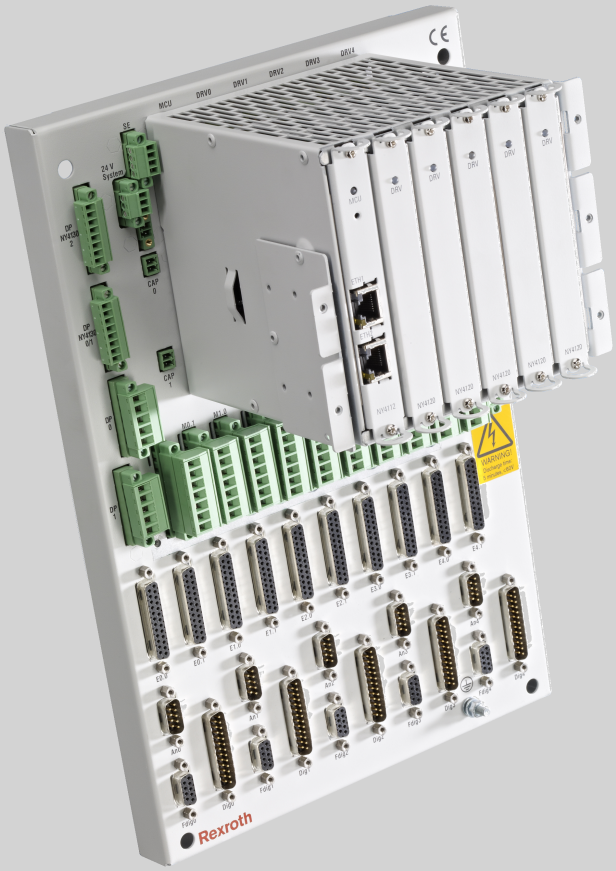
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A Bosch Company

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Standard Housings & Accessories

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1 Introduction

1.1 Purpose of Documentation

This NYCe 4000 "Standard Housings and Accessories" Manual provides information about standard housings and accessories for the NYCe 4000 system. You can find on the internet (http://www.boschrexroth.com/various/utilities/mediadirectory/index.jsp?oid=326148&language=en-GB) the latest version of this manual. Click the links "Electric Drives and Controls" → "Control Units" → "Controls" → NYCe 4000" on the mentioned webpage.

The following system housings are described in this manual.

NYS04.2-ST-01-ULNN-NY4013	NYS04.2-ST-02-ULNN-NY4023
NYS04.2-ST-03-ULNN-NY4033	NYS04.2-ST-04-ULNN-NY4043
NYS04.2-ST-05-ULNN-NY4053	NYS04.2-ST-02-LMSN-NY4074
NYS04.1-ST-01-LMS-SERCOS-NY4079	

Tab. 1-1: System housings described in this manual

The following accessories are described in this manual.

NYM04.1-ESC-NNNN-NY4199	NYA04.1-COVRPL-NO-USED-NY4900
NYA04.1-STRAIN-RELIEF-5PCS-4110-NY4901	NYA04.1-STRAIN-RELIEF-41XX-NY4901/10
NYA04.1-SHIELD-SUP-MOT-5PCS-NY4910	NYA04.1-1394B-INT-PCIE-NY4917
NYA04.1-CONSET-SYSPW-NY4920/10	NYA04.1-CAP-100V-NY4921
NYA04.1-CAP-200V-NY4921/10	NYA04.1-FAN-1DRV-NY4922/00
NYA04.1-FAN-2DRV-NY4922/10	NYA04.1-FAN-3DRV-NY4922/20
NYA04.1-FAN-4DRV-NY4922/30	NYA04.1-FAN-5DRV-NY4922/50
NYA04.1-1394B-CABLE-B-B-00.5M-NY4950	NYA04.1-1394B-CABLE-B-B-01.0M-NY4950/10
NYA04.1-1394B-CABLE-B-B-02.0M-NY4950/20	NYA04.1-1394B-CABLE-B-B-04.5M-NY4950/30
NYA04.1-1394B-CABLE-ANGLED-01.2M-NY4950/40	NYA04.1-CHOKES-10PCS-1394B-NY4950/99
NYA04.1-LMS-MUX2-10Vtt-5V-NY4960/10	NYA04.1-LMS-MUX2-10Vtt-15V-NY4960/20
NYA04.1-LMS-COIL-UNIT-TM3S-3685075	NYA04.1-LMS-COIL-UNIT-TM6S-3685076
NYA04.1-LMS-COIL-UNIT-TM6Y-104582	NYA04.1-LMS-COIL-UNIT-TM12S-3685078
NYA04.1-LMS-MAGNETTM-96MM-3685225	NYA04.1-LMS-MAGNETTM-144MM-3685226
NYA04.1-LMS-MAGNETTM-384MM-3685227	NYA04.1-LMS-MAGNETTMV-144MM-120C-3685419
NYA04.1-LMS-MAGNETTMV-384MM-120C-3685511	NYA04.1-LMS-COIL-UNIT-TL6N-3697458
NYA04.1-LMS-COIL-UNIT-TL6S-3685032	NYA04.1-LMS-COIL-UNIT-TL9N-3685311
NYA04.1-LMS-COIL-UNIT-TL9S-3675312	NYA04.1-LMS-COIL-UNIT-TL12N-3697459
NYA04.1-LMS-COIL-UNIT-TL12S-3685033	NYA04.1-LMS-COIL-UNIT-TL15N-3687460
NYA04.1-LMS-COIL-UNIT-TL15S-3685034	NYA04.1-LMS-COIL-UNIT-TL18N-3685223
NYA04.1-LMS-COIL-UNIT-TL18S-3685224	NYA04.1-LMS-COIL-UNIT-TL24N-3685014
NYA04.1-LMS-COIL-UNIT-TL24S-3685035	NYA04.1-LMS-MAGNETTL-192MM-3685193

NYA04.1-LMS-MAGNETTL-288MM-3685194	NYA04.1-LMS-MAGNETTLV-192MM-120C-3685457
NYA04.1-LMS-MAGNETTLV-288MM-120C-3685472	NYA04.1-LMS-MAGNETTLV-192MM-150C-3685473
NYA04.1-LMS-MAGNETTLV-288MM-150C-3685420	NYA04.1-LMS-COIL-UNIT-TB12N-3685155
NYA04.1-LMS-COIL-UNIT-TB12S-3685157	NYA04.1-LMS-COIL-UNIT-TB15N-3685122
NYA04.1-LMS-COIL-UNIT-TB15S-3685120	NYA04.1-LMS-COIL-UNIT-TB30N-3685123
NYA04.1-LMS-COIL-UNIT-TB30S-3685121	NYA04.1-LMS-MAGNETTB-192MM-3685221
NYA04.1-LMS-MAGNETTB-288MM-3685222	NYA04.1-LMS-MAGNETTBV-192MM-120C-3685474
NYA04.1-LMS-MAGNETTBV-288MM-120C-3685475	NYA04.1-LMS-HALLSENSOR-24-180-NY4980/00
NYA04.1-LMS-HALLSENSOR-24-90-NY4980/10	NYA04.1-LMS-MRSENSOR-180-NY4981/00
NYA04.1-LMS-MAGNETSCALE-5-XXXX-NY4985	NYA04.1-SENSORCABLE-M-F-00.6M-NY4951/00
NYA04.1-SENSORCABLE-M-F-01.5M-NY4951/10	NYA04.1-SENSORCABLE-M-F-03.0M-NY4951/20
NYA04.1-SENSORCABLE-M-F-05.0M-NY4951/30	NYA04.1-SENSORCABLE-M-F-09.0M-NY4951/40
NYA04.1-SHARED-CABLE-M-M-01.0M-NY4951/70	

Tab. 1-2: Accessories described in this manual

The "Standard Housings and Accessories" Manual is intended for electrical engineers, system engineers and users of the NYCe 4000 system. They can use this document as a reference for connecting and installing a specific NYCe 4000 system.

⚠ WARNING **Personal injury and property damage can be caused by incorrect usage of the modules, machines and installations!**

Take the content of this "Standard Housings and Accessories" Manual into account.

Further, this "Standard Housings and Accessories" Manual contains the following information.

- Identification information and dimensions of each system housing.
- Specification of the headers on the base plate of the system housing.
- Detailed connection information for each header.
- Installation instructions for a system housing.
- Electromagnetic compatibility (EMC) issues.
- Environmental conditions, maintenance and disposal information.

Each chapter that describes a NYCe 4000 component shows the dimensions of the component and lists all connections. A separate chapter lists common detailed information for the headers on the base plate of the system housings.

1.2 General Information

Damage can be caused to the NYCe 4000 module or circuit boards if electrostatic charge present in people and/or tools is discharged across them. Therefore, please note the following information:

⚠ WARNING **Electrostatic charges can cause damage to electronic components and interfere with their operational safety!**

Objects that come into contact with components and circuit boards must be discharged by means of grounding. Otherwise, errors may occur when triggering motors and moving elements.

Such objects include:

- the copper bit when soldering
- the human body (discharge through touching a conductive, grounded item)
- parts and tools (placing on a conductive support)

Components sensitive to electrostatic discharge may only be stored or dispatched in conductive packaging.

☞ Rexroth connection diagrams are only to be used for producing installation connection diagrams. The installation connection diagrams of the machine manufacturer must be used for wiring the installation!

- Route signal wires separately from the load resistance wires because of the occurrence of interference.
- Feed analog signals (for example, command values, actual values) via shielded lines.
- Do not connect mains, DC bus or power leads to low voltages or allow them to come into contact.
- When carrying out a high voltage test or insulation withstand test on the machine's electrical equipment, disconnect all connections to the units. This protects the electronic components (permitted in accordance with EN 60204-1).

⚠ WARNING **Plugging and unclamping live connections can damage the controller.**

Do not plug in or unclamp live connections.

1.3 Cross reference component name, order number, short name

1.3.1 Introduction

This chapter identifies the components of the NYCe 4000 system, the official component name with its order number and the short name as used in the user documentation. The short name is used in the user documentation to improve readability.

1.3.2 NYCe 4000 system housings

Component name	Order number	Short name
NYS04.2-ST-01-ULNN-NY4013	R911172904	NY4013
NYS04.2-ST-02-ULNN-NY4023	R911172905	NY4023
NYS04.2-ST-03-ULNN-NY4033	R911172966	NY4033
NYS04.2-ST-04-ULNN-NY4043	R911172906	NY4043
NYS04.2-ST-05-ULNN-NY4053	R911172907	NY4053
NYS04.2-ST-02-LMSN-NY4074	R911378504	NY4074
NYS04.1-ST-01-LMS-SERCOS-NY4079	R911378505	NY4079

Tab. 1-3: Component name - order number and short name overview of NYCe 4000 system housings

1.3.3 NYCe 4000 MCUs, drive, digital I/O and SERCOS III Master modules

Component name	Order number	Short name
NYM04.1-MCU-NNNN-NY4110	R911318960	NY4110
NYM04.1-MCU-ETHER-NY4112	R911173007	NY4112
NYM04.1-MCU-ETHER-NY4114	R911173598	NY4114
NYM04.1-2PW-NNNN-NY4120	R911318961	NY4120
NYM04.1-2PW-LMSN-NY4120/10	R911320447	NY4120/10
NYM04.1-5PW-NNNN-NY4125	R911172221	NY4125
NYM04.1-2LD-NNNN-NY4130	R911318962	NY4130
NYM04.1-1HV-NNNN-NY4140	R911318963	NY4140
NYM04.1-SE3-MAST-NY4150	R911325072	NY4150
NYM04.1-SE3-MAST-NY4150/10	R911172782	NY4150/10

Tab. 1-4: Component name - order number and short name overview of NYCe 4000 system modules

1.3.4 NYCe 4000 accessories

Component name	Order number	Short name
NYM04.1-ESC-NNNN-NY4199	R911320450	NY4199
NYA04.1-COVRPL-NO-USED-NY4900	R911318964	NY4900
NYA04.1-STRAIN-RELIEF-5PCS-4110-NY4901	R911322873	NY4901
NYA04.1-STRAIN-RELIEF-41XX-NY4901/10	R911172941	NY4901/10
NYA04.1-STRAIN-RELIEF-4112-NY4901/20	R911403463	NY4901/20
NYA04.1-STRAIN-RELIEF-4114-NY4901/30	R911403464	NY4901/30
NYA04.1-STRAIN-RELIEF-4150-NY4901/40	R911403465	NY4901/40
NYA04.1-SHIELD-SUP-MOT-5PCS-NY4910	R911172999	NY4910
NYA04.1-1394B-INT-PCIE-NY4917	R911345705	NY4917
NYA04.1-CONSET-SYSPW-NY4920/10	R911325078	NY4920/10

Component name	Order number	Short name
NYA04.1-CAP-100V-NY4921	R911325079	NY4921
NYA04.1-CAP-200V-NY4921/10	R911325082	NY4921/10
NYA04.1-FAN-1DRV-NY4922/00	R911328062	NY4922/00
NYA04.1-FAN-2DRV-NY4922/10	R911325083	NY4922/10
NYA04.1-FAN-3DRV-NY4922/20	R911172220	NY4922/20
NYA04.1-FAN-4DRV-NY4922/30	R911328063	NY4922/30
NYA04.1-FAN-5DRV-NY4922/50	R911325084	NY4922/50
NYA04.1-1394B-CABLE-B-B-00.5M-NY4950	R911318966	NY4950
NYA04.1-1394B-CABLE-B-B-01.0M-NY4950/10	R911318967	NY4950/10
NYA04.1-1394B-CABLE-B-B-02.0M-NY4950/20	R911318968	NY4950/20
NYA04.1-1394B-CABLE-B-B-04.5M-NY4950/30	R911318969	NY4950/30
NYA04.1-1394B-CABLE-ANGLED-01.2M-NY4950/40	R911334596	NY4950/40
NYA04.1-CHOKES-10PCS-1394B-NY4950/99	R911322874	NY4950/99
NYA04.1-LMS-MUX2-10Vtt-5V-NY4960/10	R911320451	NY4960/10
NYA04.1-LMS-MUX2-10Vtt-15V-NY4960/20	R911320453	NY4960/20
NYA04.1-LMS-COIL-UNIT-TM3S-3685075	R911343771	-
NYA04.1-LMS-COIL-UNIT-TM6S-3685076	R911343770	-
NYA04.1-LMS-COIL-UNIT-TM6Y-104582	R911398301	-
NYA04.1-LMS-COIL-UNIT-TM12S-3685078	R911343769	-
NYA04.1-LMS-COIL-UNIT-TM18N-3685500	R911384027	-
NYA04.1-LMS-COIL-UNIT-TM18S-3685519	R911384029	-
NYA04.1-LMS-MAGNETTM-96MM-3685225	R911343774	-
NYA04.1-LMS-MAGNETTM-144MM-3685226	R911343775	-
NYA04.1-LMS-MAGNETTM-384MM-3685227	R911343773	-
NYA04.1-LMS-MAGNETTMV-144MM-120C-3685419	R911343772	-
NYA04.1-LMS-MAGNETTMV-384MM-120C-3685511	R911369668	-
NYA04.1-LMS-COIL-UNIT-TL6N-3697458	R911343602	-
NYA04.1-LMS-COIL-UNIT-TL6S-3685032	R911343601	-
NYA04.1-LMS-COIL-UNIT-TL9N-3685311	R911343558	-
NYA04.1-LMS-COIL-UNIT-TL9S-3675312	R911343559	-
NYA04.1-LMS-COIL-UNIT-TL12N-3697459	R911343597	-
NYA04.1-LMS-COIL-UNIT-TL12S-3685033	R911343435	-
NYA04.1-LMS-COIL-UNIT-TL15N-3687460	R911343560	-
NYA04.1-LMS-COIL-UNIT-TL15S-3685034	R911343561	-
NYA04.1-LMS-COIL-UNIT-TL18N-3685223	R911343562	-
NYA04.1-LMS-COIL-UNIT-TL18S-3685224	R911343603	-

Component name	Order number	Short name
NYA04.1-LMS-COIL-UNIT-TL24N-3685014	R911343604	-
NYA04.1-LMS-COIL-UNIT-TL24S-3685035	R911343605	-
NYA04.1-LMS-MAGNETTL-192MM-3685193	R911343580	-
NYA04.1-LMS-MAGNETTL-288MM-3685194	R911343563	-
NYA04.1-LMS-MAGNETTLV-192MM-120C-3685457	R911343565	-
NYA04.1-LMS-MAGNETTLV-288MM-120C-3685472	R911343573	-
NYA04.1-LMS-MAGNETTLV-192MM-150C-3685473	R911343576	-
NYA04.1-LMS-MAGNETTLV-288MM-150C-3685420	R911343579	-
NYA04.1-LMS-COIL-UNIT-TB12N-3685155	R911343767	-
NYA04.1-LMS-COIL-UNIT-TB12S-3685157	R911347637	-
NYA04.1-LMS-COIL-UNIT-TB15N-3685122	R911347642	-
NYA04.1-LMS-COIL-UNIT-TB15S-3685120	R911347643	-
NYA04.1-LMS-COIL-UNIT-TB30N-3685123	R911347644	-
NYA04.1-LMS-COIL-UNIT-TB30S-3685121	R911347645	-
NYA04.1-LMS-MAGNETTB-192MM-3685221	R911343765	-
NYA04.1-LMS-MAGNETTB-288MM-3685222	R911343763	-
NYA04.1-LMS-MAGNETTBV-192MM-120C-3685474	R911343764	-
NYA04.1-LMS-MAGNETTBV-288MM-120C-3685475	R911343768	-
NYA04.1-LMS-HALLSENSOR-24-180-NY4980/00	R911173569	NY4980/00
NYA04.1-LMS-HALLSENSOR-24-90-NY4980/10	R911173570	NY4980/10
NYA04.1-LMS-MRSENSOR-180-NY4981/00	R911174592	NY4981/00
NYA04.1-LMS-MAGNETSCALE-5-XXXX-NY4985	R91117yyyy	NY4985
NYA04.1-SHARED-CABLE-M-M-01.0M-NY4951/70	R911174516	NY4951/70
NYA04.1-SENSORCABLE-M-F-00.6M-NY4951/00	R911174517	NY4951/00
NYA04.1-SENSORCABLE-M-F-01.5M-NY4951/10	R911174518	NY4951/10
NYA04.1-SENSORCABLE-M-F-03.0M-NY4951/20	R911174519	NY4951/20
NYA04.1-SENSORCABLE-M-F-05.0M-NY4951/30	R911174520	NY4951/30
NYA04.1-SENSORCABLE-M-F-09.0M-NY4951/40	R911174521	NY4951/40

Tab. 1-5: Component name - order number and short name overview of NYCe 4000 accessories

2 Safety Instructions for Electric Drives and Controls

2.1 Definitions of Terms

Application Documentation The entire documentation used to inform the user of the product about the use and safety-relevant features for configuring, integrating, installing, mounting, commissioning, operating, maintaining, repairing and decommissioning the product. The following terms are also used for this kind of documentation: User Guide, Operation Manual, Commissioning Manual, Instruction Manual, Project Planning Manual, Application Manual, etc.

Component Combination of elements with a specified function, which are part of a piece of equipment, device or system. Components of a drive and control system are, for example, supply units, drive controllers, mains choke, mains filter, motors, cables, etc.

Control System Several interconnected control components placed on the market as a single functional unit.

Device Finished product with a defined function, intended for users and placed on the market as an individual piece of merchandise.

Drive System A group of components consisting of electric motor(s), motor encoder(s) and cable(s), supply units and drive controllers, as well as possible auxiliary and additional components, such as mains filter, mains choke, etc.

Electrical Equipment Objects used to generate, convert, transmit, distribute or apply electrical energy, such as machines, transformers, switching devices, cables, lines, power-consuming devices, circuit board assemblies, plug-in units, control cabinets, etc.

Installation Several devices or systems interconnected for a defined purpose and on a defined site which, however, are not intended to be placed on the market as a single functional unit.

Machine Entirety of interconnected parts or units at least one of which is movable. Thus, a machine consists of the appropriate machine drive elements, as well as control and power circuits, which have been assembled for a specific application. A machine is, for example, intended for processing, treatment, movement or packaging of a material. The term "machine"" also covers a combination of machines which are arranged and controlled in such a way that they function as a unified whole.

Manufacturer Individual or legal entity bearing responsibility for the design and manufacture of a product which is placed on the market in the individual's or legal entity's name. The manufacturer can use finished products, finished parts or finished elements, or contract out work to subcontractors. However, the manufacturer must always have overall control and possess the required authority to take responsibility for the product.

Product Produced device, component, part, system, software, firmware, among other things.

Project Planning Manual Part of the application documentation used to support the dimensioning and planning of systems, machines or installations.

Qualified Persons In terms of this application documentation, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the drive and control system, as well as with the hazards this implies, and who possess the qualifications their work requires. To comply with these qualifications, it is necessary, among other things,

- to be trained, instructed or authorized to switch electric circuits and devices safely on and off, to ground them and to mark them,
- to be trained or instructed to maintain and use adequate safety equipment,
- to attend a course of instruction in first aid.

User A person installing, commissioning or using a product which has been placed on the market.

2.2 Explanation of Signal Words and the Safety Alert Symbol

The Safety Instructions in the available application documentation contain specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2011).

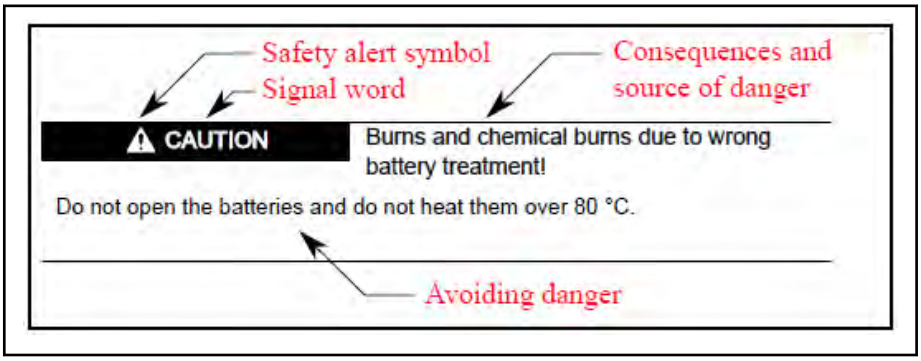


Fig. 2-1: Example of a Safety Instruction

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

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 can occur.

NOTICE

In case of non-compliance with this safety instruction, property damage can occur.

2.3 General Information

2.3.1 Using the Safety Instructions and Passing Them on to Others

Do not attempt to install and operate the electric components of the drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Bosch Rexroth sales partner. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.

If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user´s country.

⚠ WARNING

Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, can result in property damage, injury, electric shock or even death.

Observe the safety instructions!

2.3.2 Requirements for Safe Use

Read the following instructions before initial commissioning of the electric components of the drive and control system in order to eliminate the risk of injury and/or property damage. You must follow these safety instructions.

- Bosch Rexroth is not liable for damages resulting from failure to observe the safety instructions.
- Read the operating, maintenance and safety instructions in your language before commissioning. If you find that you cannot completely understand the application documentation in the available language, please ask your supplier to clarify.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.
- Only qualified persons may work with components of the drive and control system or within its proximity.

- Only use accessories and spare parts approved by Bosch Rexroth.
- Follow the safety regulations and requirements of the country in which the electric components of the drive and control system are operated.
- Only use the components of the drive and control system in the manner that is defined as appropriate. See chapter 3.1 "Appropriate Use" on page 19.
- The ambient and operating conditions given in the application documentation at hand must be observed.
- The equipment is designed for installation in industrial machinery.
- Safety-relevant applications are only allowed if clearly and explicitly specified in the application documentation "Integrated Safety Technology". If this is not the case, they are excluded. Safety-relevant are all such applications which can cause danger to persons and property damage.

  For example, the following areas of use are not permitted: construction cranes, elevators used for people or freight, devices and vehicles to transport people, medical applications, refinery plants, transport of hazardous goods, nuclear applications, applications sensitive to high frequency, mining, food processing, control of protection equipment (also in a machine).
- The information given in the application documentation with regard to the use of the delivered components contains only examples of applications and suggestions.

  The machine and installation manufacturer must
  - make sure that the delivered components are suited for his individual application and check the information given in this application documentation with regard to the use of the components,
  - make sure that his individual application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Commissioning of the delivered components is only allowed once it is sure that the machine or installation in which the components are installed complies with the national regulations, safety specifications and standards of the application.
- Operation is only allowed if the national EMC regulations for the application are met.
- The instructions for installation in accordance with EMC requirements can be found in the section on EMC in the documentation.

  The machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national regulations.
- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.

National regulations which the user must take into account

- European countries: According to European EN standards
- United States of America (USA):
  - National Electrical Code (NEC)
  - National Electrical Manufacturers Association (NEMA), as well as local engineering regulations

  - Regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
  - International Organization for Standardization (ISO)
  - International Electrotechnical Commission (IEC)

2.3.3 Hazards by Improper Use

- High electrical voltage and high working current! Danger to life or serious injury by electric shock!
- High electrical voltage by incorrect connection! Danger to life or injury by electric shock!
- Dangerous movements! Danger to life, serious injury or property damage by unintended motor movements!
- Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric drive systems!
- Risk of burns by hot housing surfaces!
- Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!

2.4 Instructions with Regard to Specific Dangers

2.4.1 Protection against Contact with Electrical Parts and Housings

☞ This section concerns components of the drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

⚠ WARNING **High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!**

- Only qualified persons are allowed to operate, maintain and/or repair the electric components of the drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:

  Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- As a basic principle, residual-current-operated circuit-breakers cannot be used for electric drives to prevent direct contact.
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.
- The System Housing may only be used as build-in equipment, which means that the end-user must provide a suitable fire and electrical safe enclosure.
- The System Housing has no certified functional safety on board. This means that all precautions for a safe operation must be ensured by external components.
- The System Housing may only be used in combination with external approved (for example EN60950-1 or EN61558-2-16) power supplies. The supply voltages 24V System, DP NY4130, 24V Dig, and 24V Fdig for the system must be separated at least by reinforced insulation from all hazardous voltages according to the standard IEC 61010-1:2010.

To be observed with electrical drive and filter components:

⚠ WARNING **High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!**

- Before switching on and before commissioning, ground or connect the components of the drive and control system to the equipment grounding conductor at the grounding points.
- Connect the equipment grounding conductor of the components of the drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a copper wire of a cross section of at least 10 mm^2 (AWG 8) or additionally run a second equipment grounding conductor of the same cross section as the original equipment grounding conductor.

2.4.2 Safety Extra-Low Voltage as Protection Against Electric Shock

Safety extra-low voltage (SELV) is used to allow connecting devices with basic insulation to extra-low voltage circuits.

All connections and terminals with voltages between 5 and 50 volts at the components of the Bosch Rexroth drive and control system are SELV systems. It is allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections.

⚠ WARNING **Danger to life, risk of injury by electric shock! High electrical voltage by incorrect connection!**

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (for example, the mains connection) are connected to Bosch Rexroth products, the connected extra-low voltage circuits must comply with the requirements for SELV ("Safety Extra-Low Voltage").

- Only connect equipment, electrical components and cables of the protective low voltage type to all terminals and clamps with voltages of 0 to 50 Volts.
- Only electrical circuits may be connected which have double or reinforced isolation against high voltage circuits. Double or reinforced isolation is achieved, for example, with an isolating transformer or when battery-operated.

2.4.3 Protection against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- Improper or wrong wiring or cable connection
- Operator errors
- Wrong input of parameters before commissioning
- Malfunction of sensors, encoders and monitoring devices
- Defective components

- Software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring functions in the components of the drive and control system will normally be sufficient to avoid malfunction in the connected drives. Regarding personal safety, especially the danger of injury and/or property damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

⚠ WARNING **Dangerous movements! Danger to life, risk of injury, serious injury or property damage!**

- A **risk assessment** must be prepared for the installation or machine, with its specific conditions, in which the components of the drive and control system are installed. As a result of the risk assessment, the user must provide for monitoring functions and higher-level measures on the installation side for personal safety. The safety regulations applicable to the installation or machine must be taken into consideration. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, injury and/or property damage:

- Keep free and clear of the machine's range of motion and moving machine parts. Prevent personnel from accidentally entering the machine's range of motion by using, for example:
  - Safety fences
  - Safety guards
  - Protective coverings
  - Light barriers
- Make sure the safety fences and protective coverings are strong enough to resist maximum possible kinetic energy.
- Mount emergency stop switches in the immediate reach of the operator. Before commissioning, verify that the emergency stop equipment works. Do not operate the machine if the emergency stop switch is not working.
- Prevent unintended start-up. Isolate the drive power connection by means of an emergency stop circuit or use a safe starting lockout.
- Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone.
- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example,
  - mechanically securing the vertical axes,
  - adding an external braking/arrester/clamping mechanism or
  - ensuring sufficient equilibration of the vertical axes.
- The standard equipment **motor holding brake** or an external holding brake controlled by the drive controller is **not sufficient to guarantee personal safety**!
- Disconnect electrical power to the components of the drive and control system using the master switch and secure them from reconnection for:
  - Maintenance and repair work
  - Cleaning of equipment
  - Long periods of discontinued equipment use
- Prevent the operation of high-frequency, remote control and radio equipment near electric/electronic components of the drive and control system and their supply leads. If the use of these devices cannot be avoided, check the machine or installation, before initial commissioning of the drive and control system, for possible malfunctions when operating such high-frequency, remote control and radio equipment in its possible positions of normal use. It might possibly be necessary to perform a special electromagnetic compatibility (EMC) test.

2.4.4 Protection against Magnetic and Electromagnetic Fields during Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors or permanent magnets of electric motors represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.

⚠ WARNING **Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric components!**

- Persons with heart pacemakers and metal implants are not allowed to enter the following areas:
  - Areas in which components of the drive and control systems are mounted, commissioned and operated.
  - Areas in which parts of motors with permanent magnets are stored, repaired or mounted.
- If it is necessary for somebody with a heart pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of implanted heart pacemakers differs greatly so that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above.

2.4.5 Protection against Contact with Hot Parts

⚠ CAUTION **Hot surfaces of components of the drive and control system. Risk of burns!**

- Do not touch hot surfaces of, for example, braking resistors, heat sinks, supply units and drive controllers, motors, windings and laminated cores!
- According to the operating conditions, temperatures of the surfaces can be **higher than 60 °C** (140 °F) during or after operation.
- Before touching motors after having switched them off, let them cool down for a sufficiently long time. Cooling down can require **up to 140 minutes**! The time required for cooling down is approximately five times the thermal time constant specified in the technical data.
- After switching chokes, supply units and drive controllers off, wait **15 minutes** to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications and according to the respective safety regulations, the manufacturer of the machine or installation has to take measures to avoid injuries caused by burns in the end application. These measures can be, for example: Warnings at the machine or installation, guards (shieldings or barriers) or safety instructions in the application documentation.

2.4.6 Protection during Handling and Mounting

⚠ CAUTION **Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting, and mechanical shock!**

- Observe the relevant statutory regulations of accident prevention.
- Use suitable equipment for mounting and transport.
- Avoid jamming and crushing by appropriate measures.
- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- Use suitable protective equipment (hard hat, safety goggles, safety shoes, safety gloves, for example).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids from the floor due to the risk of slipping.

3 Important Directions for Use

3.1 Appropriate Use

Introduction

Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

⚠ WARNING **Personal injury and property damage caused by incorrect use of the products!**

The products have been designed for use in the industrial environment and may only be used in the appropriate way. If they are not used in the appropriate way, situations resulting in property damage and personal injury can occur.

☞ Rexroth, as manufacturer, is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

Before using Rexroth products, make sure that all the pre-requisites for an appropriate use of the products are satisfied:

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
- If the product takes the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
- Do not install damaged or faulty products or use them in operation.
- Make sure that the products have been installed in the manner described in the relevant documentation.

3.2 Areas of use and Application

NYCe 4000 modules made by Rexroth are designed to control electrical motors and monitor their operation.

Control and monitoring of the motors may require additional sensors and actuators.



The NYCe 4000 modules may only be used with the accessories and parts specified in this documentation. If a component has not been specifically named, then it may neither be installed nor connected.

Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified in the relevant function descriptions.

Every NYCe 4000 module must be programmed before starting it up, making it possible for the motor to execute the specific functions of an application. The NYCe 4000 modules are designed for use in single or multiple-axis drive and control applications.

To ensure an application-specific use, the NYCe 4000 modules are available with differing drive power and different interfaces.

Typical applications of NYCe 4000 modules are the following.

- semiconductor machines
- solar cell machines

The NYCe 4000 modules may only be operated under the assembly, installation and ambient conditions as described in this documentation (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

3.3 Inappropriate Use

Using the NYCe 4000 modules outside of the above-referenced areas of application or under operating conditions other than described in the documentation, technical data and specifications is defined as "inappropriate use".

NYCe 4000 modules may not be used

- if they are subject to operating conditions that do not meet the specified ambient conditions. This includes, for example, operation under water, in case of extreme temperature fluctuations or extremely high maximum temperatures,

  or

- if Rexroth has not specifically released them for that intended purpose.



Make sure you carefully follow the specifications outlined in chapter 2.3 "General Information" on page 9.

3.4 Acceptance tests and approvals

3.4.1 Introduction

Declarations of conformity confirm that the components comply with valid EN standards and EU directives. If required, our sales representative can provide you with the declarations of conformity for our components.

3.4.2 Low voltage directive

The following components correspond to the standard

- IEC 61010-1:2010

  (Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements)

NYS04.2-ST-01-ULNN-NY4013	NYS04.2-ST-02-ULNN-NY4023
NYS04.2-ST-03-ULNN-NY4033	NYS04.2-ST-04-ULNN-NY4043
NYS04.2-ST-05-ULNN-NY4053	NYS04.2-ST-02-LMSN-NY4074
NYA04.1-CAP-100V-NY4921	NYA04.1-CAP-200V-NY4921/10

Tab. 3-1: IEC 61010-1

3.4.3 EMC directive

The following components correspond to the following standards

- IEC 61000-6-2:2005

  (Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments)

- IEC 61000-6-4:2018

  (Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments)

NYS04.2-ST-01-ULNN-NY4013	NYS04.2-ST-02-ULNN-NY4023
NYS04.2-ST-03-ULNN-NY4033	NYS04.2-ST-04-ULNN-NY4043
NYS04.2-ST-05-ULNN-NY4053	NYS04.2-ST-02-LMSN-NY4074
NYS04.1-ST-01-LMS-SERCOS-NY4079	NYM04.1-ESC-NNNN-NY4199
NYA04.1-CAP-100V-NY4921	NYA04.1-CAP-200V-NY4921/10
NYA04.1-LMS-HALLSENSOR-24-180-NY4980/00	NYA04.1-LMS-MRSENSOR-180-NY4981/00
NYA04.1-LMS-HALLSENSOR-24-90-NY4980/10	

Tab. 3-2: IEC 61000-6-2 and IEC 61000-6-4

3.4.4 CE



Fig. 3-1: CE conformity

All above mentioned components comply with the requirements and the target of the following EU directive and with the following harmonized European standards.

- Low Voltage Directive 2014/35/EU

- EMC Directive 2014/30/EU

These components are built-in units which, owing to their installation characteristics, are not able to comply with the regulations for complete apparatus, machines or installations from the outset. For this reason, they may only be used for built-in purposes. The components may only be assessed with regard to their electrical and mechanical safety as well as to environmental effects (foreign bodies, moisture) after they have been installed in the product intended for the final user. After the component has been installed, its EMC properties may change. Hence the component intended for the final user (complete apparatus, machines or installations) should be inspected with regard to its EMC properties by the manufacturer of the product intended for the final user.

3.4.5 UL

The following components are UL certified (Underwriters Laboraties Inc. ®). You can find the evidence of certification on the internet address http:// www.ul.com under "Certifications" by entering the file number of the "Company Name: Rexroth".

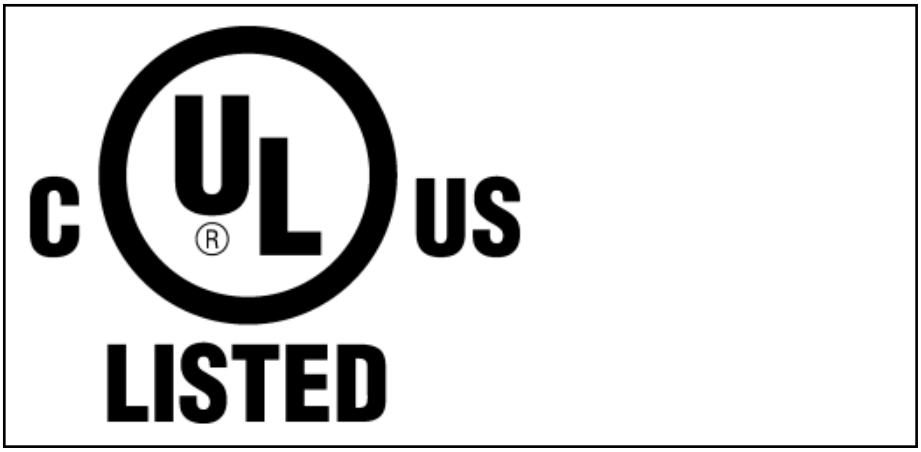


Fig. 3-2: UL listed

These components modules are certified according to:

- UL 61010-1:2012
  UL file no. E353498
  - NYS04.2-ST-01-ULNN-NY4013
  - NYS04.2-ST-02-ULNN-NY4023
  - NYS04.2-ST-03-ULNN-NY4033
  - NYS04.2-ST-04-ULNN-NY4043
  - NYS04.2-ST-05-ULNN-NY4053
  - NYS04.2-ST-02-LMSN-NY4074
  - NYS04.1-ST-01-LMS-SERCOS-NY4079
  - NYA04.1-LMS-HALLSENSOR-24-180-NY4980/00
  - NYA04.1-LMS-HALLSENSOR-24-90-NY4980/10
  - NYA04.1-LMS-MRSENSOR-180-NY4981/00



Fig. 3-3: UL recognized

These components modules are certified according to:

- UL 61010-1:2012

  UL file no. E353498
  - NYM04.1-ESC-NNNN-NY4199
  - NYA04.1-CAP-100V-NY4921
  - NYA04.1-CAP-200V-NY4921/10
  - NYA04.1-FAN-1DRV-NY4922/00
  - NYA04.1-FAN-2DRV-NY4922/10
  - NYA04.1-FAN-3DRV-NY4922/20
  - NYA04.1-FAN-4DRV-NY4922/30
  - NYA04.1-FAN-5DRV-NY4922/50

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 device.

☞ **Loss of UL conformity due to changes to the component.**

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

☞ **Loss of UL conformity due to assembly with not UL compliant components.**

The UL marking is only valid for an assembly if all components used in the assembly are UL compliant.

3.4.6 RoHS



Fig. 3-4: China RoHS 2 marking

The above mentioned components and the NY4985 comply 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.

4 NY4013: 1 Drive Slot System Housing

4.1 Product Identification

The NY4013 system housing has two slots, one slot for the MCU and one slot for one drive module. Part number is R911172904, ordering code is NYS04.2-ST-01-ULNN-NY4013.

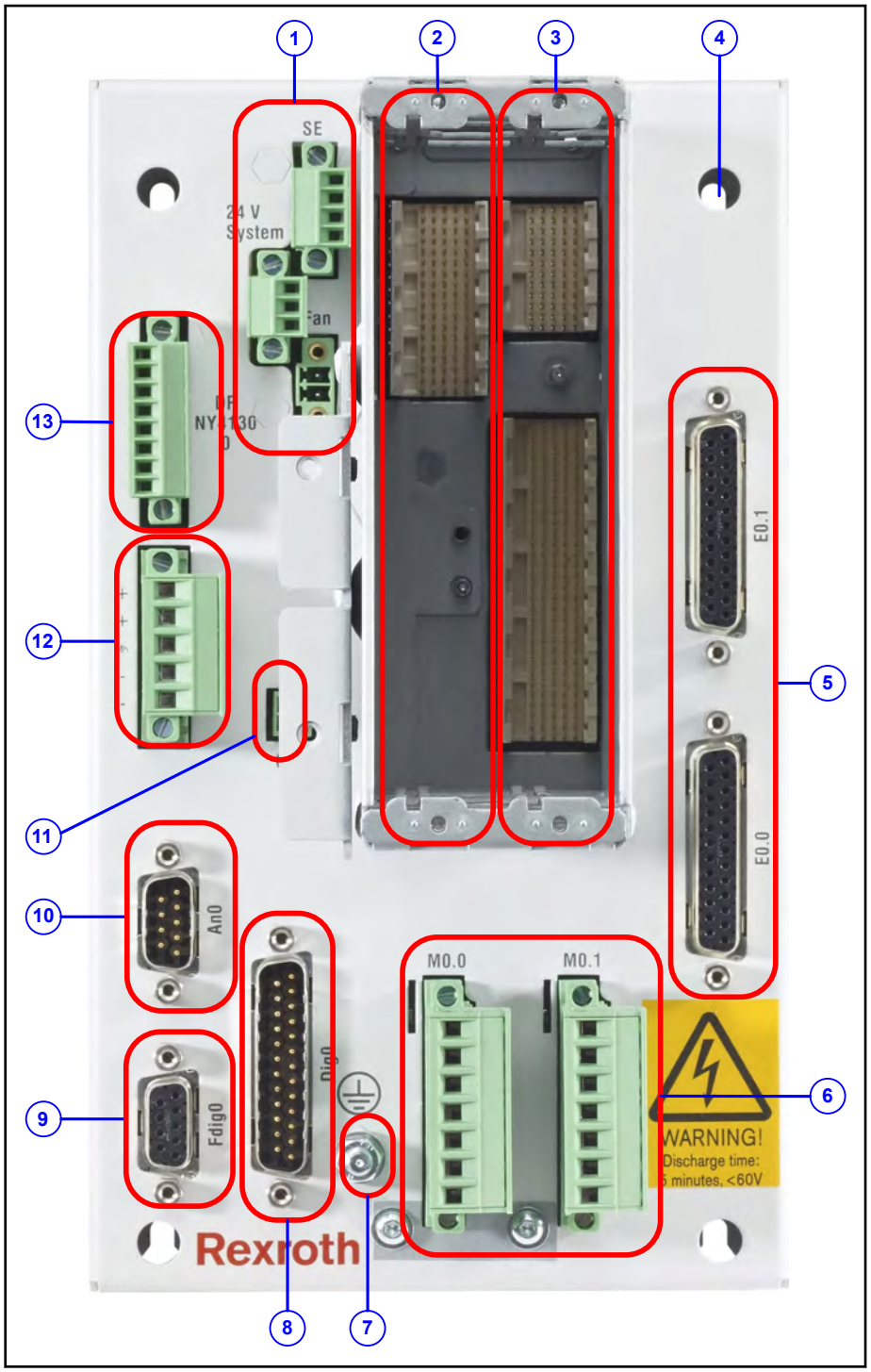


Fig. 4-1: NY4013 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	Drive module slot
4	Mounting screw opening (4)
5	Encoder connectors
6	Motor connectors
7	Protective Earth post
8	Digital I/O connector
9	Fast digital I/O connector
10	Analog I/O connector
11	Capacitor connector
12	NY4120 / NY4140 drive power connector
13	NY4130 drive power connector

Tab. 4-1: NY4013 system housing identification legend

The discharge warning label warns the technician to observe a 5 minute discharge time delay to be certain that voltages are below 60 V, before undertaking any actions with the product.



