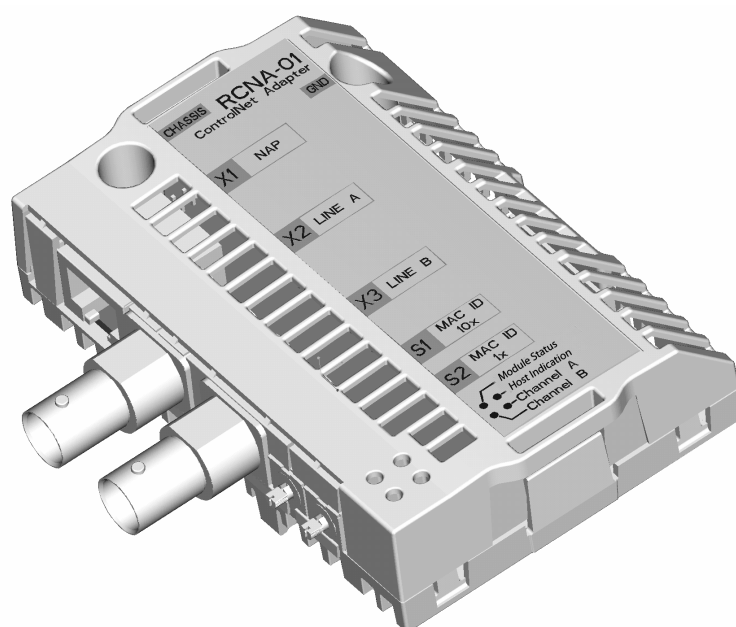


User's Manual ControlNet Adapter Module RCNA-01



ControlNet Adapter Module RCNA-01

User's Manual

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Safety instructions

Overview

This chapter states the general safety instructions that must be followed when installing and operating the RCNA-01 ControlNet Adapter module.

The material in this chapter must be studied before attempting any work on the unit.

In addition to the safety instructions given below, read the complete safety instructions of the specific drive you are working on.

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 to discharge for 5 minutes 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 on the unit. Neglecting these instructions can cause physical injury or death.

Table of contents

| | |
|--|---------------|
| Safety instructions | 5 |
| Overview | 5 |
| General safety instructions | 5 |
| Table of contents | 7 |
| Introduction | 11 |
| Overview | 11 |
| Intended audience | 11 |
| What this manual contains | 11 |
| Conventions used in this guide | 12 |
| Product and service inquiries | 13 |
| Product training | 13 |
| Providing feedback on ABB Drives manuals | 13 |
| Overview | 15 |
| Overview | 15 |
| Network overview | 15 |
| The RCNA-01 ControlNet Adapter module | 16 |
| Compatibility | 17 |
| Delivery check | 18 |
| Warranty and liability information | 18 |
| Mechanical installation | 19 |
| Mounting | 19 |
| Electrical installation | 21 |
| Overview | 21 |

| | |
|--|-----------|
| General cabling instructions | 21 |
| MacID selection | 21 |
| RCNA-01 connections | 22 |
| ControlNet connection | 22 |
| Network access port connection | 22 |
| Programming | 23 |
| Overview | 23 |
| Configuring the system | 23 |
| ControlNet connection configuration | 23 |
| Control locations | 24 |
| Communication | 33 |
| Overview | 33 |
| Introduction to ControlNet | 33 |
| Object modelling and functional profiles | 33 |
| Assembly object | 34 |
| Class objects | 41 |
| Identity Object, Class 0x01 | 41 |
| Assembly Object, Class 0x04 | 44 |
| ControlNet Object, Class 0xF0 | 45 |
| Motor Data Object, Class 0x28 | 48 |
| Control Supervisor Object, Class 0x29 | 49 |
| AC/DC-Drive Object, Class 0x2A | 53 |
| Vendor Specific Object, Class 0x90 | 55 |
| Vendor Specific ControlNet Configuration, Class 0x91 | 57 |
| Fault tracing | 61 |
| RCNA-01 status codes | 61 |
| Installation problems | 63 |
| Drive setup | 63 |
| PLC programming | 64 |
| Scanner fault indications | 64 |

| | |
|------------------------------------|-----------|
| <i>Technical data</i> | 65 |
| RCNA-01 | 65 |
| Fieldbus link | 66 |

Introduction

Overview

This chapter contains a description of the *User's Manual* for the RCNA-01 ControlNet Adapter module.

Intended audience

The guide is intended for the people who are responsible for installing, commissioning and using a ControlNet Adapter module with an ABB drive. The reader is expected to have a basic knowledge of electrical fundamentals, electrical wiring practices, the drive, the use of the drive control panel, and the ControlNet protocol.

What this manual contains

The installation and start-up of the RCNA-01 ControlNet Adapter module are introduced in this manual.

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.

Introduction contains a short description of the guide.

Overview contains a short description of the ControlNet protocol and the RCNA-01 ControlNet Adapter module, a delivery checklist and information on the manufacturer's warranty.

Mechanical installation contains placing and mounting instructions for the module.

Electrical installation contains wiring, earthing and node address setting instructions.

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

Communication contains a description of the ControlNet functionality supported by the RCNA-01.

Fault tracing describes how to diagnose the ControlNet connection during installation, commissioning, and normal operation.

Technical data contains information on physical dimensions, configurable settings and connectors of the module and a specification of the fieldbus link.

Conventions used in this guide

Communication Module

Communication Module is a 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 by a drive parameter.

Data Words

The Control Word (sometimes called the Command Word) and the Status Word, References and Actual Values (see chapter [Communication](#)) are types of data words; the contents of some data words are user-definable. For information, see the drive documentation.

Input

In this manual, the word 'input' is used to describe data flow to the ControlNet Scanner.

MacID

Every node on ControlNet network has to have a unique identifier. This node number is called MAC ID (Media Access Control Identification).

RCNA-01 ControlNet Adapter module

The RCNA-01 Adapter module is one of the optional fieldbus adapter modules available for ABB drives. The RCNA-01 is a device through which an ABB drive is connected to a ControlNet serial communication bus.

Output

In this manual, the word 'output' is used to describe data flow from the ControlNet Scanner.

Parameter

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

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type code and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/drives and selecting *Sales, Support and Service network*.

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives and select *Document Library – Manuals feedback form (LV AC drives)*.

Overview

Overview

This chapter contains a short description of ControlNet network, the RCNA-01 Adapter module, a delivery checklist, and warranty information.

Further information can be obtained from www.controlnet.org.

Network overview

The media for the fieldbus is a RG-6 quad shielded cable or fibre with support for media redundancy. The RCNA-01 Adapter module supports only RG-6 quad shielded cable (coax) for the bus connection. ControlNet is flexible in topology options (bus, tree, star) to meet various application needs. The fieldbus speed is 5 Mbits/s.

| ControlNet technical features summary | |
|---------------------------------------|--|
| Transmission technique: | Support for bus, star or tree topologies RG-6 quad shield cable Optional media redundancy Support for fibre optic cabling (Not supported by RCNA) Data rate 5 Mbit/s |
| Medium access: | Peer-to-peer Producer/Consumer Multicasts of both inputs and peer-to-peer data Multi-Scanner |

| ControlNet technical features summary | |
|--|--|
| Bus length: | 250 m (coax) with 48 nodes 1000 m (coax) with two nodes 5000 m (coax) with repeaters 3000 m fibre 30000 m (fibre) with repeaters |
| Process data: | Time-deterministic Repeatable |

The RCNA-01 ControlNet Adapter module

The RCNA-01 ControlNet Adapter module can not originate connections on its own, but a scanner node can open a connection towards it. The ControlNet protocol is implemented according to the ControlNet international specification for a Communication adapter (profile number 12).

Through the RCNA-01 ControlNet 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
- read and write drive parameter values
- reset a drive fault.

A connection to the RCNA-01 ControlNet Adapter can be opened from a ControlNet scanner. The size of the connection can be up to 450 bytes in each direction.

MacID (Node address) is selected by two decimal rotary switches. The range is 1 to 99.

The module is equipped with two BNC contacts for connection to ControlNet. If redundant operation is desired, both connectors are used, otherwise connector A or B is used.

The module is also equipped with a NAP (Network access port) for temporary connection of configuration tools, e.g. a PC card. The minimum Network update time (NUT) of the module is 5 ms.

The adapter module is mounted into an option slot inside the drive. See the Hardware Manual of the drive for module placement options.

