

Scanner Flow Computers

Timely, accurate data for guiding business decisions

Operators around the globe trust their most critical measurements to Scanner flow computers.

Originating with the Scanner* Model 2000 micro-electronic flow measurement (micro-EFM) flow computer — the first self-contained flow computer in the industry to operate autonomously with lithium battery power — the Scanner flow computer product line delivers timely, accurate measurement data in the form required for engineering, operations, accounting, and marketing management.

The Scanner Series 2000 flow computer supports temperature- and pressure-compensated measurement of fluids in power-efficient devices that are integrated easily into a SCADA network. The Scanner Series 3000 flow computer 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. Our software products complete the Scanner flow computer 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 carbon dioxide [CO₂])
- Well testing
- Fluid transfer

Transportation

- Lease automatic custody transfer (LACT) systems
- Natural gas systems
- Nonstandard gas mixture flows



Scanner Series 2000 flow computer product line.

All flow computers are not created equal

Power autonomy

The computers' power-saving design enables users to power their system for up to 1 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 stand-alone computation products and customized solutions for centralized automation makes Scanner flow computers the preferred choice for many applications. Cameron customers receive unparalleled scalability for managing their equipment investments. The smart integration capabilities enable users to start small and add units without basing their hardware decisions on contingencies for future expansion.

Wireless cost savings

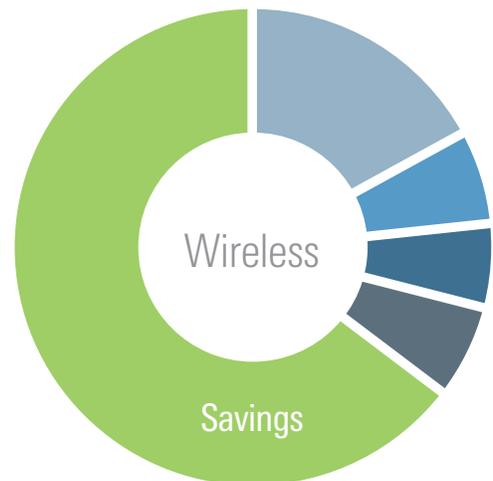
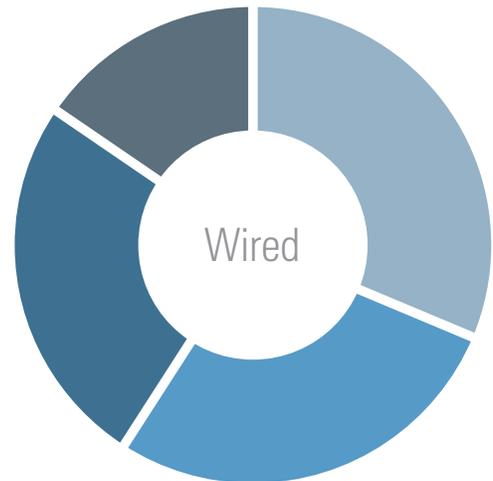
Cost-conscious operators will benefit from our investment in wireless technologies. The addition of a small-footprint short-haul IEEE 802.15.4e-compliant SmartMesh® radio to Scanner 2000 and 3000 flow computers can save operators 50% or more on setup costs without sacrificing system integrity. Wireless-equipped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

- reduced system engineering
- faster, more cost-efficient installation
- higher quality integration
- improved HSE performance during deployment
- isolation from electrical surges.

Regulatory compliance

Our 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 1-s window mandated by API standards. Scanner flow computers' EFM capabilities enable transmitting computed results that are time- and date-stamped to comply with requirements such as Federal Energy Regulatory Commission (FERC) Order No. 636, the Sarbanes-Oxley Act, Alberta Energy Regulator Directive 17, and the Enhanced Production Audit Program (EPAP).

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, American Gas Association (AGA), and American Society of Mechanical Engineers (ASME) standards. The computers can also measure gas, oil, and water flow from a two- or three-phase separator or compute the flow from an ultrasonic gas flowmeter.



Scanner Series 2000 Flow Computer

Scanner 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 flowmeter may be totalized. The Scanner Model 2000 microEFM flow computer provides an effective replacement for chart recorders. With external connections, each device operates independently as a flow computer, remote terminal unit (RTU), or process controller.

