CAMERON

CAMERON Flow Computer Solutions

Scanner series EFMs for timely, accurate data for guiding business decisions

SOLUTIONS

Operators around the globe trust their most critical measurements to CAMERON Scanner products

Originating with the CAMERON® Scanner® 2000 microEFM – the first self-contained flow computer in the industry to operate autonomously with lithium battery power – Cameron's Scanner product line delivers timely, accurate measurement data in the form required for engineering, operations, accounting, and marketing management.

The Scanner 2000 series supports temperature- and pressure-compensated measurement of fluids in power-efficient devices that are integrated easily into a SCADA network. The Scanner 3000 series expands this offering with wireless communications, advanced processing technology, and the ability to integrate and manage multiple devices in a local area network using a browser-enabled laptop or mobile device. CAMERON brand software products complete the Scanner product offering with the essential tools for configuring, calibrating, downloading logs, and presenting data in a user-friendly format.

Oil and Gas Production

- Traditional separation and measurement
- Commingled wet gas
- System-wide water flows
- Enhanced oil recovery (steam or CO_2)
- Well testing
- Fluid transfer

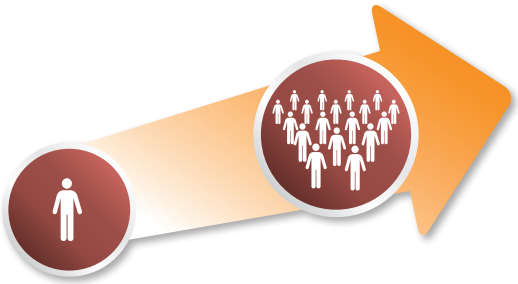
Transportation

- LACT systems
- Natural gas systems
- Non-standard gas mixture flows

All flow computers are not created equal

Power Autonomy

Cameron's power-saving design allows users to power a Scanner 2000 series flow computer for up to one year with an integral lithium battery pack. This reduces deployment costs and provides added flexibility for remote installations. Where external power is available, the battery pack acts as a backup power supply during a power outage.



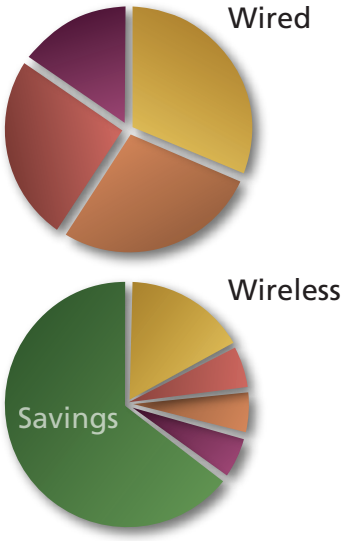
Scalability

The ability to deliver both standalone computation products and customized solutions for centralized automation makes CAMERON flow computers the preferred choice for many applications. Cameron customers enjoy a level of scalability that is second to none in managing their equipment investments. Cameron's smart integration capabilities allow users to start small and add units without basing their hardware decisions on contingencies for future expansion.

Wireless Cost Savings

Cost-conscious operators will benefit from Cameron's investment in wireless technologies. The addition of a tiny short-haul IEEE 802.15.4e-compliant SmartMesh® radio to Scanner 2000 and 3000 series devices can save operators 50% or more on setup costs without sacrificing system integrity. Wireless-equipped networks can support up to 22 flow streams, with benefits including:

- Reduced system engineering
- Faster and reduced-cost installation
- Higher quality integration
- Improved health, safety, and environmental (HSE) performance during deployment
- Isolation from electrical surges



Regulatory Compliance

Cameron's advancements in power and signal latency management enable users to realize the efficiencies of wireless communications and distributed flow computing without sacrificing compliance with industry regulations. Despite the long-recognized potential for cost savings, previous wireless implementations were unable to capture primary measurements used in flow calculations within the one-second window mandated by API standards. Scanner EFMs transmit computed results that are time- and date-stamped to comply with requirements such as FERC 636, Sarbanes-Oxley, Directive 17, and EPAP.

