## **Product Description**

The PO7093 module, from Ponto Series, has 3 serial channels for local IHM function and MODBUS networks. This module connects directly to GBL bus, generating very compact systems of control and supervision. The channel configuration is realized through the MasterTool Extended Edition (MasterTool XE) programmer, using a module of extended configuration. The figure shows the assembled product on its base: PO6404.



PO7093 main features:

- Three serial channels (2 RS-232C and 1 RS-485).
- Interface with CPUs from PO3242, PO3342 and PO3x47 Ponto Series.
- Hot swapping without interference in any wiring from panel.
- Sending of simultaneous multiple requisitions through master devices.
- Implementation of the slave ALNET I protocol and the master and slave MODBUS protocol.
- Possibility of use of two PO7093 modules in the same bus.
- LEDs of indication of transmission and reception from two PO7093 modules in the same bus.
- DG LED for local indication of diagnostic.
- Disabled for operating at the PROFIBUS head.

## **Ordering Data**

## Product Packing

- The product packing comes with:
- PO7093 Module
- Installation Guide

### Product code

Please use the following product code when ordering:

Code	Description
PO7093	Multiserial co-processor

### **Related Products for Obligatory Ordering**

The following products might be ordered along with the PO7093 in order to use the module.

Code	Description
PO6404	Multiserial co-processor base

### **Related Items**

The following products might be ordered along when necessary:

Code	Description
AL-1715	RJ45-CFDB9 cable
AL-2305	CMDB9-RS-485 deriver cable
AL-2600	Deriver and termination for network

#### Notes

AL-1715: cable with RJ45 serial connector and IBM/PC standard female DB9 RS-232C. It is used for:

- Communication of the module with MT8000 MasterTool XE software.
- Requesting of data from module.
- Monitoring of operands.

AL-2305: cable with DB9 male serial connector and, in the other extremity, pins for connection with the AL-2600 deriver. It is used for:

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• Connection of the module with the RS-485 network.

AL-2600: module used for:

Installation of a RS-485 network. For each node from network, must there be one AL-2600. One AL-2600 connector connects to the AL-2305 cable, and they are linked to devices. Others two connectors are used to make the derivation among the AL-2600. The AL-2600 modules that are at the network extremities must be configured as termination, the others as derivation.

## Features

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	PO7093	
Туре	Multiserial communication module with 3 configurable channels	
Diagnostic Indication	One multifunctional LED with OK module indication, unaccessed module and off external DC source.	
Hot Swapping	Yes	
Protections	- Glass slow fuse 2 A in accessible support on base	
	- Subtension from input or short circuit at output turn off the power source with automatic reset in the recuperation.	
	- Protection against inverted polarization of tension 24 Vdc	
External Power Source	19 to 30 Vdc, ripple included.	
Isolation	1500 Vac per 1 minute	
RS-485 Serial Channel		
Power Consumption from bus	0	
Power Consumption from external source	106 mA (maximum)	
Power Dissipation	4,5 W	
Supervision Circuit of the Watchdog Time	Yes	
Configuration of the base terminal PO6404	1 x RJ45 for COM1	
	1 x DB9 for COM2	
	1 x RJ45 for COM3	
Serial Interfaces	2x RS-232C	
	1x RS-485	
	COM1, COM2 and COM3	
Serial Interface RS-232C (COM1)	Without modem signals	
Serial Interface RS-485 (COM2)	Isolated	
Serial Interface RS-232C (COM3)	RTS, CTS, DTR and DSR	
Slave ALNET I Protocol	Available to the 3 channels	
Slave and master MODBUS Protocol	Available to the auxiliary channels COM2 and COM3	
Configuration Software	MasterTool XE MT8000	
Operating Temperature	0 a 60 °C (upper to the IEC 61131 standard)	
Storing Temperature	-25 a 75 °C (according the IEC 61131 standard)	
Dimensions	99,0 x 52,1 x 84,1 mm	
Weight	250 g	
Standards	IEC 61131-2 :2003, chapters 8 and 11	
	Please refer to CT109000 for the main features from the series.	
Compatible base	PO6404	

#### Notes

Serial interfaces: RS-232C Interfaces are available in RJ45 connectors with grounded shielding. The RS-485 interface is available in DB9 connector. The termination of this interface is put in action through a sliding key available on base.

### **Compatibilities**

The following table describes the main Altus products compatible with the PO7093 module.