Fig. 4-2: Discharge warning label on the system housing

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

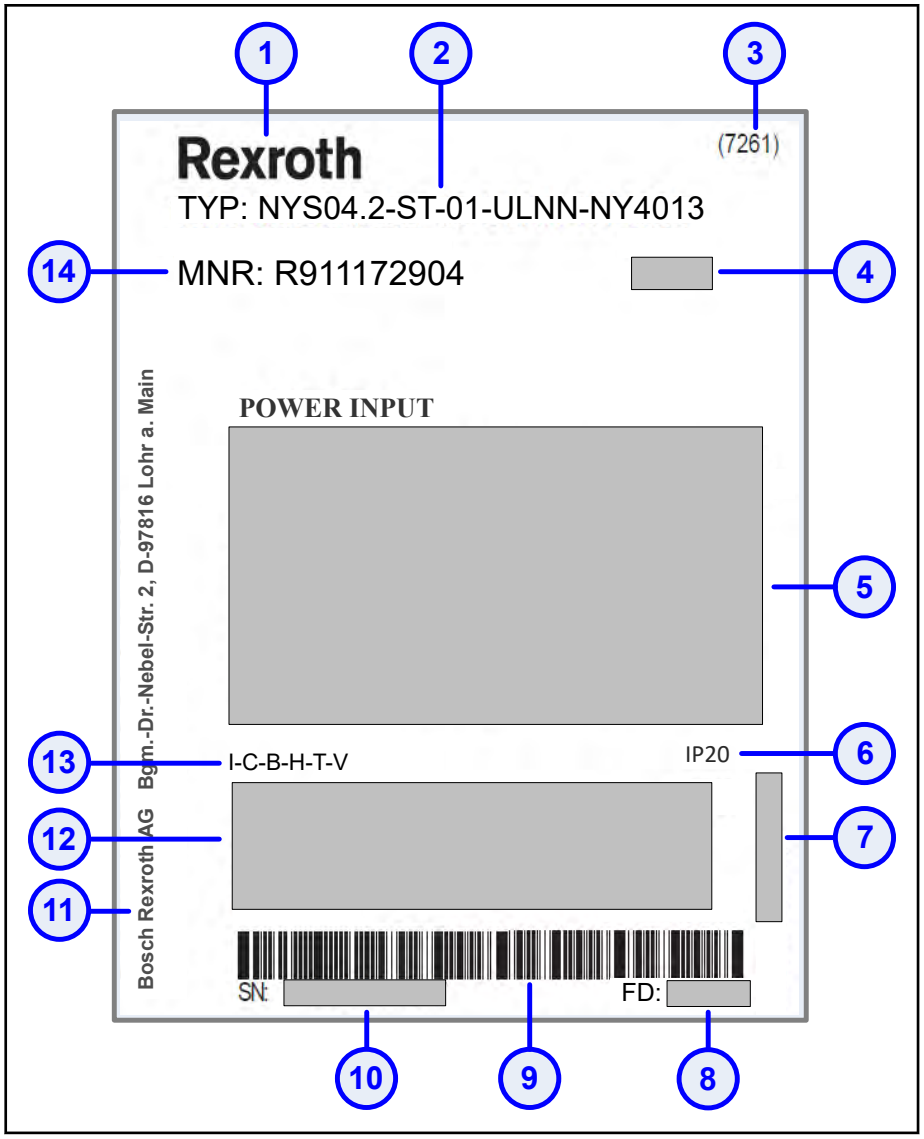


Fig. 4-3: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Designation of origin
8	Date of manufacture (yyWww)
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 4-2: Power Marking legend

4.2 System Housing Dimensions

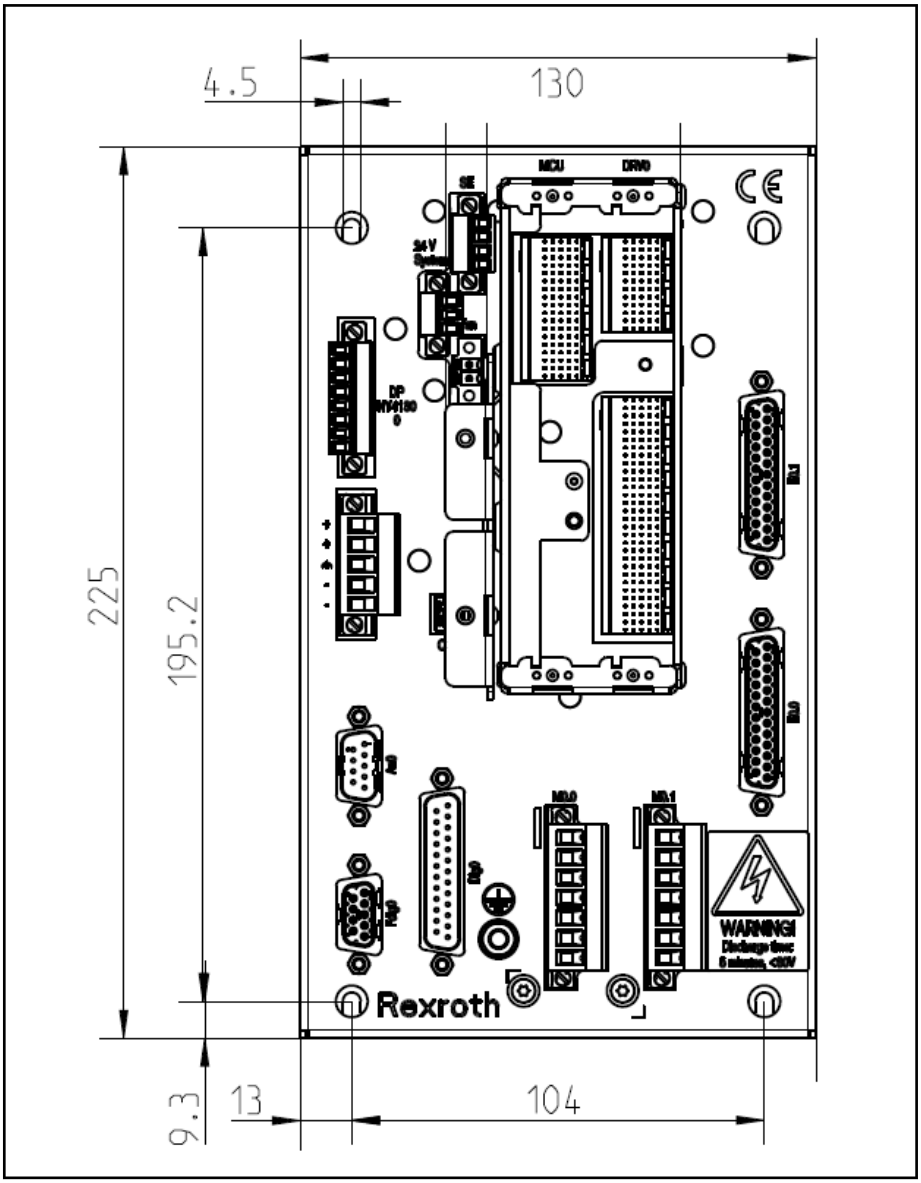


Fig. 4-4: NY4013 system housing front view dimensions

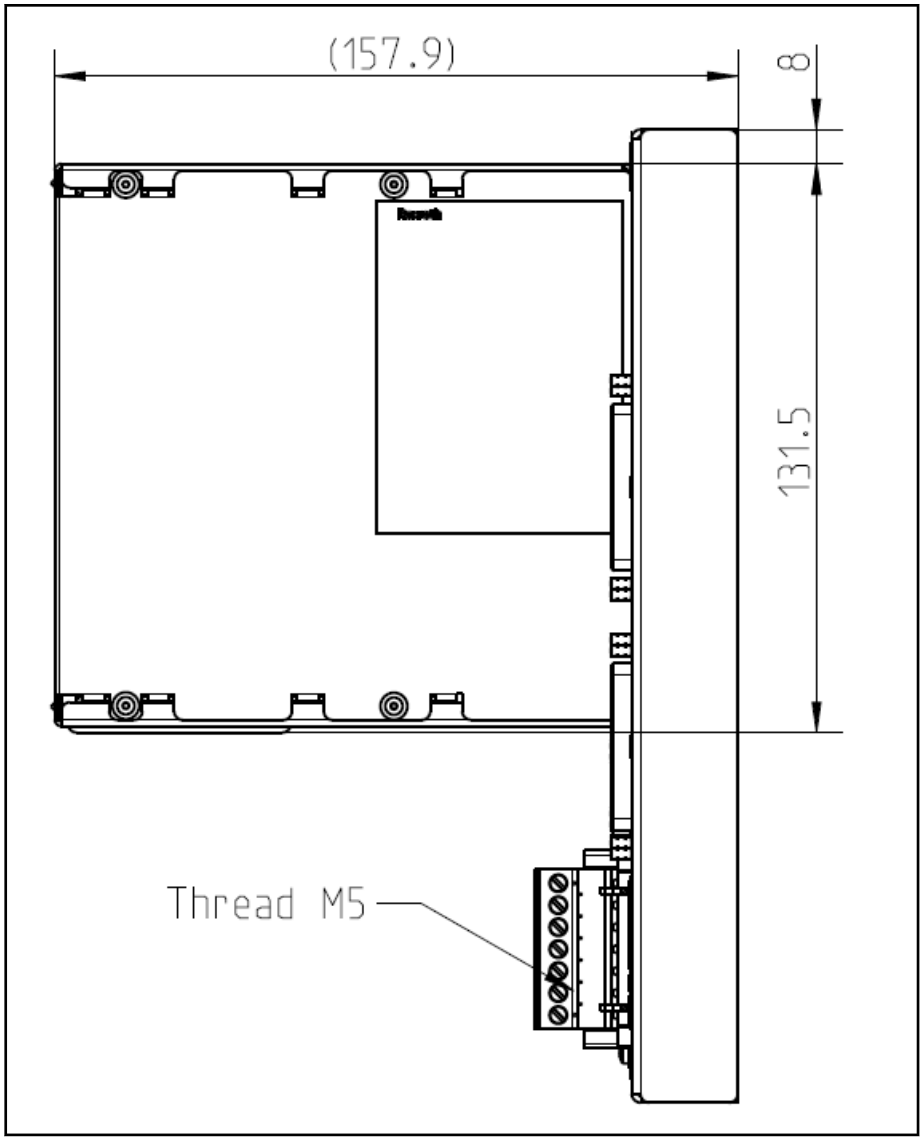


Fig. 4-5: NY4013 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.2-ST-01-ULNN-NY4013	130 mm	225 mm	157.9 mm	1800 gr

Tab. 4-3: NY4013 physical data

4.3 Connector Overview

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification.

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and drive modules • the supply voltage for all encoders connected to the drive modules.	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
CAP0	External drive power capacitor header for the drive slot in the module holder. A capacitor may only be needed if the drive module installed in the drive slot is an NY4120 or NY4140. No capacitor is needed if the drive slot contains an NY4130 drive module or NY4150 SERCOS III Master module.	CAP
DP 0	External drive power supply header for the drive slot in the module holder. This drive power supply header is used if the drive slot contains an NY4120 or NY4140 drive module.	DP
DP NY4130 0	External drive power supply header for the drive slot in the module holder if the drive slot contains an NY4130 drive module.	DP NY4130
M0.0 M0.1	Two motor headers, one header for each axis, are available for the drive slot. M0.0 is the motor header for axis 0 if the drive module of that slot contains an NY4120, NY4130, or NY4140. M0.1 is the motor header for axis 1 if the drive module of that slot contains an NY4120, NY4130. **Note:** pinout of M0.0 and M0.1 are different.	MOTOR
E0.0 E0.1	Two encoder headers, one header for each axis, are available for the drive slot. E0.0 is the encoder header for axis 0. E0.1 is the encoder header for axis 1. **Note:** pinout of E0.0 and E0.1 are different.	ENCODER
FDIG0	One header is available for the Fast Digital I/O connections.	FDIG I/O

Text marking on base plate	Purpose	Detailed information
DIG0	One header is available for the Digital I/O connections.	DIG I/O
AN0	One header is available for the Analog I/O connections.	AN I/O
PE	Protective earth connection	PE

Tab. 4-4: Connection overview

4.4 Field diagnostics

No diagnosis is available for the system housing.

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

5 NY4023: 2 Drive Slot System Housing

5.1 Product Identification

The NY4023 system housing has three slots, one slot for the MCU and two slots for drive modules. Part number is R911172905, ordering code is NYS04.2-ST-02-ULNN-NY4023.

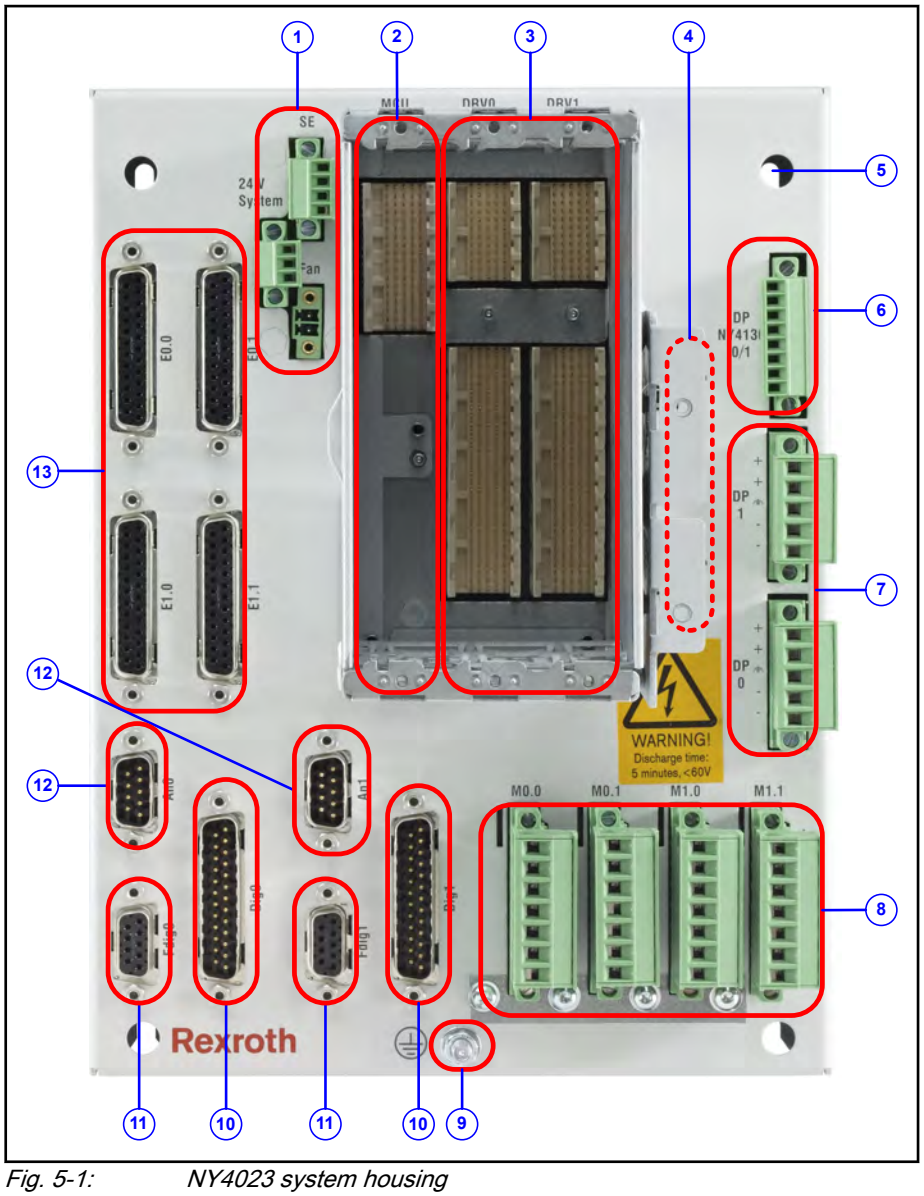


Fig. 5-1: NY4023 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	Drive module slots (2)
4	Capacitor connectors (1 per drive slot)

Identifier number	Description
5	Mounting screw opening (4)
6	NY4130 drive power connector (slot DRV0 and slot DRV1)
7	NY4120 / NY4140 drive power connectors (slot DRV0, slot DRV1)
8	Motor connectors (2 per drive slot)
9	Protective Earth post
10	Digital I/O connectors (slot DRV0, slot DRV1)
11	Fast digital I/O connectors (slot DRV0, slot DRV1)
12	Analog I/O connectors (slot DRV0, DRV1)
13	Encoder connectors (2 per drive slot)

Tab. 5-1: NY4023 system housing identification legend

The discharge warning label warns the technician to observe a 5 minute discharge time delay to be certain that voltages are below 60 V, before undertaking any actions with the product.



Fig. 5-2: Discharge warning label on the system housing

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

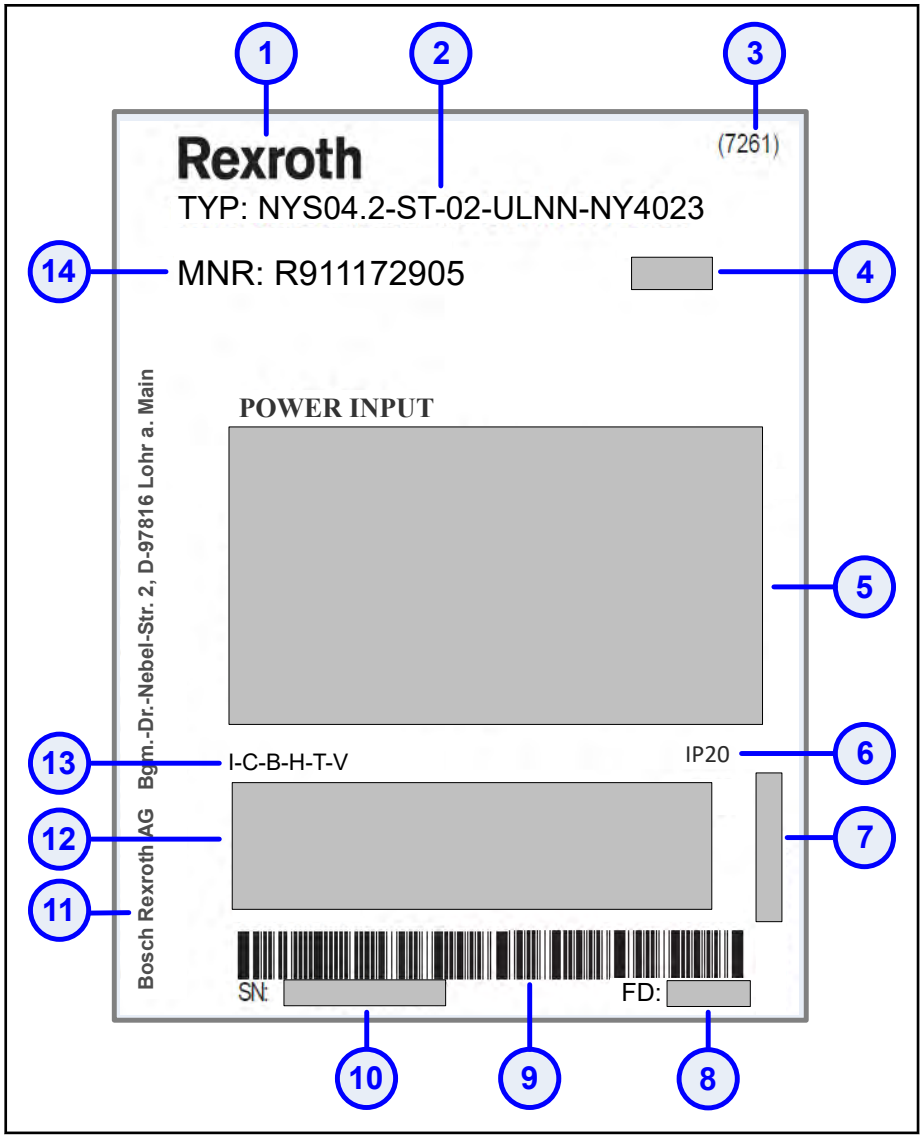


Fig. 5-3: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Designation of origin
8	Date of manufacture (yyWww)
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 5-2: Power Marking legend

5.2 System Housing Dimensions

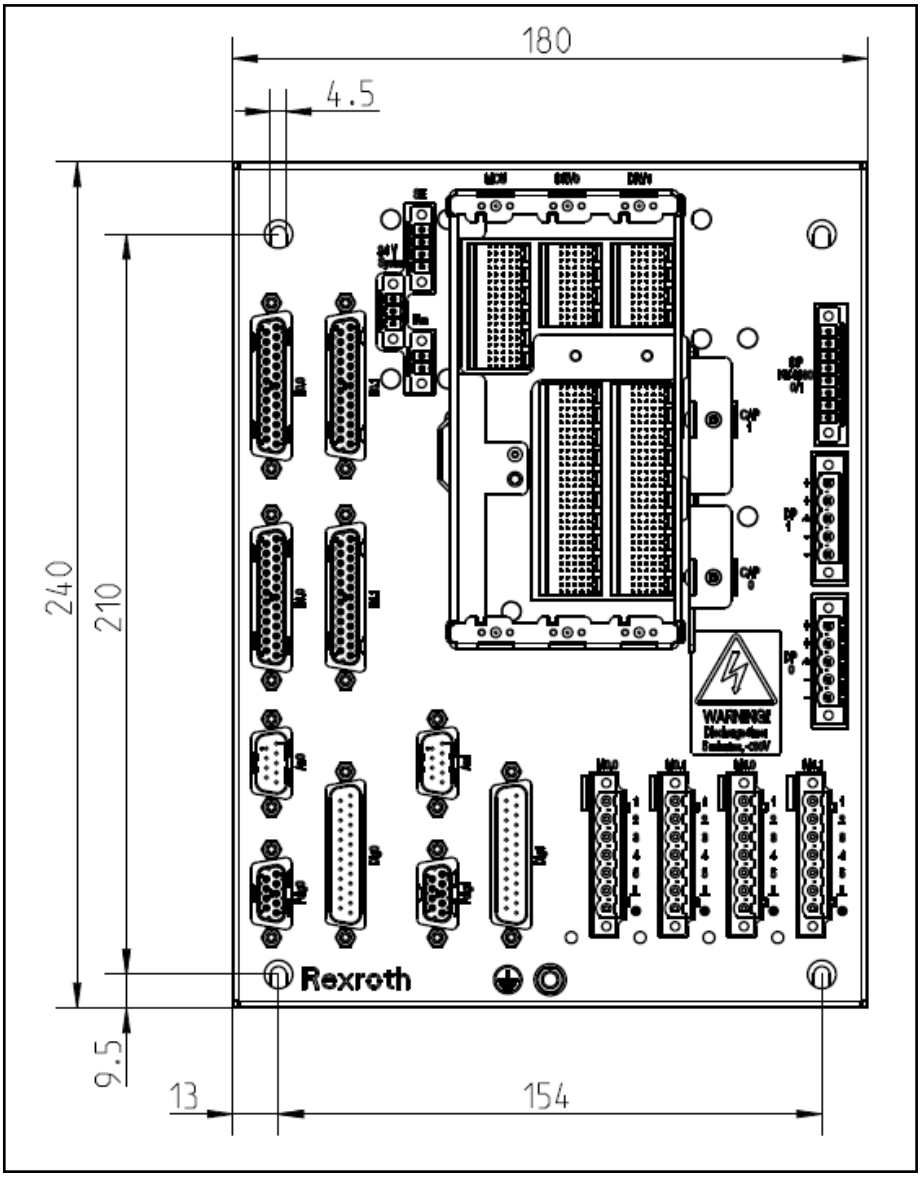


Fig. 5-4: NY4023 system housing front view dimensions

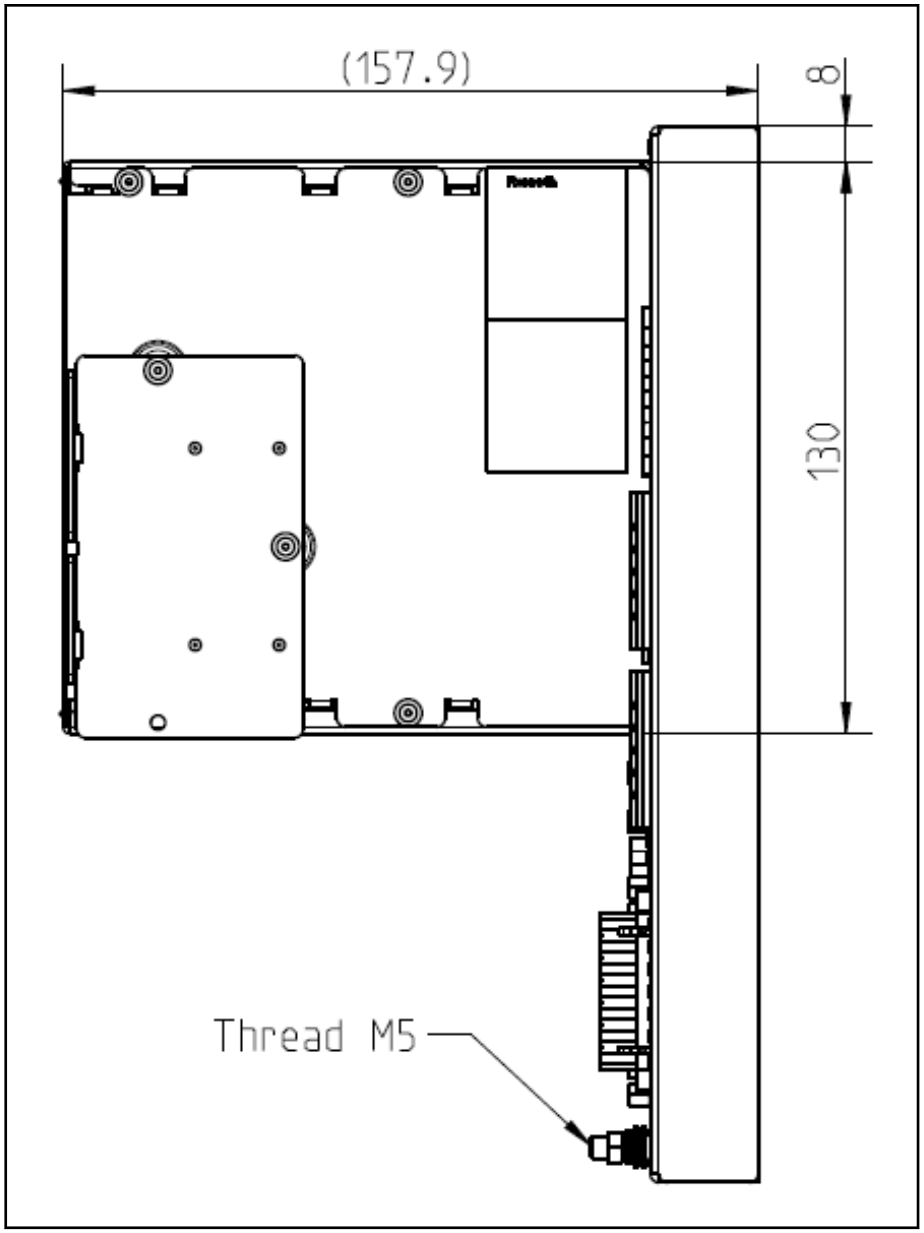


Fig. 5-5: NY4023 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.2-ST-02-ULNN-NY4023	180 mm	240 mm	157.9 mm	2300 gr

Tab. 5-3: NY4023 physical data

5.3 Connector Overview

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification.

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and drive modules • the supply voltage for all encoders connected to the drive modules.	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
CAP0 CAP1	For every drive slot in the module holder is a dedicated external drive power capacitor header. Thus CAP0 is the capacitor associated with drive slot 0, and so on. A capacitor may only be needed if the drive module installed in a drive slot is an NY4120 or NY4140. No capacitor is needed if the drive slot contains an NY4130 drive module or NY4150 SERCOS III Master module.	CAP
DP 0 DP 1	For every drive slot in the module holder is a dedicated external drive power supply header which is used if the drive slot contains an NY4120 or NY4140 drive module. Thus DP 0 is the drive power header associated with drive slot 0, and so on.	DP
DP NY4130 0/1	External drive power supply header for both drive slots in the module holder if the drive slot contains an NY4130 drive module.	DP NY4130
M0.0 M0.1 M1.0 M1.1	For every drive slot in the module holder are two motor headers, one header for each axis. Mx.0 is the motor header for axis 0 if the drive module of that slot contains an NY4120, NY4130, or NY4140. Mx.1 is the motor header for axis 1 if the drive module of that slot contains an NY4120, NY4130. **Note:** pinout of Mx.0 and Mx.1 are different.	MOTOR

Text marking on base plate	Purpose	Detailed information
E0.0 E0.1 E1.0 E1.1	For every drive slot in the module holder are two encoder headers, one header for each axis. Ex.0 is the encoder header for axis 0. Ex.1 is the encoder header for axis 1. **Note:** pinout of Ex.0 and Ex.1 are different.	ENCODER
FDIG0 FDIG1	For every drive slot in the module holder is one headers for the Fast Digital I/O connections.Thus FDIG0 is the Fast Digital I/O header associated with drive slot 0, and so on.	FDIG I/O
DIG0 DIG1	For every drive slot in the module holder is one headers for the Digital I/O connections.Thus DIG0 is the Digital I/O header associated with drive slot 0, and so on.	DIG I/O
AN0 AN1	For every drive slot in the module holder is one headers for the Analog I/O connections.Thus AN0 is the Analog I/O header associated with drive slot 0, and so on.	AN I/O
PE	Protective earth connection	PE

Tab. 5-4: Connection overview

5.4 Field diagnostics

No diagnosis is available for the system housing.

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

6 NY4033: 3 Drive Slot System Housing

6.1 Product Identification

The NY4033 system housing has four slots, one slot for the MCU and three slots for drive modules. Part number is R911172966, ordering code is NYS04.2-ST-03-ULNN-NY4033.

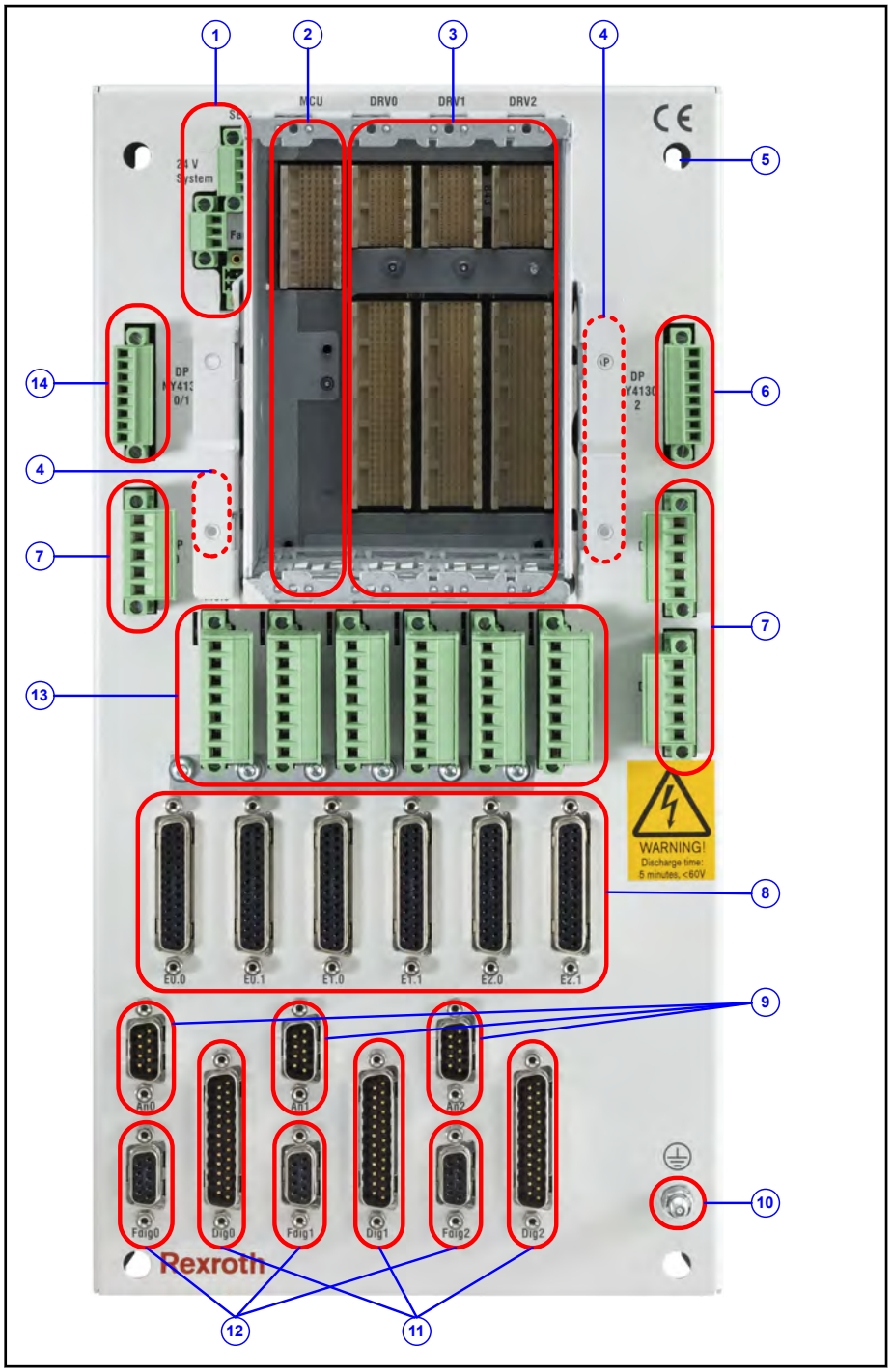


Fig. 6-1: NY4033 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	Drive module slots (3)
4	Capacitor connectors (1 per drive slot)
5	Mounting screw opening (4)
6	NY4130 drive power connector (slot DRV2)
7	NY4120 / NY4140 drive power connectors (1 per drive slot)
8	Encoder connectors (2 per drive slot)
9	Analog I/O connectors (1 per drive slot)
10	Protective Earth post
11	Digital I/O connectors (1 per drive slot)
12	Fast digital I/O connectors (1 per drive slot)
13	Motor connectors (2 per drive slot)
14	NY4130 drive power connector (slot DRV0 and slot DRV1)

Tab. 6-1: NY4033 system housing identification legend

The discharge warning label warns the technician to observe a 5 minute discharge time delay to be certain that voltages are below 60 V, before undertaking any actions with the product.



Fig. 6-2: Discharge warning label on the system housing

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

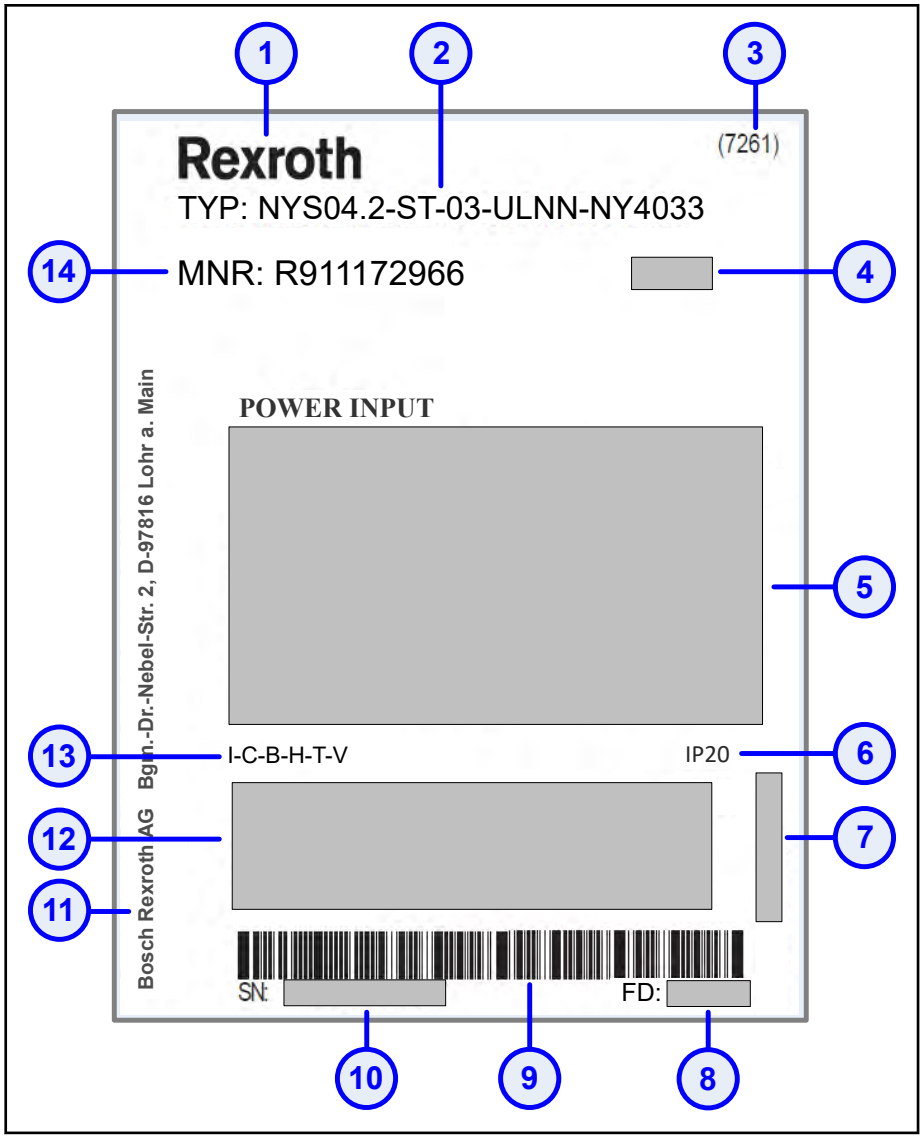


Fig. 6-3: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Designation of origin
8	Date of manufacture (yyWww)
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 6-2: Power Marking legend

6.2 System Housing Dimensions

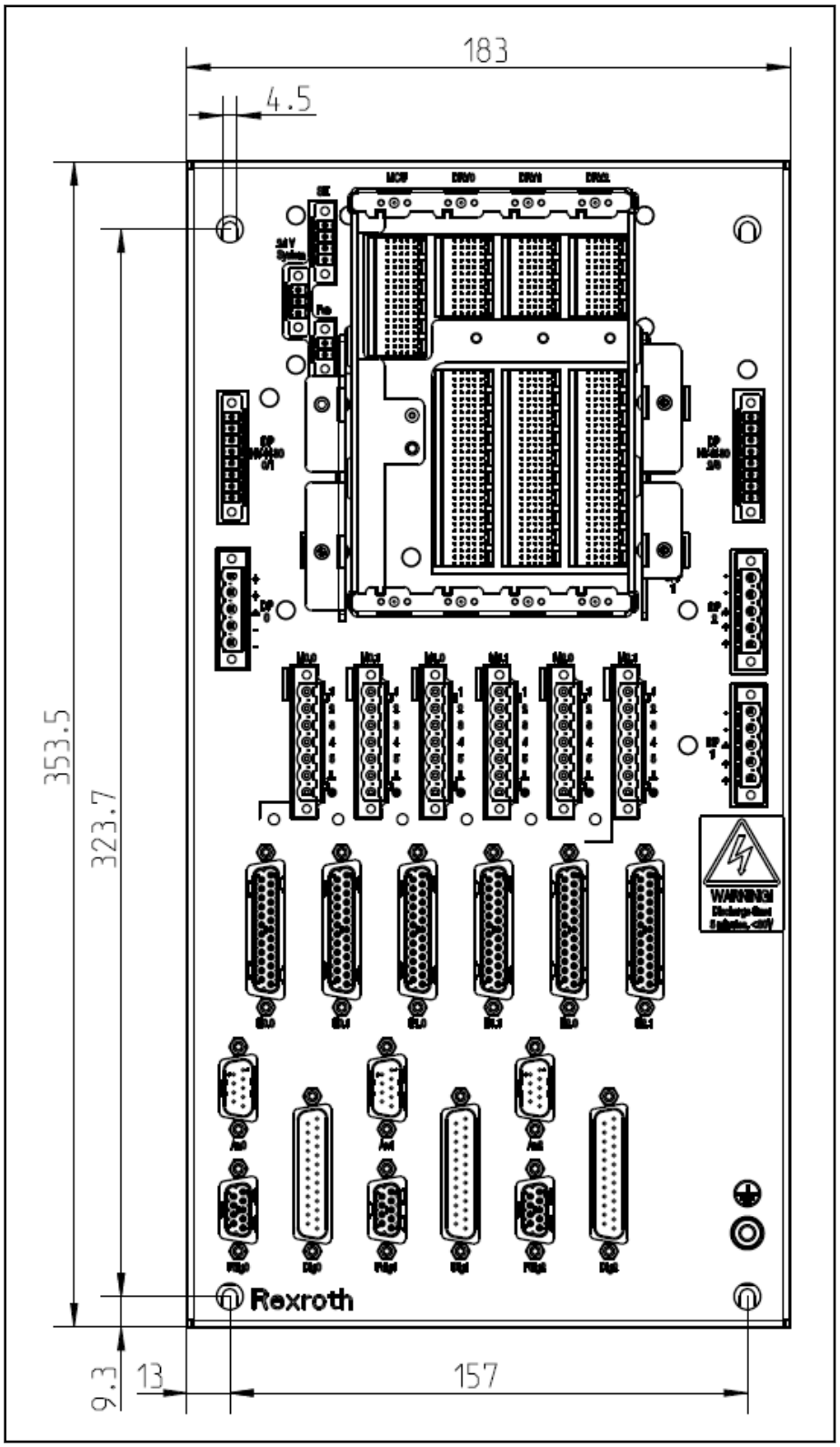


Fig. 6-4: NY4033 system housing front view dimensions

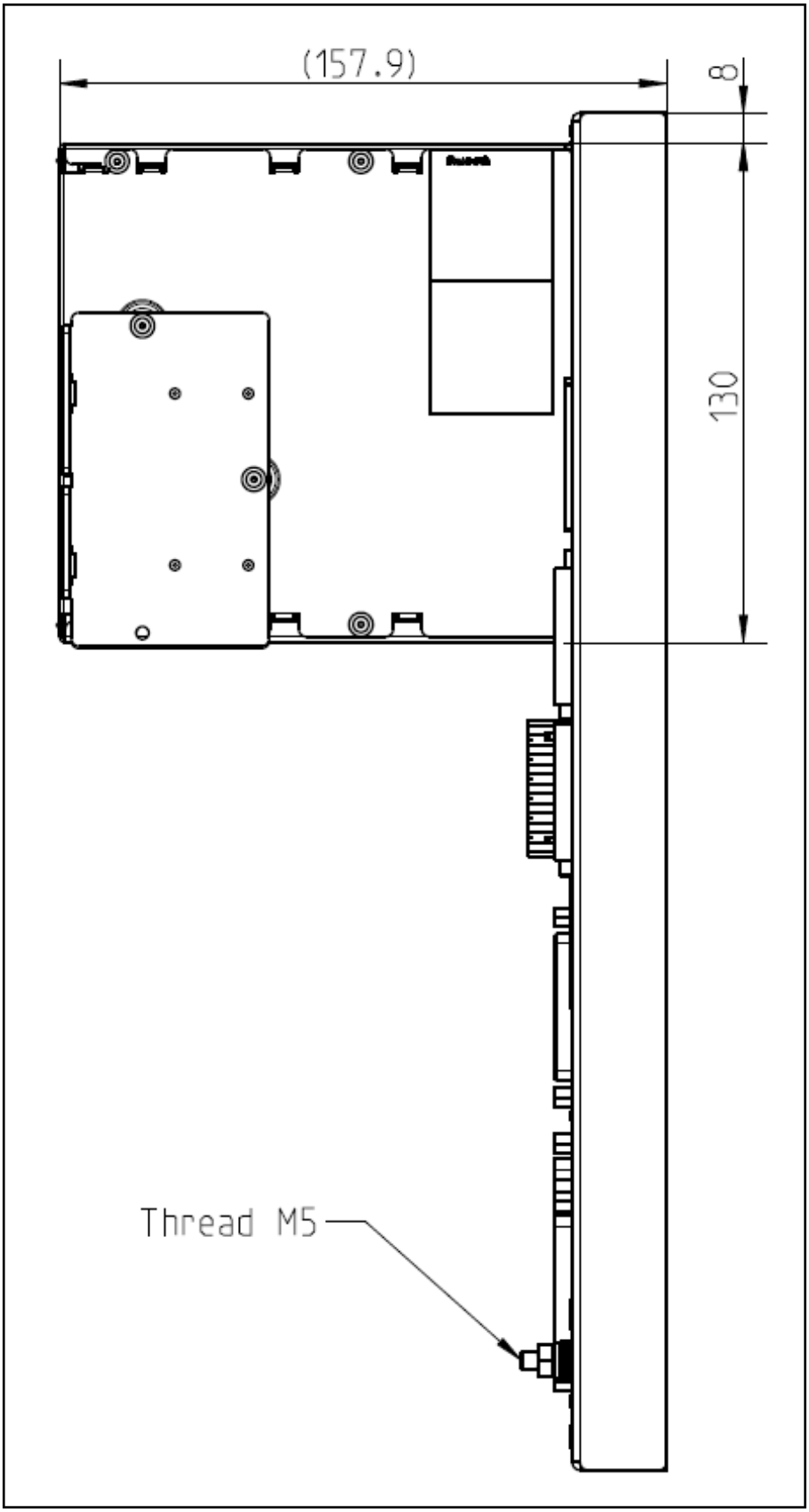


Fig. 6-5: NY4033 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.2-ST-03-ULNN-NY4033	183 mm	353.5 mm	157.9 mm	2250 gr

Tab. 6-3: NY4033 physical data

6.3 Connector Overview

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification.

