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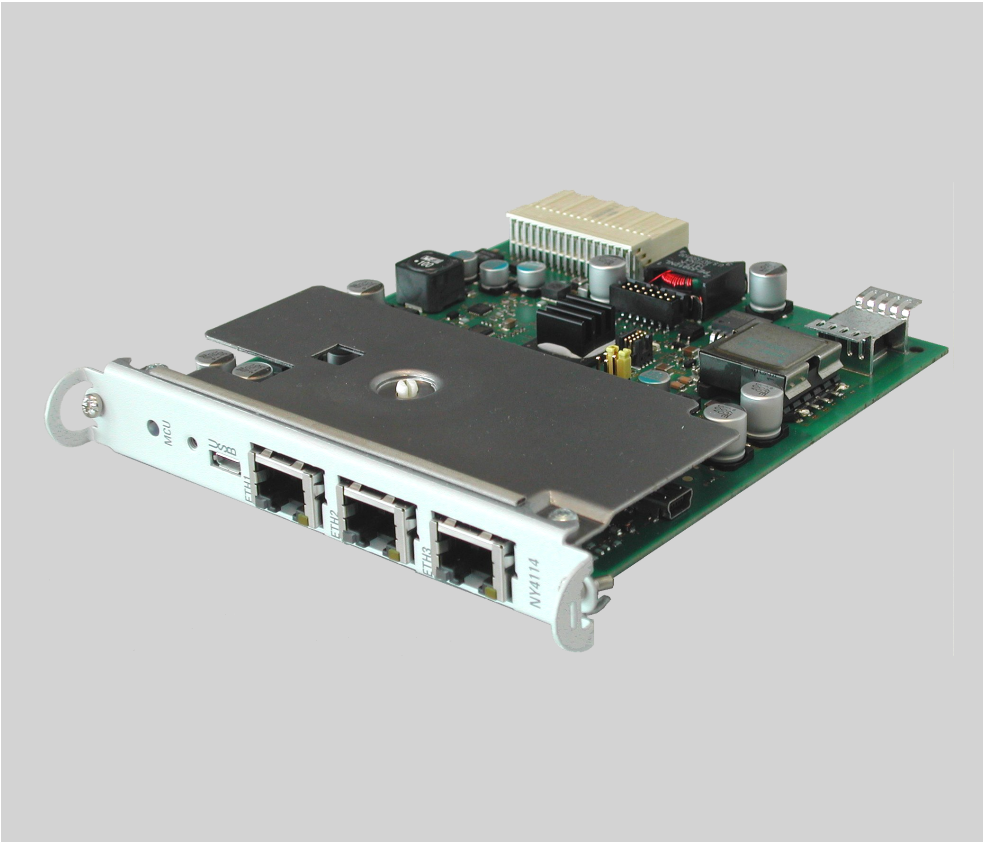
A Bosch Company

# NYCe 4000

## Multi-axis motion control system
## MCU Module NY4114

**Instructions**
**R911345042**

Edition 06



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## Published by

Bosch Rexroth AG

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http://www.boschrexroth.com

# Table of Contents

# 1 About this Documentation

## 1.1 Overview – target groups & product phases

The target groups, product phases and activities that can refer to this document are marked in rounded boxes in the following figure.

