Anybus® Wireless Bolt CAN™

Important User Information

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1   Preface

1.1   About This Document

This manual describes how to install Anybus Wireless Bolt CAN and set up a basic configuration.

For additional documentation and software downloads, FAQs, troubleshooting guides and technical support, please visit www.anybus.com/support.

1.2   Document Conventions

The following conventions are used to indicate safety information and other important content in this document:

⚠ **WARNING**
Instruction that must be followed to avoid a risk of death or serious injury.

⚠ **Caution**
Instruction that must be followed to avoid a risk of personal injury.

❗ Instruction that must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

ⓘ *Additional information which may facilitate installation and/or operation.*

1.3   Trademarks

Anybus® is a registered trademark and Wireless Bolt CAN™ is a trademark of HMS Networks AB. All other trademarks mentioned in this document are the property of their respective holders.

2   Safety

2.1   General Safety Instructions

> ⚠ **Caution**
> This equipment emits RF energy in the ISM (Industrial, Scientific, Medical) band. Make sure that all medical devices used in proximity to this equipment meet appropriate susceptibility specifications for this type of RF energy.

> ⚠ **Caution**
> Minimum temperature rating of the cable to be connected to the field wiring terminals, 90 °C.

> ⚠ **Caution**
> Use copper wire only for field wiring terminals.

> ❗ This equipment is recommended for use in both industrial and domestic environments. For industrial environments it is mandatory to use the functional earth connection to comply with immunity requirements. For domestic environments the functional earth must be used if a shielded Ethernet cable is used, in order to meet emission requirements.

> ❗ This equipment contains parts that can be damaged by electrostatic discharge (ESD). Use ESD prevention measures to avoid damage.

2.2   Intended Use

The intended use of this equipment is as a communication interface and gateway. The equipment receives and transmits data on various physical levels and connection types.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3   Preparation

3.1   General Information

Make sure that you have all the necessary information about the capabilities and restrictions of your local network environment before installation.

For optimal reception, wireless devices require a zone between them clear of objects that could otherwise obstruct or reflect the signal. A minimum distance of 50 cm between the devices should also be observed to avoid interference.

The characteristics of the antenna should also be considered when choosing the placement and orientation of the unit.

See the **Anybus Wireless Bolt CAN User Manual** for more information.

4   Installation

4.1   Mechanical Installation

The device is intended to be mounted on top of a machine or cabinet through an M50 (50.5 mm) hole using the included sealing ring and nut.

The top mounting surface (in contact with the sealing) must be flat with a finish equivalent to Ra 3.2 or finer and cleaned and free from oils and greases.
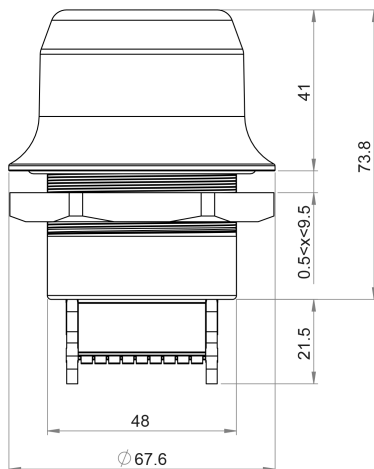
Tightening torque: 5 Nm ±10 %

> **!** Make sure that the sealing ring is correctly placed in the circular groove in the top part of the housing before tightening the nut.

> **!** Always hold the BOTTOM part of the unit when untightening the nut, not the top part (the cap).

All measurements are in mm.

4.2   Connector

The 18-pin connector is common for several models of the Anybus Wireless Bolt. Some pins may have a different function depending on model. Unused pins should not be connected.
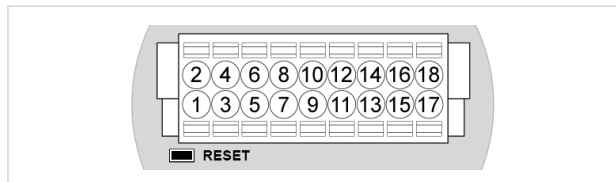

Fig. 1   Connector

The location of the **RESET** button can be used as a reference for the pin numbering when the connector is attached to the Wireless Bolt CAN. Pin 1 will be the pin closest to the button.

