Industrial Edge for machine- and plant builders

The easiest way to integrate information technology into machines

Machine-level data analysis in automation systems has always been resource-intensive, scalable only up to a point, and it requires constant outlays for service and maintenance in order to meet the demands of the latest application software and current security mechanisms. That's where Industrial Edge comes in. It simplifies the acquisition and analysis of machine data and supplements automation technology with high-level languages, container technology, and the ability to provide and manage functions flexibly and remotely.
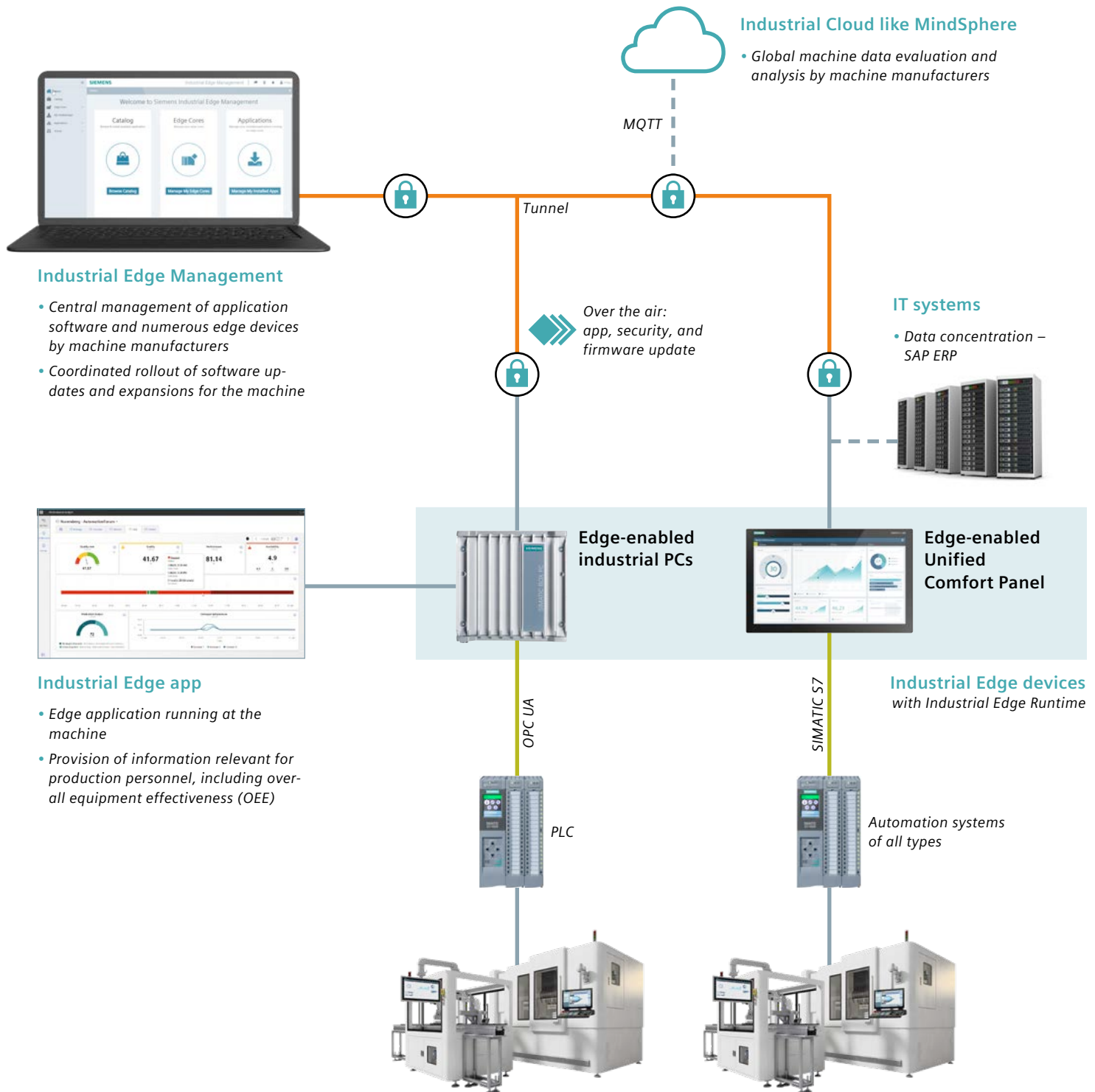
Industrial Edge offers an edge infrastructure that has been proven in practice along with a central management system, an integrated runtime environment, and numerous applications and microservices that make the provision of innovative services much easier.