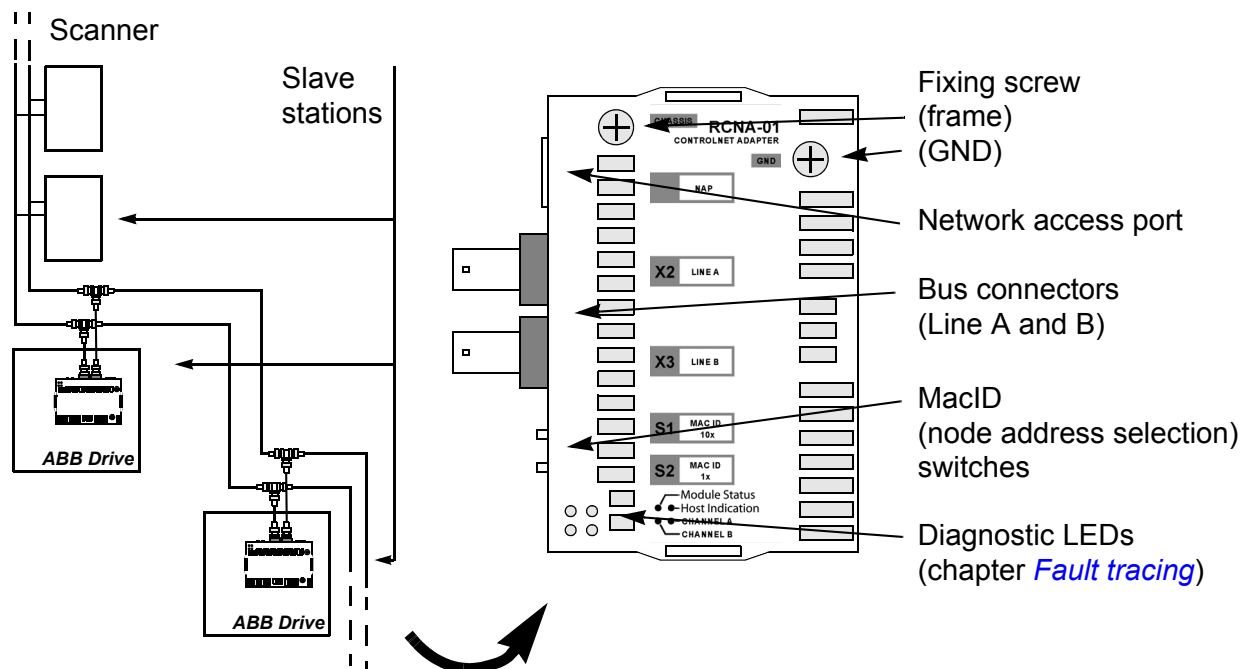


Figure 1. The construction of the ControlNet link and the layout of the RCNA-01 Adapter module

Compatibility

The RCNA-01 is compatible with all scanners working according to the ControlNet International ControlNet specifications.

Delivery check

The option package for the RCNA-01 ControlNet Adapter module contains:

- ControlNet Adapter module, type RCNA-01
- two screws (M3x10)
- this manual.

Warranty and liability information

The manufacturer warrants the equipment supplied against defects in design, materials and workmanship for a period of twelve (12) months after installation or twenty-four (24) months from date of manufacturing, whichever first occurs. The local ABB office or distributor may grant a warranty period different to the above and refer to local terms of liability as defined in the supply contract.

The manufacturer is not responsible for

- any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the drive do not fulfil the requirements specified in the documentation delivered with the unit and other relevant documentation
- units subjected to misuse, negligence or accident
- units comprised of materials provided or designs stipulated by the purchaser.

In no event shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

If you have any questions concerning your ABB drive, please contact the local distributor or ABB office. The technical data, information and specifications are valid at the time of printing. The manufacturer reserves the right to modifications without prior notice.

Mechanical installation



WARNING! Follow the safety instructions given in this manual and in the Hardware Manual.

Mounting

The RCNA-01 is to be inserted into its option slot inside the drive. The module is held in place with plastic retaining clips and two screws. The screws also provide the earthing of the I/O cable shield connected to the module, and interconnect the GND signals of the module and the control board of the drive.

On installation of the module, the signal and power connection to the drive is automatically made through a 34-pin connector.

Mounting procedure:

- Insert the module carefully into its position inside the drive until the retaining clips lock the module into position.
- Fasten the two screws (included) to the stand-offs.
- Set the bus termination switch of the module to the required position.

Note: Correct installation of the screws is essential for fulfilling the EMC requirements and for proper operation of the module.

Electrical installation

Overview

This chapter contains:

- general cabling instructions
- instructions on setting the module node address number
- instructions for connecting the module to the ControlNet bus.



WARNING! Before installation, switch off the drive power supply. Wait 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.

General cabling instructions

Bus cables are specified in chapter [Technical data](#).

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

MacID selection

The MacID (Node address) is set with the two rotary decimal switches in the front of the module. The range is 1 to 99. The value is read from the switches right after completion of the initialisation procedure, and they shall not be changed during operation. If changed, a minor fault will be detected and the MacID will not change until the next power-up or the module receives a 'Fieldbus Adapter parameter refresh' command from the drive.

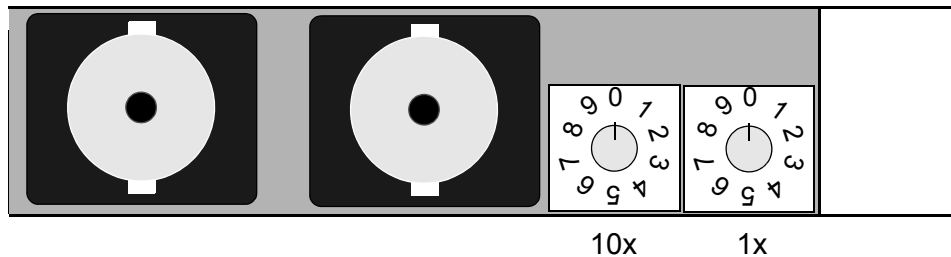


Figure 2. Node address selection

RCNA-01 connections

ControlNet connection

The bus cable is connected to the BNC connectors A and/or B on the RCNA-01. If redundant operation is desired, both connectors are used, otherwise connector A or B is used.

ControlNet bus termination

The ControlNet bus line must be terminated with 75 ohm resistor. See fieldbus details in chapter [Technical data](#).

Network access port connection

The module is also equipped with a NAP (Network access port) for temporary connection of configuration tools, e.g. a PC card. The minimum Network update time (NUT) of the module is 5 ms.

Programming

Overview

This chapter gives information on configuring the RCNA-01 ControlNet Adapter module.

Configuring the system

After the RCNA-01 ControlNet Adapter module has been mechanically and electrically installed according to the instructions in chapters [Mechanical installation](#) and [Electrical installation](#), the drive must be prepared for communication with the module and Scanner.

Please refer to the Scanner documentation for information on configuring the system for communication with the RCNA-01. Configuration (EDS) files for the RCNA-01 are available at www.abb.com.

ControlNet connection configuration

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

As communication between the drive and the RCNA-01 is established, several configuration parameters are copied to the drive. These parameters (shown in [Table 1. The RCNA-01 configuration parameters](#)) must be checked first and adjusted if necessary. The alternative selections for these parameters are discussed in more detail below the table.

Note: The new settings take effect only when the module is powered up or when the module receives a 'Fieldbus Adapter parameter refresh' command from the drive.

Note: The grouping, numbering, and adjustment procedure of parameters vary from drive to drive. See the drive documentation for information.

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. RCNA-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 Scanner 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.

Table 1. The RCNA-01 configuration parameters

| Fieldbus par. no. | Parameter name | Alternative settings | Default setting |
|-------------------|------------------|---------------------------------|-----------------|
| 1 | MODULE TYPE* | ControlNet | ControlNet |
| 2 | Module MacID | 0...99 | 99 |
| 3 | Module Baud rate | 5 = 5 MBit/s | 5 |
| 4 | HW/SW Option | 0 = Hardware 1 = Software | 0 |
| 5 | Stop Function | 0 = Ramp stop 1 = Coast stop | 0 |
| 6 | Output Instance | 20 ... 121 | 20 |
| 7 | Input Instance | 70 ... 171 | 70 |
| 8 | Output I/O Par 1 | 0 ... 32767 | 0 |
| 9 | Output I/O Par 2 | 0 ... 32767 | 0 |
| 10 | Output I/O Par 3 | 0 ... 32767 | 0 |
| 11 | Output I/O Par 4 | 0 ... 32767 | 0 |

| | | | |
|-----------|------------------|-------------|---|
| 12 | Input I/O Par 1 | 0 ... 32767 | 0 |
| 13 | Input I/O Par 2 | 0 ... 32767 | 0 |
| 14 | Input I/O Par 3 | 0 ... 32767 | 0 |
| 15 | Input I/O Par 4 | 0 ... 32767 | 0 |
| 16 | Output I/O Par 5 | 0 ... 32767 | 0 |
| 17 | Output I/O Par 6 | 0 ... 32767 | 0 |
| 18 | Output I/O Par 7 | 0 ... 32767 | 0 |
| 19 | Output I/O Par 8 | 0 ... 32767 | 0 |
| 20 | Output I/O Par 9 | 0 ... 32767 | 0 |
| 21 | Input I/O Par 5 | 0 ... 32767 | 0 |
| 22 | Input I/O Par 6 | 0 ... 32767 | 0 |
| 23 | Input I/O Par 7 | 0 ... 32767 | 0 |
| 24 | Input I/O Par 8 | 0 ... 32767 | 0 |
| 25 | Input I/O Par 9 | 0 ... 32767 | 0 |
| 26 | VSA I/O Size | 1 ... 32 | 2 |

* Parameter 1 (MODULE TYPE) is read-only.

