

# Moduino<sup>+</sup> series

## Energy-efficient **ESP32-based** Industrial Automation Controller

**Moduino** is a lightweight, but powerful energy-efficient and fully capable automation controller series - an industrial computer for remote data control and management, equipped with latest **ESP32** compute module, wide range of serial, digital and analog inputs/outputs and wireless communication interfaces.

This cost effective solution is perfect for end-point devices. Moduino is powered by **ultra-low power Dual-Core Tensilica LX6 240 MHz** processor with **8MB pSRAM** and up to **16MB SPI\* flash** memory on-board. Integrated Wi-Fi/BLE modem and extra wireline/wireless interfaces make the Moduino micro-computer a versatile addition to Industrial IoT solutions offered by TECHBASE company.

**Moduino** devices can easily work remotely with existing **ModBerry gateway** for data accumulation and monitoring, to perform specific actions before sending the data to cloud services. The Moduino-ModBerry installation can work as standalone Ecosystem (for example via MQTT), providing fog-computing to any installation.

\* 4MB / 8MB / 16MB Flash options available

## END-POINT SENSORS

The Moduino device is a comprehensive end-point controller for variety of sensors located throughout any installation. It fully supports temperature and humidity sensors and new ones are currently developed, e.g. accelerometer, gyroscope, magnetometer, etc.

## SOFTWARE & OS

Use of **ESP32-WROVER** compute module adds the support for **real-time operating systems** (compared to most Raspberry Pi based Linux and Windows OS versions), and openness of the Espressif's platform to Moduino industrial automation controller. Thanks to **enormous community of ESP32 and Arduino users and developers**, the Moduino can now adapt existing software solutions, tools and programming environments, for example:

- / **MicroPython**
- / **Arduino (C++)**
- / **ESP-IDF** (Espressif IoT Development Framework)
- / **Zephyr Project** (scalable RTOS)
- / **Mongoose OS**
- / etc.

UNLEASH THE **TRUE POTENTIAL**  
OF **INDUSTRIAL IoT**



INDUSTRIAL  
IoTReady



## Moduino<sup>+</sup> series FEATURES



### ESP32 MODULE

Energy-efficient compute module with real-time OS support incl. Zephyr Project, MicroPython, Arduino, etc.



### BATTERY POWERED

**Moduino X0** can be battery powered, making it perfect for remote installations and scattered objects monitoring



### WIRELESS COMMUNICATION

Optional SMA antenna connectors allows the **Moduino** device to increase the effective range of Wi-Fi / Bluetooth module and additional communication interfaces, e.g. LoRa, Sigfox, NarrowBand-IoT & more



### END-POINT SENSORS

Full support of temperature, humidity, pressure, accelerometer & light sensors with new ones in development, e.g. gyroscope, magnetometer, etc.



### SMALL SIZE

Dimensions of the device allows the use in limited space and difficult industrial environments

## WIRELESS COMMUNICATION

LoRa  
Sigfox  
GPRS/GPRS + GPS  
LTE/LTE+GPS  
LTE-NarrowBand-IoT  
WMBus 169/868MHz  
Z-Wave READY  
ZigBee

Wi-Fi  
Bluetooth

## I/O EXTENSIONS

CAN  
mBus 10  
ExCARD RS-232/485  
ExCARD 8xDIO  
ExCARD 8x AI  
ExCARD 4xAI-PRO 24bit  
ExCARD 12/8/4xAO  
ExCARD 4xAO-PRO 16bit  
ExCARD 4x Relay  
ExCARD 1x Ethernet  
DIO opto-isolation  
Accelerometer

## BATTERY

Battery Ready  
Battery up to 3 years  
UPS Supercap 1-15 min  
UPS Li-Po 1-2 days

