

Precise Pressure Control for Highly Reliable Data Center Power Generation

Pressure Control Solutions

Powering data center reliability, efficiency and rapid expansion with pressure control solutions.

EMERSON

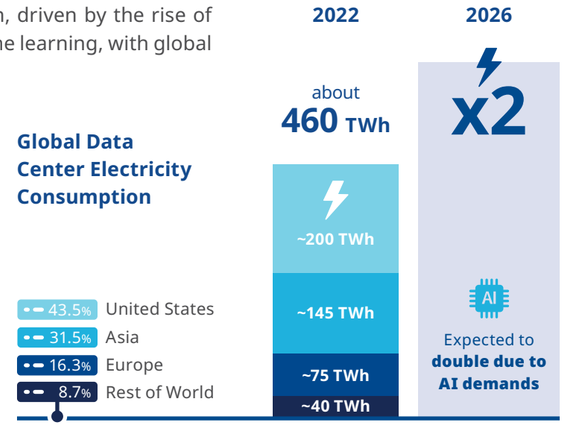
Industry Facts You Need to Know

Data centers are experiencing unprecedented growth, driven by the rise of artificial intelligence (AI), cloud computing, and machine learning, with global power consumption projected to reach:

8% **OF TOTAL ELECTRICITY DEMAND BY 2030**



Global Data Center Electricity Consumption



- 43.5% United States
- 31.5% Asia
- 16.3% Europe
- 8.7% Rest of World

Based on International Energy Agency (IEA)

Traditional grid infrastructure often struggles to keep pace, leading to delays in connectivity and power availability that can span three to five years. This has spurred a shift toward on-site power generation using natural gas turbines and reciprocating engines, which provide reliable, scalable energy with uptimes exceeding 99.999%.

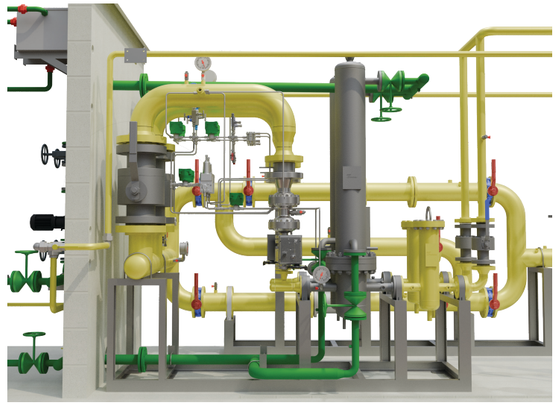


The Natural Gas Advantage

Natural gas-fired systems offer advantages such as fuel flexibility (including hydrogen blends), lower emissions (up to 30% less CO_2 than coal) and direct pipeline access for uninterrupted supply. However, challenges persist, as improper fuel-gas conditioning can lead to turbine blade erosion, efficiency losses of 5 to 10%, and unplanned outages costing millions in downtime.

According to industry reports, 80% of power plant incidents are preventable with better pressure regulation and monitoring. Emerson's regulator technologies address these by optimizing fuel delivery, reducing total lifecycle costs and enhancing sustainability.

Value of Emerson's Pressure Regulating Solutions



For more than a century, Emerson's natural gas regulators have ensured system reliability in gas distribution and power applications by providing uninterrupted, safe and accurate gas supply. Emerson provides a high-performance portfolio of Fisher™ and Tartarini™ pressure regulators and gas conditioning skid systems specifically engineered for the demanding fuel gas requirements of power generation plants, allowing power plants to switch between or use a blend of diverse fuel sources such as natural gas, hydrogen and biomethane. These solutions focus on maintaining precise pressure, rapid response to load changes and safety through integrated overpressure protection.

Pressure control solutions focused on maintaining precise pressure, rapid response to load changes, and safety in sustaining data center infrastructures

Zero Emissions: Zero atmospheric bleed technology. Environmentally friendly design for higher pressure pipelines.