CAMERON Scanner flow computers measure standard volume, mass, and energy flows of saturated steam and many types of gases and liquids with custody transfer precision utilizing ISO, API, AGA, and ASME standards. They also can measure gas, oil, and water flow from a two- or three-phase separator or compute the flow from an ultrasonic gas flow meter.

Discover the CAMERON Scanner 2000 Series

CAMERON flow computers measure and compute flow to base conditions, while correcting for the influence of dynamic pressure, temperature, and environmental factors. Simultaneously, two additional flow streams from a pulse-producing flow meter may be totalized. The Scanner 2000 microEFM provides an effective replacement for chart recorders. With external connections, each device operates independently as a flow computer, RTU, or process controller.

Sensor Options – Scanner flow computers can be factory-installed on Cameron's gas and liquid turbine meters, orifice meters, and cone meters, or shipped separately for connection to a CALDON ultrasonic meter or other primary flow sensors. For applications requiring differential pressure measurement, an integral multivariable transmitter is provided. For applications requiring additional pressure inputs, a CAMERON 800 series pressure transmitter can be used to collect data serially or via an analog input.

Control – When equipped with a 4 to 20 mA output and PID control, Scanner 2000 series flow computers can control process variables such as static pressure, differential pressure, temperature, and flow rate. The output can regulate a control valve or adjustable speed drive by controlling a single parameter such as flow rate or any single parameter in combination with a secondary pressure control.

Power Autonomy – Scanner 2000 series devices are designed to operate autonomously with an integral lithium battery pack. Where external power is available, the lithium pack provides a dependable backup, ensuring uninterrupted measurement even when power is lost.

Configuration and Reporting Software – ModWorX™ Pro is Cameron's configuration software interface for Scanner 2000 series flow computers. The PC installation supports complete configuration and maintenance, including 12-point calibration, demand polling, download of flow logs, configuration data, event/alarm records, and reporting. A configuration upload tool saves time in configuring multiple units. PID tuning controls also are provided for use with PID-enabled units.

ModWorX Pro software is complimentary and available for download from the Cameron website: *www.c-a-m.com/FlowComputers.*

Scanner 2000 Wired EFM

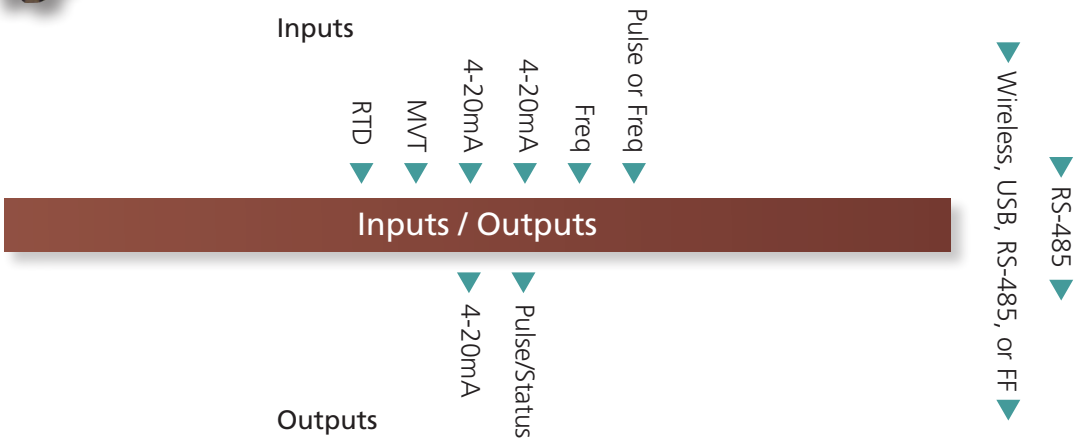
- Three conduit entries (capacity for five, with optional terminal housing)
- Explosion-proof*, intrinsically safe*, and weatherproof* hazardous area approvals
- FOUNDATION™ fieldbus communications available
- Networks with Scanner 3100