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and drive modules • the supply voltage for all encoders connected to the drive modules.	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
CAP0 CAP1 CAP2	For every drive slot in the module holder is a dedicated external drive power capacitor header. Thus CAP0 is the capacitor associated with drive slot 0, and so on. A capacitor may only be needed if the drive module installed in a drive slot is an NY4120 or NY4140. No capacitor is needed if the drive slot contains an NY4130 drive module or NY4150 SERCOS III Master module.	CAP
DP 0 DP 1 DP 2	For every drive slot in the module holder is a dedicated external drive power supply header which is used if the drive slot contains an NY4120 or NY4140 drive module. Thus DP 0 is the drive power header associated with drive slot 0, and so on.	DP

Text marking on base plate	Purpose	Detailed information
DP NY4130 0/1 DP NY4130 2	Separate external drive power supply headers are available on the base plate if the drive slot contains an NY4130 drive module. A drive power supply header for NY4130 drive modules can be allocated to a single drive slot, or to two drive slots. This is indicated in the last part of the name. Thus DP NY4130 0/1 is the drive power header associated with drive slot 0 and drive slot 1, DP NY4130 2 is the drive power header associated with drive slot 2.	DP NY4130
M0.0 M0.1 M1.0 M1.1 M2.0 M2.1	For every drive slot in the module holder are two motor headers, one header for each axis. Mx.0 is the motor header for axis 0 if the drive module of that slot contains an NY4120, NY4130, or NY4140. Mx.1 is the motor header for axis 1 if the drive module of that slot contains an NY4120, NY4130. **Note:** pinout of Mx.0 and Mx.1 are different.	MOTOR
E0.0 E0.1 E1.0 E1.1 E2.0 E2.1	For every drive slot in the module holder are two encoder headers, one header for each axis. Ex.0 is the encoder header for axis 0. Ex.1 is the encoder header for axis 1. **Note:** pinout of Ex.0 and Ex.1 are different.	ENCODER
FDIG0 FDIG1 FDIG2	For every drive slot in the module holder is one headers for the Fast Digital I/O connections.Thus FDIG0 is the Fast Digital I/O header associated with drive slot 0, and so on.	FDIG I/O
DIG0 DIG1 DIG2	For every drive slot in the module holder is one headers for the Digital I/O connections.Thus DIG0 is the Digital I/O header associated with drive slot 0, and so on.	DIG I/O
AN0 AN1 AN2	For every drive slot in the module holder is one headers for the Analog I/O connections.Thus AN0 is the Analog I/O header associated with drive slot 0, and so on.	AN I/O
PE	Protective earth connection	PE

Tab. 6-4: Connection overview

6.4 Field diagnostics

No diagnosis is available for the system housing.

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

7 NY4043: 4 Drive Slot System Housing

7.1 Product Identification

The NY4043 system housing has five slots, one slot for the MCU and four slots for drive modules. Part number is R911172906, ordering code is NYS04.2-ST-04-ULNN-NY4043.

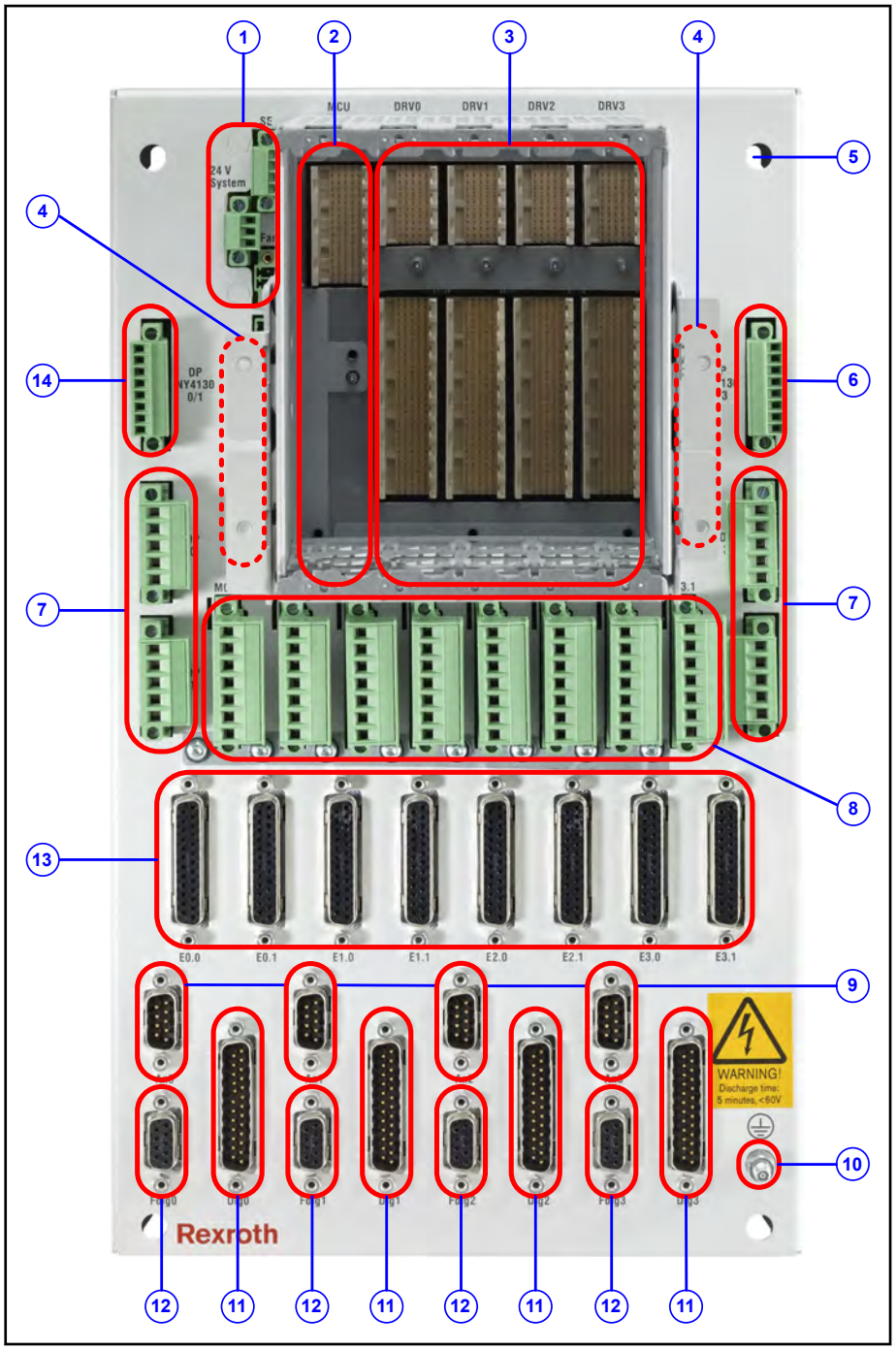


Fig. 7-1: NY4043 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	Drive module slots (4)
4	Capacitor connectors (1 per drive slot)
5	Mounting screw opening (4)
6	NY4130 drive power connector (slot DRV2 and slot DRV3)
7	NY4120 / NY4140 drive power connectors (1 per drive slot)
8	Motor connectors (2 per drive slot)
9	Analog I/O connectors (1 per drive slot)
10	Protective Earth post
11	Digital I/O connectors (1 per drive slot)
12	Fast digital I/O connectors (1 per drive slot)
13	Encoder connectors (2 per drive slot)
14	NY4130 drive power connector (slot DRV0 and slot DRV1)

Tab. 7-1: NY4043 system housing identification legend

The discharge warning label warns the technician to observe a 5 minute discharge time delay to be certain that voltages are below 60 V, before undertaking any actions with the product.



Fig. 7-2: Discharge warning label on the system housing

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

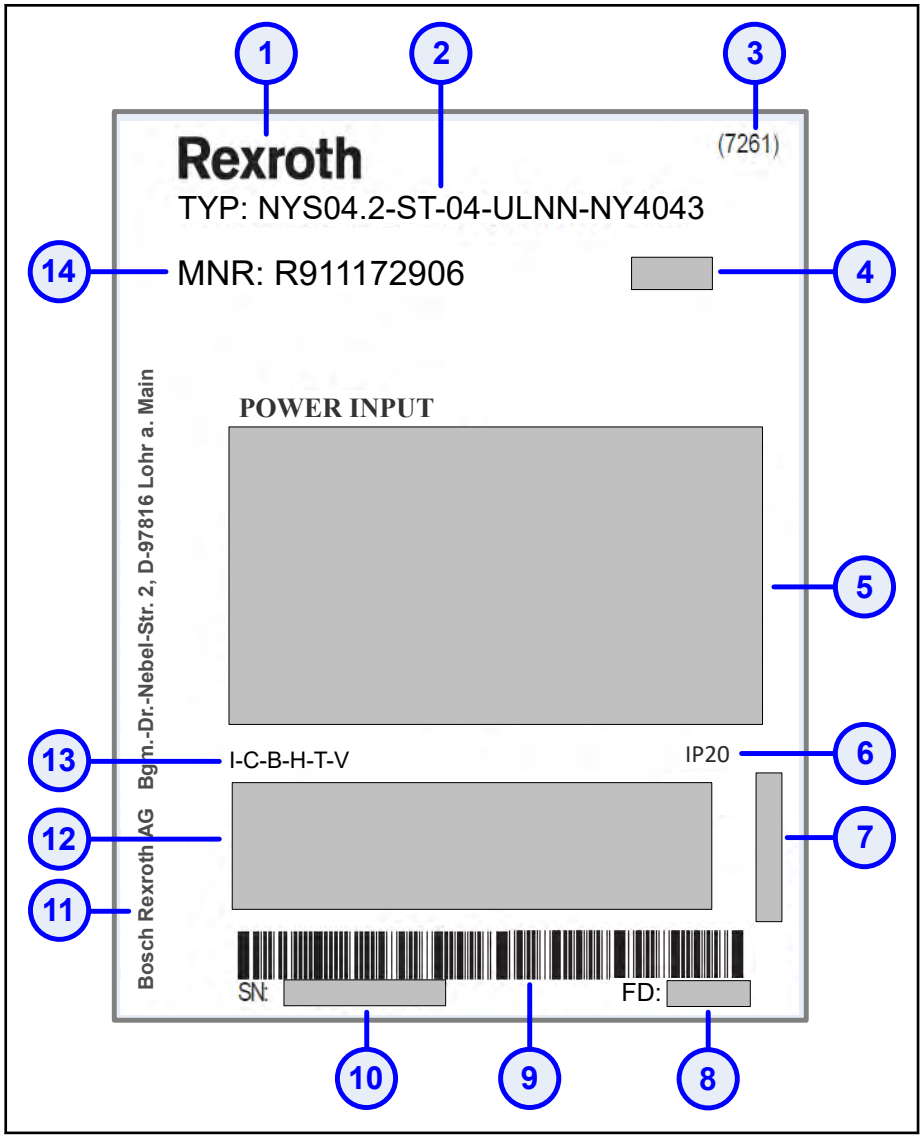


Fig. 7-3: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Designation of origin
8	Date of manufacture (yyWww)
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 7-2: Power Marking legend

7.2 System Housing Dimensions

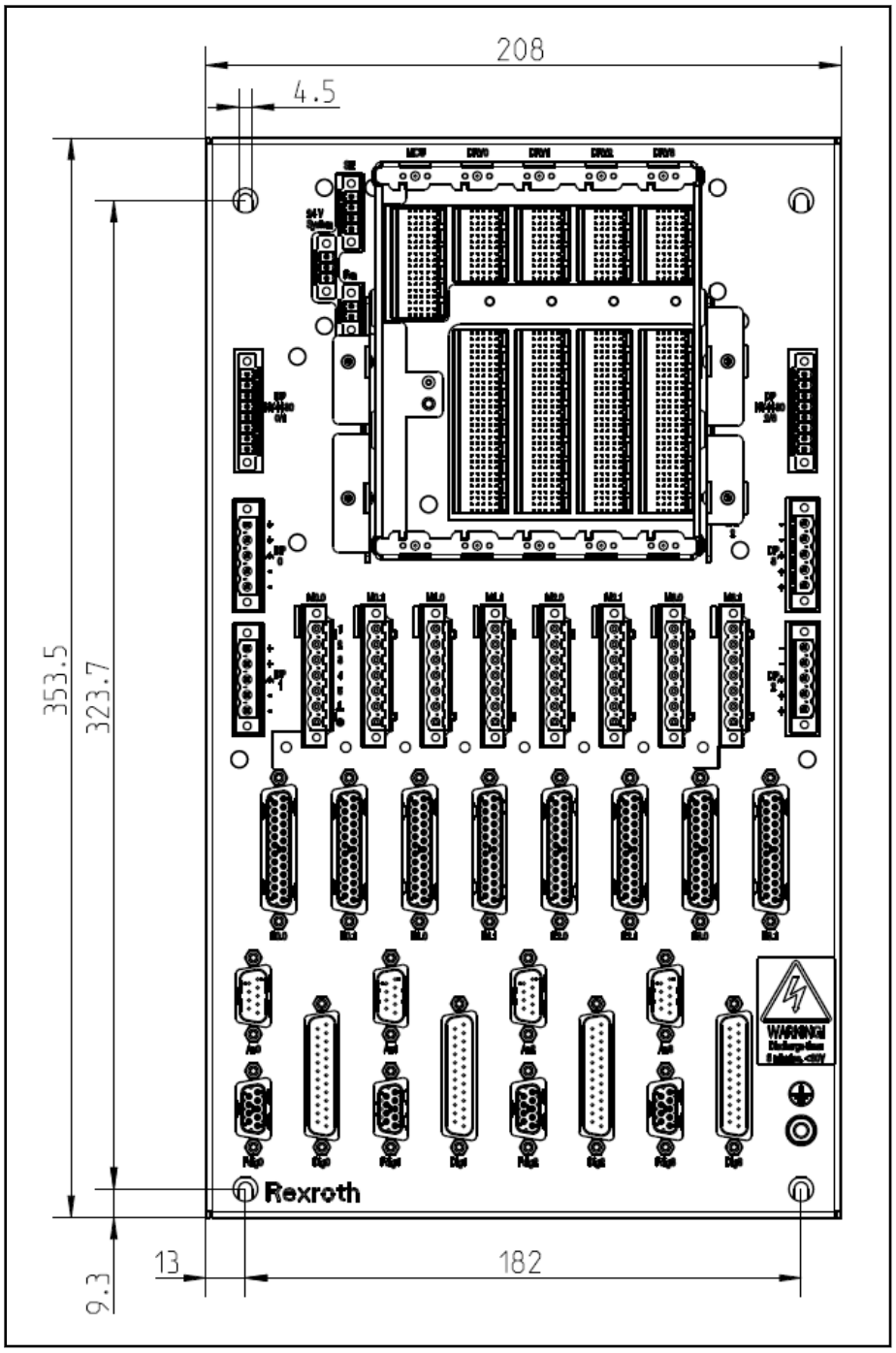


Fig. 7-4: NY4043 system housing front view dimensions

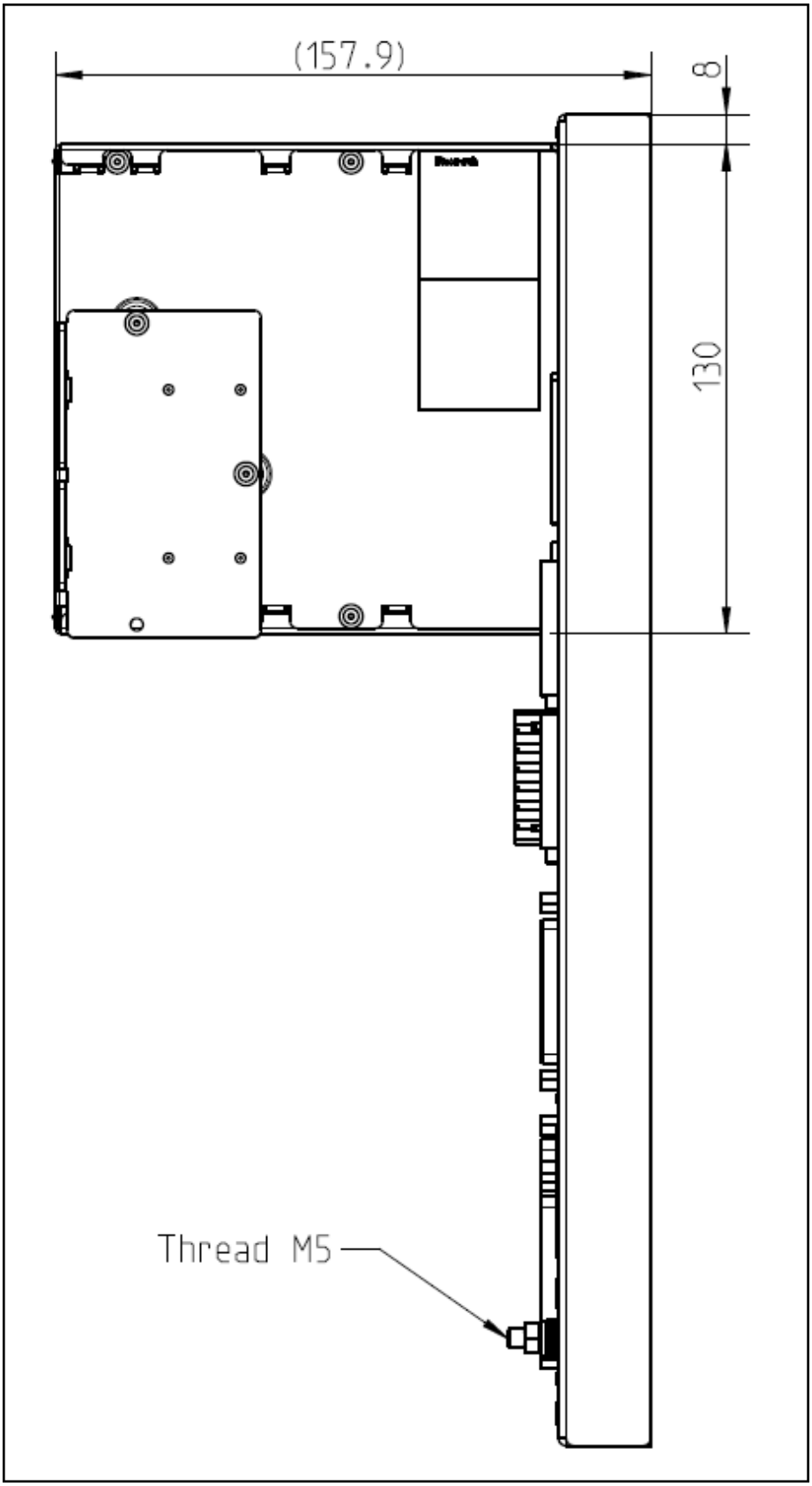


Fig. 7-5: NY4043 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.2-ST-04-ULNN-NY4043	208 mm	353.5 mm	157.9 mm	2500 gr

Tab. 7-3: NY4043 physical data

7.3 Connector Overview

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification.

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and drive modules • the supply voltage for all encoders connected to the drive modules.	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
CAP0 CAP1 CAP2 CAP3	For every drive slot in the module holder is a dedicated external drive power capacitor header. Thus CAP0 is the capacitor associated with drive slot 0, and so on. A capacitor may only be needed if the drive module installed in a drive slot is an NY4120 or NY4140. No capacitor is needed if the drive slot contains an NY4130 drive module or NY4150 SERCOS III Master module.	CAP
DP 0 DP 1 DP 2 DP 3	For every drive slot in the module holder is a dedicated external drive power supply header which is used if the drive slot contains an NY4120 or NY4140 drive module. Thus DP 0 is the drive power header associated with drive slot 0, and so on.	DP

Text marking on base plate	Purpose	Detailed information
DP NY4130 0/1 DP NY4130 2/3	Separate external drive power supply headers are available on the base plate if the drive slot contains an NY4130 drive module. A drive power supply header for NY4130 drive modules can be allocated to a single drive slot, or to two drive slots. This is indicated in the last part of the name. Thus DP NY4130 0/1 is the drive power header associated with drive slot 0 and drive slot 1, DP NY4130 2/3 is the drive power header associated with drive slot 2 and drive slot 3.	DP NY4130
M0.0 M0.1 M1.0 M1.1 M2.0 M2.1 M3.0 M3.1	For every drive slot in the module holder are two motor headers, one header for each axis. Mx.0 is the motor header for axis 0 if the drive module of that slot contains an NY4120, NY4130, or NY4140. Mx.1 is the motor header for axis 1 if the drive module of that slot contains an NY4120, NY4130. **Note:** pinout of Mx.0 and Mx.1 are different.	MOTOR
E0.0 E0.1 E1.0 E1.1 E2.0 E2.1 E3.0 E3.1	For every drive slot in the module holder are two encoder headers, one header for each axis. Ex.0 is the encoder header for axis 0. Ex.1 is the encoder header for axis 1. **Note:** pinout of Ex.0 and Ex.1 are different.	ENCODER
FDIG0 FDIG1 FDIG2 FDIG3	For every drive slot in the module holder is one headers for the Fast Digital I/O connections.Thus FDIG0 is the Fast Digital I/O header associated with drive slot 0, and so on.	FDIG I/O
DIG0 DIG1 DIG2 DIG3	For every drive slot in the module holder is one headers for the Digital I/O connections.Thus DIG0 is the Digital I/O header associated with drive slot 0, and so on.	DIG I/O
AN0 AN1 AN2 AN3	For every drive slot in the module holder is one headers for the Analog I/O connections.Thus AN0 is the Analog I/O header associated with drive slot 0, and so on.	AN I/O
PE	Protective earth connection	PE

Tab. 7-4: Connection overview

7.4 Field diagnostics

No diagnosis is available for the system housing.

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

8 NY4053: 5 Drive Slot System Housing

8.1 Product Identification

The NY4053 system housing has six slots, one slot for the MCU and five slots for drive modules. Part number is R911172907, ordering code is NYS04.2-ST-05-ULNN-NY4053.

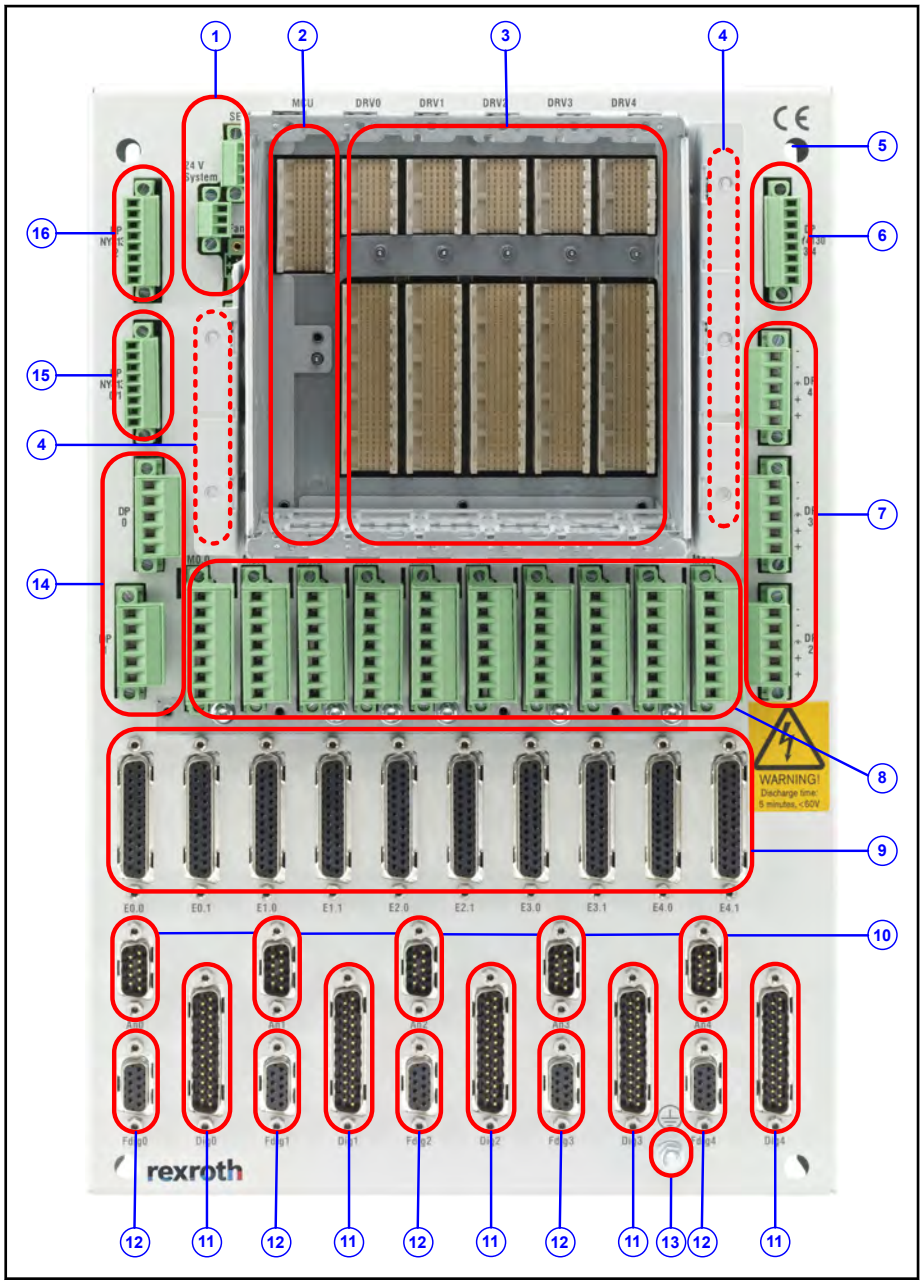


Fig. 8-1: NY4053 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	Drive module slots (5)
4	Capacitor connectors (1 per drive slot)
5	Mounting screw opening (4)
6	NY4130 drive power connector (slot DRV3 and slot DRV4)
7	NY4120 / NY4140 drive power connectors (slot DRV2, DRV3, DRV4)
8	Motor connectors (2 per drive slot)
9	Encoder connectors (2 per drive slot)
10	Analog I/O connectors (1 per drive slot)
11	Digital I/O connectors (1 per drive slot)
12	Fast digital I/O connector (1 per drive slot)
13	Protective Earth post
14	NY4120 / NY4140 drive power connectors (slot DRV0, DRV1)
15	NY4130 drive power connector (slot DRV0 and slot DRV1)
16	NY4130 drive power connector (slot DRV2)

Tab. 8-1: NY4053 system housing identification legend

The discharge warning label warns the technician to observe a 5 minute discharge time delay to be certain that voltages are below 60 V, before undertaking any actions with the product.



Fig. 8-2: Discharge warning label on the system housing

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

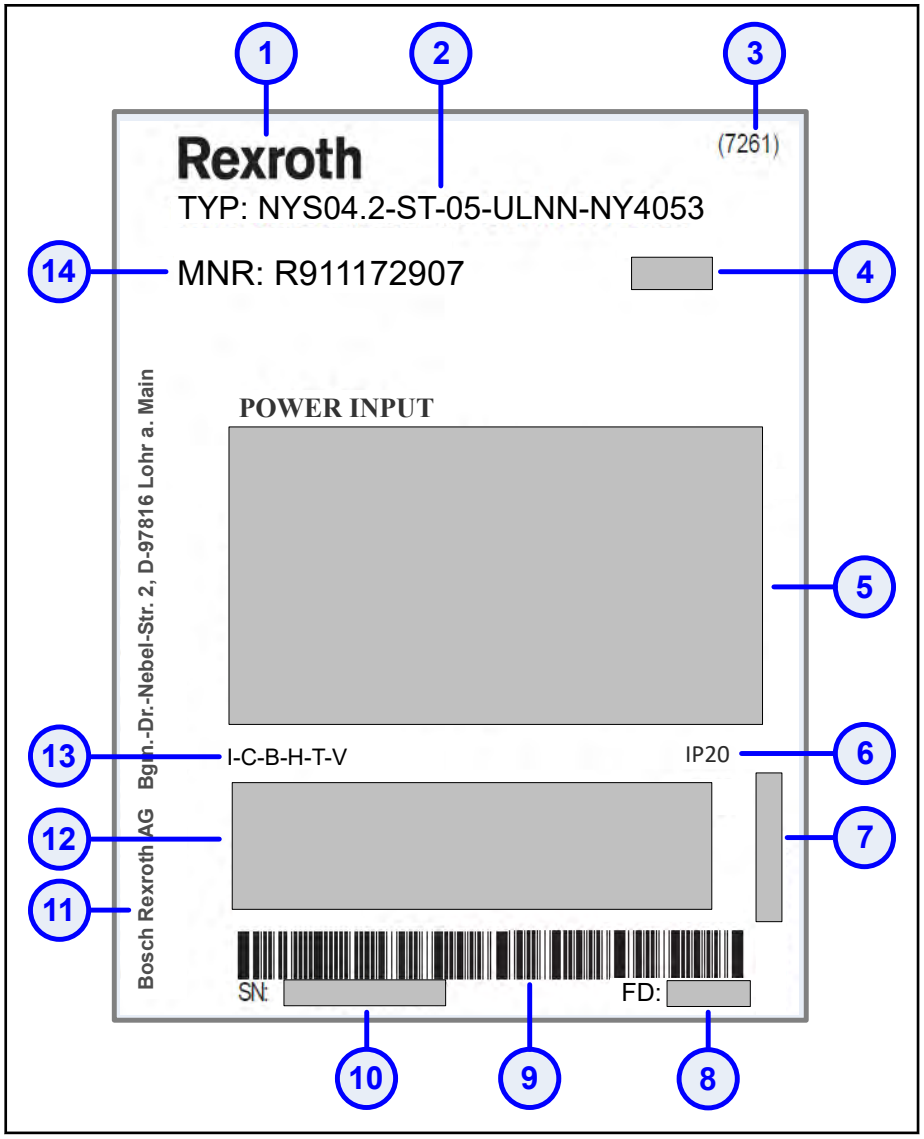


Fig. 8-3: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Designation of origin
8	Date of manufacture (yyWww)
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 8-2: Power Marking legend

8.2 System Housing Dimensions

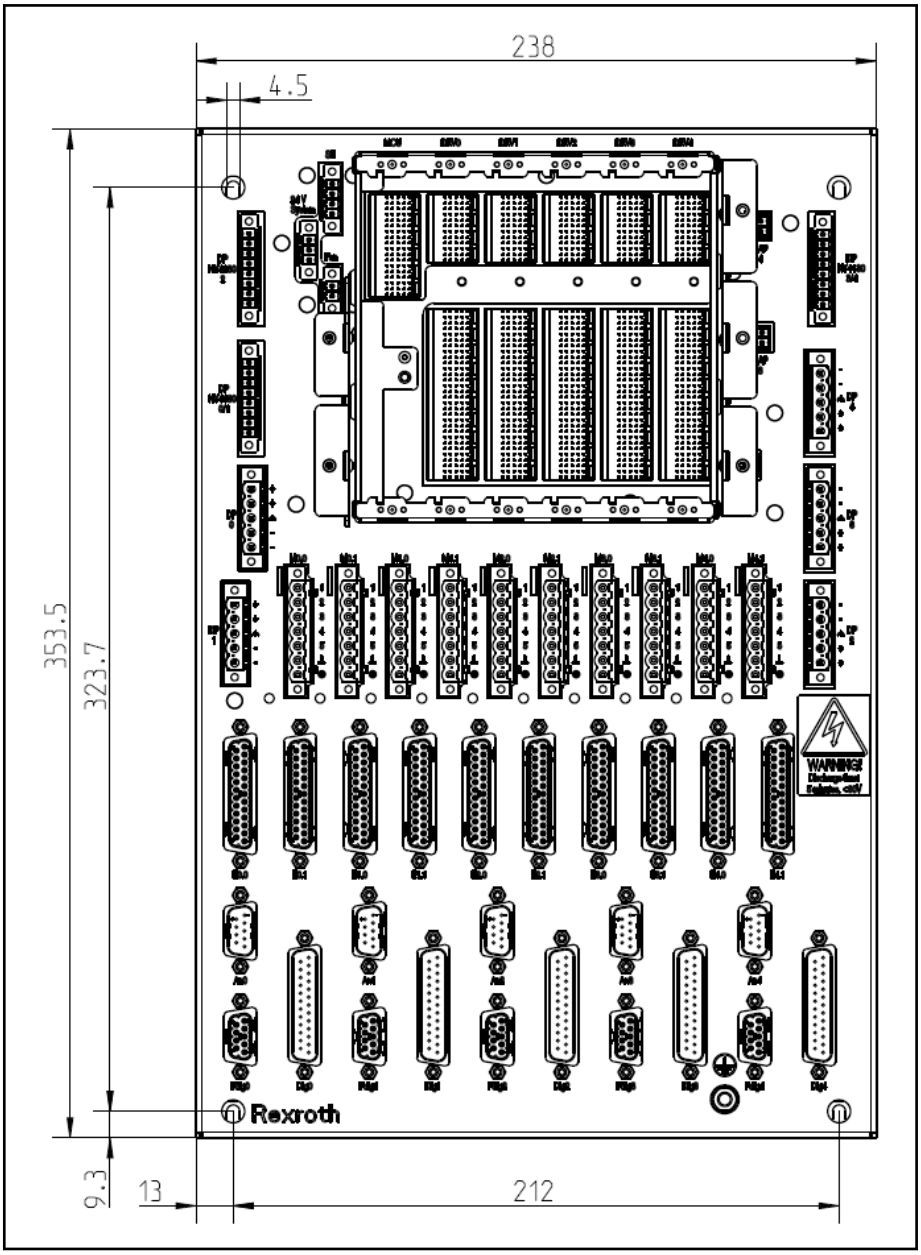


Fig. 8-4: NY4053 system housing front view dimensions

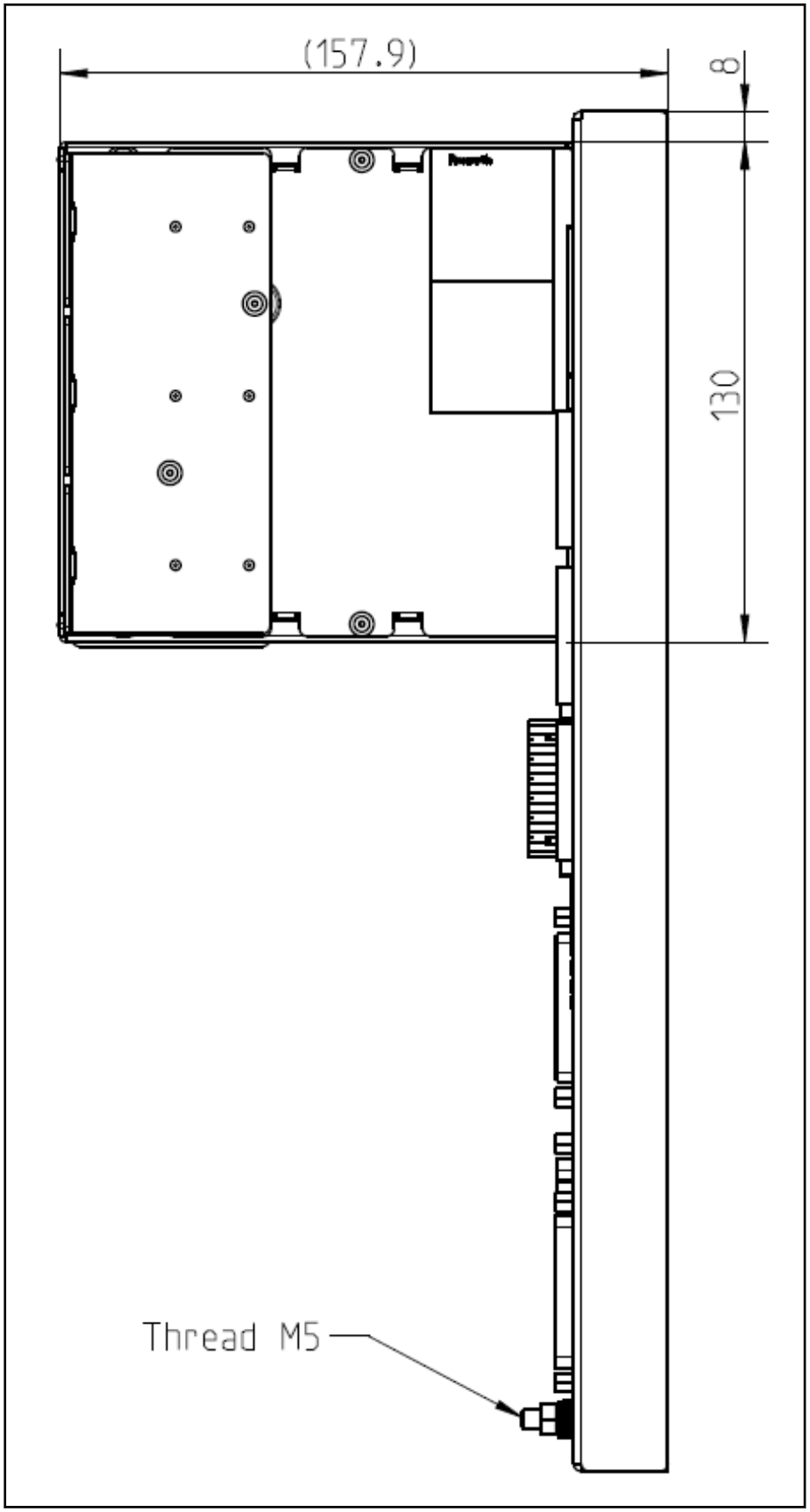


Fig. 8-5: NY4053 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.2-ST-05-ULNN-NY4053	238 mm	353.5 mm	157.9 mm	3600 gr

Tab. 8-3: NY4053 physical data

8.3 Connector Overview

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification.

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and drive modules • the supply voltage for all encoders connected to the drive modules.	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
CAP0 CAP1 CAP2 CAP3 CAP4	For every drive slot in the module holder is a dedicated external drive power capacitor header. Thus CAP0 is the capacitor associated with drive slot 0, and so on. A capacitor may only be needed if the drive module installed in a drive slot is an NY4120 or NY4140. No capacitor is needed if the drive slot contains an NY4130 drive module or NY4150 SERCOS III Master module.	CAP
DP 0 DP 1 DP 2 DP 3 DP 4	For every drive slot in the module holder is a dedicated external drive power supply header which is used if the drive slot contains an NY4120 or NY4140 drive module. Thus DP 0 is the drive power header associated with drive slot 0, and so on.	DP

Text marking on base plate	Purpose	Detailed information
DP NY4130 0/1 DP NY4130 2 DP NY4130 3/4	Separate external drive power supply headers are available on the base plate if the drive slot contains an NY4130 drive module. A drive power supply header for NY4130 drive modules can be allocated to a single drive slot, or to two drive slots. This is indicated in the last part of the name. Thus DP NY4130 0/1 is the drive power header associated with drive slot 0 and drive slot 1, DP NY4130 2 is the drive power header associated with drive slot 2, and so on.	DP NY4130
M0.0 M0.1 M1.0 M1.1 M2.0 M2.1 M3.0 M3.1 M4.0 M4.1	For every drive slot in the module holder are two motor headers, one header for each axis. Mx.0 is the motor header for axis 0 if the drive module of that slot contains an NY4120, NY4130, or NY4140. Mx.1 is the motor header for axis 1 if the drive module of that slot contains an NY4120, NY4130. **Note:** pinout of Mx.0 and Mx.1 are different.	MOTOR
E0.0 E0.1 E1.0 E1.1 E2.0 E2.1 E3.0 E3.1 E4.0 E4.1	For every drive slot in the module holder are two encoder headers, one header for each axis. Ex.0 is the encoder header for axis 0. Ex.1 is the encoder header for axis 1. **Note:** pinout of Ex.0 and Ex.1 are different.	ENCODER
FDIG0 FDIG1 FDIG2 FDIG3 FDIG4	For every drive slot in the module holder is one headers for the Fast Digital I/O connections.Thus FDIG0 is the Fast Digital I/O header associated with drive slot 0, and so on.	FDIG I/O
DIG0 DIG1 DIG2 DIG3 DIG4	For every drive slot in the module holder is one headers for the Digital I/O connections.Thus DIG0 is the Digital I/O header associated with drive slot 0, and so on.	DIG I/O
AN0 AN1 AN2 AN3 AN4	For every drive slot in the module holder is one headers for the Analog I/O connections.Thus AN0 is the Analog I/O header associated with drive slot 0, and so on.	AN I/O
PE	Protective earth connection	PE

Tab. 8-4: Connection overview

8.4 Field diagnostics

No diagnosis is available for the system housing.

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

9 NY4074: LMS System Housing for 2 drive modules

9.1 Product Identification

The NY4074 system housing has three slots, one slot for the MCU and two slots for NY4120/10 drive modules. Part number is R911378504, ordering code is NYS04.2-ST-02-LMSN-NY4074.

