Quantum
140 NOA 622 00
User Manual

840 USE 497 00 eng

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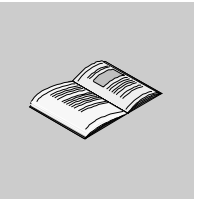
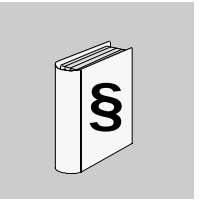


Safety Information



Important Information

NOTICE

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

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

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

DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.

WARNING

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

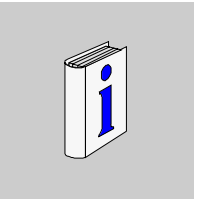
CAUTION

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

PLEASE NOTE

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

About the Book



At a Glance

Document Scope

This manual is intended for users who want to commission and maintain communication master modules on an INTERBUS system. Knowledge about the Quantum, the programming software Concept and the bus configuration tool SYC SPU LF• CD28 M (called SyCon in following texts) is required. Additionally, the reader should be familiar with INTERBUS.

Validity Note

This User Manual is valid for Concept versions starting with 2.6 SR1 for Microsoft Windows 98, Windows 2000, Windows XP and Windows NT.
The NOA 622 00 is an INTERBUS connection module and is compatible to INTERBUS Firmware Generation 4.
The configuration of the INTERBUS takes place using the sofware SYC SPU LF• CD28 M (called SyCon in following texts). Screen shots and procedures concerning this software shown in this book refer to version 2.7xx of SyCon.

Related Documents

Title of Documentation	Reference Number
Quantum Hardware User Manual	840 USE 100 00
Concept User Manual	840 USE 503 00

Note: Current Information about the INTERBUS can be found on the INTERBUS Club Homepage: http://www.interbusclub.com.

Product Related Warnings

	**CAUTION** **The guidelines provided should be observed for applications using controllers with technical safety requirements.** Repairs to components should only be carried out by the manufacturer for safety reasons and to secure documented system data. **Failure to follow this precaution can result in injury or equipment damage.**

User Comments

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

INTERBUS and INTERBUS Communication with TSX Quantum 140 NOA 622 00

I

Overview

What will you find in this section?

This section contains general information concerning INTERBUS and for configuration with TSX Quantum 140 NOA 622 00.

What's in this Part?

This part contains the following chapters:

General

1

At a Glance

Introduction

This chapter describes the most important aspects of data communication via an INTERBUS system.

What's in this Chapter?

This chapter contains the following topics:

Overview

What is INTERBUS?

INTERBUS is a serial field bus system used to connect sensors and actuators which is designed for industrial operating environments.

This field bus system uses the master-slave method. The master manages and coordinates bus access. It sends and receives data for all connected nodes.

The following nodes can be connected to the INTERBUS (among others):
- Branch interface modules
- Input/output modules from the TSX Momentum product family
- INTERBUS/AS-I Gateways
- Frequency converters (ATV 18, 58 and 66)
- TegoPower devices
- INTERBUS compatible devices from other manufacturers

Note: Current Information about the INTERBUS can be found on the INTERBUS Club Homepage: **http://www.interbusclub.com**.

Branch interface modules

The branch interfaces work as INTERBUS slaves and support then following functions:
- Make or brake connections to an installation bus, a local bus or a remote bus connected to the remote bus
- The supply for the bus electronics on the input/output modules (only for branch interfaces on the installation remote bus)
- Isolation of the remote bus segments
- Reporting faulty functions using a potential-free alarm output

Input/output modules

The input/output modules from the various product families allow sensors and actuators to be connected to the INTERBUS field bus system which are used to control or monitor machines or processes.

General Architecture of an INTERBUS Field Bus System

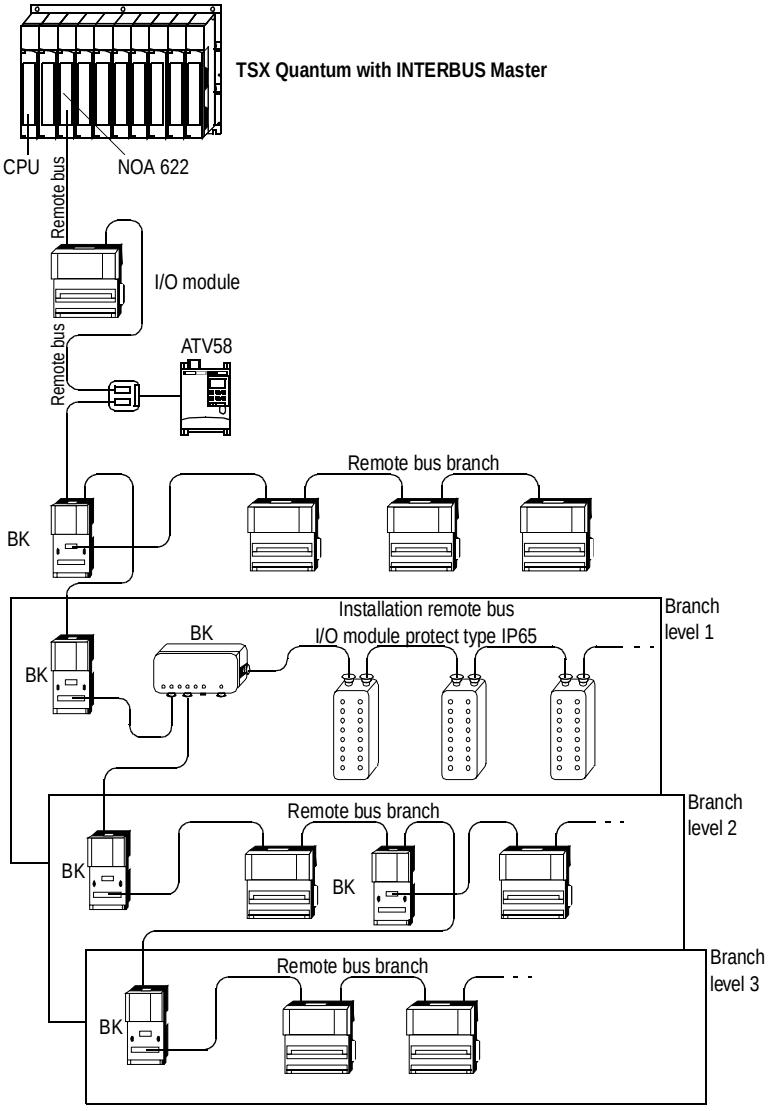
Overview

The INTERBUS is hierarchically structured. The architecture is made up of:

- Remote bus with remote bus branches (See *Remote Bus, p. 17*)
- Installation remote bus branches (See *Installation Remote Bus, p. 20*)
- Local buses (See *Local Bus, p. 21*)
- INTERBUS loop (See *INTERBUS Loop, p. 21*)

INTERBUS architecture

The following example provides a clear representation of an INTERBUS architecture:



Remote Bus

In the hierarchical structure of the INTERBUS architecture, the remote bus (RB) is the main part of the bus structure. It is generated by the INTERBUS bus master. This bus allows the longest distances within a system to be bridged.
The sections between 2 remote bus nodes are called segments. A bus branch coming from a branch interface is called a remote bus branch.

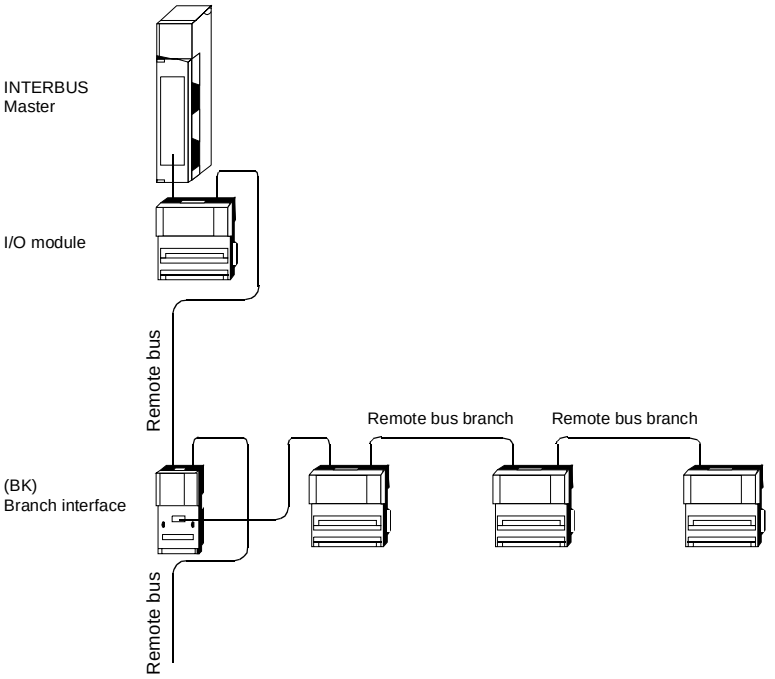
Remote bus nodes are e.g.

- TSX Momentum modules
- Branch interface modules

Remote Bus Branch

The remote bus branch is generated by a branch interface. The branch interface itself is a remote bus node. The I/O modules on the remote bus branch are identical to those on the remote bus.

INTERBUS network with remote bus branch



Note: With INTERBUS Firmware Generation 4, it is possible to create branches ("branch in branch"), also see picture *INTERBUS architecture, p. 16*.

Remote bus/ remote bus branch technical data

The following tables contain remote bus technical data.

Transfer properties

Transfer procedures	Differential signal transfer according to RS 485
Possible transfer media	• Copper cable, twisted pair, 5 conductor • Fiber optics line (HCS, polymer or glass fiber) • Infrared connection
Transfer rate	500 kbit/s

Physical Attributes

Copper cable (Cu)		
Maximum length of a segment		400m
Maximum length of the cable between...	the connection module and the first branch interface on the remote bus	400 m
	Two branch interfaces	400 m
	the connection module and the last station on the remote bus	12.8 km

Fiber optics line		**HCS (200/ 230Nm)**	**Polymer (980/ 1000Nm)**	**Glass fiber**
Maximum length of a segment		300 m	50 m	2 500 m
Maximum length of the cable between...	the connection module and the first branch interface on the remote bus	300 m	50 m	2 500 m
	Two branch interfaces	300 m	50 m	2 500 m
	the connection module and the last branch interface on the remote bus	9 600 m	1 600 m	> 80 km
Minimum length of the cable (exception INT ↔ INT and INT ↔ BNO: 0.1m)		1 m	1 m	1 m

Capacitance

Number of branch layers per branch interface on the RB main bus	"Branch in branch": Maximum 12
Number of slaves	Maximum 251 on the remote bus and in the entire network
Amount of I/O data	Maximum of 4096 input/output points
Groups	Possible, groups can be switched off
Supply for I/O modules	External supply voltage

Installation Remote Bus

The installation remote bus (IRB) is a remote bus branch. It is generated by special branch interfaces. These branch interfaces themselves are remote bus nodes. The installation remote bus is isolated from the remote bus.
Often, I/O nodes on the installation remote bus have a special safety type (e.g. IP65, IP67, etc.). The I/O modules on the installation remote bus are special modules that cannot be used on the remote bus.

Installation remote bus technical data

The following tables contain INTERBUS installation remote bus technical data.

Transfer properties

Transfer procedures	RS 485 connection
Possible transfer media	Special cable (Cu, shielded, twisted pair, 8 conductor, welding resistant) which is suited for ● the supply of input/output modules and sensors with 24 V ● the data transfer
Transfer rate	500 kbit/s

Physical Attributes

Maximum length of the cable between...	the branch interface and the first module	50 m
	the branch interface and the last module	50 m

Electrical data

Maximum current load on the cable	4.5 A

Capacitance

Number of input/output modules	Maximum 251
Groups	Possible, groups can be switched off
Supply for I/O modules	Supply voltage also applied via the I/O bus

Local Bus

The local bus LB (peripheral bus) is generated by specific branch interfaces. The modules on the local bus are I/O modules used to create a remote substation in a switching cabinet. Products from other manufacturers using peripheral bus technology can be coupled on the 140 NOA 622 00.

Local bus technical data

The following tables contain INTERBUS local bus systems technical data.

Transfer properties

Transfer procedures	TTL
Possible transfer media	Special cable: CU, shielded, twisted pair, 14 conductor
Transfer rate	500 kbit/s

Physical Attributes

Maximum length of the cable between...	the branch interface and the first module	1.5 m
	two modules	1.5 m
	the branch interface and the last module	10 m

Electrical data

Power consumption of a device	20 to 250 mA
Maximum power consumption	800 mA

Capacitance

Number of input/output modules	Maximum 8 modules
Groups	Possible
Supply for I/O modules	Supply voltage via bus cable or externally

Note: Inline modules are configured as local bus nodes in SysCon. For performance characteristics and configuration details please refer to the manufacturers specifications.

INTERBUS Loop

With the INTERBUS loop, remote sensors and actuators distributed on machines and systems or e.g. modules with safety type IP67 are networked in a closed ring.

INTERBUS loop technical data

The following tables contain INTERBUS loop system technical data.

Transfer properties

Transfer procedures	Modulated current signal
Possible transfer media	CU, unshielded, 2 conductor
Transfer rate	500 kbit/s

Physical Attributes

Maximum length of the cable between...	the branch interface and the first module	20 m
	two modules	20 m
	the branch interface and the last module	200 m

Note: When using Loop 1, divide the physical properties values in half.

Electrical data

Maximum power consumption	1.8 A (Loop2), 1.5 A (Loop1)

Capacitance

Number of nodes	Maximum 63
Groups	Possible
Supply for I/O modules	Supply voltage via bus cable or externally

Performance

2

At a Glance

Introduction

This chapter describes the performance of an INTERBUS field bus system.

What's in this Chapter?

This chapter contains the following topics:

Protocols

Overview

The following protocols are possible with the INTERBUS master module 140 NOA 622 00:

- *INTERBUS Protocol, p. 24*
- *PCP Protocol, p. 25*

INTERBUS Protocol

The INTERBUS protocol allows a high data throughput. The I/O data is transferred in blocks which allow simultaneous and predictable updating of all nodes connected to the network. The necessary transfer security is guaranteed using a CRC error test in the protocol. Complex diagnostics make it possible to find the cause and location of the error. Embedded message protocols allow complex parameter and message data to be send via the INTERBUS network.
The basic principle of an open bus system is to allow data to be exchanged between devices from different manufacturers. The data includes commands and I/O data which is defined as a standard profile and with which the devices operate. Standard profiles are available for drives, measurement encoders, robot controllers, pneumatic controlled valves, etc. The INTERBUS protocol, EN 50254, is the communication standard for these profiles. It represents an open standard for I/O networks in industrial applications.

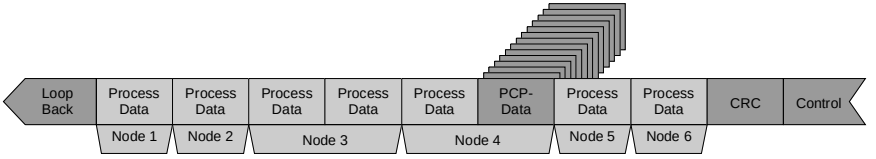
INTERBUS Protocol Format

The protocol for the INTERBUS system has a hardware dependent structure and was developed as a shift register. The I/O modules are like a chain of shift registers connected to each other.
The main elements of the network are the two protocol chips. The INTERBUS Protocol Master Chip (IPMS) on the master module controls the network. The serial universal Processor Chip (SUPI) connects the I/O node to the network.
Process data words are clocked via the network in each cycle. Process data containing output data are entered on the SUPI Chip, and then sent from there to the respective actuator. The process data also contains input data coming from the SUPI Chip which is sent on to the INTERBUS master. Please note that the process data words contain input and output data. Therefore 16 clocks are required to transfer a word. This gives the INTERBUS its extraordinary speed. Another property of the protocol is that the input and output data is updated at the same time.

PCP Protocol

The Peripherals Communication Protocol (PCP) is used to exchange data between peripheral devices (layer 2 of the OSI model). This protocol guarantees that messages are broken down and reassembled correctly during transfer. All services required to make and brake connections, as well as data transfer services are available.
The PCP protocol is connection and object oriented (Client/Server type). It is only used on intelligent I/O modules. When a connection is made, the Client and Server exchange their data using the available object type. Object types are bytes, words, ASCII characters, arrays, etc.
This protocol is mainly used to send initialization parameters to intelligent I/O modules. The PCP protocol is only seldom used after the initialization is complete.

