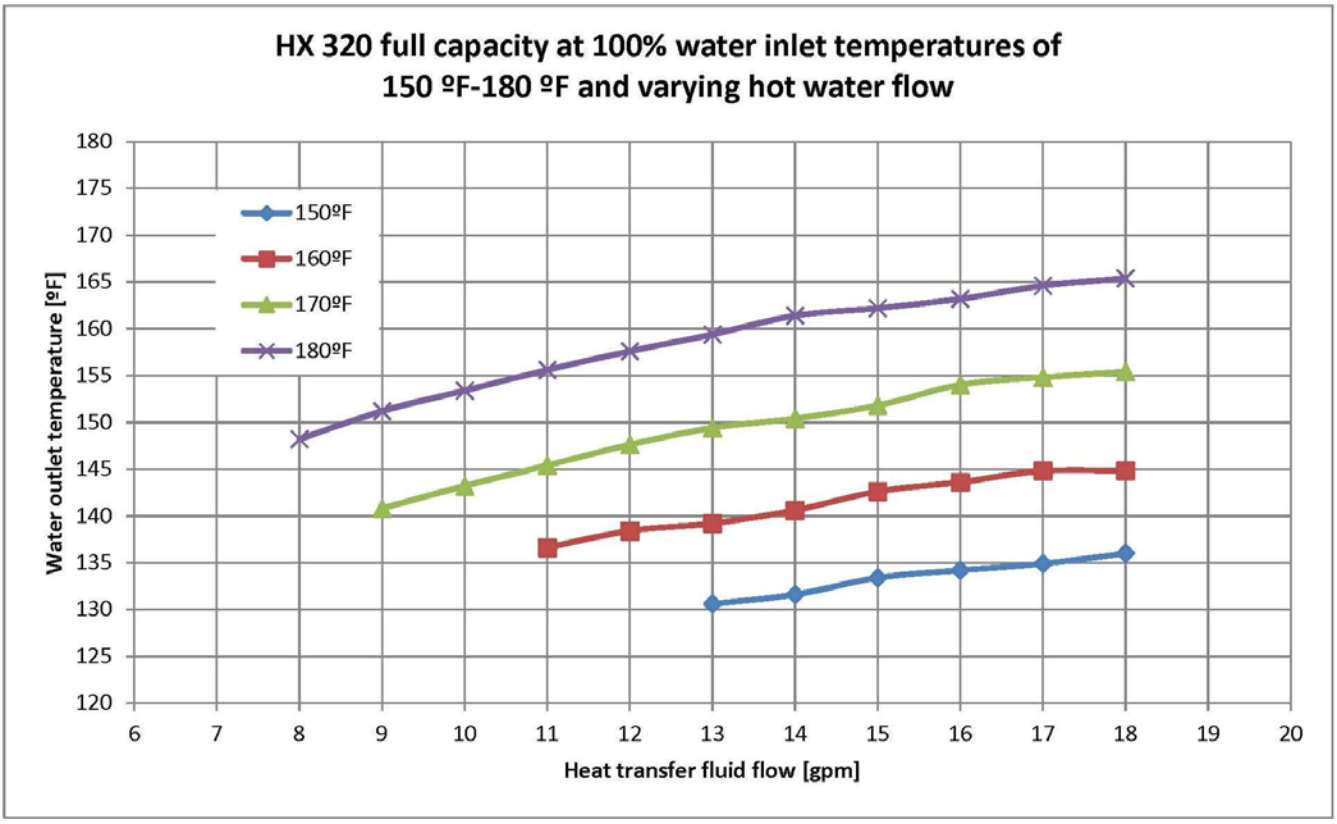
HX 320 full capacity at 100% water inlet temperatures of
150 ºF-180 ºF and varying hot water flow
Water outlet temperature [ºF]
Heat transfer fluid flow [gpm]
150ºF
160ºF
170ºF
180ºF
180
175
170
165
160
155
150
145
140
135
130
125
120
6
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9
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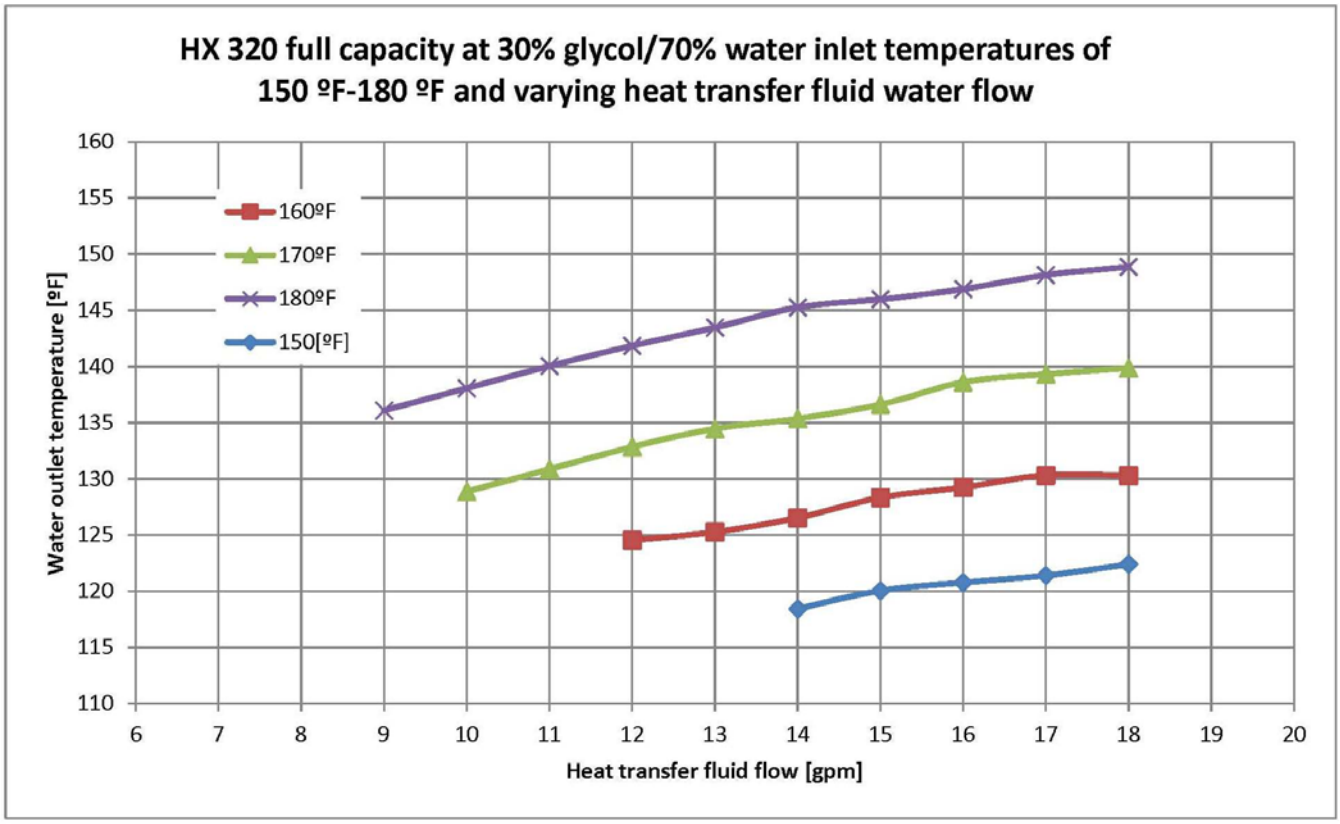
HX 320 full capacity at 30% glycol/70% water inlet temperatures of
