ABB Drives

Installation and Start-up Guide

InterBus-S Adapter Module
NIBA-01

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Safety Instructions

Overview

This chapter states the safety instructions that must be followed when installing and operating the NIBA-01 InterBus-S Adapter Module. The material in this chapter must be studied before attempting any work on, or with, the unit.

Warnings and Notes

This manual distinguishes two sorts of safety instructions. Warnings are used to inform of conditions which can, if proper steps are not taken, lead to a serious fault condition, physical injury and death. Notes are used when the reader is required to pay special attention or when there is additional information available on the subject. Notes are less crucial than Warnings, but should not be disregarded.

Warnings

Readers are informed of situations that can result in serious physical injury and/or serious damage to equipment with the following symbols:

Dangerous Voltage Warning: warns of situations in which a high voltage can cause physical injury and/or damage equipment. The text next to this symbol describes ways to avoid the danger.

General Warning: warns of situations which can cause physical injury and/or damage equipment by means other than electrical. The text next to this symbol describes ways to avoid the danger.

Electrostatic Discharge Warning: warns of situations in which an electrostatic discharge can damage equipment. The text next to this symbol describes ways to avoid the danger.

Notes

Readers are notified of the need for special attention or additional information available on the subject with the following symbols:

CAUTION! **Caution** aims to draw special attention to a particular issue.

Note: **Note** gives additional information or points out more information available on the subject.

General Safety Instructions

WARNING! All electrical installation and maintenance work on the drive should be carried out by qualified electricians.

The drive and adjoining equipment must be properly earthed.

Do not attempt any work on a powered drive. After switching off the mains, always allow the intermediate circuit capacitors 5 minutes to discharge before working on the frequency converter, the motor or the motor cable. It is good practice to check (with a voltage indicating instrument) that the drive is in fact discharged before beginning work.

The motor cable terminals of the drive are at a dangerously high voltage when mains power is applied, regardless of motor operation.

There can be dangerous voltages inside the drive from external control circuits even when the drive mains power is shut off. Exercise appropriate care when working with the unit. Neglecting these instructions can cause physical injury and death.

WARNING! There are several automatic reset functions in the drive. If selected, they reset the unit and resume operation after a fault. These functions should not be selected if other equipment is not compatible with this kind of operation, or dangerous situations can be caused by such action.

More Warnings and Notes are printed at appropriate instances along the text.

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Chapter 1 – Introduction to This Guide

Overview

This chapter contains a description of the *Installation and Start-up Guide* for the NIBA-01 InterBus-S Adapter Module.

Intended Audience

The Guide is intended for the people who are responsible for installing, commissioning, and using the NIBA-01 InterBus-S Adapter Module with an ABB drive. The reader is expected to have a basic knowledge of

- electrical fundamentals and wiring practices
- the drive and its control panel
- the host controller software.

What This Guide Contains

The installation and start-up of the NIBA-01 InterBus-S Adapter Module are introduced in this Guide.

It is assumed that the drive is installed and ready to operate before starting the installation of the adapter module. For more information on the installation and start-up procedures of the drive, please refer to its user documentation.

Safety Instructions are featured in the first few pages of this Guide. Safety Instructions describe the formats for various warnings and notations used within this Guide. This chapter also states the safety instructions which apply to the installation and operation of the NIBA-01 Module.

Chapter 1 – Introduction to This Guide contains a short description of the Guide.

Chapter 2 – Overview contains a short description of the InterBus-S system and the NIBA-01 InterBus-S Adapter Module, a delivery checklist, and information on the manufacturer's warranty.

Chapter 3 – Mechanical Installation contains the placing and mounting instructions for the module.

Chapter 4 – Electrical Installation contains the wiring instructions.

Chapter 5 – Programming explains how to program the drive before the communication through the adapter module can be started.

Chapter 6 – Communication contains a description of how data is transmitted through the NIBA-01.

Appendix A explains definitions and abbreviations concerning the InterBus-S system.

Appendix B contains Technical Data.

Appendix C contains a specification of the ambient conditions allowed during transportation, storage and use of the NIBA-01.

Conventions Used in This Guide

Communication Module (COMM.MODULE) — Communication Module is a parameter name/parameter selection name for a device (e.g. a fieldbus adapter) through which the drive is connected to an external serial communication network (e.g. a fieldbus). The communication with the communication module is activated with a drive parameter.

Data Sets and Data Words — Data sets are clusters of data sent through the DDCS link between the fieldbus adapter module and the drive. Each data set consists of three 16-bit words, ie. data words. The Control Word (sometimes called the Command Word) and the Status Word, References and Actual Values (see Chapter 6) are types of data words; the contents of some data words are user-definable.

Host — Refers to the InterBus-S master station, i.e. a PLC or a computer controlling the bus through an InterBus-S interface.

NIBA-01 InterBus-S Adapter Module — The NIBA-01 Adapter Module is one of the optional fieldbus adapter modules available for ABB drives. The NIBA-01 is a device through which an ABB drive is connected to an InterBus-S serial communication bus system.

Parameter — A parameter is an operating instruction for the drive. Parameters can be read and programmed with the drive control panel, or through the NIBA-01 Module.

Chapter 2 – Overview

Overview

This chapter contains a short description of the InterBus-S system and the NIBA-01 Adapter Module, a delivery checklist, and warranty information.

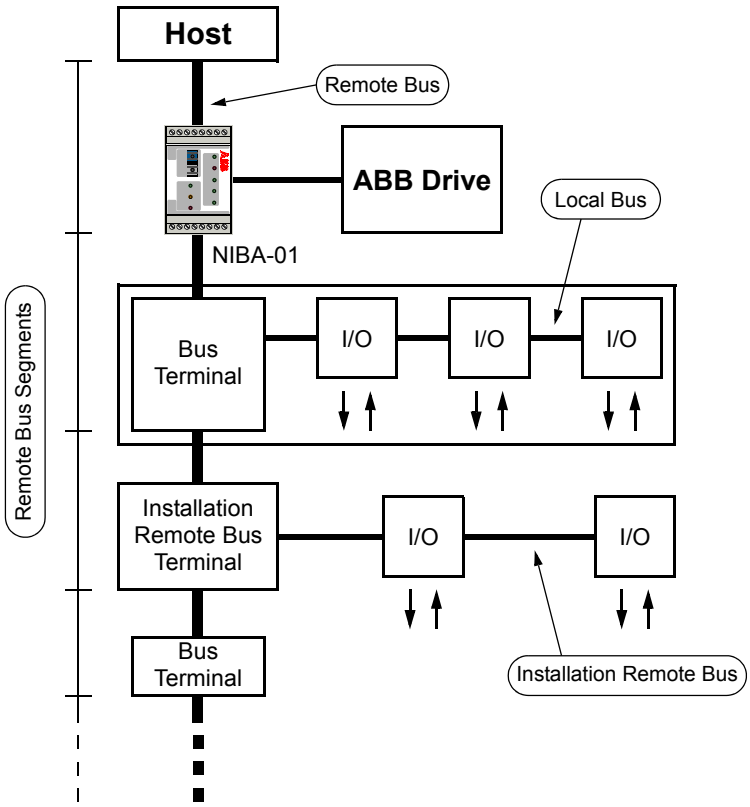
The InterBus-S System

InterBus-S is an open serial communication standard for the sensor–actuator level. The protocol is based on DIN 19245 Part 2 and itself specified in DIN 19258. In the exchange of parameter data, InterBus-S employs the FMS user interface.