> ⓘ   *The Ethernet interface is intended for configuration purposes only.*
> *Wireless Bolt CAN is not designed for permanent Ethernet communication.*

Pin	Name	Description	
1	VIN	Power + (9–30 V)	
2	GND	Power Ground	
3	DI	Digital input + (9–30 V)	
4	DI_GND	Digital input ground	
5	ETN_RD+	Ethernet receive + (white/orange)	
6	ETN_RD-	Ethernet receive - (orange)	
7	ETN_TD-	Ethernet transmit - (green)	
8	ETN_TD+	Ethernet transmit + (white/green)	
9	RS485_B	RS-485 B Line	Not used for Wireless Bolt CAN.
10	FE/Shield	Ethernet: Serial and CAN:	Functional Earth Functional Earth and Shield
11	RS232_TXD	RS-232 Transmit	Not used for Wireless Bolt CAN.

Pin	Name	Description	
12	RS485_A/RS232_RXD	RS-485 A Line / RS-232 Receive	Not used for Wireless Bolt CAN.
13	RS232_RTS	RS-232 Request To Send	Not used for Wireless Bolt CAN.
14	RS232_CTS	RS-232 Clear To Send	Not used for Wireless Bolt CAN.
15	ISO_5V	Isolated 5 V for serial interface	Not used for Wireless Bolt CAN.
16	CAN_GND	Isolated Ground for CAN interface	
17	CAN_L	CAN Low	
18	CAN_H	CAN High	

Note:

• The Ethernet wire colors refer to the **T568A** standard.

• If using a shielded Ethernet cable the shield must be unconnected.

• Use termination for CAN when required.

4.3   Cabling

> (i) *When using **Easy Config Modes**, the Wireless Bolt CAN that is to be configured as a Client does not need to be connected to the Ethernet wires. Only power and CAN wiring are used.*

To make an Ethernet, CAN and power connector cable for
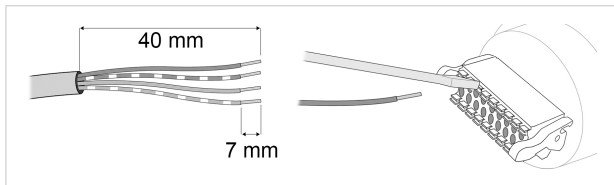Anybus Wireless Bolt CAN:

Fig. 2

> (i) *To maintain signal integrity, low emission and high immunity to EMI, untwist the twisted pair cable as little as possible.*

1.   Cut off one of the connectors on a standard Cat5e or Cat6 Ethernet cable.

2.   Strip off about 40 mm (1½ inch) of the cable jacket, from the orange, orange/white, green and green/white wires.

       The shield and the other wires are not used.

3.   Strip off about 7 mm (¼ inch) of the isolation on each wire.

4.   Push the pin spring release next to each socket on the connector and insert the correct wire end according to *Connector, p. 7*.

5.   Connect the wires from the power supply to the connector in the same way as the Ethernet wiring. **Make sure that polarity is not reversed.**

4.4   Digital Input

The digital input can be used to control roaming between Bluetooth access points (NAP). For more information, refer to the AT Reference Guide at www.anybus.com/support.

> **!** If voltage is applied to the digital input for more that 10 seconds the unit will be reset to factory defaults.

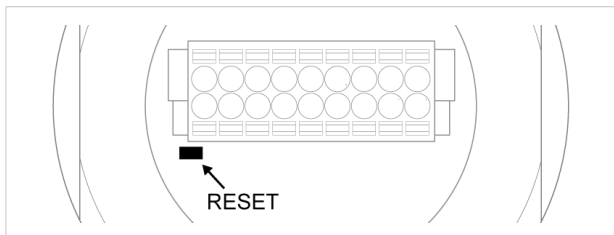## 4.5   RESET Button

Fig. 3   RESET button

The **RESET** button is located on the bottom of the unit.

When the unit is powered on, press and hold **RESET** for >10 seconds and then release it to reset to the factory default settings.

Recovery Mode

If the web interface cannot be accessed, the unit can be reset by starting in *Recovery Mode* and reinstalling the firmware using Anybus Firmware Manager II, which can be downloaded from www.anybus.com/support.

To enter Recovery Mode, press and hold **RESET** during startup.

> **!** Firmware updates should normally be carried out through the web interface. Recovery Mode should only be used if the unit is unresponsive and the web interface cannot be accessed.

5 Configuration

Anybus Wireless Bolt CAN is configured via a web interface. Parameters can be set individually or using pre-configured **Easy Config** modes.

Advanced configuration can be carried out by issuing AT commands via the web interface or over a Telnet or RAW TCP connection to port 8080 or over CAN interface. For more information, refer to the AT Reference Guide at www.anybus.com/support.

5.1 Web Interface

The web interface is accessed by pointing a web browser to the IP address of the unit.

ⓘ *The default address is **192.168.0.99**.*

The configuration settings are described in detail in the User Manual.

