



WB/HVS NatGas Backup System

Water Bath Vaporizer with Venturi-Type Mixing System

Naturally Aspirated - No Compressed Air Required

- Capacities from 14 MMBTU/h to over 200 MMBTU/h (4..55+ MW)
- Discharge Pressures 5..8 psi (350..550 mbar) (9..15 psi available)
- Complete with Vaporizer, Vapor/Air Mixer, Steel Skid, Controls, and Mixed Gas Surge Tank
- PLC Controls with Touch Screen HMI standard
- Remote Monitoring and Control standard
- Conforms to ASME, NFPA, NEC
- FM / IRI / CSA approved
- CE Configuration available
- Vaporizers with Smart Liquid Carryover Protection
- Mixer Trains with dual Solenoid Valves (Dynamic & Safety)
- Small Footprint & High Efficiency
- Near Infinite Turndown



Options:

- Extra-Large Control Room (Maintenance House)
- Wireless Ethernet Connection
- Integration into Plant Control Systems

Model Numbers and Capacities

For higher capacities, call factory !

WB- 168 / HVS- 14 MM	14 MMBTU/h	WB-1205 / HVS-100 MM	100 MMBTU/h
WB- 208 / HVS- 17 MM	17 MMBTU/h	WB-1505 / HVS-110 MM	110 MMBTU/h
WB- 258 / HVS- 20 MM	20 MMBTU/h	WB-1505 / HVS-120 MM	120 MMBTU/h
WB- 308 / HVS- 27 MM	27 MMBTU/h	WB-1505 / HVS-130 MM	130 MMBTU/h
WB- 358 / HVS- 30 MM	30 MMBTU/h	WB-1805 / HVS-140 MM	140 MMBTU/h
WB- 408 / HVS- 37 MM	37 MMBTU/h	WB-1805 / HVS-150 MM	150 MMBTU/h
WB- 458 / HVS- 40 MM	40 MMBTU/h	WB-2005 / HVS-160 MM	160 MMBTU/h
WB- 555 / HVS- 50 MM	50 MMBTU/h	WB-2005 / HVS-170 MM	170 MMBTU/h
WB- 755 / HVS- 60 MM	60 MMBTU/h	WB-2005 / HVS-180 MM	180 MMBTU/h
WB- 855 / HVS- 70 MM	70 MMBTU/h	WB-2205 / HVS-190 MM	190 MMBTU/h
WB-1005 / HVS- 80 MM	80 MMBTU/h	WB-2205 / HVS-200 MM	200 MMBTU/h
WB-1005 / HVS- 90 MM	90 MMBTU/h	WB-2505 / HVS-210 MM	210 MMBTU/h

What are Vaporizer/Mixer Systems ?

LPG vapor from a vaporizer or a storage tank is not directly compatible with natural gas and can therefore not be used for standby or backup purposes. LPG vapor/air blenders blend LPG vapor with air to produce a gas mixture that is directly compatible and interchangeable with natural gas. This allows users to switch back and forth between natural gas supplied by their utility company, and their own, LPG based backup fuel, without having to change the setup of any of their process or heating equipment, such as burners, boilers, heater, dryers, kilns, drum ovens, etc. The LP/air blend is often referred to as Synthetic Natural Gas, or SNG.

The vaporizer/mixer systems described in this brochure are designed for intermittent or continuous use as NatGas backup systems. They are the combination of a horizontal water bath vaporizer (see brochure "Water Bath LPG Vaporizers") and a Hallberg Venturi Mixer (see brochure "LPG Vapor/Air Mixing Systems - Venturi Type"), generating gas pressures of up to 8 psi (0.55 bar; optional: 15 psi, 1 bar) without the need of compressed air supply. The absence of a compressor makes these systems very simple and economical to operate.

How do Alternate Energy Systems' Vaporizer/Mixer Systems with Water Bath Vaporizer work ?

Vaporizer/Mixer Systems from AES are designed for easy installation and long, trouble-free service. They come complete with vaporizer, Venturi arrangements, surge tank, controls, and all other equipment necessary for safe operation. They are factory tested and ready to be placed on a concrete slab or other, non-combustible ground cover. After connection to liquid LPG, mixed gas line and electrical supply, they can be ready to produce SNG within a few hours after arrival of the system at the job site.

The amount of air mixed into the LPG vapor stream must be precisely controlled to make good SNG. Most important for the compatibility of SNG with natural gas is the Wobbe Index, which is a measure of the interchangeability of two fuel gases. Gases with similar Wobbe Index have similar energy transfer through a given orifice at a given pressure, allowing use of either fuel gas without changing the burner settings. The Wobbe Index of "standard" Natural Gas is 1291 (1000 BTU/cuft; S.G. = 0.6). Adjusting LPG/Air to a specific gravity of 1.3 yields a mixed gas with a very similar Wobbe Index (1480 BTU/cuft; S.G. = 1.3; WI = 1298), allowing changeovers from one gas to the other without any changes to the setup of the connected loads.

$$\text{Wobbe Index} = \frac{\text{Gross Heat Value}}{\sqrt{\text{Specific Gravity}}}$$

