Art. No. 11607-24

# OPERATING INSTRUCTIONS

# ECO 501 PRO
## INDUSTRIAL SENSOR GATEWAY of the 3rd generation for the 1-Wire bus system

https://lnk.esera.de/w81hn1zo

### HIGHLIGHTS

Fully automatic PLUG and PLAY system for up to 30 sensors

—

Web server and access point for configuration, debug and firmware updates

—

Data interface for Modbus/TCP, MQTT and ASCII

—

Auto-E-Connect Plug and Play Level I to III

—

Fast readout of all devices in 5 seconds cycle

—

Low maintenance industrial unit, because without Linux. Native programmed with known libraries

—

LAN interface for data, configuration, debug and firmware updates

—

Extended temperature range -5°C to 50°C

—

Rugged industrial design

—

Extensive protection circuits and good device protection

—

Simple assembly

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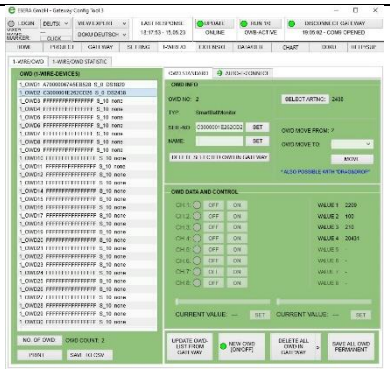
## 1 ADDITIONAL DOCUMENTS AND SOFTWARE

The ECO 501 Gateway operating manual consists of these product-specific and cross-product documents. The cross-product documents apply to several devices.
To obtain the cross-product documents and additional software, please follow the links below to our website (https://esera.de).
Please read the complete documents to the end and follow the information and instructions.
If you have trouble finding the documents or software you need, you can also contact our customer support. We will be happy to assist you with any questions or problems.

| | |
|---|---|
| **Webserver Access Point INTERFACE DOCUMENTATION** | **INTERFACE MANUAL MODBUS, MQTT, LoRaWAN, NB-IoT**<br><br>Manual for configuring the interface via web server and access point<br><br>The manual can be found in the ESERA download area at:<br>https://download.esera.de/download/technical/schnittstellen_handbuch |
|  | **CONFIG TOOL 3 SOFTWARE**<br><br>Comprehensive software for all EC and ECO gateways with 1-Wire I/O section<br><br>You can find the software in the ESERA download area at:<br>https://download.esera.de/download/technical/config%20tool%203 |
| **Modbus/TCP Modbus/RTU INTERFACE DOCUMENTATION** | **MODBUS INTERFACE MANUAL V2, GATEWAY WITH WEBSERVER**<br><br>Manual for configuring the Modbus/TCP and Modbus/RTU interface for ECO gateways with web server and access point<br><br>The Modbus manual can be found in the ESERA download area at:<br>https://download.esera.de/download/technical/programmierhandbuch |
| | **PLANNING AID FOR 1-WIRE SYSTEMS**<br><br>Here we offer you a small Excel tool for the calculation of your 1-Wire system<br>The Excel tool can be found in the ESERA download area at:<br>https://download.esera.de/download/technical/planungshilfe_1-Wire |

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**Note**
Before you start assembling the device and put the product into operation, read this operating manual through to the end at your leisure, especially the section on safety instructions.

If you have problems downloading the advanced documents or software, please contact our support by mail at support@esera.de.

We are very concerned to act in an environmentally friendly and resource-saving way for you. That is why we use paper and cardboard instead of plastics wherever possible. We would also like to make a contribution to the environment with these paperless instructions.
Please think of the environment before printing these instructions.

# 2 PRODUCT DESCRIPTION

**APPLICATION**

- Highly up-to-date, universal Modbus/TCP and MQTT sensor interface for all modern machines, Plants and consumers
- Energetic optimization through many sensors
- Industrial equipment, mechanical engineering, building management, IoT and M2M
- Manufacturer-independent usable
- Up to 30 sensors can be connected via plug and play

**ADVANTAGE**

- Cost and time savings due to fast installation and commissioning
- Connect, switch on and you already receive measured values
- Intuitive operation via web server

The ECO 501 Gateway is a powerful sensor interface of the latest generation designed for monitoring machines, plants and systems. It features an access point and an integrated web server to enable convenient configuration and monitoring.

The gateway supports the connection of up to 30 sensors via the Industrial 1-Wire bus using the Auto-E-Connect plug-and-play system. This system enables fully automatic sensor connection without manual configuration, which greatly simplifies installation and integration.

The ESERA Auto-E-Connect system, an extension of the 1-Wire bus standard, is used. It is a European patent of ESERA.
A wide range of sensors is available, including temperature, humidity, dew point, air quality (CO2, VOC or particulate matter), digital alarm contacts, glass breakage and smoke detectors. These sensors can be seamlessly connected to the ECO 501 gateway via the Auto-E-Connect plug-and-play system.

The gateway offers a web server that provides convenient access to the configuration, software updates, and sensor and production data of the connected sensors. The web server can be accessed via WLAN and the access point, which is activated at the push of a button.

The ECO 501 gateway was developed as a low-maintenance industrial device, without Linux and with its own native programming. No unknown libraries are used, which ensured the stability and reliability of the system.

Each of the maximum 30 sensors can provide up to 5 measured values, so that a total of up to 150 sensor data points can be sent to your control system or PLC.

Software support includes the Config Tool and ECO Dashboard 100, which are provided free of charge to facilitate sensor configuration and monitoring.

For reliable operation in industrial environments, the ECO 501 gateway is operated with a voltage of 9-30VDC.

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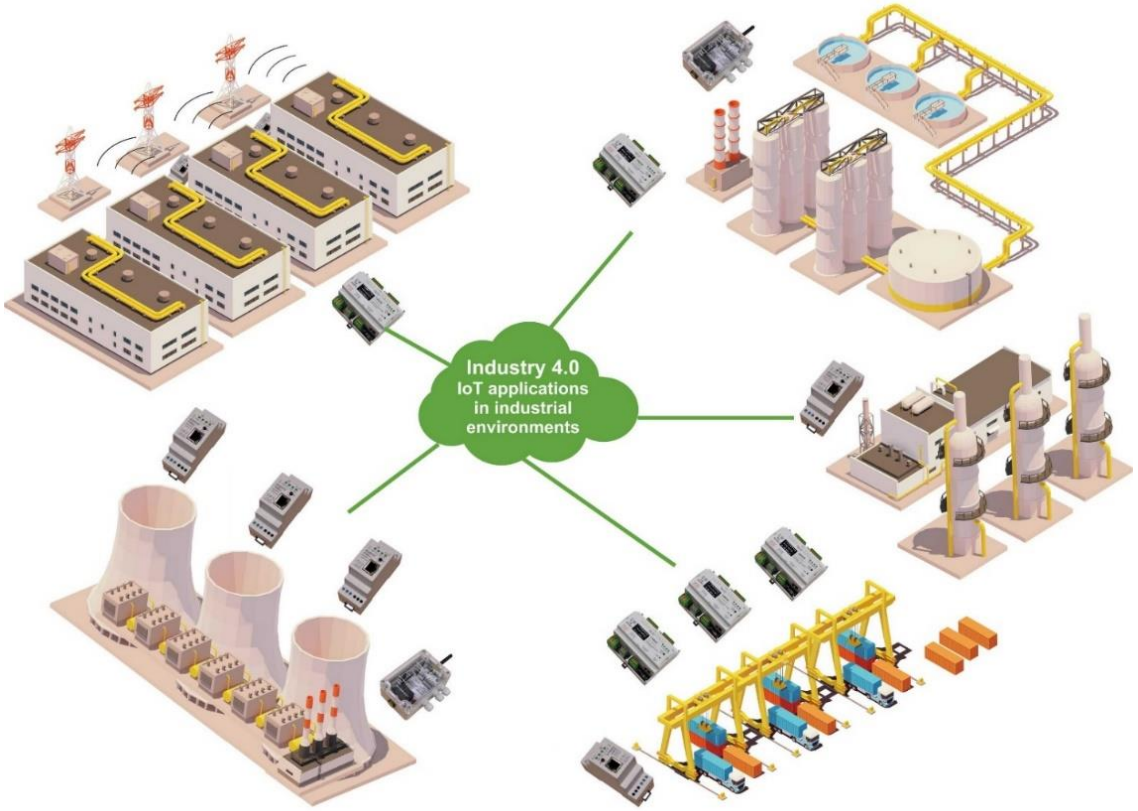
Overall, the ECO 501 gateway offers a robust and user-friendly solution for monitoring machines, plants and systems thanks to its extensive functions and easy integration of sensors.

## 3 INDUSTRIAL ENVIRONMENT FOR THE ECO 501 SENSOR GATEWAY

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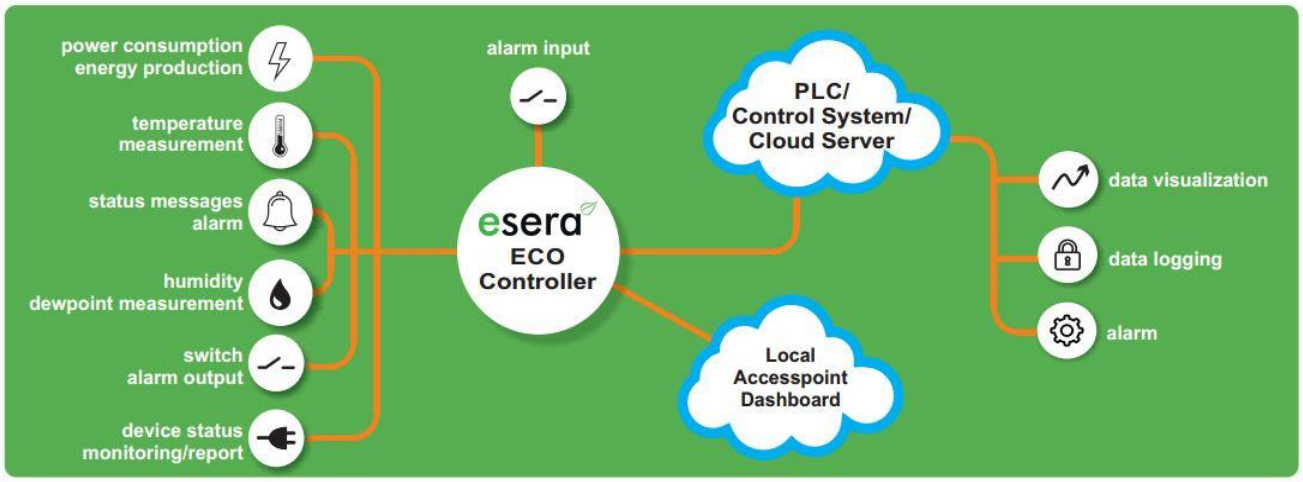
# 4 ECO GATEWAY SYSTEM

Many sensors, powerful interface and access point




# 5 The ECO Gateway Concept

For all ECO gateways, we have developed and applied a system concept based on our decades of experience in the development of electronic devices.

