# Industrial Ethernet Switches

Solutions at the Heart of the Industrial ETHERNET

# Contents

**Power supply**

• Pluggable connector
• CAGE CLAMP®, vibration-resistant and maintenance-free connections
• Wide operating voltage

**Robust design**

• DIN rail mounting and metal housing
• Excellent vibration and shock resistance
• Wide operating temperature

**Five ETHERNET ports**

• Auto-negotiation 10/100/1000 Mbit/s
• Auto-MDI/MDI-X crossover
• Status LEDs: link/output/activity

# Industrial Unmanaged Switches

## Eco – Economical and Compact

| Unmanaged | Fast ETHERNET | | Gigabit | | Stainless Steel Adapter (DNV) |
|---|---|---|---|---|---|
| Ports | 5 x 10/100 | 8 x 10/100 | 5 x 10/100/1000 | 8 x 10/100/1000 | |
| Power Supply | 18 … 30 VDC | 18 … 30 VDC | 9 … 48 VDC | 9 … 57 VDC | |
| Dimensions (W x H x D) | 23.4 x 109.2 x 73.8 mm 0.92 x 4.3 x 2.9 in | 109.2 x 73.8 x 23.4 mm 4.3 x 2.9 x 0.92 in | 23.4 x 109.2 x 73.8 mm 0.92 x 4.3 x 2.9 in | 46 x 116 x 99.6 mm 1.8 x 4.6 x 3.9 in | Use with 852-111 and 852-1111 |
| Temperature | -40 … +70 °C -40 … +158 °F | -40 … +70 °C -40 … +158 °F | -40 … +70 °C -40 … +158 °F | 0 … +60 °C +32 … +140 °F | |
| Approvals | cULus, DNV [1] | cULus | cULus , DNV [1] | cULus | |
| PROFINET | - | - | CC-A | CC-A | |
| Part Number | **852-111** | **852-112** | **852-1111** | **852-1112** | **852-9101** |

[1] With DIN 852-9101 rail adapter

## Power supply

- Pluggable connector
- Vibration-proof, maintenance-free power supply connection
- Wide operating voltage

## 5 RJ45 ports 1 Gb/s

- 4 ports PoE+ (30 W)
- 1 Uplink port

## Fiber-optic version

- 2 SFP* ports

## Status LEDs

- Power supply is connected
- PoE sensor is powered
- Communication partner is connected
- Data is being transmitted

## Operating temperature: -40 ... +158 °F

* Small form-factor pluggable interface for fiber-optic cables
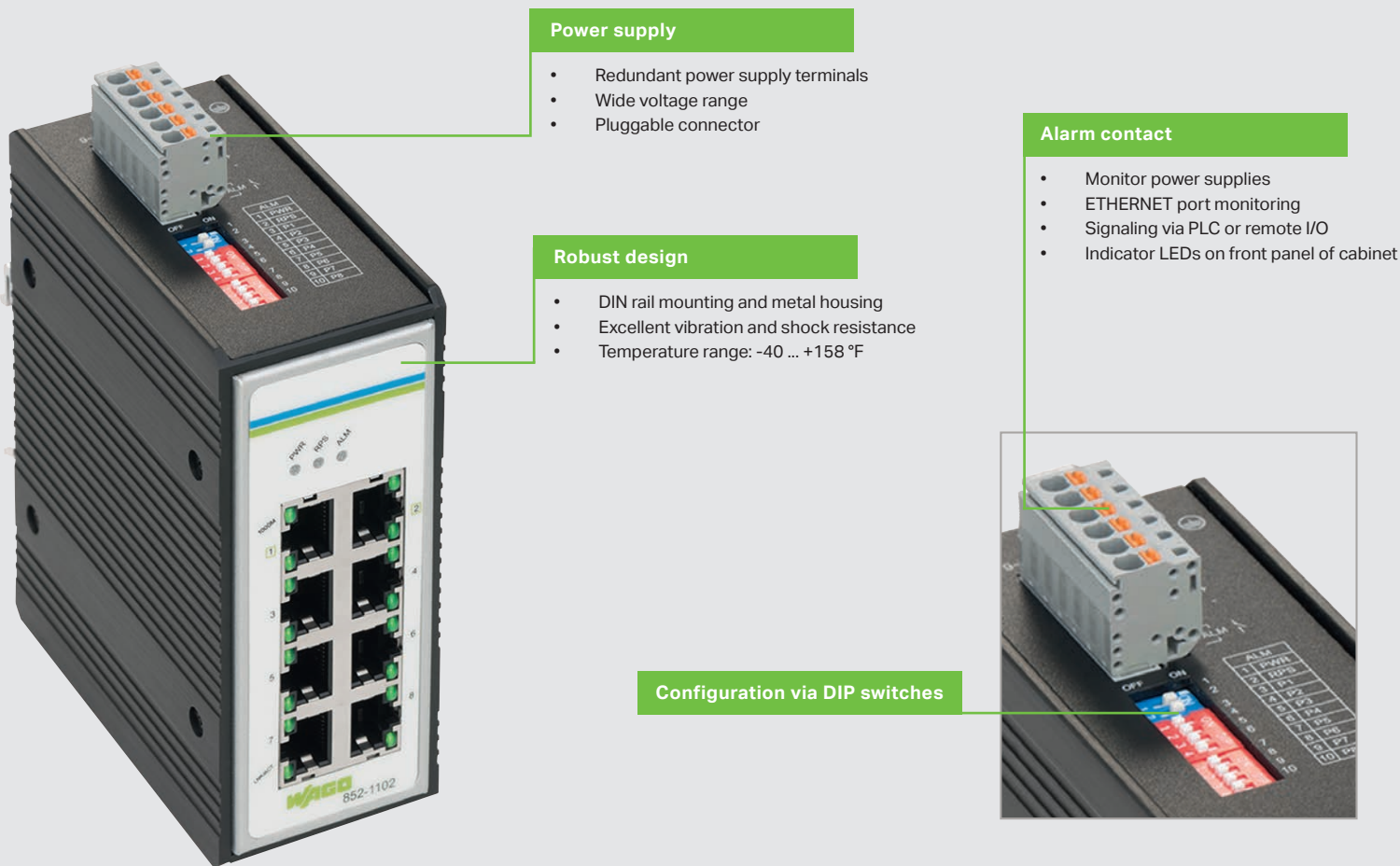
# Unmanaged Power over ETHERNET (PoE+)

"Power over ETHERNET" (PoE+) technology powers PoE-capable devices via network cable using a switch. This allows devices like PoE-capable IP cameras or IoT sensors to be economically integrated into the network, eliminating the separate installation of power and data cables. Other advantages include diagnostics performed within the system.

The IEEE 802.3at-2009 PoE standard, which is also known as PoE+ or PoE plus standard, provides up to 25.5 W of power to the PoE-capable devices. To make this possible, the PoE-capable switch can provide up to 30 W per PoE-enabled port.

| Unmanaged | | | |
|---|---|---|---|
| PoE+ Ports | 4 x PoE+ (30 W) | 4 x PoE+ (30 W) | 4 x PoE+ (30 W) |
| Copper Ports | 5 x 10/100/1000 | 5 x 10/100/1000 | 5 x 10/100/1000 |
| SFP Ports | - | 2 x SFP 1000 | - |
| Power Supply | 24 ... 57 VDC | 24 ... 57 VDC | 24 ... 57 VDC |
| Dimensions (W x H x D) | 50 x 120 x 160 mm 1.9 x 4.7 x 6.3 in | 50 x 120 x 160 mm 1.9 x 4.7 x 6.3 in | 50 x 115 x 100 mm 1.9 x 4.5 x 3.9 in |
| Temperature | -40 ... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F | -20 ... +60 °C -4 ... +140 °F |
| Approvals | cULus | cULus | cULus[1] |
| Part Number | 852-1411 | 852-1417 | 852-1411/0000-0001 |

[1] For supply voltage <48 VDC, the PoE budget is limited to 60 watts

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## Power supply

- Redundant power supply terminals
- Wide voltage range
- Pluggable connector

## Alarm contact

- Monitor power supplies
- ETHERNET port monitoring
- Signaling via PLC or remote I/O
- Indicator LEDs on front panel of cabinet

## Robust design

- DIN rail mounting and metal housing
- Excellent vibration and shock resistance
- Temperature range: -40 ... +158 °F

Configuration via DIP switches

# Industrial Unmanaged Switches

## Standard – Versatile Use

| Unmanaged | Fast ETHERNET | | | Gigabit | |
|---|---|---|---|---|---|
| Copper Ports | 5 x 10/100 | 8 x 10/100 | 8 x 10/100 | 8 x 10/100/1000 | 16 x 10/100/1000 |
| Fiber-Optic Ports | - | - | 2 x SFP 100* | - | - |
| Power Supply | 9 ... 48 VDC | 9 ... 48 VDC | 9 ... 48 VDC | 9 ... 57 VDC | 9 ... 57 VDC |
| Redundant Power Supply | Yes | Yes | Yes | Yes | Yes |
| Alarm Contact | Yes | Yes | Yes | Yes | Yes |
| Dimensions (W x H x D) | 50 x 120 x 105 mm 2 x 4.7 x 4.1 in | 50 x 162 x 105 mm 2 x 6.4 x 4.1 in | 50 x 162 x 105 mm 2 x 6.4 x 4.1 in | 50 x 120 x 105 mm 2 x 4.7 x 4.1 in | 50 x 162 x 105 mm 2 x 6.4 x 4.1 in |
| Temperature | -40 ... +70 °C -40 ... +158 °F | -40... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F |
| Approvals | cULus | cULus | cULus | cULus | cULus |
| PROFINET | - | - | - | CC-A[1] | CC-A[1] |
| Part Number | **852-101** | **852-102** | **852-103** | **852-1102** | **852-1106** |

[1] No PROFINET configuration and diagnostics with conformity class A

## Power Supply

- Redundant power supply terminals
- Wide voltage range
- Pluggable connector

## Status LEDs

## Redundant Rings

- Rapid Spanning Tree Protocol
- Ethernet Ring Protection Switching

## Alarm Contact

- Monitor primary and secondary power supply

## Copper and Fiber-Optic Versions

- 8 and 16 RJ45 versions
- Fiber-optic SFP slots
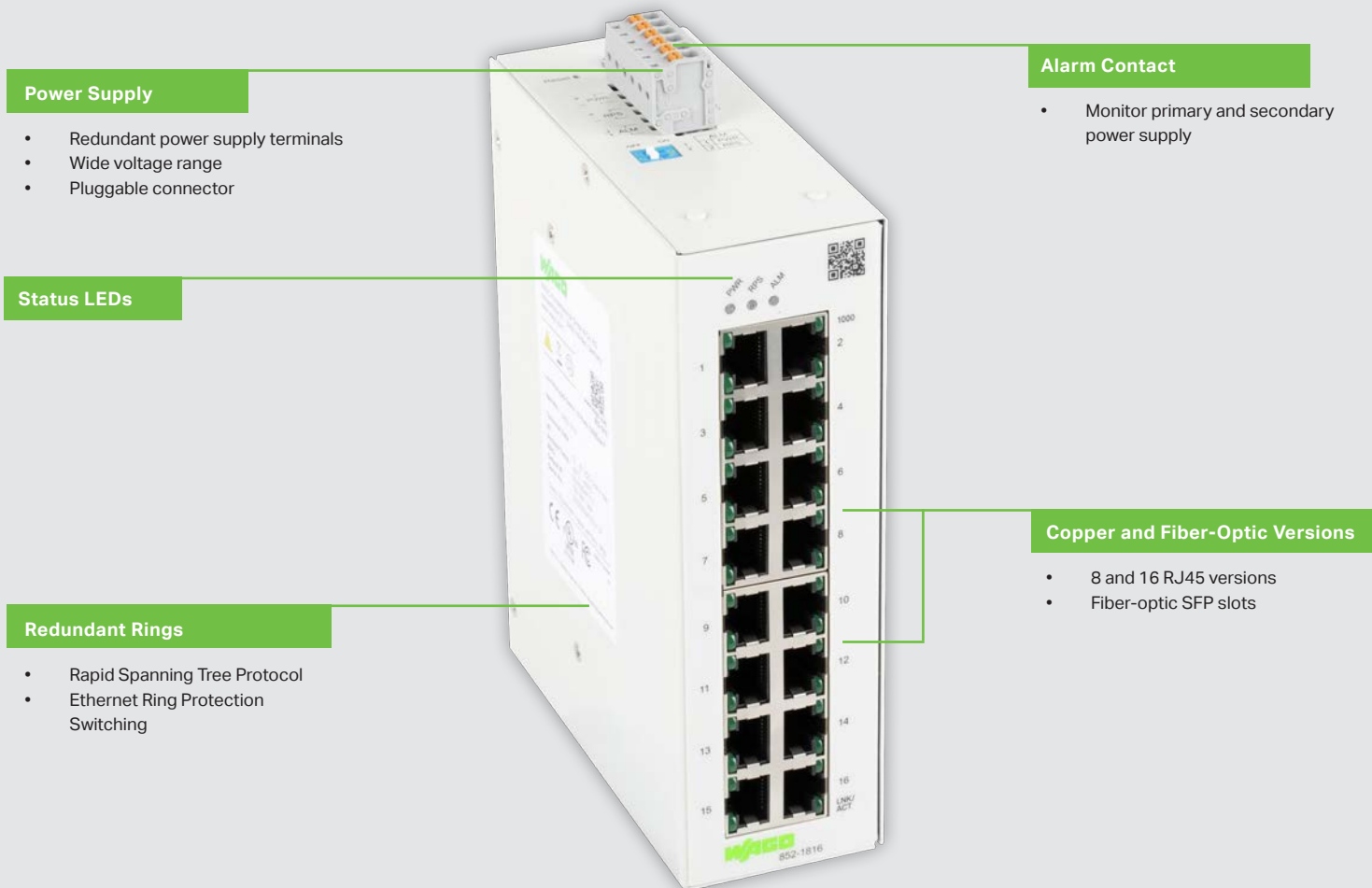
# Lean Managed Switches