Cloud and edge computing solutions from Siemens include ready-to-use software solutions for exploiting machine data locally and in real time at the machine or globally across machines via the latest information technology (IT). This allows you to offer your customers innovative services and apps anywhere in the world.

At a glance

- Open infrastructure for running high-level language-based Docker applications on the machine level
- Simpler and more powerful exchange of data with any automation or cloud system for the purpose of performing local and global analyses
- Flexible and monitored provision of machine software anywhere in the world with the Edge Management System
- Lower maintenance costs, thanks to a ready-to-use infrastructure and security/firmware updates
- Minimal investment, thanks to edge integration into HMI, IPC, and PLC
- Open ecosystem comprised of devices and applications for automation technology
- Billing of machine services via an app store

siemens.com/industrial-edge

Solutions tailored to your specific requirements

Industrial Cloud like MindSphere
- Global machine data evaluation and analysis by machine manufacturers

MQTT

Tunnel

Industrial Edge Management
- Central management of application software and numerous edge devices by machine manufacturers
- Coordinated rollout of software updates and expansions for the machine

Over the air: app, security, and firmware update

IT systems
- Data concentration – SAP ERP

Edge-enabled industrial PCs

Edge-enabled Unified Comfort Panel

Industrial Edge app
- Edge application running at the machine
- Provision of information relevant for production personnel, including overall equipment effectiveness (OEE)

Industrial Edge devices
with Industrial Edge Runtime

OPC UA

SIMATIC S7

PLC

Automation systems of all types

The specific topology depends on your application. The Industrial Edge system flexibly adapts itself to your requirements and permits the simple integration of data and management in cloud systems.

Typical real-life applications

Applications are as individual as your machines. We offer you a ready-to-use infrastructure and countless applications so that you as machine manufacturer can make even better use of machine data and offer your customers additional services as a supplement to your machines.

Additional services for machines

Additional added value

- *Data-supported applications for OEE analyses, predictive maintenance, quality information, and more*

New business models

- *New data-supported apps and services as add-ons for the machine*
- *Service offerings like machine optimization and bottleneck analyses in upstream and downstream processes*

R&D management for machines

Improved market position

- *Your machine's usage data is collected in order to optimize your offering – for example, with new functions to improve machine operation*

Machine optimization

- *Usage data utilized to improve machine design – for example, by installing a better air filter or better motor*

Service management for machines

Increased revenue in the service department

- *Additional, data-supported service offerings for machine operators – for example, a preventive spare-part supply when the results of analyses indicate that a machine failure is imminent*

Increased machine availability

- *Applications for predictive and preventive maintenance based on system and process diagnoses*
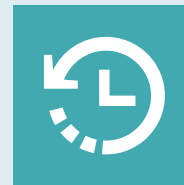
Service performance optimization

- *Dynamic service intervals based on the machine's usage data*
- *Reduced resource consumption – for example, definition of service intervals per machine based on remote data analysis*

