

CoreTigo
TigoBridge B1
USER MANUAL

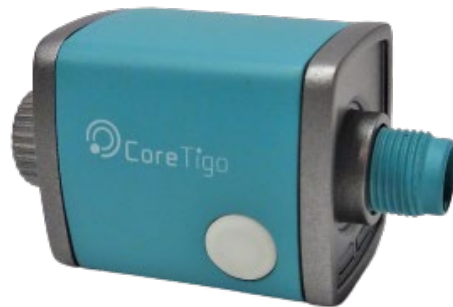


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Version Control

| Author Name | Description | Revision | Date |
|--------------|-------------|----------|-----------|
| Yaniv Yardni | Creation | 1.0 | June 2021 |
| | | | |
| | | | |
| | | | |
| | | | |

Acronyms and Abbreviations

Acronyms and abbreviations used in this document are listed in this table:

| Symbol | Meaning |
|----------|---|
| FW | Firmware |
| HW | Hardware |
| IF | Interface |
| IOLW | IO-Link Wireless |
| LED | Light-Emitting Diode |
| SW | Software |
| UID | Unique ID |
| W-Bridge | W-Device that connects a wired IO-Link device via wireless communication interface to a W-Master. |
| W-Device | Single peer to a W-Master such as an IO-Link Wireless sensor or actuator. |
| W-Master | Peer connected through W-Ports via radio to “from one up to n” W-Devices. It provides an interface to the gateway to the upper level communication systems or PLCs. |

1. Introduction

This User Manual introduces the TigoBridge B1 (Part number: CT231-0057-01P) and enables the user to perform setup, configuration, mounting, and troubleshooting. TigoBridge B1 is an IO-Link to IO-Link Wireless, Class B convertor. TigoBridge can convert any IO-Link device to IO-Link Wireless as long as it is IO-Link certified. Read the manual carefully before using the device.



Figure 1: TigoBridge B1

References:



- TigoEngine – [User Manual](#)
- TigoMaster 2TH – User Manual

1.1. Structure

The sections of this User Manual build on one another.

1.2. Typographical Conventions

Enumerations are shown in list form with bullet points.




- Entry 1
- Entry 2

Instructional steps are shown in list form with numbers.

1. Step 1.
2. Step 2.

Decimal numbers are shown without additional indicators and are not spelled out (e.g. 123).

1.3. Symbols

| Symbol | Meaning |
|---|---|
|  | Note: This symbol indicates a general note. |
|  | Warning: This symbol indicates a security notice which must be observed. |
|  | Reference: This symbol indicates a cross-reference to other documentation. |

1.4. Deviating Views

The product views and illustrations in this User Manual may deviate from the actual product. They are intended only as illustrative material.

2. Safety

2.1. General Note

This User Manual is intended for any qualified personnel using the device.

All safety messages, integrated safety messages, property damage messages, and valid legal regulations must be observed by its users.



Technical capabilities on behalf of the user are presumed.

2.2. Electrical Connection

The TigoBridge B1 shall be supplied by an isolated power source that meets the following requirements:

- Limited-Energy Circuit in accordance with UL/CSA 61010-1 or
- Limited Power Source (LPS) in accordance with (UL/CSA 60950-1 or EN 62368-1, Annex Q) or
- Class 2 supply source which complies with the National Electrical Code (NEC), NFPA 70, Clause 725.121 and Canadian Electrical Code (CEC), Part I, C22.1.



Warning: Input current is not limited. No fire protection.

2.3. Intended Use

The TigoBridge B1 is an IO-Link Wireless Class B Bridge with an IP67 enclosure.

The TigoBridge B1 is intended for indoor use only.

The TigoBridge B1 converts IO-Link to IO-Link Wireless. The TigoBridge B1 houses internal antenna and two M12 connectors for data and power.

TigoBridge is a device that connects a wired IO-Link device, via IO-Link Wireless, to an IO-Link Wireless Master. A device can be an IO-Link sensor, IO-Link actuator, or IO-Link hub.



Warning: Product applications other than those described in this User Manual are not permitted.

2.4. Personnel Qualification

The product may only be mounted, configured, operated, or demounted by qualified personnel. When working with electricity, technical skills must be demonstrated under all the following circumstances:

- Safety and health at work
- Mounting and connecting of electrical equipment
- Measurement and analysis of electrical functions and systems
- Evaluation of the safety of electrical systems and equipment



Warning: CoreTigo Ltd. does not assume any warranty or liability for damage caused to the product due to non-compliance with security measures or incorrect product installation.

3. Requirements

TigoBridge B1 is implemented based on the IO-Link Wireless standard for W-Bridge devices. TigoBridge B1 is part of an IO-Link Wireless environment. It communicates with an IO-Link Wireless master. An IO-Link Wireless master, an IO-Link device, and a power cable is required. See the illustration.