Note: The Default values are used when the module is connected to the drive for the first time. The parameters in the fieldbus group must be set up for the current application.

01 MODULE TYPE

Shows the connected communication option module type.

02 Module MacID

Selects the MAC ID for the node.

0 ... 99

On a ControlNet network, each node is identified by a unique node number. This node number is between 0 and 99, and it is called MAC ID.

Note: When parameter 04 HW/SW Option is set to 0=HW this parameter is read-only and its value is set by rotary switches. See chapter [Electrical installation](#).

03 Module Baud rate

Indicates the baud rate of the ControlNet interface. The baud rate is fixed to 5 MBit/s.

5 = 5 MBit/s

04 HW/SW Option

Defines the selection source of module MacID.

0 = selection of MAC ID via the rotary switches enabled.

1 = selection of MAC ID via parameter 02 and via the ControlNet Object enabled (see chapter [Communication sub-section ControlNet Object, Class 0xF0](#)).

05 Stop Function

Defines the method for stopping the motor.

0 = Ramp stop: the motor decelerates along the active deceleration ramp.

1 = Coast stop: the motor comes to a stop by coasting.

06 Output Instance

07 Input Instance

These parameters define the preferred output and input assemblies respectively.

The instances 20, 70, 21 and 71 are so-called Drive Profile instances as defined in the ControlNet specification (AC/DC Drive profile). The instances 121 and 171 correspond to instances 21 and 71, but contain additional space for user-mapped data. The instances 100, 101, 102 and 103 are so-called vendor-specific instances as defined by ABB, i.e. the control word, status word, speed reference and speed actual value are defined by the ABB Drives communication profile.

The static/dynamic property indicates whether the data length of the instance is fixed or adjustable.

| Output instances | | |
|-------------------------|--|-----------------------|
| Instance | Assembly | Static/Dynamic |
| 20 | Basic speed control output | Static |
| 21 | Extended speed control output | Static |
| 100 | User transparent assembly | Static |
| 102 | Vendor specific assembly | Dynamic |
| 121 | Extended speed control plus drive parameters | Dynamic |

| Input instances | | |
|------------------------|--|-----------------------|
| Instance | Assembly | Static/Dynamic |
| 70 | Basic speed control input | Static |
| 71 | Extended speed control input | Static |
| 101 | User transparent assembly | Static |
| 103 | Vendor specific assembly | Dynamic |
| 171 | Extended speed control plus drive parameters | Dynamic |

The following table shows the possible combinations of output and input instances.

| Possible instance combinations | | |
|---------------------------------------|-----------------------|---|
| Output instance | Input instance | Communication profile to be used |
| 20 | 70 | Generic Drive profile |
| | 71 | Generic Drive profile |
| | 103 | Generic Drive profile |
| | 171 | Generic Drive profile |
| 21 | 70 | Generic Drive profile |
| | 71 | Generic Drive profile |
| | 103 | Generic Drive profile |
| | 171 | Generic Drive profile |

| Possible instance combinations | | |
|--------------------------------|----------------|----------------------------------|
| Output instance | Input instance | Communication profile to be used |
| 100 | 101 | ABB Drives profile |
| | 103 | ABB Drives profile |
| 102 | 101 | ABB Drives profile |
| | 103 | ABB Drives profile |
| 121 | 70 | Generic Drive profile |
| | 71 | Generic Drive profile |
| | 103 | Generic Drive profile |
| | 171 | Generic Drive profile |

Selecting an invalid combination will reset the module and automatically configure the instances as follows:

- 1) If the output instance is invalid, instance **20** will be selected.
- 2) If the output instance is valid, but the input instance is invalid, the default input instance will be selected as follows:

| Output instance | Default input instance |
|-----------------|------------------------|
| 20 | 70 |
| 21 | 71 |
| 100 | 101 |
| 102 | 103 |
| 121 | 171 |

08 Output I/O Par 1

Defines the data word or drive parameter that can be set with Assembly object instances 102 and 121 (see chapter [Communication](#) subsection [VENDOR SPECIFIC assembly](#)).

The content is defined by a decimal number in the range of 0 to 32767 as follows:

| | |
|---------------|-----------------------------|
| 0 | not used |
| 1 - 99 | data set area of the drive |
| 101 - 9999 | parameter area of the drive |
| 10000 - 32767 | not supported by the drive |

| | |
|--|--------------------|
| The data set area is allocated as follows: | |
| 1 | data set 1 word 1 |
| 2 | data set 1 word 2 |
| 3 | data set 1 word 3 |
| 4 | data set 2 word 1 |
| 5 | data set 2 word 2 |
| 6 | data set 2 word 3 |
| 7 | data set 3 word 1 |
| ... | |
| 99 | data set 33 word 3 |

The parameter area is allocated as follows:

Parameter number with format xxyy, where xx is the parameter group number (1 to 99) and yy is the parameter number index inside the group (01 to 99).

09 to 11 Output I/O Par 2 to Output I/O Par 4

See parameter [08 Output I/O Par 1](#).

12 Input I/O Par 1

Defines the data word or drive parameter that can be read with Assembly object instances 103 and 171 (see chapter [Communication](#) subsection [VENDOR SPECIFIC assembly](#)).

The content is defined by a decimal number in the range of 0 to 32767 as follows:

| | |
|---------------|-----------------------------|
| 0 | not used |
| 1 - 99 | data set area of the drive |
| 101 - 9999 | parameter area of the drive |
| 10000 - 32767 | not supported by the drive |

| The data set area is allocated as follows: | |
|--|--------------------|
| 1 | data set 1 word 1 |
| 2 | data set 1 word 2 |
| 3 | data set 1 word 3 |
| 4 | data set 2 word 1 |
| 5 | data set 2 word 2 |
| 6 | data set 2 word 3 |
| 7 | data set 3 word 1 |
| ... | |
| 99 | data set 33 word 3 |

The parameter area is allocated as follows:

Parameter number with format xxyy, where xx is the parameter group number (1 to 99) and yy is the parameter number index inside the group (01 to 99).

13 to 15 Input I/O Par 2 to Input I/O Par 4

See parameter [12 Input I/O Par 1](#).

16 to 20 Output I/O Par 5 to Output I/O Par 9

See parameter [08 Output I/O Par 1](#).

21 to 25 Input I/O Par 5 to Input I/O Par 9

See parameter [12 Input I/O Par 1](#).

26 VSA I/O Size

Defines the number of user-mapped data words in Vendor Specific assemblies (instances 102, 103, 121 and 171). The value of this parameter directly specifies the size (in words) of instances 102 and 103, whereas the size of instances 121 and 171 will be the value of this parameter plus two words.

1 ... 32

Note: The Vendor Specific ControlNet Configuration object, Class 0x91, is activated when the VSA I/O size is set to 10 or larger.

Communication

Overview

This chapter describes the ControlNet communication protocol for the RCNA-01 and the configuration of the scanner. For detailed information on ControlNet communication, refer to ControlNet specifications.

Introduction to ControlNet

The interface from the fieldbus towards the RCNA-01 is based on the standard ControlNet objects and vendor specific objects.

The RCNA-01 has the following objects included:

| Object Name | Class |
|--|-------|
| Identity Object | 0x01 |
| Assembly Object | 0x04 |
| Connection Manager Object | 0x06 |
| ControlNet Object | 0xF0 |
| Motor Data Object | 0x28 |
| Control Supervisor Object | 0x29 |
| AC/DC Drive Object | 0x2A |
| Vendor Specific Object | 0x90 |
| Vendor Specific ControlNet Configuration | 0x91 |

Object modelling and functional profiles

One of the main features of ControlNet is object modelling. A group of objects can be described with a Functional Profile. The RCNA-01 realises the ControlNet International AC/DC Drive Functional Profile with additional features.

Assembly object

I/O Assembly Instances may also be referred to as Block Transfer of data. Intelligent devices realising a Functional Profile, such as the RCNA-01, have several objects. Since it is not possible to transmit more than one object data through a single connection, it is practical and more efficient to group attributes from different objects into a single I/O connection using the Assembly object. The Assembly object acts as a tool for grouping these attributes.

The Assembly selections described above are in fact Instances of the Assembly object class. The RCNA-01 uses Static assemblies (in other words, fixed groupings of different object data only), except for the Vendor Specific Assembly. These are predefined and cannot be changed.