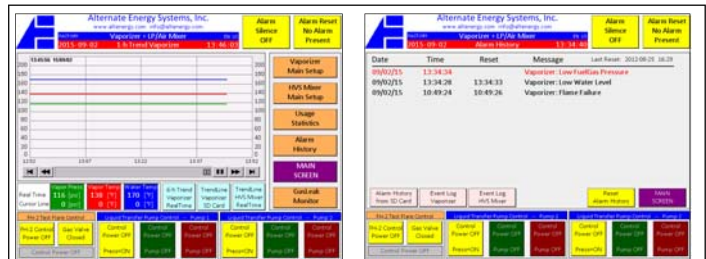
Liquid LPG from a storage tank is transferred to the vaporizer. Typically, a liquid LPG transfer pump is installed in the liquid supply line, keeping liquid pressure at approximately 100 psi (7 bar; higher for "High-Pressure Venturis"). After vaporization of the LPG in the vaporizer, vapor enters the inlet header of the mixing system and then passes through a pressure regulator. From there, the pressure-adjusted vapor flows through the high precision nozzle and the Venturi tube section of the HVS into the surge (accumulator) tank. While the vapor passes through the tube section, the Venturi effect entrains ambient air through the air-intake check-valve and sends it into the surge tank together with the LPG vapor.

All systems have a full-size or enlarged vaporizer control room and use Rosemount pressure transmitters and a programmable logic controller (PLC) to monitor and control all system functions. The PLC also communicates with a color LCD display with touch screen, indicating system pressures, Venturi ON/OFF status, and any trouble conditions that may occur.

The systems monitor the gas pressure in the surge tank with a Rosemount pressure transmitter. An increase in demand results in a momentary drop in the tank pressure. If the tank pressure falls below adjustable setpoints, one or more Venturi assemblies are activated. The Venturi assemblies will stay active until the surge tank pressure has recovered above their respective setpoint, and will then sequentially go off-line. This results in effectively unlimited turndown.

The sendout pressure, and the ON/OFF setpoints for the Venturi assemblies can easily be adjusted through simple inputs at the touchscreen. All PLC-equipped systems offer a number of convenient system status information screens. Among them are trend graphics for all system pressures, alarm history screens, and event recordings (pressing a button, starting/stopping the system, etc.).

The trend graphics typically record pressure data in 15-second intervals. Four days of data are kept in volatile memory. Up to 2 years of trend data, alarm data, and event data are stored with date and time stamp on a standard SD card or on a USB thumb drive and can be recalled any time.



Typical Graphic TrendLine screen. This particular screen shows recorded process values at the vaporizer (vapor pressure and vapor temperature at the outlet of the vaporizer, and bath temperature). The bottom of the TrendLine Display has a time stamp. Current Time and Date are also shown in the upper-left area of the graphic.

The alarm history screen is most useful for trouble shooting. Any alarms are date stamped and recorded, allowing quick determination of the root cause of the problem.

EventLog screens have a similar layout and display operator inputs, changes in the system status (ON/



Main Screen of a typical color LCD display with touchscreen operator interface.

The intuitive screen layout with colored buttons and status indicators minimizes operator training and shows the system status at a glance.



Typical Mixer Setup Screen with ranges settings for the transmitters, setpoints for low and high alarms, and Mixer Alarm Delay.

Note that the bottom section of the example screen is identical on both screens as it contains common elements, such as Liquid Transfer Pump and Test Flare controls.



This is a typical "Sendout Pressure Setup" screen. Operators with sufficient login credentials can set the sendout pressure and the ON/OFF pressures for the Venturi banks through simple touch screen inputs in the dark-red colored fields.

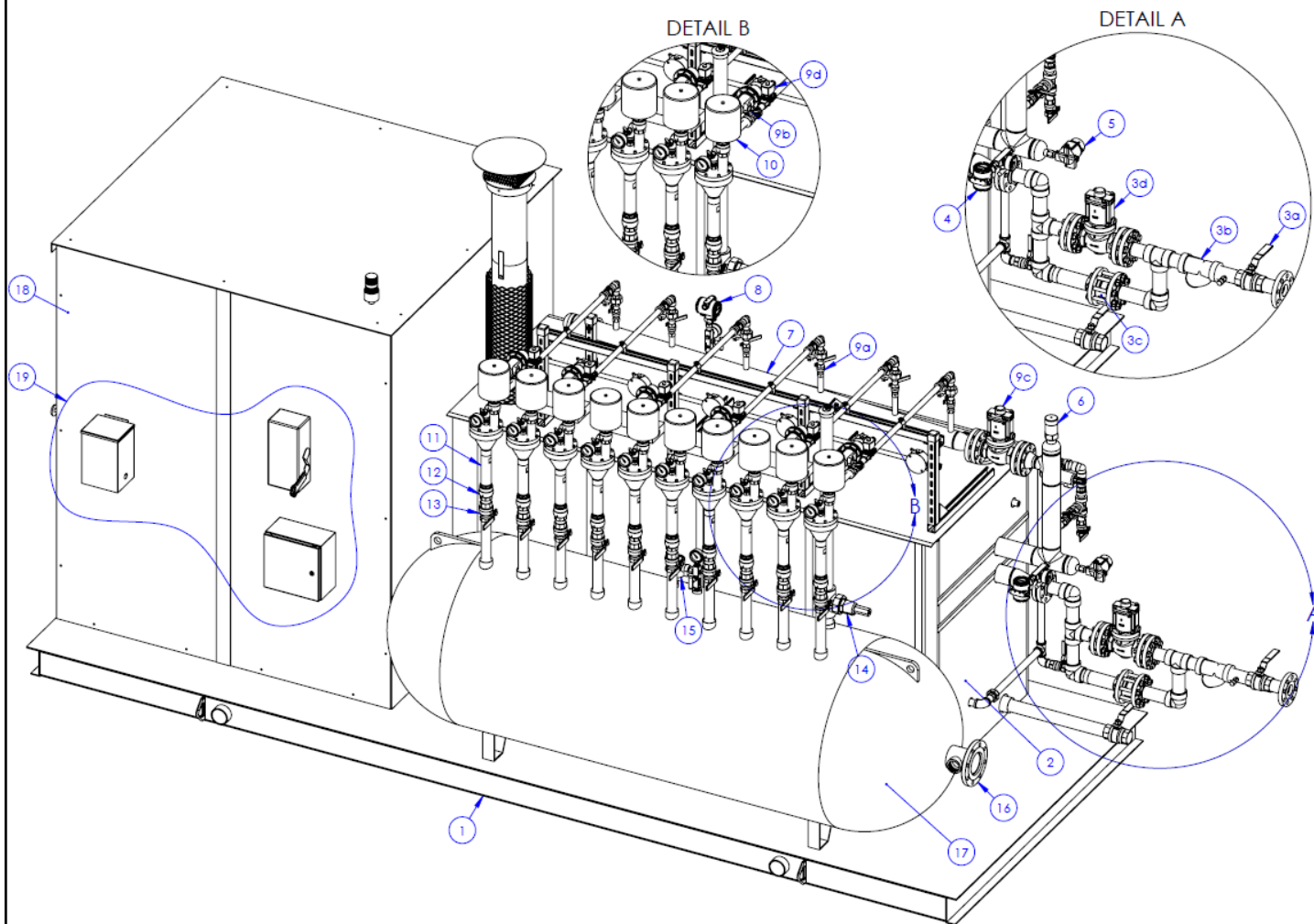
Also on this screen is the "Venturi Cycle Counter Reset" area. The counters are incremented with each OFF-to-ON transition of a Venturi bank.