Further information is available from the host controller documentation, Phoenix Contact (http://www.phoenixcontact.com), and the INTERBUS Club (http://www.interbusclub.com).

Topology

The physical transmission medium of InterBus-S is a twisted pair cable (according to the RS 485 standard). The main bus – in InterBus terminology, the *remote bus* – may contain 32 *segments,* each consisting of a cable and the device connected to it. The maximum length of one segment is 400 m. Local branches (referred to as *installation remote buses* and *local buses,* depending on branch type) can be connected to the remote bus using so-called *bus terminals.*



Data Channels

The InterBus-S system provides two channels for data transfer, the *process data channel* (for fast cyclic transfer of time-critical I/O data) and the *PCP channel* (for acyclic transfer of non-time-critical, complex blocks of data, e.g. parameter data).

The NIBA-01 InterBus-S Adapter Module

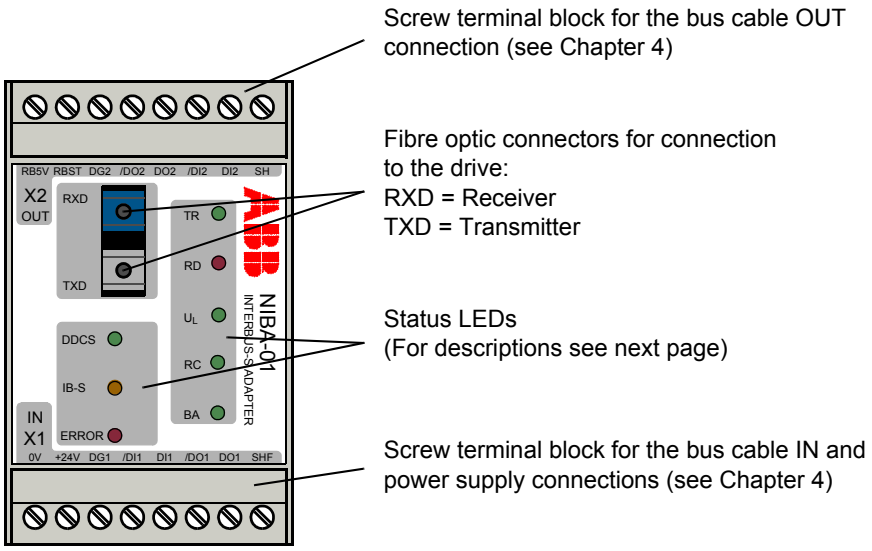
The NIBA-01 InterBus-S Adapter Module is an optional device that enables connection of an ABB drive to an InterBus-S system. The module is considered a remote bus device by the host.

Through the NIBA-01 InterBus-S Adapter Module it is possible to:

- Give control commands to the drive (Start, Stop, Run enable, etc.)
- Feed a motor speed or torque reference to the drive
- Give a process actual value or a process reference to the PID controller of the drive
- Read status information and actual values from the drive
- Change drive parameter values
- Reset a drive fault.

The InterBus-S commands and services supported by the NIBA-01 are discussed in Chapter 6. Please refer to the user documentation of the drive as to which commands are supported by the drive.

The adapter module is mounted onto a standard mounting rail inside or outside the drive unit, depending on drive type and configuration. See the user's manual of the drive for module placement options.



Status LEDs There are eight status LEDs on the NIBA-01 Module. The table below explains their functions.

LED	Operation	Explanation
DDCS	flashing	DDCS initialisation in progress
	flashing, ERROR lit	DDCS communication errors
	lit	DDCS communication established
IB-S	flashing (fast)	Waiting for InterBus-S communication
	flashing (slowly)	I/O mode (process data communication enabled only)
	flashing together with ERROR	ROM checksum test failed
	flashing, ERROR lit	InterBus-S communication error(s)
	lit	PCP mode (process data and PCP communication enabled)
ERROR	lit	PCP initialisation error
	lit, DDCS flashing	DDCS communication errors
	lit, IB-S flashing	InterBus-S communication error(s)
	flashing	RAM test failed
	flashing together with IB-S	ROM checksum test failed
RC (Remote Bus Check)	lit	Cable connection correct, host not being reset
BA (Bus Active)	lit	Bus is active
TR (Transmit/Receive)	flashing	PCP communication active
U_L	lit	Module power OK (reset inactive)
RD (Remote Bus Disabled)	lit	Extended remote bus interface disabled

Compatibility The NIBA-01 is compatible with:

- ACS 600 SingleDrive (SW vsn ACxA5000 or later)
- ACS 600 MultiDrive (SW vsn AMxM103a or later)
- ACS 600 MotionControl (ACP 600) (SW vsn APxA1100 or later)
- ACS 600 Pump & Fan Drive (ACF 600) (SW vsn AF0A1020 or later)
- DCS 500 (SW vsn DC21x226 or later)
- All host stations equipped with an InterBus-S interface.

Delivery Check

The NIBA-01 package contains:

- InterBus-S Adapter Module, Type NIBA-01
- Two pairs (four pieces) of fibre optic cables for connecting the adapter to the drive
- Mounting rail
- This manual, the *NIBA-01 Installation and Start-up Guide*.

Warranty and Liability Information

The warranty for your ABB drive and options covers manufacturing defects. The manufacturer carries no responsibility for damage due to transport or unpacking.

In no event and under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation, or abnormal conditions of temperature, dust, or corrosives, or failures due to operation above rated capacities. Nor shall the manufacturer ever be liable for consequential and incidental damages.

The period of manufacturer's warranty is 12 months, and not more than 18 months, from the date of delivery.

Extended warranty may be available with certified start-up. Contact your local distributor for details.

Your local ABB Drives company or distributor may have a different warranty period, which is specified in their sales terms, conditions, and warranty terms.

If you have any questions concerning your ABB drive, contact your local distributor or ABB Drives office.

The technical data and specifications are valid at the time of printing. ABB reserves the right to subsequent alterations.

Chapter 3 – Mechanical Installation

Overview

This chapter contains module mounting instructions. Depending on the drive, the module can be installed either inside or outside the drive housing or cabinet. See the user's manual of the drive for module placement options.

