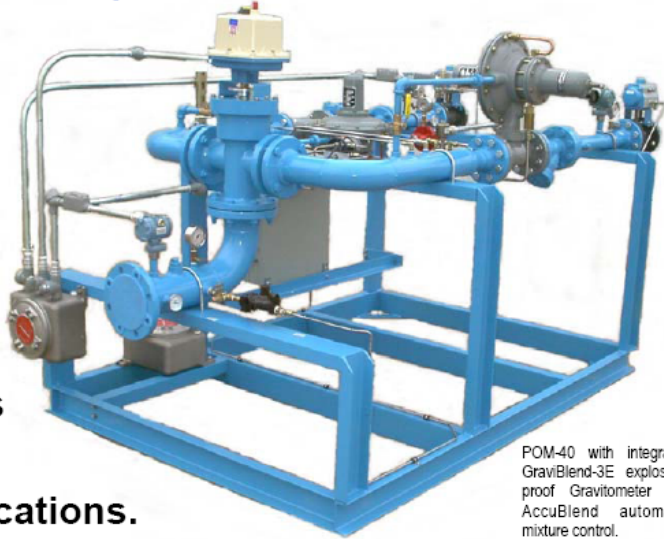


# LPG-Vapor / Air Mixing Systems

Patented Piston Operated Mixers

- Compact Design
- Low Maintenance
- Superior Reliability
- Small Footprint
- High Capacity
- National and International Patents
- For Low Pressure or High Pressure Applications.
- Rosemount Transmitters, Allen-Bradley PLC.
- For Standby Systems or Peak Shaving Applications.
- Capacities from 20 MM BTU/h to over 400 MM BTU/h.
- Option: Complete System Integration with Vaporizers.
- Option: Automatic Control of Wobbe #, O<sub>2</sub> content, Calorific Value, or Specific Gravity.
- Option: Flow Control System for Peak Shaving.
- Option: Remote Control via Modem or Ethernet.
- Option: Installation in Mobile Buildings.



POM-40 with integrated GraviBlend-3E explosion-proof Gravimeter and AccuBlend automatic mixture control.

## What are LPG-Vapor / Air Mixers ?

**L**PG vapor from a vaporizer or a storage tank is not directly compatible with natural gas and can therefore not be used for standby or backup purposes. LPG vapor/air mixers inject air into the LPG vapor stream and thereby produce a gas mixture that is directly compatible and interchangeable with natural gas. This allows users to switch back and forth between natural gas supplied by their utility company and their own, LPG based backup system, without having to change the setup of their any of their process or heating equipment, such as burners, boilers, heater, dryers, kilns, drum ovens, etc.

The most common vapor/air mixers are based on venturi tube mixing devices. For larger system capacities, or for applications with higher system pressures, AES uses our patented Piston Operated Mixer. This concept also allows for very comfortable and reliable automatic controls of the mixed gas properties.

## Standard Features and Options

### Standard Features:

- Nominal capacities from 20 MMBTU/h @ 10 psi to over 400 MMBTU/h @ 40-100 psi.
- Flanged Mixed Gas Outlet.
- Flanged Vapor Inlet and Compressed Air Inlet.
- Rosemount Transmitters for Vapor Pressure, Compressed Air Pressure, Mixed Gas Pressure, Vapor/Air Differential Pressure.
- Allen-Bradley Programmable Logic Controller (PLC) for all safety and process control functions.
- Full-graphic 6-inch color LCD display with touch-screen operator interface, for system start/stop and parameter display. Trend Graphics with up to seven days local data storage.
- Pneumatic safety actuators on vapor and air inlet valves.
- Can be used outdoor or indoor.
- UL listed Safety Pressure Relief Valve.
- UL listed Solenoid Valve in regulator loading line.
- Complete Unit FM and CSA approved and suitable for IRI installations.
- Factory Primed, Painted, and Tested – ready for installation.

### Options:

- Custom Control Panels.
- Custom System Integration.
- Complete Packages with Vaporizers.
- "Piggy-Back" and Common Skid Installation with Vaporizers.
- Flow Meters and Gravimeters/Calorimeters.
- Automatic Correction of Mixed Gas Properties (Calorific Value, Wobbe Number, Specific Gravity).
- Temperature Transmitters for Vapor Supply, Compressed Air Supply, Mixed Gas Outlet.
- Remote Monitoring and Control through Telephone dial-up or Ethernet/Internet.



