

Communication module for Premium PLCs TSX IBY 100 / TSX IBX 100

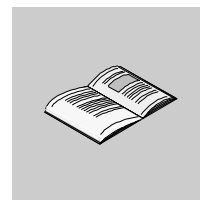
TSX DM IBY 100 eng

Document Set

Introduction

This manual groups together the Interbus-S module implementation hardware and software.

Table of Contents



	About the Book	9
Chapter 1	General	11
	Introduction	11
	Presentation	12
	General architecture of an Interbus-S field bus	13
	Interstation bus	14
	Bus installation	15
	Local bus	16
Chapter 2	Results	17
	Introduction	17
	Interbus-S scanning time	18
	PCP message transmission time	20
	Application response time	22
	Station Transmission rate	24
Chapter 3	Introduction to module TSX IBY 100	25
	Introduction	25
3.1	Description of module	27
	Introduction	27
	About the TSX IBY 100 module	28
	Operating mode	30
	Connectors	31
3.2	Installation of module	33
	How to set up the module on a rack	33
3.3	Technical specifications	36
	Introduction	36
	Compatibility	37
	Standards and Characteristics	39
	Operating conditions	40
Chapter 4	Introduction to module TSX IBX 100	43
	Introduction	43
4.1	Description of module	45

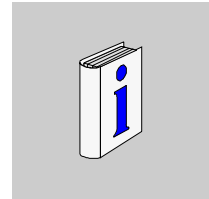
	Introduction	45
	About the TSX IBX 100 module	46
	Logical installation on X Bus	49
	Signaling on the card	50
4.2	Installation of module	51
	Introduction	51
	Preliminaries	52
	How to configure the card address on Bus X	53
	How to configure the standard address of the RS 232 internal port on the ISA bus	54
	How to configure the switch used by the module on the ISA bus	56
	How to install the module on a PC	58
	How to install the module with the operation system	61
4.3	Technical specifications	62
	Introduction	62
	Compatibility	63
	Characteristics	64
Chapter 5	Software implementation	65
	Introduction	65
5.1	General	67
	Introduction	67
	Principal	68
	Methods of Installation	70
	Physical or logical addressing of inputs/outputs	73
	Firmware update	76
5.2	Configuration	77
	Introduction	77
	How to access the configuration screen	78
	Module configuration screen	79
	Data to be provided	81
	Data resulting from the *.SVC text file	83
	IBSCNV Converter	85
	How to configure TSX IBY 100 or TSX IBX 100 modules	86
	Module configuration file	89
5.3	Programming	90
	At a Glance	90
	PMS messaging services	91
	PMS request: READ	93
	PMS request: WRITE	95
	PMS request: START	97
	PMS request: STOP	98
	PMS request: IDENTIFICATION	99
	PMS request: STATUS	101
	Management parameters: communication and operation reports	103
	Interbus-S command services	105

	Examples showing how to use Start IBS and IBS fault acknowledgement commands	108
	Examples showing how to use segment activation and deactivation commands	110
	Read PCP confirmation (Modules TSX IBX/IBY 100, minimum version :V3.0).	112
	Useful CMD Tool commands	114
5.4	Debugging	117
	Introduction	117
	Description of the debugging screen.	118
	Debugging parameters linked to bus diagnostics	120
	Sending PMS messages.	122
	Debugging parameters linked to devices	124
5.5	Diagnostics	125
	Introduction	125
	Diagnostics from module status LEDs	126
	Diagnostics from PL7 debugging screen LEDs.	128
	Main faults.	129
5.6	Language objects associated with TSX IBY 100/TSX IBX 100 modules	131
	Introduction	131
	Language objects in default exchange	132
	Language objects for explicit exchange	137
	Managing explicit exchanges	138
	Language objects associated with configuration.	139

Glossary	141
-----------------	------------

Index	145
--------------	------------

About the Book



At a Glance

Document Scope This manual addresses users wanting to implement the master Interbus-S communication modules:

- TSX IBY 100 on TSX Premium,
- TSX IBX 100 on PC.

Validity Note This updated manual takes into account the functionality of PL7 V4.3.

Related Documents

Title of Documentation	Reference Number
INTERBUS – reference manual	See the PHOENIX CONTACT documentation

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

General



Introduction

Aim of this chapter

This chapter presents the main characteristics of an Interbus-S communication.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Presentation	12
General architecture of an Interbus-S field bus	13
Interstation bus	14
Bus installation	15
Local bus	16

Presentation

Introduction

Interbus-S is a series link field bus for sensors and actuators, responding to the demands of an industrial environment.

This bus uses the master-slave procedure. The master subscriber manages and coordinates bus access. It transmits and receives all data to and from the subscribers.

Other devices are also available in the following categories:

- station headers,
- inputs/outputs modules,
- Interbus-S / AS-I gateways,
- AS-i controller gateways,
- ATV 18, 58, 66 speed controllers,
- ATS46/NEPTUNE,
- LT6 electric protection,
- keyboard terminal indicators XBT BB,
- XBT-P/E operations terminals,
- inductive identifications,
- E/S IP20 Telefast interfaces,
- Momentums,
- T CCX 17 operations consoles.

Station headers

Station headers are Interbus-S slaves supporting the following functions:

- connecting or disconnecting a bus installation, a local bus or a secondary interstation bus to an interstation bus,
- supplying the inputs/outputs modules for the bus electronics,
- regenerating the data in the interstation bus,
- providing galvanic isolation of the interstation bus segments,
- indicating errors by a potential free alarm output.

Inputs/outputs modules

Inputs/Outputs modules are used to link sensors and actuators, carrying out monitoring of machines or procedures on the Interbus-S system.

Interbus-S / AS-i gateway

AS-i is a bus used for reaching the sensor-actuator level in a less costly way than Interbus-S.

This bus is completely compatible with Interbus-S. It is connected through an intermediary station header.

General architecture of an Interbus-S field bus

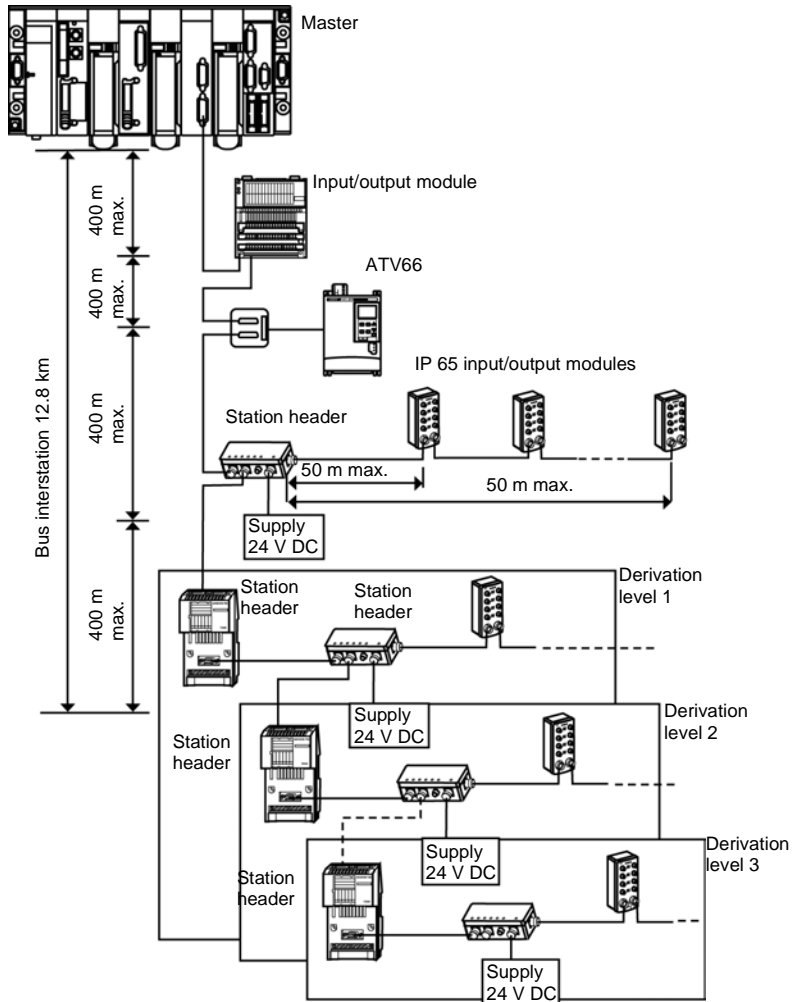
Introduction

Interbus-S architecture contains:

- an interstation bus,
- bus installations,
- local buses.

Illustration

The following example illustrates an Interbus-S field bus architecture:



Interstation bus

Introduction

Interbus-S has a general ring structure. The interstation bus RB represents the main part of this ring. Thus, it covers the largest distance inside the system. It is composed of segments connected by station headers.

Characteristics

The following table presents the characteristics of an Interbus-S bus supported by TSX IBY 100 / TSX IBX 100.

Physical characteristics		
Maximum length of a segment	up to 400 m	
Maximum length of cable between ...	the coupling card and the first station header of the interstation bus	400 m
	two station headers	400 m
	the coupling card and the last station header of the interstation bus	12,8 km
Transmission characteristics		
Transmission method	RS 485 point to point link with the TSX IBY 100 / TSX IBX 100 module	
Possible transmission supports	<ul style="list-style-type: none"> ● even twisted line ● fiber optic link ● waveguide rail ● infrared link ● turning controller 	
Transmission rate	500 Kbits/s	
Capacity		
Number of branch levels per station header on the main RB bus	Maximum 16	
Number of station headers	<ul style="list-style-type: none"> ● Maximum of 254 on Interstation bus 	
Number of Slaves IBS	<ul style="list-style-type: none"> ● Maximum of 2048 inputs and 2048 outputs for TSX IBY 100/IBX 100 modules less than version V3.0 ● Maximum of 3872 inputs and 3872 outputs, but 4096 inputs/outputs max 	

Bus installation

Introduction

The bus installation IRB is a branch from the interstation bus, connected by a station header to an interstation bus.

Characteristics

The following table presents the characteristics of an Interbus-S bus installation supported by TSX IBY 100 / TSX IBX 100.

Physical characteristics		
Maximum length of cable between ...	the station header and the first module	50 m
	the station header and the last module	50 m
Electrical characteristics		
Maximum cable current charge	4,5 A	
Transmission characteristics		
Transmission method	RS 485 link	
Possible transmission supports	special cable ensures: <ul style="list-style-type: none"> ● 24v supply to inputs/outputs modules and sensors ● data transmission 	
Transmission rate	500 Kbits/s	
Capacity		
Number of inputs/outputs modules	Maximum 40	

Local bus

Introduction

The local bus LB is a local branch of an interstation bus in which a monitoring unit is installed. The local bus makes possible the construction of an adjustable and profitable remote sub-station.

The bus is connected to an interstation bus by a station header.

Characteristics

The following table presents the Interbus-S local bus characteristics.

Physical characteristics		
Maximum length of cable between ...	the station header and the first module	1,5 m
	two modules	1,5 m
	the station header and the last module	10 m
Electrical characteristics		
Device consumption	from 20 to 250 mA	
Maximum current consumption	800 mA	
Transmission characteristics		
Transmission method	TTL	
Possible transmission supports	specific cable	
Transmission rate	500 Kbits/s	
Capacity		
Number of inputs/outputs modules	Maximum of 8 different modules	

Results

2

Introduction

Subject of this chapter

This chapter presents the performances of an Interbus-S field bus.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Interbus-S scanning time	18
PCP message transmission time	20
Application response time	22
Station Transmission rate	24

Interbus-S scanning time

Introduction

The Interbus-S scanning time is the inputs/outputs update time. It is dependent on the number of DP words and PCP cyclical exchanges on the bus.

Calculation of time

The scanning time is calculated by the following formula:

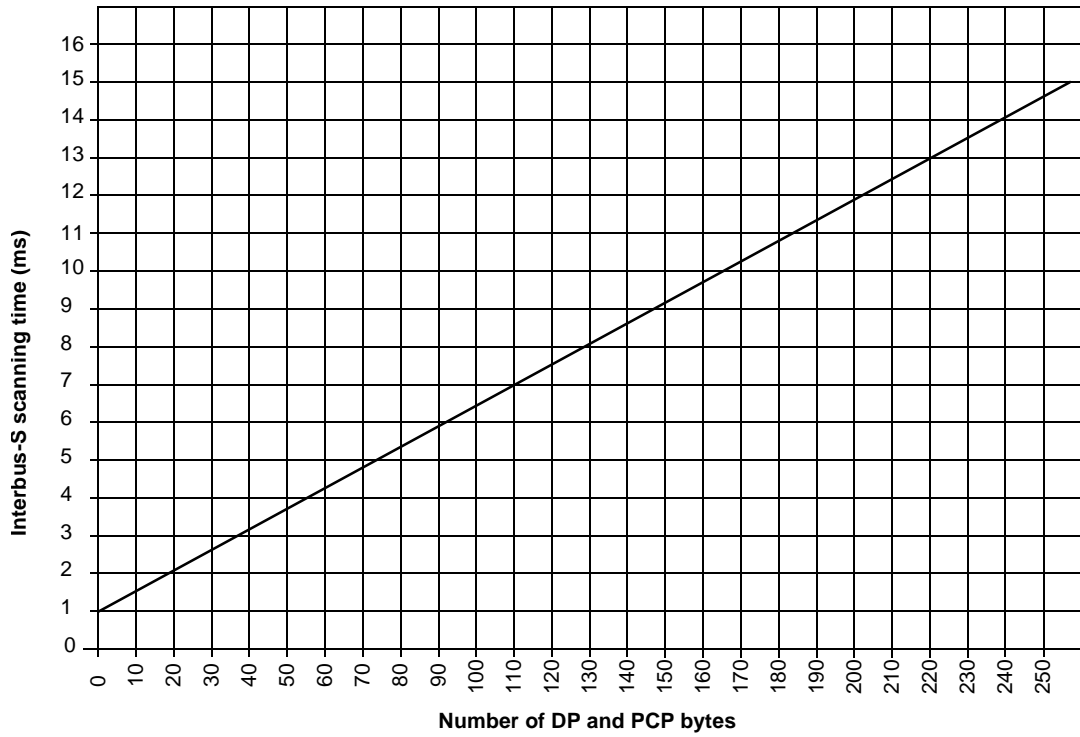
$$t = (1,15 \times 13 \times (8 + n) + 3 \times m) \times t_b + t_s + 2 \times t_p$$

Equation parameters

Parameter	Meaning
t	Scanning time
n	Number of DP and PCP bytes to transmit
m	Number of modules connected to the RB (including station headers)
t _b	Bit transmission time (0,002 ms à 500 Kbits/s)
t _s	Constant of IBS software interscan time (0.9 ms)
t _p	Cable propagation time (0.016 ms/Km)

Graph 1

The following figure presents the IBS scanning time graph.



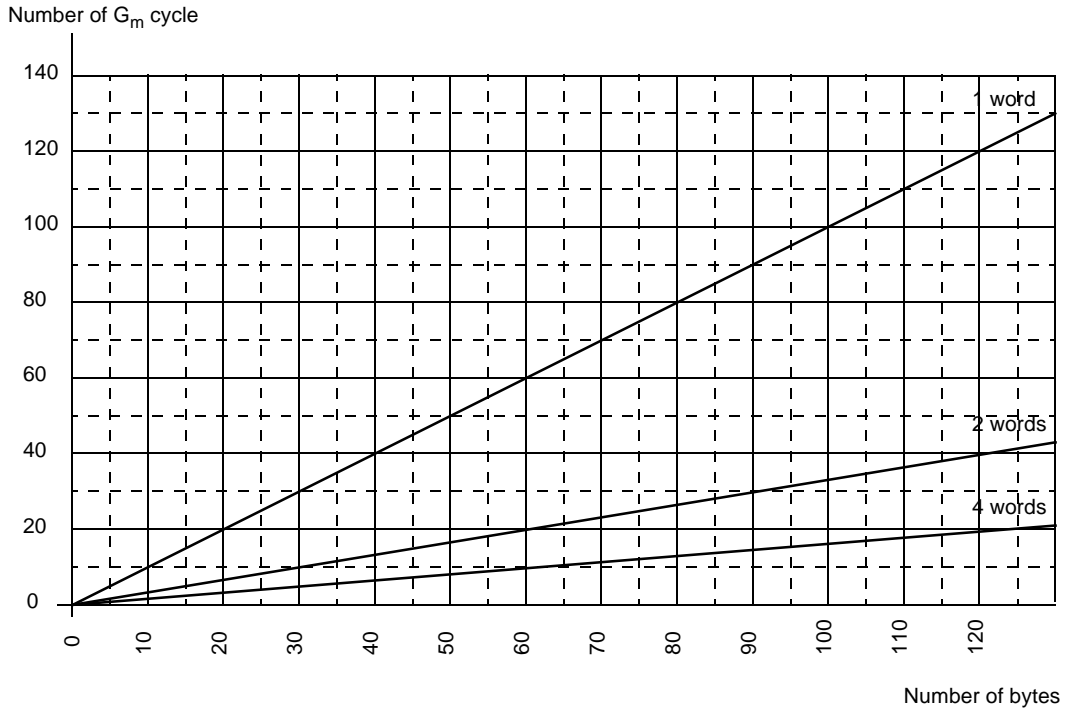
PCP message transmission time

Introduction

Message transmission time is the time between the sending of the messages and the receiving of the report.

Graph 2

The following figure presents the graph of the number of G cycles m in an Interbus-S message



Calculation example

The example shows a write request transmission of 39 bytes. Upon receiving the message, the report size is 4 bytes.