150 ºF-180 ºF and varying heat transfer fluid water flow
Water outlet temperature [ºF]
Heat transfer fluid flow [gpm]
160ºF
170ºF
180ºF
150[ºF]
160
155
150
145
140
135
130
125
120
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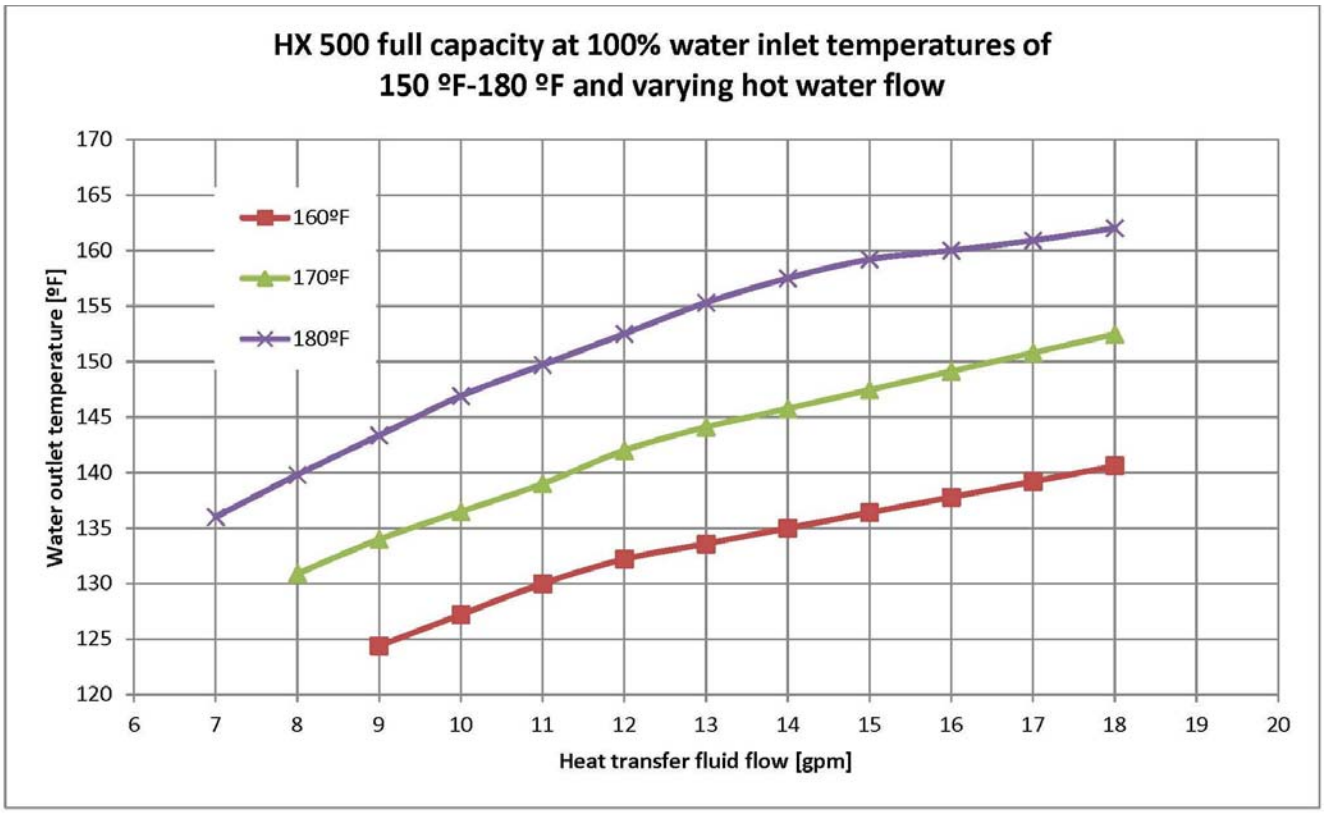
HX 500 full capacity at 100% water inlet temperatures of
150 ºF-180 ºF and varying hot water flow
Water outlet temperature [ºF]
Heat transfer fluid flow [gpm]
160ºF