Open platform meets customized edge application

Using the Schmalz Connect Suite edge application, automation experts at J. Schmalz GmbH can maintain their vacuum-based gripper systems more efficiently and according to plan.
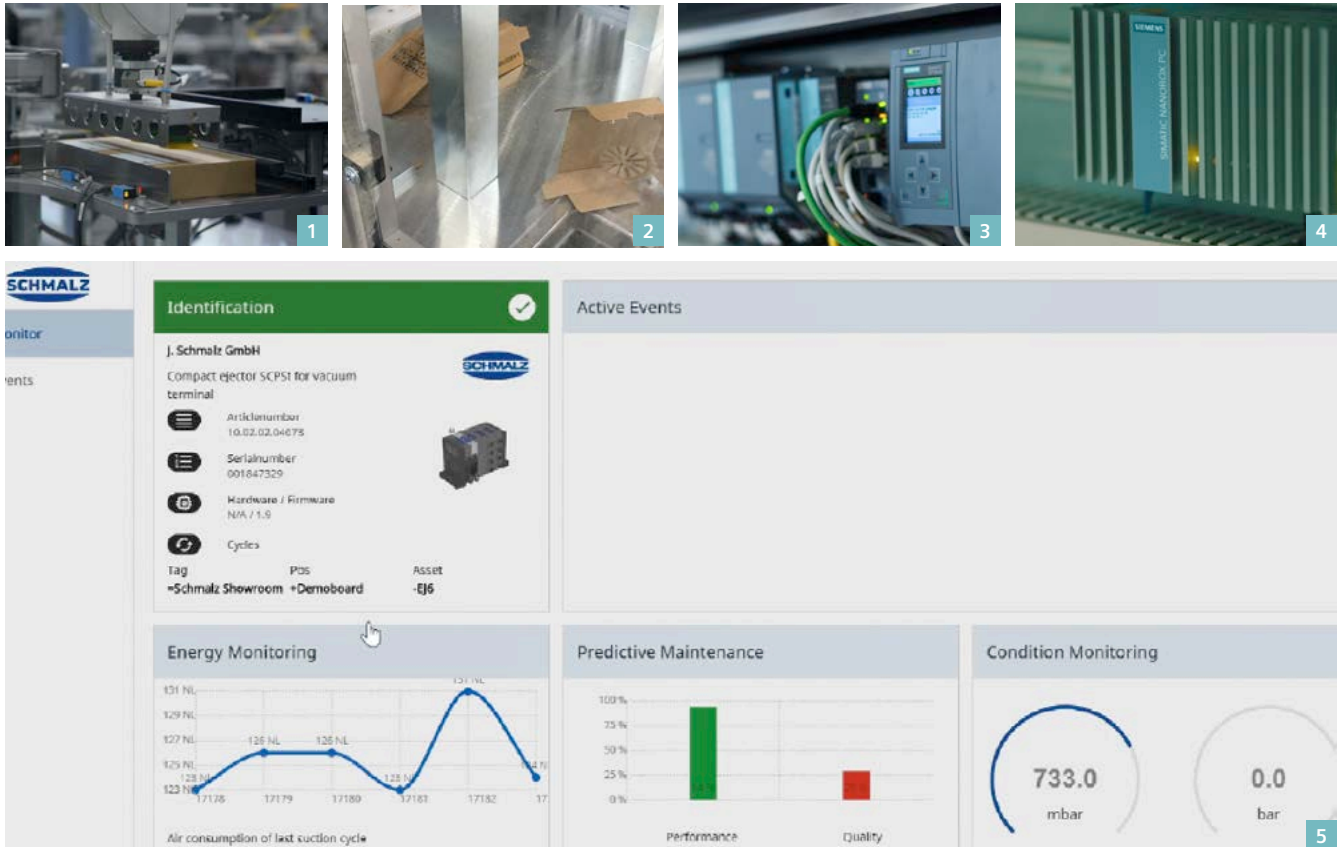
1 *The process: Material handling*
2 *The challenge: Worn-out gripper systems or dirty filters are causing incorrect handling operations inside the machine*
3 *The relevant condition data for the vacuum gripper system is extracted from the controller and vacuum components by OPC UA and IO-Link*
4 *Industrial Edge device with Industrial Edge application*
5 *Industrial Edge app from Schmalz for monitoring the condition of vacuum-based gripper systems*

The facts at a glance

- *A three-shift operation increases wear on suction grippers and leads to failures. A condition monitoring system can predict downtime over longer periods of time and enables timely maintenance*

- *Implementation of condition monitoring as an edge application (Schmalz Connect Suite) based on Docker*
  - *Uses OPC UA to acquire data in the Industrial Edge device*
  - *Acquires data from the controller and connected vacuum components by means of an OPC UA connector integrated in Industrial Edge, a databus, and specially developed IO-Link connectivity*
  - *Acquires specific vacuum system parameters like air consumption, leakage rate, and suction time*
  - *Uses statistical methods for data evaluation in order to predict the next failure or the time remaining until maintenance*
  - *Integrated Web interface for visualizing results*