Slam-Shut: Mechanical device that will shut off gas flow when it senses an over or under pressure event. Can be installed independently or attached to an existing pressure regulator valve body to save space and avoid piping modifications.

Noise Reduction: Noise attenuation options can reduce noise (10 to 20 dB) depending on application.

Monitor Setup: Wide-open and working monitor regulators that ensure continuous service in the event of primary regulator failure during over pressure.

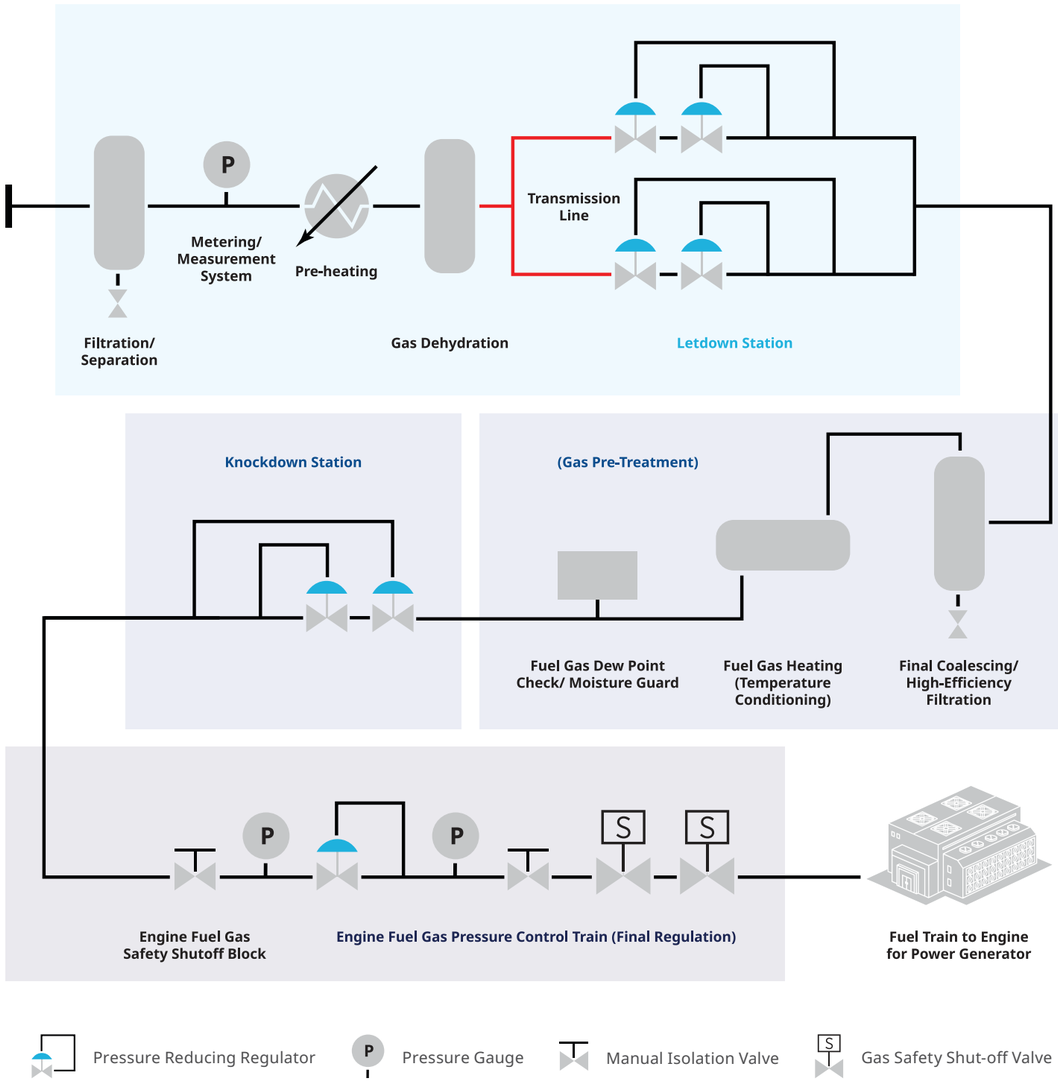
Wireless Position Indication: Mounted on a variety of regulators to indicate real-time regulator performance. Can be used to detect and troubleshoot regulator problems on your existing control system before they impact operations.

