

# Moduino <sup>series</sup>

## 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.



## Moduino <sup>series</sup> 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

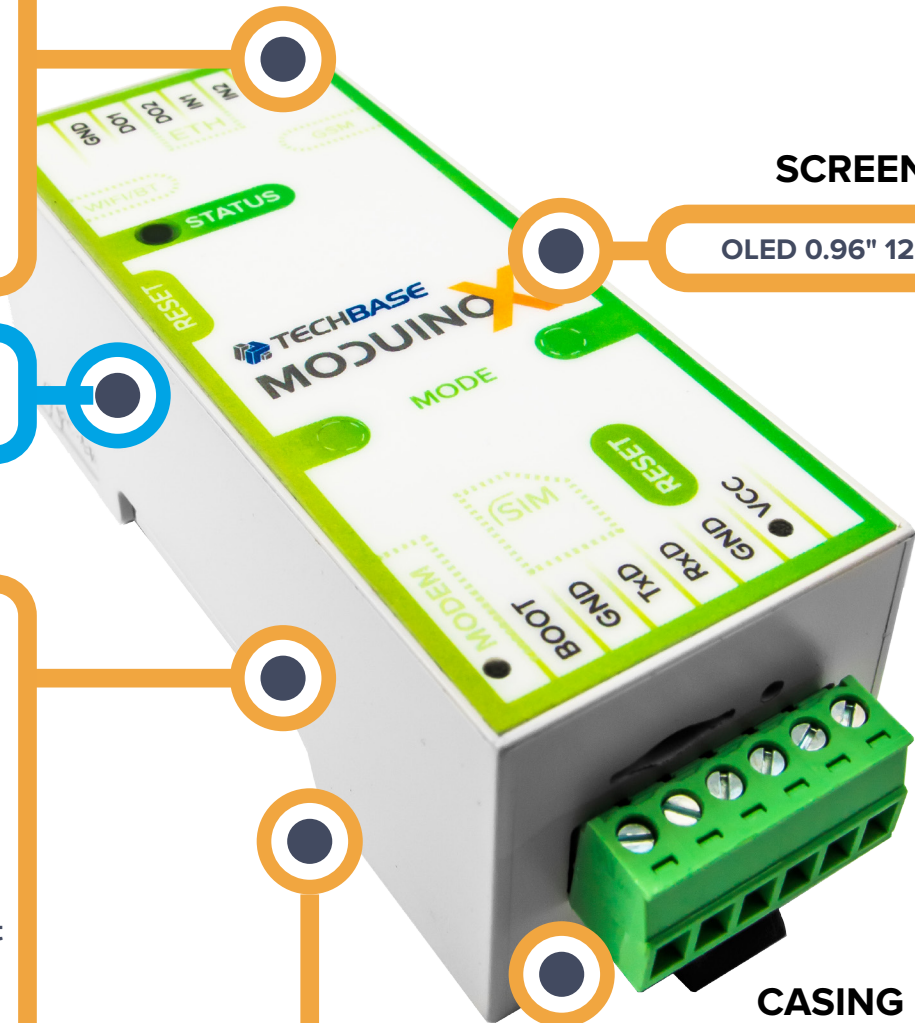
OLED 0.96" 128x64

## CASING

ABS  
ALUMINUM  
IP65-IP67 SEALED

 BUILT-IN

 OPTIONAL



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# SPECIFICATION



## COST-EFFECTIVE & WIRELESS INDUSTRIAL IoT



BATTERY POWERED

### Moduino X0

### Moduino X1

### Moduino X2

Chipset:	ESP32-WROVER		ESP32-WROVER		ESP32-WROVER	
Processor:	Dual-Core Tensilica LX6 240 MHz, RTC		Dual-Core Tensilica LX6 240 MHz, RTC		Dual-Core Tensilica LX6 240 MHz, RTC	
RAM:	8 MB pSRAM		8 MB pSRAM		8 MB pSRAM	
Flash:	4 / 8 / 16 MB SPI		4 / 8 / 16 MB SPI		4 / 8 / 16 MB SPI	
SD card:	-		-		+ microSD slot (optional)	
RS-232/485:	T1	1x RS-232/485	T1	1x RS-232/485	T1	1x RS-232/485 (default)
		+ 2x RS-232/485 (optional)				+ 2x RS-232/485 (optional)
Inputs:	T2	2x DI (surge protection: 30VDC) or 2x AI (0 ~ 10VDC)	T2	2x DI (surge protection: 30VDC) or 2x AI (0 ~ 10VDC)	T2	2x DI (surge protection: 30VDC) or 2x AI (0 ~ 10VDC)
	T3	-	T3	-	T3	+ 2x DI (surge protection: 30VDC)
Outputs:	T2	2x DO Open Collector (surge protection: 30VDC) max. Current 500mA, peak min. 600W	T2	2x DO Open Collector (surge protection: 30VDC) max. Current 500mA, peak min. 600W	T2	2x DO Open Collector (surge protection: 30VDC) max. Current 500mA, peak min. 600W
	T3	-	T3	-	T3	+ 2x DO, typical max current 50mA or 2x AO 10bit
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) Aluminum: 95 x 37 x 41 mm (LxWxH)		ABS (2M): 90 x 36 x 32 mm (LxWxH) Aluminum: 95 x 37 x 41 mm (LxWxH)		ABS (4M): 90 x 71 x 32 mm (LxWxH) Aluminum: 95 x 73 x 41 mm (LxWxH)	



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ver. 2009291150



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# SPECIFICATION



## COST-EFFECTIVE & WIRELESS INDUSTRIAL IoT



### Moduino X3

### Moduino X4

### Moduino X7

Chipset:	ESP32-WROVER		ESP32-WROVER		ESP32-WROVER	
Processor:	Dual-Core Tensilica LX6 240 MHz, RTC		Dual-Core Tensilica LX6 240 MHz, RTC		Dual-Core Tensilica LX6 240 MHz, RTC	
RAM:	8 MB pSRAM		8 MB pSRAM		8 MB pSRAM	
Flash:	4 / 8 / 16 MB SPI		4 / 8 / 16 MB SPI		4 / 8 / 16 MB SPI	
SD card:	+ microSD slot (optional)		microSD slot (optional)		microSD slot (optional)	
RS-232/485:	T1	1x RS-232/485	T1	1x RS-232 + 1x RS-485	T1	1x RS-232 + 1x RS-232/485 (optional)
Inputs:	T2	2x DI (surge protection: 30VDC) 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)	T3	+ 3x DI, 2x AI (0 ~ 10VDC)	T3	+ 2x DI/AI (0 ~ 10VDC) + 3x DI/AI (optional)
	T2	2x DO Open Collector (surge protection: 30VDC) max. 500mA, peak min. 600W	T2	3x DO Open Collector (surge protection: 30VDC) + max. 500mA, peak min. 600W	T2	+ 3x DO Open Collector + 2x DO (optional) (s.p.: 30VDC), max. 500mA, peak min. 600W
	T3	2x DO, typical max current 50mA or 2x AO 10bit	T3	-	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) Aluminum: 95 x 73 x 41 mm (LxWxH)		ABS (4M): 90 x 71 x 32 mm (LxWxH) Aluminum: 95 x 73 x 41 mm (LxWxH)		ABS (4M): 106 x 71 x 32 mm (LxWxH) Aluminum: 110 x 73 x 41 mm (LxWxH)	



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