170ºF
180ºF
170
165
160
155
150
145
140
135
130
125
120
6
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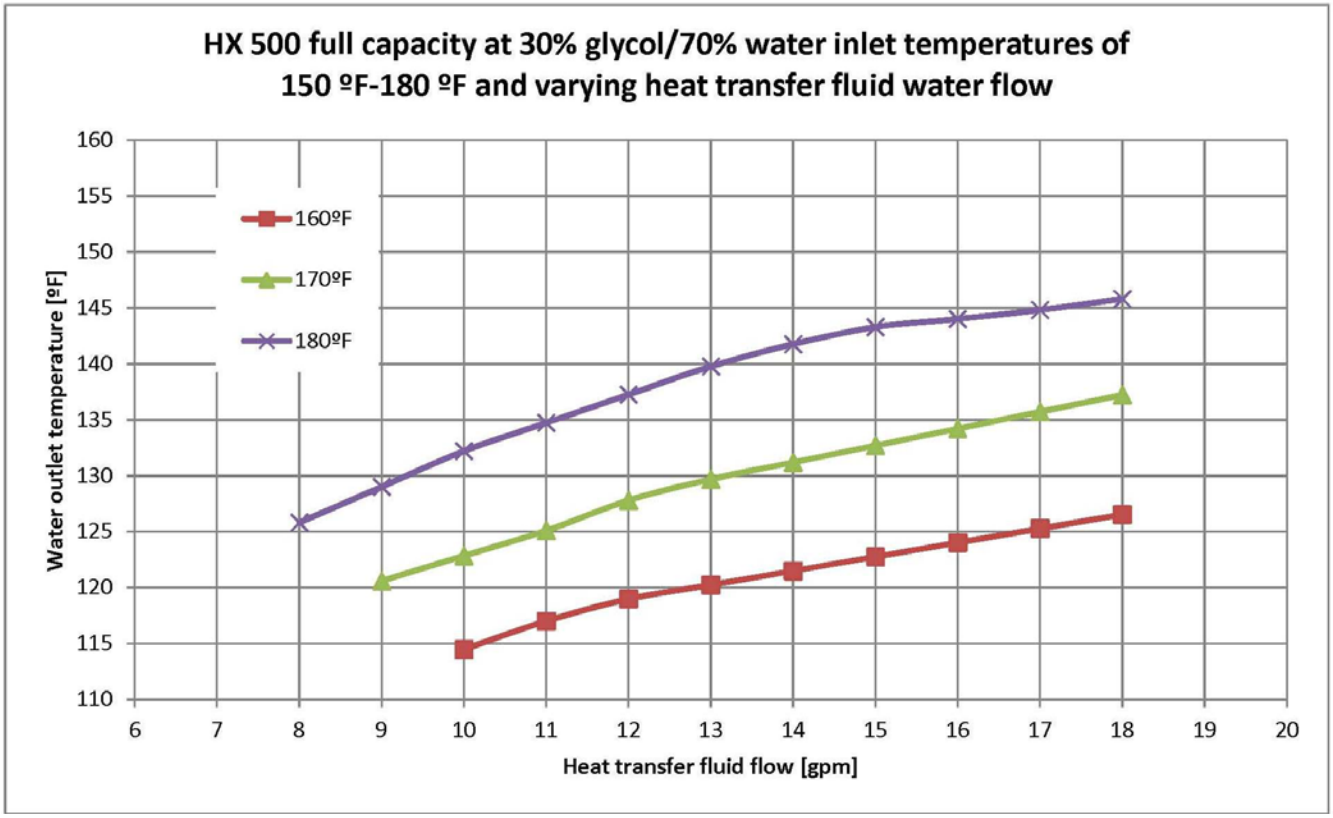
HX 500 full capacity at 30% glycol/70% water inlet temperatures of
150 ºF-180 ºF and varying heat transfer fluid water flow
Water outlet temperature [ºF]
Heat transfer fluid flow [gpm]
160ºF
170ºF
180ºF
160
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HYDREXX Saturated Steam Vaporizer Data Sheet
LPG Systems