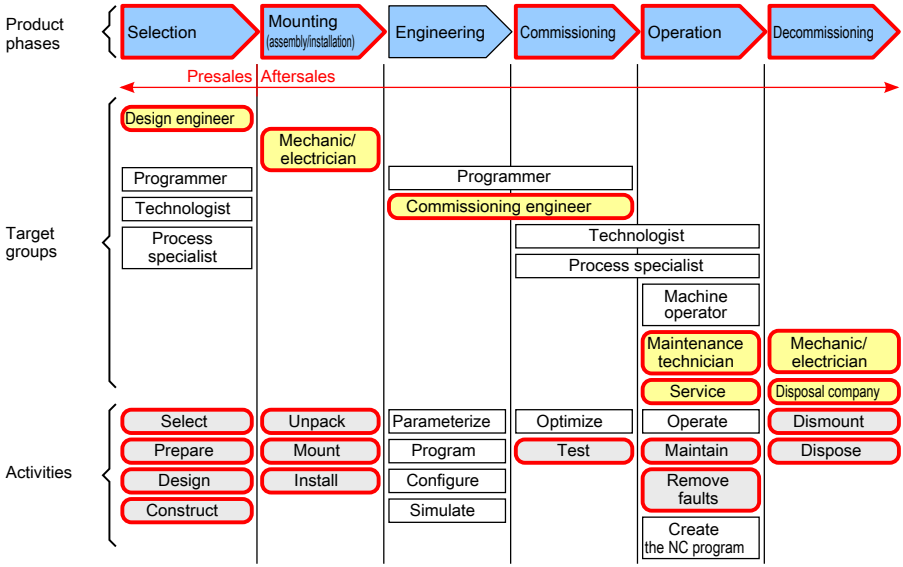


**Fig. 1-1:** Target groups, product phases and activities

## 1.2 Intended audience

This document explains **technical and service personnel of the machine builder** how to safely install the Motion Control Unit (MCU) module mechanically and electrically. This document is not the usage manual.

## 1.3 Availability

These Instructions are part of the MCU module product delivery and must always be available for the user. If the MCU module is handed over to another person, these Instructions must be handed over as well.

## 1.4 Included parts

| Type code | Material number | Description |
|---|---|---|
| NYM04.1-MCU-ETHER-NY4114 | R911173598 | NY4114 |
| DOK-NY4000-MCU*NY4114*-ITxx-yy-P | R911345042 | Instructions |

**xx** 2-digit version number
**yy** language indication

**Tab. 1-1:** Available MCU module

## 1.5 Variations

These Instructions apply to the NYCe 4000 MCU module with the following type code:

- NYM04.1-MCU-ETHER-NY4114

## 1.6 Further available documentation

The following documentation contains detailed information. Use the listed documentation or a newer version, if available.

| Title and type code | Material number |
|---|---|
| Rexroth NYCe 4000 Hardware System Manual<br>DOK-NY4000-HW***SYSTEM-PRRS-EN-E | R911337671 |
| Rexroth NYCe 4000 Standard Housings & Accessories Manual<br>DOK-NY4000-HOUSING*ACC-PRRS-EN-E | R911337672 |

**Tab. 1-2:** Available documentation

## 1.7 Additional parts

Standard housings, host adapter, drive modules, fan units, capacitor kits, connection cables, and more are listed in the project planning manuals (see chapter 1.6) or on www.boschrexroth.com.

# 2 Product Identification and Scope of Delivery

## 2.1 Product identification

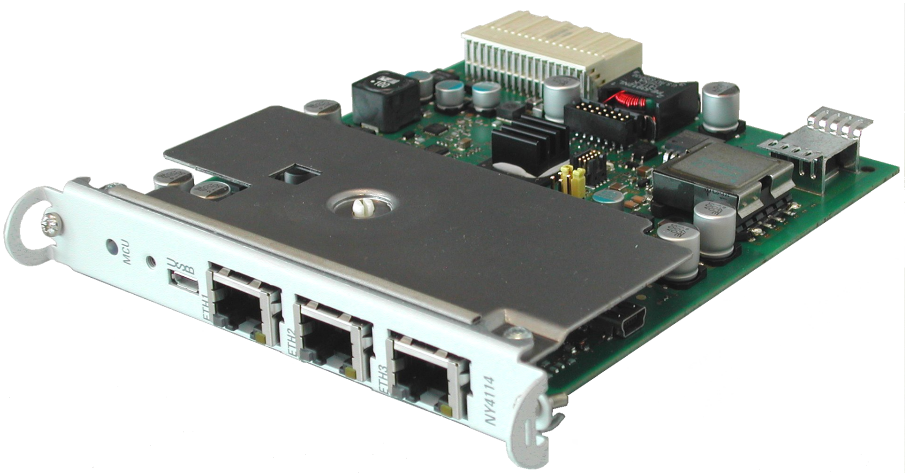


**Fig. 2-1:** View of the NYM04.1-MCU-ETHER-NY4114

The NYM04.1-MCU-ETHER-NY4114 can be identified by the cover plate and the label on the rear side of the circuit board.

