

ABB Drives

User's Manual DeviceNet Adapter Module RDNA-01



DeviceNet Adapter Module
RDNA-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 RDNA-01 DeviceNet 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 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 on the unit. Neglecting these instructions can cause physical injury or death.

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Introduction

Overview

This chapter contains a description of the User's manual for the RDNA-01 DeviceNet Adapter module.

Intended audience

The manual is intended for people responsible for installing, commissioning and using a DeviceNet 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 DeviceNet protocol.

What this manual contains

The installation and start-up of the RDNA-01 DeviceNet 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 manual.

Overview contains a short description of the DeviceNet protocol and the RDNA-01 DeviceNet 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, bus termination and earthing instructions.

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

Communication contains a description of the DeviceNet functionality supported by the RDNA-01. This chapter also explains how to configure the Scanner.

Fault tracing describes how to diagnose the DeviceNet 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.

Terms used in this manual

Change of State/Cyclic Message

The Change of State/Cyclic Message is transmitted by either the Master or the Slave. A Change of State/Cyclic Message is directed towards a single specific node (point-to-point). An Acknowledge Message may be returned in response to this message.

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.

EDS File

The Electronic Data Sheet (EDS) file identifies the properties of the device to the DeviceNet Scanner. Each type of drive and application program requires its own EDS file.

Input

In the ODVA DeviceNet specification the word 'input' is used to describe data flow from a device (such as the RDNA-01) to the network.

I/O Assembly selection

Smart networked devices (like the RDNA-01) can produce and/or consume more than one I/O value. Typically, they will produce and/or consume one or more I/O value, as well as status and diagnostic information. Each piece of data communicated by a device is represented by an attribute of one of the device's internal objects.

Communicating multiple pieces of data (attributes) across a single I/O connection requires that the attributes be grouped or assembled together into a single block.

MAC ID

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

RDNA-01 DeviceNet Adapter module

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

ODVA

ODVA stands for Open DeviceNet Vendor Association. ODVA is an independent organisation that promotes interoperativity between different manufacturers DeviceNet products. ABB is an Associate Member at the ODVA.

Output

In the ODVA DeviceNet specification the word 'output' is used to describe data flow from the network into a device (such as the RDNA-01).

Parameter

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

Poll Message

Most DeviceNet Scanners as well as the RDNA-01 support two different data services. These are Poll and Change of State/Cyclic messages.

The Poll Command is an I/O Message that is transmitted by the Master. A Poll Command is directed towards a single, specific Slave (point-to-point, RDNA-01 always acts as a Slave). A Master must transmit a separate Poll Command Message for each of its Slaves that is to be polled. The Poll Response is an I/O Message that a Slave transmits back to the Master when the Poll Command is received.

Scanlist

The DeviceNet Scanner communicates with the DeviceNet Slaves in a user-defined order. This order of communication is the scanlist. The scanlist contains a complete list of the Slave nodes and the order in which the Slaves are accessed.

Overview

Overview

This chapter contains a short description of DeviceNet bus topology, the RDNA-01 Adapter module, a delivery checklist, and warranty information.

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

DeviceNet Bus topology

The DeviceNet network has a linear bus topology. Terminating resistors are required on each end of the trunk line. Drop lines as long as 6 metres (20 feet) each are permitted, allowing one or more nodes to be attached. DeviceNet allows branching structures only on drop lines. An example of an allowable topology is shown in Figure 1.

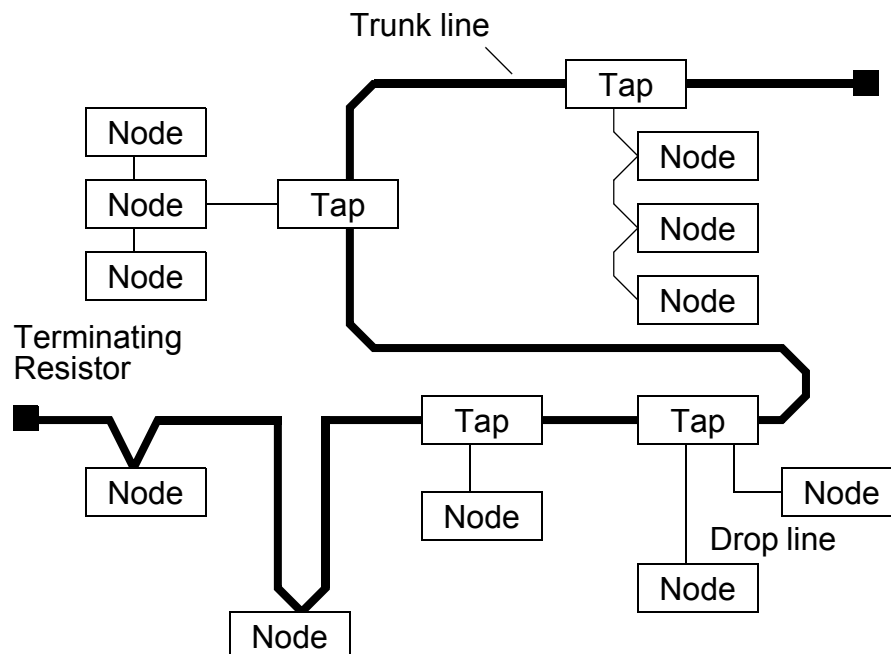


Figure 1. DeviceNet bus topology

The maximum length of trunk cable depends on the data rate and on the type of the cable used (see chapter *Technical data*).

Terminating resistor

The DeviceNet network should be terminated at both ends of the trunk cable with a 121 Ω , ¼ W, 1% Metal Film resistor. Connect this resistor between the two signal wires (CAN_H, CAN_L) on the DeviceNet cable.

The RDNA-01 DeviceNet Adapter module

The RDNA-01 DeviceNet Adapter module is an optional device for ABB drives which enables the connection of the drive to a DeviceNet system. The drive is considered as a slave in the DeviceNet network. Through the RDNA-01 DeviceNet 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.

The RDNA-01 acts as a Class 2 slave only with predefined master-slave connection set services. These include the Explicit Messaging, the Poll-Response service and the Change of State/ Cyclic service. The DeviceNet commands and services supported by the RDNA-01 DeviceNet Adapter module are discussed in chapter *Communication*. Please refer to the user documentation of the drive as to which commands are supported by the drive.