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	Compatible Version
CPU PO3242	2.20
CPU PO3342	2.20
CPU PO3X47	1.20
MT6000 ProPonto	1.59 or upper
MasterTool XE MT8000	5.45 or upper

## Application

This section shows an example of suggested use configuration for the Multiserial Co-processor PO7093.

This example shows a computer linked to one of the serial interfaces from a PO3242 CPU, using ALNET I protocol and executing commands as programming module transference, operands monitoring/forcing etc. In this case, only one serial port (COM2) is available for others communications. According the model of PONTO Serie CPU, there are until two auxiliary interfaces for communication. In order to get more serial communication interfaces (until six at the following example) are used PO7093 modules, each with three configurable and available serials for ALNET I, master and slave MODBUS protocols.

At the following example, one PO7093 module communicates with other computer (by ALNET I protocol), an IHM and other PO3242 CPU (by MODBUS protocol). The second PO7093 module communicates with an IHM and other PO3242 CPU, by MODBUS protocol.

The serial channels configured as MODBUS may work as master or slave. As master, it is possible reading or writing on operands from others CPUs. As slave, the IHM may read or write on operands from master CPU of the bus where the PO7093 modules are.



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## ALNET I Command List

The following table shows the ALNET I command list developed in the PO7093 module. All the commands are passed again to the CPU, except the command 37, which read status. When the command 37 is executed in the PO7093 module, it does not answer the status from the CPU, but the status from the module itself.

Command	Description
002	Force operand
004	Free all operands
005	Turn to programming mode
006	Monitor operand
007	Turn to cycle mode
008	Execute one cycle
009	Disable digital outputs
010	Enable digital outputs
011	Turn to execute mode
033	Remove programming module
034	Transfer module on EEPROM to RAM
036	Compact RAM memory
037	Read status
038	Read directory of programming modules
039	Read status from programming module
040	Monitor single operands
041	Monitor table operands
042	Read forcing status
045	Transfer modules on RAM to FLASH EPROM
046	Erase FLASH EPROM memory
129	Force single operands
130	Force table operands
131	Free operands
133	Write single operands
134	Turn protection level
135	Change password

## **MODBUS Command List**

The following table shows the list of MODBUS command developed on the PO7093 module.

Command	Description
01	Read Coil
02	Read Input
03	Read Holding Register
04	Read Input Register
05	Write 1 Coil
06	Write 1 Holding Register
15	Write Multiple Coils
16	Write Multiple Holding Registers

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## Installation



#### ATTENTION:

Device sensible to static electricity (ESD). Touch on grounded metallic object before handle it.

### **Electric Installation**

The diagram shows the wiring from power supply of 24 Vdc and the cable of connection from serial channel 2 to the RS-485 network with the PO7093 module installed on the PO6404 base. Please refer to the User's Manual of PO70930 – Multiserial Co-processor – in order to get more details.



#### Notes of diagram

1 – DB9-RS-485 Standard interface for configuration.

2 - The AL-2305 cable has active termination (two terminals which carry the supply to networking terminal)

3 - The power supply of 24 Vdc is connected at the terminals indicated by "24", "0" and grounding "G".

4 – The common point of the power supply of the modules (0 Vdc) can be turn on the ground from the electric panel. This joining is not obligatory, but it is recommended in order to minimize electric noise in an automation system.

5 – RJ45-RS-232C standard interface for configuration.

6 - RJ45-RS-232C standard interface for configuration.

7 - The termination key must be positioned in function of the interface position at the network topology.



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#### ATTENTION:

Atmospheric discharges (rays) can do harm to module though existent protections.

If the power of the module is deriving from source located out the electric panel, where the module is installed, and it may be submitted to those discharges, a suitable protection must be put in the entry of the panel control.

If the wiring of the entry points is submitted to this type of phenomenon, a protection against tension boom must be used.

#### Mechanical Assembly

The mechanical assembly of this module is described at the User's Manual from the Ponto Series. There are no particularities about the installation of this module.

The mechanical code which must be adjusted in the assembly base is 93 (93 in the key A and 3 in the key B).

## **Configurations**

The configuration from the module PO7093 is defined by software through CPU. The configuration is realized by the MasterTool XE programming software, through edition of an extended module C. The configurations bytes defined in the extended module C are sent by the MasterTool XE programming software to the CPU, which sent them through GBL bus to the PO7093 module.