## Economical Managed Switches Optimized for Industrial Networking

| Lean Managed | | | | |
|---|---|---|---|---|
| | | | | |
| **Copper Ports** | 8 x 10/100/1000 | 8 x 10/100/1000 | 8 x 10/100/1000 | 16 x 10/100/1000 |
| **PoE+ Ports** | - | - | 8 (up to 240 W) | - |
| **SFP Ports** | - | 2 x 100 or 1000 | 2 x 100 or 1000 | - |
| **Redundant Power Supply** | Yes | Yes | Yes | Yes |
| **Power Supply** | 24 … 28 VDC | 24 … 48 VDC | 24 … 57 VDC | 12 … 60 VDC |
| **Alarm Contact** | Yes | Yes | Yes | Yes |
| **Dimensions (W x H x D)** | 50 x 116 x 100 mm 2 x 4.5 x 3.9 in | 50 x 116 x 100 mm 2 x 4.5 x 3.9 in | 50 x 120 x 160 mm 2 x 4.7 x 6.3 in | 50 x 120 x 160 mm 2 x 4.7 x 6.3 in |
| **Temperature** | -40 … +60 °C -40 … +140 °F | -40 … +60 °C -40 … +140 °F | -40 … +60 °C -40 … +140 °F | -40 … +60 °C -40 … +140 °F |
| **Approvals** | CE, cULus | CE, cULus | CE, cULus | CE, cULus |
| **Topology Map/Dashboard** | Yes | Yes | Yes | Yes |
| **Part Number** | **852-1812** | **852-1813** | **852-1813/000-001** | **852-1816** |

# Lean Managed Switches

Lean Managed Switches are engineered for use in industrial environments that are installed and maintained by control minded Automation Engineers and Technicians. Unique tools such as a graphical active topology map and diagnostic dashboards provide users information to easily monitor and troubleshoot any industrial network. WAGO's Lean Managed Switches offer network tools that control engineers need without the overhead of IT related features that are commonly not used on the plant floor.
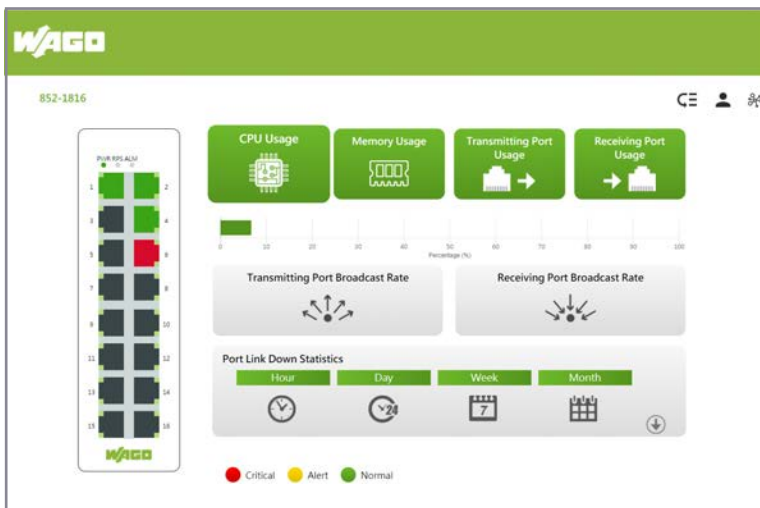


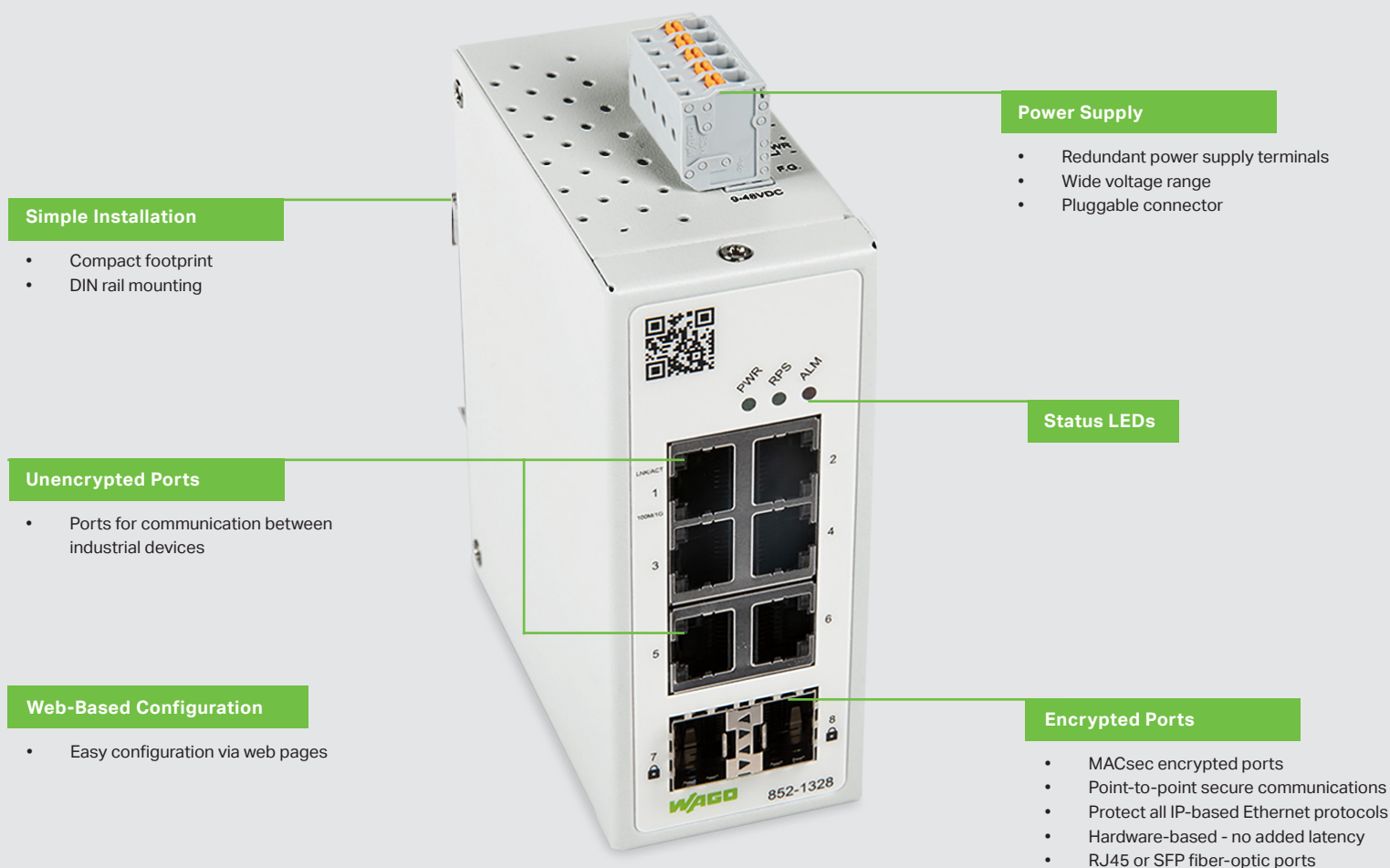**Web-based Dashboard**
**Network Health at a Glance**

- Red, yellow and green indicators for instant network health status
- Port link status for all used ports
- Transmission TX and RX usage
- Port broadcast rates
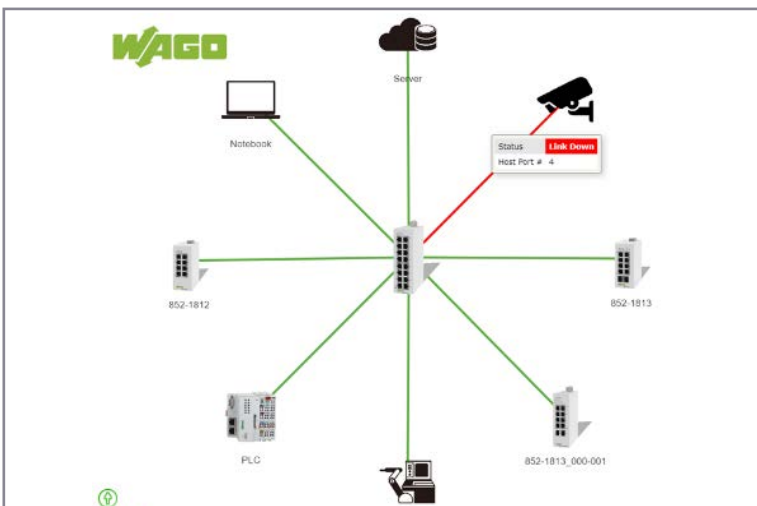


**Web-based Topology Map**
**Network Status View**

- Network connectivity information
- Connection status via green/red visualization
- Link information

**Power Supply**

- Redundant power supply terminals
- Wide voltage range
- Pluggable connector

**Simple Installation**

- Compact footprint
- DIN rail mounting

**Status LEDs**

**Unencrypted Ports**

- Ports for communication between industrial devices

**Web-Based Configuration**

- Easy configuration via web pages

**Encrypted Ports**

- MACsec encrypted ports
- Point-to-point secure communications
- Protect all IP-based Ethernet protocols
- Hardware-based - no added latency
- RJ45 or SFP fiber-optic ports

# MACsec Encrypted Managed Switches

## Encrypt Fieldbus Networks for Enhanced Cybersecurity

Help increase cybersecurity on the plant floor using easy to implement Media Access Control Security or MACsec technology. (IEEE 802.1AE)

Whether for new applications or retrofitting, MACsec managed switches will encrypt fieldbus such as MODBUS. Ethernet/IP, BACnet, and Profinet or IIoT protocols including HTTP, or MQTT.   Install communication encryption without modifying your applications.