The adapter module is mounted into its option slot inside the drive. See the Hardware Manual of the drive.

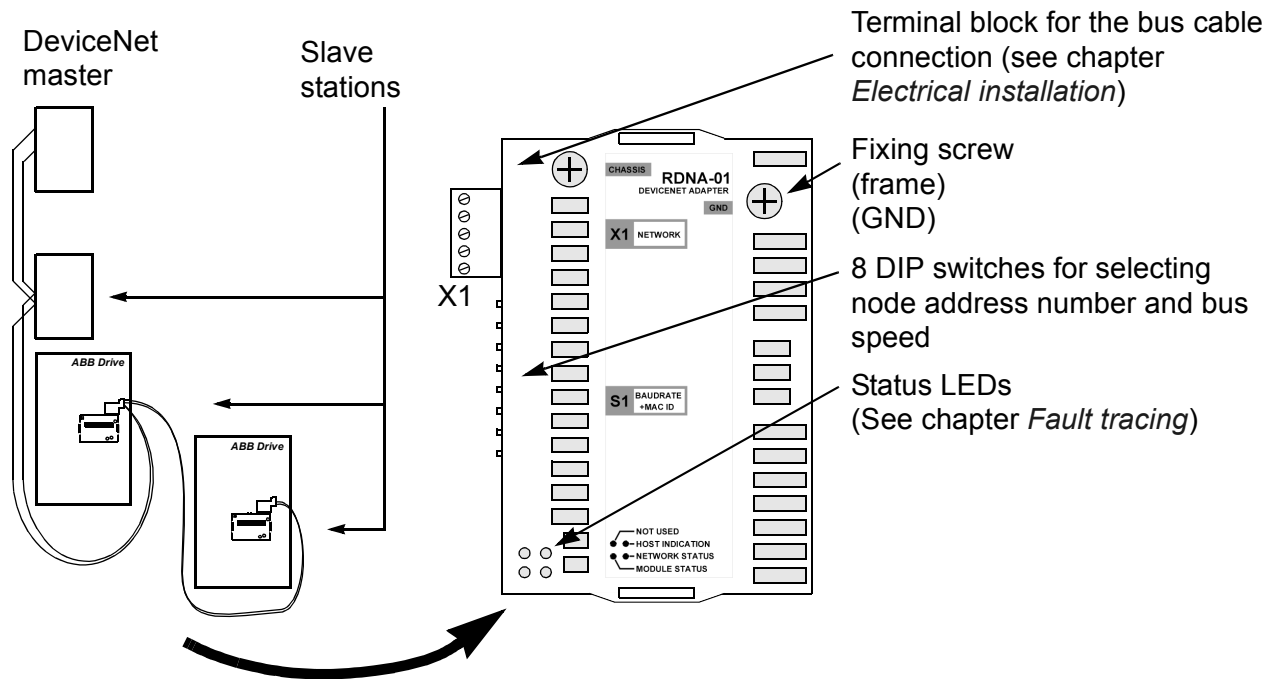


Figure 2. The construction of the DeviceNet link and the module layout of the RDNA-01

Compatibility

The RDNA-01 is compatible with all scanners working according to ODVA DeviceNet specifications.

Delivery check

The option package for the RDNA-01 DeviceNet Adapter module contains:

- RDNA-01 module
- 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 RDNA-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 for setting the module node address number and communication speed (bit rate)
- instructions for connecting the module to the DeviceNet bus.



WARNING! Before installation, switch off the drive power supply. Wait 5 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.

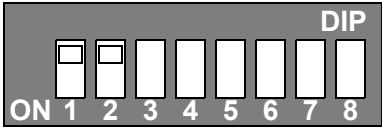


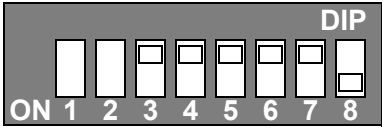
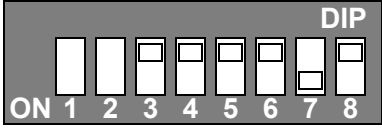
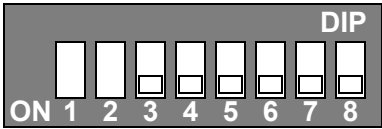
General cabling instructions

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

DIP switch settings

DIP switches on the printed circuit board of the RDNA-01 are used to select node address number and bus speed for the module.

Use the table below to set the values. Note that switch 3 is the most significant bit of the node address number.

| Bit rate | Binary | DIP switch |
|------------|--------|---|
| 125 kbit/s | 00 |  |
| 250 kbit/s | 01 |  |
| 500 kbit/s | 10 |  |
| Node no. | Binary | |
| 1 | 000001 |  |
| 2 | 000010 |  |
| ... | ... | ... |
| 63 | 111111 |  |

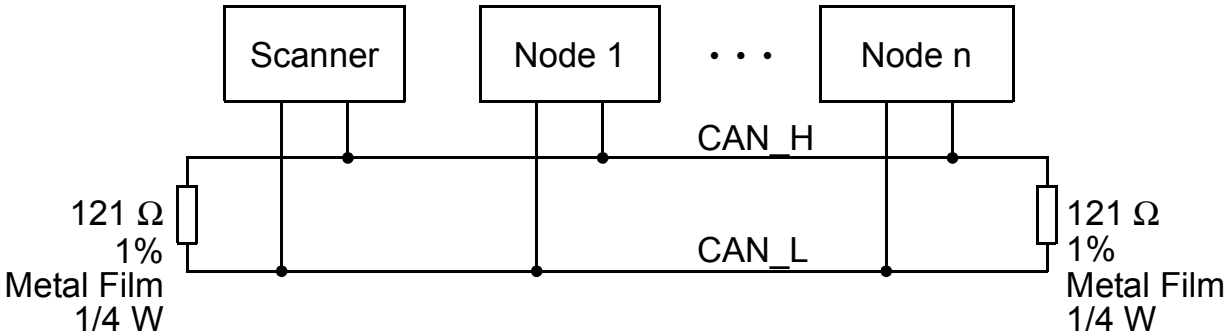
DeviceNet connection

The bus cable is connected to terminal block X1 on the RDNA-01. The terminal block is described below.