The purpose of this counter is to help deciding when preventive maintenance should be performed at the dynamic Venturi solenoids (replace the solenoid valve, or install a repair kit), and other mechanical components that are cycled with each OFF/ON transition (check valves; regulator; ...). The average life expectancy of these components is between 0.5 and 2 million cycles.

After a Venturi train has been overhauled, reset its cycle counter by pressing its associated reset button. This feature is standard on all AES Vaporizer/Venturi-mixer systems.

For more detailed information and specifications about water bath vaporizers and HVS mixing systems, please refer to the following brochures: "Water Bath LPG Vaporizers" and "LPG-Vapor / Air Mixing Systems, Venturi - Type".

Main Components of Low-Pressure NatGas Backup Systems with Hallberg Venturi and Water Bath Vaporizer

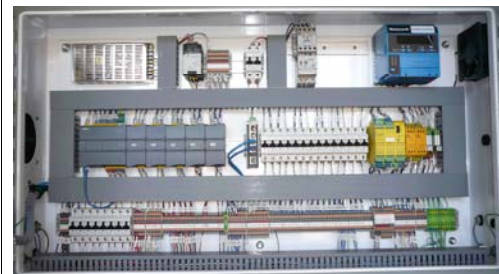


Legend (WB-1205/HVS-100MM)

1 Steel Skid	B Detail B: Venturi Line
2 Vaporizer	9a Manual Vapor Shutoff Valve
A Detail A: Liquid Inlet Train	9b Vapor Pressure Regulator
3a Manual Inlet Shutoff Valve	9c "Safety" Solenoid Valve <small>See Note below</small>
3b Strainer	9d "Dynamic" Solenoid Valve
3c Bypass Check Valve	10 Air Inlet with Check Valve
3d Solenoid Valve	11 Venturi Nozzle
4 "Smart" Liquid Carryover Pressure Transmitter	12 Check Valve
5 "Smart" Liquid Carryover Temperature Transmitter	13 Shutoff Valve
6 Vapor Header Relief Valve	14 Surge Tank Relief Valve
7 Vapor Header	15 Mixed Gas Pressure Transmitter
8 Vapor Pressure Transmitter	16 Mixed Gas Outlet Flange
	17 Surge (Accumulator) Tank
	18 Full Size System Control Room
	19 Disconnect, Load Center, Transformer, Communications Box

Note: The Safety Solenoid stays open as long as the Mixer Control Power is ON. It closes when the Mixer Control Power is OFF, or when a High Vapor Pressure or a High MixGas Pressure alarm condition exists. On smaller systems, each Venturi train has a dedicated Safety solenoid; on larger, several trains share a Safety solenoid.

Typical WB/HVS Control Panel



System Control Panel with Siemens S7-1200 PLC, Safety Controller, automatic circuit breakers, Ethernet Switch, and Honeywell Flame Safeguard.

The implementation of an Agency-approved Safety Controller or equivalent Safety PLC elevates the AES vaporizer/mixer systems to "Performance Level 4" (formerly known as SIL 3).

All AES control panels are designed to meet all relevant codes and standards, and can be supplied with UL 508a stamp. Control panels for European countries comply with all relevant European Directives.

The control panel can be expanded to include additional functions such as control of Liquid Transfer Pumps, flow measurement, flare control, etc. Contact AES with your specific requirements.