Mounting Outside the Drive

Choose the location for the module. Note the following:

- The cabling instructions must be followed (see Chapter 4). Also, the length of the fibre optic cables included in the option package restrict the distance between the module and the drive.
- Observe the free space requirements for the module (min. 10 mm from adjoining equipment or wall) and the drive (see the drive documentation).
- The ambient conditions should be taken into account (see *Appendix C)*. The degree of protection of the module is IP 20.
- Module earth is connected to the mounting rail by means of an earthing clip (see Figure 3-1 below). The mounting rail onto which the option module is to be mounted must be earthed to a noiseless earth. If the rail is not mounted on a properly earthed base, a separate earthing conductor must be used. The conductor must be as short as possible and the cross-sectional area must be 6 mm^2 at least. ***Note:*** No solid copper conductor may be used (stranded wire allowed only).

Mounting instructions:

1. Switch off all dangerous voltages in the enclosure that the module is to be mounted in.
2. Fasten the rail and ensure the proper earthing as described above.
3. Push the module onto the rail. The module can be released by pulling the locking spring with a screwdriver (see Figure 3-1).

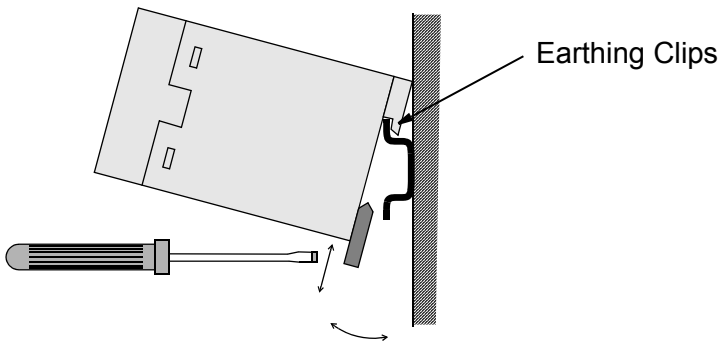


Figure 3-1 Mounting and removing the module.

Mounting Inside the Drive

The work inside the drive should be carried out by a qualified electrician only.

WARNING! Pay attention to the slowly discharging voltage of the capacitor bank and the voltages that are connected from external control circuits to the inputs and outputs of the drive.

WARNING! Do not touch the printed circuit boards. The integrated circuits are extremely sensitive to electrostatic discharge.

Mounting instructions:

1. Stop the drive.
2. Switch off the power supply of the drive and all dangerous voltages connected to the inputs and outputs.
3. Wait for five minutes to ensure that the capacitors in the intermediate circuit have discharged.
4. Remove the front cover of the drive.
5. Ensure that the mains cable, motor cable and capacitor bank (UDC+ and UDC–) are not powered.
6. Locate the position for the module (see the user's manual of the drive). Fasten the mounting rail to its place if not already installed. Observe the free space requirements for the module (min. 10 mm from adjoining equipment/wall).
7. Push the module onto the rail. The module can be released by pulling the locking spring with a screwdriver (see Figure 3-1).

Chapter 4 – Electrical Installation

Overview

This chapter contains:

- Cabling instructions
- Connection and earthing instructions for the NIBA-01 Module and earthing instructions for the bus cable.

WARNING! Before installation, switch off the drive power supply. Wait for five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive.

Cabling

Arrange the bus cables as far away from the motor cables as possible. Avoid parallel runs. Use bushings at cable entries.

Handle the fibre optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibres with bare hands as the fibre is extremely sensitive to dirt.

The maximum long term tensile load for the fibre optic cable is 1 N. The minimum short term bend radius is 25 mm.

The NIBA-01 module is connected to the drive using a fibre optic cable link. Consult the drive documentation as to the corresponding terminals inside the drive.

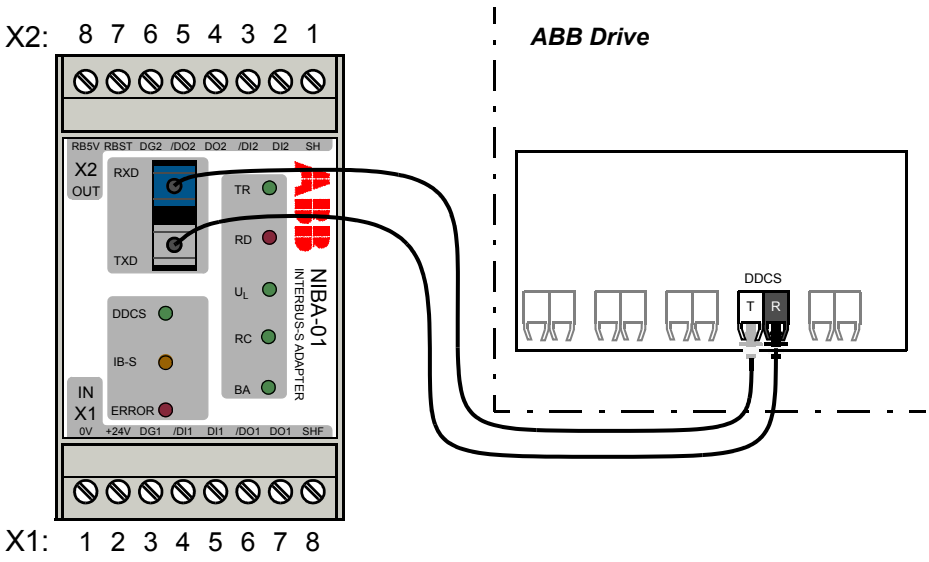


Figure 4-1 Fibre optic link between the NIBA-01 adapter and the drive.

Module Earthing

The NIBA-01 module earth is connected to the rail onto which the module is mounted. If the rail is fastened to an earthed metallic assembly plate, the module is automatically earthed, and no external earthing wire is needed. If the rail is fastened to a base that is not earthed, the rail must be connected to the nearest earthing terminal. However, the earthing wire should not be connected to the same terminal as the power cable screens. (See page 3-1.)

Bus Cable Connections

The **incoming** bus cable and the external power supply are connected to terminal block X1 on the NIBA-01. The **outgoing** bus cable (if required) is connected to X2. See the connection diagram on page 4-4.

Note: If the NIBA-01 module is the last station on the remote bus, the terminals of X2 are left unconnected.

