

# CoreTigo TigoStarter K22

## USER MANUAL



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## 1. Introduction

### 1.1. About

This user manual describes the TigoStarter K22 IO-Wireless Evaluation Kit. The kit allows users to connect IO-Link Wireless sensors and actuators to a PLC, PC, and on-premise server. It combines the TigoMaster 2TH, TigoBridge, and TigoEngine software tool to configure, test, and evaluate the functionality of IO-Link, digital or analog sensors and actuators converted into IO-Link Wireless devices.




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**Note:**

The TigoStarter K22 IO-Wireless Evaluation Kit can be used with either PROFINET (Part Number: CT2-EVAL-K22-PN) or EtherNet/IP (Part Number: CT2-EVAL-K22-EIP) protocol.

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**References:**

- TigoMaster 2TH – User Manual
  - TigoBridge – User Manual
  - TigoEngine – Installation Guide for TigoMaster 2TH
  - TigoEngine – User Manual
  - IO-Link Devices – Data Sheet
  - *ifm* – AL2605 – Operating Instructions
- 

### 1.2. Structure

The sections of this user manual build on one another from section numbers 1 to 5.

### 1.3. Typographical Conventions

Enumerations are shown in list form with bullet points.

- Entry 1
- Entry 2
- Entry 3

Instructional steps are shown in list form with numberings.

1. Step 1.
2. Step 2.
3. Step 3.

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

### 1.4. Symbols




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**Note:**

This symbol indicates a general note.

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**Warning:**

This symbol indicates a security notice which must be observed.

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**Reference(s):**

This symbol indicates a cross-reference to other documentation (available upon request).

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## 1.5. Acronyms and Abbreviations

Term	Meaning
D/A	Digital or Analog
EDS	Electronic Data Sheet
GSD	General Station Description
ISDU	Indexed Service Data Unit
LED	Light Emitting Diode
PC	Personal Computer
PLC	Programmable Logic Controller
TIA portal	Totally Integrated Automation Portal
W-Device	IO-Link Wireless Device

Table 1 – Acronyms and Abbreviations

## 1.6. 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 and Requirements

### 2.1. General Note

This user manual is only intended for qualified personnel using the kit. All safety messages, integrated safety messages, property damage messages, and valid legal regulations must be observed by users.



**Note:**

Technical capabilities on behalf of the user are presumed by CoreTigo Ltd.

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### 2.2. Intended Use

The TigoStarter K22 IO-Link Wireless Evaluation Kit can be used to set up an IO-Link Wireless environment. Users can achieve this through the kit by establishing IO-Link Wireless device connections to a PLC, PC, and on-premise server upon converting IO-Link sensors and actuators to IO-Link Wireless device types.

This kit is intended for indoor use only and in operating temperatures of -25°C to 55°C for the TigoMaster 2TH and -25°C to 60°C for the TigoBridge. Components are protected against damage caused by any buildup of moisture on surfaces which are in contact with the air.

Kit components are developed for working environments with protection class IP67.



**Warning:**

Applications other than those described in this user manual are not permitted.

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### 2.3. Personnel Qualification

Kit components may only be mounted, configured, operated or demounted by qualified personnel. When working with electricity, technical skills must be demonstrated under all 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 kit and its components due to non-compliance with security measures or incorrect installation.

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### 2.4. Installation Prerequisites

The TigoEngine software tool is provided together with an evaluation license as part of the TigoStarter K22 IO-Link Wireless Evaluation Kit. The software tool should be installed on an on-premise server or PC first as part of the setup and configuration of all kit components.

*See section 3.3 of this user manual for more information on setup and configuration, and section 4 for more information on TigoEngine features.*

Please refer to the TigoEngine User Manual for detailed installation instructions.



**Reference:**

TigoEngine – User Manual

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## 2.5. Components




The TigoStarter K22 IO-Link Wireless Evaluation Kit includes none other than the following kit components:

- TigoEngine Software Tool (With Evaluation License)
- TigoMaster 2TH IO-Link Wireless Master
- 2x IO-Link Wireless TigoBridge
- Supplied Cables



**Note:**

All kit components listed above are provided by CoreTigo Ltd. upon purchase.

Item	Description	Example
TigoEngine Software Tool  (P/N: CT-ENG-1000-ET)	Configures, tests, evaluates, and demonstrates various functions of IO-Link Wireless sensors or actuators.	
TigoMaster 2TH IO-Link Wireless Master  (P/N: PROFINET – CT241-0003t2-02 / EtherNet/IP – CT241-0004t2-01)	Can support up to 16 IO-Link Wireless sensors or actuators which are represented in the TigoEngine software tool.	
2x IO-Link Wireless TigoBridge  (P/N: CT221-0057-03)	Converts wired IO-Link sensors and actuators to IO-Link Wireless in order to establish a connection with the TigoMaster 2TH IO-Link Wireless Master.	

Supplied Cables	1x D-Coded M12 Male to RJ45 Cable	
	2x L-Coded PVC Black Female Cable, 1m	
	2x A-Coded Female PVC Cable, 1m	

Table 2 – Kit Components

## 3. Getting Started

### 3.1. Overview

The TigoStarter K22 IO-Link Wireless Evaluation Kit is designed for users required to build an end-to-end IO-Link Wireless demonstration environment with the ability to perform the actions listed below.

#### 3.1.1. Field Device Level

- Conversion of IO-Link sensors and actuators to IO-Link Wireless devices that can communicate with the TigoMaster 2TH using the IO-Link Wireless TigoBridge

#### 3.1.2. Control Level

- PLC connection using either PROFINET or EtherNet/IP protocols
- PC and on-premise server connection using TigoEngine
- Connection of an IO-Link Wireless sensor/actuator and the *ifm* IO-Link D/A Hub through the TigoMaster 2TH (with support of up to 16 IO-Link Wireless devices by the TigoMaster)

#### 3.1.3. Software System Level

- Installation of the TigoEngine software tool on the PC and/or on-premise server
- End-user configuration, testing, and evaluation of IO-Link Wireless sensors and actuators
- Provision of process and on-demand data (cyclic and acyclic)

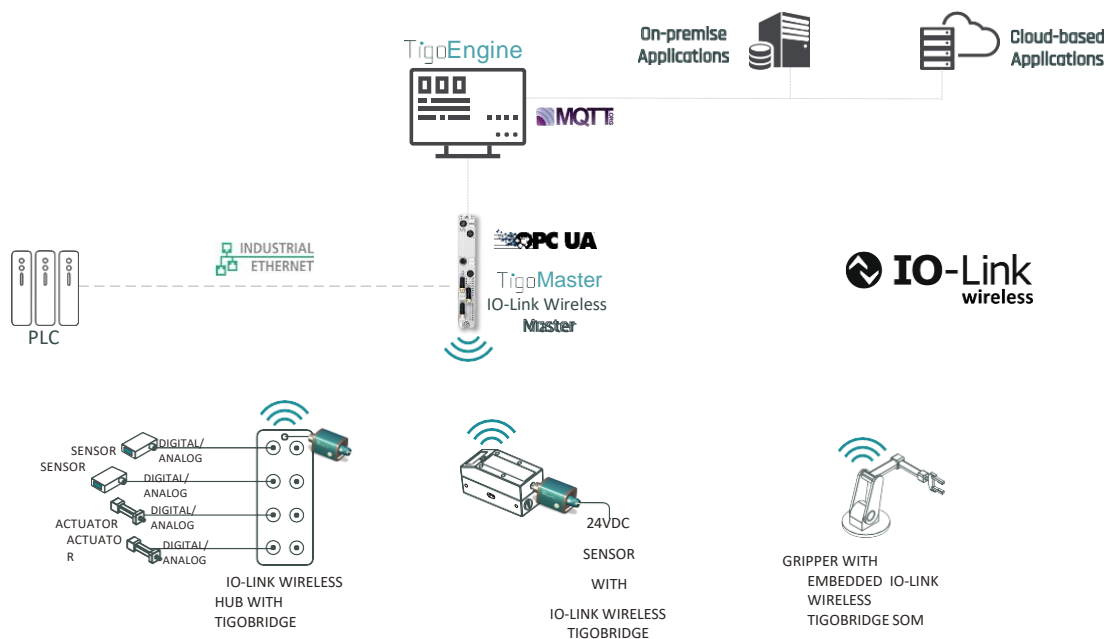


Figure 1 – System Architecture

## 3.2. Description

The sections below provide a more detailed description of each kit component's functionality.

### 3.2.1. Field Device Level – TigoBridge

The kit comes with 2 IO-Link Wireless TigoBridge devices, enabling the connection of multiple IO-Link Wireless devices such as sensors and actuators. The IO-Link Wireless TigoBridge converts IO-Link devices to IO-Link Wireless devices. Once such devices are converted, they can be wirelessly connected to the TigoMaster 2TH IO-Link Wireless Master, as is illustrated by the figure below.



**Note:**

While the IO-Link Wireless TigoBridge can be used independently, as in the figure below, it can also be paired with a flow meter.

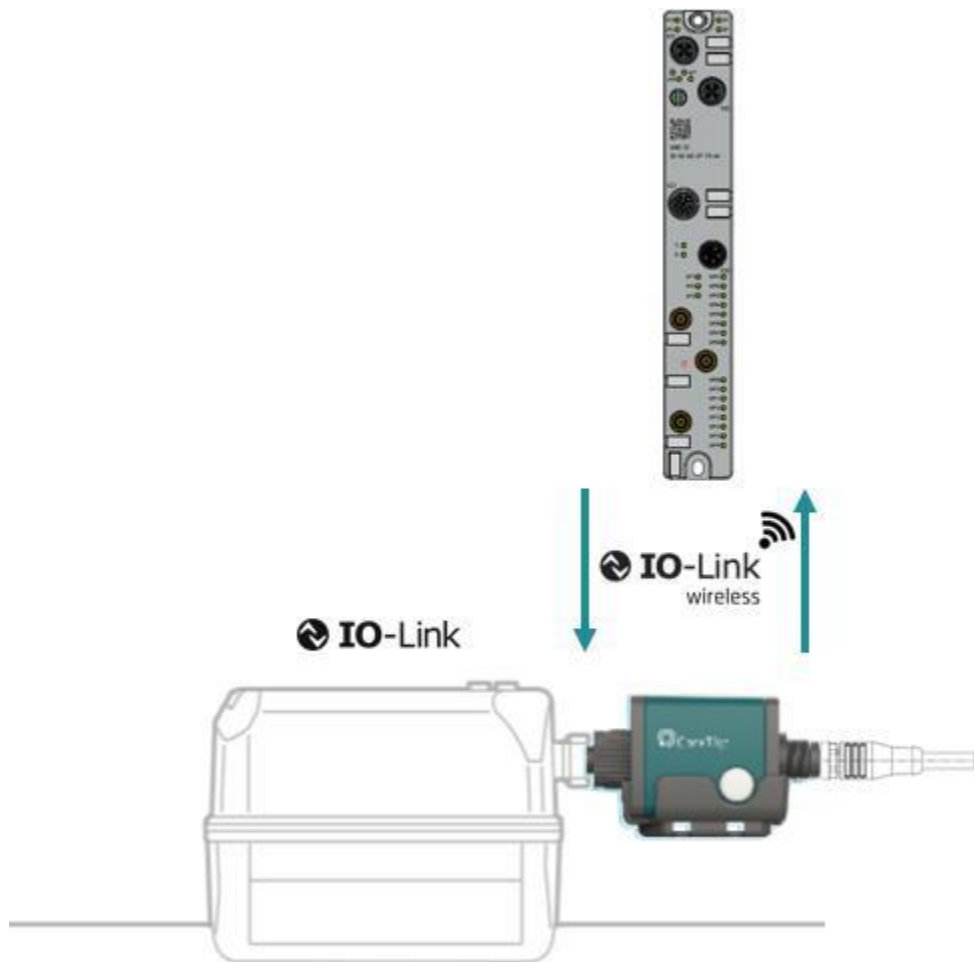


Figure 2 – TigoBridge Illustration

Below are figures and tables describing the TigoBridge in further detail, including TigoBridge functionality, and Status and Power LED indications.