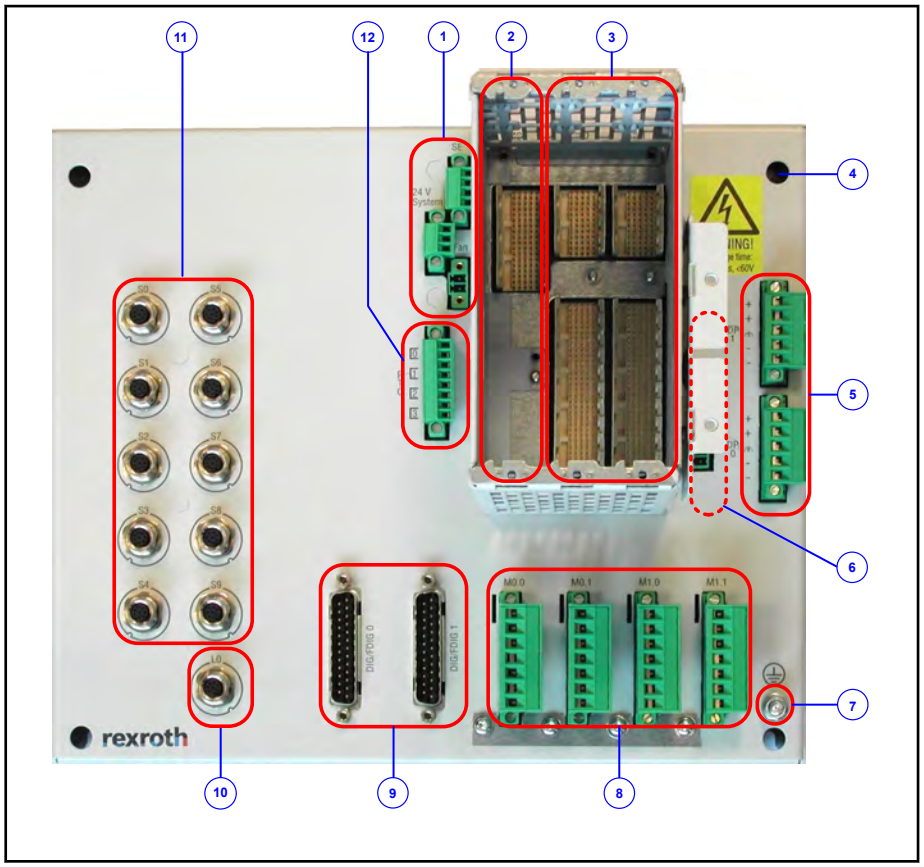


Fig. 9-1: NY4074 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	NY4120/10 drive module slots
4	Mounting screw opening (4)
5	Drive power connectors (1 per drive slot)
6	Capacitor connectors (1 per drive slot)
7	Protective Earth post
8	Motor connectors (2 for each drive slot)
9	Digital I/O and Fast digital I/O connectors (1 per drive slot)
10	Shared sensor connector

Identifier number	Description
11	LMS sensor connector (10)
12	PTC connector

Tab. 9-1: NY4074 system housing identification legend

The discharge warning label warns the technician to observe a 5 minute discharge time delay to be certain that voltages are below 60 V, before undertaking any actions with the product.



Fig. 9-2: Discharge warning label on the system housing

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

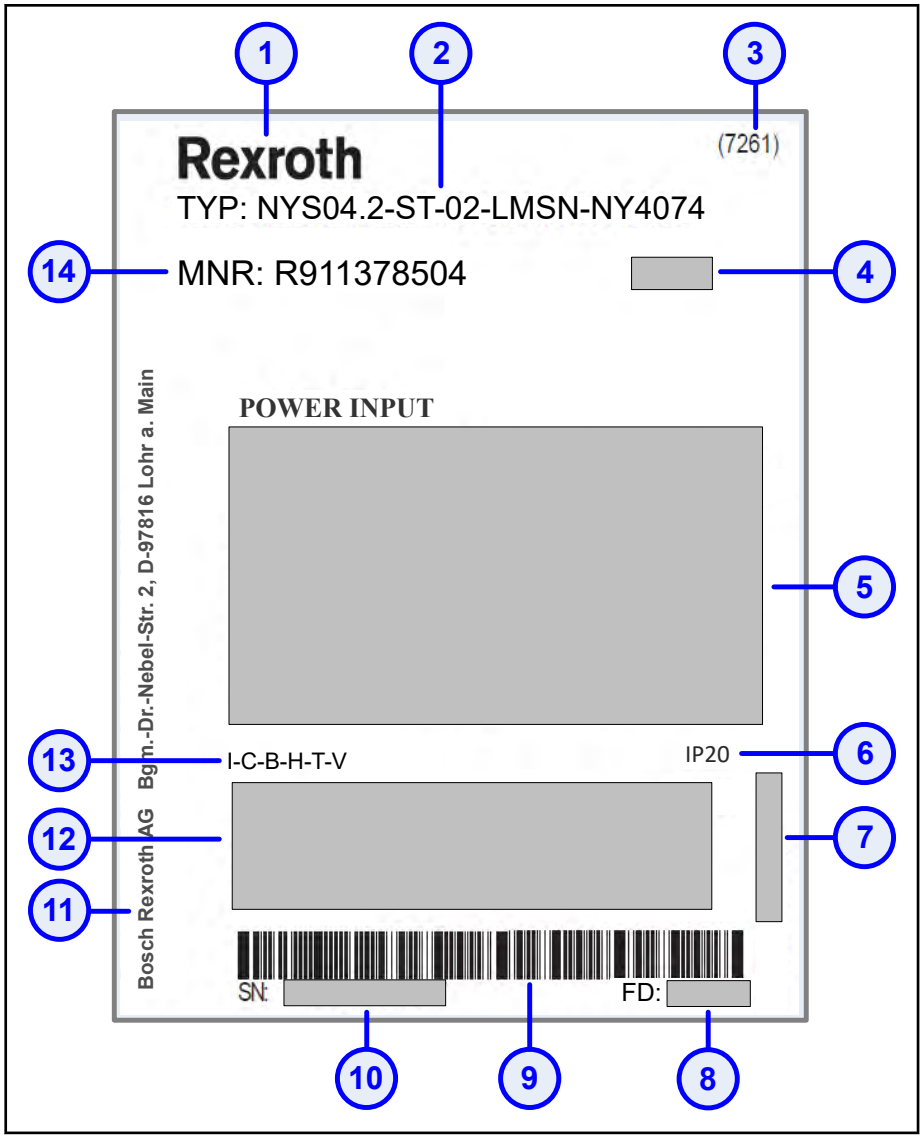


Fig. 9-3: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Designation of origin
8	Date of manufacture (yyWww)
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 9-2: Power Marking legend

9.2 System Housing Dimensions

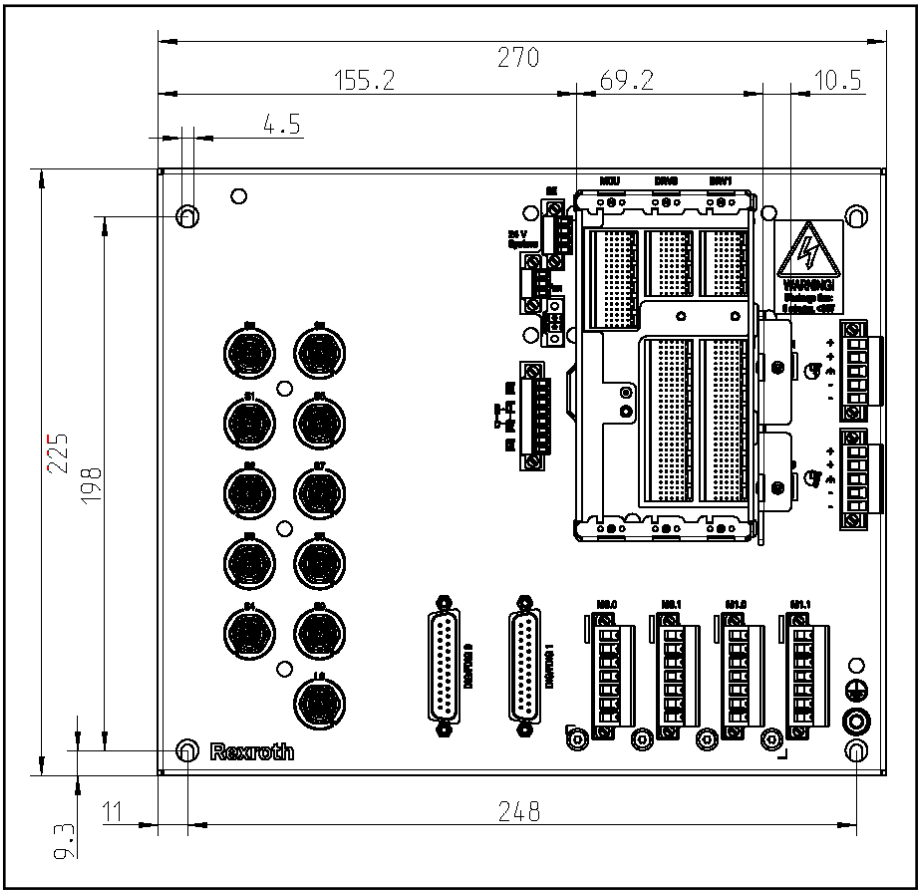


Fig. 9-4: NY4074 system housing front view dimensions

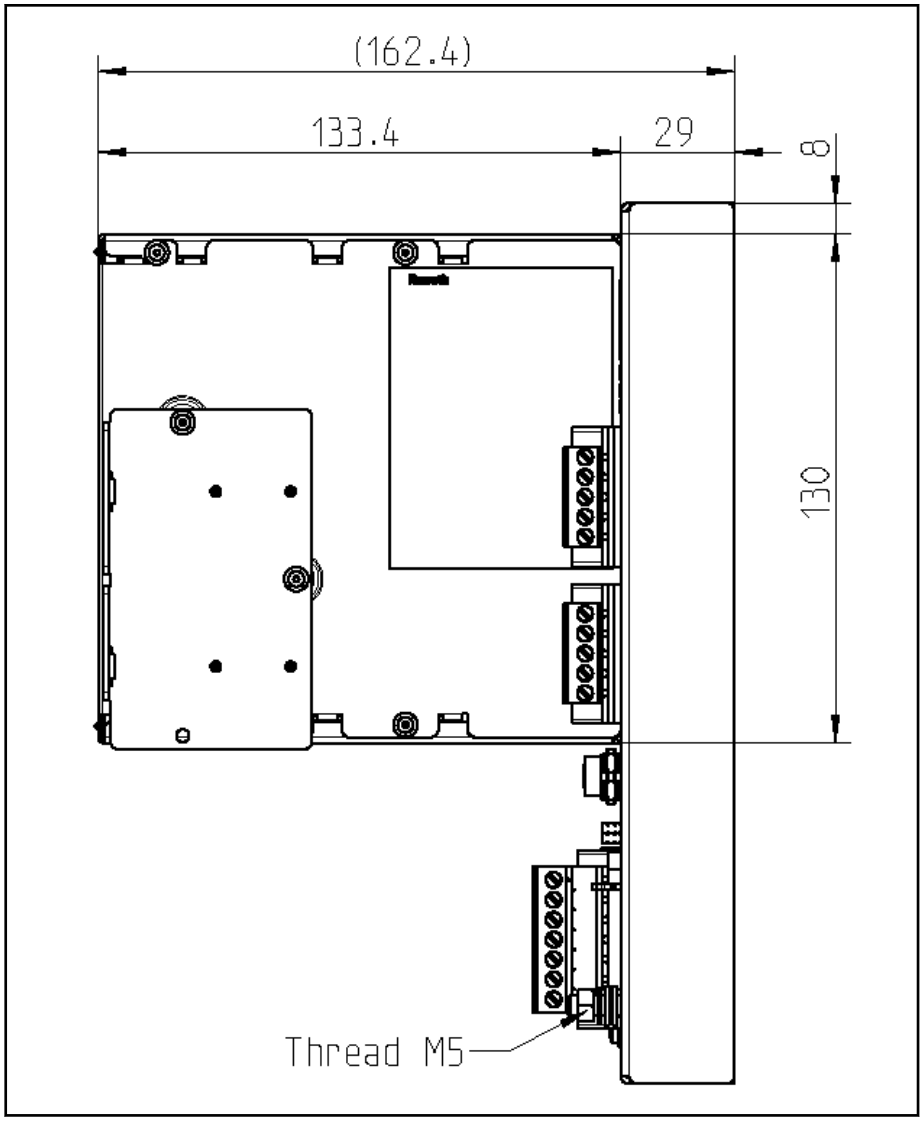


Fig. 9-5: NY4074 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.2-ST-02-LMSN-NY4074	270 mm	225 mm	162.4 mm	1980 gr

Tab. 9-3: NY4074 physical data

9.3 Connector Overview

9.3.1 Introduction

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification. In case of system housing specific connections all detailed information is given in the sub-chapters.

9.3.2 Common System Housing Connectors

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and drive modules	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
CAP0 CAP1	For every drive slot in the module holder is a dedicated external drive power capacitor header. Thus CAP0 is the capacitor associated with drive slot 0, and so on.	CAP
DP 0 DP 1	For every drive slot in the module holder is a dedicated external drive power supply header is available. Thus DP 0 is the drive power header associated with drive slot 0, and DP 1 is the drive power header associated with drive slot 1.	DP
PE	Protective earth connection	PE

Tab. 9-4: Connection overview

9.3.3 Motor connectors

Each drive slot has two motor headers, one header for each axis.

Header type on the backplane: female, 7 pins, Phoenix Contact, ICV 2,5/ 7-GF-5,08.

Mating plug on the cable: Phoenix Contact, IC 2,5/ 7-STF-5,08, order code 1825365. The cable plugs are supplied with the system housing.

The following motor headers are available on the backplane.

- M0.0 and M0.1 : drive module slot 0 motor 0 and motor 1 header
- M1.0 and M1.1 : drive module slot 1 motor 0 and motor 1 header

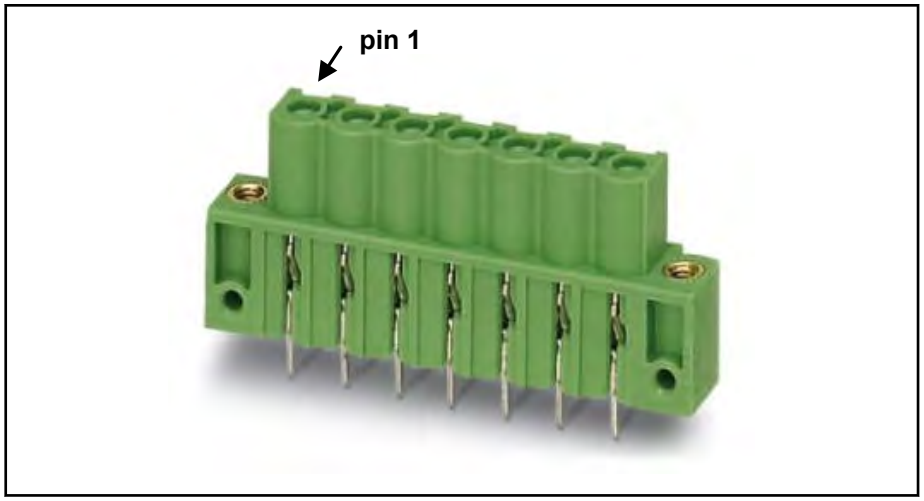


Fig. 9-6: Motor header (backplane) pinout

The connector pin assignment for the coils (motors) is given in tab. 9-5 "Motor header pinout" on page 71.

The shield of the motor cables must be connected via the NY4910 Motor Cable Shield and Support bracket, see chapter 16 "NY4910: Motor Cable Shield and Support" on page 139.

Pin	Pin name	Coil (motor)
1	HB1+	
2	HB1–	U - coil wire black "1"
3	HB2+	V - coil wire black "2"
4	HB2–	W - coil wire black "3"
5	HB3–	
6	DR_GND	
7	PE	Protective earth of motor.

Tab. 9-5: Motor header pinout

⚠ WARNING **Voltage on the pins of the M header can be higher than 60V DC.**

Do not touch the pins of the M connector.

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	depends on drive current and installed fuse in the drive power supply connection. See also chapter 28.11.4 "Drive Power Supply" on page 219.
Maximum cable length	15 m

Tab. 9-6: Motor cable specification

Connector data

IC 2,5/ 7-STF-5,08	minimum	maximum
Tightening torque	4,43 lbs*inch (0,5 Nm)	5,31 lbs*inch (0,6 Nm)
Wire	24 AWG (0,24 mm^2)	12 AWG (4,0 mm^2)

Tab. 9-7: Motor connector data

Motor supply characteristics

Characteristic	Coil (motor)
U_{out}	3x AC 0V ... 150V
I_{out}	0 ... 7A rms

Tab. 9-8: Motor supply characteristics

Keying of the Motor Headers and Plugs

To prevent wrong motor cable connection the motor headers can be keyed. It is the responsibility of the customer to put key fingers accordingly on the motor plugs. A key on the motor header implies no finger on the motor plug for that pin. See chapter 18.3 "Keying Fingers for Drive Power and Motor Connectors" on page 143 for more information.

Pin	M0.0	M0.1	M1.0	M1.1
1	no key	no key	key	no key
2	no key	key	no key	key
3	key	key	no key	no key
4	no key	no key	no key	no key
5	no key	no key	no key	no key
6	key	no key	key	key
7	no key	no key	no key	no key

Tab. 9-9: Example of motor header keying for all axes

9.3.4 LMS sensor connectors

Each drive slot has 5 LMS sensor inputs for the NY4980 Hall sensor module or the NY4981 MR sensor module.

Connector type on the backplane: female, 8 pins M8.

The following LMS sensor connectors are available on the backplane.

- S0, S1, S2, S3, S4 : drive module slot 0 LMS sensor inputs
- S5, S6, S7, S8, S9 : drive module slot 1 LMS sensor inputs

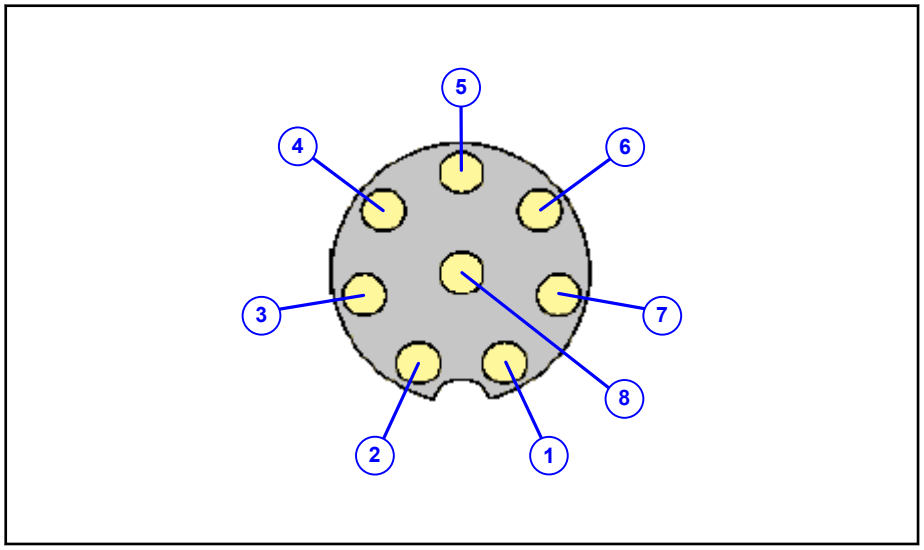


Fig. 9-7: LMS sensor input female connector (backplane) pinout

The connector pin assignment is given in tab. 9-10 "LMS sensor connection pinout" on page 73.

Pin	LMS sensor connections
1	sine +
2	sine -
3	cosine +
4	cosine -
5	+5V
6	GND
7	-5V
8	GND
housing	cable shielding

Tab. 9-10: LMS sensor connection pinout

Tightening torque of the M8 connector is 0.2 Nm.

Cable Characteristics

Characteristic	Description
Type of cable	NY4951/x0 (where x is 0, 1, 2, 3, 4) See chapter 22 "NY4951: LMS sensor and shared sensor cables" on page 167
Maximum cable length	10 m

Tab. 9-11: Sensor connection cable specification

9.3.5 Shared sensor connector

The system housing has one shared sensor connection.

Connector type on the backplane: female, 8 pins M8.

The shared sensor connector is indicated by the text "L0".

The connector "L0" is internally connected to connector "S9" and is used to connect the sensor connected to "S9" also to the next system housing.

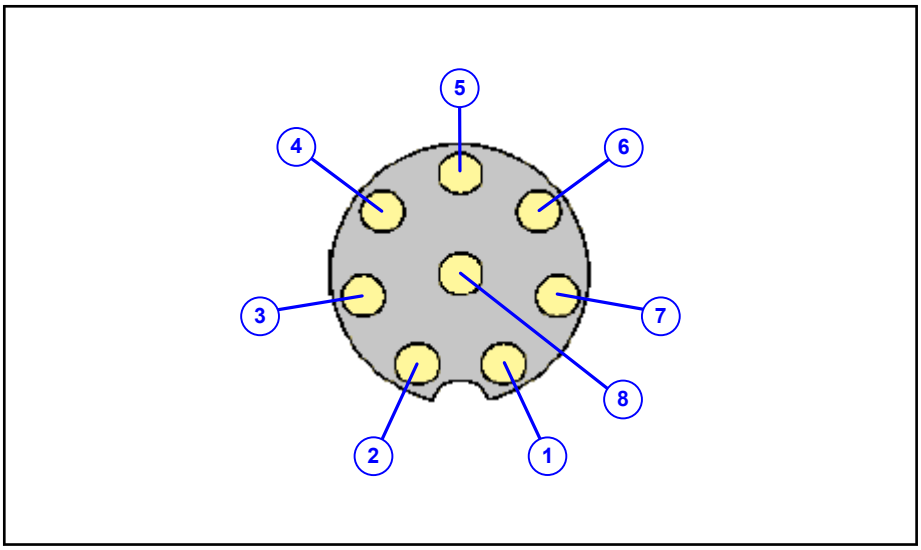


Fig. 9-8: Shared sensor connector (backplane) pinout

The connector pin assignment is given in tab. 9-12 "Shared sensor connection pinout" on page 74.

Pin	Shared sensor connections
1	peer output sine +
2	peer output sine -
3	peer output cosine +
4	peer output cosine -
5	not connected
6	peer out GND
7	not connected

Pin	Shared sensor connections
8	peer out GND
housing	cable shielding

Tab. 9-12: Shared sensor connection pinout

Tightening torque of the M8 connector is 0.2 Nm.

Cable Characteristics

Characteristic	Description
Type of cable	NY4951/70 See chapter 22 "NY4951: LMS sensor and shared sensor cables" on page 167
Maximum cable length	10 m

Tab. 9-13: Shared sensor connection cable specification

If the distance between NY4074 system housings is too large for the NY4951/70 shared sensor cable, you can extend the length with a suitable LMS sensor extension cable, see chapter 22.1 "LMS sensor extension cables" on page 167.

9.3.6 Digital / Fast Digital I/O Connectors

The digital and fast digital I/O header (DIG/FDIGx) is available for each drive module.

Header type on the backplane: male, 25 pins sub-D.

The following digital I/O headers are available on the backplane.

- DIG/FDIG0 : drive module slot 0 digital and fast digital I/O header
- DIG/FDIG1 : drive module slot 1 digital and fast digital I/O header

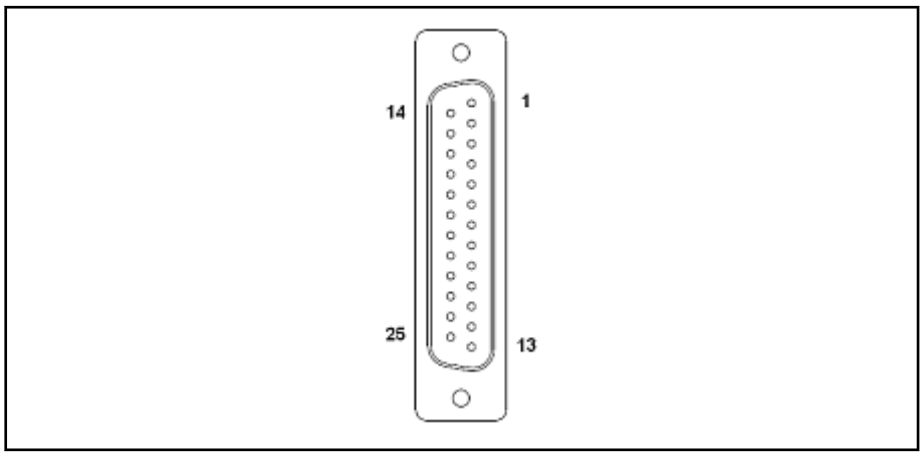


Fig. 9-9: Digital and fast digital I/O header (backplane) pinout

The connector pin assignment is given in tab. 9-14 "Digital and fast digital I/O header pinout" on page 76.

Pin	Pin name	Function
1	DigIn0	Digital Input 0 in group 0.
2	DigIn1	Digital Input 1 in group 0.
3	DigIn2	Digital Input 2 in group 0.
4	DigIn3	Digital Input 3 in group 0.
5		Not connected.
6		Not connected.
7	FastIn0	Fast digital input 0.
8	FastIn1	Fast digital input 1.
9	GND_DIO	Ground for digital output and fast digital input,connected to power supply.
10	DigOut0	Digital Output.
11	DigOut1	Digital Output.
12	DigOut2	Digital Output.
13	DigOut3	Digital Output.
14	DigComm0	Common for digital Input group 0, may be ground or 24V.
15		Not connected.
16		Not connected.
17	FastOut0	Fast digital output 0.
18	FastOut1	Fast digital output 1.
19		Not connected.
20		Not connected.
21	GND_DIO	Ground for digital output and fast digital input,connected to power supply.
22	24V_DIO	24 Volt digital (fast) output supply.
23	24V_DIO	24 Volt digital (fast) output supply.
24	24V_DIO	24 Volt digital (fast) output supply.
25	24V_DIO	24 Volt digital (fast) output supply.

Tab. 9-14: Digital and fast digital I/O header pinout

NOTICE

The system housing has no provisions against wrong polarity connection of the 24V I/O power supply.

Observe the polarity of the power supply connections.

- Connect the shield of the cable to the metal housing of the sub-D plug.
- Each pin is rated for a load of 1 A. Connect pin # 22, 23, 24, and 25 to match the total load connected to the digital output pins.

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 24 / 0.24 mm^2 (1A) Use cables with wires of correct rating
Maximum cable length	15 m

Tab. 9-15: Digital and Fast Digital I/O cable specification

9.3.7 PTC connector

The system housing has one connection for the PTC sensors of the coils.

Header type on the backplane: male, 8 pins, Phoenix Contact, MCV 1,5/ 8-GF-3,5.

Mating plug on the cable: Phoenix Contact, MC 1,5/ 8-STF-3,5, order code 1847181. The cable plug is supplied with the system housing.

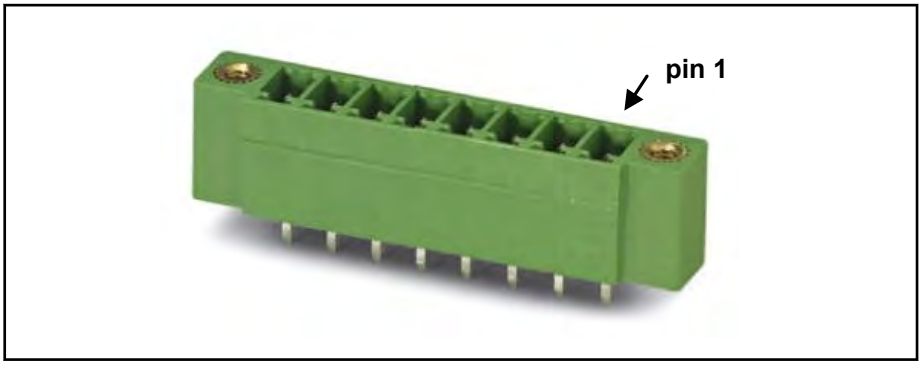


Fig. 9-10: PTC header (backplane) pinout

Pin	Pin name	Function	Connected to
1	MX-P3+	PTC input coil number 3+	DRV1 - DigIn7
2	MX-P3-	PTC input coil number 3-	DRV1 - DigIn7
3	MX-P2+	PTC input coil number 2+	DRV1 - DigIn6
4	MX-P2-	PTC input coil number 2-	DRV1 - DigIn6
5	MX-P1+	PTC input coil number 1+	DRV0 - DigIn7
6	MX-P1-	PTC input coil number 1-	DRV0 - DigIn7
7	MX-P0+	PTC input coil number 0+	DRV0 - DigIn6
8	MX-P0-	PTC input coil number 0-	DRV0 - DigIn6

Tab. 9-16: PTC header pinout

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 26 / 0.14 mm^2
Maximum cable length	15 m

Tab. 9-17: PTC cable specification

Connector data

MC 1,5/ 8-STF-3,5	minimum	maximum
Tightening torque	1,95 lbs*inch (0,22 Nm)	2,21 lbs*inch (0,25 Nm)
Wire	30 AWG (0,06 mm^2)	14 AWG (2,5 mm^2)

Tab. 9-18: PTC connector data

9.4 Field diagnostics

No diagnosis is available for the system housing.

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

9.5 System Housing power requirements

The NY4074 system housing requires additional power from the 24V System, because this system housing includes electronic circuits on the backplane.

System housing power supply	Voltage and current
Nominal voltage	24V DC ±5%
Maximum supply current	1.6 A
Typical supply current (no sensors, I/O, drive power connected)	0.5 A

Tab. 9-19: NY4074 power requirements

10 NY4079: LMS System Housing for 4 SERCOS axes

10.1 Product Identification

The NY4079 system housing has two slots, one slot for the MCU and one slot for the SERCOS III Master module. Part number is R911378505, ordering code is NYS04.1-ST-01-LMS-SERCOS-NY4079.

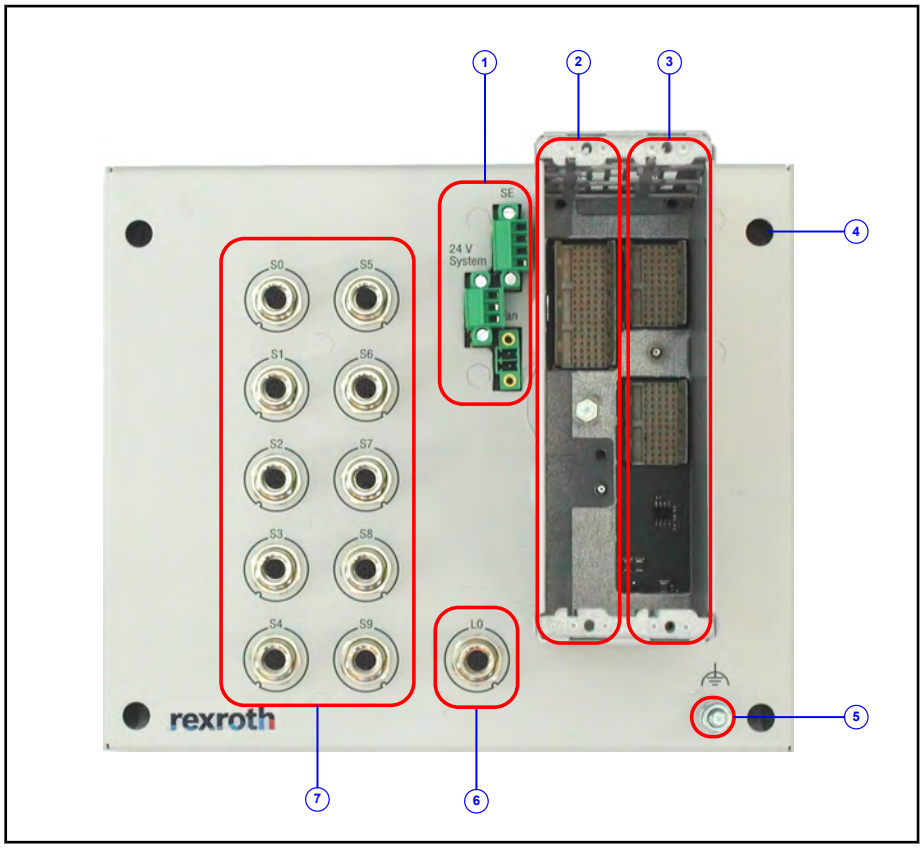


Fig. 10-1: NY4079 system housing

Identifier number	Description
1	24V System, SE and Fan connectors
2	Motion Control Unit slot
3	NY4150 SERCOS III Master module slot
4	Mounting screw opening (4)
5	Protective Earth post
6	Shared sensor connector
7	LMS sensor connector (10)

Tab. 10-1: NY4079 system housing identification legend

The Power Marking label at the right side of the module holder indicates the rating of the system housing and other information.

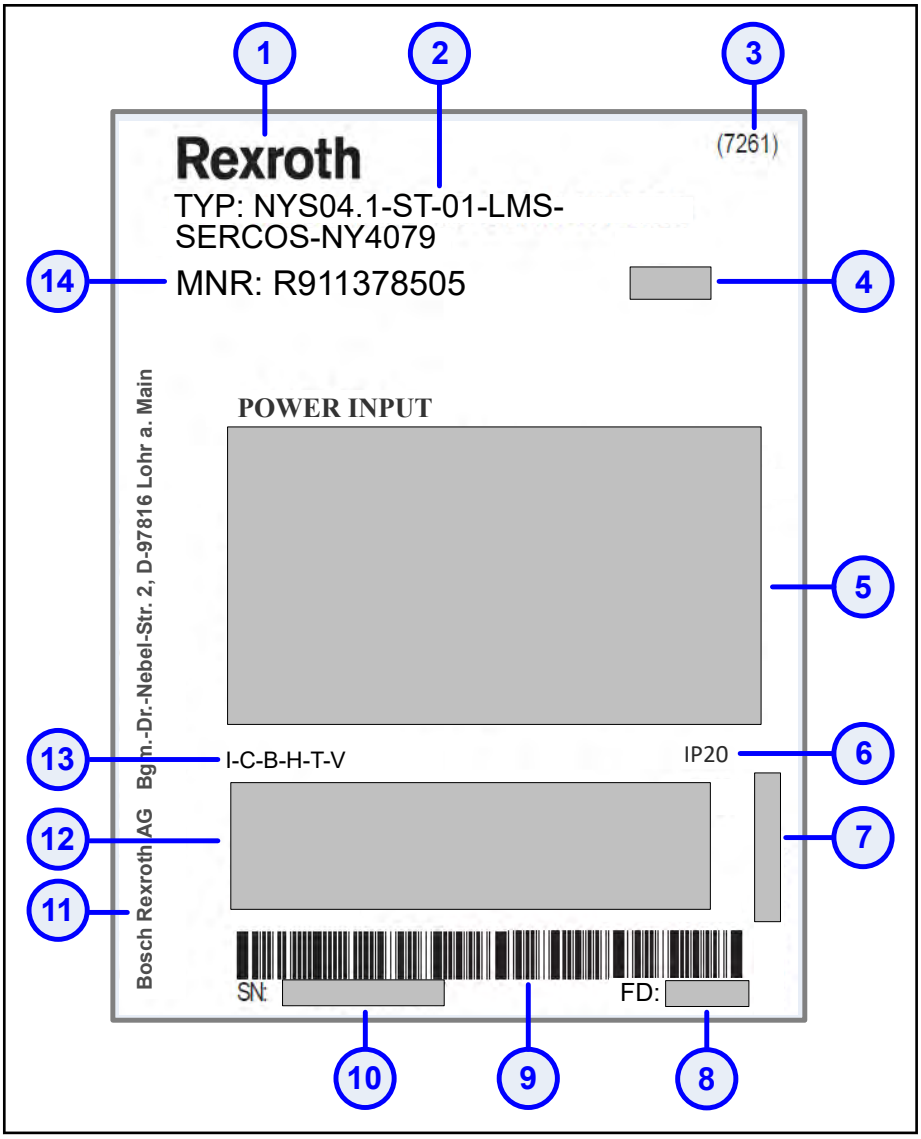


Fig. 10-2: Power Marking label on the module holder

Identifier number	Description
1	Logo type
2	Type code
3	Division number / plant number
4	Change index
5	Rated voltages and currents
6	Degrees of protection provided by enclosure (IP code)
7	Date of manufacture (yyWww)
8	Designation of origin
9	Rexroth bar code
10	Serial number

Identifier number	Description
11	Company address
12	Certification markings
13	Test marking
14	Material number

Tab. 10-2: Power Marking legend

10.2 System Housing Dimensions

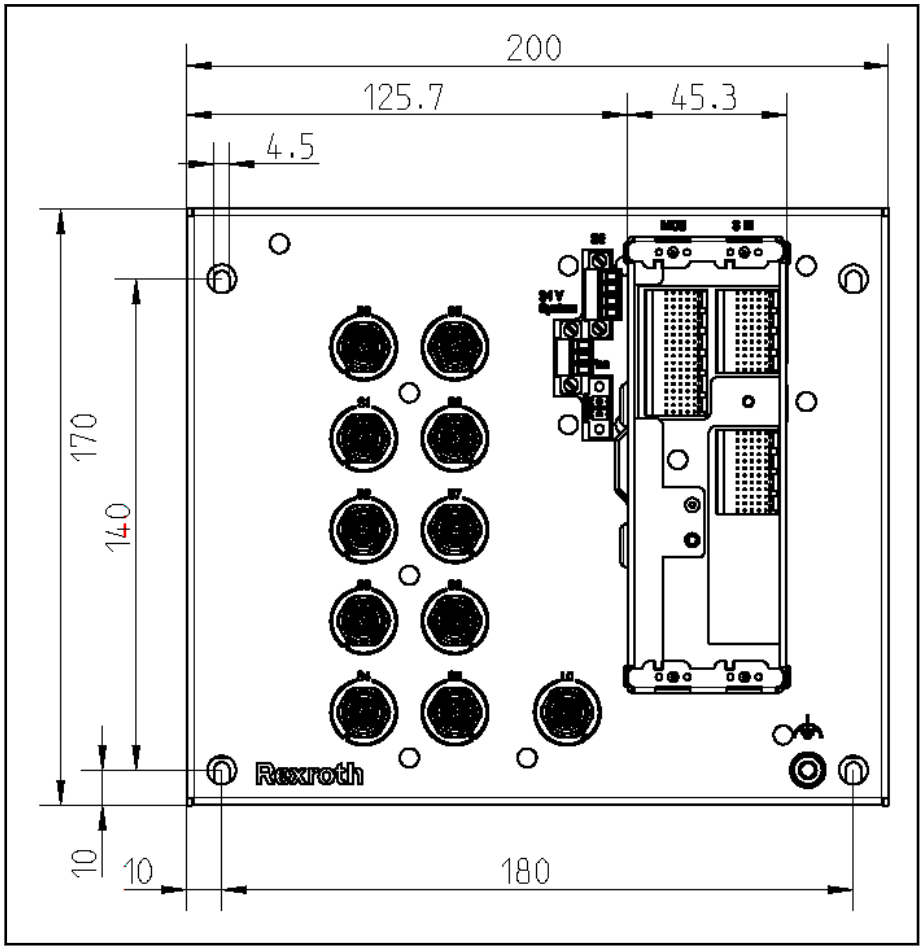


Fig. 10-3: NY4079 system housing front view dimensions

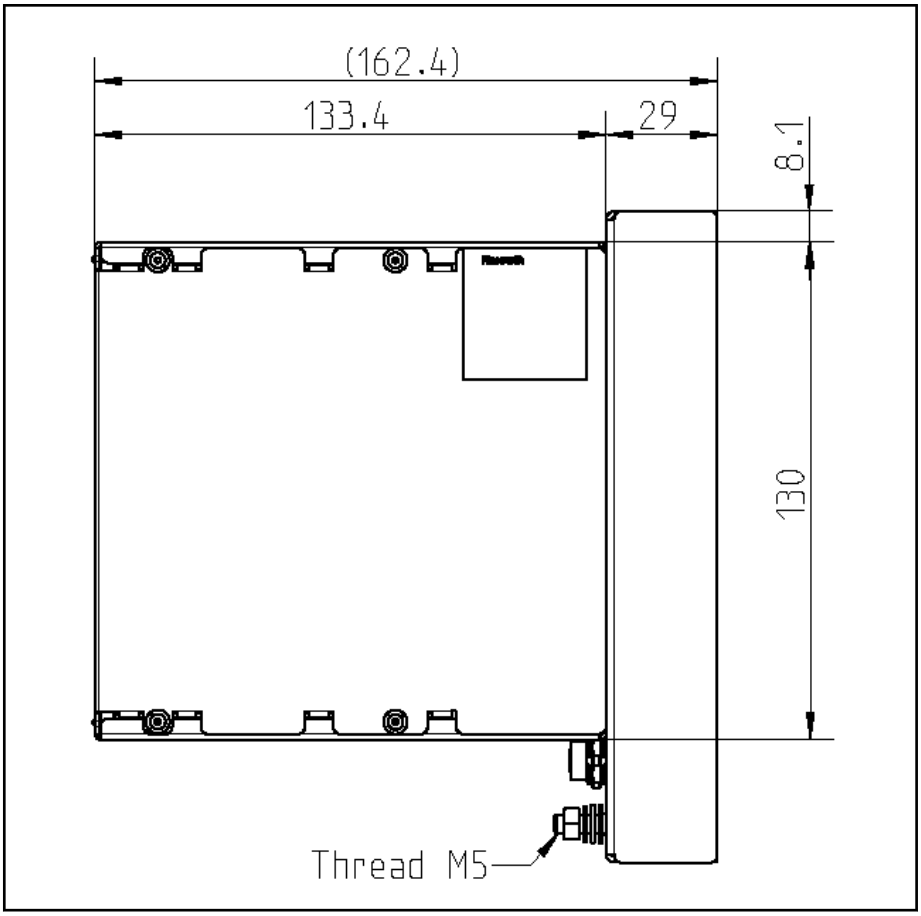


Fig. 10-4: NY4079 system housing side view dimensions

System housing type code	Width	Height	Depth	Weight
NYS04.1-ST-01-LMS-SERCOS-NY4079	200 mm	170 mm	162.4 mm	1280 gr

Tab. 10-3: NY4079 physical data

10.3 Connector overview

10.3.1 Introduction

This chapter gives an overview of all connections on the base plate of the system housing with links to the detailed information such as connector type, order code and pinout specification. In case of system housing specific connections all detailed information is given in the sub-chapters.

10.3.2 Common System Housing Connectors

Text marking on base plate	Purpose	Detailed information
24V System	The 24 Volt System supply header is used by the MCU module to generate • the logic supply voltages for the MCU and SERCOS III Master module	24V SYSTEM
SE	The Service Connection has two inputs. One input called "ServiceMode" is used to set the operation mode of the system to "service mode". The other input called "StopAxes" can be used to execute an as fast as possible stop of all axes connected to the system.	SERVICE
Fan	The Fan connector is a power supply header for the optional fan unit that can be installed underneath the module holder for forced cooling of the system.	FAN
PE	Protective earth connection	PE

Tab. 10-4: Connection overview

10.3.3 LMS sensor connectors

The NY4079 system housing has 10 LMS sensor inputs for the NY4980 Hall sensor module or the NY4981 MR sensor module.

Connector type on the backplane: female, 8 pins M8.

The LMS sensor connectors are identified by the text S0, S1, S2, S3, S4, S5, S6, S7, S8, S9.