The table regroups the different element in the transmission time calculation

Number of PCP words (Bandwidth)	1	2	4
IBS scanning time (in ms, obtained according to)	3	3	3
Sending of the 39 byte write request			
Number of G cycles G_m (according to Graph 2)	39	13	6
$T_{D1} = G_m \cdot \text{scanning time} + 10$ (in ms)	127	49	28
Receiving the 4 byte report			
Number of G cycles G_m (according to Graph 2)	4	2	1
$T_{D2} = G_m \cdot \text{scanning time} + 10$ (in ms)	22	16	13
Request transmission time			
$= T_{D1} + T_{D2}$ (in ms)	149	65	41

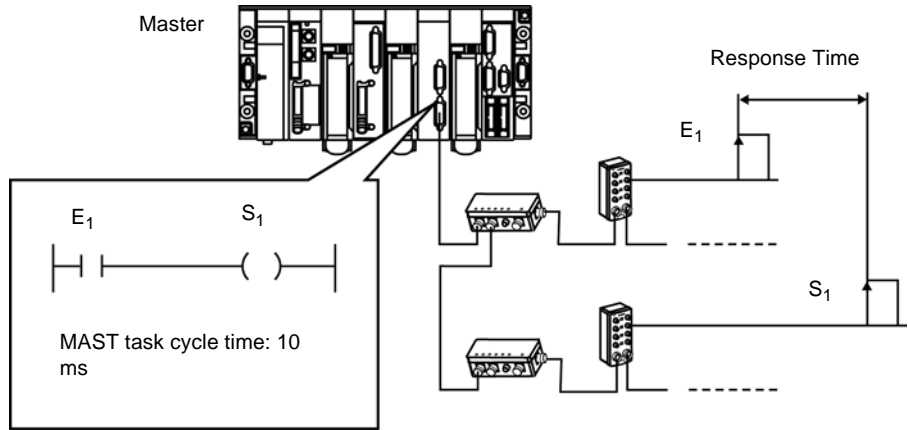
Application response time

At a Glance

The application response time is a logical response time which does not take into account the filtering time or the response of the sensor and actuator interfaces. This is the time elapsed between acquiring an input and setting an output on the InterBus-S bus.

Illustration

The following example illustrates the application response time.



Response time example

The following table gives an example of a response time measured for the configuration of a specific bus.

Number of words used			CPU mode	Interbus_S scan time (ms)	PLC scan time (ms)			Response time measured (ms)		
%IW	%QW	PCP			average	min.	max.	average	min.	max.
56	56	2	Periodic	4.8	5	2	13	39	30	46
56	56	2	Cyclic	4.8	25	-	-	74	60	75
103	118	5	Periodic	9.7	4	2	11	80	58	92
128	128	5	Periodic	11.4	6	3	12	88	68	114

Calculation of the response time

The following formula is used to calculate the maximum response time.

- $T_{max} (ms) = 2 \cdot T_{plc_max} + 5 \cdot T_{ibs} + T_{input} + T_{soft}$, where :
 - T_{plc_max} = maximum PLC scan time (ms),
 - T_{ibs} = IBS scan time (ms),
 - T_{input} = input delay time (ms),
 - T_{soft} = software scan time = 6 ms.

Note: The response time depends on the scan times of the PLC and Interbus bus. For this, an exact formula cannot be given. The formula above provides an approximate value for response times if the Interbus bus scan time is twice as short as that of the PLC.

The table contains measured values which may be different for other applications.

Station Transmission rate

Introduction

The transmission rate depends on the bandwidth of the PCP channel (1 byte of control information + n bytes of user data messages) and on the Interbus-S scanning time.

If the bandwidth is...	And if the scanning time is ...	Then the transmission rate is worth ...
one word per cycle on the PCP channel	3,27 ms	2,45 Kbits/s
	4,94 ms	1,62 Kbits/s
	8,27 ms	0,97 Kbits/s
two words per cycle on the PCP channel	3,27 ms	7,34 Kbits/s
	4,94 ms	4,86 Kbits/s
	8,27 ms	2,90 Kbits/s
four words per cycle on the PCP channel	3,27 ms	17,13 Kbits/s
	4,94 ms	11,34 Kbits/s
	8,27 ms	6,77 Kbits/s

Introduction to module TSX IBY 100



3

Introduction

Subject of this chapter

This chapter presents the main technical characteristics of the module TSX IBY 100.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
3.1	Description of module	27
3.2	Installation of module	33
3.3	Technical specifications	36

3.1 Description of module

Introduction

Subject of this section This section describes the physical aspect of the module and its functioning.

What's in this Section? This section contains the following topics:

Topic	Page
About the TSX IBY 100 module	28
Operating mode	30
Connectors	31

About the TSX IBY 100 module

Introduction

The TSX IBY 100 communication module communicates in an Interbus-S architecture.

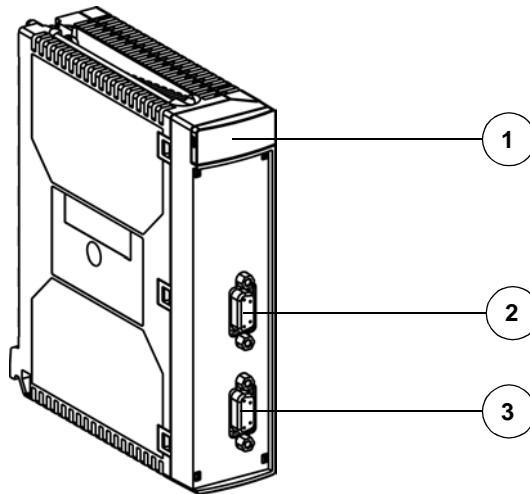
This module offers the following Interbus-S departments:

- DP parametering channel,
- PMS messaging department,
- preprocessing,
- logical addressing,
- interstation bus segmentation,
- the Interbus-S / AS-i gateway.

Physical description

Module TSX IBY 100 is a simple format module for insertion into any slot in a main rack or in an extension to a TSX Premium PLC station.

This module is composed of the following elements



Elements

The following table describes the different elements in the TSX IBY 100 module.

Addresses	Type of element	Function
1	Signaling block	It is composed of 6 luminous indicators for viewing the state of the module and for carrying out a diagnostic. See <i>Diagnostics from module status LEDs</i> , p. 126.
2	Female connector RS 232-C Sub-D 9 points	It connects to a PC equipped with CMD Tool software. See <i>Software</i> , p. 38.
3	Female connector RS 485 Sub-D 9 points	Maintains the connection with the Interbus-S field bus. This connector acts as the arrival and departure point on an interstation bus (ring topology).

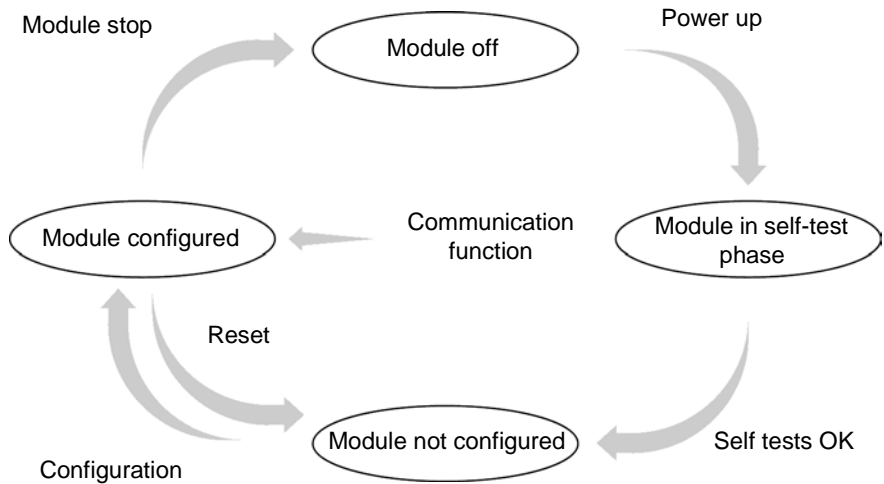
Operating mode

Introduction

The following graph describes the operating modes of modules TSX IBY 100.

General graph

The operating mode is as follows:



Operation

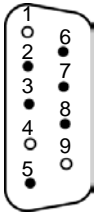
- The Interbus-S module is in RUN mode: the data is exchanged on the bus.
- The applied task is in RUN mode: inputs/outputs are updated.
- The applied task is in STOP mode:
 - inputs are updated,
 - outputs are in fallback made (maintained at or reset to zero).

Connectors

RS connector 232-C

The link between the TSX IBY 100 module and the PC is done with a cable with the reference 990 NAA 263 20.

The connection of the RS 232-C port of the module is as follows:

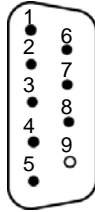


The following table shows the connection:

Address	Description
1	Non-connected
2	D2 (RXD): input
3	D1 (TXD): output
4	Non-connected
5	E2 (GND): ground connection
6	Reserved
7	S2 (RTS): Send request
8	M2 (CTS): ready to send
9	Non-connected

**RS
Connector 485**

The connection of the RS 485 port, linking the module to the bus is as follows:



The following table shows the connection:

Address	Description
1	DO: output
2	DI: input
3	COM: ground connection (isolated)
4	GND: fiber optic ground connection interface
5	VCC: fiber optic supply interface
6	NOT DO: logically inverted output
7	NOT DI: logically inverted input
8	Vcc: supplementary supply for fiber optics
9	Non-connected

3.2 Installation of module

How to set up the module on a rack

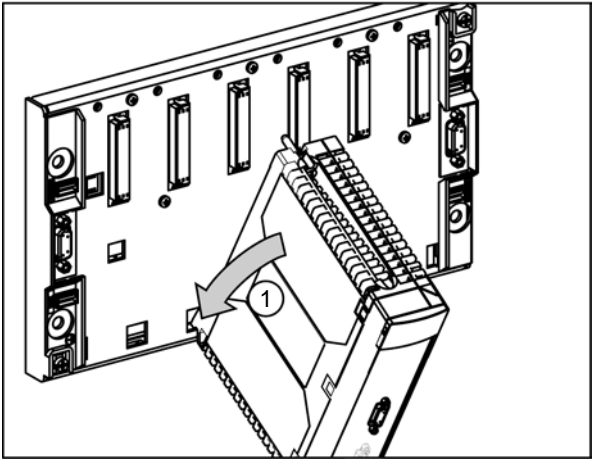
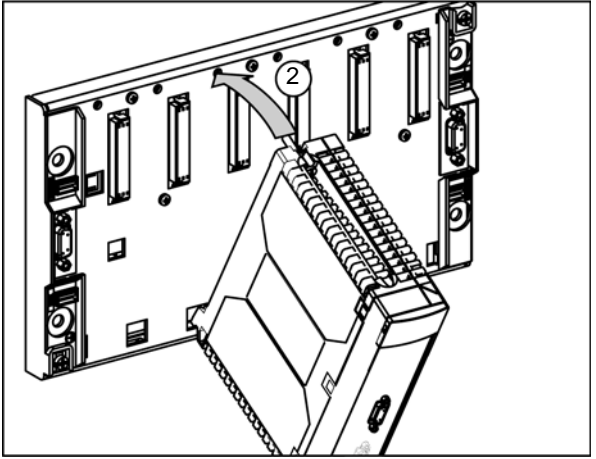
Prerequisites

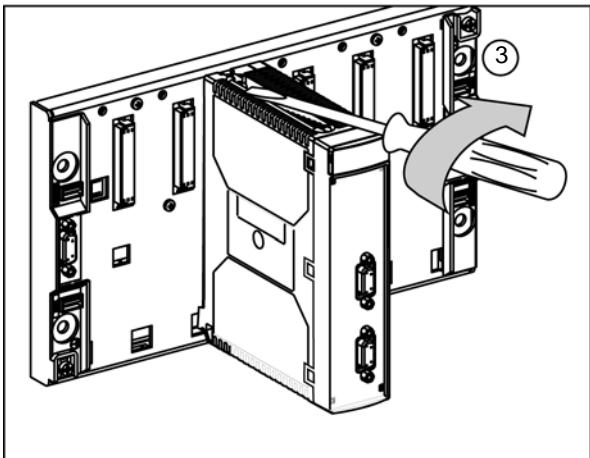
The set up and removal of a module can be done after power-up.

Insertion / extraction when the module is powered up, can be done through manual screwing / unscrewing to maintain an adequate connection / disconnection sequencing of BusX signals.

Using an electric screwdriver does not maintain this sequencing.

Procedure The following procedure shows how a TSX IBY 100 module is set up on a rack.

Step	Action	Illustration
1	Place the pins on the back of the module in the centering holes on the lower part of the rack.	
2	Rotate the module to connect it with the rack.	

Step	Action	Illustration
3	Fix the module to the rack by tightening the screw on the upper part of the module.	 A technical line drawing showing a TSX IBY 100 coupler module being inserted into a rack. The module is partially inserted, and a screwdriver is shown tightening a screw on the top edge of the module. A circled number '3' is placed near the screw to indicate the step. The rack has several other slots and components visible.

3.3 Technical specifications

Introduction

Subject of this section

This sub-chapter presents the technical specifications for using an Interbus-S communication with the TSX IBY 100 module.

What's in this Section?

This section contains the following topics:

Topic	Page
Compatibility	37
Standards and Characteristics	39
Operating conditions	40

Compatibility

Hardware compatibility

The TSX IBY 100 module requires the use of a Premium family PLC.

The table describes the number of TSX IBY 100 modules available for each processor.

Processor version	Processor type			Number of Modules
	TSX	PMX	PCX	
V3.0	P57 102	P57 102	57 1012	0
	P57 202/252	P57 202/352/ 452	57 3512	1
	P57 302/352			
	P57 402/352			
≥V3.3	P57 102	P57 102	57 1012	0
	P57 202/252	P57 202	-	1
	P57 302/352	P57 352 P57 452	57 3512	2
	P57 402/452			
≥V5.0	P57 103/153	-	-	0
	P57 203/2623/ 253/2823	-	57 203	1
	P57 303/353/ 3623/453/4823	-	57 353	2

TSX IBY 100 modules can manage:

- a maximum of 254 slaves for modules less than version V3.0,
- a maximum of 510 slaves for modules of version V3.0 or above.

Software

TSX IBY 100 modules are compatible with CMD Tool software of version V4.41 or above. Application topology, debugging and diagnostics of the Interbus-S field bus can be done with this software.

The converter is compatible with PL7 software of version V3.3 or above and CMD Tool of version V4.41 or above.

The following table presents the number of inputs/outputs words (%IW/%QW) exchanged in a PLC cycle according to the module version and the PL7 software version.

TSX IBY 100 version	PL7 version	Number of inputs/outputs words
Lower than V3.0	Higher than V3.0	128 words
V3.0 or higher	Lower than V4.0	128 words
	V4.0 or higher	242 words

Standards and Characteristics

Standards

The TSX IBY 100 communication coupler conforms to the following international standards:

EC Standards	IEC 1131-2 / CENELEC (50081-2)
US Standards	UL508
CANADA Standards	CSA C22.2 No.142-M1987

The TSX IBY 100 coupler is designed to conform to the following standards:

- Marine classification:
 - Germanischer Lloyd
 - Lloyds Registers
 - Det Norsk Veritas
 - Bureau Veritas

Electrical characteristics

- Logical Vcc supply: 5 V DC provided by the rack supply
 - Current consumed on 5 V: 400 mA
-

Operating conditions

Operating temperatures

- Ambient operating temperature: 0°C to +60°C
-

Hygrometry

- Relative humidity: 10% to 95% (without condensation)
-

Mechanical standards

- Vibration immunity: conforms to the IEC 68-2-6 standard, Fc test
 - Shock immunity: conforms to the IEC 68-2-27 standard, Ea test
-

Electrostatic discharge standard

- Electrostatic discharge immunity: conforms to the IEC 1000-4-2 standard, level 3

Note: Minimum level in test conditions defined by standards.

HF parasite standard

- Immunity to radiated electromagnetic fields: conforms to the IEC 1000-4-3 standard, level 3
- Immunity to rapid burst transients: conforms to the IEC 1000-4-4 standard, level 3
- Immunity to absorbed oscillatory waves: conforms to the IEC 1000-4-12 standard, level 3

Note: Minimum level in test conditions defined by standards.

BF parasite standard

- Conforms to IEC 1131-2 standard prescriptions
-

PLC protection processing

Premium PLCs respond to **TC** processing demands (TC: all climate processing).

For industrial production installations or installations in an environment corresponding to **TH** processing (TH: processing for warm and humid environments), the TSX Premium PLCs must be incorporated in IP54 minimum protection envelopes as prescribed by the IEC 664 and NF C 20 040 standards.

Reminders

Premium PLCs show an IP20 protection index. They can be installed without an envelope in premises with restricted access not exceeding pollution level 2 (control room with no machines or dust-producing activity).

<p>Note: When a position is unoccupied by any module, it is necessary to install a TSX RKA 02 protection cache in it.</p>
--

Prescriptions relating to transport and storage

These prescriptions conform to the prescriptions of the IEC 1131-2 standard.

- Storage temperature: -25°C to +70°C
 - Relative humidity: 5% to 95% (without condensation)
-

Introduction to module TSX IBX 100



Introduction

Subject of this chapter

This chapter presents the main technical characteristics of the module TSX IBX 100.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
4.1	Description of module	45
4.2	Installation of module	51
4.3	Technical specifications	62

4.1 Description of module

Introduction

Subject of this section

This section describes the physical aspect of the module and its functioning.

What's in this Section?