**THIS CONCEPT CONTAINS THE FOLLOWING POINTS**

**CONNECTION OF SENSORS**

The system concept allows a large number of sensors to be connected via the Industrial 1-Wire Bus using Auto-E-Connect. This process is fully automatic, which simplifies installation and configuration.

**NUMBER OF SENSORS**

Up to 30 sensors can be connected to an ECO gateway. These sensors can provide a maximum of 150 sensor values in total.

**ANALOG AND DIGITAL INPUTS**

In addition to the sensors connected via 1-Wire bus, the ECO gateways also offer direct analog and digital inputs. This means that other sensors or devices can also be connected directly to the gateway.

**CASE INTERIOR CLIMATE MONITORING**

The system concept includes a climate monitoring system for the interior of the case. It monitors various parameters such as temperature, humidity, etc. and has limit values and an alarm system to detect potential problems at an early stage.

**POWERFUL DATA INTERFACE**

The ECO gateways offer an extremely powerful data interface that supports up to 5 simultaneous data connections to control systems and PLC controllers. This allows the acquired sensor values to be transmitted efficiently in real time.

**CONFIGURATION VIA WEBSERVER**

The settings of the device can be made via a web server. This gives users a user-friendly interface for configuring and monitoring the gateway.

**ACCESS POINT**

The ECO gateways have a connectable access point that enables independent access by mobile devices such as smartphones, tablets or laptops. This also allows users to access the gateway wirelessly and monitor and control the data.

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# 6 DEVICE CONSTRUCTION

The basic structure of all ESERA ECO gateways consists of two sections. The following is a general description of the functions and advantages resulting from the structure.
The description does not apply to all devices, this is a general description about all ECO gateways.

## 6.1 INTERFACE / SENSOR INTERFACE AND I/O SECTION

The basic structure of all ESERA ECO gateways consists of two sections. The following is a general description of the functions and advantages resulting from the structure.
The description does not apply to all devices, this is a general description about all ECO gateways.

**SECTION I, I/O SECTION/GATEWAY**
This section includes the 1-Wire bus, the eBus and/or a sensor unit. It is specially optimized for the acquisition and communication of sensor information.
The I/O section is designed as an independent, microcontroller-based electronic unit.

**SECTION II, DATA INTERFACE, MAXI INTERFACE**
The data interface or also called Maxi Interface represents the powerful communication interface of the gateway. It enables the connection to other systems, control systems or controllers. The Maxi Interface is also designed as a separate electronic unit based on a microcontroller.

## ADVANTAGES OF THE SEPARATE SECTIONS

Below are some of the advantages that result from the device's structure in two sections:

**MODULAR EXPANSION** OPTIONS
Due to the construction of the device in two sections, extensions and upgrades can be easily carried out. When a new function or additional module is needed, it can be easily inserted into the appropriate section without having to replace all the hardware. This allows flexible adaptation of the device to the specific requirements and needs of the user.

**EASY MAINTENANCE AND REPAIR**
The modular design also facilitates maintenance and repair of the unit. If a problem occurs in one section, it can be checked and repaired separately without affecting the functionality of the other section. This reduces downtime and allows problems to be fixed more quickly.

**SCALABILITY AND FLEXIBILITY**
The two-section design of the device allows for easy scaling and adaptation to changing requirements. Different sections with different functions can be combined to meet the requirements of a specific application area. This makes the device flexible to use and adapt to different scenarios.

**SPACE AND COST SAVINGS**
Due to the modular design and the possibility of expansion, the device can be used more efficiently. There is no need to purchase separate devices for different functions, but they can be integrated into a single device. This saves space and costs for additional hardware.

**NATIVELY PROGRAMMED**
The sections are natively programmed, which means that they do not rely on Linux or other operating systems. This contributes to the gateway's low maintenance and enables many years of use without frequent updates.

**SEPARATE CONSTRUCTION**
The separate design of the two sections offers advantages in terms of security and operational readiness. In the event of attempted interference or cyber sabotage attacks on one of the sections, the other section remains unaffected and operational.

**VARIOUS I/O FUNCTIONS AND INTERFACES**

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Depending on the requirements and the field of application of the ECO gateways, different I/O functions such as 1-Wire or eBus as well as different interfaces such as Ethernet, WLAN, NB-IoT and LoRaWAN are available. This allows the gateways to be adapted to different environments and applications.

Overall, the two-section design and associated benefits of the device provide increased flexibility, security, scalability and efficiency in the use of the device.

**Implementation of specific protection measures**
In addition, the implementation of specific protection measures in each section of the gateway provides increased security and protection against potential attacks. Here are some of the protections that can be implemented in each section of the gateway:

- **Secure Boot**
  Using Secure Boot ensures that only trusted and authenticated software components are loaded during the boot process. This prevents malicious or unauthorized code from running and compromising the system.

- **Encryption techniques**
  Sensitive data exchanged between the sections of the gateway can be protected by encryption techniques. For example, symmetric or asymmetric encryption algorithms are used here to ensure the confidentiality and integrity of the data.

- **TPM modules**
  Trusted Platform Modules (TPM) are special hardware modules that are used to securely store cryptographic keys and perform security-related operations. The use of TPM modules can further strengthen the security functions of the gateway, as they enable the detection of hardware tampering, for example, and support the secure generation and management of keys.

These protective measures help to increase the security of the gateway and ward off potential attacks. They ensure the integrity of the system, protect against unauthorized access to sensitive data, and ensure trustworthy and secure communication between the sections of the gateway. The use of these security mechanisms minimizes the risk of security breaches and unauthorized access.

Overall, the separate sections, the powerful communication interface and the security measures provide a robust and flexible system for the acquisition, transmission and backup of sensor data. The use of native programming and the absence of Linux ensure reliable and low-maintenance use of the ECO gateways over a long period of time.

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# 7 ECO 501 GATEWAY FUNCTIONS

The ECO 501 gateway offers various functions and interfaces for data communication and management of 1-Wire networks. Here are some important features and information about the functions:

**DATA INTERFACE**
Ethernet interface with 10/100 Mbit speed. Support of different data protocols like TCP/IP and UDP. Up to 3 simultaneous data connections possible.

**MODBUS PROTOCOL**
Modbus/TCP addressing for the gateway, simple and clear.
Addresses available for system and device data. A comprehensive address overview of all available data points is available for download as a separate document on the website.

**MQTT PROTOCOL**
For M2M (Machine-to-Machine) and IoT (Internet of Things) applications.
Data connection via MQTT to a broker for sending and receiving data.
Send interval can be set via the web server.
Names can be added for 1-Wire sensors via Config Tool and are used in the send protocol. Default names are used if no specific names are specified.
More details about the MQTT protocol can be found in the document "Interface manual" on the website.

**ASCII TEXT PROTOCOL**
The 1-Wire sensor data are output by the ECO 501 gateway ready prepared.
For example, temperature sensors are output cyclically in °C. Scaling only requires a division by 100.
Part numbers for ESERA modules can also be entered, whereby the calculation and output are adapted to the function of the module.

**SENSORS AND ACTUATORS**
The ECO 501 Sensor Gateway supports up to 30 sensors.
Sensors are automatically connected to the Industrial 1-Wire bus via the Auto-E-Connect Plug and Play system.
Each sensor can provide up to 5 measured values, for a total of up to 150 sensor data to your control system or PLC.

**AUTARKIC MANAGEMENT**
The Sensor Gateway enables the self-sufficient management of a 1-Wire network.
No 1-Wire commands or formulas are required to evaluate the sensors and actuators.
The ECO 501 PRO gateway automatically scans the 1-Wire network for new 1-Wire devices, reads their Auto-E-Connect data and outputs the converted data in plain text.

**DESIGNED FOR ALL 1-WIRE NETWORKS**
The 1-Wire interface of the ECO 501 PRO is specially designed for large 1-Wire networks with long cable runs. 1-Wire devices can be operated in mixed parasitic or normal mode.
The interface offers maximum data security, even for complex network structures.

**VOLTAGE SUPPLY**
The ECO 501 gateway can be operated with a voltage of 9-30 VDC.
Suitable for 12V and 24V power supply systems in stationary and mobile applications.
Suitable DIN rail or plug-in power supplies are available in the webshop.

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**COMMISSIONING**
Support videos for commissioning and configuration can be found on our website www.esera.de under "Service and Support", Support Videos.

**NOTE**
Basics and tips on the 1-Wire bus system can be found in the ESERA Online Shop at
1-Wire Basics or please refer to our eBook in the store under Training/Documentation.

# 8 AUTO-E-CONNECT® PLUG AND PLAY SYSTEM

The Auto-E-Connect® 1-Wire Plug and Play system enables fully automatic configurations of the 1-Wire sensors and actuators on the 1-Wire bus. It offers various added values and time savings for the customer. The system has been optimized over many years and is optimized for smart building, industrial applications and IoT.