Bus Cable Specifications

Ready-made remote bus cables in different lengths are available from Phoenix Contact. If these are not used, the cable should fulfil the following specifications:

Parameter	Value	Test Method
No. of Conductors	3 x 2 (twisted pairs), common shield	–
Conductor Cross-section	Min. 0.2 mm^2	–
Conductor Resistance (DC)	Max. 9.6 Ω/m	VDE 0472-501, IEC 189-1 cl. 5-1
Characteristic Impedance	120 Ω ± 20% at f = 0.064 MHz, 100 Ω ± 15% at f > 1 MHz	IEC 1156-1 cl. 3.3.6
Dielectric Strength, Conductor/Conductor, Conductor/Shield	1000 V RMS, 1 min	VDE 0472-509 Test type C or IEC 189-1 cl. 5.2
Insulation Resistance (after Dielectric Strength test)	Min. 150 MΩ/1000 metres of cable	VDE 0472-509 Test type B or IEC 189-1 cl. 5.3
Maximum Transfer Impedance at 30 MHz	250 mΩ/m	IEC 96-1
Operating Capacity at 800 Hz	Max. 60 nF/1000 metres of cable	VDE 0472-504 Test type A, IEC 189-1 cl. 5-4
Minimum Near-end Crosstalk Attenuation (NEXT) for 100 metres of cable at		VDE 0472-517 or IEC 1156-1 cl. 3.3.4
0.722 MHz	61 dB	
1 MHz	59 dB	
2 MHz	55 dB	
4 MHz	50 dB	
8 MHz	46 dB	
10 MHz	44 dB	
16 MHz	41 dB	
20 MHz	40 dB	

Terminal Blocks

Table 4-1 Description of terminal block X1 (INPUT).

X1 (IN)		Description
1	0V	Power supply for the module 24 V d.c. ± 10 %; maximum power consumption 160 mA
2	+24V	
3	DG1	Signal Ground
4	/DI1	Data in 1 (Inverted)
5	DI1	Data in 1
6	/DO1	Data out 1 (Inverted)
7	DO1	Data out 1
8	SHF	Filtered Shield (Connected to module earth via an RC filter)

Table 4-2 Description of terminal block X2 (OUTPUT).
(Not connected if the module is the last device on the remote bus.)

X2 (OUT)		Description
1	SH	Shield (Module earth)
2	DI2	Data in 2
3	/DI2	Data in 2 (Inverted)
4	DO2	Data out 2
5	/DO2	Data out 2 (Inverted)
6	DG2	Signal Ground
7	RBST	Remote Bus Connector
8	RB5V	Signal +5V

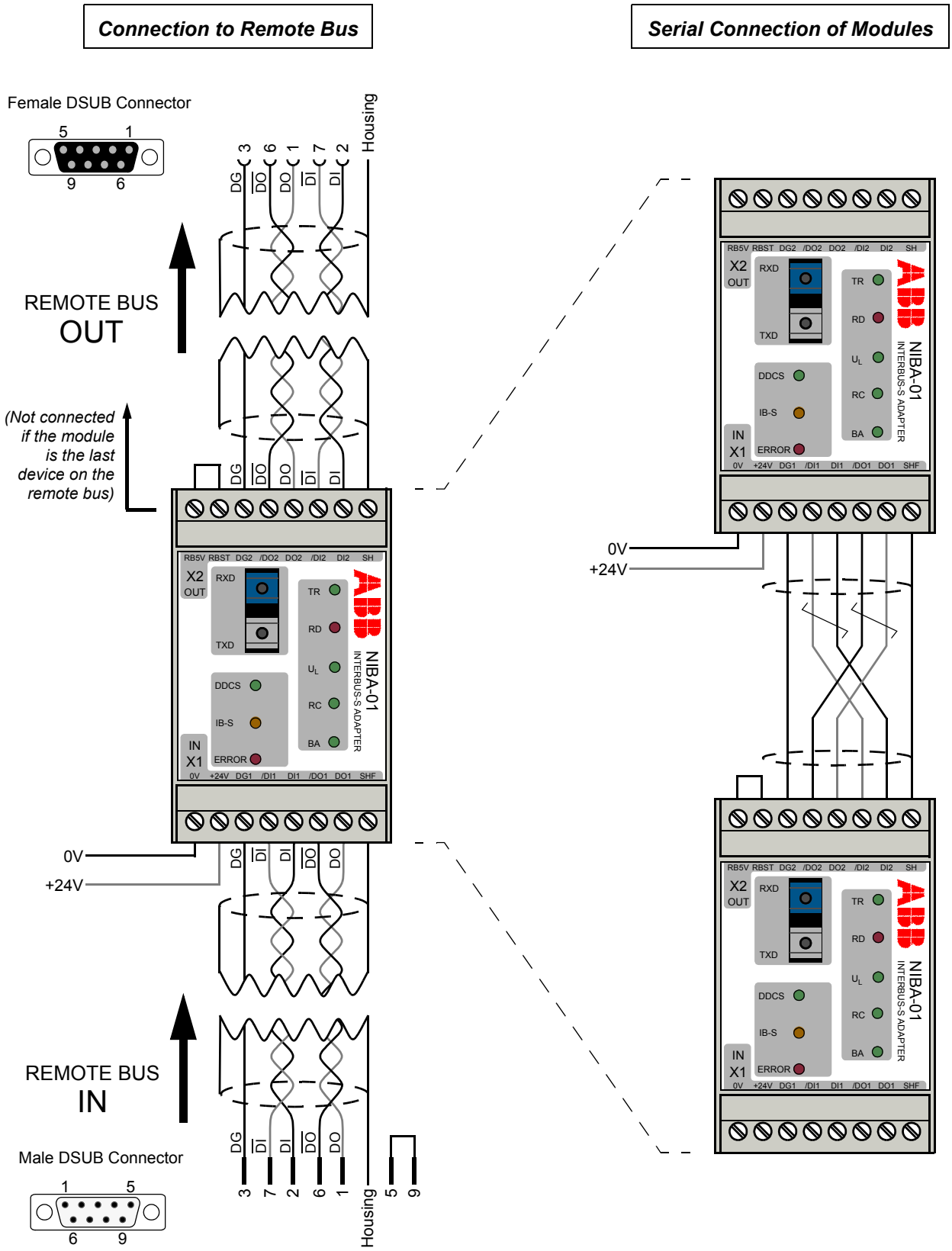


Figure 4-2 InterBus-S remote bus cable connections.

Chapter 5 – Programming

Overview

This chapter gives information on configuring the drive and the InterBus-S system for communication through the NIBA-01 Module. It is assumed that the NIBA-01 has been mechanically and electrically installed according to the instructions given in Chapters 3 and 4.

Drive Configuration

The detailed procedure of activating the module for communication with the drive is dependent on drive type. (Normally, a drive parameter must be adjusted to activate the communication. See the drive documentation.)

As communication between the drive and the NIBA-01 is established, the configuration parameters of the module become available at the drive. These parameters – shown below in Table 5-1 – must be checked first and adjusted if necessary. The alternative selections for these parameters are discussed in more detail below the table. (Note that the new settings take effect only when the module is powered up for the next time.)

Note: The groupings, numberings, and adjustment procedures of parameters vary. Refer to the drive documentation.

Table 5-1 NIBA-01 configuration parameters.