| X1 | | Description |
|----|-------|--------------------------------|
| 1 | V- | Isolated ground |
| 2 | CAN_L | CAN_L bus line |
| 3 | SHLD | Network cable shield |
| 4 | CAN_H | CAN_H bus line |
| 5 | V+ | Isolated 24V DC voltage supply |

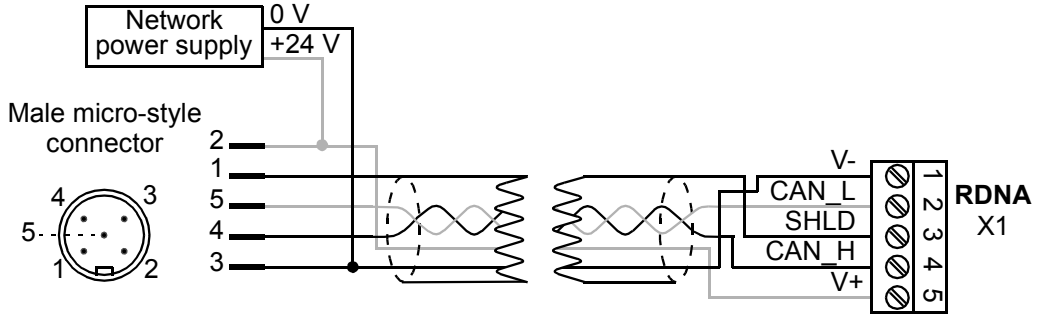
DeviceNet bus termination

The DeviceNet bus line must be terminated with 121 ohm resistors connected between the CAN_L and CAN_H wires at each end as shown below.

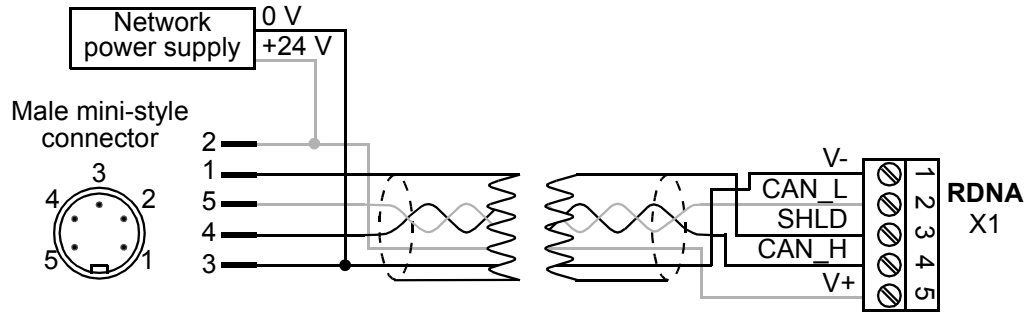


Connection examples

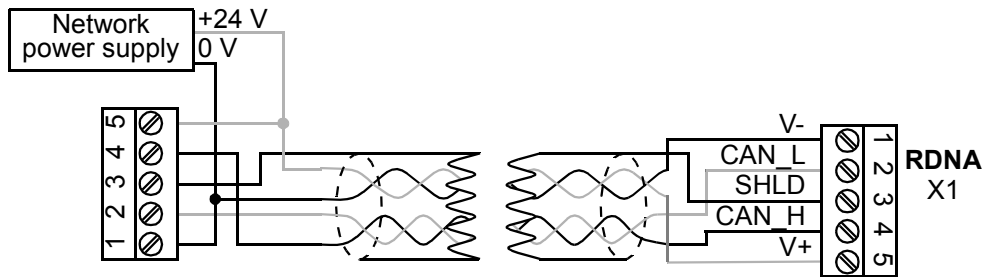
5-pin micro-style connector



5-pin mini-style connector



Standard open-style screw connector



Programming

Overview

This chapter gives information on configuring the RDNA-01 DeviceNet Adapter module.

Configuring the system

After the RDNA-01 DeviceNet 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 RDNA-01. Configuration (EDS) files for the RDNA-01 are available from your local ABB representative.

DeviceNet 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 RDNA-01 is established, several configuration parameters are copied to the drive. These parameters (shown in Table 3.) 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 the next time or when the module receives a 'Fieldbus Adapter parameter refresh' command from the drive.

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. RDNA-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 3. The RDNA-01 configuration parameters

| Fieldbus par. no. | Parameter name | Alternative settings | Default setting |
|--------------------------|-----------------------|---|------------------------|
| 1 | MODULE TYPE | DEVICENET | DEVICENET |
| 2 | Module MacID | 0 ... 63 | 63 |
| 3 | Module Baud rate | 0 = 125 kBit/s; 1 = 250 kBit/s; 2 = 500 kBit/s | 0 |
| 4 | HW/SW Option | 0 = Hardware 1 = Software | 0 |
| 5 | Stop Function | 0 = Ramp stop; 1 = Coast stop | 0 |
| 6 | Output Instance | 20 ... 102 | 20 |
| 7 | Input Instance | 70 ... 103 | 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 ... 9 | 4 |

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 ... 63

On a DeviceNet network, each node is identified by a unique node number. This node number is between 0 and 63, 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 DIP switches. See chapter *Electrical installation*.

03 Module Baud rate

Sets the baud rate for the DeviceNet interface. This is user selectable, but must be the same on every node on the DeviceNet network.

0 = 125 kBit/s; **1** = 250 kBit/s; **2** = 500 kBit/s

Note: When parameter 04 HW/SW Option is set to 0=HW this parameter is read-only and its value is set by DIP switches. See chapter *Electrical installation*.

04 HW/SW Option

Defines the selection source of module MacID and baud rate.

0 = selection of MAC ID and baud rate via the DIP switches enabled.

1 = selection of MAC ID and baud rate via parameters 02 and 03 and via the DeviceNet Object enabled (see chapter *Communication sub-section DeviceNet Object, Class 0x03*).