The following tables describe the predefined assembly instances supported by the RCNA-01.

Note: Add 4 extra bytes (2 words) to all the input assemblies; for example, the total size of Input Assembly Instance 70 is 4 bytes + 4 extra bytes = 8 bytes. For output assemblies, the extra bytes must not be added.

The configuration parameter 26 VSA I/O SIZE must be configured without these extra bytes.

BASIC SPEED CONTROL assembly

The BASIC SPEED CONTROL assembly is defined by the ControlNet AC/DC Drive Profile. The format of the output assembly is:

| Instance 20 (Output assembly) | | | | | | | | |
|-------------------------------|-------------------------------|-------|-------|-------|-------|-------------|-------|---------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | | | | | | Fault reset | | Run fwd |
| 1 | | | | | | | | |
| 2 | Speed Reference (Low Byte) * | | | | | | | |
| 3 | Speed Reference (High Byte) * | | | | | | | |

* Scaling of Speed Reference is configured by Speed Scale attribute in AC/DC-Drive Object (class 0x2A, instance 0x01, attribute 0x16), and it defaults to 1 rpm.

The format of the input assembly is:

| Instance 70 (Input assembly) | | | | | | | | |
|------------------------------|----------------------------------|-------|-------|-------|-------|-----------|-------|---------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | | | | | | Running 1 | | Faulted |
| 1 | | | | | | | | |
| 2 | Speed Actual Value (Low Byte) * | | | | | | | |
| 3 | Speed Actual Value (High Byte) * | | | | | | | |

* Scaling of Speed Actual Value is configured by Speed Scale attribute in AC/DC-Drive Object (class 0x2A, instance 0x01, attribute 0x16), and it defaults to 1 rpm.

Note: If the BASIC SPEED CONTROL or the EXTENDED SPEED CONTROL assembly is used, it must be ensured that the fieldbus is selected as the drive control source and fieldbus specific (Generic Drive profile) Control/Status Word format is selected instead of ABB Drives profile.

EXTENDED SPEED CONTROL assembly

The EXTENDED SPEED CONTROL assembly is defined by the ControlNet AC/DC Drive Profile. The format of the output assembly is:

| Instance 21 (Output assembly) | | | | | | | | |
|-------------------------------|-------------------------------|--------|---------|-------|-------|-------------|-------------|-------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | | NetRef | NetCtrl | | | Fault Reset | Run Reverse | Run Forward |
| 1 | | | | | | | | |
| 2 | Speed Reference (Low Byte) * | | | | | | | |
| 3 | Speed Reference (High Byte) * | | | | | | | |

* See [BASIC SPEED CONTROL assembly](#) for information on speed reference scaling.

The format of the input assembly is:

| Instance 71 (Input assembly) | | | | | | | | |
|-------------------------------------|----------------------------------|--------------|---------------|--------------|-----------------|-----------------|--------------|--------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | At Reference | Ref From Net | Ctrl From Net | Ready | Running Reverse | Running Forward | Warning | Faulted |
| 1 | Drive State | | | | | | | |
| 2 | Speed Actual Value (Low Byte) * | | | | | | | |
| 3 | Speed Actual Value (High Byte) * | | | | | | | |

* See [BASIC SPEED CONTROL assembly](#) for information on speed actual value scaling.

USER TRANSPARENT assembly

USER TRANSPARENT assembly allows the use of the ABB Drives communication profile. The format of the output assembly is:

| Instance 100 (Output assembly) | | | | | | | | |
|---------------------------------------|-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Control Word (Low Byte) | | | | | | | |
| 1 | Control Word (High Byte) | | | | | | | |
| 2 | Speed Reference (Low Byte) * | | | | | | | |
| 3 | Speed Reference (High Byte) * | | | | | | | |

* Refer to Drive User's Manual for scaling.

The format of the input assembly is:

| Instance 101 (Input assembly) | | | | | | | | |
|--------------------------------------|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Status Word (Low Byte) | | | | | | | |
| 1 | Status Word (High Byte) | | | | | | | |
| 2 | Speed Actual Value (Low Byte) * | | | | | | | |
| 3 | Speed Actual Value (High Byte) * | | | | | | | |

* Refer to Drive User's Manual for scaling.

VENDOR SPECIFIC assembly

VENDOR SPECIFIC assembly allows the use of the ABB Drives communication profile. The format of the output assembly is:

| Instance 102 (Output assembly) | | | | | | | | |
|--------------------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Output I/O 1 (Low Byte) | | | | | | | |
| 1 | Output I/O 1 (High Byte) | | | | | | | |
| 2 | Output I/O 2 (Low Byte) | | | | | | | |
| 3 | Output I/O 2 (High Byte) | | | | | | | |
| 4 | Output I/O 3 (Low Byte) | | | | | | | |
| 5 | Output I/O 3 (High Byte) | | | | | | | |
| 6 | Output I/O 4 (Low Byte) | | | | | | | |
| 7 | Output I/O 4 (High Byte) | | | | | | | |
| 8 | Output I/O 5 (Low Byte) | | | | | | | |
| 9 | Output I/O 5 (High Byte) | | | | | | | |
| 10 | Output I/O 6 (Low Byte) | | | | | | | |
| 11 | Output I/O 6 (High Byte) | | | | | | | |
| 12 | Output I/O 7 (Low Byte) | | | | | | | |
| 13 | Output I/O 7 (High Byte) | | | | | | | |
| 14 | Output I/O 8 (Low Byte) | | | | | | | |
| 15 | Output I/O 8 (High Byte) | | | | | | | |
| 16 | Output I/O 9 (Low Byte) | | | | | | | |
| 17 | Output I/O 9 (High Byte) | | | | | | | |

The value of Output I/O 1 to 9 sets the data word or drive parameter defined by Output I/O Par 1 to 9 respectively. See chapter [Programming](#).

Output I/O 10 to 32 can be configured through the Vendor Specific ControlNet Configuration object, Class 0x91.

Note: the max number of output I/O's supported by the drive depends on the drive type and application.

The format of the input assembly is:

| Instance 103 (Input assembly) | | | | | | | | |
|--------------------------------------|-------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | Input I/O 1 (Low Byte) | | | | | | | |
| 1 | Input I/O 1 (High Byte) | | | | | | | |
| 2 | Input I/O 2 (Low Byte) | | | | | | | |
| 3 | Input I/O 2 (High Byte) | | | | | | | |
| 4 | Input I/O 3 (Low Byte) | | | | | | | |
| 5 | Input I/O 3 (High Byte) | | | | | | | |
| 6 | Input I/O 4 (Low Byte) | | | | | | | |
| 7 | Input I/O 4 (High Byte) | | | | | | | |
| 8 | Input I/O 5 (Low Byte) | | | | | | | |
| 9 | Input I/O 5 (High Byte) | | | | | | | |
| 10 | Input I/O 6 (Low Byte) | | | | | | | |
| 11 | Input I/O 6 (High Byte) | | | | | | | |
| 12 | Input I/O 7 (Low Byte) | | | | | | | |
| 13 | Input I/O 7 (High Byte) | | | | | | | |
| 14 | Input I/O 8 (Low Byte) | | | | | | | |
| 15 | Input I/O 8 (High Byte) | | | | | | | |
| 16 | Input I/O 9 (Low Byte) | | | | | | | |
| 17 | Input I/O 9 (High Byte) | | | | | | | |

The value of Input I/O 1 to 9 is read from the data word or drive parameter defined by Input I/O Par 1 to 9 respectively. See chapter [Programming](#).

Input I/O 10 to 32 can be configured through the Vendor Specific ControlNet Configuration object, Class 0x91.

Note: the max number of output I/O's supported by the drive depends on the drive type and application.

Note: If the BASIC SPEED CONTROL or the EXTENDED SPEED CONTROL assembly is used, it must be ensured that the fieldbus is selected as the drive control source and fieldbus specific (Generic Drive profile) Control/Status Word format is selected instead of ABB Drives profile.

