V7/21

WS1102 Programmable Wireless RS232/422/485 Controller

The WS1102 is a compact Tibbo BASIC/C-programmable **wireless** controller equipped with an RS232/422/485 serial port. The product targets serial-over-IP (SoI) and serial control applications.

This cloud-native device incorporates Wi-Fi (802.11a/b/g/n over 2.4GHz/5GHz) and Bluetooth Low Energy (BLE) interfaces that introduce several new features, such as Wi-Fi auto-connects, wireless debugging, over-the-air (OTA) updates, and Transport Layer Security (TLS) support. As a vendor-agnostic product, it can communicate with Microsoft Azure, Google Cloud, Amazon Web Services (AWS), and virtually any other cloud services provider.

There are eight LEDs on the device's front: green and red main status LEDs, a yellow access point association (link) LED, and five blue LEDs, which can be used for Wi-Fi signal strength indication or other purposes. A buzzer is provided as well.

Each WS1102 is supplied with a DIN rail and wall mounting plates.

The WS1102 comes preloaded with a full-featured Serial-over-IP (SoI) application that turns the WS1102 into a powerful serial-over-IP (SoI) device (a.k.a. a "device server"). A versatile Modbus Gateway application is also available.

Serial port

Power jack & MD button

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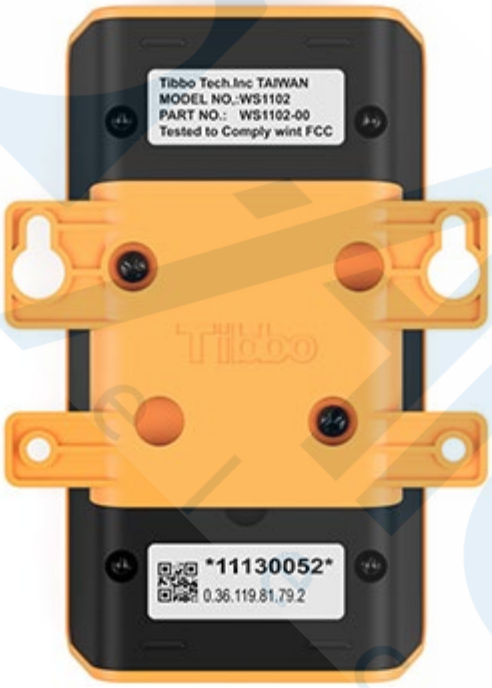
Front view



Bottom cover with wall mounting plate

Bottom cover with DIN rail mounting plate

Here is How You Can Use the WS1102

As a Serial-over-IP (SoI) Device

Serial-over-IP conversion is a large part of what we do, and there is an entire section of our website dedicated to serial converters (a.k.a. "serial device servers"). We offer an open-source serial-over-IP (SoI) app that turns the WS1102 into a full-featured RS232/422/485-to-IP converter.

As a Modbus Gateway

Modbus is everywhere — it is virtually synonymous with industrial control! Our open-source Modbus Gateway app allows you to seamlessly interconnect Modbus TCP, Modbus ASCII, and Modbus RTU masters and slaves.

Build Your Own IoT Solution

The WS1102 is programmable in Tibbo BASIC and Tibbo C. Develop your very own Internet of Things (IoT) solution from scratch or take inspiration from our open-source applications and code samples published in the Code and Apps section.

Key Features

- High-performance ARM CPU
- Stores **two** Tibbo BASIC/C apps
- Integrated Wi-Fi connectivity (802.11a/b/g/n)
- Wireless debugging via Wi-Fi
- TLS1.2 (RSA-2048)
- Integrated Bluetooth Low Energy connectivity (BLE 4.2)
- Supports over-the-air (OTA) updates
- RS232/422/485 port
- Buzzer
- Onboard RTC (no backup battery)
- 4MB flash for TiOS and **two** apps + 4MB for the flash disk file system
- 2048-byte EEPROM

Hardware

Specifications:

- Powered by Tibbo OS (TiOS)
- Stores **up to two** compiled Tibbo BASIC/C binaries (apps)[1]
  - A **Device Configuration Block (DCB)**[2] defines which of the two apps normally runs on power-up
  - Forced launch of APP0 through the MD button
- Wi-Fi interface (802.11a/b/g/n)
  - Controlled via a simple-to-use, yet sophisticated API
  - TLS1.2 with RSA-2048 cryptosystem[3]
  - Optional "autoconnect" — automatic association with a designated Wi-Fi network as defined by the DCB[2]
  - Optional debugging of Tibbo BASIC/C applications via the Wi-Fi interface[4]
- Bluetooth Low Energy (BLE 4.2)
  - Controlled via a simple-to-use, yet sophisticated API
  - Can access the DCB via a new, integrated console[2]
- Internal Wi-Fi/BLE antenna
- RS232/422/485 port on a DB9M connector
  - Port modes are software-selectable
  - TX, RX, RTS, CTS, DTR[5], and DSR[5] lines
  - Baudrates of up to 921,600bps
  - None/even/odd/mark/space parity modes
  - 7 or 8 bits/character
  - RTS/CTS and XON/XOFF flow control
- Built-in buzzer
- RTC (no backup battery)
- 58KB SRAM for Tibbo BASIC/C variables and data
- 4MB flash for code storage
  - System files and TiOS occupy a combined 2,408KB
  - 1,688KB available for storing up to two app binaries
- **Additional** 4MB flash for the hardened fault-tolerant file system
- 2048-byte EEPROM for data storage
- Eight LEDs
  - Green and red main status LEDs
  - Yellow access point association (link) LED
  - Five blue LEDs (for Wi-Fi signal strength indication, etc.)
- Power: 12VDC (9 ~ 18V)
- Dimensions (LxWxH): 90 x 48 x 25mm
- Operating temperature range: –40°C to +85°C
- Firmware and compiled Tibbo BASIC/C apps can be updated via:
  - Serial port
  - Wi-Fi interface
  - Bluetooth Low Energy (BLE) interface
- Tibbo BASIC/C applications can be debugged via Wi-Fi[4] or serial port[5]
- Supplied with an SoI app preloaded
- Supplied with an SoI companion app preloaded
  - The app allows editing of the DCB from the L.U.I.S. smartphone app (availabe for iOS and Android)
  - Users are free to modify the app for additional functionality

1. *Although two independent Tibbo BASIC/C compiled binaries (apps) can be stored in the WS1102's flash memory, only one can run at a time.*
2. *Several of the WS1102's configuration parameters are stored in the DCB, which is accessible via a new integrated console. Our BLE Terminal web app leverages the Web Bluetooth API (compatible with the Chrome, Chromium, Edge, and Opera web browsers) to connect to the WS1102's console. Configuration properties can also be read and set through Tibbo BASIC/C code.*

3. *TLS is supported on a single outgoing TCP connection.*
4. *To enable Wi-Fi debugging, you must enable autoconnect — automatic association with a designated Wi-Fi network. This can be accomplished via the integrated BLE console or in code.*
5. *The TX and RX line of the debugging UART are connected to the DTR and DSR lines of the serial port. When the serial debugging is enabled, these lines cease functioning as the DTR and DSR lines. To avoid occupying the DTR and DSR lines for debugging, use wireless debugging instead. The debug mode can be selected via the integrated BLE console or in code.*

Included Accessories:

- DIN rail mounting plate
- Wall mounting plate and two screws

Optional Accessories:

- TB1100 terminal block adapter (version "B" recommended)
- 12V/0.5A adapter: APR-P0011(US), APR-P0012(EU), APR-P0013(UK)
- WAS-P0004(B) DB9M-to-DB9F serial cable (device-to-PC)
- WAS-P0005(B) DB9F-to-DB9F serial cable (device-to-device)

See Also:

- DS1100 single-channel RS232 controller
- DS1101 3.5-channel RS232 controller
- DS1102 3-channel RS232/422/485 controller

Programming

Create powerful, network-enabled applications in Tibbo BASIC and Tibbo C. Learn more...

Platform objects:

- beep — generates buzzer patterns.
- bt — in charge of the BLE (Bluetooth Low-Energy) interface.
- button — monitors the MD (setup) button.
- fd — manages the flash memory file system and direct sector access.
- io — handles I/O lines, ports, and interrupts.
- pat — "plays" patterns on a pair of status LEDs.
- romfile — facilitates access to resource files (fixed data).
- rtc — keeps track of date and time.
- ser — controls the serial channels.
- sock — socket comms (up to 16 UDP, TCP, and HTTP sessions).
- stor — provides access to the EEPROM.
- sys — in charge of general device functionality.
- wln — handles the Wi-Fi interface.

Function Groups: 27 string functions, 8 date/time conversion functions, encryption/hash calculation functions (RC4, MD5, SHA-1), and more.

Variable Types: Signed and unsigned 8-bit, 16-bit, and 32-bit types; floating point and string types; user-defined arrays and structures.