- *Data connectivity to the Schmalz cloud solution for remote monitoring, central aggregation, and comparison of machine condition*

- *Central management of the application, along with updates by the plant oyperator*

- *Future: In addition to its vacuum systems, J. Schmalz GmbH will sell the Industrial Edge application directly to its customers through the Industrial Edge App Store*
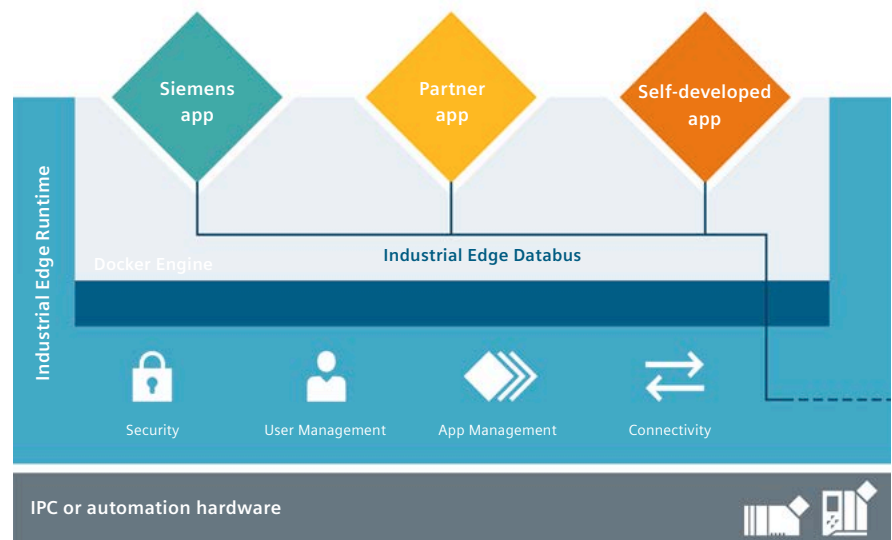
Ready-to-use Industrial Edge applications

Based on the Docker IT standard, you can run your own applications on the edge devices in the Industrial Edge ecosystem. This also applies to existing applications for data analysis.

Docker-based container virtualization offers numerous advantages, including the isolation of applications and their simple operation and availability. You can use any high-level language like Python, Node.js, Java, or C++ to develop new edge apps, virtualize them as Docker images, and run them scalably on a variety of edge devices.

Industrial Edge also offers you a series of ready-to-use apps for data visualization, condition monitoring, machine service optimization, alarming, and machine interaction.