Fig. 4   Web interface

5.2   Easy Config Modes

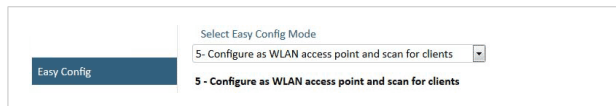In the web interface, you can perform the initial configuration using Easy Config Modes:

Fig. 5   Example, Easy Config Mode 5

EC	Role	Description
1	Bluetooth PANU	Configure as Bluetooth client and scan for another client (PANU to PANU). Recommended setting for Bluetooth point-to-point communication. Listens for 40 seconds or until a configuration is established.
2	–	Reset configuration to factory defaults.
3	–	Reset IP settings to factory defaults.
4	Client	Wait for automatic configuration. Listens for 120 seconds or until receiving a configuration. Configure units in mode 4 as clients.
5	WLAN AP	Restart as access point and connect clients.
6	Bluetooth NAP	Mode 5 and 6 will time out after 120 seconds.
11	(any)	Activate ConfigLock mode.

The Easy Config Modes are also described when selected in the web interface.

Default Easy Config Mode

Select Easy Config Mode

4- Await automatic discovery and configuration

Easy Config

4 - Await automatic discovery and configuration
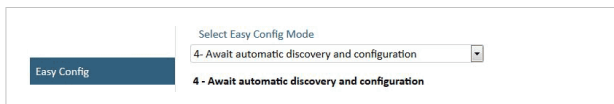
Fig. 6   The default mode is Easy Config Mode 4

By default Wireless Bolt and Bridge starts in **Easy Config Mode 4**.

Configuration of Wireless Bolt and Bridge Clients can be performed wirelessly, via a PC connected to the Wireless Bolt or Bridge Access Point.

After factory reset, Wireless Bolt will by default start in Easy Config Mode 4, if there is no Ethernet connection.

When connection is established via the wireless interface, the Wireless Bolt or Bridge Client does not need to be connected with an Ethernet cable during configuration.

5.3 Set Up a Wireless Infrastructure

Connect two or more Wireless Bolt CAN units via WLAN or Bluetooth using Easy Config.

When installing more than one Wireless Bolt CAN in the bridge, configure the Wireless Bolt CAN connected to the Master device as the Access Point. Configure the Wireless Bolt CAN connected to the *Slave* as a *Clients*.

> ℹ️ *When the Wireless Bolt CAN Access Point is connected to a Modbus network, the Master device must be connected to the Access Point.*

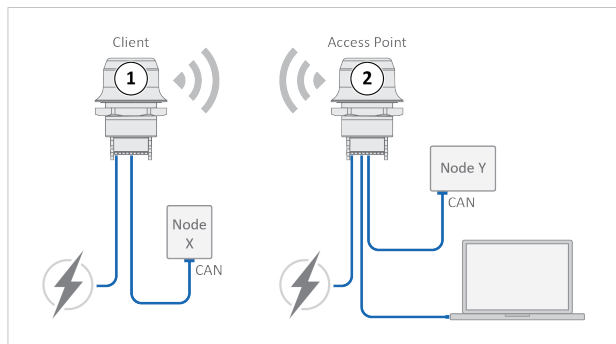### 5.3.1 Connecting the Devices

Fig. 7 CAN bridge example

1. Connect *Client unit 1* to a CAN device.
2. Connect *Access Point unit 2* to the master device.
3. Connect *Access Point unit 2* to your PC, with an Ethernet cable.
4. Connect *Access Point unit 2* to power.

5.3.2   Activate Easy Config

1. Navigate to the web interface of *Access Point unit 2*.

    The default address to *Access Point unit 2* is **192.168.0.99**.

2. Activate one of the following Easy Config Modes:

    –   **Easy Config Mode 1** for Bluetooth PANU-PANU. Used for setting up point-to-point communication.

    –   **Easy Config Mode 5** for WLAN

    –   **Easy Config Mode 6** for Bluetooth

3. Connect *Client unit 1* to power.

→   *Client unit 1* starts up in **Easy Config Mode 4** and is open for automatic configuration during 120 seconds.

→   *Access Point unit 2* will discover and configure *Client unit 1* as a *Client* and configure itself as an *Access Point*.

→   *Client unit 1* will be assigned the first free IP address in the same Ethernet subnet as *Access Point unit 2*.

    The default address to the first *Client unit* is **192.168.0.100**.

→   If no connection is established during Easy Config Mode:

    –   Ensure that *Client unit 1* is disconnected from Ethernet.

    –   Disconnect *Client unit 1* from power and repeat Activate Easy Config step 5 and 6.

