MANUFACTURER DOCUMENT PACKAGE

# Manufacturer's Manual

Reference package for procurement and maintenance review

ABB

## NCAN-02C

**CANOPEN FIELDBUS ADAPTER**

Used with the applicable ABB Drives CANopen configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: ABB 3BFE 64254154 Rev B, chapters 2–4 and Appendix B; ACS800-67 +G314 hardware manual, p. 34

CANopen Adapter Module
NCAN-02

# Installation and Start-up Guide

3BFE 64254154 REV B
EN
EFFECTIVE: 10.10.2003

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# Chapter 2 – Overview

## Overview

This chapter contains a short description of the CANopen protocol and the NCAN-02 Adapter Module, a delivery checklist, and warranty information.

## CANopen

CANopen is a higher-layer protocol based on the CAN (Control Area Network) serial bus system and the CAL (CAN Application Layer). CANopen assumes that the hardware of the connected device has a CAN transceiver and a CAN controller as specified in ISO 11898.

The CANopen Communication Profile, CiA DS-301, includes both cyclic and event-driven communication, which makes it possible to reduce the bus load to minimum while still maintaining extremely short reaction times. High communication performance can be achieved at relatively low baud rates, thus reducing EMC problems and cable costs.

CANopen device profiles define both direct access to drive parameter and time-critical process data communication. The NCAN-02 fulfils CiA (CAN in Automation) standard DSP-402 (Drives and Motion Control), supporting the 'Manufacturer Specific' operating mode only.

The physical medium of CANopen is a differentially-driven two-wire bus line with common return according to ISO 11898. The maximum length of the bus is limited by the communication speed as follows:

| Baud Rate | Max. Bus Length |
|---|---|
| 1 Mbit/s | 25 m |
| 800 kbit/s | 50 m |
| 500 kbit/s | 100 m |
| 250 kbit/s | 250 m |

| Baud Rate | Max. Bus Length |
|---|---|
| 125 kbit/s | 500 m |
| 50 kbit/s | 1000 m |
| 20 kbit/s | 2500 m |
| 10 kbit/s | 5000 m |

The maximum theoretical number of nodes is 127. However, in practice, the maximum number depends on the capabilities of the CAN transceivers used.

Further information can be obtained from the CAN in Automation International Users and Manufacturers Group (*www.can-cia.de*).

### *The NCAN-02 CANopen Adapter Module*

The NCAN-02 CANopen Adapter Module is an optional device for ABB drives which enables the connection of the drive to a CANopen system. Through the NCAN-02 Module it is possible to:

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

The communication objects and functions supported by the NCAN-02 are discussed in Chapter 6.

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

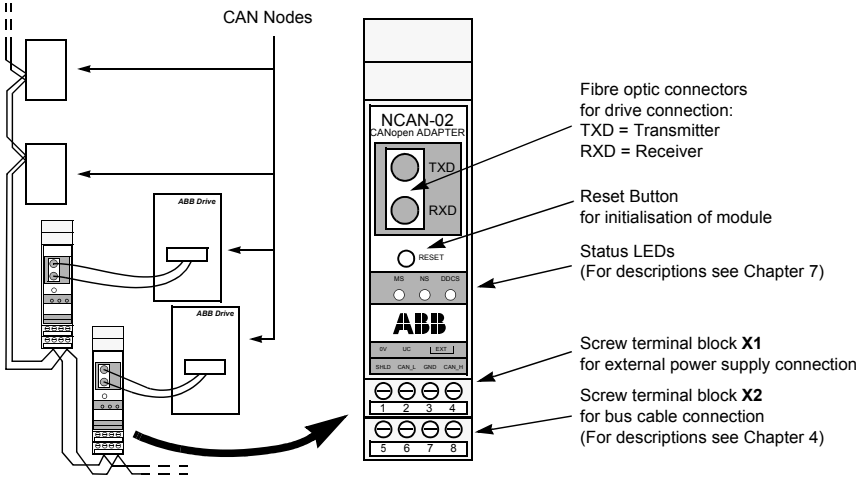



*Figure 4-1 The construction of the CANopen network and the face of the NCAN-02 Module.*