The Auto-E-Connect system automatically recognizes sensors and actuators and starts suitable libraries. The data is ready formatted and output. These functions run automatically in the background during the installation and commissioning of sensors and actuators.

The Auto-E-Connect system consists of three complementary levels that extend the functionality. With these functions, fully automatic configurations of the 1-Wire sensors and actuators on the 1-Wire bus can be realized.

Please note that the Auto-E-Connect functionality will be available for the ESERA ECO Gateways and Station 200 Pro from 2021.

# 9 SCOPE OF FUNCTIONS AUTO-E-CONNECT SYSTEM

The three levels of the Auto-E-Connect system provide advanced functions and automation for the installation and configuration of sensors and actuators in the 1-Wire bus.
Below are three levels of the Auto-E-Connect system

## Level I

**OWD Detect** stands for "One-Wire Device Detect" and refers to the function of the ECO gateway to automatically detect new sensors and actuators and to start adapted libraries within the gateway. This saves time when connecting a new device to a 1-Wire gateway.

When a new sensor or actuator is connected to the 1-Wire bus, the ECO gateway automatically detects the new device. It then automatically starts the corresponding libraries which are required for the detected device.

This function makes the integration of new sensors and actuators much easier, as the manual configuration effort is eliminated. It saves time and simplifies the installation process, as the gateway independently makes the necessary settings and adjustments.

OWD Detect thus avoids the time-consuming manual configuration of new devices on the 1-Wire gateway, which saves time overall when connecting new devices.

## Level II

The ECO Gateway offers the possibility to read out and visualize the Auto-E-Connect data and manufacturer data of sensors and actuators. Various information such as article number, date of manufacture, firmware version and hardware version can be displayed.

Reading out this data gives you a detailed overview of the properties and specifications of the connected sensors and actuators. This can help you manage and monitor your 1-Wire devices.

The visualization of the data can be done in different ways, depending on the functions and possibilities of the ECO Gateway. This can be done, for example, via a web-based user interface or special software provided by the manufacturer.

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The visualization of the product data gives you a quick overview of the connected devices and their specific properties. This can be of great benefit when troubleshooting, maintaining and monitoring the 1-Wire network.

### Level III

The advanced plug-and-play system for the 1-Wire bus offers various functions that facilitate the installation and configuration of sensors and actuators. Here are some of the functions in detail:

**PRE-CONFIGURATION**

You can write
the desired OWD number (1-Wire Device Number) for the next installation directly into the sensor or actuator. In this way, the device itself stores the information about its position in the gateway. This enables automatic assignment of the devices in the target gateway without the need for manual sorting.

**AUTOMATIC-POSITIONING**

The device automatically logs on to each ECO gateway with Auto-E-Connect III using the pre-configured OWD number. This automatic login process works up to the maximum possible number of OWDs of the ECO gateway. No further configuration is required during commissioning.

**SENSOR-FINDER-FUNCTION**

The ECO 501 PRO gateway can activate the status LED of a sensor in the 1-Wire sensor network. The status LED flashes for a certain time to facilitate the detection of a sensor within the network. This enables faster localization of sensors and saves time and costs.

**CLASSES-ASSIGNMENT**

ESERA 1-Wire Devices are assigned to OWD classes based on their part number. These classes map comparable properties, variable names and units. This class assignment enables fully automated software installation, visualization and data evaluation, both locally and in the cloud. The class parameters can be output via the data interface, e.g., via MQTT protocol.

These advanced features of the plug-and-play system simplify the installation and configuration of sensors and actuators in the 1-Wire bus. It saves time and enables efficient management of the devices in your system.

**NOTE** The above functions of the extended plug-and-play system only apply to sensors and actuators that support the Auto-E-Connect functionality. It is important to consult the respective operating instructions and technical specifications of the sensors and actuators to ensure that they are compatible with the Auto-E-Connect system.

The Auto-E-Connect feature is specific to ESERA 1-Wire Devices and provides additional benefits for device configuration and management. Please note that not all sensors and actuators on the market support this feature, and it is important to verify compatibility prior to purchase.

For exact details on Auto-E-Connect support, please refer to the respective operating instructions and technical documentation of the devices you intend to use.

## 10 PATENT AUTO-E-CONNECT® SYSTEM

The 1-Wire Plug and Play System Auto-E-Connect is protected by a European patent. This officially documents and confirms the innovation and uniqueness of this system.
The expansion of functionality and the modernization of the 1-Wire bus through the Auto-E-Connect system are impressive.

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The great advantages for customers, such as the significant increase in convenience and the enormous cost and time savings, make the 1-Wire Plug and Play System Auto-E-Connect extremely attractive.

The benefits are particularly noticeable in commissioning, preparation, inventory, live time management, and service and maintenance (predictive maintenance).

With the Auto-E-Connect system, the Industrial 1-Wire sensor and actuator bus is state-of-the-art and at least on par with comparable plug and play sensor systems such as IO-Link.

The system's areas of application are diverse and range from smart home and smart building to IoT and M2M to mechanical and plant engineering, the German armed forces, and aerospace. This shows that the 1-Wire Plug and Play System Auto-E-Connect can play out its advantages in various industries and application areas.

This is a very innovative system that can be used in various areas. The ability to detect and configure sensors and actuators fully automatically saves time and money and significantly increases the convenience for the customer. In addition, the system is protected by ESERA's patent, making it unique on the market.

Figure, Patent Certificate for the 1-Wire Bus Auto-E-Connect System

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPÄISCHES PATENT | EUROPEAN PATENT
BREVET EUROPÉEN

Hiermit wird bescheinigt, dass für die in der Patentschrift beschriebene Erfindung ein europäisches Patent für die in der Patentschrift bezeichneten Vertragsstaaten erteilt worden ist.

It is hereby certified that a European patent has been granted in respect of the invention described in the patent specification for the Contracting States designated in the specification.

Il est certifié par la présente qu'un brevet européen a été délivré pour l'invention décrite dans le fascicule de brevet, pour les États contractants désignés dans le fascicule.

Europäisches Patent Nr.
European patent No.
Brevet européen n°
EP3764602

Tag der Bekanntmachung des Hinweises auf die Erteilung des europäischen Patents
Date of publication of the mention of the grant of the European patent
Date de la publication de la mention de la délivrance du brevet européen
27.07.2022

ONE-WIRE BUS MIT EINEM ODER MEHREREN ONE-WIRE-DEVICES

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Präsident des Europäischen Patentamts | President of the European Patent Office | Président de l'Office européen des brevets

München, den | Munich, | Munich, le 27.07.2022

URKUNDE | CERTIFICATE | CERTIFICAT

EP/AEPO/OEB 2031 04.22

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## 11 TECHNICAL DATA

| | |
|---|---|
| **Feature** | • Web server for configuring the data connections<br>• Internal access point available for 30 minutes at the touch of a button<br>• High-performance Ethernet interface<br>• Internal WLAN antenna<br>• Designed for use in extended temperature ranges<br>• Secure Boot and SSL-encrypted firmware for a high Security<br>• Existing TPM chip |
| **Data interfaces** | • Ethernet (LAN): TCP/IP, UDP<br>• Industrial 1-Wire Bus (5V, 1-Wire Data and Ground (GND))<br>• Modbus/TCP (Ethernet 10/100MBit)<br>• Text protocol according to ASCII standard |
| **Plug and Play System,**<br><br>**Auto E-connect functions** | - **Automatic Positioning**: Advanced Plug and Play system for fully automatic positioning of the sensor / actuator in the ECO Gateway<br>- **Automatic library assignment**: The appropriate library is assigned fully automatically for the sensor<br>- **Classes Assignment**: Output OWD sensor class via ECO gateway<br>- **Electronic nameplate**: output of part number, year of manufacture, software version, software revision, hardware version, OWD position, sensor finder function<br>- **Pre-Configuration**: Programming of the desired OWD at the next ECO gateway, storage of the OWD number.<br>- **Sensor Finder Function**: LED display for sensor identification. Let the status LED on the sensor / actuator flash for identification. |
| **Data, Firmware Update and configuration** | Web Server and Config Tool 3 |
| **Software Support** | Config Tool 3, ECO Dashboard 100 |
| **Supply voltage** | Wide range 9-30VDC, universal 12VDC / 24VDC supply |
| **Current consumption** | • Power consumption max. 2.5W at 24VDC<br>• max. 10W at 24VDC with full bus load |
| **Power Supply RTC** | Goldcap, buffering of the internal clock (RTC) in case of supply voltage failure for approx. 2 days. In the event of a longer failure, the RTC must be reset.<br>The Goldcap is charged after approx. 2 hours. |
| **1-Wire interface** | • Advanced 1-Wire bus functions with Plug and Play feature, Auto-E-Connect system<br>• max. 30 1-Wire sensors or actuators<br>• Data line with 5V level<br>• Output voltage 5V, max. 500mA |
| **Protection circuits** | • ESD, overvoltage and reverse polarity protection<br>• 1-Wire Protector for 1-Wire interface (overvoltage protection up to 28VDC) during operation of ECO 501 |
| **Connection** | Screw terminals for stranded wire and cable up to 2.5qmm cross-section |
| **Isolation** | Galvanic isolation between Ethernet and 1-Wire interface |

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| | |
|---|---|
| **Supported 1-Wire devices** | DS2401, DS1963, DS1990, DS1820, DS18S20, DS18B20, DS2413, DS2438, DS2450, DS2408, DS2405, DS2406 (only423,<br>other chips on request.<br>We will be happy to support additional modules as an OEM product for you. |

## 12 ENVIRONMENTAL CONDITIONS

| | |
|---|---|
| Operating temperature | -5°C to +50°C, standard temperature range |
| Storage temperature | -10°C to +60°C |
| Relative humidity | 10% to 92% (non-condensing) |
| Room classification | Operate only in dry rooms |
| Protection class | IP20 |
| Protection class | III |
| Dimensions | 2TE, 32 x 90 x 70mm (WxHxD) |