Scanner 2100 Short-Haul Wireless EFM

- SmartMesh® 2.4 GHz short-haul communication (requires Scanner 3100 gateway)
- Wired option with expandable I/O
- Five conduit entries (capacity for eight, with optional MVT adapter)
- Explosion-proof* and weatherproof* hazardous area approvals
- Twice the battery capacity of the Scanner 2000
- Easy battery access

Scanner 2200 Long-Haul Wireless EFM

- Third-party, long-haul wireless communication devices
- Powered by rechargeable battery or DC power
- Non-arcing (weatherproof*) Div. 2 hazardous area approval
- Networks with Scanner 3100



For more information, see the Scanner 2000 series technical data sheet.

*Explosion-proof, weatherproof, and/or intrinsically safe as defined by CEC, NEC, ATEX, IEC, and CE codes. See technical data sheets for full details.

Discover the CAMERON Scanner 3000 Series

The CAMERON flow computer Scanner 3100 model is Cameron's most advanced flow computer, offering two integral flow runs, gas chromatograph support, and the processing power to handle the industry's most challenging fluid property calculations like GERG-08. It also serves as a wireless network manager with the capacity to maintain up to 20 wired or wireless Scanner series devices in a local area network.

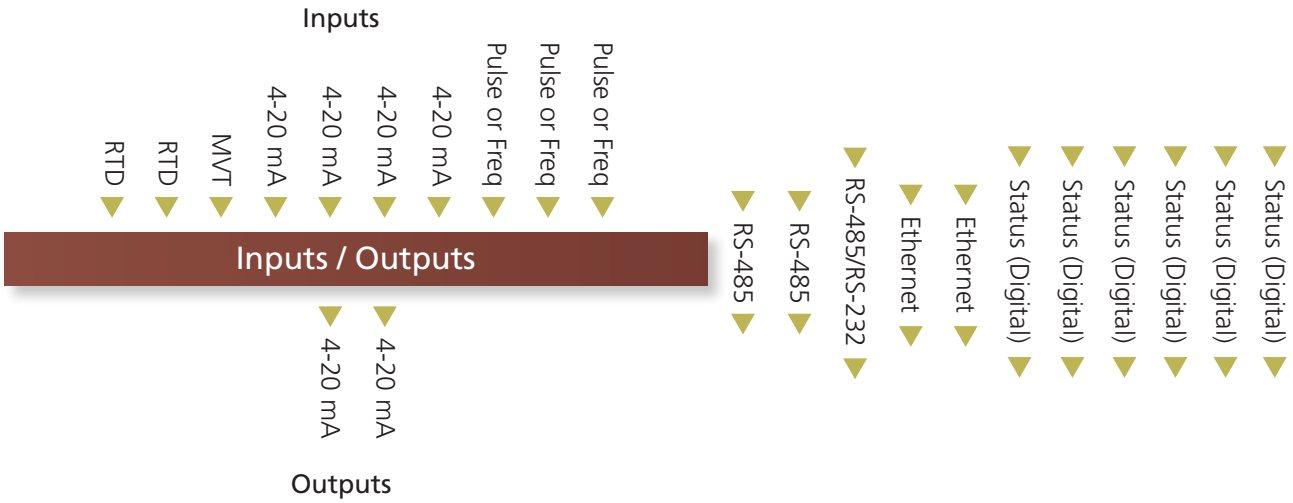
Sensor Options – Like the CAMERON Scanner 2000 series, the Scanner 3100 model can be factory-installed on Cameron's gas and liquid turbine meters, orifice meters, and cone meters, or shipped separately for connection to a CALDON ultrasonic meter or other primary flow sensor. With 17 inputs and outputs, the Scanner 3100 model exceeds requirements for common industry applications, and serves the needs of customers in search of a flow computer, totalizer/recorder replacement, RTU, or complete network solution.

Web Interface – Cameron's newest flow computer model is configured using an Ethernet connection and a simple web browser. Users can access the interface with a laptop, tablet, or even a smart phone, providing maximum flexibility in monitoring operations, locally or remotely. The interface simplifies configuration and calibration and provides access to data generated by the Scanner 3100 and networked devices. Data can be downloaded via the web interface, an FTP server, or serial connection.