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 70 are so-called Drive Profile instances as defined in the ODVA DeviceNet specification (AC/DC Drive profile). 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 |

| 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 |

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 |
| 21 | 70 | Generic Drive profile |
| | 71 | Generic Drive profile |
| | 103 | Generic Drive profile |
| 100 | 101 | ABB Drives profile |
| | 103 | ABB Drives profile |
| 102 | 101 | ABB Drives profile |
| | 103 | ABB Drives 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 |

08 Output I/O Par 1

Defines the data word or drive parameter that can be set with Assembly object instance 102 (see chapter *Communication* sub-section *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 *xyyy*, 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 a data word or drive parameter that can be read with Assembly object instance 103 (see chapter *Communication* sub-section *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 *xyy*, 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 length of the Vendor Specific assembly in words.

1 ... 9

Communication

Overview

This chapter describes the DeviceNet communication protocol for the RDNA-01 and the configuration of the scanner. For detailed information on DeviceNet communication, refer to ODVA DeviceNet Specifications Release 2.0.

Introduction to DeviceNet

DeviceNet is a protocol based on CAN technology. CAN specifies the physical layer interface. DeviceNet specifies the wiring, and the data transfer through CAN.

The RDNA-01 is a device acting as a Group 2 only Server realising the Predefined Master Slave Connection Set functionality. The Off-line Connection Set functionality and UCMM are not supported.

Object modelling and functional profiles

One of the main features of DeviceNet is object modelling. A group of objects can be described with a Functional Profile. The RDNA-01 realises the ODVA 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 RDNA-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 (for example a Polled 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 RDNA-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 RDNA-01.

BASIC SPEED CONTROL assembly

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

| Instance 20 | | | | | | | | |
|-------------|-----------------------------|-------|-------|-------|-------|-------------|-------|---------|
| 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) | | | | | | | |

The format of the input assembly is:

| Instance 70 | | | | | | | | |
|-------------|--------------------------------|-------|-------|-------|-------|-----------|-------|---------|
| 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) | | | | | | | |

The unit of speed reference and actual is 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 ODVA AC/DC Drive Profile. The format of the output assembly is:

| Instance 21 | | | | | | | | |
|--------------------|-----------------------------|--------------|--------------|--------------|--------------|----------------|----------------|----------------|
| 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) | | | | | | | |

The format of the output assembly is:

| Instance 71 | | | | | | | | |
|--------------------|--------------------------|--------------------|---------------------|--------------|--------------------|--------------------|--------------|--------------|
| 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 (Low Byte) | | | | | | | |
| 3 | Speed Actual (High Byte) | | | | | | | |

USER TRANSPARENT assembly

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

| Instance 100 | | | | | | | | |
|---------------------|---------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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 | Set Speed (Low Byte), unscaled | | | | | | | |
| 3 | Set Speed (High Byte), unscaled | | | | | | | |

The format of the input assembly is:

| Instance 101 | | | | | | | | |
|---------------------|------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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 | Actual Speed (Low Byte), unscaled | | | | | | | |
| 3 | Actual Speed (High Byte), unscaled | | | | | | | |

VENDOR SPECIFIC assembly

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

| Instance 102 | | | | | | | | |
|---------------------|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 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*.

The format of the input assembly is:

| Instance 103 | | | | | | | | |
|--------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| 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*.

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.

Drive Parameter handling

With the RDNA-01, drive parameters can also be accessed. (Access to the drive parameters requires the Full EDS file – see further below). The function is implemented by employing the so-called Explicit Messaging properties of the DeviceNet protocol. Explicit Messaging makes use of objects consisting of three parts, *Class*, *Instance*, and *Attribute*.

Class is always 144 (90h). *Instance* and *Attribute* correspond to the drive parameter Group and Index in the following way:

- *Instance* = Parameter Group (0...99)
- *Attribute* = Parameter Index (01...99)

For example, Parameter 99.01 is accessed as follows:

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

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.

Class Attributes

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|---|----------------|----------|---------------------------------|---------------------------|----------------|
| 1 | Revision | Get | Revision of the Identity Object | 1,1,1 | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|---|----------------------------|----------|---|---------------------------|---------------------|
| 1 | Vendor ID | Get | Identification of the device vendor. | 46 | UINT16 |
| 2 | Device Type | Get | Identification of the general product type | 2 | UINT16 |
| 3 | Product Code | Get | Assigned vendor code to describe the device | N/A,N/A, N/A | UINT16 |
| 4 | Revision | Get | Revision of the item the Identity Object represents | | Array[UINT 8 UINT8] |
| 5 | Status | Get | Summary Status of the Device | 0,0,255 | UINT16 |
| 6 | Serial Number | Get | Serial Number of the DeviceNet module | N/A,N/A, N/A | UINT32 |
| 7 | Product Name | Get | Product identification. Max 32 characters. | RDNA-01 and ACS xxx | Short String |
| 9 | Configure Consistent Value | Get | Contents identify the device configuration | N/A,N/A, N/A | UINT16 |

Attribute explanations

Vendor ID

Vendor IDs are managed by the Open DeviceNet Vendor Association, Inc. (ODVA). The ABB Vendor ID is 46.

Device Type

The list of device types is managed by ODVA. It is used to identify

the device profile that a particular product is using.

E.g. 2 = AC drive, 13 = DC drive

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. |

| Bit(s) | Type/Name | Definition |
|-------------|---------------------------|--|
| 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 DeviceNet.

Product Name:

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

Configuration Consistency Value:

A product may automatically modify the Configuration Consistency Value whenever any non-volatile attribute is altered.

DeviceNet Object, Class 0x03

The DeviceNet Object provides the configuration and status of a DeviceNet port. Each DeviceNet product must support one (and only one) DeviceNet object per physical connection to the DeviceNet communication link.

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------------------|--|----------------|
| 1 | Revision | Get_Attribute_Single | Revision of the DeviceNet Object Class Definition upon which the implementation is based | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|---|------------------------|----------------------|--------------------------------------|---------------------------|--------------------------|
| 1 | MAC ID | Get_Attribute_Single | Node address | -,0,63 | UINT8 |
| 2 | Baud Rate | Get_Attribute_Single | The baud rate of the device | -,0,2 | UINT8 |
| 5 | Allocation information | Get_Attribute_Single | Allocation Choice Master's Mac ID | N/A,N/A, N/A | Struct UINT8 UINT8 |

The Allocation Information attribute consists of the following:

Allocation Choice Byte

The Allocation Choice byte indicates which of the Predefined Master/Slave Connections are active (in the Configuring, or Established state).