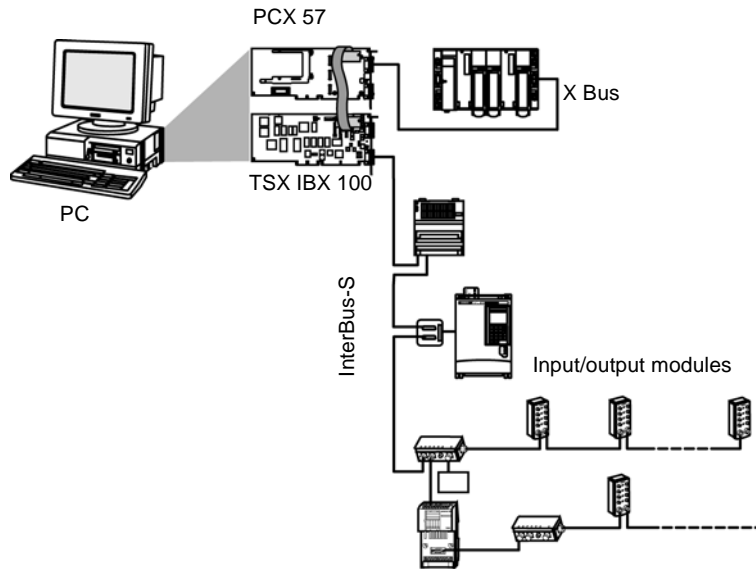
This section contains the following topics:

Topic	Page
About the TSX IBX 100 module	46
Logical installation on X Bus	49
Signaling on the card	50

About the TSX IBX 100 module

Introduction

The TSX IBX 100 communication module communicates in an Interbus-S architecture.



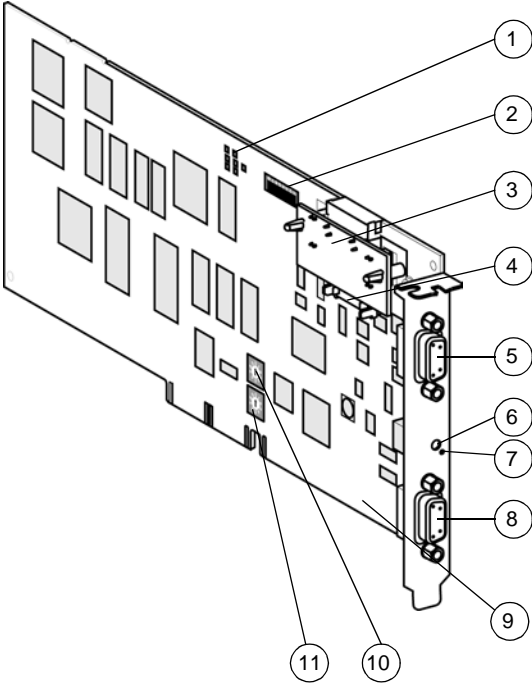
This module offers the following Interbus-S departments:

- DP parametering channel,
- PMS messaging department,
- preprocessing,
- logical addressing,
- interstation bus segmentation,
- the Interbus-S / AS-i gateway.

Physical description

The TSX IBX 100 module mechanically and electrically occupies a slot on the ISA bus.

This module is composed of the following elements



Elements

The following table describes the different elements in the module TSX IBY 100.

Addresses	Type of element	Function
1	Signaling block	It is composed of 7 luminous indicators for viewing the state of the module and for carrying out a diagnostic. See <i>Diagnostics from module status LEDs</i> , p. 126.
2	Micro-switches	Rack addresses and module positions can be coded using these switches.
3	Termination of the A/ to Bus X line	Ensures Bus X impedance adaptation.
4	Connector	Bus X can be linked to the PCX 57 processor.
5	Female connector RS 232-C Sub-D 9 points	It connects to a PC equipped with CMD Tool software. See <i>Software</i> , p. 63.
6	RESET pencil-point button	Initiates a warm restart of the module when it is activated.
7	ERR signaling indicator	-
8	Female connector RS 485 Sub-D 9 points	Maintains the connection with the Interbus-S field bus. This connector acts as the arrival and departure point on an interstation bus (ring topology).
9	16 bit ISA connector	The PC host can be connected, enabling the use of the CMD Tool software (if it is installed on the terminal).
10	Pivotable IRQ micro-switches	The IRQ, used by the internal port RS 232 on the ISA bus, can be interrupted.
11	Pivotable address micro-switches	The inputs/outputs addresses on the internal port RS 232 can be coded.

Logical installation on X Bus

At a Glance

The TSX IBX 100 module logically occupies the same slot as a TSX IBY 100 module. The position normally occupied by a TSX IBY 100 module will be empty (virtual TSX IBX 100 module slot).

Linking the TSX IBX 100 module on the X Bus is ensured by an internal floating point with a PCX type processor.

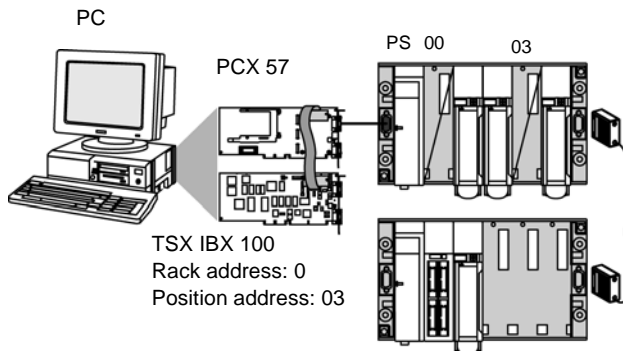
Principle

The slot corresponding to the TSX IBX 100 module address (physically free on the rack) must never be used by another module.

So that the TSX IBX 100 module knows of its address on the X Bus, it must be configured with the help of the micro-switches on the module. See *How to configure the standard address of the RS 232 internal port on the ISA bus*, p. 54 and see *How to configure the switch used by the module on the ISA bus*, p. 56.

Illustration

The following figure presents the configuration using the TSX IBX 100 module.



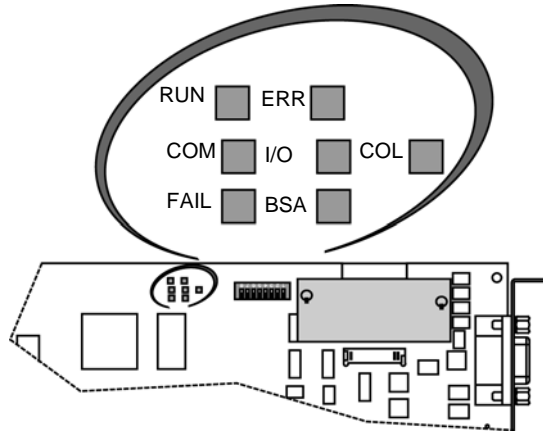
Signaling on the card

Introduction

The state of the module and the Interbus-S network can be seen from the LEDs. Signaling conforms to the Interbus-S and Premium standard.

Illustration

Indicators show the following:



Indicator significance

Indicators **RUN**, **ERR**, **COM**, **I/O**, **FAIL**(or **HF**), **BSA** are equivalent to the TSX IBY 100 and enable a diagnostic to be done on the module and on the bus. See *Diagnostics from module status LEDs, p. 126*.

Indicator **COL** enables the detection of an address conflict:

- **COL** lights up if a module has the same rack and Bus X position addresses.
- **COL** lights up when a conflict is detected.

4.2 Installation of module

Introduction

Subject of this section This section describes the operations for installing a TSX 1BX 100 module on a rack.

What's in this Section? This section contains the following topics:

Topic	Page
Preliminaries	52
How to configure the card address on Bus X	53
How to configure the standard address of the RS 232 internal port on the ISA bus	54
How to configure the switch used by the module on the ISA bus	56
How to install the module on a PC	58
How to install the module with the operation system	61

Preliminaries

Introduction

Before installing the TSX IBX 100 module onto the PC, certain precautions must be taken and certain operations carried out.

Precautions to be taken whilst installing

It is advisable to limit the static electricity charges, which can significantly damage electrical circuits:

- Hold the card by the edges, do not touch the connectors or any of the whole circuit which is visible.
 - Do not take the card out of its protective anti-static packaging until ready to install in onto the PC.
 - During manipulation ensure that the operator is earthed.
 - Do not place the card on a metal surface.
 - Avoid unnecessary movement because static electricity is created by clothing, carpets and furniture.
-

Preliminary operations

Before installing the card onto the PC, the following preliminary operations must be carried out.

Step	Action
1	Configure .
2	Configure used by the module in the RS 232 internal port of the ISA bus.
3	Configure used by the module on the ISA bus.
4	onto the PC.

How to configure the card address on Bus X

Introduction

These addresses must be the same as those which will be configured on the PL7 software configuration screen.

Micro-switches on the TSX IBX 100 card facilitate this configuration.

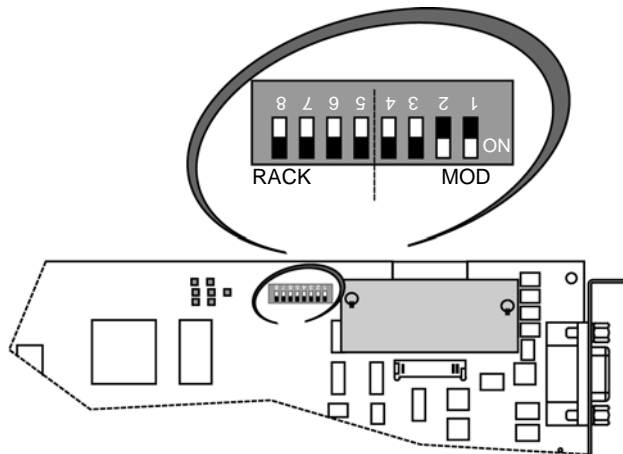
Procedure

Micro-switches on the TSX IBX 100 card facilitate this configuration. See *Logical installation on X Bus*, p. 49.

Step	Action
1	Select the rack address.
2	Select the module position (virtual position of the module on the rack).

Example

In this example, the TSX IBX 100 module is on rack 0 in position 3.



How to configure the standard address of the RS 232 internal port on the ISA bus

Introduction

The RS 232 internal port uses 8 consecutive addresses in the input/output (I/O) space on the ISA bus and an IRQ switch. Before configuring the port, it is appropriate to determine an input/output (I/O) space and a switch on the PC using the standard utilities on Windows 95/98, Windows NT or Windows 2000.

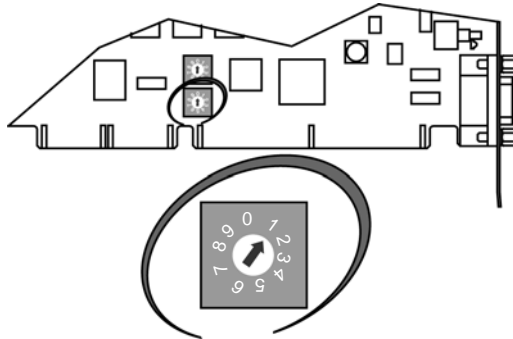
Procedure

A rotating micro-switch, whose position designates the internal communication port, facilitates this configuration.

Step	Action
1	Select the position corresponding to the communication port address. Note: This address should be the same as that which will be configured by Windows.

Example

In this example, the TSX IBX 100 module has the address 3F8.



Address format The position of the micro-switch defines the following standard address:

Position	Communication port	Address (hexa.)	Note
0	None	-	-
1	COM 1	3F8	Standard (1) (2)
2	COM 2	2F8	Standard (1) (2)
3	COM 3	3E8	Standard (2)
4	COM 4	2E8	Standard (2)
5	COM 5	250	Non standard
6	COM 6	258	Non standard
7	COM 7	260	Non standard
8	COM 8	268	Non standard
9	COM 9	270	Non standard
Key			
(1)	In Windows 95/98, the CMD Tool software installed on the host PC communicates only through ports COM 1 and COM 2.		
(2)	In Windows NT/2000, the CMD Tool software installed on the host PC communicates only through ports COM 1 to COM 4.		

How to configure the switch used by the module on the ISA bus

Introduction

The RS 232 internal port uses 8 consecutive addresses in the input/output (I/O) space on the ISA bus and an IRQ switch. Before configuring the port, it is appropriate to determine an input/output (I/O) space and a switch on the PC using the standard utilities on Windows 95/98, Windows NT or Windows 2000.

Note: You are reminded that the switch is a function of the communication port.

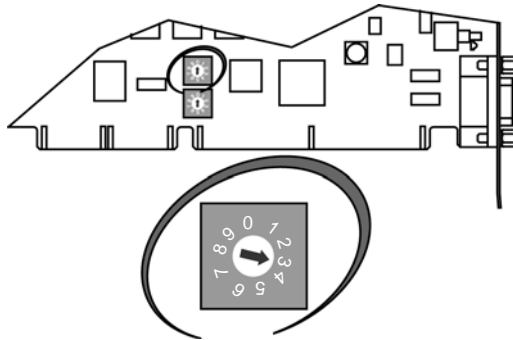
Procedure

A rotating micro-switch must be placed in regard to the selected switch to facilitate this configuration.

Step	Action
1	Select the position corresponding to the switch. Note: This address should be the same as that which will be configured by Windows.

Example

In this example, the TSX IBX 100 module is on switch INT3.



Address format The position of the micro-switch defines the following standard address:

Position	IRQ	Note
0	INT 10	Non standard
1	INT 11	Non standard
2	INT 2/9	Non standard
3	INT 3	Standard: corresponds to ports COM 2 and COM 4
4	INT 4	Standard: corresponds to ports COM 1 and COM 3
5	INT 5	Non standard
6	INT 12	Non standard
7	INT 15	Non standard
8	None	Not used
9	None	Not used

How to install the module on a PC

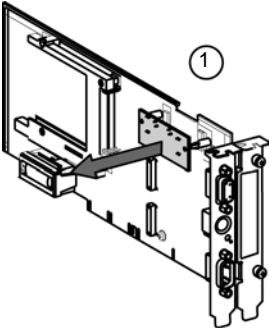
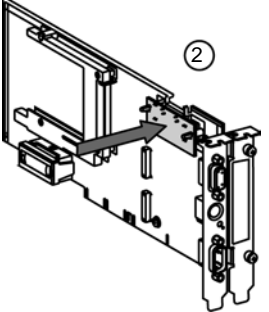
Prerequisites

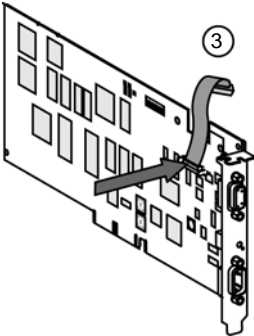
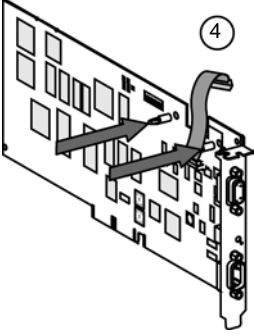
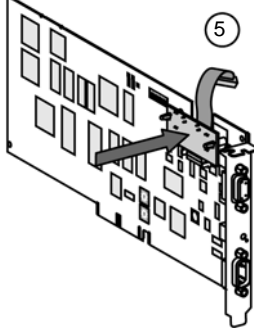
Before installing cards in a PC, turn the host PC off and open the cover.

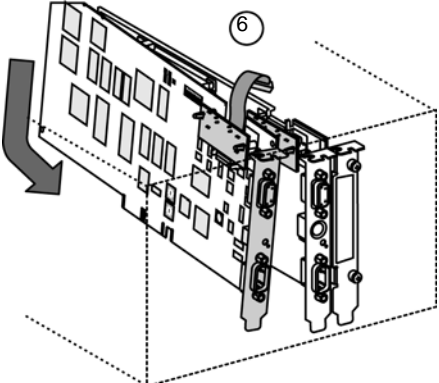
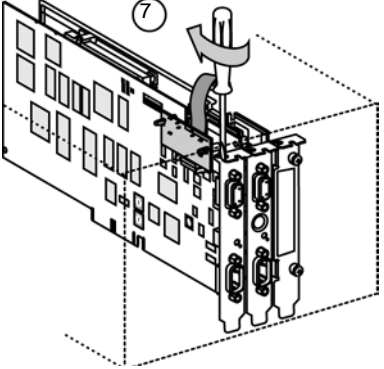
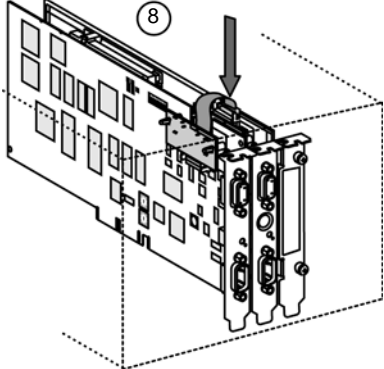
The implementation of a TSX IBX 100 card first requires the installation of a PCX 57 type processor on the host PC. See Hardware compatibility. It is advisable to refer back to PCX 57 processor service instruction if it is not in the host PC.

Procedure

The following procedure describes how to install a TSX IBX 100 module on a PC and the link with the PCX 57 processor.

Step	Action	Illustration
1	Remove the line A/ termination on the PCX 57 procesor from its slot.	
2	In this place put the daughterboard provided with the TSX IBX 100 card.	

Step	Action	Illustration
3	Plug the pins provided on the TSX IBX 100 card in the specified slot.	
4	Place the centering and fixing feet provided on the TSX IBX 100 card.	
5	Put the line A/ termination (retrieved from the processor) in place on the TSX IBX 100 card.	

