

+ Automated Gas Lift Optimization Solutions

INTELLIGENT ACTION OPTIMIZES YOUR RETURNS

Product release 3 now with Surveillance by ConnectedProduction

sensia

Rockwell Automation + Schlumberger



AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

+ When you need more oil for less...

In a typical well, up to 5% of production shortfall can be attributed to gas lift operational inefficiencies. Automated gas lift optimization solutions from Sensia deliver responses in minutes not days.

Sensia solutions enable you to reduce production shortfalls, reduce the quantity of gas that you use, and reduce manual interventions.

Well processes are continuous. But surveillance, injection rate targets, and optimization are still carried out manually, and therefore intermittently, in most cases. Chokes are set, but not continuously controlled, and this inevitably means that operators are injecting suboptimal amounts of gas.

COMPLETE CONTROL. FASTER RESPONSE TIMES.

By automating gas lift optimization – rather than intervening manually – your response to events happens in minutes rather than days. In addition to a reduction in production shortfalls, management time will be freed up to improve the business, rather than firefighting day-to-day issues. We've shown in recent field trials that manual interventions can be reduced by up to 85%.

... INTELLIGENT ACTION DELIVERS

Sensia's Intelligent Action unifies measurement, intelligence, and action to optimize decisions and significantly reduce the time and interactions between detection, diagnosis, and resolution. We can methodically guide you on your automation and digitalization journey to solve the challenges you face in gas lift surface optimization.

**+ 15% GAS SAVING
+ 85% FEWER MANUAL INTERVENTIONS
+ RESPOND IN MINUTES, NOT DAYS**

AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

+ Intelligent Action differentiates Sensia from the competition.

Sensia configured-to-order solutions are developed and supported by professionals with a deep understanding of oil and gas production workflows. This industry focus differentiates Sensia solutions from other offerings on the market that consist of repurposed equipment and software adapted to the oil and gas industry.



OFM
Product
forecasting

OFM* well and reservoir analysis software is a specialized tool that can help you decide if gas lift is the correct artificial lift technology for your well, determine when it should be deployed, and forecast its effectiveness as a production asset ages. OFM software is uniquely offered by Sensia, either as a product or as a tool used in Sensia's consultancy offerings.



avocet
Production
operation data

The Avocet* production operations software captures, warehouses, and serves data to a myriad of applications throughout a production company. For gas lift applications, it holds both static data related to the well and dynamic data from operations. This data is used by the ConnectedProduction platform to assess in near real time the degree of optimization achieved.



connectedproduction
Artificial lift visualization

The ConnectedProduction* platform provides production engineers with visualization of the gas lift system.

AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

+ Choose your gas lift automation level

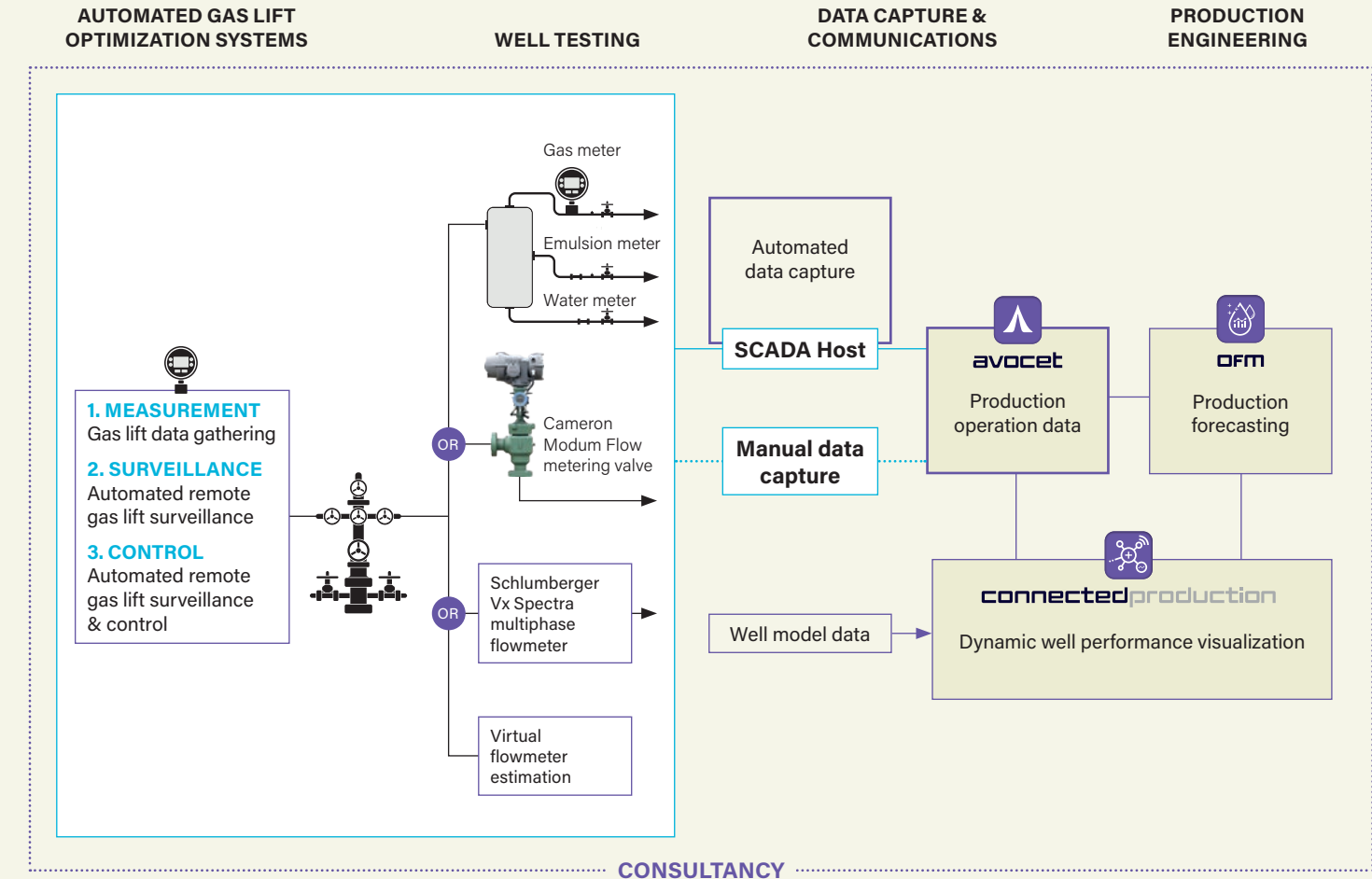
Successful oil and gas producers achieve the highest production possible from the lowest input costs. Optimal efficiency requires software tools to manage and contextualize information into wise operating decisions.

While Sensia's software can acquire data from a variety of measurement sources, our field instrumentation packages offer a path for increasing the degree of automated data collection and onsite gas lift control. This architecture supports a progressive deployment in a tight CAPEX budget environment so you can progress toward automatic optimization without delay.

We currently offer three levels of configure-to-order (CTO) automated gas lift optimization systems.

Sensia software systems are offered in three different deployments:

1. Sensia-managed cloud connectivity as software as a service (SAAS)
2. Client-managed cloud deployment
3. Client-controlled on-premises computing



AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

1.

MEASUREMENT BASED SYSTEM

Gas lift data gathering

Measurement based systems rely on wellhead visits to collect gas injection history and to manually adjust the choke to set the injection flow rate. These packages derive much of their ultralow CAPEX status from the fact that onsite power generation or other utilities are not required.