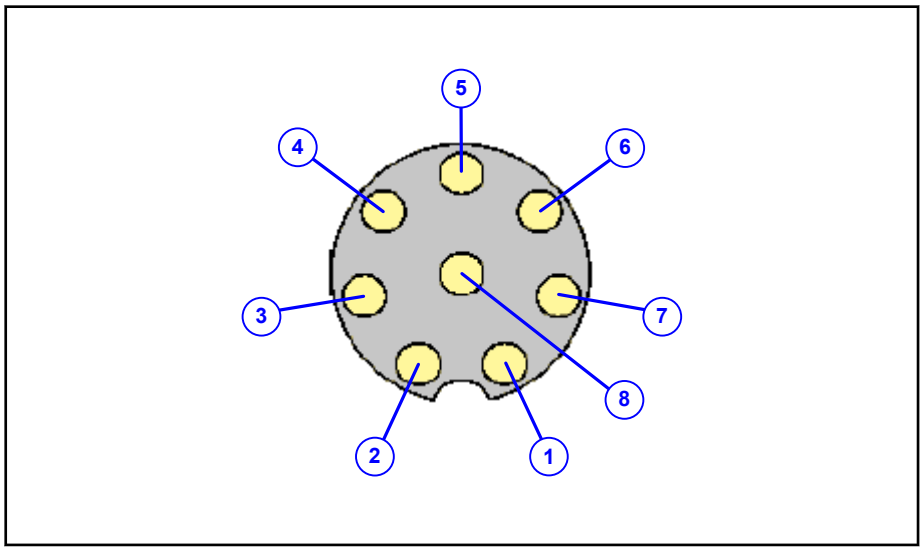


Fig. 10-5: LMS sensor input female connector (backplane) pinout

The connector pin assignment is given in tab. 10-5 "LMS sensor connection pinout" on page 84.

Pin	LMS sensor connections
1	sine +
2	sine -
3	cosine +
4	cosine -
5	+5V
6	GND
7	-5V
8	GND
housing	cable shielding

Tab. 10-5: LMS sensor connection pinout

Tightening torque of the M8 connector is 0.2 Nm.

Cable Characteristics

Characteristic	Description
Type of cable	NY4951/x0 (where x is 0, 1, 2, 3, 4) See chapter 22 "NY4951: LMS sensor and shared sensor cables" on page 167
Maximum cable length	10 m

Tab. 10-6: Sensor connection cable specification

10.3.4 Shared sensor connector

The system housing has one shared sensor connection.

Connector type on the backplane: female, 8 pins M8.

The shared sensor connector is indicated by the text "L0".

☞ The connector "L0" is internally connected to connector "S9" and is used to connect the sensor connected to "S9" also to the next system housing.

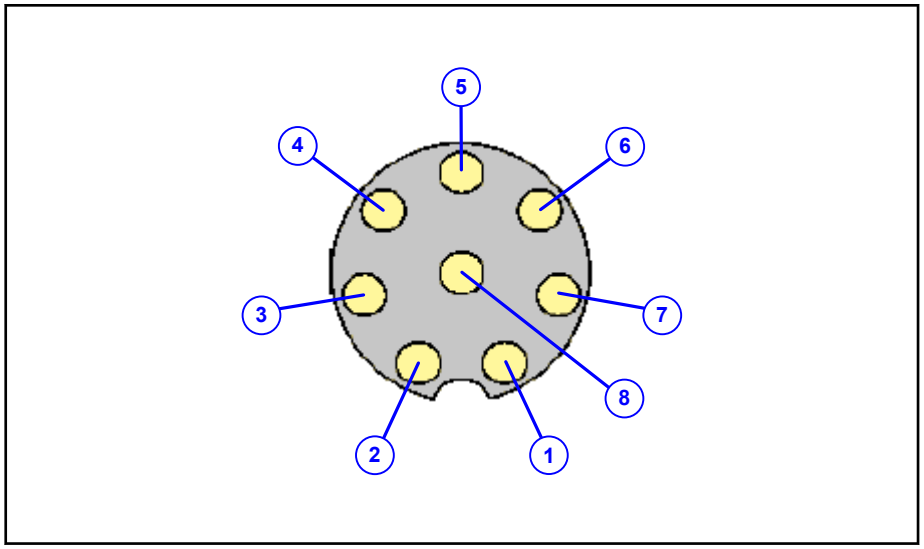


Fig. 10-6: Shared sensor connector (backplane) pinout

The connector pin assignment is given in tab. 10-7 "Shared sensor connection pinout" on page 85.

Pin	Shared sensor connections
1	peer output sine +
2	peer output sine -
3	peer output cosine +
4	peer output cosine -
5	not connected
6	peer out GND
7	not connected
8	peer out GND
housing	cable shielding

Tab. 10-7: Shared sensor connection pinout

Tightening torque of the M8 connector is 0.2 Nm.

Cable Characteristics

Characteristic	Description
Type of cable	NY4951/70 See chapter 22 "NY4951: LMS sensor and shared sensor cables" on page 167
Maximum cable length	10 m

Tab. 10-8: Shared sensor connection cable specification



If the distance between NY4074 system housings is too large for the NY4951/70 shared sensor cable, you can extend the length with a suitable LMS sensor extension cable, see chapter 22.1 "LMS sensor extension cables" on page 167.

10.4 Field diagnostics

No diagnosis is available for the system housing.

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

10.5 System Housing power requirements

The NY4079 system housing requires additional power from the 24V System, because this system housing includes electronic circuits on the backplane.

System housing power supply	Voltage and current
Nominal voltage	24V DC ±5%
Maximum supply current	1.5 A
Typical supply current (no sensors connected)	0.4 A

Tab. 10-9: NY4079 power requirements

11 Detailed Connection Information of Common Connectors

11.1 Introduction

This chapter specifies the connection pins of the connectors common on the base plate of the system housings. See the NYCe 4000 Hardware System Manual for circuit specific details, such as encoder input circuits, digital I/O input and output circuits, and specifications of maximum voltage and current, etc.

11.2 24V System – System Power Connection

The 24V System supply header is used by the MCU module to generate

- logic power supply voltages for the MCU module and drive modules installed in the system housing
- power supply voltage for all encoders connected to drive modules installed in the system housing

Header type on the backplane: male, 3 pins, Phoenix Contact, MCV 1,5/ 3-GF-3,5.

Mating plug on the cable: Phoenix Contact, MC 1,5/ 3-STF-3,5, order code 1847068. The cable plug is supplied with the system housing.

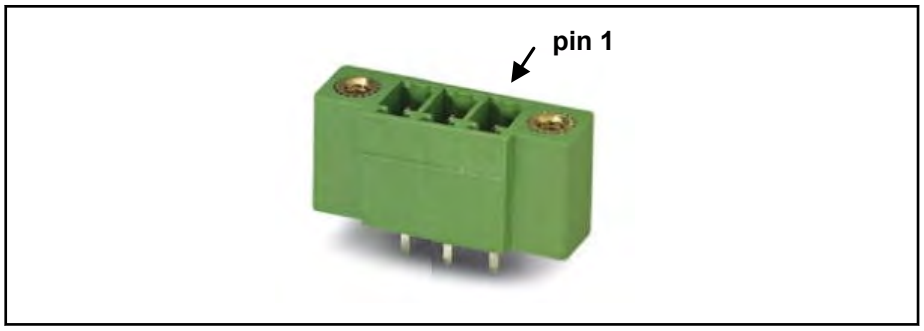


Fig. 11-1: 24V System header (backplane) pinout

The connector pin assignment is given in tab. 11-1 "24V System header pinout" on page 87.

Pin	Pin name	Function
1	24V_GND	24V common.
2	+24V	System power (24 Volt DC).
3	SHIELD	Cable shield.

Tab. 11-1: 24V System header pinout

NOTICE

The system housing has no provisions against wrong polarity connection of the 24V System power supply.

Observe the polarity of the power supply connections.



24V_GND must be connected to the same potential as SHIELD (safety ground), not at the system housing side of the cable, but at the power supply.

The connection includes an auto-resetable fuse on the system backplane, see fig. 11-2 "24V System connection diagram with auto-resetable fuse" on page 88.

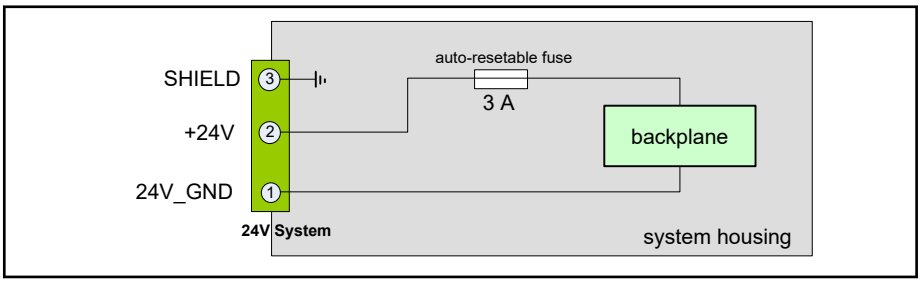


Fig. 11-2: 24V System connection diagram with auto-resetable fuse

24V power supply characteristics

Characteristic	Description
Input voltage	+24 V ± 5%
Current	• Minimum: supply required power for all components • Maximum current 3A (inrush 6A for 10 ms)

Tab. 11-2: System power supply

When you calculate the system power supply requirements of the 24V power supply, you must take into account that the external power supply must be able to deliver this power at a voltage lower than the nominal voltage of 24V. The minimum level at which the DC-DC converter on the MCU module switches on is 16.2V. This means that the external power supply should be able to deliver at least 1.5 times the nominal current at 24V required for the node without encoders. The chosen external system power supply must be able to fulfill this current requirement, and must support inrush currents of 3A (6A/ms) to prevent startup problems.

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 18 / 1.0 mm^2 (4A) minimum
Maximum cable length	15 m

Tab. 11-3: 24V System cable specification

Connector data

MC 1,5/ 3-STF-3,5	minimum	maximum
Tightening torque	1,95 lbs*inch (0,22 Nm)	2,21 lbs*inch (0,25 Nm)
Wire	30 AWG (0,06 mm^2)	14 AWG (2,5 mm^2)

Tab. 11-4: 24V System connector data

11.3 SE – Service Mode Input Connection

Header type on the backplane: male, 4 pins, Phoenix Contact, MCV 1,5/ 4-GF-3,5.

Mating plug on the cable: Phoenix Contact, MC 1,5/ 4-STF-3,5, order code 1847071. The cable plug is supplied with the system housing.

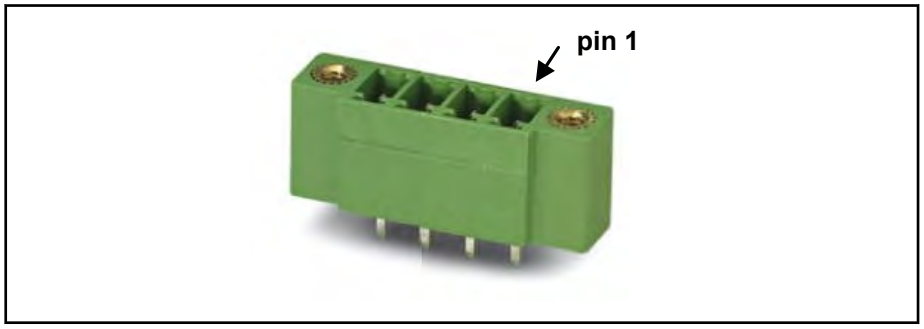


Fig. 11-3: SE header (backplane) pinout

The connector pin assignment is given in tab. 11-5 "SE header pinout" on page 89.

Pin	Pin name	Function
1	SHIELD	Cable shield.
2	INP_COMMON	Input common.
3	INP_Service_Mode	24 Volt input service mode to MCU.
4	INP_Stop_Axes	24 Volt input stop axes to MCU.

Tab. 11-5: SE header pinout

Input Characteristics

Characteristic	Description
Permitted input voltage	–30V ... 30V
Input high level	15V ... 30V –15V ... –30V
Input low level	–5V ... 5V
Input current @ 24V	Nominal 3.5 mA

Tab. 11-6: Input characteristics

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 26 / 0.14 mm^2 minimum
Maximum cable length	15 m

Tab. 11-7: SE cable specification

Connector data

MC 1,5/ 4-STF-3,5	minimum	maximum
Tightening torque	1,95 lbs*inch (0,22 Nm)	2,21 lbs*inch (0,25 Nm)
Wire	30 AWG (0,06 mm^2)	14 AWG (2,5 mm^2)

Tab. 11-8: SE connector data

11.4 Fan – Fan Unit Connection

The Fan header is available as power supply connection for the optional fan unit. The optional fan unit is used for forced cooling of the modules in the module holder.

The connection includes an auto-resetable fuse, see fig. 11-4 "Fan unit connection" on page 90.

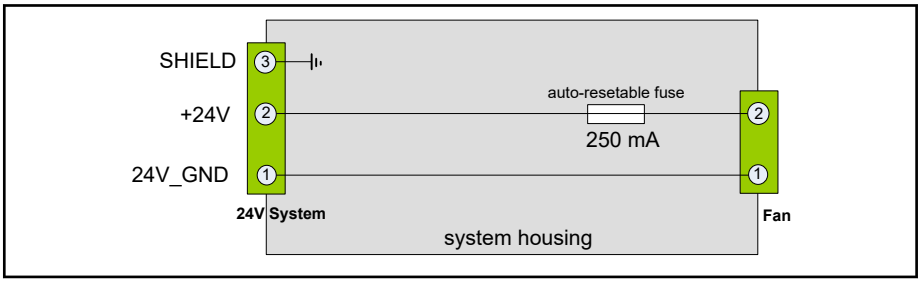


Fig. 11-4: Fan unit connection

The Fan header is only for connection of the fan unit. No other devices may be connected to the Fan header.

The following fan units are available.

Component name	Order number	Short name	Used on
NYA04.1-FAN-1DRV-NY4922/00	R911328062	NY4922/00	NY4013 NY4079
NYA04.1-FAN-2DRV-NY4922/10	R911325083	NY4922/10	NY4023 NY4074
NYA04.1-FAN-3DRV-NY4922/20	R911172220	NY4922/20	NY4033

Component name	Order number	Short name	Used on
NYA04.1-FAN-4DRV-NY4922/30	R911328063	NY4922/30	NY4043
NYA04.1-FAN-5DRV-NY4922/50	R911325084	NY4922/50	NY4053

Tab. 11-9: NYCe 4000 accessories: fan units

11.5 DP – NY4120 / NY4125 / NY4140 Drive Power Connections

The DP drive power headers are used to connect the drive power supply to NY4120, NY4125 and NY4140 drive modules installed in the module holder. For each drive slot a separate drive power supply header is available.

Header type on the backplane: male, 5 pins, Phoenix Contact, MSTBV 2,5/ 5-GF-5,08.

Mating plug on the cable: Phoenix Contact, MSTB 2,5/ 5-STF-5,08, order code 1778014. The cable plugs are supplied with the system housing.

The following DP drive power headers are available on the backplane (depending on the type of system housing).

- DP 0 : drive power supply header for drive module slot 0
- DP 0 NY4125 : drive power supply header for the NY4125 drive module
- DP 1 : drive power supply header for drive module slot 1
- DP 2 : drive power supply header for drive module slot 2
- DP 3 : drive power supply header for drive module slot 3
- DP 4 : drive power supply header for drive module slot 4

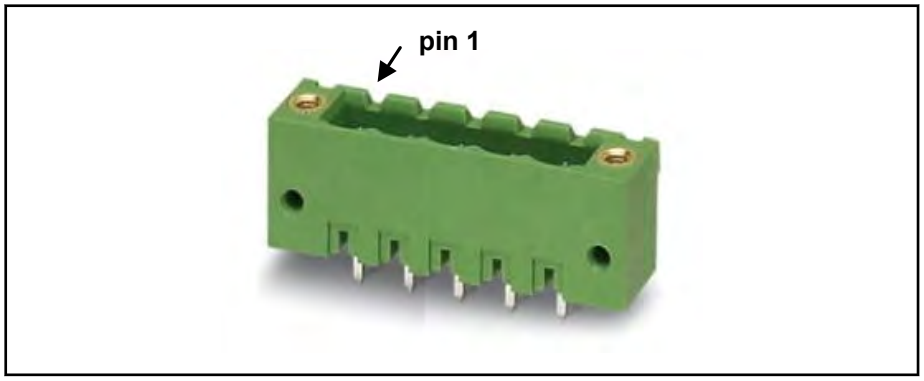


Fig. 11-5: DP drive power supply header (backplane) pinout

The connector pin assignment is given in tab. 11-10 "DP drive power supply header pinout" on page 91.

Note that the orientation of the headers at opposite sides of the module holder is 180° rotated.

Pin	Pin name	Function
1	DP_PWR+	+ Drive power supply module.
2	DP_PWR+	+ Drive power supply module.
3	SHIELD	Cable shield.

Pin	Pin name	Function
4	DP_GND	Ground drive power supply module.
5	DP_GND	Ground drive power supply module.

Tab. 11-10: DP drive power supply header pinout

⚠ WARNING

Voltage on the pins of the DP header can be higher than 60V DC. When the connector is unplugged a high voltage can remain present for 5 minutes after disconnection. If the drive module is not installed in the slot which has an accompanying capacitor installed, you must wait 30 minutes.

Do not touch the pins of the DP connector.

NOTICE

The system housing has no provisions against wrong polarity connection of the DP drive power supply.

Observe the polarity of the drive power supply connections.

☞ Shielding of the cable must be connected at the system housing side to the SHIELD pin of the connector. It is recommended to connect the shielding at the power supply unit side to the chassis of the power supply unit, not to the PE connection.

Drive power supply characteristics

Characteristic	Maximum rating per DP header
Drive power voltage and input current for NY4120 and NY4120/10	DC +15 .. +75V 12,0A (forced cooling) 6,0A (convection cooling)
Drive power voltage and input current for NY4140	DC +48 .. +150V 6,0A (forced cooling) 2,5A (convection cooling)

Tab. 11-11: DP drive power input characteristics per DP header

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	Depends on drive current and installed fuse
Maximum cable length	15 m

Tab. 11-12: DP Drive power cable specification

Connector data

MSTB 2,5/ 5-STF-5,08	minimum	maximum
Tightening torque	4,43 lbs*inch (0,5 Nm)	5,31 lbs*inch (0,6 Nm)
Wire	26 AWG (0,14 mm^2)	12 AWG (4,0 mm^2)

Tab. 11-13: DP connector data

As you can see in tab. 11-10 "DP drive power supply header pinout" on page 91, there are two pins for DP_PWR+ and 2 pins for DP_GND. If the total current is higher than the current supported by one pin, you must connect wires of sufficient gauge to the other drive power connection pins. These wires must be connected directly to the drive power supply or connection blocks, if possible. See fig. 11-6 "Four examples of correct DP drive power connections" on page 93.

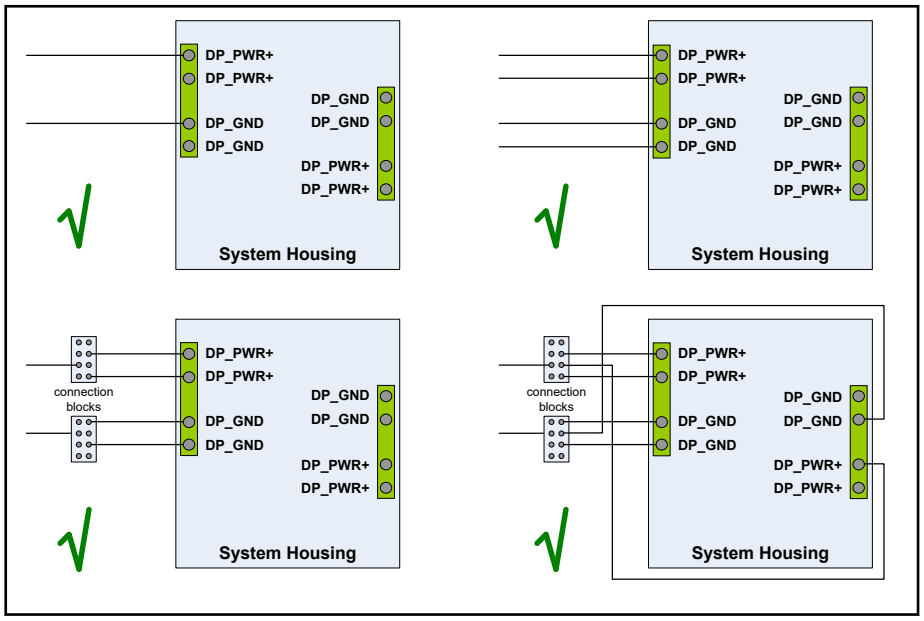


Fig. 11-6: Four examples of correct DP drive power connections

- It is not recommended to connect the power supply wires from a DP header on one system housing to a DP header on another system housing or from DP header to DP header on the same system housing, due to current rating of the pins or wire diameter.
- It is not recommended to use the second set of drive power supply pins (DP_PWR+ / DP_GND) as power supply connection to a DP header on another system housing, due to current rating.

See fig. 11-7 "Four examples of not recommended DP drive power connections" on page 94.

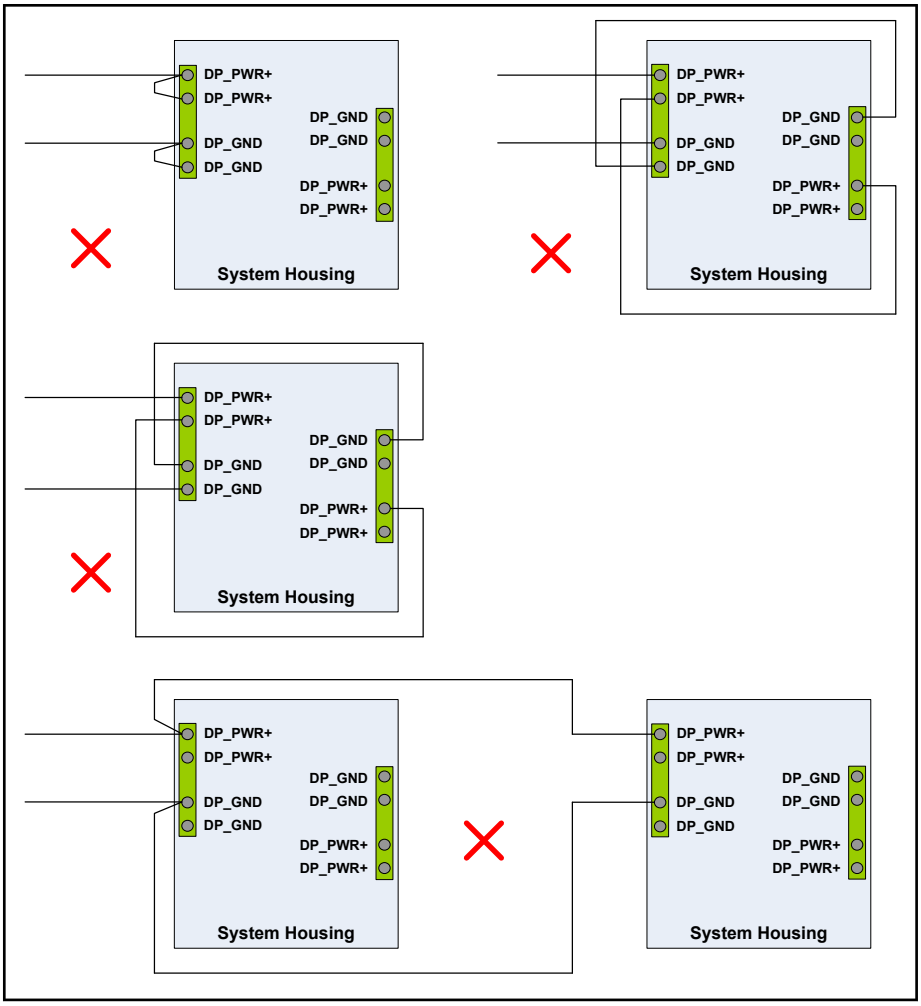


Fig. 11-7: Four examples of not recommended DP drive power connections

11.6 DP NY4130 – NY4130 Drive Power Connections

The DP NY4130 drive power supply headers are used to connect the drive power supply to NY4130 drive modules installed in the module holder.

Header type on the backplane: male, 8 pins, Phoenix Contact, MCV 1,5/ 8-GF-3,5.

Mating plug on the cable: Phoenix Contact, MC 1,5/ 8-STF-3,5, order code 1847181. The cable plugs are supplied with the system housing.

The following drive power headers are available on the backplane (depending on the type of system housing).

- DP NY4130 0 : drive power supply header for drive slot 0
- DP NY4130 0/1 : drive power supply header for drive slot 0 and 1
- DP NY4130 2 : drive power supply header for drive slot 2
- DP NY4130 2/3 : drive power supply header for drive slot 2 and 3
- DP NY4130 3/4 : drive power supply header for drive slot 3 and 4

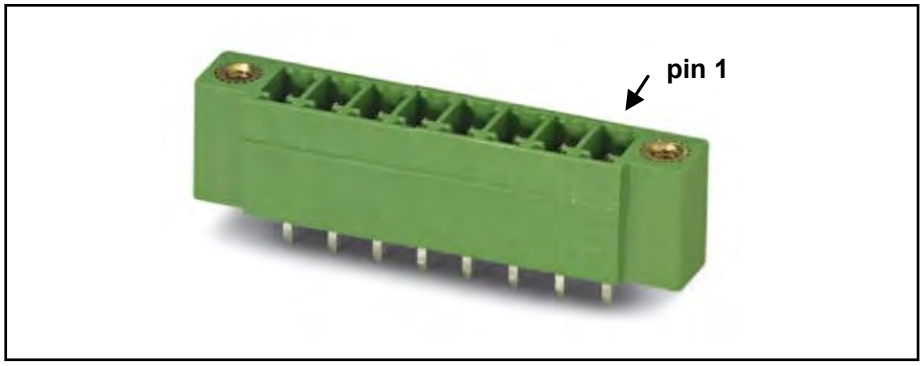


Fig. 11-8: DP NY4130 drive power supply header (backplane) pinout

The connector pin assignment is given in tab. 11-14 "DP NY4130 drive power supply header pinout" on page 95.

Note that the orientation of the headers at opposite sides of the module holder is 180° rotated.

Pin	Pin name	Function
1	DRVPW+L0	+ Drive power supply for first drive module.
2	DRVPW–L0	– Drive power supply for first drive module.
3	DR_GND	Ground Drive power supply for first drive module.
4	SHIELD	Cable shield.
5	SHIELD	Cable shield.
6	DR_GND	Ground Drive power supply for second drive module.
7	DRVPW–L1	– Drive power supply module for second drive module.
8	DRVPW+L1	+ Drive power supply module for second drive module.

Tab. 11-14: DP NY4130 drive power supply header pinout

NOTICE

The system housing has no provisions against wrong polarity connection of the DP NY4130 drive power supply.

Observe the polarity of the drive power supply connections.

Shielding of the cable must be connected at the system housing side to the SHIELD pin of the connector. It is recommended to connect the shielding at the power supply unit side to the chassis of the power supply unit, not to the PE connection.

Drive power supply characteristics

Characteristic	Maximum rating per DP NY4130 header
Drive power voltage and input current	+26V / -26V 1,0A (forced cooling) 0,5A (convection cooling)
	+15V / -15V 1,7A (forced cooling) 1,0A (convection cooling)

Tab. 11-15: DP NY4130 drive power input characteristics per DP NY4130 header

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	depends on drive current and installed fuse
Maximum cable length	15 m

Tab. 11-16: DP NY4130 Drive power cable specification

Connector data

MC 1,5/ 8-STF-3,5	minimum	maximum
Tightening torque	1,95 lbs*inch (0,22 Nm)	2,21 lbs*inch (0,25 Nm)
Wire	30 AWG (0,06 mm^2)	14 AWG (2,5 mm^2)

Tab. 11-17: DP NY4130 connector data

As you can see in tab. 11-14 "DP NY4130 drive power supply header pinout" on page 95, there are two sets of pins for drive power connection on the header, DRVPW+L0 / DRVPW–L0 / DR_GND for axis0 and DRVPW+L1 / DRVPW–L1 / DR_GND for axis1. You must use wires of sufficient gauge directly to the drive power supply or connection blocks, if possible. See fig. 11-9 "Two examples of correct DP NY4130 drive power connections" on page 96.

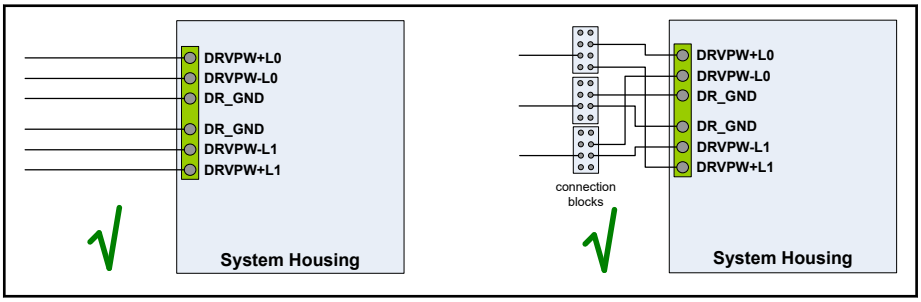


Fig. 11-9: Two examples of correct DP NY4130 drive power connections



It is not recommended to connect the power supply wires from a DP NY4130 header on one system housing to a DP NY4130 header on another system housing or from DP NY4130 header to DP NY4130 header on the same system housing, due to the wire diameter. See fig. 11-10 "Examples of not recommended DP NY4130 drive power connections" on page 97.

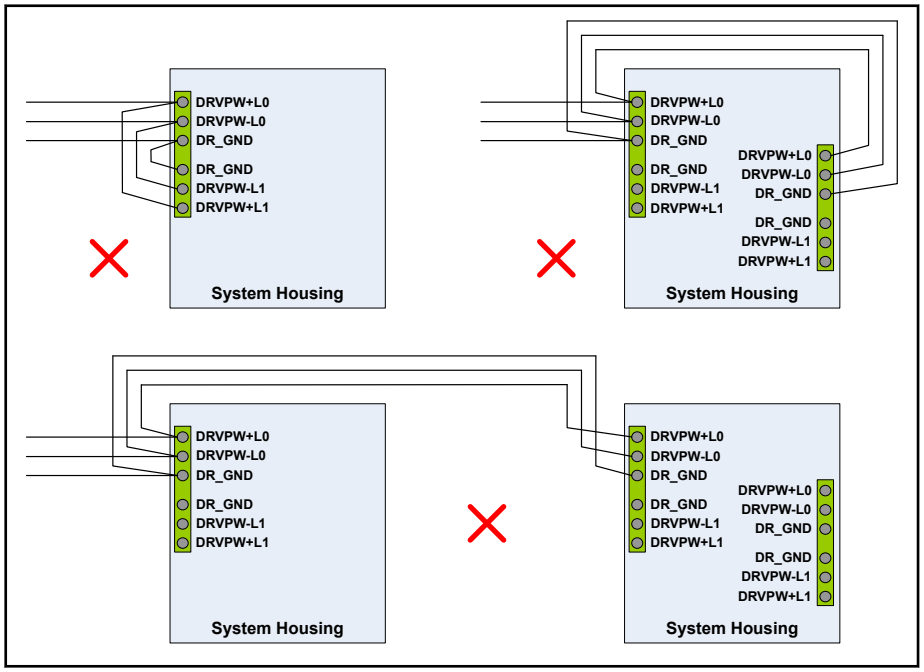


Fig. 11-10: Examples of not recommended DP NY4130 drive power connections

11.7 CAP – Capacitor Connections

The CAP header is available as connection for the optional capacitor kit.

The following capacitor headers are available on the backplane (depending on the type of system housing).

- CAP0 : capacitor header for Drive Power 0 connection
- CAP1 : capacitor header for Drive Power 1 connection
- CAP2 : capacitor header for Drive Power 2 connection
- CAP3 : capacitor header for Drive Power 3 connection
- CAP4 : capacitor header for Drive Power 4 connection

The following capacitor kits are available.

Component name	Order number	Short name
NYA04.1-CAP-100V-NY4921	R911325079	NY4921
NYA04.1-CAP-200V-NY4921/10	R911325082	NY4921/10

Tab. 11-18: NYCe 4000 accessories: capacitor kits

⚠ WARNING **Voltage on the pins of the CAP header can be higher than 60V DC.**

Do not touch the pins of the CAP header.

NOTICE **Maximum drive power voltage for the installed drive module must be lower than the working voltage of the installed capacitor.**

Observe the working voltage of the capacitor.

NOTICE **The system housing has no provisions against wrong polarity connection of the capacitor.**

Observe the correct polarity of the connection of the DP drive power header.

11.8 M – Motor Connections

Each drive slot has two motor headers, one header for each axis.

Header type on the backplane: female, 7 pins, Phoenix Contact, ICV 2,5/ 7-GF-5,08.

Mating plug on the cable: Phoenix Contact, IC 2,5/ 7-STF-5,08, order code 1825365. The cable plugs are supplied with the system housing.

The following motor headers are available on the backplane (depending on the type of system housing).

- M0.0 and M0.1 : drive module slot 0 motor 0 and motor 1 header
- M1.0 and M1.1 : drive module slot 1 motor 0 and motor 1 header
- M2.0 and M2.1 : drive module slot 2 motor 0 and motor 1 header
- M3.0 and M3.1 : drive module slot 3 motor 0 and motor 1 header
- M4.0 and M4.1 : drive module slot 4 motor 0 and motor 1 header

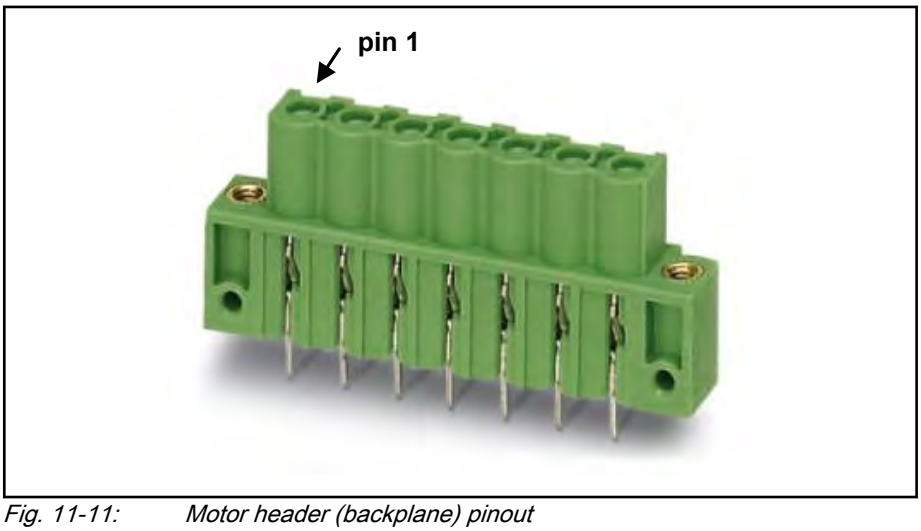


Fig. 11-11: Motor header (backplane) pinout

☞ Motor connection to an NY4140 drive module differs from the motor connection to an NY4120 and NY4130 drive module.

The connector pin assignment for motor 0 of the NY4120 and NY4130, and the high voltage motor of the NY4140 is given in tab. 11-19 "Motor Mx.0 (NY4120, NY4130, and NY4140) header pinout" on page 99.

The connector pin assignment for motor 1 of the NY4120 and NY4130 is given in tab. 11-20 "Motor Mx.1 (NY4120 and NY4130) header pinout" on page 99.

The shield of the motor cables must be connected via the NY4910 Motor Cable Shield and Support bracket, see chapter 16 "NY4910: Motor Cable Shield and Support" on page 139.

Pin	Pin name	Stepper motor NY4120	BLAC / BLDC motor NY4120	DC motor NY4120 NY4130	BLAC / BLDC / DC motor NY4140
1	HB1+	A+		$+V_{DCmotor}$	
2	HB1–	A–	U	$–V_{DCmotor}$	U
3	HB2+	B+	V		
4	HB2–	B–	W		V / $+V_{DCmotor}$
5	HB3–				W / $–V_{DCmotor}$
6	DR_GND			Used for unbalanced motor (only on NY4130).	
7	PE	Protective earth of motor.			

Tab. 11-19: Motor Mx.0 (NY4120, NY4130, and NY4140) header pinout

Pin	Pin name	stepper motor NY4120	BLAC / BLDC motor NY4120	DC motor NY4120 NY4130
1	HB3+	A+		$+V_{DCmotor}$
2	HB3–	A–	U	$–V_{DCmotor}$
3	HB4+	B+	V	
4	HB4–	B–	W	
5		Not used		
6	DR_GND			Used for unbalanced motor (only on NY4130).
7	PE	Protective earth of motor.		

Note: This header is not used in combination with an NY4140.

Tab. 11-20: Motor Mx.1 (NY4120 and NY4130) header pinout

⚠ WARNING **Voltage on the pins of the M header can be higher than 60V DC.**

Do not touch the pins of the M connector.

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	depends on drive current and installed fuse in the drive power supply connection. See also chapter 28.11.4 "Drive Power Supply" on page 219.
Maximum cable length	15 m

Tab. 11-21: Motor cable specification

Connector data

IC 2,5/ 7-STF-5,08	minimum	maximum
Tightening torque	4,43 lbs*inch (0,5 Nm)	5,31 lbs*inch (0,6 Nm)
Wire	24 AWG (0,24 mm^2)	12 AWG (4,0 mm^2)

Tab. 11-22: Motor connector data

Motor supply characteristics

Characteristic	BLAC / BLDC	Stepper	DC
U_{out}	3x AC 0V ... 150V	2x 0V ... 75V	1x 0V ... 150V
I_{out}	0 ... 7A rms	0 ... 7A rms	0 ... 7A rms

Tab. 11-23: Motor supply characteristics

Keying of the Motor Headers and Plugs

To prevent wrong motor cable connection the motor headers can be keyed. It is the responsibility of the customer to put key fingers accordingly on the motor plugs. A key on the motor header implies no finger on the motor plug for that pin. See chapter 18.3 "Keying Fingers for Drive Power and Motor Connectors" on page 143 for more information.

Pin	M0.0	M0.1	M1.0	M1.1	M2.0	M2.1	M3.0	M3.1	M4.0	M4.1
1	no key	no key	key	no key	key	no key	key	no key	no key	no key
2	no key	key	no key	key	no key	key	no key	key	no key	no key
3	key	key	no key	no key	no key	no key	no key	no key	key	key

Pin	M0.0	M0.1	M1.0	M1.1	M2.0	M2.1	M3.0	M3.1	M4.0	M4.1
4	no key	no key	no key	no key	no key	no key	key	key	no key	key
5	no key	no key	no key	no key	key	key	no key	no key	key	no key
6	key	no key	key	key	no key	no key	no key	no key	no key	no key
7	no key	no key	no key	no key	no key	no key	no key	no key	no key	no key

Tab. 11-24: Example of motor header keying for all axes

11.9 E – Encoder Connections

Each motor has its own encoder header.

Header type on the backplane: female, 25 pins sub-D, with 4-40 UNC nut.

The following encoder headers are available on the backplane (depending on the type of system housing).

- E0.0 and E0.1 : drive module slot 0 encoder 0 and encoder 1 header
- E1.0 and E1.1 : drive module slot 1 encoder 0 and encoder 1 header
- E2.0 and E2.1 : drive module slot 2 encoder 0 and encoder 1 header
- E3.0 and E3.1 : drive module slot 3 encoder 0 and encoder 1 header
- E4.0 and E4.1 : drive module slot 4 encoder 0 and encoder 1 header

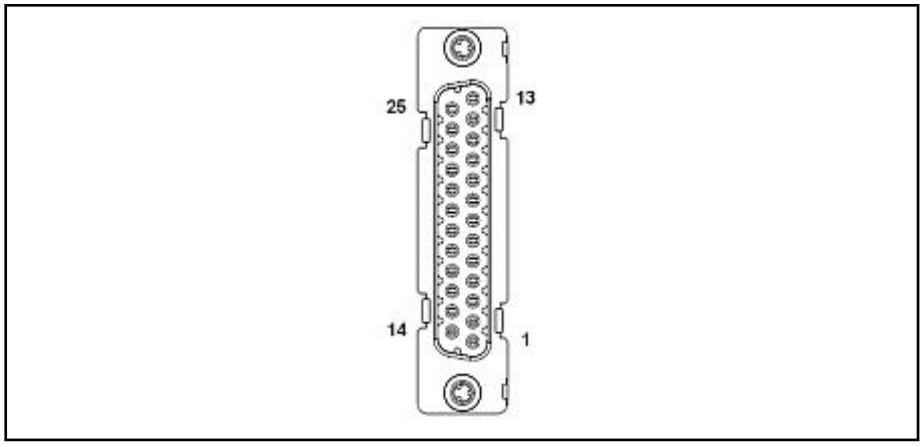


Fig. 11-12: Encoder Ex.0 and encoder Ex.1 header (backplane) pinout

The connector pin assignment for the encoder header Ex.0 for axis 0 is given in tab. 11-25 "Axis 0 encoder header Ex.0 pinout" on page 102. The connector pin assignment for the encoder header Ex.1 for axis 1 is given in tab. 11-26 "Axis 1 encoder header Ex.1 pinout" on page 102.

Pin	Pin name	Function of connections for encoder on axis 0 (header Ex.0)						
		EnDat2.2	EnDat2.1	MSM	Hiperface	SinCos	Quadrature	Sanyo Denki
1	Enc5V0	+5 Volt	+5 Volt	+5 Volt		+5 Volt	+5 Volt	+5 Volt
2	EncVref						EncVref	
3	Enc0QuadA+						QuadA+	
4	Enc0QuadB+						QuadB+	
5	Enc0Index+						Index+	
6	Dig5VIn0a+	Clock+					Hall A+	
7	Dig5VIn0b+						Hall B+	
8	Dig5VIn0c+	Data+	Data+	Data+	Data+		Hall C+	ES+
9	Opt_0+		Sine+		Sine+	Sine+		
10	Opt_1+		Cosine+		Cosine+	Cosine+		
11	Opt_2+					Index+		
12	Dig5VIn0a+		Clock+					
13	Opt_2+				+8 Volt			
14	EncGND	0 Volt	0 Volt	0 Volt		0 Volt	0 Volt	0 Volt
15	Enc0QuadA–						QuadA–	
16	Enc0QuadB–						QuadB–	
17	Enc0Index–						Index–	
18	Dig5VIn0a–	Clock–					Hall A–	
19	Dig5VIn0b–						Hall B–	
20	Dig5VIn0c–	Data–	Data–	Data–	Data–		Hall C–	ES–
21	Opt_0–		Sine–		Sine–	Sine–		
22	Opt_1–		Cosine–		Cosine–	Cosine–		
23	Opt_2–					Index–		
24	Dig5VIn0a–		Clock–					
25	EncGND				0 Volt			

Tab. 11-25: Axis 0 encoder header Ex.0 pinout

Pin	Pin name	Function of connections for encoder on axis 1 (header Ex.1)						
		EnDat2.2	EnDat2.1	MSM	Hiperface	SinCos	Quadrature	Sanyo Denki
1	Enc5V1	+5 Volt	+5 Volt	+5 Volt		+5 Volt	+5 Volt	+5 Volt
2	EncVref						EncVref	
3	Enc1QuadA+						QuadA+	
4	Enc1QuadB+						QuadB+	
5	Enc1Index+						Index+	
6	Dig5VIn1a+	Clock+					Hall A+	

Pin	Pin name	Function of connections for encoder on axis 1 (header Ex.1)						
		EnDat2.2	EnDat2.1	MSM	Hiperface	SinCos	Quadrature	Sanyo Denki
7	Dig5VIn1b+						Hall B+	
8	Dig5VIn1c+	Data+	Data+	Data+			Hall C+	ES+
9	Dig5VIn1a+		Sine+		Sine+	Sine+		
10	Dig5VIn1b+		Cosine+		Cosine+	Cosine+		
11	Dig5VIn1c+					Index+		
12	Dig5VIn0b+		Clock+		Data+			
13	Dig5VIn1c+				+8 Volt			
14	EncGND	0 Volt	0 Volt	0 Volt		0 Volt	0 Volt	0 Volt
15	Enc1QuadA–						QuadA–	
16	Enc1QuadB–						QuadB–	
17	Enc1Index–						Index–	
18	Dig5VIn1a–	Clock–					Hall A–	
19	Dig5VIn1b–						Hall B–	
20	Dig5VIn1c–	Data–	Data–	Data–			Hall C–	ES–
21	Dig5VIn1a–		Sine–		Sine–	Sine–		
22	Dig5VIn1b–		Cosine–		Cosine–	Cosine–		
23	Dig5VIn1c–					Index–		
24	Dig5VIn0b–		Clock–		Data–			
25	EncGND				0 Volt			

Tab. 11-26: Axis 1 encoder header Ex.1 pinout

- Connect the shield of the cable to the metal housing of the sub-D plug.
- Use twisted pair cabling for the differential signals Clock+/Clock–, Data+/Data–, Sine+/Sine–, Cosine+/Cosine–, Index+/Index–, Hall A+/Hall A–, Hall B+/Hall B–, Hall C+/Hall C–, QuadA+/QuadA–, QuadB+/QuadB–, ES+/ES–.

