

**Measurement Solutions for Liquid and Gas**

**FMC Measurement Solutions** is the world leader in the supply of custody transfer measurement systems for liquid and gas.

- Over 1,500 measurement systems installed in over 100 countries
- Projects designed to international measurement requirements
- Customized applications
- Single source responsibility
- Experience in providing innovative design solutions for any custody transfer application
- Highly skilled project management teams capable of supplying systems on a global basis in a timely manner
- Total turnkey capabilities

FMC’s systems provide the optimum solution for any measurement objective.

**Total Measurement Solutions**

FMC Measurement Solutions combines the strengths and capabilities acquired over the past six decades as the world's leading supplier of liquid and gas petroleum measurement systems and equipment to provide complete measurement solutions to its customers. By applying its unique engineering expertise in the design and commissioning of petroleum measurement and control systems for the most demanding applications in the world, FMC has established itself as the name customers trust for experience, state-of-the-art innovation, proven global capabilities and superior project management.

**Experience Combined With Innovation**

FMC has acquired a vast knowledge base that can be applied to any liquid or gas measurement challenge. A thorough understanding of diverse conditions and customer requirements provides the ability to custom-design premium systems for specific applications.

Liquid metering systems developed range from relatively small liquid production LACT units to fiscal and custody transfer flow metering systems to huge crude export facilities, many of which involve high volume transfer of crude oil. Gas metering systems design includes capabilities ranging from production well meters to fuel and flare gas metering to large pipeline transportation facilities.

FMC has provided more FSO (floating storage and off-loading) metering facilities than any other company in the world and in doing so has developed very unique capabilities and experiences related to measuring the large flow rates characteristic of marine loading operations. Because each marine loading transfer involves a multi-million dollar transaction - measurement accuracy becomes much more significant in these large transfers than in any other application. FMC's specialized knowledge and experience is applied to these demanding measurement applications to ensure successful project execution from start to finish.

**Project Management**

Since system manufacturing involves custom design and fabrication, FMC's highly skilled project management and engineering teams offer complete support at every phase of the project. Whether there are requirements for language translation, international code interpretation, compliance with regional practices or project commissioning in a remote location, FMC project teams have the experience the petroleum industry relies on. Project team structure and flexible manufacturing capacities provide the geographic focus, mobility and resources necessary to deliver excellence anywhere in the world. FMC personnel oversee every aspect of system design, fabrication, and commissioning to ensure flawless operation.

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*Kårsto Processing Plant Upgrade Norway – The project scope allows for new allocation and fiscal metering systems for propane, condensate, and natural gas. Statpipe and Åsgard fiscal gas metering system upgrades incorporate five Kongsberg MPU 1200 Ultrasonic gas flowmeters. The systems are combined with an on-line gas analyzer and a propane metering skid with compact prover and sampler. Condensate metering skid and flare metering equipment are all fully controlled and integrated by Kongsberg metering control systems.*
Technical Services
- Front end engineering and budget pricing to assist in project development
- Dedicated project management for each project
- System component specification to ensure the highest accuracy for any custody transfer application
- Specialized MMI (man-machine interface) packages for efficient operation and interface to overall plant operating systems
- Customized software modules provide security and reporting of fiscal data necessary for accurate transactions
- Integration of product quality analysis equipment including densitometers, viscometers, sampling devices, chromatographs and similar analyzers
- Integration and testing of completed system at the factory
- Documentation, training and specialized field support ensuring efficient start-up and trouble-free operation
- Existing facility surveys for upgrade recommendations

Integrated systems with Supervisory control capabilities

This metering skid for the PEMEX FSO features twenty 16” Smith positive displacement meters. Flow computation is provided by split architecture Smith Meter SyberTrol flow computers and the total operation is controlled by a Smith SyberVisor® control system.

Supervisory Computer Systems
The Smith Meter™ SyberVisor® and Kongsberg FCS 212 are FMC’s upper-level supervisory computer systems. Whether utilizing Windows or Unix based operating systems, FMC’s control systems allow incorporation of the widest range of industry standard flow meters, instrumentation, valve actuators and process control systems to provide customers with a full range of solutions to attain cost-effective, accurate and innovative measurement systems.

Features and Benefits:
- Additional meter runs added easily without software changes
- Trending of process variables is a standard feature
- Easy to understand graphics format gives the operator system status at a glance
- Quick and easy navigation between screens
- Available in fully redundant configuration
- Compatible with a variety of flow computers

A Name You Can Trust
FMC Measurement Solutions recognizes the critical importance of maintaining accurate measurement to ensure fiscal accountability. Whether the requirements are on-site commissioning, planned maintenance programs, or refurbishment assessments, FMC is unsurpassed for expertise, flexibility and responsiveness. Recognized for more than 65 years as the world leader for accurate, reliable, and innovative measurement solutions, FMC Measurement Solutions has earned its reputation as the most trusted name in measurement.

