RFID Ositrack

Compact stations
Stations compactes

User Guide / Manuel utilisateur

a brand of **Schneider Electric**

⊞ **Telemecanique**

www.telemecanique.com

Table of Contents

Safety Information

Important Information

NOTICE   Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, 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 an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

⚠ CAUTION
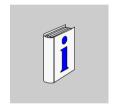
CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

English

PLEASE NOTE Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

About the Book

At a Glance

Document Scope   This manual describes how to use Ositrack compact stations and associated accessories..

Related Documents

Title of Documentation	Reference Number
User Guide: Splitter box, Ethernet Modbus TCP/IP	1655668 01
User Guide: Hand-held terminal	1706482 01

User Comments   We welcome your comments about this document. You can reach us by e-mail at techpub@schneider-electric.com

English

General

1

Presentation

Aim of this Chapter

This chapter presents the Ositrack compact stations and the associated range of equipment.

What's in this Chapter?

This chapter contains the following topics:

English

System Presentation

Definition of RFID

RFID is the use of radio transmission to identify and locate objects.

An RFID system is based on three main components:

- A reader (Read/Write station)
- A radio antenna
- An electronic tag

Operation of an RFID System

The tag is fixed on, or in, the object to be tracked or identified. There is no contact with the reader. This means that the tag can be placed inside objects (boxes, bags, etc) and that the reader can be positioned behind a protective screen, as long as the materials are not metallic.

When a tag enters the field generated by the reader, it detects the signal and exchanges the data (read or write) between its memory and the reader.

Presentation of the Ositrack Offer

Ositrack is an RFID system offering:

- Traceability and tracking of items
- Flexibility of production systems
- Various types of access control

An open system:

- System compatible with tags that comply with standards ISO 14 443 and ISO 15 693
- Modbus, Modbus TCP/IP and Uni-Telway protocols.

A simple system:

- No station programming
- Data formatted in accordance with PLC standards (16-bit words)
- Automatic configuration of communication parameters (speed, format, etc)
- Quick wiring using M12 connectors
- Extensive range of cables and fixing accessories
- Possibility of using metal supports
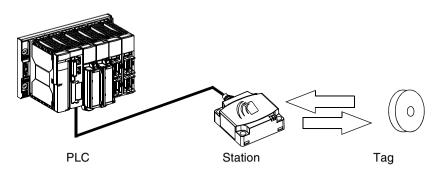
Integrated system:

- Reader, radio antenna and network functions in the same unit
- The smallest industrial RFID reader

Exchange Principle

Presentation   The compact station is used to send information from the tag to the PLC and vice versa, as described below:

PLC   Station   Tag

Phases in the Process
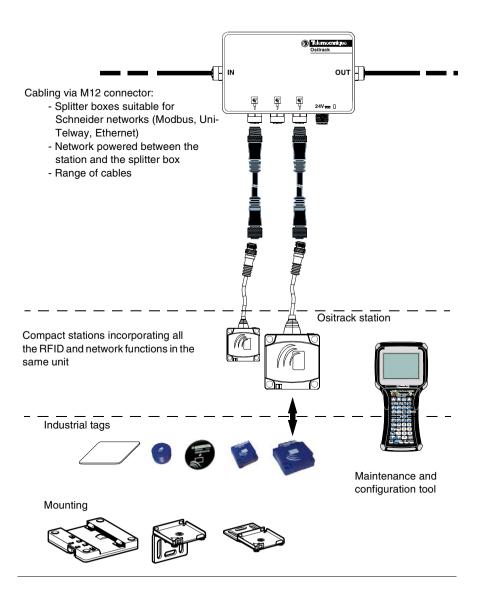
The following table shows the various exchange phases:

Phase	Exchanges			
	PLC	**Station**	**Station**	**Tag**
1			Look for a tag in the dialog zone →	
2			← Positive response	
3	Send a read/write command →			
4			← Execution of the command (with checks) →	
5	← Send back report			

Notes:

1	If phase 3 is carried out with no tag present, an error message is sent back to the PLC.
2	If an error is detected in phase 4, this phase is automatically restarted (up to 3 times). If an error is still detected at the end of phase 4, an error report is sent back in phase 5.

English

Equipment in the Ositrack Range

Cabling via M12 connector:
- Splitter boxes suitable for Schneider networks (Modbus, Uni-Telway, Ethernet)
- Network powered between the station and the splitter box
- Range of cables

IN   OUT

Telemecanique
Ositrack

24V

Ositrack station

Compact stations incorporating all the RFID and network functions in the same unit

Industrial tags

Maintenance and configuration tool

Mounting

Installing the system

2

Presentation

Aim of this Chapter

This chapter describes the procedure for installing compact stations.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Defining the System Environment	14
Setting up the Station	18
Connecting the Station	25
Wiring a Modbus/Uni-Telway Network	27
Wiring an Ethernet Modbus TCP/IP network	30
Connecting the TCS AMT31FP splitter box	31

English

Defining the System Environment

Station Characteristics

The following table gives the technical characteristics of the compact stations:

Type of station		XGC S4901201 - C format	XGC S8901201 - D format
Temperature	Operation	-25...+55°C *(-13...+131°F)*	
	Storage	-40...+85°C *(-40...+185°F)*	
Degree of protection		IP67 according to IEC60529	
Vibration resistance EN 60068.2.27 EN 60068.2.6		2 mm *(0.078 in)* from 5 to 29.5 Hz/7 g *(7 gn)* from 29.5 to 150 Hz 30 g *(30 gn)* / 11 ms	
Resistance to mechanical shocks		IK02 according to EN 50102	
Standards/Certifications		UL 508, CE, EN 300330, EN 301489-01/03, FCC Part 15	
Immunity to disturbance		Immunity to electrostatic discharges, radiated electromagnetic fields, fast transients, electrical surges, conducted and induced interference and power frequency magnetic field according to IEC61000.	
Unit dimensions		40x40x15 mm *(1.57x1.57x0.59 in)*	80x80x26 mm *(3.15x3.15x1.02 in)*
RFID frequency		13.56 MHz	
Type of associated tag		Standardized ISO 15693 and ISO 14443 tags.	
Nominal range (depending on associated tag)		18...70 mm *(0.70...2.75 in)*	20...100 mm *(0.78...3.94 in)*
Nominal power supply		⎓ 24 V PELV	
Power supply voltage limits		19.2...29 V including ripple	
Power consumption		< 60 mA	
Serial link	Type	RS485	
	Protocol	Modbus RTU / Uni-Telway (Uni-Telway from version V3.8)	
	Speed	9600...115,200 Bauds: Automatic detection	
Display		1 bi-color LED for network communication and 1 bi-color LED for RFID communication (Tag present, Station/tag dialog)	
Connection		One shielded 5-way male M12 connector for connection to the communication network and power supply	
Tightening torque for the fixing screws		< 1 Nm *(8.85 lbf-in)*	< 3 Nm *(26.55 lbf-in)*

These RFID compact stations complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) These devices may not cause harmful interference, and

(2) these devices must accept any interference received, including interference that may cause undesired operation.

References :

	XGC S4901201	XGC S8901201
FCC ID	TW6XGCS4	TW6XGCS8
IC info	7002B-XGCS4	7002B-XGCS8

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

> **Note:**
> The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

English

Tag Characteristics

The following table gives the technical characteristics of the tags:

Type of tag			XGH B445345	XGH B444345	XGH B320345	XGH B221346	XGH B211345	XGH B90E340
Temperature	Operation		-25...+70 °C *(-13...+158°F)*					-25...+55 °C *(-13...+131°F)*
	Storage		-40...+85 °C *(-40...+185°F)*					-40...+55 °C *(-40...+131°F)*
Degree of protection			IP68		IP65	IP68		IP65
Standards supported			ISO 14443		ISO 15693			
Vibration resistance EN 60068.2.27 EN 60068.2.6			2 mm *(0.078 in)* from 5 to 29.5 Hz / 7 g *(7 gn)* from 29.5 to 150 Hz 30 g *(30 gn)* / 11 ms					
Resistance to mechanical shocks			IK02 according to EN 50102					
Dimensions			40x40x15 mm *(1.57x1.57x0.59 in)*		∅ 30x3 mm *(1.18x0.12 in)*	26x26x13 mm *(1.02x1.02x 0.51 in)*	∅ 18 mm *(0.70 in)*	58x85.5x1 mm *(2.28x3.34x 0.039 in)*
Casing materials			PBT+PC		PC	PBT+PC		PVC
Mounting method			Screw or clip		Screw	Screw or clip	Threaded hole	-
Tightening torque for the fixing screws			< 1 Nm *(8.85 lbf-in)*				-	-
Memory capacity (bytes)			13,632	3,408	112	256	256	256
Type of memory			EEPROM					
Type of operation			Read/Write					
Type of associated station			XGC S•					
Nominal range	Read/ Write	XGC S4	30 mm *(1.18 in)*	33 mm *(1.30 in)*	48 mm *(1.89 in)*	40 mm *(1.57 in)*	18 mm *(0.70 in)*	70 mm *(2.75 in)*
		XGC S8	40 mm *(1.57 in)*	48 mm *(1.89 in)*	65 mm *(2.56 in)*	55 mm *(2.16 in)*	20 mm *(0.78 in)*	100 mm *(3.94 in)*
Number of read cycles			Unlimited					
Number of write cycles			100,000 guaranteed across the whole temperature range					
Number of write cycles at 30°C			Typically 2.5 million					
Read time			See *Read/Write Time, p. 47*					
Write time			See *Read/Write Time, p. 47*					
Retention period			10 years					

Splitter Box Characteristics

The splitter box TCS AMT31FP is used to connect 1 to 3 XGCS compact stations to an RS485 network, ensuring distribution of the power supply.