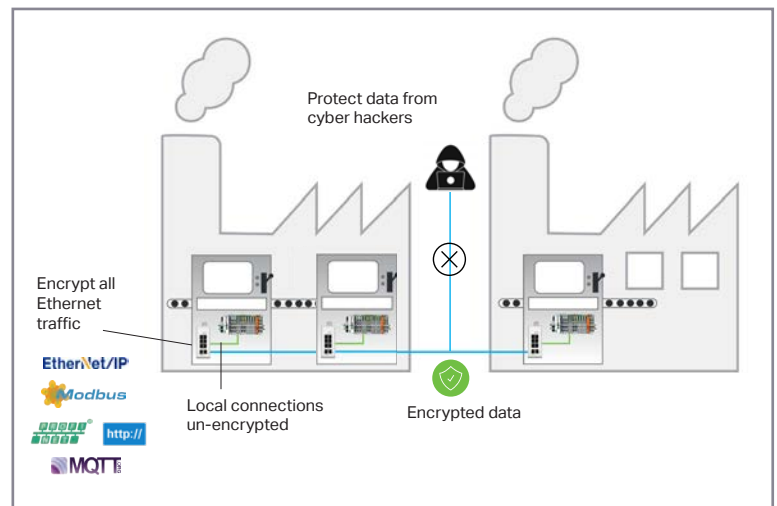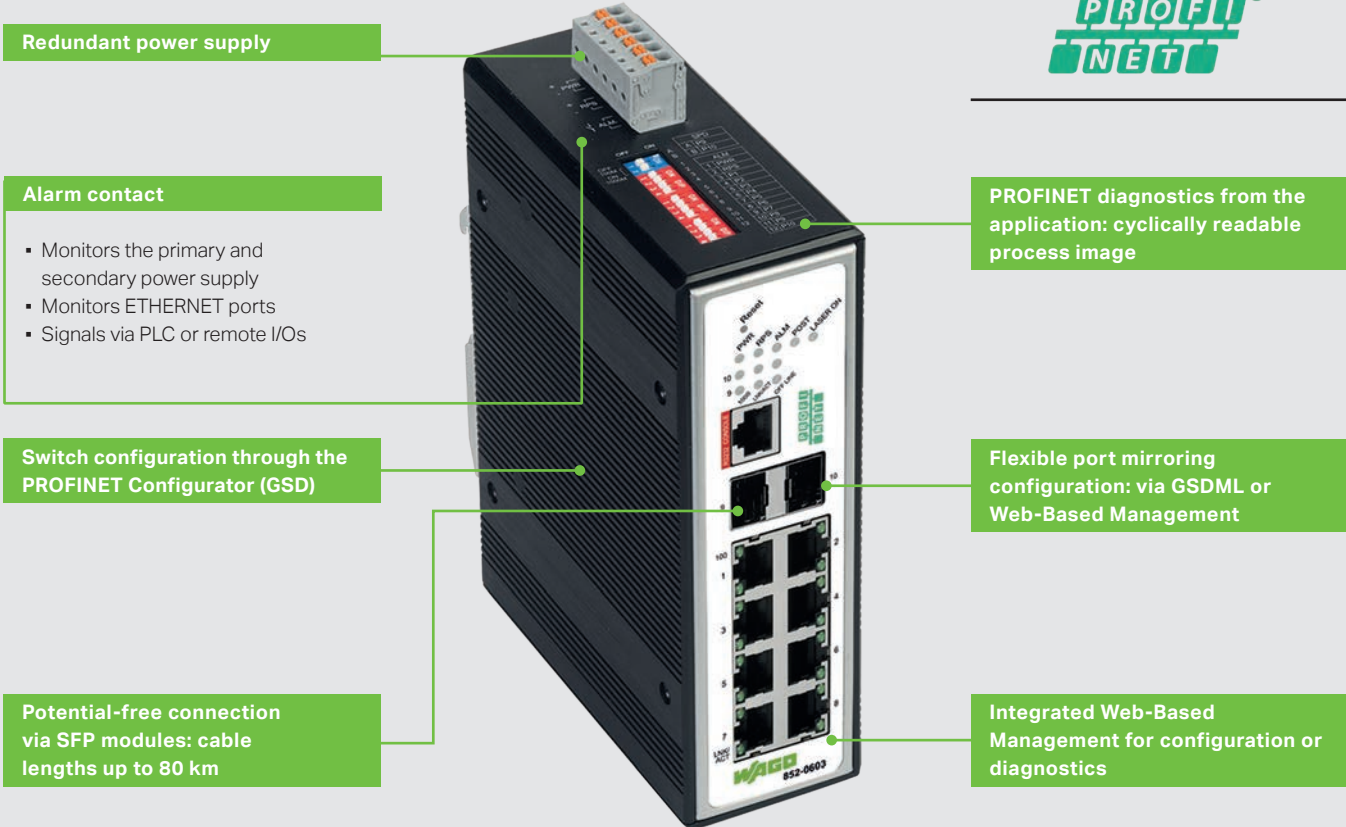|  | Gigabit | |
| --- | --- | --- |
| **Copper Ports** | 8 x 10/100/1000 | 6 x 10/100/1000 |
| **with MACsec** | 2 x RJ45 | 2 x SFP |
| **Ports Fiber** | None | 2 x SFP 100/1000 |
| **Alarm Redundancy** | Yes | Yes |
| **Dimensions (W x L x H)** | 45.3 x 92 x 110 mm 1.7 x 3.6 x 4.3 in | 45.3 x 92 x 110 mm 1.7 x 3.6 x 4.3 in |
| **Temperature** | -20 ... +70 °C -4 ... +158 °F | -20 ... +70 °C -4 ... +158 °F |
| **Power Supply** | 9 ... 48 VDC | 9 ... 48 VDC |
| **Approvals** | CE, cULus | CE, cULus |
| **Part Number** | **852-1322** | **852-1328** |

# MACsec Data Encryption

**MACsec Encryption**

- IEEE 802.1 AE standard
- Encrypt IP-based protocols such as HTTP, MQTT, MODBUS TCP, BACnet, PROFINET, or EtherNet/IP
- No latency encryption - hadware based
- Secure against multiple threats:
    - Man-in-the-middle
    - Masquerading
    - Passive wiretapping
    - Playback attacks
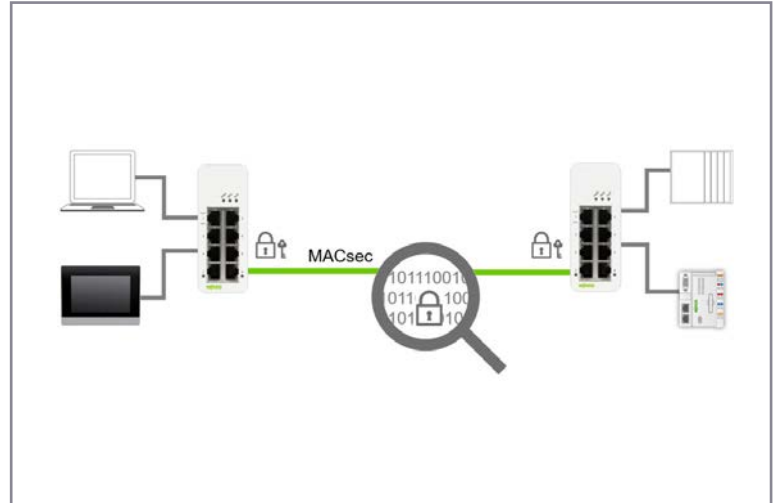


**Green or Brown Field**

- Easy to retrofit in a network - use existing Ethernet cables
- Use within a plant for horizontal security
- Use between manufacturing buildings
- Space-saving control cabinet installation

**Redundant power supply**

**Alarm contact**
- Monitors the primary and secondary power supply
- Monitors ETHERNET ports
- Signals via PLC or remote I/Os

**Switch configuration through the PROFINET Configurator (GSD)**

**Potential-free connection via SFP modules: cable lengths up to 80 km**

**PROFINET diagnostics from the application: cyclically readable process image**

**Flexible port mirroring configuration: via GSDML or Web-Based Management**

**Integrated Web-Based Management for configuration or diagnostics**

\* Small form-factor pluggable interface for fiber-optic cables

# Industrial Managed PROFINET Switches

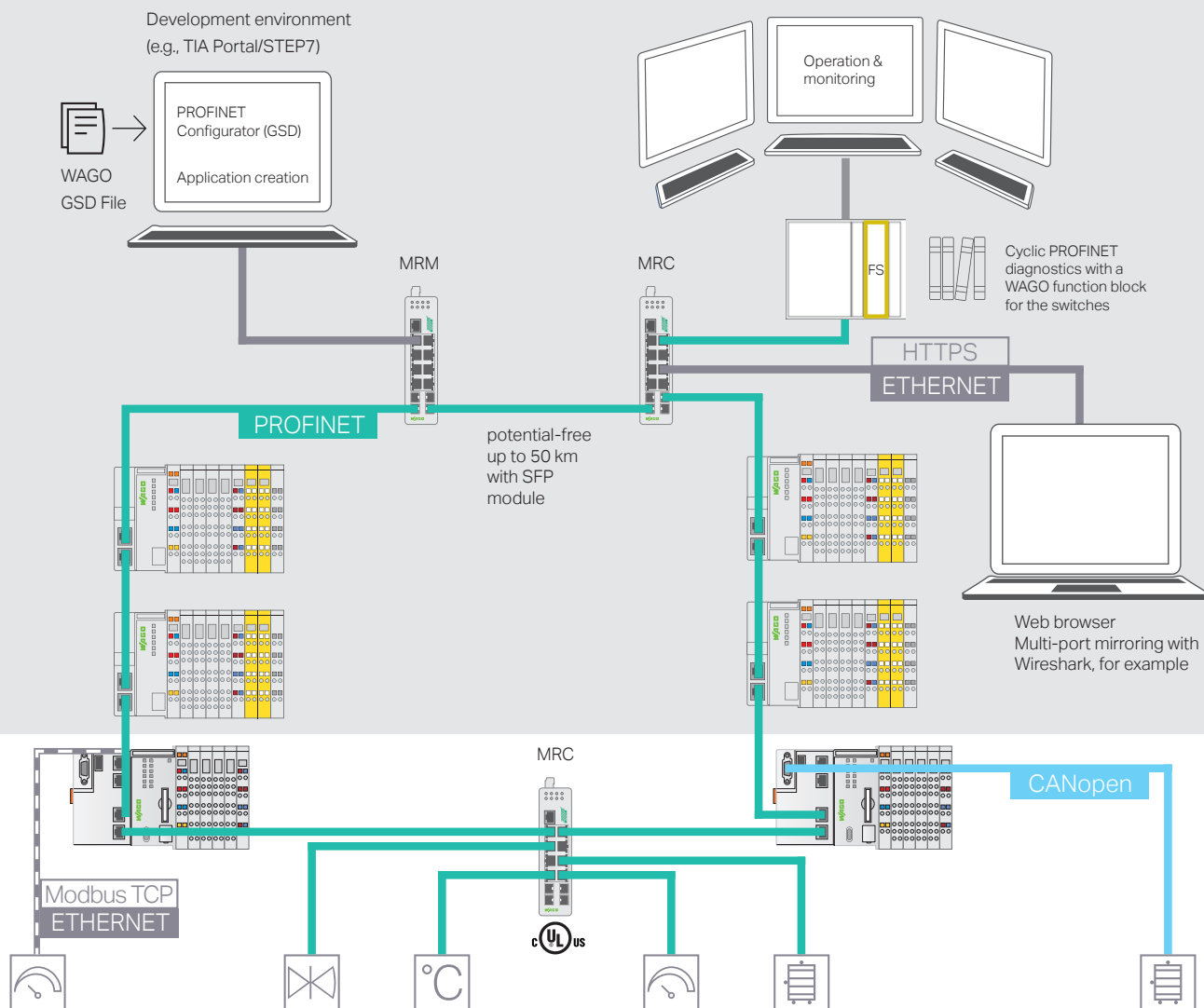## Performance, Availability, Data Transmission & Security

| Managed | | | |
|---|---|---|---|
| |  |  |  |
| **Copper ports** | 8 x 10/100BASE-TX | 8 x 10/100BASE-TX | 8 x 10/100/1000BASE-T |
| **SFP ports** | | 2 x SFP 100/1000[2] | 4 x SFP 1000BASE-SX/LX |
| **Supply voltage** | 12 … 60 VDC | 12 … 60 VDC | 12 … 60 VDC |
| **Redundant power supply** | Yes | Yes | Yes |
| **Alarm contact** | Yes | Yes | Yes |
| **Dimensions (W x H x D)** | 50 x 162 x 122 mm 2 x 6.4 x 4.8 in | 50 x 162 x 122 mm 2 x 6.4 x 4.8 in | 50 x 162 x 122 mm 2 x 6.4 x 4.8 in |
| **Surrounding air temperature (operation)** | −40 … +70 °C -40 … +158 °F | −40 … 70 °C -40 … +158 °F | −40 … 70 °C -40 … +158 °F |
| **Approvals** | cULus | cULus | cULus |
| **PROFINET** | CC-B | CC-B | CC-B |
| **Item number** | **852-602** | **852-603** | **852-1605** |

Suitable SFP modules on page 17

[2] Configurable via DIP switches (1000BASE-SX/LX or 100BASE-FX)

# PROFINET-Specific Features



Development environment
(e.g., TIA Portal/STEP7)

PROFINET
Configurator (GSD)

Application creation

WAGO
GSD File

Operation &
monitoring

MRM

MRC

FS

Cyclic PROFINET
diagnostics with a
WAGO function block
for the switches

HTTPS

ETHERNET

PROFINET

potential-free
up to 50 km
with SFP
module

Web browser
Multi-port mirroring with
Wireshark, for example

MRC

CANopen

Modbus TCP

ETHERNET

°C

The following products meet the requirements
of PROFINET conformity class A (CC-A):
852-1111, 852-1112, 852-1411,
852-1411/000-001 and 852-1417

**Special Product Features:**
- Prioritized PROFINET data packet forwarding
- Configuration via GSDML file not possible
- Neighborhood detection and
  PROFINET diagnostics not supported

**Your Benefits:**

- Use in industrial automation thanks to PROFINET
  certificate (conformity class B)
- Port-independent configuration of the media
  redundancy protocol as a manager (MRM) or
  client (MRC)
- Flexible multi-port mirroring configuration via
  device description file
- Switch configuration with device description file

## Power supply

- Redundant power supply terminals
- Wide voltage range
- Pluggable connector

## Alarm contact

- Monitor power supply
- ETHERNET port monitoring
- Signaling via PLC or remote I/O