***Compatibility***

The NCAN-02 is compatible with the following ABB drives:

- ACS 400
- ACS 600 with Standard, System, Motion Control, Pump and Fan Control, or Crane Application Program
- ACS 800 with Standard, System, Motion Control, Pump and Fan Control, or Crane Application Program
- ACS 1000
- DCS 400
- DCS 500
- DCS 600.

***Delivery Check***

The option package for the NCAN-02 CANopen Adapter Module contains:

- CANopen Adapter Module, Type NCAN-02
- Shorting plug for power supply selection
- Two pairs (four pieces) of fibre optic cables for connecting the adapter to the drive
- Mounting rail
- This manual.

***Warranty and Liability Information***

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

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

The period of manufacturer's warranty is 12 months, and not more than 18 months, from the date of delivery. Extended warranty may be available with certified start-up. Contact your local distributor for details.

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

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

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

# Chapter 3 – Mechanical Installation

## Overview

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

## Mounting Outside the Drive

Choose the location for the module. Note the following:

- The cabling instructions must be followed (see Chapter 4). Also, the length of the fibre optic cables included in the option package restrict the distance between the module and the drive.
- Observe the free space requirements for the module (min. 10 mm from adjoining equipment or wall) and the drive (see the drive documentation).
- The ambient conditions should be taken into account (see Appendix D). The degree of protection of the module is IP 20.
- Module earth is connected to the mounting rail by means of an earthing clip (see Figure 3-1). The mounting rail onto which the option module is to be mounted must be earthed to a noiseless earth. If the rail is not mounted on a properly earthed base, a separate earthing conductor must be used. The conductor must be as short as possible and the cross-sectional area must be 6 $mm^2$ at least.

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***Note:*** No solid copper conductor may be used (stranded wire allowed only).

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Mounting instructions:

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

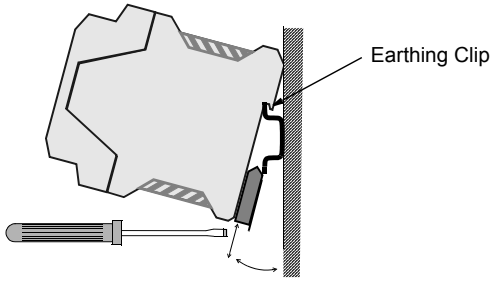



*Figure 3-1 Mounting and removing the module.*

### *Mounting Inside the Drive*

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

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

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

Mounting instructions:

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

# Chapter 4 – Electrical Installation

## Overview

This chapter contains:

- general cabling instructions
- module earthing instructions
- instructions of setting the module node number and communication speed (baud rate)
- instructions for connecting the module to the drive and to the CANopen 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

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

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

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

## Earthing the Module

The NCAN-02 module earth is connected to the rail onto which the module is mounted. If the rail is fastened to an earthed metallic assembly plate, the module is automatically earthed, and no external earthing wire is needed. If the rail is fastened to a base that is not earthed, the rail must be connected to the nearest earthing terminal. However, the earthing wire should not be connected to the same terminal as the power cable screens. (See the mounting instructions in Chapter 3.)