- Cover plate identification.

  One LED is visible at the top. Below the LED is the text "MCU".

  Further, there is one micro-USB socket marked "USB", and there are three RJ45 ethernet sockets marked "ETH1", "ETH2" and "ETH3".

  At the bottom of the cover plate is the text "NY4114".
- Label on the rear side of the circuit board.

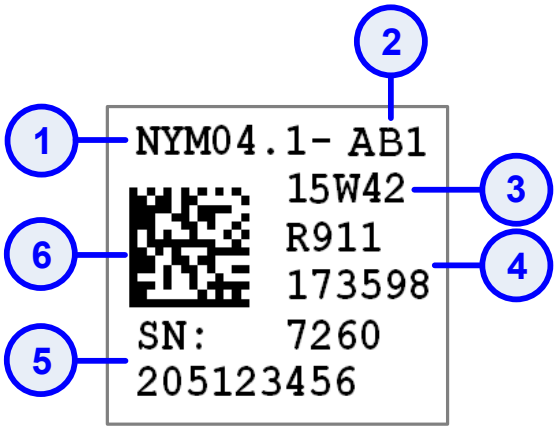


**Fig. 2-2:** NY4114 product label

| | |
|---|---|
| 1 | Type code |
| 2 | Version level and status |
| 3 | Date of manufacture (yyWww) |
| 4 | Material number |
| 5 | Serial number |
| 6 | 2D bar code |

**Tab. 2-1:** NY4114 product label and explanation

## 2.2 Scope of delivery

The product delivery consists of the following items.

- NYM04.1-MCU-ETHER-NY4114 MCU module, material number R911173598.
- DOK-NY4000-MCU*NY4114*-ITxx-yy-P Instructions (where "xx" represents a 2-digit version number, and "yy" the language indication), material number R911345042.

# 3 Using the Safety Instructions

## 3.1 Safety instructions - structure

The safety instructions are structured as shown in the following example.

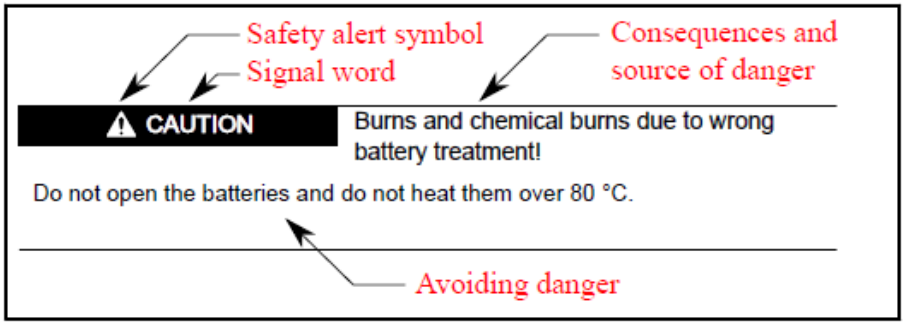


**Fig. 3-1:** Safety instruction lay-out

## 3.2 Explaining signal words and safety alert symbols

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and if necessary, a safety alert symbol (according to ANSI Z535.6-2011).