Refer to Nameplate on unit for the model then look up specific information on the tables below.

General Specifications: Applies to all saturated steam units

Operating Temperature: 200ºC max. 392ºF max.

Connections: ¾" FNPT – Inlet; 1" FNPT – Outlet

Type of Service: LPG Vaporization

ASME Pressure Vessel: 250 PSIG MAWP

Heat Exchanger Area:	5 ft^2 / 0.464 m^2	HX160
	10 ft^2 / 0.929 m^2	HX320
	13 ft^2 / 1.208 m^2	HX500
Dry Weight:	95 lbs / 43.1 kg	HX160
	95 lbs / 43.1 kg	HX320
	95 lbs / 43.1 kg	HX500

Other: Meets NFPA Pamphlet 58 requirements and may be installed per indirect fired vaporizers limitations in Class I, Div 1 and Zone 1 or 2 Locations.

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WATERBATH / PROPYLENE GLYCOL MAINTENANCE

GLYCOL CONTENT 30% RECCOMENDED. 50% MAX. FOR PROPANE SERVICE

In addition to maintaining proper coolant level, PH and corrosion inhibitor control are also necessary.

PH control is important because propylene glycol's oxidize into acidic end products which are very corrosive. Dow and CH20 products have additives in them to neutralize these acids which may become depleted over time. PH should be checked with a PH monitor or indicating paper. These are available from Omega or Misco Products. When ordering paper, the necessary PH range to check for is 7 to 10.

The PH range should be kept between 8.0 and 10.0. Adjustments need to be made if PH falls below 8.0. This indicates the coolant is approaching the acidic range. If using Dow products, adjustments can be made by adding a 50% solution of sodium hydroxide or potassium hydroxide to bring the PH level to an acceptable level. If using **CH20 HYDRO-TREAT**, adding about 25% of the initial fill amount, per Table 1, should correct the problem.

Dow provides a free fluid analysis to determine inhibitor condition for systems containing 250 gallons or more of **DOWFROST**, and a small fee for lesser amounts. The kit consists of several 4-ounce containers and labels to fill with fluid samples to send to Dow. It is recommended that you order the kit in time to take a sample after the unit has been initially filled and circulated for 24 hours. The test results from Dow will include inhibitor and glycol levels and any necessary recommendations.

The inhibitor used in **CH20 HYDRO-TREAT** is molybdenum based and can be checked using Omega's Molybdate/Molybdenum Test Kit #WTMO-3632. The kit costs about $40 (US) and will do 20 - 30 tests. The test consists of withdrawing a small sample of coolant and adding drops of the reacting reagent from a calibrated dropper until a color change occurs. Counting the number of drops and multiplying by a conversion factor yields the PPM concentration. All necessary equipment for the test is included in the kit. The molybdenum level should be 125 PPM minimum. If it is less, add about 25% of the initial fill amount, per Table #2, of **HYDRO-TREAT** and retest after circulating about 30 minutes. Repeat if necessary.