**Status LEDs**

**RS-232 maintenance interface**

**RJ45 ports**

## Network security features**

- Authentication
- Firewall
- Port security

**Location for fiber-optic SFP modules***

\* Small form-factor pluggable

\*\* See page 13 for more details

# Industrial Managed ETHERNET Switches

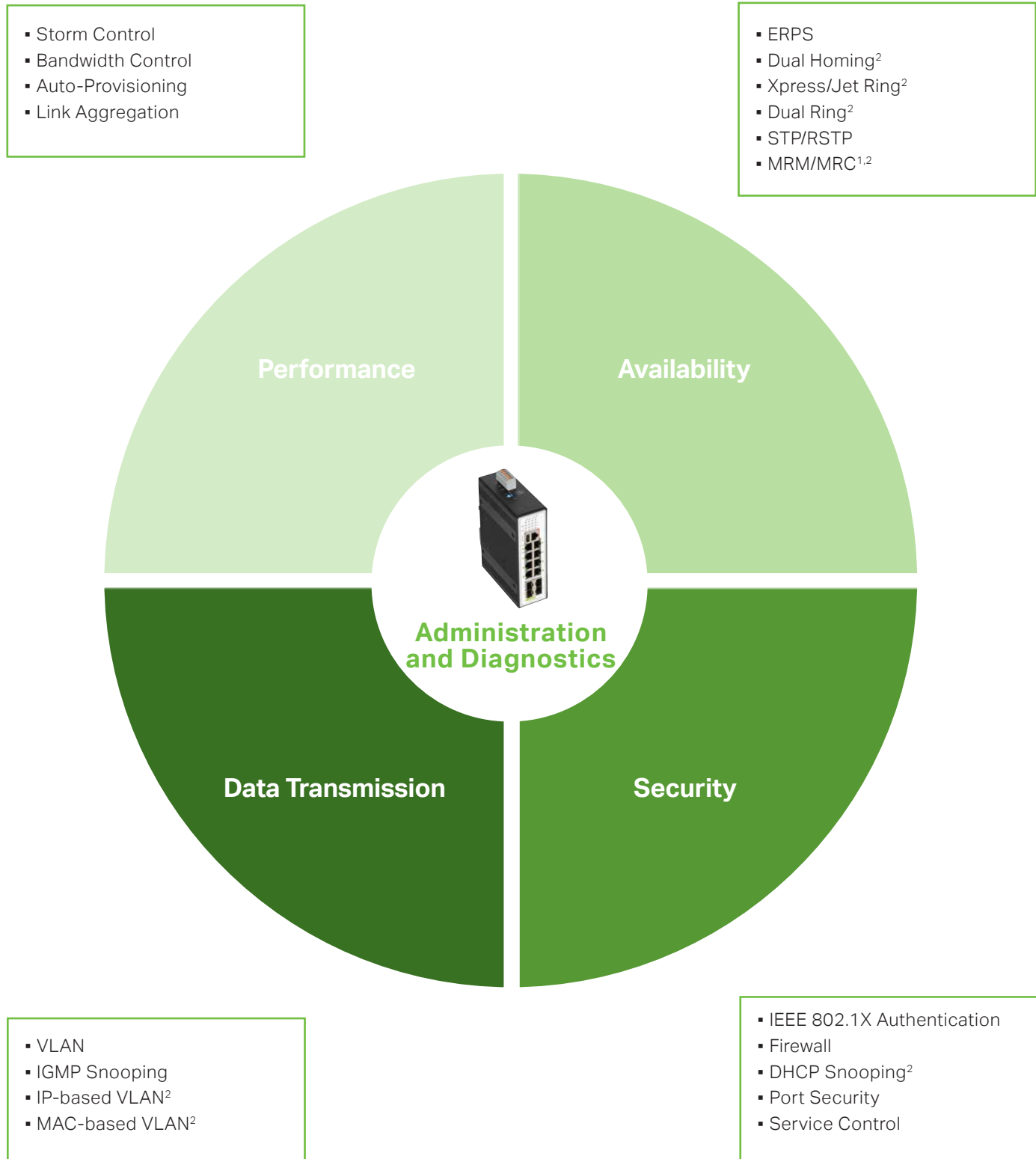## Performance, Availability, Data Transmission & Security

| Managed | | | | PoE+ |
|---|---|---|---|---|
| PoE+ Ports | | | | 8 x PoE+ (30 W) |
| Copper Ports | 8 x 10/100 | 8 x 10/100/1000 | 8 x 10/100/1000 | 8 x 10/100/1000 |
| Fiber-Optic Ports | 2 x SFP 100/1000[1] | 4 x SFP 1000 | 4 x SFP 1000 | 4 x SFP 1000 |
| Power Supply | 12 ... 60 VDC | 12 ... 60 VDC | 12 ... 48 VDC | 24 ... 57 VDC |
| Redundant Power Supply | Yes | Yes | Yes | Yes |
| Alarm Contact | Yes | Yes | Yes | Yes |
| Dimensions (W x H x D) | 50 x 162 x 120 mm 2 x 6.4 x 4.7 in | 50 x 162 x 120 mm 2 x 6.4 x 4.7 in | 50 x 162 x 120 mm 2 x 6.4 x 4.7 in | 50 x 162 x 120 mm 2 x 6.4 x 4.7 in |
| Temperature | -40 ... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F | -40 ... +70 °C -40 ... +158 °F |
| Approvals | cULus, DNV | cULus, DNV | cULus, IEC 61850-3 | cULus, IEC 61850-3 |
| PROFINET | CC-A | CC-A | | |
| Part Number | **852-303** | **852-1305** | **852-1305/000-001** | **852-1505/000-001**[2] |

[1] Configurable via DIP switches (1000BASE-SX/LX or 100BASE-FX)    \* Suitable SFP modules on page 17

[2] For supply voltage < 48 VDC, the PoE budget is limited to 120 watts

# Function Overview of the Industrial Managed Switch

- Storm Control
- Bandwidth Control
- Auto-Provisioning
- Link Aggregation

- ERPS
- Dual Homing[2]
- Xpress/Jet Ring[2]
- Dual Ring[2]
- STP/RSTP
- MRM/MRC[1,2]

**Performance**

**Availability**

**Administration and Diagnostics**

**Data Transmission**

**Security**

- VLAN
- IGMP Snooping
- IP-based VLAN[2]
- MAC-based VLAN[2]

- IEEE 802.1X Authentication
- Firewall
- DHCP Snooping[2]
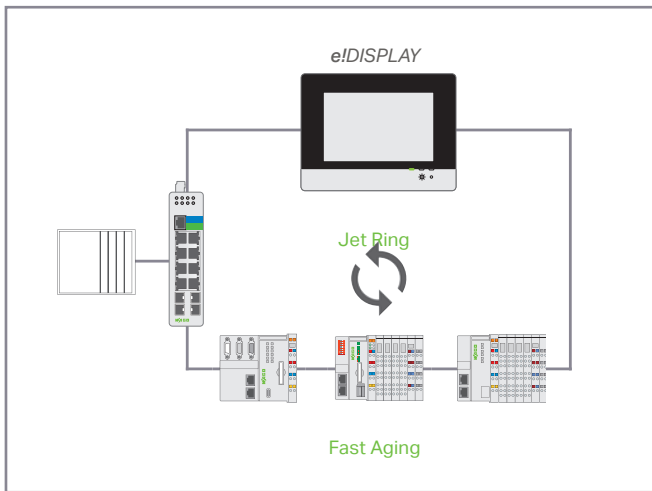- Port Security
- Service Control

[1] Only available in 852-602, 852-603 and 852-1605.
[2] Not available in lean managed switches.
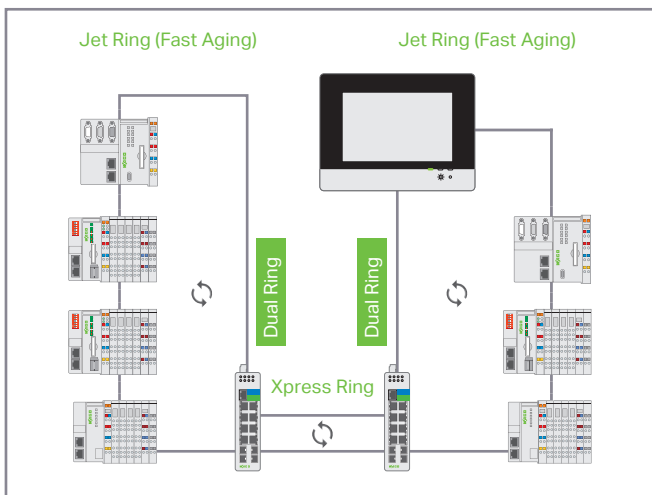
# Availability

## via Communication Redundancy



Jet Ring

**Jet Ring[1]**
**Fast, Easy Setup Ring Topology**

- Typical switching time of 400 ms
  (depends on the application)
- Extremely easy configuration (on or off)
- Up to 20 switches in a Jet Ring
- WAGO ETHERNET devices (Fast Aging)
  can be used in the Jet Ring
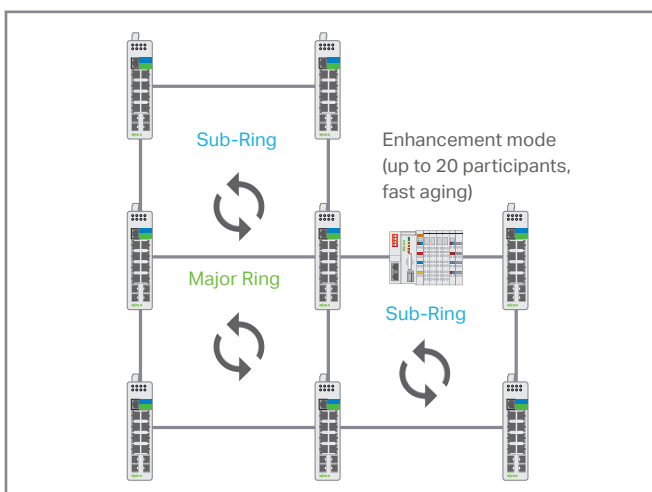


Xpress Ring and Dual Ring

**Xpress Ring[1]**
**High Speed Reconfiguration**

- Switching time < 20 ms
- Easy configuration (three parameters per switch)
- Up to 200 switches in one Xpress Ring
- Two Xpress Rings per switch

**Dual Ring[1]**

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



ERPS V2

**ERPS: ETHERNET Ring Protection Switching**
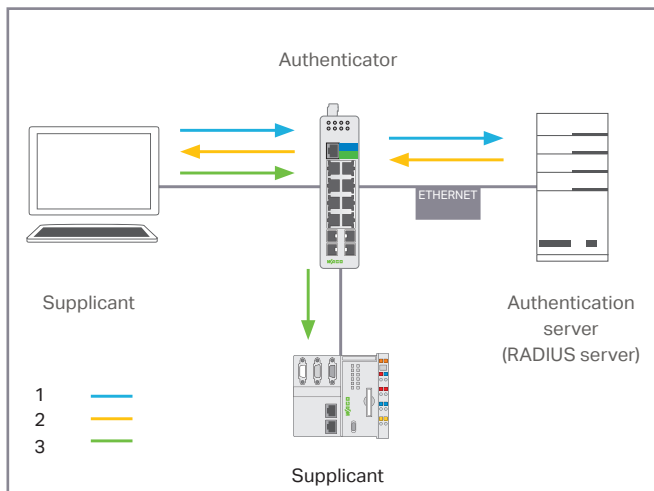**The Fast and Open Solution**

- Standardized and open technology
- Switching time < 800 ms
- Nested topologies
- Realization of one-fault tolerance
  (SPOF – Single Point of Failure)

**ERPS – Enhancement Mode[1]**

- WAGO devices with an integrated switch and Fast
  Aging configuration
- Typical switching time of 400 ms
  (depends on the application)

[1] Not available in lean managed switches.

# Security

## Absolutely Secure Industrial Networks



Authenticator

ETHERNET

Supplicant

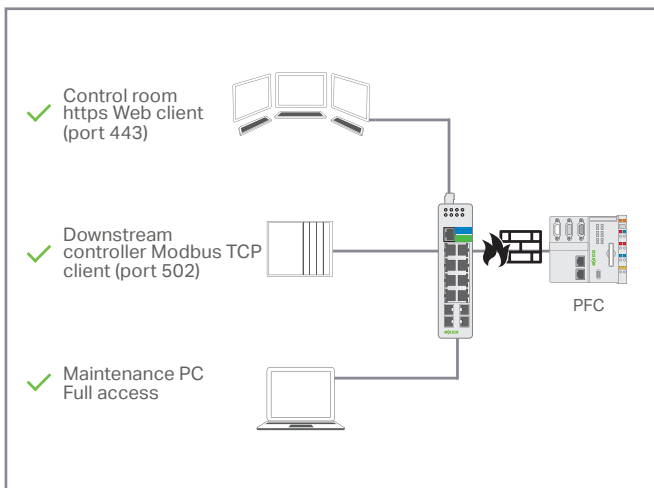Authentication server (RADIUS server)

1
2
3

Supplicant

IEEE 802.1X

### IEEE 802.1X Authentication
**The Security Standard for IT Networks**

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.