3.2.1.1. Functionality



Figure 3 – TigoBridge Functionality (1)

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

Table 3 – TigoBridge Functionality (1)



Figure 4 – TigoBridge Functionality (2)

Letter	Description
A	TigoBridge Model
B	Input Power Supply Range
C	Product Number
D	QR CODE (URL)
E	Refer to Warning on section 2.2
F	FCC ID

Table 4 – TigoBridge Functionality (2)

### 3.2.1.2. LED Indications

Consult the tables below for preliminary information on Status LED and Power LED indications.



**Reference:**  
TigoBridge – User Manual

Status LED Color	IOL/IOLW	Indication
Yellow	IOL	Not Operational
Green	IOL	Operational
Magenta (Purple)	IOLW	Unpaired
Blue	IOLW	Operational
White	IOLW	Communication Ready
Red	IOL/IOLW	Assert

Table 5 – TigoBridge Status LEDs

Power LED Color	Indication
Green	Power Supply Connected

Table 6 – TigoBridge Power LEDs

### 3.2.2. Control Level – TigoMaster 2TH IO-Link Wireless Master

The industrial grade TigoMaster 2TH IO-Link Wireless Master connects to a PLC, PC, and on-premise server. It contains 2 IO-Link Wireless transmission tracks which each support up to 8 devices, thereby supporting up to 16 IO-Link Wireless devices in total. All tracks have their own transceiver and antenna.



**Note:**  
The TigoMaster 2TH IO-Link Wireless Master is available in two versions with one supporting the EtherNet/IP protocol and the other supporting the PROFINET protocol.



Figure 5 – TigoMaster 2TH Illustration

Below are a figure and tables describing the TigoMaster 2TH (EtherNet/IP version only) in further detail, including TigoMaster 2TH functionality, and Supply Voltage Status, Wireless Track Status, and Wireless Port Status LED indications.

### 3.2.2.1. Functionality

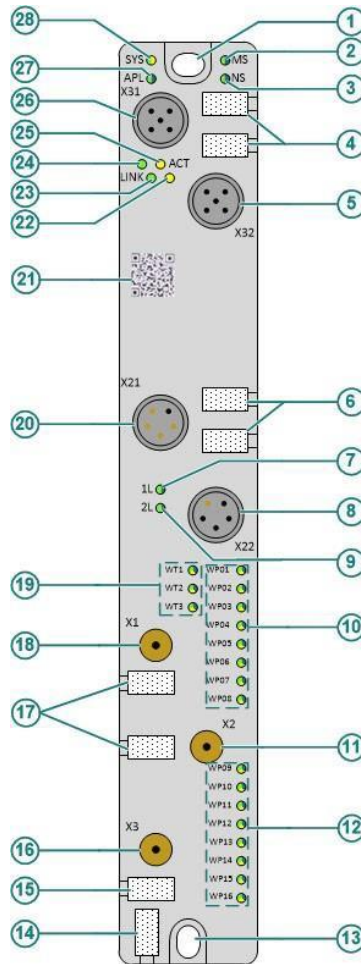


Figure 6 – TigoMaster 2TH Functionality (EtherNet/IP Version)



**Note:**

The figure above illustrates the TigoMaster 2TH's EtherNet/IP version. For the PROFINET version, all functionality remains the same except that the MS and NS labels for LEDs numbers (2) and (3) correspond with SF and BF. The same applies to the table below.

Function	No.	Name	Description
Ethernet	(26)	X31	Ethernet interface, M12, D-coded, EtherNet/IP port 1 (CH0)
	(5)	X32	Ethernet interface, M12, D-coded, EtherNet/IP port 2 (CH1)
	(24)	LINK (X31)	Link LED for connector X31
	(25)	ACT (X31)	Activity LED for connector X31
	(22)	ACT (X32)	Activity LED for connector X32
	(23)	LINK (X32)	Link LED for connector X32
	(4)	N/A	Labeling fields Ethernet interfaces X31 and X32
LEDs	(28)	SYS	System status LED



	(27)	APL	Application status LED
	(2)	MS or SF	Module status LED
	(3)	NS or BF	Network status LED
Power supply	(20)	X21	Power supply input (Power In), M12, L-coded
	(8)	X22	Power supply output (Power Out), M12, L-coded
	(7)	1L (X22)	1L supply voltage status LED (DC 24 V)
	(9)	2L (X22)	2L supply voltage status LED (DC 24 V)
	(6)	N/A	Labeling fields power supply input X21 and output X22
Antenna connectors and LEDs for the IO-Link Wireless radio module	(18)	X1	Connector for SMA antenna for IO-Link wireless connection to the devices 1 to 8
	(11)	X2	Connector for SMA antenna for IO-Link wireless connection to the devices 9 to 16
	(16)	X3	Connector for auxiliary antenna
	(17), (15)	N/A	Labeling fields SMA antennas X1, X2 and X3
	(19)	WT1-WT3	IO-Link wireless track status LEDs
	(10)	WP01-WP08	Port status LEDs for IO-Link wireless device ports P01 to P08
	(12)	WP09-WP16	Port status LEDs for IO-Link wireless device ports P09 to P16
Identification	(21)	N/A	Data matrix code
	(14)	N/A	Device labeling field for the TigoMaster 2TH device
Mounting	(1)	N/A	Mounting hole (up) and grounding
	(13)	N/A	Mounting hole (down)

Table 7 – TigoMaster 2TH Functionality

### 3.2.2.2. LED Indications

Consult the tables below for preliminary information on Supply Voltage Status LED, Wireless Track Status LED, and Wireless Port Status LED indications.


**Reference:**

TigoMaster 2TH – User Manual

Supply Voltage Status LED	LED Color	State	Indication
1L	Green	On	Supply Voltage
	Grey	Off	No Supply Voltage

Table 8 – TigoMaster 2TH Supply Voltage Status LEDs

Wireless Track Status LED	LED Color	State	Indication
WT1 - WT3	Green	On	Track Operational Mode / Service Mode
	Yellow	On	Track Inactive
	Red	Blinking	Track Error
	Green	Off	Track Off

Table 9 – TigoMaster 2TH Supply Voltage Status LEDs

Wireless Port Status LED	LED Color	State	Indication
WP01 - WP16	Green	On	Port Operational
	Green	Blinking	Pairing Successful and Communication Ready
	Yellow	Blinking	Port Ready
	Red	Blinking	Port Communication Lost
	Red	On	Port Errors (Pairing Timeout, Pairing Wrong Slot Type, Revision Fault, Compatibility Fault, Serial Number Fault, Process Data Fault, Cycle Time Fault)
	Grey	Off	Port Inactive

Table 10 – TigoMaster 2TH Supply Voltage Status LEDs

### 3.2.3. Software System Level – TigoEngine Software Tool

The TigoEngine software tool allows users to efficiently set up IO-Link Wireless masters and devices, such as the TigoMaster 2TH IO-Link Wireless Master and IO-Link Wireless sensors and actuators. Once installed, users may configure, test, and evaluate IO-Link Wireless devices.

See section 4 for further details on the TigoEngine software tool.

## 3.3. Setup and Configuration

Follow the steps below to set up and configure the following hardware components:

- TigoMaster 2TH IO-Link Wireless Master
- IO-Link Wireless TigoBridge

For information on the setup and configuration of software components, see section 4 of this user manual on the use of the TigoEngine software tool, and see section 5 on establishing a local PLC connection.



#### Note:

The devices and cables described below are part of the kit and supplied by CoreTigo Ltd. Other mentioned items, such as the PLC, PC, on-premise server, and IO-Link devices such as sensors and actuators are not provided by CoreTigo Ltd. and considered user property.

### 3.3.1. Phase 1 – TigoMaster 2TH

Follow the steps below to connect the provided cables to the TigoMaster 2TH IO-Link Wireless Master.

1. Connect the L-coded power cable to the TigoMaster 2TH IO-Link Wireless Master's **X21** port.
2. Connect the cable's other side to **24VDC**. Use the brown wire as **+24V** and blue wire as **GND**.
3. Connect the D-coded communication cable to the TigoMaster 2TH's **X31** port.

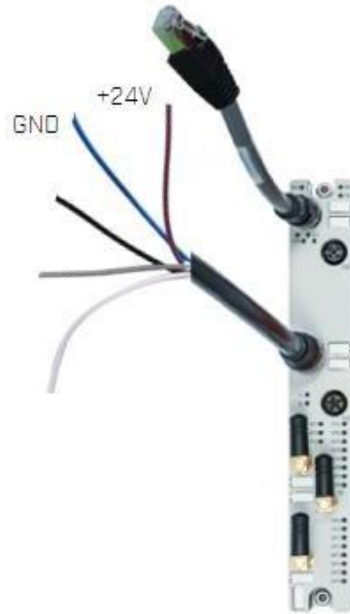


Figure 7 – Setup and Configuration (1)

### 3.3.2. Phase 2 – TigoBridge

Follow the steps below to connect the provided cables to the IO-Link Wireless TigoBridge.

1. Connect the A-coded power cable to the IO-Link Wireless TigoBridge's male connector.
2. Connect the cable's other side to **24VDC** with an **M12** connector. If the power supply requires a pig tail connection, then use the brown wire as **+24V** and the blue wire as **GND**.
3. Connect any IO-Link device to the TigoBridge's female connector.



Figure 8 – Setup and Configuration (2)

## 4. TigoEngine Software Tool

### 4.1. Installation

This section considers features and functionality of the TigoEngine software tool that is most relevant for the use of the TigoStarter K22 IO-Link Wireless Evaluation Kit.

Consult the references below for details on the installation requirements for the TigoEngine software tool.



#### References:

- TigoEngine – Installation Guide for TigoMaster 2TH
- TigoEngine – User Manual

Once installed, users may connect the TigoMaster 2TH IO-Link Wireless Master to the TigoEngine software tool, after which they can configure, test, and evaluate IO-Link Wireless devices.