Fieldbus Par. No.	Name	Alternative Settings	Default Setting	Note
1	MODULE TYPE		NIBA-01 Vx.x	Not adjustable
2	COMM. MODE	PCP; I/O; I/O MUXED	PCP	
3	IB TIME-OUT	0 to 255	30	10 ~ 1 s (0 = disabled)
4	DATA SET OFFSET	FBA D SET 1; FBA D SET 10	FBA D SET 1	

MODULE TYPE This parameter shows the module type as detected by the drive. The value cannot be adjusted by the user. (If this parameter is undefined, the communication between the drive and the module has not been established.)

COMM. MODE This parameter selects the operating mode of the NIBA-01. The NIBA-01 InterBus-S Adapter Module has three operating modes.

PCP
Process data channel and PCP channel enabled. This setting should be selected if drive parameters are to be adjusted through the fieldbus.

I/O
Process data channel enabled only. This setting is ideal for applications that do not require drive parameter adjustment through the fieldbus. Furthermore, equipment set-up is also simple, requiring only the definition of addressing areas by means of the controller program.

I/O MUXED
Process data channel enabled only. The first word of InterBus process data is used to indicate a multiplexed data word. The first IN data word selects the word to be read; the first OUT data word indicates the data word which was read. The index value range is 0 to 9. If the index value is greater than 9, the module will sequentially cycle through the indexes 0 to 9, incrementing the index with each InterBus message.

Index	Name	Information	Note
0	Actual Value 2	*Data Set 2 Word 3	Actual Value support depends on drive type and application program. See the *Firmware Manual* of the drive for more information.
1	Actual Value 3	*Data Set 4 Word 1	
2	Actual Value 4	*Data Set 4 Word 2	
3	Actual Value 5	*Data Set 4 Word 3	
4	Actual Value 6	*Data Set 6 Word 1	
5	Actual Value 7	*Data Set 6 Word 2	
6	Actual Value 8	*Data Set 6 Word 3	
7	Actual Value 9	*Data Set 8 Word 1	
8	Actual Value 10	*Data Set 8 Word 2	
9	Actual Value 11	*Data Set 8 Word 3	
>9	Cycle indexes 0 to 9. The OUT index value indicates the value which was read.		

*Add 9 to data set number if module configuration parameter 4 (DATA SET OFFSET) is set to FBA D SET 10.

Direction	Process Data Word 1	Process Data Word 2	Process Data Word 3	Process Data Word 4
IN	Index of data word to be read	Control Word	Reference 1	Reference 2
OUT	Index of data word which was read	Status Word	Actual Value 1	(One of the values in table above)

IB TIME-OUT If the communication between the NIBA-01 and the host fails, this parameter defines the time after which the NIBA-01 stops communicating with the drive. (See the drive manuals for information on drive behaviour if this occurs.) Setting the parameter to 0 disables the function. Otherwise, 1 unit corresponds to approx. 0.1 seconds.

DATA SET OFFSET Selects the number of the first data set to be used for fieldbus communication. By default, the value of this parameter is FBA D SET 1, denoting that data sets from no. 1 onwards are used for communication with the drive. However, some drives reserve these data sets for other use, so it may be necessary to use other data sets. Setting this parameter to the value of FBA D SET 10 makes data set 10 the first data set to be used for communication between the NIBA-01 and the drive.

FBA D SET 1; FBA D SET 10

Control Locations ABB drives can receive control information from multiple sources including digital inputs, analogue inputs, the drive control panel and a communication module (e.g. NIBA-01). ABB drives allow the user to separately determine the source for each type of control information (Start, Stop, Direction, Reference, Fault Reset, etc.). In order to give the fieldbus master station the most complete control over the drive, the communication module must be selected as source for this information. See the user documentation of the drive for information on the selection parameters.

Host Configuration

The devices on the remote bus are automatically detected by the host controller software, and then assigned input and output memory addresses. The need for further configuration depends on the host controller software and the application. The configuration data in Table 5-2 below is valid for the NIBA-01.

Table 5-2 Host controller configuration data for the NIBA-01 module.

Communication Parameter	Value
Device Name/Type	NIBA-01
ID Code	PCP Mode: 243 (F3h) IO Mode: 3 (03h)
Length Code	4 (04h)
No. of Process Data Bytes In/Out	6/6
No. of Parameter Data Bytes In/Out	2/2
Register Length (bytes)	8
Profile No.	0
Services Supported	All mandatory services, Get OV, Read, Write
Maximum PDU Length	64 bytes
COMMUNICATION REFERENCE LIST ENTRIES	
Max-PDU Sending-High-Prio	0
Max-PDU Sending-Low-Prio	64 bytes
Max-PDU Receiving-High-Prio	0
Max-PDU Receiving-Low-Prio	64 bytes
PMS-Services-Supported	80 30 00 / 00 00 00; Client / Server

Calculating the Optimal Cycle (Scan) Time

For fast data transfer, the host controller should send the message frame (detailed in Chapter 6) as frequently as possible. However, the slave stations on the bus may not be able to follow if the cycle time (scan time) is too short. The cycle time can be calculated using the following formula:

$$t_{cycle} = (13 \cdot (6 + n) + 1.5 \cdot m) \cdot t_{Bit} + t_{SW} + t_{PH}$$

where

t_{cycle}	Transfer time in milliseconds
n	Number of user data bytes
m	Number of remote bus modules installed
t_{Bit}	Bit duration (0.002 ms for 500 kbit/s)
t_{SW}	Software runtime (0.2 ms)
t_{PH}	Runtime on the transmission medium (for copper, 0.016 ms • l/km, where l = remote bus cable length in kilometres)

Note: The minimum cycle time with the NIBA-01 is 1 ms.

Chapter 6 – Communication

Overview

This chapter describes the messaging used in InterBus-S communication. Further information is available from the host controller documentation, Phoenix Contact (http://www.phoenixcontact.com), and the INTERBUS Club (http://www.interbusclub.com).

InterBus-S Message Frame

The InterBus-S system employs so-called summation frames. The host controller cyclically sends a message frame that includes the process data for every module on the bus. The frame is constructed by the host controller using the configuration data entered previously for each module on the bus.

As the message frame is relayed through the system, each device on the bus stores the information addressed to it in a buffer and responds by writing a response message into the same position in the frame. As the message frame returns to the host controller, it is checked against the original message.