Control room https Web client (port 443)

Downstream controller Modbus TCP client (port 502)

PFC

Maintenance PC Full access

Firewall

### Firewall – Access Control List
**Authorization Only for the Required Services**

Filtering data packets via:

- Source MAC or source IP address
- Destination MAC or destination IP address
- Range of MAC or IP addresses
- UDP/TCP source or destination ports



MAC 1

MAC 4

MAC 2

MAC 3
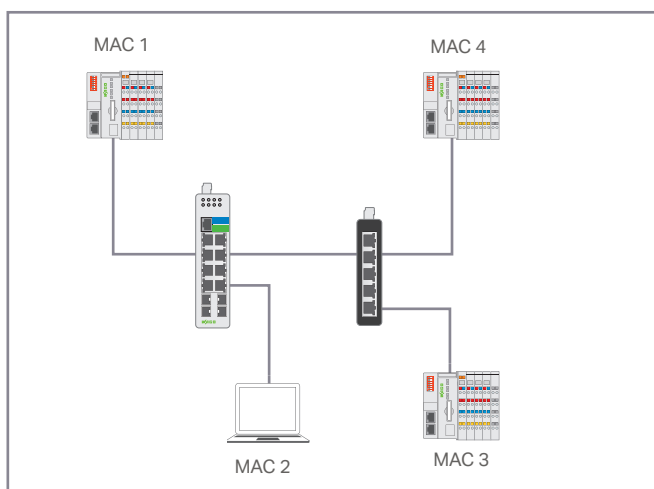
Ports

### Port Security
**MAC Based Firewall**

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

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# Data Transmission

## Optimized ETHERNET Networks
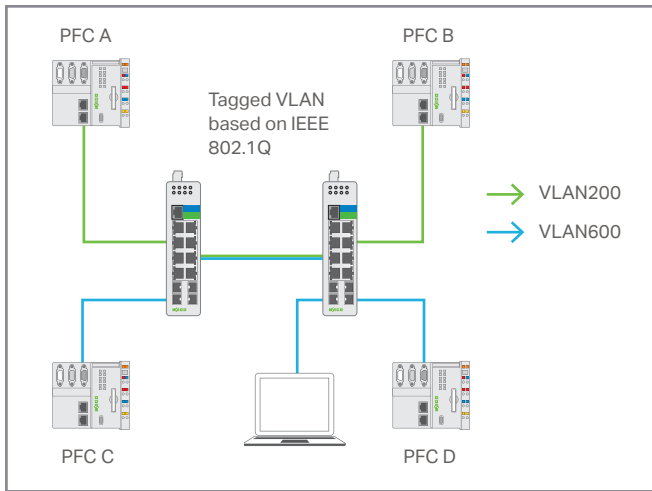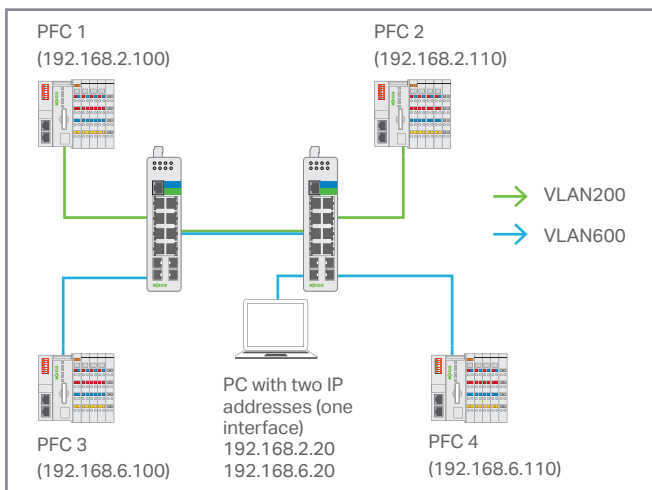


### Logical Network Isolation
**Enhance Network Security**

- VLAN (e.g., per IEEE 802.1Q)
  Segmentation into logical, virtual networks:
  - Broadcast limitation
  - Security improvement
  - Data flow prioritization
  - Subdivision of machines and office networks



### IP-Based VLAN[1]
**Secure by Known IP**

- Routing of data packets between VLANs
  based on the IP address
- Communication from one participant in
  two or more VLANs
- Economical connection of networks
  to higher-level routers
- Prioritization of data packets based on
  the IP address
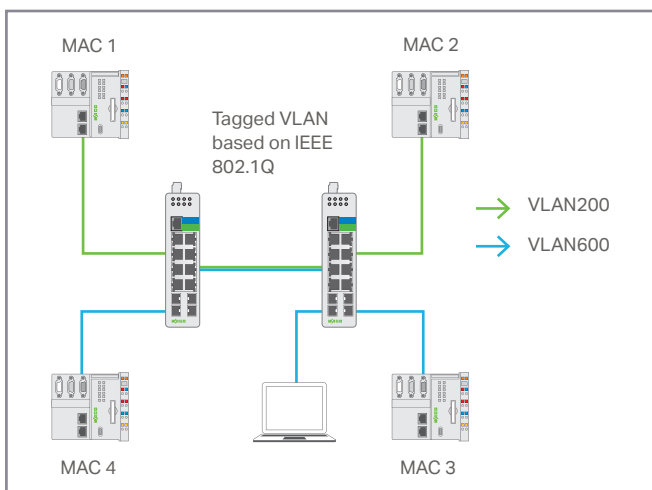


### MAC-Based VLAN[1]
**Secure by Known Device**

- Assignment of data packets to a VLAN
  based on the MAC address
- Prioritization of data packets based on
  the MAC address

[1] Not available in lean managed switches.

# Performance

## Optimized ETHERNET Networks
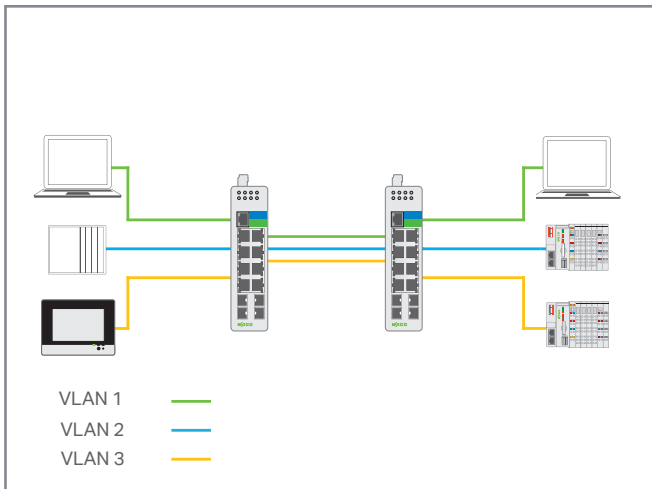


Link Aggregation

### Network Optimization
**Logical Segmentation**

- LACP link aggregation
  Merge multiple data connections
  into a single logical link:
  - Increased transmission rate
  - Link redundancy

VLAN 1
VLAN 2
VLAN 3
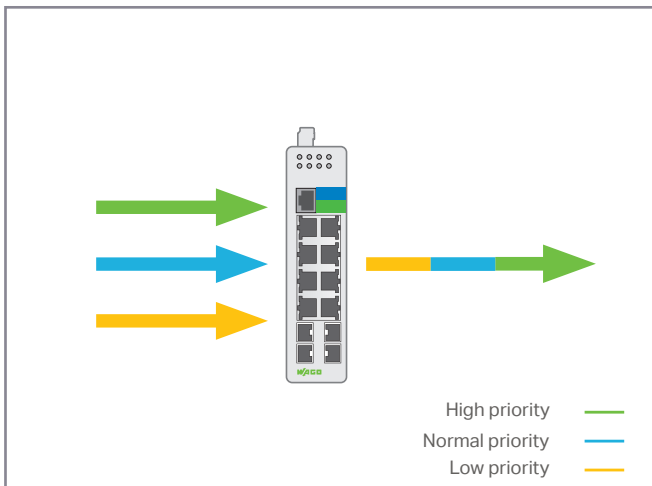


QoS

### Traffic Prioritization and Limitation
**Controlled Bandwidth**

- 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

High priority
Normal priority
Low priority
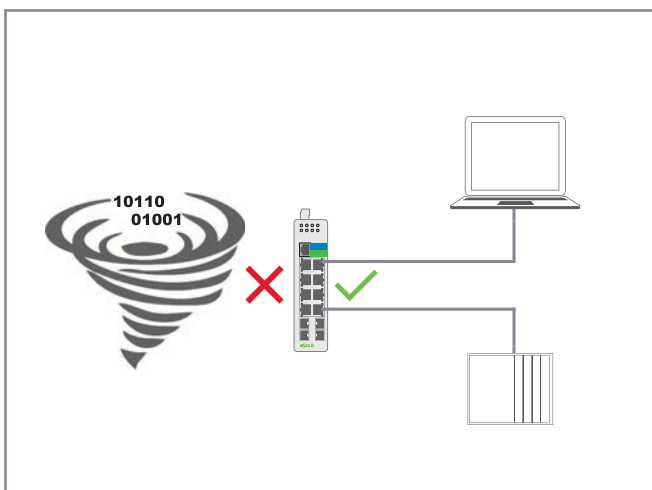


Storm Control

### Mastering Data Traffic
**High Availability**

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

# Administration and Diagnostics

## Simplified Commissioning and Maintenance
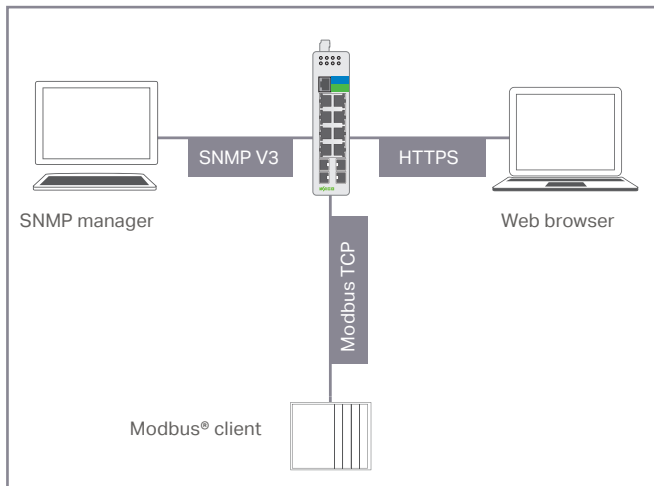


Configuration Interfaces

### Configuration and Diagnostics
**Several Options**

- Configuration via Web-Based Management
- Configuration via command line
- Network management via SNMP v1, v2c, v3
- Support for MIB standards
  (*Management Information Base*)
- Diagnostics via Modbus TCP
  Comprehensive data available for easy diagnostics via
  Modbus®

| SFP Information | |
|---|---|
| Fiber Cable | Link Up |
| Connector | LC |
| Wavelength(nm) | 1310 |
| Transfer Distance(nm) | 10km, Single mode |
| DDM Supported(nm) | YES (Internally Calibrated) |
| Vendor Name(nm) | WAGO |
| Vendor PN(nm) | 852-1210 |
| Vendor rev(nm) | V2.0 |
| Vendor SN(nm) | AX16500009214 |
| Date code(nm) | 161209 |

| DDMI Information(nm) | | | | | |
|---|---|---|---|---|---|
| | Current(nm) | High-Alarm(nm) | Low-Alarm(nm) | High-Warn(nm) | Low-Warn(nm) |
| Temperature(C) | 42.980 | 90.000 | -45.000 | 85.000 | -40.000 |
| Voltage(V) | 3.238 | 3.600 | 3.000 | 3.500 | 3.100 |
| Tx Bias(mA) | 21.022 | 60.000 | 3.000 | 50.000 | 5.000 |
| Tx Power(mW) | 0.263 | 0.631 | 0.089 | 0.501 | 0.112 |
| Tx Power(dBm) | -5.807 | -2.004 | -10.505 | -3.000 | -9.506 |
| Rx Power(mW) | 0.000 | 0.631 | 0.008 | 0.501 | 0.010 |
| Rx Power(dBm) | -39.000 | -2.004 | -21.028 | -3.000 | -20.000 |

DDM

### DDM: Digital Diagnostic Monitoring[1]
**Simplify Maintenance and Troubleshooting**

- Automatic detection of a connected SFP module
- Detailed module information
- Monitoring in real time
  - Temperature
  - Supply voltage
  - Transmission power
  - Reception power
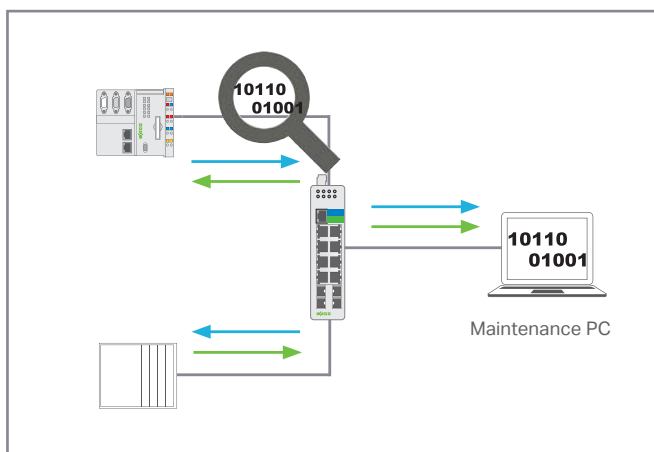


Port Mirroring

### Monitoring and Diagnostics
**Simplified Maintenance**

- Port mirroring:
  Mirrors the network traffic
- LLDP:
  Automatically detects adjacent devices
- Email notifications

[1] Not available in lean managed switches.