Data is exchanged with the Ositrack stations using the Modbus protocol.
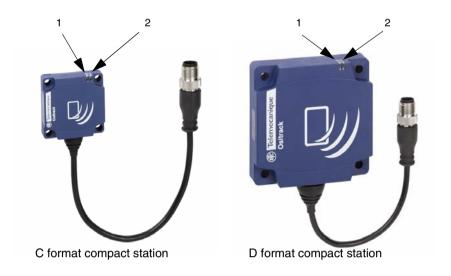
The following table gives the technical characteristics of the TCS AMT31FP splitter box:

Characteristics	
Storage temperature	-40...+85°C *(-40...+185°F)*
Operating temperature	-25...+55°C *(-13...+131°F)*
Degree of protection	IP65
Power supply	⎓ 24 V PELV (19.2...29 V including ripple)
Stations	5-way female M12 connector
Conformity to standards	CE
LED indicators	Power supply (green)

The XGS Z33ETH splitter box performs the same functions using the Modbus TCP/IP protocol. For further information, see manual reference 165566801.

Setting up the Station
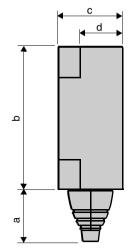
**Presentation of
the Stations**

C format compact station   D format compact station
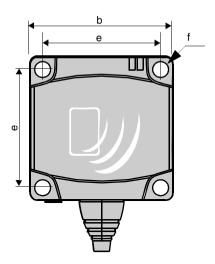
Item no.	Description
1	TAG: LED relating to the tags
2	COM: LED relating to communication

For further information on the operation of the LEDs, see *Diagnostics, p. 85*.

**Station
Dimensions**

Dimensions in mm *(inches)*:

	a	b	c	d	e	f
XGC S4 C format	14 *(0.55)*	40 *(1.57)*	15 *(0.59)*	9.8 *(0.38)*	33 *(1.3)*	4.5 *(0.17)*
XGC S8 D format	14 *(0.55)*	80 *(3.15)*	26 *(1.02)*	16 *(0.63)*	65 *(2.56)*	5.5 *(0.21)*

English

Distances Between Stations
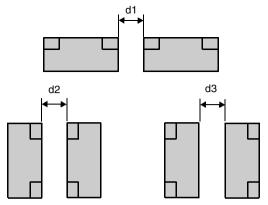
⚠ **CAUTION**
UNINTENDED OPERATION
Follow the installation instructions below relating to distances between 2 stations. When two stations are too close to one another, there is a risk of mutual disturbance.
Failure to follow this instruction can result in injury or equipment damage.

Distances between two identical stations according to the tags used:

Distances in mm *(inches)*:
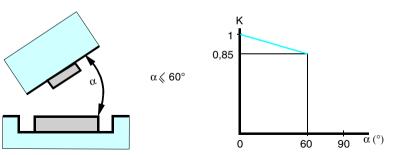
Tag	XGC S4 - C format			XGC S8 - D format		
	d1	d2	d3	d1	d2	d3
XGH B90E340	310 *(12.20)*	550 *(21.65)*	120 *(4.72)*	430 *(16.92)*	750 *(29.52)*	280 *(11.02)*
XGH B221346	200 *(7.87)*	320 *(12.59)*	100 *(3.93)*	280 *(11.02)*	530 *(20.86)*	260 *(10.23)*
XGH B320345	140 *(5.51)*	360 *(14.17)*	110 *(4.33)*	310 *(12.20)*	540 *(21.25)*	240 *(9.44)*
XGH B211345	210 *(8.26)*	180 *(7.08)*	60 *(2.36)*	200 *(7.87)*	370 *(14.56)*	170 *(6.69)*
XGH B444345	90 *(3.54)*	190 *(7.48)*	30 *(1.18)*	310 *(12.20)*	400 *(15.74)*	160 *(6.29)*
XGH B445345	110 *(4.33)*	170 *(6.69)*	30 *(1.18)*	310 *(12.20)*	380 *(14.96)*	160 *(6.29)*

Angular Positioning   The angle between the station and the tag modifies the dialog distance according to the graph below:

$\alpha \leqslant 60°$
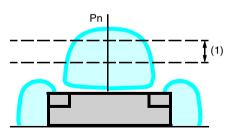
K = correction factor to be applied to the nominal range.

Reading distance = nominal range x K.

Sensing Zones   The dialog zones of the compact stations are circular. There is no recommended direction for the movement of the tag. The following diagram shows the dialog zones of the compact stations:

(1) Recommended movement zone: between 0.4 and 0.8 Pn.
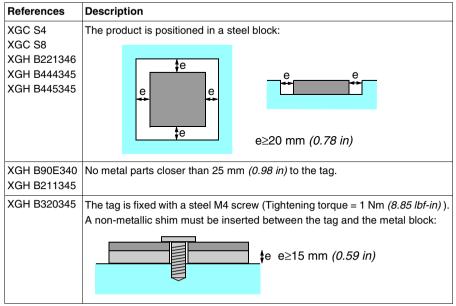
Note: Nominal range (Pn)
Conventional range, which does not take dispersions (manufacturing, temperature, voltage, mounting in metal) into account.

English

Mounting in metal

The presence of metal close to tags and stations affects the nominal range (Read/Write distance).

The following table gives the minimum permissible mounting positions in a metal block:

| References	Description
XGC S4 XGC S8 XGH B221346 XGH B444345 XGH B445345	The product is positioned in a steel block: e≥20 mm *(0.78 in)*
XGH B90E340 XGH B211345	No metal parts closer than 25 mm *(0.98 in)* to the tag.
XGH B320345	The tag is fixed with a steel M4 screw (Tightening torque = 1 Nm *(8.85 lbf-in)*). A non-metallic shim must be inserted between the tag and the metal block: e e≥15 mm *(0.59 in)*

The following table shows the effect on the nominal range when the station and the tag are mounted in metal in accordance with the most unfavorable cases given above:

Reference	Memory size	Dimensions	Reduced range with metal		Nominal range	
			XGC S4	XGC S8	XGC S4	XGC S8
XGH B90E340	256 bytes	Badge 85x58x0.8 mm *(3.35x2.28x0.03 in)*	58 mm *(2.28 in)*	80 mm *(3.15 in)*	70 mm *(2.75 in)*	100 mm *(3.94 in)*
XGH B221346	256 bytes	26x26x13 mm *(1.02x1.02x0.51 in)*	30 mm *(1.18 in)*	33 mm *(1.29 in)*	40 mm *(1.57 in)*	55 mm *(2.16 in)*
XGH B320345	112 bytes	∅ 30x3 mm *(1.18x0.12 in)*	45 mm *(1.77 in)*	56 mm *(2.20 in)*	48 mm *(1.89 in)*	65 mm *(2.56 in)*
XGH B211345	256 bytes	∅ 18x12 mm *(0.70x0.47 in)*	16 mm *(0.62 in)*	15 mm *(0.59 in)*	18 mm *(0.70 in)*	20 mm *(0.78 in)*
XGH B444345	3.3 Kb	40x40x15 mm *(1.57x1.57x0.59 in)*	28 mm *(1.10 in)*	34 mm *(1.33 in)*	33 mm *(1.30 in)*	48 mm *(1.89 in)*
XGH B445345	13.3 Kb	40x40x15 mm *(1.57x1.57x0.59 in)*	24 mm *(0.94 in)*	28 mm *(1.10 in)*	30 mm *(1.18 in)*	40 mm *(1.57 in)*

**Distances
Between Tags**
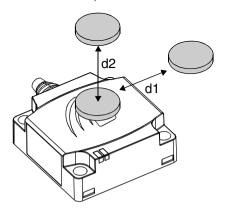
⚠ CAUTION

UNINTENDED OPERATION
Follow the installation instructions below relating to distances between 2 tags.
When two tags are too close to one another, there is a risk of communications errors.
Failure to follow this instruction can result in injury or equipment damage.

When two tags are too close to one another, there is a risk of communications errors.