Typical Indicator Unit with Touch Screen Operator Interface.  
Allen-Bradley PLC ML1200 with DH485 Interface Module.

## Applications

**A**ES Piston Operated Mixers received their national and international patents in 1987 and 1992. They have been manufactured since then with a number of improvements of their control components, but without any changes to the main design concept.

Installations around the world include Peak Shaving Plants for Gas Utilities, Standby Plants for large industrial users, Backup Systems for government and defense installations, Primary Fuel Source for areas without natural gas supply or for areas preparing for connection to natural gas, in Power Plants, Glass and Brick Manufacturing, Chemical Plants, Food Processing, etc.

AES Piston Operated Mixers can be used with AES LPG vaporizers, or with existing vaporizers from other manufacturers. Using them with AES vaporizers allows complete integration with sophisticated, computerized system controls, including remote monitoring and operation.

## How do Alternate Energy Systems' POM LPG-Vapor / Air Mixers work ?

**S**tandard high capacity / high pressure LPG vapor / air mixers used to be very complicated pieces of machinery, difficult to set up, and requiring a very high level of maintenance. With the advent of the POM, "Piston Operated Mixer", these installer and operator "nightmares" are a thing of the past. The astonishing simplicity of the POM guarantees the ultimate in accuracy, reliability and flexibility, and allows the POM to be manufactured in virtually any capacity and of any material compatible with the medium being blended. By using a piston, there are no design pressure or temperature restrictions commonly found with diaphragms, which have high temperature restrictions or may stiffen and crack in cold temperatures.

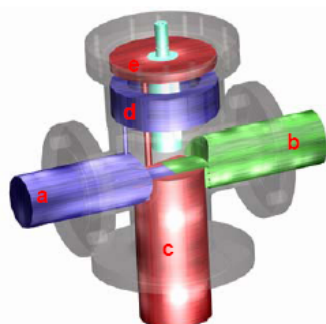
Compared to systems with proportional mixing valves, which typically use differential pressure feedback, POM systems impress with their simple installation, setup, operation and maintenance, their unsurpassed operational reliability, their quick response to load changes, and their turn-down ratio of 50:1 or better.

Once set, the POM will mix two gasses at a constant ratio: the result is an LPG / air mixture which is compatible with natural gas, regardless of the downstream demand. The POM system is a "pushthru" system. This means that it is not necessary to reduce the compressed air or the LPG vapor to zero pressure during the mixing process, before compressing both air and gas to the desired pressure. The POM system utilizes the existing pressure in the LPG to satisfy most industrial and utility peak shaving applications.

**HOW IT WORKS** – The dominant gas (i.e. LPG) enters the mixer at Inlet Port "A". Compressed air enters at Inlet Port "B". Both gasses exit together at Exit Port "C". A small connecting tube connects Inlet Port "A" with Chamber "D" and, another tube connects Chamber "E" (through the piston) with Exit Port "C".

When turned off, or during no-flow periods, the piston rests in the closed position. Upon demand for gas, pressure at Exit Port "C" drops slightly and this depression is passed through the piston to Chamber "E". The pressure Inlet Port "A" (dominant gas) is greater and, since this area connects to Chamber "D", the piston will rise or descend with demand changes or pressure drops at Exit Port "C". When the flow rate is constant, the piston will "float", partially opening the inlet gates. This results in a very accurate positioning of the piston, accurately measuring the flow of gas, regardless of the downstream demand.