Sensor options

Scanner flow computers can be factory installed on our gas and liquid turbine meters, orifice meters, and cone meters, or shipped separately for connection to a CALDON* ultrasonic flowmetering product or other primary flow sensors. For applications requiring differential pressure measurement, an integral multivariable transmitter (MVT) is provided. For applications requiring additional pressure inputs, a 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 Series 2000 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.

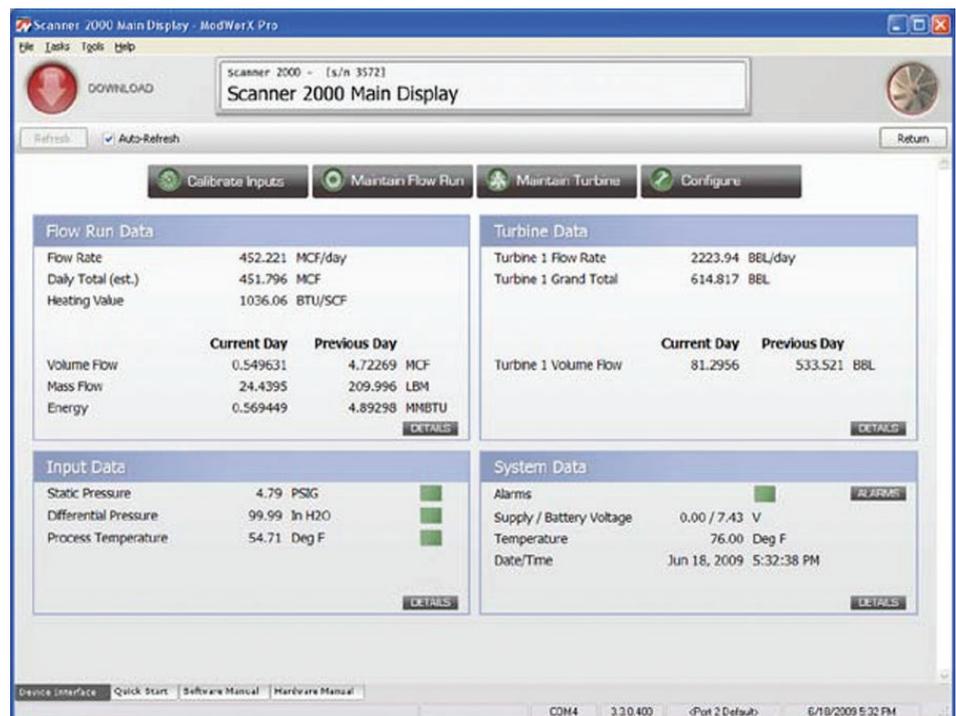
Power autonomy

Scanner Series 2000 flow computers 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 our configuration software interface for Scanner Series 2000 flow computers. The PC installation supports complete configuration and maintenance, including 12-point calibration, demand polling, download of flow logs, configuration data, event and alarm records, and reporting. A configuration upload tool saves time in configuring multiple units. Proportional-integral-derivative (PID) tuning controls also are provided for use with PID-enabled units.

ModWorX Pro software is complimentary and available for download on the Cameron website product page at cameron.slb.com/flowcomputers.





Scanner Model 2000 wired EFM flow computer

- 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 flow computers



Scanner Model 2100 short-haul wireless EFM flow computer

- SmartMesh 2.4-GHz short-haul communication (requires Scanner 3100 computer 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 flow computer
- Easy battery access



