FairCom

Edge v5

Key Highlights

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Edge v5

Welcome to the latest release of FairCom Edge, an integration hub for mission-critical Industrial IoT. It collects, stores, transforms, and delivers data—whether through factories, to and from IT, or to and from the cloud. It streamlines data management, enhances security, and provides robust analytics.

Key Capabilities

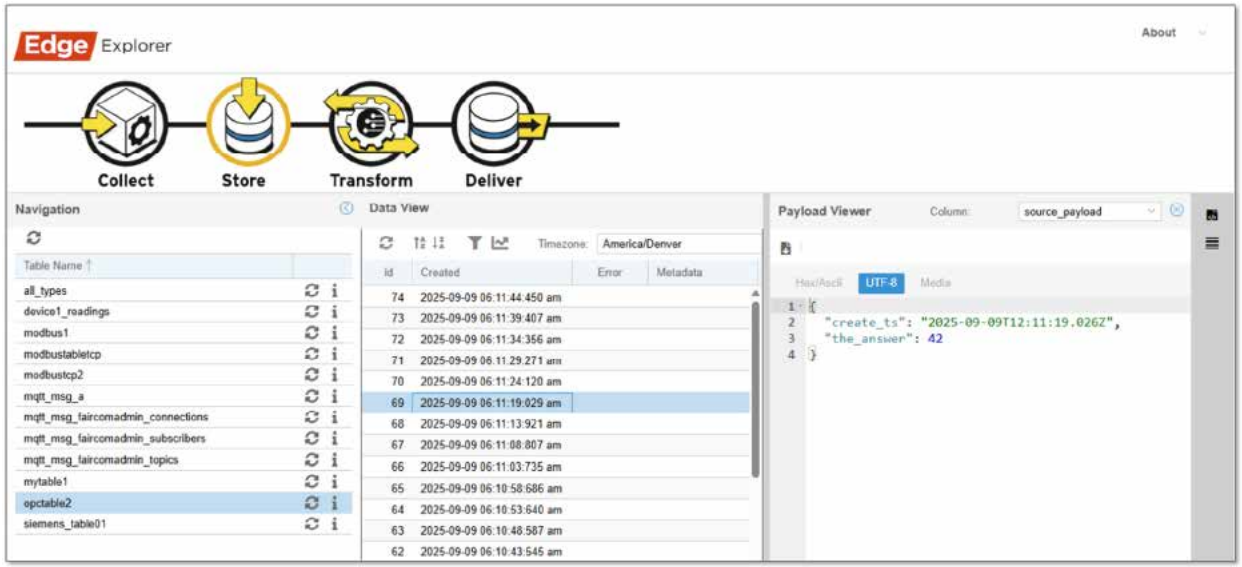
- **Enhanced User Interface** Point-and-click configuration of data collection, transformation, and delivery between PLCs, devices, software, and cloud.
- **New and Improved Industrial Protocols** EtherNet/IP, MQTT, Modbus, MTConnect, OPC UA, Siemens S7, REST, SQL, and MQTT.
- **Real-Time Data Transformation** Server-side JavaScript and no-code transformations provide bidirectional JSON/SQL conversion while renaming tags, converting data, monitoring conditions, performing OEE, categorizing data, doing realtime analytics, running machine learning, etc.
- **Integration with Analytics Tools:** Integrates with analytics and machine learning tools, including Power BI, Tableau, and Python.
- **Dynamic MQTT:** Conditionally sends and routes MQTT messages based on incoming data.
- **Unified Data:** Integrates and unifies data across machine tags, SQL tables, and JSON documents.
- **Namespace Management:** Simplifies the implementation of a unified namespace to standardize and enrich data across multiple factories.
- **Robust Data Security:** Includes FIPS-verified, tamper-proof encryption for data in transit and at rest with built-in Certificate Management.

Contact support@faircom.com or call +USA 573-445-6833 for more information.

Improved User Interface

Edge v5 includes the browser-based application **Edge Explorer.** It facilitates rapid factory integration by collecting, storing, transforming, and delivering data within a factory, between factories, and to and from public clouds.

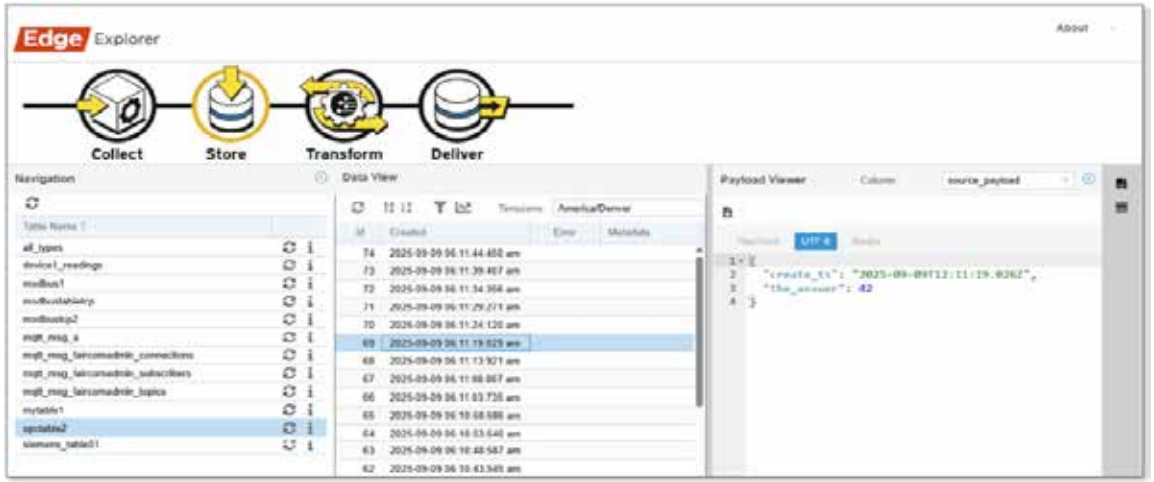
The new user interface supports all our major features, including the ability to collect data from devices, store it in tables, transform it before storage, and deliver it to devices and software.