Minimum distances in mm *(inches)*:

Tag	XGC S4 - C format		XGC S8 - D format	
	d1	**d2**	**d1**	**d2**
XGH B90E340	35 *(1.37)*	60 *(2.36)*	110 *(4.33)*	140 *(5.51)*
XGH B221346	50 *(1.96)*	10 *(0.39)*	120 *(4.72)*	50 *(1.96)*
XGH B320345	70 *(2.75)*	50 *(1.96)*	190 *(7.48)*	60 *(2.36)*
XGH B211345	40 *(1.57)*	10 *(0.39)*	120 *(4.72)*	20 *(0.78)*
XGH B444345	20 *(0.78)*	10 *(0.39)*	70 *(2.75)*	40 *(1.57)*
XGH B445345	10 *(0.39)*	10 *(0.39)*	60 *(2.36)*	10 *(0.39)*

English

**Electro-
magnetics
Disturbances**

⚠ **CAUTION**
UNINTENDED OPERATION Do not install one station less than 300 millimeters *(12 in)* away from any product likely to generate electromagnetics disturbances (electric motor, solenoid valve...). The electromagnetics disturbances can stop the dialog between the Ositrack station and one tag. **Failure to follow this instruction can result in injury or equipment damage.**
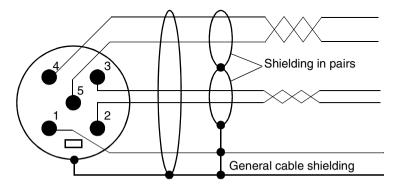
Connecting the Station

**Connector
Wiring**

The stations are equipped with a single male M12 A-coded connector for the power
supply and communication bus.

The communication bus wires are shielded separately from the power supply
cables, to avoid interference carried by the power supply causing disturbance on the
communication wires.

Station M12 connector pinout:

Shielding in pairs

General cable shielding

Male M12 connector   Compact station

Pin no.	Signal	Description
1	Drain (SHLD)	Cable shielding
2	⎓ 24 V	Station power supply *
3	0 V	0 V
4	D0	RS 485
5	D1	RS 485
Connector casing	Shielding	Cable shielding

* : Use a PELV power supply and fused protection (1 A). The power supply used
must be class II according to VDE 0106 (eg: Phaseo ABL 7/8 range from
Telemecanique) and the 0V must be grounded.

English

| Range of Accessories	The TCS AMT31FP splitter box and the TCS Modbus/Uni-Telway cables supply power to the XGCS stations and enable their quick, easy connection to the Modbus network.
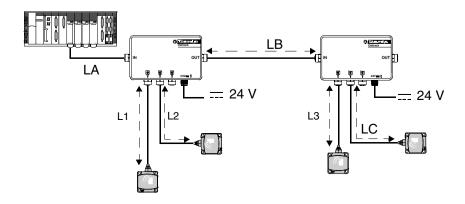
	Description	Reference
	Splitter box for connecting up to three XGCS stations: • Modbus/Uni-Telway	TCS AMT31FP
	• Modbus Ethernet TCP/IP (see manual 1655668 01)	XGS Z33ETH
	Shielded cable, 5-way male/female M12 coding A, for Modbus/Uni-Telway RS485 connection between one TCS AMT31FP splitter box and an XGCS station (or to another splitter box).	TCS MCN1M1F1 (1 m/*3.28 ft*) TCS MCN1M1F2 (2 m/*6.56 ft*) TCS MCN1M1F5 (5 m/*16.4 ft*) TCS MCN1M1F10 (10 m/*32.8 ft*)
	Shielded cable, 5-way female M12 coding A/flying leads, for Modbus/Uni-Telway RS485 connection between one TCS AMT31FP splitter box and one TSX SCA50 connector.	TCS MCN1F2 (2 m/*6.56 ft*) TCS MCN1F5 (5 m/*16.4 ft*) TCS MCN1F10 (10 m/*32.8 ft*)
	Cable, 4-way female M12 coding A/flying leads, for the splitter box power supply.	XGS Z08L2 (2 m/*6.56 ft*) XGS Z08L5 (5 m/*16.4 ft*) XGS Z08L10 (10 m/*32.8 ft*)
	Shielded cable, 5-way female M12 coding A/Mini-DIN, for connecting TCS AMT31FP splitter boxes to a Telemecanique PLC.	TCS MCN1F9M2P (2 m)
	Shielded cable, 5-way female M12 coding A/15-way SUB-D, for connecting TCS AMT31FP splitter boxes to a TSX SCA62 connector.	TCS MCN1FQM2 (2 m/*6.56 ft*)
	Shielded 5-way M12 coding A connectors with screw terminals	FTX CN12F5 (female) FTX CN12M5 (male)
	Tee, 5-way female M12/5-way female M12 + 5-way male M12 coding A	TCS CTN011M11F
	120 Ω line terminator, M12 male coding A. **For Modbus and CANopen only, unusable on Uni-Telway**	FTXCNTL12

Wiring a Modbus/Uni-Telway Network

Network Architecture

Example of a Modbus/Uni-Telway network assembly:

Cable Sizes

The cables used for this assembly must comply with the rules for the maximum lengths of buses and tap-offs.

Maximum Bus Length

With Ositrack Compect stations, the maximum length of the bus (LA + LB + LC) depends on the network speed and the protocol :

Network	Network speed	Maximum length of the bus with Ositrack Compect stations
Modbus	9600 Bauds	1000 m *(3280.83 ft)*
	19200 Bauds	500 m *(1640.41 ft)*
Uni-Telway	9600 Bauds	500 m *(1640.41 ft)*
	19200 Bauds	250 m *(820.21 ft)*
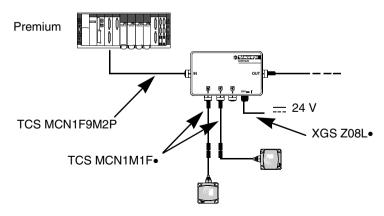
- On modbus, for lengths of more than 100 m *(328.083 ft)*, it is recommended that a line terminator is added at the ends of the network (end of segment LC in the example).
- On Uni-Telway, and for the lenghts above, it's not necessary to add a line terminator at the ends of the network. Never use FTX CNTL12 line terminator.

Maximum Tap-Off Length
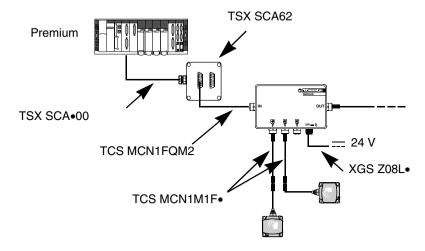
The maximum tap-off (L1, L2 and L3) length is 10 meters *(32.8 ft)*.

English

Connection to a Telemecanique PLC using Modbus/Uni-Telway

Direct connection:

Premium

TCS MCN1F9M2P

TCS MCN1M1F•

IN   OUT

24 V

XGS Z08L•

Connection via a TSX SCA62:

TSX SCA62

Premium

TSX SCA•00

TCS MCN1FQM2

TCS MCN1M1F•

IN   OUT

24 V

XGS Z08L•
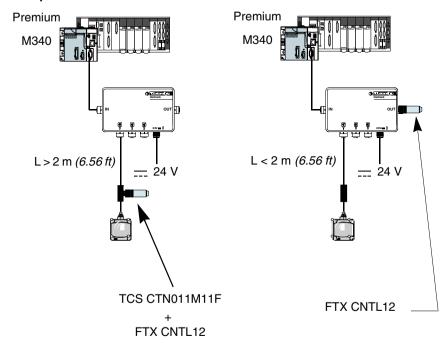
Connection of Line Terminators on Modbus

Using long network cables can generate signal distortion. The installation of line terminators corrects these distortions.

A line terminator near the station (M12 tee) may be necessary, depending on the quality of the cables and the EMC environment.

Examples:
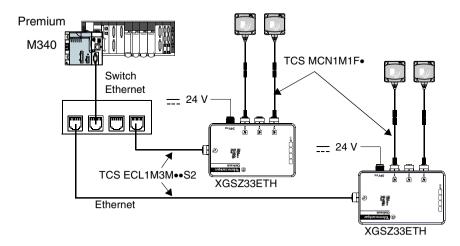
The line terminator can be positioned differently depending on the distance between the station and the splitter box.

Wiring an Ethernet Modbus TCP/IP network

Connection Diagram

Example of a Modbus Ethernet TCP/IP network setup with splitter box XGS Z33ETH:

The default transmission speed of the Ethernet splitter box (XGS Z33ETH) is 57600 bauds. This speed allows a total bus length of 160 m *(524.93 ft)* between the splitter box and the stations.

Example:

- 3 x 50 meters *(164.04 ft)* for 3 stations
- 2 x 80 meters *(262.46 ft)* for 2 stations
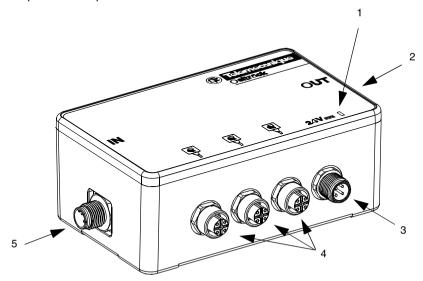
Using long network cables can generate signal distortion. The installation of line terminators corrects these distortions.