The signal word is meant to draw the reader's attention to the safety instruction and signifies the degree of danger. The safety alert symbol (a triangle with an exclamation point), which precedes the signal words "danger", "warning" and "caution" is used to alert the reader to personal injury hazards.

| | |
|---|---|
| **⚠ DANGER** | **In case of non-compliance with this safety instruction, death or serious injury will occur.** |
| **⚠ WARNING** | **In case of non-compliance with this safety instruction, death or serious injury can occur.** |
| **⚠ CAUTION** | **In case of non-compliance with this safety instruction, minor or moderate injury could occur.** |
| ***NOTICE*** | **In case of non-compliance with this safety instruction, property damage could occur.** |

# 4 Intended Use

The MCU module is for indoor use only, and may only be used in combination with parts indicated in this document and NYCe 4000 software and firmware. Not explicitly mentioned parts may not be installed or connected.

Do not install and use this MCU module before you have read all relevant documents. You must read the safety instructions and all other directions for use before you start any work or activity with this MCU module.

The MCU module has no certified functional safety on board. This means that all precautions for a safe operation must be ensured by external components.

# 5 Accessories, Spare Parts and Wear Parts

Some form of network cable strain relief is advised for the ethernet connection cables to the NYM04.1-MCU-ETHER-NY4114. The following accessories are available for network cable strain relief.

| Type code and description | Material number |
|---|---|
| NYA04.1-STRAIN-RELIEF-41XX-NY4901/10<br>Network cable strain relief | R911172941 |
| NYA04.1-STRAIN-RELIEF-4114-NY4901/30<br>Network cable strain relief for NY4114 | R911403464 |

**Tab. 5-1:** Accessories for MCU module

The MCU module does not contain any replaceable or wear parts. In case of failure, the entire MCU module must be replaced.

# 6 Ambient Conditions

| | Operating | Storage and transport |
|---|---|---|
| Maximum environment temperature | +5 °C .. +55 °C | −40 °C .. +85 °C |
| Relative Humidity | 10 % .. 90 % (non-condensing) | 5 % .. 95 % (non-condensing) |
| Mechanical strength | Vibration: IEC 60068-2-6:2007<br>Vibration, broad-band: IEC 60068-2-64:2008 | Shock: IEC 60068-2-27:2008 |
| Pollution degree | 2 | 2 |
| Overvoltage category | II | - |
| Maximum altitude | 4000 m | |

**Tab. 6-1:** Ambient conditions

# 7 Technical Data

## 7.1 Power supply

The MCU requires a 24V power supply which supports inrush currents of 0.36 $A^2s$ to prevent start-up problems.

| 24V System power supply | Voltage |
|---|---|
| Nominal voltage | DC 24V |
| Tolerance | ± 5% |

**Tab. 7-1:** MCU power supply

The 24V power supply current rating with modules installed in the system housing is as follows.

| 24V System power supply | Current |
|---|---|
| Minimum supply current | Supply required for all installed modules. |
| Maximum supply current | 3A |

**Tab. 7-2:** Current rating

The 24V power supply must be secured with a UL certified fuse of 3A slow in the +24V connection.

# 8 Standards

## 8.1 Used standards

The MCU module corresponds to the following standards.

- IEC61000-6-2:2005) (Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments)
- IEC61000-6-4:2018 (Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments)

## 8.2 CE marking

Declaration of Conformity

CE

**Fig. 8-1:** CE logo

The MCU module described in the present instructions complies with the requirements and the target of the following EU directive and with the following harmonized European standards:

- EMC Directive 2014/30/EU

Maintaining the EMC directive presuppose an EMC adapted installation of the devices within the installation of the machine. The complied limit values and standards are specified in the Rexroth Manual of associated product. The regulations for the structure and the installation in this manual must be maintained and realized. Tests were run using a typical installation in a test assembly that conforms with the standards. These Rexroth products are built-in devices for a product for the final user. The test results cannot be transferred to every state as installed in every product intended for the final user. This declaration does not therefore assure the EMC characteristics of the product for the final user.

## 8.3 UL certification


**Fig. 8-2:** UL Recognized logo

The MCU module

- NYM04.1-MCU-ETHER-NY4114

is certified according to

- UL 61010-1:2012

UL file no. E353498

However, there can exist combinations with modules or accessories with limited or missing certification. Therefore, verify the registration according to the UL marking on the components.