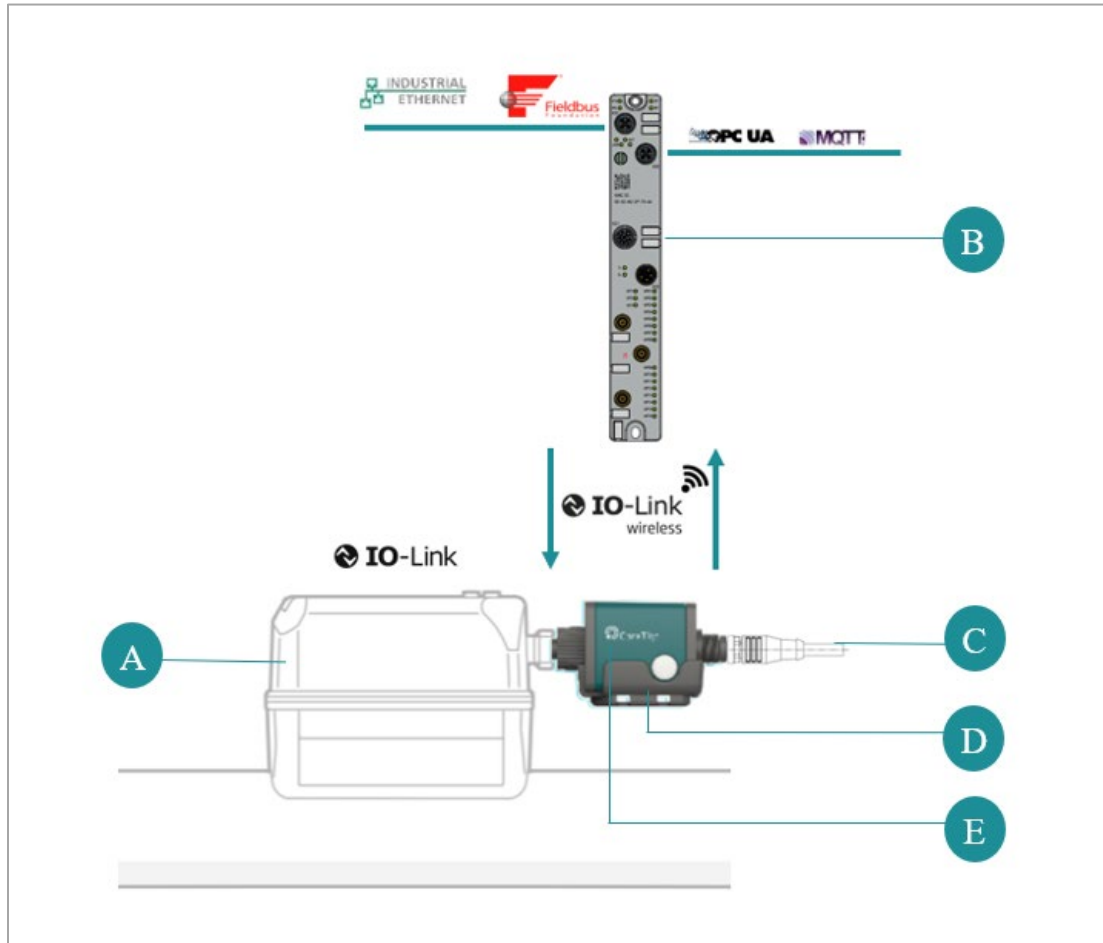


Figure 2: TigoBridge B1 Overview

- A. IO-Link Class B Device
- B. IO-Link Wireless Master
- C. 2x Power Sources – 24VDC (for 1L+ and 2L+)
- D. Mounting Accessory – TigoBridge Cradle
- E. TigoBridge B1

4. Pre-Installation

4.1. Description

An IO-Link device can be connected to a TigoBridge B1 directly or using an M12 cable. TigoBridge B1 can be connected to an IO-Link Wireless Master by TigoEngine, Integrated web server tool, or PLC.

Each IO-Link Wireless master can operate up to 16 TigoBridges B1.

4.2. Overview

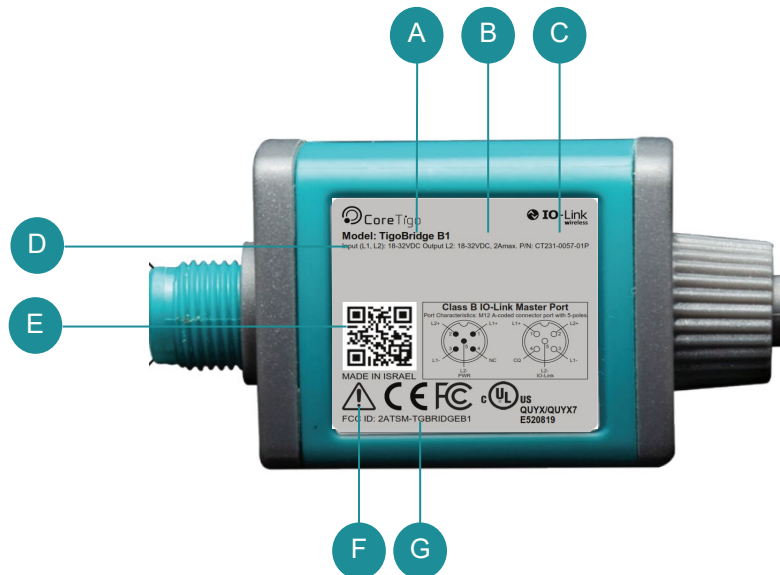


Figure 3: TigoBridge B1 Label

Label:

- A. TigoBridge Model
- B. Output Power Supply Range
- C. Product Number
- D. Input Power Supply Range
- E. QR CODE (URL)
- F. Refer to Warning in section [2.2](#).
- G. FCC ID

Functional Diagram



Figure 4: TigoBridge B1 Functional Diagram

- A. Device Connector
- B. Pairing Button
- C. Power Supply Connector
- D. Power LED (Green)
- E. Status LED (RGB)

4.3. LEADS



Figure 5: TigoBridge B1 LEDs

- A. Status LED (RGB)
- B. Power LED (Green)

Power LED

Table 1: Power LED

| LED Color | Indication |
|-----------|------------------------|
| Green | Power supply connected |

Status LED

Table 2: Status LED

| LED Color | Indication |
|------------------|------------------------------|
| Magenta | Unpaired wireless |
| Blue | Operational wireless bridge |
| Green | Operational wired device |
| Yellow | Non-operational wired device |
| White | Wireless Error (see Note) |
| “Blinking” Green | Firmware update mode |

4.4. Pairing Button

The Pairing-Button is used to replace existing TigoBridge B1 with a new one.

The Pairing-Button supports further functions, depending on the duration of the button pressed, as detailed in the table below.

Table 3: Pairing Button Function

| Button timing press | Button press function |
|---------------------|---|
| [>0...1] s | No action |
| [>1...5] s | Pairing by Button/Re- pairing by Button |
| [>5...10] s | No action |
| [>10...20] s | Device Reset |
| [>20...30] s | No action |
| [>30...40] s | Unpairing |

An overview of Pairing by Button or Re-pairing by Button is given in chapter [6](#).

4.5. Standalone Mode

TigoBridge is designed to work seamlessly with IO-Link Devices. It also has the capability to operate in Standalone mode.

In Standalone mode, TigoBridge can be configured and diagnosis data can be read, but process data will not be available. The ISDU mechanism behaves identically to a W-Device, allowing the TigoBridge to have device-specific ISDU parameters. This feature provides flexibility and convenience for the user in certain scenarios where a connected IO-Link Device is not necessary or available. For more information see chapter [6.2](#).

4.6. Electrical Wiring

TigoBridge B1 has two M12 connectors.

- **IO-Link Connector:** 5 pins, A-Coded female connector.



Maximum Current supply to IO-Link device 1L+ port is 1 A when using 24 VDC.

Maximum Current supply to IO-Link device 2L+ port is 2.5 A under 50°C, linearly de-rated to 1 [A] at 60°C

- **Power Connector:** 5 pins, A-Coded male connector.



Higher voltage than 32 VDC is restricted, as it can damage the TigoBridge.

4.7. Electrical Connection



Figure 6: Electrical Schematic Diagram



Warning: TigoBridge B1 does not have reverse polarity power connection protection!

5. Mounting

TigoBridge B1 should be mounted safely and securely next to the device to which it is connected. TigoBridge B1 can be mounted with or without the cradle accessory.

TigoBridge Cradle

The cradle is designed to simplify mounting of the TigoBridge B1 on flanges or any other surface/machine/device. The cradle can be secured to any surface using either cable ties or M3 screws.

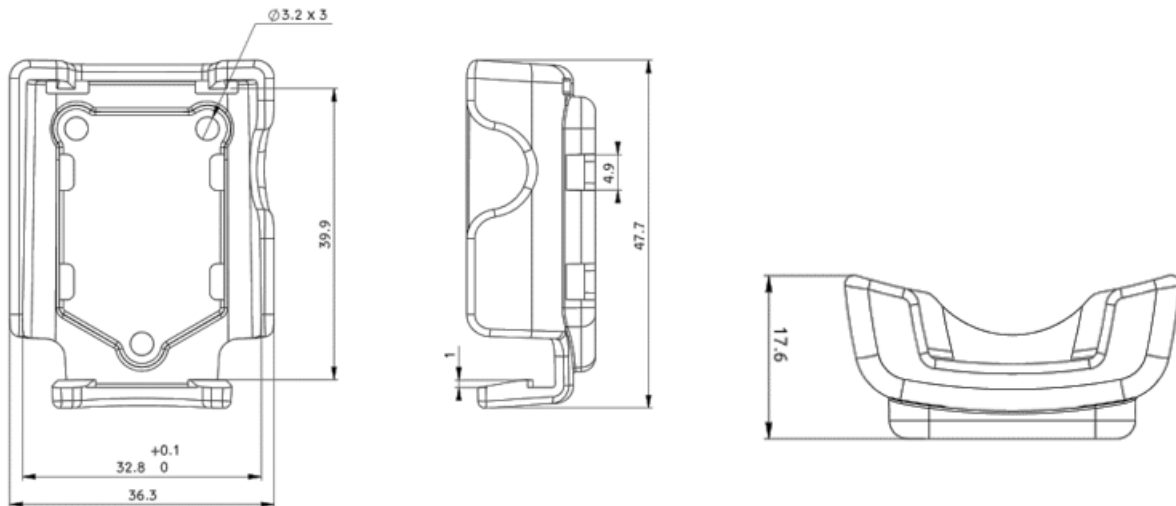


Figure 7: Cradle Dimensions



Figure 8: TigoBridge B1 and Cradle



Figure 9: TigoBridge B1 Mounted on the Cradle

Cradle Mounting Guidelines

1. Secure the cradle on the flange (or machine or any other surface) using M3 screws or cable ties.
2. Mount the TigoBridge B1 onto the cradle by pushing it in.
3. Pull the TigoBridge B1 from the cradle to unmount it.