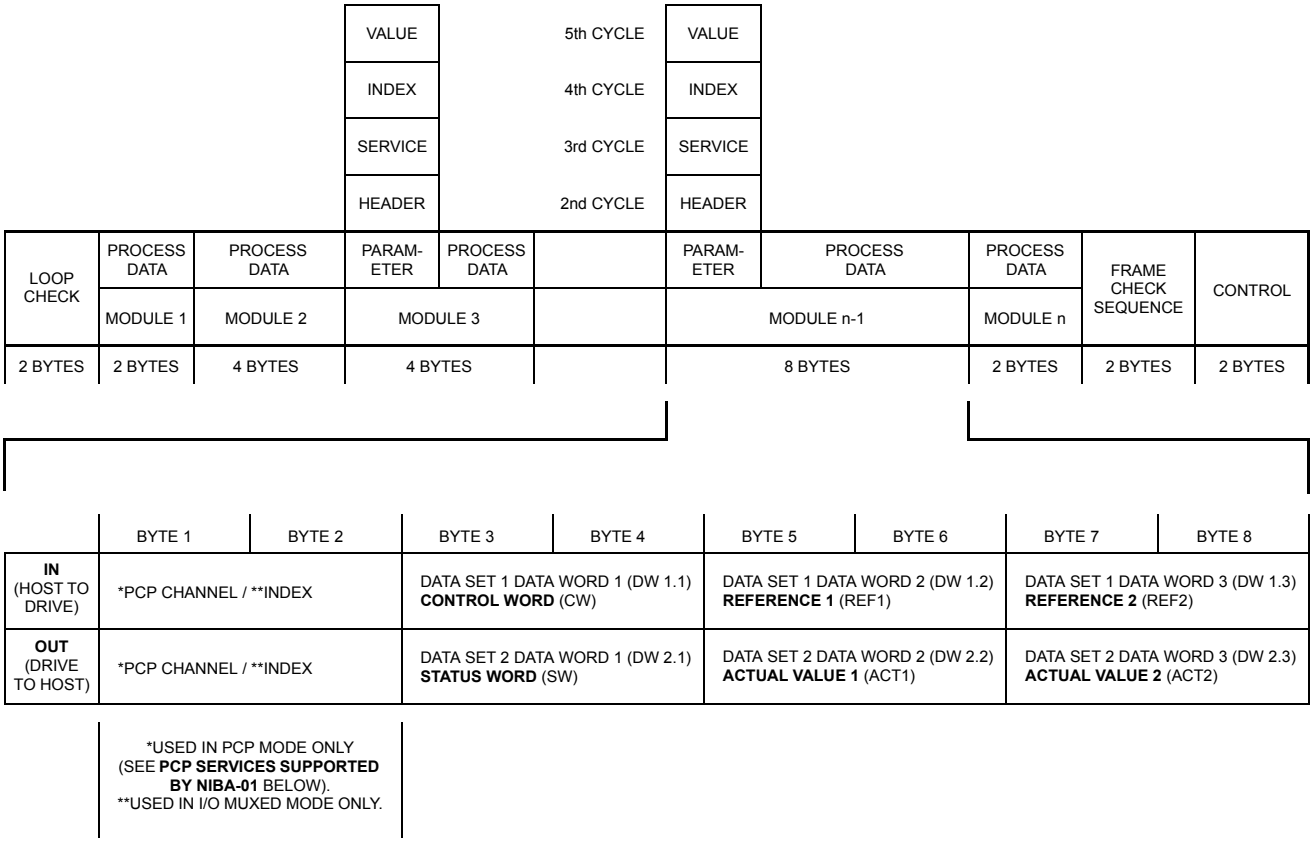


Figure 6-1 InterBus-S message frame.

PCP Services Supported by NIBA-01

The PCP services presented below are supported (in PCP Mode) by the NIBA-01 InterBus-S Adapter Module.

Note: The Command Codes given are valid for Generation 4 Phoenix Contact host controllers (equipped with an LCD display). Generation 3 controllers (equipped with an LED display) require the substitution of 8 for the first 0 (e.g. **8**08Bh for **0**08Bh).

Service	Command Codes		Message Codes	
	Request	Response	Indication	Confirmation
READ	0081h	00A1h	01A1h	0181h
WRITE	0082h	00A2h	01A2h	0182h
STATUS	0086h	–	–	0186h
IDENTIFY	0087h	–	–	0187h
GET OV	0088h	–	–	0188h
INITIATE INITIATE ERROR	008Bh	00ABh 00ACh	01ABh	018Bh 018Ch
ABORT	008Dh	–	01ADh	–

Appendix A – Definitions and Abbreviations contains basic explanations for the byte names used. The following values are applicable to all the PCP services supported.

Parameter Count: The number of words (of 2 bytes each) to follow (in hexadecimal)

Invoke ID: For NIBA-01, **00**

Comm.Ref.: The Communication Reference (module number) assigned for the NIBA-01 upon host configuration (in hexadecimal)

Password: For NIBA-01, **00**

Index: ((Drive Param. No.) • 100 + 12288), converted to hexadecimal

Subindex: For NIBA-01, **00**

Error Codes:

Error Class	Error Code	Additional Code (hex)	Explanation
6	3	00	No access
6	5	11	Invalid subindex
6	5	12	Data too long
6	5	13	Data too short
6	6	00	Object is not a parameter
6	7	00	Object does not exist
8	0	00	Service cannot be executed
8	0	20	Service cannot currently be executed
8	0	31	Parameter value too high
8	0	32	Parameter value too small

Read

Reads a parameter value from the drive via NIBA-01.

Read Request:

BYTE 1	BYTE 2
Command Code (0081h)	
Parameter Count	
Invoke ID	Comm.Ref.
Index*	
Subindex	

Example of a Read Request (Param. 30.19):

BYTE 1	BYTE 2
00	81
00	03
00	eg. 02
3B	CB
00	

Read Response (+):

BYTE 1	BYTE 2
Command Code (00A1h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	Length
Data	• •
⋮	
• •	Data

Read Response (–):

BYTE 1	BYTE 2
Command Code (00A1h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

Read Indication:

BYTE 1	BYTE 2
Message Code (01A1h)	
Parameter Count	
Invoke ID	Comm.Ref.
Index*	
Subindex	

Read Confirmation (+):

BYTE 1	BYTE 2
Message Code (0181h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	Length
Data	• •
⋮	
• •	Data

Read Confirmation (–):

BYTE 1	BYTE 2
Message Code (0181h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

*Index: ((Drive Param. No.) • 100 + 12288), converted to hexadecimal

Write

Writes a parameter value to the drive via NIBA-01.

Write Request:

BYTE 1	BYTE 2
Command Code (0082h)	
Parameter Count	
Invoke ID	Comm.Ref.
Index*	
Subindex	Length
Data	• •
⋮	
Data	

Example of a Write Request (Param. 21.02 set to 1000):

BYTE 1	BYTE 2
00	82
00	04
00	e.g. 02
38	36
00	02
03	E8

Write Response (+):

BYTE 1	BYTE 2
Command Code (00A2h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	

Write Response (–):

BYTE 1	BYTE 2
Command Code (00A2h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

Write Indication:

BYTE 1	BYTE 2
Message Code (01A2h)	
Parameter Count	
Invoke ID	Comm.Ref.
Index*	
Subindex	Length
Data	• •
⋮	
• •	Data

Write Confirmation (+):

BYTE 1	BYTE 2
Message Code (0182h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	–

Write Confirmation (–):

BYTE 1	BYTE 2
Message Code (0182h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

*Index: ((Drive Param. No.) • 100 + 12288), converted to hexadecimal

Status
Displays NIBA-01 status.

