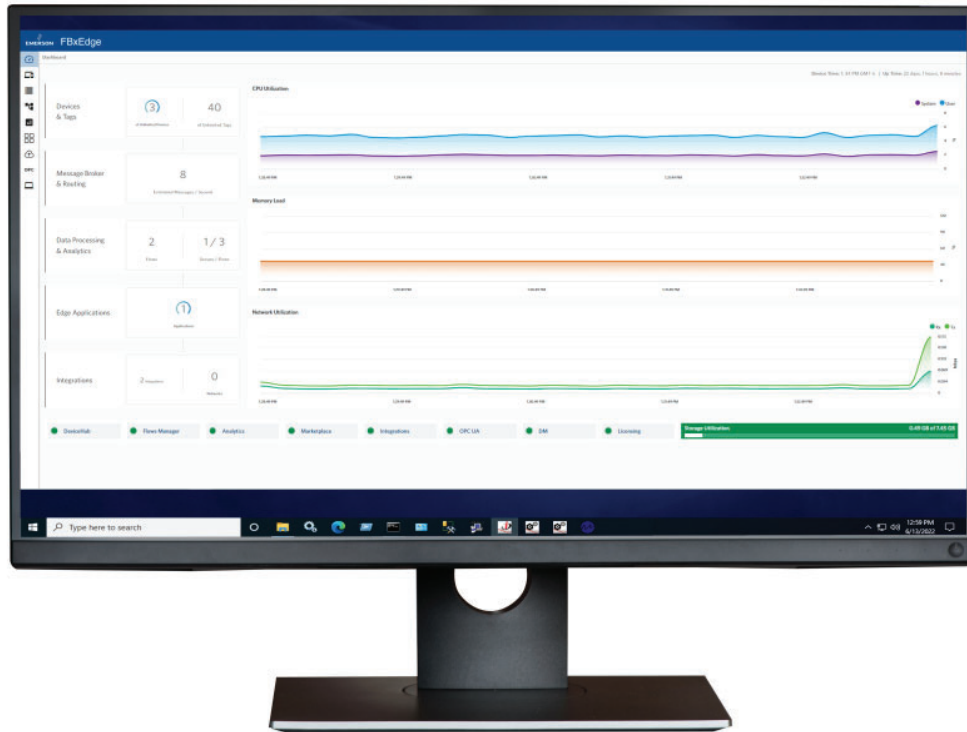# FBxEdge™ Software Platform
Advanced Analytics Software for Energy Operations

FBxEdge is an open-source, out-of-the-box IoT solution that enables energy operations across the value chain to embrace digital transformation.

Seamlessly Connect

- Emerson & non-Emerson devices
- MQTT & cloud drivers

Empower Users

- Intuitive, web-based user interface
- Central management of devices & operation

Compute with Flexibility

- No-code analytics
- Docker Engine to run applications
- Node-RED

Maintain a Secure Infrastructure

- Hardened operating system
- Custom user permissions
- Encrypted communications

EMERSON™

Smarter Asset Management

The highly scalable, cyber-secure FBxEdge Software Platform optimizes data acquisition and analysis, enabling users to seamlessly move critical operational data from the field to the edge and into the cloud. From the wellpad to distribution points, users across the energy value chain capitalize on the software's robust, analytics-driven capabilities to gain actionable insights in real time, leading to greater reliability, productivity, and safety of remote operations. This transformational IoT solution consists of a suite of flexible, powerful data analytics applications that enable enterprise-scalable data connectivity and contextualization. The advanced software's visual interface and intuitive configuration menu eliminate tedious programming, ensuring a shorter learning curve and faster adoption.
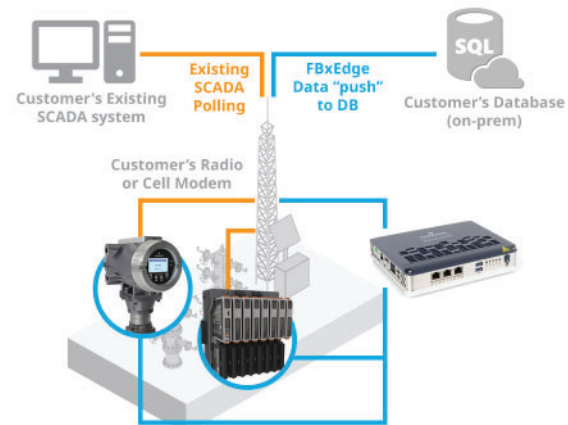