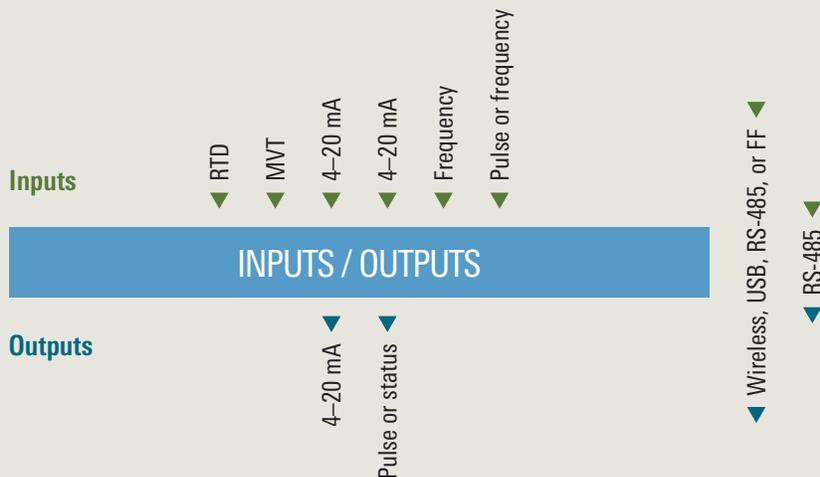
Scanner Model 2200 long-haul wireless EFM flow computer

- Third-party, long-haul wireless communication devices
- Powered by rechargeable battery or DC power
- Nonarcing (weatherproof^{††}) Div. 2 hazardous-area approval
- Networks with Scanner 3100 flow computer

[†] Explosion-proof, weatherproof, or intrinsically safe as defined by Canadian Electrical Code (CEC), National Electrical Code (NEC), Atmosphères Explosives (ATEX), International Electrotechnical Commission (IEC), and Conformité Européene (CE) codes.

[§] Explosion-proof as defined by CEC, NEC, ATEX, IEC, and CE codes.

^{††} Weatherproof as defined by CEC, NEC, ATEX, IEC, and CE codes.



Scanner Series 3000 Flow Computer

The Scanner Model 3100 flow computer is our 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-2008. 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.



Scanner Model 3100 flow computer

- 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

Sensor options

Like the Scanner Series 2000 flow computer, the Scanner Model 3100 flow computer can be factory installed on our gas and liquid turbine flowmeters, orifice meters, and cone meters or shipped separately for connection to a CALDON product or other primary flow sensor. With 17 inputs and outputs, the Scanner Model 3100 exceeds requirements for common industry applications and serves the needs of customers in search of a flow computer, totalizer or recorder replacement, RTU, or complete network solution.

Web interface

The Scanner Model 3100 flow computer model is configured using an Ethernet connection and a simple web browser. Users can access the interface with a laptop, tablet, or 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 Model 3100 flow computer and networked devices. Data can be downloaded via the web interface, an FTP server, or serial connection.

Record keeping and diagnostics

The Scanner Model 3100 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

Scanner computers employ universal Modbus[®] structures for exchanging data among Scanner computers, remote SCADA hosts, and other field automation devices. As an intermediary to the SCADA host, the Scanner computer significantly reduces the number of expensive long-haul communication connections. The Scanner Model 3100 flow computer responds to inquiries from radios and other devices using serial, Ethernet, and optional WiFi communications.

^{††} Explosion-proof as defined by CEC, NEC, ATEX, IEC, and CE codes.

Reporting and SCADA integration software

The Scanner flow computer data manager software opens the data files downloaded from any Scanner computer model, enabling users to view, print, and export flow, event, and 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.

The ScanMap software creates customized Modbus register maps that simplify Scanner computer 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 Model 3100 flow computer for viewing within the web interface.

Scanner flow computer data manager and ScanMap software are complimentary and available for download on the Cameron website product page at cameron.slb.com/flowcomputers.

Scanner Data Manager interface showing a table of historical data. The table includes columns for Record ID, Timestamp, Status Flags, and various flow and pressure metrics.