Encoder power supply characteristics

Characteristic	Description
Power supply voltage	5.25V ±0.05V (Quadrature① and SinCos encoders) 8V ±5% (Hiperface encoder)
Current	700 mA per module (Quadrature① and SinCos encoders) 400 mA per module (Hiperface encoder)

① The quadrature encoder is also known as A/B encoder, S0S90 encoder and 3-channel digital incremental encoder.

Tab. 11-27: Encoder power input characteristics

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 24 / 0.24 mm^2 (1A) minimum
Maximum cable length	15 m

Tab. 11-28: Encoder cable specification

11.10 Fdig – Fast Digital I/O Connections

The fast digital I/O header (FDIGx) is available for each drive module.

Header type on the backplane: female, 9 pins sub-D, with 4-40 UNC nut.

The following fast digital I/O headers are available on the backplane (depending on the type of system housing).

- Fdig0 : drive module slot 0 fast digital I/O header
- Fdig1 : drive module slot 1 fast digital I/O header
- Fdig2 : drive module slot 2 fast digital I/O header
- Fdig3 : drive module slot 3 fast digital I/O header
- Fdig4 : drive module slot 4 fast digital I/O header

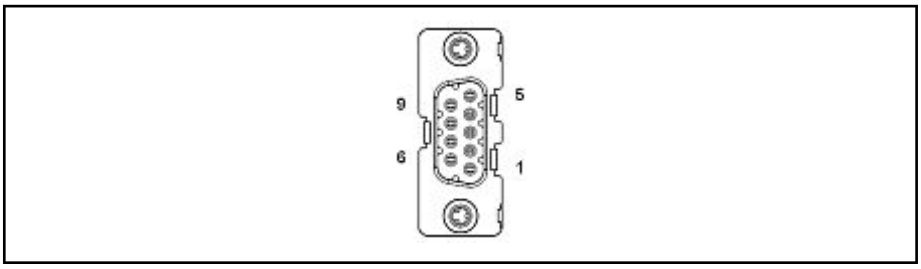


Fig. 11-13: Fast digital I/O header (backplane) pinout

The connector pin assignment is given in tab. 11-29 "Fast digital I/O header pinout" on page 104.

Pin	Pin name	Function
1	GND_DIO	Ground for digital I/O.
2	FastOut0	Fast 24 Volt Output 0.
3	FastOut1	Fast 24 Volt Output 1.
4	FastIn0	+ Fast 24 Volt Input 0.
5	FastIn1	+ Fast 24 Volt Input 1.
6	24V_DIO	24 Volt I/O supply.
7	24V_DIO	24 Volt I/O supply.

Pin	Pin name	Function
8	GND_DIO	Ground for digital I/O.
9	GND_DIO	Ground for digital I/O.

Tab. 11-29: Fast digital I/O header pinout

NOTICE

The system housing has no provisions against wrong polarity connection of the 24V I/O power supply.

Observe the polarity of the power supply connections.

- Connect the shield of the cable to the metal housing of the sub-D plug.
- The GND wire of the signal wire must always be included in the cable.
- GND_DIO and 24V_DIO pins of the FDIGx headers are also connected to GND_DIO and 24V_DIO pins of the DIGx headers.

Fast Digital Input Characteristics

Characteristic	Description
Permitted input voltage	0V ... 30V
Input high level	15V ... 30V
Input low level	0V ... 5V
Input current @ 24V	Nominal 15 mA

Tab. 11-30: Fast digital Input characteristics

The fast digital inputs only support high-side switching.

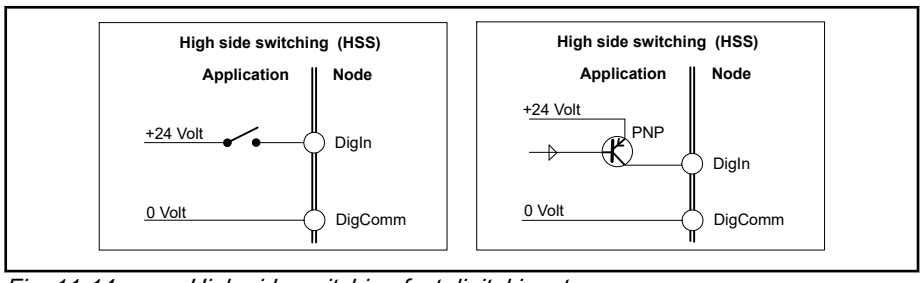


Fig. 11-14: High-side switching fast digital inputs

Fast Digital Output Characteristics

Characteristic	Description
Output voltage	24V ±6V
Output current	0.4 mA ... 100 mA, typical 50 mA

Tab. 11-31: Fast digital output characteristics

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 24 / 0.24 mm^2 (1A) Use cables with wires of correct rating
Maximum cable length	15 m

Tab. 11-32: Fast Digital I/O cable specification

11.11 Dig – Digital I/O Connections

The digital I/O header (DIGx) is available for each drive module.

Header type on the backplane: male, 25 pins sub-D, with 4-40 UNC nut.

The following digital I/O headers are available on the backplane (depending on the type of system housing).

- Dig0 : drive module slot 0 digital I/O header
- Dig1 : drive module slot 1 digital I/O header
- Dig2 : drive module slot 2 digital I/O header
- Dig3 : drive module slot 3 digital I/O header
- Dig4 : drive module slot 4 digital I/O header

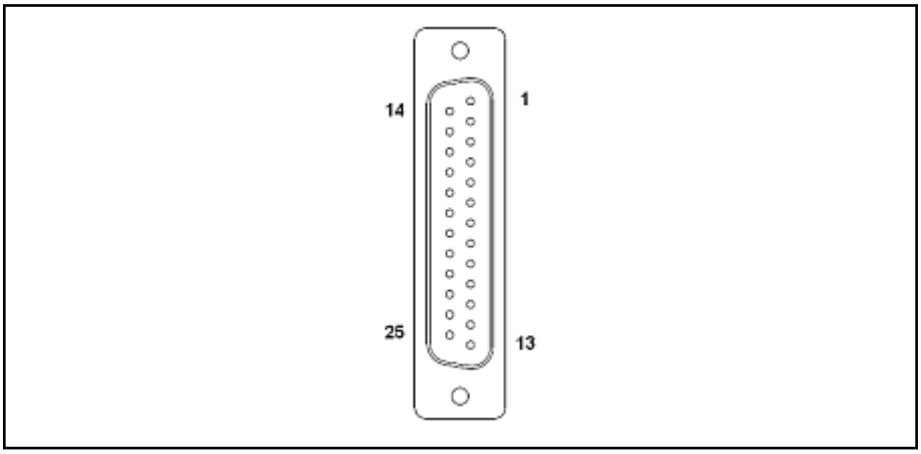


Fig. 11-15: Digital I/O header (backplane) pinout

The connector pin assignment is given in tab. 11-33 "Digital I/O header pinout" on page 106.

Pin	Pin name	Function
1	DigIn0	Digital Input in group 0.
2	DigIn1	Digital Input in group 0.
3	DigIn2	Digital Input in group 0.
4	DigIn3	Digital Input in group 0.

Pin	Pin name	Function
5	DigIn4	Digital Input in group 1.
6	DigIn5	Digital Input in group 1.
7	DigIn6	• Digital Input in group 1, or • Drive disable input for axis 0 in group 1. (only supported NY4120 and NY4140).
8	DigIn7	• Digital Input in group 1, or • Drive disable input for axis 1 in group 1. (only supported NY4120).
9	GND_DIO	Ground for digital Output, connected to power supply.
10	DigOut0	Digital Output.
11	DigOut1	Digital Output.
12	DigOut2	Digital Output.
13	DigOut3	Digital Output.
14	DigComm0	Common for digital Input group 0, may be ground or 24V.
15	DigIn8	Digital Input in group 2 (only supported NY4130).
16	DigIn9	Digital Input in group 2 (only supported NY4130).
17	DigIn10	Stop alarm input for axis 0 in group 2. (only supported NY4130).
18	DigIn11	Stop alarm input for axis 1 in group 2. (only supported NY4130).
19	DigComm2	Common for digital Input group 2, may be ground or 24V. (Note: connection to 24V only allowed if DigIn10 and DigIn11 are not used).
20	DigComm1	Common for digital Input group 1, may be ground or 24V.
21	GND_DIO	Ground for digital Output, connected to power supply.
22	24V_DIO	24 Volt digital Output supply.
23	24V_DIO	24 Volt digital Output supply.
24	24V_DIO	24 Volt digital Output supply.
25	24V_DIO	24 Volt digital Output supply.

Tab. 11-33: Digital I/O header pinout

NOTICE

The system housing has no provisions against wrong polarity connection of the 24V I/O power supply.

Observe the polarity of the power supply connections.

- Connect the shield of the cable (if shielded cable is used) to the metal housing of the sub-D plug.
- The GND wire of the signal wire must always be included in the cable.
- Each pin is rated for a load of 1 A. Connect pin # 22, 23, 24, and 25 to match the total load connected to the digital output pins.
- GND_DIO and 24V_DIO pins of the DIGx headers are also connected to GND_DIO and 24V_DIO pins of the FDIGx headers.

Digital Input Characteristics

Characteristic	Description
Permitted input voltage	0V ... 30V
Input high level	15V ... 30V
Input low level	0V ... 5V
Input current @ 24V	Nominal 3.5 mA

Tab. 11-34: Digital Input characteristics

The digital inputs support high-side switching and low-side switching.

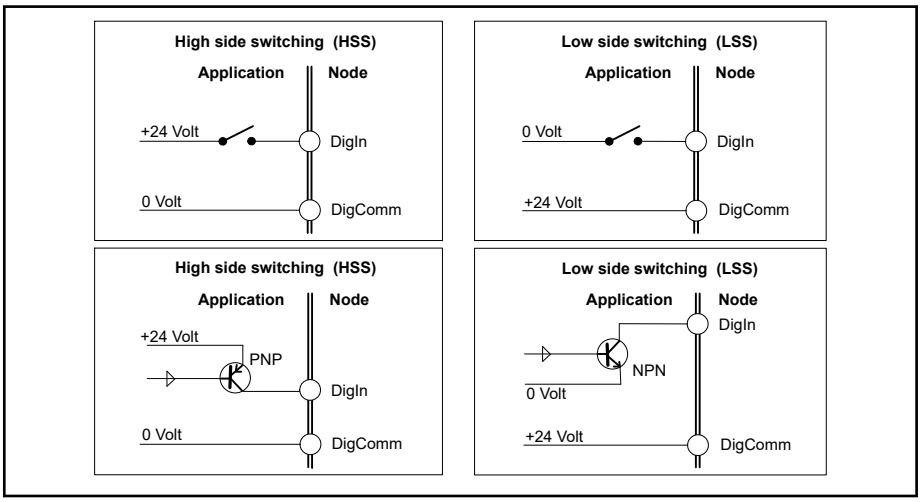


Fig. 11-16: High-side switching and low-side switching digital inputs

Digital Output Characteristics

Characteristic	Description
Output voltage	24V ±6V
Output current	0.02A ... 1A, 2A peak (max. 50 ms)

Tab. 11-35: Digital output characteristics

Cable Characteristics

Characteristic	Description
Type of cable	Shielded or unshielded cable
Wire gauge / cross section	AWG 24 / 0.24 mm^2 (1A) Use cables with wires of correct rating
Maximum cable length	15 m

Tab. 11-36: Digital I/O cable specification

11.12 An – Analog I/O Connections

For each drive module an analog I/O header is available.

Header type on the backplane: male, 9 pins sub-D, with 4-40 UNC nut.

The following analog I/O headers are available on the backplane (depending on the type of system housing).

- An0 : drive module slot 0 analog I/O header
- An1 : drive module slot 1 analog I/O header
- An2 : drive module slot 2 analog I/O header
- An3 : drive module slot 3 analog I/O header
- An4 : drive module slot 4 analog I/O header

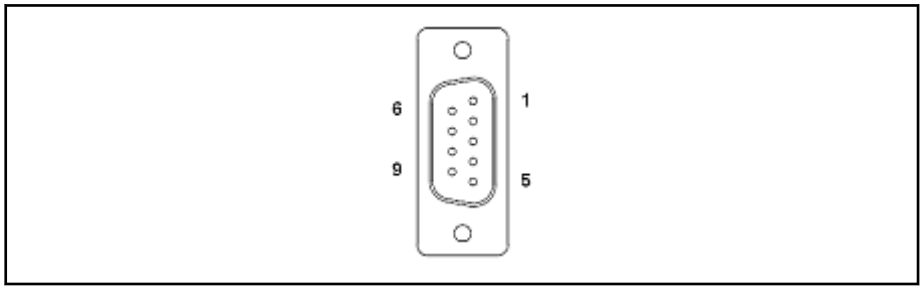


Fig. 11-17: Analog I/O header (backplane) pinout

The connector pin assignment is given in tab. 11-37 "Analog I/O header pinout" on page 109.

Pin	Pin name	Function
1	AnIn0+	Positive analog input +/– 10 V (differential or single ended).
2	AnIn0C	• NY4120/NY4140: Positive analog input 4-20 mA must be linked in connector to AnIn0+. • NY4130: analog reference output voltage.
3	AnIn0–	• Negative analog input +/– 10 V (differential input) or connected to AnGND in case of single ended input. • Negative analog input 4-20 mA must be linked in connector to AnGND (Only NY4120/NY4140).
4	AnOut0	Analog output.
5	AnOut1	Analog output.

Pin	Pin name	Function
6	AnIn1+	Positive analog input +/– 10 V (differential or single ended).
7	AnIn1C	• NY4120/NY4140: Positive analog input 4-20 mA must be linked in connector to AnIn1+. • NY4130: analog reference output voltage.
8	AnGND	Return for analog output or 4-20 mA input, ground reference for inputs.
9	AnIn1–	• Negative analog input +/– 10 V (differential input) or connected to AnGND in case of single ended input. • Negative analog input 4-20 mA must be linked in connector to AnGND (Only NY4120/NY4140).

Tab. 11-37: Analog I/O header pinout

- Connect the shield of the cable to the metal housing of the sub-D plug.
- Use twisted pair cabling for the differential signals (AnIn0+ / AnIn0– and AnIn1+ / AnIn1–).

Cable Characteristics

Characteristic	Description
Type of cable	Shielded cable
Wire gauge / cross section	AWG 26 / 0.14 mm^2
Maximum cable length	15 m

Tab. 11-38: Analog I/O cable specification

11.13 PE – Protective Earth Connection

For safety reasons, a protective earth connection via the threaded earth post is mandatory. The protective earth connection must be connected before any other cables are connected to the system housing.

The protective earth connection is an M5 threaded post on the base plate.

See also chapter 28.7 "Protective Earth Connection and Machine Frame" on page 213.

12 NY4901 and NY4901/10: Cable Strain Relief

NY4901 The NY4110 MCU uses IEEE 1394b connections to connect to other nodes and the PC. Some form of network cable strain relief is required for the IEEE 1394b connection cables. The NY4901 strain relief is developed, because the IEEE 1394b connectors do not support a locking mechanism.

NY4901/10 The NY4112 and NY4114 MCU use RJ45 connections to connect to other nodes and the PC. The NY4150 and NY4150/10 SERCOS III Master modules also use RJ45 connections to connect to the IndraDrives. Some form of network cable strain relief is required for the connection cables to ensure a reliable connection. The NY4901/10 strain relief bracket is developed for the NY4112, NY4114, and the NY4150/10. For SERCOS network cables connected to the NY4150 you can use the strain relief bracket installed on the NY4112 or NY4114 MCU.

Short name	Component name	Order number	Usage
NY4901	NYA04.1-STRAIN-RELIEF-5PCS-4110-NY4901	R911322873	NY4110
NY4901/10	NYA04.1-STRAIN-RELIEF-41XX-NY4901/10	R911172941	NY4112 NY4114 NY4150/10

Tab. 12-1: Available cable strain relief brackets

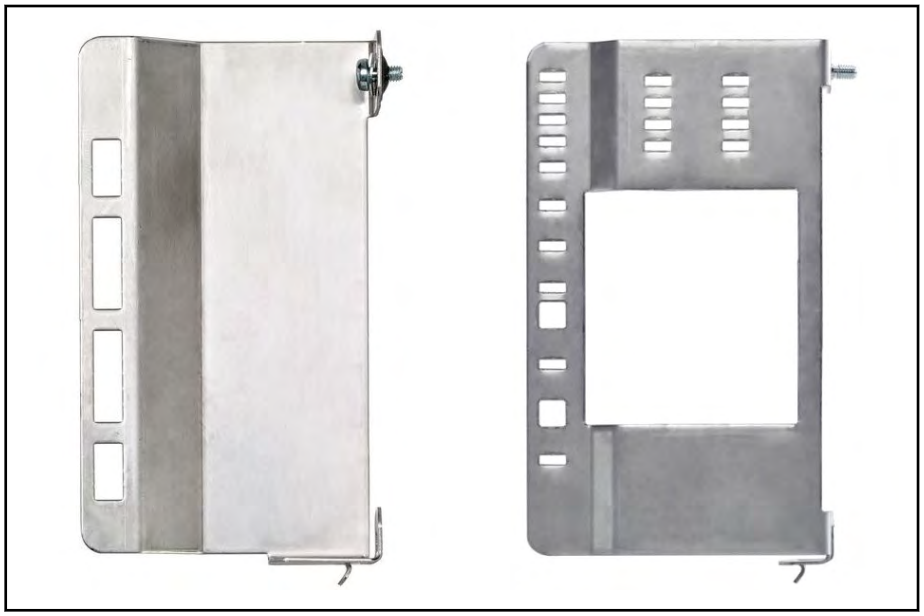


Fig. 12-1: NY4901 strain relief (left), NY4901/10 strain relief (right)

Installation of the NY4901 or NY4901/10 strain relief on a module

When you look at the front of the module the large plate of the NY4901 bracket is at the left side of the module, and the large plate of the NY4901/10 bracket is at the right side of the module. First, you hook the lower corner of the bracket (the corner shown at the bottom side in fig. 12-1 "NY4901 strain relief (left), NY4901/10 strain relief (right)" on page 111) on the bottom end of the front of the module at an angle of approximately 60°. Place the bracket against the front of the module, and install the bracket with the screw.

You can secure the connections of the connector(s) to the module with the NY4901 or NY4901/10 using a tie-wrap around the cable and through the holes in the cable strain relief bracket, see fig. 12-2 "IEEE 1394b cable attached to the NY4901 strain relief on the NY4110 MCU" on page 112.



Fig. 12-2: IEEE 1394b cable attached to the NY4901 strain relief on the NY4110 MCU

☞ Make sure that your machine design has sufficient free clearance space in front of the MCU and the SERCOS III Master module for a cable strain relief and the maximum allowed bending of the connection cables. As rule of thumb, 100 mm should suffice.

13 NY4901/20: Cable Strain Relief for NY4112

13.1 Introduction

The NY4112 MCU uses RJ45 connections to connect to other nodes and the PC. Some form of network cable strain relief is required for the connection cables to ensure a reliable connection. The NY4901/20 cable strain relief bracket is specifically developed for the NY4112 MCU and can also be used to replace the NY4901/10 cable strain relief bracket. The NY4901/20 cable strain relief bracket offers easier installation and improved clamping of the network cables.

Short name	Component name	Order number	Usage
NY4901/20	NYA04.1-STRAIN-RELIEF-4112-NY4901/20	R911403463	NY4112

Tab. 13-1: NY4901/20 cable strain relief bracket for the NY4112

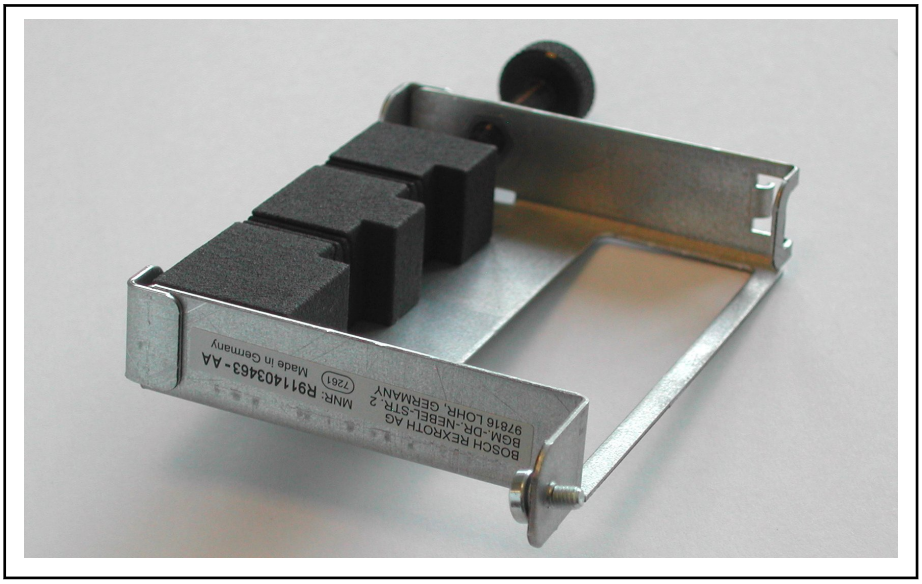


Fig. 13-1: NY4901/20 cable strain relief bracket

13.2 Product identification

The NY4901/20 cable strain relief bracket has a knurled screw on the bottom at the front side. Looking at the front side, the bracket has a metal plate at the right side with two slits in it. Three clamping blocks slide in these slits. On the top side of the bracket is the product identification label. The identification label indicates the following information.

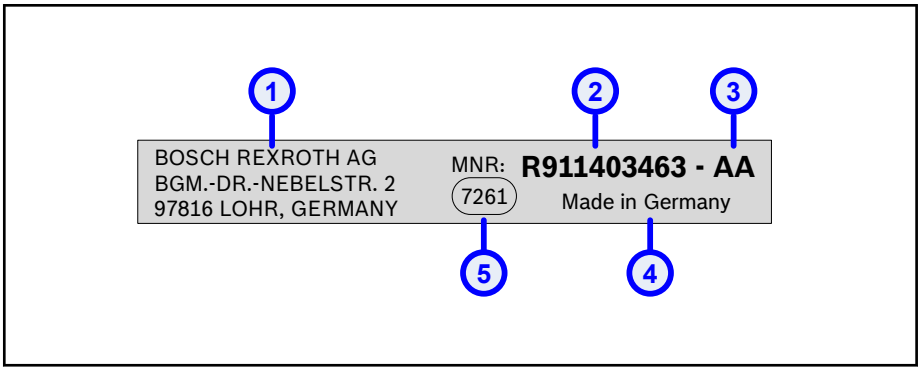


Fig. 13-2: Identification label on the cable strain relief bracket

Identifier number	Description
1	Company address
2	Material number
3	Change index
4	Designation of origin
5	Division number / plant number

Tab. 13-2: Label legend

13.3 Dimensions

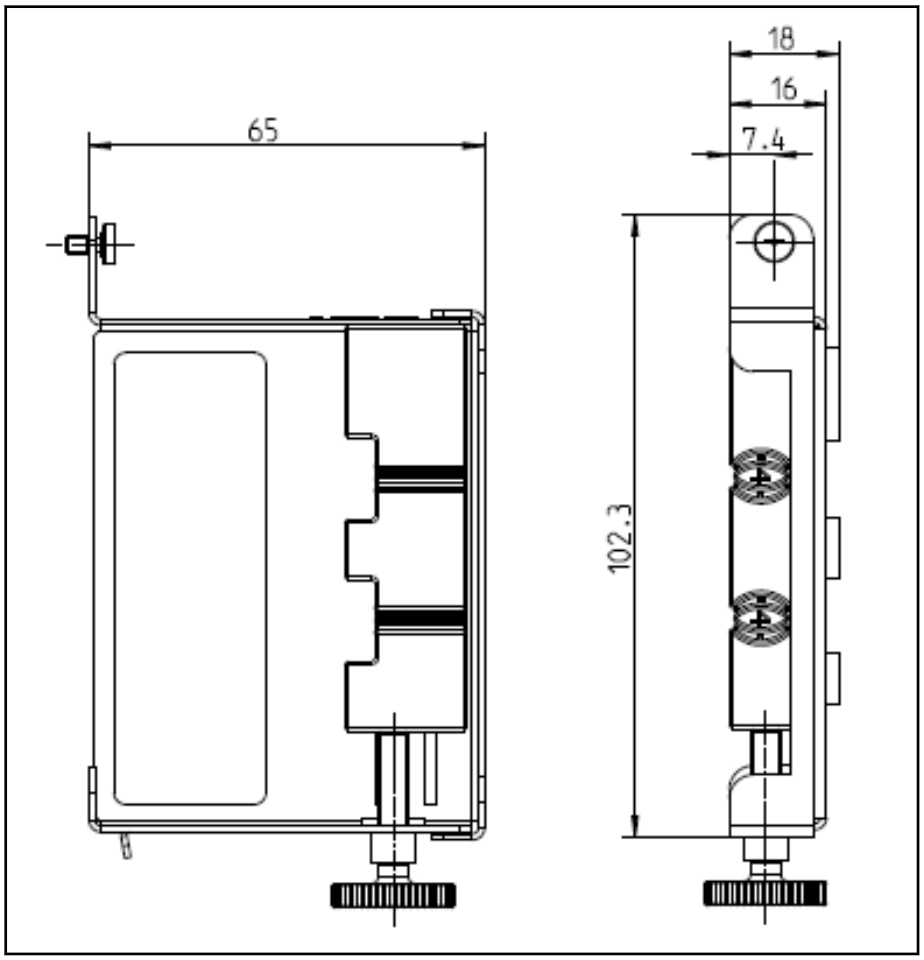


Fig. 13-3: NY4901/20 dimensions

Type code	Width	Height	Depth
NYA04.1-STRAIN-RELIEF-4112-NY4901/20	18 mm	102.3 mm	65 mm

Tab. 13-3: NY4901/20 physical data

13.4 Installation and removal

13.4.1 Before you begin

⚠ WARNING **Damage to components may occur if power is applied during installation or removal.**

- Make sure power supplies are switched off before installation or removal.

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

⚠ WARNING **Damage to components may occur due to electrostatic discharges.**

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

13.4.2 Installation of the cable strain relief bracket

Do the following steps to install the cable strain relief bracket on the NY4112 MCU.

Precondition The NY4112 module is installed in the NYCe4000 standard housing.

1. When you look at the front of the cable strain relief bracket, the plate with the slits is at the right side of the bracket. Hook the lower corner of the bracket onto the bottom end of the front of the NY4112 at an angle of approximately 60°.
2. Place the bracket against the front of the NY4112 MCU, and install the bracket with the mounting screw. Maximum torque is 0.7 Nm.

☞ Make sure that your machine design has sufficient free clearance space in front of the MCU for a cable strain relief and the maximum allowed bending of the connection cables.

13.4.3 Installation of the connection cables

Loosen the lock screw at the bottom of the bracket to install the connection cables onto the cable strain relief bracket.

Remark.

The figures show the NY4112 MCU outside the standard housing for clarity. If the bracket is installed on the NY4112 MCU before the MCU is installed in the standard housing, it is not possible to tighten the lower mounting screw of the NY4112 MCU.

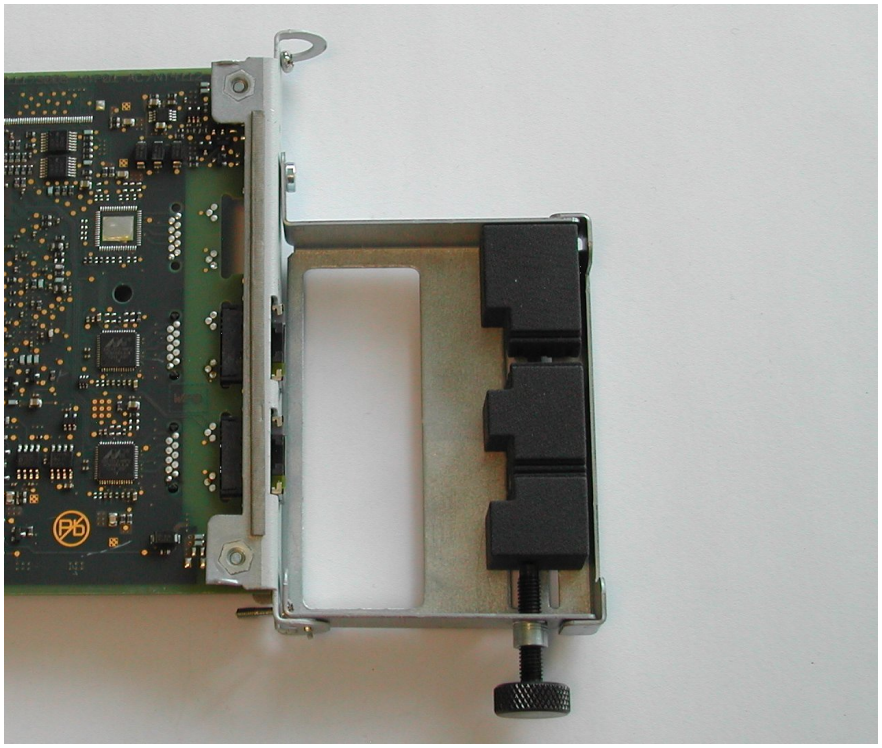


Fig. 13-4: NY4901/20 cable strain relief bracket on NY4112

Do the following steps to install the connection cable(s) on the cable strain relief bracket.

1. Slide the lower two clamping blocks completely to the bottom side of the bracket. Slide the top clamping block against the top side of the bracket.
2. Between the upper and lower clamping blocks and the clamping block in the middle are 3 small parts. See fig. 13-5 "Ethernet cable connected to port ETH1" on page 118.
   - If you use thick Ethernet connection cables, you have to remove these 3 parts.
   - If you use thin Ethernet connection cables, you only remove the small part in the middle.
   - If no connection cable is used, you must keep all 3 parts mounted.
3. Connect the Ethernet cable to ETH1 of the NY4112 MCU. See fig. 13-5 "Ethernet cable connected to port ETH1" on page 118.

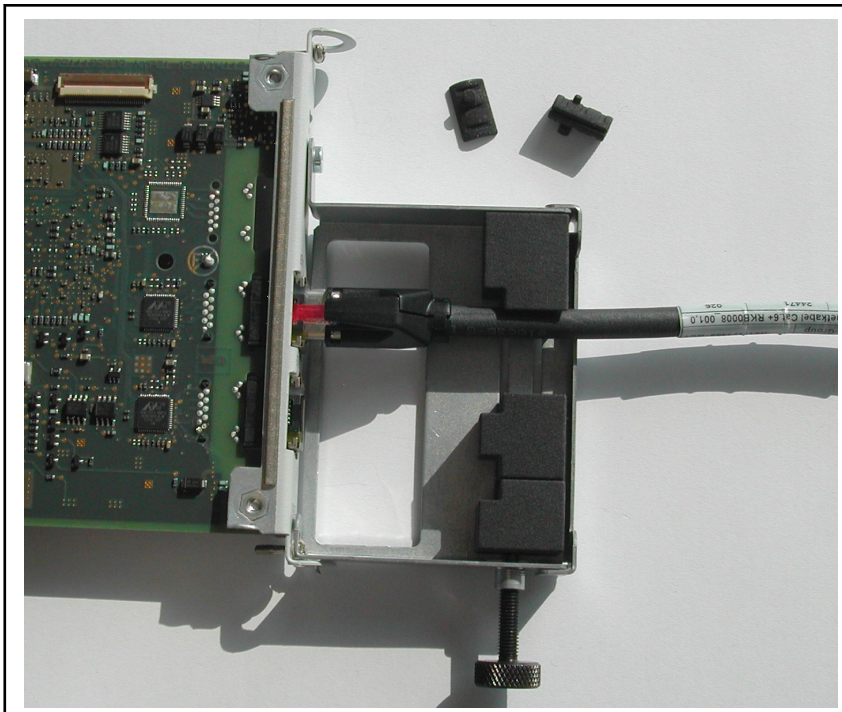


Fig. 13-5: Ethernet cable connected to port ETH1

4. Slide the middle clamping block upward, so that the Ethernet cable is held between the cable guidance of the upper and middle clamping block.
5. Optionally, connect the second Ethernet cable to ETH2 of the NY4112 MCU.

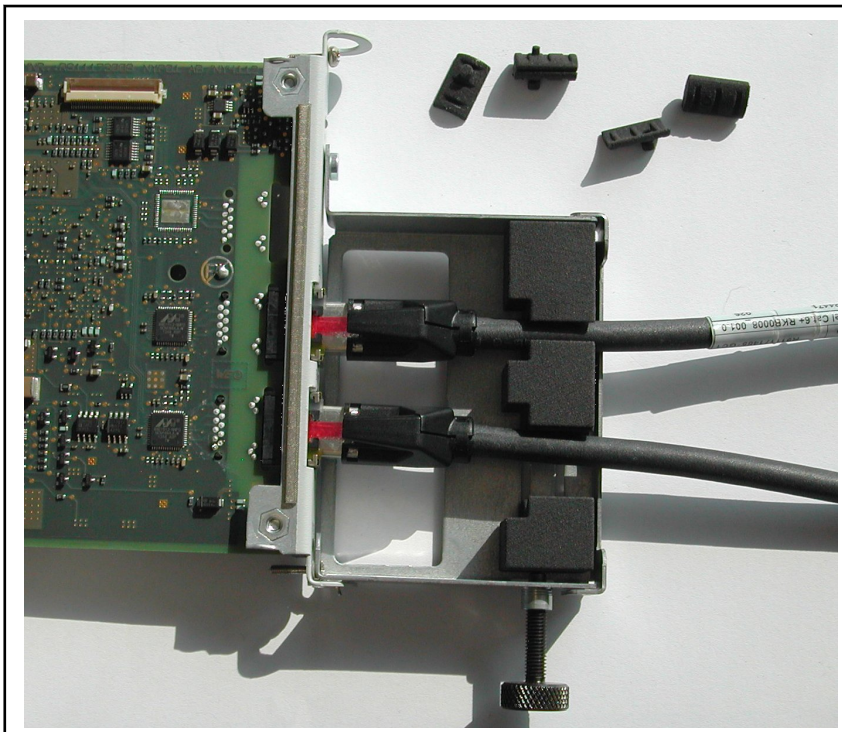


Fig. 13-6: Ethernet cable connected to port ETH2

If no cable is installed, you must keep the 3 small parts between the middle and lower clamping block.

6. Slide the lower clamping block upward so that the second Ethernet cable (or the 3 small parts) is held between the cable guidance of the middle and lower clamping block.
7. Tighten the lock screw so that the clamping blocks keep the Ethernet cables firmly in place. Maximum tightening torque is 0.2 Nm.

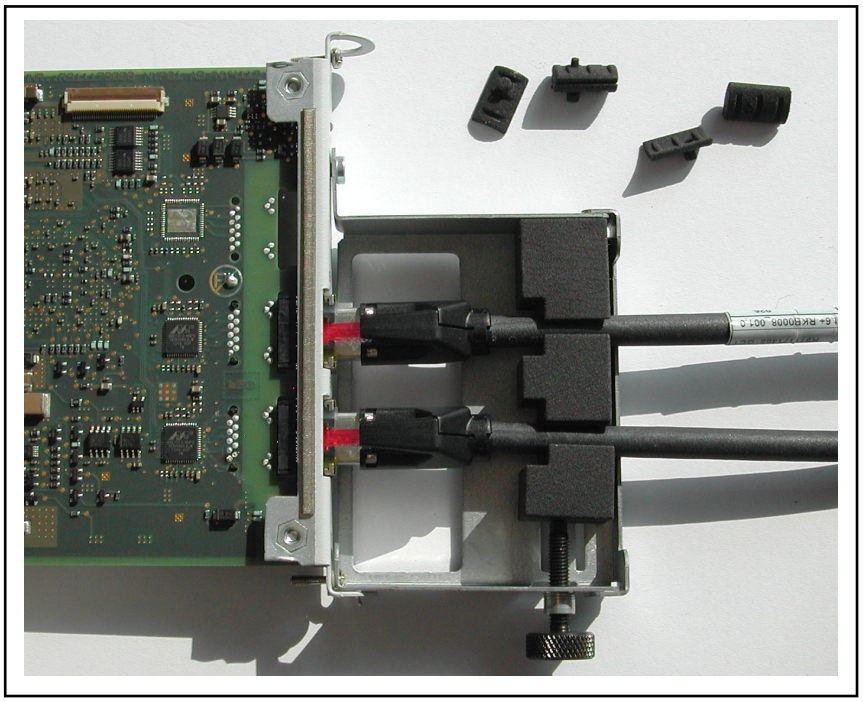


Fig. 13-7: Ethernet cables firmly in place

13.4.4 Disconnection of the Ethernet cables

Do the following steps to disconnect the Ethernet cables from the NY4112 MCU.

1. Loosen the lock screw at the bottom of the bracket.
2. Slide the lower clamping block to the bottom of the bracket.
3. Disconnect the Ethernet cable from ETH2 of the NY4112 MCU, if that cable is installed.
4. Slide the middle clamping block towards the bottom of the bracket.
5. Disconnect the Ethernet cable from ETH1 of the NY4112 MCU.

13.4.5 Removal of the cable strain relief bracket

Do the following steps to remove the cable strain relief bracket from the NY4112 MCU.

1. Disconnect the Ethernet cable(s) from the NY4112 MCU. See chapter 13.4.4 "Disconnection of the Ethernet cables" on page 119.
2. Loosen the mounting screw at the top side of the cable strain relief bracket.

3. Pivot the cable strain relief bracket to an angle of approximately 60° and lift the bracket from the NY4112 MCU.

14 NY4901/30: Cable Strain Relief for NY4114

14.1 Introduction

The NY4114 MCU uses RJ45 connections to connect to other nodes and the PC. Some form of network cable strain relief is required for the connection cables to ensure a reliable connection. The NY4901/30 cable strain relief bracket is specifically developed for the NY4114 MCU and can also be used to replace the NY4901/10 cable strain relief bracket. The NY4901/30 cable strain relief bracket offers easier installation and improved clamping of the network cables.

Short name	Component name	Order number	Usage
NY4901/30	NYA04.1-STRAIN-RELIEF-4114-NY4901/30	R911403464	NY4114

Tab. 14-1: NY4901/30 cable strain relief bracket for the NY4114

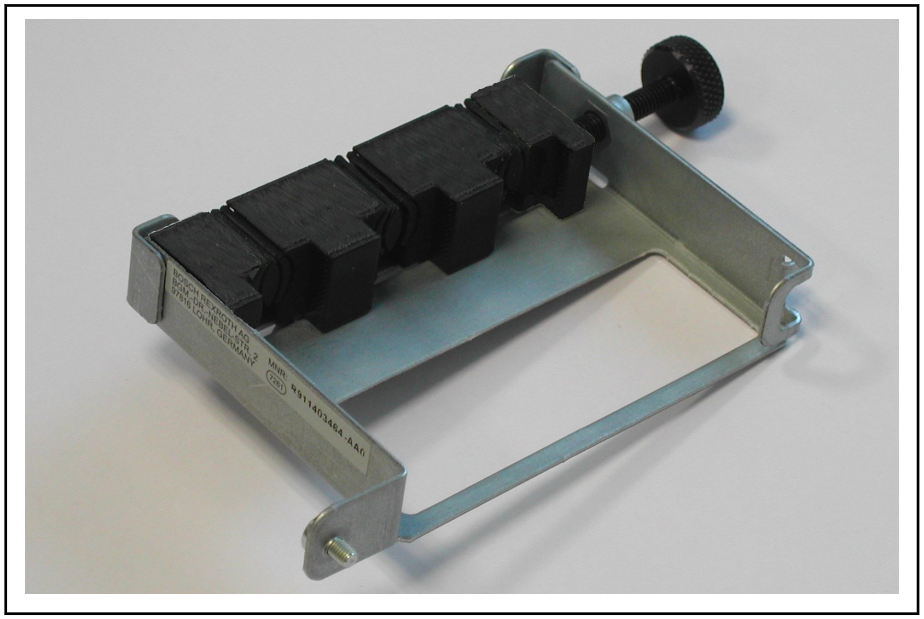


Fig. 14-1: NY4901/30 cable strain relief bracket

14.2 Product identification

The NY4901/30 cable strain relief bracket has a knurled screw on the bottom at the front side. Looking at the front side, the bracket has a metal plate at the right side with two slits in it. Four clamping blocks slide in these slits. On the top side of the bracket is the product identification label. The identification label indicates the following information.