Features and Specifications

General Specifications

Model Number	Nominal System Capacity ¹ MMBTU/h	Number of Venturis ² 5 to 8 psi Systems	Number of Venturis ² 9 to 15 psi Systems	Surge Tank Capacity US-gal (m ³)	Liquid Inlet Connection @ Vaporizer	Mixed Gas Outlet Connection @ Surge Tank	Approximate Skid Size in inches (m) W x L x H	Approximate Shipping Weight lbs (kg)
WB - 168 / HVS - 14 MM	14	2	N/A	120 (0.450)	1-inch 300# Raised Face ANSI Flange or DN25 PN40 DIN Flange	3-inch 150# Raised Face ANSI Flange or DN80 PN10 DIN Flange	W = 60" / 1.52m L = 132" / 3.35m H = 112" / 2.54m	4650 (2110)
WB - 208 / HVS - 17 MM	17	2	N/A	120 (0.450)				4650 (2110)
WB - 258 / HVS - 20 MM	20	2	2	120 (0.450)				4650 (2110)
WB - 308 / HVS - 27 MM	27	3	N/A	120 (0.450)				4700 (2130)
WB - 358 / HVS - 30 MM	30	3	3	120 (0.450)				5180 (2350)
WB - 408 / HVS - 37 MM	37	4	N/A	120 (0.450)		5230 (2375)		
WB - 458 / HVS - 40 MM	40	4	4	120 (0.450)		5230 (2375)		
WB - 555 / HVS - 50 MM	50	5	5	250 (0.950)		6700 (3040)		
WB - 755 / HVS - 60 MM	60	6	6	250 (0.950)		DN100 PN10 DIN Flange	W = 72" / 1.83m L = 142" / 3.61m H = 112" / 2.54m	8200 (3720)
WB - 855 / HVS - 70 MM	70	7	7	250 (0.950)			8250 (3740)	
WB - 1005 / HVS - 80 MM	80	8	8	500 (1.893)	2-inch 300# Raised Face ANSI Flange or DN50 PN25 DIN Flange	6-inch 150# Raised Face ANSI Flange or DN150 PN10 DIN Flange	W = 78" / 1.98m L = 164" / 4.17m H = 112" / 2.54m	12000 (5440)
WB - 1005 / HVS - 90 MM	90	9	9	500 (1.893)				12050 (5465)
WB - 1205 / HVS - 100 MM	100	10	10	500 (1.893)				12100 (5490)
WB - 1505 / HVS - 110 MM	110	11	11	500 (1.893)				12150 (5510)
WB - 1505 / HVS - 120 MM	120	12	12	500 (1.893)				12200 (5530)
WB - 1505 / HVS - 130 MM	130	13	13	500 (1.893)				12250 (5560)
WB - 1805 / HVS - 140 MM	140	14	14	1000 (3.785)		8-inch 150# Raised Face ANSI Flange or DN200 PN10 DIN Flange	Contact Factory	
WB - 1805 / HVS - 150 MM	150	15	15	1000 (3.785)				
WB - 1805 / HVS - 160 MM	160	16	16	1000 (3.785)				
WB - 2005 / HVS - 170 MM	170	17	17	1000 (3.785)				
WB - 2005 / HVS - 180 MM	180	18	18	1000 (3.785)				
WB - 2205 / HVS - 190 MM	190	19	19	1000 (3.785)				
WB - 2205 / HVS - 200 MM	200	20	20	1000 (3.785)				
WB - 2505 / HVS - 210 MM	210	21	21	1000 (3.785)				
WB - 2505 / HVS - 220 MM	220	22	22	1000 (3.785)				

¹ Nominal Capacity for Propane/Butane @ 0°F Liquid Inlet Temperature. ² Actual number of venturi arrangements may vary with desired mixed gas pressure. Weights and dimensions are approximate and for standard configurations only. Specifications are subject to change without notice.

Mixed Gas Sendout Pressure (naturally-aspirated Venturi Mixers)

Standard Venturi type mixers use ambient air to mix with LPG vapor. The maximum achievable mixed gas delivery pressure largely depends on shape and dimension of the nozzle/Venturi tube configuration, as well as on the type of the LPG feedstock (Propane/Butane mixture) and the LPG vapor pressure.

Keeping the LPG vapor at low to moderate pressures (75 to 100 psi), mixed gas pressures of up to 8 psi can be generated safely and reliably. Depending on the type of LPG feedstock and the installation location (lowest ambient temperatures that must be expected; altitude), these mixing systems can sometimes be operated without the installation of a liquid LPG transfer pump, although installation of a pump to guarantee sufficient motive pressure is recommended.

Higher mixed gas pressures of up to 15 psi can be achieved with specially designed nozzle/Venturi tube configurations, operating at vapor pressures of up to 200 psi. Without exception, these systems require the installation of a liquid LPG transfer pump.

Since higher vapor pressures also lead to higher vapor dew point temperatures, the risk for liquid carryover situations increases.

To reduce these risks, the LPG vapor must be delivered (from the vaporizer) at higher temperatures and/or the vapor supply lines to the mixer must be insulated and/or heat-traced.

Mixed gas delivery pressures higher than 15 psi require the injection of compressed air into the vapor stream. All AES HVS Venturi mixer systems can be equipped with this high pressure, air-assist option, which consists of a separate pressure regulator and associated controls for the air section of each Venturi assembly. Using this option, system pressures of up to 40 psi can be generated.

