RFID OsiSense® XG

EtherNet/IP Splitter Box

User Guide

Original instructions



Telemecanique Sensors

www.telemecaniquesensors.com

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Our product should be installed, operated and maintained only by qualified personnel. Neither TMSS France nor any of its subsidiaries or other affiliated companies shall be responsible or liable for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE : Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer’s instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer’s instructions and the machinery used with the electrical equipment.
- Only those operational adjustments required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

Document Scope

This document describes OsiSense® XG XGSZ33EIP EtherNet/IP splitter box.

The OsiSense® XG EtherNet/IP splitter box enables OsiSense® XG compact RFID smart antennas to be connected on an EtherNet/IP network in distributed automation systems using pre-assembled cables.

This splitter box is used to connect three XGCS compact smart antennas on an EtherNet/IP network (up to 15 smart antennas could be connected with T-connectors).

As a server on the network, the splitter box can receive and respond to data messages.

This data exchange allows your network accessing some OsiSense® XG smart antenna functions, such as:

- reading/writing tags
- control and command
- monitoring
- diagnostics

Validity Note

The technical characteristics of the device(s) described in this manual also appear online. To access this information online:

Step	Action
1	Go to www.telemecaniquesensors.com
2	In the **Search** box, type the model number of a product or the name of a product range. Do not include blank spaces in the model number/product range.
3	If more than one model number appears in the **Products** search results, click the model number that interests you.
4	To save or print a data sheet as a .pdf file, click **Download product datasheet.**

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of Documentation	Reference Number
User Guide: Compact Stations	W916556690111

You can download these technical publications and other technical information from our website at www.telemecaniquesensors.com.

Cybersecurity

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

⚠ WARNING

UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS

- In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cybersecurity concept.
- Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering IT security and cybersecurity (such as ISO/IEC 27000 series, ISO/ IEC 15408-1, IEC 62351 series, ISA/IEC 62443 series, Common Criteria for Information Technology Security Evaluation, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security).
- Verify the effectiveness of your IT security and cyber security systems using appropriate, proven methods.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Consult the TMSS Cybersecurity Best Practices (www.telemecaniquesensors.com) for additional information.

Presentation

Introduction

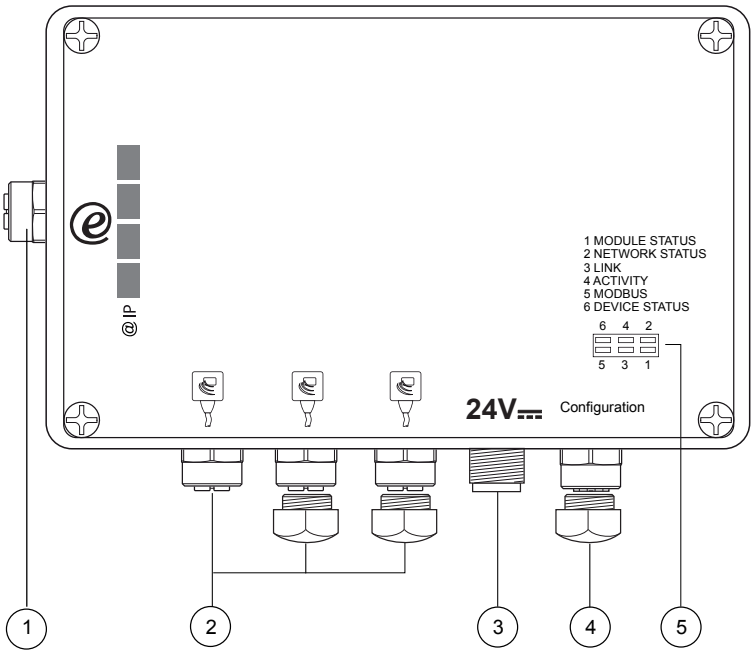
This chapter presents the OsiSense® XG EtherNet/IP splitter box and the associated range of accessories.

Overview

Introduction

This section gives a detailed technical description of the OsiSense® XG EtherNet/IP splitter box.

Description



N°	Description
1	EtherNet/IP connector (M12 4-pin female, D-coding)
2	Compact smart antenna connectors (M12 5-pin female, A-coding)
3	Power supply connector (M12 4-pin male, A-coding)
4	Configuration port (M12 female, A-coding) (for internal use only)
5	Diagnostic LEDs for EtherNet/IP and Modbus fieldbuses, splitter box status

Overview of the Accessories Range

Connection Accessories

Use the following components for wiring (please refer to TMSS catalogs for more information):

Connector N°	Type of cable / connectors	Type of equipment to be connected	Cable length (m)	Reference
1	IP67 straight-through cable 4-pin M12 male A / RJ45 male	Switch Hub	1	TCSECL1M3M1S2
			3	TCSECL1M3M3S2
			5	TCSECL1M3M5S2
			10	TCSECL1M3M10S2
			40	TCSECL1M3M40S2
2	Extension 5-pin M12 male A / M12 female	XGCS••••••• Ositrack compact smart antennas	1	TCSMCN1M1F1
			2	TCSMCN1M1F2
			5	TCSMCN1M1F5
			10	TCSMCN1M1F10
3	Extension 4-pin M12 female A / flying leads	24 Vdc Power supply	2	XGSZ09L2(1)
			5	XGSZ09L5(1)
			10	XGSZ09L10(1)
(1)XGSZ09L• cables replace XGSZ08L• cables from January 2008.				

NOTE: Refer to the Connexium IP67 catalog for the IP67 Ethernet cables and accessories.

Installation

Introduction

This chapter provides all required information for installing an OsiSense® XG EtherNet/IP splitter box.

Installing the Splitter Box

Description

The OsiSense® XG EtherNet/IP splitter box can be mounted directly onto a wall or a machine. Four threaded mounting holes have been provided for this purpose inside the splitter box.

