

Always the Right Solution

WAGO's range of switches ensures the scalability of your ETHERNET network infrastructure, while providing outstanding electrical and mechanical characteristics. These robust switches are designed for industrial use and are fully compliant with IEEE 802.3, IEEE 802.3u and IEEE 802.3ab.

Combinable with Fiber Optic Cables

ETHERNET via fiber optic cables offers a multitude of advantages for industrial applications. High immunity to interference, electrical isolation and long ranges up to 80 km are extremely beneficial characteristics – and these benefits are a perfect fit with IT.

Scaled Offering

Unmanaged and managed switches in various designs are available for high-end applications. Our Eco Switches are ideal for cost-sensitive applications that do not require technical features such as redundancy. They are ideal for small- to medium-sized networks.

Modular and Expandable

Exchangeable SPF modules adapt WAGO's switches to various fiber optic cables (FOC) and the associated required distances and fibers.

There are SFP modules for multimode and single-mode fiber optic cables for ranges up to 80 km. With the exact combination of copper and fiber optic cables, you are prepared for a multitude of requirements.

Web-Based Management

WAGO's fully managed switches have integrated Web-based management. Any Web browser can be used to configure the switch.

Integrated Function Monitoring

For monitoring and error reporting, the managed switch has configurable functions such as e-mail alarm and SNMP traps. In addition, all switches (except for Eco versions) can monitor individual ports or the power supply via potential-free alarm contact. A DIP switch is used to configure this function.

Full Bandwidth on All Ports

The switches' internal bandwidth is designed so that all ports can communicate simultaneously – in full duplex without restrictions.

Security

Managed switches have built-in security features, such as:

- Authentication
- Access control lists
- DHCP snooping
- Port security

Data Transmission

Managed switches provide configuration options for data transfer, such as:

- VLAN
- IGMP snooping
- IP-based VLAN
- MAC-based VLAN

Availability, Redundancy

Select industrial switches have several options to build redundant network structures and guarantee secure communication – even when connections are faulty:

- Rapid Spanning Tree per IEEE 802.1w – compatible with IT standards
- Jet Ring – a simple ring protocol with switching time < 300 ms
- Xpress Ring – fast ring protocol with switching time < 20 ms
- ERPSv2 per ITU-T standard with switching time < 50 ms

In addition to communication link redundancy, a redundant power supply – which can also be monitored using an alarm relay – is integrated into the switches. If the power supply fails, communication is not interrupted.

Different Operating Modes

The unmanaged switches are ideal for direct plug-and-play use. Managed switches are available for applications where IP filtering or further interpretation of telegrams is required for the application.

Configurable Performance

Managed switches offer performance control features, such as:

- Storm control
- Bandwidth control
- Auto-provisioning
- Link aggregation

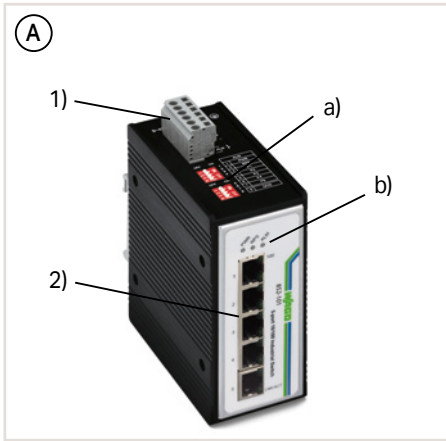
Bit-Based Configuration and Diagnostics

Modbus® can be used to diagnose managed switches. Configuration and diagnostics are also possible with standardized protocols such as SNMP.