The Allocation Choice byte is initialized to 00 at device power-up or reset.

Master's MAC ID

The range of values is 0 to 63 and 255 decimal. A value in the range of 0 ... 63 indicates that the Predefined Master/Slave Connection Set is currently allocated, and denotes the MAC ID of the device that performed the allocation. The value 255 means the Predefined Master/Slave Connection set has not been allocated. The Master's MAC ID attribute is initialized to 255 (FF hex) at device power-up/reset.

Configuration Object, Class 0x91

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------|--|----------------|
| 1 | Revision | Get | Revision of the DeviceNet Object Class Definition upon which the implementation is based | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|---|------------------|----------|--|---------------------------|-----------|
| 1 | Vendor_MacID | Get, Set | The MacID set by software | 63,0,63 | UINT8 |
| 2 | Vendor_Baudrate | Get, Set | The Baudrate set by software. 0 = 125kbit/s 1 = 250 kbit/s 2 = 500 kbit/s | 0,0,2 | UINT8 |
| 3 | SW_HW | Get, Set | Software or hardware setting of the MacID and Baudrate 0 = Hardware settings 1 = Software settings | -,0,1 | UINT8 |
| 4 | Stop_Function | Get, Set | The mode of the stopping of the drive 0 = Ramp stop 1 = Coast stop | -,0,1 | UINT8 |
| 5 | Output_Assy_Inst | Get, Set | Output assembly instance | - | UINT8 |
| 6 | Input_Assy_Inst | Get, Set | Input assembly instance | - | UINT8 |

DeviceNet Connection Object, Class 0x05

The Connection Class allocates and manages the internal resources associated with both I/O and Explicit Messaging Connections. The specific instance generated by the Connection Class is referred to as Connection Instance or Connection Object.

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------|----------------------------------|----------------|
| 1 | Revision | Get | Revision of the DeviceNet Object | Array of UINT8 |

Explicit Connection Instance

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|----|--------------------------|----------|---|---------------------------|-----------|
| 1 | State | Get | State of the object | 1,0,5 | UINT8 |
| 2 | Instance Type | Get | Indicates either I/O or messaging connection. | 0,0,0 | UINT8 |
| 3 | Transport Class Trigger | Get | Defines the behaviour of the connection. | 0x83, 0x83, 0x83 | UINT8 |
| 4 | Produced Cnxn Id | Get | Placed in CAN Identifier Field when the Connection Transmits | N/A,N/A, N/A | UINT16 |
| 5 | Consumed Cnxn Id | Get | CAN Identifier Field value that denotes message to be received | N/A,N/A, N/A | UINT16 |
| 6 | Comm Characteristics | Get | Defines the Message Group(s) across which productions and consumptions are associated in this Connection. | N/A,N/A, N/A | UINT8 |
| 7 | Produced Connection Size | Get | Maximum number of bytes transmitted across this Connection | 512,512, 512 | UINT16 |
| 8 | Consumed Connection size | Get | Maximum number of bytes received across this Connection | 512,512, 512 | UINT16 |
| 9 | Expected Packet Rate | Get,Set | Defines timing associated with this Connection. | N/A,N/A, N/A | UINT16 |
| 12 | Watchdog Timeout Action | Get,Set | Defines how to handle Inactivity/Watchdog timeouts. | N/A,N/A, N/A | UINT8 |

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|----|---------------------------------|----------|--|---------------------------|----------------|
| 13 | Produced Connection Path Length | Get | Number of bytes in the produced_connection_path length attribute | 256,256,256 | UINT16 |
| 14 | Produced Connection Path | Get | Application Object producing data on this Connection | NULL, NULL, NULL | Array of UINT8 |
| 15 | Consumed Connection Path Length | Get | Number of bytes in the consumed_connection_path length attribute | 256,256,256 | UINT16 |
| 16 | Consumed Connection Path | Get | Specifies the Application Object(s) that are to receive the data consumed by this Connection Object. | NULL, NULL, NULL | Array of UINT8 |
| 17 | Production Inhibit Time | Get | Defines minimum time between new data production. | 0,0,0 | UINT16 |

Polled I/O Connection Instance

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|---|-------------------------|----------|--|---------------------------|-----------|
| 1 | State | Get | State of the object | 1,0,4 | UINT8 |
| 2 | Instance Type | Get | Indicates either IO or messaging connection. | 0,0,1 | UINT8 |
| 3 | Transport Class Trigger | Get | Defines the behaviour of the connection. | 0x83, 0x83, 0x83 | UINT8 |
| 4 | Produced Cnxn Id | Get | Placed in CAN Identifier Field when the Connection Transmits | N/A,N/A, N/A | UINT16 |
| 5 | Consumed Cnxn Id | Get | CAN Identifier Field value that denotes message to be received | N/A,N/A, N/A | UINT16 |

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|----|---------------------------------|----------|---|-----------------------------------|-------------------|
| 6 | Comm Characteristics | Get | Defines the Message Group(s) across which productions and consumptions are associated in this Connection. | N/A,N/A, N/A | UINT8 |
| 7 | Produced Connection Size | Get | Maximum number of bytes transmitted across this Connection | I/O in length, 0, I/O in length | UINT16 |
| 8 | Consumed Connection size | Get | Maximum number of bytes received across this Connection | I/O out length, 0, I/O out length | UINT16 |
| 9 | Expected Packet Rate | Get,Set | Defines timing associated with this Connection. | N/A,N/A, N/A | UINT16 |
| 12 | Watchdog Timeout Action | Get | Defines how to handle Inactivity/Watchdog timeouts. | N/A,N/A, N/A | UINT8 |
| 13 | Produced Connection Path Length | Get | Number of bytes in the produced_connection_path length attribute | 3,3,3 | UINT16 |
| 14 | Produced Connection Path | Get | Application Object producing data on this Connection | 0x62 0x39 0x37, N/A,N/A | Array of UINT8 |
| 15 | Consumed Connection Path Length | Get | Number of bytes in the consumed_connection_path length attribute | 3,3,3 | UINT16 |
| 16 | Consumed Connection Path | Get | Specifies the Application Object(s) that are to receive the data consumed by this Connection Object. | 0x62 0x31 0x35, N/A,N/A | Array of UINT8 |
| 17 | Production Inhibit Time | Get | Defines minimum time between new data production. | 0,3FFF, N/A | UINT16 |