Figure 2: FBxEdge optimizes data acquisition and analysis by seamlessly moving critical operational data from the field to the edge and into the cloud.

Seamless Multi-Device Communication

Connectivity is the foundation of IoT. FBxEdge efficiently fulfills connectivity requirements for complex energy operations, enabling seamless integration of a wide range of devices, sensors, and endpoints. By providing a unified platform, users effortlessly manage and monitor all assets in a single software platform that is designed to support IoT ecosystems.

Scalable, Flexible Architecture

FBxEdge keeps pace with changing operational requirements by offering the architectural flexibility necessary to accommodate increasing data volumes and expanding IoT deployments. It easily scales to support hundreds to thousands of tags, enabling efficient data exchange amongst all connected assets. It also supports seamless integration with multiple data destinations, allowing effortless streaming, storage, and analysis of data across multiple cloud services, databases, and on-premise systems.

Robust Cybersecurity Protection

With multiple industry-leading cybersecurity features, FBxEdge ensures devices and data are safe and secure. The platform's unique combination of advanced encryption, secure communication protocols, and comprehensive access controls increases resiliency to shield IoT infrastructures from unauthorized access and data breaches. This multi-layered security approach safeguards confidential information and data as well as devices to mitigate risks and preserve the integrity of IoT operations.

Rapid Integration of Machine Learning Algorithms

FBxEdge simplifies implementation of pre-built machine learning algorithms for energy operations. No programming required. Intuitive tools enable users to easily integrate the pre-built machine learning models into IoT workflows. These models allow data to be leveraged to its fullest degree, leading to greater visualization for intelligent, data-driven decision making.

Sophisticated Data Processing Logic – No Coding Required

FBxEdge empowers users to implement complex logic and sophisticated algorithms without extensive coding. The intuitive graphical interface enables users to visually design data processing workflows, define custom rules, and configure real-time analytics using a simple drag-and-drop approach.

Powerful Central Management Capabilities

Users gain full control and oversight of the IoT ecosystem with FBxEdge Manager (optional) to simplify management of large-scale IoT deployments. The software's powerful central management capabilities along with a single, centralized interface result in effortless monitoring and management of devices, data flows, security policies, machine learning algorithms, and Docker applications. This centralization helps to streamline operations, automate tasks, and ensure compliance. Easy scalability also allows the FBxEdge software platform to quickly adapt to evolving operational needs.

Hosting of Docker Applications

Docker containers are a powerful component of a tightly integrated IoT ecosystem. FBxEdge streamlines hosting of Docker applications by providing a scalable, flexible environment for your containerized applications. In addition, the Docker containers can consume data from end-devices regardless of the native protocols used to retrieve the data, eliminating the complexity that ensues when implementing numerous data retrieval methods. By ensuring seamless data acquisition and data publishing, FBxEdge maintains the integrity of the data and makes it readily available to your Docker containers, regardless of how the data was obtained or the protocol used to obtain it. With reliable, easily accessible data, there is no need to allocate your valuable resources to data integration and protocol conversion.
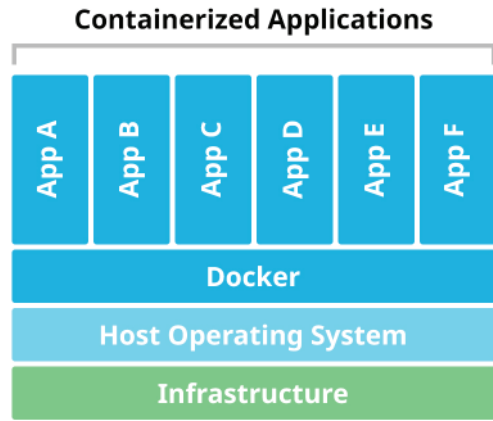