A line terminator near one of the stations (M12 tee) may be necessary, depending on the quality of the cables and the EMC environment.
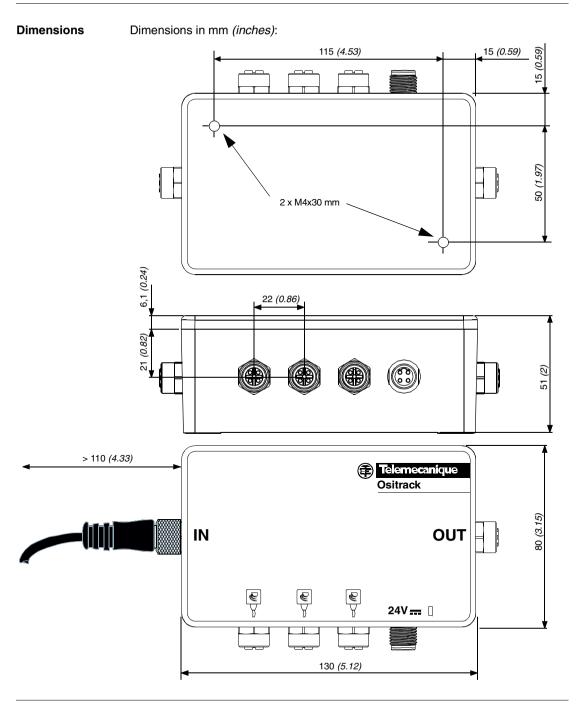
Connecting the TCS AMT31FP splitter box

Description   Description of the splitter box:

No.	Description
1	Green LED indicating voltage present
2	Sub-base to another splitter box (Network OUT)
3	24 V power supply sub-base
4	3 Ositrack compact station sub-bases
5	Sub-base to a PLC or another splitter box (Network IN)

English

Dimensions   Dimensions in mm *(inches)*:

Sub-Base to Station Wiring

Pinout of the female M12 coding A sub-base (station link):

Diagram	Pin no.	Signal	Description
	1	Drain (SHLD)	Cable shielding
	2	$=$ 24 V	Station power supply
	3	0 V/ GND	0 V
	4	D0	RS 485
	5	D1	RS 485
	Connector casing	Shielding	Cable shielding

Sub-Base to Power Supply Wiring

Pinout of the male M12 coding A sub-base (power supply):

Diagram	Pin no.	Signal	Description
	1	$=$ 24 V	Power supply +
	2	$=$ 24 V	Power supply +
	3	$=$ 0 V	Power supply -
	4	$=$ 0 V	Power supply -

Wiring for Sub-Base to Another Splitter Box

Pinout of the female M12 coding A sub-base (Network OUT):

Diagram	Pin no.	Signal	Description
	1	Drain (SHLD)	Cable shielding
	2	-	Reserved
	3	0 V / GND	0 V
	4	D0	RS 485
	5	D1	RS 485
	Connector casing	Shielding	Cable shielding

Sub-base to PLC Wiring

Pinout of the male M12 coding A sub-base (Network IN):

Diagram	Pin no.	Signal	Description
	1	Drain (SHLD)	Cable shielding
	2	-	Reserved
	3	0 V / GND	0 V
	4	D0	RS 485
	5	D1	RS 485
	Connector casing	Shielding	Cable shielding

English

Connection Recommen-dations

Connection recommendations for TCSMCN1F• cables:

Connection:

Diagram	Pin no.	Signal	Description	Color of wire
	1	Drain (SHLD)	Cable shielding	-
	2	⎓ 24 V	Station power supply	Red
	3	0 V / GND	0 V	Black
	4	D0	RS 485	White
	5	D1	RS 485	Blue
	Connector casing	Shielding	Cable shielding	-

Setting the System Parameters

3

Presentation

Aim of this Chapter

This chapter describes the station parameter settings for network communication with the control system.

What's in this Chapter?

This chapter contains the following topics:

English

Setting the Station Parameters

General   Each time the station is powered up, it automatically detects the format and network speed.

The stations are supplied configured at network address 1 with a transmission speed of 19200 Bauds.
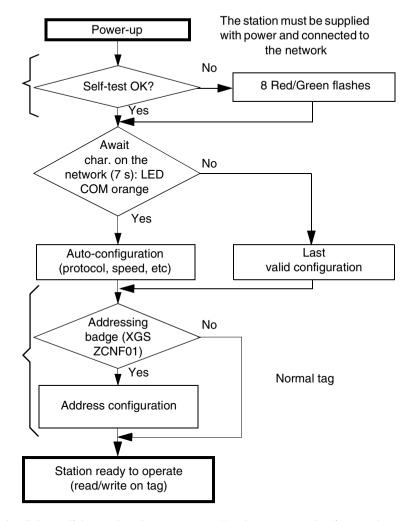
Before use, it is essential to configure the network address of each station. Stations can be addressed in two ways:

- Either using the XGS ZCNF01 configuration badge (supplied with the station)
- Or via the network (Modbus or Uni-Telway write command).

**Station
Initialization**

The station start-up cycle is as follows:

```
                ┌─────────────────────┐         The station must be supplied
                │      Power-up        │         with power and connected to
                └─────────────────────┘                 the network
                          │
                          ▼
                                            No   ┌──────────────────────┐
                   ╱ Self-test OK? ╲ ──────────▶ │  8 Red/Green flashes  │
                   ╲              ╱               └──────────────────────┘
                          │ Yes
                          ▼

                   ╱   Await       ╲
                   ╱ char. on the   ╲    No
                   ╲ network (7 s): LED ╲─────┐
                   ╲  COM orange     ╱        │
                          │ Yes              │
                          ▼                   ▼
          ┌─────────────────────┐    ┌──────────────────────┐
          │  Auto-configuration  │    │         Last          │
          │ (protocol, speed, etc)│    │  valid configuration  │
          └─────────────────────┘    └──────────────────────┘
                          │                   │
                          ▼◀──────────────────┘

                   ╱  Addressing    ╲   No
                   ╱  badge (XGS      ╲──────┐
                   ╲   ZCNF01)       ╱       │
                          │ Yes             │  Normal tag
                          ▼                  │
          ┌─────────────────────┐           │
          │ Address configuration │           │
          └─────────────────────┘           │
                          │                  │
                          ▼◀─────────────────┘

          ┌─────────────────────────┐
          │  Station ready to operate │
          │    (read/write on tag)    │
          └─────────────────────────┘
```

At all times, if the station does not recognize three successive frames, it returns to
Auto-configuration mode.

Advice: Launch a reading loop of the station status word to allow the auto-
configuration of the station. As soon as the station answers, it is ready to operate.

Address Configuration via the XGS ZCNF01 Badge

The addressing procedure is described on the back of the configuration badge:

Configuring the station network address:

Step	Action	Result
1	Power up the Station. Wait for 5 seconds	Station self-test
2	Place the configuration badge in front of the station. Count the number of flashes.	The TAG LED flashes red. Each red flash emitted corresponds to one increment of the network address.
3	Remove the configuration badge when the required network address is reached.	The TAG LED flashes green. The number of green flashes emitted corresponds to the network address that has just been configured. It is then possible to restart the configuration at step 2.
4	Place a "normal" (XGHB) tag in front of the station.	The configured network address is confirmed and saved in the station.

Note: The network address range is from 1 to 15.

Addressing via the Network

The station address can be modified using a standard word write request (see *Station Memory Zone, p. 43*).

The request will be sent to the known station address. The new address is immediately effective.

When the execution report has been sent, the TAG LED will emit as an echo a number of green flashes equivalent to the address that has just been configured.

Note: The network address range is from 1 to 15.

Setting the PLC Parameters

Electrical Characteristics

The network interface module supports 2-wire RS 485.

Communication Configuration for Modbus and Uni-Telway

The Modbus / Uni-Telway communication parameters that define the frame can be configured in various ways.

The Ositrack compact station parameters are defined so that they support the following values:

Parameter	Value	
	Modbus	**Uni-Telway**
Mode	RTU	-
Parity	Automatic detection (even, odd, no parity)	Odd
Stop bit	1	1
Data bit	8	8
Data rate	Automatic detection (9600... 115200 bauds)	Automatic detection (9600... 19 200 bauds)

⚠ **WARNING**

UNINTENDED OPERATION

Check that all the devices on the network are communicating using the appropriate parameters. A disparity between the parameters could result in unintended operation of the inputs, outputs and the other devices. The hardware configuration may cause unintended equipment operation.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

Operating Principles

<div style="text-align:right">**4**</div>

Presentation

Aim of this Chapter

This chapter describes the system operating principle based on memory zones.

What's in this Chapter?

This chapter contains the following topics:

Memory Zones

Presentation   The addressing memory zone is divided into two zones:

- The tag memory zone
- The station memory zone
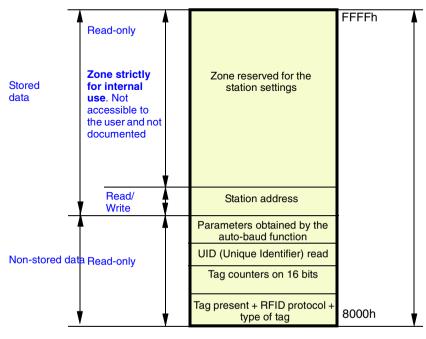
Definition of the word address zones used:

%MW65535	Station memory zone	FFFFh
%MW32768		8000h
%MW32767	Tag memory zone	7FFFh
%MW0		0000h

Station Memory Zone

General Description

Definition of the word address zones used:

Type of access

Word addresses in hexadecimal format

System Zone

Modifications to values in this zone are taken into account by the station immediately.

