



# Alternat Energy Systems, Inc.

LPG Vaporizers - LPG/Air Blenders - Gas/Gas Blenders  
NatGas Backup Systems - PeakShaving Systems

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This price list supersedes all previous price lists. Prices and other information shown in this list are believed to be accurate at the time of printing. They are given for standard equipment, standard options, and standard product configurations. All sales are subject to the terms and conditions as shown on page 16 of this price list. Please contact the factory or your nearest authorized AES distributor for a price quote and current delivery times. Prices and product configurations are subject to change at any time and without notice.

## Options and Accessories for Horizontal Water Bath Vaporizers

Listed below are the most common options and accessories for Horizontal Water Bath Vaporizers. Additional factory-installed options and accessories are available to meet almost any needs a customer may have. This includes non-standard control systems (higher-level Allen-Bradley PLCs such as CompactLogix, ControlLogix, and SLC; Siemens S7-300 PLCs; etc.); non-standard paint colors; Utility Packages with dual temperature controllers and high-capacity water circulation pumps; etc.

Please contact your area distributor or the factory to discuss your specific needs.

Standard Options Standard Accessories	WB - 168	WB - 208	WB - 258	WB - 308	WB - 358	WB - 408	WB - 458	WB - 508	WB - 455	WB - 555	WB - 655	WB - 755	WB - 855	WB - 1005	WB - 1205	WB - 1505	WB - 1805	WB - 2005	WB - 2205	WB - 2505	WB - 3005	WB - 3505	WB - 4505	WB - 5505	WB - 7005	WB - 10005	contact AES	for larger units
ASME "U"-Stamp for Vapor Tubes	\$ 2,235.00				\$ 3,597.00				\$ 4,228.00				\$ 6,665.00				standard											
Extended Control Room	N/A				\$ 4,733.00				\$ 0.00 (standard)																			
Enclosure Fan with Thermostat	\$ 1,870.00																											
UL508a Stamp for Control Panel	\$ 2,057.00												\$ 3,342.00						\$ 4,759.00									
CE Mark (all applicable EU directives)	\$ 4,292.00				\$ 5,654.00				\$ 6,285.00				\$ 7,570.00				\$ 10,007.00				\$ 11,424.00							
High-Temperature Configuration	Vaporizer configured for high-temperature / high-pressure applications (example: fuel supply to turbines) Contact AES for Price																											
<b>PLC Configurations</b>																												
S7-1200(F) / HMI	Siemens S7-1200(F) with Ethernet Interface and high-resolution color touchscreen with built-in VNC server for remote monitoring and control \$ 0.00 (Standard Configuration for 50Hz countries)																											
ML-1400 / HMI	Allen-Bradley MicroLogix-1400 with Ethernet Interface and high-resolution color touchscreen with built-in VNC server for remote monitoring and control \$ 0.00 (Standard Configuration for North America [60 Hz countries])																											
Client for Remote Monitoring and Control	Client software with open (unlimited) license; can be installed on as many PCs or Laptops as desired; available for all standard EOIs; software is used to connect to EOI from remote location via Ethernet (Internet or Intranet) \$ 0.00 (included with standard HMI)																											
S7-1200 Profibus	Profibus Interface (Slave) for Siemens S7-1200 PLC (in addition to standard Profinet/Ethernet Interface) \$ 1,380.00																											
Other PLC/EOI Configurations	Various other PLC and HMI options are possible. For example: Siemens S7-300, Allen-Bradley CompactLogix or ControlLogix, Bristol ControlWave Micro, GE 90-30, 7-inch PanelView-Plus (640x480), 10-inch GE series touchscreens, and others are available. Contact AES with your specific needs.																											
Industrial-Grade Uninterruptible Power Supply (UPS)	Main AC supply is continually monitored. If brown-out or black-out occurs, UPS continues AC supply to Control System. If black-out continues for more than 5 sec, system status is memorized and vaporizer is shut down. If AC supply returns within 30 minutes, vaporizer is automatically re-started.												\$ 6,312.00															
Other Vaporizer Options	Other vaporizer options, for example: high-pressure; installation in ISO shipping containers; air conditioning for Control Room; wireless Ethernet bridge; Heavy Duty Utility Package, etc., are available. Contact AES with your specific needs.																											

## ProCool™ Heat Transfer Solution

AES Water Bath Vaporizers use a mixture of buffered propylene glycol with corrosion inhibitors and deionized water as the heat transfer medium. The corrosion inhibitors in the buffered propylene glycol provide rust/corrosion protection to the carbon steel heat exchanger components and bath box of the WB series. Topping off the bath with small amounts of standard tap water to make up evaporation losses is acceptable, but AES recommends using pre-diluted ProCool™ or deionized/distilled water.

Under no circumstances should an automotive grade coolant be used as the heat transfer fluid. Using standard automotive coolant could cause premature deterioration of the heat exchangers. It is imperative that special attention be given to maintaining the quality of the water bath. AES recommends that quality be maintained via a regularly scheduled analysis by a qualified laboratory. We recommend a minimum of yearly testing, and preferably before and after every heating season.

Alternate Energy Systems recommends a 50/50 Propylene-Glycol/DI-Water solution for all installations. This mixture will provide burst protection to -60°F (-50°C), and will provide freeze protection to -30°F (-34°C), while providing the maximum level of corrosion protection. Also available is a 30/70 Propylene-Glycol/DI-Water solution that provides freeze protection to 10°F (-12°C) best suited for installation locations where ambient conditions will not drop below freezing. For ambient conditions expected to drop below -20°F (-29°C), please contact AES for custom formulations.

In cooperation with a leading manufacturer of corrosion-inhibited Propylene-Glycol, Alternate Energy Systems offers ProCool™ heat transfer fluid for all WB-series Water Bath Vaporizers. We typically stock drums and totes of ProCool™-50 and ProCool™-30 in 55-gallon drums and 275-gallon totes. We can also provide undiluted buffered propylene glycol and pails of corrosion inhibitor concentrate upon request.

### Water Specifications

The use of hard water should be avoided. Hard water contains calcium and magnesium ions which deposit scale in the system and could also cause precipitation of a portion of the inhibitor system. When hard water conditions exist, distilled, deionized, or boiler condensate water should be used. To avoid the introduction of water with questionable quality, Alternate Energy Systems recommends using only pre-diluted ProCool™, and to top off with deionized/distilled Water.

COMPONENT	SPECIFICATION
Chloride	25 PPM, Max.
Sulfate	25 PPM, Max.
Calcium	25 PPM, Max.
Magnesium	25 PPM, Max.
Total Hardness	100 PPM, Max.

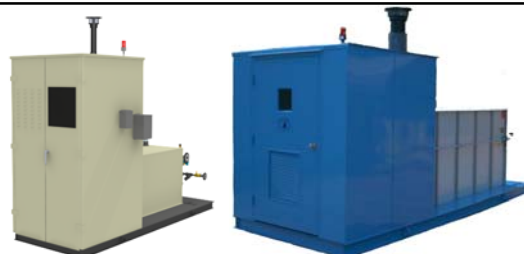
AES Part #	Description	Price in US-\$
HTS-5055-00-3	ProCool™-50 Heat Transfer Solution in 55-gallon non-returnable plastic drum Dimensions: 24" x 24" x 35" (standard pallet, up to 4 drums: 48" x 48" x 40"); Shipping Weight: 550 lbs/drum	\$ 1,100.00 / drum
HTS-3055-00-3	ProCool™-30 Heat Transfer Solution in 55-gallon non-returnable plastic drum Dimensions: 24" x 24" x 35" (standard pallet, up to 4 drums: 48" x 48" x 40"); Shipping Weight: 550 lbs/drum	\$ 936.00 / drum
HTS-5275-00-3	ProCool™-50 Heat Transfer Solution in 275-gallon non-returnable plastic tote with steel-cage reinforcement Dimensions: 48" x 40" x 46"; Shipping Weight: 2600 lbs/tote; can not be stacked.	\$ 5,386.00 / tote
HTS-5275-00-3	ProCool™-30 Heat Transfer Solution in 275-gallon non-returnable plastic tote with steel-cage reinforcement Dimensions: 48" x 40" x 46"; Shipping Weight: 2600 lbs/tote; can not be stacked.	\$ 4,578.00 / tote
HTS-C005-00-3	ProCool™ corrosion inhibiting buffer concentrate in 5-gallon non-returnable plastic pail or bottle.	\$ 665.00 / pail
HTS0004-00-3	Maintenance Sample Kit, including pre-addressed shipping box, sample bottle, label for sample bottle, and detailed sampling procedures. Analytical laboratory results from the samples will be forwarded by AES to our customer.	See Note 1

Note 1: Available at no charge to customers who have purchased their Heat Transfer Solution through AES. Contact AES for pricing if your Heat Transfer Solution is not ProCool™-50 or -30, or if it was not purchased from AES.

## Horizontal Water Bath Vaporizers

AES manufactures two lines of full-feature Water Bath Vaporizers: the 08-Series for capacities from 168 gph to 508 gph (322 kg/h to 975 kg/h); and the 05-Series for capacities from 455 gph to 10005 gph (873 kg/h to 20 metric tons per hour). Also available: the 04-series, a low profile/reduced feature variant of the 08-series. See "Low-Capacity Water Bath LPG Vaporizers" data sheet for details.

All AES water bath vaporizers are of horizontal design. Top, sides, and rear are insulated to hold the temperature of the water bath. The vaporizing tube bundle and all LPG piping conform to the standards of the ASME Boiler and Pressure Vessel Code and the latest edition of NFPA Pamphlet #58. The design is approved by Factory Mutual (FM) and Canadian Standards Association (CSA), and is accepted for Industrial Risk Insurers (IRI) installations. The vaporizers are also available with European CE Approval (third-party inspection by a recognized Notified Body established within the EU).



A mixture of deionized water and buffered propylene glycol with corrosion inhibitors is the heat transfer medium (sold separately). A pump constantly circulates the solution to reduce heat stratification. The vaporizers are skid mounted, primed, painted, factory tested, and ready for installation. The vaporizers come with 2 sets of Operating Manuals and Factory Test Reports (one printed, one in electronic format on a USB drive), are designed for outdoor installation, and require only nominal preventive maintenance. The model number (WB-xxxx) designates the vaporization capacity in gallons per hour Propane vaporization at 0°F (-18°C) inlet temperature.

All WB vaporizers are manufactured with a protective enclosure for the burner and the control components. Models WB-1805 and above are equipped with an extended control room (maintenance house) standard, which is available as an option for the smaller models WB-455 to WB-1505. Model numbers ending in "8" use a European-style compact power burner; model numbers ending in "5" use Maxon TOT power burners (or similar types). Both full-feature series are equipped with an Agency-approved Safety System, gas leak monitor with long-life infrared sensor, and electronic flame safe guard. This combination elevates the safety of the vaporizers to Performance Level 4 (formerly known as SIL 3). They are also equipped with "Smart" Liquid Carryover Protection function, using a Rosemount pressure transmitter and a Rosemount temperature transmitter in the vapor outlet. The PLC monitors the vapor properties and issues an alarm (and if need be, shutdown) if the sendout conditions are in danger of approaching saturation/re-condensation.

Prices for all full-feature models include a control panel with Siemens S7-1200F or Allen-Bradley MicroLogix-1400 PLC and a high-resolution color LCD display with touchscreen Operator Interface (EOI) for system status display and first-outage indication. Ethernet Interface is standard on all PLCs. The Siemens PLCs are also available with Profibus DP interface. All standard control systems are equipped with a built-in VNC Server for remote monitoring and control. An open (unlimited) license of the VNC viewer software is included and can be installed on multiple PCs or Laptops.

Detailed equipment descriptions for full-feature models can be found in AES brochure "Water Bath LPG Vaporizers". Standard lead time on all models WB-455 to WB-2505 is 6 weeks. Larger models (WB-3005 and above) are typically available within 12 weeks. Some models are carried in inventory (mainly 08-Series up to 508 gph / 975 kg/h). Actual lead times depend on factory workload and may vary.

Model Number	Nominal Capacity in gal/h (kg/h)		Nominal Capacity in MMBTU/h (MW)		Burner Input in MMBTU/h (kW)		Overall Dimensions Inches L x W x H			Water Tank Capacity in US-gal (m³)		Shipping Weight in lbs. (kg)		Price in US-\$	
										Totes	Drums				
WB-168	168	(322)	15.5	(4.54)	0.200	(59)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 33,648.00
WB-208	208	(399)	19.1	(5.60)	0.250	(73)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 36,051.00
WB-258	258	(495)	23.7	(6.95)	0.310	(91)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 40,859.00
WB-308	308	(585)	28.1	(8.24)	0.370	(108)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 44,464.00
WB-358	358	(687)	32.9	(9.64)	0.430	(126)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 46,867.00
WB-408	408	(783)	37.5	(11.0)	0.490	(144)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 48,671.00
WB-458	458	(879)	42.1	(12.3)	0.550	(161)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 50,473.00
WB-508	508	(975)	46.8	(13.7)	0.610	(179)	132	48	110	0	165	3	(0.625)	3700 (1700)	\$ 54,078.00
WB-455	455	(873)	42	(12.3)	0.540	(158)	138	72	112	0	220	4	(0.830)	5400 (2450)	\$ 57,130.00
WB-555	555	(1065)	51	(14.9)	0.660	(193)	138	72	112	0	220	4	(0.830)	5400 (2450)	\$ 61,123.00
WB-655	655	(1257)	60	(17.6)	0.780	(229)	138	72	112	0	220	4	(0.830)	5400 (2450)	\$ 65,996.00
WB-755	755	(1449)	69	(20.2)	0.900	(264)	142	72	112	1	385	2	(1.460)	6200 (2800)	\$ 72,641.00
WB-855	855	(1640)	79	(23.1)	1.020	(299)	142	72	112	1	385	2	(1.460)	6200 (2800)	\$ 76,618.00
WB-1005	1005	(1928)	92	(27.0)	1.200	(352)	164	78	112	1	495	4	(1.870)	8000 (3650)	\$ 87,466.00
WB-1205	1205	(2312)	111	(32.5)	1.440	(422)	164	78	112	1	495	4	(1.870)	8000 (3650)	\$ 94,693.00
WB-1505	1505	(2888)	139	(40.7)	1.800	(528)	164	78	112	1	495	4	(1.870)	8000 (3650)	\$ 105,607.00
WB-1805	1805	(3463)	166	(48.6)	2.160	(633)	204	84	112	3	990	3	(3.750)	14000 (6400)	\$ 114,784.00
WB-2005	2005	(3847)	185	(54.2)	2.400	(703)	204	84	112	3	990	3	(3.750)	14000 (6400)	\$ 137,731.00
WB-2205	2205	(4231)	203	(59.5)	2.640	(774)	204	84	112	3	990	3	(3.750)	14000 (6400)	\$ 142,328.00
WB-2505	2505	(4807)	231	(67.7)	3.000	(879)	204	84	112	3	990	3	(3.750)	14000 (6400)	\$ 158,670.00
WB-3005	3005	(5766)	277	(81.2)	3.750	(1099)	240	80	112	7	2035	2	(7.710)	16500 (7500)	\$ 170,518.00
WB-3505	3505	(6726)	323	(94.7)	4.200	(1231)	240	80	112	7	2035	2	(7.710)	16500 (7500)	\$ 182,451.00
WB-4505	4505	(8645)	415	(122)	5.400	(1583)	310	80	112	8	2420	4	(9.160)	20000 (9100)	\$ 213,339.00
WB-5505	5505	(10534)	507	(149)	6.600	(1934)	310	80	112	8	2420	4	(9.160)	20000 (9100)	\$ 246,003.00
WB-7005	7005	(13442)	645	(189)	8.400	(2462)	These Vaporizers are typically manufactured to meet customer-specific requirements. Please contact your area distributor or the factory to discuss your specific needs.								
WB-10005	10005	(19199)	921	(270)	12.000	(3517)									

Weights and dimensions are approximate. Specifications are subject to change without notice. Call factory or distributor for price quotation and actual lead times.

