EMCON 200

PTP transparent Ethernet media converter

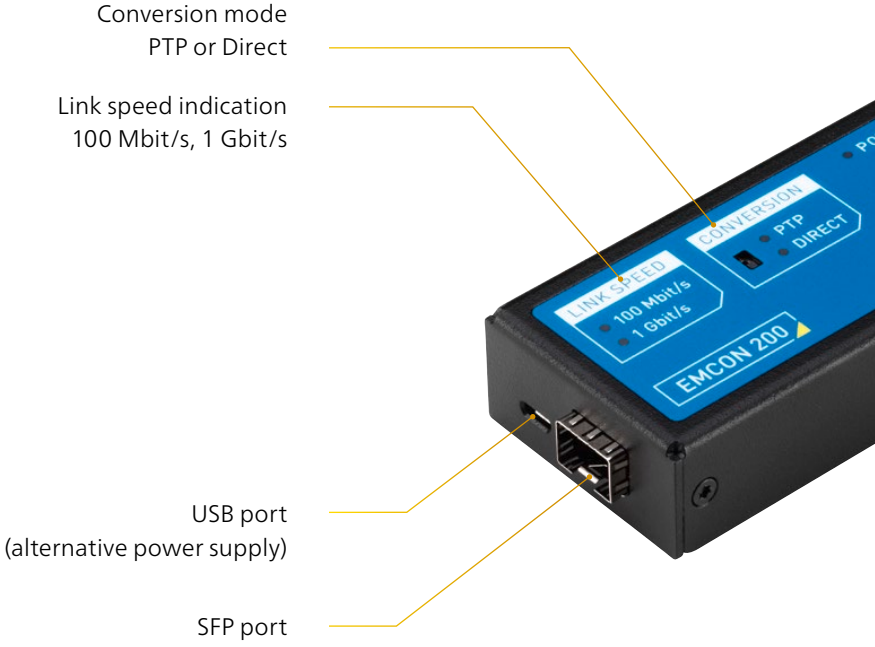
Ethernet media converter

EMCON 200 is an Ethernet media converter used for connecting optical fiber and twisted pair copper Ethernet networks. Copper-based connections are limited to a certain data transmission rate and distance, whereas optical fiber cables can transmit more data over much longer distances.

EMCON 200 can also be used in networks with different fiber optic link speeds and wherever IEEE 1588 precision time protocol (PTP) time synchronization is required. EMCON 200 is also a valuable accessory for OMICRON's CMC and DANEO 400 devices that can provide the power required for EMCON 200 with an Ethernet cable (PoE).

Main features

- Cut-through forwarding between twisted pair copper and optical fiber networks
  - 100BASE-TX to 100BASE-X
  - 1000BASE-TX to 1000BASE-X
- PTP transparent clock according to IEEE 1588-2008 for preserving time synchronization
- Link speeds of 100 Mbit/s or 1 Gbit/s (determined by the connected SFP transceiver)
- Power supply with Power over Ethernet (PoE) or USB
- Various fiber types (depending on SFP module) for high flexibility
- Auto-negotiation with link partners
- No frame size limit (jumbo frames support)
- Link fault pass through
- Low power consumption



Field of application

> Accessory for OMICRON CMC and DANEO 400 test sets for connecting to optical fiber networks (power supply via PoE)
> Standalone device for connecting optical fiber and twisted pair copper networks
> Back-to-back connection with two EMCON 200s for network communication across long distances

Powering options

EMCON 200 is powered either via PoE or via USB:

PoE – Power over Ethernet

In order to power EMCON 200 with PoE, it needs to be connected via an Ethernet cable to a power sourcing equipment (PSE), such as OMICRON's CMC or DANEO 400 devices. If no PSE is available, a PoE injector can be used instead.

USB

EMCON 200 can be powered via its Micro-B USB 2.0 port with a common USB charger (e.g., from a mobile phone). Alternatively, a USB cable from a PC or laptop can be used.

Conversion modes

EMCON 200 offers the following two conversion modes:

PTP mode

EMCON 200 works as a PTP transparent clock that preserves PTP time synchronization. It modifies PTP messages as they pass through the media converter. EMCON 200 knows how much time it takes for a packet to pass through the media converter because it knows the packet's residence time. EMCON 200 writes this residence time into the correction field of the PTP packets.

