2WIRE Converter

User Manual

30 March 2026

Version 1.0

ADATIS

VERSION HISTORY

Version	Date	Comment
1.0	30.03.2026	First version

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1. About this Product

1.1. Features

Ethernet Connection for Remote Devices

The Adatis 2Wire Converter provides an Ethernet connection at locations where no structured cabling exists. The connection is made via any unused wire pair of an existing cable installation, bridging distances of up to 1000m.

The use of the 2Wire Converter is therefore particularly indicated when distances must be bridged that exceed the permissible cable length of structured cabling, which is typically limited to 100m. Since the Power Supply of the converters and connected devices is provided via the same wire pair, the wires must be voltage-free.

Use as PD or PSE

Depending on the type selected, the Ethernet connection of the converter box behaves with respect to Power-over-Ethernet (PoE) either as a Powered Device (PD) which is supplied with power by a PoE Ethernet switch, PoE injector or an on-site power supply, or as Power Sourcing Equipment (PSE) which provides Power-over-Ethernet for connected devices.

AES Encryption

A further advantage of connecting devices via the 2Wire Converter is the built-in encryption technology based on the AES standard with 128 bits.

1.2. Scope of Delivery

As 2Wire Set:

1x 2Wire Box Type PD (switch side = local side)

1x 2Wire Box Type PSE (terminal device side = remote side)

1.3. Type Distinction PD and PSE Box

The different 2Wire Converter types can easily be distinguished by the front panel label or the type label. Both the front panel and the type label explicitly state the type “PD” or “PSE”.

2. Mechanical Installation

The 2Wire Converter can be placed, glued or screwed onto a flat surface in any installation position. For the latter option, 2 mounting brackets with holes are provided on the housing.

IMPORTANT: When choosing the installation location, care must be taken to ensure that the device has sufficient ventilation through the ventilation slots recessed into the sides of the box. If the installation location is difficult to access, pairing should be performed prior to final installation if necessary.

3. Electrical Connection

3.1. 2-Wire Connection

The 2-wire connection is made via a pluggable screw terminal with a pitch of 3.5 mm. This allows for a convenient installation. The screw terminal is suitable for solid and stranded wires and is designed for wire cross-sections of 0.13-1.5 mm² (corresponding to AWG 26-16). Cables should be stripped to a length of approximately 6-7 mm. The M2 screw of the terminal may only be tightened by hand. The maximum torque is 0.34 Nm.

WARNING: The cables used must be voltage-free. Connecting live cables to the 2-wire connection can destroy the device.

Polarity: The 2-wire line is polarity-free, i.e. transmission and power supply work with any polarity of the cables.

IMPORTANT: It is absolutely essential to ensure that when using more than one 2Wire system, a distance of >= 1 m is maintained between the twisted wire pairs of the different 2Wire systems.

3.2. Ethernet Connection

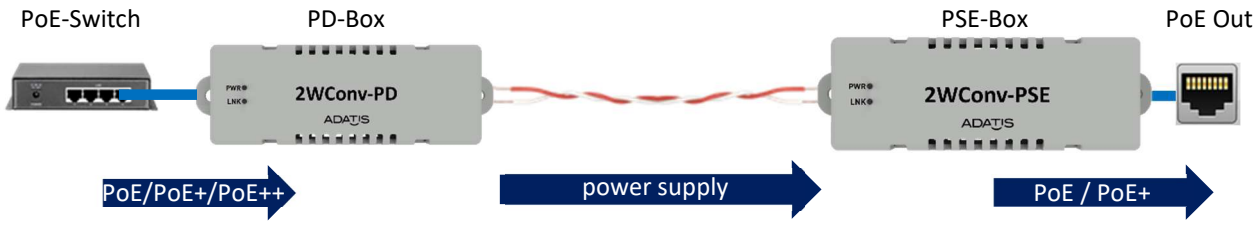
The Ethernet connection is made at the RJ45 socket of the 2Wire Converter. The Ethernet interface has an Auto-MDIX function. This guarantees a working connection in any case, even if a crossover cable with reversed polarity is used instead of a standard Ethernet cable (intentionally or unintentionally).

Furthermore, the interface features automatic detection of the transmission speed 10/100 Base-T and supports both half- and full-duplex communication.

4. Power Supply

4.1. Power Supply via PoE Switch

The 2Wire Set consists of 2 converter boxes that can be used completely independently of other products to provide an Ethernet connection even without the presence of structured cabling. For illustration purposes, the side to which the network switch is connected is referred to below as the local side, and the converter box on the other side of the 2-wire connection as the remote side.



Connection on the Local Side

As shown in the figure, the power supply is provided via the network switch. From the perspective of the PoE switch, the converter box is a Powered Device (PD) that is supplied with electrical power by the switch. Alternatively, a PoE power injector can be used if the switch does not support PoE.