6. Configuration and Setup

Commissioning Prerequisites:

- TigoEngine software installed and running on PC.
- TigoMaster/TigoGateway successfully connected to PC.

Installation:

1. Plug a 24VDC power supply to TigoBridge B1 M12 power connector via M12 cable.
2. The Power LED lights up **Green**. If it does not, check the power connection.
3. Once the power supply is connected, a reset cycle occurs. The reset cycle duration is a few seconds and displays a **Red Green Blue** color sequence.
4. Once the reset cycle is complete, the status LED alternates between **Magenta** and **Yellow**.
5. Plug the TigoBridge B1 to an IO-Link device (sensor/actuator).
If TigoBridge B1 cannot connect directly to the device, use an M12 cable. Once successfully connected the Status LED alternates between **Magenta** and **Green**.
6. Open the TigoEngine and scan the network for the IO-Link Wireless TigoBridge B1.

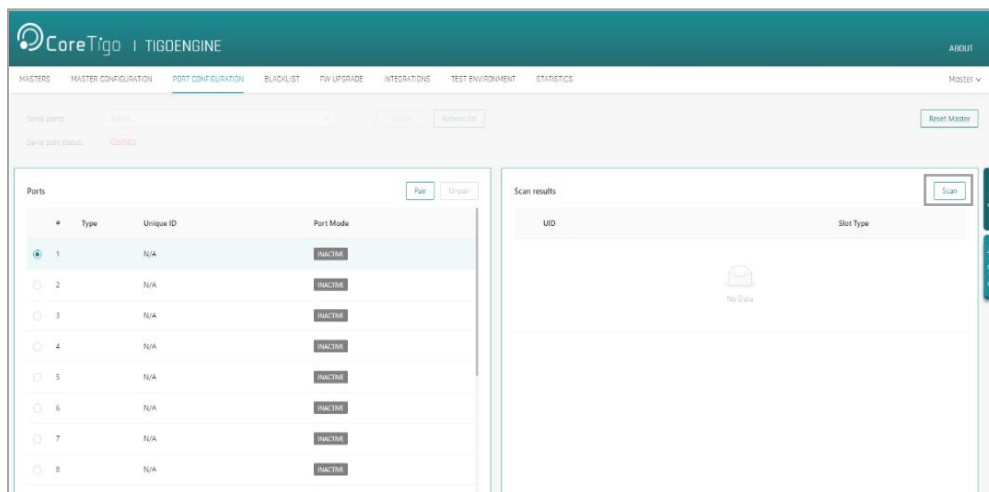


Figure 10: TigoEngine Scanning Mode

7. Identify the TigoBridge B1 using the UID.
8. Select the requested TigoBridge B1.

9. Click **OK** and click **Pair**.

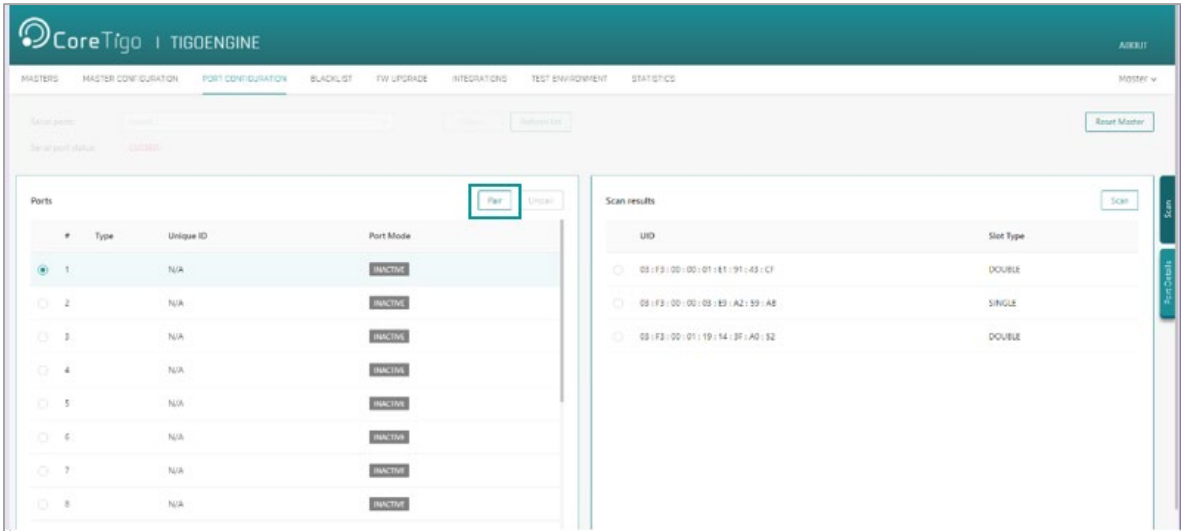


Figure 11: TigoEngine Pairing Process

When the pairing process is complete, the TigoEngine **Port Mode** displays in **Green** and should indicate **OPERATE**. The TigoBridge B1 Status LED alternates between **Blue** and **Green**.