The figure below illustrates the kit topology, including the TigoEngine software tool's connection to the TigoMaster 2TH IO-Link Wireless Master which communicates with remaining IO-Link Wireless devices.



Figure 9 – TigoEngine Software Tool

## 4.2. Connecting the TigoMaster 2TH

Follow the steps below to connect the TigoMaster 2TH IO-Link Wireless Master to the TigoEngine software tool in order to enable the subsequent connection of additional IO-Link Wireless devices.

1. Open the TigoEngine software tool upon installation.
2. Click the **MASTERS** tab in the top menu of the application.

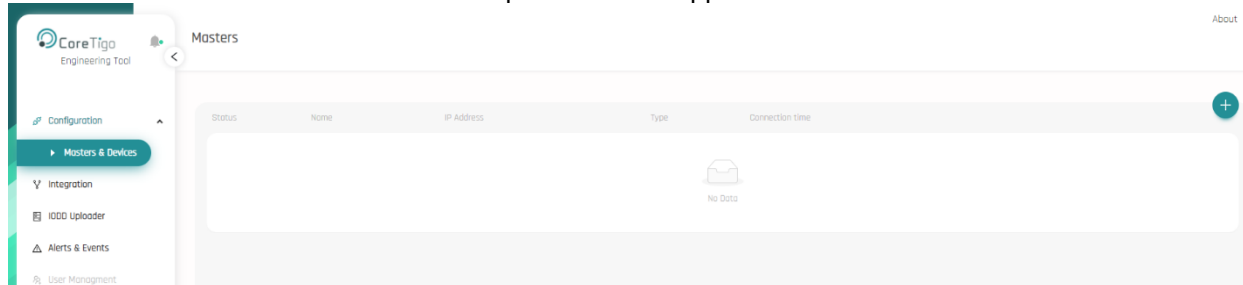


Figure 10 – Masters

3. Click the **Connect New Master** button on the right side of the screen.

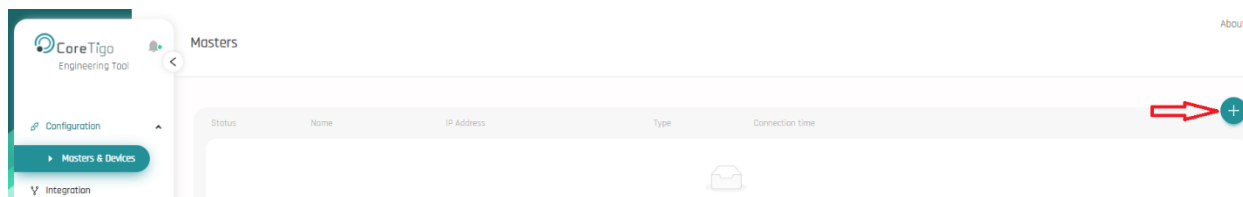


Figure 11 – Connect New Master (1)

4. Enter all following fields inside the **Connect New Master** pop-up window:
  - a. **NAME:** The modifiable name of the TigoMaster 2TH IO-Link Wireless Master. Note that users may choose any given name.
  - b. **MASTER TYPE:** Make sure to select the **TigoMaster 2TH** option in the list.
  - c. **IP ADDRESS:** Use the IP address that configured.

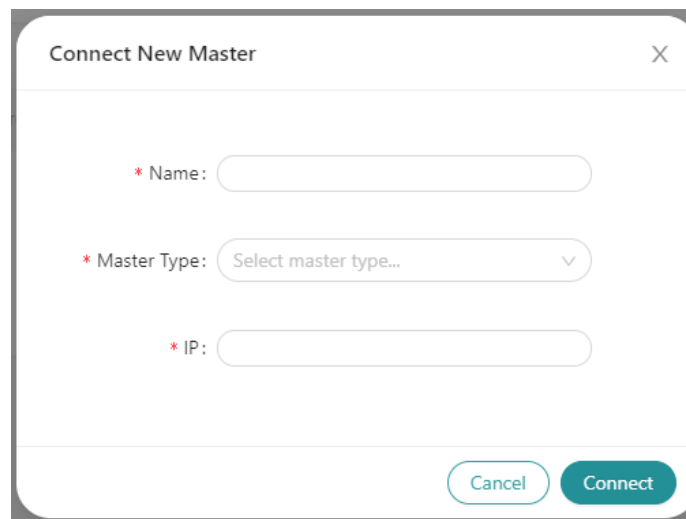


Figure 13 – Connect New Master (2)

5. Click the Connect button to proceed.
6. View the newly connected TigoMaster 2TH on the screen.

Masters About



Status	Name	IP Address	Type	Connection time	
<span style="color: green;">●</span>	TigoMaster	192.168.1.1	TigoMaster 2TH	Connected on: 11/30/2021, 9:47:37 AM	  Disconnect

Figure 14 – Connected Masters

7. Click the **Connect** button to proceed.
8. View the newly connected TigoMaster 2TH on the screen.

### 4.3. Port Configuration

Click the **PORT CONFIGURATION** tab in the top menu of the application to scan, (un)pair, debug, and monitor IO-Link Wireless devices (“W-Devices”) in range of the TigoMaster 2TH IO-Link Wireless Master.

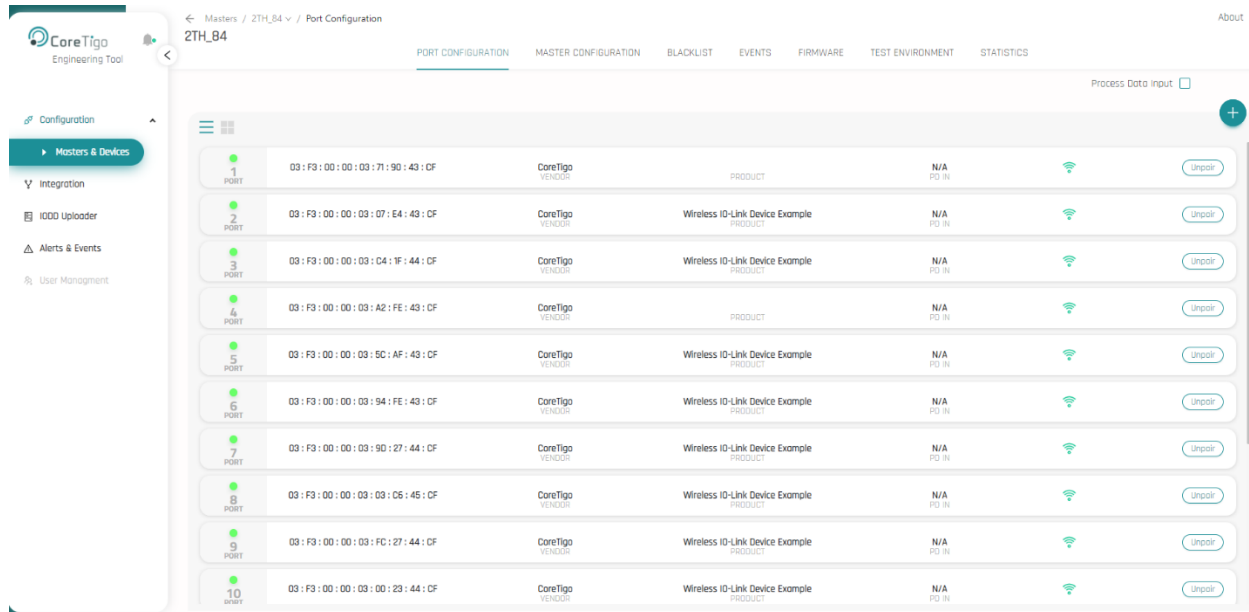


Figure 15 – Port Configuration

From this tab, users may perform additional actions, including:

- Scanning for W-Devices in range of the TigoMaster 2TH IO-Link Wireless Master
- Pairing the IO-Link Wireless TigoBridge to the TigoMaster 2TH IO-Link Wireless Master
- Using the IODD finder for IO-Link devices

Continue reading the subsections below to learn about each action in further detail.

#### 4.3.1. Scan for Devices

Follow the steps below to scan for available W-Devices.

1. Click the **+** button to add new device.
2. Click **Scan** button on the right-hand side of the screen.

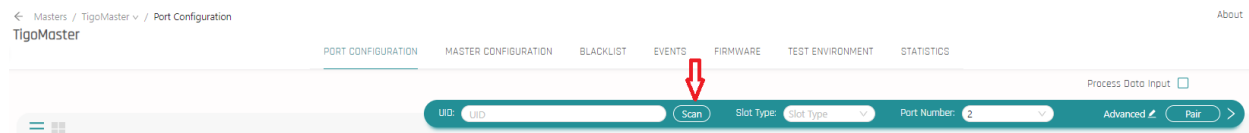


Figure 16 – Scan for Devices

1. Click the **Rescan** button to initiate another scanning process.

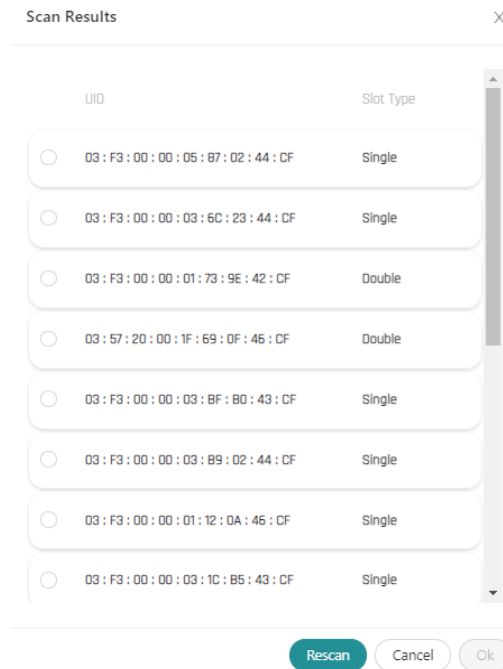


Figure 17 – Scanning Process

2. Wait for available W-Devices to appear inside the **Scan Results** area.
3. Please note:
  - a. Each table row will represent a single W-Device.
  - b. The **UID** column shows the unique ID of each W-Device in hexadecimal form. Users can identify it on the TigoBridge label.
  - c. The **Slot Type** column indicates whether the W-Device uses a single or double slot. This difference is determined by the device type and its system requirements.



### 4.3.2. Device Pairing

Follow the steps below to pair the IO-Link Wireless TigoBridge with the TigoMaster 2TH IO-Link Wireless Master in order to enable the configuration, testing, and evaluation of IO-Link Wireless devices.

1. Select the required UID in the **Scan Results** window.
2. Select **Port Number** and **Slot Type** and press the **Pair** button.