Figure 3: A Docker container ensures an application's code and all its dependencies are intact to maintain reliable operation from one computing environment to another.
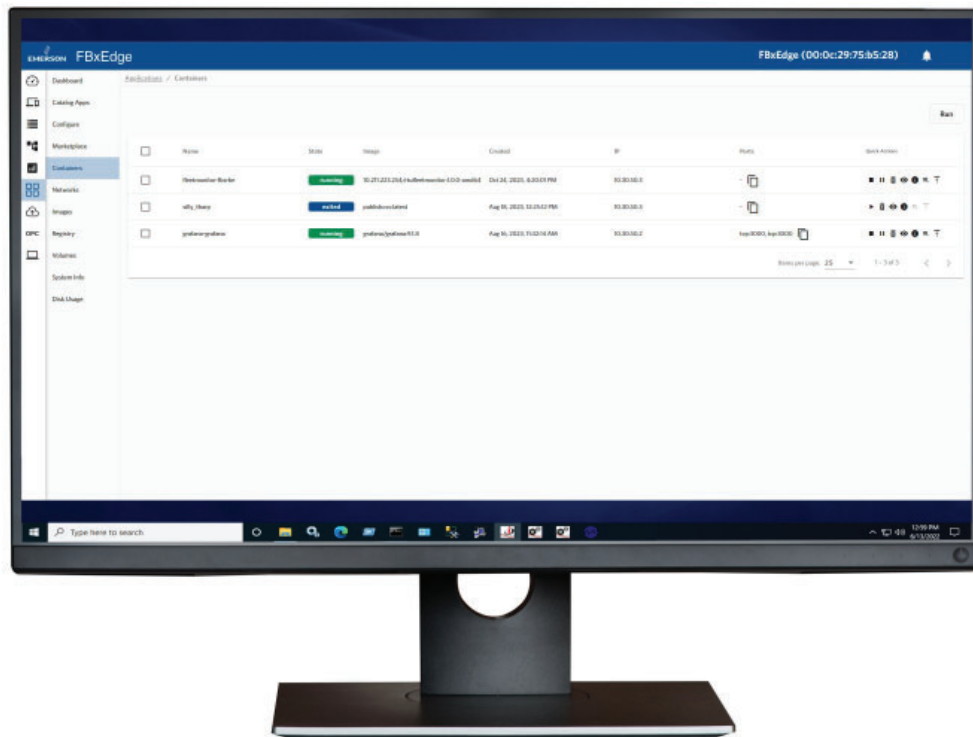

Figure 4: FBxEdge enables hosting of Docker applications in a highly flexible environment that will easily scale as needed to accommodate additional containers.

Custom Data Processing with Node-RED

FBxEdge enables users to fully leverage data to gain valuable insights in real time that lead to highly reliable, efficient and safe operations. Node-RED is embedded and integrated in FBxEdge, providing drag-and-drop functionality for the design and deployment of custom data processing logic.

Intuitive and Versatile Data Processing

The powerful Node-RED platform allows users to visually design data processing flows and define custom rules, transformations, and analytics using an intuitive drag-and-drop interface. In addition, FBxEdge simplifies data integration efforts by handling all the complexities of communication protocols with end devices. The software streamlines protocol translations and seamlessly delivers the data to Node-RED in a format that is easy to consume and work with.