Fuel Flexibility: Regulators are hydrogen-ready, suitable to handle most gas compositions.

Fuel-Gas System for Data Center Power Generation

From the transmission line to the engine, there are three significant stages where pressure cuts occur in a power generation fuel gas conditioning system.

Primary Pressure Reduction (Letdown Station) | **Knockdown Station** | **Engine Fuel Gas Pressure Control**



Primary Pressure Reduction (Letdown Station)

This is the first point of entry for natural gas into the power plant facility. It acts as the interface between the high-pressure utility pipeline and the plant's internal distribution piping.

Function: Reduce high-pressure pipeline gas to manageable plant distribution pressure.

Key Requirements:
- Maximized Uptime: Reliability and redundancy are key to ensure the primary supply is always available.
- High Capacity: Must handle total volumetric flow for entire plant.
- Temperature and Environmental Resistance: Letdown Stations often produce large temperature changes (Joule-Thomson effect) especially in gas systems. It is important to maintain performance across specified temperature ranges to prevent freezing or icing risks, especially under large pressure drops.

Knockdown Station (Secondary/Conditioning Stage)

Function: This stage stabilizes the gas for distribution to multiple engine units or to the balance of plant utility systems. It acts as a buffer to prevent pressure surges or starvation when one engine starts or stops while others are running.

Key Requirements:
- Stability: Provides a buffer so that fluctuations at the pressure reduction station do not reach sensitive engine valves.
- Safety Integration: Features an active monitor setup or integrated slam-shut valves for redundant overpressure protection.

Engine Fuel Gas Pressure Control (Final Stage)

This is the precision stage. Whether it is a reciprocating engine or gas turbine, the fuel must be delivered at a very specific and unwavering pressure to ensure clean combustion.

Function: To maintain the exact injection pressure required by the fuel headers. Taking inlet pressures into outlet pressures of 12 to 35 mbar/ 0.2 to 5 psi / 5 to 14 in. w.c (for reciprocating engines) or 20 to 25 bar/ 290 to 360 psi (for gas turbines).

Key Requirements:
- Transient Response: Engine fuel demands change instantly when the electrical load on the generator spikes or drops. These regulators must react in milliseconds to prevent flameout or over-speed condition.
- Accuracy: Accurate pressure control is critical in power generation because gas fired turbines, engines, boilers, and combustion systems require stable and precisely regulated fuel gas pressure to maintain efficiency, prevent combustion instability and protect equipment.



Emerson products provide solutions to help data centers achieve important fuel-gas and power-generation goals.

Enhance Efficiency and Reduce Emissions

Solution

Efficiency and emission reduction are critical. How well pressure is regulated directly affects plant performance, operating costs, and environmental compliance.

Emerson's zero atmospheric bleed design ensures safe, uninterrupted, and accurate gas supply, supporting system stability even under varying flow conditions with zero emission pressure control.

Ensure Safety and Protect Assets

Solution

All three pressure cut stages are critical in safety and protecting assets especially the reciprocating engine. Improper equipment selection in performing these pressure cuts could result in catastrophic events.

Placing monitor regulators (wide-open and working) ensures continuous service in the event of primary regulator failure during overpressure.

Minimize Maintenance and Unplanned Downtime

Solution

This is critical in all three pressure cut stages because when any stage fails, the entire plant's performance, safety and financial stability are immediately affected.

Emerson's Fisher™ and Tartarini™ Natural Gas Regulators are engineered for long-term reliability, simple installation and maintenance. Helping reduce technician hours and costs associated to downtime.

Reliable Lead Times

Solution

Lead times are critical in building a fuel-gas system for power generation because any delay in equipment delivery can directly postpone plant commissioning, increase project costs and jeopardize guaranteed power-availability commitments.