Change of state/Cyclic (Acknowledged)

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|----|---------------------------------|----------|---|---------------------------------|-------------------|
| 1 | State | Get | State of the object | 1, N/A, N/A | UINT8 |
| 2 | Instance Type | Get | Indicates either IO or messaging connection. | 1, 0, 1 | UINT8 |
| 3 | Transport Class Trigger | Get | Defines behaviour of the connection. | N/A, N/A, N/A | UINT8 |
| 4 | Produced Cnxn Id | Get | Placed in CAN Identifier Field when the Connection Transmits | N/A, N/A, N/A | UINT16 |
| 5 | Consumed Cnxn Id | Get | CAN Identifier Field value that denotes message to be received | N/A, N/A, N/A | UINT16 |
| 6 | Comm Characteristics | Get | Defines the Message Group(s) across which productions and consumptions are associated in this Connection. | N/A, N/A, N/A | UINT8 |
| 7 | Produced Connection Size | Get | Maximum number of bytes transmitted across this Connection | 0, 0, N/A | UINT16 |
| 8 | Consumed Connection size | Get | Maximum number of bytes received across this Connection | 0, 0, N/A | UINT16 |
| 9 | Expected Packet Rate | Get, Set | Defines timing associated with this Connection. | 0, 0, 0xffff | UINT16 |
| 12 | Watchdog Timeout Action | Get | Defines how to handle Inactivity/Watchdog timeouts. | N/A, N/A, N/A | UINT8 |
| 13 | Produced Connection Path Length | Get | Number of bytes in the produced_connection_path length attribute | 3, 0, 3 | UINT16 |
| 14 | Produced Connection Path | Get | Application Object producing data on this Connection | 0x62 0x39 0x37, 0, N/A | Array of UINT8 |

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|----|---------------------------------|----------|--|----------------------------------|-------------------|
| 15 | Consumed Connection Path Length | Get | Number of bytes in the consumed_connection_path length attribute | 5,0,5 | UINT16 |
| 16 | Consumed Connection Path | Get | Specifies the Application Object(s) that are to receive the data consumed by this Connection Object. | 0x62 0x31 0x35, N/A,N/A | Array of UINT8 |
| 17 | Production Inhibit Time | Get,Set | Defines minimum time between new data production. | 0,3FFF, N/A | UINT16 |

Acknowledge Handler Object, Class 0x2B

The Acknowledge Handler Object is used to manage the reception of message acknowledgements. This object communicates with a message producing Application Object within the device. The Acknowledge Handler Object notifies the producing application of acknowledge reception, acknowledge timeouts and production retry limit.

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------|--|-------------------|
| 1 | Revision | Get | Revision of the DeviceNet Object Class Definition upon which the implementation is based | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Default, Minimum, Maximum | Data type |
|---|-----------------------------------|----------|---|---------------------------|-----------|
| 1 | Acknowledge Timer | Get, Set | Time in milliseconds to wait for acknowledge before resending | 16,1,65535 | UINT16 |
| 2 | Retry Limit | Get, Set | Number of Acknowledge Timeouts to wait before informing the producing application of a Retry-Limit_Reached event | 1,0,255 | UINT8 |
| 3 | COS Producing Connection Instance | Get | Connection Instance Id which contains the path of the producing I/O application object which will be notified of Acknowledge Handler events | N/A | UINT16 |

Motor Data Object, Class 0x28

This object serves as a database for motor parameters. Different motor types require different data to describe the motor. For example, AC induction motors do not need field current data like a DC motor to describe the motor.

| Motor class | Motor types in class |
|-------------|--|
| AC motors | 3 - PM synchronous 6 - Wound rotor induction 7 - Squirrel cage induction motor |
| DC motors | 1 - PM DC motor 2 - FC DC motor |

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------|--|----------------|
| 1 | Revision | Get | Revision of the DeviceNet Object Class Definition upon which the implementation is based | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Motor type | Data type |
|----|-----------------|----------|---|------------|-----------|
| 6 | Rated Current | Get, Set | Rated Stator Current from motor name plate | AC/DC | UINT16 |
| 7 | Rated Voltage | Get, Set | Rated Base Voltage from motor name plate | AC/DC | UINT16 |
| 8 | Rated Power | Get, Set | Rated Power at Rated Frequency | AC/DC | UINT32 |
| 9 | Rated Frequency | Get, Set | Rated Electrical Frequency | AC | UINT16 |
| 12 | Pole Count | Get | Number of poles in the motor | AC | UINT16 |
| 15 | Base Speed | Get | Nominal speed at rated frequency from nameplate | AC/DC | UINT16 |

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 by the *State transition diagram* and the *Run/Stop event matrix*. See Table 4 and Figure 5.

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------|--|----------------|
| 1 | Revision | Get | Revision of the DeviceNet Object Class Definition upon which the implementation is based | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Data type |
|----|---------------------------|----------|---|-----------|
| 3 | Run 1 ¹⁾ | Get, Set | 0 = Stop, 1 = Run | BOOL |
| 4 | Run 2 ²⁾ | Get, Set | 0 = Stop, 1 = Run | BOOL |
| 5 | Net Control ²⁾ | Get, Set | 0 = Local Control, 1 = Network Control | BOOL |
| 6 | State | Get | 1 = Start/up, 2 = Not_ready, 3 = Ready, 4 = Enabled, 5 = Stopping, 6 = FaultStop, 7 = Faulted | UINT8 |
| 7 | Running 1 ³⁾ | Get | 0 = Stopped, 1 = Running | BOOL |
| 8 | Running 2 ⁴⁾ | Get | 0 = Stopped, 1 = Running | BOOL |
| 9 | Ready | Get | 1 = Ready, Enabled or Stopping; 0 = Other state | BOOL |
| 10 | Faulted | Get | 0 = Not faulted, 1 = Fault occurred | BOOL |
| 11 | Warning | Get | 0 = No Warnings present, 1 = Warning | BOOL |
| 12 | FaultRst | Get, Set | 0 → 1 Fault Reset | BOOL |
| 13 | Fault Code | Get | The fault that caused the last transition to the Faulted state. | UINT16 |
| 14 | Warning Code | Get | Code word indicating warning present. If multiple warnings are present, the lowest code value is displayed. | UINT16 |
| 15 | CtlFromNet | Get | 0 = NetControl disabled 1 = NetControl enabled | BOOL |
| 16 | DNFaultMode | Get, Set | 0 = Fault+Stop, 1 = Ignore, 2 = Vendor specified | UINT8 |
| 17 | Force Fault | Get, Set | 0 → 1 Force a fault | BOOL |
| 18 | Force Status | Get | 0 = Not Forced Non-zero = Forced | BOOL |