Composition of the system zone:

Object no.	Description	Mode *
8000h	Tag family present/Tag system flags	R
8001h	Tag counter	R
8002h...8009h	UID	R
8018h	Station address	R/W

* : R = Read - W = Write

English

Object 8000h   Status:

MSB		LSB	
Tag family present Indicates the tag family while it is present. Reset when no longer present.		**Tag system flags** Updated in real time.	
Bit		Bit	
8	15693	0 (LSB)	Tag present
9	Icode	1	Initial parameter-setting phase following boot-up
A	14443A	2	Reserved
B	14443B	3	Reserved
C	Inside	4	Reserved
D	Reserved	5	Configuration badge present
E	Reserved	6	Reserved
F (MSB)	Reserved	7	Reserved

Object 8001h   Tag counter:

MSB	LSB
Incremented each time there is a new tag. Reset at each time power-up.	

Objects 8002h...8009h   UID:

MSB	LSB
Updated each time there is a new tag and valid if tag present.	

Each tag has a different unique code (UID). This code is spread over 16 bytes.

English

Object 8018h   Station address:

Read request:

Response to the read request:

MSB	LSB
0	Station address

Write request:

Write request:		Result
MSB	LSB	
0...1E	Station address	No action
1F	Station address	The new station address is immediately effective.

Tag Memory Zone

Automated Production Tag

These tags are addressed according to the table below and are accessible in Read/Write mode.

The station can read any tag in the XGHB range (automatic detection of the tag type).

Type of tag	XGH B90E340		XGH B221346		XGH B320345		XGH B211345		XGH B444345		XGH B445345	
	256 bytes		256 bytes		112 bytes		256 bytes		3408 bytes		13632 bytes	
Addresses	Dec.	Hex.	Dec.	Hex.	Dec.	Hex.	Dec.	Hex.	Dec.	Hex.	Dec.	Hex.
	0 to 127 (1)	0 to 7F (1)	0 to 127 (1)	0 to 7F (1)	0 to 55 (1)	0 to 37 (1)	0 to 127 (1)	0 to 7F (1)	0 to 1703 (2)	0 to 6A7	0 to 6815 (2)	0 to 1A9F

(1): Reserved addresses

(2): Reject if higher address requested

⚠ CAUTION

UNINTENDED OPERATION

Do not use XGH B445345 and XGH B444345 tags in the same application.
Once the station has automatically detected the XGH B445345 tag, it will no longer recognize the XGH B444345 tag.
**Failure to follow this instruction can result in injury or equipment damage.**
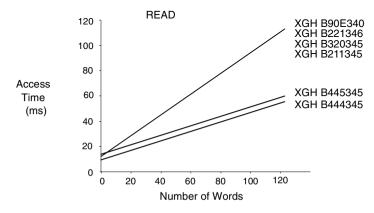
Read/Write Time   The read/write times are calculated using the following formulas:
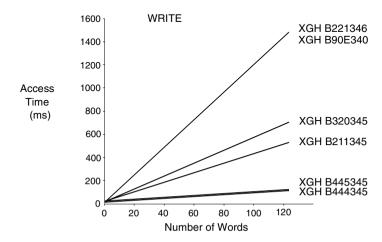
N: Number of words

The following table gives the read/write speeds:

Access time (ms)	XGH B90E340	XGH B221346	XGH B320345	XGH B211345	XGH B444345	XGH B445345
Read time	12+0.825xN	12+0.825xN	12+0.825xN	12+0.825xN	9.25+0.375xN	16.25+0.375xN
Write time	20+11.8xN	20+11.8xN	12+5.6xN	19+4.1xN	13+0.8xN	20+0.8xN
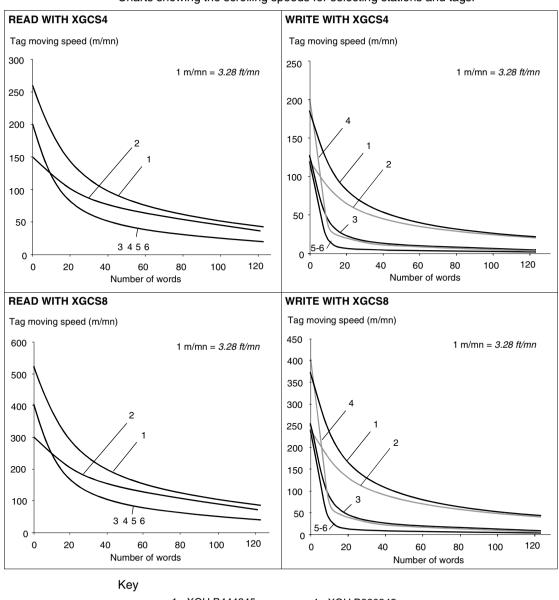
Charts showing the access times for selecting stations and tags:

Note: The access times given do not take the transfer times on the network into account.

English
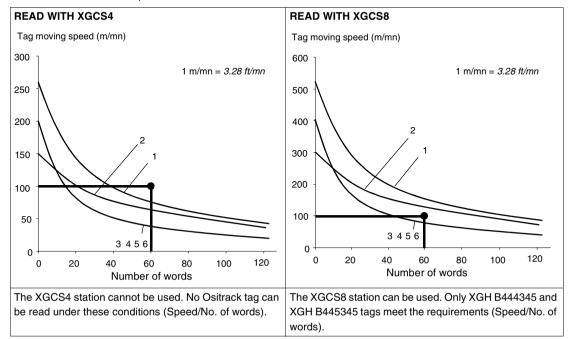
Charts showing the scrolling speeds for selecting stations and tags:

READ WITH XGCS4

Tag moving speed (m/mn)

1 m/mn = *3.28 ft/mn*

Number of words

WRITE WITH XGCS4

Tag moving speed (m/mn)

1 m/mn = *3.28 ft/mn*

Number of words

READ WITH XGCS8

Tag moving speed (m/mn)

1 m/mn = *3.28 ft/mn*

Number of words

WRITE WITH XGCS8

Tag moving speed (m/mn)

1 m/mn = *3.28 ft/mn*

Number of words

Key

1	XGH B444345		4	XGH B320345
2	XGH B445345		5	XGH B90E340
3	XGH B211345		6	XGH B221346

Example of using the charts:

On an assembly line, the scrolling speed is 100 m/min *(328 ft/mn)*. The application requires 60 words to be read.

READ WITH XGCS4	READ WITH XGCS8
Tag moving speed (m/mn) 1 m/mn = *3.28 ft/mn* 2 1 3 4 5 6 Number of words	Tag moving speed (m/mn) 1 m/mn = *3.28 ft/mn* 2 1 3 4 5 6 Number of words
The XGCS4 station cannot be used. No Ositrack tag can be read under these conditions (Speed/No. of words).	The XGCS8 station can be used. Only XGH B444345 and XGH B445345 tags meet the requirements (Speed/No. of words).

English

Communicating with the Uni-Telway Protocol

5

Presentation

Aim of this Chapter

This chapter describes the Uni-Telway protocol communication principle (Only from version V3.8 of the station).

What's in this Chapter?

This chapter contains the following topics:

General

General

In the Telemecanique communication architecture, all message exchanges are performed in point-to-point mode between two logical entities (client and server).

These logical entities must be identified by an address which is unique within the whole environment.

These addresses (sender address and destination address) are transmitted with each message.

Message structure:

SENDER ADDRESS	DESTINATION ADDRESS	MESSAGE

In the Telemecanique addressing system, based on the TSX7 PLC architecture, these addresses (sender and destination) are coded on 5 bytes:

- network number
- station number
- gate number
- module number
- channel number

The network number and station number bytes are used to identify the devices connected to the Uni-Telway network.

Exchange Principle

The UNI-TE requests supported by the Ositrack system enable the following operations:

- data exchanges with the tag in direct operating mode using standard requests:
  - WRITE OBJECTS
  - READ OBJECTS
  - WRITE WORD
  - READ WORD
  - INIT

- access to data specific to the system (product version, protocol version, communication quality, etc) using standard requests:
  - IDENTIFICATION
  - PROTOCOL VERSION
  - STATUS
  - MIRROR
  - READ COUNTERS
  - CLEAR COUNTERS

Note: The Ositrack compact stations does not accept more than one request at the same time. A negative acknowledgement (nack) is returned if a request is received while the previous one is not yet finished.

Connection   For more detailed explanations on installation and connection, see *Installing the system, p. 13*.