Communication on the PCP channel



Network Control

Network Operation

During initialization and operation of the network, the IPMS Chip simultaneously transfers a control data telegram to all SUPI Chips in the network. For the SUPI Chips to receive these messages at the same time, the shift register must be bypassed.

INTERBUS Telegrams

The INTERBUS architecture consists of frame telegrams. Each frame telegram contains all network data. The identification telegram and the data telegram are the two types of INTERBUS frame telegrams. Transfer telegrams begin with a "loop-back" word. This word is used as code for the end of the identification telegram. All network data (input and output data) follow the "loop-back" word. The last words in the transfer telegram are the CRC word and control word. A telegram is sent on the network between each byte shift.

Network Timing

INTERBUS cycle times are deterministic. They can be calculated with microsecond precision when considering all network variables. The cycle time mainly depends on the number of process data words. Please also include the influence of PCP communication when calculating the INTERBUS system cycle time.

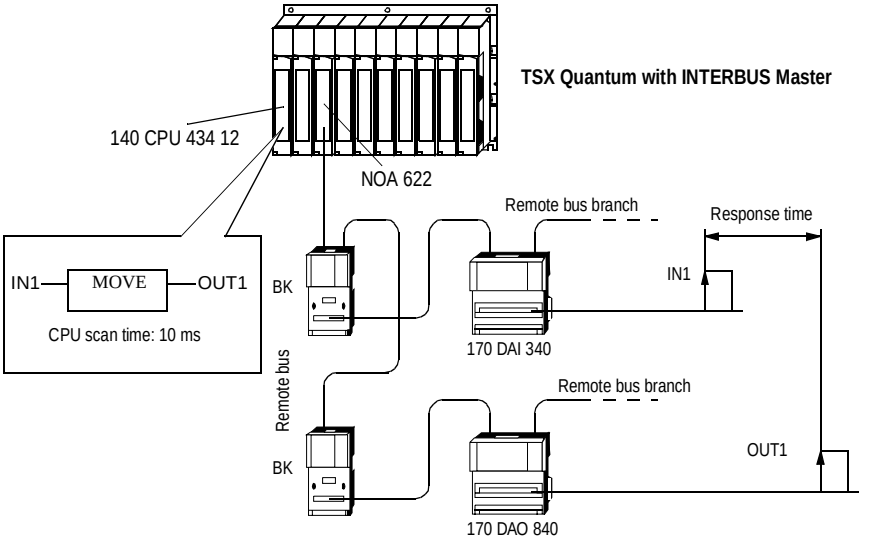
Response Time for the Application

At a Glance

The response time for the application is a logical response time which does not contain the reaction time of the sensor and actuator interfaces.
It is the same as the time span between acquiring an input signal and setting an output using INTERBUS.

Diagram

The following example provides a clear representation of the response time for an application.



Calculation example

The table shows the various elements used to calculate the response time of the application with the 140 NOA 622 00.

Number of I/O words	1	33	65	129
Number of modules	2	18	34	66
CPU scan time (in ms)	3.00	5.00	8.00	10.00
Application response time (in ms)	9.00 to 13.00	18.00 to 26.00	30.00 to 40.00	44.00 to 74.00

Data Transfer Rate per Station

Data transfer rate

The data transfer rate depends on the bandwidth of the PCP channel (1 byte control information + n bytes user data) and from the INTERBUS polling time.

A bandwidth of...	**and a polling time of...**	**results in a data rate of...**
one word per cycle via the PCP channel	3.27 ms	2.45 kbit/s
	4.94 ms	1.62 kbit/s
	8.27 ms	0.97 kbit/s
two words per cycle via the PCP channel	3.27 ms	7.34 kbit/s
	4.94 ms	4.86 kbit/s
	8.27 ms	2.90 kbit/s
four words per cycle via the PCP channel	3.27 ms	17.13 kbit/s
	4.94 ms	11.34 kbit/s
	8.27 ms	6.77 kbit/s

Note: The more words that are transferred together during a cycle, the more efficient the communication. SyCon supports the shared transfer of 4 words.

The 140 NOA 622 00 as INTERBUS Master

3

Overview

Introduction

This chapter describes the 140 NOA 622 00 as INTERBUS master.

What's in this Chapter?

This chapter contains the following topics:

The 140 NOA 622 00 as INTERBUS-Master

Performance

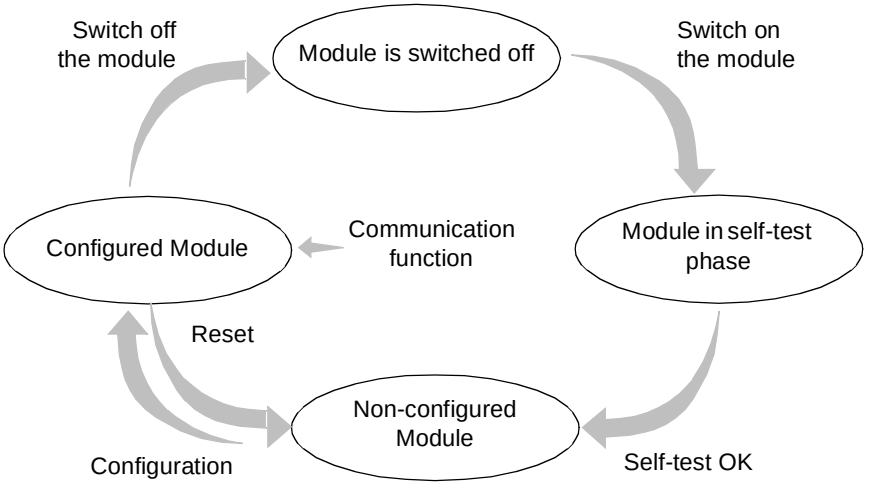
The 140 NOA 622 00 is the INTERBUS master for the TSX Quantum and has the following performance:

- Can be used with Concept Version 2.5 SR2 and up
- Support of PCP channels (Version 2.0)
  In this version, the PCP channel can be up to 4 words, which can be addressed logically or physically.
- Full compatibility with INTERBUS standards is guaranteed
- Data capacity to address up to 251 nodes
- Branch interfaces for remote bus branches can be configured
- Groups and alternative branches can be defined
- No process data preparation
- Macros and events cannot be created
- Forcing 0x/1x references on INTERBUS nodes is not possible

Note: The software package SYC SPU LF• CD28 M (SyCon) is needed to create the INTERBUS configuration.

Method of operation

The following graphic describes the how the 140 NOA 622 00 works.



Restrictions

Note: The INTERBUS coupler AS-BDEA-202 does not support INTERBUS firmware generation 4, i.e. this coupler cannot be implemented together with 140 NOA 622 00. If such a coupler exists in the INTERBUS configuration, the coupler as well as the following I/O-modules have to be replaced by suitable modules, e.g. Modicon TSX Momentum modules, in case of convertion to 140 NOA 622 00.

Data exchange

The table shows how the inputs and outputs are processed in the different operating conditions:

If	Then
INTERBUS module is in RUN mode	data is exchanged via the bus
PLC program is running	the inputs and outputs are updated
PLC program is stopped	the inputs are not updated the outputs are in error mode (i.e. they are held or set to zero).

Use as INTERBUS master

140 NOA 622 00 is an INTERBUS master for the TSX Quantum and can only be operated in the central backplane. A maximum of 251 nodes or 4096 I/O points are allowed per NOA module.
The maximum number of nodes allowed in the entire INTERBUS configuration for a Quantum SPS depends on the module type being used. For a typical module with 16 inputs and 16 outputs (e.g. 170 ADM 350 11), around 250 modules can be used in the entire condiguration.

The INTERBUS slaves are connected to the bus master 140 NOA 622 00 in Concept via the generic bus. The maximum configuration size of the Generic Bus is 64 kB for all NOA 622 modules together.
After selecting the generic bus in the I/O map, enter the start addresses for the status and activation words.
The bus and slave specific data is placed in the status area for status information and diagnostics. You enter a 3x reference here as start address for a range of 207 consecutive words.
Data to control the INTERBUS node is entered in the activation area. You enter a 4x reference here as start address for a range of 25 consecutive words.
Additional information concerning utilization of the status and activation words can be found in chapter *Diagnostics and Control via the Generic Bus, p. 68*.

The INTERBUS slaves can be assigned the following references in Concept:
- 0x/1x references
- 3x/4x references

Possible uses of the 140 NOA 622 00 depending on CPU type

Number of INTERBUS masters depending on CPU type

Note: In Modsoft / ProWorx NxT, the 140 NOA 622 00 **cannot** be operated.

Possible uses with the 140 NOA 622 00

CPU type	Concept IEC and LL984	Concept LL984	Concept IEC
140 CPU 113 02	Use of the 140 NOA 622 00 **is not** possible		
140 CPU 113 03	max. 2	max. 2	max. 2
140 CPU 213 04	max. 2	max. 2	max. 2
140 CPU 424 02	Use of the 140 NOA 622 00 **is not** possible		
140 CPU 434 12	max. 6	max. 6	-
140 CPU 534 14	max. 6	max. 6	-

Note: For pure Concept LL984 applications you cannot use PCP communication. Furthermore, only a limited Diagnosis is possible in this case.

Comparison of the INTERBUS Master Modules

Overview of the Properties

Properties of the INTERBUS master modules

	140 NOA 622 00	**140 NOA 611 10**	**140 NOA 611 00**
Physical addressing	(x)	x	x
Logical addressing	x	x	-
PCP channel	x	x	-
PCP version	2.0	1.5	-
PCP channel size	1, 2, 4 words	1 Word	-
Configuration test during commissioning	x	x	x
Software for bus configuration	SyCon	CMD Tool (INTERBUS Generation 3)	CMD Tool
Text on LED field	x	x	x
Diagnostics display (3 digits)	-	x	-
Configurable switch-off behavior	x	x	x
I/O addressing	in 0x/1x/3x/4x registers	in 3x/4x registers	in 3x/4x registers
Configurable addressing mode (IEC/984)	x	x	-
Support of remote bus branches	x	x	x
NOA slot	Central backplane	Central backplane	Central backplane
Transparent mode	-	x	-
Hot Standby support	-	-	-
Number of NOA modules in the central backplane	up to 6 (depending on CPU type, see paragraph *Number of INTERBUS masters depending on CPU type, p. 32*)	3	3

Note: If you have the 140 NOA 611 00 or the 140 NOA 611 10 and you want to replace them by the 140 NOA 622 00, contact the support center for further help. You will find a brief description in appendix *Upgrading from 140 NOA 611 x0 to 140 NOA 622 00, p. 125*.

Overview of the Software Requirements

Software requirements for use of the INTERBUS master modules

	140 NOA 622 00	**140 NOA 611 10**	**140 NOA 611 00**
NOA firmware	starting with NOA1_xx.bin (Exec Loader) or NOA1_xx.Q12 (SyCon)	starting with 2.0	starting with 1.05
ULEX version	-	starting with 2.02	starting with 2.0
Modsoft / PRoWorx	-	starting with 2.4	starting with 2.4
Concept	starting with 2.5, SR2	starting with 2.1	starting with 1.1
CMD Tool	-	starting with 1.21	starting with 1.21
SyCon	starting with 2.7xx	-	-

Accessories and Replacement Parts

4

Overview

Introduction

This chapter contains a list of accessories and replacement parts for the use of copper cables and fiber optics.

What's in this Chapter?

This chapter contains the following topics:

Accessories and Replacement Parts for Software

Software Components

Installing Accessories and Replacement Parts

Term	Order no.
Sycon (configuration software, assignment for Schneider Automation)	SYC SPU LF• CD28M

Accessories and Replacement Parts for Copper Lines

Components for copper lines

List of accessories and replacement parts

Term	Order no.
Programming cable for 140 NOA 622 00, 3.7 m (Modbus cable)	990 NAA 263 20
INTERBUS cable, 100 cm	170 MCI 100 00
Remote bus cable 100 m	TSX IBSCA 100
Remote bus cable 400 m	TSX IBSCA 400
Remote bus cable (Meterware), LiYCY 3x2x0.25 mm^2	KAB3225LI
INTERBUS plug set, 9 pin D-SUB, plug plus socket	170 XTS 009 00
Branch interface for remote bus branch, copper cable	170 BNO 671 0x

Accessories and Replacement Parts for Fibre Optic Cable Technology

Components for Fibre Optic Technology

The following components are available for the connection with fiber optic technology:

Term	Order no.
Branch interface for remote bus branch, fibre optic cable	170 BNO 681 00
Polymer cable	PSM-LWL/KDL/O, by the meter
HCS cable	PSM-LWL/HCS/O, by the meter
Polymer plug set	PSM-SET-FSMA/4
HCS plug set	PSM-SET-FSMA/4-HCS
Polishing set	PSM-SET-FSMA-POLISH
Cable with plug	PSM-LWL/KDL/2, by the meter
Cable with HCS plug	PSM-LWL/HCS/2, by the meter
Fiber optic adapter with additional voltage supply	OPTOSUB
Fiber optic adapter without additional voltage supply	OPTOSUB PLUS

Note: Supplier for the fiber optic accessories:
Phoenix Contact GmbH & Co;
Homepage: **http://www.phoenixcontact.com**

Module descriptions

II

Overview

What will you find in this section?

In this section, you will find the module description for the communication module.

What's in this Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
5	140 NOA 622 00: Communication Module for INTERBUS	41

140 NOA 622 00: Communication Module for INTERBUS

5

Overview

Introduction

This chapter describes the communication module 140 NOA 622 00.

What's in this Chapter?

This chapter contains the following topics:

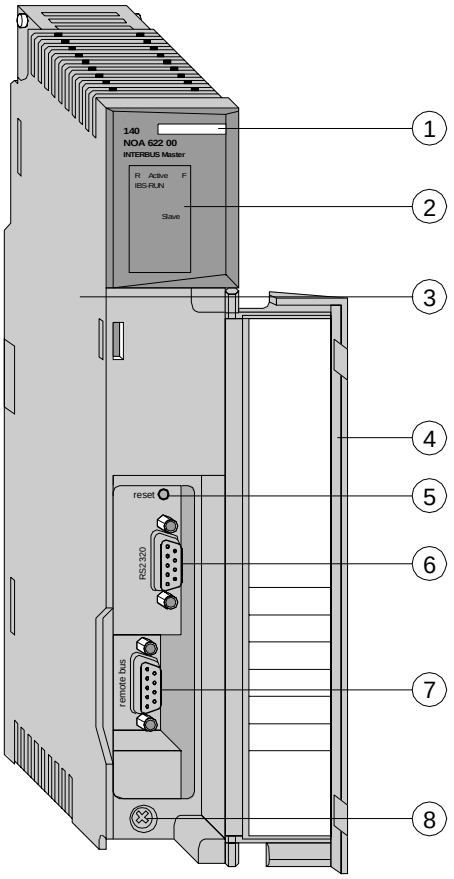
Brief description

Features

The NOA 622 00 is the INTERBUS master and is used to couple this bus to the automation device Modicon TSX Quantum.
The module is compatible to the performance of the INTERBUS Generation 4.

Front View of the Module

Front view with location of the operating elements



1 Color code

2 Display field (LEDs)

3 Standard housing

4 Removable cover

5 Reset button

6 RS 232 C interface

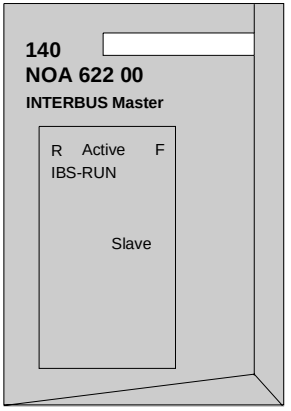
7 INTERBUS interface

8 Module screws

Description of the Operating and Display Elements (LEDs)

View of the Display

Representation of the display



Meaning of the LEDs

Meaning of LEDs

LED	Color	Status	Meaning
R	green	On	Ready. The switch-on routine was completed successfully. The firmware is running correctly and the module is ready for operations. RAM and checksum are ok.
		Flashing	No firmware, or firmware is being loaded.
		Off	Module error.
Active	green	On	The communication with the TSX Quantum CPU is active.
F	red	On	Fault. An error occurred on the INTERBUS and at least one node was switched off intentionally.
IB-S Run	green	On	The INTERBUS is functioning, normal data transfer.
		Flashing cyclically	The INTERBUS is ready.
		No cyclic flashing	No INTERBUS configuration. (error message)
Slave	red	On	An INTERBUS node is indicating a module error.