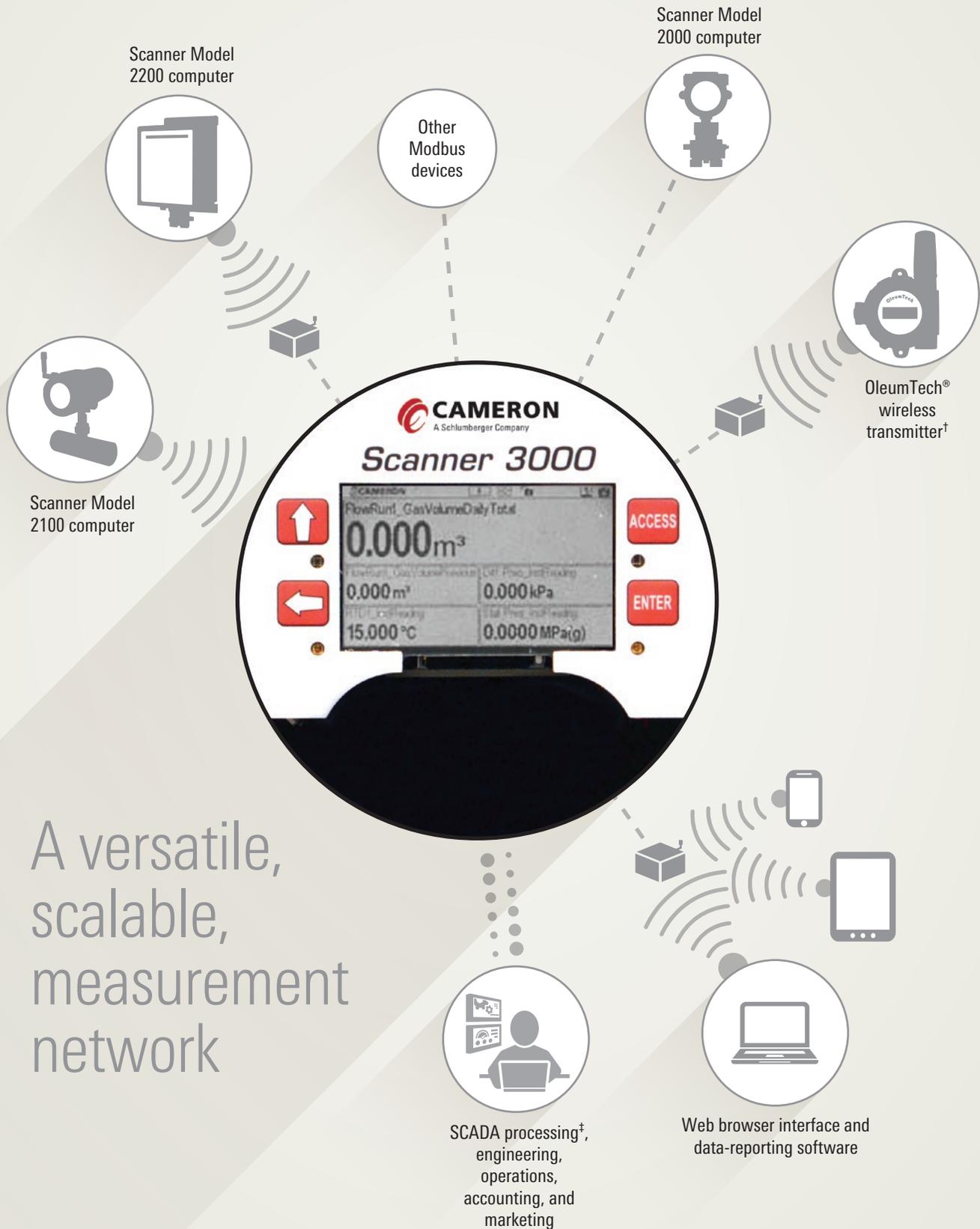
Rec	Timestamp	Status Flags	Flow Run 1 Gas Volume Total m³	Flow Run 1 Gas Mass Total kg	Flow Run 1 Gas Energy Total MJ	Flow Run 1 Runtime s	Diff Pres Value kPa
0	2014-07-03 14:00:00	I H	0.000	0.000	0.000	0.000	0.000
1	2014-07-03 15:00:00	e I	0.000	0.000	0.000	0.000	0.000
2	2014-07-03 16:00:00	I	0.000	0.000	0.000	0.000	0.000
3	2014-07-03 17:00:00	I	0.000	0.000	0.000	0.000	0.000
4	2014-07-03 18:00:00	I	0.000	0.000	0.000	0.000	0.000
5	2014-07-03 19:00:00	I	0.000	0.000	0.000	0.000	0.000
6	2014-07-03 20:00:00	I	0.000	0.000	0.000	0.000	0.000
7	2014-07-03 21:00:00	I	0.000	0.000	0.000	0.000	0.000
8	2014-07-03 22:00:00	I	0.000	0.000	0.000	0.000	0.000

ScanMap User Modbus Map configuration screen. It shows fields for Starting Address (7000), Group Name (Group A), and Register Size (32-bit). A table lists registers within the selected group.