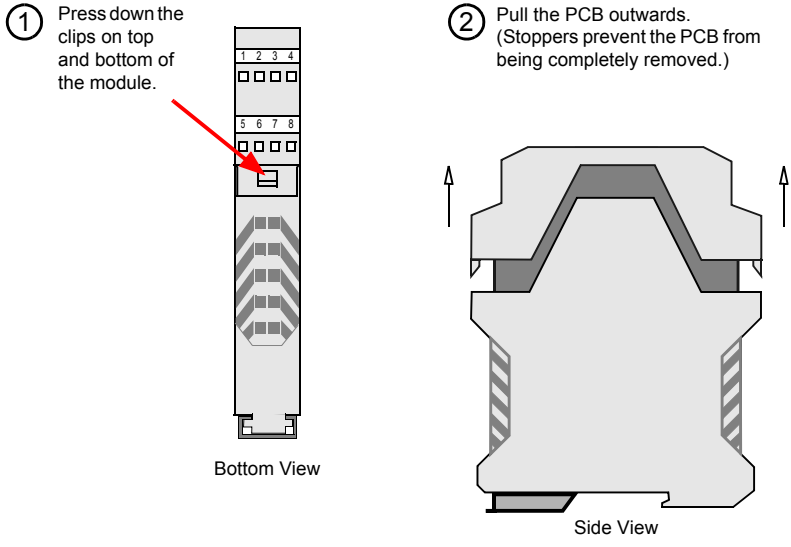
### DIP Switch Settings

The DIP switches SW1 and SW2 on the NCAN printed circuit board can be used to select the node number and the baud rate for the module.

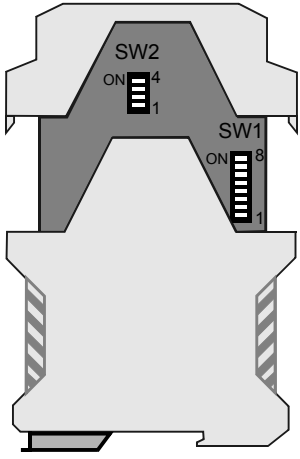
Setting switch SW1:8 to ON enables DIP switch selection. In this case, the corresponding selection parameters (in the fieldbus parameter group; see Chapter 5) only act as read-only indicators.

If SW1:8 is set to OFF (default), the node number and the baud rate are selected through module parameters (see Chapter 5).

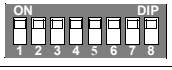
The figures below show how the DIP switches on the circuit board can be accessed.



③ Make the required settings.




| Function | SW1 |
|---|---|
| SW1 and SW2 enabled – node no. and baud rate selected with DIP switches. |  |
| *SW1 and SW2 disabled – node no. and baud rate selected with parameters. |  |

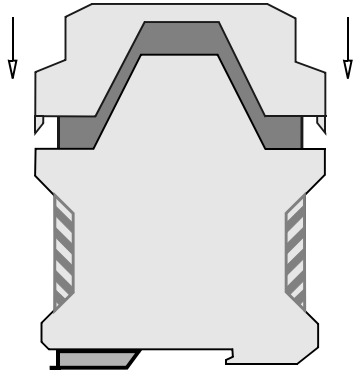
| Node No. | Binary | SW1 |
|---|---|---|
| *1 | 0000001 |  |
| 2 | 0000010 |  |
| • • • | • • • | • • • |
| 127 | 1111111 |  |

| Baud Rate | Binary | SW2 |
|---|---|---|
| 1 Mbit/s | 000 |  |
| 500 kbit/s | 001 |  |
| 250 kbit/s | 010 |  |
| *125 kbit/s | 011 |  |

| Baud Rate | Binary | SW2 |
|---|---|---|
| 100 kbit/s | 100 |  |
| 50 kbit/s | 101 |  |
| 20 kbit/s | 110 |  |
| 10 kbit/s | 111 |  |

*Default setting

④ Finally, close the module by sliding the PCB back until the clips lock into their recesses.



## NCAN-02 Connections

***Drive Connection*** The NCAN-02 module is connected to the drive using a fibre optic cable link. Consult the drive documentation as to the corresponding terminals inside the drive.