## SCREEN

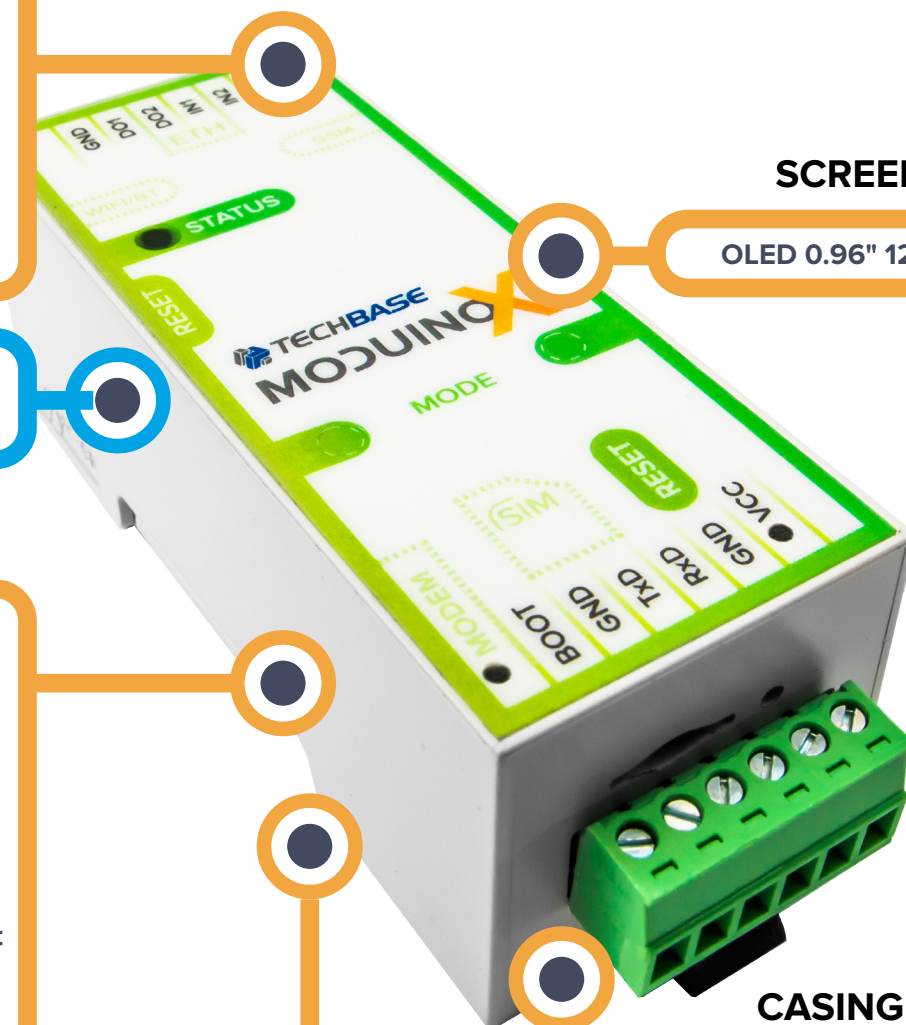
OLED 0.96" 128x64

## CASING

ABS  
ALUMINUM  
IP65-IP67 SEALED

 BUILT-IN

 OPTIONAL



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ver. 2009291150



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# SPECIFICATION



## COST-EFFECTIVE & WIRELESS INDUSTRIAL IoT



BATTERY POWERED

### Moduino X0

### Moduino X1

### Moduino X2

|                    |                                                                                                          |                                                                                            |                                                                                                                                 |
|--------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Chipset:           | ESP32-WROVER                                                                                             |                                                                                            |                                                                                                                                 |
| Processor:         | Dual-Core Tensilica LX6 240 MHz, RTC                                                                     |                                                                                            |                                                                                                                                 |
| RAM:               | 8 MB pSRAM                                                                                               |                                                                                            |                                                                                                                                 |
| Flash:             | 4 / 8 / 16 MB SPI                                                                                        |                                                                                            |                                                                                                                                 |
| SD card:           | -                                                                                                        | -                                                                                          | + microSD slot (optional)                                                                                                       |
| RS-232/485:        | T1<br>+ 1x RS-232/485 (optional)                                                                         | T1<br>1x RS-232/485                                                                        | T1<br>+ 1x RS-232/485 (default)<br>+ 2x RS-232/485 (optional)                                                                   |
| Inputs:            | T2<br>2x DI (surge protection: 30VDC)<br>or 2x AI (0 ~ 10VDC)                                            | T2<br>2x DI (surge protection: 30VDC)<br>or 2x AI (0 ~ 10VDC)                              | T2<br>2x DI (surge protection: 30VDC)<br>or 2x AI (0 ~ 10VDC)                                                                   |
| Outputs:           | T3<br>2x DO Open Collector (surge protection: 30VDC)<br>max. Current 500mA, peak min. 600W               | T3<br>2x DO Open Collector (surge protection: 30VDC)<br>max. Current 500mA, peak min. 600W | T3<br>+ 2x DI (surge protection: 30VDC)<br>2x DO Open Collector (surge protection: 30VDC)<br>max. Current 500mA, peak min. 600W |
| Ethernet:          | 1x Ethernet 10/100 Mbps (optional)                                                                       | 1x Ethernet 10/100 Mbps (optional)                                                         | 1x Ethernet 10/100 Mbps (optional)                                                                                              |
| CAN:               | -                                                                                                        | -                                                                                          | + 1x CAN (optional)                                                                                                             |
| USB:               | -                                                                                                        | -                                                                                          | + 1x microUSB 2.0                                                                                                               |
| Wi-Fi:             | 802.11b/g/n 16mbps                                                                                       |                                                                                            |                                                                                                                                 |