Approximate Vapor Pressures for various Mixed Gas Pressures

Mixed Gas Pressure	Propane (HD-5)	Propane/Butane (50/50)
5 psi	50 psi	55 psi
7 psi	75 psi	80 psi
9 psi	130 psi	n/a
12 psi	170 psi	n/a

Features and Specifications

Control System Components and Configuration

Standard Vaporizer Safety Features

Electronic Flame Safe Guard	Honeywell 7800-Series; PLC Input with Status Indication at Operator Interface; Alarm History.
Low Burner Fuel Gas Pressure High Burner Fuel Gas Pressure	Flame Safe Guard Interlock; PLC Input with Status Indication at Operator Interface; Alarm History.
Low Water Level Cutoff High Bath Temperature Limit Flame Safe Guard Trouble Alarm	Safety System (Performance Level 4 [SIL3]); Flame Safe Guard Interlock; PLC Input with Status Indication at Operator Interface; Alarm History.
Dual E-Stop Circuits	Safety System (Performance Level 4 [SIL3]); PLC Input with Status Indication at Operator Interface; Alarm History.
Liquid Carryover Protection	Smart; Pressure and Temperature transmitters in Vapor Outlet; selectable LPG Type; adjustable Safety Margin; Alarm History; adjustable Alarm Delay.
Relief Valve for Vaporization Tubes	Properly Sized for Vaporizer Capacity; UL listed relief valves for vaporizers with ASME "U"-Stamp; CE marked relief valves for export into European countries.
Relief Valve for Burner Gas Train	Second-stage Burner Fuel Regulator with internal relief; relief pipe routed to outside of vaporizer control room
Option: Gas Leak Monitor in Control Room	20% LEL Warning; 40% LEL Shutdown Alarm; Sensor Trouble warning; Alarms & Warnings in Alarm History; Alarms integrated into Safety System (Performance Level 4 [SIL3]); PLC Input with Status Indication

Standard Mixer Safety Functions

Low Vapor Supply Pressure Alarm	Operator-adjustable setpoints through simple inputs at the touch screen; adjustable deadband; Alarm History; adjustable Alarm Delay.
High Vapor Supply Pressure Alarm	Operator-adjustable setpoints through simple inputs at the touch screen; adjustable deadband; Alarm History; adjustable Alarm Delay.
Low MixGas Discharge Pressure Alarm	Operator-adjustable setpoints through simple inputs at the touch screen; adjustable deadband; Alarm History; adjustable Alarm Delay.
High MixGas Discharge Pressure Alarm	Operator-adjustable setpoints through simple inputs at the touch screen; adjustable deadband; Alarm History; adjustable Alarm Delay.
Venturi Cycle Counter	Separate, individually resettable counters for each Venturi Bank; the counters are incremented with each OFF-to-ON transition of a Venturi bank.

Vaporizer / Mixer Controls

Standard Configuration Standard PLC Electronic Operator Interface (EOI) Non-volatile Memory Optional Controls	Integrated, Full-Feature Electronic System Controls for Vaporizer and Mixing System; Siemens S7-1200F Safety PLC with integrated Ethernet interface; or Allen-Bradley MicroLogix-1400 with integrated Ethernet interface; high-resolution Color LCD Display with Touchscreen Operator Interface; First Outage Monitor (Alarm History); Graphic Trendline recording; Event log recording; 9" panel at 1024x768 resolution; SD card or USB thumb drive with 2-year capacity for storage of Trendlines, Alarms, and Event Logs; Please contact the factory if you have specific control system requirements.
Display Language and Engineering Units	Standard language is English; standard engineering units are "US" (psig, °F, inWC, etc.); when operator interfaces are configured for second language (Spanish, Portuguese, Russian, Polish, Turkish, German, French) and/or second engineering units "SI", the selection of language and engineering units is a simple input at the startup screen of the operator interface.
Local Operation and Remote Monitoring and Control	Password-protected login for multiple users with multiple credentials; remote monitoring and control through built-in VNC server; open-source VNC client software is included with system manual; access restrictions and login requirements are the same for local operation and remote monitoring and control; remote monitoring and control requires "visible" connection to private or public Ethernet network.

System Control Configuration shown is "typical". Customized system control configurations are available. Please contact factory with your specific requirements. For additional design and feature details of the WB-vaporizers, please review the "LPG Water Bath Vaporizers" brochure.

High Pressure Option: Compressed Air Requirements (for Propane [HD-5] and Specific Gravities between 1.28 and 1.31)

<p>The High Pressure, air-assist option is available for all AES venturi mixer systems. This consist of a separate air pressure regulator and associated controls for each venturi train. Using this option, discharge pressures of up to 40 psi can be generated.</p> <p>The table on the right shows the air requirements for various system sizes. The numbers are based on propane as the LPG feedstock and include a 15% safety margin for specific gravities of 1.28 to 1.31, allowing the mixed gas to be a direct replacement for typical natural gas with a calorific value of 1000 BTU/cuft and a specific gravity of 0.6.</p>	Approximate Compressed Air Requirements		Approximate Compressed Air Requirements	
	Model Number	Air Supply	Model Number	Air Supply
	WB - 168 / HVS - 14 MM	76 cfm @ 100 psi	WB - 1505 / HVS - 110 MM	592 cfm @ 100 psi
	WB - 208 / HVS - 17 MM	92 cfm @ 100 psi	WB - 1505 / HVS - 120 MM	646 cfm @ 100 psi
	WB - 258 / HVS - 20 MM	108 cfm @ 100 psi	WB - 1505 / HVS - 130 MM	699 cfm @ 100 psi
	WB - 308 / HVS - 27 MM	145 cfm @ 100 psi	WB - 1805 / HVS - 140 MM	753 cfm @ 100 psi
	WB - 358 / HVS - 30 MM	161 cfm @ 100 psi	WB - 1805 / HVS - 150 MM	807 cfm @ 100 psi
	WB - 408 / HVS - 37 MM	199 cfm @ 100 psi	WB - 1805 / HVS - 160 MM	861 cfm @ 100 psi
	WB - 458 / HVS - 40 MM	215 cfm @ 100 psi	WB - 2005 / HVS - 170 MM	915 cfm @ 100 psi
	WB - 555 / HVS - 50 MM	269 cfm @ 100 psi	WB - 2005 / HVS - 180 MM	968 cfm @ 100 psi
	WB - 755 / HVS - 60 MM	323 cfm @ 100 psi	WB - 2205 / HVS - 190 MM	1022 cfm @ 100 psi
	WB - 855 / HVS - 70 MM	377 cfm @ 100 psi	WB - 2205 / HVS - 200 MM	1076 cfm @ 100 psi
	WB - 1005 / HVS - 80 MM	430 cfm @ 100 psi	WB - 2505 / HVS - 210 MM	1130 cfm @ 100 psi
	WB - 1005 / HVS - 90 MM	484 cfm @ 100 psi	WB - 2505 / HVS - 220 MM	1185 cfm @ 100 psi
	WB - 1205 / HVS - 100 MM	538 cfm @ 100 psi	Actual requirements depend on application and may vary!	