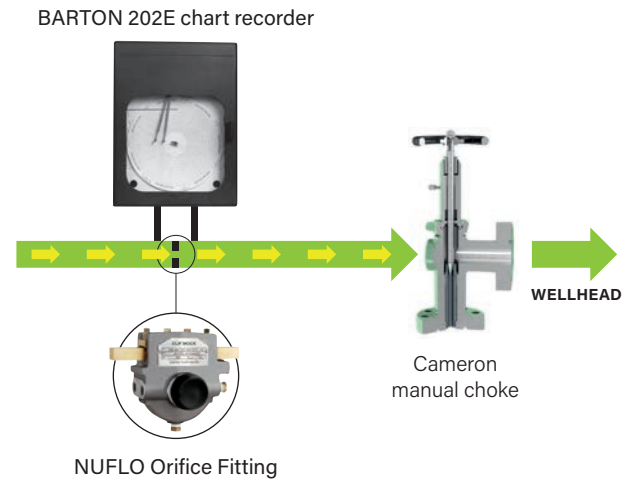
The BARTON* measurement technology and the NUFLO* measurement technology are proven to be robust with tens of thousands of deployments using both systems.

MECHANICAL SYSTEM

- + BARTON 202E chart recorder
- + NUFLO single chamber orifice fitting (or equivalent)
- + Cameron manual choke (control valve)

Advantages

The circular chart enables visiting operators to visualize anomalies at a glance without a PC or tablet. While onsite the operator can apply corrective action.



DIGITAL SYSTEM

- + NUFLO Scanner flow computer
- + NUFLO single chamber orifice fitting (or equivalent) or NUFLO cone meter
- + Cameron manual choke (control valve)

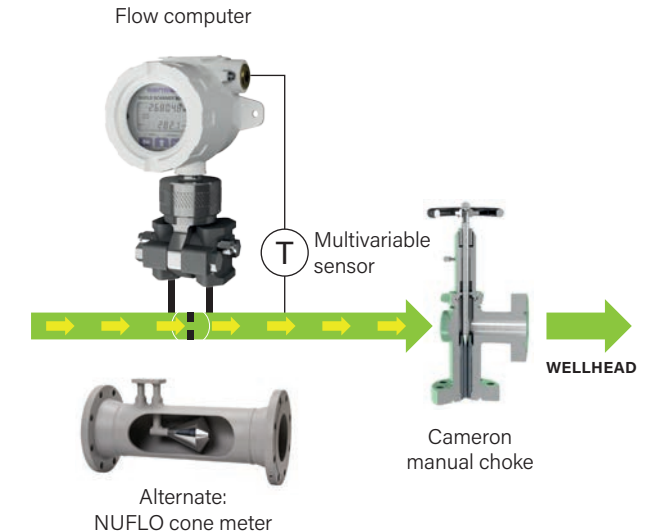
Data is captured in a secure and reliable digital file with nominally 10x the accuracy available from a mechanical system. A copy of the data file is downloaded to a PC for transport off-site where it can be assessed by ScanData* Scanner data analysis and reporting software and imported into the Avocet* production operations software.

Multiple months of detailed history supports extended intervals between site visits.

The NUFLO Scanner 2000 flow computer is the most compact model. NUFLO Scanner 2100 and 2200 offer larger housings, which is a helpful provision in the upgrade path to support additional wellhead measurements, automatic data collection, or remote control.

Where the path to automation foresees the use of the cloud-based ConnectedProduction platform, then a QRATE Scanner 3100 series model should be selected for its MQTT communication capabilities.

All measurements taken by NUFLO Scanner flow computers are compliant to API 21.1 and many other international measurement standards.



AUTOMATED GAS LIFT SOLUTIONS

2. SURVEILLANCE BASED SYSTEM Automated gas lift remote surveillance

- + NUFLO Scanner 2000, 2100, and 2200 flow computers or QRATE Scanner* 3100 integrated control flow computer
- + NUFLO single chamber orifice fitting or NUFLO cone meter
- + Cameron manual choke
- + Power and communications subsystem

Fast, centralized indication of unexpected problems, and automatic data collection by any Modbus-based SCADA system including Avocet production operations software with visualization in the ConnectedProduction platform. The cloud-based ConnectedProduction platform requires MQTT communication from a QRATE Scanner 3000 series model.