Direct mode

When using direct mode, data is converted directly to the physical layer without adding or removing any information from it. In this mode, EMCON 200 has minimum packet delays, but the delays are different for the two directions (i.e., "fiber to copper" and "copper to fiber"). The asymmetry of the packet delays affects the PTP path delay measurements, and this influences the accuracy of the PTP time synchronization in the network.

In special cases where two EMCON 200 media converters are used "back to back", the asymmetry of the direct mode is compensated (see page 4).

Your benefits

> Small and lightweight
> Preserves PTP time synchronization
> Easy plug & play handling with PoE
> Supports various fiber types for high flexibility
> Clear device status overview

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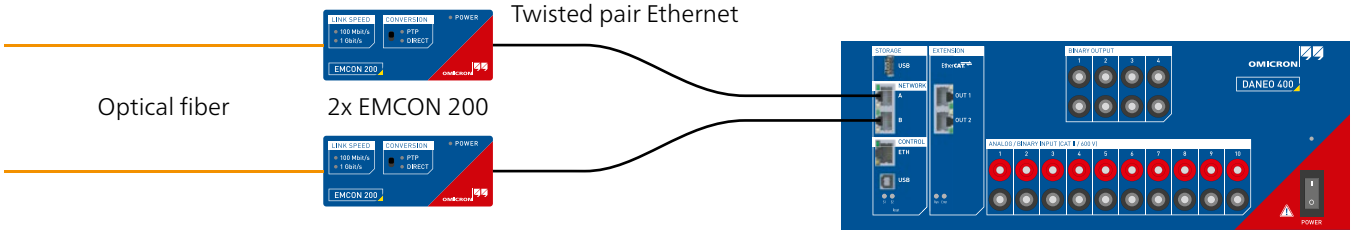
Examples for direct mode (back-to-back)

Network TAP

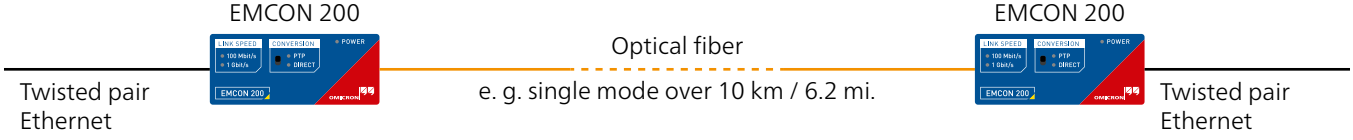
To set up a network TAP to monitor or record network traffic, two EMCON 200 media converters can be used to connect the tapping device (e.g., OMICRON's DANEO 400) to the optical fiber network. The packet asymmetry created by the first media converter ("fiber to copper" connection) is compensated by the second media converter ("copper to fiber" connection).



DANEO 400 (in TAP mode)

Long distance optical fiber connection

For data transmissions over long distances, optical fiber cables are used. With EMCON 200 a twisted pair Ethernet network on both ends of the line can be connected to the optical fiber cabling. The packet asymmetry created by the first EMCON 200 is compensated by the second EMCON 200 media converter.



Accessories and technical data

SFP transceiver	Description	Media	Wavelength	Distance	Order No.
	100BASE-FX	Multi-mode	1310 nm	2 km / 1.25 mi.	E1311100
	1000BASE-SX	Multi-mode	850 nm	550 m / 0.34 mi.	E0668700
	1000BASE-LX	Single-mode	1310 nm	10 km / 6.2 mi.	E0668800

EMCON 200

Ports

Twisted pair ETH port	100BASE-TX or 1000BASE-T Auto-negotiation (100 / 1000 Mbit/s full duplex, depending on SFP transceiver)
Optical fiber SFP port	100BASE-X or 1000BASE-X 50/125 or 62.5/125 multi-mode fiber 9/125 single-mode fiber Far end fault indication Auto-negotiation for 1000Base-X
USB port	Micro-B USB 2.0