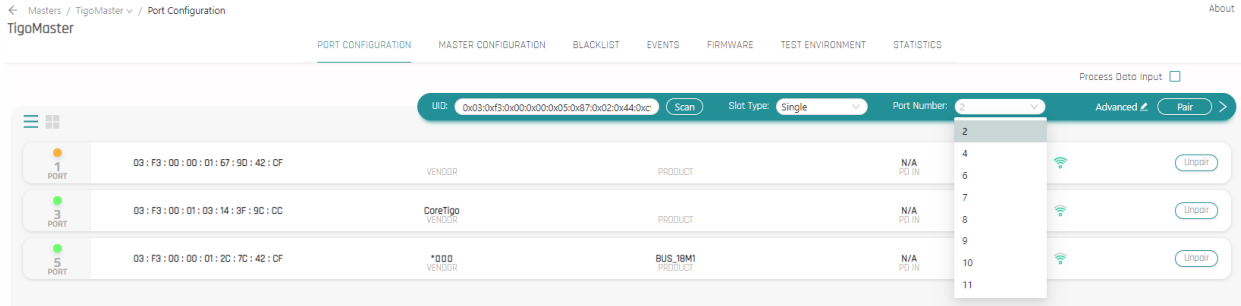


Figure 19 – Ports

3. Click the **Pair** button.
4. Retain all default parameters inside the **Advanced** link beside the **Pair** button.

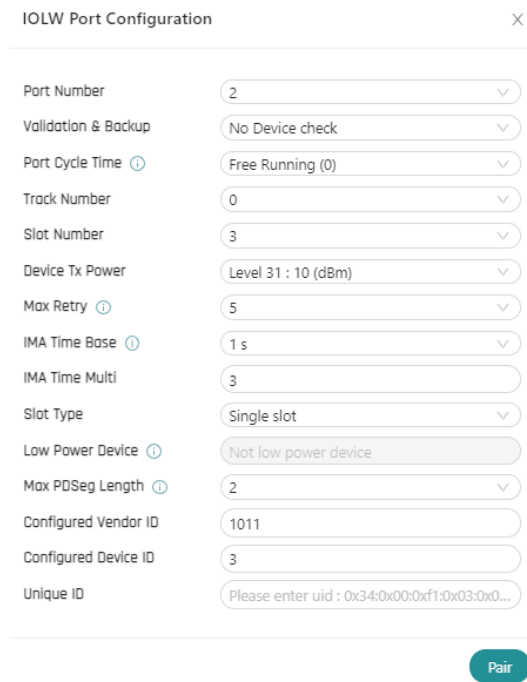


Figure 20 – IOLW Master Configuration

5. Click the **Pair** button.
6. Once fully paired, the **Port Mode** status should change to **Operate** status (Green Led)

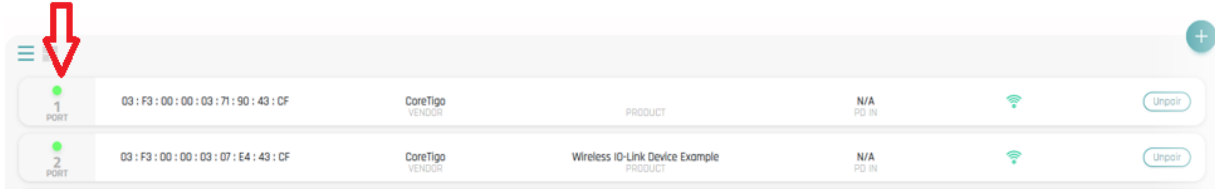


Figure 21 – Port Mode Status

#### 4.3.3. Process Data Monitoring (Cyclic)

After users have connected IO-Link devices to the TigoEngine software tool, it is possible to monitor the data by ticking the **Process Data Input** check box.

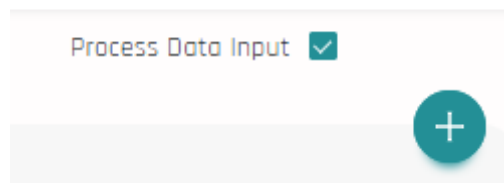


Figure 22 – Process Data Input

Upon ticking the tick box, users will be able to view the monitored IO-Link devices' process data. The data is displayed in hexadecimal base display.



**Note:**

PDin can only be enabled for IO-Link sensors. IO-Link actuators which do not support PDin will not have any data for them displayed.

#### 4.3.4. On-Demand Data Configuration (Acyclic)

The TigoEngine software tool enables the reading and writing of on-demand acyclic data of IO-Link devices. Each IO-Link device has its own set of on-demand parameters.



##### Reference:

IO-Link Devices – Data Sheet

View the example below of the ISDU reading process for vendor ID details of the Bus0029 sensor which is connected directly to one of the TigoBridge. For on-demand (acyclic) parameterization, the ISDU read and write functions can be found under the **Data** tab under connected port.

##### 4.3.4.1. ISDU Read

An ISDU read command is used to read on-demand parameters from any sensor connected to a TigoBridge.

The figure below illustrates a reading command of ProductID with index 16 [Hex] and subindex 0 from an Bus0029 sensor. It's hardware revision, 6.0, will be displayed by clicking on read button.

Details Port Configuration **Data** Device Configuration Process Data Events

ISDU Write

Data: Hex

Index: Hex  Subindex: Hex

ISDU read

Data: String  [ "0x00", "0x30", "0x2e", "0x36" ]

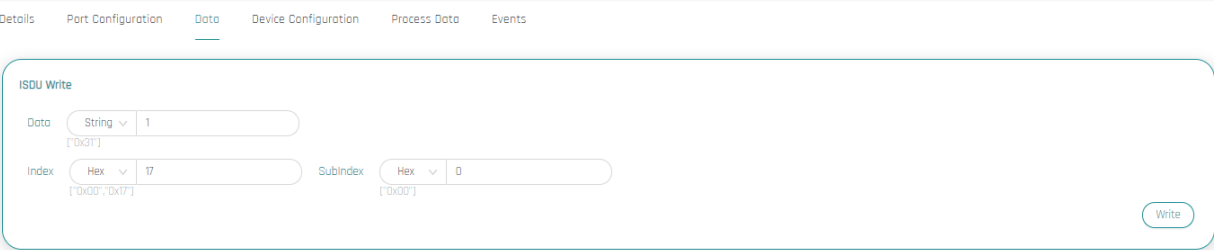
Index: Hex  [ "0x00", "0x16" ] Subindex: Hex  [ "0x00" ]

Success

Figure 23 – ISDU Read

#### 4.3.4.2. ISDU Write

An ISDU write command is used to write on-demand parameters to the Bus0029 sensor. The figure illustrates demonstrates such a writing command.



The screenshot shows a web interface for configuring an ISDU Write command. At the top, there are navigation tabs: Details, Port Configuration, Data (selected), Device Configuration, Process Data, and Events. Below the tabs is a form titled 'ISDU Write'. The form contains three input fields: 'Data' with a dropdown menu set to 'String' and a text input containing '1'; 'Index' with a dropdown menu set to 'Hex' and a text input containing '17'; and 'Subindex' with a dropdown menu set to 'Hex' and a text input containing '0'. Each input field has a small label below it indicating the format: ['0x31'] for Data, ['0x0D', '0x07'] for Index, and ['0x00'] for Subindex. A 'Write' button is located at the bottom right of the form.

Figure 24 – ISDU Write

### 4.4. Advanced Features

Advanced features of the TigoEngine software tool include the following features:

- IO-Link Wireless performance testing
- IO-Link Wireless statistics

Consult the reference below for further details on these features.



**Reference:**  
TigoEngine – User Manual

## 5. PLC Connection

This section describes how to independently establish a PLC connection in order to complete the kit setup and configuration. The PLC connection may be established through the PROFINET or EtherNet/IP protocol.

The figure below illustrates the kit topology which includes the user's local PLC station.



**Note:**

All kit components must be connected and powered before establishing a PLC connection.

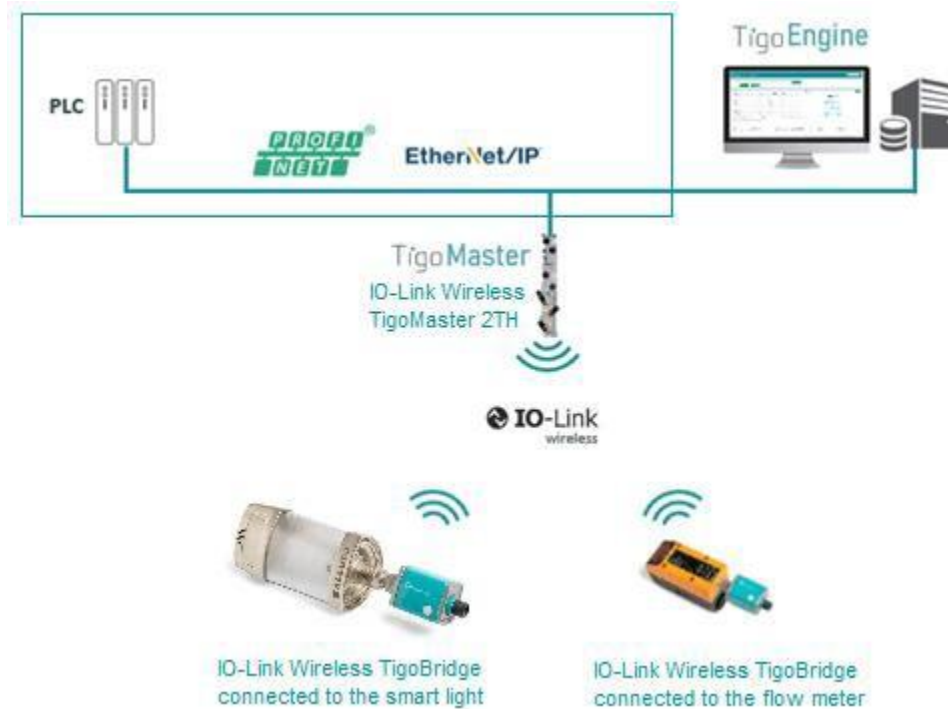


Figure 25 – PLC Connection

## 5.1. PROFINET Protocol

Follow the steps below to configure users' local PLC and establish a PLC connection over PROFINET.



### Note:

It is the user's responsibility to install and activate the required TIA portal locally in order to establish a PLC connection through the PROFINET protocol.

1. Establish a connection between a PLC subnet and the TigoMaster 2TH IO-Link Wireless Master.
2. Open the TIA portal.
3. Click the **Options** button in the top menu of the application.
4. Click the **Manage General Station Description (GSD) Files** option in the list.