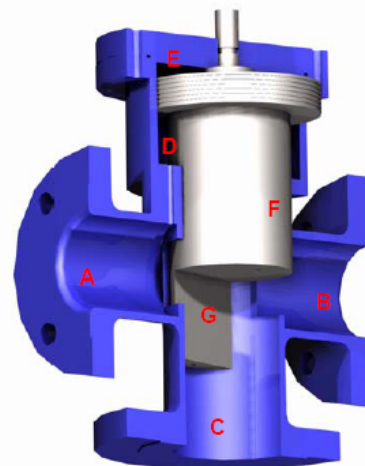
**RATIO ADJUSTMENT** – A segment, cut out of the piston, matches the edge of the cutouts in Port "A-B". The piston is positioned by between a sliding pinned guide and the top of the piston. A knurled knob, attached to the stem of the guide, easily allows adjustment to be made externally by rotating the guide to restrict either Inlet Port, and controls the ratio of gas and air. The piston is designed with a series of grooves, called a "labyrinth", which generates circular "O" rings or vortices which prevent the gasses from transferring between the top and bottom chambers. This design eliminates the need for a diaphragm or a mechanical seal such as a piston ring. It also allows the POM to be equipped with an actuator/positioner for automatic correction of the properties of the mixed gas, i.e. Calorific Value, Wobbe Index Number, O<sub>2</sub> content, Specific Gravity, etc.



Gas Flow through POM Valve

Legend:

- A Dominant Gas Inlet (LPG)
- B Compressed Air Inlet
- C Mixed Gas Outlet
- D Dominant Gas Loading Chamber
- E Mixed Gas Flow Sensing Chamber
- F Piston
- G Ratio Adjustment Segment



# Specifications

SPECIFICATIONS <sup>3</sup>		POM - 30	POM - 40	POM - 60	POM - 80 and higher
Type		Equal Pressure Blending System / Patented Piston Operated Mixer. US-Patents, International Patents			
Max. Capacity <sup>1</sup> at 10 psi / 0.7 bar	MMBTU/h Nm <sup>3</sup> /h	20 400	80 1600	140 2700	consult factory
Max. Capacity <sup>1</sup> at 30 psi / 2.1 bar	MMBTU/h Nm <sup>3</sup> /h	80 1600	200 3900	320 6250	consult factory
Max. Capacity <sup>1</sup> at 50 psi / 3.5 bar	MMBTU/h Nm <sup>3</sup> /h	120 2350	280 5500	400+ 7800+	consult factory
Max. Capacity <sup>1</sup> at 70 psi / 4.9 bar	MMBTU/h Nm <sup>3</sup> /h	180 3500	400+ 7800+	400+ 7800+	consult factory
Max. Capacity <sup>1</sup> at 100 psi / 6.9 bar	MMBTU/h Nm <sup>3</sup> /h	240 4700	400+ 7800+	400+ 7800+	consult factory
Design Temperature	°F °C	180 82	180 82	180 82	consult factory
Manufactured Construction		Conforms to ASME Boiler & Pressure Vessel Code and latest Edition of NFPA # 58			consult factory
Approvals		Factory Mutual (FM) and CSA Suitable for Industrial Risk Insurers (IRI) installations.			consult factory
Standard Safety Features		All system status signals are constantly monitored through a Programmable Logic Controller (Allen-Bradley PLC). Process values and any alarm conditions are communicated to, and displayed at, the 6-inch color LCD display with touch screen operator interface in plain English.			consult factory
High Mixed Gas Pressure		Rosemount electronic pressure transmitter in mixed gas outlet. Setpoint adjustable through Operator Interface.			consult factory
Low Mixed Gas Pressure		Rosemount electronic pressure transmitter in mixed gas outlet. Setpoint adjustable through Operator Interface.			consult factory
High LPG Vapor Pressure		Rosemount electronic pressure transmitter in vapor supply line. Setpoint adjustable through Operator Interface.			consult factory
Low LPG Vapor Pressure		Rosemount electronic pressure transmitter in vapor supply line. Setpoint adjustable through Operator Interface.			consult factory
High Air Supply Pressure		Rosemount electronic pressure transmitter in compressed air supply line. Setpoint adjustable through Operator Interface.			consult factory
Low Air Supply Pressure		Rosemount electronic pressure transmitter in compressed air supply line. Setpoint adjustable through Operator Interface.			consult factory
Excess Differential Pressure		Electronic differential pressure transmitter between downstream vapor and air lines. Setpoint adjustable through Op. Interface.			consult factory
Local Indicators		Liquid filled pressure gauges for vapor supply, compressed air supply and mixed gas outlet. Vapor/air differential gauge.			consult factory
Safety Valves in Vapor and Air Inlet		Air-actuated full-port ball valves close on high-pressure alarms. Fail-safe design with spring-return closes valves on power failure.			consult factory
Vapor Supply Connection		2" 300# Flange	2" 300# Flange	2" 300# Flange	consult factory
Air Supply Connection		2" 150# Flange	2" 150# Flange	2" 150# Flange	consult factory
Mixed Gas Outlet Connection		3" 150# Flange	4" 150# Flange	6" 150# Flange	consult factory
Electrical Requirements	domestic Export	AC 110 V 60 Hz 3 A, Single Phase AC 220 V 50 Hz 3 A, Single Phase			consult factory
Dimensions <sup>2</sup> (W x L x H)	inch mm	54 x 92 x 53 1372 x 2337 x 1346	54 x 96 x 57 1372 x 2438 x 1448	54 x 103 x 64 1372 x 2616 x 1626	consult factory
Weight <sup>2</sup>	lbs kg	1000 455	1050 480	1200 550	consult factory