1) Supported only with assembly instances 20 and 21

2) Supported only with assembly instance 21

3) Supported only with assembly instances 70 and 71

4) Supported only with assembly instance 71

Table 4. 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 |

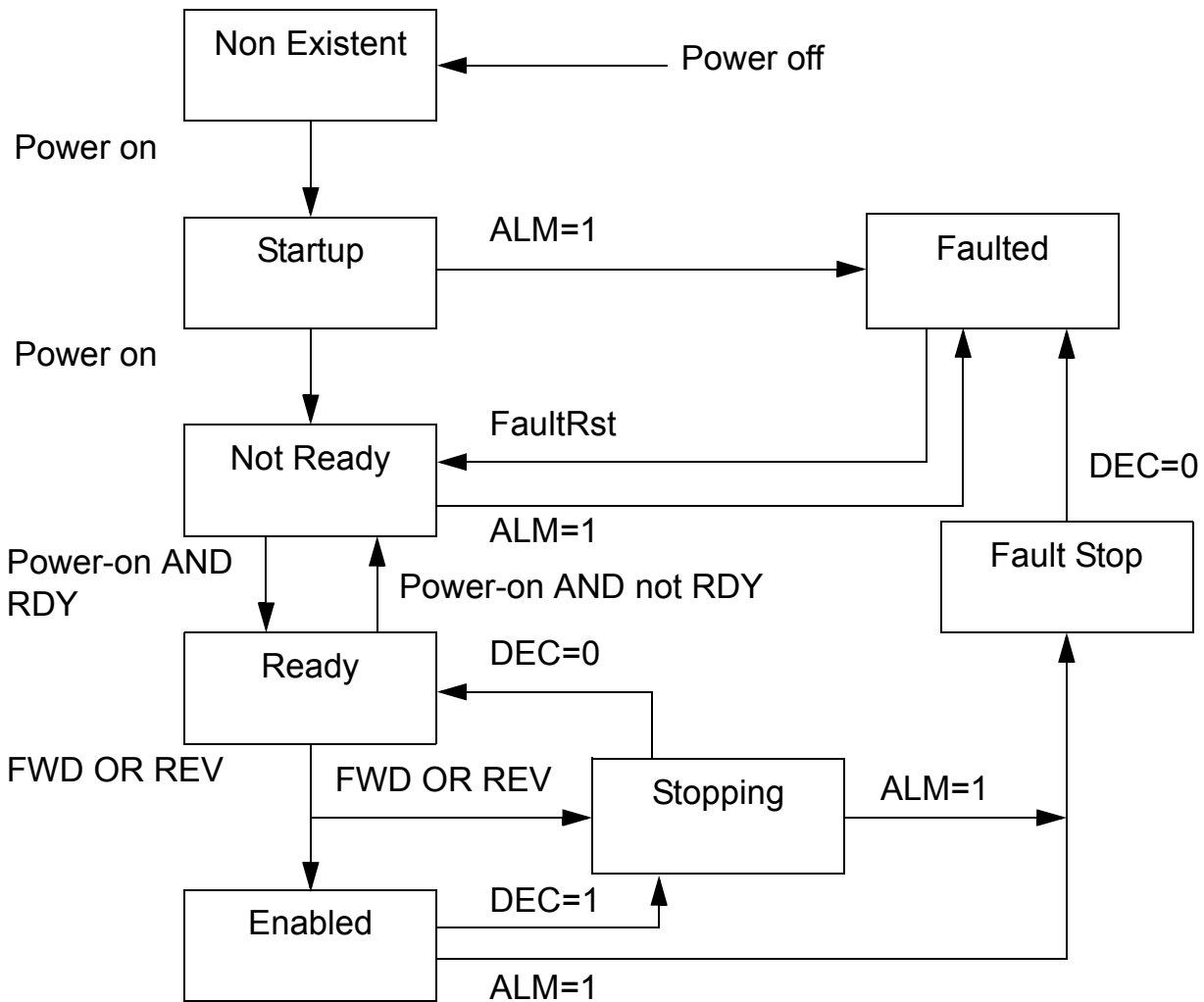


Figure 5. State transition diagram

AC/DC-Drive Object, Class 0x2A

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

Class Attributes

| # | Attribute name | Services | Description | Data type |
|---|----------------|----------|--|----------------|
| 1 | Revision | Get | Revision of the DeviceNet Object Class Definition upon which the implementation is based | Array of UINT8 |

Instance Attributes

| # | Attribute name | Services | Description | Data type |
|----|----------------------|----------|--|-----------|
| 3 | At Reference | Get | Frequency arrival | BOOL |
| 4 | 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 |
| 6 | Drive mode | Get, Set | 0 = Vendor specific, 1 = Open Loop Speed, 2 = Closed Loop Speed, 3 = Torque Control | UINT8 |
| 7 | Speed Actual | Get | Units RPM/2 ^{SpeedScale} | SINT16 |
| 8 | SpeedRef | Get, Set | Units RPM/2 ^{SpeedScale} | SINT16 |
| 18 | AccelTime | Get, Set | Units msec/2 ^{TimeScale} | UINT16 |
| 19 | DecelTime | Get, Set | Units msec/2 ^{TimeScale} | UINT16 |
| 22 | Speed Scale | Get, Set | Speed scaling factor | UINT8 |
| 23 | Current Scale | Get, Set | Current scaling factor | UINT8 |
| 24 | Torque Scale | Get, Set | Torque scaling factor | UINT8 |
| 26 | Power Scale | Get, Set | Power scaling factor | UINT8 |
| 27 | Voltage Scale | Get, Set | Voltage scaling factor | UINT8 |
| 28 | Time Scale | Get, Set | Time scaling factor | UINT8 |
| 29 | Ref From Net | Get | Reflecting attribute 4 | BOOL |
| 31 | Field I or IV | Get, Set | Always to be set to 0 | - |

²⁾ Supported only with assembly instance 21

EDS files

Electronic Data Sheet (EDS) files specify the properties of the device for the DeviceNet Scanner. The device is identified by the Scanner by means of the Product Type and Product Code definitions.