Timing

IEEE 1588-2008 protocol	Supports E2E and P2P delay mechanism Supports Layer 2 (with/without VLAN), IPv4, and IPv6 transport mechanisms No configuration required Suitable for PTP profiles such as IEC 61850-9-3 or IEEE C37.238-2011
PTP transparent clock	Corrects internal latencies and inherent conversion asymmetries Updates PTP correction field for all event messages Enabled in PTP conversion mode
Minimal jitter	Time stamping resolution: 4 ns Typically ≤ 8 ns in PTP conversion mode
Low latency	PTP conversion mode: 25467 ns at 100 Mbit/s 2894 ns at 1 Gbit/s Direct conversion mode: 915 ns at 100 Mbit/s 432 ns at 1 Gbit/s

Power supply

Power over Ethernet (PoE)	Class 1 powered device according to IEEE 802.3af
USB	< 2.5 W with active link depending on SFP transceiver

Mechanics

Dimensions (W x H x D)	110 mm x 25mm x 50 mm / 4.3 x 1.0 x 2.0 in
Weight	128 g / 0.28 lb

Environmental conditions

Operating temperature	-25 °C ... + 50 °C / - 13 °F ... + 122 °F
Humidity	5 % … 95 % relative humidity; no condensation

Safety standards

Europe	EN 62368-1
USA	UL 62368-1
International	IEC 62368-1

Electromagnetic compatibility

Europe	EN 61326-1; EN 55032 Class B; EN 55024
USA	47 CFR 15 class B of FCC
International	IEC 61326-1; CISPR 32 Class B; CISPR 24

We create customer value through ...

Quality

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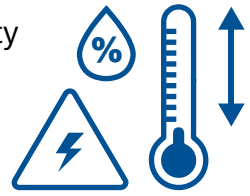
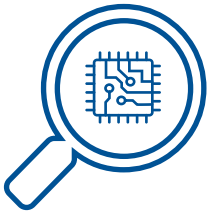
72

hours burn-in tests before delivery



100%

routine testing for all test set components



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TÜV & EMAS
ISO 14001
OHSAS 18001

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More than

200

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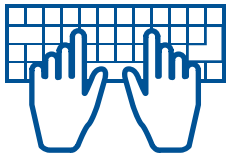

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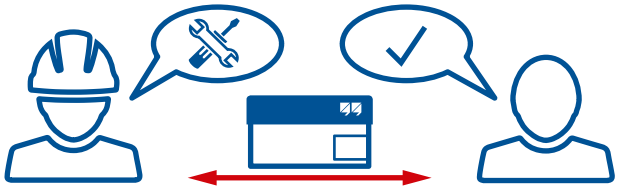
testing time through templates, and automation

Support

24/7

Professional technical support at any time

Loaner devices help to reduce downtime



Cost-effective and straight-forward repair and calibration

25

offices worldwide for local contact and support

Knowledge

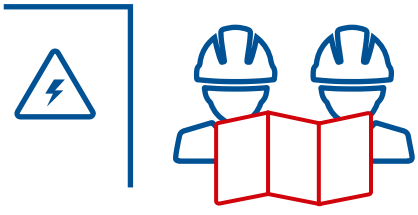
More than

300

Academy and numerous hands-on trainings per year

Frequently OMICRON hosted user meetings, seminars and conferences

to thousands of technical papers and application notes



Extensive expertise in consulting, testing and diagnostics

OMICRON is an international company that works passionately on ideas for making electric power systems safe and reliable. Our pioneering solutions are designed to meet our industry's current and future challenges. We always go the extra mile to empower our customers: we react to their needs, provide extraordinary local support, and share our expertise.

Within the OMICRON group, we research and develop innovative technologies for all fields in electric power systems. When it comes to electrical testing for medium- and high-voltage equipment, protection testing, digital substation testing solutions, and cybersecurity solutions, customers all over the world trust in the accuracy, speed, and quality of our user-friendly solutions.

Founded in 1984, OMICRON draws on their decades of profound expertise in the field of electric power engineering. A dedicated team of more than 900 employees provides solutions with 24/7 support at 25 locations worldwide and serves customers in more than 160 countries.

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

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