Step	Action	Illustration
6	Connect the TSX IBX 100 card to the ISA bus.	
7	Fix the TSX IBX 100 card to the PC.	
8	Link the pins to the connector on the daughterboard installed in Step 2	
9	Close the cover and power up the PC.	

How to install the module with the operation system

Introduction The procedure for configuring the TSX IBX 100 card is standard to the procedure for adding peripherals in Windows 95/98 or Windows NT/2000.

It is recommended that you refer to instructions for the installation of a communication port.

Procedure For Windows 95/98 operating systems, it is recommended that during the procedure:

Step	Action
1	Select No to the question Do you want Windows to search for new hardware in your place?
2	Select Hardware type → Ports (COM & LPT) .
3	Select Constructors → (standard port types)
4	Select Models → Communication port
5	Input the I/O input/output and IRQ switch addresses.

4.3 Technical specifications

Introduction

Subject of this section

This section describes the technical specifications for using an Interbus-S communication with the TSX IBX 100 module.

What's in this Section?

This section contains the following topics:

Topic	Page
Compatibility	63
Characteristics	64

Compatibility

Hardware compatibility

The TSX IBX 100 module requires the use of a PCX 57 type PLC.

The table describes the number of TSX IBX 100 modules available for each processor.

Processor version	PCX processor type	Number of Modules
V3.0	57-1012	0
	57-3512	1
V3.3	57-1012	0
	57-3512	2
V5.0	57-203	1
	57-353	2

TSX IBX 100 modules can manage:

- a maximum of 254 slaves for modules less than version V3.0,
- a maximum of 510 slaves for modules of version V3.0 or above.

To receive a TSX IBX 100 module, the PC must:

- function with Windows 95/98 or Windows NT/2000,
- use a 16 bit ISA bus and an available slot,
- have sufficient power at its disposal to supply the processor and the module.

Software

TSX IBX 100 modules are compatible with CMD Tool software of version V4.41 or above. Application topology, debugging and diagnostics of the Interbus-S field bus can be done with this software.

The following table presents the number of inputs/outputs words (%IW/%QW) exchanged in a PLC cycle according to the module version and the PL7 software version.

TSX IBX 100 version	PL7 version	Number of inputs/outputs words
Lower than V3.0	V3.0 or higher	128 words
V3.0 or higher	Lower than V4.0	128 words
	V4.0 or higher	242 words

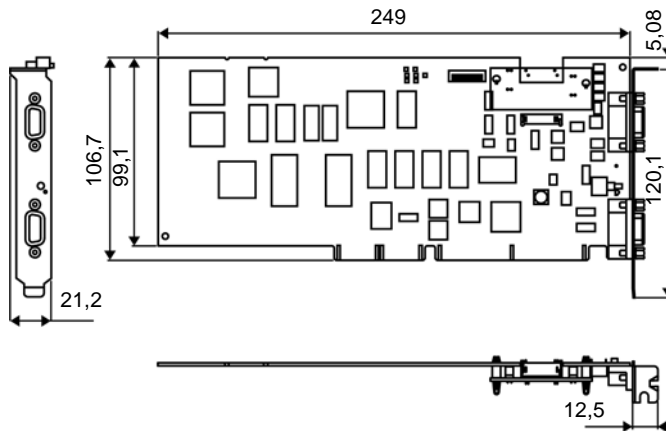
Characteristics

Electrical characteristics

- Logical DC V supply: 5 V DC provided by the ISA bus supply
 - Typical current consumption on 5 V: 500 mA
 - Maximum current consumption on 5 V: 650 mA
 - Voltage limits supported:
 - above 4.75 V
 - below 5.25 V
-

Space required

The following figure shows in millimeters the dimensions of the module TSX IBX 100 :



Software implementation

5

Introduction

Subject of this chapter

This chapter describes the different possibilities for configuration, control and diagnostics of an Interbus-S application.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
5.1	General	67
5.2	Configuration	77
5.3	Programming	90
5.4	Debugging	117
5.5	Diagnostics	125
5.6	Language objects associated with TSX IBY 100/TSX IBX 100 modules	131

5.1 General

Introduction

Subject of this sub-chapter

This chapter describes the software implementation of a TSX IBY 100 module or TSX IBX 100.

What's in this Section?

This section contains the following topics:

Topic	Page
Principal	68
Methods of Installation	70
Physical or logical addressing of inputs/outputs	73
Firmware update	76

Principal

Introduction

The physical context of the application into which it will be integrated (rack, supply, processor, modules or devices) must be set for the implementation of Interbus-S and installation in a logical order must be ensured.

Logical implementation will be done from different PL7 editors:

- either offline,
 - or on-line: in this instance, modification is limited to certain parameters.
-

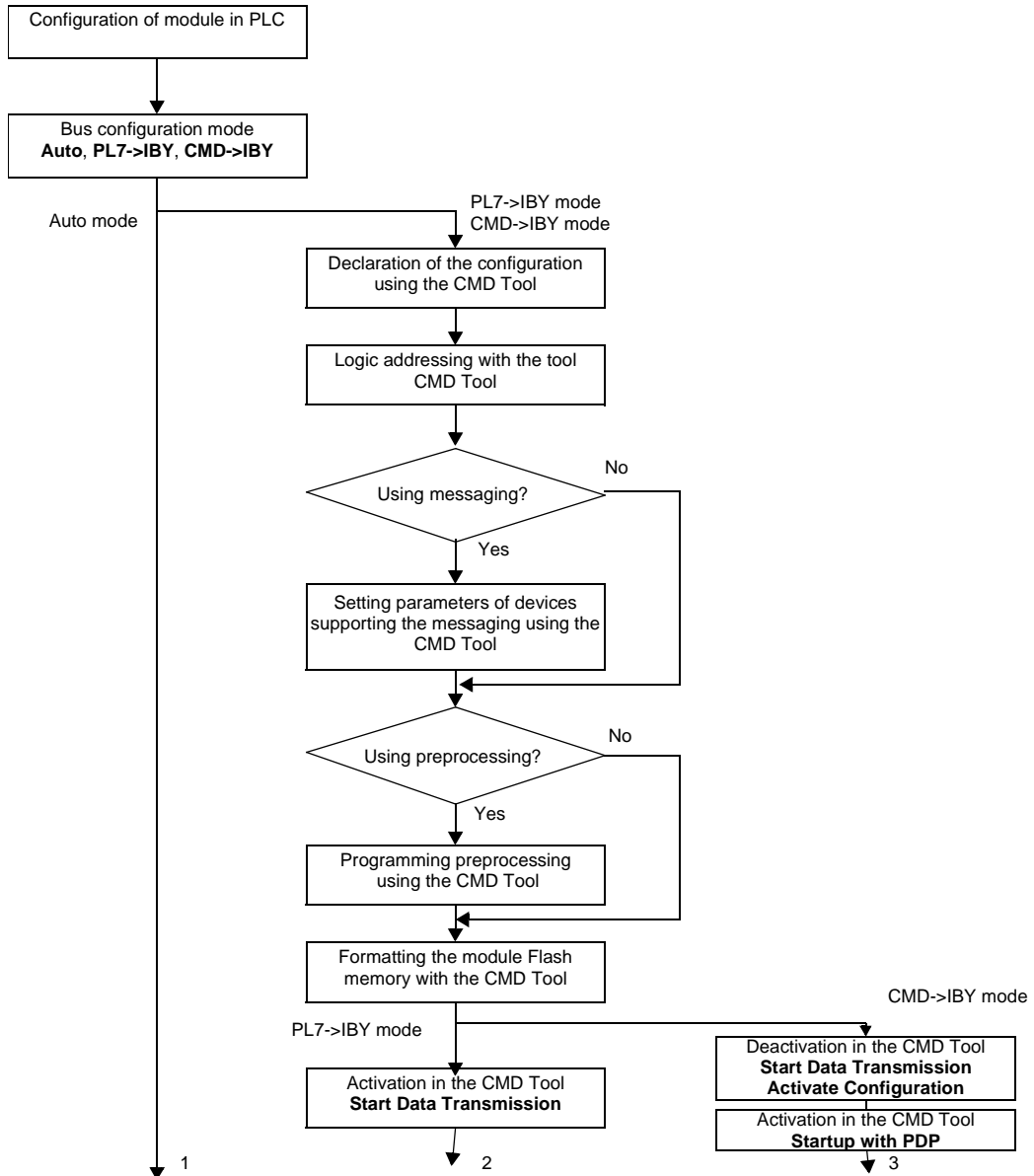
Set up principle The table below shows the different set-up phases.

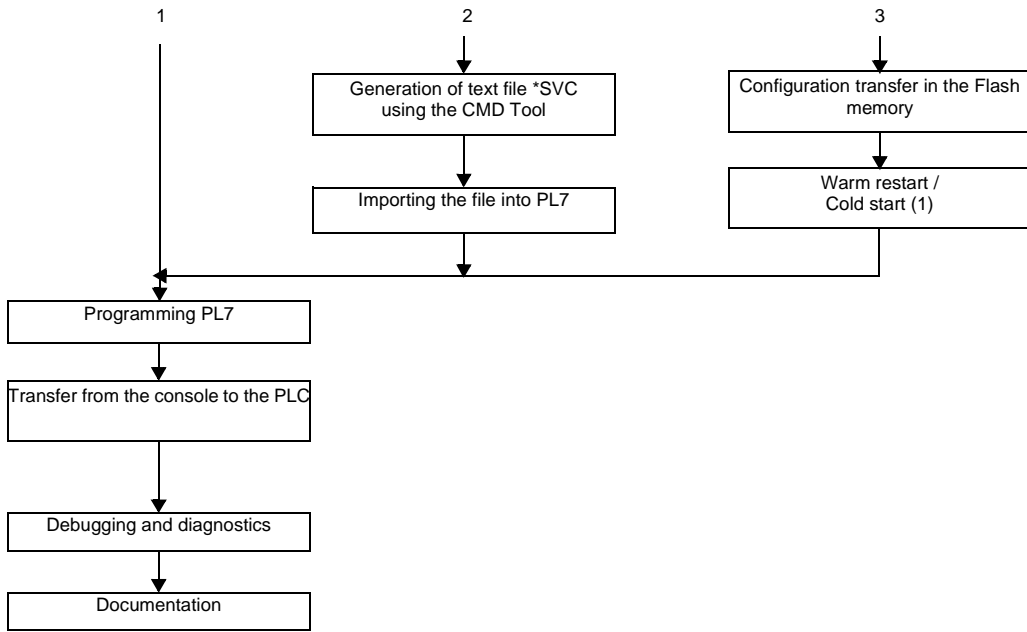
Mode	Stage	Description
Offline	Module declaration	Choice: <ul style="list-style-type: none"> ● of geographical position (number and slot when a module is on a rack) ● of module type.
		<ul style="list-style-type: none"> ● Entering the configuration parameters. ● Declaration of the bus configuration by the CMD Tool software and generation of text file *.SVC
Offline or on-line	Symbolization	Symbolization of variables associated with the Interbus-S module.
		Programming the functions that the module must carry out using:: <ul style="list-style-type: none"> ● the bit and word objects associated with the module or the Interbus-S link, ● the module-specific instructions.
On-line	Transfer	Transferring the application to the PLC An application transfer to a PLC or a cold start of the application, configures and starts up the Interbus-S module.
		Different methods are available for de-bugging the application, controlling inputs/outputs and fault diagnostics: <ul style="list-style-type: none"> ● PL7 language objects, ● the PL7 de-bugging screen, ● CMD Tool software ● module signaling.
Offline or on-line		Impression of the different information relative to the configuration of the Interbus-S module.

Note: The order defined above is given as an indication. The PL7 software can use editors interactively in any order you wish (however you cannot use the data or program editors without first configuring the modules).

Methods of Installation

Block Diagram The following logic diagram shows the module installation methods.





(1) In the CMD->IBY mode, the action Warm Restart/Cold Start enables the contents of the Flash memory to be transferred into the module RAM.

Recommendations


Operating

It is advisable to:

- carry out the bus architecture training in **Auto** mode,
- read the configuration again,
- to reassign the logical addresses using the CMD Tool.


Programming

To ensure programming that is totally secure, you are strongly advised to use the I/O data according to the status bit. Data exchange takes place when the **%Ix.0.ERR** bit is at 0.

	CAUTION
	<p>Events</p> <p>During the programming of events, do not use %IW and %QW on Interbus-S</p> <p>Failure to follow this precaution can result in injury or equipment damage.</p>

Use of preprocessing

Inter-slave communication can be configured for I/O exchanges directly from one slave device to another without application monitoring. In this instance, output images controlled directly by the module, are not updated in the %QW language objects.

	CAUTION
	<p>Assigning the module to a task</p> <p>TSX IBY 100/IBX 100 modules can be managed by the master task or the fast task. When one of these tasks is deactivated by the %S30 system bit (MAST) or %S31 (FAST), exchanges between the module and the slaves are not interrupted.</p> <p>Failure to follow this precaution can result in injury or equipment damage.</p>

Physical or logical addressing of inputs/outputs

Introduction

Inputs/Outputs respect the topology used by the PL7 software and can be identified:

- by physical addressing,
- by logical addressing.

Topology

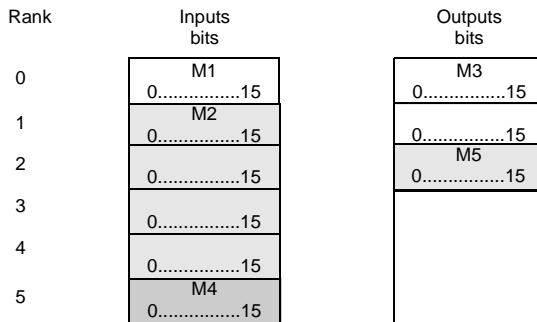
Addressing is defined in the following manner:

%	I or Q	X, W or D	XY	•	i	•	r	:	Xj
Symbol	Types of objects I = input Q = output	Format X = Boolean W = word D = double word	Rack address x = 0 to 7 Module position Y = 00 to 14		Channe I N i = 0		Rank r = 0 to 253		Bit j X = 0 to 15

Physical addressing

This addressing is obtained by an automatic mode configuration. Inputs/Outputs words are stacked continuously according to the rank in the Interbus-S memory.

Example

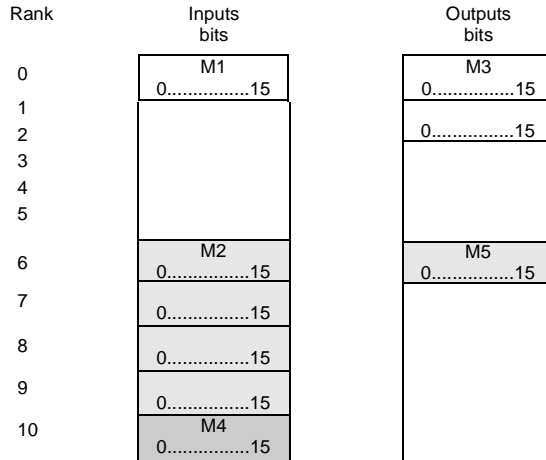


Logical addressing

CMD Tool carries out logical addressing. The I/O words ranks can be reassigned using this.

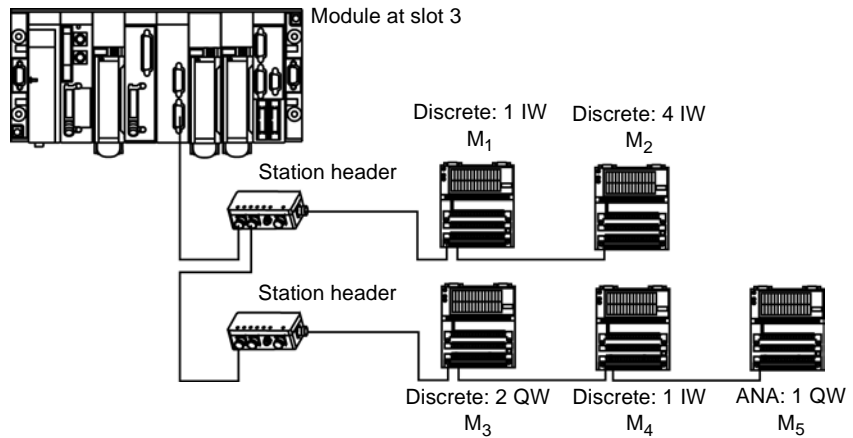
The advantage of this is to enable configuration growth in addition to new modules, without modifying the already existing device assignments.

Example



Example

The following figure illustrates physical and logical addressing.



The following table shows how to access inputs/outputs according to the addressing.

Inputs/Outputs	Physical addressing	Logical addressing
M1 access to input 7	%IW3.0.0:X6	%IW3.0.0:X6
M2: access to input 24	%IW3.0.2:X7	%IW3.0.7:X7
M3: access to output 3	%QW3.0.0:X2	%QW3.0.0:X2
M4: access to input 4	%IW3.0.5:X3	%IW3.0.10:X3
M5: access to analog output	%QW3.0.2	%QW3.0.6

Firmware update

Introduction

The firmware of the TSX IBY100/IBX 100 module comprises two elements which can be updated separately:

- the firmware which monitors the module,
 - the firmware enables the module to be used in InterBus-S master mode.
-

Necessary hardware

These firmwares are updated by the female connector RS 232-C Sub-D 9 pulses on the TSX IBY 100/IBX 100 modules of version V3.0 or higher.

The module connects to the series COM port on a standard PC with a cable of type:

- standard Modbus programming cable (example: 990 NAA 263-30),
- standard Nullmodem cable.

Then the firmware update is transferred by a standard terminal emulator.