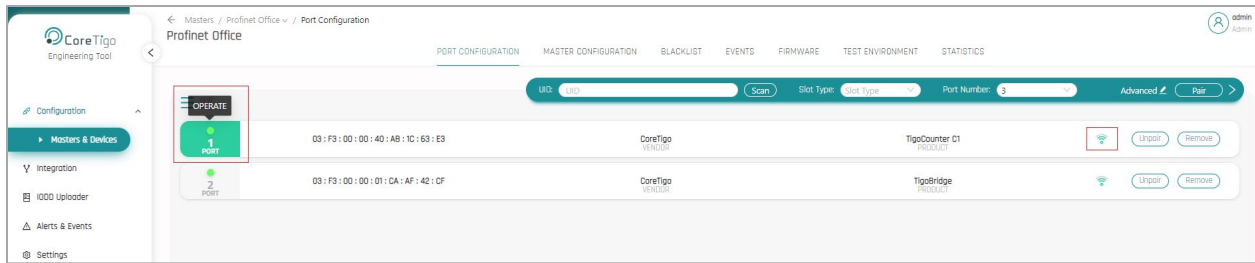


Figure 12: TigoEngine Operate Mode

10. To configure the IO-Link device, select the appropriate row in the interface.

11. Configuring the IO-Link device is done through the **Port Details** view.

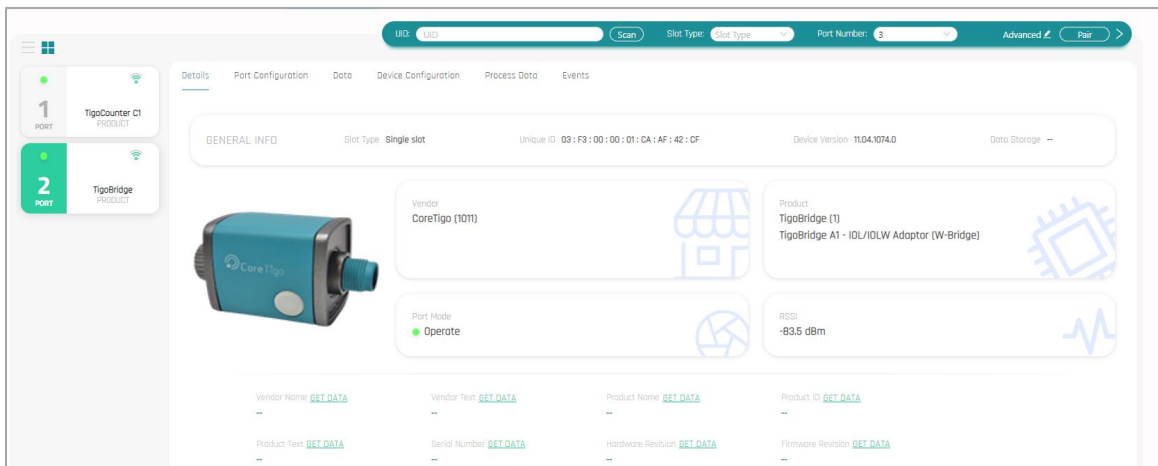


Figure 13: Port Details View

12. **Unpair** – To replace a TigoBridge B1, click the **Unpair** button on the TigoEngine interface, and follow the instructions to unpair it. Once unpaired, the TigoBridge B1 status LED alternates between **Magenta** and **Green**.

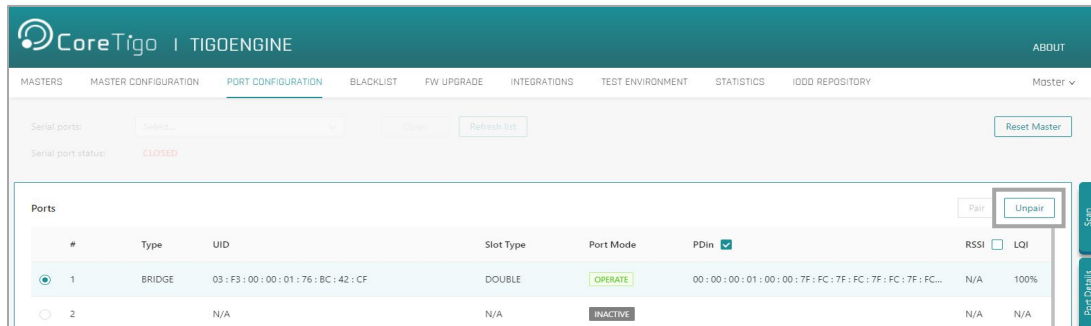


Figure 14: Unpair Button

6.1. Pairing by Button

This mechanism is for manual pairing without detailed knowledge about the TigoBridge device.