## 13 CONFORMITY

EN 50090-2-2
EN 61000-4-2, ESD
EN 61000-4-3, HF
EN 61000-4-4, Burst
EN 61000-4-5, Surge
EN 61000-6-1, Noise immunity
EN 61000-6-3, Interference radiation
RoHS

## 14 DISPLAY LED

The module has different display LEDs. The function of the displays is as follows

| ADVERTISEMENT | DESCRIPTION | FUNCTION |
|---|---|---|
| LED Green | PWR | Display for supply voltage |
| LED Green | DATA | • After switching on the device, the LED flashes 3x<br>• Flashes during 1-Wire activity<br>• Flashes when sending data via the data interface<br>• Flashes very quickly when "KAL Receive" has been activated and the "KAL messages" from the control system are absent. |
| LED Green | LAN | LAN - network status LED<br>Lights up when LAN network connection is established<br>Flashes when the interface is not activated |
| LED Green | WLAN | WLAN - Network Status LED<br>Lights up when WLAN network connection is established<br>Flashes when the WLAN access point is activated and a direct connection is possible |

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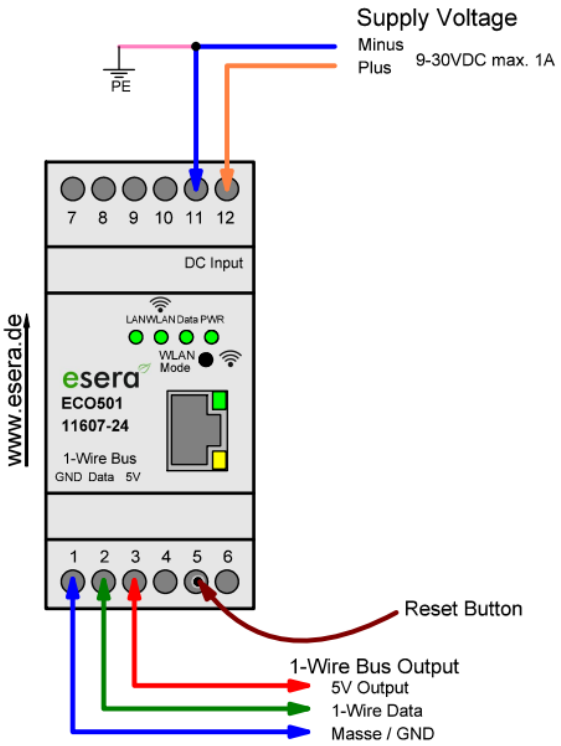
## 15 CONNECTION PLAN

**Module bottom**
**1-Wire Bus Interface**
1 = Ground 1-Wire
2 = 1-Wire Data
3 = 5V output

**Module top side power supply 10-30VDC**
12 = Minus supply voltage
21 = Plus supply voltage

Notice:
5 = Reset Button




**NOTE**
The FE connection (functional ground) of the ECO 501 should be connected to the ground potential (PE) to establish a functional ground. This is important to ensure reliable operation of the module.
Connecting the FE terminal to ground potential establishes a grounding that helps minimize interference and electrical problems. Proper functional grounding protects the assembly from electrostatic discharge, surges, and other potential interference.
It is advisable to follow the manufacturer's instructions and guidelines to ensure that functional grounding is performed according to the specific requirements of the ECO 501. Also observe possible specifications and regulations in your specific environment to ensure a safe and reliable installation.

**IMPORTANT**
It is essential that the module is operated exclusively in accordance with the specified voltages and ambient conditions.
The operating position of the device is arbitrary, i.e., it can be operated in any orientation.

The installation and commissioning of the assembly may only be carried out by a qualified electrician. A qualified electrician has the necessary knowledge and skills to ensure that the installation complies with the appropriate safety standards.
It is also important to perform all connection work on the assembly in a de-energized state. Before starting any connection work, all power sources should be switched off and appropriate safety precautions taken to prevent injury or damage.
For more detailed information on the specific operating conditions, I recommend that you read the enclosed instructions. There you should find all necessary information to operate the module safely and properly.

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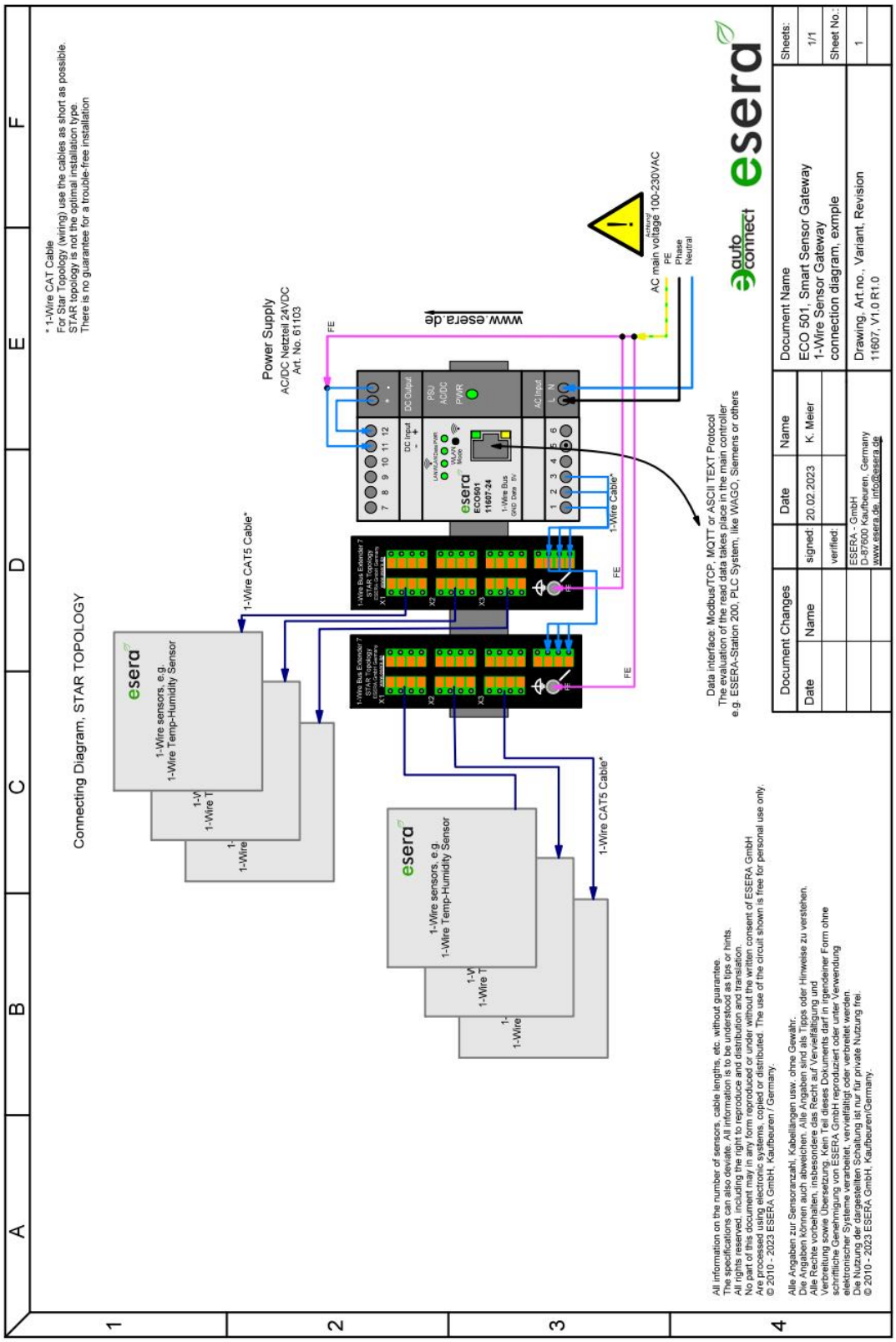
# 16 CONNECTION EXAMPLE

Connection example of the ECO 501 Sensor Gateway with many sensors

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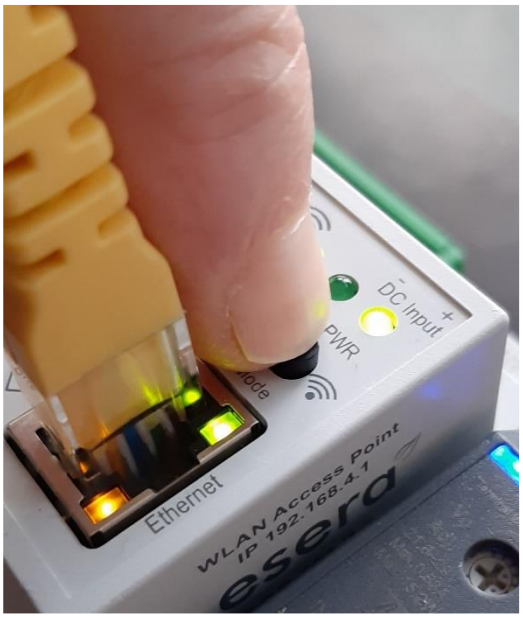
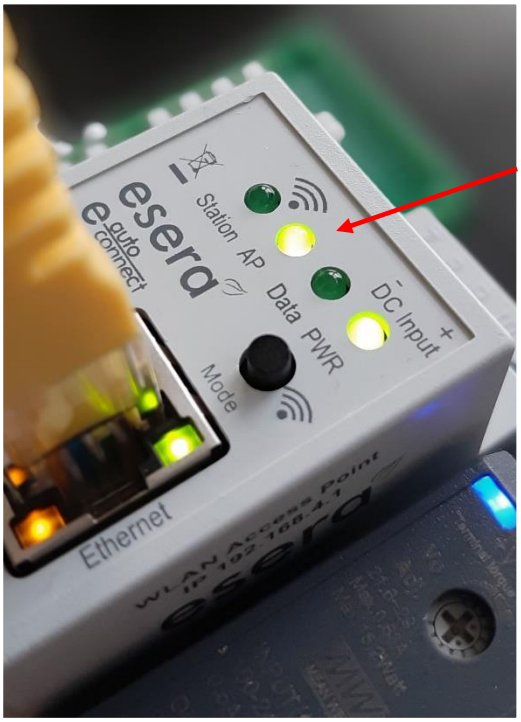
## 17 ACTIVATE ACCESS POINT




Push button to activate the Access Point




Access Point is activated

The ECO gateway with Maxi interface has a connectable WiFi (WLAN) access point. This allows you to access the gateway directly with a mobile device such as a smartphone, tablet or laptop without the need for additional devices such as a separate access point (e.g. a Fritzbox).
By activating the WiFi access point on the ECO gateway, you can establish a wireless connection and access the gateway's functions and settings. This allows you, for example, to configure network settings, monitor sensor data or control connected devices.
To access the gateway via WiFi, make sure that your mobile terminal is connected to the WiFi access point of the gateway. You can then access the gateway via a web browser or special application software and use the desired functions. Please note that you may need to follow the manufacturer's instructions for activating and configuring the WiFi access point on the ECO gateway. These instructions should help you to successfully set up and use access via WiFi.