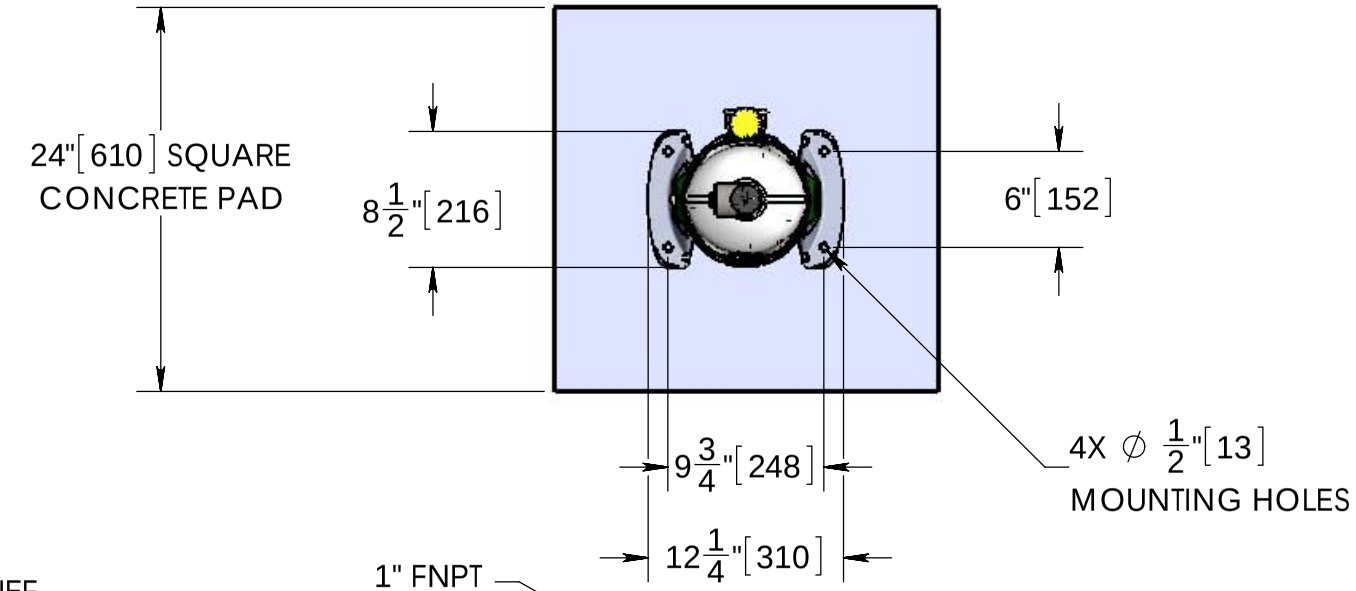
A rigorous PH and inhibitor monitoring and maintenance schedule is essential but not always easy to establish, as the rate of change is dependent on system use. A good method to establish a pattern for a schedule is to analyze PH and inhibitor level (for Hydro-treat) immediately after installation, after 2 months or 200 hours use, whichever occurs first, and after six months or 500 hours use, whichever occurs first.

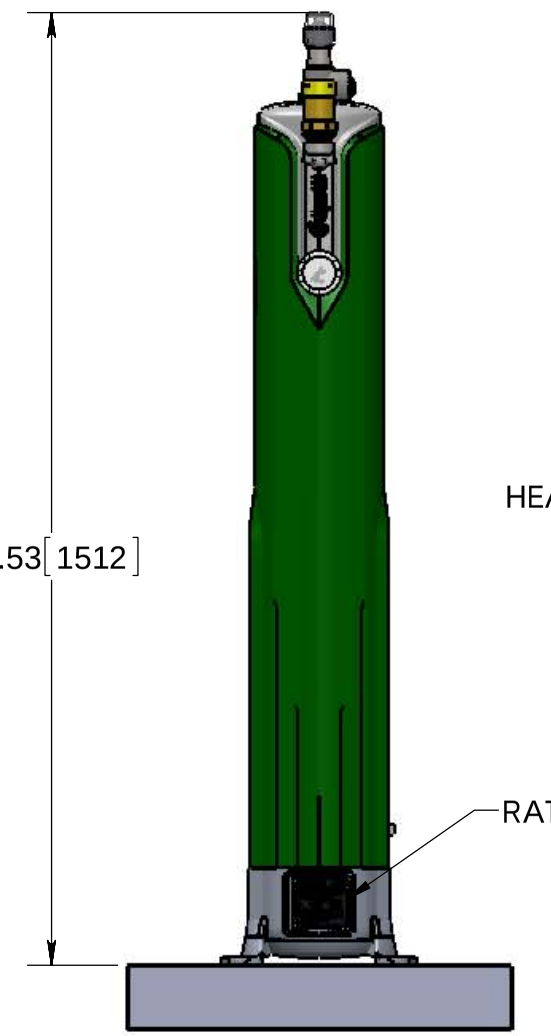
Temperature [ºF]	Percent (volume) Glycol Concentration Required	
	For Freeze Protection	For Burst Protection
20	18%	12%
10	29%	20%
0	36%	24%
-10	42%	28%
-20	46%	30%
-30	50%	33%
-40	54%	35%
-50	57%	35%
-60	60%	35%