For example, you can use the Performance Insight Industrial Edge app to provide your customers with individually configurable, machine-level data visualization solutions that allow them to view the condition of their machines at a glance. When there are data point deviations – for example, in the event of a machine outage – either you or on-site production personnel can be alerted via smartphone using the Notifier Edge app so that targeted interventions can be coordinated immediately.
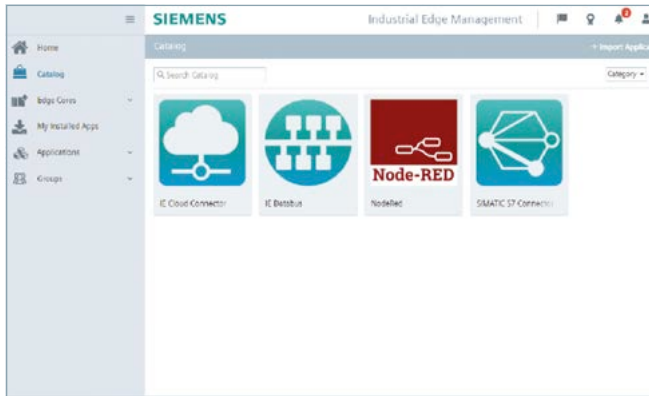
Naturally, you can choose where to run the application, whether it's locally on the machine with Industrial Edge or globally for machine comparisons with MindSphere.
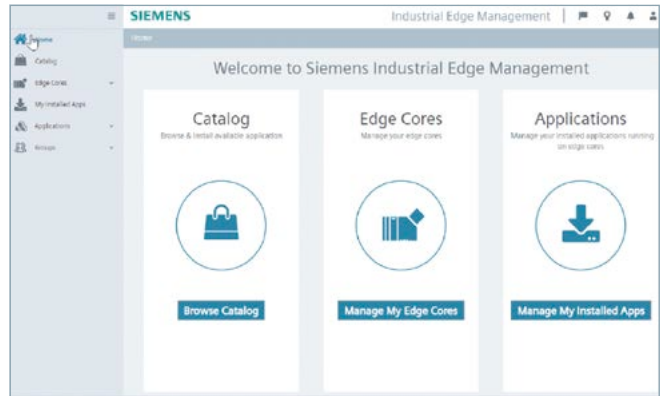
Schematic structure of an Industrial Edge device with Industrial Edge Runtime
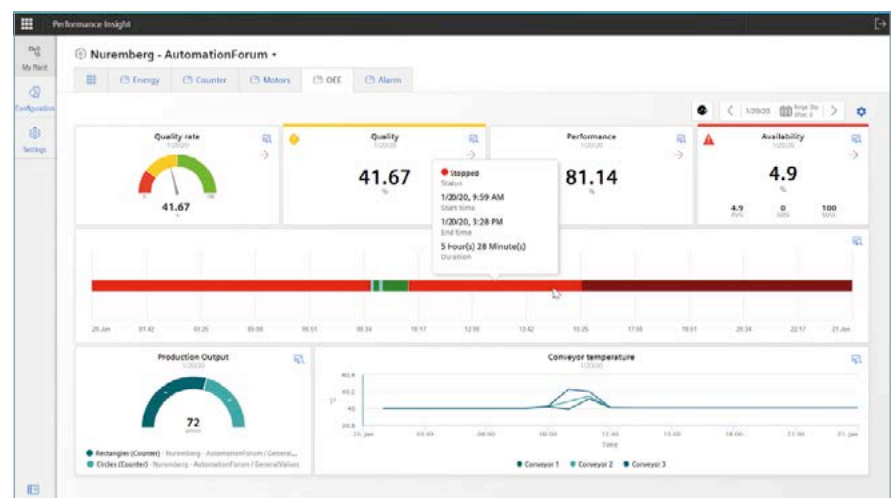
Ready-to-use (mass) device and application management with an app store

User view with user-specific applications available for installation on distributed edge devices (over-the-air updates)

Welcome screen for centrally managing connected edge devices and associated apps

Administrator view for centrally monitoring globally registered devices, available and installed applications, and registered users in the system

User view of edge applications installed on edge devices: A service interface permits direct access to local app dashboards

The Edge Management System allows you to manage thousands of distributed edge devices and their application software worldwide. With this ready-to-use solution, you'll automate your IT processes from app development and deployment to operations, and you can run the software globally and scalably at your machines.

Industrial Edge Management offers central application and device management, over-the-air updates, individually configurable user management, and extended statistical and logging functions for devices and apps.

And not only can you roll out applications yourself, you can also offer them to your customers through our Industrial Edge App Store. This gives you the potential to attract new customers who are already using Industrial Edge but don't yet belong to your customer base.

Function overview

Industrial Edge Management	
Hosting	• Local hosting in the company infrastructure • Hosting on cloud services like AWS and MS Azure • Software as a service (SaaS) operated by Siemens
App management	• Central management, versioning, and distribution of Docker-based applications and services on connected edge devices • Centralized configuration of edge applications and data connections of connected edge devices to automation and the cloud • Targeted mass rollout with integrated version management of edge applications based on groups (for example, machine type) • Schedulable time-based rollouts, for example, to account for shift schedules • Tracking of changes and updates by a job scheduling system
Device management	• Central device management for thousands of distributed edge devices with Industrial Edge Runtime • Central alarming for events like "Device offline" • Central access to statistical and diagnostic information (apps running, CPU, RAM, and much more)
Integration of existing development environments	• Extremely simple integration in existing development and testing environments • Automation of formerly manual development steps like programming, testing, deployment, and operation, thanks to integration via open APIs
Logging	• Central logging of events and log files from the Edge Management System, apps, devices, and their operating system
Activatable interface	• Firewall-friendly remote access to globally distributed edge devices and access to edge applications via remote port tunneling
User management	• Individually configurable and integrated user management for the Edge Management System, edge devices, and edge apps • Option to assign up to 30 function-related attributes to different users • Assignment and sharing of edge devices and apps between users enables realistic operation without requiring supervision by an administrator
Security	• Certificate-based encrypted communication between edge devices and the Edge Management System based on TLS 1.2