**NOTE**
You activate the access point by pressing (for 5 seconds) the button on the top.
The access point is active for approx. 30 minutes. After that, it deactivates automatically for security reasons.
You can switch off the access point by pressing it again for at least 5 seconds.

See figure, LED "AP" is on, LED "Station" is off

**NOTE**
To access the web server of the ECO gateway, use the Ethernet interface and the IP address of the device. You can get the exact IP address from the "Ethernet Interface Settings" web page.

**The following steps can help you to determine the IP address of the ECO gateway:**

- Make sure that the ECO Gateway is connected to your network and turned on.
- Open a web browser on a device connected to the same network.
- In the browser's address bar, type the IP address you normally use to access a router's configuration interface. For example, this could be "192.168.0.1" or "192.168.1.1".
- On the web page that is displayed, look for the "Ethernet Interface Settings" section or similar options that contain information about the IP address of the ECO gateway.
- Make a note of the specified IP address of the ECO gateway.

Once you have the IP address of the ECO gateway, you can enter it in the address bar of your browser and access the web server of the gateway. This will give you access to the configuration settings and other functions of the ECO gateway via the web user interface.

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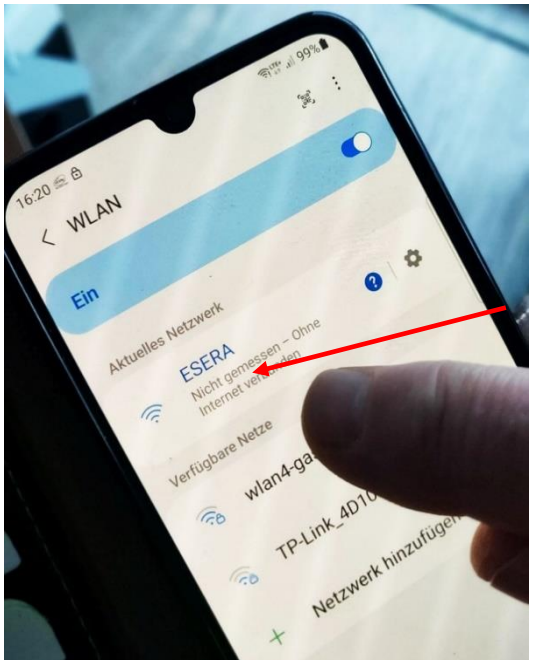
Please note that the exact steps and user interface may vary depending on the model and firmware version of the ECO Gateway.

## 18 SELECT ACCESS POINT

The ECO gateway with Maxi interface reports as WLAN access point with the identification "ESERA". In the delivery state, the Ethernet interface is set to "DHCP".
The access point is open, without access password.

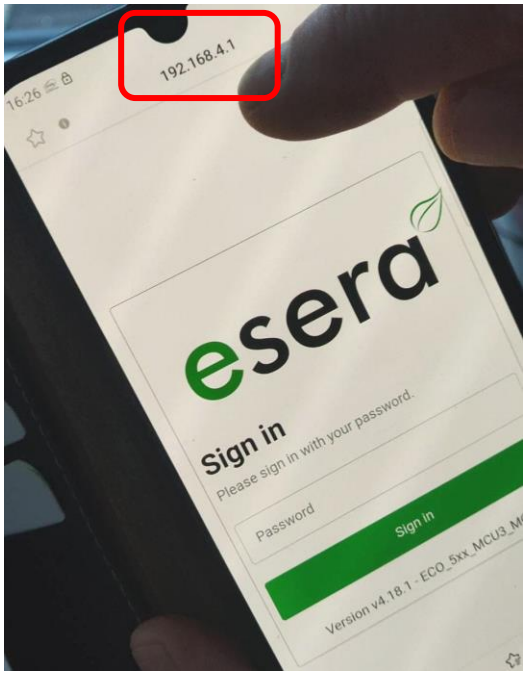



Select "ESERA" Access Point

**NOTE**
The ECO WLAN access point can be found as a WLAN network at the identifier "ESERA".

## 19 CALL WEB SERVER VIA WIFI

If you have connected to the WLAN network "ESERA", the web browser starts directly on many smartphones.
If this is not the case, switch to your web browser (e.g. Firefox, Chrome, etc.) and enter enter the IP address of the ECO Gateway.




Now the web server of the ECO Gateway should be visible, comparable to the following picture.

The configuration of the device is currently only possible via the web server of the ECO Gateway.

**NOTE**
The IP address of the ECO Gateway via Access Point is: **192.168.4.1**

The IP address of the access point is printed on the right side of the gateway housing.

**Important**:
Enter the IP address without "**Fehler! Linkreferenz**

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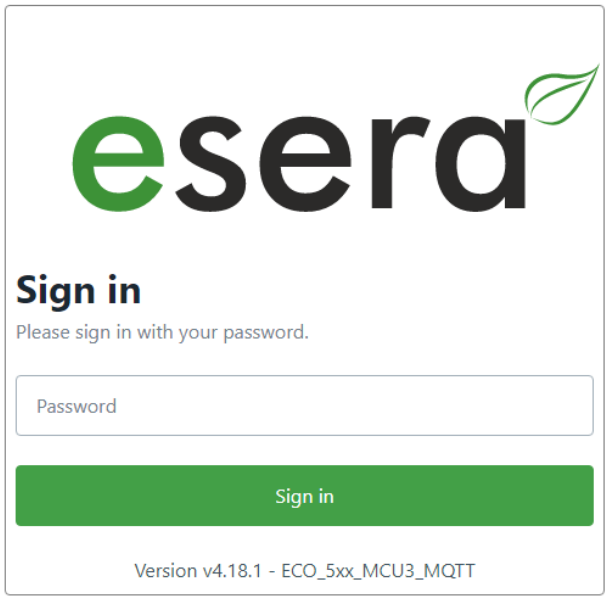
## 20 CALL WEBSERVER VIA LAN

You can also connect the web server of the ECO Gateway at any time via LAN interface using the set Reach IP address.
The IP address of the ECO Gateway is shown on the device display (if the device has a display). If the device does not have a display, you can
also read out the current IP address (not the
IP address of the access point) via your router/DHCP server.

## 21 WEBSERVER, LOG IN




**Password, Log In**
To be able to log in to the web server of the ECO Gateway, use for the first login the
**Startup/default password**: **eserapwd**

For security reasons, the password is not displayed in plain text, but with dots.
After entering the password, click on the "Login" button to open the main menu (hereinafter referred to as the main menu).

Please change the password after the first login, otherwise unauthorized persons can also
make settings on the
ECO Gateway.
Please enter a new and secure password via the main menu/"Change Password".
Advice on how to assign secure passwords can be found on the Internet.

**Software version Ethernet interface/Log Out**
Display of the software version of the Ethernet interface installed on the device. The version of the 1-Wire firmware can be seen via the Config Tool 3.

Click on the "Log Out" button to exit the web interface.

**NOTE**
**The startup/default password for login is: eserapwd**

**IMPORTANT**
**Please change the password after the first login.**

It is a good security practice to change the password after the initial login to ensure the security of the system. After you have successfully logged in, you should change the default password and set a new, strong password.
This will minimize the risk of unauthorized access to the system. Make sure that the new password is sufficiently complex and contains both letters, numbers and special characters. Avoid using passwords that are easy to guess and use a combination of different characters instead.

To get more details about the functions of the web server of the ECO Gateway, we recommend that you consult the document "Interface manual". You can find this document via the website www.esera.de in the download area/technical downloads.

