



Weatherford®

Red Eye® Multiphase Metering System



Complete multiphase measurement solution.

Red Eye Multiphase Metering System

The *Red Eye* multiphase metering system (REMMS), combines partial separation technology with conventional liquid and gas metering to provide a complete multiphase measurement solution. An advanced controller governs the operation of the system as well as interpreting and recording data and providing communications with external host systems. The REMMS unit can be used for automated well testing at a manifold or on an individual well.

The main components of these multiphase metering systems are a gas-liquid cylindrical cyclone (GLCC) separator, flow metering instruments, and level control valves. The principle of operation is based on inducing bulk separation of the liquid and gas phases by creating a cyclonic flow pattern. Once separated, individual streams are measured with conventional liquid and gas meters, giving the unit a distinct advantage over more complicated non-separation meters. The separated phases are then recombined or transported in separate flowlines. Although this concept and its advantages have been known for some years, recent advances in technology have brought GLCC separators to the forefront of multiphase metering in the oil and gas industry.

Weatherford's REMMS well testing systems are built to ANSI B31.3 piping code. This provides greater flexibility for designing and building systems to handle any well head or process pressure and temperatures up to 450°F (232°C). It also eliminates the need for a pressure safety valve on the system. Depending on customer requirements, production well testing systems can also be built under ASME Section VIII, Division 1 vessel code specifications.

Features

- Non-nuclear
- Conventional instrumentation
- Compact design
- Real-time data for well optimization
- 0 to +95% GVF operating range
- High accuracy
 - ±2% volumetric gas measurement*
 - ±2% volumetric liquid measurement*
 - ±2% water cut over full measurement range*

*For standard well testing systems under normal flowing conditions.



Major Advantages

- Real-time data for continuous mode monitoring

The GLCC and flowmeters operate in continuous, rather than batch mode, giving the operator real-time production information. Real-time data helps in maximizing the production as well as creates the ability to optimize the injection rates of water, steam, CO₂, or natural gas.
- Compact design

The REMMS unit has a small footprint and is lightweight, which makes it ideal for use on portable systems; offshore platforms; mobile offshore production units (MOPUs); floating production, storage, and offloading (FPSO) vessels; or anywhere there is a space or weight consideration. It is approximately 1/8th the wet weight of a vertical separator and 1/64th the wet weight of a horizontal separator.
- Well optimization

Due to the low cost and simple design of the well testing system, it can be employed cost-effectively to perform real-time monitoring for individual wells or a production stream.
- Lower operating cost
- Self cleaning
- Standard conventional controls
- Can be fully automated
- Slug handling capability

The cyclone separator has the ability to handle approximately four times the maximum normal instantaneous liquid flow.
- Large turndown

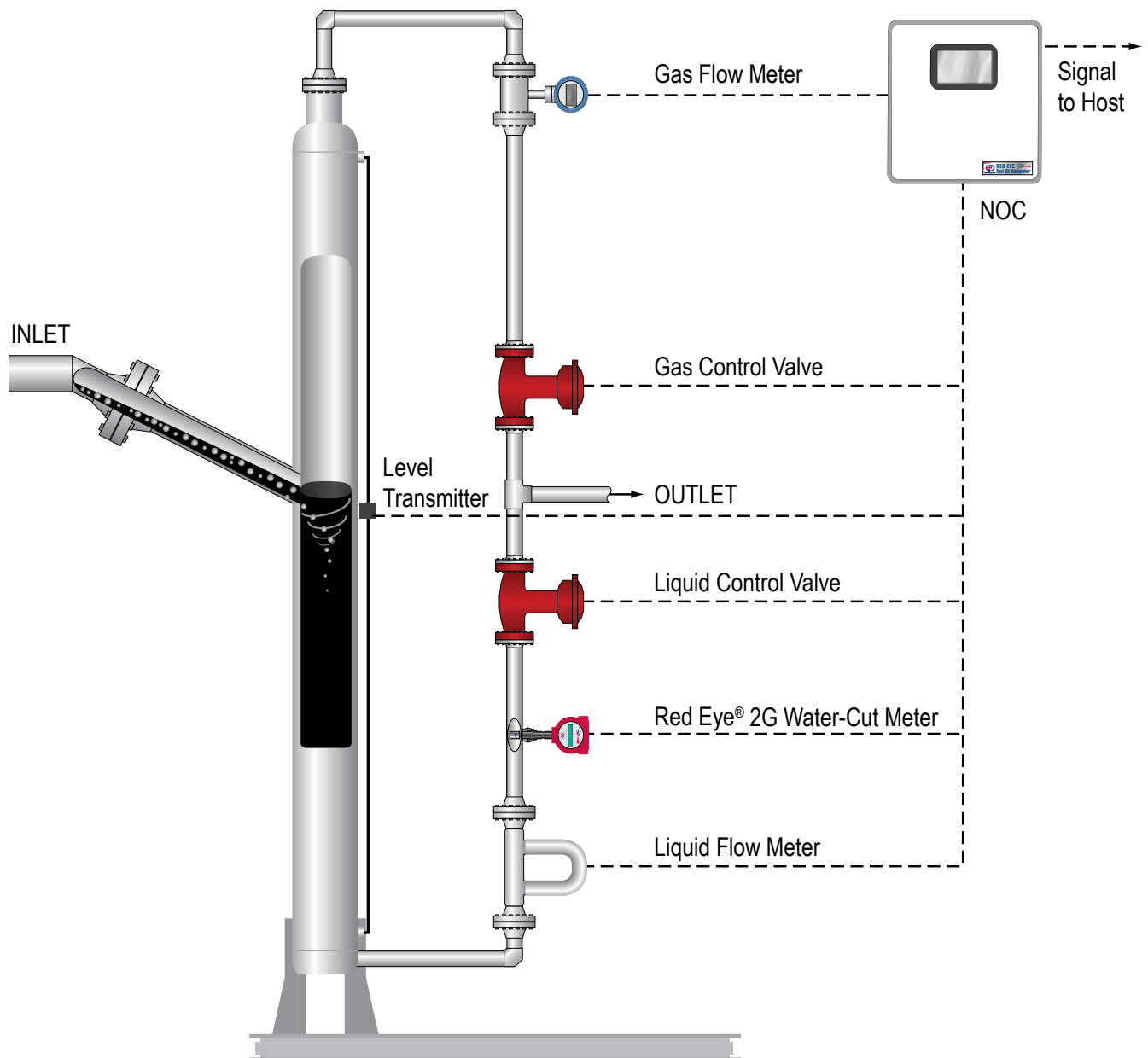
The well testing system can be designed for high turndown ratios 100:1.
- Not affected by the motion of the vessel or platform