The power supply is used firstly for the local converter box, which requires approximately 1 W of its own consumption. The remaining power is transmitted via the 2-wire connection to the remote converter box, which is supplied by it. This also requires approximately 1 W of power. After deducting the self-consumption of both converter boxes, the remaining power is available to supply a connected PoE device on the remote side.

Connection on the Remote Side

On the remote side, PoE or PoE+ is again available at the Ethernet socket for PD devices to be connected. The power output follows classes 0 to 4, i.e. a maximum of PoE+ with 25.5W.

Note: The output-side power is limited by the input power on the local side minus 2x self-consumption and line losses.

Reducing Line Losses

It should be noted that ohmic resistance always causes line losses in the wire pair. This loss increases proportionally with the cable length. The cable should therefore always be as short as necessary and the cross-section of the wires used should be as large as possible. A wire with a copper cross-section of 0.8 mm should therefore be preferred over a cable with only 0.6 mm cross-section. To improve the cable cross-section, cables can be connected in parallel.

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5. Pairing

Pairing refers to the setup of a transmission link in which the two 2Wire Converters involved are coordinated with each other and an encrypted connection is established between the two converters. Encryption always takes place; however, without explicit pairing, a preset factory password is used. Through pairing, a new, unknown password for encryption is used between the participating boxes.

5.1. No Password Entry Required

Data transmission over the 2-wire line is AES-128 encrypted. To secure a transmission link with encryption, it is normally necessary to enter a password on both sides. So that the converters do not need to be separately parameterised or configured, a means of establishing an encrypted connection via a so-called pairing button has been provided.

5.2. Position of the Button

The pairing button can be reached through the hole on the underside of the housing next to the type label – see the “PAIR” inscription on the type label – using a paper clip.

IMPORTANT: When pressing the button in the converter box, care must be taken to ensure that no small metal parts enter the interior of the device. The paper clip used should be inserted as perpendicular to the housing surface as possible to hit the button. Under no circumstances should a longer thin wire be used.

5.3. Pairing Procedure

The pairing buttons in both boxes are pressed in quick succession so that the respective green 2W-PWR LED flashes. This is best done before mounting the boxes. The flashing of the LEDs indicates that the devices are performing a pairing process in which a password exchange takes place. After completion of the pairing process, this LED lights up continuously. The devices are now connected to each other and data transmission is encrypted.

5.4. Retaining the Password

The pairing process only needs to be performed once during installation. Even after the supply voltage is removed, the two boxes remain assigned to each other, i.e. they retain the negotiated secret password. Should it be necessary to replace a box, pairing must be performed again to enable communication and connect the devices. Pairing can be repeated any number of times.

6. LED Indicators

6.1. Front Panel LED Indicators

The front panel has 2 LEDs indicating the operating states of the converter and the 2Wire line. The LED display is identical for both converter types, PD and PSE.

	**PWR**: Power supply of the 2Wire Converter present **LINE:** 2Wire connection to the remote side established

PD-Box

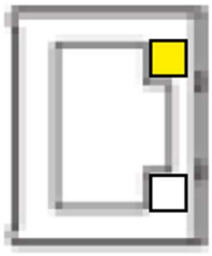
The PD box supports all currently existing PoE standards, i.e. standard PoE (802.3af), PoE+ (802.3at) and PoE++ (802.3bt). The PoE switch or power injector used determines the power class, which is negotiated when the PD box is connected.

PSE-Box

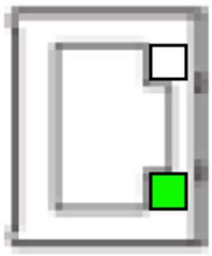
The PSE box supports standard PoE (802.3af) and PoE+ (802.3at).

6.2. Ethernet Socket LEDs

The Ethernet socket in RJ45 form factor is used to connect the network cable. 2 LEDs are built into the socket.



LED – yellow: The LED flashes during data transmission



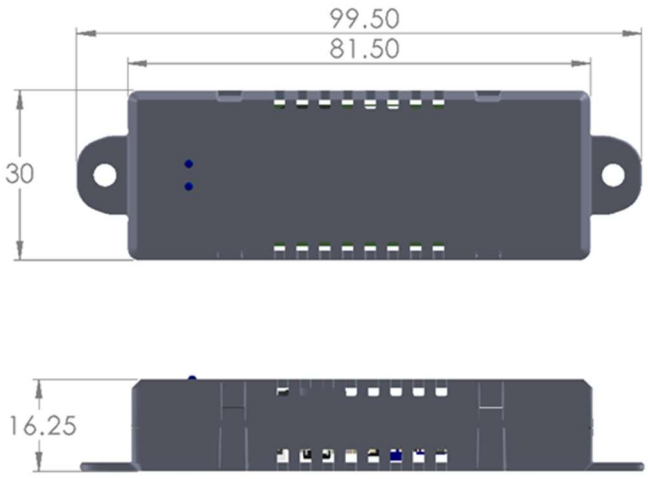
LED – green: The LED lights up when there is an active link, i.e. the connection is established.