Note: For further details and to receive the new firmware, contact Schneider Automation technical assistance.

5.2 Configuration

Introduction

Subject of this section

This section describes the implementation of a module during its configuration.

What's in this Section?

This section contains the following topics:

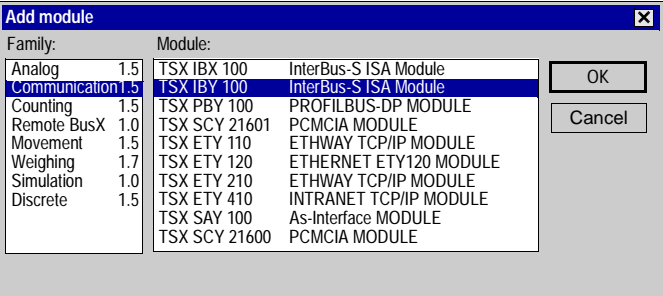
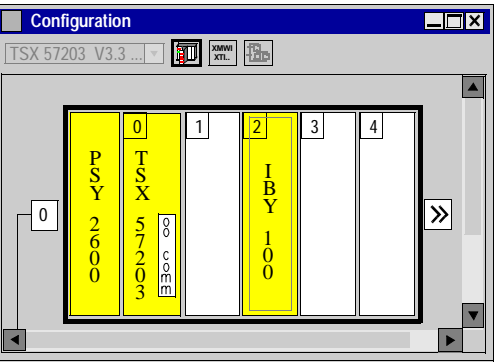
Topic	Page
How to access the configuration screen	78
Module configuration screen	79
Data to be provided	81
Data resulting from the *.SVC text file	83
IBSCNV Converter	85
How to configure TSX IBY 100 or TSX IBX 100 modules	86
Module configuration file	89

How to access the configuration screen

Procedure

The logical declaration of a TSX IBY1 100 or TSX IBX 100 module in a PLC rack is carried out by this operation.

The example below concerns a TSX IBY 100 module, the procedure being identical whatever the module type on the rack.

Step	Action
1	Access the application's hardware configuration screen.
2	<p>Double click on the slot on which the module must be configured. Result: Screen Add a module appears.</p> 
3	Select in the field Label → Communication .
4	Select in the field Module the module reference (in the example TSX IBY 100).
5	<p>Validate the choice with Ok. Result: the module is declared in its slot, which becomes grayed out and contains the module reference.</p> 
6	Double click on the module (in the example TSX IBY 100) to access the .

Module configuration screen

Introduction

This screen, split into two areas, is used to register the communication channel and to configure the necessary parameters for an Interbus-S link.

Illustration

The screen dedicated to Interbus-S communication looks like this:

The screenshot shows the configuration screen for an InterBus-S module. The window title is "TSX IBY 100 [RACK 0 POSITION 4]". The configuration is for an "InterBus-S MODULE".

1 points to the "Configuration" dropdown menu.

2 points to the "InterBus-S configuration" table:

ID	I/O	PCP
D 1.0	2	1 Word
D 2.0	3	1 Word
D 3.0	11	1 Word
E 3.1	P 203	0 Word 1 Word
B 4.0	8	0 Word
D 4.1	191	1 Word
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

3 points to the summary table at the bottom:

I/O data	PCP
Total 4 Words	1 Word

4 points to the "General Parameters" section, including "Handling on stopped mode" (PMS: Active, Inactive, Maintain, Fallback) and "Task" (MAST) and "No. of IW/QW" (128).

5 points to the "InterBus-S configuration file" section, including "Auto", "PL7->IBY", and "CMD->IBY" options, and a "Select" button for the file path "E:\Svc\workbench.svc".

6 points to the "Device IN/OUT Data" section, including the "Address" and "Symbol" columns.

7 points to the "InterBus-S configuration file" section.

8 points to the "Device IN/OUT Data" section.

Elements and functions

This table describes the different areas that make up the configuration screen:

Zone	Address	Function
common	1	This zone is composed of: <ul style="list-style-type: none"> • a title bar which indicates the product reference and the module position, • a pull-down menu providing the choice of configuration or debugging mode (on-line mode only), • a window displaying the designation of the selected module.
specification	2	This pull-down menu shows the configuration of the Interbus-S field bus. See <i>Data resulting from the *.SVC text file</i> , p. 83.
	3	The two fields I/O data and PCP indicate respectively, the number of words of data DP and the number of words of data PCP. Note: The number of DP and PCP words must not exceed 256.
	4	The strategy for applying a stop to an application is defined by the general parameters. See <i>General Parameters</i> , p. 81.
	5	This icon CMD is used to launch CMD Tool software if it is installed locally on the machine.
	6	This icon IBSCNV is used to launch the file converter for PL7 and CMD Tool. See <i>IBSCNV Converter</i> , p. 85.
	7	The configuration mode and the *.SVC configuration file can be selected in this window. See <i>How to configure TSX IBY 100 or TSX IBX 100 modules</i> , p. 86.
	8	This window is used to display addresses, symbols and values associated with input and output data for a device on the list. See <i>Device IN/OUT Data</i> , p. 84.

Data to be provided

At a Glance

To configure the communication channel, you must complete the parameters dedicated to the application.

They are split between two windows:

- the window **General Parameters**,
- the **Interbus-S configuration file** window.

General Parameters

The window is set out as follows:

The **Task** field allows the task which drives the Interbus-S bus to be selected:

- **MAST**: default value, select the master task as the bus driver,
- **FAST**: select the fast task as the bus driver.

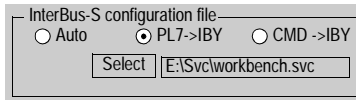
The **Nbr IW/QW** field allows the number of words used for the inputs/outputs to be selected: 32, 64, 128 or 242. See *Software*, p. 38.

The **Handling on stopped mode** zone allows the definition of the strategy to apply to outputs and PMS messaging when the application is in Stop mode:

- **PMS**: select the performance of the PMS services
 - **Inactive**: default value,
 - **Active**.
- **Outputs**: select the outputs fallback mode
 - **Maintain**: the value of the outputs is maintained,
 - **Fallback**: the outputs revert to their original values.


Interbus-S configuration file

The window is set out as follows:



The **Auto** box allows automatic selection of the bus configuration mode:

- This mode is automatically triggered by powering up the Interbus-S bus.
- It allows rapid verification, without using the CMD Tool software, of the installation's cabling without the necessary manipulation or monitoring.
- The PCP channels are limited to 64 bytes.

	CAUTION
	<p>After the transfer of the application to the PLC, Interbus-S starts automatically if the bus has been correctly installed.</p> <p>Failure to follow this precaution can result in injury or equipment damage.</p>

The **PL7->IBY** box allows selection of the bus configuration mode via PL7:

- This mode requires the use of CMD Tool in order to generate a *.SVC configuration text file and to import it into PL7.
 - The **Select** button allows this file to be retrieved or any other existing *.SVC text file.

This file describes the performance of the application and all the configuration information for transmission to the module before the bus is started up. See data resulting from decoding the *.SVC file.
 - The adjoining screen displays the file used for the bus configuration.
- Interbus-S can be started from downloading in the module and configuration monitoring (secured mode).
- This mode allows access to advanced Interbus-S services (preprocessing, logical addressing, segmentation,...).
- If a TSX IBY 100 /TSX IBX 100 module has to be replaced, the configuration is automatically reloaded into the new module. This manipulation does not need the CMD Tool software.

The **CMD->IBY** box allows selection of the bus configuration mode using the CMD Tool:

- If the configuration size exceeds 8 Kwords, a third mode, CMD->IBY, allows the configuration to be loaded onto the module.
- Every intervention on a module linked with Interbus-S requires the use of CMD Tool software.

Data resulting from the *.SVC text file

Introduction

One part of the configuration screen is used to display the Interbus-S bus topology and information on the slaves, which are linked with the module.

They are composed of two windows:

- the **Interbus-S configuration** window,
 - The **I/O device data**.
-

Interbus-S configuration

The **INTERBUS-S configuration** dropdown list shows the Interbus-S field bus configuration. It represents the contents of the *.SVC selected text file. Configuration of the 510 possible devices can be accessed in this manner.

Each line from this dropdown list shows the status of a single device. One line is shown as follows:

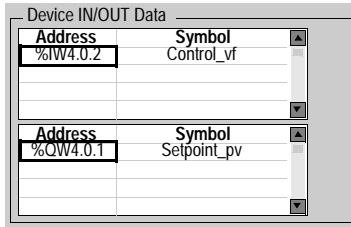
E 3.1 P 203 0 Word 0 Word

- The first field indicates the device category:
 - **A**: Analog,
 - **D**: Digital,
 - **E**: Expert if supported by PCP messaging,
 - **B**: Interstation bus if the size of the data is zero (e.g.: BK station head).
- The second field indicates the device's place in the Interbus-S (1 to 512) or its logic address if the module is configured (position segment number).
- The third field indicates the communication protocol:
 - **P**: if the device supports PCP messaging,
 - empty: if the device does not support PCP messaging.
- The following line indicates:
 - device identification with an ID code: 0 to 255 in decimal,
 - the size of DP device data in words,
 - the size of PCP device data in words.

Note: These sizes should be adjusted using CMD Tool software depending on the device.

Device IN/OUT Data

The window is set out as follows:



The screenshot shows a window titled "Device IN/OUT Data" containing two separate tables. Each table has two columns: "Address" and "Symbol".

Address	Symbol
%IW4.0.2	Control_vf

Address	Symbol
%QW4.0.1	Setpoint_pv

Two lists displaying the addresses and input/output symbols:

- a bottom list shows the input data relative to the device selected, with their associated symbols,
 - a top list shows the output data relative to the device selected, with their associated symbols.
-

IBSCNV Converter

Introduction The IBSCNV tool is a converter to operate between PL7 software variables import/export files and CMD Tool.

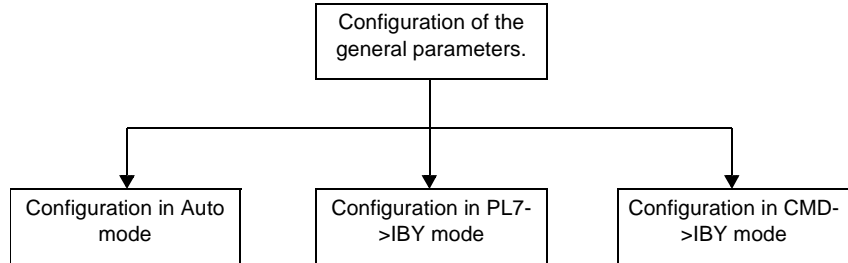
This tool is used to avoid the double entry of symbols and comments between PL7 and CMD Tool.

CMD Tool converts just as well to PL7 as PL7 converts to CMD Tool. The user must beforehand ensure consistency between *.SCY files for PL7 and *. PEX files for CMD Tool.

How to configure TSX IBY 100 or TSX IBX 100 modules

Introduction

The following figure illustrates the configuration principles:



How to configure general parameters

The following procedure is used to configure general parameters.

Step	Action
1	Select the type of task that will guide the bus.
2	Select the number of words used for the inputs/outputs.
3	Select the action of PMS facilities on an application stop.
4	Select the action of output on an application stop.

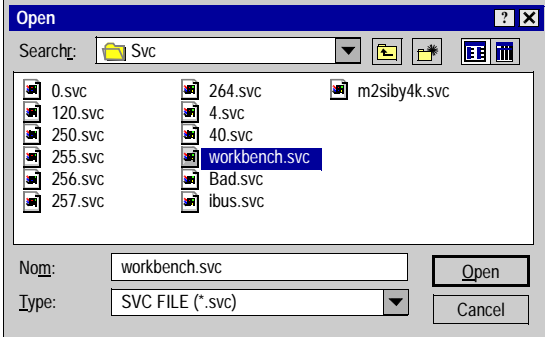
How to configure automatic mode

The following procedure is used to configure the module in automatic mode.

Step	Action
1	Configure the general parameters.
2	Select the Auto box.
3	Confirm the configuration

How to configure PL7->IBY mode

The following procedure is used to configure the module in PL7->IBY mode.

Step	Action
1	Configure the general parameters.
2	Press the CMD button. Result: CMD Tool software is activated.
3	While in CMD Tool, configure: <ul style="list-style-type: none"> ● the bus topology, ● memory allocation: address for each image module in the %IW and %QW registers, ● group settings, ● special functions.
4	Export this configuration as a *.SVC text file. See <i>How to create an *.SVC file</i> , p. 115.
5	In PL7, select the PL7->IBY box.
6	Click on the Select button. Result: the following window appears.
	
7	Find and select the *.SVC text file which describes the configuration being used.
8	Confirm your choice with the Open button. If, on reading the *.SVC text file, the size of the configuration generated by the CMD Tool software is larger than 8 Kwords, the file is rejected and CMD->IBY mode is directly selected.
9	Confirm the configuration.

**How to configure
CMD->IBY mode**

The following procedure is used to configure the module in CMD->IBY mode.

Step	Action
1	Configure the general parameters.
2	Select the CMD->IBY box.
3	Confirm the configuration.
4	Press the CMD button. Result: CMD Tool software is activated.
5	While in CMD Tool: <ul style="list-style-type: none">● configure:<ul style="list-style-type: none">● the bus topology,● memory allocation: address for each image module in the %IW and %QW registers,● group settings,● special functions.● format the Memory Flash● load the configuration into the Memory Flash● then start the bus.

Module configuration file

Introduction A file describing the configuration of the application for the TSX IBY100/TSX IBX 100 module is available in the PL7 documentation editor.

Illustration It is presented in the following form:

TSX IBY 100 [RACK 0 POSITION 4]			
Module Identification			
Product Reference:	TSX IBY 100	Designation:	Interbus-S MODULE
Address:	004	Symbol:	
Channel Parameters: 0			
OUTPUT fallback parameters:	Fallback	Operating mode:	PL7->IBY
PMS fallback mode:	Inactive		
Task:	MAST	No. of IW/QW:	128
InterBus-S configuration file:		E:\Svc\workbench.svc	
InterBus-S device	Module ID	Data process	PCP
1	1.0 2	1 Word	
2	2.0 3	1 Word	
3	3.0 11	1 Word	
4	3.1 203	0 Word	1 Word
5	4.0 8	0 Word	1 Word
6	4.10 191	1 Word	
	Total:	4 Word	2 Word
InterBus-S device	IW/QW language object	Symbol	
1	1.0 %IW4.0		
2	2.0 %IW4.0.1		
	2.0 %QW4.0		
3	3.0 %IW4.0.2	Control_vf	
	3.0 %QW4.0.1	Setpoint_pv	
6	4.1 %IW4.0.4		
	4.1 %QW4.0.3		

5.3 Programming

At a Glance

Subject of this section This section describes the Programming process in implementing Interbus-S communication.

What's in this Section? This section contains the following topics:

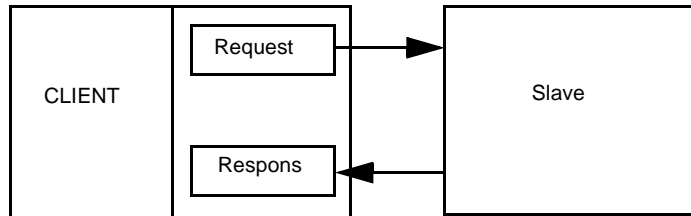
Topic	Page
PMS messaging services	91
PMS request: READ	93
PMS request: WRITE	95
PMS request: START	97
PMS request: STOP	98
PMS request: IDENTIFICATION	99
PMS request: STATUS	101
Management parameters: communication and operation reports	103
Interbus-S command services	105
Examples showing how to use Start IBS and IBS fault acknowledgement commands	108
Examples showing how to use segment activation and deactivation commands	110
Read PCP confirmation (Modules TSX IBX/IBY 100, minimum version :V3.0)	112
Useful CMD Tool commands	114

PMS messaging services

At a Glance

PMS is the application layer of the PCP messaging channel. The PLC always acts as a PMS messaging client, and all the PCP devices linked on the bus act as servers.

Each device connected to the Interbus-S bus follows a set profile. This sets the application functions that are visible through the communication.



PMS services

The following table lists PMS services for the TSX IBY 100 or TSX IBX 100 modules.

Type of facility	Facility	Accessing the application
Variable access		READ_VAR(ADR#xy.0.pcp,'PMS', index, subindex, MWi:L, %MWk:4)
		WRITE_VAR(ADR#xy.0.pcp,'PMS', index, subindex, MWi:L, %MWk:4)
Device management		SEND_REQ(ADR#xy.0.pcp,16#31, MWi:L, %MWj:L, %MWk:4)
		SEND_REQ(ADR#xy.0.pcp,16#0F, MWi:L, %MWj:L, %MWk:4)
Program management		SEND_REQ(ADR#xy.0.pcp,16#24, MWi:L, %MWj:L, %MWk:4)
		SEND_REQ(ADR#xy.0.pcp,16#25, MWi:L, %MWj:L, %MWk:4)

Requests addressing

The addressing for requests is carried out by `ADR#xy.0.pcp` where

- `xy` corresponds to the rack and module,
- `0` corresponds to the channel,
- `pcp` corresponds to the physical order number of the PCP device with `PL7 + 1` configuration (`pcp` ranges between 2 and 63).

Example of a physical order number

In the Interbus-S configuration list, two devices can support PCP messaging.

In this case, the first PCP device will have as a number: 2 (= 1+1).

The second PCP device will have as a number: 3 (= 2+1)

Implementation If a request needs to be sent, the PMS messaging facility establishes a connection with the Interbus-S slave.