| Bluetooth:         | Bluetooth v4.2 BR/EDR and Bluetooth Low Energy (BLE)                                                     |                                                                                            |                                                                                                                                 |
| WMBus (optional):  | Wireless M-Bus 868 MHz and 169MHz band                                                                   |                                                                                            |                                                                                                                                 |
| LoRa (optional):   | Semtech LoRa transceiver SX1272, LoRaWAN stack, Class A and C devices                                    |                                                                                            |                                                                                                                                 |
| Sigfox (optional): | TI CC1125NarrowbandTransceiver, Class 0 devices, Sigfox pre-certified (January 2017)                     |                                                                                            |                                                                                                                                 |
| LTE (optional):    | Narrowband LTE UE categories M1/NB1, 34 bands supported from 699Mhz to 2690Mhz (Total worldwide support) |                                                                                            |                                                                                                                                 |
| ZigBee (optional): | Compatible with IEEE 802.15.4, ZigBee 2007 / PRO                                                         |                                                                                            |                                                                                                                                 |
| Ext. antenna:      | SMA female antenna connectors (optional)                                                                 |                                                                                            |                                                                                                                                 |
| Ext. modules:      | max. 1x ExCard module (optional)                                                                         | max. 1x ExCard module (optional)                                                           | + max. 3x ExCard module (optional)                                                                                              |
| Battery:           | + Battery power support (optional)                                                                       | UPS (LiPo or Supercapacitor) (optional)                                                    | UPS (LiPo or Supercapacitor) (optional)                                                                                         |
| Display:           | OLED 0.96" 128x64 (optional)                                                                             |                                                                                            |                                                                                                                                 |
| Power supply:      | 6~30 V DC (depending on configuration)                                                                   |                                                                                            |                                                                                                                                 |
| Casing:            | ABS (default) or Aluminum (optional), DIN rail mount                                                     |                                                                                            |                                                                                                                                 |
| Working cond.:     | -40 ~ 70°C, humidity 5 ~ 95% RH (no condensation)                                                        |                                                                                            |                                                                                                                                 |
| Dimensions:        | ABS (2M): 90 x 36 x 32 mm (LxWxH)<br>Aluminum: 95 x 37 x 41 mm (LxWxH)                                   | ABS (2M): 90 x 36 x 32 mm (LxWxH)<br>Aluminum: 95 x 37 x 41 mm (LxWxH)                     | ABS (4M): 90 x 71 x 32 mm (LxWxH)<br>Aluminum: 95 x 73 x 41 mm (LxWxH)                                                          |