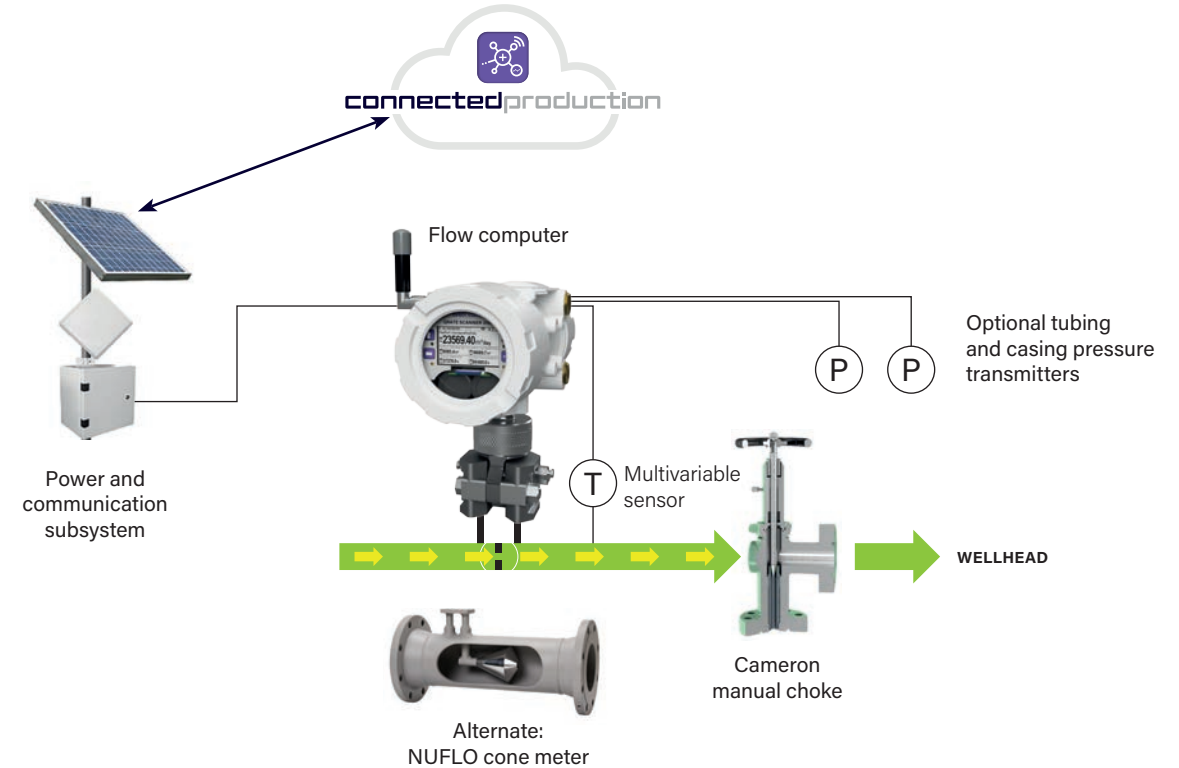
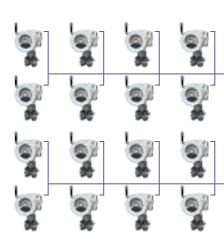
The preferred model of NUFLO Scanner or QRATE Scanner is selected based on area electrical classification and wellsite monitoring and control beyond gas lift only.

The surveillance-based system is easily upgradable to remote control.



ADD MULTI-WELL AUTOMATION INNOVATION

The close wellhead spacing of pad production benefits from the multidrop wired or wireless deployment of the self-integrating distributed measurement and control network. This alternative subsystem uses a model 3000 QRATE Scanner acting as a redundant single point interface to a network of autonomous NUFLO Scanner 2000 flow computers.