Advantages:

- Adaptable to different transmission media
- Automatically adapts to
 - Speed (auto-negotiation)
 - Wiring (auto-crossover, MDI/MDIX)
- Optional redundancy
- Wide supply voltage range

Industrial Switches Interfaces and Types



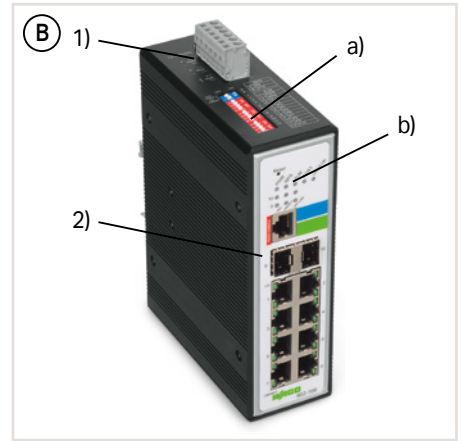
Power supply (1)
Technologically related differences on the connection level (2)

Housing Design (A)

- DIP switch for configuration (a)
- Diagnostic LEDs (b)
- W x H* x D (mm) 50 x 120 x 105

Housing Design (B)

- DIP switch for configuration (a)
- Diagnostic LEDs (b)
- W x H* x D (mm) 50 x 120 x 162

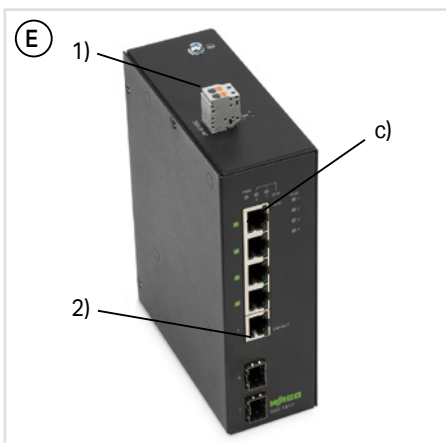
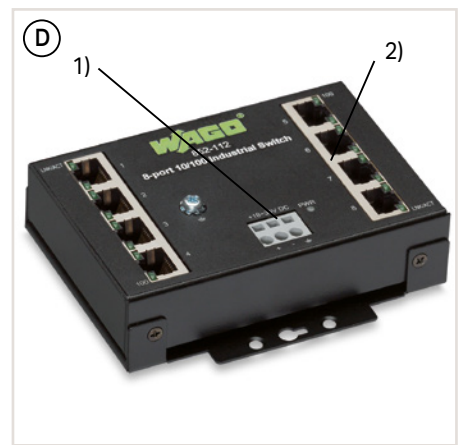


Housing Design Eco (C)

- W x H* x D (mm) 23.4 x 73.8 x 109.2 or 46 x 99.6 x 116
- DIN-35 rail
- wall-mount (852-111, 852-1111)

Housing Design Eco (D)

- W x H* x D (mm) 109.2 x 23.4 x 73.8
- DIN-35 rail or wall-mount



Housing Design PoE+ (E)

- Power over Ethernet (PoE+) Ports (c)
- W x H* x D (mm) 50 x 120 x 160

Housing Design (F)

- SFP module for connecting fiber optic cables
- LC connector
- W x H x D (mm) 13.4 x 13.3 x 56.6

*Height from upper edge of DIN-rail



Variants



Extended Temperature Range

Industrial automation technology is typically operated in temperatures ranging from 0°C to 55°C. However, there are applications that require an extended temperature range. Nearly all switches and SFP modules are available for an extended temperature range of -40°C to +70°C.

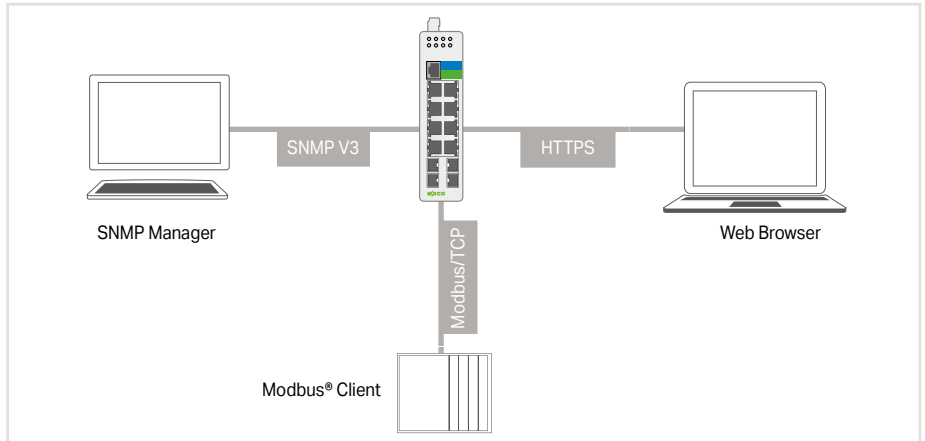
Industrial Switches

Configuration, Diagnostics and Performance

Configuration and Diagnostics

Several options:

- Configuration via Web-based management
- Configuration via command line (SSH, Telnet, RS-232)
- Network management via SNMP v1, v2c, v3
- Support of MIB standards (Management Information Base)
- Diagnostics via Modbus TCP: Comprehensive diagnostic data available for easy diagnostics via Modbus®



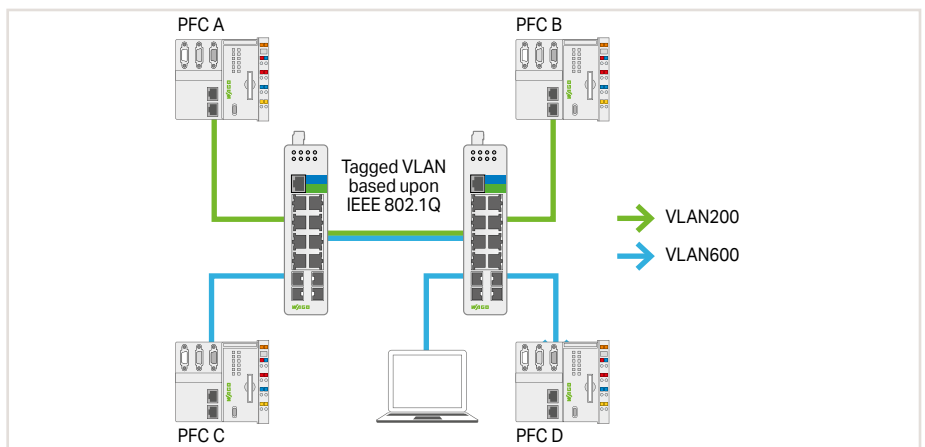
Configuration Interfaces

Logical Network Disconnection

VLAN (e.g., per IEEE 802.1Q)

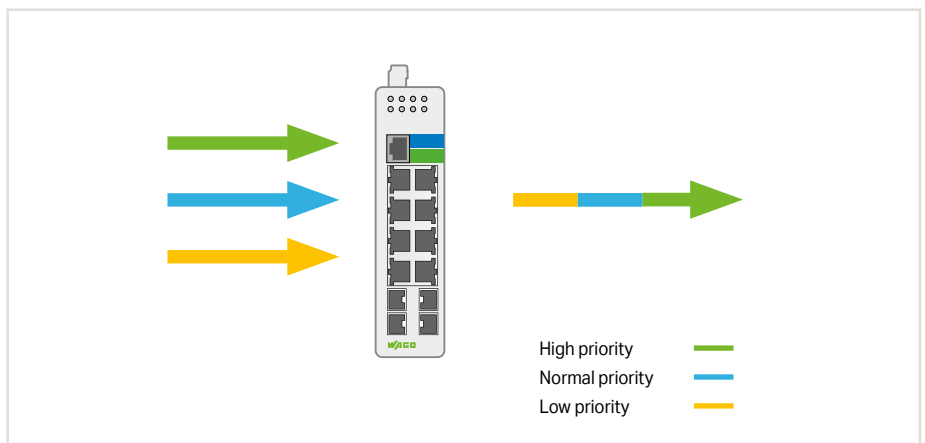
Segmentation into virtual networks:

- Broadcast limitation
- Security improvement
- Data flow prioritization
- Subdivision of machines and office networks, for example