Backed by worldwide manufacturing, supply chain strength and strong Impact Partner Network, Emerson's pressure regulating products provide dependable availability when it matters most.



Product Solution by Pressure Cut Stage

Note: Emerson solutions are listed below as guidance only. Contact your Emerson Impact Partner with specific process conditions so that the proper equipment can be selected and sized.

Primary Pressure Reduction (Letdown Station)

Reducing pressure from high-pressure transmission levels (up to 100 bar / 1500 psi) down to 1 to 20 bar / 15 to 290 psi for distribution.



Fisher™ EZH Series Pressure Reducing Regulator

- Metal plug deflects debris, extending seat life.
- Top-entry design allows in-line maintenance.
- Travel indicator shows valve position.
- Hydrogen-ready for most gas compositions.



Fisher EZR Series Pressure Reducing Regulator

- High accuracy keeps operation close to setpoint.
- Hydrogen-ready for most gas compositions.



Tartarini™ FL Series Pressure Reducing Regulator

- Axial flow design delivers high capacity with ±1% accuracy.
- Hydrogen-ready for most gas compositions.



Tartarini Cronos Series

- Precise pilot-operated control for stable gas pressure.
- Integrated monitor and slam-shut protection options.
- High-capacity, low-noise design.
- Hydrogen-ready for most gas compositions.

Fuel Gas Regulator Skid (Knockdown Station)

Reducing the distribution pressure 20 bar / 300 psi down to acceptable pressures for the reciprocating engine (1 bar / 15 psi / 400 in. w.c.)



Fisher™ Type 1098 Pressure Reducing Regulator

- Top-entry design enables in-line trim maintenance.
- 1/4-turn valves allow quick lock-up testing.
- Quick-change trim reduces service time.
- Travel indicator shows unit position.
- Hydrogen-ready for most gas compositions.



Fisher Type 627 Pressure Reducing Regulator

- Two-bolt design allows trim replacement in-line.
- Rotatable in four positions for tight spaces.
- Multiple body/orifice sizes support a wide flow range.
- Hydrogen-ready for most gas compositions.



Fisher LSR Series Pressure Reducing Regulator

- Disc replacement without actuator disassembly.
- Handles up to 4.14 bar / 60 psi with wide pressure flexibility.
- Fast response with stabilizer vent reducing lag.
- Hydrogen-ready for most gas compositions.



Tartarini™ FL Series Pressure Reducing Regulator

- Axial flow design delivers high capacity with ±1% accuracy.
- Hydrogen-ready for most gas compositions.

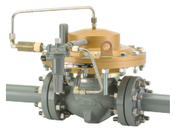


Tartarini Cronos Series

- Precise pilot-operated control for stable gas pressure.
- Integrated monitor and slam-shut protection options.
- High-capacity, low-noise design.
- Hydrogen-ready for most gas compositions.

Engine Fuel Gas Pressure Control (Final Stage)

To maintain the exact injection pressure required by the fuel headers. Taking inlet pressures of 1 bar / 15 psi into outlet pressures of 12 to 35 mbar / 0.2 to 5 psi / 5 to 14 in. w.c. The outlet pressures are typically specified by the type of engine it is feeding into.



Fisher EZL Series Pressure Reducing Regulator

- Top-entry design enables in-line trim maintenance.
- Maintains accurate downstream pressure under varying conditions.
- Travel indicator shows unit position.
- Hydrogen-ready for most gas compositions.



Fisher 299H Series Pilot-Operated Pressure Reducing Regulator

- No special startup required.
- Two-bolt design simplifies servicing.
- Integral pilot provides high-capacity and accurate control.
- Optional slam-shut for overpressure or underpressure protection.
- Flexible pressure sensing options (external, internal, dual).
- Hydrogen-ready for most gas compositions.



Fisher Type 133H Pressure Reducing Regulator

- Industry tested and trusted Engine Fuel Control.
- Balance trim design for high capacity performance and precise control.
- Fast response to meet engine start up and shutdown without over shoot.