<sup>1</sup> Nominal Capacity for Propane with 1450 BTU/cuft (12900 kcal/m<sup>3</sup>) Propane/Air Mix @ 25 to 250 psig. Capacity for other LPG mixtures may vary.

<sup>2</sup> Dimensions and weights are approximate. <sup>3</sup> Specifications subject to change without notice.

# POM Selection Chart

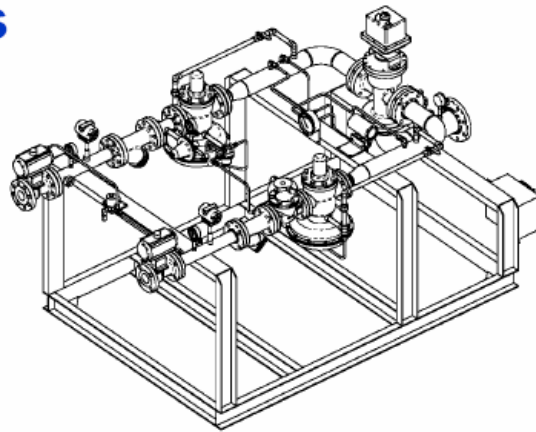
**T**o find the right POM for your application, select the required nominal system capacity from the first column of the chart. Move to the right until you are below the system design pressure (delivered mixed gas pressure). The top row of the cell indicates the POM model number. The bottom row of the cell indicates the POM configuration (regulator type / orifice size).

**N**ominal Capacity in MM BTU per hour (top row) and Nm<sup>3</sup>/h (bottom row) is given for Propane/air mixture 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 125 psig, and a pressure drop of 10% across the mixing valve at maximum flow.

	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 MM 391 m <sup>3</sup>	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978
40 MM 781 m <sup>3</sup>	POM-40 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978
60 MM 1172 m <sup>3</sup>	POM-40 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978
80 MM 1562 m <sup>3</sup>	POM-40 9978	POM-40 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 99118
100 MM 1953 m <sup>3</sup>	POM-60 9978	POM-40 9978	POM-40 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 9978	POM-30 99118	POM-30 99118
120 MM 2343 m <sup>3</sup>	POM-60 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-30 99118	POM-30 99118	POM-30 99118	POM-30 99118	POM-30 99118	POM-30 99118
140 MM 2734 m <sup>3</sup>	POM-60 99118	POM-60 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-30 9835100	POM-30 9835100	POM-30 9835100	POM-30 9835100	POM-30 9835100
160 MM 3125 m <sup>3</sup>		POM-60 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-30 9835100	POM-30 9835100	POM-30 9835100	POM-30 9835100
180 MM 3515 m <sup>3</sup>		POM-60 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-30 9835100	POM-30 9835100	POM-30 9835100	POM-30 9835100
200 MM 3906 m <sup>3</sup>		POM-60 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-40 99118	POM-30 9835100	POM-30 9835100	POM-30 9835100
220 MM 4296 m <sup>3</sup>		POM-60 98340	POM-60 98340	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-30 9835100	POM-30 9835100
240 MM 4687 m <sup>3</sup>		POM-60 98340	POM-60 98340	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-30 9835100
260 MM 5077 m <sup>3</sup>			POM-60 98340	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
280 MM 5468 m <sup>3</sup>			POM-60 98340	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
300 MM 5859 m <sup>3</sup>			POM-60 98340	POM-60 9835100	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
320 MM 6249 m <sup>3</sup>			POM-60 98340	POM-60 9835100	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
340 MM 6640 m <sup>3</sup>				POM-60 9835100	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
360 MM 7030 m <sup>3</sup>				POM-60 9835100	POM-60 9835100	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
380 MM 7421 m <sup>3</sup>				POM-60 9835100	POM-60 9835100	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100
400 MM 7811 m <sup>3</sup>				POM-60 9835100	POM-60 9835100	POM-60 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100	POM-40 9835100