5.3.3   Adding More Wireless Bolt CAN Clients

When using **Easy Config Mode 1**, continue with CAN Configuration.

When using **Easy Config Mode 5** or **Easy Config Mode 6**, up to 6 additional Wireless Bolt CAN Clients can be added to the CAN bridge.

1. To add more *Client units*, repeat Connecting the Devices step 1 and the Activate Easy Config steps.

→   Each new *Client unit* will be assigned the next free IP address in the current Ethernet subnet.

5.3.4   CAN Configuration

From the PC connected to *Access Point unit 2*:

1.   Navigate to the web interface of each Wireless Bolt CAN unit.

2.   Select the **CAN Settings** tab.

3.   Configure the CAN port settings:

CAN Settings	
Operating Mode	Select Operation Mode **On** (Default) or **Off**.
CAN Bitrate	Select a CAN Bitrate.
CAN Ethernet Protocol	**Optimized** (Default): Use this protocol when bridging two CAN buses using multiple Bolt CAN devices. Data is transferred using a raw binary encoding that maximizes the performance and minimizes the bandwidth. **SLCAN**: Use the ASCII based SLCAN protocol to bridge CAN traffic to a custom endpoint. CAN frames can be sent and received via a TCP/IP socket using basic commands. The command starts with a letter followed by a number of hexadecimal digits and ends with a carriage return (character code 0x0D). **Simple**: In this mode the raw bytes of any incoming TCP payload will be transparently copied into the data segment of one or multiple CAN frames. The frame ID can be specified in the CAN Simple ID field. Only the data segment of any incoming CAN frames will be transparently copied to the outgoing TCP stream, with no markers indicating where contents of one frame ends and the next one begins. Incoming frames will still be subject to the CAN RX filter.
CAN Simple ID	Active when the Simple CAN Ethernet Protocol is selected. Specify the frame ID to use.
Extended Frame	Active when the Simple CAN Ethernet Protocol is selected. Extended Frame defines if the CAN Simple ID should be standard or extended. By default, Standard Frame is used. Select the checkbox to enable Extended Frame.
Automatic Bus-off	By default, Automatic Bus-off is off, the checkbox is unselected.

CAN Settings (continued)

	To enable Automatic Bus-off, select the checkbox. When Automatic Bus-off is enabled, the recovering sequence automatically starts when the Wireless Bolt CAN has entered Bus-off state.
Show Statistics	When Show Statistics is selected, current statistics from the CAN bus are displayed below the checkbox. The values are updated every two seconds. Examples of statistics displayed: The number of sent/received CAN frames, buffer usage and error information.
TCP Mode	Select a TCP Mode from the dropdown menu: **Client**: The Wireless Bolt CAN acts as a client and establishes a connection to the TCP server. **Server**: The Wireless Bolt CAN acts as a server and listens for incoming connections from the TCP client.
TCP Port	Enter the TCP Port number. Default port: 5005
TCP Server IP	When TCP Mode Client is selected, enter the TCP Server IP address.
CAN RX Filters	With CAN RX filters, you can configure Bolt CAN to forward only a subset of the messages. Example: CAN RX filters can be used to reduce bandwidth requirements, avoid sending sensitive information or minimize sending unnecessary information. You can add up to 28 CAN RX Filters. **Type**: Select **Standard** (Identifier length: 11 bits) or **Extended Frame** (Identifier length: 29 bits). **ID**: Enter the ID for the CAN frames that the CAN RX Filter should receive. **Mask**: The mask specifies which bits of the incoming frame ID match the ID configured in the filter. Example: A filter with ID 0x123 and mask 0x00F will match an incoming frame with ID 0x123 or 0x333, but not with ID 0x120.

5.3.5   CAN Installation

1. Connect each Wireless Bolt CAN unit to a device or machine equipped with a CAN port.

   For more information, refer to *Connector, p. 7* and *Cabling, p. 9*.

5.4   Factory Restore

Any one of these actions will restore the factory default settings:

- Clicking on **Factory Restore** on the **System Settings** page
- Executing **Easy Config Mode 2**
- Issuing the AT command **AT&F** and then restarting the unit
- Holding pressed for >10 seconds and then releasing it

Default Network Settings	
IP Assignment	Static
IP Address	192.168.0.99
Subnet Mask	255.255.255.0
Default Gateway	192.168.0.99
Internal DHCP Server	Disabled
DHCP Interfaces	All

Default Bluetooth Settings	
Operating Mode	PANU (Client)
Local Name	[generated from MAC address]
Connectable	No
Discoverable	No
Security Mode	Just works
Bluetooth LE	Operating Mode: Disabled
	Connectable: No
	Discoverable: No

Default CAN Settings	
Operating Mode	On
Bitrate	250 kbps
Ethernet protocol	Optimized
Automatic Bus-off	Off
TCP Mode	Server
TCP Port	5005
RX Filter	Standard, ID 0x0, Mask 0x0 + Extended, ID 0x0, Mask 0x0

6   Technical Data

For complete technical specifications and regulatory compliance information please visit www.anybus.com/support.