⚠ WARNING

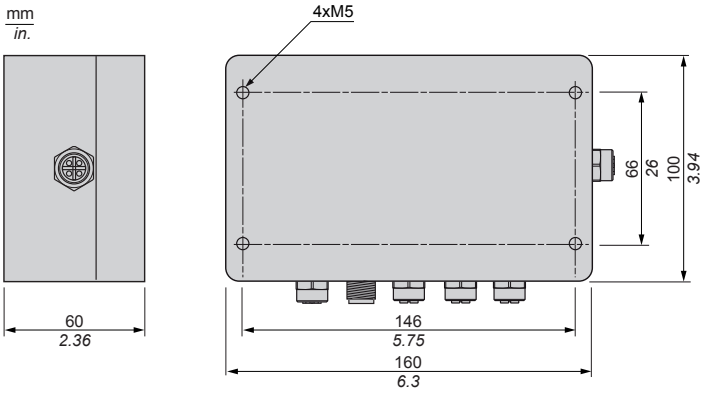
LOSS OF ENCLOSURE PROTECTION

To achieve enclosure protection level of IP65:

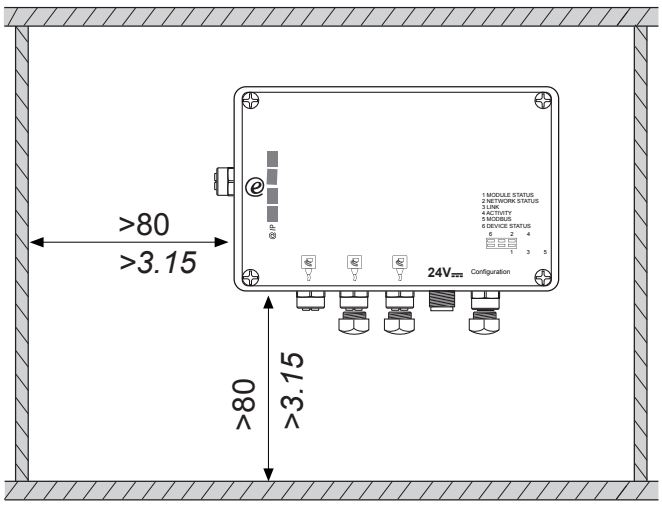
- Properly fit all connectors with cables or sealing plugs and tighten.
- Install cover onto the splitter box and tighten screws to 0.5-3.0 Nm *(4.4-26.5 lb-in)*.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Dimensions



Minimum Clearances



EMC Compatibility

Product Compliance



This product complies with the European directive 2014/30/EU on "electromagnetic compatibility".

The products described in this manual meet all the electromagnetic compatiblity (EMC) requirements and are compliant with the applicable standards. To maitain eletromagnetic compatibility in each particular end use application, the system designer must use EMC compliant and certified components and follow manufacturers instructions, work practices and applicable codes and standards related to EMC compliant installations.

The product described in this manual contains highly complex semiconductors that can be damaged or destroyed by electrostatic discharge (ESD). Care must be taken to avoid product damage from ESD. For example, the use of this product within the vicinity of devices rated as class A or B according to IEC 61000-4-4, may result in damage to this device. The effects of ESD damage, including the possibility of unintended equipment operation, may not be immediately detectable.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Where there is a risk of electromagnetic interference, the system designer must implement the protective measures:

- Do not expose electronic circuits to sources of Electrostatic Discharge.
- Avoid touching internal circuits with skin, clothing, or tools.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Cable Routing

Make sure that the following basic wiring rules are followed:

- Keep the data wire and the power cables apart from one another, in so far as is possible.
- Make sure there is a space of at least 10 cm *(3.94 in)* between the data wires and the power cables.
- The data wires and power cables must only cross at a right angle to one another.
- It is advisable to route the data wires and power cables through separate shielded ducts.
- When laying the cables, the noise voltage from other devices or wires must be considered. This particularly applies to frequency converters, motors and other devices or cables generating high frequency disturbances. High frequency sources and the cables described in this manual must be as far apart from each other as possible.
- The power supply must come from a Safety Extra Low Voltage (SELV) or a Protected Extra Low voltage (PELV) power unit.
- The 0V of the SELV or PELV power unit must be connected to the earth.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- The cabling routing rules listed above must be followed.
- Cable routing is important for proper Electromagnetic Compatibility (EMC).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Splitter Box Characteristics and Wiring

Introduction

This chapter provides an overall description of the characteristics and wiring of the OsiSense® XG EtherNet/IP splitter box.

Characteristics

Environment Characteristics

Characteristic		Description
Operating temperature		0...+55°C *(-32...+131°F)*
Storage temperature		-25...+85°C *(-13...+185°F)*
Relative humidity		30...95% non condensing
Degree of protection		IP65
Vibration resistance conforming to IEC 60068-2-6		2 mm from 5 to 29.5 Hz / 7 gn from 29.5 to 150 Hz
Shock resistance conforming to	IEC 60068-2-27	30 g/11 ms
Impact resistance conforming to	IEC 62262	Degree IK04
Dimensions (except connectors)		160 x 100x 60 mm *(6.3 x 3.94 x 2.36 in)*
Weight		871 g *(30.72 oz)*
Electromagnetic immunity conforming to	IEC 61000-6-2	Level 3
Electromagnetic emissions conforming to	EN 55022	Class B

⚠ WARNING

RADIO INTERFERENCE

- This Class B product may cause radio interference.
- Implement reduction techniques in applications where radio interference is objectionable.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Electrical Characteristics

Characteristic	Description
Power supply voltage	24 VDC SELV/PELV (range: 21.6 V...26.4 V)
Power consumption (splitter box only)	< 2.5 W
Connector	M12 4-pin male, A-coding

EtherNet/IP Fieldbus Characteristics

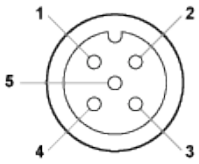
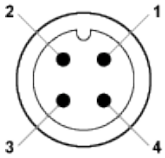
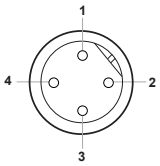
Characteristic	Description
Topology	Star
Data rate	10/100 Mbps
Physical interface	10 Base-T / 100 Base-Tx
Transmission media	Shielded twisted pairs, category CAT 5E
Connector	M12 4-pin, A-coding
Cyclic Transmitted Data (in words)	• Input: 5 for control + < 43 for user data• Output: 7 for control + < 41 for user data
Acyclic transmitted data	Not supported

RFID Smart Antenna Communication Characteristics

Characteristic	Description
Transmission rate	38400 Bits/s
Time-out	3 s (after 3 automatic retries)
Quantity of RFiD smart antenna	3 (direct connection) to 15 (chained with M12 tees)
Total length of the RFiD connections	160 m max *(525 ft)*
Connector	M12 5-pin female, A-coding

Connectors Description

Pin Assignment

Connector	Pin	Color	Assignment
Smart antennas connector (M12 5-pin female, A-coding) 	1	-	GND
	2	-	24 Vdc
	3	-	0 Vdc
	4	-	D0
	5	-	D1
Power supply connector (M12 4-pin male, A-coding)  Power supply cable XGSZ09L•• 	1	Red	24 Vdc
	2	-	Not connected
	3	Black	0 Vdc
	4	-	Not connected
EtherNet/IP connector (M12 4-pin female, D-coding) 	1	-	TD +
	2	-	RD +
	3	-	TD -
	4	-	RD -

NOTE: M12 connectors maximum tightening torque = 10 Nm *(88.5 lb-in)*.

Ethernet Network Interface

Introduction

This chapter provides theoretical background on EtherNet/IP fieldbus operation.