Collect Data from Industrial Devices

FairCom Edge simplifies data collection from devices using Edge Explorer, a point-and-click tool. It supports a range of industrial protocols for gathering data from factory equipment, devices, and sensors, including: EtherNet/IP, Modbus, MQTT, MTConnect, OPC UA, and Siemens S7.

Once data is collected into FairCom Edge, it is instantly available without further configuration through REST, MQTT, and SQL protocols. **This enables factory software, IT systems, and cloud platforms to immediately access the data.** Conversely, these same protocols allow external software to push data into FairCom Edge, which can then deliver it directly to devices using industrial protocols.



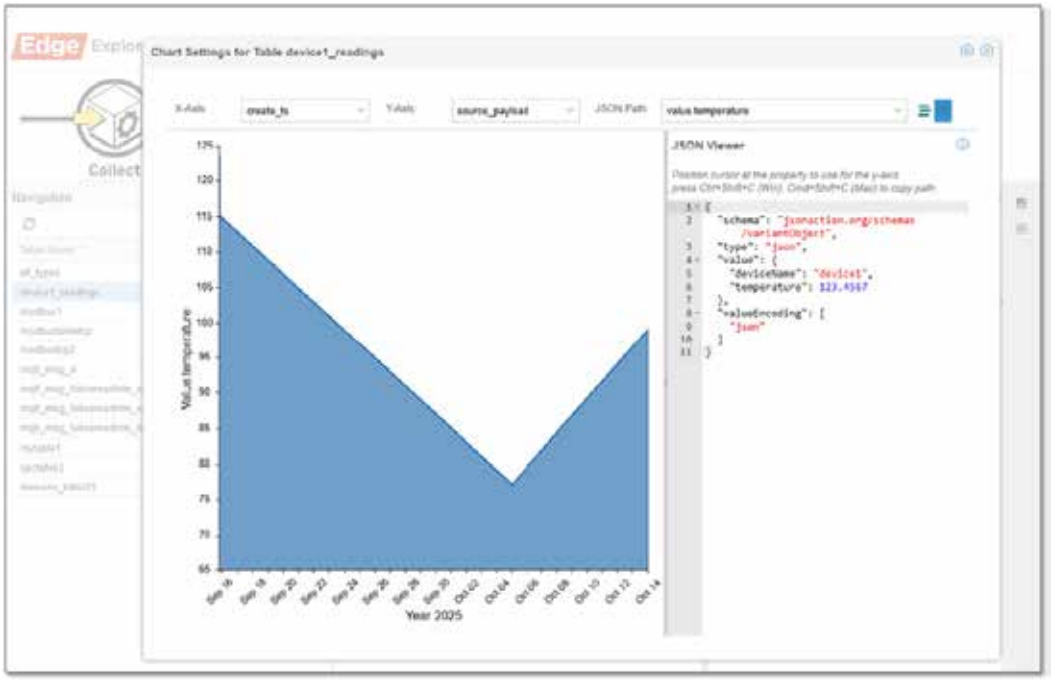
View Collected Data

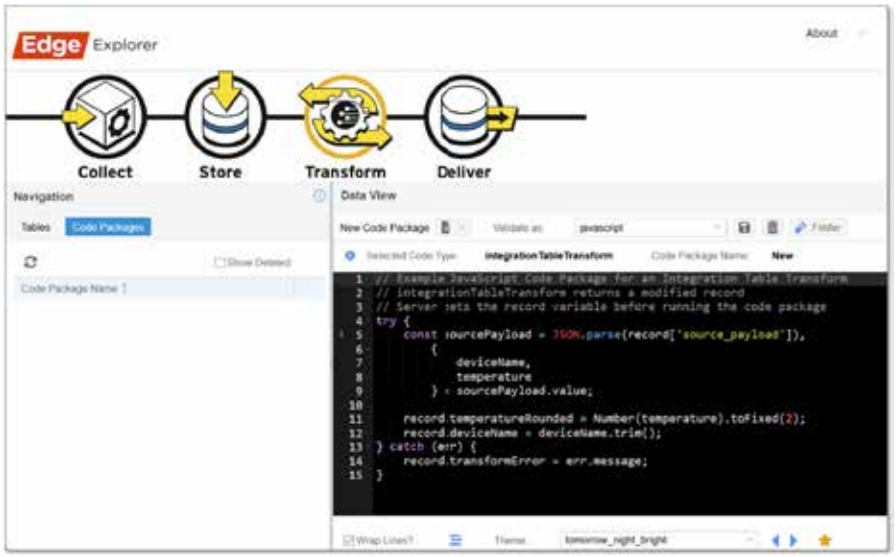
FairCom Edge organizes collected data into tables that you can view, filter, and query. You can also see past MQTT messages.

Improved User Interface

Analyze Collected Data

FairCom Edge integrates with data visualization tools and leading analytics platforms like Power BI and Tableau. Data scientists can run SQL queries to run analytics and train machine learning algorithms.