Seamless Integration with IoT Ecosystems

FBxEdge seamlessly integrates with your existing IoT ecosystem, enabling you to effortlessly connect and process data from a wide range of devices, sensors, and endpoints. With support for diverse communication protocols and data formats, our solution ensures compatibility and interoperability across your entire infrastructure. Gain valuable insights by aggregating, filtering, and transforming raw data from multiple sources, creating endless possibilities for optimization and efficiency gains.

Real-time Analytics

Make informed decisions faster with real-time analytics at your fingertips. FBxEdge enables you to process and analyze data in real-time, empowering you to identify patterns, anomalies, and trends as they occur. The power of Node-RED allows machine learning algorithms, statistical models, and custom analytics to easily integrate into data processing workflows within FBxEdge. This integration empowers users to identify patterns, anomalies, and trends in real time to optimize operations and respond swiftly to changing conditions.

Support for Flexible Architectures

The central management capability of FBxEdge facilitates the propagation of Node-RED flows to multiple gateways, providing unprecedented flexibility for designing and deploying IoT ecosystems. The ability to deploy Node-RED flows quickly and easily across multiple gateways fulfills scalability requirements while saving valuable time.

Comprehensive Support and Integration

Every organization has unique requirements and existing systems. FBxEdge seamlessly integrates with a wide range of platforms, databases, and cloud services, ensuring all users can continue leveraging the power of preferred tools and technologies. Emerson offers extensive technical documentation along with expert support to expedite deployment.
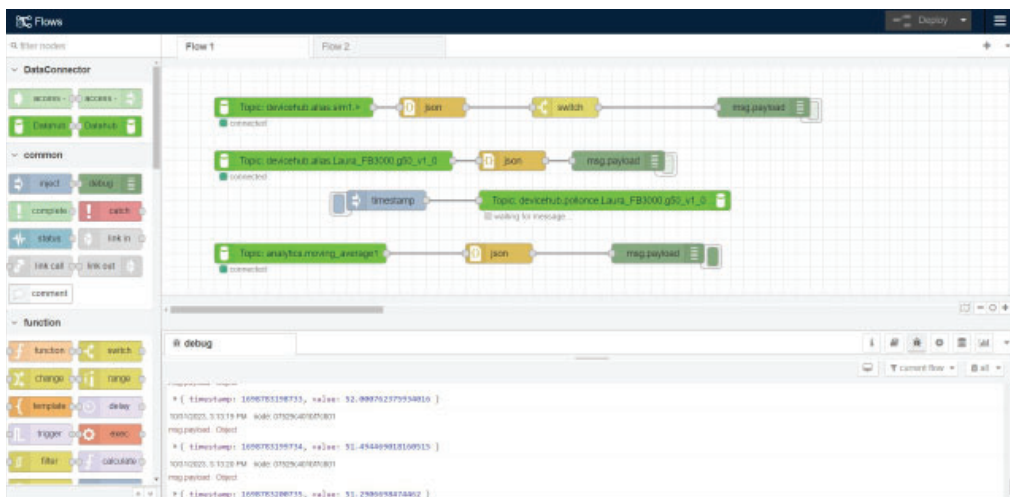

Figure 5: Node-RED is embedded in FBxEdge, giving users the ability to collect and contextualize the data from their devices.

Data Analytics

FBxEdge helps users unleash the power of data analytics. The intuitive drag-and-drop interface ensures users easily implement calculations, create complex formulas, and perform statistical analysis. By seamlessly integrating data from multiple devices, sensors, and endpoints, users discover hidden patterns and trends that result in actionable insights.

Easy-to-Configure Workflows

With FBxEdge, users can process and analyze normalized data at the edge before it's sent to the cloud. Drag-and-drop functionality allows for rapid configuration of analytic workflows within the software. KPIs such as uptime and downtime can also be easily included with no coding required.