Wiring to the EtherNet/IP Fieldbus

Introduction

The following section describes the element required for wiring the splitter box to the EtherNet/IP fieldbus.

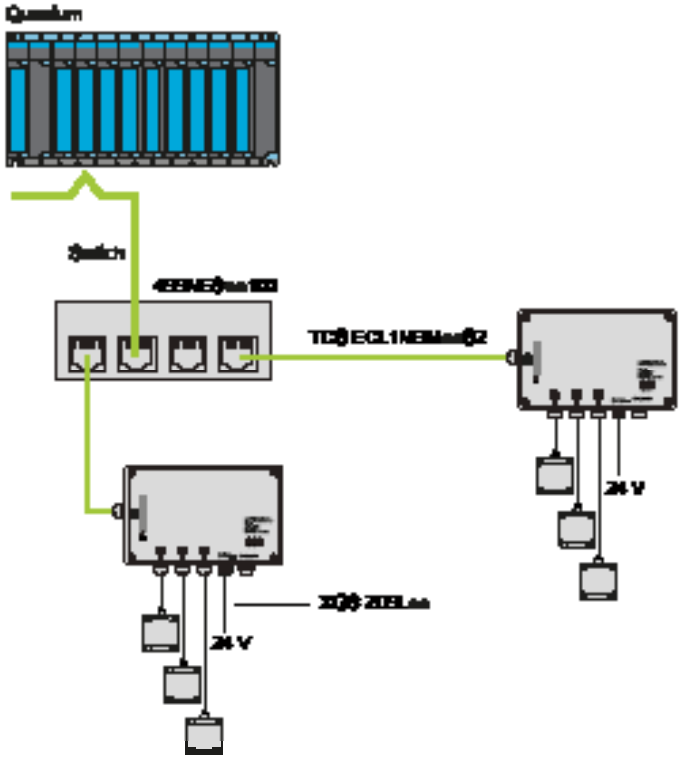
Fieldbus Connection

Description

The splitter box can either be connected to an EtherNet/IP client device, or to an Ethernet switch or hub in a star architecture.

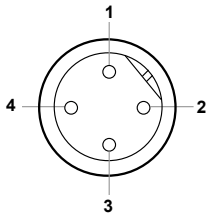
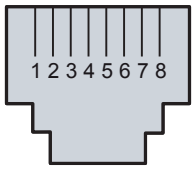
The fieldbus is connected via 4-pin M12 connectors (D-coding).

The following graphic represents of fieldbus connection with splitter boxes linked to a switch:



Correspondence Between M12 4-pin Connector and RJ45 Connector

The following table shows the correspondence between pins on M12 4-pin connector and on RJ45 connector:

M12 4-pin Connector	M12 Contact	Signal	RJ45 Contact	RJ45 Connector
	1	TD+	1	
	2	RD+	3	
	3	TD-	2	
	4	RD-	6	
	-	Not connected	4	
	-	Not connected	5	
	-	Not connected	7	
	-	Not connected	8	

Address Configuration

Introduction

IP address: Every item of equipment connected to an Ethernet network must have a unique IP address. This address makes it possible to refer to a specific unit.

Subnet mask: The subnet mask defines a range of IP addresses that can be accessed from an item of equipment.

The following table describes the standard IP subnet masks:

Network Class	Host Bits	Subnet Mask
A	24	255.0.0.0
B	16	255.255.0.0
C	8	255.255.255.0

The following table gives an example of accessible address ranges depending on the network class:

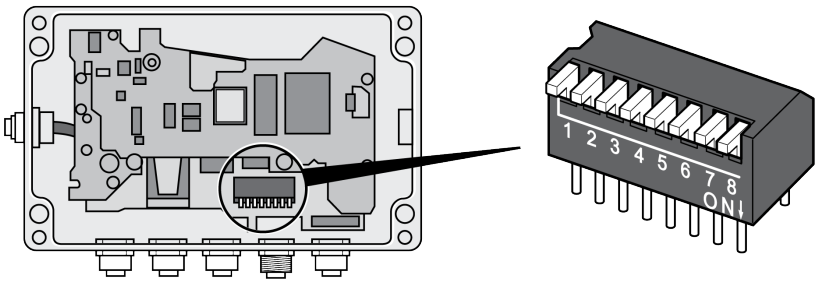
Network Class	Addresses	Accessible Addresses Ranges
B	IP: 192.168.0.1 Mask: 255.255.0.0	IP: 192.168.xxx.xxx
C	IP: 192.168.0.1 Mask: 255.255.255.0	IP: 192.168.0.xxx

NOTE: xxx represents a possible value from 0 to 255.

The configuration of the IP address can be made by:

- setting internal configuration switches
- setting parameters in the Web server embedded in the splitter box to:
  - manually set the IP address
  - automatically get an IP address from the DHCP server

Setting Internal Configuration Switches



Internal configuration switches can be set to:

- a non-zero value, forcing the splitter box to use an IP address in the range 192.168.0.1 to 192.168.0.255 defined by the switches position
- zero value, forcing the splitter box to use the IP address defined by the embedded Web server (the default IP address in the embedded Web server is set to 192.168.0.10). This value disables the configuration switches.

  NOTE: Switches are set to zero value as a default factory setting.

The following table describes the IP address value regarding the splitter box switches position:

SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	DHCP	Subnet	Gateway	IP Address
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Settings determined by the embedded Web server configuration page.			
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	255.255.255.0	192.168.0.255	192.168.0.1
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	255.255.255.0	192.168.0.255	192.168.0.2
...	...	...	...	...	...	...	...	...	...	...	...
ON	ON	ON	ON	ON	ON	ON	OFF	OFF	255.255.255.0	192.168.0.255	192.168.0.254
ON	ON	ON	ON	ON	ON	ON	ON	Invalid setting			

NOTE: The switches value is read once during the splitter box startup. Any changes performed on the switches value require a splitter box reset to be applied.

⚠ WARNING

EQUIPMENT DAMAGE

- Turn off power supplying the splitter box before opening the cover.
- Do not touch electrical circuit components contained in the splitter box.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

UNINTENDED EQUIPMENT DAMAGE

- Do not use factory configured IP address for operation.
- Assign a new IP address for operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Two or more splitter boxes with identical IP address on the same EtherNet/IP network generate loss of communication.

General Principles

Introduction

This section describes EtherNet/IP general description.

EtherNet/IP Connectivity

Introduction

The OsiSense® XG XGSZ33EIP allows to connect RFID smart antennas as a node on an EtherNet/IP local area network (LAN).