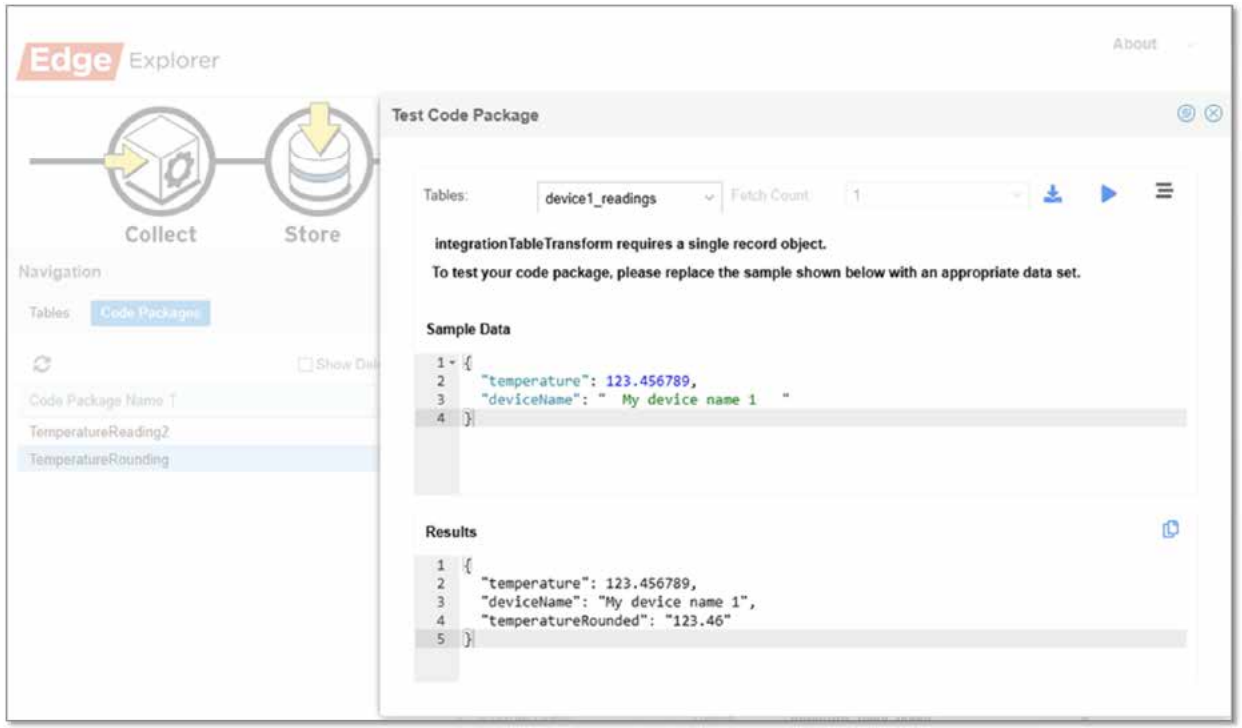


Transform Data with JavaScript

Use JavaScript to standardize, enrich, reformat, and reshape collected data. You can also standardize, enrich, reformat, and recalculate incoming tags from devices.

Test JavaScript Transforms Against Collected Data

Verify JavaScript properly transforms data by testing it against previously collected data. You can use AI to generate JavaScript code, and you can test it against collected data. You can even have AI generate test data.

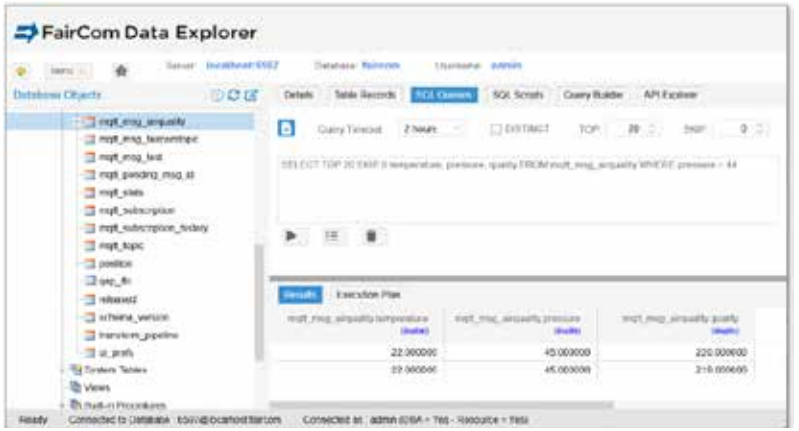


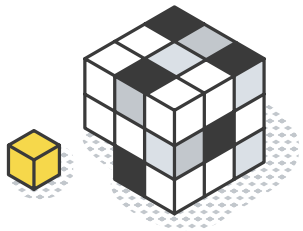
Convert Between JSON and SQL Records

FairCom Edge enables data exchange between factories and data scientists by automatically converting between JSON and tabular formats. Users can leverage Edge Explorer's visual tool to easily convert JSON properties to table fields and vice versa. For those focused on data analytics and machine learning, data can be standardized into SQL tables, the preferred format for data scientists. Alternatively, if real-time factory integration is the focus, data can be standardized as JSON objects for streamlined communication via MQTT.

Query Collected Data with SQL

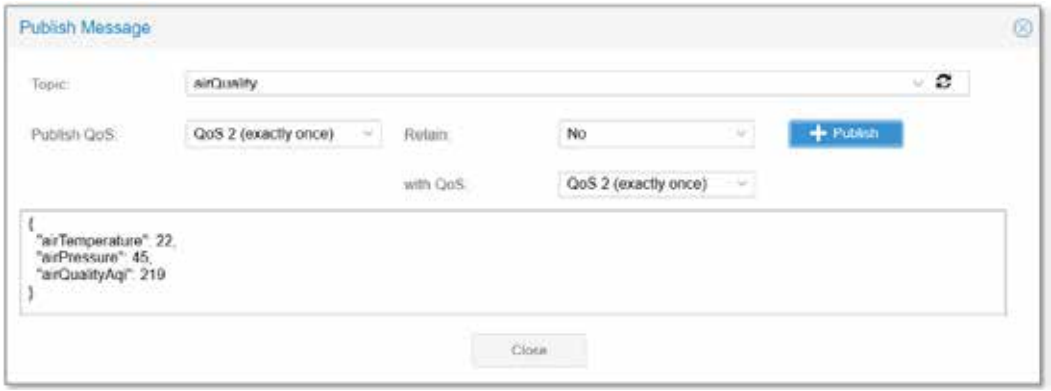
FairCom Edge includes a SQL query application that supports popular SQL analytical tools such as Power BI and Tableau. This allows data scientists and engineers to use SQL for their analytics and machine learning queries.