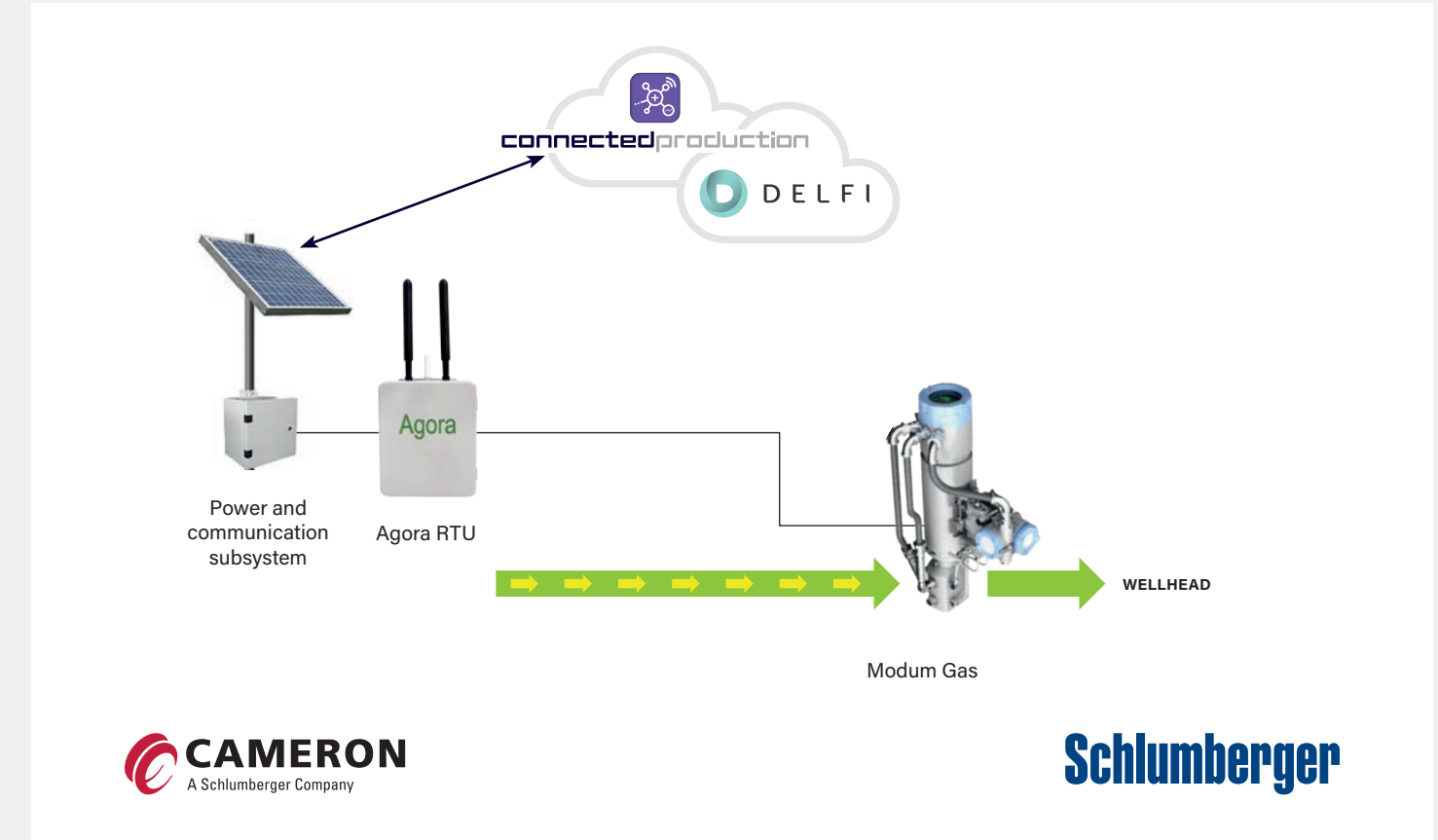
AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

SCHLUMBERGER INNOVATION

With the diversity of global deployments, there cannot be a universal perfect gas lift configuration. Sensia's advantageous relationship with its co-parent, Schlumberger, enables Sensia to incorporate Schlumberger products and global services to offer Sensia clients the best choices to fulfill their requirements.