Request

Reading Objects   This request is used to read n objects.
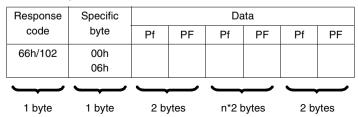
Request:

Request code	Category code	Segment	Specific byte	Object address		Number of objects to be read	
				Pf	PF	Pf	PF
36h/54	00h	01h 68h	00h 06h				

1 byte   1 byte   1 byte   1 byte   2 bytes   2 bytes

- Segment: 01h or 68h = physical address of words
- Specific byte:
  - 00h = request for deferred response if tag missing
  - 06h = request for immediate response
- Object address: Address of the first word to be read.

Station response:

Positive response:

Response code	Specific byte	Data					
		Pf	PF	Pf	PF	Pf	PF
66h/102	00h 06h						

1 byte   1 byte   2 bytes   n*2 bytes   2 bytes

Negative response (eg: with byte 06h if tag missing):

Response code
FDh/253

1 byte

Causes of rejection:

- Unknown tag
- Inadequate access rights
- Unknown object

- Address of the last object outside limits
- Indexed address outside limits
- Tag missing if specific byte = 06h.

Note: The reading is limited to 120 words maximum.

English

Writing Objects   This request is used in direct operating mode to write n words to the tag or station memory zones.

In this operating mode, all the data processing is carried out by the PLC or the computer.

Request:

Request code	Category code	Segment	Specific byte	Object address		Number of object to be written		Data	
				Pf	PF	Pf	PF	Pf	PF
37h/55	00h	01h 68h	00h 06h					Series of words	

1 byte   1 byte   1 byte   1 byte   2 bytes   2 bytes   n*2 bytes

- Segment: 01h or 68h = physical address of words
- Specific byte:
  - 00h = request for deferred response if tag missing
  - 06h = request for immediate response
- Object address: Address of the first word to be written.

Station response:

Positive response:

Response code
FEh/254

1 byte

Negative response (eg: with byte 06h if tag missing):

Response code
FDh/253

1 byte

Causes of rejection:

- Unknown tag
- Inadequate access rights
- Unknown object
- Address of the last object outside limits

- Writing not checked
- Indexed address outside limits
- Tag missing if specific byte = 06h.


Note: The writing is limited to 120 words maximum.

Read a Word   This request is used for direct access to words in an addressable memory zone.
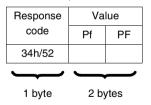
Request:

Request code	Category code	Word number	
		Pf	PF
04h/04	00h		

    1 byte   1 byte   2 bytes

Station response:

Positive response:

Response code	Value	
	Pf	PF
34h/52		

    1 byte   2 bytes

Negative response:

Response code
FDh/253

    1 byte

Causes of rejection:
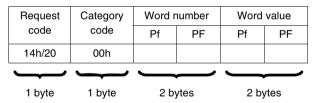
- Inadequate access rights
- Unknown object
- Word number address outside limits
- Tag missing.

Write a Word   This request is used for direct access to words in an addressable memory zone.

Request:

Request code	Category code	Word number		Word value	
		Pf	PF	Pf	PF
14h/20	00h				

1 byte	1 byte	2 bytes	2 bytes

Station response:

Positive response:

Response code
FEh/254

1 byte

Negative response:

Response code
FDh/253

1 byte

Causes of rejection:
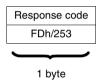
- Unknown request
- Inadequate access rights
- Word number outside limits
- Tag missing
- Tag not initialized.

INIT Request   This request is used to cancel all current requests.

Request:
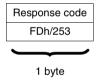
Request code	Category code
33h/51	00h

1 byte   1 byte

Station response:

Positive response:

Response code
63h/99

1 byte

Negative response:

Response code
FDh/253

1 byte

Causes of rejection:

- Unknown request
- Inadequate access rights

**MIRROR
Request**

This service is used to test the system and the communication path.
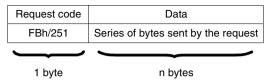
The client sends a sequence which the server sends back to the client.

Request:

Request code	Category code	Data
FAh/250	00h	Series of bytes (maximum 32)

1 byte　　　　　1 byte　　　　　　　　n bytes

Station response:

Positive response:

Request code	Data
FBh/251	Series of bytes sent by the request

1 byte　　　　　　　　n bytes
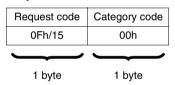
Note: There is never a negative response.

IDENTIFI-CATION Request

This request is used to obtain the product type and product version as a response.

Request:

Request code	Category code
0Fh/15	00h

⏜ 1 byte   ⏜ 1 byte

Station response:

Positive response:

Response code	Category code	Product sub-type	Product Version	Length	Product Identification
3Fh/63	24h/36	01h	(1)	0Bh	(2)

1 byte   1 byte   1 byte   1 byte   1 byte   n bytes

(1) : Version number in BCD format.

(2) : Product identification: "XGC-S-V3.8 "

Negative response:

Response code
FDh/253

1 byte

Causes of rejection:

- Unknown request
- Inadequate access rights

English

PROTOCOL VERSION Request

This service is used to identify the version and any parameters of the application protocol which is used for the conversation. In this request, the client provides the versions of the application protocol which it supports, the maximum message size, the size of the request file, etc. The server will then send back its own specifications. This then enables the client to send requests in a format and size which is known to both parties.

Request:

Request code	Category code	Max. message size		Length (1)	Version (2)
		Pf	PF		
30h/48	00h	20h	00h	01h	Series of bytes
1 byte	1 byte	2 bytes		1 byte	n bytes

(1) : number of versions supported.

(2) : list of versions supported.

Station response:
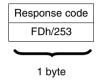
Positive response:

Response code	Max. message size		Length	Version	Request file size	
	Pf	PF			Pf	PF
60h/96	80h	00h	01h	(1)	00h	00h
1 byte	2 bytes		1 byte	1 byte	2 bytes	

(1) : 10h for version V 1.0.

Negative response:

Response code
FDh/253
1 byte

Causes of rejection:

- Unknown request
- Inadequate access rights

STATUS Request The station provides its status in the response.

Request:

Request code	Category code	Detail required
31h/49	00h	00h

1 byte   1 byte   1 byte

Station response:
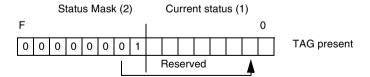
Positive response:

Response code	Current status	Status Mask
61h/97	(1)	(2)

1 byte   1 byte   1 byte

Status mask: Bit string. Only those current status bits whose bit of the same rank in "status mask" is at 1 are significant.

Example:

Negative response:

| Response code |
|:---|
| FDh/253 |

1 byte

Causes of rejection:
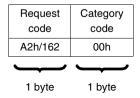
● Inadequate access rights (request in process)

English

READ COUNTER Request

Each station manages a log of link faults (character error, frame error, protocol error), and counts 4 types of error in counters (16-bit words):

- number of messages sent and not acknowledged
- number of messages sent and refused
- number of messages received and not acknowledged
- number of messages received and refused

Request:
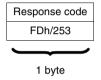
Request code	Category code
A2h/162	00h

1 byte   1 byte

Station response:

Positive response:

Response code	Number of messages sent and not acknowledged		Number of messages refused		Number of messages received and not acknowledged		Number of messages refused	
	Pf	PF	Pf	PF	Pf	PF	Pf	PF
D2h/210								

1 byte   2 bytes   2 bytes   2 bytes   2 bytes

Note: There is no counter overflow. The counters remain frozen at address 7FFFh (32767) until they are reset by sending a clear counter request (A4h).

Negative response:

Response code
FDh/253

1 byte

Causes of rejection:

- Unknown request
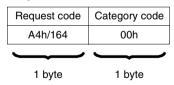
- Inadequate access rights

CLEAR COUNTER Request
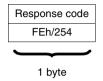
This request is used to clear the 4 error counters of a device to zero.

Request:
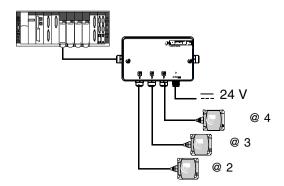
Request code	Category code
A4h/164	00h

1 byte   1 byte

Station response:

Positive response:

Response code
FEh/254

1 byte

Negative response:

Response code
FDh/253

1 byte

Causes of rejection:

- Unknown request
- Inadequate access rights

English

Programming

Application Example

A splitter box and a Premium PLC are connected to a Uni-Telway network.

24 V

@ 4

@ 3

@ 2

Read 10 words under PL7 PRO (READ_VAR command)

Read 10 words at tag address 0.

The Ositrack compact station is at address 1 on the TSX SCY 21601 card of PREMIUM PLC (slot 3, channel 0).

```
(* Description *)
(* %MW : Type of object to be read = internal word *)
(* %MD480 : Address of the first word to be read in the tag *)
(* 10 : Number of objects to be read *)
(* %MW600:10 : Table containing the value of the objects to be
read *)
(* %MW470:4 : Management parameters *)

%MD480 : = 0;
IF NOT %MW470:X0 THEN
(* send request and store result in %MW600:10 *)
READ_VAR(ADR#3.0.1, '%MW', %MD480, 10, %MW600:10, %MW470:4);
END_IF;
```

Write 10 Words under Unity (WRITE_VAR command)

Write 10 words starting at tag address 16#100.