# Quick Reference Guide

## Unmanaged

### ECO

| | Fast ETHERNET | | GIGABIT | | GIGABIT PoE+ | |
|---|---|---|---|---|---|---|
| Ports | 5 x 10/100 | 8 x 10/100 | 5 x 10/100/1000 | 8 x 10/100/1000 | 5 x 10/100/1000 | 5 x 10/100/1000 |
| with PoE | - | - | - | - | 4 x PoE+ | 4 x PoE+ |
| Fiber-Optic Ports | - | - | - | - | - | 2 x SFP 1000 |
| Part Number | 852-111 | 852-112 | 852-1111 | 852-1112 | 852-1411<br>852-1411/000-001 | 852-1417 |

### Standard

| | Fast ETHERNET | | | GIGABIT | |
|---|---|---|---|---|---|
| Ports | 5 x 10/100 | 8 x 10/100 | 8 x 10/100 | 8 x 10/100/1000 | 16 x 10/100/1000 |
| Fiber-Optic Ports | - | - | 2 x SFP 100 | - | - |
| Part Number | 852-101 | 852-102 | 852-103 | 852-1102 | 852-1106 |

## Managed

### Lean

| | GIGABIT | | | GIGABIT PoE+ |
|---|---|---|---|---|
| Ports | 8 x 10/100/1000 | 8 x 10/100/1000 | 16 x 10/100/1000 | 8 x 10/100/1000 |
| with PoE+ | - | - | - | 8 x PoE+ |
| Fiber-Optic Ports | - | 2 x SFP 1000 | - | 2 x SFP 100/1000 |
| Part Number | 852-1812 | 852-1813 | 852-1816 | 852-1813/000-001 |

### Standard

| | Fast ETHERNET | GIGABIT | GIGABIT PoE+ |
|---|---|---|---|
| Ports | 8 x 10/100 | 8 x 10100/1000 | 8 x 10/100/1000 |
| with PoE+ | - | - | 8 x PoE+ |
| Fiber-Optic Ports | 2 x SFP 100/1000 | 4 x SFP 1000 | 4 x SFP 1000 |
| Part Number | 852-303 | 852-1305/000-001 | 852-1505/000-001 |

### PROFINET

| | PROFINET | | |
|---|---|---|---|
| Ports | 8 x 10/100 | 8 x 10100 | 8 x 10/100/1000 |
| Fiber-Optic Ports | - | 2 x SFP 100/1000 | 4 x SFP 1000 |
| Part Number | 852-602 | 852-603 | 852-1605 |

### MACsec

| | GIGABIT | |
|---|---|---|
| Ports | 8 x 10/100/1000 | 6 x 10/100/1000 |
| with MACsec | 2 x RJ45 | 2 x SFP |
| Part Number | 852-1322 | 852-1328 |

## Long locking tab

- Easy insertion and retraction, even in confined spaces

## 360° shielded connection

- Reliable transmission of data in industrial environments

## Protective cover

- Protects the contacts from impact and dust during assembly and handling

## Color coded

- Speed installation with marked connections for ETHERNET and PROFINET standards

## Insulation displacement

- Fast and easy wire termination with insulation displacement connectors

## Metal housing

- Rugged connector for industrial applications

# Cat 6A RJ45 Connectors

## Fast and Tool-Free Installation

| RJ45 Connectors | | | |
|---|---|---|---|
| Category | Cat 6A | Cat 6A | Cat 6A |
| Max. rate | 10 Gbit/s | 10 Gbit/s | 10 Gbit/s |
| Housing material | Metal | Metal | Metal |
| Surrounding air temperature (operation) | -40 … +85 °C -40 … +185 °F | -40 … +85 °C -40 … +185 °F | -40 … +85 °C -40 … +185 °F |
| Cable clamp | - | Straight output | Angled output |
| Conductor cross-section[1] | 22 AWG | 22 AWG | 22 AWG |
| ETHERNET T568B[2] | **750-977/000-012** | **750-978/000-012** | **750-979/000-012** |
| PROFINET[3] | **750-977/000-013** | **750-978/000-013** | **750-979/000-013** |

[1] Also available for conductors ranging from 24 AWG, Item No. 750-97x/000-02x
[2] Also available for ETHERNET T568A, Item No. 750-97x/000-011
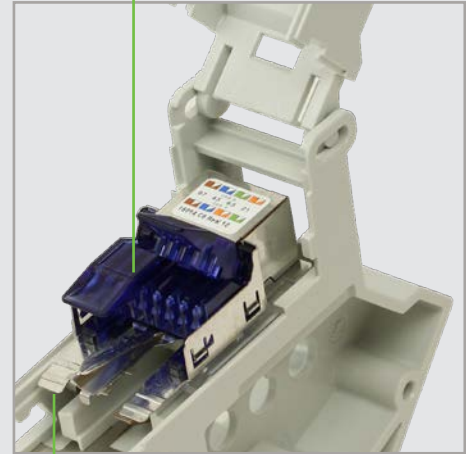[3] Max. rate for PROFINET: 100 Mbit/s

## Features

- Category 6
- PoE and PoE+ compatible

## Simple handling without specialty tools

- Insulation displacement connectors
- Dual labeling: T568A and T568B

## Shielded connection

- Safe transmission of data

# DIN Rail Mount RJ45 Interfaces

## ETHERNET Cabling on DIN Rail

| RJ45 Interfaces | | | | | |
| --- | --- | --- | --- | --- | --- |
| | | | | | |
| **Category** | Cat 6 | Cat 5 | Cat 5 | Cat 5 | - |
| **Description** | Cable to RJ45 | Passive PoE Injector | Cable to RJ45 | RJ45 to RJ45 | Cable to RJ45 |
| **Max. Output** | 10 Gbit/s | 100 Mbit/s | 100 Mbit/s | 100 Mbit/s | 100 Mbit/s |
| **Dimensions (W x H x D)** | 26.8 x 64.4 x 81.4 mm<br>1 x 2.5 x 3.2 in | 20.5 x 51 x 85 mm<br>0.79 x 2 x 3.4 in | 24 x 40 x 85 mm<br>1 x 1.6 x 3.4 in | 20.5 x 51 x 85 mm<br>0.79 x 2 x 3.4 in | 31 x 33 x 71 mm<br>1.22 x 1.3 x 2.8 in |
| **Connection** | IDC | CAGE CLAMP® | CAGE CLAMP® | - | CAGE CLAMP® |
| **Temperature** | -10 ... +60 °C<br>+14 ... +140 °F | -40 ... +85 °C<br>-40 ... +185 °F | -40 ... +85 °C<br>-40 ... +185 °F | -40 ... +85 °C<br>-40 ... +185 °F | -40 ... +40 °C<br>-40 ... +104 °F |
| **Shield Clamp** | No | No | Yes | No | No |
| **Conductors Section** | 24 ... 22 AWG | 24 ... 16 AWG | 28 ... 14 AWG | - | 28 ... 12 AWG |
| **Part Number** | **289-195** | **289-196** | **289-175/790-108** | **289-172** | **289-171/000-236** |

Large choice of SFPs

Mechanical lock
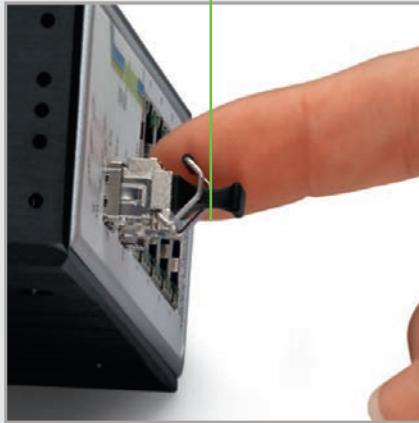
Single and multimode types

# SFP Modules

## Interfaces for Fiber-Optic

| Category | Fast ETHERNET | | Gigabit | | |
|---|---|---|---|---|---|
| |  | |  | | |
| | 100BASE-FX | 100BASE-FX | 1000BASE-SX | 1000BASE-LX | 1000BASE-ZX |
| Laser Type | Multimode | Single-mode | Multimode | Single-mode | Single-mode |
| Wavelength | 1310 nm | 1310 nm | 850 nm | 1310 nm | 1550 nm |
| Max. Distance | 2 km / 1.2 mi | 30 km / 18.5 mi | 0.55 km / 0.4 mi | 10 km / 6.2 mi | 80 km / 49.7 mi |
| DDM* | No | No | Yes | Yes | Yes |
| Connector | LC duplex | LC duplex | LC duplex | LC duplex | LC duplex |
| Operating Temp. | -40 … +70 °C<br>-40 … +158 °F | -40 … +70 °C<br>-40 … +158 °F | -40 … +85 °C<br>-40 … +185 °F | -40 … +85 °C<br>-40 … +185 °F | -40 … +85 °C<br>-40 … +185 °F |
| Part Number | **852-201/107-002** | **852-201/107-030** | **852-1200** | **852-1210** | **852-1280** |
| Compatible with | 852-103, 852-303<br>852-603, 852-1813,<br>852-1813/000-001 | 852-103, 852-303<br>852-603, 852-1813,<br>852-1813/000-001 | 852-303, 852-603<br>852-1305, 852-1505<br>852-1605, 852-1417<br>852-1305/000-001<br>852-1505/000-001<br>852-1813<br>852-1813/000-001 | 852-303, 852-603<br>852-1305- 852-1505<br>852-1605, 852-1417<br>852-1305/000-001<br>852-1505/000-001<br>852-1813<br>852-1813/000-001 | 852-303, 852-603<br>852-1305- 852-1505<br>852-1605, 852-1417<br>852-1305/000-001<br>852-1505/000-001<br>852-1813<br>852-1813/000-001 |

Gold contacts

Cat 6A, 10 Gb/s

Halogen-free and flame retardent
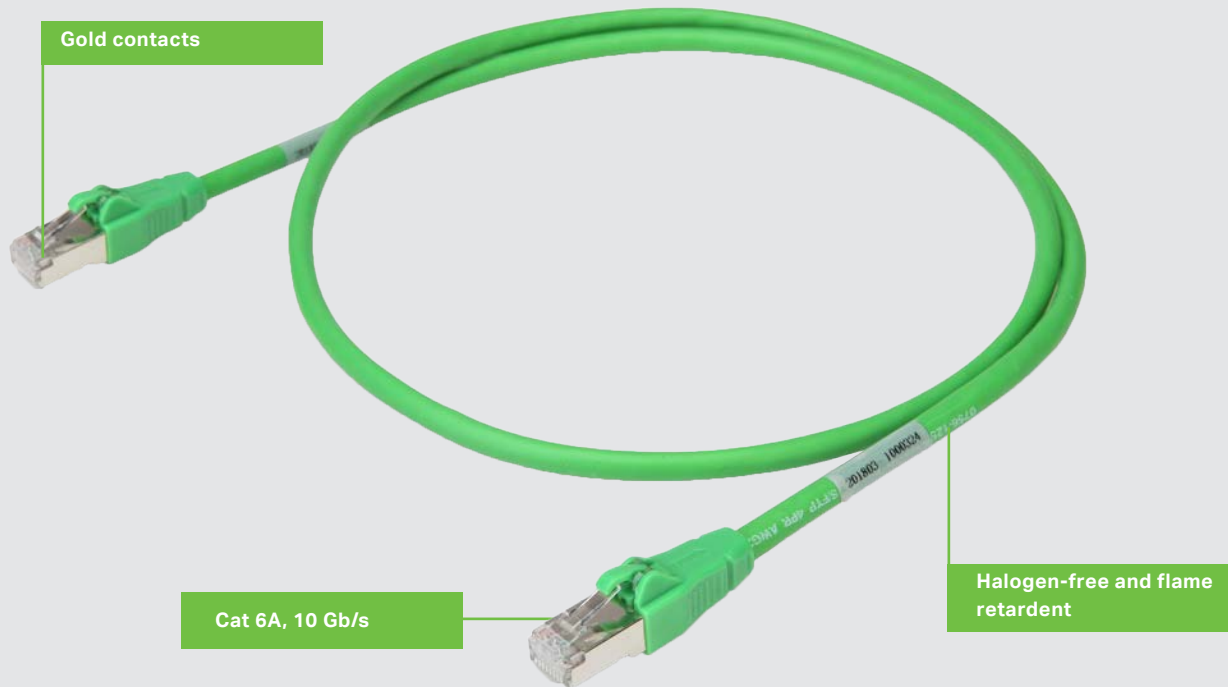
# Patch Cables

| Patch Cables | Standard | Axial Release |
|---|---|---|
| | | |
| 0.5 m / 1.6 ft | 756-1250/1013-005 | 756-1250/1023-005 |
| 1 m / 3.3 ft | 756-1250/1013-010 | 756-1250/1023-010 |
| 2 m / 6.6 ft | 756-1250/1013-020 | 756-1250/1023-020 |
| 3 m / 9.8 ft | 756-1250/1013-030 | 756-1250/1023-030 |
| 5 m / 16.4 ft | 756-1250/1013-050 | 756-1250/1023-050 |
| 7.5 m / 24.6 ft | 756-1250/1013-075 | 756-1250/1023-075 |
| 10 m / 32.8 ft | 756-1250/1013-100 | 756-1250/1023-100 |