## Vertical Steam Vaporizers and Vertical Circulating Hot-Water Vaporizers

Alternate Energy Systems offers a line of shell-and-tube vaporizers that can be configured for steam-heating, or for circulating hot-water. Capacities for both versions range from 200 gph to over 20000 gph (400 kg/h to over 40000 kg/h). The outer shell of these types is made from carbon steel; the inner, multi-pass tube bundle can be made from carbon steel (standard) or from stainless steel. The tube bundle and all propane piping conform to Section VIII, Division I of the latest edition of the ASME Boiler and Pressure Vessel Code. The pressure vessel carries the ASME "U" stamp and is National Board registered.

The prices shown below include dual liquid carryover protection through an ultrasonic liquid level transmitter in the pressure vessel, and through "smart" liquid carryover protection with Rosemount pressure transmitter and Rosemount temperature transmitter in the vapor outlet. If the high liquid level switch is tripped, the liquid inlet valve (solenoid valve) closes. It re-opens automatically when the liquid level is again below the high-limit. If the "smart" liquid carryover protection trips, a manual re-start is required.

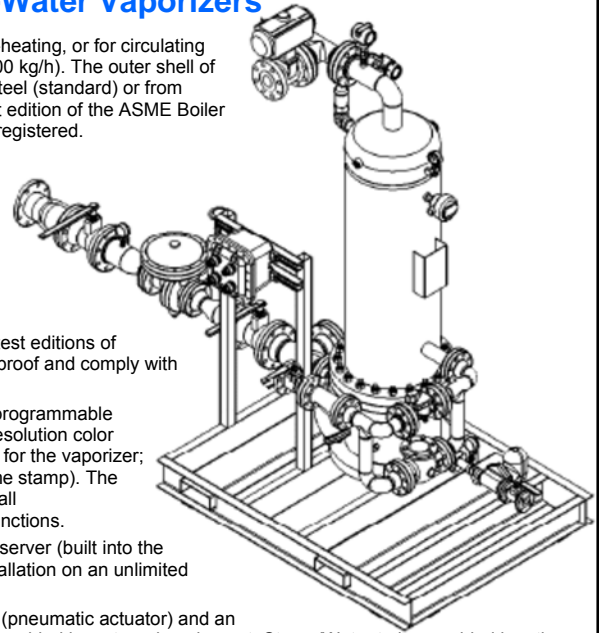
Pressure gauges and thermometers in steam/water inlet and outlet, the pressure vessel, and vapor outlet are standard.

Vaporizer design, wiring, controls, and electrical components and their installation comply with the latest editions of NFPA #58 and NFPA #70. The wiring on the vaporizer, and all electrical components, are explosion-proof and comply with Class I, Division 1, Group D requirements.

All safety devices of the vaporizer, including the dual liquid carryover protection, are monitored by a programmable logic controller (Siemens S7-1200 or Allen-Bradley MicroLogix-1400), which is connected to a high-resolution color LCD display with Touch Screen Operator Interface. The operator interface provides start/stop control for the vaporizer; it displays the system status, and any failure conditions that may occur, in plain English (with date/time stamp). The enclosure for the PLC and the operator interface are to be installed in a non-classified location. A small explosion-proof enclosure, installed on the vaporizer skid, provides local start/stop and alarm reset functions.

All control systems are equipped with remote monitoring and control software through a built-in VNC server (built into the operator interface). The remote-client software is included and is supplied as an open license for installation on an unlimited number of PCs or Laptops.

VSV Steam Vaporizers are equipped with a Spirax Sarco electronic steam temperature control valve (pneumatic actuator) and an automatic Steam Trap. Water circulation and water temperature control for VWB vaporizers is to be provided by external equipment. Steam/Water to be provided by others. Standard lead time on all models is 12 weeks. Actual lead times depend on factory workload and may vary.



Model Number <small>VSV = Steam VWB = Hot-Water</small>	Nominal Capacity (Propane + up to 30/70 Propane/Butane)				Steam Consumption (Water Flow)		Heat Exchanger Dimensions		Shipping Weight		Price in US-\$
	gal/h	(kg/h)	MMBTU/h	(MW)	lbs/h (gal/min)	kg/h (l/min)	D x H [in]	D x H [mm]	lbs	kg	<small>VSV Price VWB Price</small>
VSV - 200 VWB - 400	200	(400)	18.4	(5.4)	200 (23)	91 (85)					\$ 50,787.00 \$ 42,305.00
VSV - 400 VWB - 800	400	(800)	37	(11)	400 (46)	181 (170)					\$ 54,834.00 \$ 46,517.00
VSV - 600 VWB - 1200	600	(1200)	55	(16)	600 (69)	272 (255)					\$ 60,129.00 \$ 51,109.00
VSV - 800 VWB - 1600	800	(1600)	74	(22)	800 (92)	363 (340)					\$ 63,952.00 \$ 54,537.00
VSV - 1000 VWB - 2000	1000	(2000)	92	(27)	1000 (115)	454 (425)					\$ 71,345.00 \$ 59,710.00
VSV - 1500 VWB - 3000	1500	(3000)	138	(40)	1500 (173)	680 (638)					\$ 84,161.00 \$ 72,533.00
VSV - 2000 VWB - 4000	2000	(4000)	184	(54)	2000 (230)	907 (850)					\$ 90,905.00 \$ 80,532.00
VSV - 2500 VWB - 5000	2500	(5000)	230	(67)	2500 (288)	1134 (1063)					\$ 98,627.00 \$ 84,860.00
VSV - 3000 VWB - 6000	3000	(6000)	276	(81)	3000 (345)	1361 (1275)					\$ 110,865.00 \$ 96,890.00

Consult  
Factory

Steam Consumption (max 400°F / 204°C) is directly proportional to momentary load  
(example: if vaporizer is used at 50% nominal capacity, it consumes only 50% of max. steam consumption).  
Water Flow Requirements are based on 185°F (85°C) water temperature and 40°F (22°C) inlet/outlet temperature drop.  
Specifications are subject to change without notice. Call factory or distributor for price quotation and actual lead times.

Standard Options and Accessories	VSV-200 VWB-400	VSV-400 VWB-800	VSV-600 VWB-1200	VSV-800 VWB-1600	VSV-1000 VWB-2000	VSV-1500 VWB-3000	VSV-2000 VWB-4000	VSV-2500 VWB-5000	VSV-3000 VWB-6000
Skid Mounting	36"x40" \$3,081.00	36"x48" \$3,081.00		48"x48" \$3,380.00		48"x48" \$3,380.00		48"x48" \$3,380.00	
Enclosure (walk-in Maintenance House); includes skid mounting, personnel door, overhead lighting, alarm beacon, and installation of explosion-proof control panel in enclosure.	36"x96"x100" \$27,673.00	36"x96"x100" \$27,673.00		48"x96"x100" \$31,455.00		48"x96"x100" \$31,455.00		48"x96"x100" \$35,891.00	

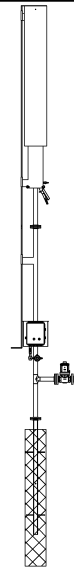
### PLC Configurations

S7-1200F / HMI8070	Siemens S7-1200F with Ethernet Interface and high-resolution (800x480) Touch Screen with built-in VNC server for remote monitoring and control \$ 0.00 (Standard Configuration for 50Hz countries)
ML-1400 / HMI8070	Allen-Bradley MicroLogix-1400 with Ethernet Interface and high-resolution (800x480) Touch Screen with built-in VNC server for remote monitoring and control \$ 0.00 (Standard Configuration for North America [60 Hz countries])
Client for Remote Monitoring and Control	Client software with open (unlimited) license; can be installed on as many PCs or Laptops as desired; available for HMI8070; software is used to connect to EOI from remote location via Ethernet (Internet or Intranet) \$ 0.00 (included with standard HMI)
Other PLC/EOI Configurations & Options	Various PLC/HMI options are available, e.g. Siemens S7-300, Allen-Bradley CompactLogix or ControlLogix, Siemens Profibus (Slave) Interface, ... Contact AES with your specific needs.

## Flare Burner Heads (Test Flares)

Test Flares are used during system setup, and for periodical system tests and maintenance. They represent large loads, and allow the system to be tested under simulated load conditions.

AES manufactures standard test flares with 2-inch and 3-inch gas lines. Other flares for specific systems are available as customer specials. All AES test flares are equipped with automatic ignition, standing pilot, stainless steel parts, Electronic Flame Safeguard, and electric solenoid (or pneumatically actuated) main flare gas valve (please specify electric/pneumatic preference). Flame Arrestors with flanged connections, carbon steel body, and 316L stainless steel element, are available as an option.



Model Number	Size	Shipping Weight	Price in US-\$	Flame Arrester
FH-2	2-inch	250 lbs. / 115 kg	\$ 10,526.00	\$ 5,674.00 (3-inch)
FH-3	3-inch	390 lbs. / 180 kg	\$ 12,652.00	\$ 6,595.00 (4-inch)

Specifications are subject to change without notice. Call factory or distributor for price quotation and actual lead times.

### Approximate Theoretical Flare Burner Capacities

	@ 5 psi	@ 10 psi	@ 15 psi	@ 30 psi	@ 50 psi
FH-2	36 MMBTU/h	72 MMBTU/h	101 MMBTU/h	188 MMBTU/h	304 MMBTU/h
FH-3	108 MMBTU/h	196 MMBTU/h	290 MMBTU/h	522 MMBTU/h	841 MMBTU/h

Capacities are approximate and are based on flare stack distance of ~50 ft. from mixer discharge location.

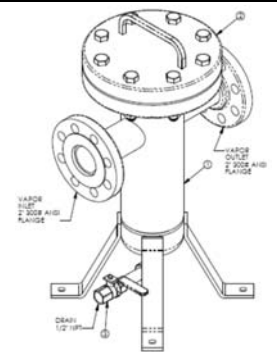
## Coalescing LPG Vapor Filters

Coalescing LPG Vapor Filters remove moisture and "heavy ends" from the LPG Vapor stream. All AES vaporizers are equipped with strainers in the liquid LPG supply line. These strainers are designed to remove solid contaminants from the LPG, i.e. sand or rust. However, to remove moisture and unwanted by-products from the refining process of the LPG, so-called "heavy ends", from the LPG vapor stream, an optional coalescing filter is required. AES manufactures coalescing filters for the vapor phase (PVF series) that are specifically designed for this purpose.

The filters are available in various sizes/capacities, and are all equipped with a manual drain for the removal of accumulated contaminants, and a differential pressure gauge. All filters are designed for 250 psi operating pressure at 650°F (17.2 bar @ 343°C). Filters above 6 inch vessel ID are shipped with ASME "U"-Stamp. The ASME "U"-Stamp is available as an option for smaller filters. All filters have flanged inlet and outlet connections (ANSI or DIN). Filter elements can be removed easily for maintenance and inspection. PVF-series do not use filter cartridges that need to be replaced.

**All filters should be installed with a maintenance bypass around them** (not included in below pricing).

All standalone AES PVF Coalescing Filters are painted "Gas-Yellow" (RAL 1017).



### Coalescing Vapor Filters

Model Number	PVF 020204	PVF 020206	PVF 030306	PVF 040408	PVF 060614
Nominal Flow Capacity	500 gph / 1000 kg/h	800 gph / 1600 kg/h	1200 gph / 2400 kg/h	2500 gph / 5000 kg/h	3500 gph / 7000 kg/h
Inlet Size	2-inch / DN100	2-inch / DN100	3-inch / DN80	4-inch / DN100	6-inch / DN150
Outlet Size	2-inch / DN100	2-inch / DN100	3-inch / DN80	4-inch / DN100	6-inch / DN150
Vessel Diameter	4-inch / DN100	6-inch / DN150	6-inch / DN150	8-inch / DN200	14-inch / DN350
Overall Dimensions, W	16 inches / 0.41 m	18 inches / 0.46 m	18 inches / 0.46 m	22 inches / 0.56 m	28 inches / 0.72 m
Overall Dimensions, H	46 inches / 1.17 m	46 inches / 1.17 m	46 inches / 1.17 m	56 inches / 1.42 m	56 inches / 1.42 m
Shipping Weight	150 lbs / 68 kg	220 lbs / 100 kg	250 lbs / 113 kg	390 lbs / 177 kg	1000 lbs / 450 kg
Price	\$7,802.00	\$9,009.00	\$10,051.00	\$12,743.00	\$21,535.00
ASME "U"-Stamp	\$ 2,129.00	\$ 2,129.00	\$ 2,129.00	included	included

All specifications are subject to change without notice. Weights and dimensions are approximate. Call factory or distributor for price quotation and actual lead times.

Nominal Flow Capacity is based on 20 psi / 1.4 bar vapor pressure. Higher vapor pressures may increase the actual flow capacity. Lower vapor pressures will decrease the actual flow capacity.