Recordkeeping and Diagnostics – The Scanner 3100 model flow computer not only generates daily and hourly flow totals, but simultaneously monitors and records other values that may be instrumental in assessing a resource or diagnosing a problem. For detailed analysis, a trigger log can be used to capture high-resolution data based on an event or threshold.

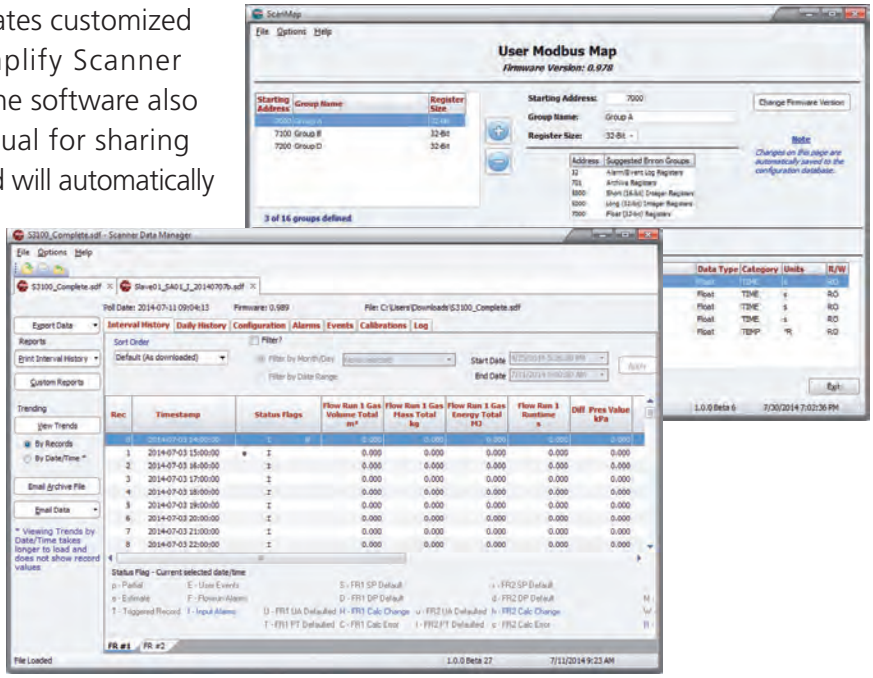
Communications – Scanners employ universal Modbus® structures for exchanging data among Scanners, remote SCADA hosts, and other field automation devices. As an intermediary to the SCADA host, the Scanner significantly reduces the number of expensive long-haul communication connections.

The Scanner 3100 model responds to inquiries from radios and other devices using serial, Ethernet, and optional Wi-Fi communications.



Reporting and SCADA Integration Software – Cameron's Scanner Data Manager software opens the data files downloaded from any Scanner model, allowing users to view, print, and export flow/event/alarm logs and configuration data for sharing with others or satisfying audit requirements. The software also converts data to Flow-Cal® and PGAS® formats. Users can view flow data in tabular or trend graph views, and create professional customized reports.

Cameron's ScanMap software creates customized Modbus register maps that simplify Scanner integration with a SCADA host. The software also can create an HTML custom manual for sharing register information with others, and will automatically upload the manual to a Scanner 3100 model for viewing within the web interface.