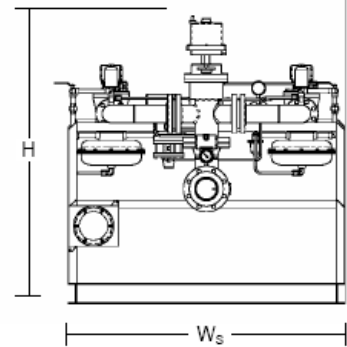
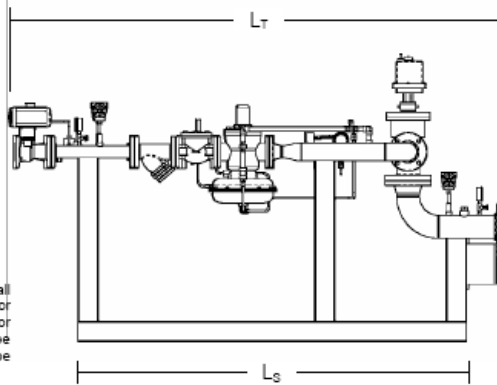
# Drawings, Dimensions

	Dimensions in inches		Dimensions in mm	
	W <sub>S</sub>	L <sub>S</sub>	L <sub>T</sub>	H
POM-30	54	72	92	53
	1372	1829	2337	1346
POM-40	54	76	96	57
	1372	1930	2438	1448
POM-60	54	84	103	64
	1372	2134	2616	1626