Seamless Integration with IoT Data

From real-time sensor data to data from external systems, FBxEdge provides a unified platform for data integration and harmonization. The compilation of high-volume data allows users to explore correlations and identify outliers to improve decision-making.
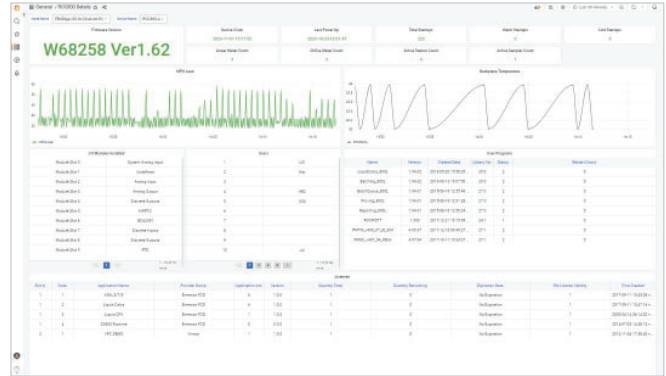

Figure 6: FBxEdge users have access to Grafana, an open-source visualization application, to generate charts, graphs and more.

Real-time Visualization and Dashboards

FBxEdge offers powerful visualization tools and customizable dashboards through Grafana, enabling users to monitor key performance indicators, track trends, and make data-driven decisions in real time. From interactive charts to dynamic dashboards, Grafana provides an intuitive environment to create compelling visual representations of IoT data.
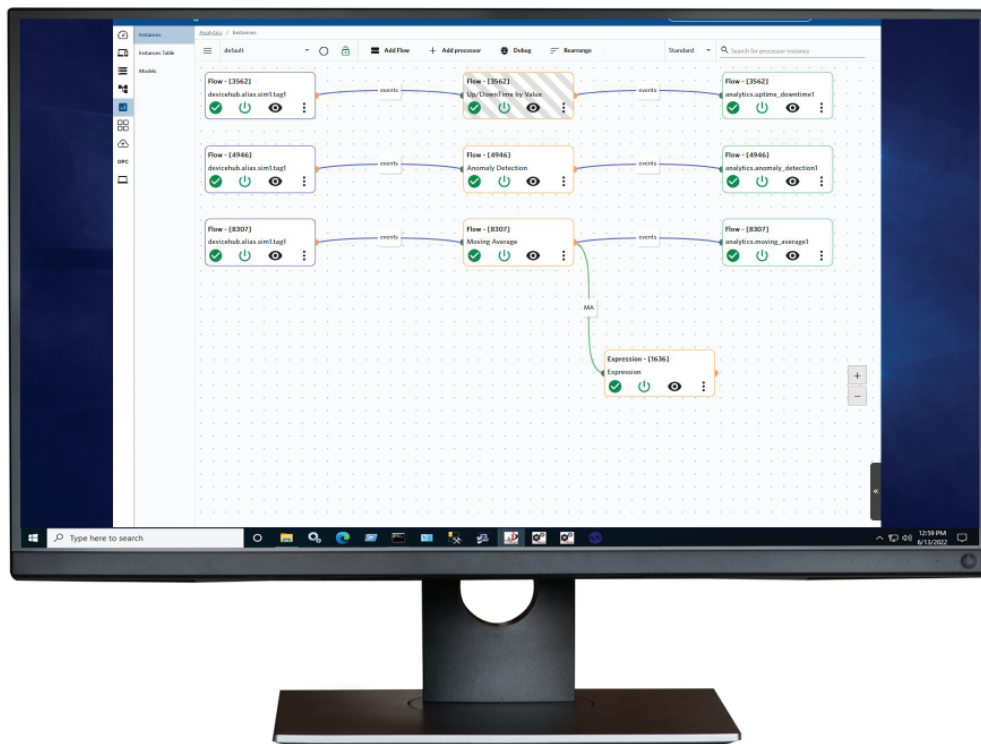

Figure 7: FBxEdge enables users to process and analyze data at the edge with drag-and-drop analytic flows.