What is EtherNet/IP

EtherNet/IP (the Ethernet Industrial Protocol) is especially suited to factory applications in which there is an emphasis on control, configuration and information reporting. The ODVA-specified protocol runs CIP (Common Industrial Protocol) on top of standard Internet protocols, like TCP/IP and UDP. It is an open local (communications) network that enables the interconnectivity of all levels of manufacturing operations from the plant's office to the sensors and actuators on its floor.

> **NOTE**: For more information on standard EtherNet/IP specifications and mechanisms, refer to the ODVA home page (http://www.odva.org).

Transmission Rate

An OsiSense® XG XGSZ33EIP node resides on a baseband network with an auto-negotiated transmission rate of 10 or 100 Mbit/s.

Object Model

The EtherNet/IP specification is presented in terms of an abstract object model describing device characteristics and the manner in which network connections are established and managed. Each network node is modeled as a collection of objects that describe the node's available communication services and behavior. A device object model mapping is specific to its implementation on the network.

Device Profiles

The EtherNet/IP device models define the physical connections and promote interoperability among standard devices. Devices that implement the same device model must support common identity and communications status data. Device-specific data is contained in device profiles that are defined for various device types.

Typically, a device profile defines the device:

- object model
- I/O data format
- parameters that can be configured

What is an EDS

The EDS (Electronic Data Sheet) is a standardized ASCII file that contains information about a network device communications functionality and the contents of its object dictionary (as defined by ODVA). The EDS also defines device-specific and manufacturer-specific objects.

Your application may or may not require the EDS file.

Using the EDS, you can standardize tools to:

- configure EtherNet/IP devices
- design networks for EtherNet/IP devices
- manage project information on different platforms

EDS File

An EDS file is embedded in the OsiSense® XG XGSZ33EIP. This file can be downloaded by a PC connected to the web server embedded in the device, with a web browser. The address to be typed in the web browser is the IP address of the OsiSense® XG XGSZ33EIP (factory setting is 192.168.0.10).

I/O Data

The OsiSense® XG XGSZ33EIP splitter box provides two memory tables, where the clients (PLCs, HMI, etc.) connected to the EtherNet/IP network can exchange data with the group of OsiSense® XG RFID smart antennas connected to the splitter box.

The size of each table is defined by the client on the EtherNet/IP network, from the EDS file of the OsiSense® XG XGSZ33EIP splitter box.

Data Access to OsiSense® XG Smart Antenna

Introduction

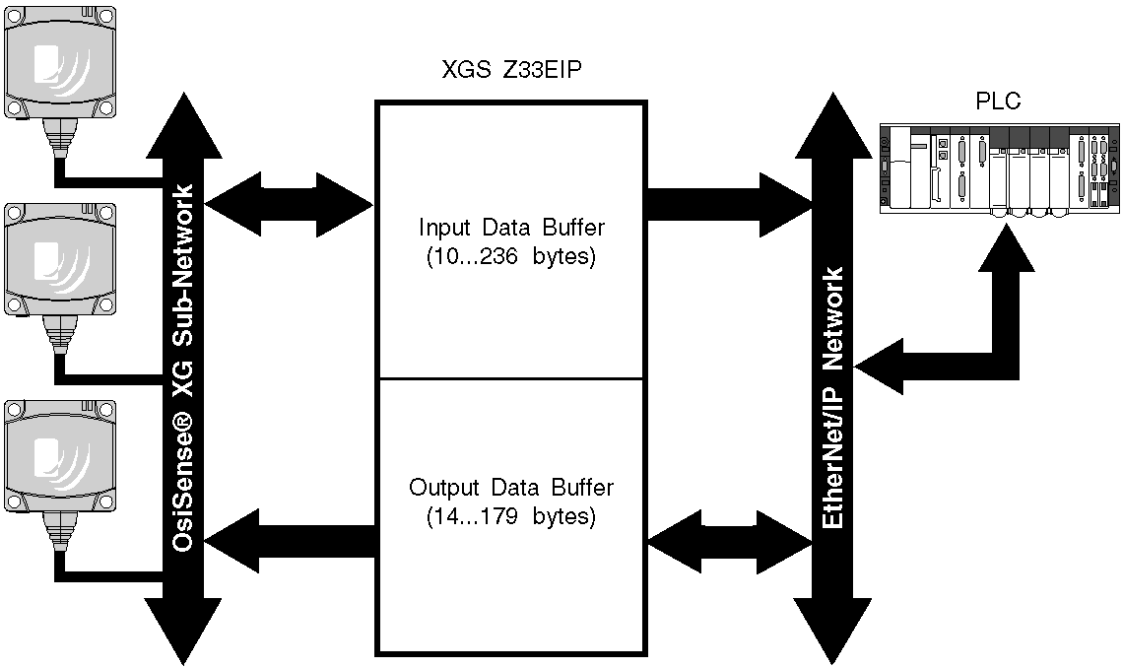
This chapter provides information about the exchange of data between:

- a client on EtherNet/IP network
- a node on the network composed of the XGSZ33EIP splitter box connected with one or more OsiSense® XG RFID smart antennas

Data Exchanges

Presentation

The diagram below illustrates the data exchanges:



Two memory buffers are integrated in the XGSZ33EIP splitter box:

- Output Data Buffer for:
  - commands addressed to OsiSense® XG smart antennas
  - commands written from EtherNet/IP network

- Input Data Buffer for:
  - results of commands addressed to OsiSense® XG smart antennas
  - status of the commands addressed to OsiSense® XG smart antennas

Data Buffer Structure

Presentation

The following table describes the Output Data Buffer structure of the XGSZ33EIP splitter box:

Register (Word)	Description	
1st	Not applicable	
2nd	Bit 0 = Read command trigger bit	
3rd	Bit 0 = Write command trigger bit	
4th	RFID smart antenna server address (1 to 15)	
5th	Start address of the Read/Write command	
6th	Quantity of registers to Read (1 to 113) / Write (1 to 82)	
7th	LSB: Not used MSB: Quantity of bytes Write command (2 x quantity of registers defined in the 6th word)	
8th	Data 1	Used only for Write command
9th	Data 2	
10th	Data 3	
...	...	
...	Data n	

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not exceed the maximum number of words to read or write.
- Communication errors can result if the maximum number of words is exceeded.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following table describes the Input Data Buffer structure of the XGSZ33EIP splitter box:

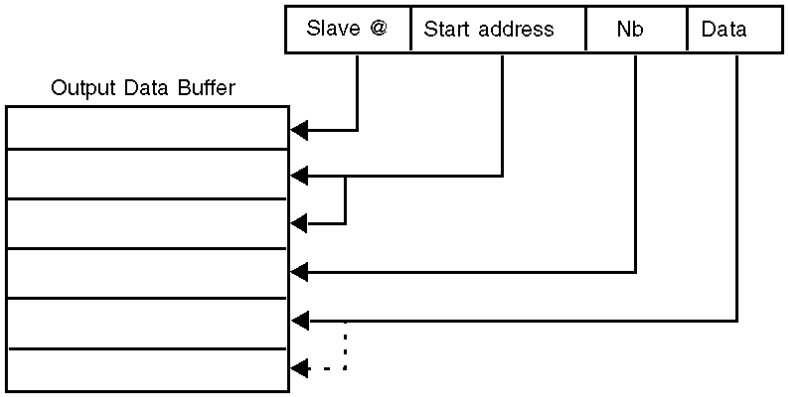
Register (Word)	Description	
	MSB	**LSB**
1st	Status bit (bit4): • 1 = OK • 0 = missing RFID smart antenna	
2nd	Not applicable	Counter of Read commands
3rd	Not applicable	Counter of Write commands
4th	Total Data bytes received (Read command only)	Address of the RFID smart antenna

Register (Word)	Description	
	MSB	**LSB**
5th	Bit 8 to bit 14: command codes. Values of the command code: • 03h: Read • 10h: Write Bit 15: `error status bit`. Values of the `error status bit`: • 1: negative answer from the RFID smart antenna and validation of the error code in the LSB • 0: valid answer from the RFID smart antenna	The content of the LSB has two meanings depending on the `error status bit` (bit 15) value: • if `error status bit` = 1: detected error code with the following values: • 1h: unknown function code or incorrect request format • 2h: incorrect address, or prohibited zone, or protected zone, or address outside the tag memory zone • 3h: incorrect data, or too much data in the frame, or not enough data in the frame, or quantity is null, or incompatible data • 4h: execution detected error in read or write mode, or tag out of the dialog area • if `error status bit` = 0: Read data byte count
6th	Data 1	Used only for Read command
7th	Data 2	
8th	Data 3	
...	...	
...	Data n	

Data Access Procedure

Presentation

The following table describes the steps to follow to access the data:

Step	Action
1	From the PLC, send the data contents to the Output Data Buffer: 
2	Toggle the Command trigger bit (2nd register of the Output Data Buffer for Read, 3rd register of the Output Data Buffer for Write). The command is sent to the OsiSense® XG smart antenna.
3	Test the Counter of Read or Write commands (2nd or 3rd register of the Input Data Buffer), when the OsiSence®XG smart antenna has answered to the command, the splitter box increments this register.
4	The answer can be read by the PLC. **Note**: The `error status bit` of the 5th register of the Input Data buffer (bit 15) must be tested to know if the command has been well executed or if a detected error arose, page 24 .

Write Command Example

Presentation

This example describes a write command of two words from address 5 to the OsiSense® XG smart antenna at address 3.

The table below illustrates the data to send to the output data buffer:

Output Word (%QW)	Description		Value
	MSB	LSB	
0	Not applicable		-
1	00	Not applicable	-
2	Not applicable	Write command trigger byte	-
3	00	Server address	0003h
4	Start address		0005h
5	00	Quantity of registers	0002h
6	Byte count	Not applicable	0400h
7	Data to write 1		0123h
8	Data to write 2		4567h

NOTE: For a write command, 82 words maximum can be written.

The table below illustrates the smart antenna answer in the input data buffer (after a toggle of the command trigger byte %QW2 and a detection of a change in the counter byte %IW2):

Input Word (%IW)	Description		Value
	MSB	LSB	
0	Status word		-
1	00	Not applicable	-
2	00	Write command count	-
3	Total byte count	Server address	0503h
4	Command code	Not applicable	1000h

The table below illustrates the smart antenna answer in the input data buffer if the tag is missing:

Input Word (%IW)	Description		Value
	MSB	LSB	
0	Status word		-
1	00	Not applicable	-
2	00	Write command count	-
3	Total byte count	Server address	0503h
4	Command code	Detected error code	9004h

Read Command Example

Presentation

This example describes a read command of two words from address 5 to the OsiSense® XG smart antenna at address 3.

The table below illustrates the data to send to the output data buffer:

Output Word (%QW)	Description		Value
	MSB	LSB	
0	Command word		-
1	00	Read command trigger byte	-
2	Not applicable	Not applicable	-
3	00	Server address	0003h
4	Start address		0005h
5	00	Quantity of registers	0002h

NOTE: For a read command, 113 words maximum can be read.

The table below illustrates the smart antenna answer in the input data buffer (after a toggle of the command trigger byte %QW1 and a detection of a change in the counter byte %IW1):

Input Word (%IW)	Description		Value
	MSB	LSB	
0	Status word		-
1	00	Read command count	-
2	Not applicable	Not applicable	-
3	Total byte count	Server address	0903h
4	Command code	Read data byte count	0304h
5	Read Data 1		0123h
6	Read Data 2		4567h

The table below illustrates the smart antenna answer in the input data buffer in case of addressing detected error (out of memory range):

Input Word (%IW)	Description		Value
	MSB	LSB	
0	Status word		-
1	00	Read command count	-
2	Not applicable	Not applicable	-
3	Total byte count	Server address	0903h
4	Command code	Detected error code	8302h

Diagnostics

Introduction

Diagnostics information simplifies installation and accelerates troubleshooting.

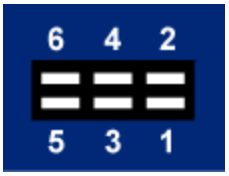
This chapter provides information for diagnostics by:

- LED display
- software

Diagnostic LEDs

Description

6 LEDs allow you to diagnose the splitter box communication status:



The following table describes the states and status of these 6 LEDs:

No.	Description	State	Status
1	Module Status	Off	No power
		Green	Normal operation
		Green, flashing	Standby, not initialized
		Red	Major detected error
		Red, flashing	Minor detected error
		Alternating Red/Green	Self test
2	Network Status	Off	• no IP address, or • no power
		Green	EtherNet/IP connection established
		Green, flashing	No EtherNet/IP connection established
		Red	Duplicate IP address detected
		Red, flashing	One or several connections timed out
		Alternating Red/Green	Self test
3	Link	Off	• no link, or • no power
		Green	Connected to an EtherNet/IP network
4	Activity	Off	no EtherNet/IP activity, orno power
		Green	Receiving or transmitting EtherNet/IP packets
5	Modbus	Off	No power
		Green	Running
		Green, flashing	Initializing and not running
		Red	• stopped, or • subnet detected error, or • timeout

No.	Description	State	Status
6	Device Status	Off	No power
		Green	Initializing
		Green, flashing	Running
		Red, flashing	Contact TMSS support service
		Alternating Red/Green	Invalid or missing configuration

LED 4 (Activity) Behavior

Specific detected errors indicated by the **Activity** LED:

- Flashing red LED (1 Hz): input and/or output data length is invalid.
  Check the overall length of the splitter box data, using the network configuration tool of the EtherNet/IP network client, e.g., SyCon.
- Flashing red LED (2 Hz): User parameter data length and/or content is invalid.
- Flashing red LED (4 Hz): Error detected when resetting the ASIC in charge of EtherNet/IP communications.