Traffic Prioritization and Limitation

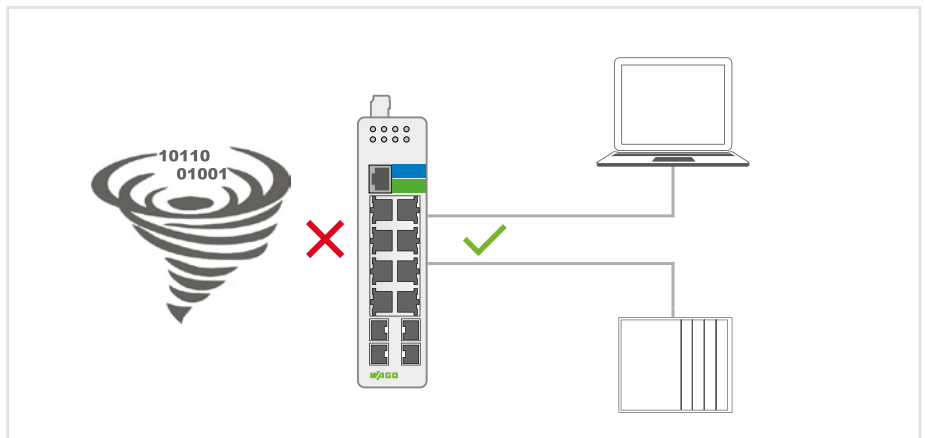
- Faster transfer of important data packets through the switch
- Prioritization of data packets per IEEE 802.1 Q
- Limitation of the bandwidth or number of packets per unit of time per port
- Increase in data transmission quality



QoS

Mastering Data Traffic

- Stopping broadcast storms
- Ensuring network availability
- Limiting broadcast and multicast data flows (packets/time)



Storm Control

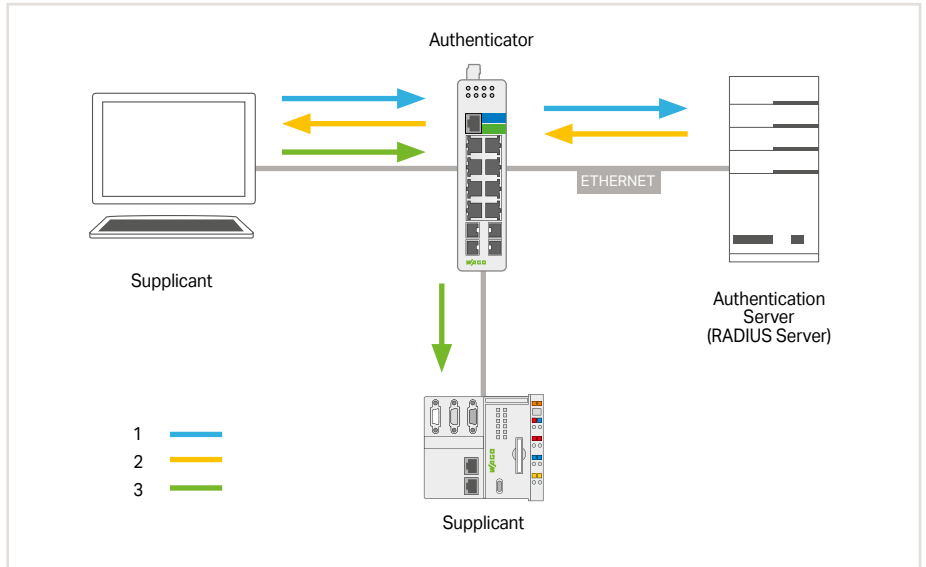
Industrial Switches Security

Authentication IEEE 802.1X

Secure authentication and authorization in ETHERNET networks (locally on the switch or via RADIUS server)

Process:

- Authentication of a subscriber is performed by the authenticator.
- The authenticator checks the authentication information of the subscriber (supplicant) with an authentication server.