With pairing buttons activated on both TigoBridge and TigoEngine the TigoBridge can be exchanged without the need for additional configurations.

1. In the TigoEngine, go to the row of the relevant W-Device and click **Pair**.

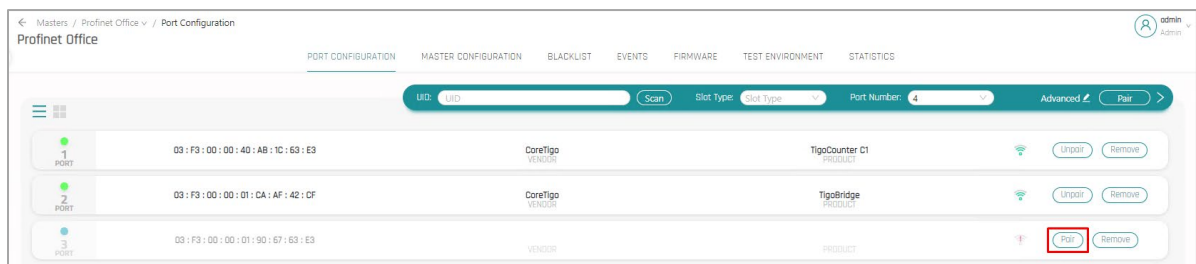


Figure 15: Pair Button

2. In the **Pairing** dialog box that pops up, set **Pairing Method** to **Pair by button**.

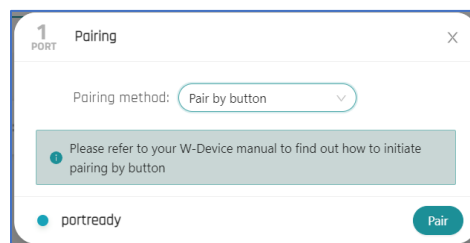


Figure 16: Pairing Dialog Box

3. Press and hold the Pairing Button of the W-Device for 3 secs.
4. Click **Pair** in the TigoEngine pairing window.
5. After replacement, the parameters are downloaded automatically from the Data Storage into the new W-Device.

6.2. Operation in Standalone Mode

Standalone mode is a built-in feature of the TigoBridge that can be accessed when the TigoBridge is not connected to any W-Device.



Relevant for FW revision 11.04.1074.0 onwards

To ensure proper operation and system security, on some applications it may be necessary to halt operation if any device is disconnected from the system. The Standalone mode feature in TigoBridge allows for the application to continue functioning unless the user manually sets the **Advanced IOLW Port Configuration** of the connected device to stop when the W-Device is disconnected.

Proceed as follows:

1. When connecting to a new TigoBridge click on the **Advanced** button.

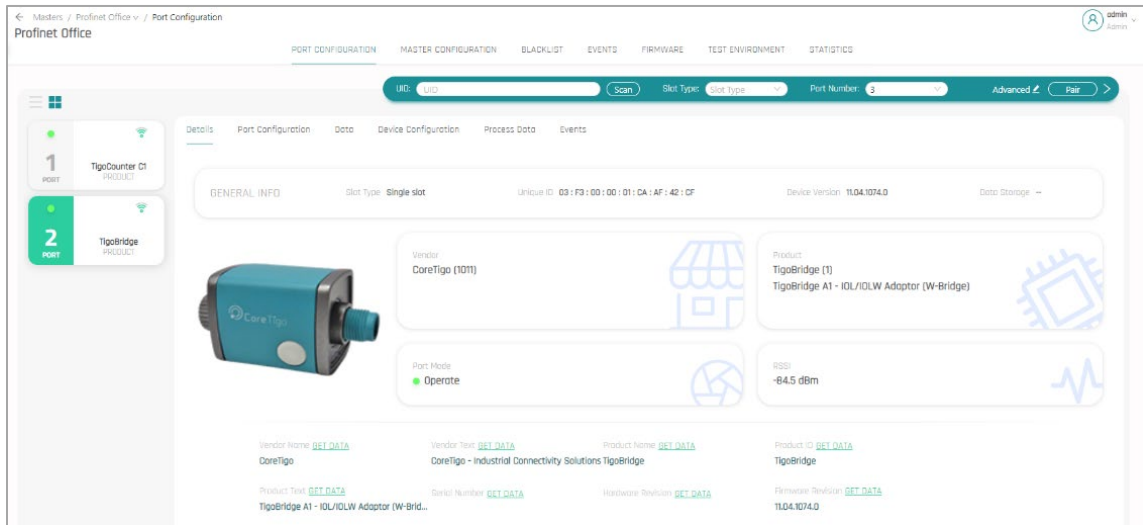


Figure 17: Connecting to a New TigoBridge

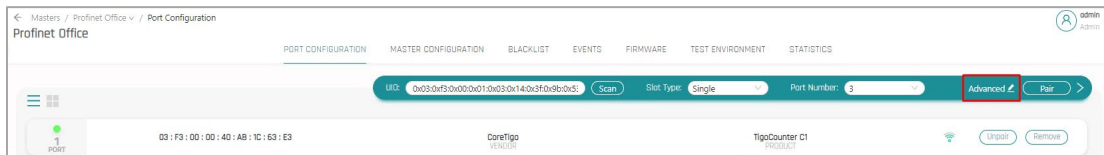


Figure 18: Setting Advanced IOLW Port Configuration

2. In the IOLW Port Configuration window, set the **Validation & Backup** box to **IOLW Type Compare, No Backup/Restore**.

