4ZeroBox
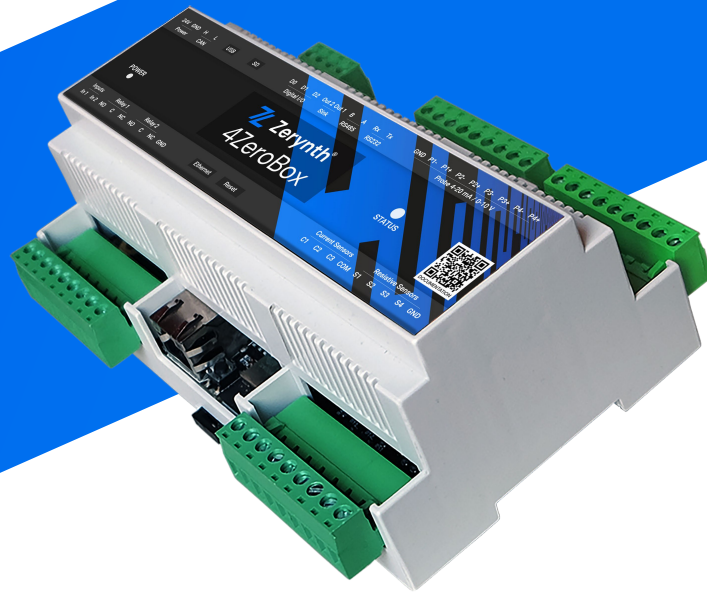
4ZeroBox is a modular hardware electronic unit that simplifies the development of Industrial IoT applications allowing rapid integration with sensors, actuators, and Cloud services.
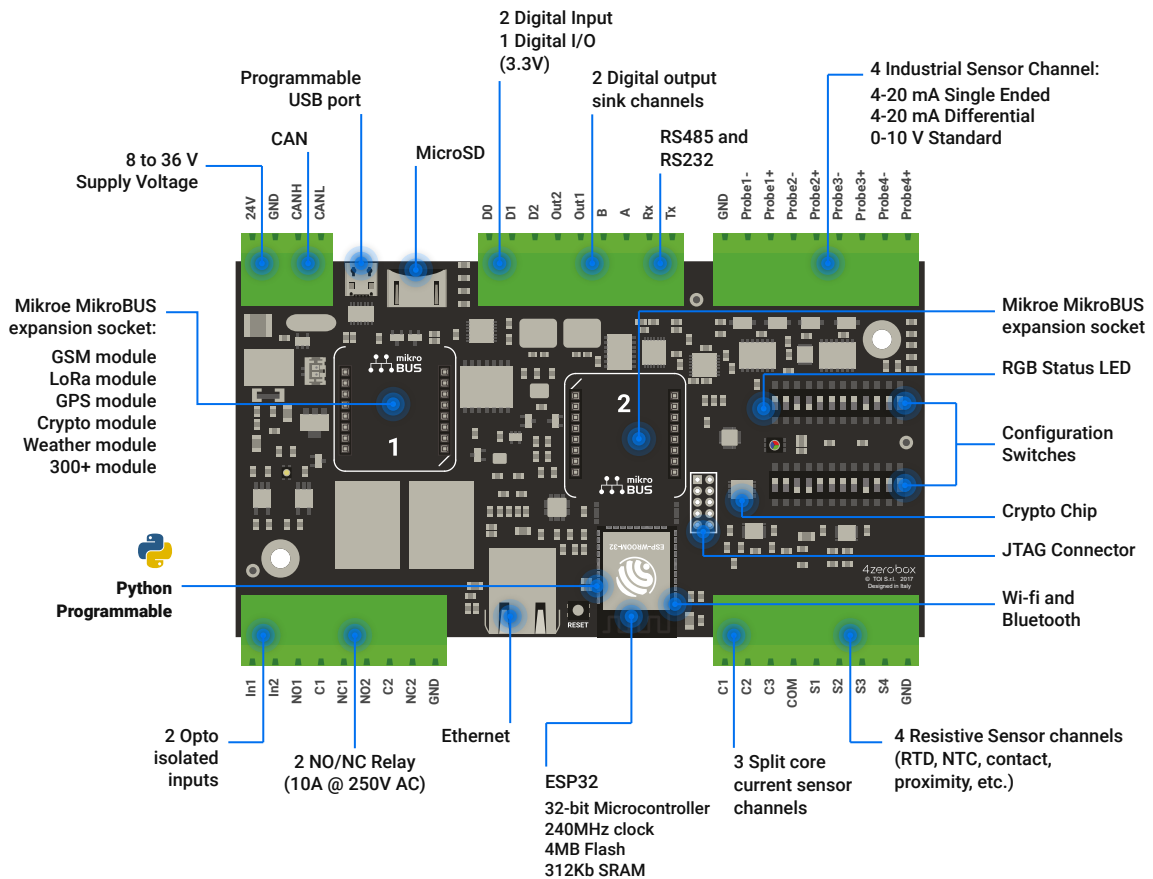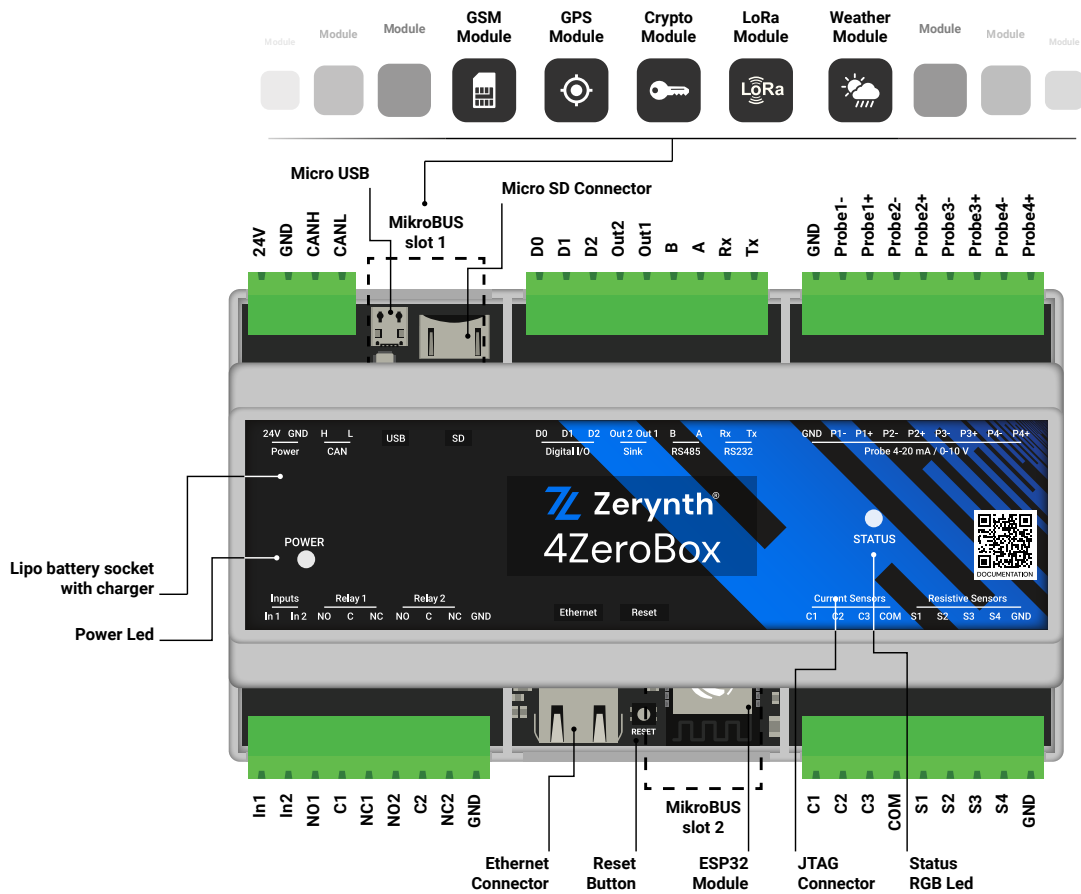
4ZeroBox mounts a powerful ESP32 Microcontroller by Espressif Systems (240MHz, 4Mb Flash, 512KB SRAM) and provides many onboard features like: a DIN-rail mountable case with industrial grade sensor channels, support for Wi-fi, Bluetooth, Ethernet, LoRa, CAN, RS485, RS232, SD Card, JTAG, I2C, SPI; last but not least, there are 2 on-board MikroBUS sockets to extend the 4ZeroBox with hundreds of MikroElektronika click boards (see "MikroBus Slots" section).