Communication Options

Alternate Energy Systems, Inc. uses Siemens S7-1200 or Allen-Bradley MicroLogix-1400 Programmable Logic Controllers in all our products. Both PLCs have an integrated Ethernet interface for communication with the Electronic Operator Interface (EOI), and for communication with external devices such as plant monitoring systems.

The operator interfaces have color LCD displays with touch screen for intuitive system operation. The standard EOI is a 9-inch panel with high-resolution screen (1024x768).

If additional control functions are integrated into the vaporizer/mixer controls, such as the control of liquid transfer pumps or the control of a test flare, size of the Operator Interface may be optionally increased to 10", 12", or 15"..

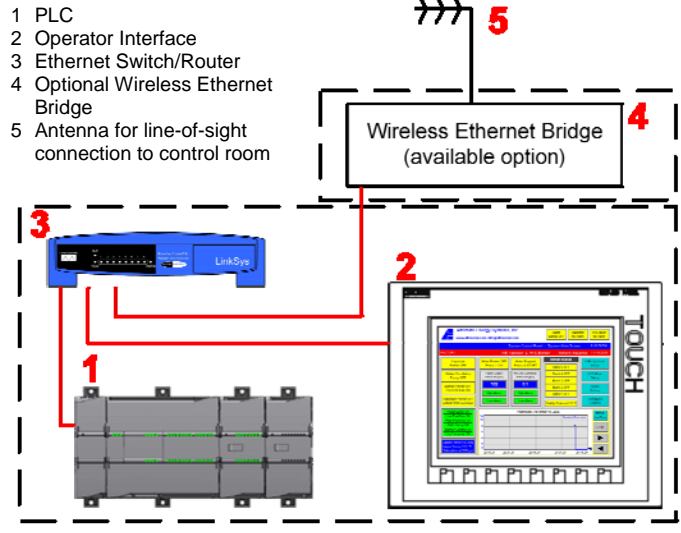
All systems are prepared for remote monitoring and control through a built-in VNC server. As long as the system is connected to an accessible Ethernet Network, it can be monitored and/or controlled from "anywhere". Open-source VNC client software is included with the system manual and can be installed on as many PCs or Laptops as desired without a license fee. Access restrictions and login requirements are the same for local operation and remote monitoring and control.

Other communication options, i.e. Profibus DP, Modbus, etc. are available as options.

For locations without network connection we can provide a wireless Ethernet Bridge that can connect the system to a plant network without the expensive installation of communications cable (see example on right).

Please call AES if you require non-standard communication solutions.

Example of a Control System for a WB/HVS Mixer with Wireless Ethernet Connection to a Plant Network



Option Extended Control Room and Option Enlarged Control Room

All mixing systems with Water Bath Vaporizers have a full-size system control room (maintenance house) with light fixture, wall outlet, and door with window insert.

A standard option for 05-series vaporizers is the "Extended Control Room (Maintenance House)", where the depth of the standard control room has been extended by 3 ft. to a total of 72 inches (1.83 m). This larger space provides room for additional control and recording equipment, and weather protection for operating and maintenance personnel.

If even-larger control rooms are desired, the optional "Enlarged Control Room (Maintenance House)" is available for all AES vaporizer/mixer systems. They are typically as wide as the vaporizer/mixer skid and approximately 9 ft. long, but can be built to meet any specific requirements. They can be equipped with light fixture, AC outlet, heaters, air conditioners, gas alarm, uninterruptible power supplies, gas properties monitoring equipment, etc. For pricing and available options, or to discuss your specific requirements, please contact the factory or your nearest AES distributor.



WB-458/HVS-40

System Dimensions (in inches)

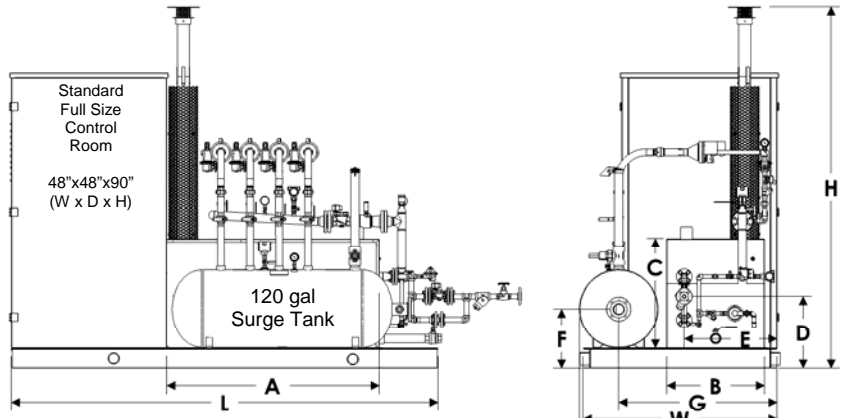
Weights and Dimensions in this brochure are approximate and are intended for planning purposes only. Contact AES for drawings with exact dimensions.