***NOTICE*** **Loss of UL conformity due to changes to the MCU module.**

The UL marking is only valid for the MCU module in its delivery status. After any modification by the customer to the MCU module the UL compliance is to be verified.

## 8.4 China RoHS 2 marking


**Fig. 8-3:** China RoHS 2 logo

The MCU module

- NYM04.1-MCU-ETHER-NY4114

complies with the requirements of the Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products, known as China RoHS 2.

# 9 Interfacing

The following connections are available on the cover plate of the MCU.

| Designation on the cover plate | Connection type | Connection type on the MCU | Connection type on the cable |
|---|---|---|---|
| ETH1 | RJ45 | Female socket | Male plug |
| ETH2 | RJ45 | Female socket | Male plug |
| ETH3 | RJ45 | Female socket | Male plug |
| USB | micro-USB | Female socket | Male plug |

**Tab. 9-1:** Connections on the front of the MCU

***NOTICE*** **Damage to the MCU may occur if external power is connected to the USB connector.**

Do not connect an external (USB) power supply to the USB port of the MCU module.

The connector block on the circuit board at the rear side plugs into the system backplane of the system housing. More information is available in the NYCe 4000 Hardware System Manual.

# 10 Installation and Removal

## 10.1 General

**NOTICE** **Damage to the MCU may occur if power is applied during installation or removal.**

- Make sure power supplies are switched off before installation or removal of the MCU module.
- Do not apply power until the MCU module is installed.

**NOTICE** **Damage to the MCU may occur due to electrostatic discharges.**

Comply with all ESD protective measures while working with modules and components. Avoid electrostatic discharges.

Power supplies must be switched on/off with the disconnecting device installed in the cabinet.

The MCU module must be installed in a system housing and requires programming before you can control a motion application.

The MCU module may only be used as build-in equipment in a cabinet, which means that the end-user must provide a suitable fire and electrical safe enclosure.

The MCU module may only be used in combination with external approved power supplies. The supply voltage 24V System for the MCU must be separated at least by reinforced insulation from all hazardous voltages according to the standard UL61010-1 third edition.

## 10.2 Mechanical dimensions

The dimensions of the MCU module are the following.

| Type code | Width (mm) | Height (mm) | Depth (mm) |
|---|---|---|---|
| NYM04.1-MCU-ETHER-NY4114 | 21.9 | 128.4 | 148.5 |

**Tab. 10-1:** MCU module mechanical dimensions

You can see the dimensions of the MCU module in the following views.