Powerful IIoT Development Tools

FBxEdge offers a flexible and powerful set of advanced, open-source tools to help users develop custom IIoT applications. The tools listed in the chart below are included with FBxEdge to provide a highly flexible yet intuitive environment for application development to accelerate deployment.

Tool	Description
Node-RED Machine Virtualization & HMI	A visual programming tool that visually presents relations and functions, enabling users to program and create JavaScript functions without writing code. ■ Provides flexible development environment with a wide variety of nodes and tools, including numerous communication and protocol nodes, data processing nodes, and interfaces to databases and storage along with machine learning and visualization and dashboarding capabilities ■ Allows developers to easily obtain and transmit data to remain focused on data processing, analytics, and visualization ■ A tool for both experts and novices, Node-RED flows can be created entirely in a graphical flow, while experts can use Function nodes and Python nodes to write their own code in Python or JavaScript

Grafana
Data Processing & Flow Control
	A multi-platform, open-source analytics and interactive visualization web application that provides charts, graphs, and alerts when connected to supported data sources.
	
	■ Allows users to easily:
	  ■ Configure views and view types
	  ■ Perform data analytics (calculations, apply functions)
	  ■ Setup alerts to generate warnings and emails
	  ■ Interactively zoom in and out
	  ■ Search and explore data on the fly
	
	■ Provides numerous plug-ins and expansion options via open community

MongoDB Developer Data Platform	A source-available, cross-platform, and document-oriented database program. ■ Classified as a NoSQL database program, uses JSON-like documents with optional schemas ■ Unifies operational, analytical and generative AI data services to support the development of AI-enriched applications ■ Allows for rapid application development with superior scalability
Splunk Developer Data Platform	A tool that produces software for searching, monitoring, and analyzing machine-generated data via a web-style interface. ■ Facilitates search, analysis and visualization of data ■ Provides secure access to data across hybrid cloud environments ■ Can be used on its own or in combination with MongoDB
TensorFlow Open-Source, Machine Learning Platform	Free and open-source software library for machine learning and artificial intelligence. ■ Facilitates creation of machine learning models with user-friendly building blocks ■ Allows users to train and deploy models easily regardless of the language used ■ Offers multiple levels of abstraction to serve all user types, from novices to experts

Industrial PC Options for FBxEdge

Edge Device Models	RXi2-LP Industrial PC	RXi2-BP Industrial PC
Processor	AMD G-Series CPU (4-Core, 1.6 GHz)	AMD Ryzen CPU (4-Core, 2 GHz)
Memory	4 Gb RAM	4 Gb RAM
Storage	64 Gb	128 Gb
Serial Communications	One RS232, One RS422/485 RTC	One RS-232, One galvanically isolated RS422/485
Ethernet	Four 1GB Ethernet channels – RJ-45 standard	Four 10/100/1000BASE-T Ethernet ports
USB Ports	Two USB 2.0 external	Two USB 2.0
Power	Input: 24V DC (±25%) with protection	Input: 24 VDC (±25%) with surge protection, maximum current 2.4 A
Operating Temperature	-25°C to +65°C (-13°F to +149°F)	-40°C to +70°C (-40°F to +158°F)
Certifications	■ UL Listed US/CAN Hazardous Locations: Class 1 Division 2, Class 2 Division 2, Class 3 Division 1 ■ ATEX Zone 2/22 & IECEx ■ CE (EN 62368, EN 61000-6-4, 61000-6-2)	■ UL Listed US/CAN Hazardous Locations: Class 1 Division 2 Groups ABCD ■ ATEX Zone 2/22
Dimensions (H x W x D)	33.7 x 160 x 298.3 mm (1.33 x 6.30 x 11.74 in)	158 x 191 x 44.5 mm (6.22 x 7.52 x 1.75 in)
Installation	Flat mount	DIN rail mount

Central Management at Scale for Complex Energy Operations

Figure 8: FBxEdge Manager enables FBxEdge users to leverage powerful central management capabilities, including bulk deployment of tags, applications, and remote upgrades.

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