Model Number	Skid Width	Overall Width	Skid Length (Full-Size Contr. Room)	Skid Length (Extended Contr. Room)	Overall Height	Water Bath Length	Water Bath Width	Water Bath Height	Liquid Inlet (Height from Grade)	Liquid Inlet (Recess from skid)	Mixed Gas Outlet (Height from Grade)	Mixed Gas Outlet (Recess from skid)
	W	OAW	L	L1	H	A	B	C	D	E	F	G
WB - 168 / HVS - 14 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 208 / HVS - 17 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 258 / HVS - 20 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 308 / HVS - 27 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 358 / HVS - 30 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 408 / HVS - 37 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 458 / HVS - 40 MM	60	65	132	N/A	112	66	30	34	22-1/2	28-3/4	20-1/4	50
WB - 555 / HVS - 50 MM	72	76	142	174	112	80	35	36	17-7/8	11	24	56-1/2
WB - 755 / HVS - 60 MM	72	76	142	178	112	93	38	51	31-3/4	8-7/16	24	56
WB - 855 / HVS - 70 MM	72	76	142	178	112	93	38	51	31-3/4	8-7/16	24	56
WB - 1005 / HVS - 80 MM	78	82	164	200	112	105	40	54	30-7/8	10-3/4	28-1/4	57-9/16
WB - 1005 / HVS - 90 MM	78	82	164	200	112	105	40	54	30-7/8	10-3/4	28-1/4	57-9/16
WB - 1205 / HVS - 100 MM	78	82	164	200	112	105	40	54	30-7/8	10-3/4	28-1/4	57-9/16
WB - 1505 / HVS - 110 MM	78	82	164	200	112	105	40	54	30-7/8	10-3/4	28-1/4	57-9/16
WB - 1505 / HVS - 120 MM	78	82	164	200	112	105	40	54	30-7/8	10-3/4	28-1/4	57-9/16
WB - 1505 / HVS - 130 MM	78	82	164	200	112	105	40	54	30-7/8	10-3/4	28-1/4	57-9/16
WB - 1805 / HVS - 140 MM												
WB - 1805 / HVS - 150 MM												
WB - 2005 / HVS - 160 MM												
WB - 2005 / HVS - 170 MM												
WB - 2005 / HVS - 180 MM												
WB - 2205 / HVS - 190 MM												
WB - 2205 / HVS - 200 MM												
WB - 2505 / HVS - 210 MM												
WB - 2505 / HVS - 220 MM												