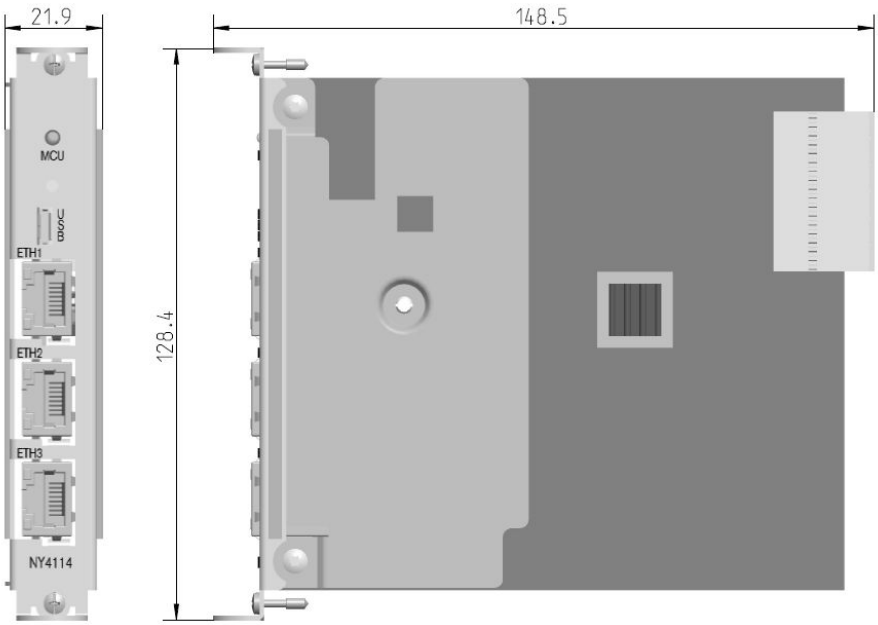


**Fig. 10-1:** Dimensions of the MCU module

## 10.3 Installation of the MCU module

The MCU module is intended for installation in a NYCe 4000 system housing with a Bosch Rexroth backplane. The MCU module is always installed in the most-left slot of the system housing. That slot is marked with the text "MCU".

Position the MCU module in the front slot guides and gently slide the module into the slot. Align the connectors of the module with the connectors on the system backplane. Then push the module into the connector. Do **not** use excessive force to prevent damage to the connector pins.

Tighten the two screws on the cover plate of the MCU module to lock the MCU module in its slot.

If you have a network cable strain relief bracket as described in chapter 5, do the following. Put the hook of the cable strain relief bracket on the lower handle of the MCU module and install the bracket with the screw on the cover plate of the MCU module. Note that some form of network cable strain relief is advised.

## 10.4 Removal of the MCU module

Make sure that all power supplies are switched off and capacitors in the system are fully discharged before you remove the MCU module.

Loosen the parts that hold the network cable(s) onto the network cable strain relief bracket, and unlock/pull the ethernet cable(s) out of the socket on the front of the MCU.

Loosen the two screws that hold the MCU module in the slot of the system housing. Gently pull the MCU module out of the slot of the system housing. Note that you do not need to remove the network cable strain relief bracket to remove the MCU module.

# 11 Commissioning

## 11.1 Power supply connections

Power supply to the MCU module is connected via the connector block at the rear side of the MCU module and is supplied via the "24V System" connector on the system housing.

## 11.2 Communication connection

The MCU module communicates with the host via an ethernet cable. Plug the ethernet cable in the ETH1 socket on the front of the MCU module. Lock the ethernet cable onto the optional bracket.

## 11.3 Configuration

The MCU module contains a web server to communicate with the PC over the ethernet network. The default IP address is 192.168.41.14. Any modern web browser can be used to access the NY4114 MCU module. Enter in the address field of the web browser http://192.168.41.14. A new bootloader, firmware and other files can be downloaded to the MCU module via the "Boot" tab of the web server. Via the "Network" tab of the web server the IP address assignment method can be changed between static IP address and DHCP server. If you select a static IP address assignment and change the default IP address, make a note of the new IP address for future reference. Without the correct IP address you cannot make a connection with the MCU module. See for more information the NYCe 4000 documentation delivered with the NYCe 4000 Software Release.

# 12 Description of the MCU module

The MCU module has one connector block at the rear edge of the circuit board, which connects the MCU module to the backplane in the system housing. All power supply connections and interface connections to other modules and headers on the base plate of the system housing are established via this connector block.

The front side of the MCU module has a cover plate. On the cover plate is one LED visible. The LED is marked "MCU". Further, there is one micro-USB connection, marked "USB", and are three ethernet connections, marked "ETH1", "ETH2", and "ETH3".

On the bottom side of the MCU module at the top edge is a micro-SD slot.

# 13 Diagnosis

After the installation of the MCU module in a system housing, connection of the power supply, and a connection to a PC with the ethernet cable, you can check the operation of the MCU module.