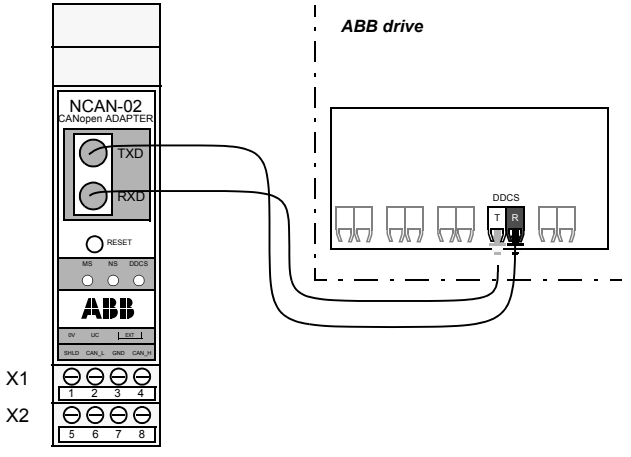



*Figure 4-1 Fibre optic link connecting the NCAN-02 to the drive.*

***CANopen Connection***

The bus cable and the external power supply are connected to terminal blocks X1 and X2 on the NCAN-02.

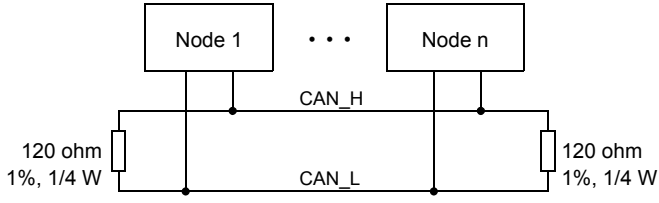
The terminal blocks are described below.

| X1 | | Description | |
|---|---|---|---|
| 1 | 0 V | DC GND | Power supply ground (0 V). If the power to the module is supplied through the CAN network, this terminal should be left unconnected. |
| 2 | UC | +24 VDC | +24 V ±10% (80 mA) DC supply to the module. The power can be taken from the drive's internal power supply (see drive manuals), a dedicated external power supply, or through the CAN network. The on-board power supply is disabled if the voltage drops below 11 V. |
| 3 | EXT | DC GND | These terminals should be connected together if the power to the module is supplied through the CAN network. This makes the NCAN-02 a non-isolated node. |
| 4 | | CAN GND | |

| X2 | | Description |
|---|---|---|
| 5 | SHLD | Network cable shield. |
| 6 | CAN_L | CAN_L bus line. |
| 7 | GND | CAN bus ground (digital ground). |
| 8 | CAN_H | CAN_H bus line. |

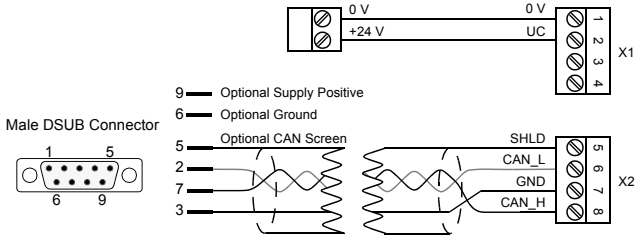
*CAN Bus Termination*

The CAN bus line must be terminated with 120 ohm resistors connected between the CAN_L and CAN_H wires at each end as shown below.