## Truck Unload Stations and Forklift Cylinder Fill Stations

Truck Unload Stations are used to transfer LPG from supply trucks to the storage tank(s). AES truck unload stations are designed to be anchored in a concrete foundation. They come complete with liquid transfer connection and vapor return connection. They are equipped with block valves, excess flow valves, vent valves, backcheck valves, breakaway couplings, and Emergency Shutoff Valves (ESV) with pull cable. Nitrogen-operated ESV are available as an option.

Cylinder fill stations, i.e. for filling of forklift cylinders, can be supplied separately, or integrated with the truck unload station. The price shown below is for a station that is integrated with a Truck Unload Station.

Model Number	Description, Size	Shipping Weight	Price in US-\$
TUS-2	Truck Unload Station, 2-inch x 1¼-inch	430 lbs. / 200 kg	\$ 8,453.00
TUS-3	Truck Unload Station, 3-inch x 2-inch	520 lbs. / 240 kg	\$ 13,382.00
CFS-1	Forklift Cylinder Fill Station	120 lbs. / 55 kg	\$ 4,286.00
MIS-1	Methanol Injection System for TUS-2	90 lbs. / 40 kg	\$ 3,344.00
MIS-2	Methanol Injection System for TUS-3	120 lbs. / 55 kg	\$ 4,349.00

Price for Cylinder Fill Station is for integrated unit (with TUS-2 or TUS-3) and does not include fill hose or nozzle.

Weights and dimensions are approximate. Specifications are subject to change without notice. Call factory or distributor for price quotation and actual lead times.

## HVS LPG-Vapor / Air Mixers

All HVS Systems are designed to be used with an existing LPG vapor source, such as a vaporizer, or as the replacement for less efficient or less reliable LPG-vapor/air mixing systems. They come complete with steel skid, vapor inlet header, Venturi trains, surge tank, controls, and all other equipment necessary for safe operation. The produced gas is directly compatible, and interchangeable, with NatGas.

All HVS systems monitor and maintain the mixed-gas pressure in the surge tank. Smaller systems up to two Venturi trains (up to HVS-20) use pressure switches and standard controls. Larger systems with three or more Venturi trains use a pressure transmitter which is connected to a Siemens or Allen-Bradley PLC. The PLC sequences the Venturi lines and controls all system safety functions. The PLC also communicates with a color LCD display with Touch Screen Operator Interface, indicating system pressures, and any trouble conditions that may occur. The PLC may also be used to interlock the HVS system with an external vaporizer.

Installations where the mixer system is separated from an open-flame vaporizer, and installations with electric vaporizers, require the option "Explosion Proof Control Components", which includes explosion proof transmitters and solenoid valves. The control panel for these mixers must be installed in a non-hazardous location. A local start/stop station in an explosion-proof enclosure provides basic control over the mixer. The main control panel for these mixers, with PLC and operator interface, must be installed in a non-hazardous location.

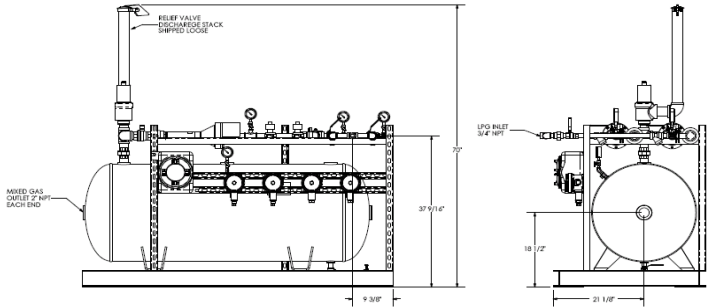
All HVS Mixers are equipped with two solenoid valves per Venturi train. The dynamic solenoid valve opens and closes each time a Venturi train is activated to produce mixed gas. The static safety solenoid valves opens when the mixer is started and stays open until the mixer is stopped, or until a high-pressure alarm occurs. This feature provides an additional level of safety and prevents the unwanted discharge of mixed gas in case of a failure of the dynamic solenoid valve.

HVS mixers with PLC-based controls allow the adjustment of the sendout pressure and the sequencing of the Venturi lines (differential pressure between trains; ON-OFF deadband) through simple inputs at the operator interface. These versions also offer a Venturi Cycle Counter for each Venturi train. The counter increments each time a Venturi train is activated. This information can be used to determine when the mechanical components of a Venturi train should be closely inspected, overhauled, or replaced.

The required vapor supply pressure depends on the desired sendout pressure, on the type of available LPG (Propane/Butane content), and on other factors (i.e. altitude). Typical supply pressures for Propane and 5-8 psi sendout pressure are 50-70 psi. Sendout pressures of 9-15 psi require High Pressure Configuration. Mixed Gas Sendout Pressures of more than 15 psi require the High-Pressure "Air-Assist" option, which includes an ASME "U"-stamped surge tank.

**Please Note:** Venturi-based LP/Air mixers are generally considered for intermittent use. Due to the finite service life of their dynamically exercised mechanical components (regulators, check valves, solenoid valves, air intake valves, etc. are typically specified to withstand 500000 to 750000 cycles), they are not very well suited for baseload applications. Their main application is Emergency Backup.

**Compact HVS:** Models with one or two Venturi trains (HVS-7, HVS-10, HVS-14, HVS-20) come in Compact configuration standard (as shown at right). These models are specifically designed for air freight shipment (small footprint, reduced height, removable relief valve stack, Venturi trains parallel rather than perpendicular to tank, etc.).



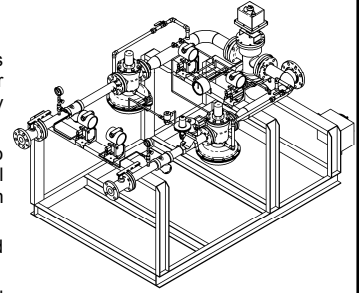
Model (in MMBTU/h Natural Gas decatherms)	Nominal Capacity Nm <sup>3</sup> /h of Natural Gas	Number of Venturis	Surge Tank Capacity US-gal (m <sup>3</sup> )	Approximate Skid Size in Inches L x W x H	Price in US-\$ 5 to 8 psi General Purpose	Price in US-\$ 5 to 8 psi Ex-Proof	Price in US-\$ Air-Assist General Purpose	Price in US-\$ Air-Assist Ex-Proof
HVS - 7	200	1	120 (0.450)	68 x 36 x 68	\$ 19,955.00	\$ 23,804.00	\$ 23,970.00	\$ 27,819.00
HVS - 10	280	1	120 (0.450)	68 x 36 x 68	\$ 19,955.00	\$ 23,804.00	\$ 23,970.00	\$ 27,819.00
HVS - 14	400	2	120 (0.450)	68 x 36 x 68	\$ 24,200.00	\$ 28,780.00	\$ 30,390.00	\$ 34,970.00
HVS - 20	560	2	120 (0.450)	68 x 36 x 68	\$ 32,196.00	\$ 36,776.00	\$ 38,384.00	\$ 42,964.00
HVS - 30	850	3	250 (0.950)	102 x 65 x 70	\$ 42,515.00	\$ 50,989.00	\$ 51,162.00	\$ 59,636.00
HVS - 40	1130	4	250 (0.950)	102 x 65 x 70	\$ 49,779.00	\$ 58,980.00	\$ 60,597.00	\$ 69,798.00
HVS - 50	1410	5	250 (0.950)	102 x 65 x 70	\$ 57,046.00	\$ 66,978.00	\$ 69,788.00	\$ 79,719.00
HVS - 60	1700	6	500 (1.893)	128 x 65 x 80	\$ 68,123.00	\$ 76,394.00	\$ 83,038.00	\$ 91,311.00
HVS - 70	1980	7	500 (1.893)	128 x 65 x 80	\$ 75,387.00	\$ 84,389.00	\$ 92,474.00	\$ 101,479.00
HVS - 80	2260	8	500 (1.893)	128 x 65 x 80	\$ 82,651.00	\$ 92,386.00	\$ 101,666.00	\$ 111,402.00
HVS - 90	2550	9	1000 (3.785)	199 x 65 x 84	\$ 93,291.00	\$ 103,755.00	\$ 114,758.00	\$ 125,224.00
HVS - 100	2800	10	1000 (3.785)	199 x 65 x 84	\$ 100,558.00	\$ 111,752.00	\$ 124,154.00	\$ 135,396.00
HVS - 110	3100	11	1000 (3.785)	199 x 65 x 84	\$ 107,820.00	\$ 119,747.00	\$ 133,637.00	\$ 145,563.00
HVS - 120	3400	12	1000 (3.785)	call factory	\$ 115,085.00	\$ 127,740.00	\$ 144,333.00	\$ 156,988.00
HVS - 130	3600	13	1000 (3.785)	call factory	\$ 122,421.00	\$ 135,808.00	\$ 153,843.00	\$ 167,229.00
HVS - 140	4000	14	1000 (3.785)	call factory	\$ 129,611.00	\$ 143,731.00	\$ 163,207.00	\$ 177,326.00
HVS - 150	4250	15	1000 (3.785)	call factory	\$ 136,832.00	\$ 151,680.00	\$ 172,600.00	\$ 187,449.00
HVS - 160	4530	16	1000 (3.785)	call factory	\$ 144,143.00	\$ 159,722.00	\$ 181,833.00	\$ 197,412.00
HVS - 170	4800	17	1000 (3.785)	call factory	\$ 151,408.00	\$ 167,717.00	\$ 191,274.00	\$ 207,583.00
HVS - 180	5100	18	1000 (3.785)	call factory	\$ 164,891.00	\$ 181,930.00	\$ 206,930.00	\$ 223,968.00

Please contact AES to discuss larger HVS units. Dimensions and weights are approximate. Specifications are subject to change.

HVS Option	Description	Price US-\$
HVSOPTPLC	For Models HVS-7MM to HVS-20MM only: PLC-based controls with Siemens S7-1200 or Allen-Bradley MicroLogix-1400 PLC; includes Rosemount pressure transmitters and high-resolution (800 x 480) color LCD display with touch-screen EOI. Includes Venturi Cycle Counter, Ethernet interface, and remote access. Controls Enclosure to be installed in non-classified area. This option is standard on HVS-30 and up.	\$ 12,162.00
HVSOPHP	High Pressure Configuration: for sendout pressures of 9-15 psi without the use of compressed air. Requires very high sendout pressures at the Venturi train (170+ psi) & low Butane content. Sendout pressures above 15 psi require "Air Assist" Configuration.	\$ 5,028.00 / Venturi train

## POM LPG-Vapor/Air and NatGas/Air Blenders

All POM Systems are designed to be used with an existing LPG vapor source, such as a vaporizer, or as the replacement for less efficient or less reliable LPG-vapor/air mixing systems. They can also be used as NatGas/Air or NatGas/Nitrogen blenders (i.e. for NatGas stabilization) and come assembled on a steel skid, complete with electronic controls, and all other equipment necessary for safe operation.



A PLC (Siemens S7-1200 or Allen-Bradley MicroLogix-1400) is used to monitor and control all system functions. The PLC also communicates with an Electronic Operator Interface (EOI) with high-resolution color LCD display and touch screen, displaying all system pressures in real time. Any trouble conditions that may occur are displayed in plain English, and are recorded in the Alarm History. Graphic trend recording and remote access function for monitoring and control are standard, as is Ethernet Interface.

The PLC may also be used to interlock the POM system with an external vaporizer. The standard mixer control panel is designed to be installed in a non-hazardous location. Field cabling between control panel and ex-proof junction box on skid by others.

Vapor inlet, air inlet, strainers, check valves, and regulators are flanged. Pneumatically operated ball valves in vapor inlet and compressed air inlet are standard. The inlet valves are fail-safe-closed and will close automatically in the event of a power failure, or when a high-pressure condition exists.

Installations where the mixer system is separated from the water bath vaporizer (or other gas-fired vaporizer), installations with electric vaporizers, and some local codes require Explosion Proof Configuration (POMOPEX1 or 2, POMOPEXCE), which also includes explosion-proof transmitters and solenoid valves. Cabling by others.

To find the right POM for your application, select the required nominal system capacity from the first column of the chart. Move to the right until you are below the system design pressure (delivered mixed gas pressure). The top row of the cell indicates the POM model number. The bottom row of the cell indicates the price for this configuration. Please note that the selection is only preliminary and requires verification through AES or your distributor.

Nominal Capacity in BTU per hour (top row) and NatGas Equivalent\*\* (Nm<sup>3</sup>/h; bottom row) is approximate and is given for Propane/Air mixtures with 1450 BTU/cuft at delivered mixed gas pressures of 10 psig to 100 psig. Capacity for other LPG/Air mixtures and/or pressures may vary. Nominal Capacity is based on vapor and compressed air inlet pressures of 100-125 psig, and a pressure drop of 10% across the mixing valve at maximum flow.

The minimum vapor and air supply pressures are "Sendout Pressure + 15 psi (1bar)". These conditions may require different regulator configurations and may result in different prices. Please contact the factory or your area distributor for details.

Other Blender configurations (for lower or higher delivery pressures, higher flow rates, other blending gasses, different materials, ...) are available. Please contact the factory or your area distributor for details.