If connection is successful, all transactions directed towards the slave are executed. If the connection fails, all requests sent to the Interbus-S slave are refused.

When the application stops, the status of the PMS messaging complies with the configuration set up in PL7.

Entering `READ_VAR` and `WRITE_VAR` functions in PL7 is done using dialog boxes.

PMS request: READ

At a Glance

This request is used to read the variables of a device connected to the Interbus-S bus.

This request is carried out using the `READ_VAR` communication function.

Syntax

The syntax of the communication function is presented in the following format:

```
READ_VAR(ADR#xy.0.pcp, 'PMS', index, subindex, %Mwi:L, %MWk:4)
```

The following table describes the various function parameters.

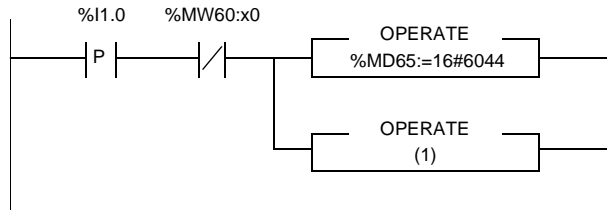
Parameter	Description
ADR#xy.0.pcp	The exchange destination unit address. <ul style="list-style-type: none"> ● xy: rack, module ● 0 : channel (always 0) ● pcp: number of pcp channels
'PMS'	Type of PMS object (PMS always in capital letters)
index	Double word or value identifying the object to be accessed
subindex	Word or value specifying the object to be accessed
%Mwi:L	Table of words containing the value of objects read (minimum length = 1)
%MWk:4	Exchange management parameters: four words identifying the address of the PL7 data used to control the <code>READ_VAR</code> function

Management parameters

The following table gives details of %MWk:4 words.

Word number	Most significant byte	Least significant byte	Data managed by
%MWk	Exchange number	Activity bit	system
%MWk+1	Operation report	Communication report	
%MWk+2	Timeout: value complies with the bandwidth per Interbus-S message user		you
%MWk+3	Length: number of response bytes stored in the buffer parameter (initialization not mandatory for activating the function)		

Example of use This example concerns the output speed reading of an Altivar 66.



(1) READ_VAR(ADR#4.0.2,'PMS',%MD65,0,%MW70:1,%MW60:4)

Note: It is not necessary to initialize the length parameter before starting the function.

PMS request: WRITE

At a Glance

This request is used to write variables to a device connected to the Interbus-S bus. This request is carried out using the communication function `WRITE_VAR`.

Syntax

The syntax of the communication function is presented in the following format:
`WRITE_VAR(ADR#xy.0.pcp, 'PMS', index, subindex, %MWi:L, %MWk:4)`

The following table describes the various function parameters.

Parameter	Description
<code>ADR#xy.0.pcp</code>	The exchange destination unit address. <ul style="list-style-type: none"> ● xy: rack, module ● 0: channel (always 0) ● pcp: pcp channel number
<code>'PMS'</code>	Type of PMS object (always PMS in upper case)
<code>index</code>	Double word or value identifying the object to be accessed
<code>subindex</code>	Word or value specifying the object to be accessed
<code>%MWi:L</code>	Table of words containing the data destined for the PCP device (minimum length = 1)
<code>%MWk:4</code>	Exchange management parameters: four words identifying the address of the PL7 data used to control the <code>WRITE_VAR</code> function

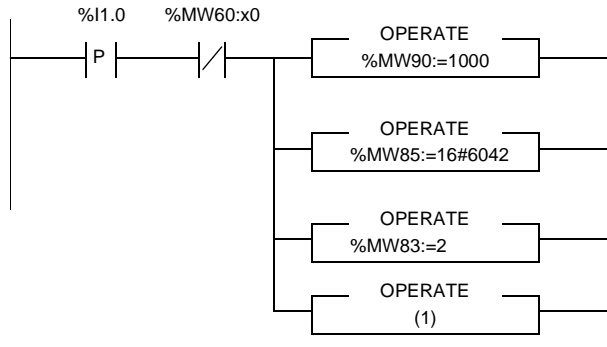
Management parameters

The following table gives details of `%MWk:4` words.

Word number	Most significant byte	Least significant byte	Data managed by
<code>%MWk</code>	Exchange number	Activity bit	system
<code>%MWk+1</code>	Operation report	Communication report	
<code>%MWk+2</code>	Timeout: value complies with the bandwidth per Interbus-S message user		you
<code>%MWk+3</code>	Length: number of bytes for the reply stored in the buffer parameter. It is mandatory to initialize the length to activate the function.		

Example of use

The example shows the writing of the setpoint speed (1000 turns per min) for an Altivar 66.



(1) `WRITE_VAR(ADR#4.0.2,'PMS',%MD85,0,%MW90:1,%MW80:4)`

The data to be sent is coded in 2 bytes (1 word, `%MW90`).
 The send length is initialized at a value of 2 bytes.

PMS request: START

At a Glance

This request is used to start a device connected to the Interbus-S bus.
This request is carried out using the `SEND_REQ` communication function.

Syntax

The syntax of the communication function is presented in the following format:
`SEND_REQ(ADR#xy.0.pcp, 16#24, %MWi:L, %MWj:L, %MWk:4)`

The following table describes the various function parameters.

Parameter	Description
ADR#xy.0.pcp	The exchange destination unit address. <ul style="list-style-type: none"> ● xy: rack, module ● 0 : channel (always 0) ● pcp: number of pcp channel
16#24	Function code
%MWi:L	Initialized with the value of the PMS index (constant length of 1)
%MWj:L	Not used for the <code>START</code> function (length at 1)
%MWk:4	Exchange management parameters: four words identifying the address of the PL7 data used to control the <code>START</code> function

Management parameters

The following table gives details of %MWk:4 words.

Word number	Most significant byte	Least significant byte	Data managed by
%MWk	Exchange number	Activity bit	system
%MWk+1	Operation report	Communication report	
%MWk+2	Timeout		you
%MWk+3	Length: initializing on 1 is mandatory before sending the function		

PMS request: STOP

At a Glance

This request is used to stop a device connected to the Interbus-S bus.
This request is carried out using the `SEND_REQ` communication function.

Syntax

The syntax of the communication function is presented in the following format:
`SEND_REQ(ADR#xy.0.pcp, 16#25, %MWi:L, %MWj:L, %MWk:4)`

The following table describes the various function parameters.

Parameter	Description
<code>ADR#xy.0.pcp</code>	The exchange destination unit address. <ul style="list-style-type: none"> • xy: rack, module • 0 : channel (always 0) • pcp: pcp channel number
<code>16#25</code>	Function code
<code>%MWi:L</code>	Initialized with the value of the PMS index (constant length of 1)
<code>%MWj:L</code>	Not used for the <code>STOP</code> function (length at 1)
<code>%MWk:4</code>	Exchange management parameters: four words identifying the address of the PL7 data used to control the <code>STOP</code> function

Management parameters

The following table gives details of `%MWk:4` words.

Word number	Most significant byte	Least significant byte	Data managed by
<code>%MWk</code>	Exchange number	Activity bit	system
<code>%MWk+1</code>	Operation report	Communication report	
<code>%MWk+2</code>	Timeout		you
<code>%MWk+3</code>	Length: initializing at 1 is mandatory before sending the function		

PMS request: IDENTIFICATION

At a Glance

This request is used to identify a device connected to the Interbus-S bus.
This request is carried out using the `SEND_REQ` communication function.

Syntax

The syntax of the communication function is presented in the following format:
`SEND_REQ(ADR#xy.0.pcp, 16#0F, %MWi:L, %MWj:L, %MWk:4)`

The following table describes the various function parameters.

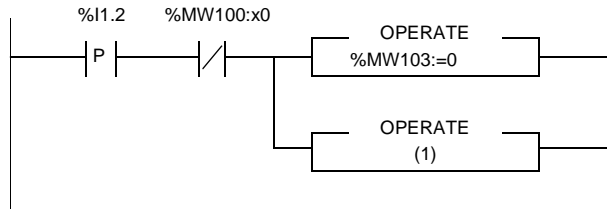
Parameter	Description
ADR#xy.0.pcp	The exchange destination unit address. <ul style="list-style-type: none"> ● xy: rack, module ● 0 : channel (always 0) ● pcp: pcp channel number
16#0F	Request code
%MWi:L	Not used for the <code>IDENTIFICATION</code> function (length at 1)
%MWj:L	Initialized with the identification of the Interbus-S slave: the buffer memory will be the same length as that of the response.
%MWk:4	Exchange management parameters: four words that identify the address of the PL7 data are used to control the <code>IDENTIFICATION</code> function

Management parameters

The following table gives details of %MWk:4 words.

Word number	Most significant byte	Least significant byte	Data managed by
%MWk	Exchange number	Activity bit	system
%MWk+1	Operation report	Communication report	
%MWk+2	Timeout		you
%MWk+3	Length: initializing at 0 is mandatory before sending the function		

Example of use The example is as follows.



(1) SEND_REQ(ADR#4.0.2,16#0F,%MW105:1,%MW110:20,%MW100:4)

Note: The length parameter must be initialized before starting the function at 0.

PMS request: STATUS

At a Glance

This request is used to read the status of a device connected to the Interbus-S bus. This request is carried out using the `SEND_REQ` communication function.

Syntax

The syntax of the communication function is presented in the following format:
`SEND_REQ(ADR#xy.0.pcp, 16#31, %MWi:L, %MWj:L, %MWk:4)`

The following table describes the various function parameters.

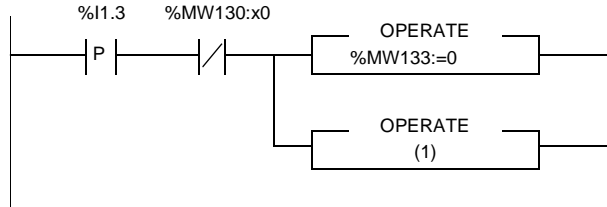
Parameter	Description
ADR#xy.0.pcp	The exchange destination unit address. <ul style="list-style-type: none"> ● xy: rack, module ● 0 : channel (always 0) ● pcp: pcp channel number
16#0F	Request code
%MWi:L	Not used for the STATUS function (length at 1)
%MWj:L	Initialized with the Interbus-S slave status value: the buffer memory will be the same length as the status memory.
%MWk:4	Exchange management parameters: four words which identify the address of the PL7 data are used to control the STATUS function

Management parameters

The following table gives details of %MWk:4 words.

Word number	Most significant byte	Least significant byte	Data managed by
%MWk	Exchange number	Activity bit	system
%MWk+1	Operation report	Communication report	
%MWk+2	Timeout		you
%MWk+3	Length: initialization at 0 is mandatory before sending the function		

Example of use The example is as follows.



(1) SEND_REQ(ADR#4.0.2,16#31,%MW135:1,%MW140:20,%MW130:4)

Note: The length parameter must be initialized before starting the function at 0.

Management parameters: communication and operation reports

At a Glance

Communication and operation reports form part of the management parameters.

Note: It is recommended that communication function reports always be tested after use and before being started again. On a cold start, it is imperative to check that all management parameters for communication functions are reset to 0.

Report

These messages are common to all types of request.

Communication report (least significant byte)		
Value	Meaning	
16#00	Successful exchange	
	Operation report (most significant byte)	
	Value	Meaning
	Request code + 16#30	Positive result
	16#01	Non processed request
	16#02	Successful response
	16#03	Reserved
16#01	Stopping the exchange on timeout	
16#02	Stopping the exchange on user request (CANCEL)	
16#03	Incorrect address format	
16#04	Incorrect destination address	
16#05	Incorrect management parameter format	
16#06	Incorrect specific parameters	
16#07	Problem with sending to destination	
16#08	Reserved	
16#09	Size of reception buffer is insufficient	
16#0A	Size of transmission buffer is insufficient	
16#0B	Absence of processor resource system	
16#0C	Incorrect exchange number	
16#0D	No telegram received	
16#0E	Incorrect length	
16#0F	Telegram service not configured	
16#10	Network module missing	

16#11	Request missing	
16#12	Application server already active	
16#13	UNI-TE V2 transition number incorrect	
16#FF	Message refused	
	Operation report (most significant byte)	
	Value	Meaning
	16#01	Lack of resource to the processor
	16#02	Lack of line resource
	16#03	Device missing
	16#04	Line error
	16#05	Length error
	16#06	Communication channel faulty
	16#07	Addressing errors
	16#08	Application error
	16#0B	Resource system missing
	16#0C	communication function not active
	16#0D	Destination missing
	16#0F	Intra-station routing problem or non-configured channel
16#11	Address format not handled	
16#12	Lack of destination resource	
16#FD	Invalid parameter	

Interbus-S command services

At a Glance

This service is used to send the following Interbus-S commands to the TSX IBY 100 /TX IBX 100 module:

- IBS start,
- IBS fault acknowledgement,
- bus segment deactivation,
- bus segment activation.

Note: Interbus-S accepts other commands. For further information please refer to the Phoenix Contact documentation.

Syntax

A command is sent via the `SEND_REQ` communication function:

```
SEND_REQ(ADR#xy.0.SYS, 16#83, %KWi:L, %MWj:4, %MWk:4)
```

The following table describes the various function parameters.

Parameter	Description
ADR#xy.0.SYS	The exchange destination unit address. <ul style="list-style-type: none"> ● xy: rack, module ● 0: channel (always 0) ● SYS: module server
16#83	Function code, always 16#83 to execute IBS commands
%KWi:L	Data to be sent
%MWj:4	4 word report
%MWk:4	Exchange management parameters: four words which identify the address of the PL7 data used to control the <code>SEND_REQ</code> function

Data to be sent

The following table shows the coding of the %KWi:L data to be sent.

Word number	Value	Meaning
%KWi	16#1807	-
%KWi+1	16#0500	-
%KWi+2	16#0000	-
%KWi+3	16#FF00	-
%KWi+4	16#00xx	Number of tracking bytes
%KWi+5	16#07xx	Interbus-S command code
%KWi+6	16#00xx	Number of parameter words
%KWi+7	16#xxxx	Parameters

The %KWi+4 to %KWi+7 data are coded according to the type of command you wish to execute.

The following table shows the coding of these data.

	Start Bus	Fault acknowledgement	Segment activation	Segment deactivation
Command code	16#0701	16#0760	16#0713	
Number of parameters (in words)	16#0000	16#0000	16#00xx	16#00xx
Parameters	-		16#0001	16#0000
			Number of segments (16#00xx)	
			First segment word	
			Second segment word	
			Third segment word	

Report

The following table shows the coding of the four response words.

Word number	Value	Meaning
%MWj	16#0005	-
%MWj+1	16#0000	-
%MWj+2	16#00xx	Number of bytes in the request
%MWj+3	16#00xx	Report: <ul style="list-style-type: none"> ● 16#0000 : command performed ● 16#0001 : illegal parameters ● 16#0003 : command in progress ● 16#000C : command refused

Note: This report only indicates the recognition of the command by the TSX IBY 100/IBX 100 module. In no way does this correspond to confirmation of the commands according to the Interbus-S standard. See the procedure on how to receive conformation.

Management parameters

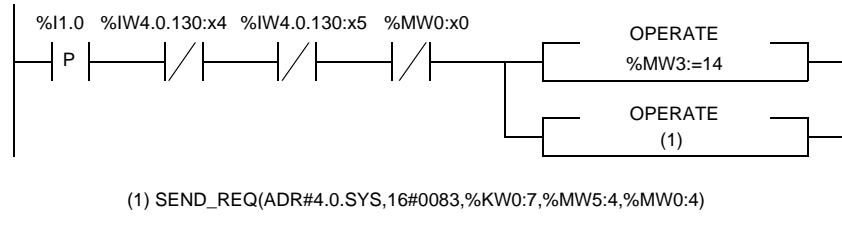
The following table gives details of %MWk:4 words.

Word number	Most significant byte	Least significant byte	Data managed by
%MWk	Exchange number	Activity bit	the system
%MWk+1	Operation report	Communication report	
%MWk+2	Timeout		you
%MWk+3	Length: number of bytes in the request (initialization mandatory to activate the function)		

Examples showing how to use Start IBS and IBS fault acknowledgement commands

Start IBS

The following diagram provides an example of the Start IBS command.



Note: In this example, we assume that fewer than 242 exchange words have been configured.

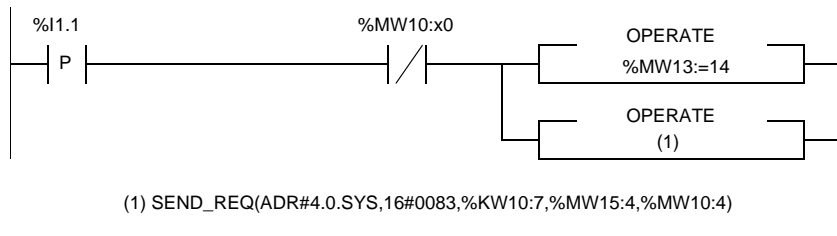
The following table describes the coding of the function data.

Parameters	Variables	Values
Address	-	ADR#4.0.SYS
Request code	-	16#0083
Data to be sent	%KW0:7	16#1807
		16#0500
		16#0000
		16#FF00
		4 (decimal)
		16#0701
Reception zone	%MW5:4	-
Report	%MW0:4	-

Note: The request to start the bus is conditioned by %IW4.0.130:x4 and x5 (no operation detection fault and no cyclic exchange).

**IBS
acknowledgement**

The following diagram provides an example of the IBS fault acknowledgement command.



The following table describes the coding of the function data.