EXTENDED SPEED CONTROL PLUS DRIVE PARAMETERS assembly

EXTENDED SPEED CONTROL PLUS DRIVE PARAMETERS assembly allows the use of ControlNet AC/DC Drive Profile with additional user-mapped parameters. The format of the output assembly is:

| Instance 121 (Output assembly) | | | | | | | | |
|---------------------------------------|-------------------------------|--------------|--------------|--------------|--------------|----------------|----------------|----------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | | NetRef | NetCtrl | | | Fault Reset | Run Reverse | Run Forward |
| 1 | | | | | | | | |
| 2 | Speed Reference (Low Byte) * | | | | | | | |
| 3 | Speed Reference (High Byte) * | | | | | | | |
| 4 | Output I/O 1 (Low Byte) | | | | | | | |
| 5 | Output I/O 1 (High Byte) | | | | | | | |
| 6 | Output I/O 2 (Low Byte) | | | | | | | |
| 7 | Output I/O 2 (High Byte) | | | | | | | |
| 8 | Output I/O 3 (Low Byte) | | | | | | | |
| 9 | Output I/O 3 (High Byte) | | | | | | | |
| 10 | Output I/O 4 (Low Byte) | | | | | | | |
| 11 | Output I/O 4 (High Byte) | | | | | | | |
| 12 | Output I/O 5 (Low Byte) | | | | | | | |
| 13 | Output I/O 5 (High Byte) | | | | | | | |
| 14 | Output I/O 6 (Low Byte) | | | | | | | |
| 15 | Output I/O 6 (High Byte) | | | | | | | |
| 16 | Output I/O 7 (Low Byte) | | | | | | | |
| 17 | Output I/O 7 (High Byte) | | | | | | | |
| 18 | Output I/O 8 (Low Byte) | | | | | | | |
| 19 | Output I/O 8 (High Byte) | | | | | | | |
| 20 | Output I/O 9 (Low Byte) | | | | | | | |
| 21 | Output I/O 9 (High Byte) | | | | | | | |

* See [BASIC SPEED CONTROL assembly](#) for information on speed reference scaling.

The value of Output I/O 1 to 9 sets the data word or drive parameter defined by Output I/O Par 1 to 9 respectively. See chapter [Programming](#).

Input I/O 10 to 32 can be configured through the Vendor Specific ControlNet Configuration object, Class 0x91.

Note: The maximum number of input I/O's supported by the drive depends on the drive type and application.

The format of the input assembly is:

| Instance 171 (Input assembly) | | | | | | | | |
|--------------------------------------|----------------------------------|--------------------|---------------------|--------------|--------------------|--------------------|--------------|--------------|
| Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| 0 | At Refer- ence | Ref From Net | Ctrl From Net | Ready | Running Reverse | Running Forward | Warn- ing | Faulted |
| 1 | Drive state | | | | | | | |
| 2 | Speed Actual Value (Low Byte) * | | | | | | | |
| 3 | Speed Actual Value (High Byte) * | | | | | | | |
| 4 | Input I/O 1 (Low Byte) | | | | | | | |
| 5 | Input I/O 1 (High Byte) | | | | | | | |
| 6 | Input I/O 2 (Low Byte) | | | | | | | |
| 7 | Input I/O 2 (High Byte) | | | | | | | |
| 8 | Input I/O 3 (Low Byte) | | | | | | | |
| 9 | Input I/O 3 (High Byte) | | | | | | | |
| 10 | Input I/O 4 (Low Byte) | | | | | | | |
| 11 | Input I/O 4 (High Byte) | | | | | | | |
| 12 | Input I/O 5 (Low Byte) | | | | | | | |
| 13 | Input I/O 5 (High Byte) | | | | | | | |
| 14 | Input I/O 6 (Low Byte) | | | | | | | |
| 15 | Input I/O 6 (High Byte) | | | | | | | |
| 16 | Input I/O 7 (Low Byte) | | | | | | | |
| 17 | Input I/O 7 (High Byte) | | | | | | | |
| 18 | Input I/O 8 (Low Byte) | | | | | | | |
| 19 | Input I/O 8 (High Byte) | | | | | | | |
| 20 | Input I/O 9 (Low Byte) | | | | | | | |
| 21 | Input I/O 9 (High Byte) | | | | | | | |

* See [BASIC SPEED CONTROL assembly](#) for information on speed actual value scaling.

The value of Input I/O 1 to 9 is read from the data word or drive parameter defined by Input I/O Par 1 to 9 respectively. See chapter [Programming](#).

Input I/O 10 to 32 can be configured through the Vendor Specific ControlNet Configuration object, Class 0x91.

Note: The maximum number of output I/O's supported by the drive depends on the drive type and application.

Class objects

| Legend | Data type |
|--------|-------------------------|
| UINT8 | Unsigned Integer 8 bit |
| UINT16 | Unsigned Integer 16 bit |
| SINT16 | Signed Integer 16 bit |
| UINT32 | Unsigned Integer 32 bit |
| BOOL | Boolean value |

Identity Object, Class 0x01

This object provides identification of and general information about the device.

Services Supported

| Service Code No. | Service Name |
|------------------|-------------------|
| 0x01 | Get attribute all |
| 0x05 | Reset |

Class attributes

| ID# | Attribute name | Services | Description | Default, Min, Max | Data type |
|------|----------------|----------|---|----------------------------|------------------------|
| 0x01 | Vendor ID | Get | Identification of the device vendor | 46 | UINT16 |
| 0x02 | Device Type | Get | Identification of the general product type | 2 | UINT16 |
| 0x03 | Product Code | Get | Assigned vendor code to describe the device | Drive dependent (e.g. 101) | UINT16 |
| 0x04 | Revision | Get | Revision of the item the Identity Object represents | | Array [UINT8 UINT8] |
| 0x05 | Status | Get | Summary Status of the Device | 0, 0, 255 | UINT16 |
| 0x06 | Serial Number | Get | Serial Number of the DeviceNet module | N/A, N/A, N/A | UINT32 |
| 0x07 | Product Name | Get | Product identification, Max 32 characters | RCNA-01 and ACSxxx | Short String |

*Attribute explanations***Vendor ID**

Vendor IDs are managed by ControlNet International. The ABB Vendor ID is 46.

Device Type

The list of device types is managed by ControlNet International. It is used to identify the device profile that a particular product is using.

Product Code

Every ABB drive type or application of the drive has a dedicated product code.

Revision

Revision attribute, which consists of Major and Minor Revisions, identifies the Revision of the item the Identity Object is representing.

Status

This attribute represents the current status of the entire device. Its value changes as the state of the device changes. The Status attribute is a WORD, with the following bit definitions:

| Bit(s) | Type/Name | Definition |
|--------------|---------------------------|---|
| 0 | Owned | TRUE indicates the device (or an object within the device) has an owner. Within the Master/Slave paradigm the setting of this bit means that the Predefined Master/Slave Connection Set has been allocated to a master. Outside the Master/Slave paradigm the meaning of this bit is to be defined. |
| 1 | | Reserved, set to 0. |
| 2 | Configured | TRUE indicates the application of the device has been configured to do something that differs from the “out-of-box” default. This does not include configuration of the communications. |
| 3 | | Reserved, set to 0. |
| 4, 5, 6, 7 | | Vendor-specific |
| 8 | Minor Recoverable Fault | TRUE indicates the device detected a recoverable problem. The problem does not cause the device to go into a faulted state. |
| 9 | Minor Unrecoverable Fault | TRUE indicates the device detected a unrecoverable problem. The problem does not cause the device to go into a faulted state. |
| 10 | Major Recoverable Fault | TRUE indicates the device detected a problem which caused the device to go into the “Major Recoverable Fault” state. |
| 11 | Major Unrecoverable Fault | TRUE indicates the device detected a problem which caused the device to go into the “Major Unrecoverable Fault” state. |
| 12,13, 14,15 | | Reserved, set to 0. |

Serial Number:

This attribute is a number used in conjunction with the Vendor ID to form a unique identifier for each device on ControlNet.

Product Name:

This text string should represent a short description of the product/product family represented by the product code in attribute 3.

Assembly Object, Class 0x04

The Assembly Object binds attributes of multiple objects which allows data to or from each object to be sent or received over a single connection. Assembly objects can be used to bind input data or output data. The terms “input” and “output” are defined from the network’s point of view. An input will produce data on the network and an output will consume data from the network.

Services Supported

| Service Code No. | Service Name |
|-------------------------|----------------------|
| 0x0E | Get Attribute Single |
| 0x10 | Set Attribute Single |

Only the instances selected by configuration parameters 06 (Output Instance) and 07 (Input Instance) can be accessed through this class. Write requests (Set service) are rejected if the assembly instance is linked with an active I/O connection and the scanner is in Run mode. Writes to the instances containing actual data from drive will have no effect.

| Instance | Attribute | Service | Description |
|---------------|-----------|---------|--|
| 0x14 (20) | 3 | Get/Set | Accesses assembly instance 20 as a byte array. |
| 0x15 (21) | 3 | Get/Set | Accesses assembly instance 21 as a byte array. |
| 0x46 (70) | 3 | Get/Set | Accesses assembly instance 70 as a byte array. Set has no effect, since instance 70 contains actual data from the drive. |
| 0x47 (71) | 3 | Get/Set | Accesses assembly instance 71 as a byte array. Set has no effect, since instance 71 contains actual data from the drive. |
| 0x64 (100) | 3 | Get/Set | Accesses assembly instance 100 as a byte array. |
| 0x65 (101) | 3 | Get/Set | Accesses assembly instance 101 as a byte array. Set has no effect, since instance 101 contains actual data from the drive. |
| 0x66 (102) | 3 | Get/Set | Accesses assembly instance 102 as a byte array. |
| 0x67 (103) | 3 | Get/Set | Accesses assembly instance 103 as a byte array. Set has no effect, since instance 103 contains actual data from the drive. |
| 0x79 (121) | 3 | Get/Set | Accesses assembly instance 121 as a byte array. |
| 0xAB (171) | 3 | Get/Set | Accesses assembly instance 171 as a byte array. Set has no effect, since instance 171 contains actual data from the drive. |