Reset button

Pressing the reset button causes a total reset on the 140 NOA 622 00:

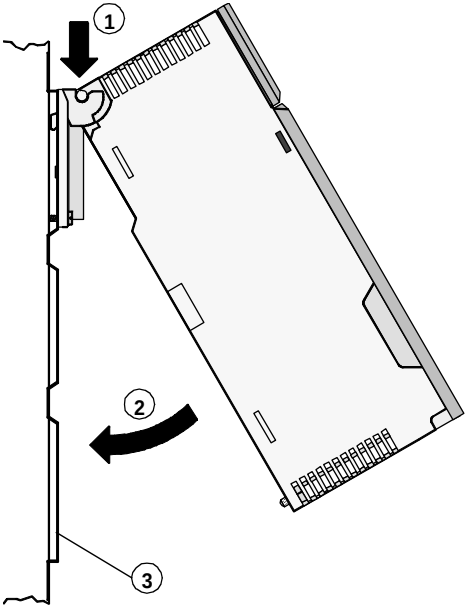
- The bus is reinitialized.
- The bus configuration is reloaded from the CPU to the NOA.

Configuration

Mounting Location in the Backplane

Mount the module in any slot on the TSX Quantum central rack and screw it to the backplane. The module must be screwed into position to ensure correct operation (EMC).

Mounting the Module



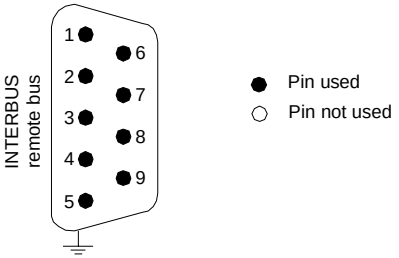
1 Insert the module

2 Screw the module to the backplane

3 Backplane

Connection to INTERBUS

Remote bus cable connection to the interface labeled "remote bus".

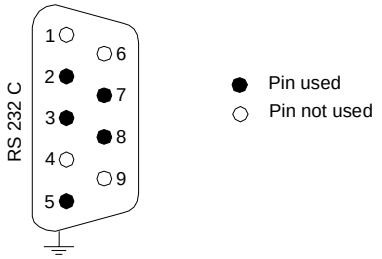


Assignments for "remote bus" interface

Socket	Signal	Meaning
1	DO	Data, direction of transmission (+), (Data Out)
2	DI	Data, direction of reception (+), (Data In)
3	COM	Reference conductor, isolated (Signal Ground, insulated)
4	GND	Reference conductor for fiber optics interface, grouped potential (Signal Ground, not insulated)
5	VCCI	Supply voltage for fiber optics interface: 5 V, isolated
6	$\overline{\text{DO}}$	Transmit negated data (Data Out negated)
7	$\overline{\text{DI}}$	Receive negated data (Data In negated)
8	VCC	Auxiliary supply for fiber optics interface: 5 V, grouped potential **Note:** Only for connecting OPTOSUB.
9	RBST	RBST coupling (Bridge)

Connection of the RS 232C interface

To connect the RS 232C interface use the data cable 990 NAA 263 20 (Length: 3 m).



Assignments for "remote bus" interface

Socket	Signal	Meaning
2	RXD	Received Data
3	TXD	Transmitted Data
5	GND	Reference conductor (Signal Ground)
7	RTS	Switch on transmission unit (Request to Send)
8	CTS	Ready for transmission (Clear to Send)

Technical Data

Power supply

Data of the supply

Internal via Quantum bus	5 VDC, max. 0.8 A, typ. 0.7 A **Note:** When using fiber optics adapters, the power consumption increases according to the adapter used.

Data interface

Data interface data

INTERBUS	RS 485, isolated (500 VAC test voltage)
RS 232C possible line lengths	according to DIN 66 020, grouped potential 20 m shielded

Mechanical structure

Mechanical structure data

Format	Width = 40.34 mm (Standard Housing)
Mass (weight)	0.4 kg

Connection Type

Connection method data

INTERBUS	9 pin D-SUB socket
RS 232C	9 pin D-SUB socket for 990 NAA 263 x0

Environmental conditions

Environmental conditions data

System data	See Quantum User Manual
Power dissipation	Max. 4 W, typ. 3.5 W
MTBF Time (GF)	> 100 000 hours

Software

III

At a Glance

Introduction

This section describes the various possibilities regarding configuration, contol and diagnosis of an INTERBUS application with 140 NOA 622 00 as master module.

What's in this Part?

This part contains the following chapters:

Commissioning

6

At a Glance

Introduction

This chapter provides an overview of commissioning the INTERBUS configuration.

What's in this Chapter?

This chapter contains the following topics:

Principle of Commissioning

Overview

To commission an INTERBUS system, the definition of the physical environment where the application will be intigrated is needed (e.g. backplane, power supply, processor, modules or devices, etc.). Then the commissioning of the configuration with the respective software takes place.
The master configuration is made using Concept starting with version 2.5 SR2.
The configuration of the bus takes place with the help of the configuration software SyCon.

Principle of commissioning

The following table describes the individual phases of commissioning.

Phase	Software	Description
Mounting the 140 NOA 622 00	-	The module is inserted in the desired slot in the central backplane.
PLC configuration	Concept	The following entries must be made: ● Enter the NOA 622 in the I/O map ● Enter the configuration parameters for the INTERBUS master (number and slot, bus start behavior) ● Configuration of the generic bus incl. SyCon software call
Bus configuration	SyCon	The following steps must be carried out: ● Enter/read the bus configuration with the SyCon software) ● Generate the configuration file *.IB and load the file in Concept (takes place automatically when ending the SyCon software)
Assigning the signal memory	Concept	Assigning the signal memory to the INTERBUS modules
Programming	Concept	Programming ● respective user program ● respective diagnostics
Load the program and start the PLC	Concept (Online)	Load the project to the controller. Then when the conztroller is started, the INTERBUS module is configured and placed in operation.
Debugging Diagnosis	Concept / SyCon	To debug the project, Various utilities are available for control of the inputs and outputs as well as error diagnostics: ● Online diagnostics ● User diagnostics ● LED Display
Documentation	Concept (Offline or Online) SyCon	Print various information concerning the bus configuration as the project

Software Startup for using the 140 NOA 622 00

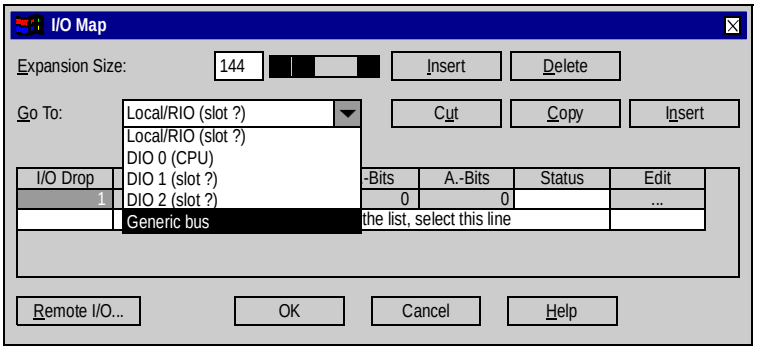
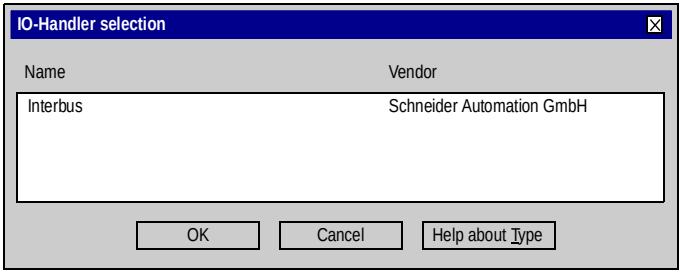
Overview

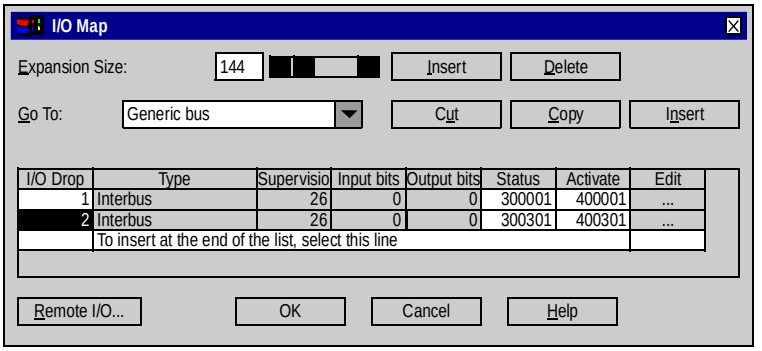
The following section provides a brief description of the steps required for the software startup of the INTERBUS master 140 NOA 622 00.
The steps are divided into the following sections:

- *Selecting INTERBUS in Concept, p. 53*
- *Evaluating the bus configuration with SyCon, p. 55*
- *Editing the bus configuration in Concept, p. 57*
- *Configuring the 140 NOA 622 00 yourself, p. 59*

Selecting INTERBUS in Concept

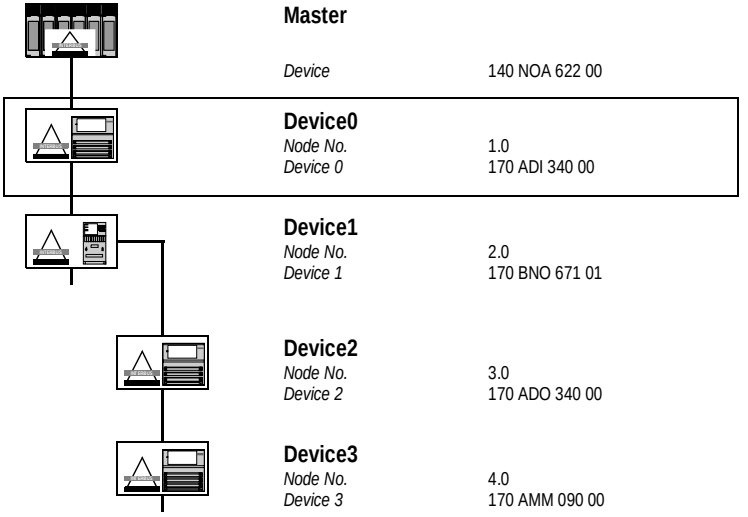
Proceed as follows to enter the INTERBUS in Concept for using the 140 NOA 622 00:

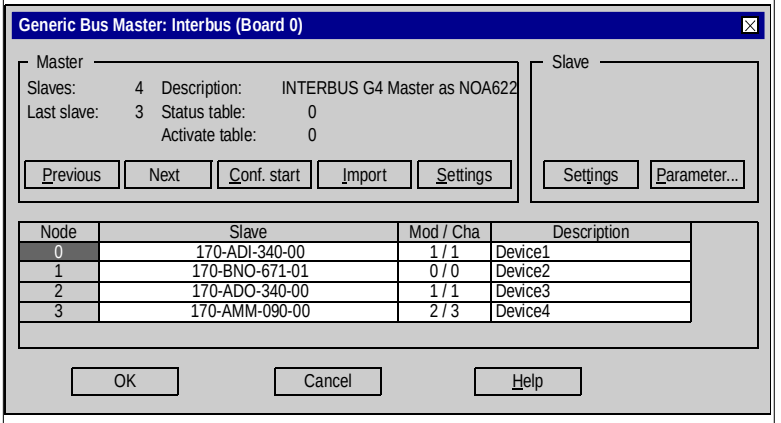
Step	Action Performed
1	Open the respective project in Concept.
2	Select **Project** → **PLC Configuration** → **I/O Map** → **Go To** the entry **Generic Bus**. 
3	Click **Insert** and enter **Interbus** in the **I/O Handler selection** dialog box. 

Step	Action Performed
4	Enter the respective references in the **Status** box and **Activate**, see also *Diagnostics and Control via the Generic Bus, p. 68* 
5	Select the desired INTERBUS and continue with **Edit...**to the dialog box **Generic Bus Master: Interbus (Board x)**
6	Choose **Launch Cfg** to start the SyCon program for bus configuration **Note:** A Bus Configuration imported using the **Import** command cannot be overwritten by a configuration that was created using **Launch Cfg**. To do this you must first delete the Interbus assignment to the generic bus and re-enter it. Since the Bus tables for the Generic Bus are created from scratch for every **Import**, you must also re-enter all address assignments in Concept when changes to the existing configuration are made.

Evaluating the bus configuration with SyCon

For evaluating the INTERBUS configuration using the SyCon bus configuration tool, proceed as follows:

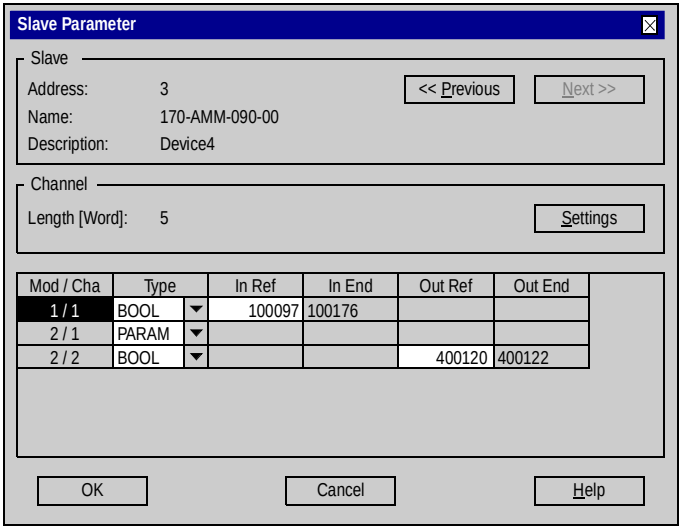
Step	Action Performed
1	There are the following possibilities for evaluating the INTERBUS configuration: ● Read the connected INTERBUS configuration using **Online** → **Automatic Network Scan** **Note**: Select the **Serial Device Driver** and assign the corresponding COM interface. Connect the NOA 622 to the PC (for the cable see *Accessories and Replacement Parts, p. 35*). ● Enter the connected INTERBUS configuration ● For converting an existing generation 4 CMD project to SyCon, see*Import CMD G4 Projects in SyCon, p. 129*. **Note**: Further information on this can be found in the SyCon online help or in the documentation provided on the SyCon CD.
2	The following figure shows a configuration in SyCon:  **Master** *Device* 140 NOA 622 00 **Device0** *Node No.* 1.0 *Device 0* 170 ADI 340 00 **Device1** *Node No.* 2.0 *Device 1* 170 BNO 671 01 **Device2** *Node No.* 3.0 *Device 2* 170 ADO 340 00 **Device3** *Node No.* 4.0 *Device 3* 170 AMM 090 00

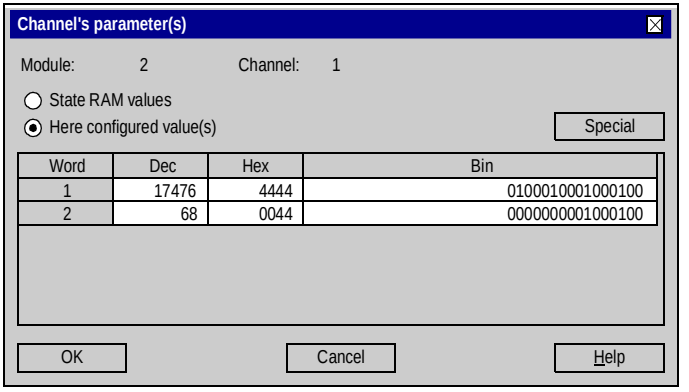
Step	Action Performed
3	Save the project and close SyCon. **Result**: The INTERBUS configuration data is accepted by Concept when SyCon is closed. The list of nodes is displayed in the dialog box **Generic Bus Master: Interbus (Board x)**.  **Note:** If Concept is **Not Connected**, a change to the Bus configuration in SyCon or a new Save in SyCon **without** changes being made, means that the Concept project is **not the same** and must be reloaded.