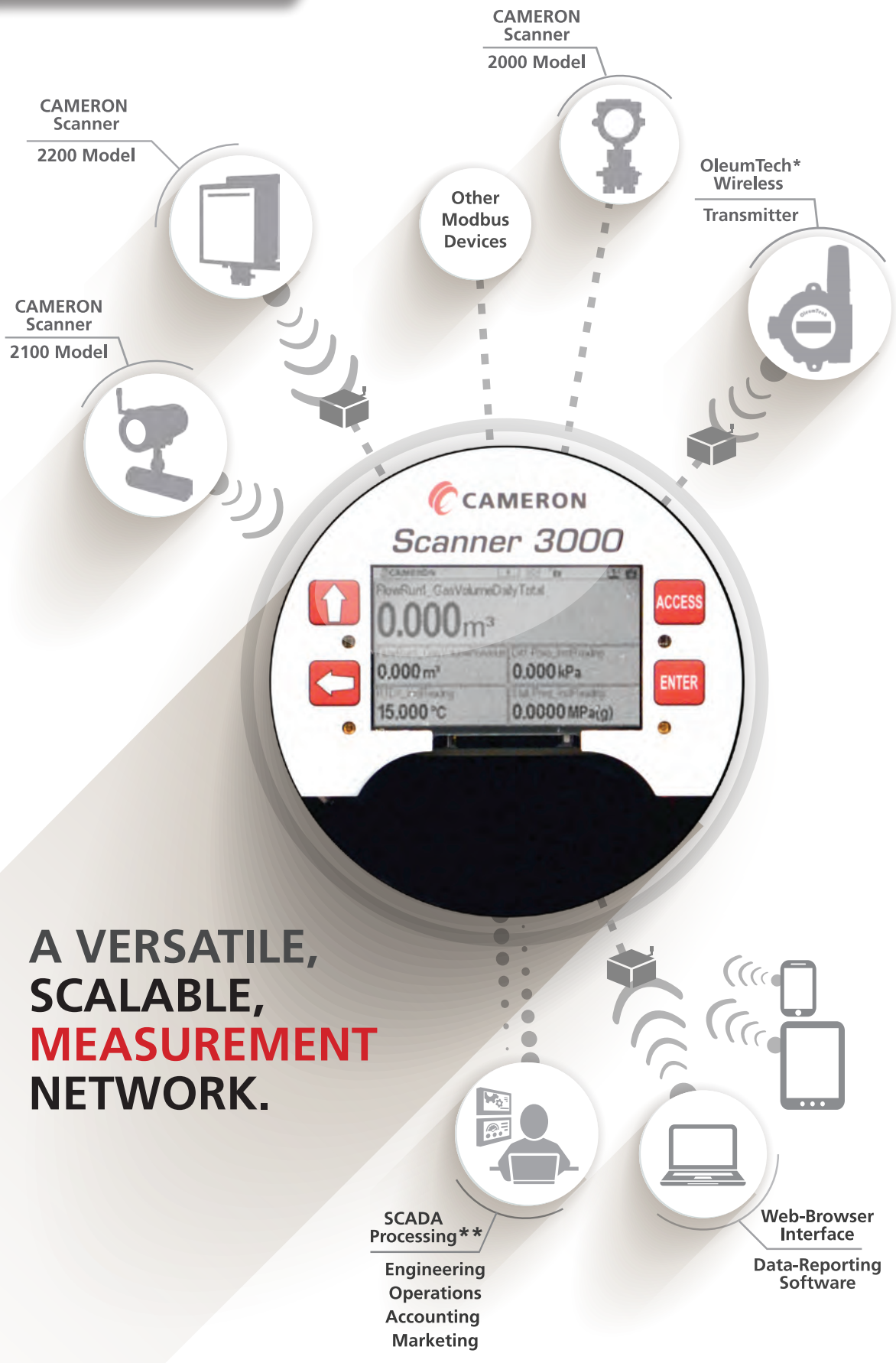


Scanner Data Manager and ScanMap software is complimentary and available for download from the Cameron website: *www.c-a-m.com/FlowComputers.*

Scanner 3100 Model

- Multistream measurement and control
- Two integral flow streams
- Local area network manager (supports up to 20 remote flow runs)
- Wireless communications
- Monitors up to 384 data points from Modbus devices
- Five conduit entries
- Explosion-proof* hazardous area approvals
- External power with lithium battery backup

For more information, see the Scanner 3100 EFM and Scanner Data Manager technical data sheets.



A VERSATILE, SCALABLE, MEASUREMENT NETWORK.