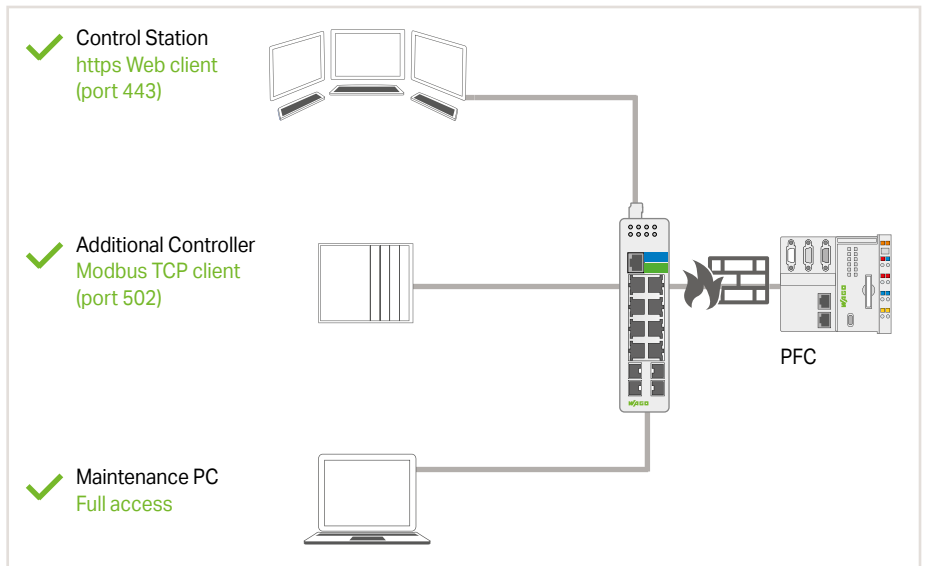


IEEE 802.1X

Firewall – Access Control List

Filtering data packets due to:

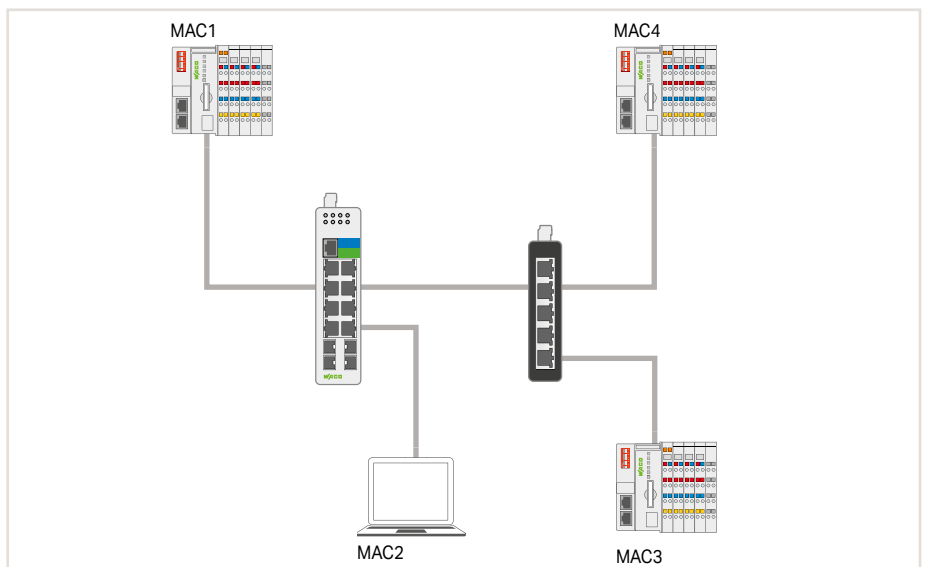
- a source MAC or source IP address
- a destination MAC or destination IP address
- a range of MAC or IP addresses
- UDP/TCP source or destination ports