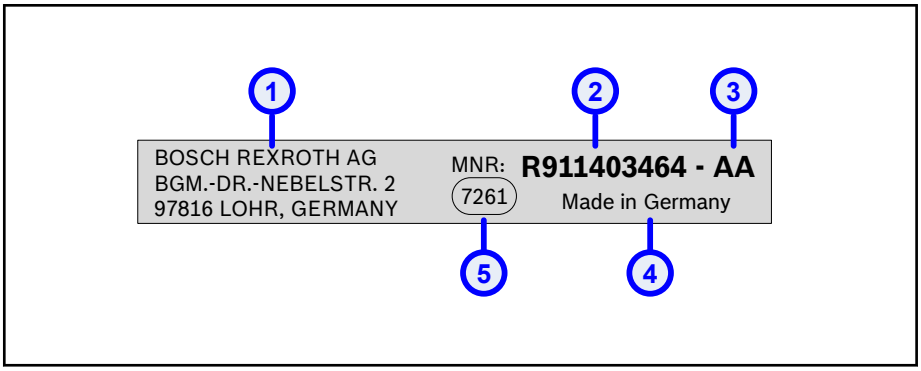


Fig. 14-2: Identification label on the cable strain relief bracket

Identifier number	Description
1	Company address
2	Material number
3	Change index
4	Designation of origin
5	Division number / plant number

Tab. 14-2: Label legend

14.3 Dimensions

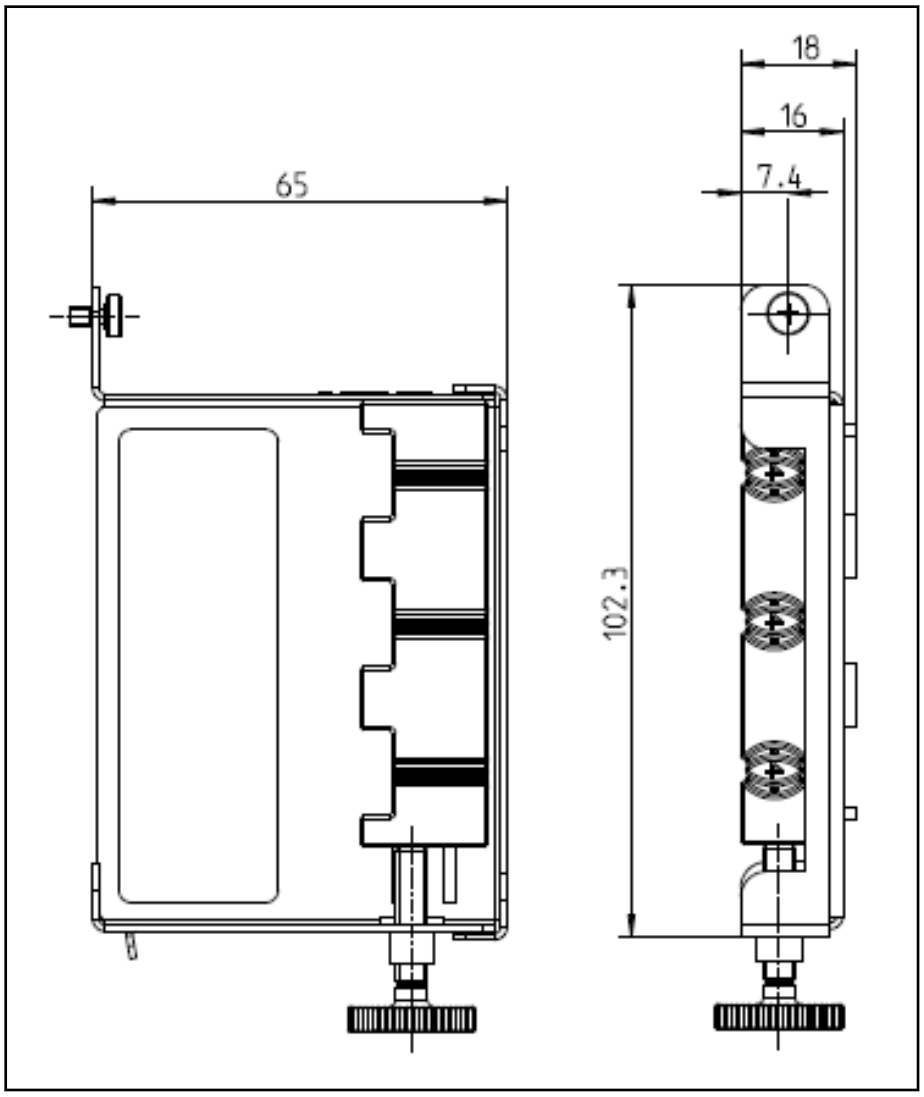


Fig. 14-3: NY4901/30 dimensions

Type code	Width	Height	Depth
NYA04.1-STRAIN-RELIEF-4114-NY4901/30	18 mm	102.3 mm	65 mm

Tab. 14-3: NY4901/30 physical data

14.4 Installation and removal

14.4.1 Before you begin

⚠ WARNING **Damage to components may occur if power is applied during installation or removal.**

- Make sure power supplies are switched off before installation or removal.

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

⚠ WARNING **Damage to components may occur due to electrostatic discharges.**

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

14.4.2 Installation of the cable strain relief bracket

Do the following steps to install the cable strain relief bracket on the NY4114 MCU.

Precondition The NY4114 module is installed in the NYCe4000 standard housing.

1. When you look at the front of the cable strain relief bracket, the plate with the slits is at the right side of the bracket. Hook the lower corner of the bracket onto the bottom end of the front of the NY4114 at an angle of approximately 60°.
2. Place the bracket against the front of the NY4114 MCU, and install the bracket with the mounting screw. Maximum torque is 0.7 Nm.

☞ Make sure that your machine design has sufficient free clearance space in front of the MCU for a cable strain relief and the maximum allowed bending of the connection cables.

14.4.3 Installation of the connection cables

Loosen the lock screw at the bottom of the bracket to install the connection cables onto the cable strain relief bracket.

Remark.

The figures show the NY4114 MCU outside the standard housing for clarity. If the bracket is installed on the NY4114 MCU before the MCU is installed in the standard housing, it is not possible to tighten the lower mounting screw of the NY4114 MCU.

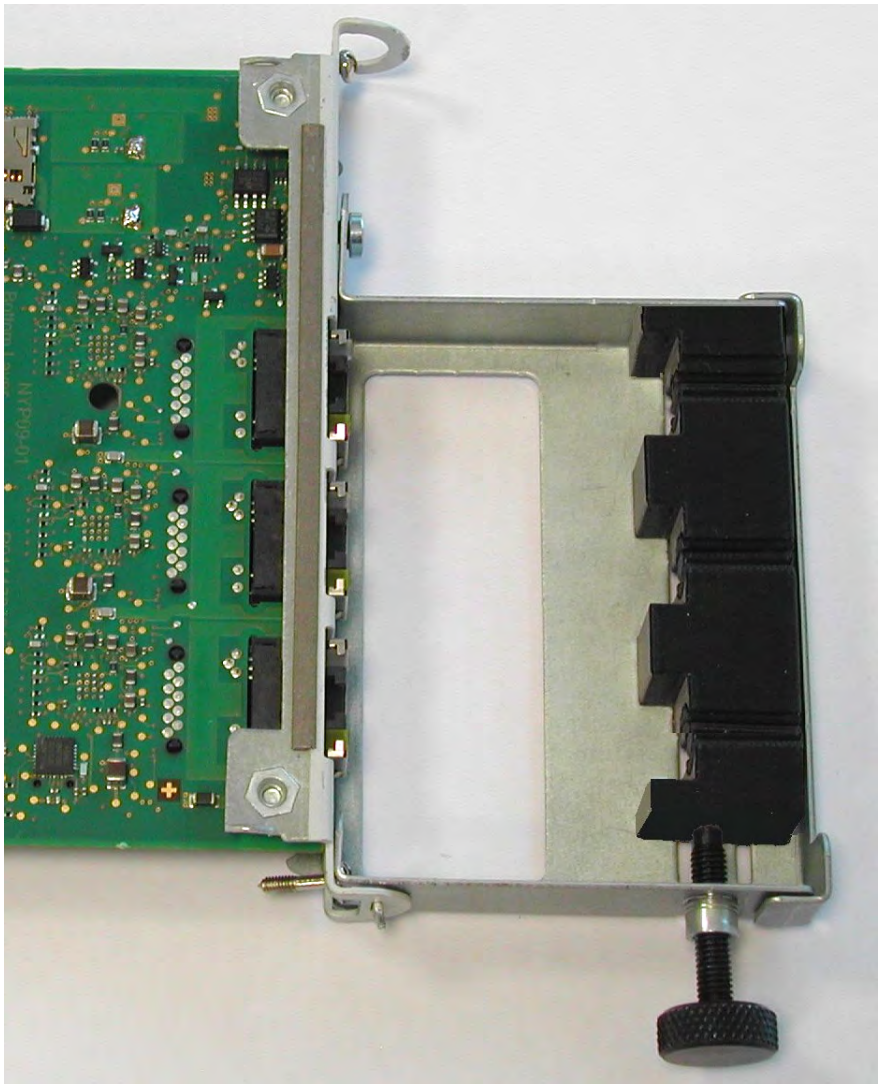


Fig. 14-4: NY4901/20 cable strain relief bracket on NY4114

Do the following steps to install the connection cable(s) on the cable strain relief bracket.

1. Slide the lower three clamping blocks completely to the bottom side of the bracket. Slide the top clamping block against the top side of the bracket.
2. Between the upper clamping block, 2 clamping blocks in the middle, and lower clamping block are 3 small parts. See fig. 14-5 "Ethernet cable connected to port ETH1" on page 126.
   - If you use thick Ethernet connection cables, you have to remove these 3 parts.
   - If you use thin Ethernet connection cables, you only remove the small part in the middle.
   - If no connection cable is used, you must keep all 3 parts mounted.
3. Connect the Ethernet cable to ETH1 of the NY4114 MCU. See fig. 14-5 "Ethernet cable connected to port ETH1" on page 126.

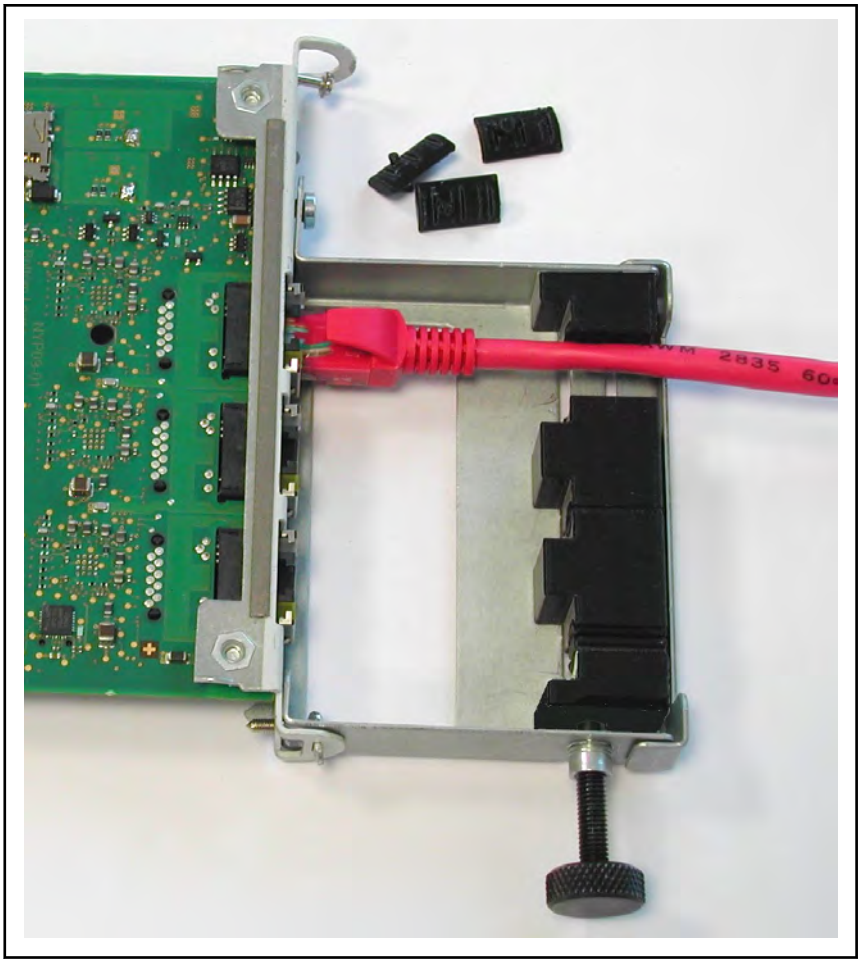


Fig. 14-5: Ethernet cable connected to port ETH1

4. Slide the upper middle clamping block upward, so that the Ethernet cable is held between the cable guidance of the upper and upper middle clamping block..
5. Optionally, connect the second Ethernet cable to ETH2 of the NY4114 MCU.

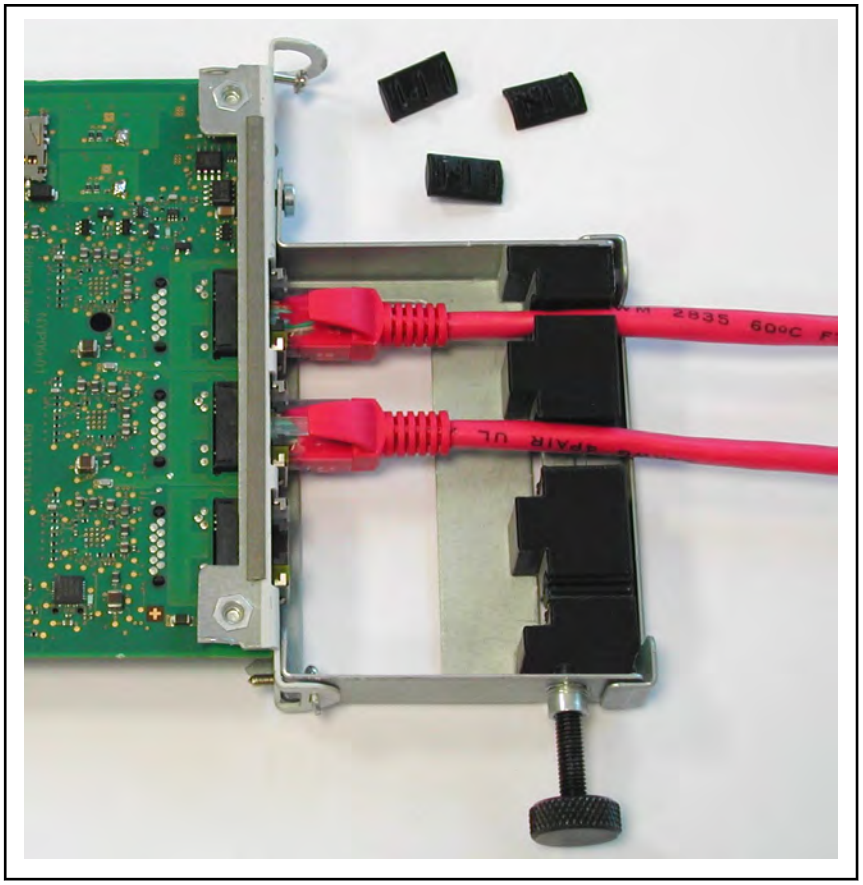


Fig. 14-6: Ethernet cable connected to port ETH2

If no cable is installed, you must keep the 3 small parts between the middle and lower clamping block.

6. Slide the lower middle clamping block upward so that the second Ethernet cable (or the 3 small parts) is held between the cable guidance of the two clamping blocks in the middle.
7. Optionally, connect the third Ethernet cable to ETH3 of the NY4114 MCU.
8. Slide the bottom clamping block upward so that the third Ethernet cable (or the 3 small parts) is held between the cable guidance of the lower middle clamping block and the bottom clamping block.
9. Tighten the lock screw so that the clamping blocks keep the Ethernet cables firmly in place.. Maximum tightening torque is 0.2 Nm.

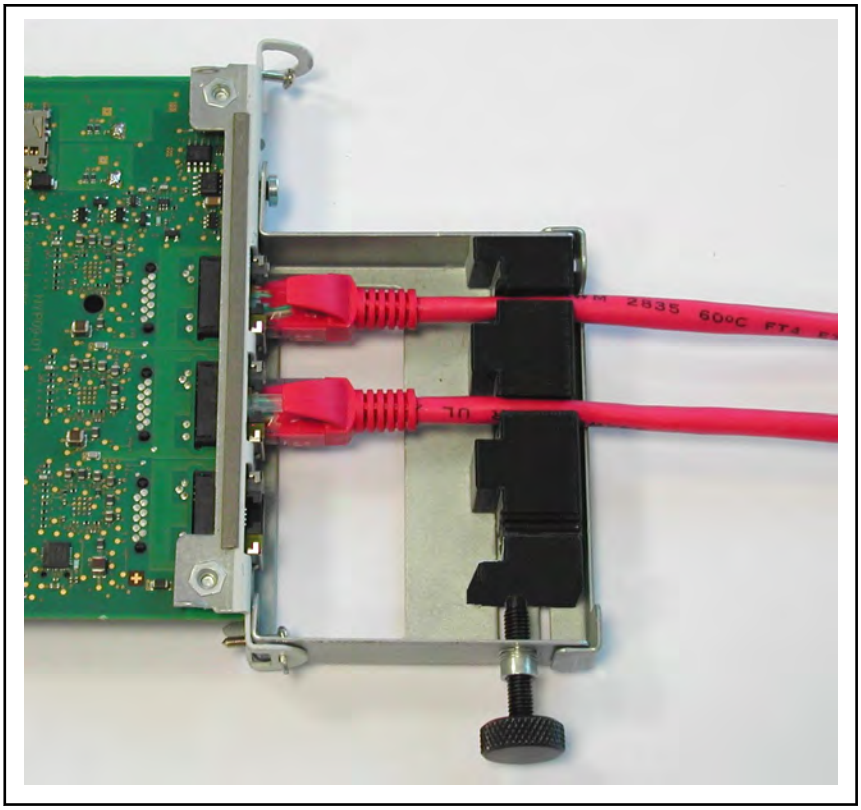


Fig. 14-7: Ethernet cables firmly in place

14.4.4 Disconnection of the Ethernet cables

Do the following steps to disconnect the Ethernet cables from the NY4114 MCU.

1. Loosen the lock screw at the bottom of the bracket.
2. Slide the bottom clamping block to the bottom of the bracket.
3. Disconnect the Ethernet cable from ETH3 of the NY4114 MCU, if a cable is connected to ETH3.
4. Slide the lower middle clamping block towards the bottom of the bracket.
5. Disconnect the Ethernet cable from ETH2 of the NY4114 MCU, if a cable is connected to ETH2.
6. Slide the upper middle clamping block towards the bottom of the bracket.
7. Disconnect the Ethernet cable from ETH1 of the NY4114 MCU.

14.4.5 Removal of the cable strain relief bracket

Do the following steps to remove the cable strain relief bracket from the NY4114 MCU.

1. Disconnect the Ethernet cable(s) from the NY4114 MCU. See chapter 14.4.4 "Disconnection of the Ethernet cables" on page 128.
2. Loosen the mounting screw at the top side of the cable strain relief bracket.

3. Pivot the cable strain relief bracket to an angle of approximately 60° and lift the bracket from the NY4114 MCU.

15 NY4901/40: Cable Strain Relief for NY4150/10

15.1 Introduction

The NY4150/10 SERCOS III Master module uses RJ45 connections to connect to the SERCOS network. Some form of network cable strain relief is required for the connection cables to ensure a reliable connection. The NY4901/40 cable strain relief bracket is specifically developed for the NY4150/10 SERCOS III Master module and can also be used to replace the NY4901/10 cable strain relief bracket. The NY4901/40 cable strain relief bracket offers easier installation and improved clamping of the network cables.

Short name	Component name	Order number	Usage
NY4901/40	NYA04.1-STRAIN-RELIEF-4150-NY4901/40	R911403465	NY4150/10

Tab. 15-1: NY4901/40 cable strain relief bracket for the NY4150/10

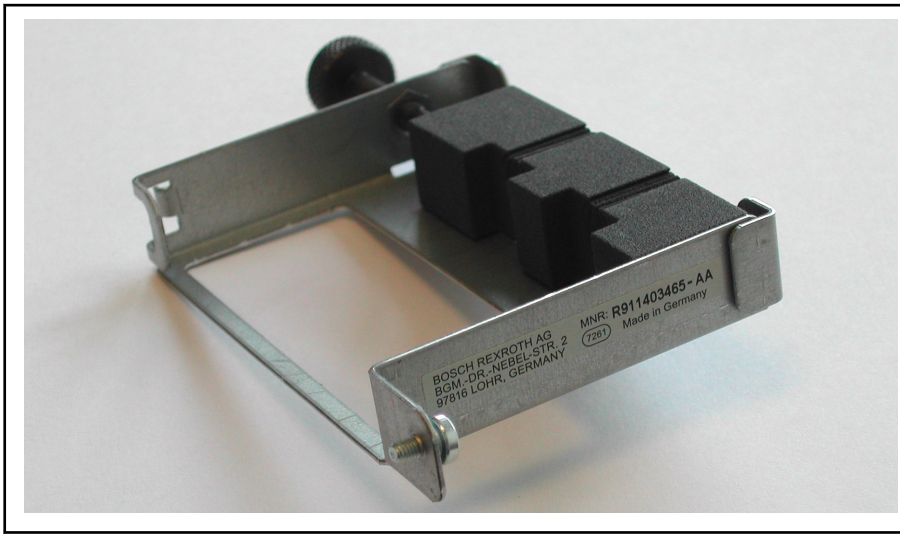


Fig. 15-1: NY4901/40 cable strain relief bracket

15.2 Product identification

The NY4901/40 cable strain relief bracket has a knurled screw on the bottom at the front side. Looking at the front side, the bracket has a metal plate at the left side with two slits in it. Three clamping blocks slide in these slits. On the top side of the bracket is the product identification label. The identification label indicates the following information.

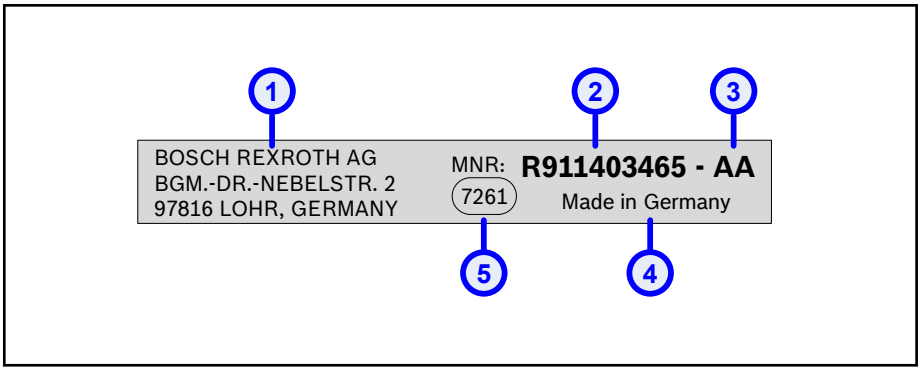


Fig. 15-2: Identification label on the cable strain relief bracket

Identifier number	Description
1	Company address
2	Material number
3	Change index
4	Designation of origin
5	Division number / plant number

Tab. 15-2: Label legend

15.3 Dimensions

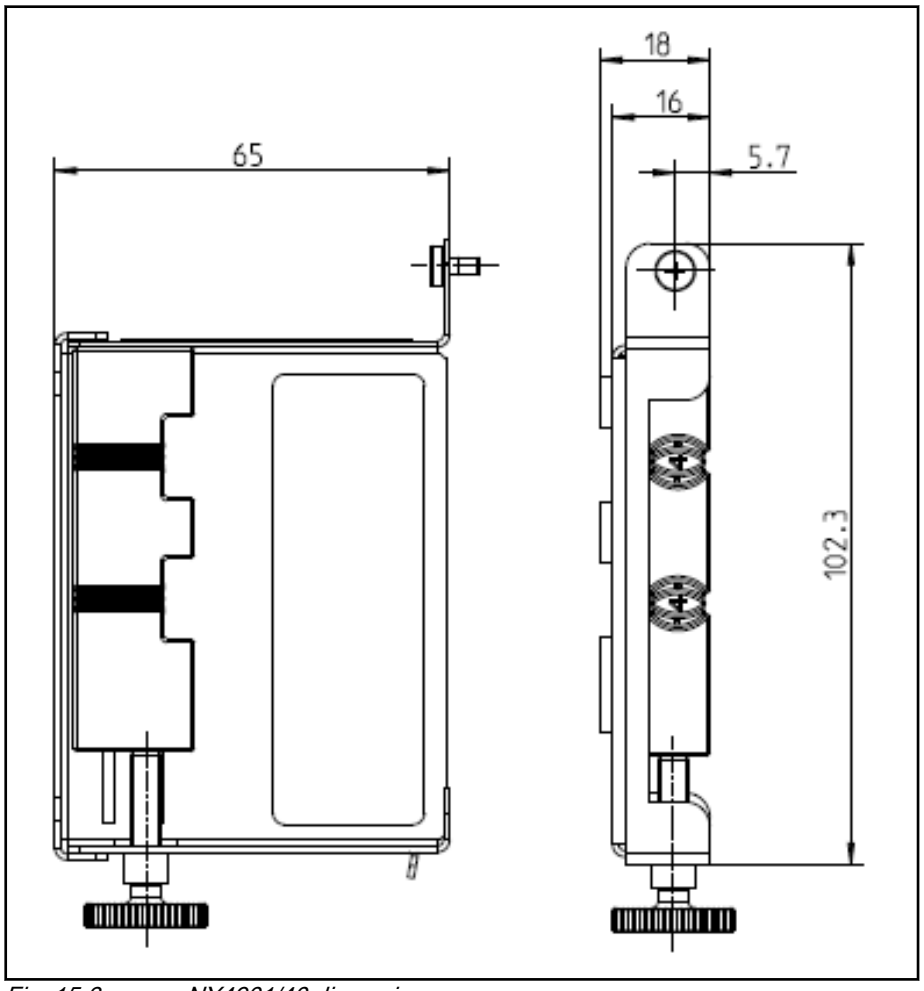


Fig. 15-3: NY4901/40 dimensions

Type code	Width	Height	Depth
NYA04.1-STRAIN-RELIEF-4150-NY4901/40	18 mm	102.3 mm	65 mm

Tab. 15-3: NY4901/40 physical data

15.4 Installation and removal

15.4.1 Before you begin

⚠ WARNING **Damage to components may occur if power is applied during installation or removal.**

- Make sure power supplies are switched off before installation or removal.

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

⚠ WARNING **Damage to components may occur due to electrostatic discharges.**

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

15.4.2 Installation of the cable strain relief bracket

Do the following steps to install the cable strain relief bracket on the NY4150/10 module.

Precondition The NY4150/10 module is installed in the NYCe4000 standard housing.

1. When you look at the front of the cable strain relief bracket, the plate with the slits is at the left side of the bracket. Hook the lower corner of the bracket onto the bottom end of the front of the NY4150/10 at an angle of approximately 60°.
2. Place the bracket against the front of the NY4150/10 module, and install the bracket with the mounting screw. Maximum torque is 0.7 Nm.

☞ Make sure that your machine design has sufficient free clearance space in front of the NY4150/10 for a cable strain relief and the maximum allowed bending of the connection cables.

15.4.3 Installation of the connection cables

Loosen the lock screw at the bottom of the bracket to install the connection cables onto the cable strain relief bracket.

Remark.

The figures show the NY4150/10 module outside the standard housing for clarity. If the bracket is installed on the NY4150/10 module before the module is installed in the standard housing, it is not possible to tighten the lower mounting screw of the NY4150/10 module.

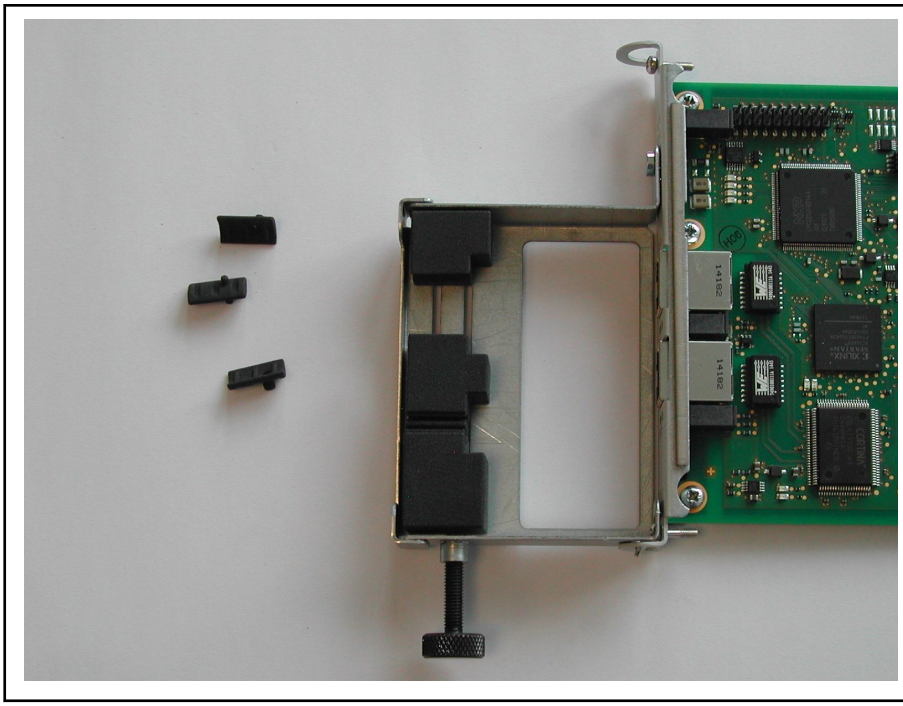


Fig. 15-4: NY4901/40 cable strain relief bracket on NY4150/10

Do the following steps to install the connection cables on the cable strain relief bracket.

1. Slide the lower two clamping blocks completely to the bottom side of the bracket. Slide the top clamping block against the top side of the bracket.
2. Between the upper and lower clamping blocks and the clamping block in the middle are 3 small parts. See fig. 15-4 "NY4901/40 cable strain relief bracket on NY4150/10" on page 135.
   - If you use thick Ethernet connection cables, you have to remove these 3 parts.
   - If you use thin Ethernet connection cables, you only remove the small part in the middle.
   - If no connection cable is used, you must keep all 3 parts mounted.
3. Connect the SERCOS cable to PORT 1 of the NY4150/10 module. See fig. 15-5 "SERCOS cable connected to PORT 1" on page 136.

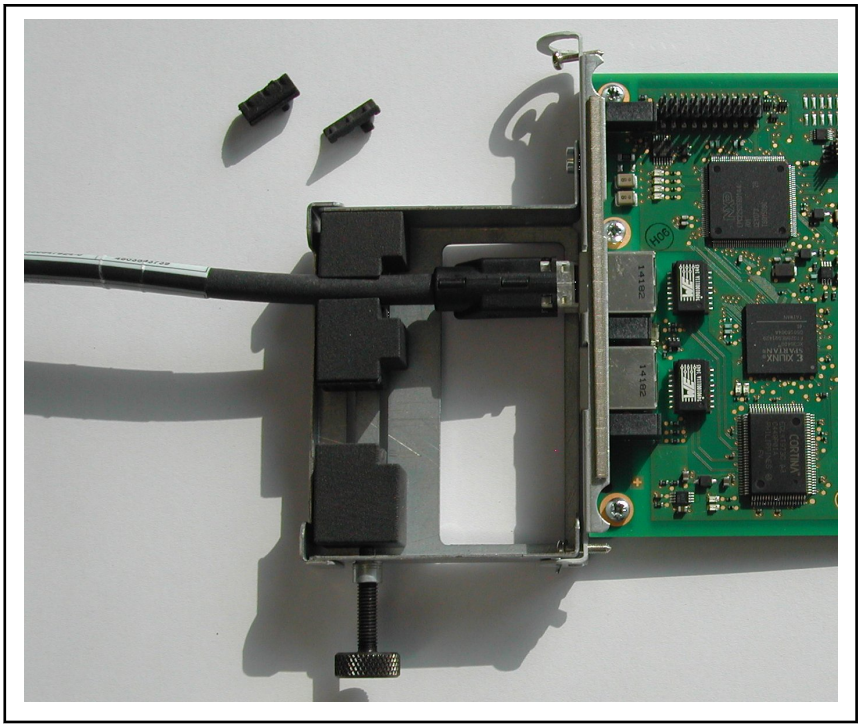


Fig. 15-5: SERCOS cable connected to PORT 1

4. Slide the middle clamping block upward, so that the SERCOS cable is held between the cable guidance of the upper and middle clamping block.
5. Connect the second SERCOS cable to PORT 2 of the NY4150/10 module.

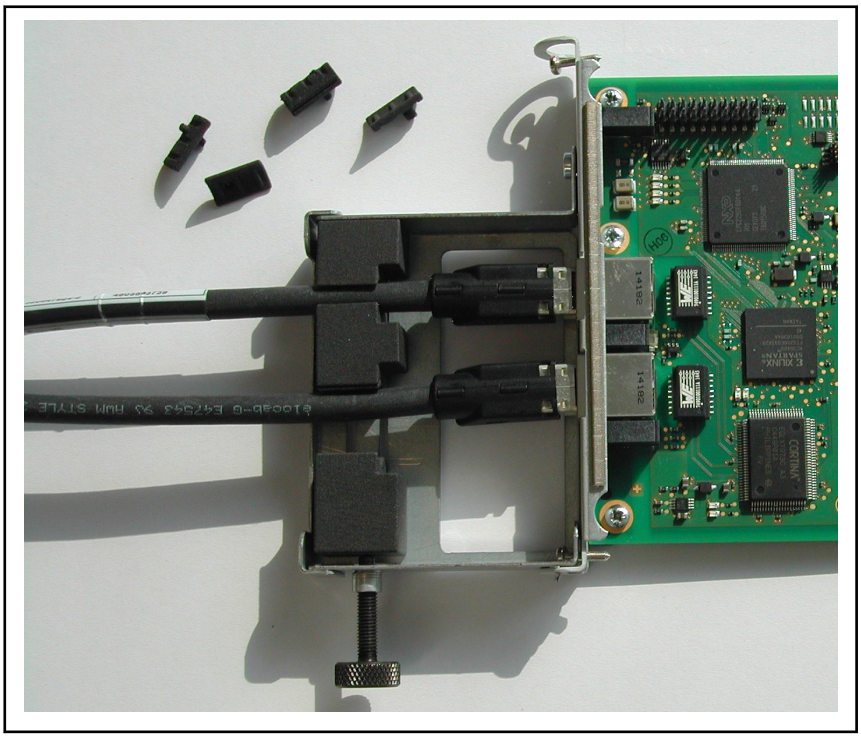


Fig. 15-6: SERCOS cable connected to PORT 2

6. Slide the lower clamping block upward so that the second SERCOS cable is held between the cable guidance of the middle and lower clamping block.
7. Tighten the lock screw so that the clamping blocks keep the SERCOS cables firmly in place. Maximum tightening torque is 0.2 Nm.

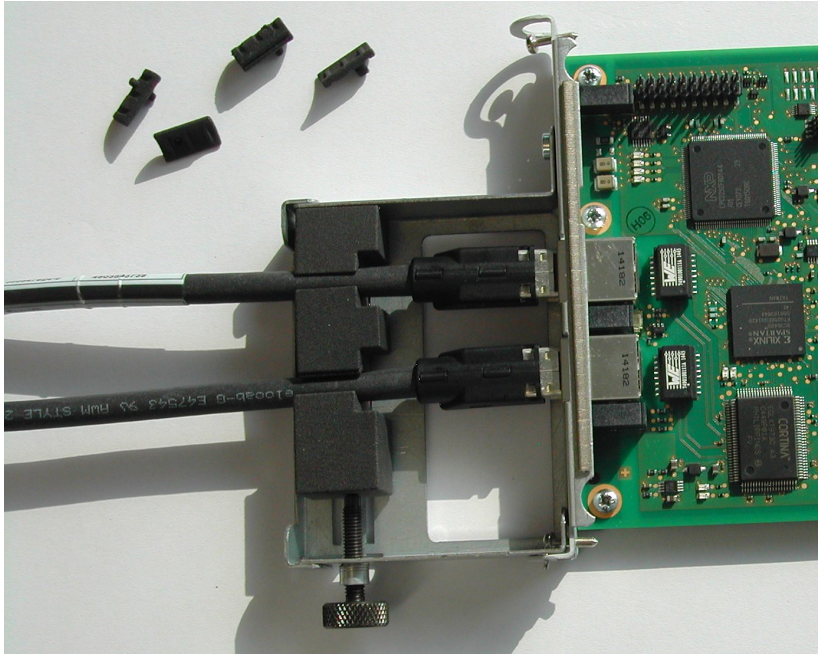


Fig. 15-7: SERCOS cables firmly in place

15.4.4 Disconnection of the SERCOS cables

Do the following steps to disconnect the SERCOS cables from the NY4150/10 module.

1. Loosen the lock screw at the bottom of the bracket.
2. Slide the lower clamping block to the bottom of the bracket.
3. Disconnect the SERCOS cable from PORT 2 of the NY4150/10 module.
4. Slide the middle clamping block towards the bottom of the bracket.
5. Disconnect the SERCOS cable from PORT 1 of the NY4150/10 module.

15.4.5 Removal of the cable strain relief bracket

Do the following steps to remove the cable strain relief bracket from the NY4150/10 module.

1. Disconnect the SERCOS cables from the NY4150/10 module. See chapter 15.4.4 "Disconnection of the SERCOS cables" on page 137.
2. Loosen the mounting screw at the top side of the cable strain relief bracket.
3. Pivot the cable strain relief bracket to an angle of approximately 60° and lift the bracket from the NY4150/10 module.

16 NY4910: Motor Cable Shield and Support

16.1 Introduction

The Motor Cable Shield and Support bracket creates a solid construction for the connection of the motor cables to the system housing, a cable strain relief, and provides an adequate shielding connection for EMC measures.

The Motor Cable Shield and Support bracket package consist of the following parts.

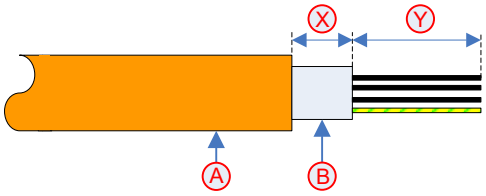
- Five metal brackets for five motor cables, including the mounting screw.
- Five tie-wraps with an EMC gasket.
- Five standard tie-wraps.

Part number is R911172999, ordering code is NYA04.1-SHIELD-SUP-MOT-5PCS-NY4910.

16.2 Mounting Instruction

Do the following steps to connect a motor cable with the Motor Cable Shield and Support bracket to the motor header on the system housing.

1. Strip the wires of the motor cable according to the following picture.



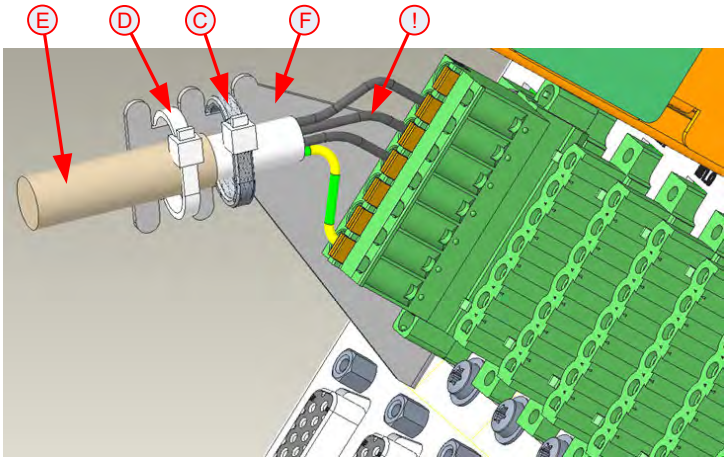
Strip the cable coating Ⓐ for a length of 50 mm.

Strip the shield Ⓑ for a length of 40 mm.

The shield length Ⓧ is 10 mm, the wire length Ⓨ is 40 mm.

2. Put the wires of the motor cable into the motor connector according to the instructions of the connector manufacturer. Keep the wires of the motor cable to the connector as short as possible (!).

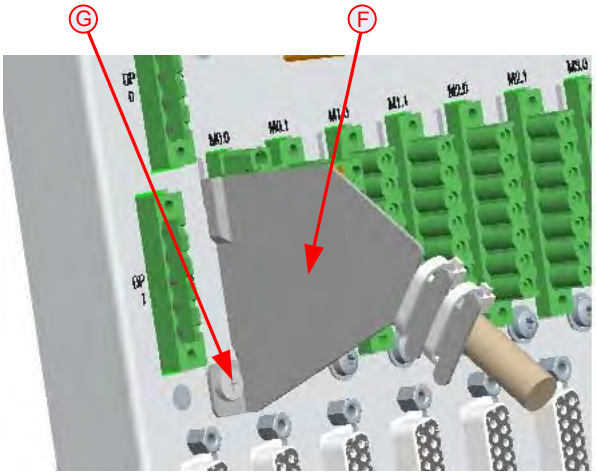
Securely attach the motor cable Ⓔ to the shield and support bracket Ⓕ.



Use the tie-wrap with the EMC gasket Ⓒ to clamp the shield of the cable against the metal bracket.

Use the standard tie-wrap Ⓓ to attach the cable firmly onto the metal bracket.

3. Put the hook of the shield and support bracket Ⓑ into the slit at the left side of the header on the metal base plate of the system housing. Lock the shield and support bracket Ⓕ onto the base plate with the screw Ⓖ.



17 NY4917: Host Adapter IEEE 1394b (PCIe)

The NY4917 is a card with a PCIe interface to install in a PCIe slot of a PC. The NY4917 host adapter facilitates the connection of a host PC to the NY4110 MCU module using an IEEE 1394b cable.

Part number is R911345705, ordering code is NYA04.1-1394B-INT-PCIE-NY4917.

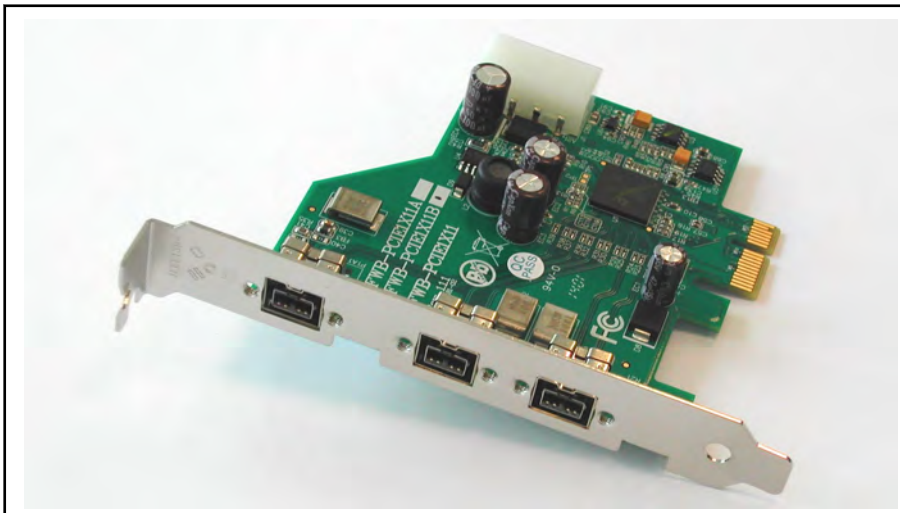


Fig. 17-1: NY4917 host adapter

NY4917 main features:

- Standard PCIe (x1) interface for installation in any PCIe slot of a modern PC.
- Three IEEE 1394b interface connectors for IEEE 1394b cable length up to 4.5 meter. Any of the three sockets can be used in the NYCe 4000 system.
- The host adapter includes an industry-standard header to supply power to the IEEE 1394b connection.

18 NY4920/10 Connector Set and Keying Fingers

18.1 Introduction

The system housing has Phoenix Contact headers to connect the system power supply voltage, service inputs, drive power supply voltage and motors. To prevent errors in the assembly of the connection cables, you can order Phoenix Contact plugs with appropriate text markings that support the correct assembly of the connection cables.

Additionally, keying profiles and matching keying fingers for the drive power and motor connectors enable the machine builder to define connector configurations that prevent accidental wrong connection. The following connector set is available.

Connector set	Part number	Description Ordering code
NY4920/10	R911325078	Connector set for one system. NYA04.1–CONSET–SYSPW-NY4920/10

Tab. 18-1: Connector sets

18.2 NY4920/10 Connector Set for One System

The NY4920/10 connector set contains one 3-pin 24V System power plug and one 4-pin SErvice input plug. Appropriate text markings on the plugs support the correct assembly of the connection cables.