ControlNet Object, Class 0xF0

Services Supported

| Service Code No. | Service Name |
|------------------|----------------------|
| 0x05 | Reset |
| 0x0E | Get Attribute Single |
| 0x4C | Get and Clear |

Class attributes

| ID# | Attribute name | Services | Description | Value | Data type |
|------|----------------|----------|-------------------------|---------------|-----------|
| 0x02 | Max instance | Get | Maximum instance number | Node specific | UINT |

Instance 0x01, Attributes

| ID# | Attribute name | Services | Description | Data type |
|------|-------------------------------|---------------------------------------|--|--------------------|
| 0x81 | Current link config | Get Attribute Single | Current link configuration parameters | Struct of 34 bytes |
| 0x82 | Diagnostic counters | Get_Attribute_Single Get_And_Clear | Diagnostic counters | Struct of 42 bytes |
| | Buffer errors | | Buffer event counter | UINT |
| | Error log | | Bad Mac frame log | Byte[8] |
| | Event counters | | Diagnostic counters | Struct of 32 bytes |
| | Good frames transmitted | | Good Mac frames transmitted (LSB first) | Byte[3] |
| | Good frame received | | Good Mac frames received (LSB first) | Byte[3] |
| | Selected channel frame errors | | Framing errors detected on active receive channel | USINT |
| | Channel A frame errors | | Framing errors detected on channel A | USINT |
| | Channel B frame errors | | Framing errors detected on channel B | USINT |
| | Aborted frames transmitted | | MAC frames aborted during transmission (transmit underflows) | USINT |
| | Highwaters | | LCC transmit underflow and LCC receiver underflow | USINT |

| ID# | Attribute name | Services | Description | Data type |
|-----|-------------------------|----------|---|-----------|
| | NUT overflow | | No unscheduled time in NUT (all time used for scheduled transmissions) | USINT |
| | Slot overloads | | More scheduled data queued for one NUT than allowed by sched_max_frame parameter. | USINT |
| | Blockages | | Single Lpacket size exceeds sched_max_frame parameter. | USINT |
| | Non concurrence | | Two or more nodes could not agree whose turn it is to transmit. | USINT |
| | Aborted frames received | | Incomplete MAC frames received. | USINT |
| | Lonely counter | | Number of times nothing heard on network for 8 or more NUT's. | USINT |
| | Duplicate Node | | Mac frame received from node with local nodes MacID. | USINT |
| | Noise hits | | Noise detected that locked modem rx PLL. | USINT |
| | Collisions | | Rx data heard just when transmit started. | USINT |
| | Mod MAC ID | | MAC ID of the current moderator node. | USINT |
| | Non lowman mods | | Moderator frames heard from non-lowman nodes. | USINT |
| | Rouge count | | Rouge events detected. | USINT |
| | Unheard moderator | | MAC frames being heard but no moderators being heard. | USINT |
| | Vendor specific | | | USINT |
| | Reserved | | Reserved | Byte[4] |
| | Vendor specific | | | USINT |

| ID# | Attribute name | Services | Description | Data type |
|------|-----------------|----------------------|---|--------------------|
| | Vendor specific | | | USINT |
| | Reserved | | Reserved | Byte |
| 0x83 | Station status | | Station status | Struct of 6 bytes |
| | SMAC ver | | MAC implementation | USINT |
| | Vendor specific | | | USINT |
| | Channel state | | Channel LED's redundancy warning and active bits | Byte |
| 0x84 | Mac ID | Get_Attribute_Single | Mac ID switch and current settings | Struct of 4 bytes |
| | Mac ID current | | Current Mac ID | USINT |
| | Mac ID switches | | Mac ID switch setting | USINT |
| | Mac ID changed | | Mac ID switch setting changed since reset | BOOL |
| | Reserved | | Reserved | USINT |
| 0x86 | Error log | Get_Attribute_Single | Driver firmware buffer error counts and troublesome node list | Struct of 10 bytes |
| | Buffer errors | | Buffer event counter | UINT |
| | Error log | | | Byte[8] |

Motor Data Object, Class 0x28

This object serves as a database for motor parameters.

Services Supported

| Service Code No. | Service Name |
|------------------|----------------------|
| 0x0E | Get Attribute Single |
| 0x10 | Set Attribute Single |

Instance 0x01, Attributes

| ID# | Attribute name | Services | Description | Motor Type | Default, Min, Max | Data type |
|------|-----------------|----------|--|------------|-------------------|-----------|
| 0x03 | Motor Type | Get | 1 - PM DC Motor 2 - FC DC Motor 3 - PM Synchronous Motor 4 - FC Synchronous Motor 5 - Switched Reluctance Motor 6 - Wound Rotor Induction Motor 7 - Squirrel Cage Induction Motor 8 - Stepper Motor 9 - Sinusoidal PM BL Motor 10 - Trapezoidal PM BL Motor | AC/DC | 7, 1, 10 | UINT |
| 0x06 | Rated Current | Get/Set | Rated Stator Current from motor nameplate. | AC/DC | | UINT |
| 0x07 | Rated Voltage | Get/Set | Rated Base Voltage from motor nameplate. | AC/DC | | UINT |
| 0x08 | Rated Power | Get/Set | Rated Power at Rated Frequency | AC/DC | | UINT |
| 0x09 | Rated Frequency | Get/Set | Rated Electrical Frequency | AC | | UINT |
| 0x0C | Pole Count | Get | Number of poles in the motor | AC | | UINT |
| 0x0F | Base Speed | Get/Set | Nominal Speed at rated frequency from nameplate | AC/DC | | UINT |

Control Supervisor Object, Class 0x29

The object models all the management functions for devices within the 'Hierarchy of Motor Control Devices'. The behaviour of motor control devices is described in [Table 2. Run/Stop event matrix](#) and [Figure 3. State transition diagram](#).

Services Supported

| Service Code No. | Service Name |
|------------------|----------------------|
| 0x05 | Reset |
| 0x0E | Get Attribute Single |
| 0x10 | Set Attribute Single |

Instance 0x01, Attributes

| ID# | Attribute name | Services | Description | Data type |
|------|---------------------------|----------|---|-----------|
| 0x03 | Run 1 ¹⁾ | Get, Set | 0 = Stop, 1 = Run | BOOL |
| 0x04 | Run 2 ²⁾ | Get, Set | 0 = Stop, 1 = Run | BOOL |
| 0x05 | Net Control ²⁾ | Get, Set | 0 = Local Control, 1 = Network Control | BOOL |
| 0x06 | State | Get | 1 = Start/up, 2 = Not_ready, 3 = Ready, 4 = Enabled, 5 = Stopping, 6 = FaultStop, 7 = Faulted | UINT8 |
| 0x07 | Running 1 ³⁾ | Get | 0 = Stopped, 1 = Running | BOOL |
| 0x08 | Running 2 ⁴⁾ | Get | 0 = Stopped, 1 = Running | BOOL |
| 0x09 | Ready | Get | 1 = Ready, Enabled or Stopping 0 = Other state | BOOL |
| 0x0A | Faulted | Get | 0 = Not faulted, 1 = Fault occurred | BOOL |
| 0x0B | Warning | Get | 0 = No Warnings present, 1 = Warning | BOOL |
| 0x0C | FaultRst | Get, Set | 0 → 1 Fault Reset | BOOL |
| 0x0D | Fault Code | Get | The fault that caused the last transition to the Faulted state. | UINT16 |
| 0x0F | CtlFromNet | Get | 0 = NetControl disabled 1 = NetControl enabled | BOOL |
| 0x11 | Force Fault | Get, Set | 0 → 1 Force a fault | BOOL |
| 0x12 | Force Status | Get | 0 = Not Forced Non-zero = Forced | BOOL |

| ID# | Attribute name | Services | Description | Data type |
|------|----------------|----------|--|-----------|
| 0x14 | Net Idle | Get, Set | Action taken when the master goes to idle state in Generic drive profile 0 = Stop 1 = Freeze (keep running) 2 = Fault | UINT8 |

- 1) Supported only with assembly instances 20, 21 and 121
- 2) Supported only with assembly instances 21 and 121
- 3) Supported only with assembly instances 70, 71 and 171
- 4) Supported only with assembly instances 71 and 171