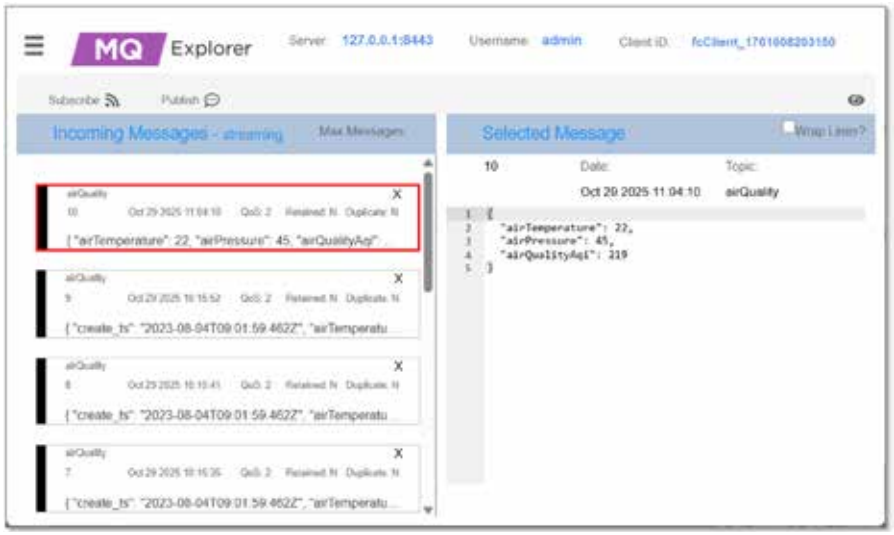




Publish MQTT Messages

FairCom Edge also provides a built-in MQTT client that publishes and subscribes to MQTT messages. As MQTT is a widely adopted industry standard, you can also use any MQTT client to publish and subscribe to topics on FairCom Edge. Because the cloud uses MQTT to connect to factory data, FairCom Edge can automatically deliver collected data to the cloud and return enhanced data to FairCom Edge, factory devices, and software.



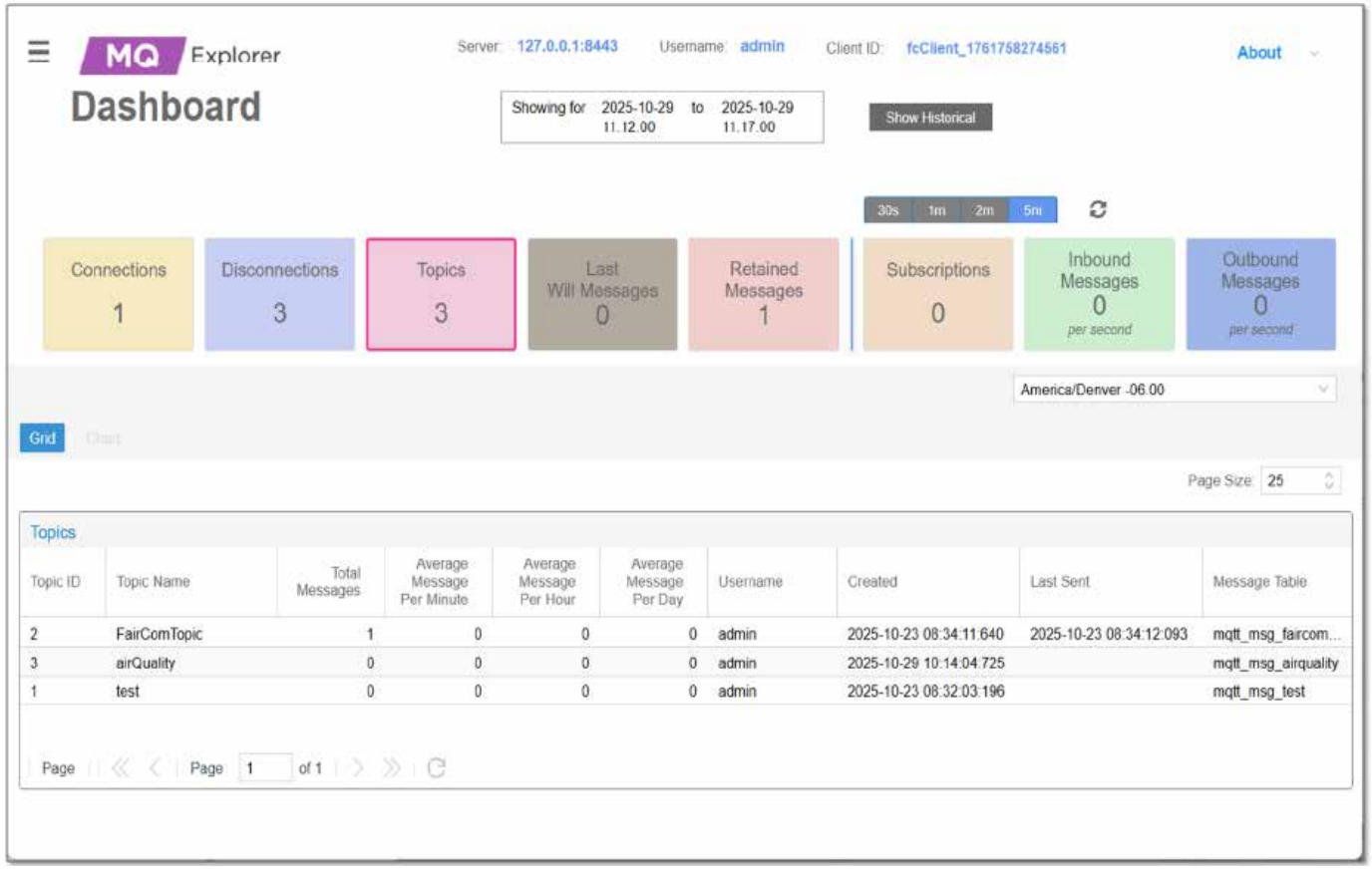


View MQTT Messages

FairCom's MQTT message viewer lets users monitor incoming messages. It can pause and resume the message stream and display the payload of any specific message.