The extended module C can be created through the menu **Module\New** at the MasterTool XE programming software. The window **Create a New Module** is showed by that menu. Its following fields must be edited:

• Type of Module:

The option Extended Module must be chosen;

Name of Module:

A name for the configuration module must be defined and, by the side of the field, a module number (3 until 9). The module number must be changed if there are others extended modules created in the project.

Configuration:

The option PO709 Multiserial must be chosen.

After to click in OK, the module is created and a window is showed for its configuration.

The position of the module PO7093 on the bus and the protocol for each of the modules must be chosen at the item **Protocols Configuration**. The configuration windows of each of the serial channels change according the protocol selected for the channel (ALNET I protocol, or master or slave MODBUS protocol). The User's Manual of module PO7093 MU209617 may be consulted in order to get more details about the configurable parameters for each protocol.

≽ New Module	×
Create New Module Select the type, the name of the file and the tag	of the module.
Module Type Extended Module	Configuration Multiserial PD7093
C- P07093 3	Language
	<u> </u>

#### ALNET I Configurations

ALNET I is the protocol used to the communication between the module and a microcomputer, allowing: execution of writing and reading commands on operands from CPU (the master CPU from bus where the PO79030 module is); reading of status from module; change of the operating mode of CPU; etc. The user must define the properties from the serial channel, namely: address, speed (baud rate), types of modem signals, types of parity and number of stop bits.



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#### Slave MODBUS Configurations

In this configuration, the user must define the MODBUS relations, besides the properties of serial channel that are common to the ALNET I protocol. The user can insert, edit and remove a relation. The following figure shows the configuration window of the MODBUS relation.

≽ Editing the Slave MOD	BUS Relation - Relation 1		x
Slave MODBUS I Configure the operan Slave.	Relation ds band to access the data	of the MODBUS	
Data Area	First Operand	Operands band on the PLC	
C Input	First MODBUS Operand	MODBUS Operands Band 1 to 1	
C Input Register	Quantity	l	
		<u> </u>	

Through configuration of relations, the user defines the operands area from CPU that will be associated to MODBUS operands, allowing handling of the requests from master. For more details, the User's Manual from PO7093 MU209617 module may be consulted.

#### Master MODBUS Configuration

When to configure the serial channel as master MODBUS, the user must configure the MODBUS relations and an advanced configuration window, besides the properties from serial channels in common with slave MODBUS and ALNET I configurations.

At the advanced configuration window, the user must define: time-out of the slave, retry number, priority relation, status operands band and diagnostic from PLC, and control operand of relation inability. The following figure shows the advanced configuration window. For more details, the User's Manual from PO7093 MU209617 module may be consulted.

🦕 Advanced Cor	ofiguration	ns to the Mast	er MODBL	JS	×
Advanced Advanced	Config Configurati	urations ons to the Mast	er MODBUS	3.	
Slave Time-out	10	÷	x 100ms	_	
netties	μ	<u></u>		Relation 1 priority	
Status and Diagno	ostic	%M0000	÷	%M0000 to %M0001	
Unable Relations		%A0000.0	÷	%A0000.0	
			<u>(</u>	<u>DK</u> ancel	

At the master MODBUS configuration of relations, operands area from CPU are also defined and associated to MODBUS operands. The following figure shows the configuration window of the master MODBUS relations. For more details, the User's Manual from PO7093 MU209617 module may be consulted.

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		5003
-MODBUS Function	MODBUS Address	Quantity
Read Coil	1 📑	1
C Read Input	MODBUS Operand	MODBUS Operand band
C Read Holding Register	1 =	1 to 1
C Read Input Register	Origin Operand on PLC	, Origin Operand band
O Write 1 Coil		
O Write 1 Holding Register	1 3	]
O Write N Coil	Target Operand on PLC	Target Operand band
O Write N Holding Register	%M0000 ÷	%M0000
C Generic Relation	Status Operand	Status Operand band
Number of the MODBUS Function	2×M0000	%M0000 to %M0001
1	Pooling	x 100ms

After configuration, the relations may be edited or removed through "Edit Relation" and "Remove Relation" buttons, respectively. In order to edit a relation, the user must be click over the chosen relation and click on "Edit Relation" button, or double click on chosen relation only. The relation will be edited at the window of creation, the same window showed before. In order to remove a relation, the user must be click on it and click on "Remove Relation" button.

## Maintenance

The proceeding for hot swap of the module is described in the Ponto Series Users Manual.