Fisher LSR Series Pressure Reducing Regulator

- Disc replacement without actuator disassembly.
- Handles up to 4.14 bar / 60 psi with wide pressure flexibility.
- Fast response with stabilizer vent reducing lag.
- Hydrogen-ready for most gas compositions.



Fisher CSR Series Pressure Reducing Regulator

- Maintains stable and accurate outlet pressure under varying conditions.
- Multiple configurations with wide outlet pressure ranges.
- Built-in protections: monitor, slam-shut, internal relief and secondary seat.
- Hydrogen-ready for most gas compositions.

Product Matrix Summary

												
Regulator	EZH	FL	EZR	1098	Cronos		627	LSR	299	CSR	133	EZL
Maximum Capacity*	up to 1,549,282 Nm³/hr / 57,831,000 SCFH	up to 2,031,017 Nm³/hr / 75,813,000 SCFH	up to 700,232 Nm³/hr / 26,138,000 SCFH	up to 303,555 Nm³/hr / 11,331,000 SCFH	up to 189,650 Nm³/h / 7,079,178 SCFH		up to 3859 Nm³/hr / 144,000 SCFH	up to 22,664 Nm³/hr / 846,000 SCFH	up to 2411 Nm³/hr / 90,000 SCFH	up to 800 Nm³/hr / 30,000 SCFH	up to 4286 Nm³/hr / 160,000 SCFH	up to 68,000 Nm³/hr / 2,534,000 SCFH
Accuracy**	+/- 1%	+/- 1%	+/- 1%	+/- 1%	+/- 1%		20%	20%	+/- 1%	2% ABS	10%	+/- 1%
Maximum Inlet Pressure	102 bar / 1480 psig	102 bar / 1480 psig	72.4 bar / 1050 psig	27.6 bar / 400 psig	100 bar / 1450 psig		138 bar / 2000 psig	27.6 bar / 400 psig	12.1 bar / 175 psig	8.6 bar / 125 psig	8.6 bar / 125 psig	20 bar / 285 psig
Outlet Pressure Range	1.0 to 80 bar / 15 to 1160 psig	1.0 to 80 bar / 15 to 1160 psig	0.17 to 62 bar / 2.5 to 900 psig	17 mbar to 5.2 bar / 7 in. w.c to 75 psig	0.5 to 80 bar / 7.3 to 1160 psig		0.34 to 10.3 bar / 5 to 150 psig	0.34 to 4.1 bar / 5 to 60 psig	8.7 mbar to 4.1 bar / 3.5 in. w.c. to 60 psig	10 mbar to 0.69 bar / 4 in. w.c. to 10 psig	5 mbar to 0.69 bar / 2 in. w.c. to 10 psig	17 mbar to 15.5 bar / 7 in. w.c. to 225 psig

Typical solutions are listed above as guidance only. Contact your Emerson Impact Partner with specific process conditions so that proper equipment can be selected and sized.

*Maximum Capacity is dependent on inlet pressure and line size.

**Pilot-operated regulators have an accuracy of ±1%; all others are direct-operated regulators.

Complete Fuel Gas Solutions from Quote to Commissioning



Building reliable power generation systems for data centers requires more than high-performance equipment. It requires a partner capable of supporting every phase of the project lifecycle. Emerson combines proven pressure regulation technologies, global manufacturing strength and a network of local Impact Partners to deliver comprehensive support from specification and sizing through installation, startup and commissioning.

Our experts help customers:

- Select and size the right pressure control solutions.
- Accelerate project execution.
- Reduce installation and maintenance complexity.
- Support reliable startup and commissioning.
- Minimize operational risk and unplanned downtime.

With local inventory, application expertise and service resources available worldwide, Emerson helps data center operators bring critical power generation assets online faster and operate with confidence.

From pipeline to power generation, Emerson delivers the pressure control expertise behind reliable data center operations.

Learn more at Emerson.com/dcvalves

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