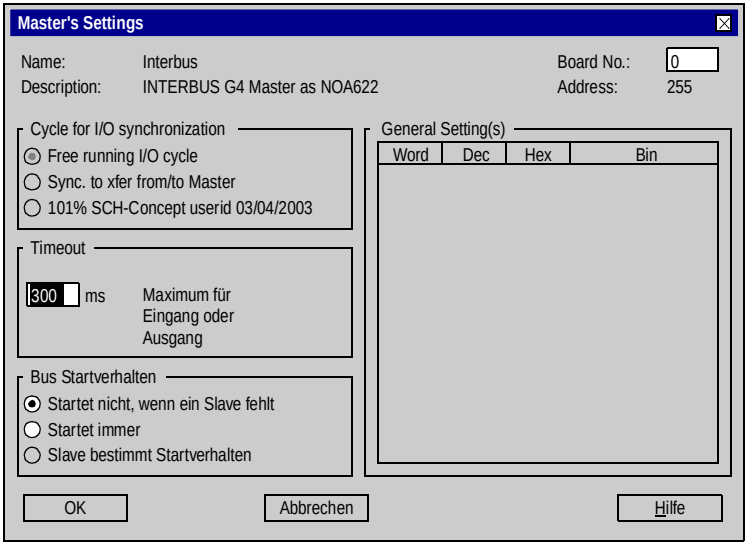
Editing the bus configuration in Concept

You must now make the following entries for the INTERBUS configuration now in Concept:

Step	Action Performed
1	In the dialog field enter **Generic Bus Master: Interbus (Board x)** for every IBS slave in **Slave** → **Parameter** State RAM addresses. You can switch between the individual slave nodes in the dialog box **Slave Parameter** using **<<Previous** and **Next>>**.
2	You can enter values for **Params** in the area **Channel** in **Settings**:

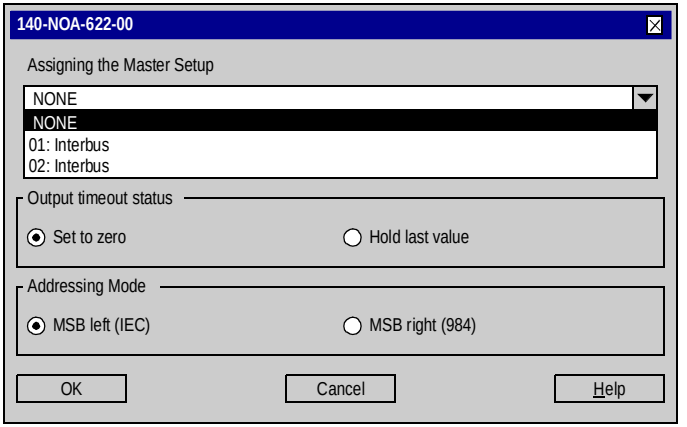




Step	Action Performed
3	Check, and if necessary make changes to the settings in **Master** under **Settings** for **Timeout** and **Bus startup behavior**.  **Note:** Note: The Timeout time selected for the NOA 622 must be larger than or equal to the CPU Watchdog Timeout to avoid an INTERBUS failure. For larger configurations or older firmware versions the CPU supervision time and the Timeout time for the NOA622 must be increased as required, so that the INTERBUS starts.
4	If you want to connect several NOA modules with further INTERBUS-configurations, repeat step 3 for each NOA (selecting the INTERBUS), table *Selecting INTERBUS in Concept, p. 53*, up to step 3, table *Editing the bus configuration in Concept, p. 57*.

Configuring the 140 NOA 622 00 yourself

Proceed as follows for entering the INTERBUS Master:

Step	Action Performed
1	Select **I/O Map** → **Go To** the entry **Local/RIO (slot?)**
2	In the I/O map for the local backplane under **Project** → **SPS configuration** → **I/O map** → **Edit....** → **Module** enter module 140 NOA 622 00.
3	Assign the respective INTERBUS to the corresponding NOA using **Params** in the **140-NOA-622-00** parameter dialog box. 
4	In the **140-NOA-622-00** parameter dialog box, set the values for the **Output Timeout Status** and the **Addressing Mode**.
5	Confirm the settings with **OK**

Shutdown and Startup Procedure of the 140 NOA 622 00

Introduction

The are different possibilities for the shutdown and startup of the 140 NOA 622 00 as well as the connected INTERBUS and its nodes:

- Switch power supply on and off (switch on routine)
- Press reset button on the NOA module (switch on routine)
- Starting and stopping the INTERBUS via the bits of the activation word (Generic Bus) (switch on/restart routine)
- Starting and stopping individual INTERBUS nodes (See *Switching INTERBUS-nodes, p. 61*) via the bits of the activation word (Generic Bus) (switch on/restart routine)

Switch off behavior of the 140 NOA 622 00

The following routines are started when switching on the NOA:

- Module Self Test
- Load the INTERBUS configuration from the CPU
- Start the INTERBUS, if a valid configuration is available on the NOA

Switch off behavior of the 140 NOA 622 00

The valences of the outputs (analog and binary) behave in accordance to the presettings in Concept when the program is stopped.
INTERBUS goes into Stop Mode in the event of a CPU or NOA breakdown, or if the NOA Timeout is smaller than the CPU Watchdog-Timerout the INTERBUS also goes into Stop mode. In this case, the valences of the outputs (analog and binary) are always set to "0".
This behavior applies to all analog and digital outputs on the INTERBUS.

	CAUTION
	**Stopping and starting the INTERBUS using the SyCon tool if the application program stops.** If the user program stops and you start the INTERBUS using the SyCon tool, all the outputs are set up "0" even if you set the shutdown procedure to **Hold last value**. If you start the INTERBUS under these conditions using the SyCon tool, the outputs take the last valid status again (status active when the program was stopped). **Failure to follow this precaution can result in injury or equipment damage.**

Parameterization in Concept

The switch off behavior must be configured in Concept. After selecting the 140 NOA 622 00 module in the I/O Map, open the respective parameter dialog using **Params**. Here you can choose between the following possibilities:

- The valences of the outputs (analog and binary) are frozen at the last valid value. or
- The valences of the outputs (analog and binary) are set to "0".

Switching INTERBUS-nodes

When the bus is in operation individual nodes, segments, groups and alternative branches can be added or switched off. The nodes to be switched are specified viaactivate word 4x+1 (See *Activate, p. 69*)in Concept.

The switching operation effects the specified nodes and all the nodes which depend on it, i.e. all INTERBUS nodes

- which belong to the same bus segment
- which belong to the same group
- which are after an activated INTERBUS node in the physical ring: If, for example, you switch off a branch interface module, always switch off all remote bus nodes which follow it, including the branch on the branch interface module.

	**CAUTION**
	INTERBUS node for the SUPI 1 generation cause errors in the switching procedures for the entire INTERBUS architecture. Nodes from the SUPI 1 generation **cannot**be used with the INTERBUS architecture, if any node of the configuration has to be switched. **Failure to follow this precaution can result in injury or equipment damage.**

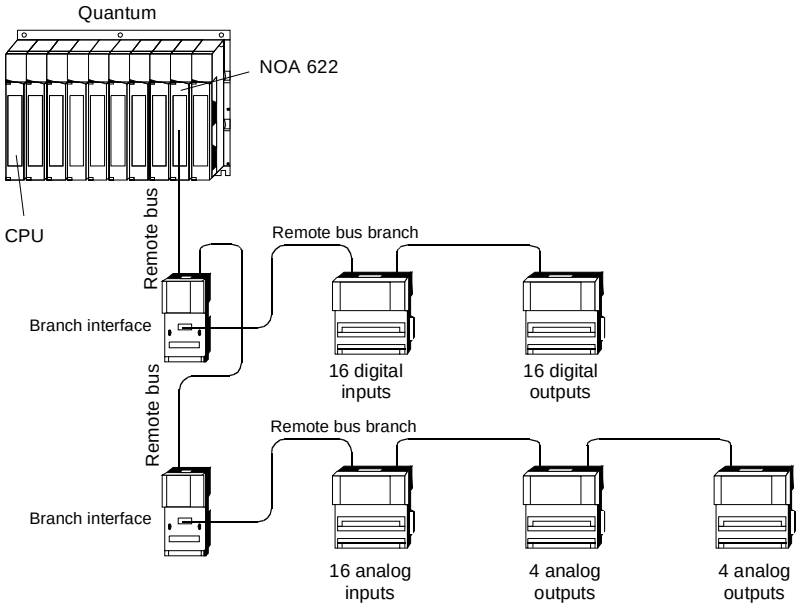
Addressing Modes of the Inputs and Outputs

Overview

In Concept, addresses for each module are assigned individually, therefore this is not really physical addressing.
Only logical addressing is used in Concept (according to the definition) because the modules are assigned to the respective registers.
Quasi-physical addressing can be achieved by only using 0x/1x or 3x/4x registers and assigning them to the bus nodes in increasing order without spaces.

Example

The following diagram provides a clear representation of addressing.



Addressing

Module with ...	**Addressing**
16 digital inputs	1x1 ... 1x16
16 digital outputs	0x1 ... 0x16
16 analog inputs	3x1 ... 3x16
4 analog outputs	4x1 ... 4x4
4 analog outputs	4x5 ... 4x8

Bit Alignment Mode (IEC/984)

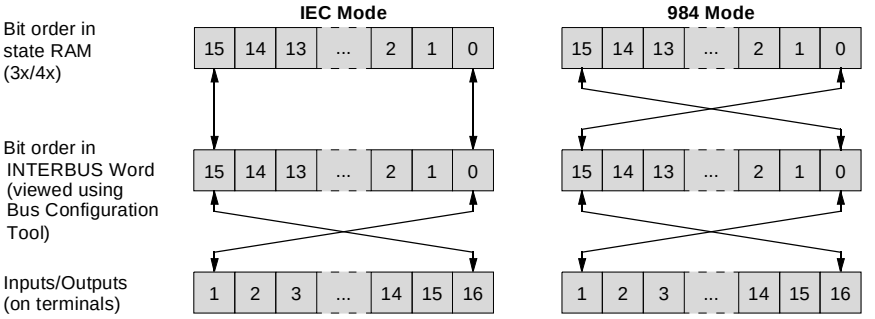
The 140 NOA 622 00 has two bit alignment modes for binary I/O modules:

- IEC Mode
- 984 Mode

Using these two modes, you can define the order of the I/O bits in the I/O words (not mirrored / mirrored). The following sections show the difference between both modes.
The bit alignment of the analog I/O modules remains the same in both modes.
To select the bit alignment mode in Concept, open the parameter dialog box for the NOA module.
Additionally, there is also the difference in data mapping when using 0x/1x or 3x/4x registers.

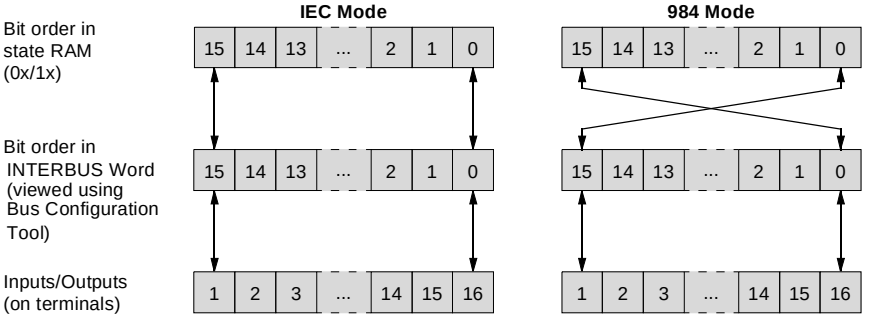
Binary 16 Bit I/O Modules (in 3x/4x Range)

The addressing of binary 16 bit I/O modules takes place according to the following scheme:



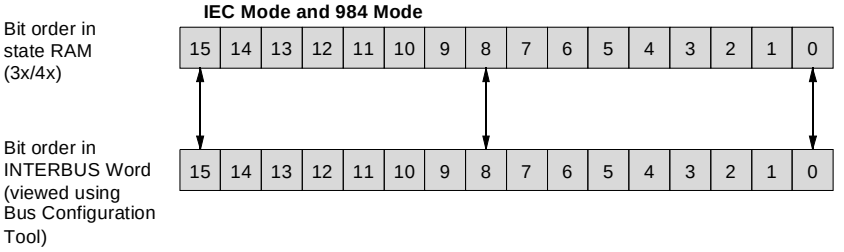
Binary 16 Bit I/O Modules (in 0x/1x Range)

The addressing of binary 16 bit I/O modules takes place according to the following scheme:



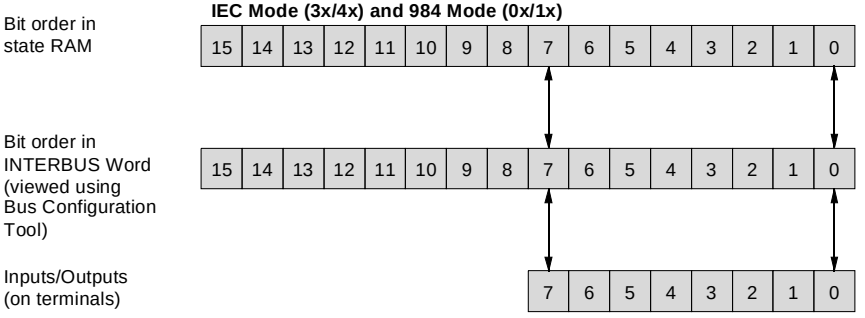
Analog I/O Modules (in 0x/1x and 3x/4x Range)

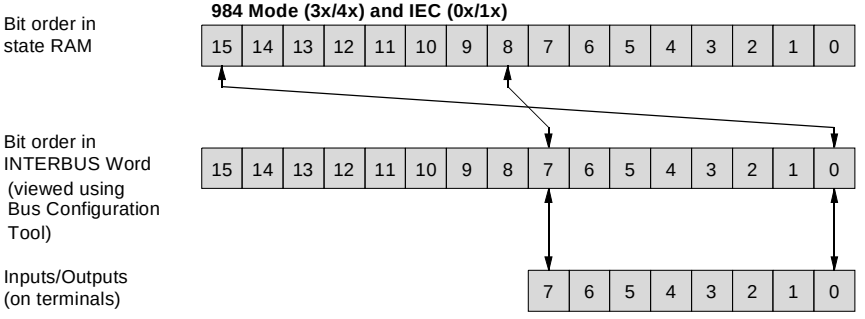
The addressing of analog I/O modules takes place according to the following scheme:



Binary 8 Bit I/O Module (in 0x/1x and 3x/4x Range)

The addressing of 8 bit modules in the example for the 170 ADM 390 30 (8 outputs) takes place according to the following scheme:





Firmware for the INTERBUS Master

Update Possibilities

Updating the Firmware in the INTERBUS Master can by carried out in two ways:

- Load the updated directly from SyCon to the 140 NOA 622 00 module
  or
- Load the updated Firmware via the Quantum CPU using the EXECLoaders

Note: The NOA 622 00 is delivered with Firmware installed. The procedures described for loading new Firmware are only required if an update is being made. Further details as well as new Firmware can be supplied by the technical support on request.

Loading the Firmware directly

Loading the Firmware directly to the INTERBUS Master is carried out via the RS 232C interface on the 140 NOA 622 00 module.

Step	Action
1	The module is cionnected to the serial interface (COM) on the PC using a Modbus standard programming cable (see *Accessories and Replacement Parts, p. 35*).
2	The Firmware is transfered from the configurator SyCon using **Online** → **Firmware Download...** , follow the menu instructions. **Note**: You have to load the Firmware NOA1_xx**.Q12** (xx = Version number).

Loading the Firmware

Loading the Firmware in the INTERBUS Master is carried out via the Quantum CPU with the EXECLoader.

Notice

CAUTION

Blocking Communication with the Module.

Loading the Firmware may not be interrupted under any circumstances as it means the module can no longer be accessed via the EXECLoader. Ensure that the neither the communication connection or the power supply is broken during the load process and do not break the process using **ABORT**.

Failure to follow this precaution can result in injury or equipment damage.

Load with EXECLoader

To load the Firmware using the EXECLoader tool, carry out the following steps:

Step	Action
1	Create a cable connection between the CPU and the controller. The following options are supported: ● Modbus Plus ● TCP/IP Ethernet ● Modbus
2	Start the EXECLoader
3	Select the protocol used.
4	Enter the address and with Modbus the transfer parameters for the CPU, which are to be used for loading the NOA.
5	Select **Device Type** → **Local Head**.
6	Enter the NOA slot number in **Slot number**.
7	Select **Select Operation** → **Transfer EXEC to Device**.
8	Enter in **Filename** ,the names and directory of the NOA Firmware (NOA1_xx**.BIN**, xx = Version number)
9	Then press the **Close** to end the operation.

Configuration and Diagnostics

7

Overview

Introduction

This chapter describes configuration and diagnostics.

What's in this Chapter?

This chapter contains the following topics:

Diagnostics and Control via the Generic Bus

What diagnostic and control possibilities exist?

The INTERBUS slaves are connected to the bus master 140 NOA 622 00 in Concept via the generic bus. After selecting the generic bus in the I/O map, enter the start addresses for the Status and Activation words.
Data for bus status and diagnostics is acquired in the status area; data used to control the INTERBUS nodes is stored in the activation area.