Address	Tag ID	User Defined - Register Name	Data Type	Category	Units	R/W
7000	m32_FC_IN_2_Holding_DailyRuntime	Static Press: Daily Runtime	Float	TIME	s	RO
7001	m32_FC_IN_2_Holding_IntervalRuntime	Static Press: Interval Runtime	Float	TIME	s	RO
7002	m32_FC_IN_2_Holding_PollingRuntime	Static Press: Polling Runtime	Float	TIME	s	RO
7003	m32_FC_IN_2_Holding_CalculationRuntime	Static Press: Calculation Run Time	Float	TIME	s	RO
7004	m32_FC_IN_4_Holding_InstReading	RTD2: Inst Reading	Float	TEMP	°R	RO



Network Solutions



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

Our distributed network solution reduces the risk and inefficiency associated with conventional automation by securely storing data at the point of measurement. Scanner flow computers independently process and store measurement values, copy the results to a Scanner Model 3100 computer, then communicate the data to distant operational and accounting centers, providing high-quality measurement accuracy and integrity.

Redundant storage

Unlike conventional networks that transmit data from multiple subsidiary devices to a main computer for processing, Scanner flow computers compute and store measurements locally. As a result, the data is secure and retrievable, even if a primary flow computer fails.

Processing protection

Our distributed processing technique frees up processing power at the data collection site to ensure that the main 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 radio frequency (RF) interference and multipath fading. Since communications are scheduled, multiple conversations can occur simultaneously within the network on nonoverlapping 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 Model 2100 flow computer 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 Model 3100 computer monitors network traffic and dynamically adjusts timeslot allocation in response to changes in data demands.
- **Path diversity**—The SmartMesh network creates redundant routes for data to travel between the network manager and multiple Scanner computer 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 eliminated because the data includes a date and time stamp for automatic chronological ordering.