The allowable Product Types are defined by the ODVA DeviceNet specification. In the EDS files for the RDNA-01, only one Product Type is used:

- Product Type 2 = AC Drives

To enable the use of different ABB drive types on the same DeviceNet network, a unique Product Code has been given to each drive and/or application program.

The EDS files are available in Limited and Full formats. The Limited EDS files include the I/O Assembly configuration properties and the definition of the parameters in the fieldbus parameter group (see chapter *Programming*) only. The Limited EDS files can be used with the corresponding drive and/or application program independent of the application program revision.

The Full EDS files are intended for applications where access to the drive parameters via the DeviceNet network is required. The Full EDS files for ABB drives are specific to each drive type and application program revision. The Full EDS files are available from your ABB representative on request.

Fault tracing

RDNA-01 status codes

The status of the DeviceNet 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 DeviceNet Module.

EXECUT. INIT

The module is initialising and performing self-test.

TIME-OUT

The DeviceNet Module has stopped communicating with the drive.

CONFIG ERROR

The DeviceNet 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 DeviceNet Scanner or the Manager software to establish a connection.

ON-LINE

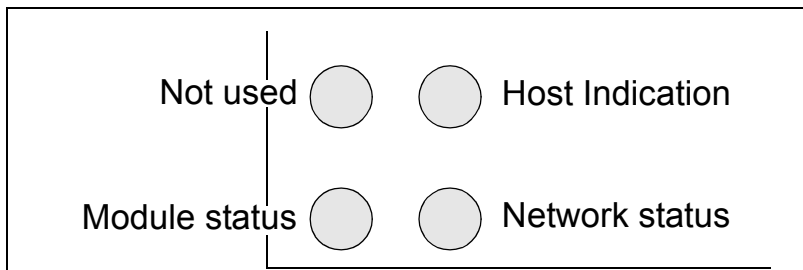
The DeviceNet module is connected and communicating with a DeviceNet Scanner or Manager software.

RESET

The drive has initiated a reset command to the module.

LED indications

The RDNA-01 module is equipped with three diagnostic LEDs. The description of the LEDs is below.



| Name | Colour | Function |
|-----------------|--------|---|
| Module status | Green | Steady - Device operational |
| | Red | Steady - Unrecoverable fault Flashing - Minor fault |
| | Off | No power |
| Network status | Green | Steady - Module is on-line Flashing - Module is not on-line |
| | Red | Steady - Critical link failure Flashing - Connection timeout |
| Host indication | Green | Lit - Link functional |
| | Red | Lit - Link lost permanently Flashing - Link lost temporarily |

Installation problems

Verify all the connections on the module:

- Check that the DeviceNet cables are connected to terminal block X1 as described in chapter *Electrical installation*.
- Check that an external voltage of 24 V DC is applied to terminals X1:1 and X1:5.
- Check that the RDNA-01 module is properly inserted into the option slot.
- Check the fastening of the RDNA-01 module with the 2 screws.

Drive setup

The fieldbus parameter group is not shown on the panel:

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

The RDNA-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 RDNA-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.

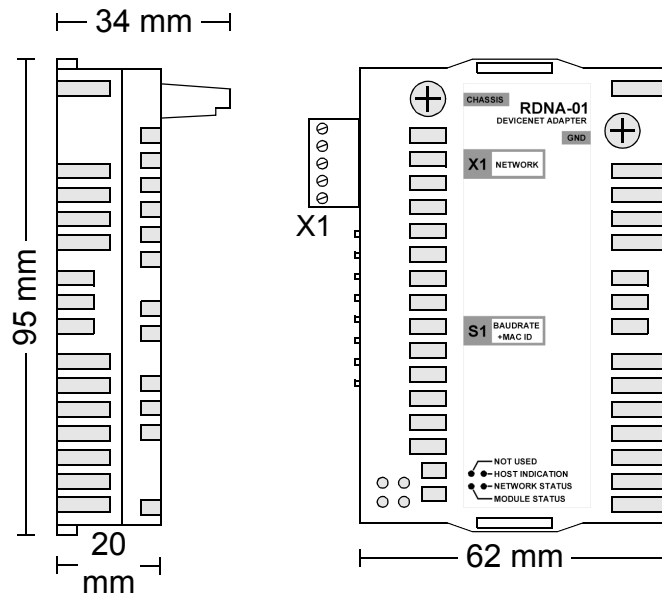
Scanner fault indications

Refer to scanner documentation.

Technical data

RDNA-01

Enclosure:



Mounting: Into an option slot inside the drive

Degree of protection: IP 20

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

Settings:

- Through drive parameters
- Eight DIP switches for selecting node address and baud rate

Connectors:

- 34-pin parallel bus connector
- 5-pole screw type connector for bus connection (max. 2.5 mm² cross section), removable

Current consumption:

- 250 mA max. (5 V), supplied by the RMIO board
- 15 mA max. (24 V) from the network supply.

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 ODVA-compliant DeviceNet scanner supporting Poll - Response commands to Group 2 only Slaves

Medium:

- **Termination:** 121 Ω , 1%, Metal Film, 1/4 W
- **DeviceNet Cables:**
YR-29790 (Thick DeviceNet Cable)
YR-29832 (Thin DeviceNet Cable)
- **Maximum Bus Length:** 1200 m

Topology: Multi-drop

Serial Communication Type: Asynchronous, half Duplex

Transfer Rate: 125, 250 or 500 kBit/s

Protocol: DeviceNet



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