FMC Measurement Solutions offers a variety of gas systems designed, engineered and built as precision instruments for measuring gas flow. Our unsurpassed experience and commitment to excellence are built into every system to ensure that your application requirements are met, on time and budget every time.

Analyzers, gas chromatographs and sampling systems for liquid and gas are integrated to meet the project’s design and goals.
Superior Liquid and Gas Flow Computing

**FMC Measurement Solutions** flow computers and control systems are the superior choice for integration with liquid and gas measurement systems to compliment the project’s design goals.

**Flow Computers and Metering Control Systems**

**Kongsberg FPM 207 Flow Computer**

The FPM 207 flow computer is an advanced, single board computer for rack installation in a control cabinet. It performs all fiscal flow calculations, production totaling, signal monitoring and control logic. All field interfaces are installed as Industrial Pack (IP) modules on the system board. Several serial protocols are available for instrument communication.

**Applications**
- Liquid and gas metering
- Batch loading
- Proving control
- Sampling and analysis

**Features**
- Compact design
- Hart communication
- TCP/IP protocol
- User interface on PC
- 1-3 meter runs in any combination of gas or liquid
- Remote maintenance

**Kongsberg FCS 212 Flow Metering Control System**

Efficient and Accurate Metering and Control – The Kongsberg FCS 212 is a complete metering control system with a full range of components including field cable termination, signal conditioning, flow computers, supervisory computers, and an advanced man-machine interface. The system not only meets recognized international standards but the strictest statutory and regulatory requirements as well.

**Applications**
- Liquid metering and proving control
- Gas metering
- Sampling and analysis

The FCS 212 system provides a wide range of basic functions and can be configured for special functions not normally part of a metering system.

**Functions**
- Batch loading
- Automatic proving
- Multi-product metering
- Automatic sampling
- Metering data management
- Long-term storage
- Reports and bills
- Alarms and logs
- Trending and monitoring

**Smith Meter SyberTrol® Flow Computer**

A control room in a box – The power of custom configuration makes the Smith Meter SyberTrol the industry’s most advanced custody transfer flow computer. Its unique split architecture design flexibility provides ease of installation and cost savings by allowing mounting at the metering skid or control room. It has the capability to be configured to meet unique I/O parameters, communication, mounting, printing, display and report requirements. Utilizing SyberMate software, SyberTrol parameters are quickly and easily set up and customized via a PC based Windows operating system.

**Applications**
- Pipelines
- Marine facilities
- Crude oil gathering systems
Smart Flow Computer
Flow computing made smarter – FMC’s new breed of high performance smart flow computers offer field mounting installation for quick, easy and cost-effective computing for both liquid and gas applications.

Software Features
- **User Configurable Flow Computer** – Complete online help menu and clear selection parameters makes configuring the flow computer easy.
- **Tube Switching** – Two pulse/switch outputs and 3 additional optional switch outputs.
- **User Configurable Reports** – Daily, hourly, monthly and proving reports are available. Standard and user formatted reports. Programmable ticket reports.
- **API, AGA, GPA, ASTM Calculations.**
- **Flow Direction and Pulse Security** – Valve sequencing, temperature/flow rate stabilization.
- **Audit Trail** – In full compliance with API chapter 21.
- **Single or Dual Stream** – Selectable single or dual detector switch inputs. Valve sequencing, temperature/flow rate stabilization. Piston/Ball launching.
- **Turbine or Orifice** – Turbine sine or square wave, and 1 - 5 volt input are all located on the terminal board.
- **"C" Based Software** – Free PC software for the flow computer interface is provided with each flow computer.
- **Modbus Protocol** – Modbus shift registers for re-ringing 16 and 32 bit data in pre-configured sequence.
- **User Configurable Display** – 2 lines 16 characters extended temperature industrial plasma display. Display scrolls through user configured parameters.
- **Batches and Presets** – User assignable for temperature, pressure, flow rate, and density.

Hardware Features
- **Temperature Compensated 24 Bit A/D** – 24 bit resolution with reading stability of 1/100 degree F (-17.2 to 37.8°C).
- **Industrial Display** – Industrial plasma display.
- **EEPROM Memory** – 64K of EEPROM for configuration backup and totalizer security.
- **Memory** – 2 megs of EPROM and 2 megs of RAM are standard.
- **Transient Protection** – Zener diodes for voltage and transient.
- **Optical Isolation** – Optical isolation for noise immunity and micro processor protection.
- **Explosion Proof Housing** – NEMA 7 (NEMA 4X).
- **Battery Backed RAM** – Real Time clock for keeping time and date at power loss.
- **32 Bit Microprocessor** – Motorola 68332 20.97 MHz, 4 MIPS.
- **12-36 Volt DC Power** – Maximum load 220 mA at 24 volts. Minimum cold start current is 2 Amps.
- **RS485/RS232** – RS485 half duplex to host computer only. RS232 can be configured as a host computer interface, a chromatography port or printer interface.
- **Communications** – Two communications ports with multi-drop capability. RS485 half duplex to host computer only. RS323 can be configured as a host computer interface, chromatography port, or printer interface.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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