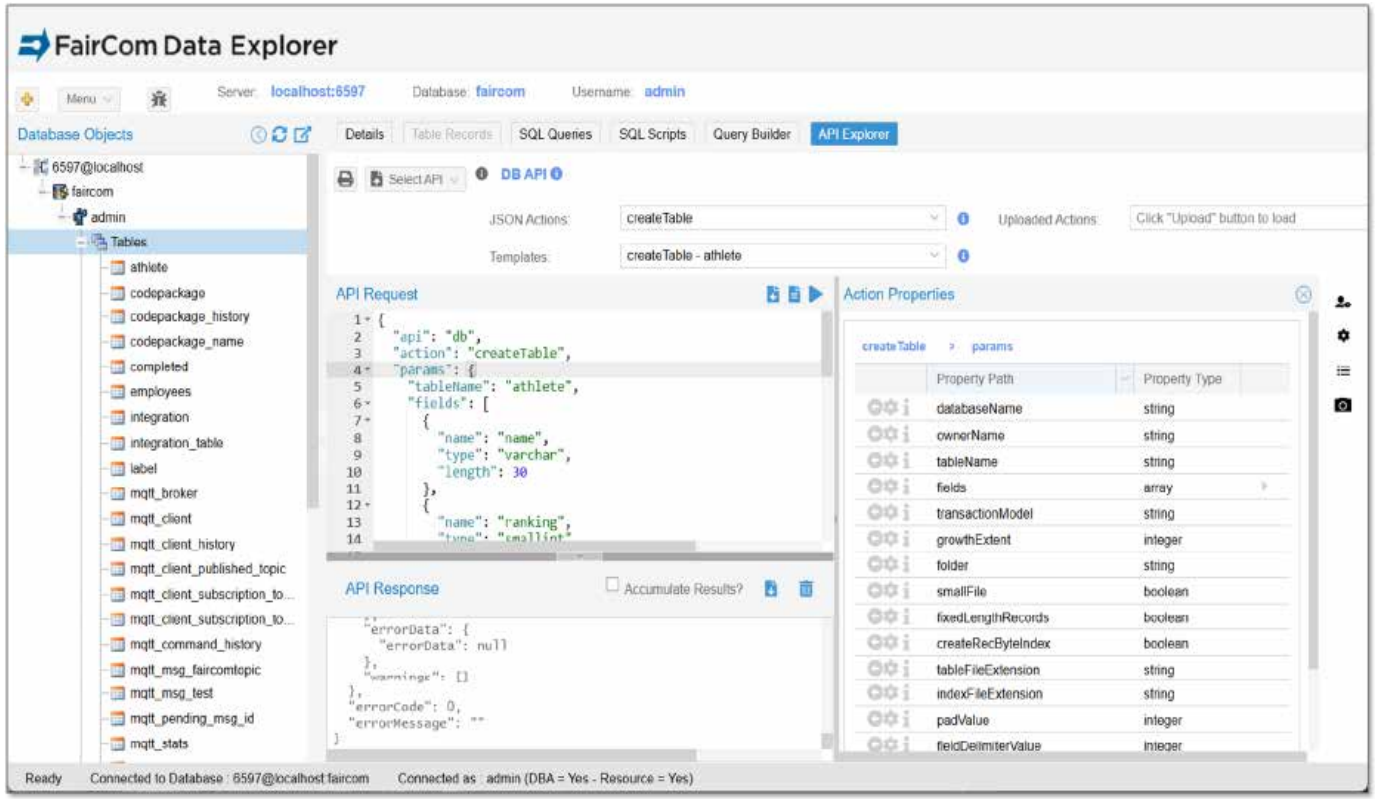
Monitor MQTT Status

FairCom's MQTT dashboard lets users monitor all aspects of MQTT.