LED 5 (Modbus) Behavior

The **Modbus** LED turns red when one or more Modbus servers can not respond to the splitter box as expected. This can be caused by:

- the loss of communication with one or more OsiSense® XG RFID smart antenna, e.g., a broken or disconnected cable
- a wrong configuration of the network address of one or more OsiSense® XG RFID smart antenna

NOTE: When **Modbus** LED is flashing red because of a simple loss of communication, the LED reverts to a green state when communications are restored.

The **Modbus** LED turns green when all transactions have been active at least once. This includes transactions using **Change of state** or **Change of state on trigger**. If a timeout occurs on a transaction, this LED turns red.

LED 6 (Device Status) Behavior

NOTE: If the **Device Status** LED is flashing with a sequence beginning with one or more red flashes, cycle the splitter box power **OFF** and **ON** again. If flashing does not stop, please note the order of the sequence and contact TMSS support service.

Application Example

Introduction

The example illustrates the OsiSense XGSZ33EIP connection box on an Ethernet/IP network to communicate with a Premium controller on Unity Pro.

Presentation

Overview

This example illustrates the OsiSense XGSZ33EIP connection box on an Ethernet/IP network to communicate with a Premium controller on Unity Pro.

It is a walkthrough for the configuration of the connection box with the following steps:

- Create the required Premium platform on Unity Pro
- Configure the XGSZ33EIP
- 2 command examples

NOTE: This example will not provide explanations on how to install the hard ware, refer to the document of the controller for this purpose.

Hardware Requirement

The hardware required to set up this example is the following:

- A Premium controller TSXP576634M
- A TSXETC100 ethernet module
- OsiSense XGSZ33EIP connection box (set IP address, page 17 to: 192.168.0.10)
- 2 OsiSense reader smart antennas XGCS4901201 (set to Modbus address 2 and 3)
- OsiSense power cable XGSZ09L2
- OsiSense Ethernet cable TCSECL1M3M1S2

Software Requirement

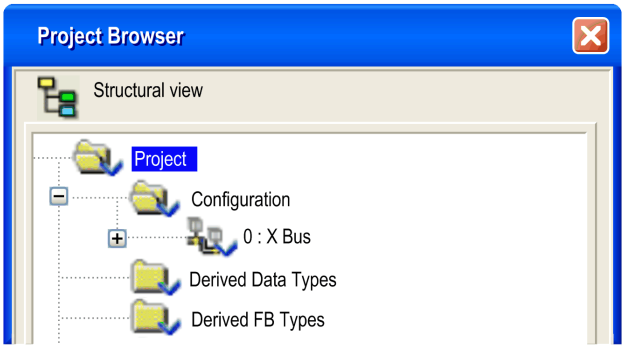
The software required to set up this example is the following:

- Unity Pro (version 5.0 or better)
- EtherNet/IP configuration tool

Creating a Project

Procedure

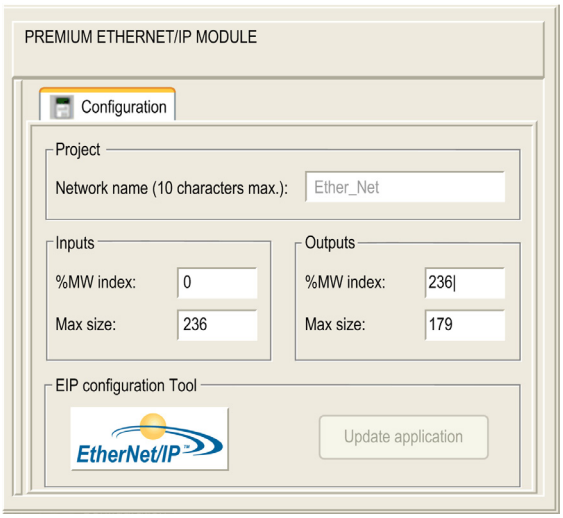
Use Unity Pro to create a new project:

Step	Action
1	Launch Unity Pro.
2	In the Unity Pro main menu, select **File > New....** The **New Project** window opens displaying a list of controller types.
3	In the **New Project** window, open the Premium sub-list and select the controller TSXP576634M.
4	Click **OK**. The **Project Browser** opens: 
5	In the **Project Browser**, double click **Local Bus**. Unity Pro displays: • the **Hardware catalog,** and • a **Local Bus** window with the selected CPU in the second position (slot 0) and a TSXPSY2600M power supply in the first position
6	In the **Hardware catalog,** use your mouse to drag a TSXETC100 EtherNet/IP communication module from the Communication section to a position in the backplane. In this example, the module is placed in the third position (slot 2).
7	To open the configuration window for the TSXETC100, do one of the following: • double click the left mouse button on the TSX ETC 100 module in the **Local Bus** window above, or • click the right mouse button on the module, then select **Open Module...** in the popup menu The module configuration window opens, where you can configure the properties for the TSXETC100.

Configuring the TSX ETC 100 EtherNet/IP Communication Module

Setting Input and Output Memory Addresses and Naming the Module

The **Configuration** page looks like this:



In the **Configuration** page, perform the following steps to name the module, and to set addresses and sizes for both inputs and outputs:

Step	Action
1	In the **Project** section, type in a name for your module in the **Module name** input box - in this example: **ETC1** **Note**: After the module name is entered and the EtherNet/IP configuration is validated (by clicking the ☑ button), the module name cannot be edited.
2	In the **Input area** and **Output area**, type in the size and starting position of both the inputs and outputs. These values can later be edited. For this example, the following values are entered: In the **Input area**: • In the **%MW index** field, type in a starting address for inputs—in this example: 0. • In the **Max size** field, type in the maximum number of 16-bit words dedicated to inputs—in this example: **236**.) In the **Output area**: • In the **%MW index** field, type in a starting address for outputs—in this example: 236. • In the **Max size** field, type in the maximum number of 16-bit words dedicated to outputs—in this example: **179**.) **Notes**: • The inputs and outputs can be located at any available address, and do not need to be located in adjacent areas. It is important only that the space allocated to inputs and outputs do not overlap • The specified %MW range for both inputs and outputs must be available in the CPU. For more information, refer to the Unity Pro help file topic Processor Configuration Screen.
3	In Unity Pro, select **Edit > Validate** (or click the **Validate** ☑ button) to: • save the EtherNet/IP module name—which becomes a non-editable, read-only value • save the address and size settings for inputs and outputs, and