\*\* NatGas Equivalent: In most cases, POM blenders will be used to provide backup for a NatGas supply. Use the peak NatGas flow per hour to select the correct POM model. Average fuel consumption should NOT be used to size the system

Nominal Capacity	10 psi 0.7 bar	20 psi 1.4 bar	30 psi 2.1 bar	40 psi 2.8 bar	50 psi 3.5 bar	60 psi 4.2 bar	70 psi 4.9 bar	80 psi 5.6 bar	90 psi 6.3 bar	100 psi 7 bar
20 MMBTU/h 560 Nm <sup>3</sup> /h	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9V \$100,953.00	POM-30-9V \$100,953.00	POM-30-81HV \$114,108.00
40 MMBTU/h 1130 Nm <sup>3</sup> /h	POM-40-9 \$96,127.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9V \$100,953.00	POM-30-9V \$100,953.00	POM-30-81HV \$114,108.00
60 MMBTU/h 1700 Nm <sup>3</sup> /h	POM-40-9 \$96,127.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9V \$100,953.00	POM-30-9V \$100,953.00	POM-30-81HV \$114,108.00
80 MMBTU/h 2260 Nm <sup>3</sup> /h	POM-40-9 \$96,127.00	POM-40-9 \$96,127.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9V \$100,953.00	POM-30-9V \$100,953.00	POM-30-81HV \$114,108.00
100 MMBTU/h 2800 Nm <sup>3</sup> /h	POM-60-9 \$118,260.00	POM-40-9 \$96,127.00	POM-40-9 \$96,127.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9V \$100,953.00	POM-30-9V \$100,953.00	POM-30-81HV \$114,108.00
120 MMBTU/h 3400 Nm <sup>3</sup> /h	POM-60-9 \$118,260.00	POM-40-9 \$96,127.00	POM-40-9 \$96,127.00	POM-40-9 \$96,127.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9 \$86,050.00	POM-30-9V \$100,953.00	POM-30-8V \$119,812.00	POM-30-8HV \$127,262.00
140 MMBTU/h 4000 Nm <sup>3</sup> /h	POM-60-9 \$118,260.00	POM-60-9 \$118,260.00	POM-40-9 \$96,127.00	POM-40-9 \$96,127.00	POM-40-9 \$96,127.00	POM-30-9 \$86,050.00	POM-30-8 \$100,044.00	POM-30-8V \$119,812.00	POM-30-8V \$119,812.00	POM-30-8HV \$127,262.00
160 MMBTU/h 4530 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
180 MMBTU/h 5100 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
200 MMBTU/h 5660 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
220 MMBTU/h 6230 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
240 MMBTU/h 6800 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
260 MMBTU/h 7360 Nm <sup>3</sup> /h <sup>3</sup>	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
280 MMBTU/h 7930 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
300 MMBTU/h 8500 Nm <sup>3</sup> /h	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-40-8 \$113,971.00	POM-40-8 \$113,971.00	POM-40-8V \$129,886.00	POM-40-8V \$129,886.00	POM-40-8HV \$137,337.00
320 MMBTU/h 9060 Nm <sup>3</sup> /h	POM-100 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8V \$152,021.00	POM-60-8V \$152,021.00	POM-60-8HV \$159,471.00
340 MMBTU/h 9630 Nm <sup>3</sup> /h	POM-100 Call Factory	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8V \$152,021.00	POM-60-8V \$152,021.00	POM-60-8HV \$159,471.00
360 MMBTU/h 10200 Nm <sup>3</sup> /h	POM-100 Call Factory	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8V \$152,021.00	POM-60-8V \$152,021.00	POM-60-8HV \$159,471.00
380 MMBTU/h 10760 Nm <sup>3</sup> /h	POM-100 Call Factory	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-83 \$155,975.00	POM-60-83V \$180,813.00	POM-60-83V \$180,813.00	POM-60-8H3V \$188,263.00
400 MMBTU/h 11330 Nm <sup>3</sup> /h	POM-100 Call Factory	POM-80 Call Factory	POM-80 Call Factory	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-8 \$136,104.00	POM-60-83 \$155,975.00	POM-60-83V \$180,813.00	POM-60-83V \$180,813.00	POM-60-8H3V \$188,263.00

POM-30, POM-40, and POM-60 are available with Fisher 99 or Fisher 1098 EGR regulators for installations with sufficiently high LP-vapor supply pressure (100-125 psi) and should be used only if the LPG consists at least of 80% Propane. Higher Butane content and/or lower LP-vapor pressure require different regulator configurations.

For discharge pressures above 75 psi (5.2 bar) POM-30, POM-40, and POM-60 are configured with a Fisher V-Ball control valve on the air side. Subject to change without notice.

Configuration	Suffix -9	Suffix -9V	Suffix -8	Suffix -8V	Suffix -8HV	Suffix -81HV	Suffix -83	Suffix -83V	Suffix -8H3V
Vapor Side	2-in 99	2-in 99	2-in 1098EGR	2-in 1098EGR	2-in 1098HEGR	1-in 1098HEGR	3-in 1098EGR	3-in 1098EGR	3-in 1098HEGR
Air Side	2-in 99	2-in V-Ball	2-in 1098EGR	2-in V-Ball	2-in V-Ball	1-in V-ball	3-in 1098EGR	3-in V-Ball	3-in V-Ball

## Options for POM Blenders

The following is an abbreviated list of available options for POM Blenders. Many more options and non-standard configurations are available to meet the requirements of (almost) any application. Unless stated otherwise, all options are available for all POM models.

If you need a blender that cannot be configured using the options listed below, please contact your area distributor or the factory.

Option	Description	Price in US-\$
GB-3E	<p>Option: GraviBlend<sup>®</sup>-3E, Gravitometer for LPG/Air mixtures, Explosion-Proof Configuration for classified areas, Range 0.2 ... 2.2 (relative density). High-speed, high-accuracy, on-line gravitometer; measures and indicates specific gravity of mixed gas. Separate enclosures for electronic components, gas distribution elements, and density sensor.</p> <p>Electronics Enclosure: powder coated steel NEMA 4 wall-mount enclosure; full-graphic color LCD display with touch screen operator interface; direct display of Specific Gravity, Calorific Value, and Wobbe Index number; electronic signal processor with alarm contacts; internally powered analog output signal 4...20 mA (source; scaled to 0.4 ... 2.0 SG) for external recording instruments; AC110V 60Hz or AC220V 50Hz; graphic trend recording function; semi-automatic calibration feature.</p> <p>Gas Distribution Enclosure: powder coated steel NEMA 4 wall-mount enclosure; integrated filter element in sample gas line; integrated consumption jet in sample gas line; integrated sample gas bypass with precision instrument valve; 1/8" bulkhead fittings for connection to Sensor Enclosure.</p> <p>Sensor Enclosure: explosion-proof aluminum junction box with density sensor and signal conditioner, wall-mount (horizontally).</p>	\$25,081.00
POMOPTACC	Option: AccuBlend™ System, Automatic Gas Properties Control. Electric actuator to adjust the angular position of the piston in the POM, and thereby correcting the calorific value of the mixed gas. Actuator is installed on top of the POM valve. Price includes proportional controller (integrated in electronic signal processor of GraviBlend™-3/3E), which receives a linear analog signal (4-20 mA or 0-5V) from the Gravitometer and sends a control signal to the actuator (requires Option: GB-3E).	\$10,134.00
POMOPTFLOW	Flow Transmitter in sendout line; real-time SNG flow display on EOI. If the POM is equipped with a Gravitometer, LPG vapor flow, compressed air flow, and liquid LPG flow are also displayed. Dual Flow Totalizer (with individual reset) is standard for all displayed flow values.	\$12,874.00
POMOPTMOD	Option: Single-Skid Module. Installation of POM on same skid with water bath vaporizer. POM orientation is vertical; available for WB-168 to WB-2505; included in WB/POM pricing on page 11. Single-skid installations for WB-3005 and above require skid-extension; call AES for custom pricing.	POM-30 \$11,122.00 POM-40 \$11,900.00 POM-60 \$13,855.00
POMOPTEX1	Option: Ex-proof control components; required for installations where the POM is more than 15 ft. away from a gas-fired vaporizer (U.S. rules), or where required by local law. Includes explosion-proof pressure transmitters in vapor supply line, air supply line, and mixed gas line. Includes explosion-proof control panel enclosure, mounted directly at the blender skid.	\$17,656.00
POMOPTEX2	Option: Ex-proof control components; required for installations where the POM is more than 15 ft. away from a gas-fired vaporizer (U.S. codes), or where required by local law. Includes explosion-proof pressure transmitters in vapor supply line, air supply line, and mixed gas line. Includes powder coated NEMA 4 wall-mount enclosure for system control panel, to be installed in non-classified area. Interconnecting cable between explosion-proof start/stop station at the blender skid and control panel is to be supplied and installed at job site by others. Maximum distance between blender and control panel approximately 2000 ft. (600 m). Includes ex-proof on-skid start/stop station.	\$7,996.00
POMOPTEX3	Option: Ex-proof transmitters & on-skid junction box. Equivalent to POMOPTEX2 but without on-skid start/stop station.	\$2,230.00
POMOPTCE	Option: CE Approval; available for all POM models; compliant with PED, ATEX, and all other applicable European Directives.	POM-30 \$7,347.00 POM-40 \$7,347.00 POM-60 \$8,449.00
POMPKSHV	Option: Electronic PeakShaving Controller. Includes PLC upgrades (10- or 12-inch color LCD display with Touch Screen Operator Interface; Analog Output for Flow Control Valve). Includes user-selectable PeakShaving modes (i.e. "Inject fixed SNG Volume"; "Limit NG Flow"; "Maintain Grid Pressure"; ...). Includes Flow Control Valve in Mixed Gas Sendout Line (pneumatically actuated); Flow Transmitter in Mixed Gas Sendout Line; Flow Transmitter for Grid Flow (or NatGas Flow); Grid Pressure Transmitter.	Call Factory

### PLC Configurations

S7-1200 / HMI	Siemens S7-1200 with Ethernet Interface and high-resolution color Touch Screen with built-in VNC server for remote monitoring and control \$ 0.00 (Standard Configuration for 50Hz countries)
ML-1400 / HMI	Allen-Bradley MicroLogix-1400 with Ethernet Interface and high-resolution color Touch Screen with built-in VNC server for remote monitoring and control \$ 0.00 (Standard Configuration for North America [60 Hz countries])
Client for Remote Monitoring and Control	Client software with open (unlimited) license; can be installed on as many PCs or Laptops as desired; available for all standard EOIs; software is used to connect to EOI from remote location via Ethernet (Internet or Intranet) \$ 0.00 (included with standard HMI)
S7-1200 Profibus	Profibus Interface (Slave) for Siemens S7-1200 PLC (in addition to standard Profinet/Ethernet Interface) \$ 1,380.00
Other PLC/EOI Configurations	Various other PLC and HMI options are possible. For example: Siemens S7-300, Allen-Bradley CompactLogix or ControlLogix, Bristol ControlWave Micro, GE 90-30, 7-inch PanelView-Plus (640x480), 10-inch GE series touchscreens, and others are available.

### Other Customization Options

Custom compressed air supply (full-feature compressor with air dryer, air receiver tank with automatic drains, pressure relief); installation into ISO shipping container (standalone unit, integrated with compressed air supply, etc; see also I-Blend brochure); vertical configurations for small footprint installations; matching existing piping connections to simplify replacement of your old blender; replacing or upgrading your existing blender's control system with custom PLC and/or EOI; integration of AES blender into existing DCS or plant PLC scheme; etc

Please contact AES to discuss your specific needs.



## Spare Parts

Part Number	Description	Price in US-\$
SOL01XX-00-3	Solenoid valve; for Venturi assembly; valve can be used in static or dynamic positions in Venturi line; non-Ex-proof (XX=03 for AC120V 60Hz; XX=13 for AC220V 50Hz)	\$ 367.00
SOL01XX-00-3	Solenoid valve; for Venturi assembly; valve can be used in static or dynamic positions in Venturi line; Ex-proof (XX=16 for AC110V 60Hz; XX=20 for AC220V 50Hz)	\$ 519.00
VENxxxx	Replacement Venturi Train, complete, new, assembled; intended as spare part or for field maintenance replacement; includes Air Intake Valve Assembly with Venturi Nozzle, Venturi Tube, strainer, dual solenoid valves (static and dynamic), vapor pressure regulator, pressure gauge, 90-degree elbow, check valve; specify "C/M" for 7MM BTU/h or "D/N" for 10MM BTU/h and sendout pressure with order	\$ 6,242.00
VALH0002-04-5	Air Intake Valve Assembly with Venturi Nozzle, complete, new, supplied as individual components (w/o piping or nipples) or assembled; intended as spare part or for field maintenance replacement; includes valve body, back plate, check plate, bronze bearing sleeve, gasket, Venturi Nozzle (specify "C" for 7MM BTU/h or "D" for 10MM BTU/h and sendout pressure), O-rings, self-locking nut, stainless steel spring, spring retainer	\$2,383.00
VALH0084-00-3	Air Check valve: backplate for air intake	\$ 264.00
VALH0085-00-3	Air Check valve: check-plate for air intake	\$ 276.00
GAS0014-00-3	Air Check valve: gasket for air intake	\$ 27.00
SPR0001-00-3	Air Check valve: spring, stainless steel, for air intake	\$ 66.00
VALC004X-00-3	Check valve: (X=1 mixed gas; inline, 1-1/2 inch NPT; X=4 air, inline, 1-1/4 inch)	\$ 195.00
REG270006-00-3	Regulator in vapor supply line to Venturi Mixer	\$ 743.00
REGR270008-00-3	Repair Kit for regulator in vapor supply line to Venturi Mixer	\$ 279.00
SWI0030-00-3	Pressure switch, 1 setpoint; Low LPG; for systems with electro-mechanical controls; non EX-Proof Configuration	\$ 639.00
SWI0025-00-3	Pressure switch, 1 setpoint; Low LPG; for systems with electro-mechanical controls; EX-Proof Configuration	\$ 959.00
SWI0033-00-3	Pressure switch, 2 setpoints; Tank Monitor for High/Low Mixed Gas or Venturi Operator; for systems with electro-mechanical controls; non EX-Proof Configuration	\$ 881.00
SWI0029-00-3	Pressure switch, 3 setpoints; Tank Monitor for Venturi Operator; for systems with electro-mechanical controls; non EX-Proof Configuration	\$ 1,340.00
SWI0026-00-3	Pressure switch, 1 setpoint; Tank Monitor for Venturi Operator; for systems with electro-mechanical controls; EX-Proof Configuration	\$ 987.00
SWI0032-00-3	Pressure switch, 2 setpoints; Tank Monitor for Venturi Operator; for systems with electro-mechanical controls; EX-Proof Configuration	\$ 1,306.00
GAU00XX-00-3	Pressure gauge; liquid filled; stainless steel case, brass internals; with case vent; specify psi range (XX=16 for 0..15 psi, XX=12 for 0..30 psi, XX=13 for 0..100 psi, XX=17 for 0..300 psi)	\$ 42.00
TRG0160-00-3	Gas Leak Monitor, Transmitter, Replacement; Rosemount/Emerson Net Safety Millennium II Single Channel Transmitter	\$ 1,636.00
TRG0161-00-3	Gas Leak Monitor, IR Sensor, Replacement; Rosemount/Emerson Net Safety Millennium II IR Combustion Sensor	\$ 1,394.00
TRG0173-00-3	Gas Leak Monitor, IR Sensor, Internals, Replacement	\$ 1,086.00
CAL0001-00-5	Calibration Kit for Gas Leak Monitors; includes calibration gas (50% LEL), flow regulator, sensor adapter, Teflon tubing. NOTE: Available as a spare for domestic customers only. International customers MUST order this kit to be included with shipment of a system; this item can not ship internationally separately or as part of a parts order.	\$ 451.00
TRP0157-00-3	Transmitter; Mixed Gas Pressure; Rosemount 2088G2; 0..150 psi/0..10 bar, 4..20 mA	\$ 2,051.00
TRP0165-00-3	Transmitter; Vapor or Air Pressure; Rosemount 2088G3; 0..300 psi/0..25 bar, 4..20 mA	\$ 2,051.00
TRP0167-00-3	Transmitter; Mixed Gas Pressure, Standard Venturi Surge Tank; Rosemount 2088G1; -15..30 psi/-1..2 bar, 4..20 mA	\$ 2,051.00
TRP0168-00-3	Transmitter, Differential Pressure; Rosemount 3051; ±60 inWC/±150 mbar, 4..20 mA	\$ 3,175.00
TRT0132-00-3	Transmitter; Vapor Temperature; Rosemount 644H; -50°C..+150°C, 4..20 mA	\$ 1,824.00
LOW0001-00-3	Low Water Cutoff Switch (all WB)	\$ 434.00
AQU0001-00-3	Temperature Operator Switch (08-series and 04-series WB only)	\$ 219.00
AQU0002-00-3	High Temperature Limit Switch (all WB)	\$ 170.00
LIG0029-00-3	Alarm Strobe, Red, for hazardous locations	\$ 537.00
PUM0030-00-3	Circulation Pump, Taco 0010-F3 (for 08-series and 05-series to WB-855), 60Hz	\$ 586.00
PUM0016-00-3	Circulation Pump, Taco 0012-F4 (05-series WB-1005 and up), 60Hz	\$ 775.00
PUM0044-00-3	Circulation Pump, Taco 0010-F3A (for 08-series and 05-series to WB-855, pre-2016), 50Hz	\$ 573.00
PUM0096-00-3	Circulation Pump, Taco 0012-F4A (05-series WB-1005 and up, pre-2016), 50Hz	\$ 719.00
PUM0020-00-3	Circulation Pump, WITA (for 50Hz vaporizers 2016 onwards)	\$ 250.00
SOL009XR-00-3	Liquid Inlet Solenoid Repair Kit, 1-inch (X=4 for 120V/60Hz, X=5 for 220V/50Hz)	\$ 710.00
SOL009XR-00-3	Liquid Inlet Solenoid Repair Kit, 2-inch (X=3 for 120V/60Hz, X=7 for 220V/50Hz)	\$ 1,401.00
SWI01XX-00-3	High Gas Pressure Switch (XX=41 for Dungs GMH-A2-4-6; XX=79 for Dungs GMH-A2-4-8)	\$201.00
SWI014X-00-3	Low Gas Pressure Switch (X=2 for Dungs GML-A2-4-6; X=6 for Dungs GML-A2-4-4)	\$ 191.00
ORI00XX-00-3	POM Body O-rings, set of 10 (XX=11 for POM-30; XX=13 for POM-40; XX=14 for POM-60)	\$ 20.00
POM0019-00-3	POM Actuator O-rings, set of 10	\$ 20.00
SOL0096-00-3	Three-way Solenoid, 1/4-inch, 24VDC, EX-proof	\$ 427.00