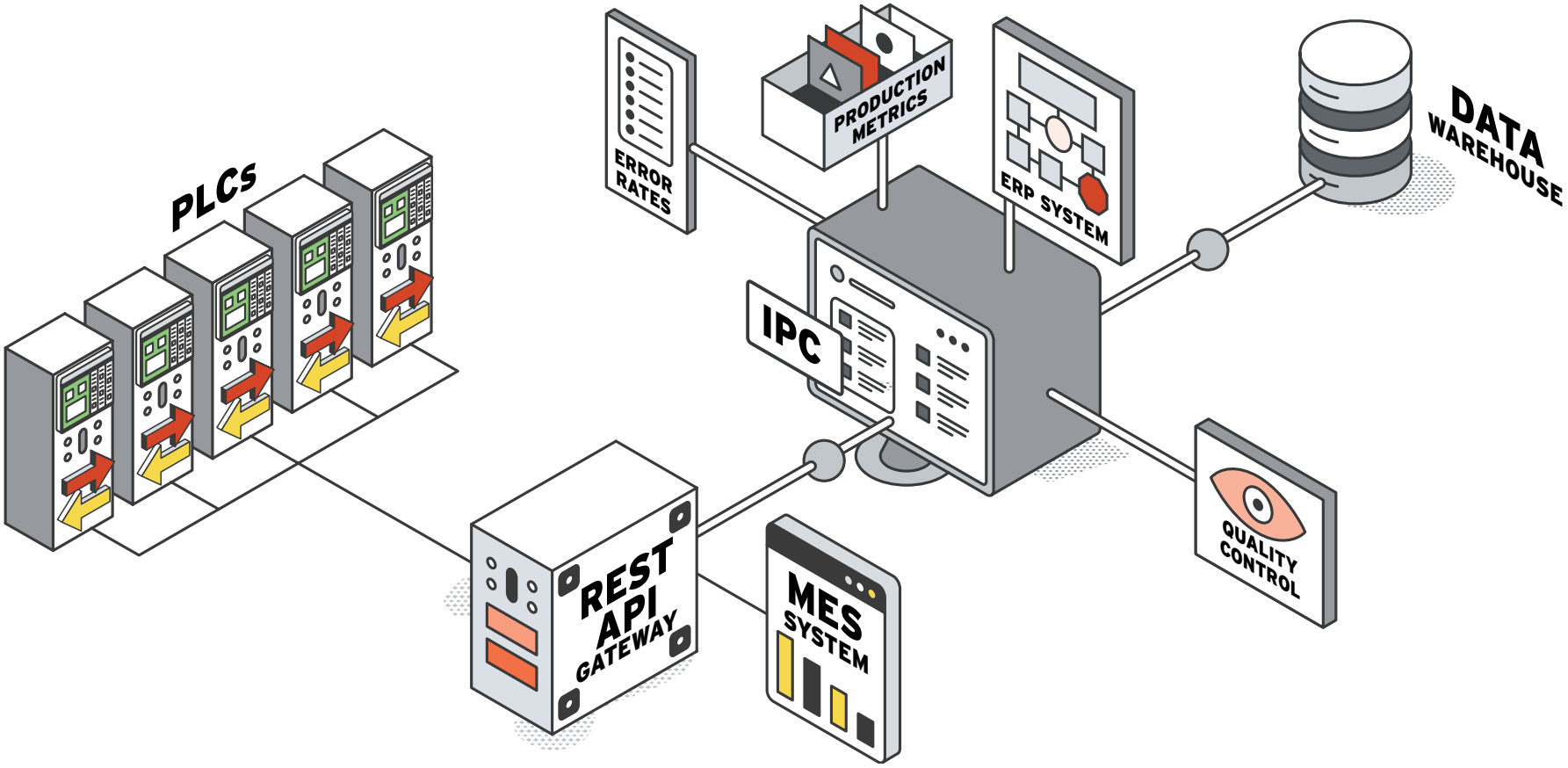


Interactively Run Actions in FairCom's REST API

API Explorer is FairCom Edge's interactive development environment. It provides examples for each API call, enabling users to quickly test actions and outcomes.



New and Improved Connectors



FairCom Edge v5 now supports Modbus, EtherNet/IP, MTConnect, REST, and Siemens S7 industrial protocols, greatly reducing the effort, time, and cost of collecting and writing data to and from industrial devices.

These new connectors are in addition to the Modbus, MQTT, OPC UA, and SQL connectors available in previous versions of FairCom Edge.

A new connector benchmark tool is now included with FairCom Edge. This tool demonstrates the data collection capacity of FairCom Edge on an industrial PC, specifically showing the number of devices and volume of data that can be handled.

FairCom Edge Connector Capabilities

Protocol	Read Data	Bulk Read Data	Write Data	Bulk Write Data
EtherNet/IP	Yes	Arrays	Roadmap	Roadmap
Modbus	Yes	No	Yes	No
MQTT	Yes	Yes	Yes	Yes
MTConnect	Yes	Yes	No	No
OPC UA	Yes	Yes	Roadmap	Roadmap
REST	Yes	Yes	Yes	Yes
Siemens S7	Yes	Yes	Roadmap	Roadmap
SQL	Yes	Yes	Yes	Yes

Improved Modbus Connector

FairCom Edge provides a full-featured connector for the Modbus TCP/IP and RTU protocols that reads and writes data to a huge variety of industrial devices.

Key new features of Edge v5 include the ability to write data to devices, convert bit values into JSON strings, numbers, or boolean (true/false) values, and persist data only when a change is detected.

FairCom also provides a Modbus emulator, scripts, and tutorials showing how to simulate a Modbus device, change its values, and collect those values into FairCom Edge.

New EtherNet/IP Connector

FairCom Edge provides a connector for the EtherNet/IP protocol, a widely adopted industrial protocol used by Allen-Bradley (Rockwell) devices and many others, including PLCs, barcode readers, robotics, servo drives, smart sensors, VFDs, and Vision Systems.

New Siemens S7 Connector

Edge v5 introduces a Siemens S7 connector that enables seamless data integration with various Siemens PLCs, including the SIMATIC S7-1500, S7-1200, S7-400, S7-300, S7-200, and S7-LOGO!.

New MTConnect Connector

Our MTConnect connector uses the MTConnect protocol to read and write to industrial devices like PLCs, CMMs, and CNC machines.

New REST Connector

FairCom Edge provides a REST connector that can push collected data to any REST endpoint. Because all major industrial applications communicate using REST, FairCom Edge can deliver all data it collects to most applications in the factory, in IT, and in the cloud.

FairCom Edge also provides a REST connector for software and cloud systems to write data to it.

Users and applications can also use FairCom's REST API to query data collected by FairCom Edge. It can also write data to any device supported by FairCom Edge.

Improved OPC UA Connector

FairCom Edge's OPC UA connector uses the OPC UA protocol to read data, metadata, alarms, events, and commands from a wide variety of industrial devices, including PLCs, barcode readers, CNC machines, HMIs, robots, vision inspection systems, RFID systems, and more.

Edge v5 introduces new capabilities, including reading multiple tags in a single operation and improved troubleshooting with clearer log messages.

Improved REST API

FairCom Edge offers a feature-rich REST API, enabling developers to quickly configure and use its features with simple JSON requests. The FairCom Edge application uses it to configure FairCom Edge to collect, store, transform, and deliver data. Automation engineers use it in their scripts to configure FairCom Edge. Developers use it to create new applications and integrate existing applications with Edge.

API Feature	Description
Collect data	Configure input connectors to collect data periodically from a device or software system. It can save data when it is collected or only when it changes.
Deliver data	Configure output connectors to deliver data in real-time to a device or software system. It guarantees delivery to other systems, such as cloud providers, enterprise applications, MQTT brokers, etc.
Transform data	Create transform pipelines that enrich, reshape, recalculate, and standardize collected data values. Use JavaScript and built-in transforms to convert a JSON value in the MQTT payload to user-defined fields and vice-versa.
Manage JavaScript code	Create and manage the complete lifecycle of JavaScript code that you use to enrich, reshape, recalculate, and standardize collected data.
Connect to External MQTT Brokers	Publish and subscribe to external MQTT brokers, which may be FairCom Edge, FairCom MQ, or an MQTT broker from another vendor.
Publish and retrieve MQTT messages	Leverage the FairCom server as an event streaming platform by using REST to publish, subscribe, and retrieve MQTT messages.
Manage MQTT topics	Create and configure topics, map topics to tables, define retention policies, forward messages to external brokers, and subscribe to external brokers.
Manage MQTT sessions	Create and manage devices and software that connect to FairCom's MQTT broker.
Manage databases	Create and manage databases, which are security containers for tables.