Note: A node can be
- an individual node / segment
- a group
- an alternative branch

Status

The bus and slave specific data is placed in this area for status information and diagnostics. You enter a 3x reference here as start address for a range of 207 consecutive words.
Overview of the status words

Word	Significance
3x	Error Status (See *Word 3x, p. 71*)
3x + 1	Global status (See *Word 3x +1 to word 3x +8, p. 71*)
...	
3x + 8	
3x + 9	Health status (See *Word 3x +9 to word 3x +24, p. 74*) of the individual slaves
...	
3x + 24	
3x + 25	Diagnostics status (See *Word 3x +25 to word 3x +40, p. 75*) of the individual slaves
...	
3x + 40	
3x + 41	Reserved
...	
3x + 206	

A detailed description of the individual areas can be found in section *Details about the Status Words, p. 71*

Activate

Data to control the slave is entered in this area. You enter a 4x reference here as the start address for a range of 25 consecutive words.
Overview of the "activation" words

Word	Significance
4x	Control activities (See *Word 4x, p. 70*)
4x + 1	Node no.(from Concept) of the node for which activity entered in word 4x should be carried out. Area: 0 ... 250
4x + 2	Reserved
...	
4x + 24	

Note: If you add your INTERBUS configuration to Concept using the command **Import**, the bus table for the generic bus is completely recreated, i.e. the "activation" area is deleted (assignment to INTERBUS and content of the words).

Word 4x

The bits of word 4x have the following meaning:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bit Word 4x (hex)	**Significance**
0... 7 -	Reserved
8 100	1 = Start INTERBUS
9 200	1 = Stop INTERBUS
10 400	1 = disconnect the node specified in 4x + 1
11 800	1 = connect the node specified in 4x + 1
12 ... 15 -	Reserved

CAUTION

Setting the bits at the same time can lead to erroneous behavior

The control bits in word 4x may only be set **individually**, as the functions cannot be uniquely mapped for bits which are set concurrently.

Failure to follow this precaution can result in injury or equipment damage.

Details about the Status Words

Overview

The following section provides detailed information about the Generic Bus status words.

Word 3x

The bits of word 1 have the following meaning: :

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bit	Function	Significance
0	ASH	0 = all configured slaves are OK 1 = at least one configured slave has failed
1	LIC	Toggles with each successful data transfer. Remains 0 or 1 in the event of an error.
2	BDP	0 = There is no diagnosis message 1 = at least one slave returns an error
3 - 15	-	Reserved

Word 3x +1 to word 3x +8

This range contains global status data:

Word	Significance	
3x + 1	Global communication errors (See *Details about word 3x + 1, p. 72*)	
3x + 2	Low Byte	Number of the faulty nodes (from Concept: 0 to 250 = Slave, 255 = Master)
	High Byte	Error number, see section*Error numbers for the Master, p. 76* or *Error numbers for the slaves, p. 77*.
3x + 3	Number of faulty data cycles	
3x + 4	Number of Bus re-initializations	
3x + 5	Communication Collective Error (See *Details about word 3x + 5, p. 73*)	
3x + 6 to 3x + 8	Reserved	

Details about word 3x + 1

The bits of these words have the following meaning:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bit	Function	Significance	
0	CTRL	Control Error Configuration or runtime error	
1	ACLR	Auto Clear Error Communication with the slave is stopped, Auto Clear End State achieved	
2	NEXC	Non-exchange Error Communication with at least one slave is faulty; no process data can be exchanged with it.	
3	PRHL	Peripheral error A short circuit has occurred at a minimum of one slave or there is no voltage supply present.	
4	EVE	Event Notification At least one faulty process data cycle has been detected, or the bus has been restarted	
5	NRDY	Host Not Ready Notification 1 = INTERBUS communication is not possible. 0 = INTERBUS communication is ok.	
6	I1ERR	Outgoing Interface 1 Error Runtime error in local or installation bus, after an INTERBUS ID-Scan.	
7	I2ERR	Outgoing Interface 2 Error Runtime error in remote bus after an INTERBUS ID Scan.	
8 - 15		Master status:	
		00 hex 40 hex 80 hex c0 hex	OFFLine STOP Clear Operate

Details about word 3x + 5

The bits of these words have the following meaning:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bit	Function	Significance
0	WARN	Quality Warning Increased number of faulty data cycles detected within a defined time period.
1	MWARN	MAU (Medium Acces Unit) WARNING When using at least one Slave with a fibre optic connection, the last control stage of the optical diode is reached to guarantee error free INTERBUS transfer. **Note:** This bit is set independently of the transfer medium (copper wire or LWL), if the INTERBUS node belongs to different SUPI generations, i.e. if a SUPI 3 (OPC) INTERBUS node comes after a SUPI 2 node. In this instance the bit has no meaning.
2	MFAIL	MAU (Medium Access Unit) FAIL At least one Slave has reported a hardware error in the INTERBUS wiring.
3	PUE	POWER-UP-EVENT (for SUPI 3 INTERBUS node only) A voltage dip was discovered at a Slave during the runtime.
4 - 15		Reserved

Word 3x +9 to word 3x +24

The Health-Status of the up to 251 configured slaves is registered in these 16 words as follows:

Word	Slave - address
3x+ 9	0 ...15
3x + 10	16 ... 31
3x + 11	32 ... 47
...	...
3x + 23	224 ... 239
3x + 24	240 ... 250

Assignment of the slave addresses to the bits:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Word	3x +9	3x + 10	3x + 11	...	3x + 23	3x + 24
Bit	Slave Address					
0	0	16	32	...	224	240
1	1	17	33		225	241
2	2	18	34		226	242
3	3	19	35		227	243
4	4	20	36		228	244
...	...	...	...		...	...
10	10	26	42		234	250
11	11	27	43		235	-
...	...	...	...		...	...
14	14	30	46		238	-
15	15	31	47		239	-

Bit 0 ... 15 = 0: corresponding module does not run error free
Bit 0 ... 15 = 1: corresponding module runs error free

Word 3x +25 to word 3x +40

The diagnosis status of the configured slaves (up to 251) is registered in these 16 words as follows:

Word	Slave address
3x+ 25	0 ...15
3x + 26	16 ... 31
3x + 27	32 ... 47
...	...
3x + 39	224 ... 239
3x + 40	240 ... 250

Assignment of the slave addresses to the bits:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Word	3x + 25	3x + 26	3x + 27	...	3x + 39	3x + 40
Bit	Slave address					
0	0	16	32	...	224	240
1	1	17	33		225	241
2	2	18	34		226	242
3	3	19	35		227	243
4	4	20	36		228	244
...	...	...	...		...	...
10	10	26	42		234	250
11	11	27	43		235	-
...	...	...	...		...	...
14	14	30	46		238	-
15	15	31	47		239	-

Bit 0 ... 15 = 0: there is no diagnosis message for the corresponding module
Bit 0 ... 15 = 1: there is a diagnosis message for the corresponding module

Error numbers for the Master

The following tables shows the error numbers for the Master (Highbyte from 3x+2 = 255)

Error number		Description
dec	**hex**	
0	0	No error
52	34	Unknown process data handshake
56	38	No configuration found.
57	39	The INTERBUS processor chip is defective or does not answer.
101	65	The configured ID or length codes do not match the connected configuration.
102	66	There are too many slaves connected to the master.
103	67	The configuration was changed during the ID scan. This was caused by an interruption to the ID scan as a result of a non-diagnosed network error.
104	68	Faulty setup of the current network configuration after a main ID scan
105	69	Interruption of the ID scan cycle due to a non-diagnosed network error, caused by an installation error or a defective slave
106	6A	A previously scanned slave is missing during the next ID scan cycle.
107	6B	Configuration was changed during runtime, a running slave is no longer answering.
108	6C	No connection to INTERBUS. Interruption between the master and the first remote bus nodes in the network.
120	78	The configuration of the local bus is not permitted.
121	79	An invalid group or branch has been configured.
122	7A	A branch number is defined for the slave, but no group number is defined.
220	DC	The CPU watchdog is faulty, this triggers a runtime error/timeout.
224	E0	Error in the INTERBUS processor communication

Error numbers for the slaves

The following tables show the error numbers for the slaves (Highbyte from 3x+2 < 255)

Error number		Description
dec	**hex**	
0	0	No error
INTERBUS network specific error numbers		
30	1E	A slave was not found in the last network scan cycle.
31	1F	A slave returns a different ID code than that given in the configuration.
32	20	The slave returns a different length code than that given in the configuration.
33	21	Further, non-configured slaves discovered at the interface to the remote bus, local bus or installation bus branch.
34	22	Further, non-configured slaves detected at the interface to the remote bus.
36	24	A slave reports a peripheral error.
40	28	Faulty interface to the remote bus, local bus or installation bus branch
41	29	Faulty interface to the remote bus
42	2A	Slave reports a false ID and length code during the last network scan cycle.
46	2E	Communication with this slave is stopped.
Configuration error in the event of a download from SyCon		
70	46	An address is occupied twice in the configuration.
71	47	Length of the data set for a slave is wrong
72	48	Length of the process data configuration is wrong
73	49	Length of the additional table is wrong
74	4A	Length of the PCP data is wrong
75	4B	Size of the entire data set is inconsistent.
76	4C	Additional table not consistent.
77	4D	Maximum number of output process data offsets exceeded.
78	4E	Maximum number of input process data offsets exceeded.
79	4F	Maximum number of offset addresses exceeded (> 255).
80	50	Number of slaves different compared to offset.
81	51	The number of output modules does not equal the number of output offsets.
82	52	The number of input modules does not equal the number of input offsets.
83	53	The actual output length is not equal to the configured module length.

Error number		Description
dec	**hex**	
84	54	The actual input length is not equal to the configured module length.
85	55	Overlapping output data configured.
86	56	Overlapping input data configured.
87	57	An output module has also been assigned inputs.
88	58	An input module has also been assigned outputs.
89	59	The output module is defined as an input module.
90	5A	The input module is defined as an output module.
91	5B	The slave was configured in an invalid installation level.
92	5C	The configured ID code is not supported by the slave.

Using the PCP Channel

8

Overview

Introduction

This chapter describes how to use the PCP channel.

What's in this Chapter?

This chapter contains the following topics:

the PCP channel with the 140 NOA 622 00

How do you use the PCP channel?

Communication via the PCP channel (Peripheral Communication Protocol) is enabled by EFB's from Concept. Using PCP communication with Concept LL984 programming is not possible.
The following modules are available:

Name	Description
IBS_READ	This module reads data into the state RAM of the PLC from a PCP slave connected via the INTERBUS.
IBS_WRITE	This module writes data from the status RAM of the PLC to a PCP slave connected via the INTERBUS.
IBS_SEND_REQ	This module requests data from the specified INTERBUS master and stores it in the PLC state RAM.

Configuration limits for the PCP channel

A NOA 622 00 can serve up to 62 PCP nodes.
The standard buffer length for PCP modules is 64 Bytes. If your PCP module requires a large buffer length you must set this in the SyCon tool. The maximum length is 246 Bytes (the same as the largest value that can be set here).

Addressing the PCP Node

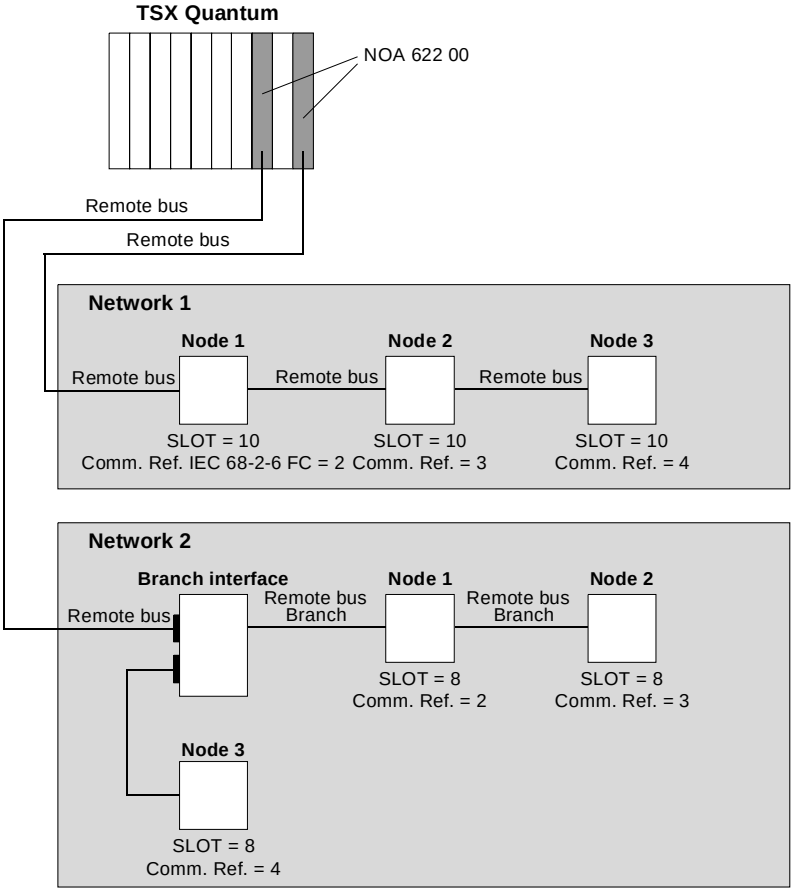
A communications reference (CR) and the NOA slot number is required to set the address for a PCP node. All PCP nodes can be given unique addresses using these two parameters.

parameters	Description
Communication reference (CR)	The communication reference (CR) is a continuous number and is entered in the EFB as the parameter CR. CR is a value between 2 and 62 and is set automatically by SyCon during the bus configuration. It starts behind the NOA with 2 and increases by 1 from PCP node to PCP node. The last node on the bus has the highest number.
Slot Number	The INTERBUS network is identified through the slot number where the node is located. The slot number is entered in the EFB as the parameter SLOT

Example of Addressing a PCP Node

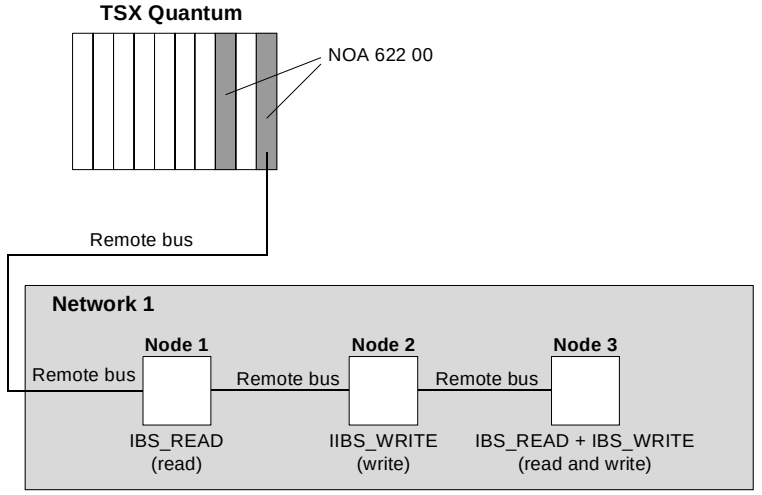
Example of Addressing a PCP Node

The following configuration consists of two INTERBUS networks that are each controlled by an NOA. The communication references (EFB parameter) run in these networks from 2 ... 4.As well as the slot number (in this example 8 and 10), the EFBs of each node can be uniquely identified.
Configurations Example



You need the EFBs IBS_READ and IBS_WRITE to receive data from your PCP module or to send data there.
We recommend configuring an EFB for each time a write or read access is made for each node.

Example Number of EFBs



Groups and Alternatives

9

Overview

Introduction

This section describes the use of groups and alternatives.

What's in this Chapter?

This chapter contains the following topics:

Groups

What are groups?

INTERBUS nodes which are functionally similar can be put together in groups. Nodes which do not directly follow each other can also be added to a group. Each node can only be added to one group. You can only add remote bus branches, local bus or peripheral bus nodes to groups.
Groups nodes and bus segments which are at a physical distance from one another can be switched on together programmatically by a command using groups.
If you shut down any node in the group, all nodes in this group and any nodes which happen to be dependant on this node will be shut down also, e.g. a local bus (peripheral bus) branch which is not assigned to the group ("branch in branch"). The same applies if a node in a group fails.

Configuring groups

Use SysCon to assign a node to a group. Enter the relevant number here in the device configuration under **Group number**.