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# SPECIFICATION



## COST-EFFECTIVE & WIRELESS INDUSTRIAL IoT



### Moduino X3

### Moduino X4

### Moduino X7

|                    |                                                                                                                                                                                    |                                                                                                                            |                                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chipset:           | ESP32-WROVER                                                                                                                                                                       |                                                                                                                            |                                                                                                                                                      |
| Processor:         | Dual-Core Tensilica LX6 240 MHz, RTC                                                                                                                                               |                                                                                                                            |                                                                                                                                                      |
| RAM:               | 8 MB pSRAM                                                                                                                                                                         |                                                                                                                            |                                                                                                                                                      |
| Flash:             | 4 / 8 / 16 MB SPI                                                                                                                                                                  |                                                                                                                            |                                                                                                                                                      |
| SD card:           | + microSD slot (optional)                                                                                                                                                          |                                                                                                                            |                                                                                                                                                      |
| RS-232/485:        | T1 1x RS-232/485                                                                                                                                                                   | T1 + 1x RS-232<br>+ 1x RS-485                                                                                              | T1 + 1x RS-232<br>+ 1x RS-232/485 (optional)                                                                                                         |
| Inputs:            | T2 2x DI (surge protection: 30VDC)<br>or 2x AI (0 ~ 10VDC)                                                                                                                         | T2 2x AI (0 ~ 10VDC)                                                                                                       | T2 + 4x AI (0 ~ 10VDC, 0-20mA, 18-bit)                                                                                                               |
| Outputs:           | T3 + 2x DIO OPTO or 2x Relay (optional)<br>T2 2x DO Open Collector (surge protection: 30VDC)<br>max. 500mA, peak min. 600W<br>T3 2x DO, typical max current 50mA<br>or 2x AO 10bit | T3 + 3x DI, 2x AI (0 ~ 10VDC)<br>T2 3x DO Open Collector (surge protection: 30VDC)<br>+ max. 500mA, peak min. 600W<br>T3 - | T3 + 2x DI/AI (0 ~ 10VDC) + 3x DI/AI (optional)<br>T2 + 3x DO Open Collector + 2x DO (optional)<br>(s.p.: 30VDC), max. 500mA, peak min. 600W<br>T3 - |
| Ethernet:          | 1x Ethernet 10/100 Mbps (optional)                                                                                                                                                 | 1x Ethernet 10/100 Mbps (optional)                                                                                         | 1x Ethernet 10/100 Mbps (optional)                                                                                                                   |
| CAN:               | -                                                                                                                                                                                  | -                                                                                                                          | -                                                                                                                                                    |
| USB:               | -                                                                                                                                                                                  | -                                                                                                                          | -                                                                                                                                                    |
| Wi-Fi:             | 802.11b/g/n 16mbps                                                                                                                                                                 |                                                                                                                            |                                                                                                                                                      |
| Bluetooth:         | Bluetooth v4.2 BR/EDR and Bluetooth Low Energy (BLE)                                                                                                                               |                                                                                                                            |                                                                                                                                                      |
| WMBus (optional):  | Wireless M-Bus 868 MHz and 169MHz band                                                                                                                                             |                                                                                                                            |                                                                                                                                                      |
| LoRa (optional):   | Semtech LoRa transceiver SX1272, LoRaWAN stack, Class A and C devices                                                                                                              |                                                                                                                            |                                                                                                                                                      |
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| LTE (optional):    | Narrowband LTE UE categories M1/NB1, 34 bands supported from 699Mhz to 2690Mhz (Total worldwide support)                                                                           |                                                                                                                            |                                                                                                                                                      |
| ZigBee (optional): | Compatible with IEEE 802.15.4, ZigBee 2007 / PRO                                                                                                                                   |                                                                                                                            |                                                                                                                                                      |
| Ext. antenna:      | SMA female antenna connectors (optional)                                                                                                                                           |                                                                                                                            |                                                                                                                                                      |
| Ext. modules:      | + max. 2x ExCard module (optional)                                                                                                                                                 | + max. 2x ExCard module (optional)                                                                                         | + max. 3x ExCard module (optional)                                                                                                                   |
| Battery:           | UPS (LiPo or Supercapacitor) (optional)                                                                                                                                            | UPS (LiPo or Supercapacitor) (optional)                                                                                    | + Battery power support (optional)                                                                                                                   |
| Display:           | OLED 0.96" 128x64 (optional)                                                                                                                                                       |                                                                                                                            |                                                                                                                                                      |
| Power supply:      | 6~30 V DC (depending on configuration)                                                                                                                                             |                                                                                                                            |                                                                                                                                                      |
| Casing:            | ABS (default) or Aluminum (optional), DIN rail mount                                                                                                                               |                                                                                                                            |                                                                                                                                                      |
| Working cond.:     | -40 ~ 70°C, humidity 5 ~ 95% RH (no condensation)                                                                                                                                  |                                                                                                                            |                                                                                                                                                      |
| Dimensions:        | ABS (4M): 90 x 71 x 32 mm (LxWxH)<br>Aluminum: 95 x 73 x 41 mm (LxWxH)                                                                                                             | ABS (4M): 90 x 71 x 32 mm (LxWxH)<br>Aluminum: 95 x 73 x 41 mm (LxWxH)                                                     | ABS (4M): 106 x 71 x 32 mm (LxWxH)<br>Aluminum: 110 x 73 x 41 mm (LxWxH)                                                                             |



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