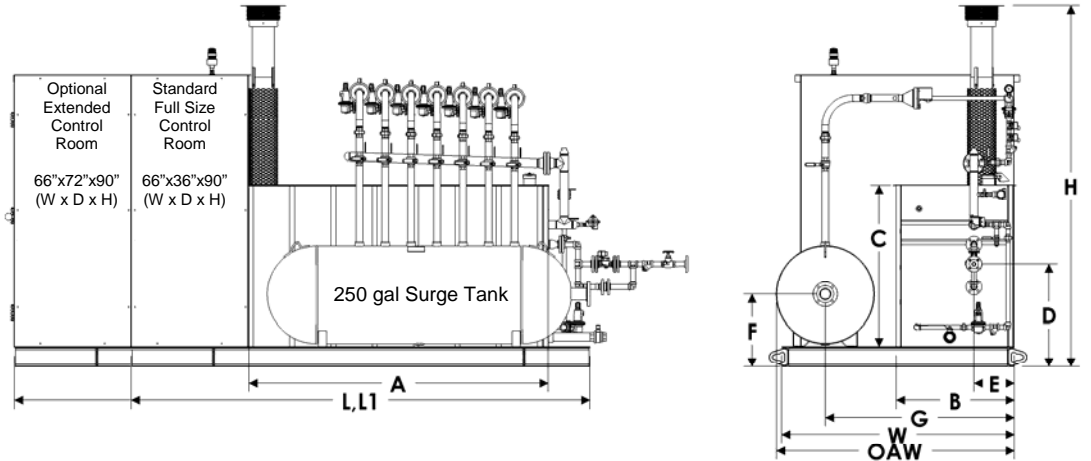
Please contact factory

Approximate Dimensions

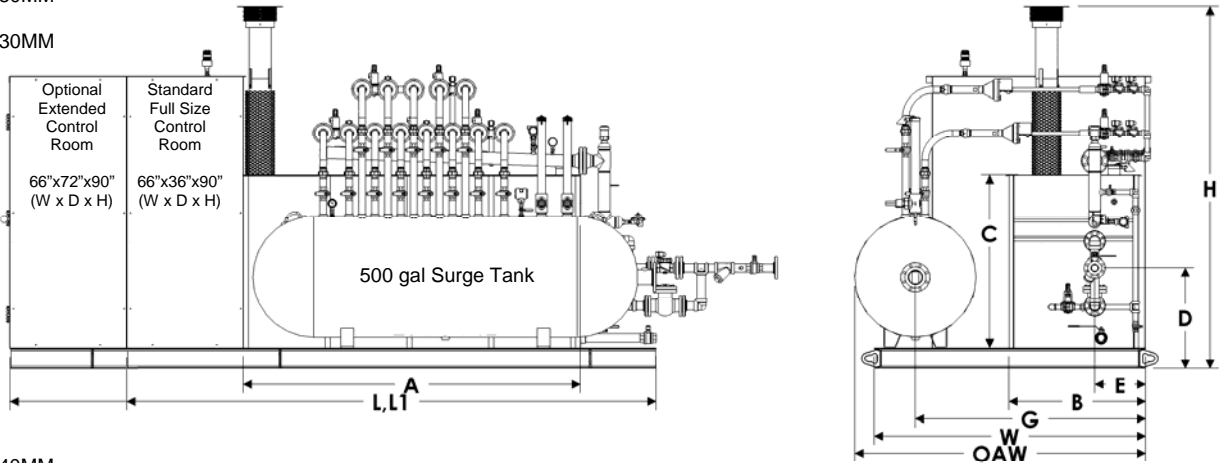
WB - 168 / HVS - 14MM
 WB - 208 / HVS - 17MM
 WB - 258 / HVS - 20MM
 WB - 308 / HVS - 27MM
 WB - 358 / HVS - 30MM
 WB - 408 / HVS - 37MM
 WB - 458 / HVS - 40MM



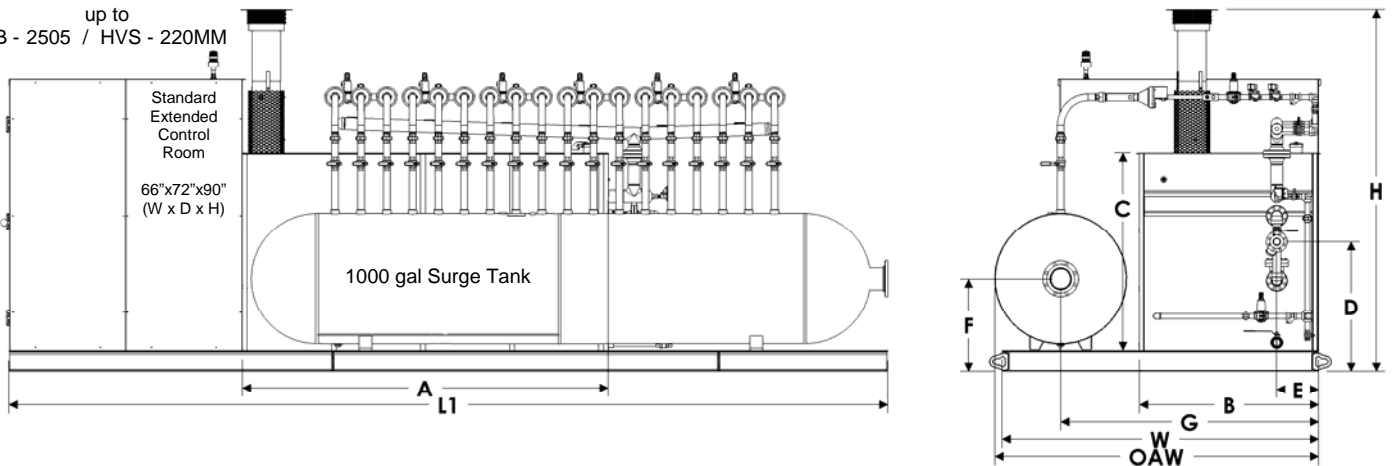
WB - 555 / HVS - 50MM
 WB - 755 / HVS - 60MM
 WB - 855 / HVS - 70MM



WB - 1005 / HVS - 80MM
 up to
 WB - 1505 / HVS - 130MM



WB - 1805 / HVS - 140MM
 up to
 WB - 2505 / HVS - 220MM



Who is Alternate Energy Systems, Inc. ?

After working for other manufacturers of LPG vaporizers and LPG / air systems for several years, John E. Hallberg founded Alternate Energy Systems, Inc. in 1974 in Peachtree City, located just 20 minutes south-west of the Atlanta airport. He successfully set out to design and manufacture products which were superior to those of his competitors. As a result, AES became very quickly known as the innovative manufacturer of quality products. Soon, the customer list included a representative cross-section of the Fortune 500 companies in the U.S.



Through the years, AES has constantly added new products, and has further improved the design of existing products, keeping us ahead of the competition. Several designs, including those for LPG/Air mixing systems, were awarded national and international patents.

Today, AES is owned by Steven Chambers. Mr. Chambers continues to build on the tradition of excellence and customer service at AES. At AES, "just good enough" is never good enough. AES is committed to both quality products and customer service. We strive to understand our customers and continuously improve so that we can exceed their needs and expectations .

AES is committed to serving customers in the U.S. and abroad through a network of sales specialists, technical support personnel, distributors and installers.

Please visit our web site at www.altenergy.com for updated versions of all data sheets, price lists, application notes, a list of authorized distributors, and other documents that are only available online.

Other Products from Alternate Energy Systems, Inc.

Water Bath Vaporizers
Hot Water Vaporizers
Steam Vaporizers

Venturi Type LPG / Air Mixers
Patented Piston Operated LPG / Air Mixers

Complete Vaporizer / Mixer Systems
Peak Shaving Plants
Gas Stabilization Systems

Accessories for LPG / Air Systems
LPG Pump Packages

Service
Maintenance
Trouble Shooting

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