The "MCU" status indicator LED is set to a specific continuous color, or flashes in one specific color or two specific colors and the flash frequency can be slow (0.5 Hz) or fast (2 Hz). You can see from the status indicator LED when the problem occurred. The status indicator LED also indicates normal operation mode states.

| Off | Red | Orange | Green |
|---|---|---|---|
| No 24V System power.<br>On-board power failure.<br>→ replace module. | Hardware start-up failure.<br>Boot failure.<br>POST failure.<br>Defective MCU module.<br>→ replace module. | 2nd level boot problem: Linux problem or<br>2nd level boot error A<br>→ restart module. | Normal operation mode. |

**Tab. 13-1:** MCU module LED state "continuous off or on"

| "first" color | "second" color | | | |
|---|---|---|---|---|
| | Off | Red | Orange | Green |
| Red | Bootloader running.<br>Check EEPROM, flash memory failure.<br>EEPROM not OK and no write jumper. | - | Recovery bootloader start-up.<br>Recovery bootloader failure. | - |
| Orange | 2nd level boot problem.<br>Motion deamon failure or 2nd level boot error C. | - | - | Recovery bootloader active.<br>Flash memory error. |
| Green | Normal operation mode and node selected by NYCeConfigurator. | - | - | - |

**Tab. 13-2:** MCU module LED state "slow flashing (0.5 Hz)"

| "first" color | "second" color | | | |
|---|---|---|---|---|
| | Off | Red | Orange | Green |
| Red | Bootloader start-up.<br>Bootloader failure. | - | Bootloader running, flash memory programming failure.<br>Restart failure. | - |
| Orange | 2nd level boot problem.<br>2nd level boot error B. | - | - | Recovery boot active (forced by jumper). |
| Green | Normal operation mode and multi-node system:<br>network stable, synchronizing nodes. | - | - | - |

**Tab. 13-3:** MCU module LED state "fast flashing (2 Hz)"

The RJ45 "ethernet" connectors on the front panel each have 2 LEDs for information indication of the network. The upper LED (green or orange) is the speed and link status indicator. The LED is green to indicate a network speed of 1000 Mbps and orange to indicate a network speed of 100 Mbps. The LED is off when the link is not active. The lower LED (yellow) is the activity indicator. The LED is illuminated when data is transported over the ethernet connection.

See the NYCe 4000 Hardware System Manual for more information. Note that the NYCe 4000 software must be installed on the PC.

You can access the web server on the MCU module via any modern web browser and download the required files. See the NYCe 4000 Tools Manual for more information.

# 14 IT-security

The operation of installations, systems and machines requires the implementation of an integral concept for state-of-the-art IT security. Bosch Rexroth products are part of this integral concept. Bosch Rexroth product characteristics have to be taken into consideration in an integral IT security concept. The relevant characteristics are documented in the IT security guideline (R911342562).

# 15 Maintenance

The MCU module has no special maintenance requirements.

# 16 Disposal

## 16.1 Products

Our products can be returned to us free of charge for disposal. It is a precondition, however, that the products are free of oil, grease or other dirt. In addition, when returned the products must not contain any undue foreign matter or foreign component.

Please send the products “free domicile” to the following address:

Bosch Rexroth AG

Bgm-Dr.-Nebel-Str. 2

97816 Lohr a.Main, Germany

## 16.2 Packaging materials

The packaging materials consist of cardboard, wood and polystyrene. They can be easily recycled. For ecological reasons you should not return the empty packages to us.

## 16.3 Environmental protection

- No release of hazardous substances.

  Our products do not contain any hazardous substances that they can release in the case of appropriate use. Normally there are not any negative effects on the environment to be expected.

- Materials contained in the products.

  Electronic devices.

  Electronic devices mainly contain

  – steel
  – aluminum
  – copper
  – synthetic materials
  – electronic components and modules

- Recycling.

  Due to their high content of metal most of the product components can be recycled. In order to recycle the metal in the best possible way it is necessary to disassemble the products into individual modules. The metals contained in the electric and electronic modules can also be recycled by means of specific separation processes.

  The synthetic materials remaining after these processes can be thermally recycled.