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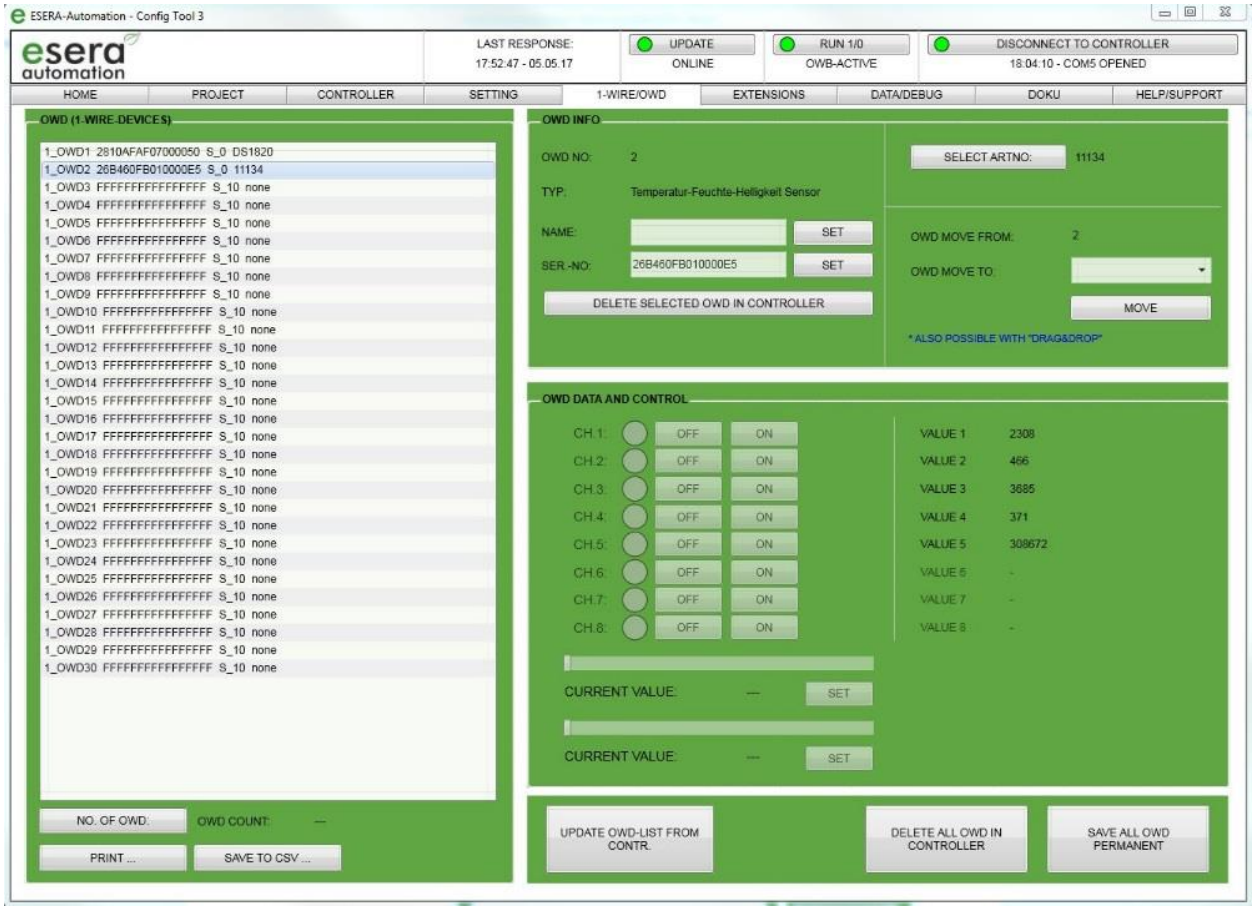
The "Interface Manual" should contain detailed information about the various functions and possibilities of the web server of the ECO gateway. It can help you to optimally configure and use the gateway to meet your requirements.

Please note that the exact procedure for navigating the website and downloading the manual may depend on the specific website structure and layout. If you have difficulty finding the manual, I recommend that you use the website search function or contact esera technical support directly for further assistance.

# 22 DATA INTERFACE, ASCII PROTOCOL

You configure the Ethernet interface with the help of the Windows ESERA program Config Tool 3. You find this program in the download area of the ESERA Onlineshop Tool 3 software.




# 23 ESERA ASCII TEXT PROTOCOL

The ASCII text protocol is a communication protocol used to transfer data between different devices via serial interfaces.
The abbreviation "ASCII" stands for "American Standard Code for Information Interchange" and refers to the standard code used to represent characters, numbers and symbols in digital form.

In the ASCII text protocol, data is transmitted in the form of character strings, with each character coded in its ASCII representation. A character string can represent different types of data, such as measured values, control commands or status messages.

The ASCII text protocol is comparatively simple and easy to implement because it uses the standardized ASCII character set. Data is transmitted in plain text, which facilitates the readability and traceability of the transmitted data.

The ASCII text protocol is used in many applications that require simple and reliable communication. For example, it is used in industrial automation, building automation, measurement technology and control technology.

The ESERA ASCII text protocol, which was developed specifically for the ECO 501 gateway, is based on the ASCII protocol and provides a specific structure and commands for configuring and analyzing the gateway.

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For more details on the configuration and use of the ESERA ASCII text protocol, refer to the corresponding documentation and manuals provided for the ECO 501 gateway.

The ESERA ASCII text protocol has the following properties:

**Standard protocol**
The ESERA ASCII protocol is a common protocol for transferring data via serial interfaces between a computer and other devices such as the ECO gateway and a controller.

**ASCII strings**
Data is transmitted in the ESERA ASCII protocol as ASCII strings. These strings consist of letters, numbers, punctuation marks and control characters.

**Division into fields or segments**
The transmitted data in the ESERA ASCII protocol are normally divided into specific fields or segments. This allows different types of data such as measured values, status messages or commands to be represented.

**Simplicity and ease of implementation**
The ESERA ASCII protocol is based on standardized ASCII characters and allows the transmission of data in plain text. It is relatively simple and easy to implement.

**Readability and comprehensibility**
During the development of the ESERA ASCII text protocol, special emphasis was placed on good readability and comprehensibility. It uses "GET" and "SET" commands that are already familiar to many programmers.
**Disclosed and documented**
The ESERA text protocol is openly documented and the current protocol description can be found in the Programming Manual and ESERA Config Tool 3.

**Standard port**
By default, port 5000 is preset for communication via the ESERA ASCII protocol.

The ESERA ASCII text protocol provides a simple and understandable way to exchange data between the ECO 501 PRO gateway and other devices. It is particularly suitable for applications in measurement and control technology or industrial automation where simple and reliable data transmission is required.

## 24 MODBUS/TCP PROTOCOL

The ECO 501 PRO offers the possibility to communicate simultaneously via several data connections using the Modbus TCP protocol. The preset ports for Modbus TCP data connections are 501, 503, 504, 505 and 506. You can establish up to 10 simultaneous data connections per port, with the total number of data connections limited to 20. The IP address is set to DHCP operation by default, which means that an IP address is automatically assigned to the device.
The Modbus protocol uses a specific addressing to access different data points. In the ECO 501 PRO programming manual, which is available in the download area, you will find an addressing overview which will help you to identify the correct addresses for reading and writing data. You can also use the Config Tool 3 software, which also contains an addressing overview.
It is important to note that the exact use and configuration of the Modbus protocol and the ECO 501 PRO may depend on your specific requirements and the devices you wish to communicate with. It is

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**NOTE**
Up to 3 permanent connections can be established per port of the ECO 501 via the Modbus TCP protocol.
However, it is important to note that the total number of connections is limited to a maximum of 3. This means that you cannot establish more than 3 simultaneous connections in total via the Modbus TCP protocol.

Furthermore, the IP address of the ECO 501 is set to DHCP operation by default. This means that the device is automatically assigned an IP address from a DHCP server in your network. This IP address enables communication with the ECO 501 via the Modbus TCP protocol.

Please note that the exact configuration options, including the number of connections and IP address settings, depend on the version and firmware version of the
ECO 501 can vary.
To get detailed information, I recommend you to consult the mentioned "Interface Manual", which is available on ESERA's website in the download section/technical downloads.

There you should find detailed instructions and information on how to configure the Modbus/RTU protocol, including the number of connections and IP address settings.

Follow the instructions in the manual to configure the ECO 501 according to your requirements and to enable effective communication via the Modbus/RTU protocol.

recommended that you consult the detailed instructions and information in the ECO 501 PRO programming manual and documentation to ensure that you can implement the protocol correctly and achieve the desired functions.

### Addressing Overview.

The complete Modbus addressing overview can be found in the programming manual in the download area of the ECO 501 PRO and within the Config Tool 3 software.

**NOTE**
To learn about the specific configuration options for the Modbus/TCP protocol of the ECO501, we recommend that you consult the "Interface Manual" document. You can find this document via the website www.esera.de in the download area/technical downloads.
The "Interface Manual" should contain detailed information about the configuration options and settings for the Modbus/TCP protocol of the ECO501. It will help you to configure the ECO501 according to your requirements and to use the desired functions.

Please note that the exact steps to navigate the website and download the manual may depend on the specific structure and layout of the website. If you have difficulty finding the manual, I recommend that you use the website's search function or contact esera technical support directly for further assistance.

The interface manual should provide you with comprehensive information to correctly configure the Modbus/TCP protocol of the ECO501. It is important to follow the instructions and information in the manual carefully to ensure that the protocol is used effectively and according to your requirements.

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## Addressing overview

The complete Modbus addressing overview can be found in the programming manual in the download area of the ECO 501 PRO and within the Config Tool 3 software.

**Excerpt Modbus address description**

| Description | Reading address | Word count (16bit) | Data type |
|---|---|---|---|
| Gateway no. | 60000 | 1 | Word |
| Item no. | 60001 | 1 | Word |
| Firmware version | 61000 | 5 | String |
| Hardware version | 61010 | 3 | String |
| Serial number | 61020 | 9 | String |
| Time | 61030 | 4 | String |
| Date | 61035 | 4 | String |
| ... | | | |

| | | | |
|---|---|---|---|
| **1-Wire Bus Sensors and Actuators** | | | |
| **OWD 1, 1-Wire module** | 40100 | 1 | Integer |
| | 40101,40102 | 2 | Dword 1 |
| | 40103,40104 | 2 | Dword 2 |
| | 40105,40106 | 2 | Dword 3 |
| | 40107,40108 | 2 | Dword 4 |
| | 40109,40110 | 2 | Dword 5 |
| | 40111,40112 | 2 | Dword 6 |
| | 40113,40114 | 2 | Dword 7 |
| | 40115,40116 | 2 | Dword 8 |
| | | | |
| **OWD 2, 1-Wire module** | 40200 | 1 | Integer |
| | 40201,40202 | 2 | Dword 1 |
| | 40203,40204 | 2 | Dword 2 |
| | ... | | |

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# 25 MQTT PROTOCOL

MQTT (Message Queuing Telemetry Transport) is a protocol designed for the transmission of messages between devices in a network. It is particularly well suited for environments with poor or intermittent network connectivity, such as NB-IoT* (4G data radio), as it requires very little network bandwidth and resources.