Status Request:

BYTE 1	BYTE 2
Command Code (0086h)	
Parameter Count	
Invoke ID	Comm.Ref.

Status Confirmation (+):

BYTE 1	BYTE 2
Message Code (0186h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	Log. Status
Phys. Status	Length
String of Local	
:	
Detail	

Status Confirmation (–):

BYTE 1	BYTE 2
Message Code (0186h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

Logical Status: 1 = Limited number of services
0 = Ready to communicate
Physical Status: 0 = Ready for operation

Identify
Displays NIBA-01 identification data.

Identify Request:

BYTE 1	BYTE 2
Command Code (0087h)	
Parameter Count	
Invoke ID	Comm.Ref.

Identify Confirmation (+):

BYTE 1	BYTE 2
Message Code (0187h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	Length
String of Vendor	
Str. of Vendor	
⋮	
Length	Str. of Module
String of Module	
⋮	
Length	Str. of Rev.
String of Revision	

Identify Confirmation (–):

BYTE 1	BYTE 2
Message Code (0187h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

Vendor: ABB Industry Oy
Model: NIBA-01
Revision: Rev. SW x.x HW x

Get OV

Reads the *object dictionary* from the drive in short form. The three words returned are the requested index, object code, and data type and length.

Get OV Request:

BYTE 1	BYTE 2
Command Code (0088h)	
Parameter Count	
Invoke ID	Comm.Ref.
All-Attrib.	Access-Spec.
Index or Name	

Get OV Confirmation (+):

BYTE 1	BYTE 2
Message Code (0188h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	More-Follows
Length	List of O.D.
List of Object Description	
⋮	
List of Object Description	

Get OV Confirmation (–):

BYTE 1	BYTE 2
Message Code (0188h)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Add. Code
Add. Code	

Initiate

Initiates communication between the InterBus-S host and the NIBA-01.

Initiate Request:

BYTE 1	BYTE 2
Command Code (008Bh)	
Parameter Count	
Invoke ID	Comm.Ref.
Password	Acc_groups

Example of an Initiate Request:

BYTE 1	BYTE 2
00	8B
00	02
00	eg. 02
00	00

Initiate Response:

BYTE 1	BYTE 2
Command Code (00ABh)	
Parameter Count	
Invoke ID	Comm.Ref.
Password	Acc_groups

Initiate Error Response:

BYTE 1	BYTE 2
Command Code (00ACh)	
Parameter Count	
Invoke ID	Comm.Ref.
Add. Code	

Initiate Indication:

BYTE 1	BYTE 2
Message Code (01ABh)	
Parameter Count	
Invoke ID	Comm.Ref.
Version	
Length	Str. of Profile
Str. of Profile	
:	
Protection	Password
Acc_groups	

Initiate Confirmation (+):

BYTE 1	BYTE 2
Message Code (018Bh)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (+)	Version
Version	Length
String of Profile	
Str. of Profile	
:	
Protection	Password
Acc_groups	

Initiate Confirmation (–):

BYTE 1	BYTE 2
Message Code (018Ch)	
Parameter Count	
Invoke ID	Comm.Ref.
Result (–)	Error Class
Error Code	Send High
Send Low	Receive High
Receive Low	Su.Services
Supported Services	
Supported Services	
Su.Services	

Abort
Aborts the connection between the host and the NIBA-01.

Abort Request:

BYTE 1	BYTE 2
Command Code (008Dh)	
Parameter Count	
–	Comm.Ref.
Abort Detail	

Abort Indication:

BYTE 1	BYTE 2
Message Code (01ADh)	
Parameter Count	
–	Comm.Ref.
Locally_gen.	Abort_id
Reason_code	Abort_detail

The Control Word and the Status Word

The Control Word is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive, the adapter module acting as a transparent link. The drive switches between its states according to the bit-coded instructions on the Control Word. The Status Word is a word containing status information, sent by the drive to the master station. The contents of both the Control and Status Words are explained in the drive documentation.

The Control and Status Words are not altered by the NIBA-01 in any way, excepting Bit 15 of the Status Word, which is turned on by the module in case of an error in the DDCS communication between the module and the drive.

References

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

ABB drives can receive control information from multiple sources including analogue and digital inputs, the drive control panel and a communication module (e.g. NIBA-01). In order to have the drive controlled through Interbus-S, the communication module must be defined as the source for control information, eg. Reference. The scaling of the integer received from the master as Reference is drive-specific. See its Programming Manual for available control source selections and Reference scaling factors.

Actual Values

Actual Values are 16-bit words containing information on the operation of the drive. The functions to be monitored are selected with a drive parameter. The scaling of the integers sent to the master as Actual Values depends on the selected function. Please refer to the drive documentation.

Appendix A – Definitions and Abbreviations

Abort	Service to abort the communication connection
Abort Detail	Application-specific, detailed designation for the abort
Access Groups	Identification about the allocation of group access
Acyclic Communication	Communication in which messages are sent only once on request
Add. Code	Application-specific, detailed designation of the error
Client	Service requester; the communication partner who requests an order
Communication Object	Data, programs or variables which may be processed or executed
Communication Reference	Module number of a station
Communication Relationship List	Contains definitions (permitted services, read and write memory sizes) regarding the communication channels
Confirmation	Order confirmation which the service provider sends to the service requester (client)
Control Word	16-bit word from master to slave with bit-coded control signals. (Sometimes called the Command Word)
Cyclic Communication	Communication in which Parameter/Process Data Objects are sent cyclically at pre-defined intervals
Error Class/Error Code	Classification number of an error
Error Code	Error number of the service
Fault	Event that leads to tripping of the device
Host (Controller)	Control system with bus initiative. Also called Master
Index	Access reference for communication objects; pointer to a variable/field
Initiate	Service to establish a communication relationship
Invoke ID	Order identification, request no. of the service to a station
KBL	See Communication Relationship List
KR	See Communication Reference
Length	Quantity of the following user data in bytes
Locally Generated	Error location. (Local station: 00; Remote station: FF)
Log. Status	Status of the module program
Object Dictionary	Local storage of all Communication Objects recognised by a device
Original Invoke ID	Invoke ID of the service which caused a reject