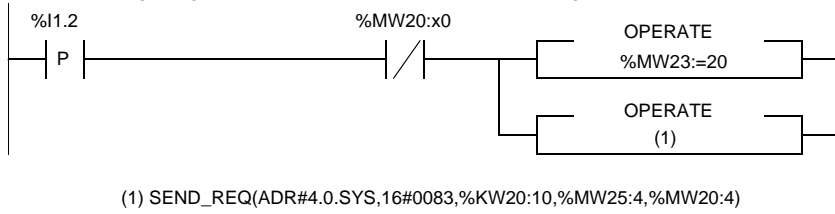
Parameters	Variables	Values
Address	-	ADR#4.0.SYS
Request code	-	16#0083
Data to be sent	%KW10:7	16#1807
		16#0500
		16#0000
		16#FF00
		4 (decimal)
		16#0760
Reception zone	%MW15:4	-
Report	%MW10:4	-

Examples showing how to use segment activation and deactivation commands

IBS segment activation


The action is performed on device 6.0 located beyond the station header.

The following diagram provides an example of the segment activation command.



The following table describes the coding of the function data.

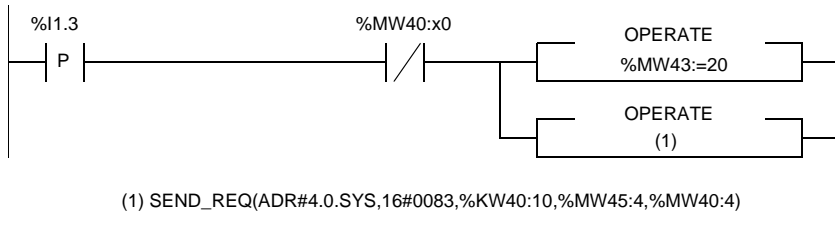
Parameters	Variables	Values
Address	-	ADR#4.0.SYS
Request code	-	16#0083
Data to be sent	%KW20:10	16#1807
		16#0500
		16#0000
		16#FF00
		10 (decimal)
		16#0713
		16#0003
		16#0001
		16#0001
		16#0600
Reception zone	%MW25:4	-
Report	%MW20:4	-

	CAUTION
	Input/Output refreshing
	For a period of 200 to 300 ms, the inputs are not refreshed and the outputs are maintained in their current state.
Failure to follow this precaution can result in injury or equipment damage.	

Deactivation of an IBS segment

The action is performed on device 6.0 located beyond the station header.

The following diagram provides an example of the segment deactivation command.



The following table describes the coding of the function data.

Parameters	Variables	Values
Address	-	ADR#4.0.SYS
Request code	-	16#0083
Data to be sent	%KW40:10	16#1807
		16#0500
		16#0000
		16#FF00
		10 (decimal)
		16#0713
		16#0003
		16#0000
		16#0001
16#0600		
Reception zone	%MW45:4	-
Report	%MW40:4	-

Read PCP confirmation (Modules TSX IBX/IBY 100, minimum version :V3.0)

Syntax

A command is sent via the `SEND_REQ` communication function :

```
SEND_REQ(ADR#xy.0, 16#0031, %KWi:3, %MWj:L, %MWk:4)
```

The following table describes the various function parameters.

Parameter	Description
ADR#xy.0	The exchange destination unit address. <ul style="list-style-type: none"> xy : rack,module 0 : channel (always 0)
16#31	Function code always 16#31
%KWi:3	Data to be send
%MWj:L	Received data
%MWk:4	Exchange management parameters: four words identifying the address of the PL7 data used to control the <code>SEND_REQ</code> function

Data to be sent

The following table shows the coding of the %KWi:3 data to be sent.

Word number	Value	Meaning
%KWi	16#00CR	PCP-Slave communication reference (low byte)
%KWi+1	16#0000	Always 16#0000
%KWi+2	16#xxxx	Received buffer length (Max 18)

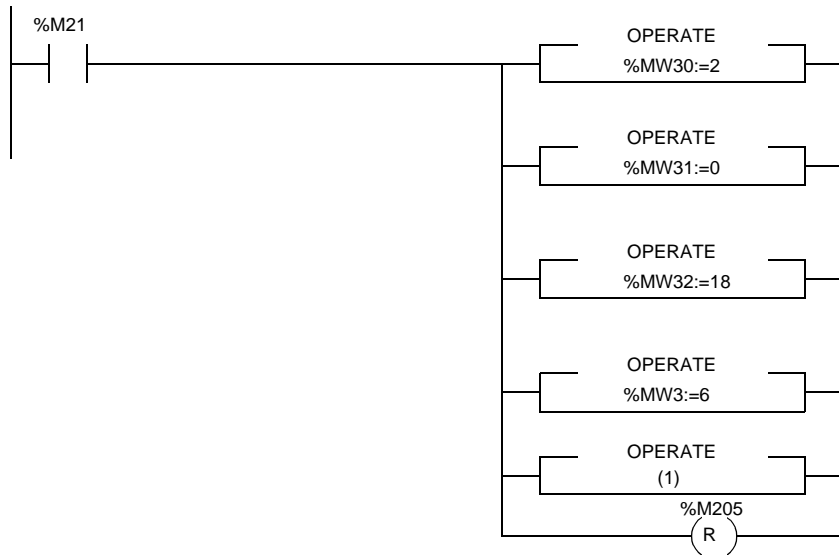
Report

The following table shows the response coding.

Word number	Value	Meaning
%MWj	16#00xx	<ul style="list-style-type: none"> 16#00FD : illegal parameters 16#00FF : command refused
%MWj+1	16#00xx	Code of the PCP confirmation
%MWj+2	16#00xx	Numbers of the following words
%MWj+3	16#xxyy	xx : PCP-Slave communication reference yy : Order number for parallel services
%MWj+4	16#xxxx	Data
%MWj+...	16#xxxx	Data

Example

The following diagram provides an example of the command.



(1) SEND_REQ(ADR#5.0,16#0031,%MW30:5,%MW40:9,%MW0:4)

Useful CMD Tool commands

At a Glance

The following description is a concise summary of the CMD Tool commands. For further information, please refer to the Phoenix Contact documentation.

How to declare the bus configuration

To apply the start up suggestion and re-read the bus configuration performed in Auto mode, carry out the following operations:

Step	Action
1	Select the Configuration Frame icon.
2	Choose the Configuration menu from the toolbar.
3	Select the Read Again command.

How to perform a logic addressing operation

In order to commence logic addressing, carry out the following:

Step	Action
1	Select the Controller Board icon.
2	Choose the Configuration menu from the toolbar.
3	Select the Process Data command.

How to parameterize the messaging

To parameterize the devices that support messaging, carry out the following:

Step	Action
1	Select the icon for the device concerned.
2	Choose the Configuration menu from the toolbar.
3	Select the Description field.
4	Select the Parameter Channel command.

How to Start Data Transmission

To activate or deactivate Start Data Transmission, carry out the following:

Step	Action
1	Select the Controller Board icon.
2	Choose the Configuration menu from the toolbar.
3	Select the Parameterization Memory field.
4	Select the Edit command.
5	In the second drop-down menu, select or deselect the Start Data Transmission box.

How to format the Flash memory

To format the Flash memory, carry out the following:

Step	Action
1	Select the Parameterization Memory field.
2	Choose the Configuration menu from the tool bar.
3	Select the Format command.

How to transfer the configuration

To transfer the configuration into the module's Flash memory, carry out the following:

Step	Action
1	Select the Parameterization Memory field.
2	Choose the Configuration menu from the toolbar.
3	Select the Save command.

How to create an *.SVC file

To create an *.SVC text file, carry out the following:

Step	Action
1	Select the Parameterization Memory field.
2	Choose the Configuration menu from the toolbar.
3	Select the Write ASCII File command.
4	Select the INTERBUS-S Data *.SVC command.

**How to access
the catalog**

To access the Schneider Electric catalog, carry out the following operations:

Step	Action
1	Install the catalog disk.
2	Choose the Options menu from the toolbar.
3	Select the Settings command.
4	Select the Database (general) tab.
5	From the pull-down menu on the left-hand side, select SCHNEIDER_DEVICE_DB .
6	Select Select .
7	Press the OK button to confirm.
8	Select the Controller Board icon.
9	Choose the Edit menu from the toolbar.
10	Select the Insert with Device Description command.
11	Enable the Other option in Data Source .
12	Enter SE in the Group field.
13	Confirm the operation via Search .

5.4 Debugging

Introduction

Subject of this section

This section describes the implementation of a module while it is being debugged.

What's in this Section?

This section contains the following topics:

Topic	Page
Description of the debugging screen	118
Debugging parameters linked to bus diagnostics	120
Sending PMS messages	122
Debugging parameters linked to devices	124

Description of the debugging screen

Introduction

The Debugging function, or double-clicking on the TSX IBY 100 module picture in the PL7 configuration, is only available in online mode.

Illustration

Selecting this option displays the following screen:

The screenshot shows the 'Debugging' window for a TSX IBY 100 module. The window title is 'TSX IBY 100 [RACK 0 POSITION 4]'. The 'Debugging' dropdown menu is open, showing 'InterBus-S MODULE' selected. The status bar shows 'RUN' (green), 'ERR' (grey), and 'DIAG...' (grey). The 'InterBus-S diagnostics' section shows 'Run' (green), 'Rdy' (green), 'Fail' (grey), 'Bsa' (grey), 'Bus' (grey), 'PF' (grey), and 'Qual' (green). The 'Cycle time' is 1348 µs. The 'Module Information' section shows 'Request to send' and 'Response received' fields. The 'Device IN/OUT Data' section shows a table with columns 'Address', 'Symbol', and 'Value'. The 'Enter %QW' field contains '16#BC5F'. The 'Format' section shows 'Bin.' (grey), 'Hex.' (grey), and 'Dec.' (selected). The 'I/O data' section shows 'Total 3 Words 1 Word'.

ID	I/O	PCP
1.0	2	1 Word
D 2.0	3	1 Word
D 3.0	11	1 Word
E 3.1	P 203	0 Word 1 Word
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

Description

The table below shows the different zones of the debugging screen:

Address	Element	Function
1	Title bar	indicates the product reference and the position of the module
2	Choosing the function	<ul style="list-style-type: none"> ● Debugging (available in online mode only) ● Configuration
3	LEDs	indicate the state of the module: <ul style="list-style-type: none"> ● RUN on: the module is in operation, ● ERR on: there is a fault in the module.
4	DIAG button	When a module error is detected, this button accesses status information for this module (this button is disabled or enabled according to the value of the %Ixy.MOD.ERR bit).
5	Interbus-S configuration	This pull-down list shows Interbus-S field bus configuration. When a device has a fault: <ul style="list-style-type: none"> ● the cursor places itself over that device ● the corresponding line in the list appears in red
6	InterBus-S diagnostics	This window launches Interbus-S bus diagnostics. See <i>Debugging parameters linked to bus diagnostics, p. 120.</i>
7	CMD	This icon is used to launch CMD Tool software if it is installed locally on the machine.
8	IBSCNV	This icon is used to launch the file converter for PL7 and CMD Tool. See <i>IBSCNV Converter, p. 85.</i>
9	Module information	This window is used to display the version of the module used. It is active for modules from version V3.0 upwards.
10	Requests to send	This window is used to test communication by sending PMS messages. See <i>Sending PMS messages, p. 122.</i>
11	I/O data	This window is used to display addresses, symbols and values associated with input and output data for a device on the list. See <i>Debugging parameters linked to devices, p. 124.</i>

Debugging parameters linked to bus diagnostics

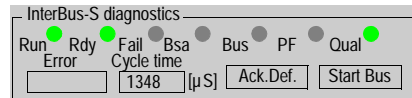
Introduction

Debugging parameters linked to Interbus-S bus diagnostics are made up of:

- LEDs,
- the **Error** window,
- the **Cycle time** window,
- **Ack. Err.** and **Start Bus** buttons.

Illustration

Parameters are shown in the following window:



LEDs

The screen animates LEDs which show the state of the bus. See *Diagnostics from PL7 debugging screen LEDs*, p. 128.

LED	Color	State of LED	
		On	Off
RUN	green	Interbus-S is running	No cyclic exchanges
RDY	green	Interbus-S ready and configured	Bus not configured
FAIL	red	Fault in TSX IBY 100 or TSX IBX 100 module	No fault indicated
BSA	yellow	At least one bus segment is deactivated	No bus segment is deactivated
BUS	yellow	Station fault on: <ul style="list-style-type: none"> • a local bus • or an installation bus • or an interstation bus 	No fault indicated
PF	yellow	Peripheral fault (e.g. supply fault, sensor/actuator fault etc.)	No fault indicated
QUAL	green	Good quality exchanges on the bus	-
	Red	Sporadic errors on the Interbus-S bus	-

Error

The **Error** field is used to display the Interbus-S master error code (Fault on the bus). Error codes are referenced in the Phoenix Contact documentation.

Cycle time	The Cycle time field shows the application bus scanning period in microseconds.
Ack. Err.	The fault acknowledgement button Ack. Err. is used to update diagnostics indications and acknowledge the fault detailed in the Error window.
Start Bus	The Start Bus button is used to restart the bus.
Example	<p>The bus is already running and the START BUS command is selected. The Error field shows the value 16#0A02, signifying that the module cannot execute this command because the bus is already running.</p> <p>To acknowledge the fault, select the Ack. Err. button.</p>

Sending PMS messages

Introduction

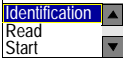
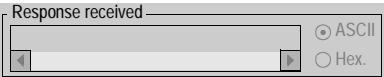
It is possible to send the list of PMS requests to some devices. If the selected device does not support PMS messaging, the request is not authorized and the window **Request to send** is disabled.

The available requests are:

- **Identification**: this is used to identify the remote device,
- **Read**: this is used to read data from a remote device,
- **Start**: this is used to start the remote device,
- **Status**: this is used to read the state of the remote device,
- **Stop**: this is used to stop the remote device,
- **Write**: this is used to write data from the remote device.


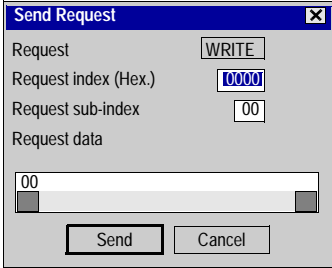
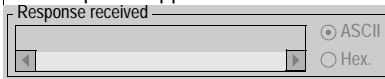
How to send an Identification or Status request

The procedure for sending a PMS request is as follows.

Step	Action
1	Select a remote device from the Interbus-S configuration list. Note: the PCP channel number of the device (between 2 and 63) is displayed.
2	Select the request to be sent from the following scroll menu. 
3	Select the Auto box if you wish to send the request periodically. To stop this facility, deselect the box. Note: this box is only available for the Identification and Status request.
4	Press the Send button to send the request. Result The response appears in the window Response received :  The response can be displayed in hexadecimal or in ASCII.

How to send a Read, Start, Stop, Write request

The procedure for sending a PMS request is as follows.

Step	Action
1	Select a remote device from the Interbus-S configuration list. Note: the PCP channel number of the device (between 2 and 63) is displayed.
2	Select the request to be sent from the following scroll menu. 
3	Press the Send button to send the request. Result The following window appears. 
4	Enter the Request index according to the profile of the destination device in hexadecimal. Note: to complete this parameter, refer to the device documentation specific to the device.
5	Enter the Request sub-index according to the profile of the destination device in hexadecimal. Note: to complete this parameter, refer to the device documentation specific to the device.
6	Enter the Request data to be sent by encoding all the data in hexadecimal. The data are entered continuously without any spaces between them. When the data are encoded in a word, the most significant bytes and the least significant bytes are reversed.
7	Press the Send button to send the request. Result The response appears in the window Response received :  The response can be displayed in hexadecimal or in ASCII.

Debugging parameters linked to devices

Slave data

To display I/O data values for a device, select **Interbus-S Configuration** from the pull down menu.

Addr.	Symbol	Value
%IW4.0.2	Control_vf	0000

Enter %QW: 16#37 [Confirm]

Format: Bin. Hex. Dec.

Addr.	Symbol	Value
%QW4.0.1	Setpoint_pv	0037

Two pull down lists show input/output data values:

- The top field displays the input data list for the device selected, with the symbol and the associated value for each data item.
- The bottom field displays the output data list for the device selected, with the symbol and the associated value for each data item.
- The middle field is used to enter the value of %QW data, and indicate the type of display for each data item.
 - hexadecimal,
 - decimal,
 - ASCII.

Note: Forcing is not authorized for IW and QW language objects.

The module fallback values appear in red when the PLC changes to STOP mode.

5.5 Diagnostics

Introduction

Subject of this section

This sub-chapter describes the diagnostics of a TSX IBY 100/IBX 100 module.

What's in this Section?

This section contains the following topics:

Topic	Page
Diagnostics from module status LEDs	126
Diagnostics from PL7 debugging screen LEDs	128
Main faults	129

Diagnostics from module status LEDs

Introduction

The state of the module and the Interbus-S network can be seen from the LEDs on the card. Signaling conforms to the Interbus-S and Premium standard.

Illustration

The diagnostic LEDs are as follows:



Note: The diagnostic LEDs differ according to the type of module. For the TSX IBX 100 module, the HF LED is replaced by the FAIL LED. See *Signaling on the card*, p. 50.