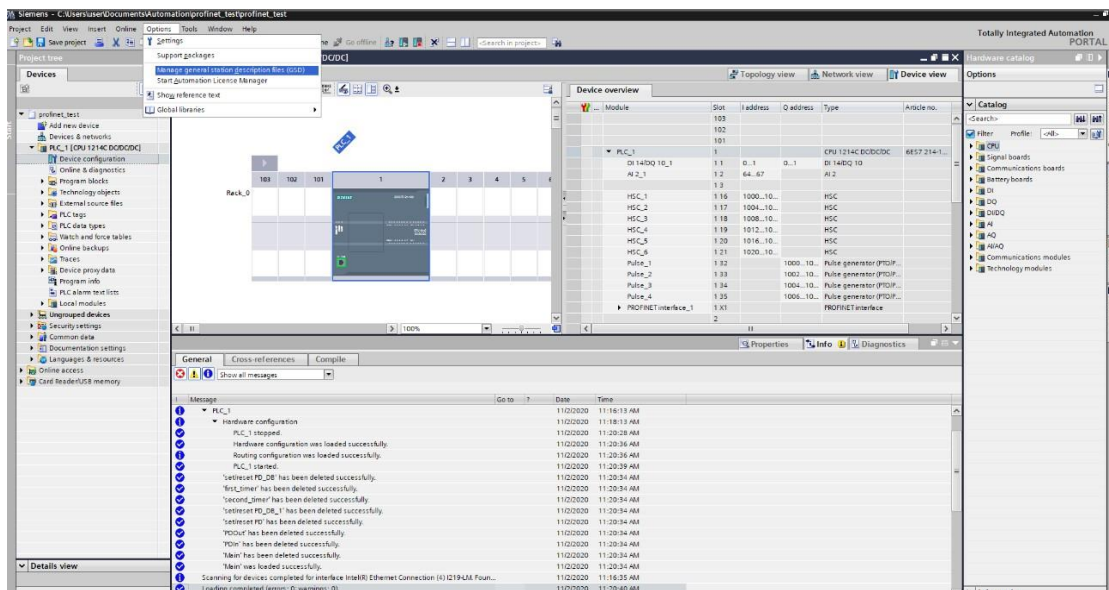


Figure 26 – Manage GSD Files

5. A pop-up window will open with a list of available GSD files received from CoreTigo Ltd.
6. Select the relevant GSD file under the **Installed GSDs** tab.
7. Click the **Install** button.

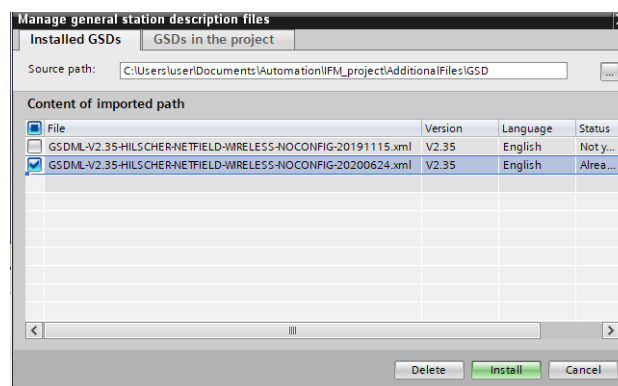


Figure 27 – Installed GSDs

- Locate and click the TigoMaster 2TH IO-Link Wireless Master under the **Catalog** tab on the screen.

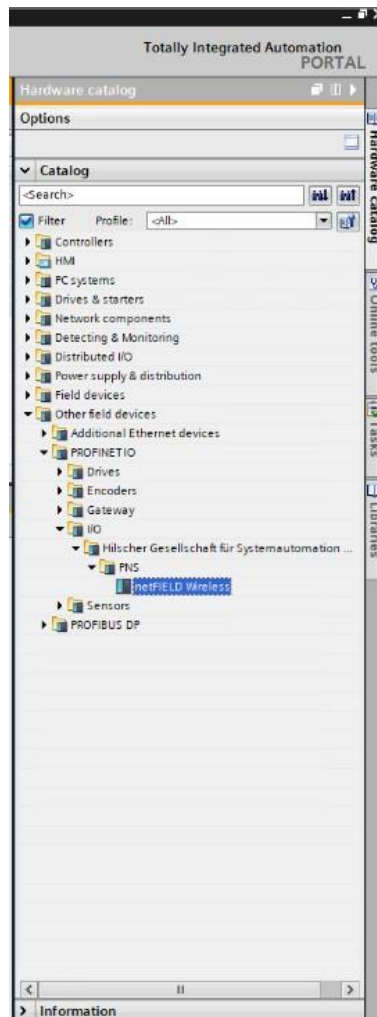


Figure 28 – Catalog

- Draw a connection between the IO-Link Wireless Master and PLC under the **Network View** tab.

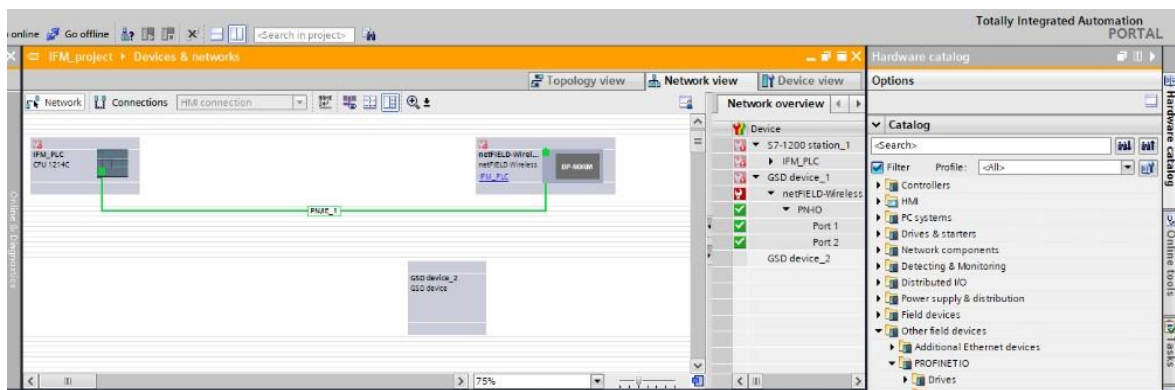


Figure 29 – Network View

10. Click the **Device View** tab.
11. Make sure to verify that the **PROFINET Device Name** field matches the supplied TigoMaster 2TH IO-Link Wireless Master's name under **General** tab of the **Properties** tab.

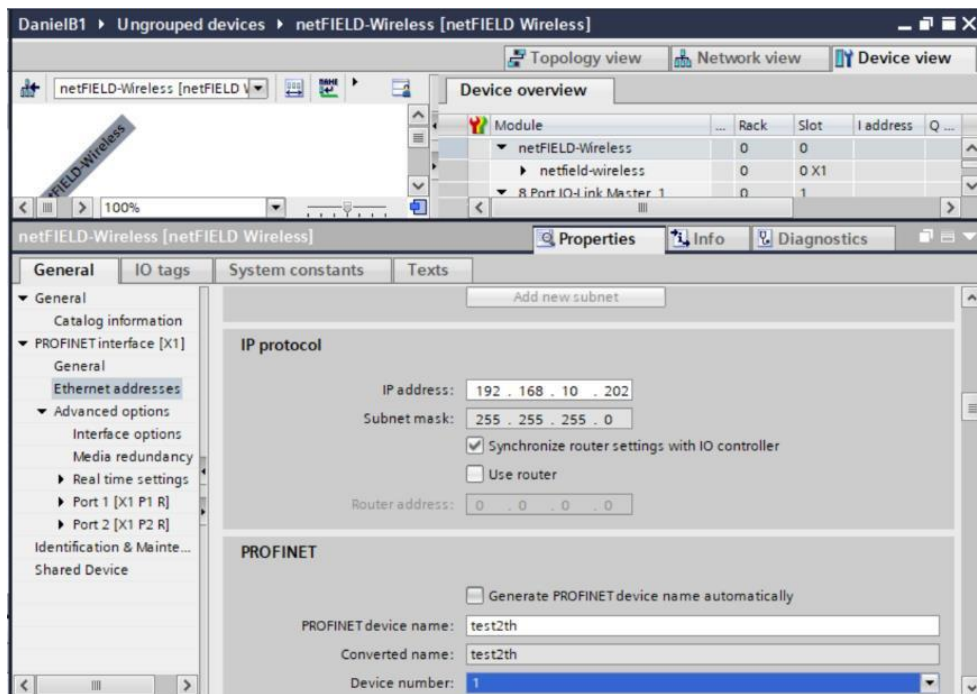


Figure 30 – PROFINET Device Name

12. Select a device from the available device list under the **Catalog** tab.
13. Drag it to the list under the **Device Overview** tab.

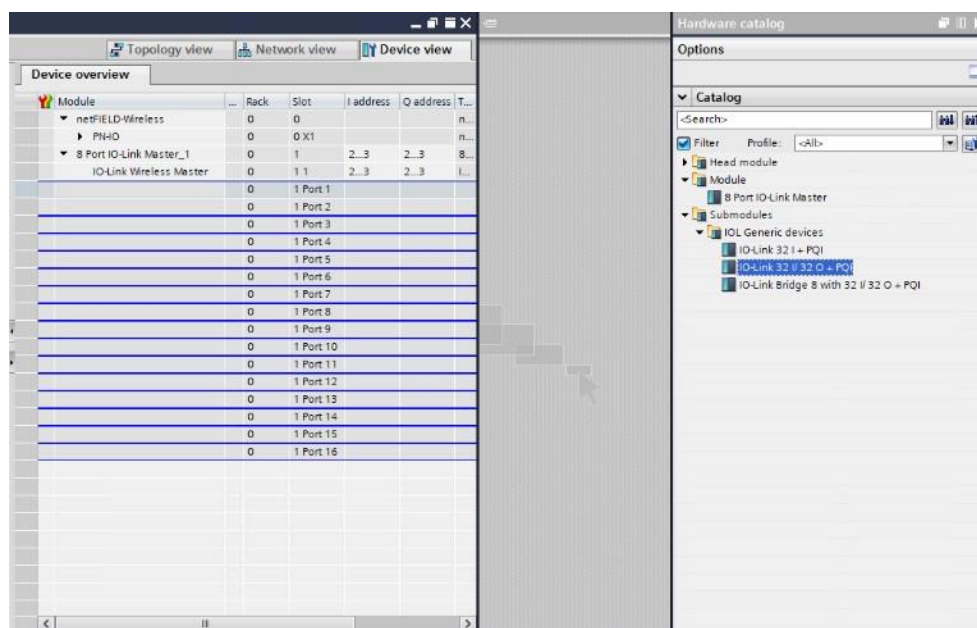


Figure 31 – Device Overview



- Make sure to fill in the **Wireless Unique ID of the W-Device** field with a unique device ID under the **General** tab of the **Properties** tab.