These are just some of the parts AES typically keeps in stock. Please contact AES with your model and serial number to discuss your needs for any replacement parts. Current standard stock items can generally be shipped within a business day. Older or non-stock items may take longer to ship.

## HVS LPG-Vapor / Air Mixers with Water Bath Vaporizers

Model Numbers are WB-168/HVS-14 to WB-2505/HVS-220. The first part of the model number indicates the vaporizer capacity in gallons per hour; the second part indicates the mixer capacity in MMBTU per hour. All systems combine horizontal water bath vaporizers (08-series or 05-series) with Venturi-type mixing systems (HVS-series). They come complete with vaporizer, Venturi mixer, surge tank, interconnecting piping, electrical and safety controls, and are mounted on a common steel skid. This design concept makes them very compact, easy to install and to maintain, and very reliable.

All systems are factory-tested prior to shipping. After placing a system on a non-combustible surface (i.e. concrete pad), filling the vaporizer with heat transfer solution, and connecting it to electrical supply, liquid gas supply, and mixed gas outlet, it is immediately ready to produce high-quality gas which is directly compatible and interchangeable with NatGas.

Standard design output pressure is 5 to 8 psi (please specify desired output pressure with order). Higher pressures up to 40 psi are also available and require either High Pressure Configuration or "Air-Assist" option with compressed air for operation. In systems with "Air-Assist" option, the surge tank is ASME "U"-stamped.

All WB/HVS systems monitor the gas pressure in the surge tank, using a pressure transmitter that is connected to a Siemens or Allen-Bradley PLC. The PLC, which is shared with the vaporizer, sequences the Venturi lines and controls all mixer safety functions. The PLC also communicates with a color LCD display with Touch Screen Operator Interface, displaying system pressures, and any trouble conditions that may occur.

The WB/HVS series is designed for outdoor installation and requires only nominal preventive maintenance. Intended for intermittent service (see Note), the systems are manufactured to meet or exceed requirements of the ASME Pressure Vessel Code Section VIII, and the latest edition of NFPA Pamphlet #58. They are approved by Factory Mutual (FM) and Canadian Standards Association (CSA), and are suitable for Industrial Risk Insurers (IRI) installations.

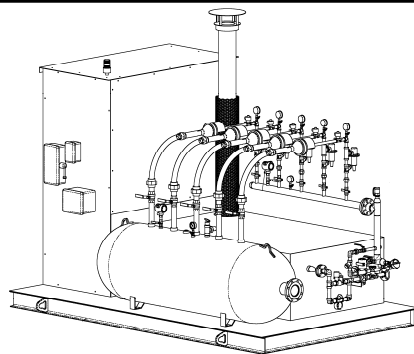
All systems are primed, painted, factory tested, and ready for installation. They come with 2 sets of operating manuals and test reports. All vaporizers are equipped with "smart" Liquid Carryover Protection.

All HVS Mixers are equipped with two solenoid valves per Venturi train. The dynamic solenoid valve opens and closes each time a Venturi train is activated to produce mixed gas. The static solenoid valves opens when the mixer is started and stays open until the mixer is stopped, or until a high-pressure alarm occurs. This feature provides an additional level of safety, and prevents the unwanted discharge of mixed gas in case of a failure of the dynamic solenoid valve.

The mixer sendout pressure and the sequencing of the Venturi lines (differential pressure between trains; ON-OFF deadband) can be adjusted through simple inputs at the touch screen. A separate Venturi Cycle Counter for each Venturi train increments each time a Venturi train is activated. This information can be used to determine when the mechanical components of a Venturi train should be closely inspected, overhauled, or replaced.

The required vapor supply pressure depends on the desired sendout pressure, on the type of available LPG (Propane/Butane content), and on other factors (i.e. altitude). Typical supply pressures for Propane and 5-8 psi sendout pressure are 50-70 psi. Mixed Gas Sendout Pressures of 9-15 psi require the High-Pressure Configuration. Sendout pressures above 15 psi require the "Air-Assist" option, which includes an ASME "U"-stamped surge tank.

Please Note: Venturi-based LP/Air mixers are generally considered for intermittent use. Due to the finite service life of their dynamically exercised mechanical components (regulators, check valves, solenoid valves, air intake valves, etc. are typically specified by their respective manufacturers to withstand 500 000 to 750 000 cycles), they are not very well suited for baseload applications. Their main application is Emergency Backup.



Model Number (number after HVS is capacity in MMBTU/h or decatherms/h)	Nominal Capacity Nm <sup>3</sup> /h of Natural Gas	Number of Venturis <sup>1</sup>	Surge Tank Capacity US-gal (m <sup>3</sup> )	Approximate Skid Size in inches (m) W x L x H	Price in US-\$ 5 to 8 psi Version	Price in US-\$ Air-Assist Option
WB - 168 / HVS - 14 MM	400	2	120 (0.450)	W = 60 (1.52) L = 132 (3.35) H = 110 (2.80)	\$ 57,825.00	\$ 64,013.00
WB - 208 / HVS - 17 MM	480	2	120 (0.450)		\$ 60,228.00	\$ 66,416.00
WB - 258 / HVS - 20 MM	560	2	120 (0.450)		\$ 65,557.00	\$ 71,748.00
WB - 308 / HVS - 27 MM	760	3	120 (0.450)		\$ 79,525.00	\$ 88,171.00
WB - 358 / HVS - 30 MM	850	3	120 (0.450)		\$ 81,928.00	\$ 90,574.00
WB - 408 / HVS - 37 MM	1050	4	120 (0.450)		\$ 93,857.00	\$ 104,675.00
WB - 458 / HVS - 40 MM	1130	4	120 (0.450)	W = 72 (1.83) L = 138 (3.51) H = 112 (2.85)	\$ 95,622.00	\$ 106,476.00
WB - 555 / HVS - 50 MM	1410	5	250 (0.950)		\$ 125,680.00	\$ 138,420.00
WB - 755 / HVS - 60 MM	1700	6	250 (0.950)		\$ 150,916.00	\$ 165,830.00
WB - 855 / HVS - 70 MM	1980	7	250 (0.950)	W = 90 (2.29) L = 164 (4.17) H = 112 (2.85)	\$ 163,996.00	\$ 181,084.00
WB - 1005 / HVS - 80 MM	2260	8	500 (1.893)		\$ 183,122.00	\$ 202,138.00
WB - 1005 / HVS - 90 MM	2550	9	500 (1.893)		\$ 194,781.00	\$ 216,250.00
WB - 1205 / HVS - 100 MM	2800	10	500 (1.893)		\$ 211,852.00	\$ 235,495.00
WB - 1505 / HVS - 110 MM	3100	11	500 (1.893)		\$ 233,331.00	\$ 259,147.00
WB - 1505 / HVS - 120 MM	3400	12	500 (1.893)		\$ 239,216.00	\$ 268,464.00
WB - 1505 / HVS - 130 MM	3600	13	500 (1.893)		\$ 247,565.00	\$ 278,986.00
WB - 1805 / HVS - 140 MM	4000	14	500 (1.893)		\$ 272,046.00	\$ 305,641.00
WB - 1805 / HVS - 150 MM	4250	15	500 (1.893)		\$ 279,648.00	\$ 315,417.00
WB - 2005 / HVS - 160 MM	4530	16	500 (1.893)		\$ 307,128.00	\$ 344,819.00
WB - 2005 / HVS - 170 MM	4800	17	1000 (3.785)	W = 102 (2.59) L = 272 (6.91) H = 112 (2.85)	\$ 315,520.00	\$ 355,386.00
WB - 2005 / HVS - 180 MM	5100	18	1000 (3.785)		\$ 330,658.00	\$ 372,696.00
WB - 2205 / HVS - 190 MM	5360	19	1000 (3.785)		\$ 343,779.00	\$ 387,744.00
WB - 2205 / HVS - 200 MM	5600	20	1000 (3.785)		\$ 351,557.00	\$ 397,690.00
WB - 2505 / HVS - 210 MM	5900	21	1000 (3.785)		\$ 377,374.00	\$ 427,193.00
WB - 2505 / HVS - 220 MM	6200	22	1000 (3.785)		\$ 392,425.00	\$ 444,416.00

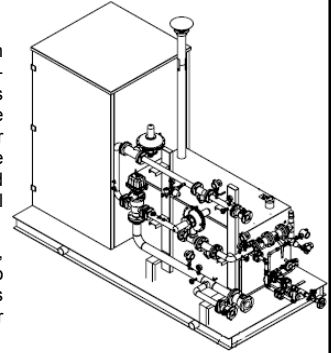
<sup>1</sup> Actual number of Venturi arrangements may vary with mixed gas pressure.

Weights and dimensions are approximate. Specifications are subject to change without notice. Call factory or distributor for price quotation and actual lead times.

HVS Option	Description	Price US-\$
HVSOPHP	High Pressure Configuration: for sendout pressures of 9-15 psi without the use of compressed air. Requires very high sendout pressures at the Venturi train (170+ psi) & low Butane content. Sendout pressures above 15 psi require "Air Assist" Configuration.	\$ 5,028.00 / Venturi train

## Piston Operated Mixers (POM) with Water Bath Vaporizers

Model Numbers are WB-168/POM-30 to WB-2505/POM-60. The first part of the model number indicates the vaporizer capacity in gallons per hour, the second part indicates the mixer size (30 - 40 - 60). All systems combine horizontal water bath vaporizers (08-series or 05-series) with our patented Piston Operated Mixer (POM-series). They can be ordered for installation as individual units (water bath vaporizer and mixer within 15 ft [4.5m] of each other), or as a very compact "Single-Skid" (see POM options), with the POM in vertical orientation and installed on the same skid with the vaporizer. In Single-Skid units, all piping between the vaporizer and the blender, and all wiring between the blender and the control panel, are factory-installed, which reduces installation time considerably. Both versions are equally reliable and have set the standard for value, reliability, ease-of-use, low maintenance, and high availability, in many different applications in many different countries, surpassing other high-capacity / high-pressure proportional blending concepts by far. Pricing below is for Single-Skid units.



To select the correct vaporizer/blender combination, first determine the connected peak load. Including a safety factor of 1.1 to 1.3, select the vaporizer model from the left-most column of the table below. Then move to the right to the desired discharge pressure to find the POM model number and the price for the vaporizer/blender combination. The capacity of the POM mixer depends on its configuration and the system pressure. Please note that the selection is only preliminary and requires verification through AES or your distributor.

All WB/POM systems share the control panel between the WB vaporizer and the POM blender. The standard PLC is a Siemens S7-1200, or an Allen-Bradley MicroLogix-1400. All PLCs have a built-in Ethernet Interface for remote monitoring and control, and communicate with an Electronic Operator Interface (EOI) with high-resolution color LCD display and Touch Screen. Electrical connections between the POM blender and the control panel are made in two different ways:

In Single-Skid units, electrical connections run from the blender directly to the control panel. In individual units, all electrical connections are terminated in an explosion proof junction box at the POM skid. From there, a multi-wire cable (provided and installed by others) is run to the mixer control panel in the vaporizer control room.