4ZeroBox lets the user choose the best installation strategy, adapting it to the specific industrial environment. While allowing to acquire data from the PLC via digital ports - filtering the data onboard to avoid bandwidth overload and waste of cloud resources - it also enable the installation and management of external sensors, for a full Industrial IoT experience.

4ZeroBox is programmable in Python (or hybrid C/Python) thanks to the Zerynth software.

TECHNICAL SPECIFICATIONS

Maximum expandability with **hundreds of Click Boards** available

| Module | Module | Module | GSM Module | GPS Module | Crypto Module | LoRa Module | Weather Module | Module | Module | Module |

Micro USB

Micro SD Connector

MikroBUS slot 1

24V GND CANH CANL   D0 D1 D2 Out2 Out1 B A Rx Tx   GND Probe1- Probe1+ Probe2- Probe2+ Probe3- Probe3+ Probe4- Probe4+

Lipo battery socket with charger

Power Led

24V GND H L USB SD   D0 D1 D2 Out 2 Out 1 B A Rx Tx   GND P1- P1+ P2- P2+ P3- P3+ P4- P4+
Power CAN   Digital I/O   Sink   RS485 RS232   Probe 4-20 mA / 0-10 V

Zerynth
4ZeroBox

STATUS

DOCUMENTATION

Inputs   Relay 1   Relay 2   Ethernet   Reset   Current Sensors   Resistive Sensors
In 1 In 2   NO C NC   NO C NC GND   C1 C2 C3 COM   S1 S2 S3 S4 GND

POWER

In1 In2 NO1 C1 NC1 NO2 C2 NC2 GND   C1 C2 C3 COM S1 S2 S3 S4 GND

MikroBUS slot 2

Ethernet Connector **Reset Button** **ESP32 Module** **JTAG Connector** **Status RGB Led**

**2 Digital Input
1 Digital I/O
(3.3V)**

Programmable USB port

2 Digital output sink channels

CAN

MicroSD

RS485 and RS232

4 Industrial Sensor Channel:
4-20 mA Single Ended
4-20 mA Differential
0-10 V Standard

8 to 36 V Supply Voltage

24V GND CANH CANL   D0 D1 D2 Out2 Out1 B A Rx Tx   GND Probe1- Probe1+ Probe2- Probe2+ Probe3- Probe3+ Probe4- Probe4+

Mikroe MikroBUS expansion socket:

GSM module
LoRa module
GPS module
Crypto module
Weather module
300+ module

1

2

mikroBUS

mikroBUS

ESP-WROOM-32

RESET

Mikroe MikroBUS expansion socket

RGB Status LED

Configuration Switches

Crypto Chip

JTAG Connector

Wi-fi and Bluetooth

Python Programmable

In1 In2 NO1 C1 NC1 NO2 C2 NC2 GND   C1 C2 C3 COM S1 S2 S3 S4 GND

2 Opto isolated inputs

**2 NO/NC Relay
(10A @ 250V AC)**

Ethernet

ESP32
**32-bit Microcontroller
240MHz clock
4MB Flash
312Kb SRAM**

3 Split core current sensor channels

**4 Resistive Sensor channels
(RTD, NTC, contact, proximity, etc.)**

Zerynth

Zerynth is a platform designed to simplify and accelerate the development of IoT applications. Zerynth offers developers, system integrators, and businesses a way to enable IoT for their products, rapidly.

Zerynth Programming Suite

Zerynth® (www.zerynth.com) is the official programming framework for the 4ZeroBox. Zerynth allows programming the 4ZeroBox applications in Python (or hybrid C/Python). Zerynth includes a compiler, a debugger, and an editor, alongside tutorials and example projects for an easy learning experience. The 4ZeroBox includes a Zerynth® OS License, thus it is programmable in Zerynth for free and without limitations. Zerynth® and all the required libraries can be installed on Windows, Linux and MAC using the Zerynth Installer (https://www.zerynth.com/zsdk/).

Zerynth Device Manager

Zerynth Device Manager (ZDM) is a cloud based device and data management service that makes it easy to securely register, organize, monitor, and remotely manage IoT devices at scale. The 4ZeroBox can be easily connected to the ZDM enabling:

- Devices onboarding and provisioning with gold-standard security practices;
- Devices lifecycle control with remote procedure call and over the air updates (FOTA);
- Data storage, aggregation and analysis;
- Events and alarms management;
- Easy integration with third-party services, clouds and dashboards.

Setup

Following the Official Documentation(https://docs.zerynth.com/latest/zerynth-hardware/4ZeroBox/), the user can configure the 4ZeroBox hardware features and all the required credentials, parameters, and libraries needed for programming the 4ZeroBox and connecting it to the Zerynth Device Manager.

Important note: The 4ZeroBox has a USB connection that requires specific drivers. If the 4ZeroBox is not automatically recognized by Zerynth Studio please follow the steps in the official documentation:
(https://docs.zerynth.com/latest/reference/libs/zerynth/4zerobox/docs/getting-started/).

Note: Software distributed by Zerynth® with or without the Zerynth® brand (including, but not limited to Zerynth® Device Manager and Zerynth® ecosystem) is not covered by the 4ZeroBox hardware warranty. Please refer to the licensing agreement accompanying the software for details

INSTALLATION OPTIONS

4ZeroBox

Zerynth Device Manager

PLC mode
Acquisition of digital data from PLC via digital ports and protocols like Siemens S7, OPC UA, Ethernet/IP, Rockwell, etc.

RETROFITTING mode
Data Acquisition in parallel to the PLC using the equipped sensors or installing new ones

HYBRID mode
The two options merged to get the best from your machines

CLOUD or ON PREMISES
Hosted on TOI Cloud or 3rd party services (Microsoft Azure, Amazon Web Services, Google Cloud, IBM Cloud) or installed on premises (your IT infrastructure)

BI INTEGRATION
Integrated with your Business Intelligence tools and ERP/MES systems

OTA DEVICE SOFTWARE UPDATE
It allows device management and over-the-air (OTA) updates

More info about the installation options and the use of 4ZeroBox:

www.zerynth.com/4zerobox