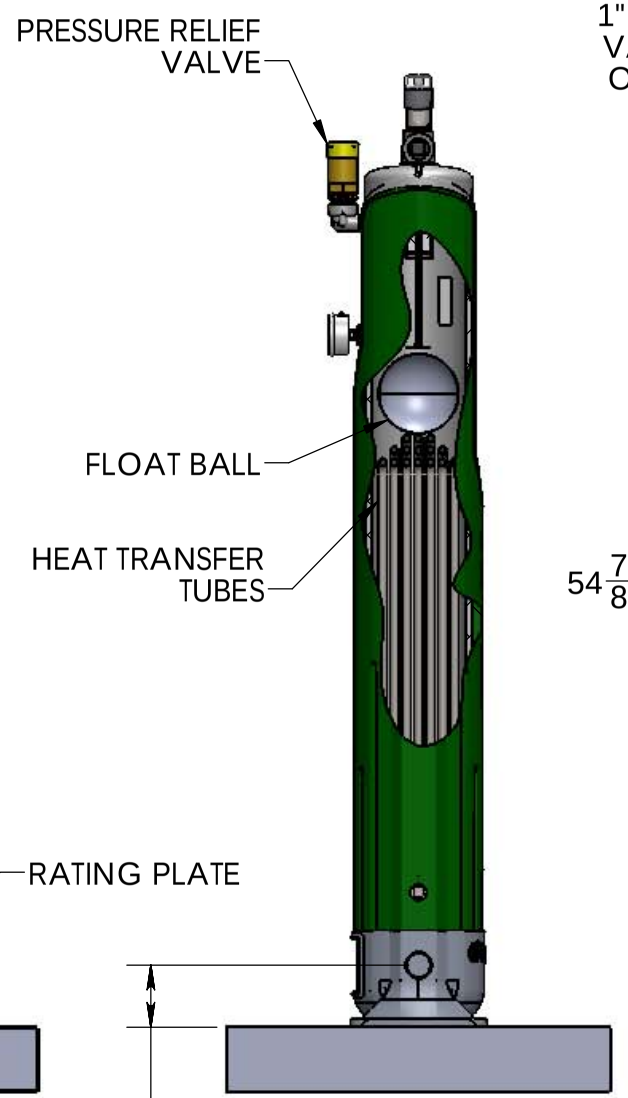
NOTE: These figures are examples only and may not be appropriate for your situation. Generally, for an extended margin of protection, you should select a temperature in this table that is at least 5ºF lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions of less than 25-30% glycol.

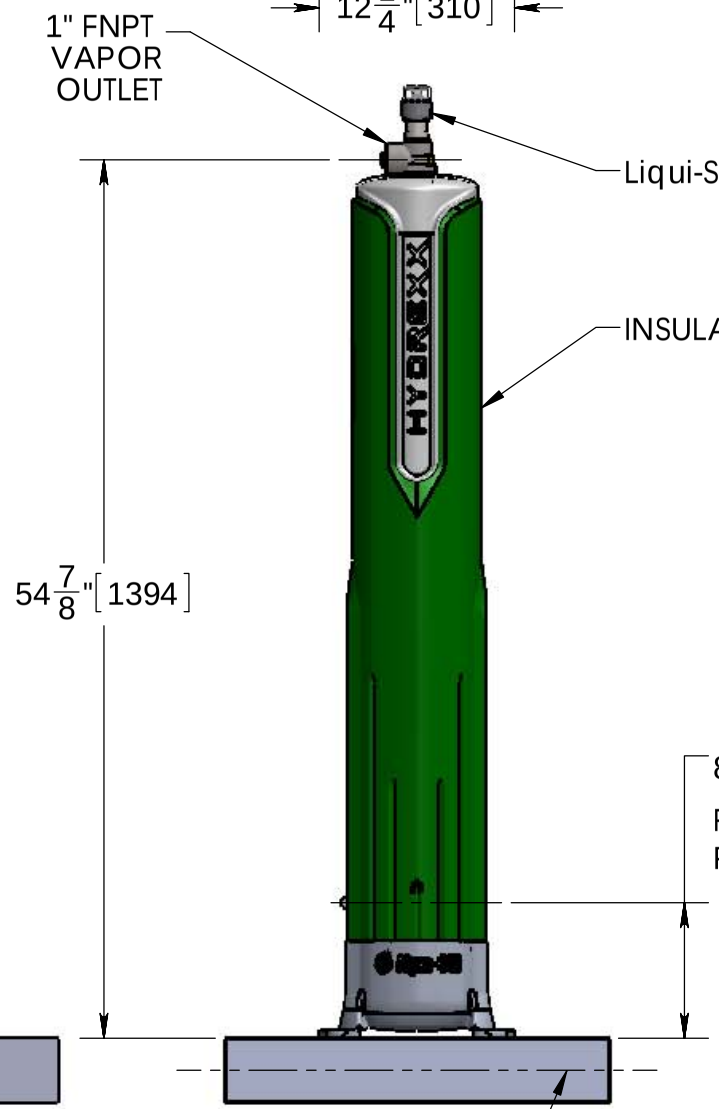
HYDREXX Vaporizer Spare Parts and Accessories