The WB/POM Series is designed for outdoor installation and requires only nominal preventive maintenance. Intended for intermittent or continuous service, the systems are manufactured to meet or exceed requirements of the ASME Pressure Vessel Code Section VIII, and the latest edition of NFPA Pamphlet #58. They are approved by Factory Mutual (FM) and Canadian Standards Association (CSA), and are suitable for Industrial Risk Insurers (IRI) installations. All systems are primed, painted, factory tested, and ready for installation. They come with 2 sets of operating manuals and test reports, one printed and one in electronic format on a USB drive.

All vaporizers in WB/POM systems are equipped with Rosemount Pressure and Temperature Transmitters in the Vapor Outlet of the vaporizer for "smart" Liquid Carryover Protection, based on pressure/temperature correlation and LPG type (Propane/Butane/...).

Nominal Capacity in BTU per hour and NatGas Equivalent\*\* (Nm<sup>3</sup>/h; in bottom row) is strictly based on the vaporization capacity of the vaporizer, and is given for Propane/Air mixtures with 1450 BTU/cuft at delivered mixed gas pressures of 10 psig (0.7 bar) to 70 psig (5 bar). Capacity for other LPG/Air mixtures and/or pressures may vary. Nominal Capacity is based on vapor and compressed air inlet pressures of 100-125 psig, and a pressure drop of 10% across the mixing valve at maximum flow. The minimum vapor and air supply pressures are Sendout Pressure + 15 psi (1bar).

Other Vaporizer/Blender configurations (for lower or higher delivery pressures, higher flow rates, other blending gasses, different materials, ...) are available. Please contact the factory or your area distributor for details.

\*\* NatGas Equivalent: In most cases, these systems will be used to provide backup for a NatGas supply. Including a sufficient safety factor (1.1 ... 1.3), use the peak expected NatGas flow per hour to select the correct WB/POM model. Average flow rates should NOT be used to size the system.

Vaporizer Model	Nominal Capacity**	System Discharge Pressure						
		10 psi	20 psi	30 psi	40 psi	50 psi	60 psi	70 psi
WB-168	15 MMBTU/h 424 m <sup>3</sup> /h	POM-30-9 \$130,820.00	POM-30-9 \$130,820.00	POM-30-9 \$130,820.00	POM-30-9 \$130,820.00	POM-30-9 \$130,820.00	POM-30-9 \$130,820.00	POM-30-9 \$130,820.00
WB-208	19 MMBTU/h 538 m <sup>3</sup> /h	POM-30-9 \$133,223.00	POM-30-9 \$133,223.00	POM-30-9 \$133,223.00	POM-30-9 \$133,223.00	POM-30-9 \$133,223.00	POM-30-9 \$133,223.00	POM-30-9 \$133,223.00
WB-258	24 MMBTU/h 679 m <sup>3</sup> /h	POM-30-9 \$138,031.00	POM-30-9 \$138,031.00	POM-30-9 \$138,031.00	POM-30-9 \$138,031.00	POM-30-9 \$138,031.00	POM-30-9 \$138,031.00	POM-30-9 \$138,031.00
WB-308	28 MMBTU/h 792 m <sup>3</sup> /h	POM-30-9 \$141,636.00	POM-30-9 \$141,636.00	POM-30-9 \$141,636.00	POM-30-9 \$141,636.00	POM-30-9 \$141,636.00	POM-30-9 \$141,636.00	POM-30-9 \$141,636.00
WB-358	33 MMBTU/h 934 m <sup>3</sup> /h	POM-40-9 \$154,894.00	POM-30-9 \$144,039.00	POM-30-9 \$144,039.00	POM-30-9 \$144,039.00	POM-30-9 \$144,039.00	POM-30-9 \$144,039.00	POM-30-9 \$144,039.00
WB-408	37 MMBTU/h 1047 m <sup>3</sup> /h	POM-40-9 \$156,698.00	POM-30-9 \$145,843.00	POM-30-9 \$145,843.00	POM-30-9 \$145,843.00	POM-30-9 \$145,843.00	POM-30-9 \$145,843.00	POM-30-9 \$145,843.00
WB-458	42 MMBTU/h 1189 m <sup>3</sup> /h	POM-40-9 \$158,500.00	POM-30-9 \$147,645.00	POM-30-9 \$147,645.00	POM-30-9 \$147,645.00	POM-30-9 \$147,645.00	POM-30-9 \$147,645.00	POM-30-9 \$147,645.00
WB-508	47 MMBTU/h 1330 m <sup>3</sup> /h	POM-40-9 \$162,105.00	POM-30-9 \$151,250.00	POM-30-9 \$151,250.00	POM-30-9 \$151,250.00	POM-30-9 \$151,250.00	POM-30-9 \$151,250.00	POM-30-9 \$151,250.00
WB-555	51 MMBTU/h 1444 m <sup>3</sup> /h	POM-40-9 \$169,150.00	POM-30-9 \$158,295.00	POM-30-9 \$158,295.00	POM-30-9 \$158,295.00	POM-30-9 \$158,295.00	POM-30-9 \$158,295.00	POM-30-9 \$158,295.00
WB-655	60 MMBTU/h 1699 m <sup>3</sup> /h	POM-40-9 \$174,023.00	POM-40-9 \$174,023.00	POM-30-9 \$163,168.00	POM-30-9 \$163,168.00	POM-30-9 \$163,168.00	POM-30-9 \$163,168.00	POM-30-9 \$163,168.00
WB-755	69 MMBTU/h 1953 m <sup>3</sup> /h	POM-40-9 \$180,668.00	POM-40-9 \$180,668.00	POM-30-9 \$169,813.00	POM-30-9 \$169,813.00	POM-30-9 \$169,813.00	POM-30-9 \$169,813.00	POM-30-9 \$169,813.00
WB-855	79 MMBTU/h 2237 m <sup>3</sup> /h	POM-40-9 \$184,645.00	POM-40-9 \$184,645.00	POM-30-9 \$173,790.00	POM-30-9 \$173,790.00	POM-30-9 \$173,790.00	POM-30-9 \$173,790.00	POM-30-9 \$173,790.00
WB-1005	92 MMBTU/h 2605 m <sup>3</sup> /h	POM-60-9 \$219,581.00	POM-40-9 \$195,493.00	POM-40-9 \$195,493.00	POM-30-9 \$184,638.00	POM-30-9 \$184,638.00	POM-30-9 \$184,638.00	POM-30-9 \$184,638.00
WB-1205	111 MMBTU/h 3143 m <sup>3</sup> /h	POM-60-9 \$226,808.00	POM-40-9 \$202,720.00	POM-40-9 \$202,720.00	POM-40-9 \$202,720.00	POM-30-9 \$191,865.00	POM-30-9 \$191,865.00	POM-30-9 \$191,865.00
WB-1505	139 MMBTU/h 3936 m <sup>3</sup> /h	POM-60-9 \$237,722.00	POM-60-9 \$237,722.00	POM-40-9 \$213,634.00	POM-40-9 \$213,634.00	POM-40-9 \$213,634.00	POM-30-9 \$202,779.00	POM-30-8 \$216,773.00
WB-1805	166 MMBTU/h 4700 m <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$264,743.00	POM-40-8 \$240,655.00	POM-40-8 \$240,655.00	POM-40-8 \$240,655.00	POM-40-8 \$240,655.00	POM-40-8 \$240,655.00
WB-2005	185 MMBTU/h 5238 m <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$287,690.00	POM-60-8 \$287,690.00	POM-40-8 \$263,602.00	POM-40-8 \$263,602.00	POM-40-8 \$263,602.00	POM-40-8 \$263,602.00
WB-2205	203 MMBTU/h 5748 m <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$292,287.00	POM-60-8 \$292,287.00	POM-40-8 \$268,199.00	POM-40-8 \$268,199.00	POM-40-8 \$268,199.00	POM-40-8 \$268,199.00
WB-2505	231 MMBTU/h 6541 m <sup>3</sup> /h	POM-80 Call Factory	POM-60-8 \$308,629.00	POM-60-8 \$308,629.00	POM-60-8 \$308,629.00	POM-40-8 \$284,541.00	POM-40-8 \$284,541.00	POM-40-8 \$284,541.00

The above prices include Option POMOPTMOD, Single-Skid-Installation of WB Vaporizer and POM Blender.

Single-Skid-Installation for vaporizers not listed requires a skid extension. Please contact AES for details.

POM-30, POM-40, and POM-60 are available with Fisher 99 or Fisher 1098EGR regulators for installations with sufficiently high LP-vapor supply pressure (100-125 psi) and should be used only if the LPG consists at least of 80% Propane. Higher Butane content and/or lower LP-vapor pressure may require different regulator configurations. Specifications are subject to change without notice.

Model Numbers with Suffix -9 indicate Fisher 99 regulators; Model Numbers with Suffix -8 indicate Fisher 1098EGR regulators. Call factory or distributor for price quotation and actual lead times.

## LPG Transfer Pumps - Corken

LPG Transfer Pumps, as the name implies, are used to transfer LPG from the storage tanks to the vaporizer. In systems with Venturi LPG/air mixing systems, they are also responsible for maintaining the pressure needed for optimum and efficient function of the Venturi mixers.

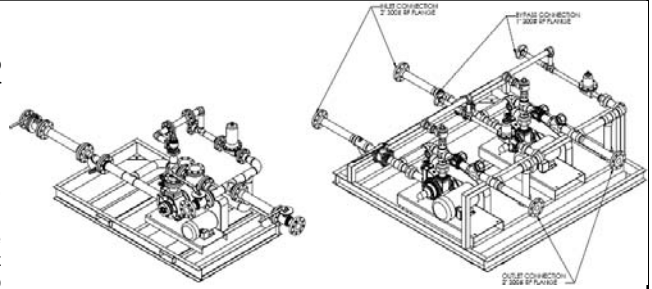
AES uses pumps from the two leading manufacturers, Blackmer and Corken.

All pumps are mounted on steel skids, and are primed and painted. They are equipped with constant and differential pressure regulators, strainer, isolation valves, summer bypass loops, liquid filled pressure gauges, and other components that are required for safe operation.

Smaller pumps are for single phase AC220V/60Hz service. Larger pumps are for 3-phase AC460V/60Hz and require magnetic motor starters. All pumps are also available for 50Hz service. Pumps up to AEP-11C are direct drive pumps (electric motor directly coupled to pump). Larger pumps are belt driven.

Duplex Pump Systems are manufactured as two single pumps. Except for the common skid, they do not share any essential components (mechanical independence = maximum redundancy). The pumps in duplex pump systems can be used in any combination: Pump 1, Pump 2, or Pump 1 and Pump 2 together.

If pump systems are integrated with the vaporizer or vaporizer/blender controls, a start/stop station in an explosion-proof enclosure is installed directly at the pump skid. Integrated pumps can also be equipped with an automatic start/stop function in response to the pressure in the storage tank(s). The price adder for these options is shown in the "Pump Options" section on pages 14 and 15.



Corken Pumps Selection Chart All prices and specifications are subject to change without notice.		Direct-Driven (Turbine)			Belt-Driven (Sliding Vane)						
		C12 AEP-05C	C13 AEP-07C	F14 AEP-11C	Z2000 AEP-22C	Z2000 AEP-32C	Z3500 AEP-42C	Z3500 AEP-53C	Z3500 AEP-66C	Z4500 AEP-98C	
60Hz Service	Simplex Pump System	US-\$ 16,086	US-\$ 16,413	US-\$ 17,272	US-\$ 19,272	US-\$ 22,267	US-\$ 35,147	US-\$ 36,721	US-\$ 39,669	US-\$ 57,314	
	Duplex Pump System	US-\$ 32,494	US-\$ 33,157	US-\$ 34,891	US-\$ 38,931	US-\$ 44,979	US-\$ 72,080	US-\$ 74,178	US-\$ 80,131	US-\$ 115,777	
	HD-5 Propane ΔP 75 psi / 5.1 bar Min. Temperature 0°F / -18°C	gph 455 kg/h 879	703 1358	1117 2159	2068 3997	3310 6398	4344 8396	5503 10637	7034 13596	10096 19515	
	HD-5 Propane ΔP 100 psi / 6.8 bar Min. Temperature -40°F / -40°C	gph 320 kg/h 618	520 1005	800 1546	1880 3634	3080 5953	3600 6958	5000 9665	6560 12680	9640 18634	
	LPG with 50% Prop./50%But. ΔP 75 psi / 5.1 bar Min. Temperature 32°F / 0°C	gph 425 kg/h 871	658 1348	1045 2142	1935 3966	3096 6346	4064 8331	5148 10553	6580 13489	9445 19362	
	LPG with 30% Propane/70%Butane ΔP 100 psi / 6.8 bar Min. Temperature 32°F / 0°C	gph 300 kg/h 630	487 1023	750 1576	1762 3703	2887 6068	3375 7094	4687 9852	6150 12927	9037 18995	
	Electric Motor	220V 60Hz		220V 60Hz 480V 60Hz	480V 60Hz						
	Motor Type	Single-Phase			3-Phase (all 3-phase motors require magnetic starters and overload protection)						
	Motor Protection	Class I, Div 1, Group D (Flame Proof)									
	Motor Size [hp]	2	2	3	5	7.5	10	15	20	25	
Motor RPM	3450	3450	3450	500	750	520	640	780	520		
50Hz Service			CF13 AEP-07C	CF17 AEP-10C	Z2000 AEP-22C	Z2000 AEP-32C	Z3500 AEP-42C	Z3500 AEP-53C	Z3500 AEP-66C	Z4500 AEP-98C	
	Simplex Pump System		US-\$ 17,119	US-\$ 18,531	US-\$ 19,944	US-\$ 22,973	US-\$ 35,005	US-\$ 37,593	US-\$ 40,770	US-\$ 58,419	
	Duplex Pump System		US-\$ 34,581	US-\$ 37,433	US-\$ 40,288	US-\$ 46,407	US-\$ 72,731	US-\$ 75,714	US-\$ 82,355	US-\$ 118,008	
	HD-5 Propane ΔP 75 psi / 5.1 bar Min. Temperature 0°F / -18°C	n/a	gph 380 kg/h 734	517 999	2068 3997	3310 6398	4344 8396	5503 10637	7034 13596	10096 19515	
	HD-5 Propane ΔP 100 psi / 6.8 bar Min. Temperature -40°F / -40°C	n/a	gph 120 kg/h 231	400 773	1880 3634	3080 5953	3600 6958	5000 9665	6560 12680	9640 18634	
	LPG with 50% Prop./50%But. ΔP 75 psi / 5.1 bar Min. Temperature 32°F / 0°C	n/a	gph 356 kg/h 729	483 990	1935 3966	3096 6346	4064 8331	5148 10553	6580 13489	9445 19362	
	LPG with 30% Propane/70%Butane ΔP 100 psi / 6.8 bar Min. Temperature 32°F / 0°C	n/a	gph 112 kg/h 235	375 788	1762 3703	2887 6068	3375 7094	4687 9852	6150 12927	9037 18995	
	Electric Motor	220/230V 50Hz		400/415V 50Hz	400/415V 50Hz						
	Motor Type	Single-Phase			3-Phase (all 3-phase motors require magnetic starters and overload protection)						
	Motor Protection	Class I, Div 1, Group D (Flame Proof)									
Motor Size [hp]	n/a	2	2	5	7.5	10	15	20	25		
Motor RPM	n/a	2880	2880	500	750	520	640	780	520		
50Hz + 60Hz Service	Pump Connections	All pump body connections and all on-skid component connections are 300# RF ANSI. All pump skid connections are 300# RF ANSI or DIN PN40 (PN25 for DN100 and above).									
	Pump Body, Inlet / Outlet, in inches	1.5" / 1"			2" / 2"		3" / 3"		4" / 3"		
	Pump Skid, Inlet, in inches (DIN)	2" (DN50)			3" (DN80)		4" (DN100)		6" (DN150)		
	Pump Skid, Outlet, in inches (DIN)	1" (DN25)			2" (DN50)		3" (DN80)		4" (DN100)		
	Tank Return, in inches	1"			2"						

# LPG Transfer Pumps - Blackmer

LPG Transfer Pumps, as the name implies, are used to transfer LPG from the storage tanks to the vaporizer. In systems with Venturi LPG/air mixing systems, they are also responsible for maintaining the pressure needed for optimum and efficient function of the Venturi mixers.

