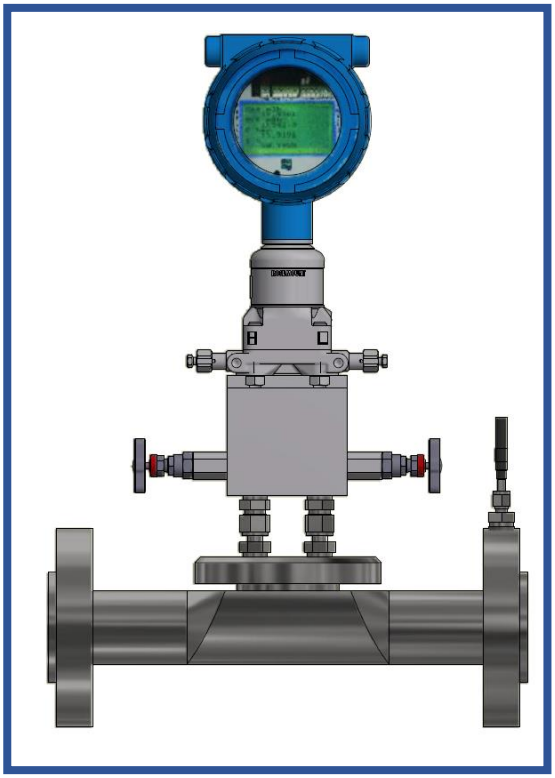
esmerGL ™

TECHNOLOGY OVERVIEW



ESMER GL is a revolutionary low cost flow meter for measuring the flow rates of ***total liquid and gas*** phases in oil, condensate and wet gas production lines without the need for separation or complex sensor technologies.

ESMER GL comprises a field unit fitted with oil industry standard transmitters and a flow computer mounted directly above the field unit.

ESMER GL Runtime Software runs on the **ESMER Flow Computer** and performs the conversion of the basic transmitter signals to liquid – gas flow rates. The software is founded on a combination of fluid dynamic and thermodynamic models and signal processing technologies. It is configured (field calibrated) by means of the **ESMER GL Configurator** running on the Windows PC platform. The Configurator is connected to the Flow Computer by means of Bluetooth wireless technology.

ELECTRO-MECHANICAL SYSTEM

ESMER GL can be installed horizontally or vertically and does not require flow conditioning. ESMER GL's primary element is the **ESMER Cone** configured with the usual set of differential pressure measurement transmitters. Cone element is interchangeable providing a beta in the range 0.5 to 0.75

ESMER Flow Computer mounted on the field unit executes the I/O and processing tasks in real time and outputs measurements to the SCADA via MODBUS. A four line digital display shows liquid and gas rates and primary measurements (P,T,DP). *ESMER GL* handles the natural fluctuations present in multiphase flow by conducting measurements (actual and standardised gas-liquid flow rates) at a high frequency.

Electro-Mechanics Summary

Materials: NACE and ASME standards.
Meter sizes: 2" to 14"
Transmitters: DP/AP/ RTD
Certification: EEx ia IIB T4
Power Supply: 220VAC / 20 W
Communication: RS485 MODBUS

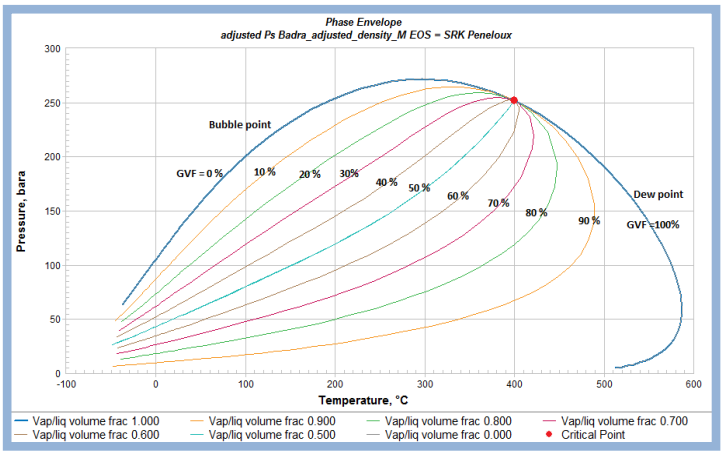
Typical Weights and Dimensions

SIZE	L cm	H cm	W cm	WEIGHT kg
2"	40	80	50	40
6"	60	90	70	100

SOFTWARE

ESMER GL Real Time Software hosted on the flow computer provides integrated fluid dynamic and thermodynamic ***Flow Models*** which can be suited for different fluid /flow regimes.

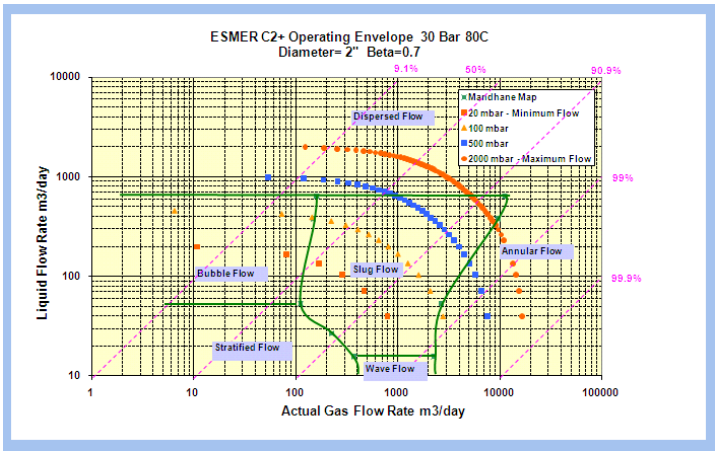
The user is able to customize the Flow Models to match particular process conditions by means of the ***ESMER GL Configurator*** package that runs on the PC – Windows platform. The same package is also used for updating / configuring the flow computer by means of Bluetooth wireless technology.



Thermodynamic Equilibrium Model – Cubic Equation of State

ESMER GL Configurator will create a synthetic fluid matching the phase behavior of the given process fluid by means of a cubic EOS. Phase densities and GOR at actual and STP conditions will be predicted by an EOS in real time. The **Configurator** will also output a correlation (based on empirical data) to predict the coefficient of discharge of the cone under given fluid and process conditions.

Inputs required for the Configurator are basic fluid PVT properties, such as oil density, viscosity and water composition. Such simple inputs are sufficient for achieving the target accuracy.



Newtonian Flow Model – Bernoulli Equation

The procedure and the tools provided for configuration of ESMER GL are in compliance with API 2566 guidelines. Petroleum Software Ltd has a long track record of testing and applying the tune up methods in the field.

Operating Envelope	Measurement Uncertainty
Gas & Liquid Flow Range: Depends on pipe diameter and beta. Each application is sized specially based on process Conditions. **Water Cut:** 0 – 100% (with Red Eye) **GVF:** 0 – 100% **Pressure:** up to 150 bar **Temperature:** up to 120 ˚C	**Liquid flow rate:** +/- 5% (relative %FS) **Gas flow rate:** +/- 10% (relative %FS) **Water cut :** +/- 3% (abs) Quoted at 95% confidence level. Accuracy will depend on GVF, water composition and field tune-up capability. A specific accuracy target will be provided for each application.

Petroleum Software Ltd

http://www.petroleumsoftware.co.uk