Firewall

Port Security

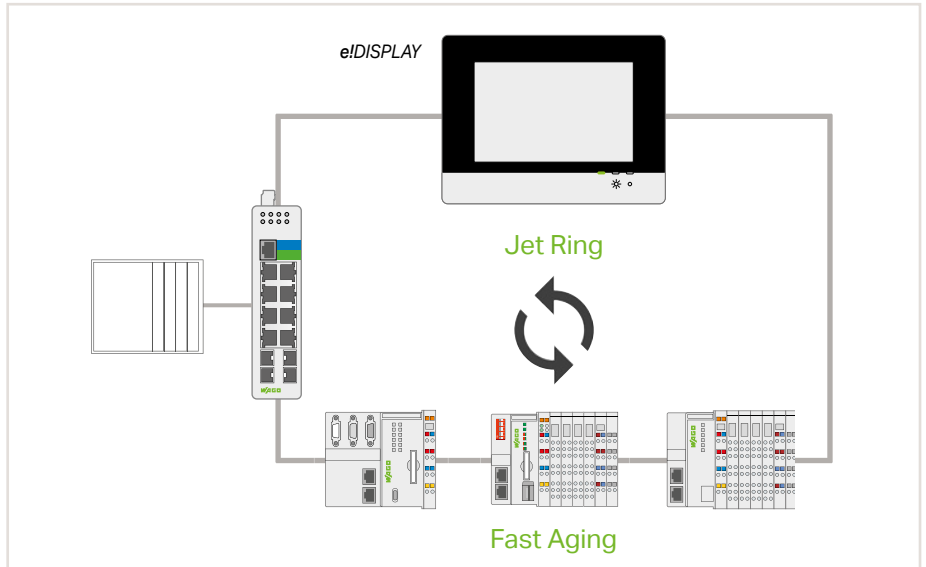
- Dynamically learns MAC addresses per port
- Limitation of MAC addresses per port
- MAC-based white/blacklist per port



Industrial Switches Redundancy

Jet Ring

- Typical switching time < ~ 300 ms (depends on the application)
- Extremely easy configuration
- Up to 20 participants (Fast Aging) in a Jet Ring



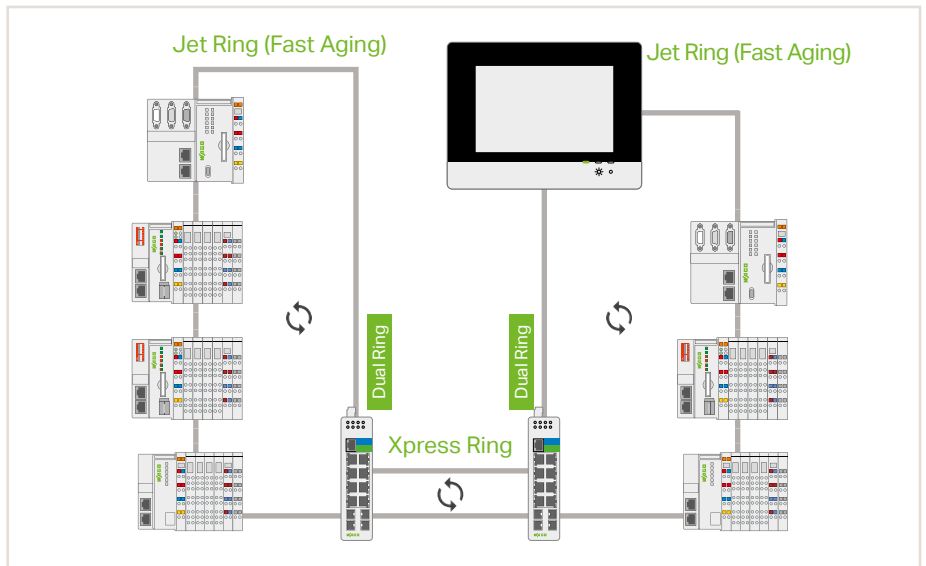
Jet Ring

Xpress Ring

- Switching time < 20 ms
- Easy configuration
- Up to 200 switches in one Xpress Ring
- 2 Xpress Rings per switch

Dual Ring

- Combination of both redundancy types
- 1 Jet Ring and 1 Xpress Ring per switch or 2 Xpress Rings per switch