REFERENCE KEY	SPARE PARTS	HX160	HX320	HX500
1	Liqui-SAFE VALVE	5001-3003	5001-3003	5001-3003
2	Liqui-SAFE VALVE O-RING KIT	40421	40421	40421
3	PRESSURE RELIEF VALVE	34876	34876	34876
4	RAIN CAP	35379	35379	35379
5	PIPE AWAY ADAPTOR	34877	34877	34877
6	VALVE, GAUGE AND STRAINER KIT	36922	36922	36922
7	DRAIN ASSEMBLY	5010-3003	5010-3003	5010-3003
8	STAND	20437	20437	20437
9	ECONOMY VALVE FIELD INSTALL KIT	41051	41051	41051
10	Balancing orifice	64004	64004	64004
11	Solenoid kit	40575	40575	40575









ISOMETRIC VIEW
NO SCALE

NOTES:
1. ALL DIMENSIONS SHOWN AS INCHES [mm]
2. PRESSURE VESSEL RATED AT 250 PSIG.
3. SUITABLE FOR INDOOR/OUTDOOR INSTALLATION.
4. RELIEF VALVE SETTINGS 250 PSIG.
5. AVOID DRY RUBBING OF THE INSULATION JACKET TO AVOID ELECTRO STATIC CHARGING HAZARD. ALWAYS USE A DAMP CLOTH FOR CLEANING.

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

TOLERANCES
UNLESS OTHERWISE SPECIFIED
.X ±
.XX ±
.XXX ±
ANGLE ±0°30'
FRACTIONS ± 1/4"

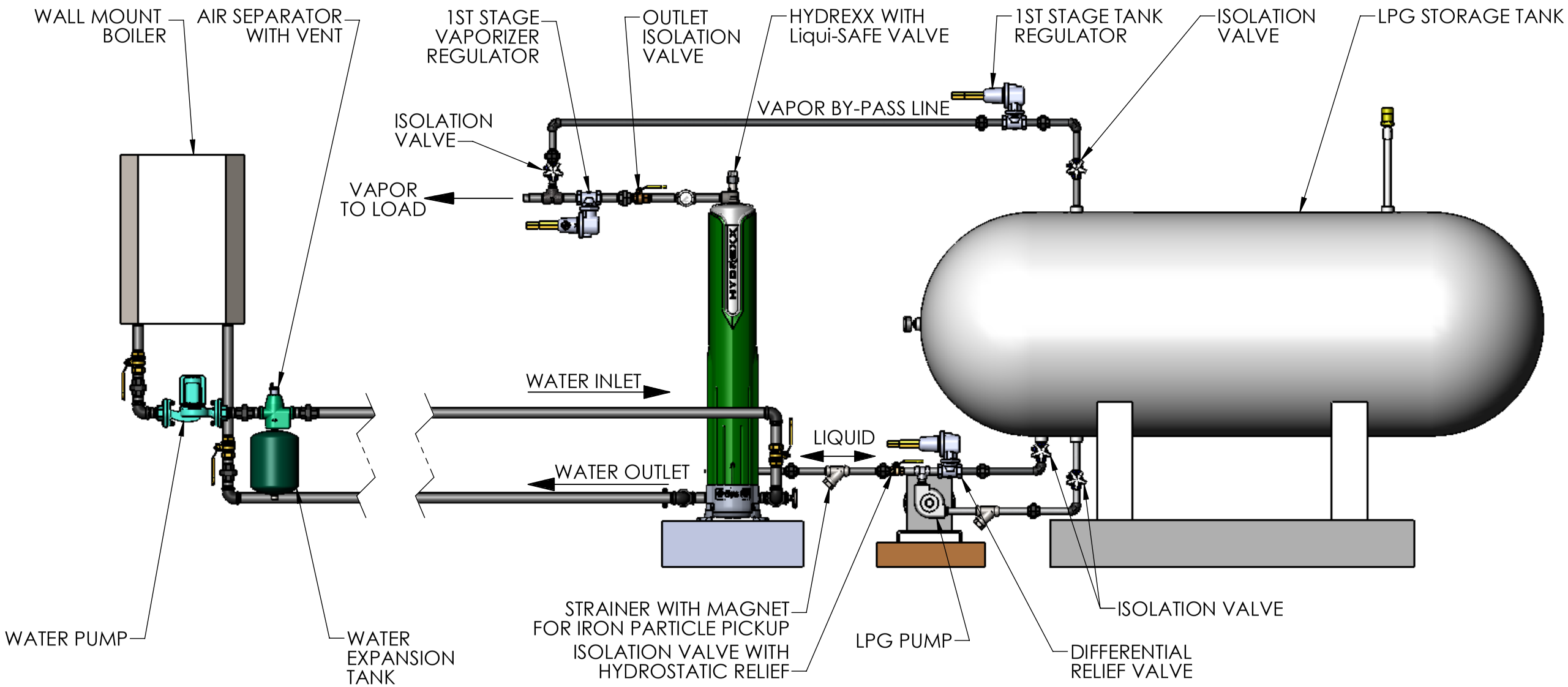
INTERPRET THIS DRAWING IN ACCORDANCE WITH ANSI/ASME Y14.5-2009

Algas-SDI™
151 S. Michigan St., Seattle, Washington. USA 98108
Tel: (206) 789-5410 Fax: (206) 789-5414

Drawn By: A. FIGLIOLI
Checked By: DN
Approved By:
Date: 6/10/11
Scale: 1:12 AND NOTED
Part # **1801-6001**
Job # A.S.D.I. STD.