Valid range for the group number. 1 ... 255

Within a branch all nodes must have the same group number with the exception of the branch interface module where the branch diverges. The branch interface module itself may not be assigned to a group.

CAUTION

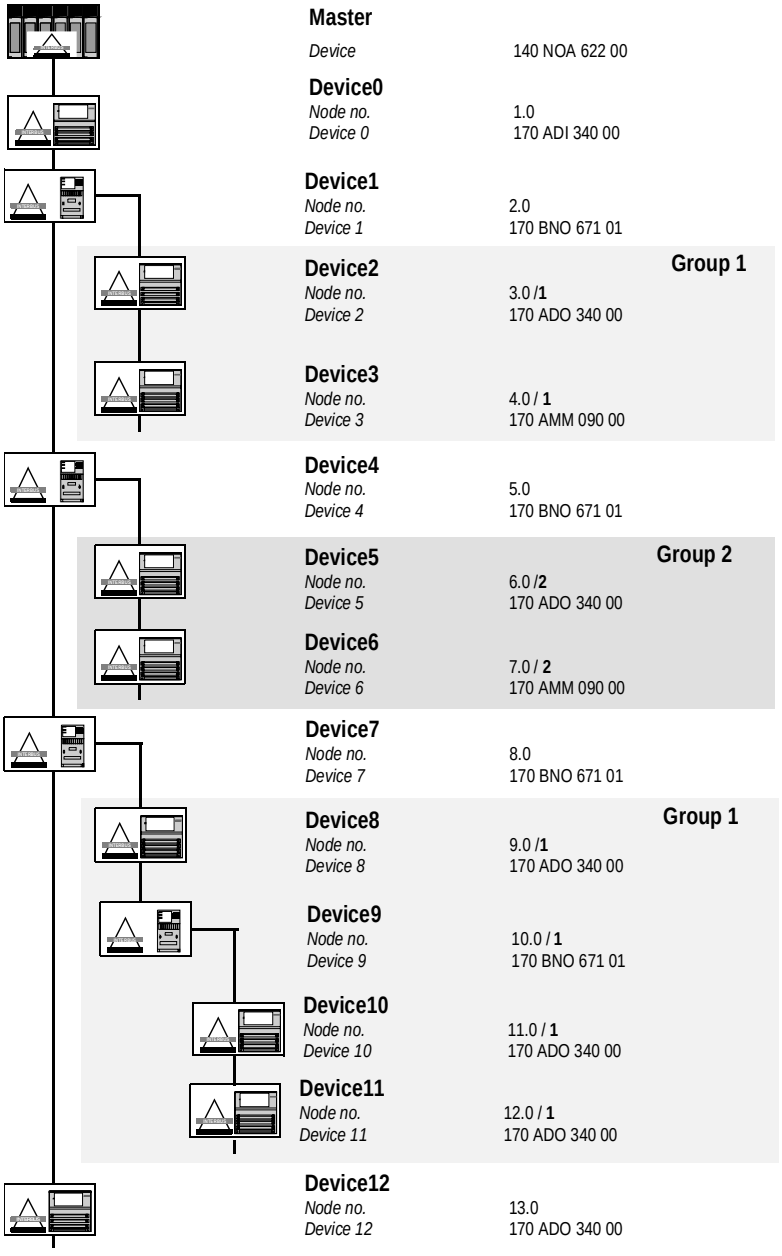
A remote bus node in the main branch of the INTERBUS architecture may not be assigned to a group.

If this node was assigned to a group **none** of the other nodes can be activated individually. Switching on an off a group via the individual nodes and via the branch interface module is also **not** possible in this case.
The configuration software does not check if the group assignment is allowed. This must be checked by the user.

Failure to follow this precaution can result in injury or equipment damage.

INTERBUS architecture with group definition

INTERBUS network with groups (Display in SyCon)



Node behavior when assigning to groups

The nodes in a group and thus the entire group can be switched on and off in Concept via the Activation word 4x (See *Activate, p. 69*)
Here you specify the individual node which should be switched on and off. If this node is assigned to a group the entire group is always switched.

Note: When switching off a remote bus node all the following nodes are switched off whether or not they are assigned to a group.
When a remote bus mode is switched on all the following nodes are switched off again. Following alternatives and groups are an exception to this. These are **not**reconnected. They must either be activated manually or the entire bus must be restarted so that all nodes are active again.

In the following table the status of the individual nodes after deactivation and then activation for some example nodes with an without group assignment are shown (see *INTERBUS architecture with group definition, p. 85*). A precondition for this is that the bus was started before a node is deactivated and all nodes are active.

Status for all nodes after deactivation and activation for some example nodes

Node number	Group	Type	Status after									
			TN 1.0		TN 4.0; Gr. 1		TN 7.0, Gr. 2		TN 8.0		TN 11.0, Gr. 1	
			Deact.	Act.	Deact.	Act.	Deact.	Act.	Deact.	Act.	Deact.	Act.
TN 1.0	-	I/O	X	J	J	J	J	J	J	J	J	J
TN 2.0	-	BK	X	J	J	J	J	J	J	J	J	J
TN 3.0	1	I/O	X	X	X	J	J	J	J	J	X	J
TN 4.0	1	I/O	X	X	X	J	J	J	J	J	X	J
TN 5.0	-	BK	X	J	J	J	J	J	J	J	J	J
TN 6.0	2	I/O	X	X	J	J	X	J	J	J	J	J
TN 7.0	2	I/O	X	X	J	J	X	J	J	J	J	J
TN 8.0	-	BK	X	J	J	J	J	J	X	J	J	J
TN 9.0	1	I/O	X	X	X	J	J	J	X	X	X	J
TN 10.0	1	BK	X	X	X	J	J	J	X	X	X	J
TN 11.0	1	I/O	X	X	X	J	J	J	X	X	X	J
12.0	1	I/O	X	X	X	J	J	J	X	X	X	J
13.0	-	I/O	X	J	J	J	J	J	X	J	J	J

TN Node number

BK Branch interface module

I/O I/O node

Deact. Node was activated

Act. Node was activated again

X Node not active (no data traffic)

J Node active (data traffic)

Alternatives

What are alternatives?

It may be necessary for an application to activate different INTERBUS configurations while a process is running via a connection point, e.g. for a serial machine with different variations. This is carried out using so-called "alternatives" or alternatively switchable groups, which make it possible for the user to connect differently structured bus segments to the same remote bus output on a branch interface module.
Using the SyCon configuration software the entire configuration with all the alternatives is stored in the power-up module. The initial alternative is selected using the application program.

Configuring alternatives

Use SysCon to assign a node to an alternative. Enter another alternative here in the device configuration under **Group number** beside the Group number
(See *Configuring groups, p. 84*).

Value range for the alternative: 1 ... 255

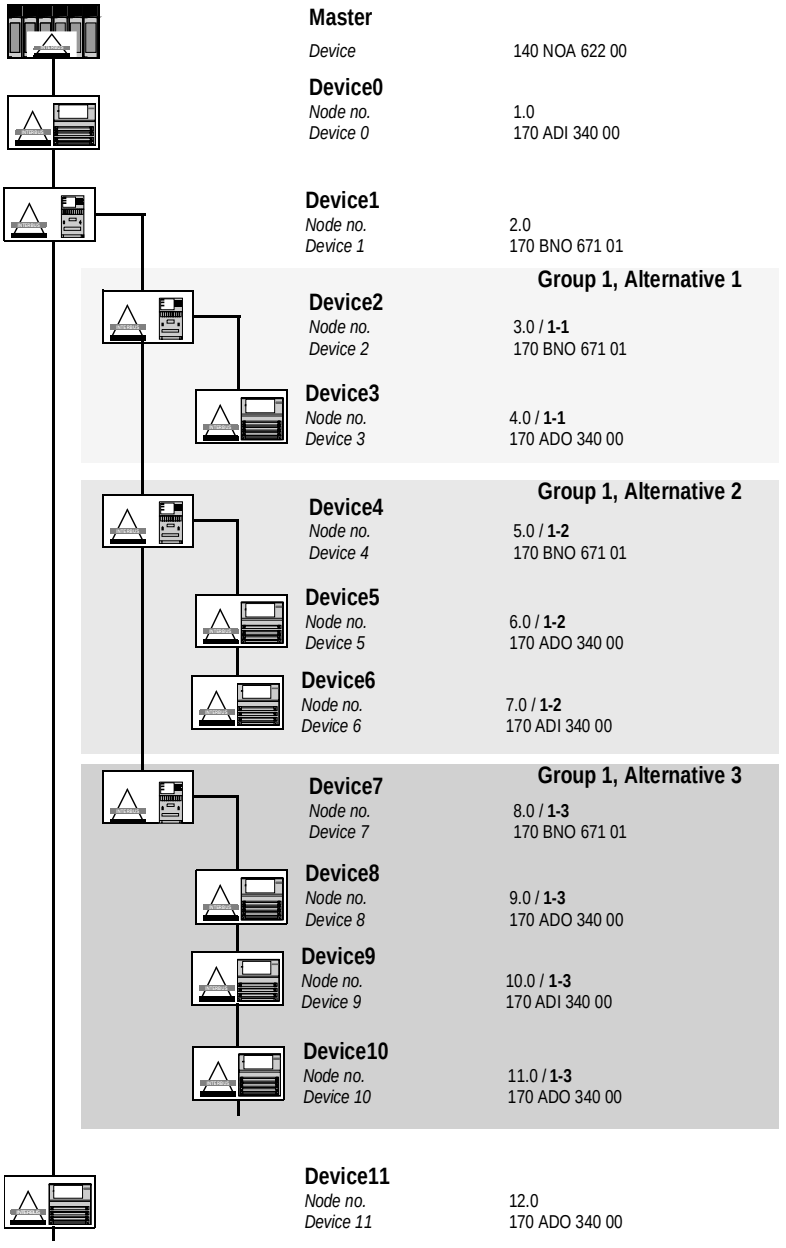
The group number and the alternative a separated by a hyphen.
Example: If a node belongs to group 3 and there it belongs to alternative 2, enter **3-2** under **Group number**.

You can only define alternative nodes within a group. Thus, they have the same group number but a different alternative number. Exactly **one** alternative for this group can be activated. No more than one alternative can even be active at the same time. The nodes in different alternatives must always have different logical nodes, i.e. one node can only ever belong to a single alternative, never to more than one.

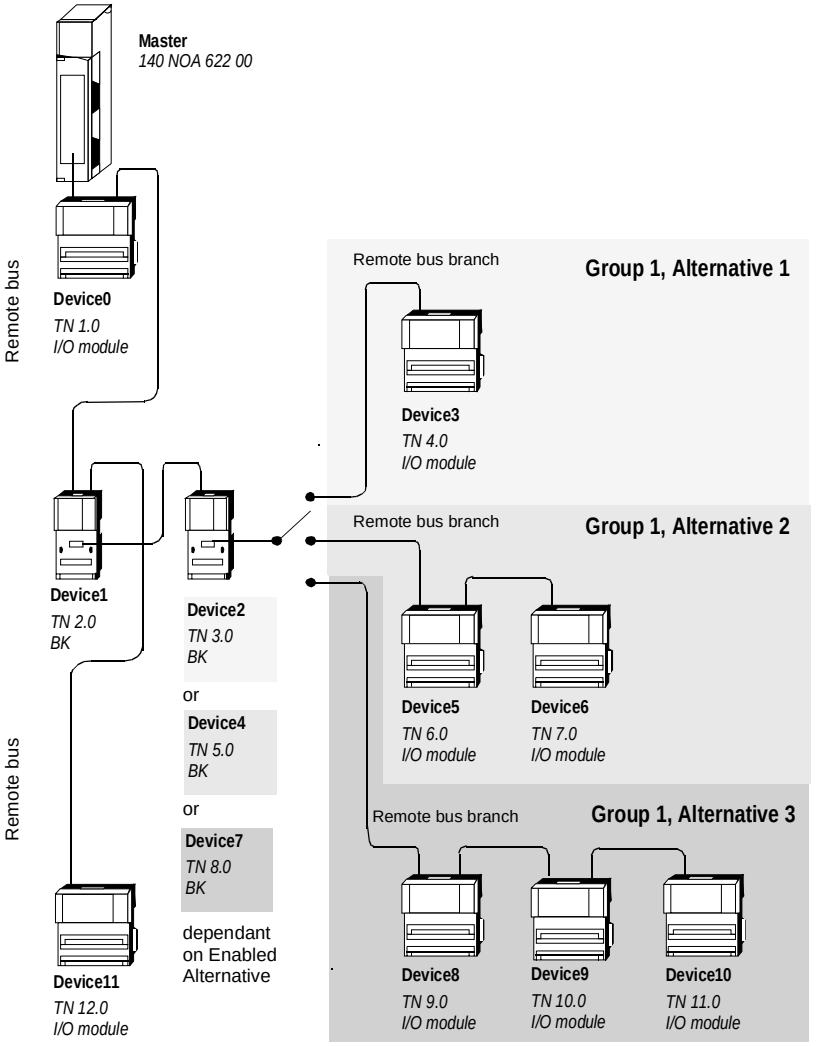
Note: An alternative group can only be connected to a remote bus node (branch interface module). Conversely, the first node in an alternative group must also be a branch interface module.
An alternative group can also be located an a deeper bus level than the main remote bus bar.

INTERBUS architecture with alternatives definition

INTERBUS network with alternatives (Display in SyCon)



Hardware configuration to INTERBUS network with alternatives
(see also display in SyCon)



TN Node number

BK Branch interface module

In the SyCon configuration every alternative in a group starts with its own branch interface module. However, in the hardware configuration there is only one other branch interface module physically available. Switching between the configured branch interface modules is carried out. for example, by connecting the individual bus line for the desired alternative to the remote bus interface for the branch interface module or via special branch interface modules.
Activation and changing between the different alternatives is configured in the application program. Before you activate an alternative here, you must make sure that this alternative is connected in the hardware.

Switching behavior for alternative groups

Note: When a bus starts **none** of the configured alternatives is active. You must explicitly specify which alternative should be started.

The nodes in alternative groups and thus the entire alternative can be switched on and off in Concept via the Activation word 4x (See *Activate, p. 69*)
Here you specify the any node from an alternative group which should be switched on and off. Then the whole alternative is always switched on.

Note: When a remote bus mode is switched off all the following nodes with and without groups and alternative assignments are switched off.
When a remote bus mode is switched on all the following nodes are switched off again. Following alternatives and groups are an exception to this, these are **not**reconnected. They must be activated manually.

EFB descriptions

IV

Overview

Introduction

The EFB descriptions are arranged in alphabetical order.

What's in this Part?

This part contains the following chapters:

IBS_READ: Reading variables via INTERBUS

10

Overview

Introduction

This chapter describes the IBS_READ block.

What's in this Chapter?

This chapter contains the following topics:

Brief Description

Function Description

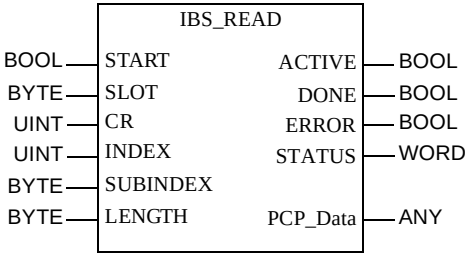
You can use this function block to read data into the status RAM of the PLC from a PCP slave connected via the INTERBUS.
Several function blocks can be configured at the same time, but of these at most 4 can be active at the same time. For these, different communication references (parameter CR) or the same communications reference with different logical addresses (parameter index, subindex) can be assigned (see *Parameter description, p. 97*). However, for all actual parameters of the individual modules different addresses must be configured.

Note: EN and ENO should not be used together with this EFB, otherwise output parameters can become fixed.