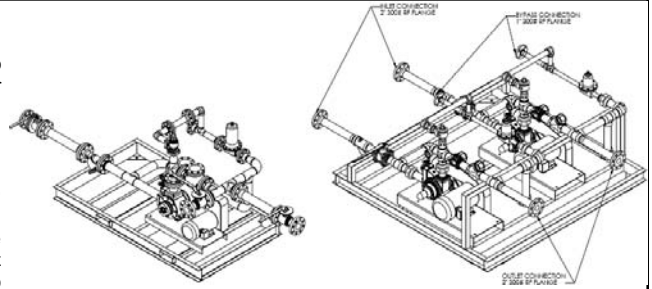
AES uses pumps from the two leading manufacturers, Blackmer and Corken.

All pumps are mounted on steel skids, and are primed and painted. They are equipped with constant and differential pressure regulators, strainer, isolation valves, summer bypass loops, liquid filled pressure gauges, and other components that are required for safe operation.

Smaller pumps are for single phase AC220V/60Hz service. Larger pumps are for 3-phase AC460V/60Hz and require magnetic motor starters. All pumps are also available for 50Hz service. Pumps up to AEP-23B are direct drive pumps (electric motor directly coupled to pump). Larger pumps are belt driven.

Duplex Pump Systems are manufactured as two single pumps. Except for the common skid, they do not share any essential components (mechanical independence = maximum redundancy). The pumps in duplex pump systems can be used in any combination: Pump 1, Pump 2, or Pump 1 and Pump 2 together.

If pump systems are integrated with the vaporizer or vaporizer/blender controls, a start/stop station in an explosion-proof enclosure is installed directly at the pump skid. Integrated pumps can also be equipped with an automatic start/stop function in response to the pressure in the storage tank(s). The price adder for these options is shown in the "Pump Options" section on pages 14 and 15.



Blackmer Pumps Selection Chart All prices and specifications are subject to change without notice.		Direct-Driven (Turbine)			Belt-Driven (Sliding Vane)						
		LGF1P AEP-09B	LGL1.25 AEP-15B	LGL1.5 AEP-23B	LGL2 AEP-45B	LGL3 AEP-58B	LGL3 AEP-78B	LGL3 AEP-98B	LGL3 AEP-118B	LGL4 AEP-150B	
60Hz Service	Simplex Pump System	US-\$ 16,202	US-\$ 17,295	US-\$ 19,854	US-\$ 22,626	US-\$ 35,721	US-\$ 37,416	US-\$ 38,309	US-\$ 46,517	US-\$ 59,300	
	Duplex Pump System	US-\$ 32,728	US-\$ 34,938	US-\$ 40,108	US-\$ 45,705	US-\$ 72,160	US-\$ 75,582	US-\$ 77,384	US-\$ 93,964	US-\$ 119,789	
	HD-5 Propane ΔP 75 psi / 5.1 bar Min. Temperature 0°F / -18°C	475 918	827 1598	1282 2478	1862 3599	2896 5597	3931 7598	4965 9597	6413 12396	10344 19994	
	HD-5 Propane ΔP 100 psi / 6.8 bar Min. Temperature -40°F / -40°C	400 773	720 1391	1120 2164	1640 3170	2400 4639	3400 6572	4400 8505	5800 11211	9200 17783	
	LPG with 50% Prop./50%But. ΔP 75 psi / 5.1 bar Min. Temperature 32°F / 0°C	445 912	774 1586	1200 2460	1741 3569	2709 5553	3677 7537	4645 9522	6000 12300	9677 19837	
	LPG with 30% Propane/70%Butane ΔP 100 psi / 6.8 bar Min. Temperature 32°F / 0°C	375 788	675 1418	1050 2207	1537 3230	2250 4729	3187 6699	4125 8670	5437 11428	8625 18129	
	Electric Motor	220V 60Hz		220V 60Hz or 480V 60Hz		480V 60Hz					
	Motor Type	Single-Phase	3-Phase (all 3-phase motors require magnetic starters and overload protection)								
	Motor Protection	Class I, Div 1, Group D (Flame Proof)									
	Motor Size [hp]	1.5	3	5	7.5	10	15	15	20	20	
Motor RPM	1750	1750	1750	520	420	520	640	800	600		
50Hz Service		LGF1P AEP-09B	LGL1.25 AEP-15B	LGL1.5 AEP-23B	LGL2 AEP-45B	LGL3 AEP-58B	LGL3 AEP-78B	LGL3 AEP-98B	LGL3 AEP-118B	LGL4 AEP-150B	
	Simplex Pump System	US-\$ 16,907	US-\$ 18,002	US-\$ 20,648	US-\$ 23,303	US-\$ 36,534	US-\$ 38,475	US-\$ 39,456	US-\$ 47,372	US-\$ 60,891	
	Duplex Pump System	US-\$ 34,156	US-\$ 36,365	US-\$ 41,712	US-\$ 47,133	US-\$ 73,798	US-\$ 77,723	US-\$ 79,701	US-\$ 95,691	US-\$ 123,449	
	HD-5 Propane ΔP 75 psi / 5.1 bar Min. Temperature 0°F / -18°C	351 678	662 1279	993 1919	1862 3599	2896 5597	3931 7598	4965 9597	6413 12396	10344 19994	
	HD-5 Propane ΔP 100 psi / 6.8 bar Min. Temperature -40°F / -40°C	280 541	560 1082	880 1701	1640 3170	2400 4639	3400 6572	4400 8505	5800 11211	9200 17783	
	LPG with 50% Prop./50%But. ΔP 75 psi / 5.1 bar Min. Temperature 32°F / 0°C	329 674	619 1268	929 1904	1741 3569	2709 5553	3677 7537	4645 9522	6000 12300	9677 19837	
	LPG with 30% Propane/70%Butane ΔP 100 psi / 6.8 bar Min. Temperature 32°F / 0°C	262 550	525 1103	825 1734	1537 3230	2250 4729	3187 6699	4125 8670	5437 11428	8625 18129	
	Electric Motor	220/230V 50Hz		400/415V 50Hz		400/415V 50Hz					
	Motor Type	Single-Phase	3-Phase (all 3-phase motors require magnetic starters and overload protection)								
	Motor Protection	Class I, Div 1, Group D (Flame Proof)									
Motor Size [hp]	1.5	3	5	7.5	10	15	15	20	20		
Motor RPM	1450	1450	1450	520	420	520	640	800	600		
50Hz + 60Hz Service	Pump Connections	All pump body connections and all on-skid component connections are 300# RF ANSI. All pump skid connections are 300# RF ANSI or DIN PN40 (PN25 for DN100 and above).									
	Pump Body, Inlet / Outlet, in inches	1" / 1"	1.25"/1.25"	1.5" / 1.5"	2" / 2"	3" / 3"			4" / 3"		
	Pump Skid, Inlet, in inches (DIN)	1.5" (DN40)	2" (DN50)		3" (DN80)	4" (DN100)			6" (DN150)		
	Pump Skid, Outlet, in inches (DN)	1" (DN25)	1" (DN25)	1.5" (DN40)	2" (DN50)	3" (DN80)			4" (DN100)		
	Tank Return, in inches	1"				2"					

## Pump Contactors and other Options and Accessories for Single-Phase Pumps

Liquid Transfer Pumps with single-phase motors can be supplied with a simple, explosion-proof ON/OFF switch that is integrated into the junction box directly at the pump motor.

If the pump control is desired to be integrated with the vaporizer- or vaporizer/blender control system (for example to facilitate remote monitoring and control), pumps with single-phase motors can also be equipped with contactors.

It is recommended that contactor-equipped pumps are also equipped with a local Start/Stop station that allows pump control from the pump location.

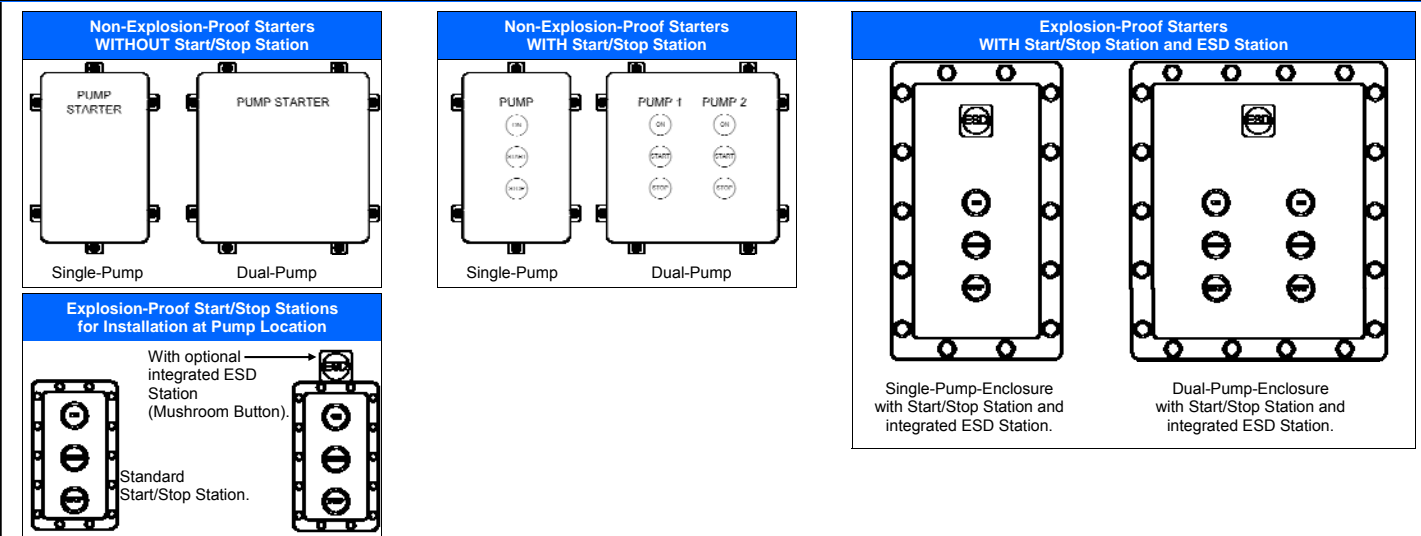
AES Start/Stop stations are configured with an explosion-proof enclosure (Class I, Div 1, Group D [Flame-Proof]), green START button, red STOP button, and amber pilot light (pump ready to be started).

The operation of single-phase pumps with contactors can also be automated in response to the pressure in the storage tanks (pump will start automatically if tank pressure falls below an adjustable setpoint, and stays on until the tank pressure has recovered above a second adjustable setpoint).

If the contactor for a single-phase pump is integrated with the control system, the contactor is typically installed inside the vaporizer or vaporizer/blender control panel.

Order Code	Starter Installation (applies to both Blackmer and Corken Pumps)		
	Description	Single-Pump	Dual-Pump
CT1	<b>Pump Contactor</b> for single-phase pumps, max. motor size 5HP; <b>installed in vaporizer- or vaporizer/blender control panel</b> ; terminals for AC feed, pump connection, and control voltage.	US-\$862	US-\$1,554
CT2	<b>Pump Contactor</b> for single-phase pumps, max. motor size 5HP; installed in separate enclosure; supplied loose <b>for indoor field installation</b> (NEMA 1).	US-\$1,208	US-\$2,174
CT3	<b>Pump Contactor</b> for single-phase pumps, max. motor size 5HP; installed in separate enclosure; supplied loose <b>for outdoor field installation</b> (NEMA 3R).	US-\$1,570	US-\$2,538
Order Code	Automatic Start/Stop Function and Control System Integration (applies to both Blackmer and Corken Pumps)		
	Description	Single-Pump	Dual-Pump
CS1	<b>Integration of pump control in vaporizer- or vaporizer/blender control system</b> ; includes Start/Stop Station, Explosion-Proof Class I Div 1 Group D [Flame Proof]; green START button; red STOP button; amber Pilot Light; installed in separate enclosure at pump skid. (Includes SS1).	US-\$2,991	US-\$4,384
CS2	<b>Automatic pump start/stop</b> in response to pressure in storage tank(s); includes option "CS1: Integration of pump control in vaporizer- or vaporizer/blender control system"; includes Rosemount pressure transmitter in pump inlet. Setpoints for pump ON/OFF are adjustable through inputs at the Electronic Operator Interface.	US-\$6,263	US-\$7,657
Order Code	Start/Stop Stations (applies to both Blackmer and Corken Pumps)		
	Description	Single-Pump	Dual-Pump
SS1	<b>Start/Stop Station, Explosion-Proof</b> Class I Div 1 Group D [Flame Proof]; installed in separate enclosure; green START button; red STOP button; amber Pilot Light; <b>supplied loose</b> for field installation at pump location (NEMA 7, 9, 3R Ex-Proof Outdoor Enclosure).	US-\$1,740	US-\$3,132
SS2	<b>Start/Stop Station, Explosion-Proof</b> Class I Div 1 Group D [Flame Proof]; installed in separate enclosure; green START button; red STOP button; amber Pilot Light; and <b>integrated ESD Station</b> ("Mushroom Button"); <b>supplied loose</b> for field installation at pump location (NEMA 7, 9, 3R Ex-Proof Outdoor Enclosure).	US-\$2,128	US-\$3,521

### Starter Enclosures and Start/Stop Station Enclosures (applies to both Blackmer and Corken Pumps)



## Magnetic Pump Starters and other Options and Accessories for 3-Phase Pumps

Liquid Transfer Pumps with 3-phase motors always require magnetic motor starters. All AES magnetic motor starters are configured with contactor, solid state motor overload protection, service-disconnect function, and manual reset.