# 17 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

### Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

| | |
|---|---|
| Phone: | **+49 9352 40 5060** |
| Fax: | **+49 9352 18 4941** |
| E-mail: | service.svc@boschrexroth.de |
| Internet: | http://www.boschrexroth.com |

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

### Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

### Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

# 18 Appendix – Declaration of Conformity

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**EU declaration of conformity –** *Original*

Doc. No.: DCTC-30329-102
Date: 2020-07-15

- ☐ in accordance with Machinery Directive 2006/42/EC
- ☒ in accordance with Low Voltage Directive 2014/35/EU
- ☒ in accordance with EMC Directive 2014/30/EU
- ☐ in accordance with Pressure Equipment Directive 2014/68/EU
- ☐ in accordance with ATEX Directive 2014/34/EU
- ☒ in accordance with RoHS Directive 2011/65/EU

The manufacturer

Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr am Main / Germany

hereby declares that the product below

Name: NYCe 4000
Function: MCUs, drive, digital I/O and SERCOS III Master modules
Type: NY4110, NY4110/10, NY4112, NY4114, NY4120, NY4120/10, NY4125, NY4130, NY4140, NY4150/10, NY4160

| Ordering code | Part number | |
|---|---|---|
| NYM04.1-MCU-NNNN-NY4110 | R911318960 | *) |
| NYM04.1-MCU-NNNN-NY4110/10 | R911377142 | *) |
| NYM04.1-MCU-ETHER-NY4112 | R911173007 | *) |
| NYM04.1-MCU-ETHER-NY4114 | R911173598 | *) |
| NYM04.1-2PW-NNNN-NY4120 | R911318961 | |
| NYM04.1-2PW-LMS-NY4120/10 | R911320447 | |
| NYM04.1-5PW-NNNN-NY4125 | R911172221 | *) |
| NYM04.1-2LD-NNNN-NY4130 | R911318962 | *) |
| NYM04.1-1HV-NNNN-NY4140 | R911318963 | |
| NYM04.1-SE3-MAST-NY4150/10 | R911172782 | *) |
| NYM04.1-DIG-IO-NY4160 | R911173299 | *) |

Trade name: Rexroth
Year of construction: as of 2008

was developed, designed and manufactured in compliance with the above-mentioned directive(s).
This declaration of conformity is issued under the sole responsibility of the manufacturer.
*) Device with an input voltage less or equal than 30V DC. In this case the declaration of conformity is pertaining to the EMC Directive only; the Low Voltage Directive is not applied.

| Standard | Title | Edition |
|---|---|---|
| The compliance with the abovementioned Low Voltage Directive is verified by the compliance with the applicable areas of the following harmonized European standards: | | |
| IEC 61010-1 | Safety requirements for electrical equipment for measurement, control and laboratory use- Part 1: General requirements | 2010 |

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**Fig. 18-1:** EU Declaration of conformity - page 1

**EU declaration of conformity** – *Original*

Page 2 / 2
**DCTC-30329-102:** 2020-07-15

The compliance with the abovementioned EMC Directive is verified by the compliance with the applicable areas with the following harmonized European standards:

| | | |
|---|---|---|
| IEC 61000-6-2 | Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments | 2005 |
| IEC 61000-6-4 | Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments | 2018 |

The compliance with the abovementioned RoHS Directive was stated with the procedure in accordance with the standard below and was documented in the material master records file.

| | | |
|---|---|---|
| IEC 63000 | Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances | 2016 |

Further explanations:
The assembling and installation instructions according to the manual have to be followed.

Lohr am Main
Place

2020-07-15
Date

ppa.
Joachim Hennig (LoP2/PT)
Plant Manager

i.V.
Bas Verhelst (DC-AE/ESW5)
Director Product Development

We reserve the right to make changes to the content of the EU Declaration of Conformity. Current issue on request.

**Fig. 18-2:** EU Declaration of conformity - page 2

## Notes

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R911345042

DOK-NY4000-MCU*NY4114*-IT06-EN-P