Method of Separation

Weatherford's REMMS well testing system can be designed to handle any three-phase flow condition. Three-phase fluid enters the GLCC through a narrow tangential inlet. This forces the liquid and gas to accelerate through the inlet and around the vertical axis of the GLCC, creating a vortex.

This vortex causes the gas to separate from the liquid and due to the large density difference between the gas and liquid phases, the gas migrates quickly to the top of the GLCC and the liquid travels to the bottom.



Flow Metering

Oil and water flow rates are measured using a liquid flowmeter and the *Red Eye 2G* water-cut meter. A gas flowmeter is used to measure the gas rate and then the two phases can be recombined or transported in separate flow lines. Level inside the GLCC is monitored by using a differential pressure transmitter. Gauge pressure and temperature transmitters are also installed on the separator to measure the process temperature and pressure conditions. Liquid and gas control valves are used to maintain an optimum separation level inside the GLCC. The signals from all these instruments are sent to the REMMS remote terminal unit (RTU) which controls the separation and metering processes and displays the well testing results.

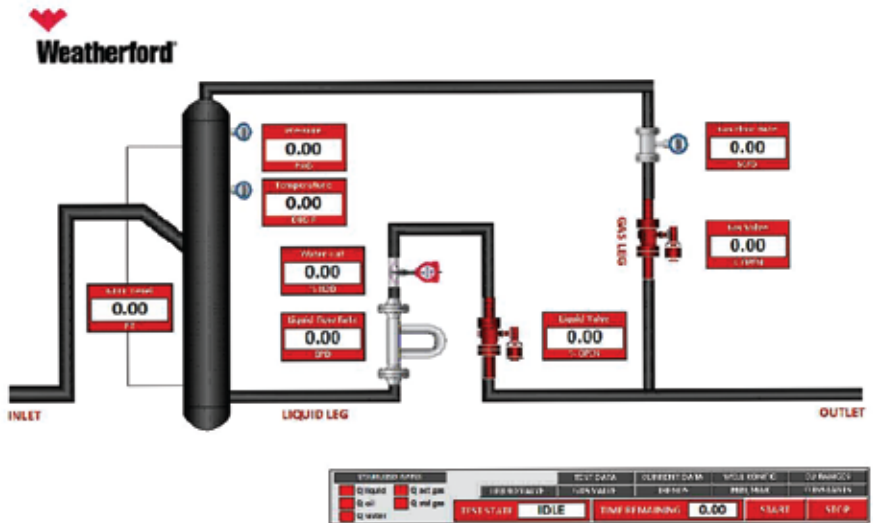
The cyclone effect in the GLCC has some damping capability and when coupled with control valves on the gas and liquid legs, it produces an efficient separation system with a very wide operating range. The result is an engineered system that can handle the whole range of flow regimes from steady state to slug flow.





REMMS RTU

- Supports all production testing modes
 - Semi-automatic
 - Automatic
 - Manual
- Local graphical display of process data and flow rates
- Class 1, Division 2 operating environment
- Integrates with most host systems



Red Eye 2G Water-Cut Meter

- Next generation optical technology
- Excellent full range accuracy
- Simple calibration
- Works with all oils/condensates
- Ignores salinity and dissolved gas
- Insensitive to entrained gas
- Easy installation and service

Typical Applications

Production Testing

REMMS replaces conventional two- and three-phase test separators with an automated system incorporating higher capacity and efficiency per footprint and weight. Due to the short residence time in the REMMS separator, well test time may be shortened, enabling the operator to have the latest well performance data. Turn-down ratios from 40:1 with single meters and up to 100:1 with multiple meters can be achieved.

Individual Well Monitoring

Weatherford continuous well testing systems can also be used to monitor individual wells. This data can then be used to optimize gas-lift, water, or steam-flood injection rates, or any artificial lift system. Most importantly, this continuous data can be used to optimize the yield from the entire reservoir, maximizing the company's return on its investment. When REMMS is installed at each wellhead, the operator has real-time production data, which can be used to provide more accurate statements of production, allocation, and payment of petroleum royalties. Networking the wells offers a tremendous savings in piping costs and instrumentation.

Customer Specific Requirements

Weatherford's units are built per customer's specifications. They can be designed to meet client's expectations in terms of size, metering options, accuracy, redundancy, and integration with other existing equipment such as choke valves or MPSVs. REMMS' mechanical design can be modified if there are any space constraints and the operating software can be customized to add inputs from any additional instruments that might be required to provide a successful well testing solution for a particular application.

Specifications for Design

Please contact a Weatherford representative to complete an application data sheet to review your particular requirements.



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