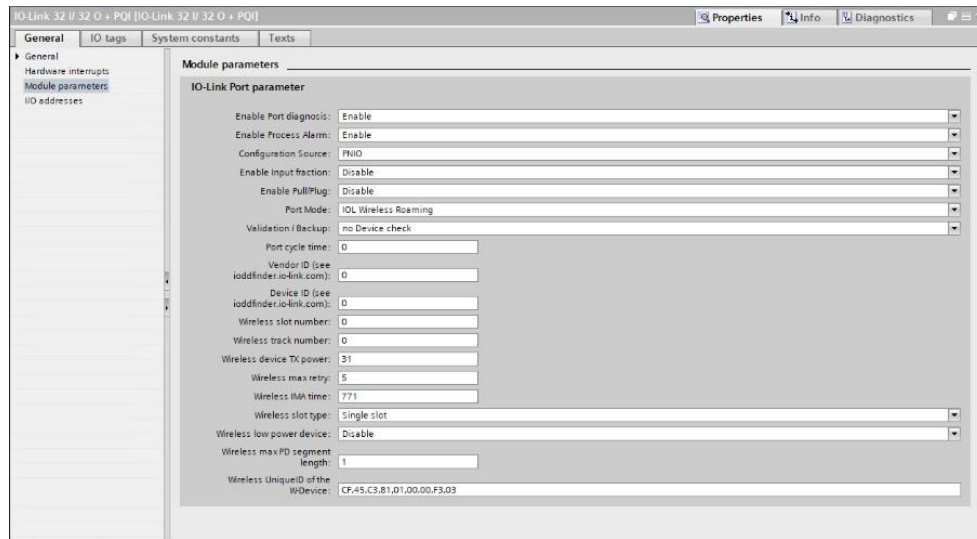


Figure 32 – Wireless Unique ID of the W-Device

- Click the **Show All Tags** option under the **PLC Tags** folder of the **Devices** tab.

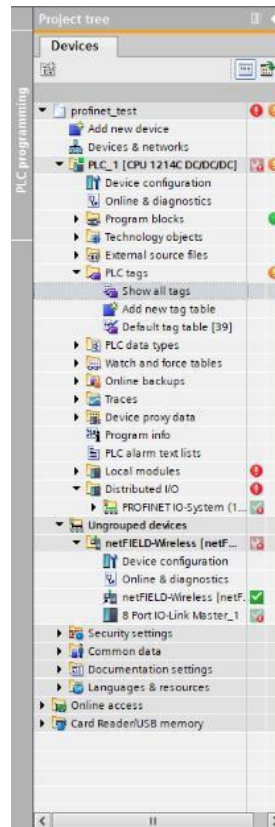


Figure 33 – PLC Tags

16. Set the W-Device tags under the **Tags** tab.

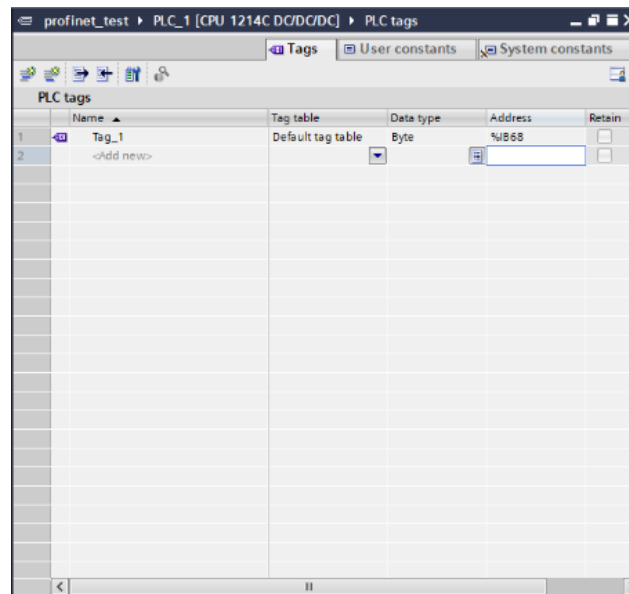


Figure 34 – Tags

17. Click the **Watch Table\_1** option under the **Watch and Force Tables** folder of the **Devices** tab to set the watch parameters.

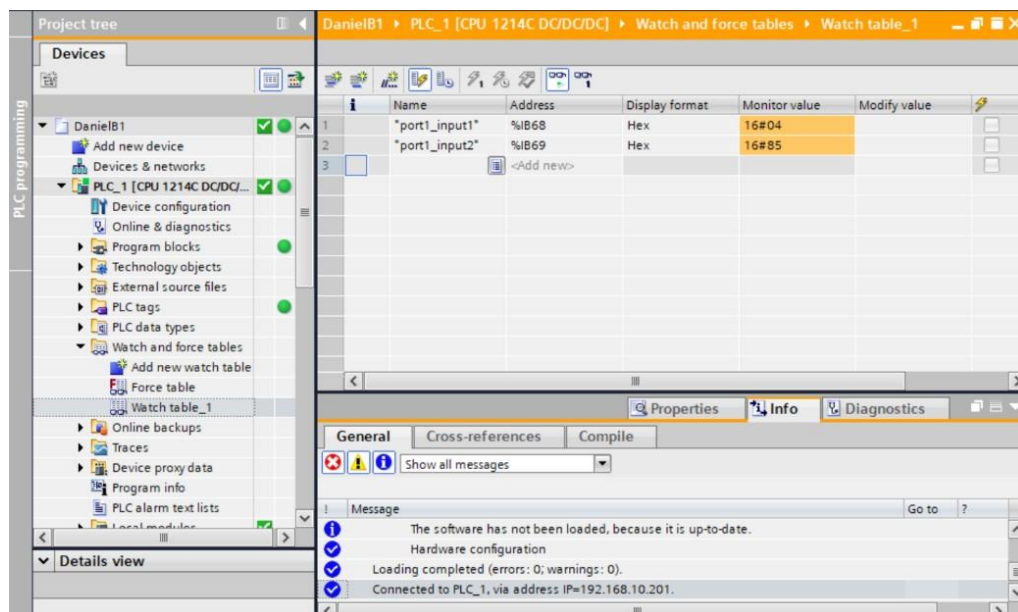


Figure 35 – Watch Table

18. Return to the watch table in order to monitor W-Device data for the IO-Link Wireless TigoBridge and IO-Link Wireless sensors and actuators inside the table.

## 5.2. EtherNet/IP Protocol

Follow the steps below to configure users' local PLC and establish a PLC connection over EtherNet/IP.



**Note:**

It is the user's responsibility to install and activate the required *Studio 5000* software tool locally in order to establish a PLC connection through the EtherNet/IP protocol.

1. Establish a connection between a PLC subnet and the TigoMaster 2TH IO-Link Wireless Master.
2. Open the *Studio 5000* software tool.
3. Click the **Logix** option under the **New Project** window in the application.
4. Click the relevant file in the list.
5. Click the **Next** button.

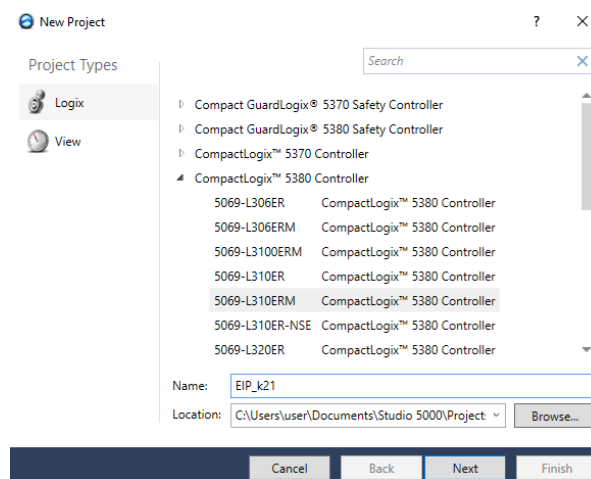


Figure 36 – New Project

6. Select the **Register a Single File** option in the **Rockwell Automation's EDS Wizard** window.
7. Click the **Next** button.

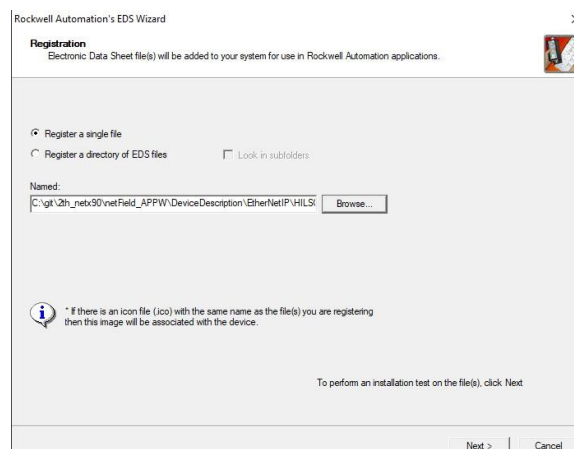


Figure 37 – Watch Table

8. Update the new **Module Definition** by setting an exclusive owner (16 bytes per IO-Link port).
9. Use **RSLinx** to connect the netFIELD TigoMaster 2TH to the PLC. The figures below provide an example for 192.168.1.3.

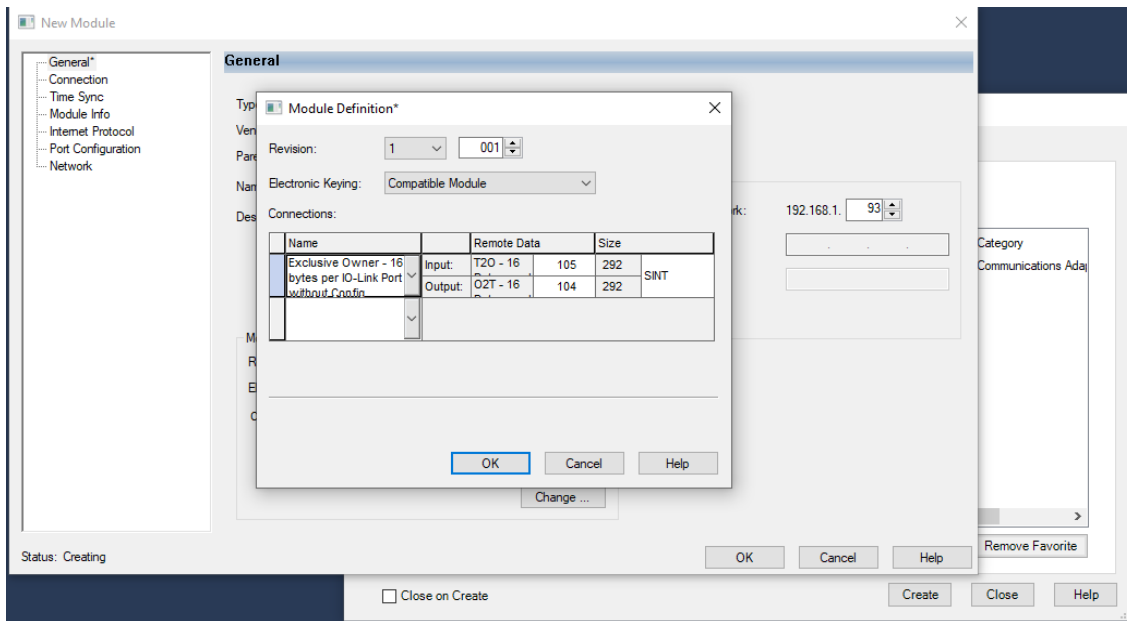


Figure 38 – First Connection Example (1)