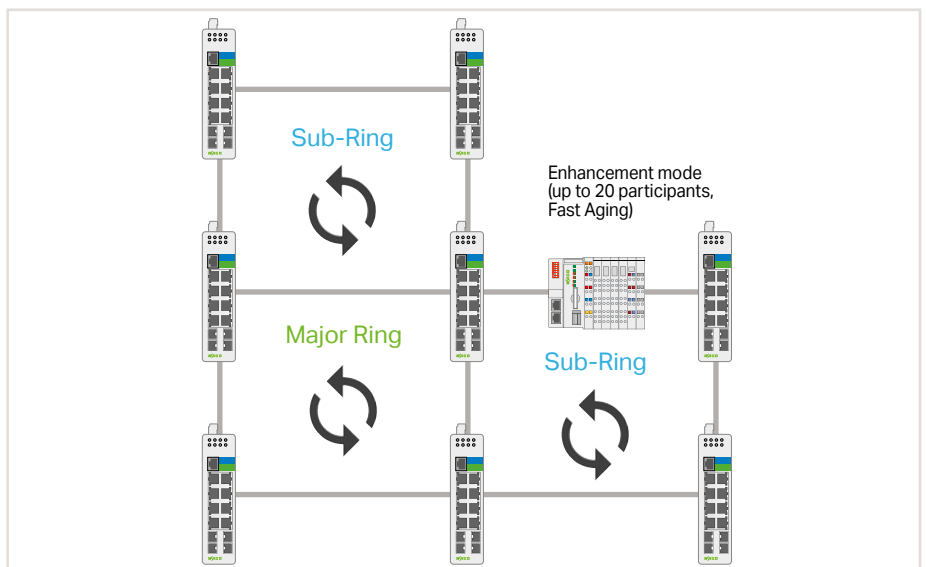
Xpress Ring and Dual Ring

ERPS: ETHERNET Ring Protection Switching

- Standardized and open technology
- Switching time < 50 ms
- Nested topologies with up to six rings per switch
- Realization of a one-fault tolerance (SPOF – Single Point of Failure)

ERPS – Enhancement Mode

- WAGO devices with an integrated switch and Fast Aging configuration
- Typical switching time < ~ 300 ms (depends on the application)

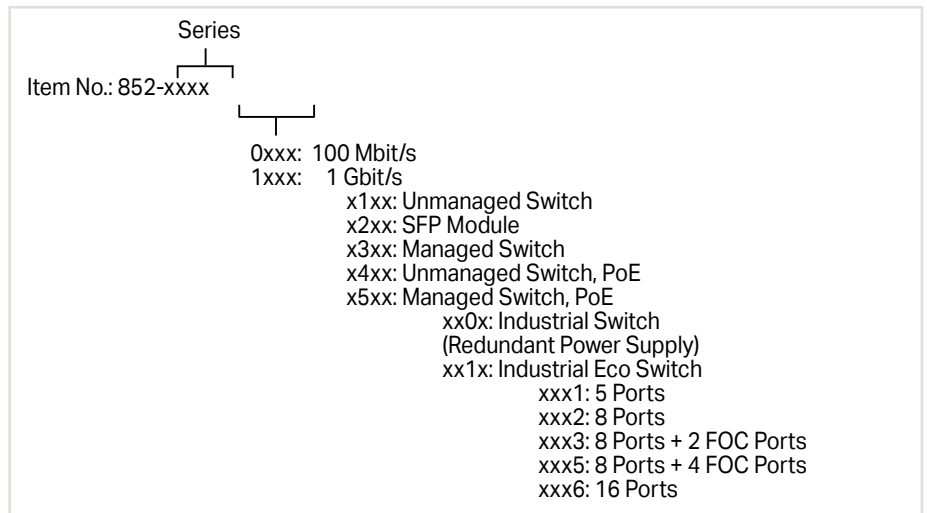


ERPS V2

Industrial Switches

Item Number Key

Explanation of an item number key's components



Standards and Rated Conditions

General Specifications

Packet throughput per port	10 Mbps port: 14,880 packages per second (pps) 100 Mbps port: 148,800 packages per second (pps) 1000 Mbps port: 1,488,000 packages per second (pps)
Surrounding air temperature (operation)	-40 ... +70 °C
Surrounding air temperature (storage)	-40 ... +80 °C
Relative humidity max.	95 % (non condensing)
Vibration resistance	4g per IEC 60068-2-6
Shock resistance	15g per IEC 60068-2-27
EMC immunity to interference	EN 61000-6-2
EMC emission of interference	EN 61000-6-4
Protection type	IP30
Mounting type	On DIN-35 rail, Eco version also for wall-mount
Mounting position	Any

Approvals

For approvals overview (item comparison), see Section 11 (Technical Section) or visit www.wago.com.