The Ositrack compact station is at address 1 on the TSX SCY 21601 card of a PREMIUM PLC (slot 3, channel 0).

```
(* Description *)
(* %MW : Type of object to be written = internal word *)
(* %MD480 : Address of the first word to be written to the tag
*)
(* 10 : Number of objects to be written *)
(* %MW600:10 : Table containing the value of the objects to be
written *)
(* %MW470:4 : Management parameters *)

%MD480 : = 16#100;
IF NOT %MW470:X0 THEN
(* send request to write data to the tag *)
WRITE_VAR(ADR#3.0.1, '%MW', %MD480, 10, %MW600:10, %MW470:4);
 END_IF;
```

**Write 10 words
(SEND_REQ
command)**

Comment : (%MW471 = 0 if exchange correct)

Send a request:

```
(* Description *)
(* %MW480 : Lo specific byte Lo segment *)
(* %MW481 : Address *)
(* %MW482 : No. of objects to be written *)
(* %MW483 : Value of 1st word *)
(* %MW492 : Value of 10th word *)
(* %MW473 : 26 bytes *)
(* %MW600 : Reception table *)

%MW480 : =16#0001;
%MW481 : =16#0100;
%MW482 : =16#000A;
%MW483 : =1st word;
%MW492 : =10th word;
%MW473 : =16#001A;
%MW600 : =reception table;
IF NOT %MW470:X0 THEN
(* send request to write data to the tag *)
SEND_REQ(ADR#3.0.1, 16#0037, %MW480:3, %MW600:1, %MW470:4);
END_IF;
```

Communicating with the Modbus Protocol

6

Presentation

Aim of this Chapter

This chapter describes the Modbus protocol communication principle.

What's in this Chapter?
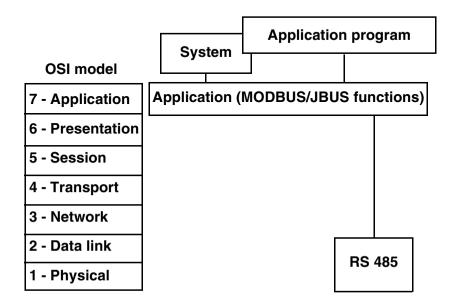
This chapter contains the following topics:

General

Presentation   With reference to the 7-layer OSI model, in which each layer performs a specific service, the Modbus/JBUS protocol supports the following three layers:

		Application program
	System	
OSI model		
7 - Application	**Application (MODBUS/JBUS functions)**	
6 - Presentation		
5 - Session		
4 - Transport		
3 - Network		
2 - Data link		**RS 485**
1 - Physical		

Communication between a PLC (or computer) processor and the Ositrack identification system using the Modbus/Jbus protocol is performed by exchanging messages in both directions on a multidrop bus, via a serial link module with an asynchronous link. Dialog between the higher processing levels and the Ositrack system is of the question/answer type. The initiator (master station) sends the messages to be executed to the Ositrack station (slave station), which answers after execution. With the Modbus/Jbus protocol, the Ositrack station communicates in RTU (Remote Terminal Unit) mode.
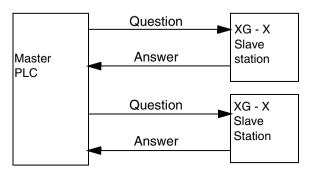
Information coding principle:

Characteristics	8 RTU bits
Coding system	8-bit binary code
Number of bits per character ● Start bit ● Significant bits ● Parity ● Stop bit	 ● 1 ● 8 ● Even/Odd/No parity ● 1 / 2
Message structure ● Message ● Check ● End of frame	 ● MODBUS frame ● CRC ● 3-character silence

Exchange Principles

Dialog between the PLC (or computer) and the Ositrack station is of the question/ answer type. The addressed slave answers every message sent by the master station (PLC) immediately. The response time is dependent on:

● The command processing time (which depends on the amount of data to be exchanged and the type of tag)
● The speed on the serial link
● The length of the message

Connection

For more detailed explanations on installation and connection, see *Installing the system, p. 13*.

English

Supported Modbus functions

The table below lists the supported Modbus functions:

Code		Type of request
Hex.	Dec.	
3	3	Read n words (1 ≤ n ≤ 123)
6	6	Write one word
8	8	Diagnostics
B	11	Read event counters
10	16	Write n words (1 ≤ n ≤ 123)
2B	43	ID

Point-to-point mode

When the PLC is connected directly to a compact station, this station can operate in point-to-point mode. In this operating mode, the station responds to the requests sent to address F8 as well as those sent to the station network address.

Broadcasting mode

In this mode, the PLC sends requests to address 0 and the slaves do not respond to the Modbus requests.

This mode is not authorized for Ositrack compact stations.

Requests

Read N Words   This function is used to read objects (word, word string).
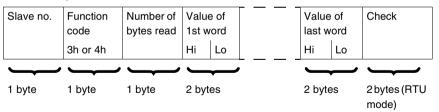
Read request:

Slave no.	Function code	Address of 1st word		Number of words		Check
	3h	Hi	Lo	Hi	Lo	

1 byte   1 byte   2 bytes   2 bytes   2 bytes (RTU mode)

- Slave no: 01h to 0Fh in multidrop mode or F8h in point-to-point mode
- Function code: 3h
- Address of the first word: Corresponds to the address of the first word to be read in the tag or the station (depending on the address)
- Number of words: $1 \leq N \leq 123$

Station response:

Slave no.	Function code	Number of bytes read	Value of 1st word			Value of last word		Check
	3h or 4h		Hi	Lo		Hi	Lo	

1 byte   1 byte   1 byte   2 bytes   2 bytes   2 bytes (RTU mode)
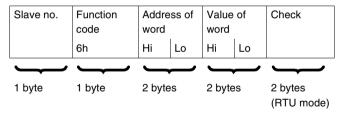
- Slave no: Same as read request
- Function code: Same as read request
- Number of bytes read: 2 to 246
- Value of the words read: 0000h to FFFFh
- **If there is no tag present, the station sends an error report** (see *Error Messages, p. 78*).

Write One Word   **Write request:**

Slave no.	Function code 6h	Address of word Hi | Lo	Value of word Hi | Lo	Check
1 byte	1 byte	2 bytes	2 bytes	2 bytes (RTU mode)
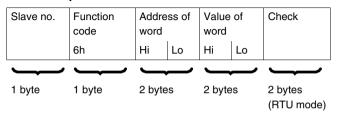
- Slave no: Same as read request
- Function code: 6h
- Word address: Same addressing field as for the read request
- Word values: 0000h to FFFFh

Station response:

Slave no.	Function code 6h	Address of word Hi | Lo	Value of word Hi | Lo	Check
1 byte	1 byte	2 bytes	2 bytes	2 bytes (RTU mode)

The response is an echo of the request, indicating that the value contained in the request has been taken into account by the station.

Write N Words　　**Write request:**

Slave no.	Function code 10h	Address of 1st word Hi | Lo	Number of words Hi | Lo	Number of bytes	Value of 1st word Hi | Lo		Value of last word Hi | Lo	Check
1 byte	1 byte	2 bytes	2 bytes	1 byte	2 bytes		2 bytes	2 bytes (RTU mode)

- Slave no: Same as read request
- Function code: 10h
- Number of words: $1 \leq N \leq 123$
- Number of bytes: Twice the number of words
- Word values: 0000h to FFFFh

Station response:

Slave no.	Function code 10h	Address of 1st word written Hi | Lo	Number of words written Hi | Lo	Check
1 byte	1 byte	2 bytes	2 bytes	2 bytes (RTU mode)

- Slave no.: Same as request
- Function code: Same as request
- Address of first word written: Same as request
- Number of words written: Same as request

Read diagnostic counters code 08h

Functions 08h and 0Bh are used to check the PLC/station link and operate the event counters (or diagnostic counters).

Request:

Slave no.	Function code	Sub-function code		Data		Check
	08h	00	Lo	00	00	

1 byte　　1 byte　　2 bytes　　2 bytes　　2 bytes (RTU mode)

Station response:

Slave no.	Function code	Sub-function code		Data		Check
	08h	00	Lo	Hi	Lo	

1 byte　　1 byte　　2 bytes　　2 bytes　　2 bytes (RTU mode)

Designation of the event counters:
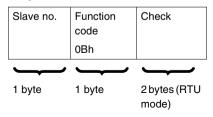
Sub-functions	Counter	Description
0Bh	1	Number of requests correctly received by the station, whether or not that station is affected
0Ch	2	Number of requests received with CRC errors
0Dh	3	Number of error messages sent back by the station (fault message), or not sent back in the event of broadcasting
0Eh	4	Number of correct requests specifically addressed to the station (apart from broadcasting)
0Fh	5	Number of broadcast requests received and correctly processed
10h	6	Number of executions not carried out due to communication with the tag not being possible
12	7	Number of faults due to incorrect characters (format, parity, etc) received by the station
00h	-	Mirror function
0Ah	8	Reset event counters function

Read events code 0Bh
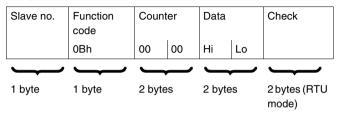
Functions 08h and 0Bh are used to check the PLC/station link and operate the event counters (or diagnostic counters).