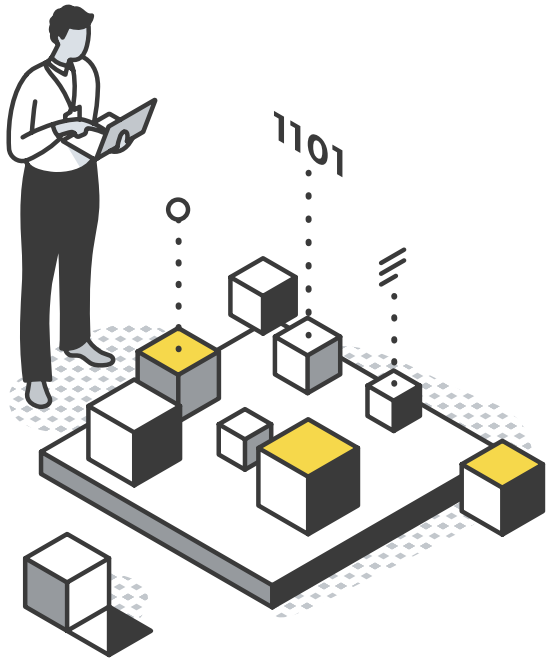
API Feature	Description
Manage tables	Create and configure tables to store data collected by collectors, MQTT, SQL, and REST APIs.
Manage indexes	Create and manage indexes to quickly access and sort collected data.
Manage records	Insert, update, and delete data records. Inserting a record into an integration table causes FairCom Edge to transform it and deliver it to the table's output connectors.
Query records	Use SQL to query collected data. Look up specific records by ID, timestamp, and user-defined fields. Quickly retrieve records in sorted and unsorted order. Create a cursor to tail the most recently inserted records or navigate forward or backward through collected data.
Use transactions	Create transactions to perform operations on records using all-or-nothing semantics.Run separate insert, update, and delete operations as if they were one operation. Run qeries that do not see changes made by concurrent users.
Manage accounts	Create and manage accounts for users and software to log into the server. Assign roles to accounts so they can read and write data to specific tables.
Manage REST sessions	Create a session to log securely into the REST API with a username and password, a client certificate, or API key.
Manage services	Retrieve and configure FairCom server settings.
Create labels	Create and manage labels that you can use to tag collected data.

Improved Database Connectors

FairCom Edge v5 has updated its suite of database drivers and APIs for connecting to and from SQL tools and applications, such as Power BI, Tableau, Excel, etc. These drivers provide full control over FairCom Edge's databases, tables, indexes, records, accounts, etc.

FairCom provides full support for Node-RED integration with FairCom Edge via its REST APIs and MQTT, complete with tutorials and sample programs.

FairCom makes it easy for applications to integrate with FairCom Edge. Language-specific drivers are also available for major languages, including Python, JavaScript, Java, C#, Visual Basic, C++, and PHP. Additionally, JDBC and ODBC SQL connectors enable off-the-shelf analytical applications to seamlessly interact with FairCom Edge data.



Enhanced Analytics

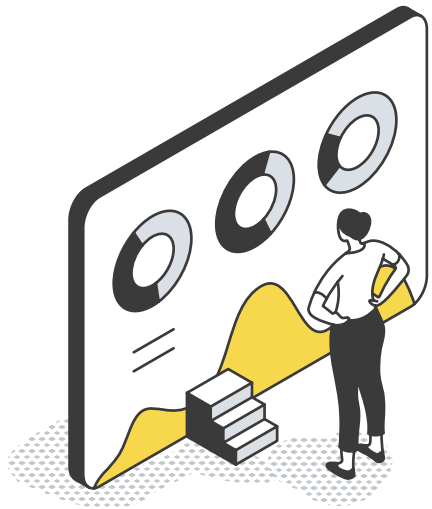
Edge v5 upgrades analytics & reporting with new SQL Window Functions for calculating running totals and moving averages, rankings, and pivots.

Analytic Window Functions compare each row's values with the other values in its group.

- AVG returns an average value from the current partition.
- SUM returns a total value from the current partition.
- COUNT returns the count of records in the current partition.
- FIRST_VALUE returns a value from the first record in the current partition.
- LAST_VALUE returns a value from the last record in the current partition.
- MAX returns a maximum value from the records in the current partition.
- MIN returns a minimum value from the records in the current partition.

Ranking Window Functions rank a row against other rows in its group.

- ROW_NUMBER returns the record's sequential row number.
- PERCENT_RANK returns the record's position as a percentage.
- RANK returns the record's numeric rank.
- DENSE_RANK returns the record's numeric rank with no gaps.
- NTILE returns the record's numeric rank within N subgroups.
- CUME_DIST returns the record's position as a cumulative distribution.