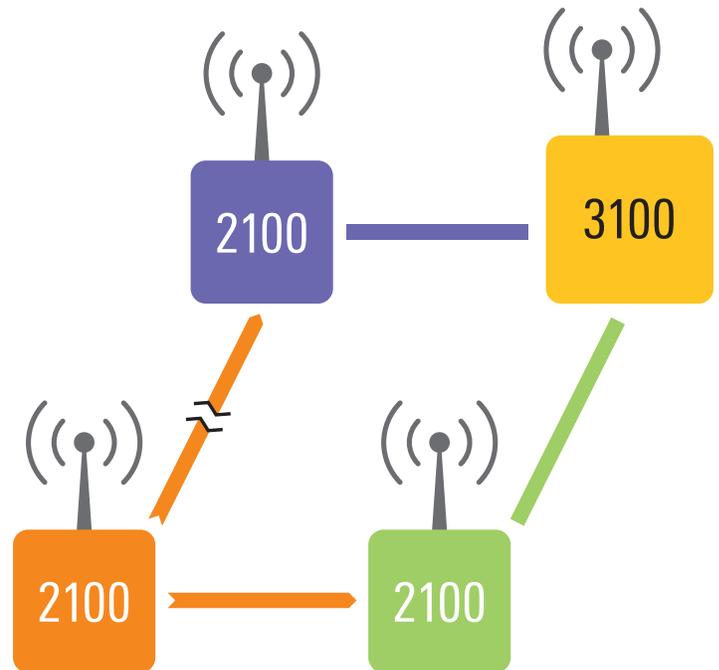


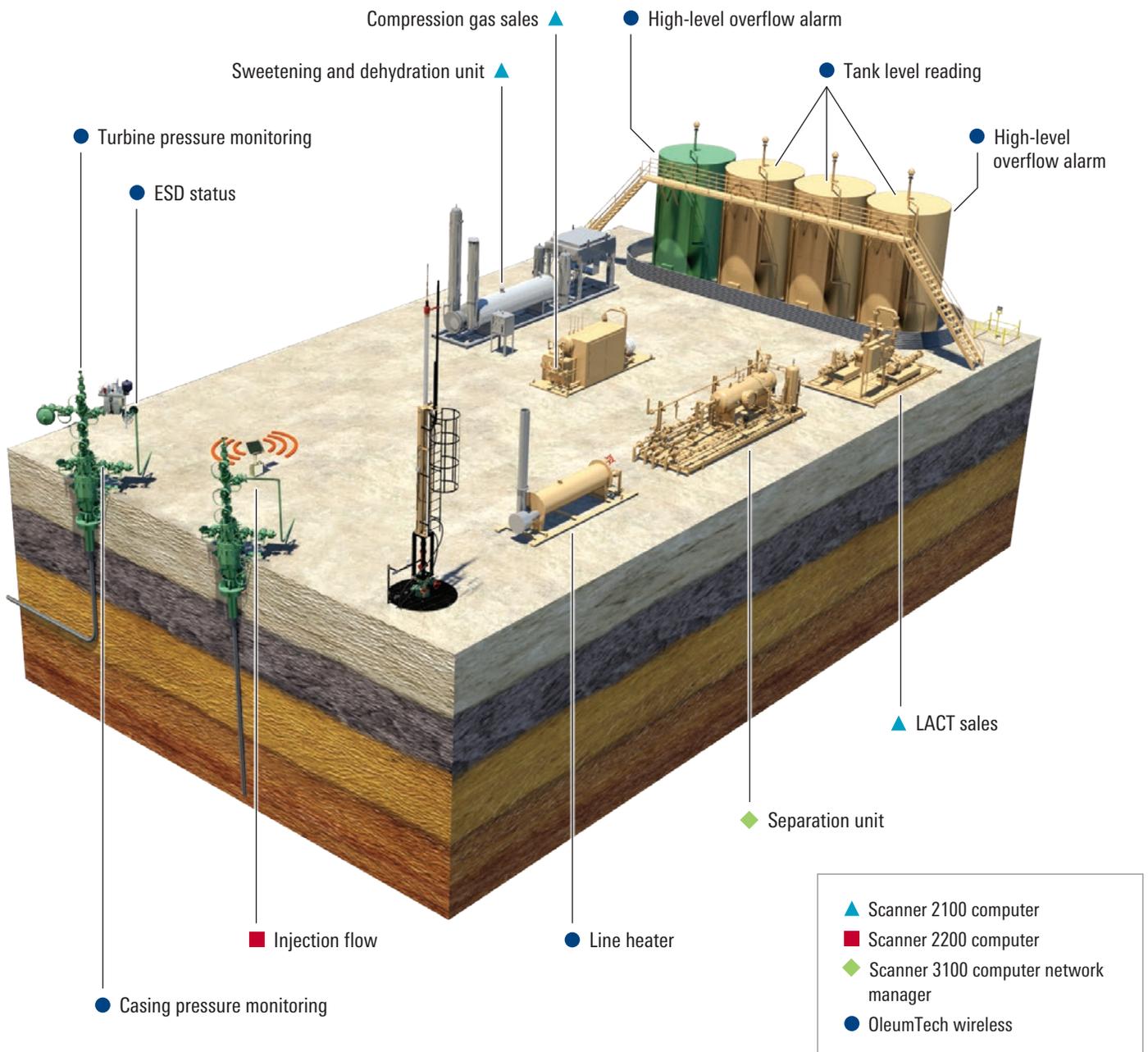
Illustration of Scanner flow computer wireless technology.

SCADA Integration Just Became a Lot Easier

Scanner flow computers with Modbus protocol ensure compatibility with the industry's preferred SCADA host platforms. SCADA integration is simplified by Cameron software, which 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.



Complete Care for a Complete Network

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

- troubleshooting
- application and integration engineering support
- spare parts.



Measurement Technology

We offer a comprehensive portfolio of measurement products and solutions.

Flowmetering

- Differential pressure (DP) cone meters
- Turbine flowmeters
- Ultrasonic flowmeters
- Coriolis flowmeters
- Orifice fittings and meter runs
- Positive displacement (DP) flowmeters

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
- Bidirectional meter prover systems
- Liquefied petroleum gas (LPG) odorant injection systems
- Pipeline and terminal metering systems



Scanner Flow Computers



cameron.slb.com/flowcomputers