Configuring the Ethernet Connection Box

Launching the Ethernet/IP Configuration Tool

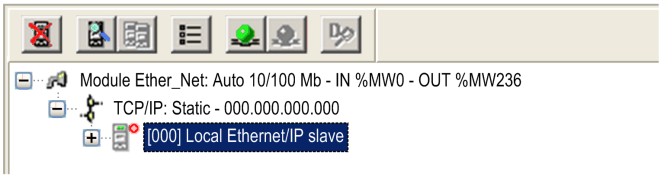
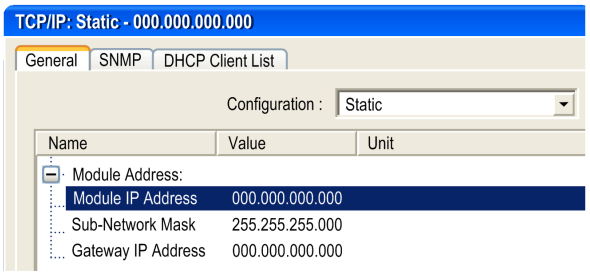
After you have saved both the EtherNet/IP module name and the input and output settings, launch the EtherNet/IP configuration tool by clicking on the EtherNet/IP button:

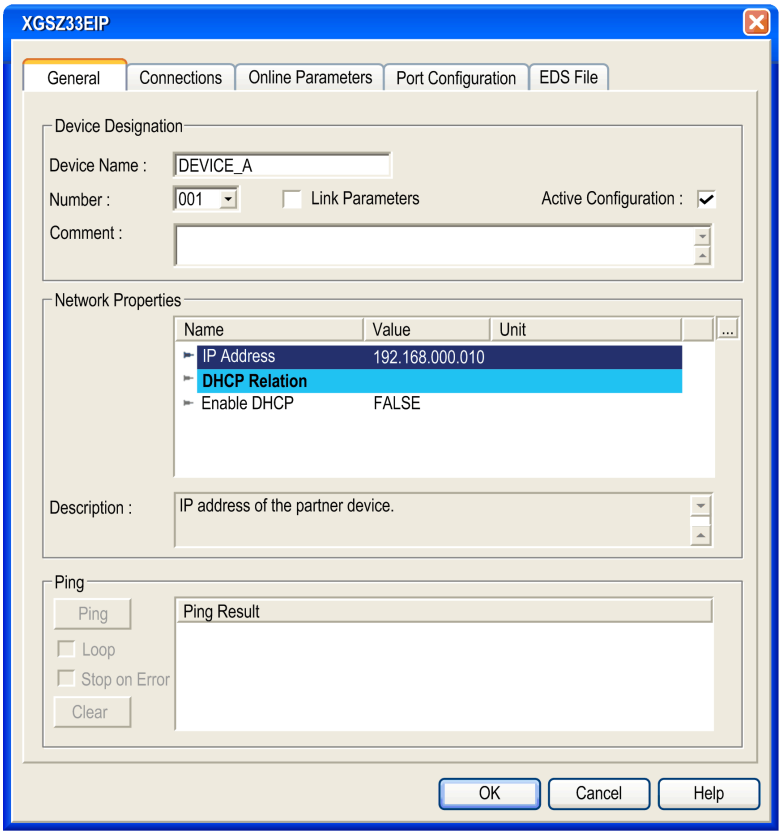


The EtherNet/IP configuration tool opens for editing. If EtherNet/IP device configurations have previously been edited and saved, they will be displayed.

> **NOTE**: If the EtherNet/IP button is grayed, it means the EtherNet/IP Configuration Tool software is not installed. It is provided with the Unity Pro installation CD.

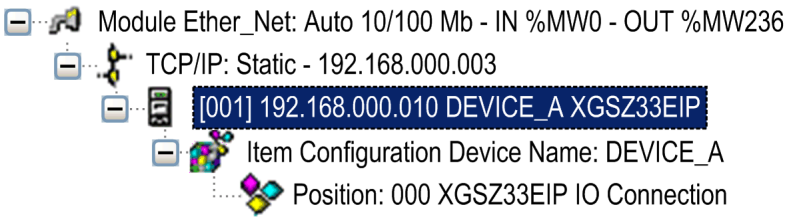
Adding the Ethernet Connection Box

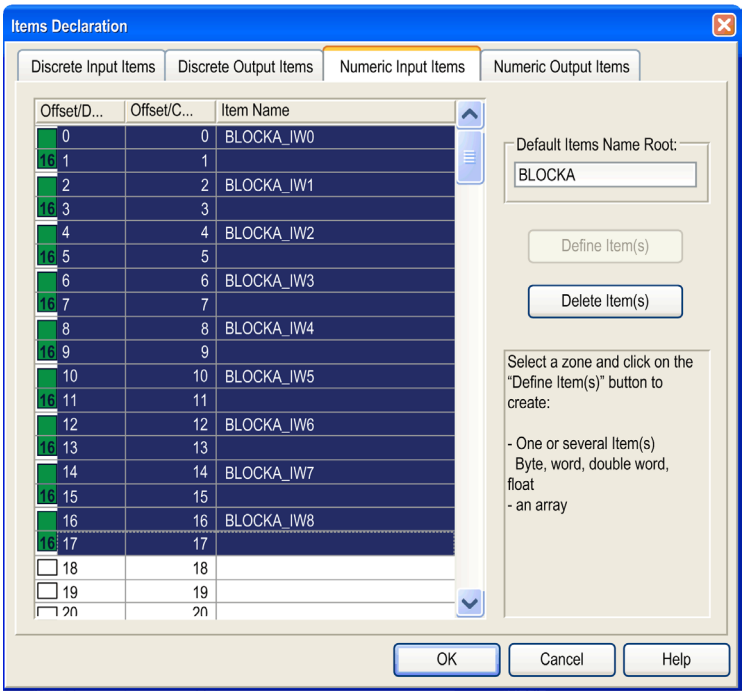
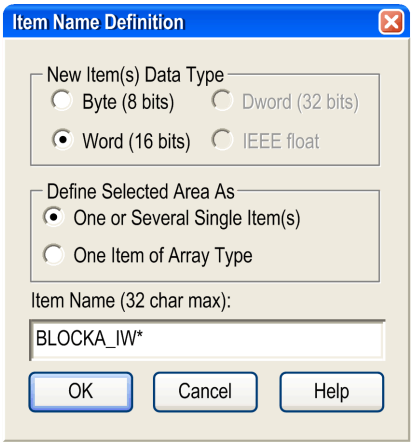
Step	Action
1	Remove the **[000] Local Ethernet/IP slave** element: 
2	Double click the **TCP/IP: Static - 000.000.000.000**  Double click on the Module IP Address and set the ip address to 192.168.000.003.
3	Follow this step if you haven't added the XGZS33EIP EDS file before. Select **Library > Add** Click **Next** Click **Browse** and browse your computer folders to the location of the file `XGSZ33EIP_V_2.10.EDS` select the file and click **Open**. Click **Next > Close**

Step	Action
4	Add the XGZS33EIP to you configuration by selecting the XGZS33EIP and select **Library > Insert in Configuration.** 
5	Double click the **IP Address** field and set the IP address to 192.168.000.010.