**Features**

- Cat 6A S/FTP
- Up to 10 Gb/s
- Gold contacts
- Mechanically and electrically tested
- Halogen free
- Flame retardent and low smoke emission
- > 1200 connections/deconnections

**Mounting**
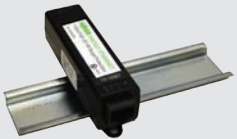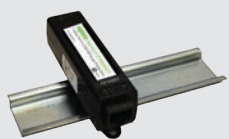
- Easy installation onto DIN rail

**Connection**

- RJ45 connection
- 1 Gb ETHERNET transmission speeds
- 48 VDC PoE data line protection

# WAGO Protect

## 1 Gb/s PoE ETHERNET Surge Protection

| ETHERNET Surge Devices | 1 Gb/s PoE+ | 1 Gb/s PoE++ |
|---|---|---|
| | | |
| Max. PoE Power | 51 Watts | 100 Watts |
| Nominal Voltage | 48 VDC | 48 VDC |
| Max. PoE Current Per Pin | 600 mA | 1.5 A |
| Suitable for Non-PoE | Yes | Yes |
| Technology | Gas discharge tube | Hybrid gas discharge tube and silicon avalanche diode |
| Protection Modes | Line-to-ground, shield-to-ground | Line-to-line, line-to-ground, shield-to-ground |
| Pins Protected | [1, 2] [3, 6] [4, 5] [7, 8] {Shield} | [1, 2] [3, 6] [4, 5] [7, 8] {Shield} |
| Surge Suppression Line to Line | N/A | < 75 Vpk @ 100 A 8/20 µs |
| Max. Surge Current Line to Ground | 1 kA (8/20 µs) | 2 kA (8/20 µs) |
| Max. Surge Current Shield to Ground | 20 kA (8/20 µs) | 20 kA (8/20 µs) |
| Response Time | < 75 ns | < 5 ns |
| Connections | Inline RJ45 Cat 5 e shielded | Inline RJ45 Cat 5 e shielded |
| Operating and Storage Temp. | -40 ... +75 °C; -40 ... +167 °F | -40 ... +75 °C; -40 ... +167 °F |
| Relative Humidity | 99% (non-condensing) | 99% (non-condensing) |
| UL Certification | 497B | 497B |
| ETHERNET Protocol | IEEE 802.3 | IEEE 802.3 |
| Part Number | **60366569** | **60366571** |
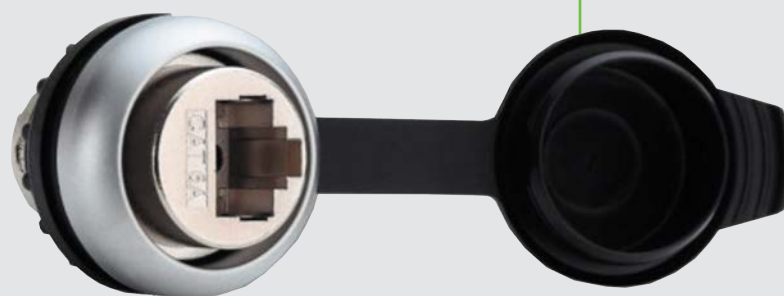
**Protective cover**

▪ Protects the contacts from impact and dust during assembly and handling

**Contact material**

▪ Gold-plated contact

# Bulkhead Sockets

## Convenient Way to Pass RJ45 or USB Networks Through a Control Enclosure

| Bulkhead Sockets | | |
|---|---|---|
| | | |
| **Description** | Cat 6A panel connector | USB 3.0 panel connector |
| **Contact Material** | CuSn, gold-plated | CuSn, gold-plated |
| **Protection Class** | IP65 and NEMA UL Type 2, 3R, 4, 4X, 12, 13 with cap closed | IP65 and NEMA UL Type 2, 3R, 4, 4X, 12, 13 with cap closed |
| **Operating Temperature Range** | -20 ... +70 °C<br>-4 ... +158 °F | -20 ... +70 °C<br>-4 ... +158 °F |
| **Storage Temperature Range** | -20 ... +80 °C<br>-4 ... +176 °F | -25 ... +80 °C<br>-13 ... +176 °F |
| **Temperature Range Connector** | -20 ... +70 °C | - |
| **Transfer Rate** | 10 Gbit/s | 5 Gbit/s |
| **Category** | Cat 6A | - |
| **USB Standard** | - | 3.0 |
| **Approvals** | cULus | cULus |
| **Part Number** | **8000-099/0000-1764** | **8000-099/0000-1765** |

**WLAN 802.11 a/b/g/d/e/i/h and Bluetooth 4.0**

- Robust communication with high data throughput

**High IP65 protection class**

- For direct on-machine use

**Access point functionality**

- Build a network of up to 7 clients

**Version with external antenna**

- Omni-directional signal pattern

**Button**

- Easy configuration
- Advanced configuration via Web server or Telnet

**Diagnostic LEDs**

- Supply voltage
- Network connections
- Wireless signal quality

# Wireless ETHERNET Gateway

## Copper Cable Replacement
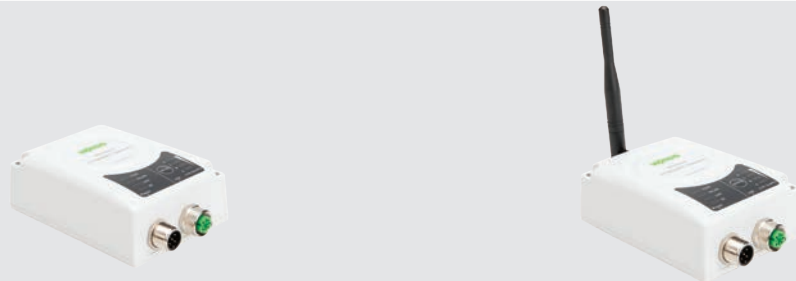
| Wireless ETHERNET Gateway | | |
|---|---|---|
| Antenna | Internal directional antenna | External antenna[2] |
| Security Encryption | WEP64, WEP128, TKIP, AES/CCMP | |
| Transmission Range | 400 m / 1,300 ft. | |
| Frequency Band | ISM band, 2.4 GHz (Bluetooth®, WLAN); ISM band, 5 GHz (WLAN) | |
| Security Authentication | WPA/WPA2 PSK, LEAP, PEAP | |
| Power Supply | 24 VDC (9 … 30 V) | |
| Temperature | -30 … +65 °C<br>-22 … +149 °F | |
| Protection Type | IP65 | |
| Approvals | CE, FCC, IC, UL[1] | |
| Part Number | 758-918 | 758-918/000-0001 |

[1] Pending   [2] Antenna included

# Application – Wireless ETHERNET Gateway
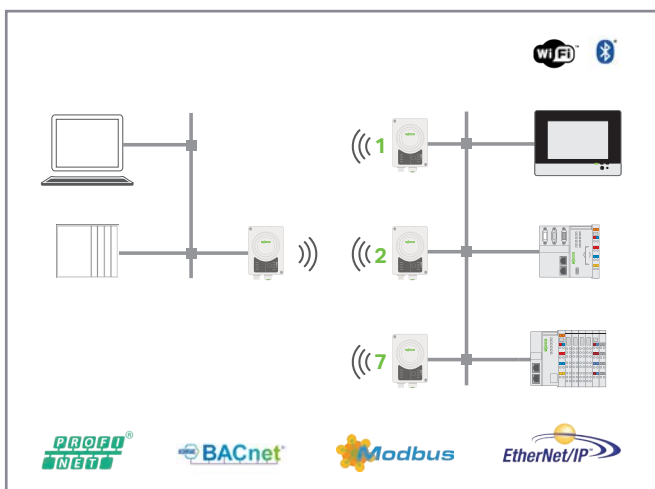


### ETHERNET Bridge
**Replacement of Network Cables**

- Transmission of each TCP/IP also of prioritized PROFINET RT and ETHERNET/IP frames
- Pairing via device's push-button
- Up to seven clients
- Use of Wi-Fi or *Bluetooth*®
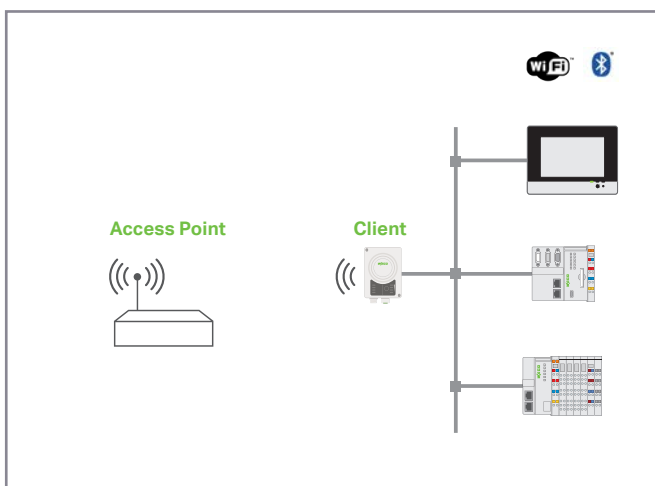


### Client for Existing Access Point
**Connect to Plant Networks**

- Connection to a network of type Wi-Fi 802.11a/b/g/d/e/i/h
- Protocols like Modbus TCP, ETHERNET/IP, BACnet/IP ...
- Possibility of connecting multiple devices after the client
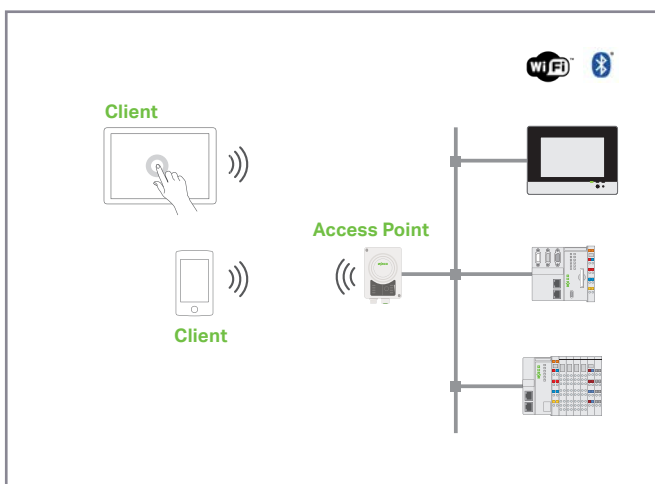


### Access Point
**Smart Devices for Operator Interface**

- Setup of a Wi-Fi 802.11a/b/g/d/e/i/h or *Bluetooth*® network
- Connection of tablets, smartphones etc.
- Up to seven clients simultaneously

## Power supply Pro 2

- Up to 96% efficiency
- IIoT-ready thanks to communication modules (IO-Link, Modbus RTU, Modbus TCP, ETHERNET)
- Versatile configuration options including software, e!COCKPIT function blocks and communication modules
- TopBoost capabilities of up to 600% of nominal output current
- PowerBoost capabilities of up to 150% of nominal output current for 5 s
- Extended temperature range: −40 … +70 °C

## Power supply Compact

- Compact, low-profile design
- Ideal for decentralized applications
- Surrounding air temperature (operation): −25 … +60 °C