3. Enter the Vendor ID and Device ID of the connected W-device in the corresponding fields.

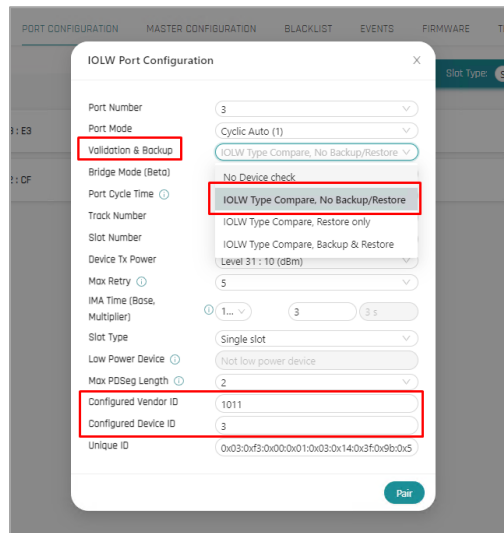


Figure 19: IOLW Port Configuration Window

4. Click **Pair**.

When a W-device is disconnected from TigoBridge, the Standalone mode will no longer be accessible and the application will stop running.

7. Firmware Update

Firmware (FW) is updated wirelessly using the TigoEngine. Refer to the *TigoEngine User Manual* for detailed instructions. Contact CoreTigo Support if needed.

8. Diagnostics and Troubleshooting

Troubleshooting is done using the LEDs display or the TigoEngine software. Refer to TigoEngine User Manual for detailed instructions.

8.1. Power LED

Power LED – if a power supply is connected to the TigoBridge B1 and the Power LED is off, the power supply is not properly connected, or it is providing a power supply different than the expected range.

8.2. Status LED

Status LED – indicates the IO-Link device connection status and the IO-Link Wireless communication status with the IO-Link Master. Therefore, it alternates to show both the status of the IO-Link device connection and the IO-Link Wireless connection.

Table 4: Status LED Troubleshooting

| IO-Link Wireless \ Wired IO-Link | Paired | Unpaired |
|----------------------------------|---|--|
| Operational | Alternating Blue and Green | Alternating Magenta and Green |
| Non-Operational | Alternating Blue and Yellow | Alternating Magenta and Yellow |

Alternating Blue and Green – fully operational: both IO-Link device and IO-Link Wireless communication are properly functioning.

Alternating Magenta and Green – TigoBridge B1 is unpaired from the TigoMaster while the IO-Link device is properly connected to the TigoBridge B1. Re-Scan and Re-Pair the TigoBridge B1 to the TigoMaster through the TigoEngine.

Alternating Blue and Yellow – TigoBridge B1 is successfully paired to the TigoMaster while the IO-Link device is not properly connected to, or not fully functioning with, the TigoBridge B1. Check the IO-Link device connectivity with the TigoBridge B1.

Alternating Magenta and Yellow – Both TigoBridge B1 IO-Link Wireless communication are unpaired and the IO-Link device is not connected/functioning. Power down the TigoBridge B1 and power it back up, reconnect the IO-Link device, scan, and pair the TigoBridge B1.

9. Guidelines and Regulations

FCC ID: 2ATSM-TGBRIDGEB1

IC: 26463-TGBRIDGEB1

9.1. RF Exposure Warnings



Warning: This device is only authorized for use in a mobile application. Maintain a separation distance of least 20 cm between the TigoBridge B1 device and the user's body.

9.2. Class A Warning

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense

9.3. Modification Statements

FCC Warning (Modification Statement)

CoreTigo LTD has not approved any changes or modifications to this device by the user. Any changes or modifications can void the user's authority to operate the equipment.

ISED Warning (Modification Statement)

CoreTigo Ltd. n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

9.4. FCC Regulatory Notices

Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Wireless Notice

This device complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme à l'exposition aux radiations FCC / ISED définies pour un environnement non contrôlé et répond aux directives d'exposition de la fréquence de la FCC radiofréquence (RF) et RSS-102 de la fréquence radio (RF) ISED règles d'exposition. L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