Configuring the XGSZ33EIP

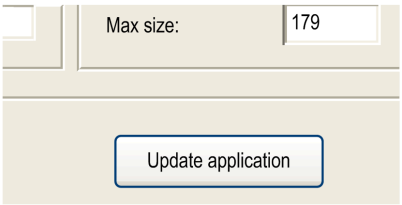
Follow the procedure to define 9 words of inputs and 9 word of outputs:

Step	Action
1	Extend the **Device_A XGSZ33EIP**:  Double click the **Position: 000 XGSZ33EIP IO Connection**
2	Select the **Numeric Input Items** tab.

Step	Action
3	Select the first 18 bytes (0 to 17): 
4	Click the **Define Item(s)** button and select **Word (16 bits)**:  Click **OK**
5	Select the **Numeric Output Items** tab and reproduce the actions from step 1 to 4 in the output table.

Update Unity Pro Configuration

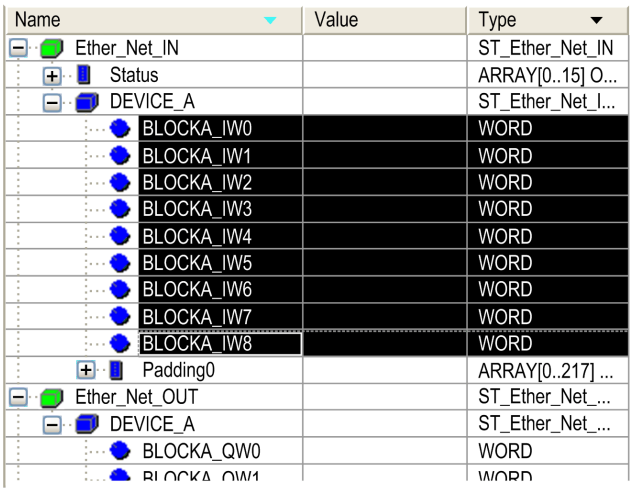
Once the configuration of the XGSZ33EIP is done, you need to import the configuration to Unity Pro:

Step	Action
1	Save and close the EtherNET/IP Configuration Tool software.
2	Click on **Update Application**  **NOTE**: If you get an **Import Trouble Report** select **Replace All** and click **OK**

Creating an Animation Table

Procedure

Create the animation table to visualize the applications:

Step	Action
1	Add the 2 arrays which were imported from the EtherNET/IP Configuration Tool: • `Ether_Net_IN` • `Ether_Net_OUT`
2	Extend the `Ether_Net_IN` values and select all the words. 
3	Display the words in hexadecimal by right clicking **Display Format > Hexadecimal**
4	Do the same for `Ether_Net_Out` words.

Write Application Example

Overview

In this example, you will write 2 values in the RFiD tag.

Refer to the Data Buffer Structure, page 24 to understanding the meaning of each value provided.

Procedure

Step	Action
1	Change the value in output word 3 (BLOCKA_QW3), to a value of 16#0002.
2	Change the value in output word 4 (BLOCKA_QW4), to a value of 16#0001.
3	Change the value in output word 5 (BLOCKA_QW5), to a value of 16#0004.
4	Change the value in output word 6 (BLOCKA_QW6), to a value of 16#0800.
5	Change the value in output word 7 (BLOCKA_QW7), to a value of 16#1234.
6	Change the value in output word 8 (BLOCKA_QW8), to a value of 16#5678.
7	Place an RFiD tag near the smart antenna reader at Modbus Address 2.
8	Change the value in Output Word 2 back to a 16#0001.

Ether_Net_OUT		ST_Ether_Net_...
DEVICE_A		ST_Ether_Net_...
BLOCKA_QW0	16#0000	WORD
BLOCKA_QW1	16#0000	WORD
BLOCKA_QW2	16#0001	WORD
BLOCKA_QW3	16#0002	WORD
BLOCKA_QW4	16#0001	WORD
BLOCKA_QW5	16#0004	WORD
BLOCKA_QW6	16#0800	WORD
BLOCKA_QW7	16#1234	WORD
BLOCKA_QW8	16#5678	WORD
Padding0		ARRAY[0..161] ...

This writes the values 16#1234 and 16#5678 from output words 7 and 8 in the PLC to the words 1 and 2 on the RFiD tag.

Read Application Example

Overview

After writing the values 16#1234 and 16#5678 on the RFiD tag, this example will provide the command to verify that the data was written to the RFiD tag in the correct locations.

Refer to the Data Buffer Structure, page 24 to understanding the meaning of each value provided.

Procedure

Step	Action
1	Change the value in output word 3 `(BLOCKA_QW3)`, to a value of 16#0003.
2	The value in output word 4,5 and 6 remain the same.
3	Place an RFiD tag near the smart antenna reader at Modbus Address 3.
4	Change the value in output word 1 `(BLOCKA_QW1)`, to a value of 16#0001.

The values in input words 5 and 6 are 16#1234 and 16#5678 respectively, as shown below:

Name	Value	Type
Ether_Net_IN		ST_Ether_Net_IN
Status		ARRAY[0..15] O...
DEVICE_A		ST_Ether_Net_I...
BLOCKA_IW0	16#0190	WORD
BLOCKA_IW1	16#0015	WORD
BLOCKA_IW2	16#0015	WORD
BLOCKA_IW3	16#0A03	WORD
BLOCKA_IW4	16#0308	WORD
BLOCKA_IW5	16#1234	WORD
BLOCKA_IW6	16#5678	WORD
BLOCKA_IW7	16#0000	WORD
BLOCKA_IW8	16#0000	WORD
Padding0		ARRAY[0..217] ...
Ether_Net_OUT		ST_Ether_Net_...
DEVICE_A		ST_Ether_Net_...
BLOCKA_QW0	16#0000	WORD
BLOCKA_QW1	16#0001	WORD
BLOCKA_QW2	16#0000	WORD
BLOCKA_QW3	16#0003	WORD
BLOCKA_QW4	16#0001	WORD
BLOCKA_QW5	16#0004	WORD
BLOCKA_QW6	16#0800	WORD
BLOCKA_QW7	16#0000	WORD
BLOCKA_QW8	16#0000	WORD
Padding0		ARRAY[0..161] ...

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TMSS France SAS
Share capital: 366 931 214 €
Tour Eqho, 2 avenue Gambetta
92400 Courbevoie – France
908 125 255 RCS Nanterre

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