The publish-subscribe architecture of MQTT allows devices to publish messages on specific topics and to be received by other devices interested in these topics. The hierarchy of Topics allows messages to be structured in an organized manner.

A broker acts as an intermediary between devices and handles message forwarding. When a device publishes a message, it sends it to the broker, which forwards it to all subscribers interested in that topic.

MQTT is characterized by its efficiency, as it requires minimal overhead communication. Maintaining the connection between devices is ensured by regular "heartbeat" messages sent to the broker.

It is important to note that a broker is basically required for the operation of the MQTT protocol. The broker is responsible for managing the messaging and enables communication between devices.

For more information on MQTT and its implementation, I recommend the sources mentioned, such as Wikipedia, as well as the documentation and resources of the MQTT libraries or platforms you are using.

**NOTE**
To learn about the specific configuration options for the MQTT protocol of the ECO501 PRO, we recommend that you consult the document "Interface Manual". You can find this document via the website www.esera.de in the download area/technical downloads.

The "Interface Manual" should contain detailed information about the configuration options and settings for the MQTT protocol of the ECO501. It will help you to configure the ECO501 according to your requirements and to use the desired functions.

Please note that the exact steps to navigate the website and download the manual may depend on the specific structure and layout of the website. If you have difficulty finding the manual, I recommend that you use the website's search function or contact esera technical support directly for further assistance.

## In combination with the ECO 501 gateway, MQTT offers the following advantages

**Efficient IoT communication**
The ECO 501 gateway supports MQTT as a communication protocol to exchange data between the gateway and other devices. MQTT is known for its efficiency and low overhead, making it ideal for use in IoT environments with limited bandwidth and resources.

**Connection to MQTT brokers:**
The ECO 501 gateway can act as an MQTT client and connect to an MQTT broker. The MQTT broker serves as an intermediary that forwards the messages between the devices. These brokers can be hosted locally or in the cloud, depending on the requirements of your IoT application.

**Publish-Subscribe-Sample**
MQTT is based on the publish-subscribe pattern, where devices publish messages on specific topics and other devices interested in those topics can subscribe to those messages. This allows you to target data to those devices that need it, improving the efficiency and scalability of communications.

**Flexible configuration**
The ECO 501 gateway allows you to configure MQTT connections, including setting QoS (Quality of Service) levels, as mentioned earlier. You can customize the reliable delivery of messages, depending on the requirements of your application.

**Integration into IoT ecosystems**

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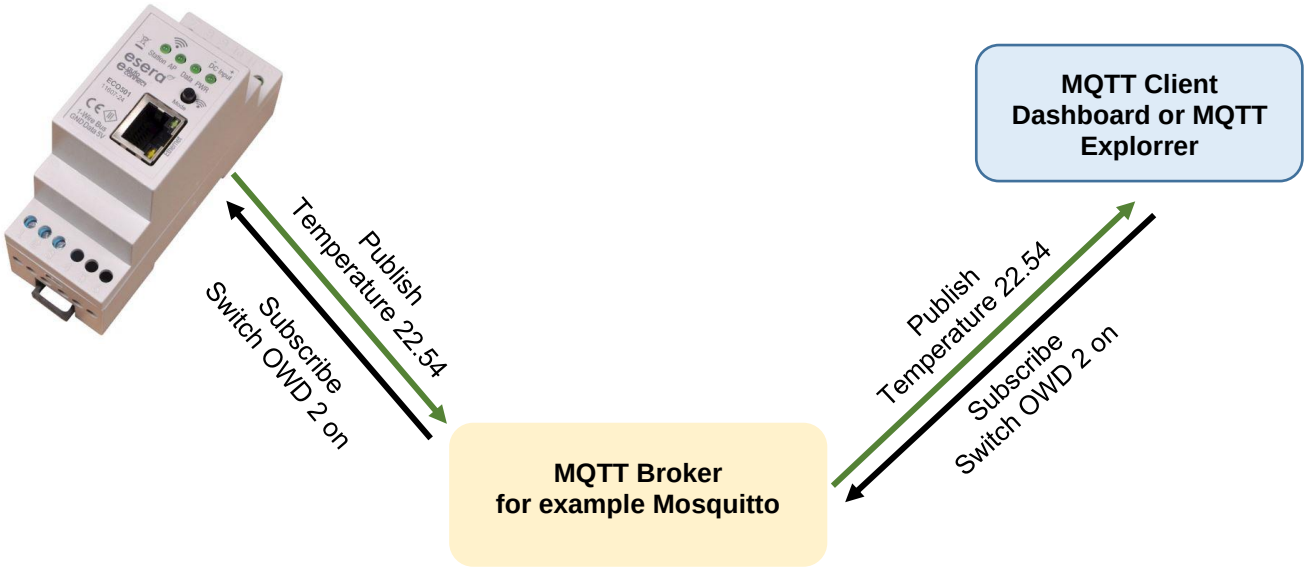
MQTT is a widely used protocol in the IoT world and is supported by many IoT platforms and solutions. The ECO 501 gateway can be seamlessly integrated into existing IoT infrastructures and enables communication with other MQTT-enabled devices and platforms.

In summary, the ECO 501 gateway in combination with MQTT offers an efficient, scalable and flexible way to transfer data in your IoT application. It enables seamless integration into existing IoT infrastructures and opens up the possibility for you to benefit from the advantages of the MQTT protocol to connect your IoT devices and exchange data.




## 26 YOUR PROTOCOL NOT THERE?

The ECO 501 PRO is extremely powerful due to the Maxi data interface used. We can also integrate other interface protocols on request. We would be happy to provide you with a quotation for this. Contact us via technical support, support@esera.de.

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# 27 1-WIRE NETWORK CABLING

The special feature of the 1-Wire system is the "BUS technology". This means that all devices (sensors and actuators) are operated in parallel on a three-wire line, which is used for both power supply and data communication.
The 1-Wire bus system joins the list of other successful bus systems, such as CAN or Modbus RTU. All of the installation principles recommended for these are also applicable and applicable to the 1-Wire bus.
The maximum size of a 1-Wire network is determined by various factors.
All factors in total are summarized and designated as 1-Wire bus load. Each increase in a factor increases the total bus load for the 1-Wire gateway and thus reduces the maximum network size.

After many years of experience and a lot of feedback from customers, we would like to pass on the following conservative recommendation to them:

- Cable distances maximum 50 -120m
- Number of 1-Wire Devices not more than 20 -22 pieces
- As linear a topology as possible without T-junctions
- Number and design of cable connectors (unnecessary connection transitions are to be avoided)
- Do not use "terminal blocks", as they contain too many connectors and are not suitable for the bus system. Optimized for the bus are the distributor modules we offer

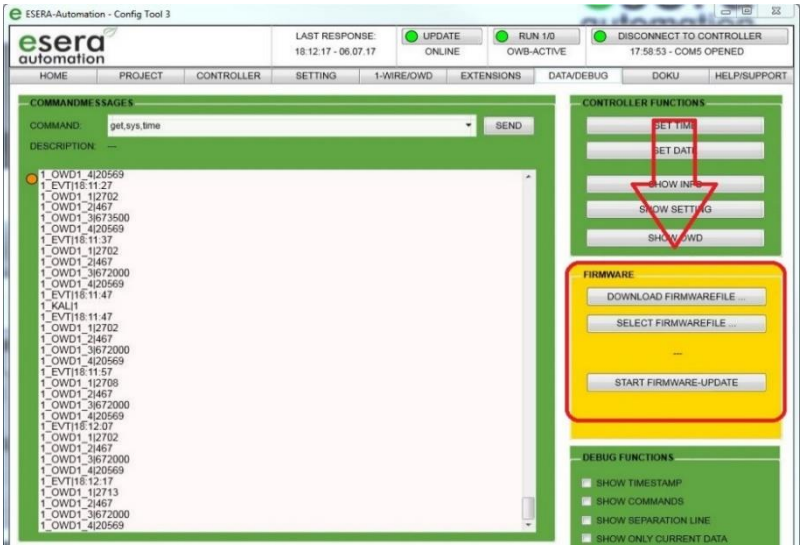
The topology in particular plays a major role. If possible, it should be installed in linear topology. The linear topology can be compared like pearls on a pearl necklace. The data line should be laid from one device to the next without T-joints.

Furthermore, you can also name the type of cable used here.
We recommend using CAT5 or CAT6 network cable for cabling.
It is also possible to use J-Y(St)Y telephone cables and KNX lines.
With CAT5 versus CAT7 cables, longer cable runs are possible.
With twisted-pair cable, a greater connection length can be achieved in an undisturbed environment, since the capacitive bus load is lower. A total length of 50 m and more can be easily achieved without additional measures.
In EMC disturbed, commercial and industrial environments, the cable should always be shielded to increase the "robustness" or interference sensitivity of the system.

**NOTE**
The above statements about 1-Wire are hints and tips and do not describe any product property or represent any guaranteed product property of the ECO 501 PRO.
Information on basic principles and tips on the 1-Wire bus system can also be found in the ESERA Online Shop at https://www.esera.de/1-wire-grundlagen/.

# 28 FIRMWARE UPDATE

The current device software (firmware) can be found in the download area of Config Tool 3.
When commissioning the ECO 501 PRO, please check for a new firmware version. Please always use the latest version.
**The firmware update is performed via the web server.**
**Alternatively, you can also perform a firmware update via Config Tool 3. However, the update via web server is preferred.**
Please refer to the operating instructions for Config Tool 3, which can be found within Config Tool 3 under the "HELP/SUPPORT" tab.