*Offered in association with OleumTech™ Corporation. ** Compatible with eFCAS (a Cameron SCADA solution offered in association with CPU, LLC) and other SCADA products.

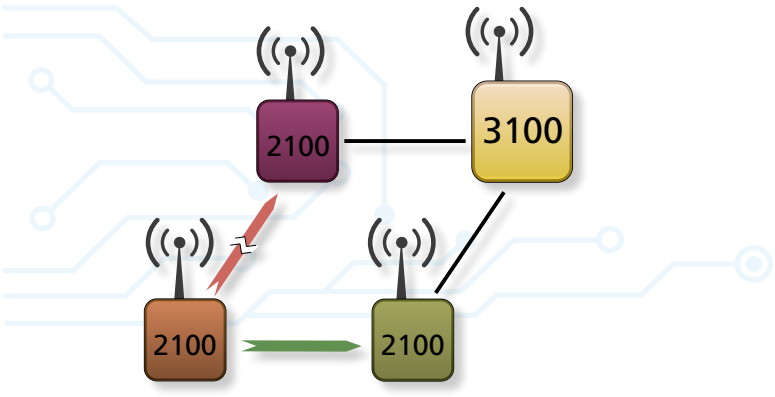
Cameron's distributed network solution reduces the risk and inefficiency associated with conventional automation by securely storing data at the point of measurement. CAMERON Scanner devices independently process and store measurement values, copy the results to a Scanner 3100, and then communicate the data to distant operational and accounting centers, providing the accuracy and measurement integrity you depend on.

Redundant Storage – Unlike conventional networks that transmit data from multiple slave devices to a master computer for processing, CAMERON Scanner slave devices are flow computers (not transmitters). Because they compute and store measurements locally, the data is secure and retrievable, even if a primary flow computer fails.

Processing Protection – Cameron's distributed processing technique frees up processing power at the data collection site to ensure that the master computer meets the expected industry-standard computation requirements, even under extreme network processing loads.

SmartMesh Wireless Technology – Wireless communications are delivered via a SmartMesh IEEE 802.15.4e-compliant system, operating in the internationally recognized 2.4 GHz frequency band. Data is securely transferred across an industrial site using three powerful integrity techniques:

- **Frequency Diversity** – Every data packet exchange channel-hops to avoid inevitable RF interference and multipath fading. Since communications are scheduled, multiple conversations can occur simultaneously within the network on non-overlapping channels, which enhances throughput without wait periods. Trusted neighbors are identified and adjusted periodically so that in the event the preferred route fails, an alternate route will be substituted immediately.
- **Time Slotting** – Every Scanner 2100 model is allocated time for sleeping, listening, and talking. With this time slotting, all nodes communicate without in-network collisions, enabling dense network deployments. The Scanner 3100 model monitors network traffic and dynamically adjusts timeslot allocation in response to changes in data demands.
- **Path Diversity** – Cameron's SmartMesh-based network creates redundant routes for data to travel between the network manager and multiple Scanner nodes. The self-healing network detects and reroutes data around broken paths to ensure that it reaches the intended destination. All traffic in the network is protected by end-to-end encryption, message integrity checking, and device authentication. Signal latency issues are negated because the data includes a date and time stamp for automatic chronological ordering.