### **Diagnostic Bytes**

The PO7093 modules have 70 bytes in order to diagnose module working. These bytes are showed at the following table. For more details about the meaning from the bytes, the User's Manual from MU209617 module may be consulted.

#### ATTENTION: The PO7093 module cannot be used on PROFIBUS Heads. Thus, it has not diagnostic from PROFIBUS network.

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Byte 0 – Executive Version H					n H			
7	6	5	4	3	2	1	0	Description
х	х	х	х	х	х	х	х	High byte from the executive version
Byte	e 1 – E	Execut	ive V	ersio	nL			Description
х	х	x	х	х	х	х	x	Low byte from the executive version
Byte 2 – Reserved						-		Description
х	х	x	х	х	х	х	х	Reserved
Byte	e 3 – F	PGA \	Versi	on			1	Description
х	х	х	х	х	х	х	х	Byte from the FPGA version
Byte	e 4 – 1	lime-o	ut of	Writi	ng End	d fron	η H	Description
х	х	х	Х	х	х	Х	Х	Time-out counter of writing end from CPU H
Byte	e 5 – 1	Time-o	ut of	Writi	ng End	d fron	۱L	Description
X	X	x	x	х	х	х	х	Time-out counter of writing end from CPU L
Byte	e 6 – F	Reserv	ed	1	T			Description
X	×	X	x	×	х	х	х	Reserved
Byte	÷/_C		roto					
0	0	0	0	0	0	1	1	
0	0	0	0	0	1	0	1	Slave MODBUS RTU
Bute			0 Seful	Comr	nunica	0 ations		
fron		M1 H	siui	Com	nunica	ations	•	Description
х	х	х	х	х	х	х	х	Counter of successful communications from COM1 H
Byte 9 - Successful Communications from COM1 L					nunica	tions		Description
х	х	x	х	х	х	х	x	Counter of successful communications from COM1 L
Byte 10 – Time-out of Reading End from COM1 H					ding E	ind fr	om	Description
x x x x x x x x					х	х	х	Time-out counter of reading end from COM1 H
Byte COM	Byte 11 – Time-out of Reading End from COM1 L					nd fr	om	Description
х	х	х	х	х	х	х	х	Time-out counter of reading end from COM1 L
Byte 12 – Successful Communications from UART1 H					munio	ation	s	Description
х	х	х	х	х	х	х	х	Counter of successful communications of the UART from COM1 H
Byte 13 - Successful Communications from UART1 L					munic	ation	s	Description
х	х	х	х	х	х	х	х	Counter of successful communications of the UART from COM1 L
Byte	e 14 –	Errors	s fron	n UAF	RT1 H			Description
х	х	х	х	х	х	х	х	Counter of Errors of the UART from COM1 H
Byte	<del>)</del> 15 –	Errors	s fron	n UAF	RT1 L			Description
х	x	x	х	x	x	х	х	Counter of Errors of the UART from COM1 L
Bvte	e 16 –	Reser	ved	1			1	Description
x	×	x	x	x	x	x	x	Reserved
Byte 17 - COM2 Protocol				`			Description	
	0	0	0	0	0	0	0	
0	0	0	0	0	0	4	4	
0	0	0	0	0	U	1	1	
0 0 0 0 0 1 0 0 Master MODBUS RTU						Master MODBUS RIU		
Byte 18 – Successful Communications from COM2 H				munio	cation	s	Description	
х	х	Х	Х	х	х	Х	Х	Counter of successful communications from COM2 H