Table 2. Run/Stop event matrix

| RunFwd | RunRev | Trigger event | Run type |
|--------|--------|---------------|----------|
| 0 | 0 | Stop | N/A |
| 0 → 1 | 0 | Run | RunFwd |
| 0 | 0 → 1 | Run | RunRev |
| 0 → 1 | 0 → 1 | No Action | N/A |
| 1 | 1 | No Action | N/A |
| 0 → 1 | 1 | Run | RunRev |
| 1 | 1 → 0 | Run | RunFwd |

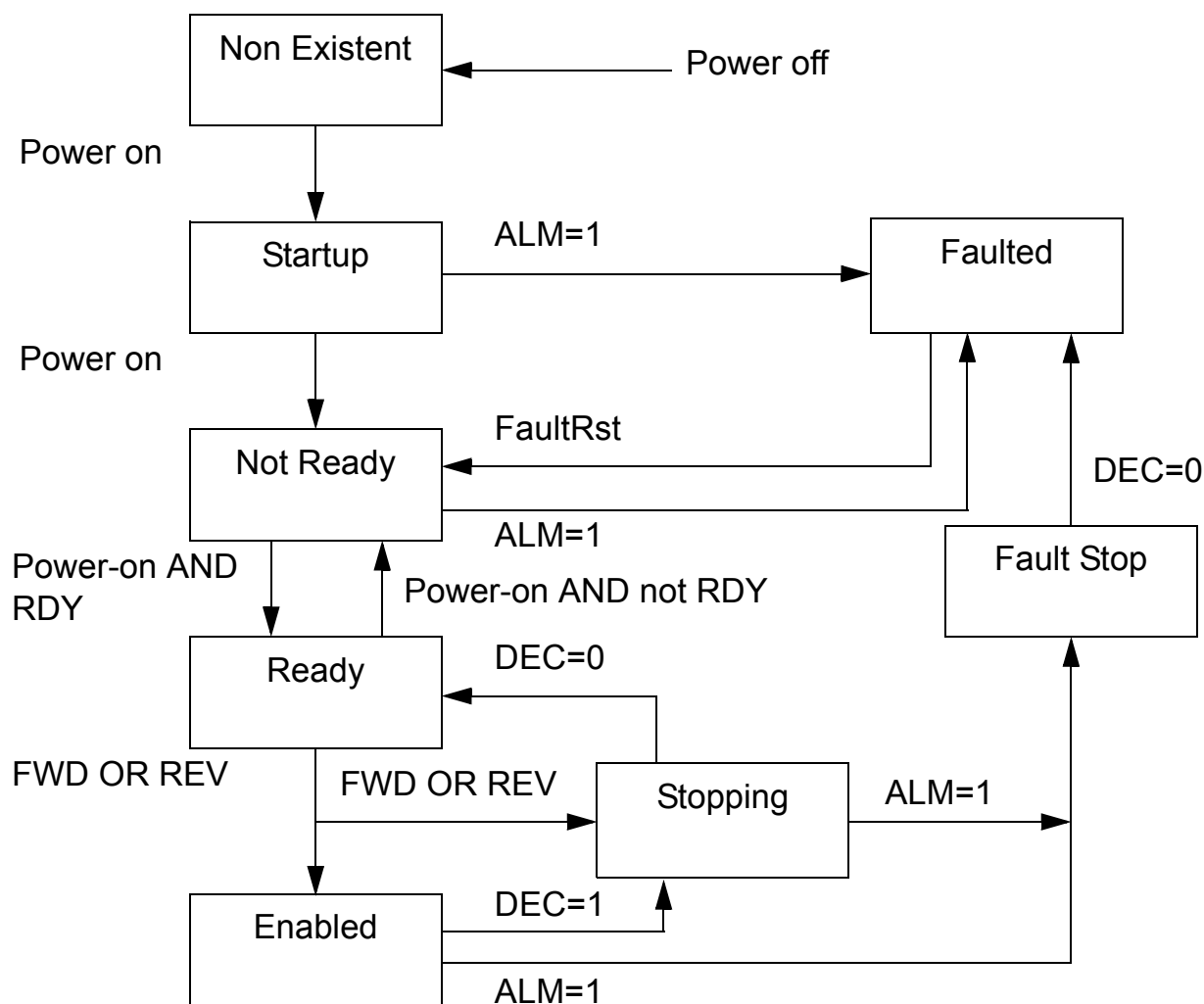


Figure 3. State transition diagram

AC/DC-Drive Object, Class 0x2A

This object models the functions specific to an AC or DC Drive.

Services Supported

| Service Code No. | Service Name |
|-------------------------|----------------------|
| 0x0E | Get Attribute Single |
| 0x10 | Set Attribute Single |

Instance 0x01, Attributes

| ID# | Attribute name | Services | Description | Data type |
|------|----------------------|----------|--|-----------|
| 0x03 | At Reference | Get | Frequency arrival | BOOL |
| 0x04 | NetRef ²⁾ | Get, Set | Requests torque or speed reference to be local or from the network. 0 = Set Reference not DN Control 1 = Set Reference at DN Control Note that the actual status of torque or speed reference is reflected in attribute 29, RefFromNet. | BOOL |
| 0x06 | Drive mode | Get, Set | 0 = Vendor specific 1 = Open Loop Speed 2 = Closed Loop Speed 3 = Torque Control | UINT8 |
| 0x07 | Speed Actual | Get | Units RPM/2 ^{SpeedScale} | SINT16 |
| 0x08 | SpeedRef | Get, Set | Units RPM/2 ^{SpeedScale} | SINT16 |
| 0x12 | AccelTime | Get, Set | Units msec/2 ^{TimeScale} | UINT16 |
| 0x13 | DecelTime | Get, Set | Units msec/2 ^{TimeScale} | UINT16 |
| 0x16 | Speed Scale | Get, Set | Speed scaling factor | UINT8 |
| 0x17 | Current Scale | Get, Set | Current scaling factor | UINT8 |
| 0x18 | Torque Scale | Get, Set | Torque scaling factor | UINT8 |
| 0x1A | Power Scale | Get, Set | Power scaling factor | UINT8 |
| 0x1B | Voltage Scale | Get, Set | Voltage scaling factor | UINT8 |
| 0x1C | Time Scale | Get, Set | Time scaling factor | UINT8 |
| 0x1D | Ref From Net | Get | Reflecting attribute 4 | BOOL |
| 0x1F | Field I or IV | Get, Set | Always to be set to 0 | - |

²⁾ Supported only with assembly instance 21

Vendor Specific Object, Class 0x90

Services Supported

| Service Code No. | Service Name |
|------------------|----------------------|
| 0x0E | Get Attribute Single |
| 0x10 | Set Attribute Single |

Instance 0x00, Attributes

| ID# | Attribute name | Services | Description | Data type |
|------|----------------|----------|---|-----------|
| 0x02 | Max instance | Get | Maximum number of instances in this Class | UINT16 |

The Vendor Specific Object, Class 0x90, enables access of drive parameter and data sets.

To access drive parameters *Instance* and *Attribute* correspond to the drive parameter Group and Index in the following way.

- *Instance* = parameter Group (1...99)
- *Attribute* = parameter Group (1...99)

For example, Parameter 99.01 is accessed as follows:

- *Class* = 144 = 0x90
- *Instance* = 99 = 0x63
- *Attribute* = 1 = 0x01

To access data sets *Instance* is always 100. *Attribute* corresponds to a specific data word.

For example, data set 2 word 1 is accessed as follows

- *Class* = 144 = 0x90
- *Instance* = 100 = 0x64
- *Attribute* = 4 = 0x04

Instance 0x01, Attributes

| ID# | Attribute name | Services | Description |
|------|-----------------|----------|------------------|
| 0x01 | Parameter Index | Get, Set | Group 1 Index 1 |
| 0x02 | Parameter Index | Get, Set | Group 1 Index 2 |
| ... | | | |
| 0x63 | Parameter Index | Get, Set | Group 1 Index 99 |

Instance 0x02, Attributes

| ID# | Attribute name | Services | Description |
|------|-----------------|----------|------------------|
| 0x01 | Parameter Index | Get, Set | Group 2 Index 1 |
| 0x02 | Parameter Index | Get, Set | Group 2 Index 2 |
| ... | | | |
| 0x63 | Parameter Index | Get, Set | Group 2 Index 99 |

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Instance 0x63, Attributes

| ID# | Attribute name | Services | Description |
|------|-----------------|----------|-------------------|
| 0x01 | Parameter Index | Get, Set | Group 99 Index 1 |
| 0x02 | Parameter Index | Get, Set | Group 99 Index 2 |
| ... | | | |
| 0x63 | Parameter Index | Get, Set | Group 99 Index 99 |

Instance 0x64, Attributes

| ID# | Attribute name | Services | Description |
|------|-----------------|----------|--------------------|
| 0x01 | Data word index | Get, Set | Data Set 1 Word 1 |
| 0x02 | Data word index | Get, Set | Data Set 1 Word 2 |
| 0x03 | Data word index | Get, Set | Data Set 1 Word 3 |
| 0x04 | Data word index | Get, Set | Data Set 2 Word 1 |
| 0x05 | Data word index | Get, Set | Data Set 2 Word 2 |
| 0x06 | Data word index | Get, Set | Data Set 2 Word 3 |
| 0x07 | Data word index | Get, Set | Data Set 3 Word 1 |
| ... | | | |
| 0x63 | Data word index | Get, Set | Data Set 33 Word 3 |

Vendor Specific ControlNet Configuration, Class 0x91

This object is used when more I/O data than listed in [Table 1. The RCNA-01 configuration parameters](#) of the Configuration chapter needs to be handled. In this object 32 words of Input and Output data can be used. The configuration of the I/O parameters in this object is identical to the configuration of the I/O parameters in Table 1. Please note this class is only used when configuration parameter “VSA I/O size” is set to 10 or larger.