Read events code 0Bh sends back the number of requests received by the station and correctly executed.

Request:

Slave no.	Function code 0Bh	Check

1 byte | 1 byte | 2 bytes (RTU mode)

Response:

Slave no.	Function code 0Bh	Counter 00 00	Data Hi Lo	Check

1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes (RTU mode)

Identification Request

Function 2Bh: This function is used to identify the station.

Read request:

Slave no.	Function code	MEI *	Read Device ID code	Object ID
	2Bh	0Eh	01h, 02h, 03h	00h

* : MEI = Modbus Encapsulated Interface
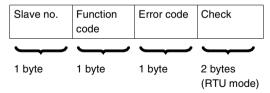
Station response:

Index	Object name & description	Description	Data type
0 (0000h)	Manufacturer's name	TELEMECANIQUE	ASCII string
1 (0001h)	Product code		
2 (0002h)	Version number	Vx.y (eg: V3.6)	

English

Error Messages   When an anomaly in the message (or during its execution) is detected by the station to which it is addressed, the station sends back an error message to the master system.

Syntax:

Slave no.	Function code	Error code	Check

1 byte   1 byte   1 byte   2 bytes
(RTU mode)

- Slave no.: Same as request
- Function code: Same as the function code and most significant bit of the byte set to 1

Examples:

- Function code of the error message after a read request:
  83h = (80 + 03) or 84h = (80 + 04)
- Function code of the error message after a write request:
  90h = (80 + 10)
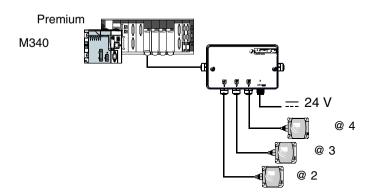
Error code:

- 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. Too much or not enough data in the frame, or quantity = 0, or data incompatible
- 4h: Execution fault (in read or write mode, or tag missing)

Programming

Application Example

A splitter box and a PLC are connected to a Modbus network.

Premium

M340

24 V

@ 4

@ 3

@ 2
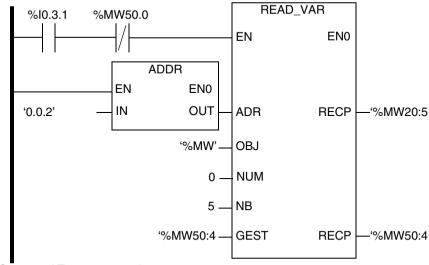
Example of Program in Unity

Program example: read station @ 2 status word.

```
(*----- Step 2 ----------------------------------------*)
(* Read status word = test presence of badge  station @ 2*)
IF NOT %MW702:X0 THEN
        %MD1:=16#00008000;(* STATUS *)
READ_VAR(0.0.2,'%mw',%MD1,1,%MW800:1,%MW702:4);
END_IF;
```

Modbus address = 2

English
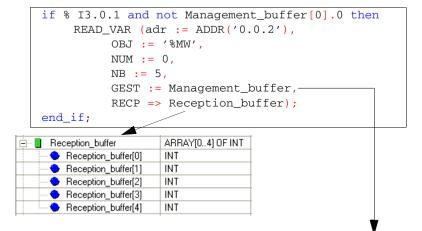
Example of Program in UNITY PRO

Program example: Read 5 words in the tag starting at word %MW 0 of the tag in station @ 2

LADDER programming

```
    %I0.3.1      %MW50.0                    ┌─────────────────────────┐
    ─┤ ├─────────┤/├──────────────────────┤ EN       READ_VAR    EN0 │
                                           │                          │
                      ┌──────────────┐     │                          │
                      │     ADDR     │     │                          │
                      │ EN       EN0 │     │                          │
        '0.0.2'     ──┤ IN      OUT  ├─────┤ ADR             RECP ├── '%MW20:5
                      └──────────────┘     │                          │
                                 '%MW' ────┤ OBJ                      │
                                           │                          │
                                     0 ────┤ NUM                      │
                                           │                          │
                                     5 ────┤ NB                       │
                                           │                          │
                             '%MW50:4 ─────┤ GEST            RECP ├── '%MW50:4
                                           └─────────────────────────┘
```

Structured Text programming

```
if % I3.0.1 and not Management_buffer[0].0 then
    READ_VAR (adr := ADDR('0.0.2'),
        OBJ := '%MW',
        NUM := 0,
        NB := 5,
        GEST := Management_buffer,
        RECP => Reception_buffer);
end_if;
```

Reception_buffer	ARRAY[0..4] OF INT
Reception_buffer[0]	INT
Reception_buffer[1]	INT
Reception_buffer[2]	INT
Reception_buffer[3]	INT
Reception_buffer[4]	INT

| Management_buffer	ARRAY[0..3] OF INT
Management_buffer[0]	INT
Management_buffer[1]	INT
Management_buffer[2]	INT
Management_buffer[3]	INT

Integration Tips
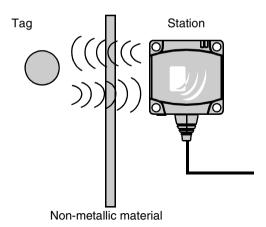
7

Tips

Protecting the System

To protect the system against impacts, you can:

- Embed the station in metal (see *Mounting in metal, p. 22*)
- Embed the tag in metal (see *Mounting in metal, p. 22*)
- Protect the station by making use of its ability to work through non-metallic materials, for example:


Non-metallic material
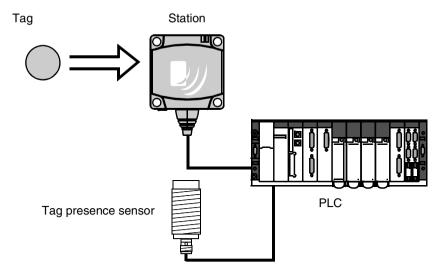
Thermal Protection

Avoid exposing the tags to radiating heat sources, such as infrared dryers.

English

Automation

Synchronize the Read/Write operations with a sensor that indicates the presence of the tag to the control system:

Tag   Station

Tag presence sensor   PLC

In case of processing errors (such as incorrect positioning of the tag or a transmission error) provide for repetition of the request before switching to "Fallback" mode (abandoning of the request and generation of an alarm).

Reading/Writing Tag

Before initiating a tag Read/Write request, ensure that the tag is present using a request to read the station STATUS word.

⚠ **CAUTION**

UNINTENDED OPERATION
- Only perform a write request when the tag is in the station's sensing zone.
- Do not use XGH B445345 and XGH B444345 tags in the same application.

**Failure to follow this instruction can result in injury or equipment damage.**
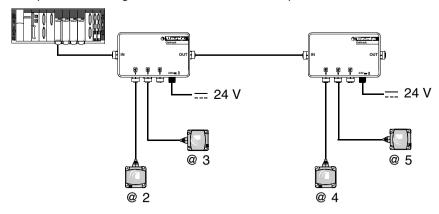
For more informations about the station's sensing zone, see *Sensing Zones, p. 21*.

To make maintenance easier

Leave address 1 on the network free.

A new station (by default address 1) can then be added without disturbing the network.

Example of addressing for ease of maintenance or replacement of stations:

English

Diagnostics

8

Diagnosing a Fault

Meaning of the 2 LEDs   The 2 LEDs on the station display all the operating states of the station:

TAG   COM

Description of the states of the TAG LED:

Station status	LED	Description
Tag not present	Series of green flashes (periodic)	Number of flashes = network address of the station
Tag present	Continuous green	Tag present in the dialog zone Read/Write functions activated
	Red	Communication error with the tag

Description of the states of the COM LED:

Station status	LED	Description
No communication on the network	Orange	Awaiting data on the network for the automatic configuration after power-up (time: 7 seconds) then the LED goes out and station reverts to its last stored configuration
Communication on the network	Green	Transmission or reception of messages (addressed to the station) on the network
	Red	Communication error on the network

English

Result of the Self-Test

On power-up, a self-test detects any faults on the station subassemblies.

In the event of a fault, the network communication LED flashes 8 times in succession, and the color of each of these 8 flashes indicates the result of the test:

Flash	Test	Result
1	Flashing test (checksum test)	Green if OK, Red if faulty
2	RAM test (read/write tests)	Green if OK, Red if faulty
3	EEPROM test (log)	Green if OK, Red if faulty
4	Line inversion test	Green if OK, Red if D0 and D1 are inverted
5	Analog/digital converter test	Green if OK, Red if faulty
6	Reader and bus test (read/write test)	Green if OK, Red if faulty. If there is a fault, the Address and Data bus bits alternate between states 1 and 0 while the 8 flashes are being transmitted, so that the buses can be tested using an oscilloscope and any faults will be detected.
7	Test of the internal clocks	Green if OK, Red if faulty
8	Watchdog test	Green if OK, Red if faulty (watchdog not working)

Note: If the tests do not show up any faults, the 8 consecutive flashes do not take place.

Note: Following the self-test, a LED operating test is performed: 1 red flash then 1 green flash on each LED