10. Technical Data

Table 5: Technical Data

| Electrical Data | |
|---------------------------------|---|
| Input Voltage | 18-32 [V]* |
| Output Voltage on L+ | Equals to Input Voltage |
| Typical Current Consumption | 21 [mA]** |
| MaxOutputSupplyCurrent - 1L+ | 1L+ = 1 [A] |
| Max Output Supply Current - 2L+ | Max current of 2.5 [A] under 50°C, linearly de-rated to 1 [A] at 60°C. |
| Max Output Peak Current | 1L+ = 1.2 [A]*** |
| Wireless Parameters | |
| Operating Frequency | 2.4 GHz ISM Band |
| Communication Standard | IO-Link Wireless |
| Modulation | GFSK, Modulation index = 0.5 |
| Radio Peak Output Power | 10 [dBm] |
| Interfaces | |
| LEDs | <ul style="list-style-type: none"> • IO-Link – RGB three color LED • Power – Green color LED |
| Button | Pairing - external push button |
| Connectors | <ul style="list-style-type: none"> • Input connector: Plug M12, A coded, power Connector <ul style="list-style-type: none"> ○ Pin number 1: Input 1L+ Power supply ○ Pin number 2: Input 2L+ Power supply ○ Pin number 3: Input L - GND ○ Pin number 5: Input 2L - GND • Output Connector: Socket M12, A coded, IO Link Class B Connector <ul style="list-style-type: none"> ○ Pin number 1: 1L+ positive supply to IO Link device ○ Pin number 2: 2L+ positive supply to IO Link device ○ Pin number 3: 1L- GND supply to IO Link device ○ Pin number 4: CQ IO Link Serial Communication ○ Pin number 5: 2L- GND supply to IO Link device |
| Antenna | Internal isotropic antenna |
| Communication | |
| Protocols | <ul style="list-style-type: none"> • IO Link <ul style="list-style-type: none"> ○ Supported transmission types: COM1, COM2, COM3 ○ Revisions 1.0 and 1.1 ○ Class B • IO Link Wireless <ul style="list-style-type: none"> ○ Version 1.1 |

| Regulation | |
|--------------------|---|
| CE | <ul style="list-style-type: none"> EN 301489 EN 300328 EN 62479 EN 61326-1 |
| FCC | <ul style="list-style-type: none"> FCC ID: 2ATSM-TGBRIDGEB1 FCC CFR Title 47 Part 15 Subpart C Section 15.247 FCC CFR Title 47 Part 15 Subpart B |
| Safety | IEC 61010-1 UL61010-1 and CSA C22.2 No. 61010-1 |
| RoHS | Complied |
| Reach | Complied |
| Qualifications | |
| Shock & Vibrations | <ul style="list-style-type: none"> Sine Vibration: IEC 60068-2-6 Random vibration: IEC 60068-2-64 Shock: IEC 60068-2-27 Bumps: IEC 60068-2-27 |

* TigoBridge B1 should be supplied from a limited, Class 2, power supply or via overcurrent protective device (fuse, breacker, etc.) rated 3A max.

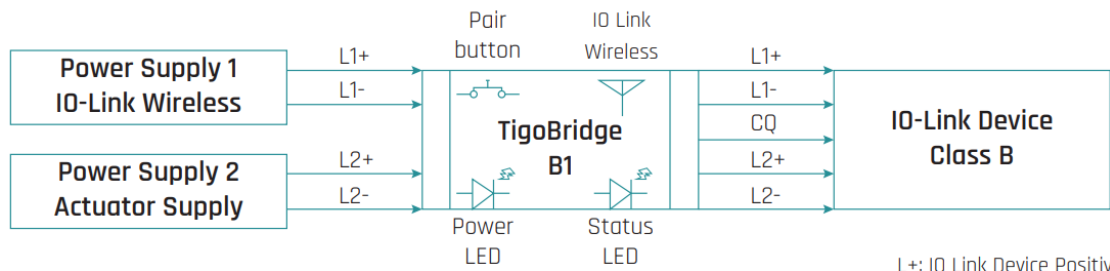
** For 24 VDC Supply input, without IO Link device current consumption

*** For 30 minutes

To read more about IO-Link Wireless solutions follow this link <https://www.coretigo.com/solutions/>.

| Operating Conditions | |
|--------------------------|--|
| Operating Temperature | -25°C to 60°C |
| Relative Humidity Rating | Relative 90%, non-condensing |
| Altitude | Up to 2000 m |
| Pollution | Degree 3 |
| IP rating | IP67 |
| Emission | <ul style="list-style-type: none"> EN 61000-6-2 <ul style="list-style-type: none"> EN55016-2-3 Radiated emission EN55022 Conducted emission |
| Immunity | <ul style="list-style-type: none"> EN 61000-6-2 <ul style="list-style-type: none"> EN31000-4-2 Electrostatic discharge EN61000-4-4 Fast transients/burst EN61000-4-5 Surge immunity EN61000-4-6 Conducted immunity |

Block Diagram



L+: IO Link Device Positive Supply
 L-: IO Link Device Negative Supply
 CQ: IO Link Tx/Rx Data

Dimensions

Units are in mm



11. Customer Support

For any issue, question, or to report a bug, contact support@coretigo.com

Appendix A – Part Number

Part number: CT231-0057-01

- Generation: 1
- Product Identifier: 3
- Product Type: 1
- Protocol: 0057
- Character Identifier of Feature
- Version: 01

| CT(GXY-ZZZZiii-vv) | | | | | |
|--------------------|--------------------|--------------|----------|--------------------------------|---------|
| 1 | 3 | 1 | 0057 | iii | 01 |
| Generation | Product Identifier | Product Type | Protocol | Feature's Character Identifier | Version |