OV	See Object Dictionary
Password	Password for the access control
PCP	Peripherals Communication Protocol. Also, an operating mode of the NIBA-01 for transferring parameter data
Phys. Status	Status of the module hardware
Primitive	Basic operation of a service
Process Data	Data that contains Control Word and Reference value or Status Word and Actual value. May also contain other control information
Profile	Adaptation of the protocol for certain application field, e.g. drives
Protection	The value of the access check. (00: Protection off; FF: Protection on)
Reason Code	Error code for the connection release
Receive High	High-priority send buffer size. (Always 00)
Receive Low	Low-priority send buffer size (in bytes)
Reject	Service, designation of the service type which indicates a non-allowable access to a station
Reject Code	Designation of the error cause which initiated the reject
Request	Service request by the client
Response	Sending of the order confirmation by the server after the order has been executed
Result	Acknowledgement result of a service (positive: 00; negative: 01 to FF)
Send High	High-priority send buffer size. (Always 00)
Send Low	Low-priority send buffer size (in bytes)
Server	Service provider
Slave	Passive bus participant
Status Word	16-bit word from slave to master with bit-coded status messages
String of Module	Module type designation as a data string, the length of which is specified with Length
String of Profile	Module profile as a data string, the length of which is specified with Length
String of Revision	Module revision as a data string, the length of which is specified with Length
String of Vendor	Manufacturer name as a data string, the length of which is specified with Length
Subindex	Pointer to a location in a variable/field
Supported Services	6-word code of the supported services

Appendix B – Technical Data

DDCS Link

Compatible Devices: All ABB Fieldbus Adapter modules, ABB ACS 300, ACS 600 SingleDrive, ACS 600 MultiDrive, ACS 600 MotionControl, ACF 600 Pump & Fan Drive, DCS 500

Size of the Link: 2 stations

Medium: Fibre optic cable

- Construction: Plastic core, diameter 1 mm, plastic sheathing
- Attenuation: 0.31 dB/m
- Maximum Length between Stations: 10 m
- Specifications:

Parameter	Minimum	Maximum	Unit
Storage Temperature	-55	+85	°C
Installation Temperature	-20	+70	°C
Short Term Tensile Force		50	N
Short Term Bend Radius	25		mm
Long Term Bend Radius	35		mm
Long Term Tensile Load		1	N
Flexing		1000	cycles

Topology: Ring

Serial Communication Type: Asynchronous, half Duplex

Transfer Rate: 4 Mbit/s

Protocol: Distributed Drives Communication System (DDCS)

Connectors: Blue – receiver; grey – transmitter

InterBus-S

Topology: Ring

Protocol: Defined in DIN E 19258

Maximum Remote Bus Length: 12.8 km

Maximum Remote Bus Segment Length: 400 m

Maximum No. of Remote Bus Segments: 32

Maximum No. of Remote I/O Stations: 256

Medium: RS-485 cable, 3 x 2 (twisted pairs), common shield

Serial Communication Type: Asynchronous, full duplex

Transfer Rate: 500 kBit/s

Minimum Bus Cycle (Scan) Time: 1 ms

NIBA-01

Enclosure: Plastic, dimensions 45 × 75 × 105 mm; degree of protection IP 20

Mounting: Onto a standard mounting rail

Settings: Via drive interface (Control panel)

Current Consumption: 160 mA at 24 V d.c.

Communication Parameters:

Communication Parameter	Value
Device Name/Type	NIBA-01
ID Code	PCP Mode: 243 (F3h) IO Mode: 3 (03h)
Length Code	4 (04h)
No. of Process Data Bytes In/Out	6/6
No. of Parameter Data Bytes In/Out (PCP Mode only)	2/2
Register Length (bytes)	8
Profile No.	0
Services Supported	All mandatory services, Get-OV, Read, Write
Maximum PDU Length	64 bytes
COMMUNICATION REFERENCE LIST ENTRIES	
Max-PDU Sending-High-Prio	0
Max-PDU Sending-Low-Prio	64 bytes
Max-PDU Receiving-High-Prio	0
Max-PDU Receiving-Low-Prio	64 bytes
PMS-Services-Supported	80 30 00 / 00 00 00; Client / Server

Connectors:

- Light transmitter (grey) and receiver (blue) for connection to the drive
- Two Combicon MVSTBW 2,5/8-ST-5,08 (8-pole, cross-section 2.5 mm^2 max.) screw terminal blocks for the fieldbus and power supply:

X1 (IN)		Description
1	0V	Power supply for the module 24 V d.c. ± 10 %; maximum power consumption 160 mA
2	+24V	
3	DG1	Signal Ground
4	/DI1	Data in 1 (Inverted)
5	DI1	Data in 1
6	/DO1	Data out 1 (Inverted)
7	DO1	Data out 1
8	SHF	Filtered Shield (Connected to module earth via an RC filter)

X2 (OUT)		Description
1	SH	Shield (Module earth)
2	DI2	Data in 2
3	/DI2	Data in 2 (Inverted)
4	DO2	Data out 2
5	/DO2	Data out 2 (Inverted)
6	DG2	Signal Ground
7	RBST	Remote Bus Connector
8	RB5V	Signal +5V

General:

- All materials are UL/CSA approved
- Complies with EMC Standards EN 50081-2 and EN 50082-2

Appendix C – Ambient Conditions

Ambient Conditions, Operation

Ambient operating conditions refer to the conditions the adapter module is subjected to when installed for stationary use.

Air Temperature: 0 to +50 °C

Relative Humidity: 5 to 95 %, no condensation allowed. Maximum allowed relative humidity is 60 % in the presence of corrosive gases.

Contamination Levels:
Chemical gases: IEC 60721-3-3, Class 3C2
Solid particles: IEC 60721-3-3, Class 3S2

Installation Site Altitude: 0 to 2000 m. If installation site is above 2000 m, contact local ABB representative.

Vibration: Max 0.3 mm (2 to 9 Hz), max 1 m/s^2 (9 to 200 Hz) sinusoidal (IEC 60068-2-6)

Shock: Max 70 m/s^2, 22 ms (IEC 60068-2-27)

Ambient Conditions, Storage

Ambient storage conditions refer to the conditions the adapter module is subjected to during storage in the protective package.

Temperature: -40 to +70 °C.

Relative Humidity: Less than 95 %, no condensation allowed

Atmospheric Pressure: 70 to 106 kPa

Vibration: Max 1.5 mm (2 to 9 Hz), max 5 m/s^2 (9 to 200 Hz) sinusoidal (IEC 60068-2-6)

Shock: Max 100 m/s^2, 11 ms (IEC 68-2-27)

Ambient Conditions, Transportation

Ambient transportation conditions refer to the conditions the adapter module is subjected to during transportation in the protective package.

Temperature: -40 to +70 °C

Relative Humidity: Less than 95 %, no condensation allowed.

Atmospheric Pressure: 60 to 106 kPa

Vibration: Max 3.5 mm (2 to 9 Hz), max 15 m/s^2 (9 to 200 Hz) sinusoidal (IEC 60068-2-6)

Shock: Max 100 m/s^2, 11 ms (IEC 68-2-27)

Bump: Max 300 m/s^2, 6 ms (IEC 68-2-29)

Free Fall: 250 mm

NIBA-01/EN
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