7. Glossary

10Base-T	Older Ethernet standard according to IEEE standard 802.3 since 1991 for transmission via one twisted wire pair each for sending and receiving at a speed of 10 Mbit/s.
100Base-TX	Standard Ethernet over so-called structured cabling according to Cat-5 (one twisted wire pair per transmission direction) at a speed of 100 Mbit/s.
1000Base-T	Ethernet at 1 Gigabit/s over copper cables that must meet the Cat-5 UTP category or better Cat-5e or Cat-6.
802.3af	The extension of the Ethernet standard to include a power supply for devices. Power-over-Ethernet (PoE) refers to a method by which network-capable devices can be supplied with power via the 8-wire Ethernet cable. The maximum power is 12.5 W.
802.3at	Newer Power-over-Ethernet standard, also referred to as PoE+ or PoE Plus, with increased power up to 25 W.
802.3bt	Latest Power-over-Ethernet standard, also referred to as PoE++ or PoE Plus Plus. The standard is divided into 2 types, Type 3 with up to 60 W and Type 4 with up to 90 W.
AES	The Advanced Encryption Standard is currently the most secure encryption method, which has been announced as a standard by the National Institute of Standards and Technology (NIST) since 2000 as the successor to the older DES and 3DES methods.
Auto-MDIX	Devices with Auto-MDIX function have the ability to automatically detect the transmit and receive lines of the connected device and adjust accordingly. The type of cable used (crossover or straight-through) is irrelevant here.
AWG	American Wire Gauge is a coding for wire diameters and is predominantly used in North America. It identifies electrical cables made of stranded and solid wire and is mainly used in electrical engineering to designate the cross-section of conductors.
Crossover Cable	In computer network technology, a crossover cable is an eight-wire cable in which certain cable conductors are swapped in one of the two RJ45 connectors. While a non-crossed (straight through) network cable connects computers with switches, a crossover cable can be used to directly connect two computers (or two switches) with each other.
Full-Duplex	Today's Ethernet standards have one wire pair each for the transmit and receive direction. This allows independent and simultaneous transmission and reception. This is referred to as full-duplex operation.
Half-Duplex	In early Ethernet networks, only one cable was used for both sending and receiving. This meant that it was not possible to send and receive simultaneously. This alternating sending and receiving is referred to as half-duplex in communications engineering.

Pairing	Pairing refers to the process of assigning two devices to each other. During the pairing process, keys are exchanged so that an encrypted connection can subsequently be established between the participating devices without the need to enter a password on each device.
PD	A Powered Device is a terminal device that is supplied with power via Ethernet.
PoE Plus	see 802.3at
PoE Plus Plus	See 802.3bt
Power Injector	A Power Injector or PoE Injector is a so-called midspan device that is inserted between the network switch and PD and supplies power to the respective wires. This may be necessary when switches without PoE function are used.
PSE	Power Sourcing Equipment is a component of the PoE architecture that determines whether a PoE-compatible device, a Powered Device (PD), is connected and needs to be supplied with power. If the PSE device detects such a device, it supplies it with power via the existing data line.
RJ45	RJ45 refers to a standardised 8-pin modular connector that is used worldwide for Ethernet networks. Shielded sockets and plugs are used in the Ethernet sector.
Signature Resistor	The signature resistor in the PoE architecture refers to the characteristic impedance for the devices to be supplied. The PSE device uses the signature resistance to determine whether a device connected to the network is a PD and which power class this PD corresponds to.

8. Dimensions



9. CE Declaration

Adatec GmbH

Kutzerstr. 30

90765 Fürth

confirms that the product

2Wire Converter

complies with the provisions of the directives on Electromagnetic Compatibility 2004/108/EC and has been developed and manufactured in accordance with the following standards:

Emission: EN55022, EN61000-3-2, EN61000-3-3

Immunity: EN55024 (EN61000-4-2 bis -6; -8; -11)

Nuremberg, 24 March 2026

Adatec GmbH

Signed: Michael Gilge (Managing Director)

Note: This declaration of conformity loses its validity if the product, without the express consent of adatec GmbH,

- is rebuilt, supplemented or otherwise modified, or
- in the event of improper connection or use other than intended.

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Products that are supplied with voltage (in particular 230 V mains voltage) must be disconnected from the power supply before opening or connecting cables.

Damage and consequential damage caused by interference or modifications to our products as well as improper handling are excluded from liability. The same applies to improper storage or external influences.

When handling 230 V mains voltage or products operated on the mains or battery, the relevant directives must be observed, e.g. directives for compliance with electromagnetic compatibility or the Low Voltage Directive. Corresponding work should only be carried out by a specialist who is familiar with it.

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