Diagnostics

Depending on the state of the LEDs, the diagnostics are as follows:

State LEDs						Meaning	Note
RUN	ERR	I/O	COM	HF or FAIL	BSA		
●	○	○	●	○	○	InterBus-S in operation	Cyclic exchange of inputs/ outputs
●	○	○	⊗	○	○	InterBus-S ready and configured	-
●	●	○	⊗	○	○	Fault in Interbus	Fault in a station and I/O UC fault LED on
●	○	●	●	○	○	Fault in periphery inputs/ outputs (sensor supply fault, short-circuit, ...)	-
●	○	○	●	○	●	At least one segment of the bus is deactivated	-
○	●	○	○	○	○	Module fault or fault signaled by the watchdog	Replace the TSX IBY 100/IBX 100 module
○	●	○	○	●	○	Fault in TSX IBY 100/IBX 100 module	Replace the TSX IBY 100/IBX 100 module
●	⊗	○	○	○	○	No communication with the PLC	-
○	⊗	○	○	○	○	Module not configured	Awaiting configuration
Key							
●		LED on					
⊗		LED flashing					
○		LED off					

Diagnostics from PL7 debugging screen LEDs

Introduction

The state of the module and of the InterBus-S network can be seen from the LEDs. Signaling conforms to the InterBus-S and Premium standard.

Diagnostics

Depending on the state of the LEDs, the diagnostics are as follows:

State LEDs							Meaning	Note
RUN	RDY	FAIL	BSA	BUS	PF	QUAL		
●	●	○	○	○	○	●	InterBus-S in operation	Cyclic exchange of inputs/outputs
○	●	○	○	○	○	●	InterBus-S ready and configured	Launching exchanges using the Start Bus command
○	●	○	○	●	○	●	Bus installation fault	Disconnection
							Incorrect configuration	In Auto mode and PL7->IBY mode, check that the module flash is empty
●	●	○	○	○	●	●	Periphery input/output fault	Device in short-circuit
●	●	○	●	○	○	●	At least one bus segment is deactivated	Activate the segment(s)
○	○	●	○	○	○	○	Module out of order	Replace the TSX IBY 100/IBX 100 module
Key								
●		LED on						
○		LED off						

Main faults

Procedure

The tables show corrective measures for the main faults encountered.

Fault type	Fault causes	Corrective measures
BUS LED lit up	Network cable disconnection: various causes (physical fault)	<ol style="list-style-type: none"> 1. Reconnect the cable. 2. Click on the Start Bus icon.
	A 24 V power outage of a module : various causes	<ol style="list-style-type: none"> 1. Switch off module, then reestablish the supply. 2. Click on the Start Bus icon.
	Functions not performed by the communication interfaces (TSX IBY 100 & IBX 100): elementary breakdown or incorrect interface connection	<ol style="list-style-type: none"> 1. Reestablish the module functions. 2. Click on the Start Bus icon.
	Interbus-S slave module declared but not present on the bus: programmer fault	<ol style="list-style-type: none"> 1. Set the declared configuration so that it is equivalent to the configuration present. 2. Start from cold.
	Interbus-S slave module not declared but present on the bus: programmer fault	
	Incorrect slave module reference declared in the software configuration: programmer fault	
	Slave device elementary breakdown	<ol style="list-style-type: none"> 1. Switch off module, then reestablish the supply. 2. Click on the Start Bus icon.
	Functions not performed by the communication interfaces of a slave: elementary breakdown or incorrect interface connection (physical fault)	
PF LED lit up	A 24 V power outage of the module sensors: various causes	<ol style="list-style-type: none"> 1. Reestablish the supply. 2. Click on the Ack. Err. icon.
	24 V power outage of the actuators: various causes	<ol style="list-style-type: none"> 1. Reestablish the supply. 2. Click on the Ack. Err. icon.
	Short circuit supply/output sensor: various causes	<ol style="list-style-type: none"> 1. Delete the short circuit. 2. Click on the Ack. Err. icon.
	Short circuit supply/input sensor: various causes	<ol style="list-style-type: none"> 1. Delete the short circuit. 2. Click on the Ack. Err. icon.
QUAL LED lit up	Effects of electromagnetic interference on the slave device	<ol style="list-style-type: none"> 1. Isolate the cable.
Outputs in fallback mode (kept or reset)	PLC in STOP position	<ol style="list-style-type: none"> 1. Switch to RUN position.

Fault type	Fault causes	Corrective measures
Outputs fallback to "0"	Application not present in the PLC: <ul style="list-style-type: none"> ● operator error ● PLC memory is erased due to electromagnetic interference 	<ol style="list-style-type: none"> 1. Load an application. 2. Switch to RUN position.
	Elementary breakdown of the IBY 100/IBX 100 TSX module: various causes	<ol style="list-style-type: none"> 1. Replace the module.
	PLC supply elementary breakdown: various causes	<ol style="list-style-type: none"> 1. Replace the supply.

5.6 Language objects associated with TSX IBY 100/ TSX IBX 100 modules

Introduction

Subject of this section

This section presents the different language objects specific to TSX IBX 100/TSX IBY 100 modules.

What's in this Section?

This section contains the following topics:

Topic	Page
Language objects in default exchange	132
Language objects for explicit exchange	137
Managing explicit exchanges	138
Language objects associated with configuration	139

Language objects in default exchange

Introduction

This page describes all the language objects for default exchange for Interbus-S communication with TSX IBY 100/TSX IBX 100 modules that can be displayed or modified by the application program.

Bit objects

The table below shows the different bit objects for default exchange.

Object (1)	Function	Meaning
%lxy.MOD.ERR	Module error bit	This bit set to 1, indicates a module error (at least one of the channels has an error)
%lxy.0.ERR	Channel error bit	This bit set to 1, indicates a module error .
Key		
(1)	xy Address <ul style="list-style-type: none">● x: corresponds to the rack number● y: corresponds to the module number	

Input Word objects

The table below shows the different input word objects for default exchange.

Object (1)	Function	Meaning
%IWxy.0.0 to %IWxy.0.n	DP inputs	n DP input Words <ul style="list-style-type: none"> ● n = 127 if 32 to 128 input/output Words have been configured ● n = 241 if 242 input/output Words have been configured
%IWxy.0.n+1	IBS status	<ul style="list-style-type: none"> ● x0 = 1: if x8 = 1 or x9 = 1 or x10 = 1 ● x4 = 1: internal error (HS Module) ● x7 = 1: faulty software configuration ● x8 = 1: Interbus-S master not operating ● x9 = 1: DP exchange error ● x10 = 1: PMS messaging exchange fault ● x11 = 1: fallback mode output on bus stop ● x13 = 1: module configuration fault ● x14 = 1: PLC communication fault ● x15 = 1: receive error message
%IWxy.0.n+2	IBS status	<p>This word designates a error code which is referred to in the Phoenix Contact documentation, if %IWm.0.n+3:x0,x3 = 1.</p> <p>This word designates the number of the bus segment at fault, if %IWm.0.130:x1,x2 = 1.</p>

Object (1)	Function	Meaning
%IWxy.0.n+3	IBS status	<ul style="list-style-type: none"> ● x0 = 1: user fault (usr), %IWm.0.129 translates the error code referred to in the Phoenix Contact documentation ● x1 = 1: Peripheral fault (pf), location of fault by %IWm.0.1.129 ● x2 = 1: local bus fault, installation bus or interstation bus (bus), location of fault by %IWm.0.129 ● x3 = 1: controller fault (ctrl), %IWm.0.129 translates the error code referred to in the Phoenix Contact documentation ● x4 = 1: operation detection fault (dtct) ● x5 = 1: IBS cyclic exchange (run) ● x6 = 1: Active IBS: identification cycles (act) ● x7 = 1: IBS ready for configuration (rdy) ● x8 = 1: at least one bus segment is deactivated (bsa) ● x9 = 1: Host fault (fail) ● x10 = 1: result of IBS command (r) ● x11 = 1: synchronization fault, synchronized mode only (syr) ● x12 = 1: data cycle fault, synchronized mode only (dcr) ● x13 = 1: cycle time overrun (w) ● x14 = 1: poor bus quality (q) ● x15 = 1: message waiting in standard interface (ssi)
%IWxy.0.n+4	IBS status	<ul style="list-style-type: none"> ● x8 = 1: master fault ● x11 = 1: master ready to communicate ● x12 = 1: TSX IBY / IBX 100 module fault ● x15 = 1: TSX IBY / IBX 100 module ready to communicate
%IWxy.0.n+5	IBS status	IBS cycle time (s): D-Word (least significant)
%IWxy.0.n+6	IBS status	IBS cycle time (s): D-Word (most significant)
%IWxy.0.n+7	IBS status	IBS command image. IBS confirms receiving a command initiated by bit %IWm.0.n+7:xi setting to 1, corresponding to command %QWm.0.n+7:xi.
%IWxy.0.n+8	IBS status	<ul style="list-style-type: none"> ● x0 to x7: number of %QW exchanges ● x8 to x15: number of %QW exchanges
%IWxy.0.n+9	IBS status	DP exchange fault code (equal to 0: OK; different to 0: internal error)
%IWxy.0.n+10	IBS status	Number of PMS messages received

Object (1)	Function	Meaning
%IWxy.0.n+11	IBS status	Number of PMS messages sent
%IWxy.0.n+12	IBS status	PMS messaging code fault (equal to 0: OK; different to 0: internal error)
Key		
(1)	xy Address <ul style="list-style-type: none"> ● x: corresponds to the rack number ● y: corresponds to the module number 	

Note: Words %IWm.0.n+1 to %IWm.0.n+12 are only significant if the TSX IBY 100 / IBX 100 module is present and configured.
Bit %IWm.0.n+3:x10 is used to test the execution of an IBS command by the QWm.0.n+7 register. If %IWm.0.n+3:x10 is worth 0, the command has been executed.

Output Word objects

The table below shows the different output Word objects for default exchange.

Object (1)	Function	Meaning
%QWxy.0.0 to %QWxy.0.n	DP outputs	n DP outputs Words <ul style="list-style-type: none"> ● n = 127 if 32 to 128 input/output Words have been configured ● n = 241 if 242 input/output Words have been configured
%QWxy.0.n+1	Commands	<ul style="list-style-type: none"> ● x0 = 1: automatic start up after fault IBS disappears ● x1 = 1: pre-processing stops on application halt, and outputs change to configured state in STOP mode (Fallback or Maintain)
%QWxy.0.n+2 to %QWxy.0.n+6	Reserved	-
%QWxy.0.n+7	IBS Commands	<ul style="list-style-type: none"> ● x0 = 1: start up of Interbus-S (2) system (Start Bus) ● x1 = 1: Stop of Interbus-S system (Stop Bus), outputs reinitialized, reconfiguration (3) ● x2 = 1: acknowledgement of %IWm.0.130 fault ● x3 = 1: disabling of a device (3) ● x4 = 1: activation of a device (3) ● x5 = 1: device shunt (3) (4) ● x6 = 1: shunt remove (3)
%QWxy.0.n+8	IBS parameters	<p>This word designates the current configuration number (value 1) if %QWm.0.n+7:x1 = 1.</p> <p>This word designates the number of the device concerned (segment position) if %QWm.0.n+7:x1 to x6 = 1</p>
%QWxy.0.n+9 to %QWxy.0.n+12	Reserved	-
Key		
(1)	xy Address <ul style="list-style-type: none"> ● x: corresponds to the rack number ● y: corresponds to the module number 	
(2)	Important If this bit is not reinitialized, the Interbus-S automatically restarts after the fault disappears.	
(3)	For this to happen, %QWm.0.n+8 parameters are required	
(4)	This command is only valid if the bus is inactive. After the command has been carried out, the device must be disconnected from the bus before restarting Interbus-S.	

Language objects for explicit exchange

Introduction

This page describes all the language objects for explicit exchange for Interbus-S communication with TSX IBY 100/TSX IBX 100 modules that can be displayed or modified by the application program.

Internal words

The following table describes the internal words:

Object (1)	Function	Meaning
%MWxy.MOD.2	Module status	<ul style="list-style-type: none"> ● x0 = 1: defective module ● x1 = 1: function fault (e.g. communication fault between CPU and module, command, adjustment or configuration value not accepted etc.) ● x5 = 1: hardware or software configuration error (the module present is not that declared in the configuration, the sub-modules are not compatible) ● x6 = 1: missing module
%MWxy.0.2	Reserved	-
Key		
(1)	xy Address	<ul style="list-style-type: none"> ● x: corresponds to the rack number ● y: corresponds to the module number

Managing explicit exchanges

Introduction

This page describes all the language objects that manage explicit exchanges.

Word objects

The table below shows the different word objects for the management of explicit exchanges.

Object (1)	Function	Meaning
%MWxy.MOD.0	Exchange in progress	<ul style="list-style-type: none">● x0 = 1: status reading in progress
%MWxy.MOD.1	Reserved	-
%MWxy.0.0	Exchange in progress	<ul style="list-style-type: none">● x15 = 0: reconfiguring...
%MWxy.0.1	Reserved	-
Key		
(1)	xy Address <ul style="list-style-type: none">● x: corresponds to the rack number● y: corresponds to the module number	

Language objects associated with configuration

Introduction

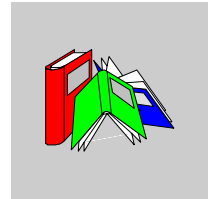
This page describes all the language objects for Interbus-S communication with TSX IBY 100/TSX IBX 100 modules that can be displayed or modified by the application program.

Internal constants

The following table describes the internal constants:

Object	Function	Meaning
%KWxy.0.0	IBS function block	FB_Type Interbus-S
%KWxy.i.1	Size of %IW and %QW	Number of %IW and %QW updated
%KWxy.i.2	Configuration bits	<ul style="list-style-type: none"> ● x0 = 0: output set to zero x0 = 1: maintained outputs ● x1 = 0: PMS connection inactive when PLC stops x1 = 1: PMS connection active when PLC stops ● x2 = 0 and x3 = 0: Auto mode x2 = 1 and x3 = 0: PL7->IBY mode x2 = 1 and x3 = 0 or 1: CMD->IBY mode
Key		
(1)	xy.i.j address <ul style="list-style-type: none"> ● x: corresponds to the rack number ● y: corresponds to the module number ● i: corresponds to the channel number 	

Glossary



C

CMD Tool

Configuration, Monitoring and Diagnostics: PC Phoenix Contact software for the configuration, control and diagnostics of the INTERBUS-S bus.

D

DP

Data Process channel: Data process channel

I

I/O

Inputs/Outputs

IBS

INTERBUS-S: this bus uses the master-slave process. The master subscriber manages and coordinates bus access; it transmits and receives data to and from all subscribers.

K

KB **Koppler Bus:** Station header

L

LB **Local Bus:** local bus

Local Bus Station The local bus modules are the I/O modules used for the construction of a remote sub-station in a monitoring unit.

O

OD **Object Dictionary:** object dictionary containing all necessary information for the description of standard PMS type objects for a particular device (Robot, ...)

OF **Optional Function:** PL7 function block message

P

PCP **Peripherals Communication Protocol:** peripherals communication protocol (level 2 of the OSI model). Ensures the fragmentation and reconstruction of messages during transmission. Makes available all the services necessary for connection and disconnection as well as data transmission services.

PMS **Peripherals Message Specification:** Peripherals Message Specification. PMS is a user interface modeled on MMS (found on level 7 of the OSI model). PMS does not formally describe the connection and disconnection services, nor the data transmission services made available by the PCP.
The standardized PMS communication services ensure that all devices use the same communication interface.

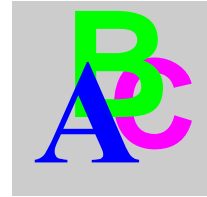
R

RB **Remote Bus:** bus interstation

RBI **Remote Bus Installation:** bus installation

Ring All INTERBUS-S subscribers are linked on a ring structure (also called loop).

Index



A

Accessing the configuration screen, 78
Acknowledgement
 IBS, 108
Addressing, 73
Architecture, 13
Auto, 82

B

Bus installation, 15

C

Characteristics, 39
 TSX IBX 100, 64
CMD Tool, 114
CMD->IBY, 82
Commands, 105
Compatibility, 37
 TSX IBX 100, 63
Configuration, 77
Configuration parameters, 81, 83
Configuration screen, 79
Connections, 31
Converter, 85

D

Debugging, 117, 118
Debugging parameters, 120, 124

Default exchange, 132
Description
 TSX IBX 100, 45
 TSX IBY 100, 27
Diagnostics, 125

E

Exchange management, 138
Explicit exchange, 137

F

Faults, 129
File, 83, 89

G

General, 11

I

I/O address, 54
IDENTIFICATION, 99, 101
Implementation, 67
Indicators, 50
Input Words, 133
Installation
 TSX IBX 100, 51
 TSX IBY 100, 33
Interstation bus, 14
IRQ address, 56

L

Language objects, 131
LEDs, 126, 128
Local bus, 16
Logical installation, 49

M

Messaging, 91
Methods, 70
Modes, 81
Module position, 53

O

Operating conditions, 40
Operating mode, 30
Output Words, 136

P

PL7->IBY, 82
PMS, 91
Preliminaries, 52
Presentation, 12
Principal, 68
Programming, 90

R

Rack address, 53
READ, 93
Report, 103, 138
Response time, 22
Results, 17

S

Scanning time, 18
Segment activation, 110
Segment deactivation, 110
Set-up, 33, 58
Signaling, 50, 126, 128
Software, 65
Standards, 39

START, 97
 IBS, 108
STOP, 98
SVC, 83

T

Technical specifications
 TSX IBX 100, 62
 TSX IBY 100, 36
Topology, 13
Transmission rate, 24
Transmission time, 20
TSX IBX 100, 43
TSX IBY 100, 25

W

WRITE, 95