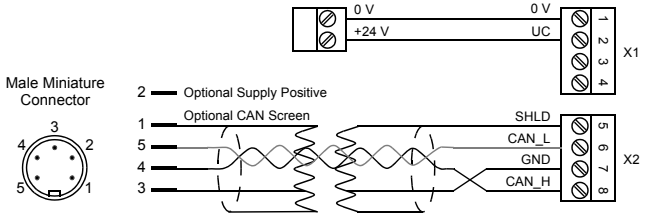


## Connection Examples

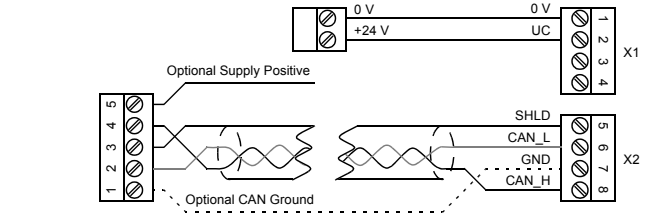
### Standard 9-pin DSUB Connector




### Standard 5-pin Miniature Connector

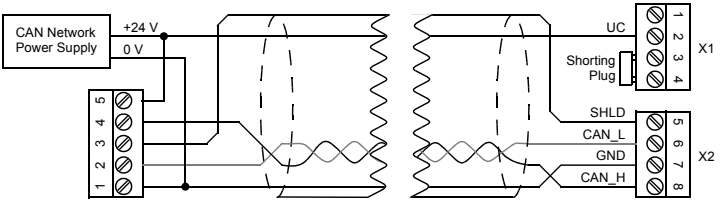



### Standard Open-style Connection




### Non-isolated Node Powered from the Network

***Note:*** Use this connection only if power supply is connected to CAN ground, and the CAN bus is short.



# Appendix B – Technical Data

## DDCS Link

**Compatible Devices:** All ABB Fieldbus Adapter modules, ABB ACS 400, ACS/ACP/ACC/ACF 600, ACS 800, ACS 1000, DCS 400/500/600 drives

**Size of the Link:** 2 stations

**Medium:** Fibre optic cable

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

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

**Topology:** Point-to-point

**Serial Communication Type:** Asynchronous, half Duplex

**Transfer Rate:** 4 Mbit/s

**Protocol:** Distributed Drives Communication System (DDCS)

**Connectors:** Blue – receiver; grey – transmitter

### *CANopen Network*

**Size of Network:** Max. 128 nodes

**Medium:** Screened, twisted pair RS-485 cable

- Termination: 120 ohm, 1/4 W, (Metal Film)

**Topology:** Multi-drop

**Serial Communication Type:** Asynchronous, half Duplex

**Transfer Rate:** 1 Mbit/s, 500 kbit/s, 250 kbit/s, 125 kbit/s, 100 kbit/s, 50 kbit/s, 20 kbit/s, or 10 kbit/s

**Protocol:** CANopen

**Standards:** CAN in Automation DS 301 *(Application Layer and Communication*, DSP 402 *(Device Profile: Drives and Motion Control),* ISO 11898 *(Controller Area Network [CAN] for High-Speed Communication)*

### *NCAN-02*

**Enclosure:** Plastic, dimensions 100 × 22.5 × 115 mm (H×W×D); degree of protection IP20

**Mounting:** Onto a standard mounting rail

**Settings:** Through drive parameters and/or DIP switches

**Current Consumption:** 30 mA at 24 VDC

**Connectors:**

- Light transmitter (grey) and receiver (blue) (Hewlett-Packard Versatile Link) for connection to the drive
- Two Combicon MSTBT 2,5/4-ST (4-pole, cross-section 2.5 $mm^2$ max.) screw terminal blocks for CAN network and power supply connection:

| X1 | | Description | |
|---|---|---|---|
| 1 | 0 V | DC GND | Power supply ground (0 V). If the power to the module is supplied through the CAN network, this terminal should be left unconnected. |
| 2 | UC | +24 VDC | +24 V ±10% (80 mA) d.c. supply to the module.<br>The power can be taken from the drive's internal power supply (see drive manuals), a dedicated external power supply, or through the CAN network.<br>The on-board power supply is disabled if the voltage drops below 11 V. |
| 3 | EXT | DC GND | These terminals should be connected together if the power to the module is supplied through the CAN network. This makes the NCAN-02 a non-isolated node. |
| 4 | | CAN GND | |

| X2 | | Description |
|---|---|---|
| 5 | SHLD | Network cable shield. |
| 6 | CAN_L | CAN_L bus line. |
| 7 | GND | CAN bus ground (digital ground). |
| 8 | CAN_H | CAN_H bus line. |

**General:**

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