AES Starter Packages will be configured to match the selected pump size and motor, and are available for indoor installation, outdoor installation, and explosion-proof Class I, Div 1, Group D [Flame-Proof] installations. It is recommended that all pumps are also equipped with a local Start/Stop station that allows pump control from the pump location. AES Start/Stop stations are configured with an explosion-proof enclosure (Class I, Div 1, Group D [Flame-Proof]), green START button, red STOP button, and amber pilot light (pump ready to be started).

All types can also be integrated into the vaporizer or vaporizer/blender control system for remote monitoring and control of the pump operation.

The pump operation can also be automated in response to the pressure in the storage tanks (pump will start automatically if tank pressure falls below an adjustable setpoint, and stays on until the tank pressure has recovered above a second adjustable setpoint).

If the contactor for a three-phase pump is integrated with the control system, the contactor is typically installed in a separate enclosure inside the control room of a vaporizer or vaporizer/blender. If preferable due to local conditions, the separate starter enclosure can also be located on the outside of the control room of a vaporizer or vaporizer/blender.

Order Code	Magnetic Motor Starters for 3-Phase Pumps (fits both Blackmer and Corken Pumps)			
	Description		Single-Pump	Dual-Pump
ST1	Starter Package, <b>Non-Explosion-Proof</b> ; installed in separate enclosure <b>without Start/Stop Station</b> ; supplied loose for indoor field installation (NEMA 1 <b>Indoor</b> Enclosure).	Motor up to 10 hp Motor over 10 hp	US-\$2,159 US-\$2,589	US-\$3,886 US-\$4,662
ST2	Starter Package, <b>Non-Explosion-Proof</b> ; installed in separate enclosure <b>with integrated Start/Stop Station</b> and Pilot Light; supplied loose for indoor field installation (NEMA 1 <b>Indoor</b> Enclosure).	Motor up to 10 hp Motor over 10 hp	US-\$2,611 US-\$3,043	US-\$4,338 US-\$5,115
ST3	Starter Package, <b>Non-Explosion-Proof</b> ; installed in separate enclosure <b>without Start/Stop Station</b> ; supplied loose for outdoor field installation (NEMA 3R <b>Outdoor</b> Enclosure).	Motor up to 10 hp Motor over 10 hp	US-\$2,364 US-\$2,794	US-\$4,091 US-\$4,867
ST4	Starter Package, <b>Non-Explosion-Proof</b> ; installed in separate enclosure <b>with integrated Start/Stop Station</b> and Pilot Light; supplied loose for outdoor field installation (NEMA 3R <b>Outdoor</b> Enclosure).	Motor up to 10 hp Motor over 10 hp	US-\$2,816 US-\$3,248	US-\$4,543 US-\$5,319
ST5	Starter Package, <b>Explosion-Proof</b> Class I Div 1 Group D [Flame Proof]; installed in separate enclosure with <b>integrated Start/Stop Station</b> and Pilot Light; supplied loose for outdoor field installation (NEMA 7, 9, 3R Ex-Proof <b>Outdoor</b> Enclosure). (Includes SS1).	Motor up to 10 hp Motor over 10 hp	US-\$5,174 US-\$6,050	US-\$9,313 US-\$10,877

Order Code	Automatic Start/Stop Function and Control System Integration (applies to both Blackmer and Corken Pumps)			
	Description		Single-Pump	Dual-Pump
CS1	<b>Integration of pump control in vaporizer- or vaporizer/blender control system</b> ; includes Start/Stop Station, Explosion-Proof Class I Div 1 Group D [Flame Proof]; green START button; red STOP button; amber Pilot Light; installed in separate enclosure at pump skid. (Includes SS1).		US-\$2,991	US-\$4,384
CS2	<b>Automatic pump start/stop</b> in response to pressure in storage tank(s); includes option "CS1: Integration of pump control in vaporizer- or vaporizer/blender control system"; includes Rosemount pressure transmitter in pump inlet. Setpoints for pump ON/OFF are adjustable through inputs at the Electronic Operator Interface.		US-\$6,263	US-\$7,657

Order Code	Start/Stop Stations (applies to both Blackmer and Corken Pumps)			
	Description		Single-Pump	Dual-Pump
SS1	<b>Start/Stop Station, Explosion-Proof</b> Class I Div 1 Group D [Flame Proof]; installed in separate enclosure; green START button; red STOP button; amber Pilot Light; <b>supplied loose</b> for field installation at pump location (NEMA 7, 9, 3R Ex-Proof Outdoor Enclosure).		US-\$1,740	US-\$3,132
SS2	<b>Start/Stop Station, Explosion-Proof</b> Class I Div 1 Group D [Flame Proof]; installed in separate enclosure; green START button; red STOP button; amber Pilot Light; and <b>integrated ESD Station</b> ("Mushroom Button"); <b>supplied loose</b> for field installation at pump location (NEMA 7, 9, 3R Ex-Proof Outdoor Enclosure).		US-\$2,128	US-\$3,521

Order Code	Starter Installation (applies to both Blackmer and Corken Pumps)			
	Description		Single-Pump	Dual-Pump
INS1	<b>Installation of Non-Explosion-Proof Motor Starter inside a Vaporizer Control Room</b> ; includes separate conduit entries in walls of vaporizer control room for power feed, connection to pump, and connection to Start/Stop Station.		US-\$1,035	US-\$1,864
INS2	<b>Installation of Non-Explosion-Proof Motor Starter in a separate enclosure outside a Vaporizer Control Room</b> ; includes separate conduit entries for power feed, connection to pump, and connection to Start/Stop Station.		US-\$1,840	US-\$3,310
INS3	<b>Installation of Explosion-Proof Motor Starter at pump skid</b> ; includes mounting frame for ex-proof starter enclosure; includes conduit connection between starter enclosure and motor junction box; includes 18-inch flex conduit.		US-\$2,635	US-\$4,744

### Ordering-Example

Starter Code	<input checked="" type="checkbox"/> ST1	<input type="checkbox"/> ST2	<input type="checkbox"/> ST3	<input type="checkbox"/> ST4	<input type="checkbox"/> ST5	Example as shown: Non-Explosion-Proof Starter, installed in separate enclosure on the outside of a vaporizer control room; integration of the starter into the vaporizer- or vaporizer/blender control system; complete with installation of a Start/Stop Station at the pump skid.
Control System Integration	<input type="checkbox"/> NONE	<input checked="" type="checkbox"/> CS1	<input type="checkbox"/> CS2			
Start/Stop Station	<input type="checkbox"/> NONE	<input type="checkbox"/> SS1	<input checked="" type="checkbox"/> SS2			
Installation	<input type="checkbox"/> NONE	<input type="checkbox"/> INS1	<input checked="" type="checkbox"/> INS2	<input type="checkbox"/> INS3		

## Terms and Conditions, Warranty Information

The following are the standard terms and conditions of Alternate Energy Systems, Inc. for **domestic** customers. Actual terms and conditions for a specific order may have adjusted language and may be attached to the acknowledgement of the purchase order. Contact Alternate Energy Systems, Inc. for terms and conditions for export orders.

### Acceptance:

Where these terms and conditions are incorporated in a proposal submitted by Alternate Energy Systems, Inc. ("Seller"), that proposal, together with these terms and conditions, expresses the Seller's entire undertaking and responsibility when the Purchaser's written order is transmitted to the Seller within thirty (30) days from the proposal date, and when the Purchaser's order is accepted by the Seller at its offices. Any previous quotations, agreements, conversations, or understandings, are superseded hereby.

For all other orders, these terms and conditions shall govern the contract between the Purchaser and the Seller. Any deviation from these terms and conditions must be agreed upon by the Seller, in writing. Specifically, the fact that Seller provides product in response to an order issued by the Purchaser, carrying deviating terms and conditions, does not automatically indicate that the Seller has accepted the Purchaser's terms and conditions.

### Limited Warranty:

Seller guarantees that all products of its manufacture, sold pursuant hereto, shall be free of defects in workmanship and material, normal wear and tear excepted, for the standard period of one year from date of shipment from Seller. Certain products may carry shorter or longer warranty periods, in effect for these particular products at the time of shipment from the Seller. Commercial items, and other components, such as controls, electric motors, drives, etc., utilized in these manufactured products, are not guaranteed by Seller. Instead, they are covered by, and are subject to, their respective manufacturers' guarantees only. Complete products represented by, distributed by, or purchased and resold in any other manner by, Seller, are not guaranteed by Seller, but will be subject to their respective manufacturer's guarantee.

In the event of defects developing within the Seller's applicable guarantee period under normal and proper use, the Seller will only be obligated to furnish, F. O. B. point of manufacture or the Seller's plant, at its option, without charge, parts required to replace materials found defective; or, at Seller's option, replacement of defective item. Seller or its suppliers shall not be held liable for any further costs or expense, or for indirect or consequential damages, including removal or reinstallation cost, and lost profits. Deterioration or wear caused by chemicals, abrasive action, or excessive heat shall not constitute defects under warranty, unless such conditions are expressly provided for by the Seller, in writing. Products or parts that have been subject to accidental damage, misuse, unauthorized disassembly or alterations, improper installation, lack of proper lubrication, or lack of other service requirements established by the manufacturer, will not be covered by warranty. THE WARRANTY STATED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, STATUTORY, OR IMPLIED; INCLUDING, WITHOUT LIMITATION, THAT OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

### Taxes:

Unless otherwise specifically noted in a proposal, prices quoted by seller do not include any applicable city, county, state or federal taxes. Any of these taxes to which a transaction is subject, are to be borne by the Purchaser, even if collection is required by the Seller.

### Applicable Codes:

Seller or any manufacturer it represents, shall not be liable for any expense involved in meeting any federal, state or local codes. Federal codes, such as those represented in OSHA, refer to the employer (Purchaser) and not to the supplier (Seller). They cannot be delegated. However, the Seller will endeavor to help the Purchaser comply with these codes.

### Component Equipment:

Seller's sales proposals are based on supplying its chosen make of motors, controls, drives and miscellaneous incidental equipment of the type required. If the Purchaser specifies a particular brand of one of these devices, the Seller reserves the right to charge any additional price involved, and its estimated shipping date is subject to such delays as may be required to obtain any non-stock item.

### Shipping:

Seller will use all reasonable care in shipping the equipment and will endeavor to make shipment within the time estimated. However, it assumes no responsibility for loss of, or damage to, the equipment after shipment from its plant, or for unavoidable delays, such as those caused by fire, strikes, carriers, or other causes beyond the Seller's control. Unless instructed otherwise, all shipments will be insured at the buyer's expense and at the net invoice value of the goods.

### Erection and Installation:

Seller assumes no responsibility for improper operation of equipment due to faulty erection or installation, when the equipment is erected by the Purchaser or his designates.

### Cancellation:

All orders placed with, and accepted by, Seller are firm and not subject to cancellation, except by mutual consent. They are cancelable then only on terms that will indemnify the Seller against any losses incurred.

### Claims:

Claims for shortages or damage to merchandise should be made to the transportation company making delivery. Should any piece of equipment prove defective, it will be repaired or replaced under the applicable warranty provided herein. Under no circumstances should any items be returned to Seller or the manufacturer from which Seller procured the item, without prior written Return Goods Authorization from Seller.

If Goods are returned without obtaining Return Goods Authorization, Seller and its associated manufacturers will not be responsible for the cost of repairs made in the field, if they are made without the written agreement of, and specific written instructions from, Seller and the affected manufacturer, if any.

### Payment Terms:

Full net payment must reach Seller's office by the 30th day after invoice date. The following finance charges will apply for later payment, unless other agreements exist for that sale only:

The account is subject to a finance charge for late payment of the lower of (A) the maximum allowable rate, or (B) 1½ % per month (Annual Percentage Rate: 18%) on the total past due balance at any time that the past due balance includes any charge remaining unpaid 30 days after the date on which it was billed. There shall be no finance charge under a "Consumer Credit Transaction" as defined under the Federal Truth in Lending Law.

### Governing Law:

This agreement has been executed in, and shall be governed by, the laws of the State of Georgia.

### Security Agreement and Security Interest:

Purchaser agrees that Seller shall have and retain a security interest in the material furnished pursuant under this Agreement and, if full payment of all sums due is not received by Seller in accordance with the payment terms set forth herein and on the face hereof, Seller shall have the right to enter Purchaser's premises, and any other place where the material may be located, and repossess the material. This right of repossession shall be in addition to, and in no way in limitation of, any rights or remedies Seller may have under law or this Agreement by reason of Purchaser's failure to pay.

### Purchaser's Acceptance of above Conditions:

All orders shall be subject to the terms and conditions described above, and to no others, whatsoever. When attached to the Seller's written quotation, this document contains the entire agreement between the parties, and there will be no oral or written understandings, terms or conditions, and Purchaser will not have relied upon any conditions or representation not contained therein. No waiver, alteration or modification of the terms and conditions on this and the other side hereof shall be binding unless in writing and signed by an executive officer or by a duly authorized representative of the Seller.

THE PURCHASER'S RECEIPT OF THE INVOICE SHALL CONSTITUTE AN ACCEPTANCE BY THE PURCHASER OF ALL THE TERMS AND CONDITIONS CONTAINED DESCRIBED ABOVE, AND ANY ATTACHMENT HEREOF OTHER THAN ANY TERMS OR CONDITIONS TO WHICH THE PURCHASER SHALL PROMPTLY TAKE EXCEPTION BY SPECIFIED WRITTEN OBJECTION.

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