## Power supply Eco

- Budget-friendly for basic applications
- Flexible mounting of DIN-rail adapter
- Flexible installation via screw-mount clips

## Power supply Classic

- Integrated TopBoost (787-16xx with ≥ 120 W)
- DC OK signal/contact
- Up to 93% efficiency
- Surrounding air temperature (operation): −25 … +70 °C

# Power Supplies

| Power Supply | Pro 2 | | Classic | | | | | | | Eco | | | Compact | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal output voltage [DC] | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 48 V | 48 V | 48 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V | 24 V |
| Nominal output current [DC] | 5 A | 10 A | 1 A | 2 A | 5 A | 10 A | 2 A | 5 A | 10 A | 1.25 A | 2.5 A | 5 A | 1.3 A | 2.5 A | 4 A | 6 A |
| Industrial Eco Switches (852-111, 852-112) | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | – | – | ◼ | ◼◼ | ◼ | ◼ | ◼ | ◼ | ◼ |
| Industrial Eco Switches (852-1111, 852-1112) | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼◼ | ◼ | ◼ | ◼ | ◼ | ◼ |
| Industrial Eco Switches (PoE) (852-1411, 852-1417) | ◼ | ◼ | – | – | ◼ | ◼ | – | ◼ | ◼◼ | – | – | ◼ | – | – | – | – |
| Industrial Switches (852-101, 852-102, 852-103/040-000, 852-1102, 852-1106) | ◼ | ◼ | ◼ | ◼◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ |
| Industrial Managed Switches (852-303, 852-1305, 852-1305/000-001) | ◼ | ◼ | – | ◼ | ◼◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | – | ◼ | ◼ | ◼ |
| Industrial Managed Switches (PoE) (852-1505) | – | – | – | – | – | – | – | ◼ | ◼◼ | – | – | – | – | – | – | – |
| Industrial Managed Switches (PoE) (852-1505/000-001) | – | ◼◼ | – | ◼ | ◼ | ◼ | ◼ | ◼ | ◼ | – | – | – | – | – | – | – |
| PROFINET Managed Switches (852-602, 852-603, 852-1605) | ◼ | ◼ | – | ◼ | ◼◼ | ◼ | ◼ | ◼ | ◼ | – | ◼ | ◼ | – | ◼ | ◼ | ◼ |
| Power Supply Part Number | 2787-2144 | 2787-2448 | 787-1602 | 787-1606 | 787-1622 | 787-1632 | 787-1623 | 787-1633 | 787-1635 | 787-1702 | 787-1712 | 787-1722 | 787-1102 | 787-1112 | 787-1122 | 787-1226 |

◼◼ Recommendation   ◼ Useable – Limited usability or none at all

**Industry's most compact**

- True 6 mm width maximizes panel space
- Depth of only 56 mm from top edge of DIN rail saves cabinet space

**Monitoring & installation**

- LED for voltage indication
- Easy commissioning with top entry terminations
- Push-in comb style jumper from the top
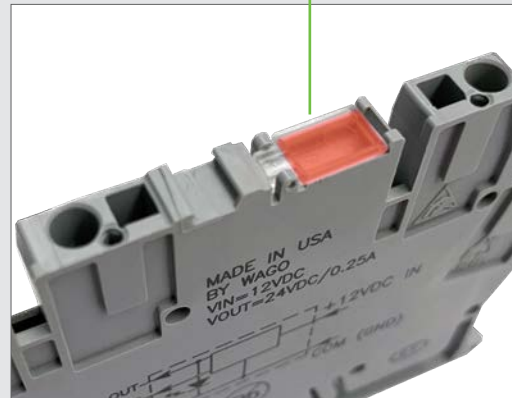


# DC/DC Converters

| DC/DC Converters | | |
|---|---|---|
| |  |  |
| **Nominal input voltage** | 12 VDC | 12 VDC |
| **Input voltage range** | 8 ... 16 VDC | 8 ... 16 VDC |
| **Nominal output voltage (SELV)** | 24 VDC | 24 VDC |
| **Output Current** | 3 A | 250 mA |
| **Efficiency** | 95% | 83% |
| **LED Indication** | Green | Red (Vo) |
| **Ambient Operating Temperature** | -40 ... +70 °C<br>-40 ... +158 °F | -25 ... +40 °C<br>-13 ... +104 °F |
| **Dimensions (mm) W x H x L** | 78 x 51 x 31 | 6 x 56 x 91 |
| **Approvals** | - | CE |
| **Line Regulation** | 0.05% max (8-16 VDC full load) | 0.5% max (8-16 VDC full load) |
| **Load Regulation** | 0.5% max (no load to full load) | 0.5% max (no load to full load) |
| **Item Number** | **8002-0099/0000-0057** | **859-804** |

**Unmanaged Industrial Switches**

| | | | | Eco | | | | | Standard | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ = supported | | 852-111 | 852-112 | 852-1111 | 852-1112 | 852-1411 | 852-1411/000-001 | 852-1417 | 852-101 | 852-102 | 852-103/040-000 | 852-1102 | 852-1106 |
| **Hardware** | Number of copper ports | 5 | 8 | 5 | 8 | 5 | 5 | 5 | 5 | 8 | 8 | 8 | 16 |
| | 100 Mbit/s | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 1 Gbit/s | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – | ■ | ■ |
| | PoE+ ports among these (1 Gbit/s) | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 |
| | Number of SFP ports | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 |
| | 100 Mbit/s | – | – | – | – | – | – | – | – | – | ■ | – | – |
| | 1 Gbit/s | – | – | – | – | – | – | ■ | – | – | – | – | – |
| | Alarm relays | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| **Approvals, Standards, Certificates** | CE | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | DNV GL | ■ | – | ■ | – | – | – | – | – | – | – | – | – |
| | UL 61010 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | IEC 61850-3 | – | – | – | – | – | – | – | – | – | – | – | – |
| | PROFINET CC-B | – | – | – | – | – | – | – | – | – | – | – | – |
| **Hardware Features** | Status LEDs | – | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Auto-negotiation | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Auto-crossing | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | PROFINET CC-A | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – | ■ | ■ |
| **Configuration** | DIP switch (diagnostics) | – | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ |
| | Web-Based Management (http, https) | – | – | – | – | – | – | – | – | – | – | – | – |
| | SNMP (MIB) | – | – | – | – | – | – | – | – | – | – | – | – |
| | CLI (SSH, Telnet) | – | – | – | – | – | – | – | – | – | – | – | – |
| | PROFINET Configurator (GSDML file) | – | – | – | – | – | – | – | – | – | – | – | – |
| | USB storage | – | – | – | – | – | – | – | – | – | – | – | – |
| **Diagnostics** | Status LED (LINK active) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Status LED (LINK down) | – | – | – | – | – | – | – | ■ | ■ | ■ | ■ | – |
| | Status LED (alarm) | – | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ |
| | SNMP (MIB) | – | – | – | – | – | – | – | – | – | – | – | – |
| | SNMP traps | – | – | – | – | – | – | – | – | – | – | – | – |
| | Modbus® register | – | – | – | – | – | – | – | – | – | – | – | – |
| | Web-Based Management (http, https) | – | – | – | – | – | – | – | – | – | – | – | – |
| | Dashboard & Topology Map | – | – | – | – | – | – | – | – | – | – | – | – |
| | PROFINET diagnostics | – | – | – | – | – | – | – | – | – | – | – | – |
| | Neighborhood detection (LLDP) | – | – | – | – | – | – | – | – | – | – | – | – |
| **Redundancy** | Redundant power supply | – | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ |
| | Jet Ring | – | – | – | – | – | – | – | – | – | – | – | – |
| | Xpress Ring | – | – | – | – | – | – | – | – | – | – | – | – |
| | ETHERNET Ring Protection Switching | – | – | – | – | – | – | – | – | – | – | – | – |
| | Media Redundancy Protocol (MRP) (client/manager) | – | – | – | – | – | – | – | – | – | – | – | – |
| | RSTP/STP | – | – | – | – | – | – | – | – | – | – | – | – |
| **Security** | Segmentation (VLAN) | – | – | – | – | – | – | – | – | – | – | – | – |
| | Authentication (IEEE 802.1X) | – | – | – | – | – | – | – | – | – | – | – | – |
| | Access Control List (MAC, IP, Port) | – | – | – | – | – | – | – | – | – | – | – | – |
| | Port Security | – | – | – | – | – | – | – | – | – | – | – | – |
| **Data Transmission and Performance** | LACP link aggregation | – | – | – | – | – | – | – | – | – | – | – | – |
| | Prioritization (IEEE 802.1 p) | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – | ■ | ■ |
| | Quality of service (IEEE 802.1 Q) | – | – | – | – | – | – | – | – | – | – | – | – |
| | Bandwidth limitation | – | – | – | – | – | – | – | – | – | – | – | – |
| | Storm detection | – | – | – | – | – | – | – | – | – | – | – | – |
| | Routing within VLANs | – | – | – | – | – | – | – | – | – | – | – | – |

# Managed Industrial Switches

■ = supported

| | Lean | | | | MACsec | | Full | | | | | PROFINET | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 852-1812 | 852-1813 | 852-1813/000-001 | 852-1816 | 852-1322 | 852-1382 | 852-303 | 852-1305 | 852-1305/000-001 | 852-1505 | 852-1505/000-001 | 852-602 | 852-603 | 852-1605 |
| **Hardware** | | | | | | | | | | | | | | |
| Number of copper ports | 8 | 8 | 8 | 16 | 8 | 6 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 100 Mbit/s | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 Gbit/s | ■ | ■ | ■ | ■ | ■ | ■ | – | ■ | ■ | ■ | ■ | – | – | ■ |
| PoE+ ports among these (1 Gbit/s) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 0 |
| Number of SFP ports | 0 | 2 | 2 | 0 | 0 | 2 | 2 | 4 | 4 | 4 | 4 | 0 | 2 | 4 |
| 100 Mbit/s | – | ■ | ■ | – | – | – | ■ | – | – | – | – | – | ■ | – |
| 1 Gbit/s | – | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | – | ■ | ■ |
| Alarm relays | 1 | 1 | 1 | 1 | – | – | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Approvals, Standards, Certificates** | | | | | | | | | | | | | | |
| CE | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| DNV GL | – | – | – | – | – | ■ | – | – | – | – | – | – | – | – |
| UL 61010 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | ■ | ■ | ■ |
| IEC 61850-3 | – | – | – | – | – | – | – | – | ■ | – | ■ | – | – | – |
| PROFINET CC-B | – | – | – | – | – | – | – | – | – | – | – | ■ | ■ | ■ |
| **Hardware Features** | | | | | | | | | | | | | | |
| Status LEDs | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Auto-negotiation | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Auto-crossing | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| PROFINET CC-A | – | – | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| **Configuration** | | | | | | | | | | | | | | |
| DIP switch (diagnostics) | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Web-Based Management (http, https) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| SNMP (MIB) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| CLI (SSH, Telnet) | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| PROFINET Configurator (GSDML file) | – | – | – | – | – | – | – | – | – | – | – | ■ | ■ | ■ |
| USB storage | – | – | – | – | – | – | – | – | ■ | – | ■ | – | – | – |
| **Diagnostics** | | | | | | | | | | | | | | |
| Status LED (LINK active) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Status LED (LINK down) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | ■ | – | ■ | ■ | ■ |
| Status LED (alarm) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| SNMP (MIB) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| SNMP traps | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Modbus® register | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – | – |
| Web-Based Management (http, https) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Dashboard & Topology Map | ■ | ■ | ■ | ■ | – | – | – | – | – | – | – | – | – | – |
| PROFINET diagnostics | – | – | – | – | – | – | – | – | – | – | – | ■ | ■ | ■ |
| Neighborhood detection (LLDP) | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| **Redundancy** | | | | | | | | | | | | | | |
| Redundant power supply | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Jet Ring | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – |
| Xpress Ring | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – |
| ETHERNET Ring Protection Switching | ■[a] | ■[a] | ■[a] | ■[a] | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – |
| Media Redundancy Protocol (MRP) (client/manager) | – | – | – | – | – | – | – | – | – | – | – | ■ | ■ | ■ |
| RSTP/STP | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| **Security** | | | | | | | | | | | | | | |
| Segmentation (VLAN) | ■[b] | ■[b] | ■[b] | ■[b] | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Authentication (IEEE 802.1X) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – | – |
| Access Control List (MAC, IP, Port) | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Port Security | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – |
| **Data Transmission and Performance** | | | | | | | | | | | | | | |
| LACP link aggregation | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ | – | – | – |
| Prioritization (IEEE 802.1 p) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Quality of service (IEEE 802.1 Q) | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Bandwidth limitation | – | – | – | – | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Storm detection | ■ | ■ | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Routing within VLANs | – | – | – | – | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

[a] Supports two ERPS rings with a switching time of less than 800 ms

[b] Supports up to five VLANs

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