Examples of alternatives leveraging Schlumberger solutions are:

- + **Cameron's purpose-built API 6A qualified automated control valve for gas lift application. This Cameron control valve is offered as the preferred device with Sensia's QRATE Scanner 3100 EFM/RTU. This low-current 24-VDC-powered combination is well suited to solar and other onsite power generation methods.**
- + **Modum Gas metering control system with an integral electric-actuated choke. State-owned companies without the obligation to have API 21.1 compliant flow records will appreciate the saving and simplicity of the Modum Gas metering control system. This device computes and controls standard volume without the need for a separate flowmeter, flow computer, and automated control valve.**
- + **Agora RTU. With this edge RTU communicating by satellite using MQTT protocol, no location on Earth is inaccessible.**
- + **DELFI. Schlumberger clients who utilize the DELFI collaborative cloud environments will appreciate the interoperability and the ConnectedProduction HMI.**



AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

3. CONTROL BASED SYSTEM

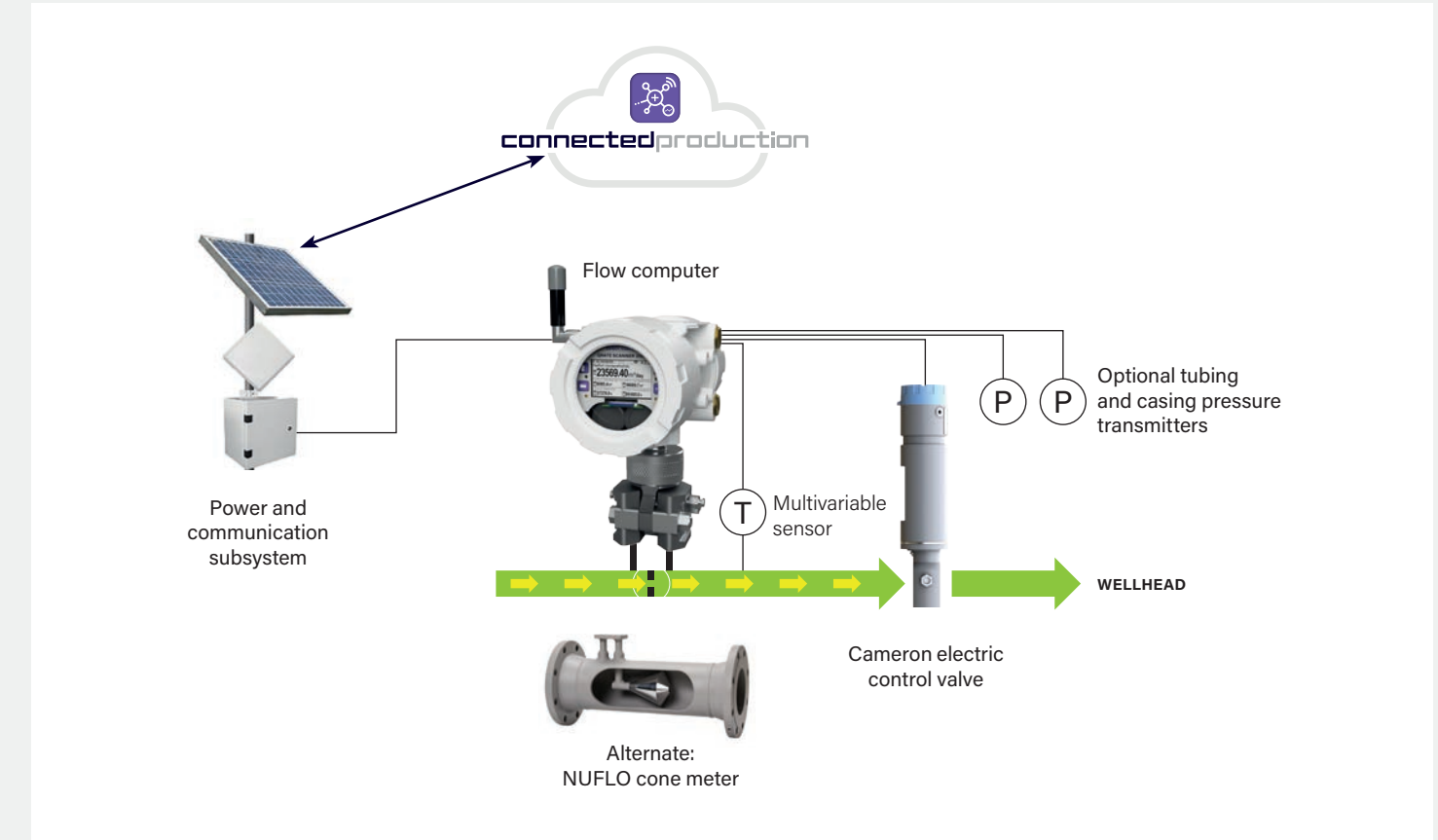
Automated gas lift optimization

- + NUFLO Scanner 2100, and 2200 flow computers or QRATE Scanner* 3100 integrated control flow computer
- + NUFLO single-chamber orifice fitting or NUFLO cone meter
- + Cameron electric operated control valve
- + Power and communications subsystem

In response to the dynamics in the injection gas and production gathering systems, the flow computer automatically adjusts the control valve to maintain the flow and pressure setpoints that it has been assigned.

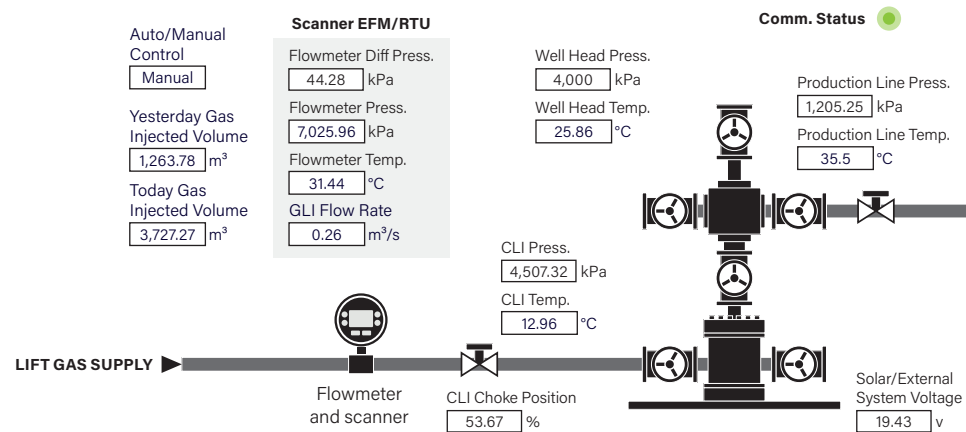
The cost of the electric choke and associated power is often quickly offset by easily assigning and automatically maintaining optimization targets communicated by the ConnectedProduction platform or other SCADA HMI.

*Choke shown requires QRATE Scanner 3000 series flow computer for its Modbus master capability