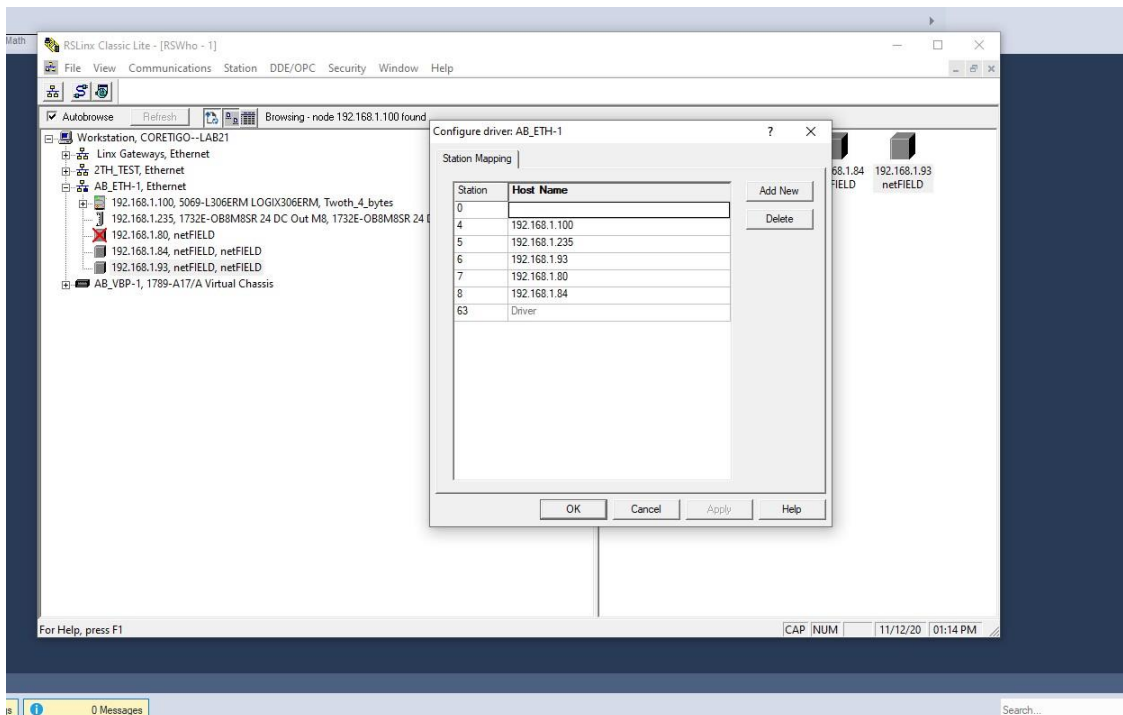


Figure 39 – First Connection Example (2)



**Note:**

When configuring the netFIELD TigoMaster 2TH, make sure the same subnet is used for the PLC and TigoMaster 2TH. Once set, TigoMaster 2TH data will be visible on the PLC side.

10. Set the path to the destination PLC. See the example below of 192.168.1.100.

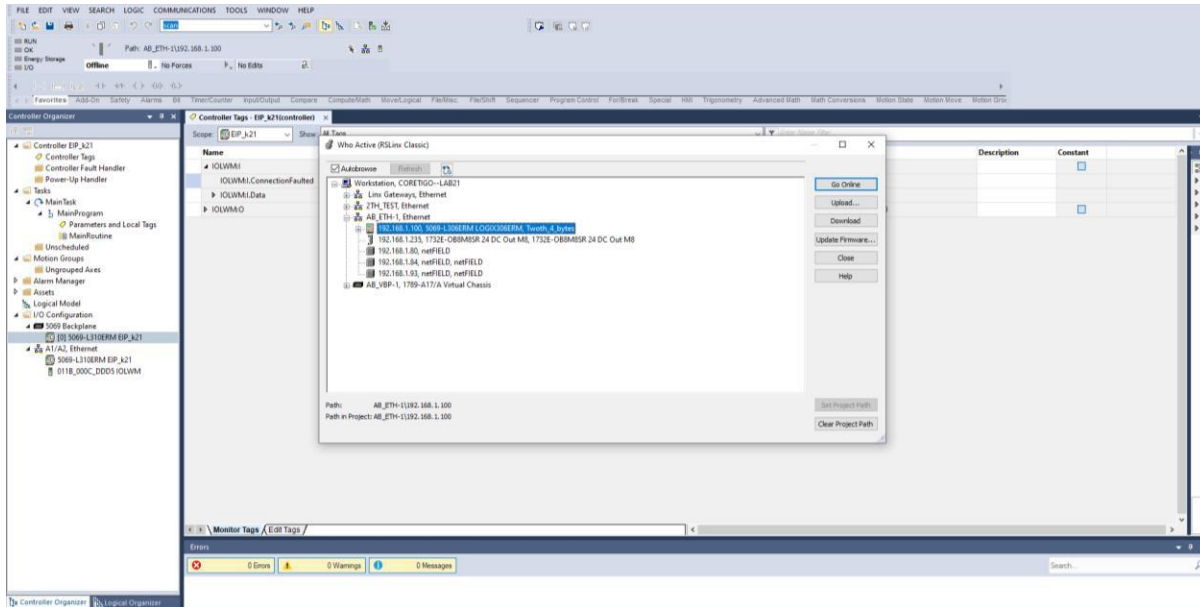


Figure 40 – Second Connection Example (1)

Item	Name	Value	Force Mask	Style	Data Type
IOLWM:I	IOLWM:I.ConnectionFaulted		0	Decimal	BOOL
	IOLWM:I.Data		{...}	Decimal	SINT[292]
id Local Tags	IOLWM:I.Data[0]		-1	Decimal	SINT
	IOLWM:I.Data[1]		0	Decimal	SINT
	IOLWM:I.Data[2]		0	Decimal	SINT
	IOLWM:I.Data[3]		0	Decimal	SINT
	IOLWM:I.Data[4]	2#1000_0000		Binary	SINT
	IOLWM:I.Data[5]		0	Decimal	SINT
	IOLWM:I.Data[6]		27	Decimal	SINT
	IOLWM:I.Data[7]		86	Decimal	SINT
	IOLWM:I.Data[8]		0	Decimal	SINT
	IOLWM:I.Data[9]		0	Decimal	SINT
	IOLWM:I.Data[10]		0	Decimal	SINT
	IOLWM:I.Data[11]		0	Decimal	SINT
	IOLWM:I.Data[12]		0	Decimal	SINT
	IOLWM:I.Data[13]		0	Decimal	SINT
	IOLWM:I.Data[14]		0	Decimal	SINT
	IOLWM:I.Data[15]		0	Decimal	SINT
	IOLWM:I.Data[16]		0	Decimal	SINT
	IOLWM:I.Data[17]		0	Decimal	SINT
	IOLWM:I.Data[18]		0	Decimal	SINT
IOLWM:I.Data[19]		0	Decimal	SINT	

Figure 41 – Second Connection Example (2)

11. Visit the controller tags to view the IOLW input date, the sample 2byte, and sensor data.



**Note:**

The TigoMaster 2TH configuration and related device links are controlled via netFIELD and/or the supplied TigoEngine software tool.

## Appendix A – Part Numbers

This product has either one Part Number depending on the protocol used:

- **PROFINET:** CT2-EVAL-K22-PN
- **EtherNet/IP:** CT2-EVAL-K22-EIP

This product's Part Numbers are generated according to the following format:

- **Generation:** 2
- **Protocol:** EVAL
- **Character Identifier of Features:** K22
- **Version:** PN or EIP

CTG-ZZZZ-iii-vv(v)			
G	ZZZZ	iii	vv(v)
Generation	Protocol	Character Identifier of Features	Version

## Appendix B – Evaluation Agreement

IMPORTANT – PLEASE READ CAREFULLY THE TERMS OF THIS EVALUATION AGREEMENT (“AGREEMENT”). BY CLICKING “I ACCEPT” OR OTHER SIMILAR BUTTON OR BY DOWNLOADING, INSTALLING, ACCESSING AND/OR USING THE PRODUCT (AS DEFINED BELOW), YOU EXPRESSLY ACKNOWLEDGE AND AGREE THAT YOU, OR THE COMPANY YOU REPRESENT, (“YOU” OR “COMPANY”) ARE ENTERING INTO A LEGAL AGREEMENT WITH CORETIGO LTD. (“CORETIGO”), AND HAVE UNDERSTOOD AND AGREE TO COMPLY WITH, AND BE LEGALLY BOUND BY, THE TERMS AND CONDITIONS OF THIS AGREEMENT, AS OF THIS DATE (“EFFECTIVE DATE”). FURTHERMORE, YOU HEREBY WAIVE ANY RIGHTS OR REQUIREMENTS UNDER ANY LAWS OR REGULATIONS IN ANY JURISDICTION WHICH REQUIRE AN ORIGINAL (NON-ELECTRONIC) SIGNATURE OR DELIVERY OR RETENTION OF NON-ELECTRONIC RECORDS, TO THE EXTENT PERMITTED UNDER APPLICABLE LAW. IF YOU DO NOT AGREE TO BE BOUND BY THIS AGREEMENT PLEASE DO NOT DOWNLOAD, INSTALL OR USE THE PRODUCT.

THE PRODUCT MAY BE USED SOLELY FOR YOUR PERSONAL, NON-COMMERCIAL PURPOSES. FOR COMMERCIAL PURPOSES PLEASE CONTACT CORETIGO’S SUPPORT TEAM AT <https://www.coretigo.com/support>.

- 1. Purpose.** The purpose of this Agreement is to enable Company to internally evaluate CoreTigo’s Product (as defined hereunder), pursuant to which Company may determine whether it has further interest in signing and executing a definitive license agreement with CoreTigo, with respect thereto. In accordance herewith, CoreTigo and Company have agreed to the terms and conditions set forth hereunder:
- 2. Product.** As used herein “Product” shall mean CoreTigo’s proprietary product, as set forth in CoreTigo’s quotation attached hereto and/or associated and referencing this Agreement, including without limitation, any software or hardware components thereof, any user’s guides and/or technical manuals or other documentation delivered by CoreTigo to Company along with the Product (“Documentation”), and any revisions, improvements, updates and upgrade thereof, to the extent delivered. The Product shall be licensed to Company under and subject to the terms of this Agreement and shall be installed by Company on Company’s computers at its premises.
- 3. License Grant.** CoreTigo hereby grants Company a limited, personal, non-exclusive, non-transferable, non-sublicensable, fully revocable right to use the Product internally for the sole purpose of evaluating the Product’s capabilities and evaluating whether to enter into a commercial agreement for the licensing of the Product (“Evaluation”). The Evaluation shall be limited to Company’s use of the Product for non-commercial use only. The Evaluation period is limited to 90 days (“Evaluation Period”). The results of the Evaluation and the outcome of the Evaluation shall not be used for any commercial purpose by Company and shall be destroyed by Company at the end of the Evaluation Period. Company shall be solely responsible to ensure that the Product is securely installed and used.
- 4. Prohibited Uses.** Except as specifically permitted in Section 3 above, Company agrees not to: (i) copy, modify, merge or sub-license the Product; and (ii) use the Product for any commercial purpose; and (iii) sell, license (or sublicense), lease, assign, transfer, pledge, or share its rights under this Agreement with/to anyone else; and (iv) modify, disassemble, decompile, reverse engineer, revise or enhance the Product or attempt to discover the Product’s source code; and (v) changing any proprietary rights notices which appear in the Product. Company shall comply with all laws and regulations applicable to its business and use of Product and with any terms and conditions imposed by cloud services providers, to the extent applicable.