6.1   Technical Specifications

Order code	AWB2020	AWB2021
Color	Black	White top and black base
Connector	Included plug connector (2x9p; 3.5mm, Phoenix DFMC 1.5/9-ST-3.5, push-in spring connection).	
Range	Up to 100 meters free line of sight	
Antenna	One internal antenna. Dual-band 2,4GHz and 5GHz.	
Temperature compatibility	Operating: Shadow black and white: -40 to +65 °C Direct sunlight: Black -40 to +45 °C, White -40 to +65 °C Storage temperature: -40 to +85 °C	
Weight	81 g	
Housing material	Top: Valox 357X(f1) PBT/PC. Suitable for outdoor use with respect to exposure to ultraviolet light, water exposure and immersion in accordance with UL 746C. Bottom: Celanex: XFR 6840 GF15. PBT glass reinforced plastic.	
IP protection class	IP66, IP67 and UL Type 4X for top (outside the host), IP21 for bottom (inside the host).	
Dimensions	Diameter: 68 mm. Height: 75 mm (95 mm including connector). Outside height: 41 mm.	
Mounting	M50 screw and nut (50.5 mm hole needed).	
Power	9-30 VDC (-5% +20%), Cranking 12V (ISO 7637-2:2011 pulse 4). Reverse polarity protection. (Consumption: 0.7W idle, 1.7W max.)	
Configuration	Three different methods: 1. Accessing the built-in web pages in the product 2. Sending AT-commands via Telnet/Raw TCP 3. Using Easy Config modes.	
Vibration compatibility	Sinusodial vibration test according to IEC 60068-2-6:2007 and with extra severities; Number of axes: 3 mutually perpendicular (X:Y:Z), Duration: 10 sweep cycles in each axes,	

Order code	AWB2020	AWB2021
	Velocity: 1 oct/min, Mode: in operation, Frequency: 5-500 Hz, Displacement ±3.5 mm, Acceleration: 2g. Shock test according to IEC 60068-2-27:2008 and with extra severities; Wave shape: half sine, Number of shocks: ±3 in each axes, Mode: In operation, Axes ± X,Y,Z, Acceleration: 30 g, Duration: 11 ms.	
Humidity compatibility	EN 600068-2-78: Damp heat, +40°C, 93% humidity for 4 days.	
Digital input	Usage: To control roaming between Bluetooth access points (NAP)	
Wired interface	CAN 2.0A/B (11/29 bit identifier). CAN Bitrate 10 kbps to 1000 kbps freely selectable. Up to 28 freely customizable CAN receive pass-through filters. Advanced settings for Prescaler, Time Seg 1+2, SJW. Transparent transfer of any CAN based protocol including e.g. J1939 and CANopen. Ethernet: 10/100BASE-T with automatic MDI/MDIX auto cross-over detection. For configuration only.	

Order code	AWB2020	AWB2021
Wireless LAN	**Wireless standards:** WLAN 802.11 a, b, g, n, d, r (fast roaming).	
	Operation modes: Access point or Client	
	WiFi channels: 2.4 GHz, channel 1-11 + 12-13 depending on regulatory domain scan. 5 GHz Access Point: 36-48 (U-NII-1), 5 GHz Client: 100-116 + 132-140 and 120-128 depending on regulatory domain scan. (U-NII-1, U-NII-2, U-NII-2e).	
	RF output power: 13.75 dBm	
	Max number of slaves for access point: 7	
	Power consumption: 54mA@24VDC	
	Net data throughput: 20 Mbps. Link speed: max 65 Mbps (802.11n SISO)	
	Security: WEP 64/128, WPA, WPA-PSK and WPA2, TKIP and AES/CCMP, LEAP, PEAP including MS-CHAP.	
Classic Bluetooth	**Wireless standards (profiles):** PANU & NAP	
	Operation modes: Access point or Client	
	RF output power: 9.75 dBm	
	Max number of slaves for access point: 7	
	Power consumption: 36 mA@24VDC	
	Net data throughput: ~1 Mbps	
	Bluetooth version support: Classic Bluetooth v2.1	
	Security: Authentication & Authorization, Encryption & Data Protection, Privacy & Confidentiality, NIST Compliant, FIPS Approved	