Representation

Symbol

Block representation



Parameter description

Description of parameters:

Parameter	Data type	Meaning
START	BOOL	=1: Reading the data from the specified INTERBUS PCP Slave is started. The parameter must remain "1" until the operation is completed. If the parameter remains "1" after the operation is completed, the EFB starts a new read operation in the next PLC cycle. **Note:** If the parameter is set to "0" before the end of the operation, the operation is stopped.
SLOT	BYTE	Specifies the slot address of the corresponding INTERBUS Master NOA 622 00 in the Quantum rack.
CR	UINT	Communications reference of the PCP node as defined in the configuration tool.
INDEX	UINT	Logical address of the PCP node; this address is specified in the manufacturer's documentation.
SUBINDEX	BYTE	Logical address defined for each element of the specified PCP node; this address is specified in the manufacturer's documentation.
LENGTH	BYTE	Number of bytes to be read from the PCP node.
ACTIVE	BOOL	This binary output is set to "1" as long as the read operation is being executed. It is set to "0" when the operation has successfully completed or if an error occurs.
DONE	BOOL	=1: a read operation has been terminated without error
ERROR	BOOL	=1: an error occurred during the read operation The error status can be found in the STATUS parameter.
STATUS	WORD	Specifies the error status; for further information refer to the section called *Runtime error, p. 98*. <Status> = 0: Module inactive, a read operation is being executed or a read operation has successfully completed
PCP_Data	ANY	The data read from the PCP node is stored here. Enter a variable here to define the required data type. The data itself is always stored in n consecutive 4x registers. n = LENGTH = number of bytes to be read

Runtime error

Error codes in PCP protocol

The following messages are displayed in the STATUS parameter of the EFB:

Error number		Explanation
Hex	**Dec**	
0x00	0	No error
0x41	65	ALI_INITIATE_ERR Connection could not be activated. The connection must be activated on the first request by sending an initialization telegram. If the remote bus node does not confirm the initialization, the connection cannot be activated and the request is rejected with this error.
0x43	67	ALI_REJECT_PAR_SRV Too many parallel services at a communications reference (CR)
0x45	69	ALI_REJECT_PDU_LENGTH Requested PDU length exceeds the maximum length configured
0x46	70	ALI_REJECT_SRV_NOT_SUPPORT Requested Service not supported by the Master
0x81	129	ALI_REMOTE_ERR Error in the use of the remote bus node The communications partner server has rejected the request and returned an error. Possible cause: ● Access to a non-existing object ● Data length of the sent data does not correspond to the data length of the object For more information, see *Note on error 081hex, p. 99*.
0x82	130	ALI_UNKNOWN_SERVICE Unknown function in a requested message
0x83	131	ALI_LOCAL_ERR PCP communication is not initialized or is incorrectly initialized for this slave Communication reference (CR) for this slave must be checked.
0x87	135	ALI_F_VFD_WRONG_STATE Local status does not allow a send The current configuration is not activated on the Master, please download the configuration.
0x8F	143	ALI_F_TIMEOUT Remote Bus Node does not respond in time (Timeout)

Error number		Explanation
Hex	Dec	
0x97	151	ALI_CR_INVALID Invalid communication reference (CR)
0x9B	155	ALI_UNKNOWN_SERVICE Invalid INTERBUS PCP service
F001	61441	A connection to NOA cannot be established or NOA is not available
F010	61456	PCP data not entered in the 4x register
F020	61472	incorrect data length (LENGTH) entered

Note on error 081hex

If the 081hex error message appears in the "STATUS" parameter, four further bytes with information will be transmitted to the INTERBUS connection module from the slave that has been affected.
This data will be stored in the first four bytes of the parameter PCP_Data of the module. Please refer to the documentation of the affected PCP node for the meaning of this data.

Note: To avoid unintentionally overwriting data we advise you to always configure 4 contiguous bytes here (e.g. for the PCP_Data parameter a word address for two contiguous free words or a word array with at least two elements).

IBS_SEND_REQ: Diagnostic query on the INTERBUS Master 140 NOA 622 00

11

Overview

Introduction

This chapter describes the IBS_SEND_REQ block.

What's in this Chapter?

This chapter contains the following topics:

Brief Description

Function Description

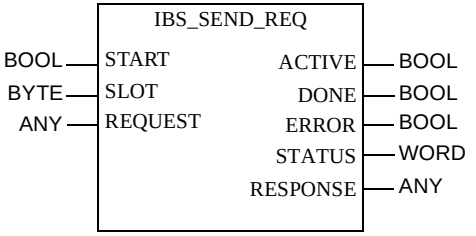
You can use this function block to request data from a specified INTERBUS Master NOA 622 00 and store it in the status RAM of the PLC.

Note: EN and ENO should not be used together with this EFB, otherwise output parameters can become fixed.

Representation

Symbol

Block representation:



Parameter Description

Block parameter description:

Parameters	Data type	Significance
START	BOOL	=1: a request operation is started, i.e. data is read from the specified INTERBUS Master 140 NOA 622 00 and stored in the state RAM on the PLC. The parameter must remain "1" until the operation is complete. If the parameter remains "1" after the operation is completed, a new request operation is started by the EFB in the following PLC cycle. **Note:** If the parameter is set to "0" before the operation is completed, the operation is cancelled.
SLOT	BYTE	Specifies the slot address of the corresponding INTERBUS Master NOA 622 00 in the Quantum backplane.
REQUEST	ANY	Enter a control block here which starts a specific request to the NOA, see section *Examples of Request/Response Blocks, p. 105* Enter a variable here to define the required data type. The data itself is always stored in n consecutive 4x registers. A minimum of 128 words must be reserved for this area.
ACTIVE	BOOL	This binary output is set to "1" as long as the operation is active. It is set to "0" when the operation has successfully completed or if an error occurs.
DONE	BOOL	=1: An operation was stopped without an error
ERROR	BOOL	=1: An error occurred during the request operation The error status can be found in the STATUS parameter.
STATUS	WORD	Specifies the error status (additional information can be found in paragraph *Runtime errors, p. 104*. <Status> = 0: Module inactive, a request operation is being executed or a request operation has successfully completed
RESPONSE	ANY	The data received from the NOA 622 00 is placed in a response block here, see section *Examples of Request/Response Blocks, p. 105* Enter a variable here to define the required data type. The data itself is always stored in consecutive 4x registers. A minimum of 128 words must be reserved for this area.

Note: Please note that the same data type always has to be used for the parameters REQUEST and RESPONSE (e.g. Bool, Word, Word, ByteArray, derived data types (see *Example of Diagnosing a PCP Node, p. 121*)...).

Runtime errors

Error numbers

The following messages are displayed in the STATUS parameter of the EFB:

Error number		Meaning
Hex	**Dec**	
1001	4097	Abort by user
2002	8194	One or more control block parameters were modified while the operation was active (this only applies to operations which require several cycles for completion). Control block parameters may only be modified in inactive operations.
2004	8196	• REQUEST not located on a 4x register • RESPONSE not located on a 4x register • No more 128 words free after the REQUEST address • No more 128 words free after the RESPONSE address
2008	8200	Unauthorized network routing path on slave
2009	8201	Routing path equivalent to their own address
5001	20481	Inconsistent response by the network
6001	24577	No response received
F001	61441	A connection to NOA cannot be established or NOA is not available
F010	61456	Data not stored in the 4x Register

Examples of Request/Response Blocks

Overview

You can use the IBS_SEND_REQ block to send the following Requests/Actions from the CPU to the NOA and INTERBUS node:

Function	Command (msg.b, msg.a)	Description
Diagnosis (See *Request/ Response Blocks for INTERBUS Diagnosis, p. 106*)	66	Request and storage of diagnosis data specified node
Configuration Changes (See *Request/Response Blocks for changing the INTERBUS configuration, p. 109*)	76	Changing the active INTERBUS configuration by enabling blocking of individually specified INTERBUS nodes during operation
Connect/disconnect Slaves (See *Request/Response blocks for connecting/ disconnecting INTERBUS nodes , p. 111*)	82	Connecting/disconnecting the specified INTERBUS node, groups or branches
Start loading	67	Starts loading parameter blocks for the INTERBUS node
End loading	69	The loading of the blocks is ended, the loaded data is enabled
Transfer of configuration parameters	68	Loading the Master bus parameters or slaves to the node
Determine Bus Configuration	75	Read the connected INTERBUS configuration

Note: The following sections contains an overview of the first three function. Further information on this subject can be found in the SyCon documentation provided on your SyCon CD.

Request/ Response Blocks for INTERBUS Diagnosis

You can determine the internal diagnosis for individual nodes using these blocks. The control block for the REQUEST parameter has the following entries:

Variable	Type	Value	Description
msg.rx	Byte	3	Receiver = IBM Task
msg.tx	Byte	16	Sender = HOST
msg.ln	Byte	8	Length of the message header = 8
msg.nr	Byte	j	Message Number (optional)
msg.a	Byte	0	No Response Number
msg.f	Byte	0	No error
msg.b	Byte	66	Operation: IBM_Device_Diag
msg.e	Byte	0	Not used.
msg.DeviceAdr	Byte	0 ... 250 (255)	Dev_Adr Node Address (from Concept)
msg.DataArea	Byte	0	Not used.
msg.DataAdr	Word	0	Not used.
msg.DataIdx	Byte	0	Not used.
msg.DataCnt	Byte	0	Not used.
msg.DataType	Byte	0	Not used.
msg.DataFnc	Byte	0	Not used.

The response block of the RESPONSE parameter has the following entries:

Variable	Type	Value	Description
msg.rx	Byte	16	Receiver = Node on the HOST
msg.tx	Byte	3	Source Node = IBM-Task
msg.ln	Byte	8+107max	Message Length
msg.nr	Byte	j	Message Number
msg.a	Byte	66	Response = IBM_Device_Diag
msg.f	Byte	0	Error Status
msg.b	Byte	0	No Operation
msg.e	Byte	0	Extensions
msg.DeviceAdr	Byte	0 ... 250 (255)	Dev_Adr Node Address (from Concept)
msg.DataArea	Byte	0	Data area, not used
msg.DataAdr	Word	0	Data address, not used
msg.DataIdx	Byte	0	Data index, not used

Variable	Type	Value	Description
msg.DataCnt	Byte	107	Data Number = Length of the diagnosis structure
msg.DataType	Byte	0	Data type, not used
msg.Function	Byte	0	Read function, not used
msg.d[0]	Byte		*Diagnosis status, p. 107*
msg.d[1]	Byte		Real_length_code
msg.d[2]	Byte		Real_ident_code
msg.d[3-4]	Word		Num_of_CRC_errors
msg.d[5]	Byte		Online_error
msg.d[6]	Byte	0 ... 100	Number of entries in the error data buffer
msg.d[7...106max]			Error data buffer, length max. 100 (50) Bytes, depends on number of entries
	Byte		*Diagnosis Error Numbers, p. 108*
	Byte		reserved, not used

Diagnosis status

The bits of the diagnosis bytes have the following meaning: :

7	6	5	4	3	2	1	0

Bit	Function	Significance
0	No_Response	Slave does not respond and is missing
1	Error_Buff_Ovfl.	Error Buffer Overflow
2	Peripheral_Fault	Slave has detected a peripheral supply error or short circuit
3	Cfg_Fault	Difference between the Device Ident or Length Code and the values configured. Check both values configured in SyCon or in the configuration loaded online
4	Reconfiguration	Slave generated a reconfiguration request
5	Interface_2_Error	Remote bus interface of the slave is faulty and triggers a Timeout. The interface is disconnected from the Master.
6	Interface_1_Error	The interface to the slave's remote bus, local bus or installation bus branch is faulty and triggers a Timeout. The interface is disconnected from the Master.
7	Deactivated	Slave is deactivated in the current configuration and is not processed. When the processing of the node is to be enabled, activate it using SyCon.

Diagnosis Error Numbers

Error numbers

Error numbers		Description
Hex	**Dec**	
0	0	no error
1E	30	A slave was not found in the last network scan cycle.
1F	31	A slave returns a different ID code than that given in the configuration.
20	32	A slave returns a different length code than that given in the configuration.
21	33	More non-configured slaves detected at the interface to the remote bus, local bus or installation bus branch.
22	34	Further, non-configured slaves detected at the interface to the remote bus.
23	35	A slave was not found in the last network scan cycle.
24	36	A slave returns a peripheral error
25	37	A slave returns a configuration request
26	38	A slave has detected a Checksum Error during data transfer
28	40	Faulty interface to the remote bus, local bus or installation bus branch
29	41	Faulty interface to the remote bus
2A	42	Slave reports a false ID and length code during the last network scan cycle.
2B	43	Slave missing because of broken INTERBUS connection during runtime
2C	44	Connection to this slave lost because of a faulty network connection in the local bus branch
2D	45	This slave was the last one that could be contacted by the INTERBUS scan in the last network scan cycle carried out during runtime
2E	46	Communication with this slave is stopped

Request/ Response Blocks for changing the INTERBUS configuration

You can use this block to change the active configuration of the connected INTERBUS by enabling or blocking individual nodes.
The control block for the REQUEST parameter has the following entries:

Variable	type	Value	Description
msg.rx	Byte	3	Receiver = IBM-Task
msg.tx	Byte	16	Source Node = HOST
msg.ln	Byte	x	Number of the active slaves 1 ...251 max.
msg.nr	Byte	j	Message Number (optional)
msg.a	Byte	0	No Response Number
msg.f	Byte	0	No error
msg.b	Byte	76	Operation: IBM_Set_Configuration
msg.e	Byte	0	Not used.
msg.d[0]	Byte	1 0	Slave Device 1 enabled Slave Device 1 blocked
msg.d[1]	Byte	1 0	Slave Device 2 enabled Slave Device 2 blocked
-	-	-	-
msg.d[x-1]	Byte	1 0	Slave Device x enabled Slave Device x blocked

The response block for the REQUEST parameter has the following entries:

Variable	type	Value	Description
msg.rx	Byte	16	Receiver = Node on the HOST
msg.tx	Byte	3	Source Node = IBM-Task
msg.ln	Byte	x	Message Length
msg.nr	Byte	j	Message Number
msg.a	Byte	76	Response = IBM_Set_Configuration
msg.f	Byte		Error status, see *Change error numbers configuration, p. 110*
msg.b	Byte	0	No Operation
msg.e	Byte	0	Not used.

Change error numbers configuration

Error number

Error number		Description
hex	**dec**	**Description**
0	0	no error
65	101	An active slave reports a false ID or length code or is missing
67	103	The configuration was changed during the ID scan
68	104	More slaves than expected were detected in a branch
69	105	Timeout when opening an INTERBUS branch
6B	107	Configuration was changed during the runtime, a running slave no longer responds
9A	154	The following error are triggered: ● msg.ln and the number of slaves configured does not match or ● not all local bus nodes in the local bus are blocked or ● following remote bus nodes are not blocked

Request/ Response blocks for connecting/ disconnecting INTERBUS nodes

You can use these blocks to connect or disconnect INTERBUS nodes, groups or branches.
The response block for the REQUEST parameter has the following entries:

Variable	type	Value	Description
msg.rx	Byte	3	Receiver = IBM-Task
msg.tx	Byte	16	Source Node = HOST
msg.ln	Byte	x	Number of the affected slaves 1 ... 251)
msg.nr	Byte	j	Message Number (optional)
msg.a	Byte	0	No Response Number
msg.f	Byte	0	No error
msg.b	Byte	82	Operation: IBM_Control_Active_Configuration
msg.e	Byte	0	Not used.
msg.d[0]	Byte	0, 1	bSwitch_Code 0 = disconnect the specified slave 1 = connect the specified slave
msg.d[1]	Byte	0 ... 250	first slave number (Number is equivalent to Device in Concept)
...	...	...	...
msg.d[x]	Byte	0 ... 250	x. slave number

The response block for the REQUEST parameter has the following entries:

Variable	type	Value	Description
msg.rx	Byte	16	Receiver = Node on the HOST
msg.tx	Byte	3	Source Node = IBM-Task
msg.ln	Byte	x	Message Length
msg.nr	Byte	j	Message Number
msg.a	Byte	82	Response = IBM_Control_Active_Configuration
msg.f	Byte		Error status, see *Connect/Disconnect Error Numbers, p. 112*
msg.b	Byte	0	No Operation
msg.e	Byte	0	Not used.

Connect/ Disconnect Error Numbers

Error numbers (msg.f)

Error number		Description
hex	**dec**	**Description**
0	0	no error
65	101	An active slave reports a false ID or length code or is missing
67	103	The configuration was changed during the ID scan
68	104	More slaves than expected were detected in a branch
69	105	Timeout when opening an INTERBUS branch
6B	107	Configuration was changed during the runtime, a running slave no longer responds
6D	109	An INTERBUS slave can not be connected, because at least one of the other slaves in the configuration is disconnected.
6E	110	An alternative group cannot be activated because a second alternative is active in the same group.

IBS_WRITE: Writing variables to INTERBUS PCP nodes

12

Overview

Introduction

This chapter describes the IBS_WRITE block.

What's in this Chapter?