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Byte 19 - Successful Communications from COM2 L					munic	ation	S	Description
x x x x x x x x				х	х	х	Counter of successful communications from COM2 L	
Byte 20 – Time-out of Reading End from COM2 H					ding E	Ind fr	om	Description
х	х	х	х	х	х	х	х	Time-out counter of reading end from COM2 H
Byte COM	e 21 – V12 L	Time-	out o	f Rea	ding E	End fr	om	Description
х	х	х	х	х	х	х	х	Time-out counter of reading end from COM2 L
Byte fron	e 22 – n UAR	Succe T2 H	essfu	I Com	muni	cation	S	Description
х	х	х	х	х	х	х	х	Counter of successful communications of the UART from COM2 H
Byte fron	Byte 23 - Successful Communications from UART2 L					ation	S	Description
х	х	х	х	х	х	х	х	Counter of successful communications of the UART from COM2 L
Byte 24 – Errors from UART2 H					RT2 H			Description
х	х	х	х	х	х	х	х	Counter of Errors of the UART from COM2 H
Byte	Byte 25 - Errors from UART2 L							Description
х	х	х	х	х	х	х	х	Counter of Errors of the UART from COM2 L
Byte	Byte 26 – Reserved							Description
х	х	х	х	х	х	х	х	Reserved
Byte	Byte 27 - COM3 Protocol					Description		
0	0	0	0	0	0	0	0	ALNET I
0	0	0	0	0	0	1	1	Slave MODBUS RTU
0	0	0	0	0	1	0	0	Master MODBUS RTU
Byte 28 – Successful Communications from COM3 H					muni	cation	s	Description
х	х	х	х	х	x	х	х	Counter of successful communications from COM3 H
Byte 29 - Successful Communications from COM3 L					munic	ation	S	Description
х	х	х	х	х	х	х	х	Counter of successful communications from COM3 L
Byte 30 – Time-out of Reading End from COM3 H					ding E	Ind fr	om	Description
х	х	х	х	х	х	х	х	Time-out counter of reading end from COM3 H
Byte 31 – Time-out of Reading End from COM3 L				ding E	End fr	om	Description	
х	х	х	х	х	х	х	х	Time-out counter of reading end from COM3 L
Byte fron	Byte 32 – Successful Communications from UART3 H				muni	cation	s	Description
х	х	х	х	х	х	х	х	Counter of successful communications of the UART from COM3 H
Byte fron	Byte 33 - Successful Communications from UART3 L				munic	ation	S	Description
х	х	х	х	х	х	х	х	Counter of successful communications of the UART from COM3 L

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Byte 34 – Errors from UART3 H					тз н			Description
х	х	х	х	х	х	х	х	Counter of Errors of the UART from COM3 H
Byte	Byte 35 - Errors from UART3 L							Description
х	х	х	х	х	х	х	х	Counter of Errors of the UART from COM3 L
Byte	Byte 36 until Byte 37							Description
x x x x x x x x		х	Reserved					
Byte 38 – Modem Signals Reading					Readi	ng		Description
х	х	х	х	х	х	х	0	DSR signal state of COM3 off
х	х	х	х	х	х	х	1	DSR signal state of COM3 on
х	х	х	х	х	х	0	х	DCD signal state of COM3 off
х	х	х	х	х	х	1	х	DCD signal state of COM3 on
Byte 39 – Modem Signals Writing					Writin	g		Description
х	х	х	х	х	х	х	0	Turn off the DTR signal of COM3
х	х	х	х	х	х	х	1	Turn on the DTR signal of COM3
Byte 40 until byte 69							Description	
х	х	х	x	х	х	х	х	Reserved

## Diagnostic LED

The Diagnostic LED from this module indicates the following situations:

DG LED	Meaning	Causes
Power ON	Normal working.	
Blinking 1 time	Unaccessible module by CPU or logic	- CPU out of the bus.
	fault at module.	- Position of the module on the bus and its position configured in the CPU are different.
		- Undeclared module.
		- Damaged module.
Blinking 3 times	Tension of power under the nominal	- The external power supply is under the specified limit.
Blinking 4 times	Unconfigured module	- Extended module C unloaded for module configuration.

#### Notes

The priority for diagnostic indication by LED follows the table order above. Thus, to blink 1 time has higher priority, and blink 4 times has lower priority. LED stays ON when there is no diagnostic situation.

## Panel LEDs

For each communication channel there are two LEDs. These LEDs indicate the channel activity according the followig table.

LEDs	Meaning
ТХ	Transmission in process
RX	Reception in process

## Physical Dimensions

Dimensions in mm.

For dimensioning of the electric panel, take into consideration dimensions from the module base. Ponto Series Installation manual must be consulted for general dimensioning of the panel.

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## Manuals

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For more technical details, configuration, installation and programming on Ponto Series products, the following documents may be consulted:

Document Code	Description
CT109000	Ponto Series characteristics and configuration
MU209000	Ponto Series Users Manual
MU209104	Users Manual from PO3042/PO3142/PO3242/PO3342 CPUs
MU209108	Users Manual from PO3047/PO3147/PO3247 CPUs
MU299040	MasterTool ProPonto MT6000 Users Manual
MU299604	MasterTool XE MT8000 Users Manual

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