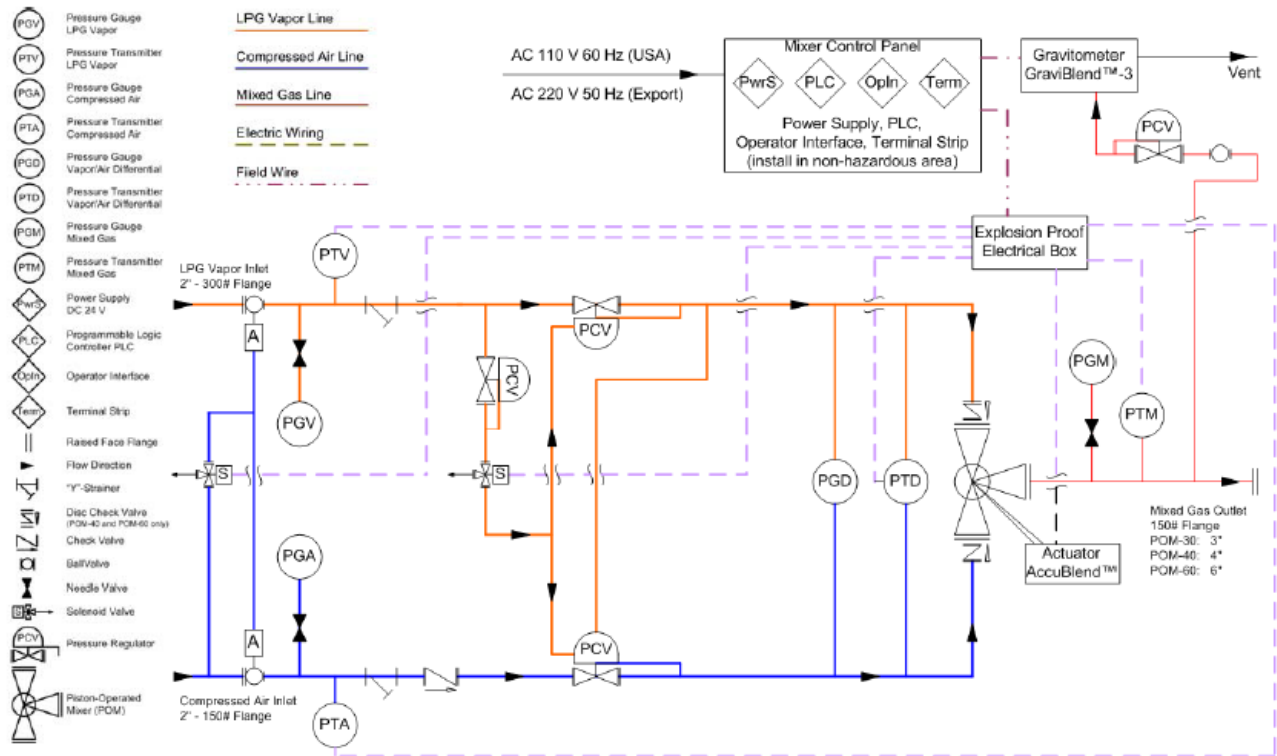


Safety Valves in Vapor Inlet and Air Inlet are pneumatically actuated and "fail-safe" through spring-return to "Closed" position in case of power failure.

Standard regulator type on all POM models is Fisher 99 or similar. POM models for certain applications may be equipped with regulator type Fisher 1098-EGR or similar.



# Typical System Configuration (P&I D)



# Options and Accessories

## AccuBlend™ – Automatic Control of Gas Properties

All AES patented Piston Operated Mixers (POM-30 to POM-80) can be equipped with this option. It consists of an electric actuator, mounted on top of the POM valve, and a dedicated PID controller. The PID controller receives the 4-20 mA signal from the GraviBlend™-3 gravitometer, and compares this signal with a pre-set value, representing the correct mixture. If deviations are detected, the actuator changes the rotational position of the piston in the POM valve, thereby effectively correcting the mixture to meet customer requirements. When model GraviBlend™-3 with option "ACUCON" is used, the function of the PID controller is integrated into the microprocessor-controls of the GraviBlend™-3.



## GraviBlend™-3 – Specific Gravity Meter

GraviBlend™-3 Gravitometers measure the Specific Gravity (S.G.) of the LPG/Air mixture. The resulting signal is an indicator for the quality of the produced gas. Maintaining a consistent SG value of the LPG/air mixture is important in applications where variations in the heat content of the gas would change the heat output of a burner or furnace, and where this change in heat output would have a negative effect on the process.

If combined with the AccuBlend™ option, the signal from the Gravitometer is looped back to the positioner/actuator at the mixing valve, which then changes the gas/air ratio to correct any variations in the S.G. of the mixed gas.



## Plant System Integration, Remote Monitoring and Control, Options

All control panels of AES POM mixers can be equipped with additional components for integration into existing plant monitoring systems, and/or for remote system monitoring and/or remote system operation.

Available solutions include modem dial-up, Ethernet, DH-485, DH+, etc. Other, customer-specific configurations are available. Please contact AES or your authorized distributor or system installer for details.

In addition to the remote monitoring and control equipment, the systems can also be equipped with transmitters for water or vapor temperature, with flow metering devices, etc.



## "Piggy-Back" Installation

In installations with limited space, the POM can be installed on top of a standard AES water bath vaporizer.

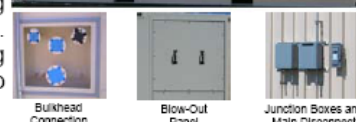
This option includes the installation of the mixer control panel in the vaporizer control room, and wiring of all control components and transmitters to the panel.

The option is available for vaporizer models WB-1000 to WB-4500 and must be specified at the time of the order.



## Separate Mixer Building

Customers in areas with extreme weather conditions very often require LPG/Air mixing equipment to be installed in separate buildings. AES has developed a building concept that is based on modified 20ft or 40ft ISO shipping containers. This makes the structures easy to transport to the installation site, without the need for special-transport-permits. All mixing equipment is factory pre-installed and fully tested, considerably reducing the installation time. A typical building has the main mixer room, and a separate room for the system control panel. This room also provides heated/climate controlled, insulated space for operating personnel. Both building sizes offer room for two mixers. The 40ft building also has room to house air compressors with a combined capacity of up to 300 kW.



Bulkhead Connection

Blow-Out Panel

Junction Boxes and Main Disconnect