Pivoting and unpivoting data

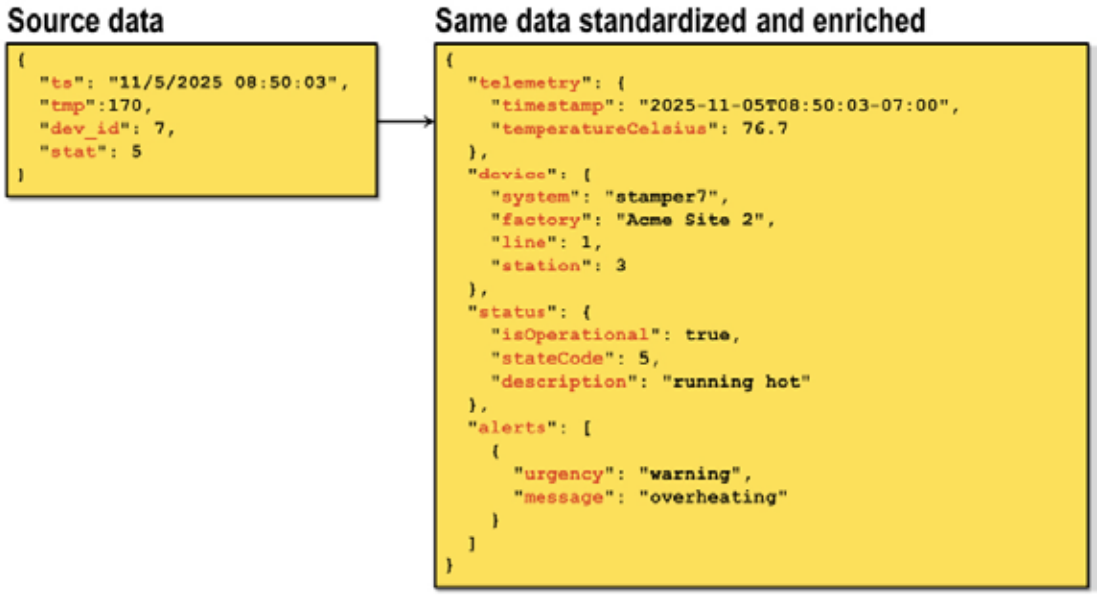
- PIVOT transposes row values to column values.
- UNPIVOT transposes column values to row values.

SQL row value constructors (RVC) boost developer productivity by simplifying complex SQL queries, making them more readable and easier to maintain.

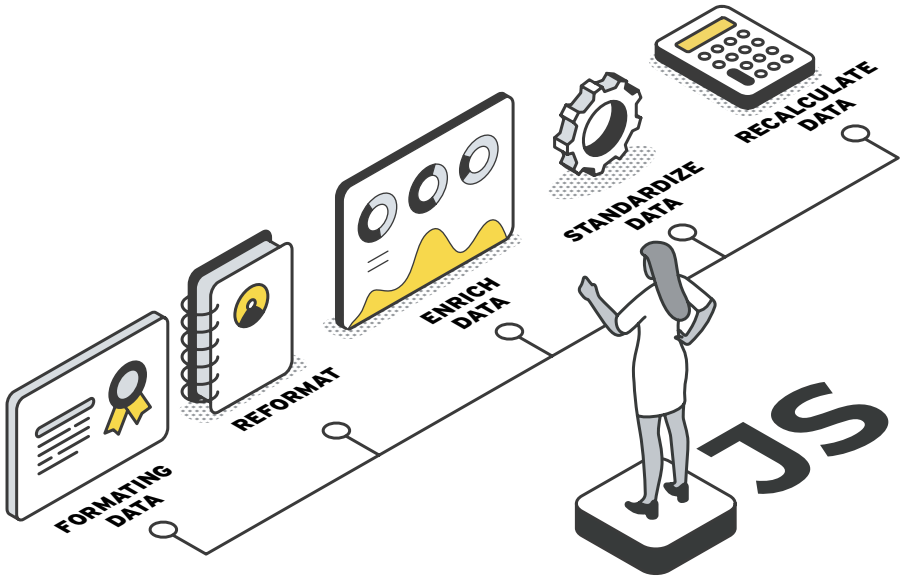
Improved No-Code Transformations

FairCom Edge provides comprehensive data transformation capabilities prior to saving

- Tag data by converting binary data into easy-to-use, flexible JSON properties and table fields.
- Convert bit values to booleans, strings, and numbers.
- Standardize data using uniform tag names, data types, units of measure, etc.
- Enrich data with location, status, or troubleshooting information via lookup values.
- Run calculations to determine Overall Equipment Efficiency (OEE), categorize ranges of values, or convert between units of measure. FairCom Edge's JavaScript engine can perform just about any calculation you can imagine.
- Monitor conditions by capturing threshold violations, determining equipment status, creating alerts, and so forth.



Additional JavaScript Transforms



FairCom Edge v5 unifies collected data through robust data transformation capabilities, enabling renaming, enriching, reshaping, and standardizing data for various software and cloud systems.

JavaScript transforms, running on the integrated Google V8 engine, now automate most server operations via FairCom's REST API, including managing MQTT messages, running queries, performing record and database operations, and configuring Edge components. This leverages JavaScript's strengths for optimal JSON processing, enabling property manipulation, data calculations (e.g., Fahrenheit-to-Celsius), running SQL queries for data lookups, and sending MQTT alerts.

FairCom Edge's REST API also supports on-the-fly data transformation during queries.

The Edge Explorer application provides comprehensive management of server-side JavaScript code. You can add, update, start, stop, and deprecate code, etc. It retains the full history of all code changes, so you never lose code and can always revert to previously working code asneeded.

Security Enhancements

FairCom Edge v5 introduces significant security enhancements across multiple areas. A new setuptls.py CLI utility simplifies the configuration of TLS and certificates for secure, encrypted server communications using FIPS-verified, tamper-proof encryption for data in transit and at rest.

FairCom's Private Certificate Manager generates and manages CA, server, and client certificates that establish secure connections with the FairCom server, preventing malicious actors from impersonating your servers, eavesdropping on communications, or hacking passwords.

Usernames are now more secure and follow the POSIX standard to prevent injection attacks. Password security has also been bolstered; passwords must be between 15 and 1024 bytes and cannot be reused. Stored password hashes are protected by PBKDF2.

Edge v5 also includes denial-of-service protections. Encryption capabilities have been updated to OpenSSL 3.0.16 and FIPS-verified 3.1.2. Finally, X.509 Client Certificate Authentication is now supported for ISAM, CTDB, Direct SQL, Shared Memory, JDBC, ADO.NET, and REST APIs.