Industrial Edge devices	
System description	• Delivery as ready-to-use system with hardware and pre-installed Industrial Edge Runtime, including secure operating system • Industrial hardware with tamper-proof manufacturer certificate as basis for trust
System integrity	• Linux-based firmware with integrity guaranteed by secure and monitored boot procedures and complete hard disk encryption by a trusted platform module (TPM)
Communication security	• Encrypted communication with external systems via TLS 1.2
Application security	• Applications run as Docker container technology, offering you the option to isolate applications from host systems and from one another
Authentification	• Access to edge applications by means of authentication based on user management (HTTPS, reverse proxy)
Over-the-air updates	• Robust and secure over-the-air updates by the Edge Management System
Data management	• MQTT-based databus for app-to-app communication • Integrated database (InfluxDB) for storing time series data
Supported protocols	• Data exchange with automation, IT, and cloud systems via Simatic S7, OPC UA Client, OPC UA server, PROFINET IO RT, Modbus TCP, Ethernet/IP, and MQTT Publish/Subscribe with buffer mechanism in case the connection fails • Additional interfaces can be programmed based on Docker
Network	• Provision of device functions through a firewall-friendly connection between an edge device and the Edge Management System via Port 443 • Network separation by means of independent physical network interfaces

Ordering information

Product description	Order No.
Industrial Edge Access	
Access to Industrial Edge (software, documentation), including Industrial Edge Management	*6ES7823-0EE00-4AX0*
Industrial Edge device license	
Due for each productively used and centrally managed edge device	*6ES7823-0EE00-4AY0*
Industrial Edge devices with Industrial Edge Runtime	
SIMATIC IPC227E	*6ES7647-8BD31-0CW1*
SIMATIC IPC127E Basic Option	*6AG4021-0AD11-0CB0*
SIMATIC IPC127E Extended Option	*6AG4021-0AD12-0CB0*
SIMATIC IPC427E	*6AG4141-5BB30-0FW8*
SIMATIC HMI Unified Comfort Panel	*Configuration-dependent*
SIMATIC TM MFP for S7-1500	*On request*
SIMATIC IOT2050	*On request*
Additional partner or Siemens devices are available or are in the planning stage	*On request*
Industrial Edge apps for acquiring data from automation and IT systems	
OPC UA connector	*Included as standard*
SIMATIC S7 connector	*Included as standard*
SIMOTION Trace connector	*As sample application*
Cloud connector	*Included as standard*
SINUMERIK connector	*On request*
Modbus TCP connector	*On request*
EtherNet/IP connector	*On request*
PROFINET IO connector	*On request*
Data service	*On request*
Owned Docker applications	*-*
Industrial Edge apps for data processing and analysis	
Flow Creator	*Included as standard*
Performance Insight	*6AV2170-0JA10-0AA0*
Machine Insight	*6AV2170-0JA30-0AA0*
Notifier	*6AV2170-0JA00-0AA0*
Inventory	*6AV2170-0JA40-0AA0*
LiveTwin	*6AV2170-0BL00-0AA0*
SIMATIC Automation Tool	*6AV6676-6EA00-0AA0*
Energy Manager	*On request*
Applications for use with machine tools, in the process industry, and more	*On request*
Owned Docker applications	*-*

For more information on the products and our comprehensive cloud offering, visit our Website at www.siemens.com/industrial-edge or go to Siemens Industry Online Support

The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.

Start now!

Ask your sales contact about a live on-site demonstration.