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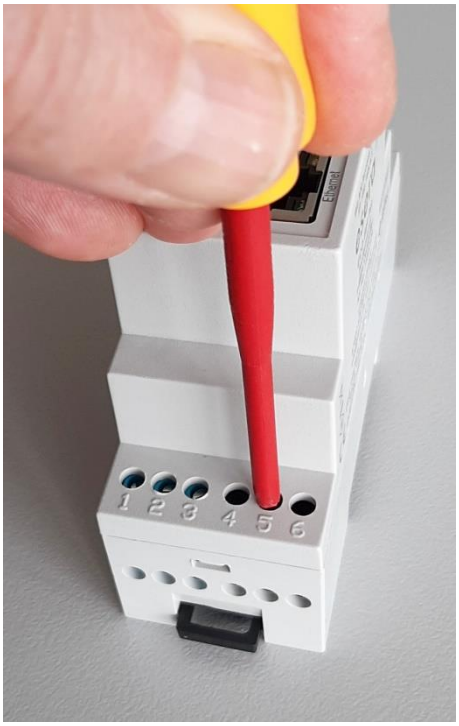
You can find a video about the firmware update on our website under "Service and Support, Support Videos".

**NOTE**
Please also refer to the operating instructions for Config Tool 3, which can be found within Config Tool 3 under the "HELP/SUPPORT" tab.
Furthermore you can find a video about the firmware update on our website under "Service and Support, Support Videos".

## 29 RECOVERY FUNCTION




If the update is faulty, e.g. due to a power failure during the update, you can use the recovery function. To do this, press and hold the reset button (this is located under hole 5 on the top of the module), start the update in ConfigTool 3 and release the reset button after approx. 1 second after starting in ConfigTool -3. Now the update should start.

If you have any problems with the installation, we will be happy to help you. Simply contact our support team by e-mail at support@esera.de.

**NOTE**
After performing a firmware update, we recommend disconnecting the gateway from the power supply for approx. 30 seconds and restarting it.

## 30 RESET BUTTON

The restart or also called RESET is performed via the RESET button of the system. When the button is pressed, the device is restarted. The permanently stored data is retained, but all connections are interrupted.
This keystroke does not correspond to an interruption (also called cold start) of the power supply.

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## 31 EXAMPLES FOR CODESYS / WAGO INTEGRATION

We will be happy to provide you with test software for integrating the ECO 501 PRO into the PLC software Codesys/WAGO. For this purpose, please contact our technical support at support@esera.de.

## 32 EXAMPLES FOR SIEMENS SPS INTEGRATION

Since many years the Modbus TCP protocol is also available in the programming environment of Siemens PLCs. The used Modbus addresses of the ECO 501 PRO were adapted to the requirements of the Siemens programming environment. Therefore, this combination is also possible and has already been implemented by many customers.

## 33 OPERATING CONDITIONS

Operate the device only within the specified voltage limits and under the specified ambient conditions. Avoid operation outside these parameters, as this may lead to malfunctions or damage.

The operating position of the device is arbitrary, which means that it can be operated in various positions. However, make sure that the device is mounted in a stable position and that there is no risk of it falling or being damaged.

The device is intended for use in dry and dust-free rooms. Avoid operation in environments with high humidity or dust accumulation, as this may cause damage or impair functionality.

If condensation forms, wait at least 2 hours to give the device time to acclimatize before turning it on. Switching on the device in a humid environment may cause short circuits or other electrical problems.

The assemblies should only be commissioned under the supervision of a qualified electrician. Qualified electricians are responsible for the proper installation and safe operation of electrical equipment.
Do not operate the module in an environment where flammable gases, vapors or dusts are or may be present. The presence of such substances can lead to explosive situations.

These additional instructions are intended to ensure that the device is operated properly and safely and that potential risks and damage are avoided. Always follow the instructions and contact a qualified electrician if you have any questions or are unsure.

## 34 ASSEMBLY

The mounting position of the device is arbitrary, this means that it can be installed in different positions, depending on the requirements and conditions on site. In this case, no specific specifications or restrictions are given for the orientation or positioning of the device.

The mounting location for the device must be protected from moisture, and the device may only be used in dry indoor areas. It is specifically designed as a fixed device for mounting inside a control cabinet.
A control cabinet provides additional protection against environmental influences such as moisture, dust or mechanical loads.

It is important to ensure that the control cabinet provides the required protection and complies with the applicable regulations and standards. This includes, for example, the degree of protection of the control cabinet according to the IP protection classes and compliance with the relevant electrical safety standards. Correct assembly and installation of the device within the control cabinet should be carried out in compliance with the applicable safety regulations and standards.
This ensures safe and reliable operation of the device and minimizes potential risks associated with moisture and other environmental influences.

## 35 DISPOSAL

Electronic devices must not be disposed of with household waste. According to the directive on waste electrical and electronic equipment, electronic devices must be disposed of at designated local collection points for electronic waste. These collection points are specialized facilities that ensure electronic devices are properly recycled and reused to minimize potential environmental impacts and recover valuable resources.

Please note that the specific collection points and procedures for disposing of electronic devices may vary depending on the region. Therefore, consult local authorities, recycling centers, or

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waste disposal companies to learn the correct procedure for disposing of electronic devices in your area. By properly disposing of electronic devices, you contribute to environmental protection and the sustainable use of resources.

## 36 SAFETY INSTRUCTIONS

When dealing with products that come into contact with electrical voltage, it is very important to observe the applicable VDE regulations. The VDE regulations are standards set by the Association for Electrical, Electronic & Information Technologies (VDE) and are designed to ensure safety when working with electrical systems and devices.

Here are some of the relevant VDE regulations to consider when handling electrical voltage:

**VDE 0100**
This standard defines the general provisions for low-voltage electrical installations, including planning, installation, commissioning, maintenance, and testing.

**VDE 0550/0551**
These standards address the safety of electrical household appliances and similar purposes. They cover requirements for household devices such as hairdryers, irons, coffee machines, etc.

**VDE 0700**
This standard focuses on the safety of electrical devices in commercial, industrial, and similar environments. It includes requirements for electrical machines, tools, and other devices used in these settings.

**VDE 0711**
This standard specifies requirements for the electrical safety of medical devices. It applies to medical equipment used for diagnosing, treating, and monitoring patients.

**VDE 0860**
This standard covers the safety of electronic devices used in office applications, including computers, printers, monitors, etc.

It is important that professionals working with electrical systems and devices are familiar with and follow the relevant VDE regulations to ensure the safety of people and property.

**Basic Safety Rules**
When working on electrical devices, always observe basic safety rules.

- **All connection** or **wiring work must be carried out in a de-energized** state.
  It is a fundamental safety measure that all connection and wiring work on electrical systems and devices should only be done when they are not live. Never work on electrical devices while they are powered.
- Before starting work, check that the device is disconnected by unplugging it or turning off the relevant power supply.
- Be especially cautious when handling high voltages and be aware of potential hazards.
- Always unplug the device or ensure it is de-energized before opening it.
- Components, assemblies, or devices must only be operated if they are safely enclosed. They must be de-energized during installation.
- Tools may only be used on devices, components, or assemblies when it has been ensured that they are disconnected from the power supply and any electrical charges stored in the device have been discharged.
- Power cables or lines connected to the device, component, or assembly must always be inspected for insulation faults or breaks.
- If a fault is found in the supply line, the device must be immediately removed from service until the faulty line is replaced.
- When using components or assemblies, always strictly adhere to the specified electrical values mentioned in the accompanying documentation.

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- If it is unclear which electrical ratings apply to a component or assembly, how external wiring should be carried out, or which external components or accessories may be connected and their connection values, a qualified electrician must be consulted.
- Before commissioning a device, always verify that the device or assembly is suitable for the intended application.
- In case of doubt, always consult experts, professionals, or the manufacturer of the used assemblies.
- We assume no liability for damages resulting from operational or connection errors beyond our control.
- Kits that do not function properly should be returned without the housing and with a detailed description of the error and the corresponding assembly instructions. Repairs cannot be made without an error description. Time-consuming assembly or disassembly of housings will be additionally charged.
- When installing and handling parts that will later carry mains voltage, always observe the relevant VDE regulations.
- Devices operating at voltages greater than 35 VDC/12mA must only be connected and commissioned by qualified electricians.
- Commissioning should only take place if the circuit is installed in an enclosure that prevents accidental contact.
- If measurements must be taken with the housing open, a safety isolating transformer or suitable power supply must be used for safety reasons.
- After installation, a required inspection must be conducted in accordance with DGUV Regulation 3 (formerly known as BGV A3).

  DGUV Regulation 3 is a safety regulation for electrical systems and equipment and defines the requirements for electrical safety.

  The DGUV Regulation 3 inspection includes checking the proper installation, functionality, and safety of the electrical device.

  The inspection should be carried out by a qualified electrician or an authorized inspection service. The purpose of the inspection is to identify potential hazards, detect defects, and take appropriate measures to ensure electrical safety.

  The DGUV Regulation 3 inspection should be repeated at regular intervals to ensure the continuous safety of electrical systems and equipment.

  The DGUV Regulation 3 inspection is legally required in many countries and serves to protect people and property from electrical hazards.

  Also, be aware of additional national and local regulations and standards that may apply in your region.

# 37 WARRANTY

ESERA GmbH warrants that the goods sold are free from material and manufacturing defects at the time of transfer of risk and have the contractually warranted characteristics. The statutory warranty period of two years from the date of invoice shall apply. The warranty does not extend to normal wear and tear. Claims of the customer for damages, e.g. due to non-performance, culpa in contrahendo, breach of secondary contractual obligations, consequential damages, damages in tort and other legal grounds are excluded. ESERA GmbH shall be liable in the absence of a warranted characteristic, in the event of intent or gross negligence. Claims arising from the Product Liability Act are not affected. Should defects occur for which ESERA GmbH is responsible, and if the replacement delivery is also defective in the event that the goods are exchanged, the purchaser shall be entitled to cancel the contract or reduce the purchase price. ESERA GmbH accepts no liability for the constant and uninterrupted availability of ESERA GmbH or for technical or electronic errors in the online offer.
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