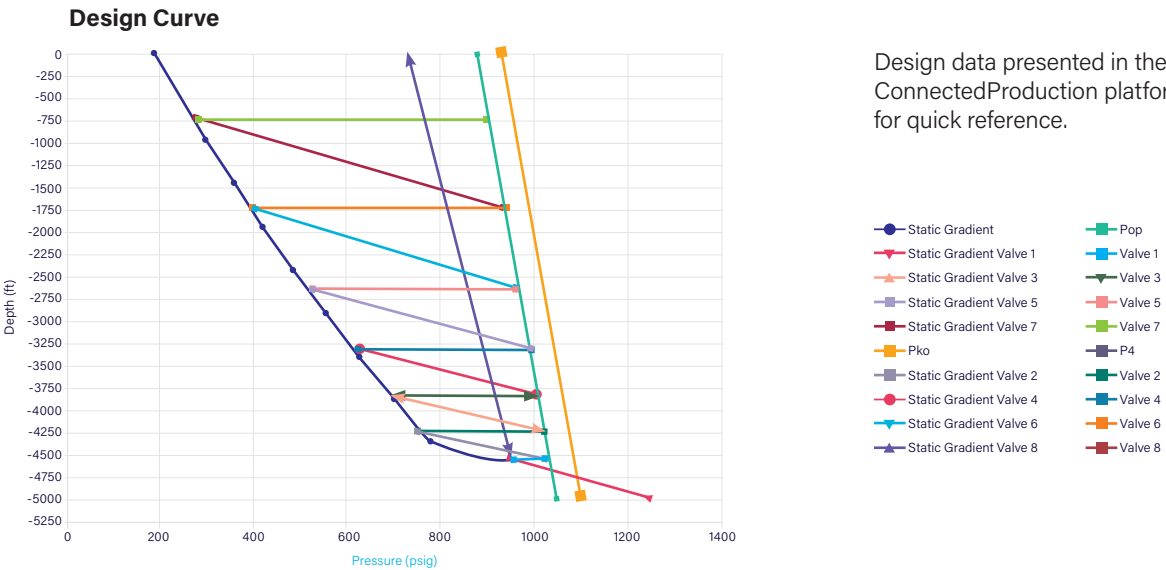


AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

Unlike a typical SCADA HMI ConnectedProduction caters to the needs of production engineers by presenting visualization and key performance indicators associated with optimal operation of a gas lifted well. This software can acquire the data from an existing automation by OPC UA or from Sensia’s own automation systems.



Real-time tile shows current values, status, and results in preferred unit of measure. A technician with authorization can tune the controller function that controls injection gas rate and pressure.



AUTOMATED GAS LIFT OPTIMIZATION SOLUTIONS

THE SCANNER PORTFOLIO

NUFLO SCANNER



NUFLO Scanner 2000 flow computer

- + Wired communications
- + Multivariable transmitter (MVT), turbine mount, or remote mount
- + Zone 1 and division 1 international approvals
- + FOUNDATION™ fieldbus communications available



NUFLO Scanner 2100 & 2105 flow computer

- + Wireless short-haul communications option
- + Zone 1 and division 1 international approvals
- + Easy battery access
- + Single-use or rechargeable battery
- + Larger housing with four conduits supports expanded I/O



NUFLO Scanner 2200 flow computer

- + Wireless long-haul communications
- + Large weatherproof enclosure with integral shelf for radio
- + Powered by lithium battery, DC, or solar power
- + Available with integral charge controller or DC power supply and a rechargeable battery
- + Generous I/O capacity

QRATE SCANNER



QRATE Scanner 3100 flow computer

- + Multiple communication protocols including MQTT provide simplified integration with the cloud-based ConnectedProduction platform
- + Zone 1 and Division 1 international approvals



QRATE Scanner 3300 flow computer

- + Large expandable I/O capacity
- + Multiple communication protocols including MQTT provide simplified integration with the cloud-based ConnectedProduction platform
- + Non-hazardous electrical certification

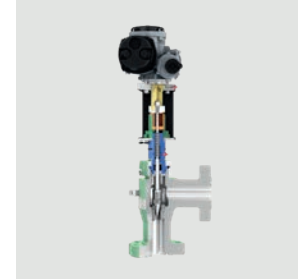
Proven Technology



Sensia offers cost-saving factory designed and built automation or piping assemblies.



NUFLO cone meters feature inherent flow conditioning that eliminates straight-run pipe resulting in a weight-saving compact installation. The fabricated design enables diverse pressure ratings, sizes, and alloys of choice.



Cameron automated production chokes When required, flow regulation can be managed by the Sensia automated systems. In certain circumstances, virtual flow metering can be achieved to enhance the automation solution.

Solving challenges from the reservoir to refinery. One challenge at a time.

We collaborate with all stakeholders to make the production, transportation, and processing of oil & gas simpler, safer, more secure, more productive, and better understood from end-to-end. Sensia is making the advantages of industrial-scale digitalization and seamless automation available to every oil & gas company. Now, every asset can operate more productively and more profitably.

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