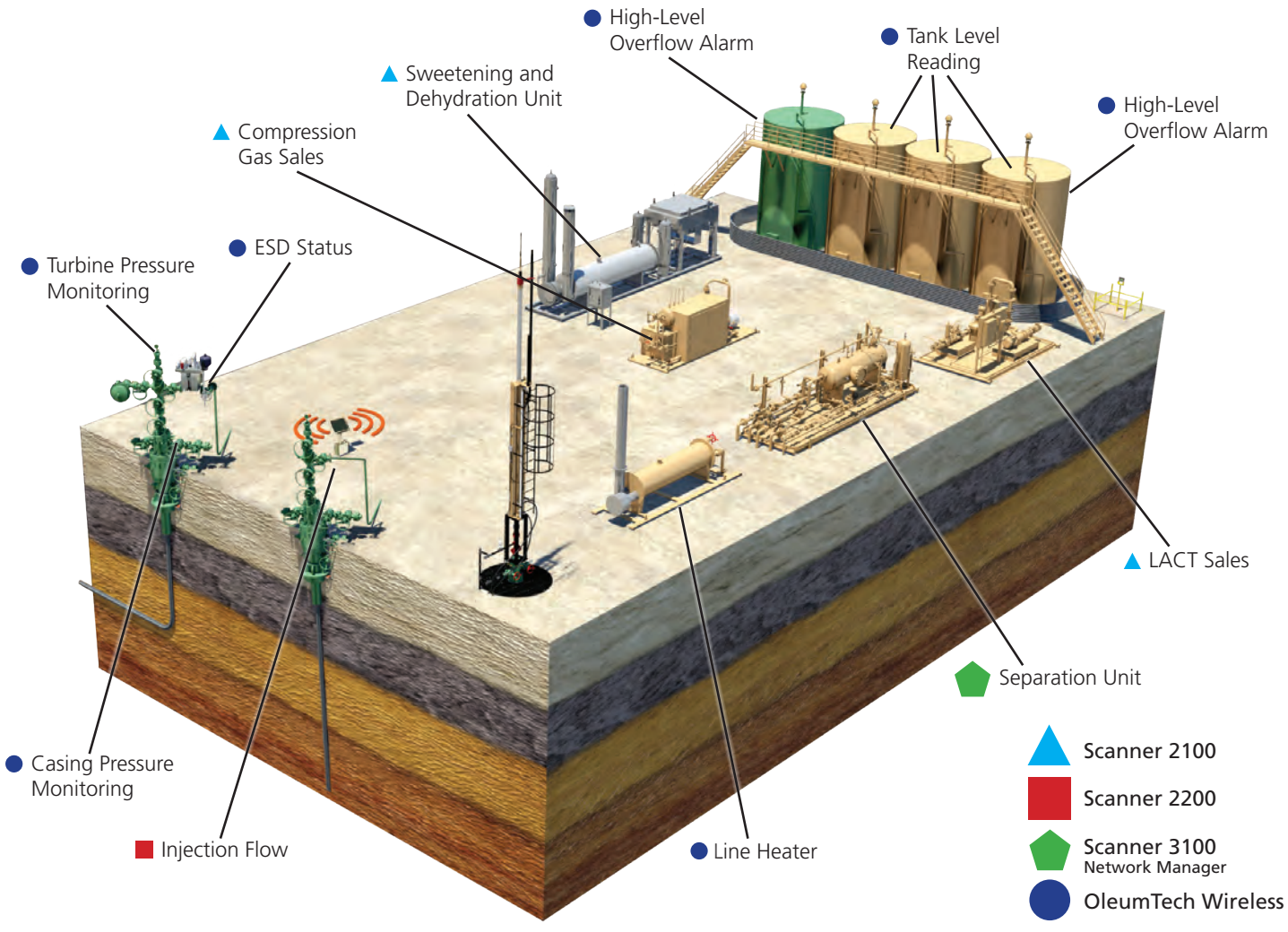


SCADA integration just became a lot easier

CAMERON Scanner flow computers with Modbus protocol ensure compatibility with the industry's preferred SCADA host platforms. SCADA integration is simplified by Cameron's software that allows users to edit Modbus register maps to conform to the structure of an existing host system.

Scanner series flow computers create and store data that supports the needs of various business segments within an organization. A host software, such as eFCAS™*, facilitates this process by copying data from the field to the office and providing the tools to validate and apply the data.

eFCAS SCADA host software is designed specifically for managing the real-time and historical data required in the oil and gas industry. eFCAS integrates automation products from multiple manufacturers to help companies maintain their legacy investments without compromising compliance with accounting and measurement standards. Solutions include automated data collection, validation, editing, real-time analysis, reporting exports, and record management.



*Offered in association with CPU LLC.