This chapter contains the following topics:

Brief Description

Function Description

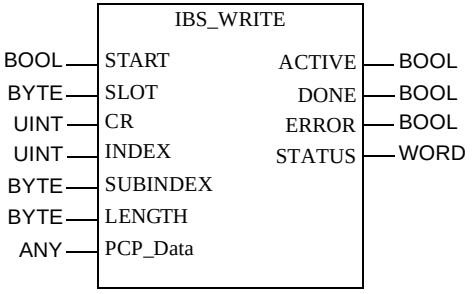
You can use this function block to write data from the status RAM of the PLC to a PCP slave connected over the INTERBUS.
Several function blocks can be configured at the same time, but of these at most 4 can be active at the same time. For these, different communication references (parameter CR) or the same communications reference with different logical addresses (parameter index, subindex) can be assigned (see *Parameter Description, p. 115*). However, for all actual parameters of the individual modules different addresses must be configured.

Note: EN and ENO should not be used together with this EFB, otherwise output parameters can become fixed.

Representation

Symbol

Block representation:



Parameter Description

Block parameter description:

parameters	Data type	Significance
START	BOOL	=1: Writing data to the specified INTERBUS PCP Slave is started. The parameter must remain "1" until the operation is complete. If the parameter remains "1" after the operation is completed, the EFB starts a new write operation in the next PLC cycle. **Note:** If the parameter is set to "0" before the operation is completed, the operation is cancelled.
SLOT	BYTE	Specifies the slot address of the corresponding INTERBUS Master NOA 622 00 in the Quantum backplane.
CR	UINT	Communications reference of the PCP node as defined in the configuration tool.
INDEX	UINT	Logical address of the PCP node; this address is specified in the manufacturer's documentation.
SUBINDEX	BYTE	Logical address defined for each element of the specified PCP node; this address is specified in the manufacturer's documentation.
LENGTH	BYTE	Number of bytes to be written to the specified PCP node.
PCP_Data	ANY	The content of this register is written to the PCP node. Enter a variable here to define the required data type. The data itself is always stored in n consecutive 4x registers. n = LENGTH = number of bytes to write
ACTIVE	BOOL	This binary output is set to "1" as long as the write operation is active. It is set to "0" when the operation has successfully completed or if an error occurs.
DONE	BOOL	=1 : a write operation has been terminated without error
ERROR	BOOL	=1: an error occurred during the write operation The error status can be found in the STATUS parameter.
STATUS	WORD	Specifies the error status; for further information refer to the section called *Runtime error, p. 98*. <Status> = 0: Module inactive, a write operation is being executed or a write operation has successfully completed

CAUTION

Overwriting input data

If the 081hex error occurs the input data for the PCP data will be overwritten by the additional information!
Before creating new modules you must make sure that the parameter PCP_Data contains the desired PCP data.

Failure to follow this precaution can result in injury or equipment damage.

Appendices

At a Glance

Introduction

The appendix contains information about Hardware, Software and upgrading possibilities.

What's in this Appendix?

The appendix contains the following chapters:

Example for diagnosis and control of a slave

A

Overview

Introduction

In this chapter you will find an example illustrating how to diagnose and control a slave.

What's in this Chapter?

This chapter contains the following topics:

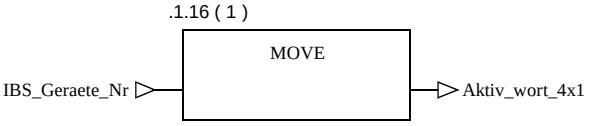
Example for control of a slave via a generic bus

Task Description

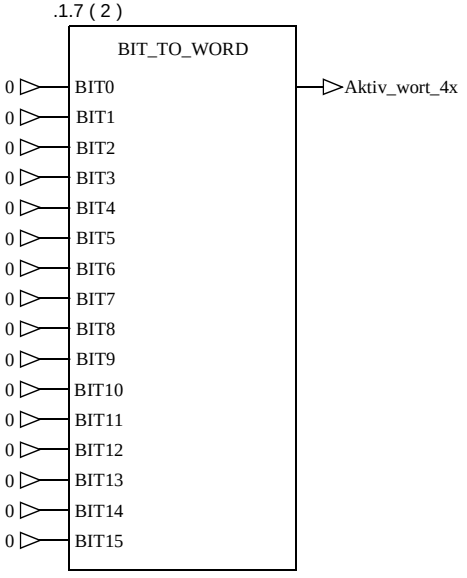
The connection by a slave to the bus master 140 NOA 622 00 via the generic bus make is possible to control a slave using as assigned activation word (See *Activate, p. 69*). By setting and resetting the individual bits you can start and stop the INTERBUS and connect and disconnect the specified node.

Possible solution

The generic bus is assigned a 4x word in the menu window **I/O Map** in the **Activate**field. With the help of the EFB the desired device address/node number (4x+1) and the controller are defined using the appropriate bits (4x).
Loading of the address of the slave node in word 4x + 1 via the variable IBS_Geraete_Nr, e.g. via the Reference Data Editor.



Input of control sequences, in this case via changes of the literals in the animated state.



Example of Diagnosing a PCP Node

Task Description

With the help of the EFBs IBS_SEND_REQ diagnosis data from a specific node address should be read. Also, data from the EFB's parameters should be prepared.

Possible solution

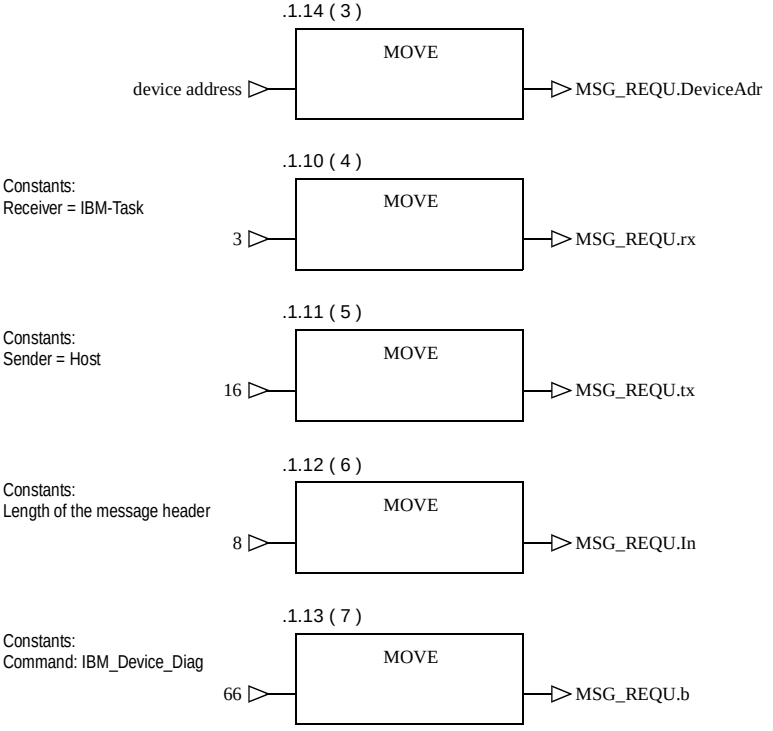
In order to make the programming more simple, a suitable derived data type (msg) must be defined. Furthermore, with the help of the EFB the desired values are loaded into the elements of the structure and started via the EFB IBS_SEND_REQ call so that the diagnosis data from the specified slave node can be read in. Information regarding the required data can be found in the block description IBS_SEND_REQ (See *IBS_SEND_REQ: Diagnostic query on the INTERBUS Master 140 NOA 622 00, p. 101*), in section *Request/Response Blocks for INTERBUS Diagnosis, p. 106* and in the SyCon documentation (InterBus Master, Protocol Interface Manual, Chapter The Message Interface) on your SyCon CD.
Definition of the derived data type `msg` with the program **Concept / Concept DFB** :

```
TYPE
    msg:
     STRUCT
        rx:          Byte;   (*receiver *)
        tx:          Byte;   (*sender *)
        ln:          Byte;   (*length of the Message Header *)
        nr:          Byte;   (*number of the message *)
        a:           Byte;   (*response number*)
        f:           Byte;   (*error status *)
        b:           Byte;   (*command number *)
        e:           Byte;   (*extension *)
        DeviceAdr:   Byte;   (*node address *)
        DataArea:    Byte;   (*data area *)
        DataAdr:     Word;   (*data address *)
        DataIdx:     Byte;   (*data index *)
        DataCnt:     Byte;   (*length of diagnose structure *)
        DataType:    Byte;   (*data type *)
        Funct:       Byte;   (*function *)
        d:           Array [0 ..106] OF BYTE; (*error data
                                                 buffer *)
END_STRUCT;
END_TYPE
```

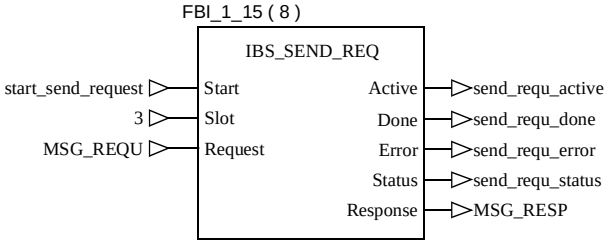
Declaration of necessary variables in **Concept** Variable Editor:

	Variable Name	**Data type**	**address**
1	device address	BYTE	
2	IBS_Geraete_Nr	WORD	400200
3	MSG_REQU	msg	400500
4	MSG_RESP	msg	400700
5	send_requ_active	BOOL	
5	send_requ_done	BOOL	
5	send_requ_error	BOOL	
5	send_requ_status	WORD	
5	start_send_request	BOOL	

Preparation of the EFBs IBS_SEND_REQ request parameter:



Call for EFBs IBS_SEND_REQ to get the diagnosis data from the desired node address:



Upgrading from 140 NOA 611 x0 to 140 NOA 622 00

B

Overview

Introduction

This chapter provides brief instructions on how to upgrade your system from 140 NOA 611 x0 to 140 NOA 622 00.

What's in this Chapter?

This chapter contains the following topics:

Requirements for changing from 140 NOA 611 x0 to 140 NOA 622 00

Overview

In principle, changing from 140 NOA 611 x0 to 140 NOA 622 00 is possible. However, project creation and the type of INTERBUS processing for the NOA 622 are different to the NOA 611x0, therefore you have to make changes in your Concept project to the I/O mapping and in the user program in addition to the hardware chan

Note: The INTERBUS coupler AS-BDEA-202 does not support INTERBUS firmware generation 4, i.e. this coupler cannot be implemented together with 140 NOA 622 00. If such a coupler exists in the INTERBUS configuration, the coupler as well as the following I/O-modules have to be replaced by suitable modules, eg. Modicon TSX Momentum modules, in case of convertion to 140 NOA 622 00.

Required components

You need the following components for the upgrade:

Term	Module Number
INTERBUS master module	140 NOA 622 00
Concept XL Version 2.5 SR2	corresponds to the desired language (see current pricelist from Schneider Electric)
Software package SyCon Version 2.8xx for bus configuration and conversion (if necessary)	SYC SPU LF• CD28 M
Programming cable for 140 NOA 622 00 (Modbus cable)	corresponds to the desired length (see chapter *Accessories and Replacement Parts, p. 35*).

Instructions for upgrading from 140 NOA 611 x0 to 140 NOA 622 00

Overview

The following sections provide brief instructions on how to upgrade hardware and the required steps to take in the software.

Hardware Upgrade

For upgrading hardware to the 140 NOA 622 00, carry out the following steps:

Step	Action Performed
1	Document the addresses configured in your current configuration
2	Stop the user program and switch off the PLC.
3	Unplug the INTERBUS connector from the 140 NOA 611x0 and remove the module from the module rack.
4	Insert the 140 NOA 622 00 in a free slot and connect the IBS cable to the corresponding connection.
5	Turn the controller on again.

Adjustments in Concept

Changes must also be made to Concept for the upgrade to 140 NOA 622 00. The following table describes the separate phases of the changes:

Phase	Description
PLC configuration	The following entries must be made: ● Configuration of the generic bus incl. SyCon software call ● Enter the configuration parameters of the INTERBUS Master (number and slot, bus start behavior), as you set in the 140 NOA 611 10 configuration. ● Changing the entries in the I/O map: 140 NOA 611 10 replace with 140_NOA 622 00
Bus configuration	The following steps must be carried out: ● Enter/read the bus configuration with the SyCon software) ● Generate the configuration file *.IB and load the file to Concept (happens automatically when closing the SyCon software, if it was started from Concept)
Assigning the signal memory	Assign the same state RAM addresses to the INTERBUS modules as in the 140 NOA 611 10 configuration

The precise sequence of the individual phases can be found in section *Software Startup for using the 140 NOA 622 00, p. 53*.

Required changes to the User program

Because of the changed INTERBUS processing, you must make the following changes and modifications to your user program if you have programmed the corresponding performance:

- **Diagnosis:**
  Programming for the Status and Diagnosis words, that are used for the 140 NOA 611 10, must be altered to the words now active for *Diagnostics and Control via the Generic Bus, p. 68*.
- **Reconfiguration input for a branch interface**
  The remote bus branch is no longer connected via the reconfiguration input of the branch interface. The input only effects the diagnosis status bit for the relevant node in the status word. Any further evaluation of diagnosis data must be carried out by the EFB IBS_SEND_REQ. The support center is available to provide any further information you might require.
- **Using the PCP Channel:**
  You must remove the EFBs/Loadables (ICNT, ICOM) from your user program for the 140 NOA 611 and integrate the EFBs for the 140 NOA 622 00 (IBS_READ/ IBS_WRITE) according to the configuration in the user program.

Import CMD G4 Projects in SyCon

C

Importing CMD G4 projects into SyCon

General Information

SyCon offers the possibility to import a project from the Configuration and Diagnosis program IBS CMD G4 by the company Phoenix Contact GmbH.

Save the CMD G4 project as an ASCII file (*.CSV)

For importing a CMD G4 project in SyCon you need the project as an ASCII file (*.CSV). Carry out the following steps in IBS CMD G4:

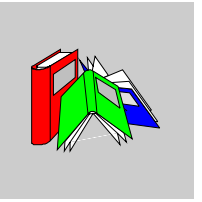
Step	Action
1	Select Parameters memory: Click on the corresponding symbol to select the parameters memory.
2	Create ASCII file: Use the menu **Configuration** → **Write ASCII file** → **Project files (*.CSV)** to create an ASCII file. All control fields in this dialog box must remain activated.
3	Set ASCII file format: Use **CSV Options** to specify the ASCII file format.

Import ASCII file in SyCon

The following steps must be carried out to import ASCII file in SyCon:

Step	Action
1	Create New Project Use the menu **File** → **New** and select **INTERBUS** to create a new project.
2	Select Master: Use the menu **Insert** → **Master** to select the Master.
3	Import ASCII file: Use the menu **File** → **Import** → **CMD** to start the import.
4	After selecting the ASCII file to import, you must make the settings for the file format in the IBS CMD G4.
5	Start the import by clicking **OK** in the dialog box. Start the import by clicking **OK** in the dialog box.

Glossary



B

BC — **Bus coupler** : Branch interface module

C

CMD Tool — **Configuration, Monitoring and Diagnostic** : PC software from Phoenix Contact for the configuration, monitoring and diagnostics of INTERBUS field bus systems.

I

I/O — Inputs/outputs

IBS — **INTERBUS** : This field bus system uses the master-slave method. The master manages and coordinates bus access; it sends the data to all connected nodes and receives data from these nodes.

IRB — **Installation Remote Bus** : Installation remote bus

L

LB — **Local Bus** : Local bus

O

OD — **Object Dictionary**: Object dictionary; contains all information required to describe standard objects from type PMS for a certain device (e.g. Robot).

P

PCP — **Peripherals Communication Protocol** : Protocol for data exchange between peripheral devices (layer 2 of the OSI model). This protocol guarantees that messages are broken down and reassembled correctly during transfer. All services required to make and brake connections, as well as data transfer services are available.

PD — **Process Data Chanel** : Channel for process data

PMS — **Peripherals Message Specification** : Specification for peripheral device messages. PMS is a user interface according to the MMS model and implemented on layer 7 of the OSI model. PMS formally defines the services used to make and brake connections as well as the data transfer services provided by PCP.
The standardized PMS communication services guarantee that the same communication interface is used for all devices.

R

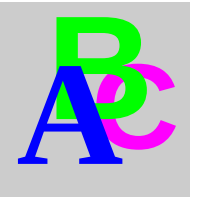
RB — **Remote Bus** : Remote bus

Ring — All nodes in a INTERBUS system are connected in a ring formed network.

S

Station on the local bus	The modules on the local bus are I/O modules used to create a remote substation in a switching cabinet.
SyCon	**System Configurator:** Software SYC SPU LF• CD28 M for configuration, monitoring and diagnostics of field bus systems

Index



Numerics

A

B

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E

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G

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M

N

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