Title: **HYDREXX SERIES VAPORIZER**

Size: **B** | Dwg. # **1801-6001** | Sht. No.: 1of 1 | Rev.: **A**



INLET WATER TEMPERATURE	MINIMUM WATER FLOW AT 100% WATER		
	HX160	HX320	HX500
150°F	9 GPM	13 GPM	N/A
160°F	8 GPM	11 GPM	9 GPM
170°F	7 GPM	9 GPM	8 GPM
180°F	5 GPM	8 GPM	7 GPM

INLET WATER TEMPERATURE	MINIMUM WATER FLOW AT 30% GLYCOL		
	HX160	HX320	HX500
150°F	10 GPM	14 GPM	N/A
160°F	9 GPM	12 GPM	10 GPM
170°F	8 GPM	10 GPM	9 GPM
180°F	6 GPM	9 GPM	8 GPM

NOTES:
1. INSTALL PER NFPA 58 AND APPLICABLE LOCAL CODES.
2. INSTALL VAPORIZER 1ST STAGE REGULATOR UPSTREAM OF TANK VAPOR BYPASS LINE CONNECTION POINT.
3. SET VAPORIZER 1ST STAGE REGULATOR 2-4 PSIG HIGHER THAN TANK 1ST STAGE REGULATOR SET POINT.
4. LIQUID PIPING LOSSES BETWEEN VAPORIZER AND THE TANK MUST NOT EXCEED HYDROSTATIC HEAD WHEN THE PUMP IS OFF.
5. INSTALL VAPORIZER 1ST STAGE REGULATOR UPSTREAM OF THE TANK VAPOR PRESSURE CONNECTION POINT.
6. NO CHECK VALVES IN LIQUID LINE. LIQUID MUST BE ABLE TO FLOW IN BOTH DIRECTIONS.
7. HOT WATER SUPPLY PIPING MUST BE INSULATED TO MINIMIZE HEAT LOSSES.
8. 30% PROPYLENE GLYCOL/70% WATER CONTENT IS RECOMMENDED. MAXIMUM ALLOWED PROPYLENE GLYCOL CONTENT 50%. SEE O&M MANUAL FOR WATER/PROPYLENE GLYCOL MAINTENANCE PROCEDURE.

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

TOLERANCES
UNLESS OTHERWISE SPECIFIED
.X ± 0.1
.XX ±0.06
.XXX ±0.030
ANGLE ±0°30'
FRACTIONS ± 1/16"

Algas-SDI™
151 S. Michigan St., Seattle, Washington. USA 98108
Tel: (206) 789-5410 Fax: (206) 789-5414

Drawn By: A. FIGLIOLI
Checked By: DN
Approved By:
Date: 7/14/11
Scale: 1:20 AND NOTED
Part #
Job # A.S.D.I. STD.

INTERPRET THIS DRAWING IN ACCORDANCE WITH ANSI/ASME Y14.5-2009

Title: **HYDREXX FIELD INSTALLATION WITH PUMP AND WALL MOUNT BOILER**

Size: B | Dwg. # 1801-8001 | Sht. No.: 1of 1 | Rev.: B

Algas-SDI™

ISO 9001 Certified

Innovative Liquid Vaporizing and Gas Mixing Solutions

WARRANTY REGISTRATION

Type of Equipment: _____ Serial Number: _____

ASDI Sales Order #: _____ Order Date: _____

Purchased By: _____

_____

_____

To help us give you better service, please fill out this warranty registration form and return it to ASDI to register your purchase and for follow up on the performance of ASDI equipment. We are dedicated to producing a quality product and if a problem occurs, ASDI wants to know about it. Please help us with a small amount of information about your company and how the equipment will be used. When contacting ASDI, please have the type of equipment and the serial number handy so we can give you accurate information. If you have had any kind of problem with this equipment, or you have any comments, please attach a separate sheet to this form. Keep a copy for your records.

End Customer/Company Name: _____

Address: _____ Tel: _____

City: _____ Fax: _____

State: _____ Zip: _____

Name of individual to contact for follow up information: _____

Title: _____

Usage - Circle one: Base Load Standby System Peak Shaving

Other: _____

In what application is the equipment being used? _____

When was the equipment put in service? ____/____/____

Note: If you have more than one piece of ASDI equipment, fill out one warranty sheet and staple the others to it, ASDI will do the rest.

151 South Michigan Street, Tel: 206.789..5410 E-mail: sales@algas-sdi.com

Seattle, Washington, 98108, USA Fax: 206.789.5414 Internet: www.algas-sdi.com

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