5. **Price and Payment Terms.** Company agrees to compensate CoreTigo for the Evaluation in the amount as set forth in the quotation attached hereto and/or associated and referencing this Agreement, which shall be paid prior to and as a contingent of the delivery of the Product. The foregoing payment shall be made free and clear of, and without reduction for sales, use, value added, excise, withholding or similar tax, which shall be at the sole responsibility of Company.
6. **Title and Ownership.** The Product is a valuable trade secret of CoreTigo and any disclosure or unauthorized use thereof will cause irreparable harm and loss to CoreTigo. All right, title and interest in and to the Product, any derivatives thereof and modifications thereto, including associated intellectual property rights (including, without limitation, patents, copyrights, trade secrets, trademarks, etc.), evidenced by or embodied in and/or attached/connected/related to the Product, are and will remain with CoreTigo. To dispel any doubt, the results of the Evaluation shall be considered CoreTigo's Confidential Information (as defined hereunder). This Agreement does not convey to Company an interest in or to the Product, but only a limited revocable right of use in accordance with the terms herein. Nothing in this Agreement constitutes a waiver of CoreTigo's intellectual property rights under any law.
7. **Suggestions and Feedback.** It is understood that Company may, at its sole discretion, provide CoreTigo with suggestions and/or comments with respect to the Product ("Feedback"). Company represents that it is free to do so and that it shall not provide CoreTigo with Feedback that infringes upon third parties' intellectual property rights. Company further acknowledges that notwithstanding anything herein to the contrary, any and all rights, including intellectual property rights in such Feedback shall belong exclusively to CoreTigo and that such shall be considered CoreTigo's Confidential Information. It is further understood that use of Feedback, if any, may be made by CoreTigo at its sole discretion, and that CoreTigo in no way shall be obliged to make use of any kind of the Feedback or part thereof.
8. **Content.** Company shall be solely responsible for any content and data used or optimized by Company by means of the Product.

UNDER NO CIRCUMSTANCES WHATSOEVER WILL CORETIGO BE LIABLE IN ANY WAY FOR ANY CONTENT AND/OR DATA INCLUDING, WITHOUT LIMITATION, FOR ANY ERRORS OR OMISSIONS IN ANY CONTENT AND/OR DATA, OR FOR ANY INFRINGEMENT OF THIRD PARTY'S RIGHT, LOSS OR DAMAGE OF ANY KIND INCURRED AS A RESULT OF THE USE OF THE CONTENT, DATA AND/OR THE PRODUCT.

9. **Support.** During the Evaluation Period, CoreTigo shall make reasonable efforts to provide Company assistance via telephone, facsimile or email to answer any questions or concerns relating to the Product. Such assistance shall be provided at no charge to Company.
10. **Warranty Disclaimer.**

COMPANY ACKNOWLEDGES THAT THE PRODUCT IS PROVIDED "AS IS", AND CORETIGO DISCLAIMS ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OF NON-INFRINGEMENT OF THIRD PARTIES' RIGHTS, INCLUDING INTELLECTUAL PROPERTY RIGHTS.
11. **High Risk Activities.** Company hereby acknowledges that the Product is not fault tolerant and is not designed, manufactured or intended for use or resale as on-line control equipment in hazardous or high risk environments and activities requiring fail-safe performance (such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines



and/or devices, or weapons systems), in which the failure of the Product could lead directly to death, personal injury or severe physical or environmental damage, and Company hereby agrees not to use or allow the use of the Product or any portion thereof for, or in connection with, any such environment or activity.

## **12. Limitation of Liability.**

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, CORETIGO, ITS OFFICERS, DIRECTORS AND/OR EMPLOYEES, SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY PERFORMANCE OF THIS AGREEMENT OR IN FURTHERANCE OF THE PROVISIONS OR OBJECTIVES OF THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO FOR ANY LOSS OR DAMAGE TO BUSINESS EARNINGS, LOST PROFITS OR GOODWILL, LOST OR DAMAGED DATA OR DOCUMENTATION, AND COSTS OF PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES SUFFERED BY COMPANY AND/OR ANY ENTITY AND/OR PERSON ARISING FROM AND/OR RELATED/CONNECTED TO ANY USE OF THE PRODUCT, EVEN IF CORETIGO IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COMPANY'S SOLE RECOURSE IN THE EVENT OF ANY DISSATISFACTION WITH THE PRODUCT IS TO STOP USING IT AND RETURN IT TO CORETIGO. IN ANY EVENT, CORETIGO'S LIABILITY UNDER THIS AGREEMENT SHALL NOT EXCEED THE AMOUNTS ACTUALLY RECEIVED BY CORETIGO HEREUNDER.

- 13. Indemnification.** Company hereby agrees that CoreTigo shall have no liability whatsoever for any use made of the Product by Company or any third party. Company hereby agrees to defend, indemnify and hold harmless CoreTigo and its affiliates and their respective officers, directors and employees, from any and all claims, damages, liabilities, costs and expenses (including reasonable attorney's fees) arising from claims related to Company's use of the Product, as well as from Company's failure to comply with the terms of this Agreement.
- 14. Third Party and Open Source Software.** The Product contains software provided by third parties, and such third parties' software is provided "AS IS" without any warranty of any kind, and subject to the license terms attached to such third party software, the provisions of this Agreement shall apply to all such third party software providers and third party software as if they were CoreTigo and the Product respectively. In addition, this Product contains open source components. Such open source components are protected under copyright law and are licensed to under specific license terms. Please see the license.txt file included in the Product and available for Company upon request for the applicable license terms of the open source components.
- 15. Confidentiality.** All information disclosed by either party ("Disclosing Party") to the other party ("Receiving Party"), prior to or during the Evaluation Period, whether in writing, orally or in any other form which is not in the public domain ("Confidential Information"), shall be held in absolute confidence, and Receiving Party shall take all reasonable and necessary safeguards (affording the Confidential Information at least the same level of protection that it affords its own information of similar importance) to prevent the disclosure of such Confidential Information to third parties. In addition, Receiving Party will limit its disclosure of the Confidential Information to employees and consultants with a "need to know" and only in the context of such employees' and consultants' fulfillment of their duties under this Agreement, and further provided that such employees and consultants are engaged in a confidentiality agreement with the Receiving Party with terms and conditions similar to the confidentiality terms under this Agreement and that Receiving Party shall remain liable for any breach of the terms herein by any of its employees and consultants. The provisions of this paragraph shall survive termination or expiration of this Agreement, for any reason whatsoever.

It is agreed that the following shall not be considered Confidential Information: (i) information that is already known to the Receiving Party at the time of disclosure, as such may be evidenced in the Receiving Party's written records; (ii) information that is or becomes known to the general public through no act or omission of the Receiving Party in breach of this Agreement; (iii) information that is disclosed to the Receiving Party by a third party who is not in breach of an obligation of confidentiality; or (iv) information that was or is independently developed by the Receiving Party without use of any of the Confidential Information, as such may be evidenced in the Receiving Party's written records.

It is further agreed that the Receiving Party may disclose any information pursuant to a court order, provided the Receiving Party notifies the Disclosing Party of such order and uses reasonable efforts to limit such disclosure only to the extent required. For avoidance of doubt, the source code of the Product constitutes Confidential Information of CoreTigo.

**16. Injunctive Relief.** Each party agrees that the wrongful disclosure of Confidential Information may cause irreparable injury that is inadequately compensable in monetary damages. Accordingly, and notwithstanding Section 18 below, either party may seek injunctive relief in any court of competent jurisdiction for the breach or threatened breach of this Section in addition to any other remedies in law or equity.

**17. Term and Termination.**

**17.1.** This Agreement shall become valid on the Effective Date and shall remain in effect until completion of the Evaluation Period, unless earlier terminated as provided below.

**17.2.** Either party shall have the right to terminate this Agreement upon 7 days' prior written notice to the other party.

**17.3.** The license granted for the Evaluation shall terminate immediately upon written notice from CoreTigo in the event of Company's use of the Product for purposes other than the Evaluation and/or any other failure of Company to comply with any provision of this Agreement.

**17.4.** Upon the earlier of expiration or termination of this Agreement: (i) the license granted hereunder shall immediately terminate; (ii) Company shall return or, at Company's request, the Product and all of CoreTigo's Confidential Information to CoreTigo and shall destroy all copies of the Product contained in any of its systems, and (iii) CoreTigo shall erase or otherwise destroy all copies of the Company's Confidential Information, which was disclosed to CoreTigo under this Agreement. Upon request of either party, the other party shall certify in writing to the other its compliance with the terms of this Section 17.4.

**17.5.** Without derogating from any of the terms set forth above, Company further agrees that following the expiration or termination of this Agreement it shall not make any commercial use whatsoever of the content optimized by using the Product.

**18. General.** If any provision, or part thereof, of this Agreement is held to be unenforceable for any reason, such provision shall be reformed only to the extent necessary to make it enforceable and such reform shall not affect the enforceability of such provision under other circumstances, or of the remaining provisions hereof under all circumstances. This Agreement shall be governed by and construed in accordance with the laws of the State of Israel and only the competent courts of Tel Aviv-Jaffa shall have jurisdiction over any dispute arising from this Agreement.

The following Sections shall survive termination of this Agreement: 4, 6, 7, 8, 10, 11, 13, 15, 16, 17.3, 17.4, 17.5 and 18.

Company shall not assign and/or subcontract any of its rights and obligations under this Agreement, except with CoreTigo's prior written consent. CoreTigo may assign any of its rights and/or obligations hereunder at its sole discretion. The parties have read this Agreement, and agree to be bound by its terms, and further agree that it constitutes the complete and entire agreement of the parties and supersedes all previous communications between them, oral or written, relating to the subject matter hereof. No representations or statements of any kind made by either party that are not expressly stated herein shall be binding on such party. Either party may use its standard business forms (such as purchase orders) or other communications to administer transactions under this Agreement but use of such forms is for the parties' convenience only and does not alter the provisions of this Agreement. Any terms or conditions that are preprinted in such forms or that are included in a quotation and/or order acknowledgement are null, void, and of no effect. A waiver of any provision will not constitute a continuing waiver of such provision or a waiver of any other provision. Failure by either party to demand performance or claim a breach of this Agreement will not constitute a waiver or otherwise affect the rights of such party.

This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one in the same instrument.