Note: All input and output parameters must be set via Class 0x91.

Services Supported

| Service Code No. | Service Name |
|-------------------------|--|
| 0x05 | This Reset command will clear all attributes in one instance to zero. I.e. a reset of Class 91, Instance 1 will set all output parameters to zero. |
| 0x0E | Get Attribute Single |
| 0x10 | Set Attribute Single |

Instance and Attributes

Two instances are supported by Class 0x91:

- Instance 1 for Output parameters.
- Instance 2 for Input parameters.

Instance 0x01, Attributes

| ID# | Attribute name | Default, Min, Max | Data type |
|------------|-------------------------|--------------------------|------------------|
| 0x01 | Output I/O parameter 1 | 0, 0, 32767 | UINT16 |
| 0x02 | Output I/O parameter 2 | 0, 0, 32767 | UINT16 |
| 0x03 | Output I/O parameter 3 | 0, 0, 32767 | UINT16 |
| 0x04 | Output I/O parameter 4 | 0, 0, 32767 | UINT16 |
| ... | | | |
| 0x20 | Output I/O parameter 32 | 0, 0, 32767 | UINT16 |

Instance 0x02, Attributes

| ID# | Attribute name | Default, Min, Max | Data type |
|------------|------------------------|------------------------------|------------------|
| 0x01 | Input I/O parameter 1 | 0, 0, 32767 | UINT16 |
| 0x02 | Input I/O parameter 2 | 0, 0, 32767 | UINT16 |
| 0x03 | Input I/O parameter 3 | 0, 0, 32767 | UINT16 |
| 0x04 | Input I/O parameter 4 | 0, 0, 32767 | UINT16 |
| ... | | | |
| 0x20 | Input I/O parameter 32 | 0, 0, 32767 | UINT16 |

Fault tracing

RCNA-01 status codes

The status of the ControlNet module is indicated by a 'fieldbus status' parameter in the drive application program (refer to the drive documentation).

IDLE

The drive could not initiate communication with the ControlNet Module.

EXECUT. INIT

The module is initialising and performing self-test.

TIME-OUT

The ControlNet Module has stopped communicating with the drive.

CONFIG ERROR

The ControlNet Module has not accepted the configuration file downloaded from the drive. Check compatibility of module and drive file version number.

OFF-LINE

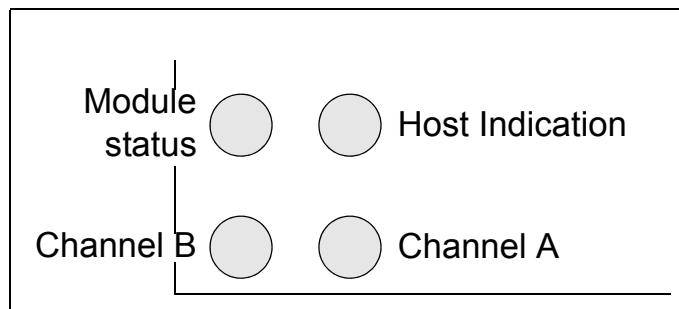
The module has completed its power-up sequence, and is waiting for a ControlNet Scanner or the Manager software to establish a connection.

ON-LINE

The ControlNet module is connected and communicating with a ControlNet Scanner or Manager software.

RESET

The drive has initiated a reset command to the module.



| Name | Colour | Function |
|-------------------------|--------------------|---|
| Channel A and Channel B | A and B: OFF | Steady - Module is not initialised. |
| | A and B: RED | Steady - Faulted unit, must be restarted or repaired |
| | A and B: RED/GREEN | Alternating - Self testing bus controller |
| | A and B: RED | Flashing - Incorrect node configuration, duplicate MacID etc. |
| | A or B: OFF | Steady - Channel is disabled, depending on network configuration. |
| | A or B: GREEN | Steady - Normal operation of channel |
| | A or B: GREEN | Flashing - Temporary errors (node will self correct) or node is not configured to go on-line |
| | A or B: RED | Flashing - Media fault or no other nodes on the network |
| | A or B: RED/GREEN | Alternating - Incorrect network configuration |
| Host Indication | GREEN | Flashing - Module is waiting for initialisation. |
| | GREEN | Steady - Module is initialised. |
| | RED | Steady - Major fault, module must be restarted |

| | | <div><div>Module status</div><div>Channel B</div><div>Host Indication</div><div>Channel A</div></div> |
|---------------|--------|---|
| Name | Colour | Function |
| Module status | GREEN | Steady - Link functional |
| | GREEN | Flashing - Waiting for PLC connection |
| | RED | Steady - Link lost permanently. |
| | RED | Flashing - Link lost temporarily |

Installation problems

Verify all the connections on the module:

- Check that the ControlNet cables are connected to the BNC connectors as described in chapter [Electrical installation](#).
- Check that the RCNA-01 module is properly inserted into the option slot.
- Check the fastening of the RCNA-01 module with the 2 screws.

Drive setup

The fieldbus parameter group is not shown on the panel:

- Enable the RCNA-01 by setting the appropriate drive parameter.

The RCNA-01 is using default values:

- Verify that the fieldbus parameter group is set up correctly. If so, turn off and on the power to the drive or issue a ‘Fieldbus Adapter parameter refresh’ command. This will make the module re-read its setup parameters.

Drive actual values can be read, but the control commands (start/stop or reference) do not go through:

- Check that the control location parameters of the drive are set to use the RCNA-01 as the source of the required command.
- Check that the drive is in REMOTE control.

PLC programming

The PLC program is beyond ABB Drives support. Contact the manufacturer for assistance.

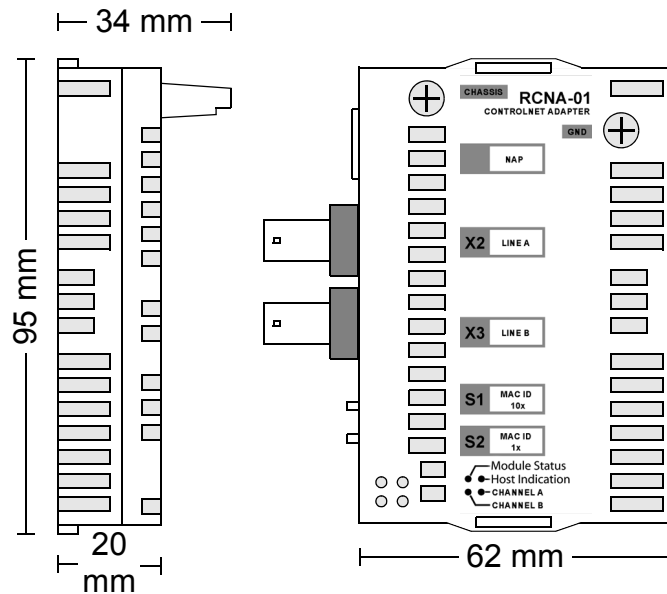
Scanner fault indications

Refer to scanner documentation.

Technical data

RCNA-01

Enclosure:



Mounting: Into an option slot inside the drive

Degree of protection: IP 20

Settings: Through drive parameters and/or rotary switches

Ambient conditions: The applicable ambient conditions specified for the drive in its *Hardware Manual* are in effect.

Connectors:

- 34-pin parallel bus connector
- Two BNC contacts for ControlNet connection
- NAP, Network Access Port for temporary connection of configuration tools

Current consumption:

- 260 mA max. (5 V), supplied by the control board of the drive

General:

- Estimated min. lifetime: 100 000 h
- All materials are UL/CSA approved
- Complies with EMC Standards EN 50081-2 and EN 50082-2

Fieldbus link

Compatible devices: Any ControlNet scanner

Medium: RG-6 quad shielded cable (coax)

- Termination: 75 Ω , 1%, Metal Film, 1/4 W
- Maximum Bus Length: 250 m (48 nodes), 1000 m (2 nodes) or 5000 m (with repeaters)

Topology: Bus, star or tree

Transfer rate: 5 MBit/s

Protocol: ControlNet



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