Complete care for a complete network

Supporting the installation of more than 30,000 Scanner series flow computers around the globe, Cameron knows the challenges and issues in the field. Our suite of product support services includes:

- Troubleshooting
- Application and integration engineering support
- Spare parts

Discover Measurement

Cameron offers a comprehensive portfolio of measurement products and solutions, including:

Flow Metering
- DP cone meters
- Turbine meters
- Ultrasonic meters
- Orifice fittings and meter runs
- PD meters

Mechanically-Actuated Instruments
- Level switches
- Pressure switches
- Differential pressure switches
- Flow switches
- Temperature switches

Flow Electronics
- Flow computers
- Totalizers
- Transmitters

Quality Systems
- Sampling systems and products
- Blending systems

Engineered Automated Systems
- LACT units
- Bi-directional meter prover systems
- LPG odorant injection systems
- Pipeline and terminal metering systems

CAMERON

United States
3250 Briarpark Drive, Suite 300
Houston, TX 77042
Tel 1 281 582 9500
ms-us@c-a-m.com

34762 Lencioni Ave.
Bakersfield, CA 93308
Tel 1 661 387 6813

4040 Capital Ave.
City of Industry, CA 90601
Tel 1 562 222 8440

7003 E 47th Avenue Drive
#A-1000
Denver, CO 80216
Tel 1 303 429 7707

197 Equity Blvd.
Houma, LA 70360
Tel 1 985 868 1514

302 Toledo Drive
Lafayette, LA 70506
Tel 1 337 234 1824

6914 Westport Ave.
Shreveport, LA 71129
Tel 1 318 682 9700

7000 Nix Drive
Duncan, OK 73533
Tel 1 580 470 9600

5125 S Garnett Road, Suite E
Tulsa, OK 74146
Tel 1 918 665 7999

1000 McClaren Woods Drive
Coraopolis, PA 15108
Tel 1 724 273 9300

6941 Leopard St.
Corpus Christi, TX 78409
Tel 1 361 883 4489

3201 Maverick Drive
Kilgore, TX 75662
Tel 1 903 984 8651

12311 W County Road 127
Odessa, TX 79765
Tel 1 432 561 9822

8639 S 190th St.
Kent, WA 98031
Tel 1 253 850 0201

806 N Foster Road
Casper, WY 82601
Tel 1 307 265 9241

Canada
7944 10th St. NE
Calgary, Alberta T2E 8W1
Tel 1 403 291 4814
ms-canada@c-a-m.com

#208, 4207 98th Street
Edmonton, AB T6E 5R7
Tel 1 780 468 2941

Latin America
Rua da Assembleia, 98 - 21 Andar
Rio de Janeiro, RJ Brazil 20011-000
Brazil
Tel 55 21 2172 9714

Goldsmith 53, 3er piso, Col. Polanco
Mexico City, D. F. 11560
Mexico
Tel 52 55 5395 4162

Europe, Caspian, Russia and Sub-Saharan Africa
Longfield Road
Tunbridge Wells, Kent TN2 3EY
England, UK
Tel 44 1892 518000
ms-uk@c-a-m.com

Trekhprudny per.9, Bld.2
123001, Moscow, Russia
Tel 7 495 225 1818
cameron.moscow@c-a-m.com

Asia Pacific
Floor 17, Tower A, Chengjian Plaza
No.18 Beitaipingzhuang Road
Haidian District 100088
Beijing, China
Tel 86 10 5320 9400
ms-china@c-a-m.com

Suite 16.02 Menara AmFirst
No. 1 Jalan 19/3
46300 Petaling Jaya
Selangor Darul Ehsan
Malaysia
Tel 603 7954 0145
ms-kl@c-a-m.com

India
501, Lotus Residency, 5th floor
Kothrud, Pune – 411038
India
Tel 91 982 2431686
ms-ind@c-a-m.com

Middle East and North Africa
Middle East FZE
Plot No S10408, South Zone
PO Box 263011
Jebel Ali, Dubai, UAE
Tel 971 4 802 7700
ms-me@c-a-m.com

HSE Policy Statement
At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.