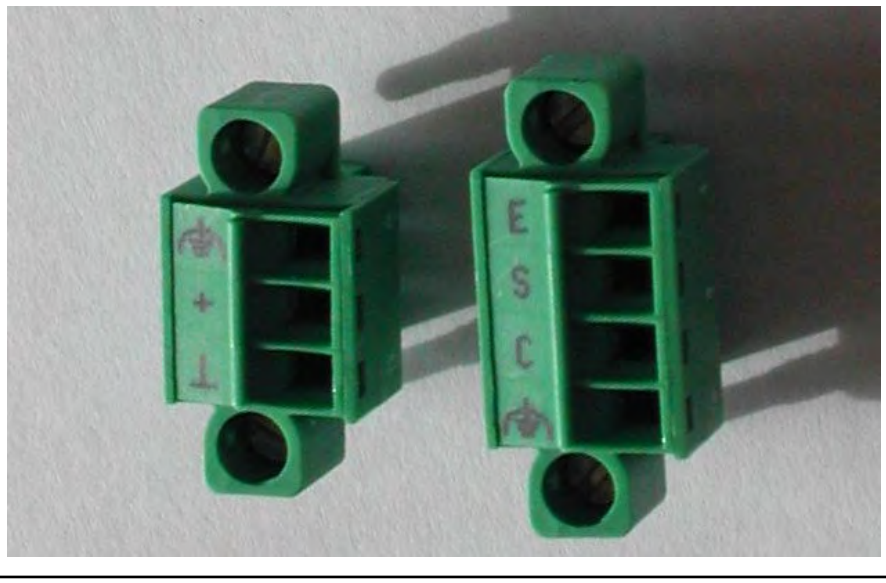


Fig. 18-1: Connector set NY4920/10

18.3 Keying Fingers for Drive Power and Motor Connectors

All NY40x3 system housings need 5-pin Drive Power plugs for installed NY4120, NY4125 or NY4140 drive modules, and one, two or five 7-pin motor plugs for each drive slot. The machine builder can install keying profiles into the male connector and install matching keying fingers on the female

connector to create an unambiguous connection scheme. This scheme prevents the possibility that a plug is plugged into the wrong header.

Type and order number for keying profiles is Phoenix Contact, type CR-MSTB, order number 1734401.

Type and order number for keying fingers is Phoenix Contact, type CP-MSTB, order number 1734634.

☞ The machine builder is responsible to install an unambiguous keying profile.

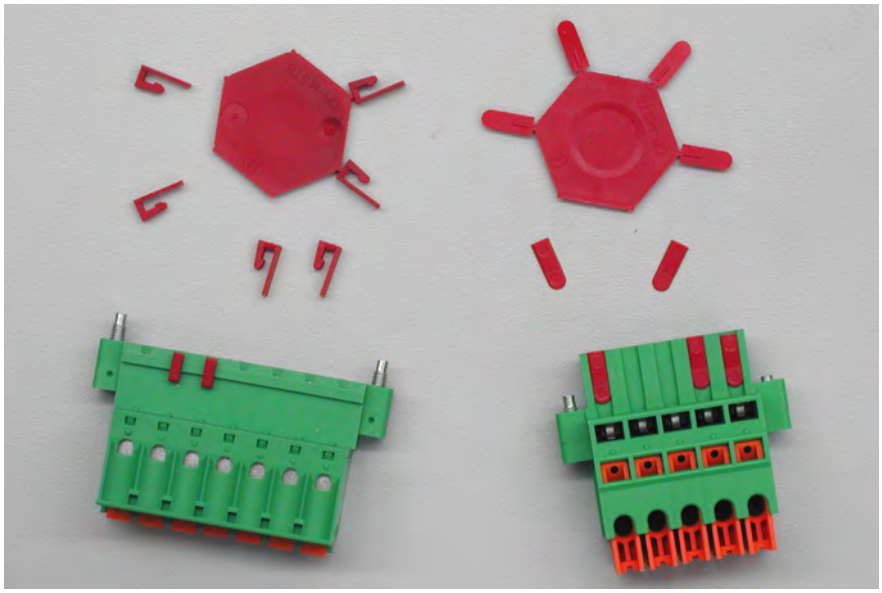


Fig. 18-2: Motor plug with keying profiles and drive power plug with keying fingers

☞ If you use another type of Phoenix Contact plug, keep in mind that it is not allowed that the plugs for the drive power supply voltage have screw terminals for connection of the wires. The distance between the pins is such that when screw terminals are used, after stripping the insulation of a wire, a short circuit condition may occur caused by strands of the conductors in the wire that are not captured by the screw.

Mounting of a keying profile and matching finger

To create an unambiguous connection system you must mount one or more keying profiles and fingers on

- all 5-pin Drive Power connectors for NY412x or NY4140 drive modules
- all 7-pin motor connectors of all NY40x3 system housings

Matching keying profiles and fingers prevent that a plug is plugged into a wrong header on the system housing.

- Keying fingers on the female plug

  Slide the keying finger in the rectangular slit next to the female connector pin of the Drive Power plug or motor header, see fig. 18-3 "Insertion of a key finger on Drive Power supply plug" on page 145. Use

as many fingers as needed to realize an unambiguous connection scheme.

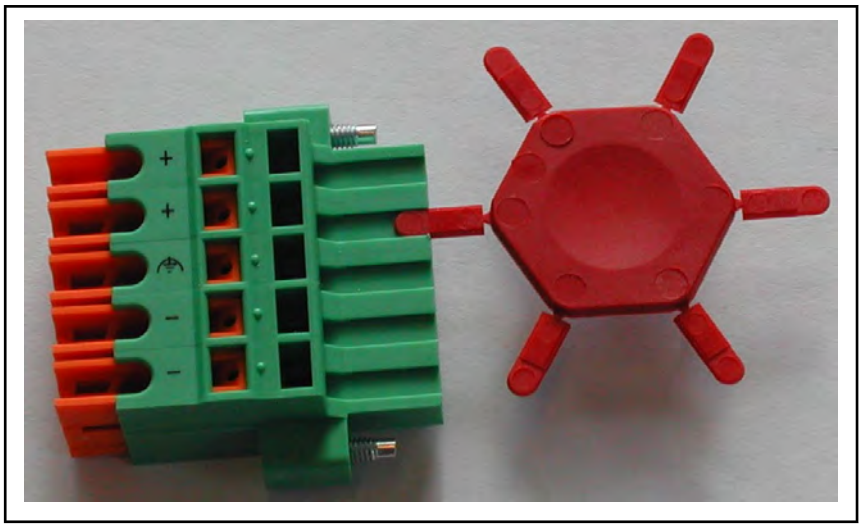


Fig. 18-3: Insertion of a key finger on Drive Power supply plug

- Keying profiles on the male plug

  Slide the keying profile over the rim of the Drive Power header or motor plug with the long leg on the inside and the short leg on the outside of the connector housing until the keying profile "clicks" into place, see fig. 18-4 "Keyed NY4120/NY4125/NY4140 Drive Power supply headers" on page 145. You must put a keying profile next to every pin for which the mating plug does not have a keying finger.

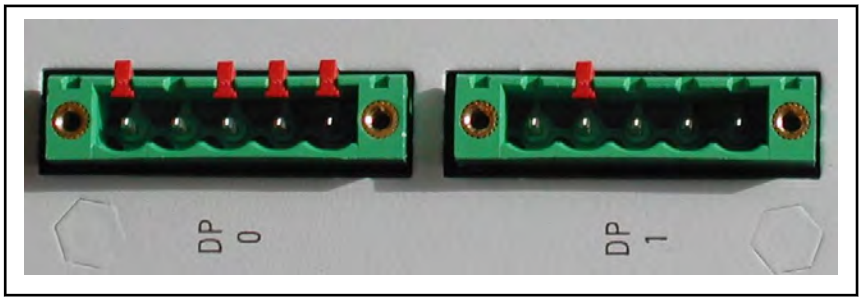


Fig. 18-4: Keyed NY4120/NY4125/NY4140 Drive Power supply headers

19 NY4921: Capacitor kit

19.1 Introduction

The NYCe 4000 drive modules NY4120, NY4140 and NY4120/10, may need an extra capacitor with a low ESR (Equivalent Series Resistance) for optimal functionality at high currents. The capacitor is needed to reduce the ripple on the supply voltage during the PWM switching cycles.

To prevent touching the contacts of the capacitor an encapsulation is supplied. The encapsulation does not cover the overpressure valve of the capacitor. For safety measures the capacitor is enclosed by a metal cover.

Each capacitor kit consists of a capacitor unit with a cable and a Phoenix Contact plug, a clamp, two screws and a metal cover to install the capacitor kit on the system housing, see fig. 19-1 "NY4921 capacitor kit" on page 147.



Fig. 19-1: NY4921 capacitor kit

19.2 Available Capacitor kits

Different capacitor kits are available for the NY4120, NY4120/10 and the NY4140 drive module, see tab. 19-1 "Capacitor kits for the NY4120 and NY4140 drive modules" on page 147.

Drive module	Capacitor kit	Specifications	Part number and ordering code
NY4120 NY4120/10 NY4125	NY4921	Capacity: 6800 µF Working voltage : 100 Volt Surge voltage : 125 Volt DC	R911325079 NYA04.1-CAP-100V-NY4921
NY4140	NY4921/10	Capacity : 2200 µF Working voltage : 200 Volt Surge voltage : 250 Volt DC	R911325082 NYA04.1-CAP-200V-NY4921/10

Tab. 19-1: Capacitor kits for the NY4120 and NY4140 drive modules

19.3 Identification

The NY4921 and NY4921/10 can be identified by the label on the capacitor unit.

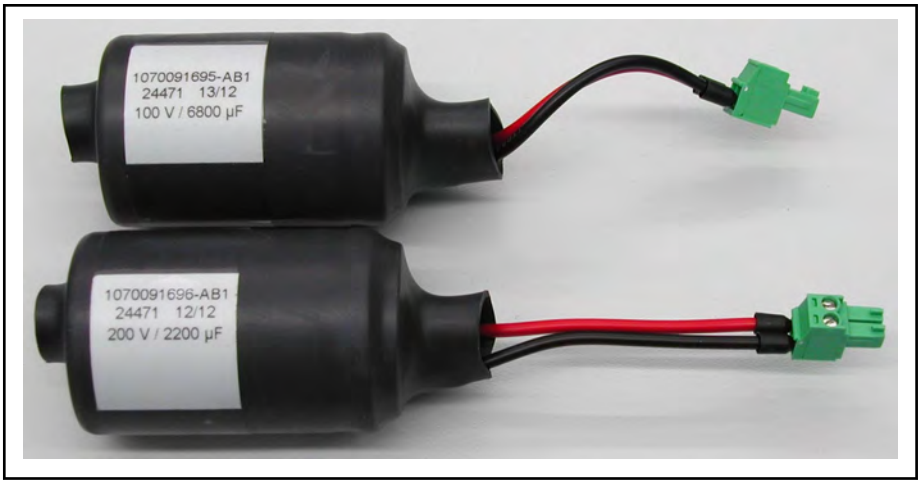


Fig. 19-2: Identification labels on the NY4921 and NY4921/10

Explanation of the identification label

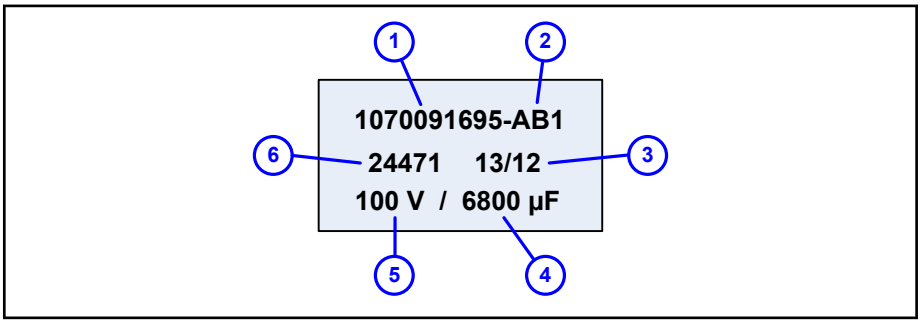


Fig. 19-3: Identification fields on the label

Field number	Explanation
1	Material number
2	Version level and status
3	Date of manufacture (ww/yy)
4	Capacitor value
5	Working voltage
6	Manufacturer identification code

Tab. 19-2: Fields of the capacitor identification label

The connection cable attached to the capacitor has a Phoenix Contact plug. The plug connects to the 2-pin header marked "CAPx" on the base plate of the system housing, where "x" can be 0, 1, 2, 3, or 4.

19.4 Mechanical dimensions of the Capacitor kit

The dimensions of the Capacitor kit are the following.

Type code	Width	Height	Depth	Weight
NY4921	43.6 mm	58.0 mm	46.0 mm	200 gr
NY4921/10	43.6 mm	58.0 mm	46.0 mm	200 gr

Tab. 19-3: Dimensions of the Capacitor kit

You can see the dimensions of the Capacitor kit in the following views.

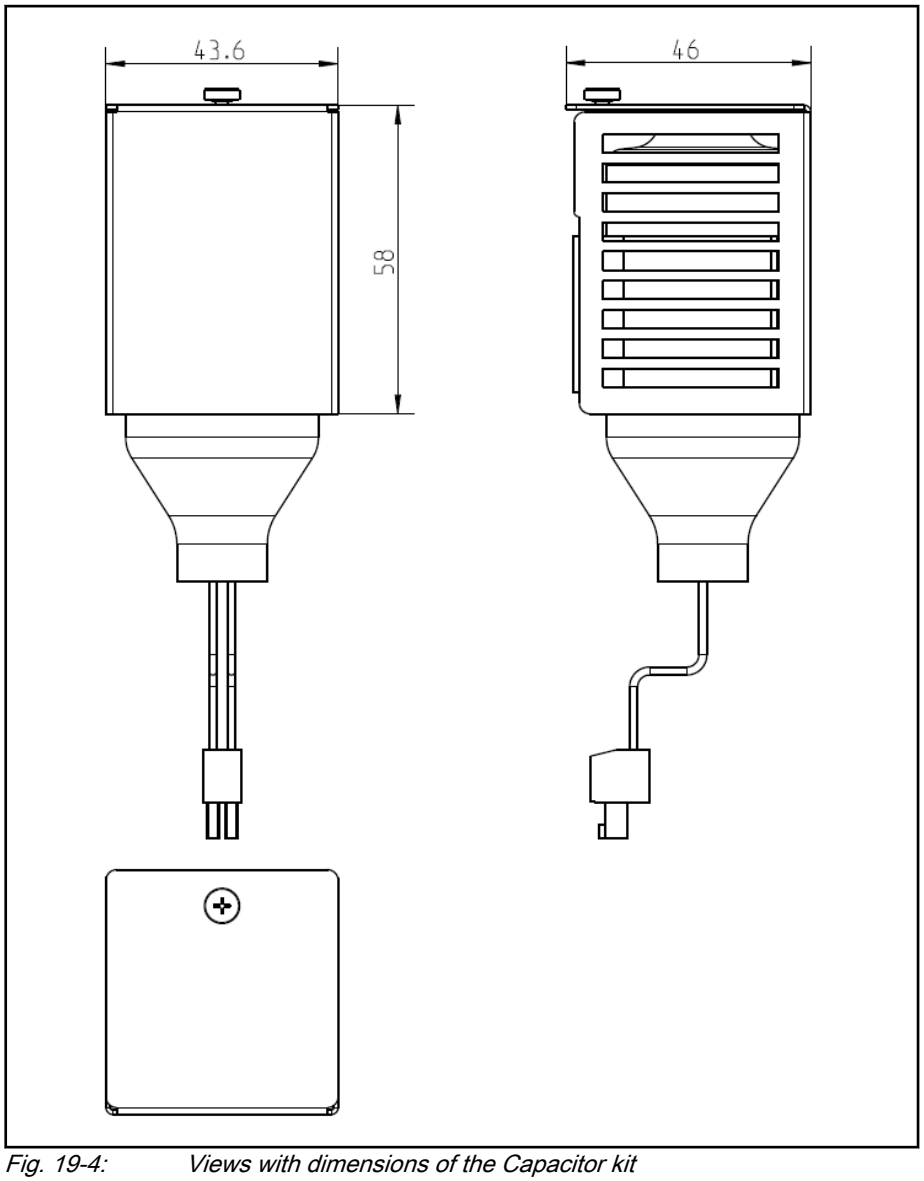


Fig. 19-4: Views with dimensions of the Capacitor kit

19.5 Installation of the Capacitor kit

The capacitor must be installed as close as possible to the drive module. For this purpose the I/O backplane in the system housing has dedicated header(s) labelled CAPx to connect the capacitor (where x is 0 for drive slot 0, 1 for drive slot 1, etc.). The module holder of the system housing has a mounting plate to install the capacitor kit(s) on the system housing.

If a Capacitor Kit is installed on a system housing, a fuse between V+ of the drive power supply and the DP_PWR+ connection of the associated drive slot on the system housing is mandatory. The fuse certified for DC rating, Fast Acting, has to be UL recognized under CCN JDYX2/8, also IEC 60127-1 certification has to be provided.



Depending on the accessibility of the sides of the system housing after installation of the system housing inside a machine, it is advised to install the required Capacitor kit(s) on the system housing before the system housing is installed in the machine.

⚠ CAUTION **The capacitor can be damaged. Maximum drive power voltage must be lower than the working voltage of the installed capacitor.**

Make sure that a capacitor with correct ratings is installed with respect to the drive power supply voltage.



If a drive slot was configured for an NY4120 or NY4125 drive module and now used for an NY4140 drive module, make sure that the Capacitor kit is upgraded (NYA04.1-CAP-100V-NY4921 upgraded to NYA04.1-CAP-200V-NY4921/10) before you connect the (higher) DP voltage.

NOTICE **The capacitor unit may be damaged. The system housing has no provisions against wrong polarity connection of the capacitor.**

Observe the correct polarity of the connection of the "DP" drive power header.

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

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

Do the following steps to install the capacitor kit on the system housing.

1. Install the capacitor clamp Ⓒ on the mounting plate Ⓐ of the system housing with the two screws Ⓑ. There is a specific position on the module holder for each drive slot.

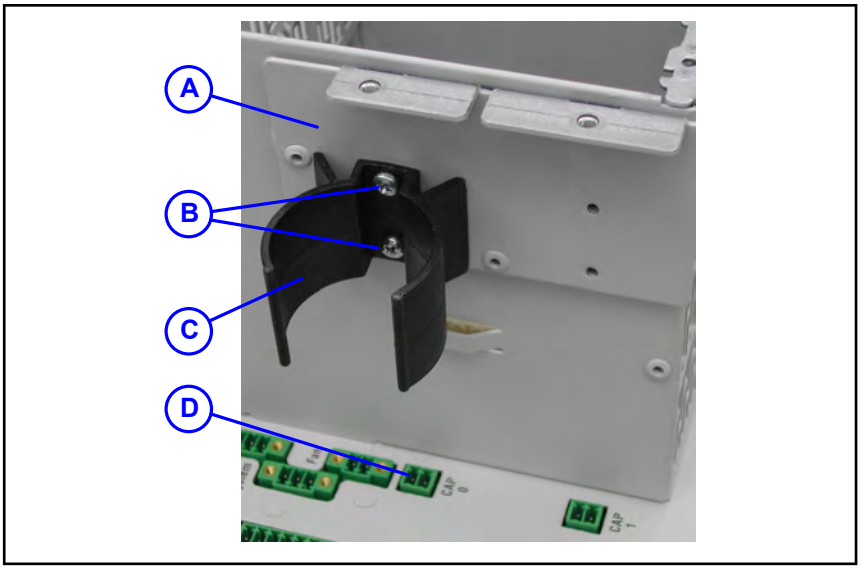


Fig. 19-5: Installation of the capacitor clamp on the system housing

2. Install the capacitor unit Ⓔ in the capacitor clamp Ⓒ.

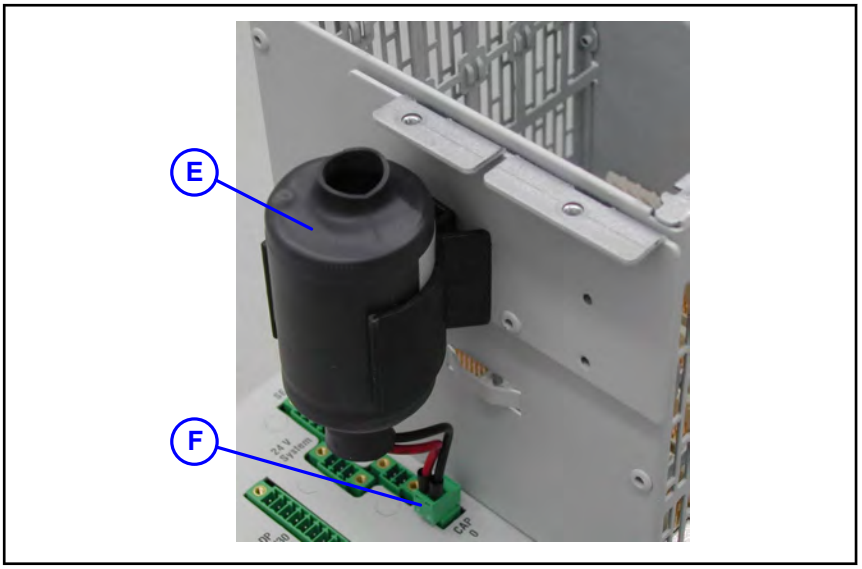


Fig. 19-6: Installation of the capacitor unit on the system housing

3. Insert the plug Ⓕ in the CAPx header Ⓓ.

NOTICE	**Damage to the capacitor unit may occur if the plug is connected in the wrong header. Do not use the FAN header.**

Make sure that the plug Ⓕ of the Capacitor unit is inserted in a header marked CAPx (where x can be 0, 1, 2, 3, or 4).

4. Put the metal cover Ⓖ over the capacitor unit and secure the cover with screw Ⓗ. The metal cover can only be installed on the NY40x3 system housings.

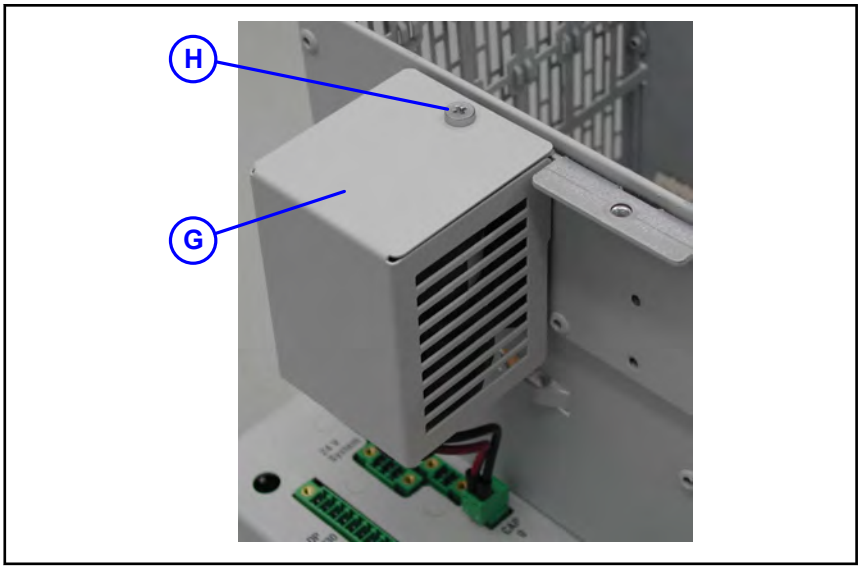


Fig. 19-7: Installation of the capacitor cover on the system housing

⚠ CAUTION **Injury may occur if specifications of the capacitor are exceeded.**

The metal cover is part of the safety measures and must always be installed.

19.6 Removal of the Capacitor kit

⚠ DANGER **Electric shock may occur. The capacitor may hold a charge. Voltage on the pins of the plug can be higher than 60V DC. When the plug is disconnected, a high voltage can remain present on the pins for 5 minutes after disconnection. If the drive slot has an accompanying capacitor installed and the drive module is not installed in that slot, you must wait 30 minutes.**

Do not touch the pins of the plug. Do not touch the rear side of the I/O backplane. Make sure that all power supplies are switched off before you start any work on the Capacitor kit. Wait until the capacitors in the system are discharged, check with a Volt meter.

First, disconnect all drive power supply plugs ("DPx"). Then disconnect the 24V System power supply plug.

Do the following steps to remove the Capacitor kit from the system housing, refer to the figures in chapter 19.5 "Installation of the Capacitor kit" on page 149.

1. Remove the screw Ⓗ, if applicable.
2. Remove the metal cover Ⓖ, if applicable.
3. Disconnect the plug Ⓕ from the header Ⓓ.

4. Remove the capacitor unit Ⓔ from the capacitor clamp Ⓒ.
5. Remove the two screws Ⓑ.
6. Remove the capacitor clamp Ⓒ.

19.7 Commissioning

The capacitor of a Capacitor kit is connected to a header on the base plate of the system housing which is marked with the text "CAPx" (where "x" can be 0, 1, 2, 3, or 4, representing a specific drive slot in the module holder of the system housing).

Via the "DPx" headers on the base plate the drive power supply voltages are connected to each drive slot. This drive power voltage is also connected to the "CAPx" header.

Check that an appropriate fuse has been installed between V+ of the drive power supply and the DP_PWR+ connection of the associated drive slot on the system housing.

If the drive power supply has been connected with wrong polarity, the Capacitor Kit must be replaced.

If electrolyte has leaked from the capacitor, the Capacitor Kit must be replaced and all components exposed to the electrolyte must be replaced.

⚠ CAUTION **Injury may occur if the maximum working voltage of the capacitor is exceeded.**

Make sure that the maximum drive power supply voltage for the drive modules NY4120, NY4120/10 and NY4140 (connected to "DPx" on the system housing, where "x" can be 0, 1, 2, 3, or 4), must be lower than the working voltage indication on the installed capacitor.

19.8 Maintenance

The Capacitor kit has no special maintenance requirements.

20 NY4922: Fan Units

20.1 Introduction

The modules that are installed in a NYCe 4000 system housing dissipate energy. The warm air can be transported from the system housing using convection cooling. However, as described in the NYCe 4000 Hardware System Manual, you must apply derating under certain conditions. You can install a fan unit at the bottom side of the module holder to extend the operating range of the NYCe 4000 node.



Fig. 20-1: Examples of NY4922 fan unit types

20.2 Available fan unit types

A specific fan unit type is available depending on the type (size) of the system housing, see tab. 20-1 "Fan units and accompanying NYCe 4000 system housings" on page 155.

Fan unit type	Type code	Order code	System housing
NY4922/00	NYA04.1-FAN-1DRV-NY4922/00	R911328062	NY4013 and NY4079
NY4922/10	NYA04.1-FAN-2DRV-NY4922/10	R911325083	NY4023 and NY4074

Fan unit type	Type code	Order code	System housing
NY4922/20	NYA04.1-FAN-3DRV-NY4922/20	R911172220	NY4033
NY4922/30	NYA04.1-FAN-4DRV-NY4922/30	R911328063	NY4043
NY4922/50	NYA04.1-FAN-5DRV-NY4922/50	R911325084	NY4053

Tab. 20-1: Fan units and accompanying NYCe 4000 system housings

20.3 Identification

The fan unit can be identified by the label on the metal housing.

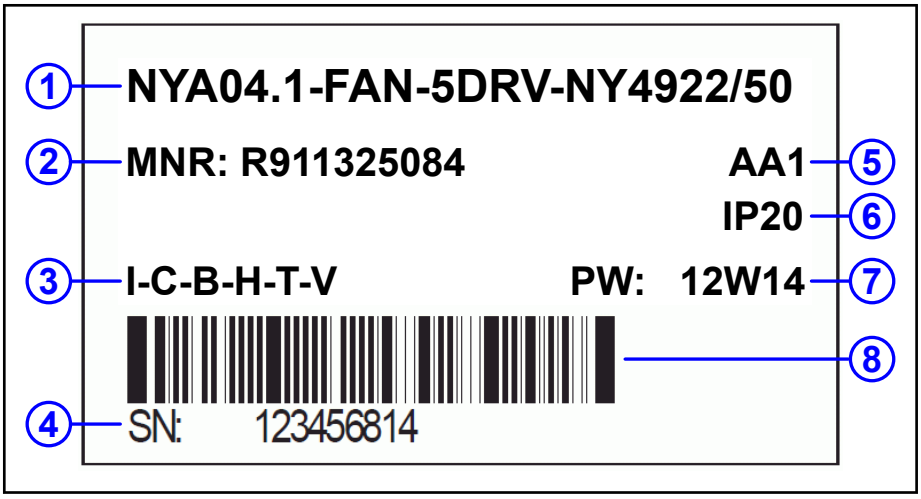


Fig. 20-2: Identification fields on the label

Field number	Explanation
1	Type code
2	Parts number
3	Test marking
4	Serial number
5	Version level and status
6	Degrees of protection provided by enclosure
7	Date of manufacture (yyWww)
8	Bar code

Tab. 20-2: Fields of the fan unit identification label

The connection cable attached to the fan unit has a Phoenix Contact plug. The plug connects to the 2-pin header marked "FAN" on the base plate of the system housing.

20.4 Mechanical dimensions of the fan units

The dimensions of the fan units are the following.

Fan unit type	Width	Height	Depth	Weight
NY4922/00	44 mm	26.15 mm	103 mm	217 gr
NY4922/10	63 mm	25.40 mm	87 mm	196 gr
NY4922/20	84 mm	26.15 mm	106 mm	285 gr
NY4922/30	104 mm	25.40 mm	77 mm	291 gr
NY4922/50	124 mm	25.40 mm	87 mm	263 gr

Tab. 20-3: Dimensions of the fan units

You can see the dimensions of the fan units in the following views.

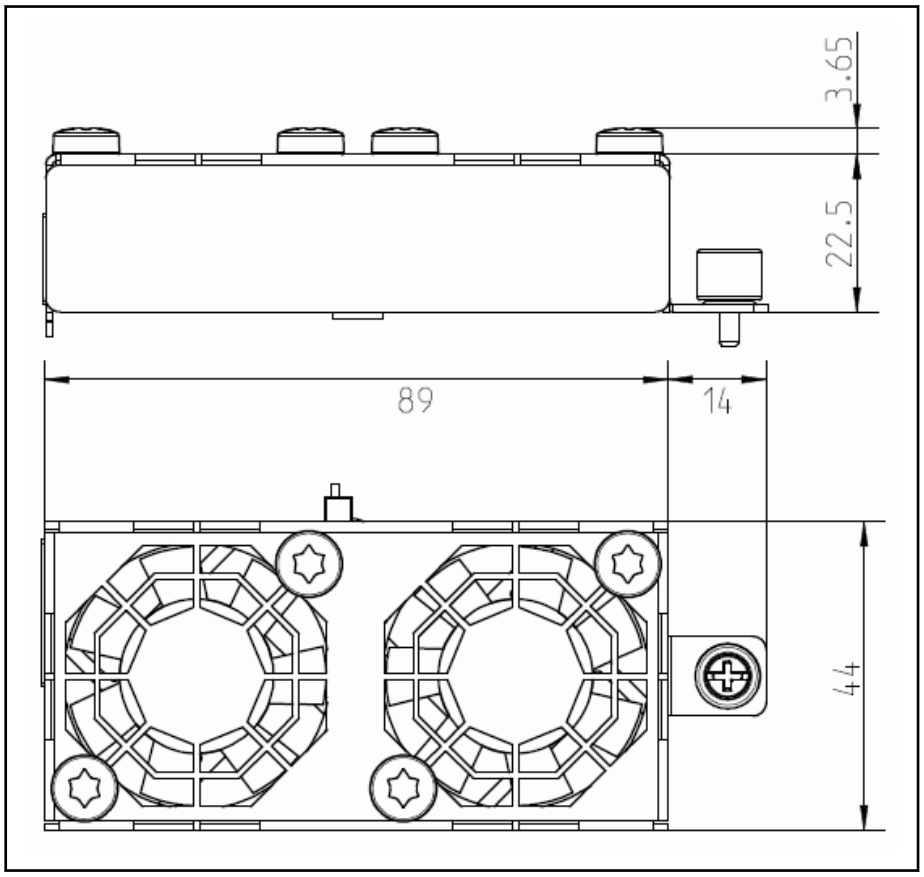


Fig. 20-3: Dimensions of the NYA04.1-FAN-1DRV-NY4922/00

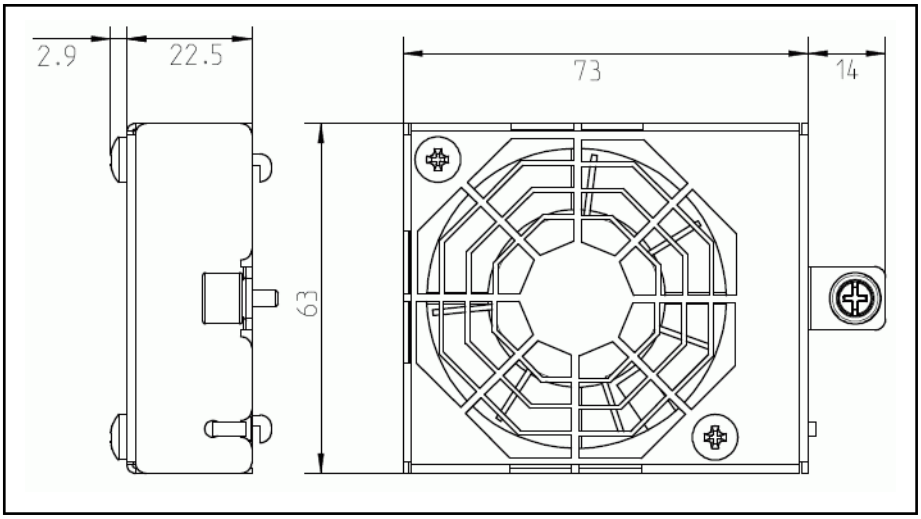


Fig. 20-4: Dimensions of the NYA04.1-FAN-2DRV-NY4922/10

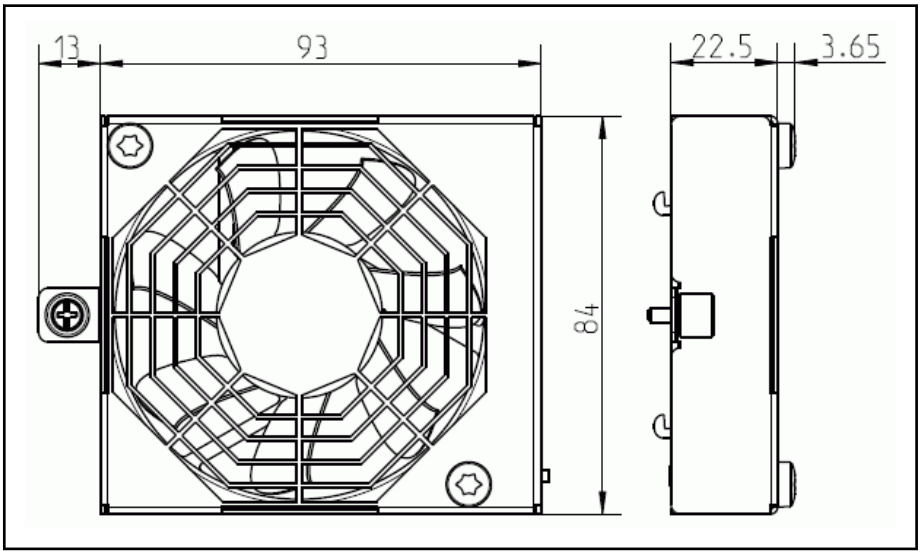


Fig. 20-5: Dimensions of the NYA04.1-FAN-3DRV-NY4922/20

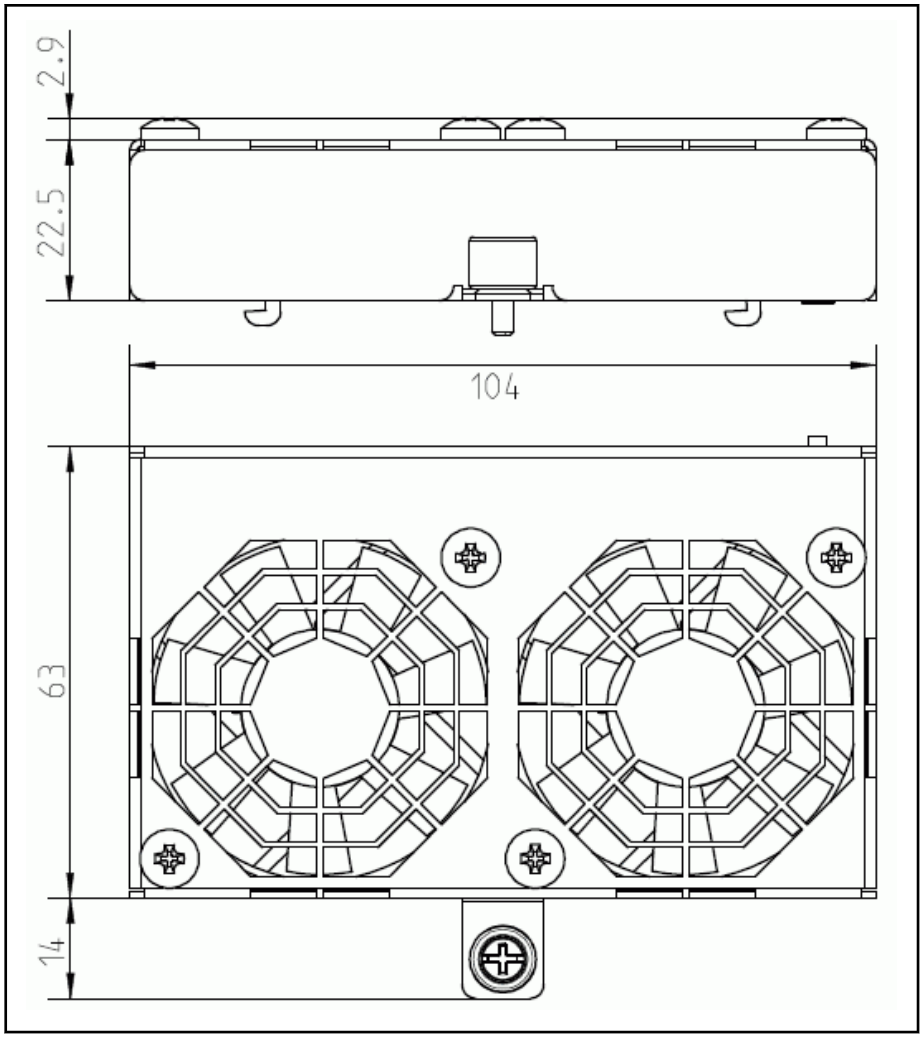


Fig. 20-6: Dimensions of the NYA04.1-FAN-4DRV-NY4922/30

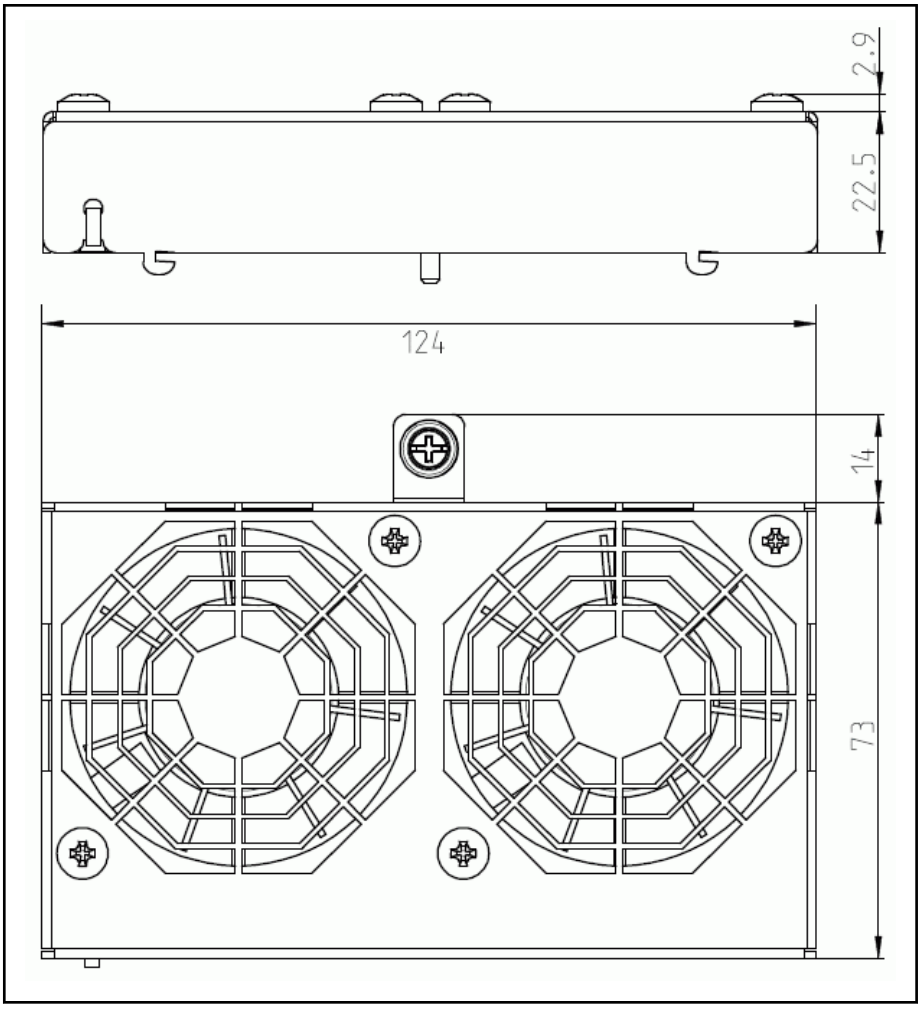


Fig. 20-7: Dimensions of the NYA04.1-FAN-5DRV-NY4922/50

20.5 Installation of the fan unit on the system housing

Depending on the accessibility of the bottom side of the system housing after installation of the system housing inside a machine, it is advised to install the fan unit module on the system housing before the system housing is installed in the machine.

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

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

Do the following steps to install the fan unit on the system housing.

1. Install the fan unit Ⓐ on the bottom of the module holder Ⓑ placing the two hooks Ⓒ into the slits Ⓓ of the module holder of the system housing.

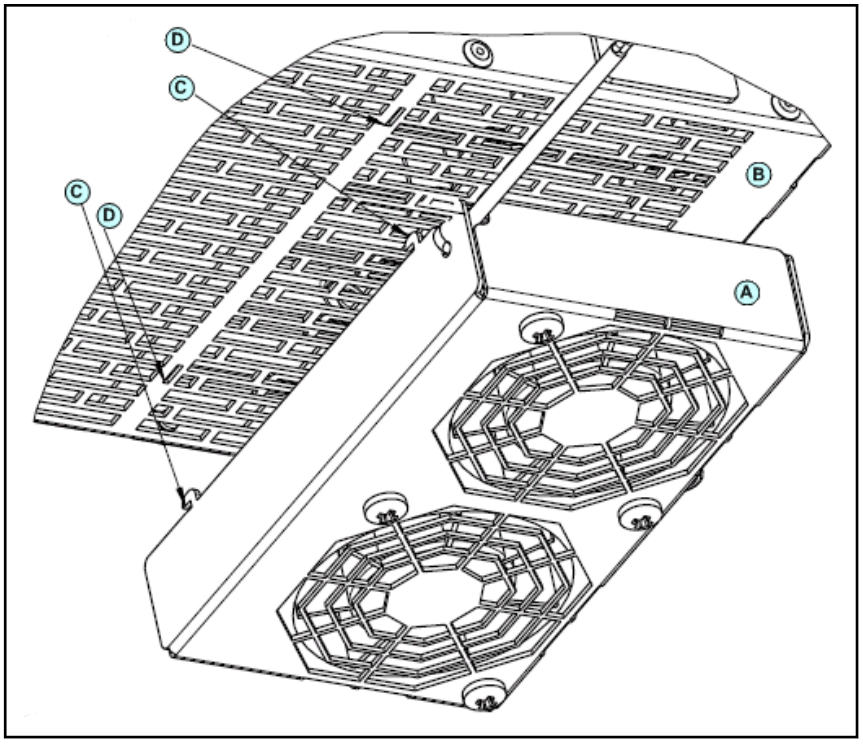


Fig. 20-8: Fan unit installation on the system housing - step 1

2. Tighten the knurled screw Ⓔ.

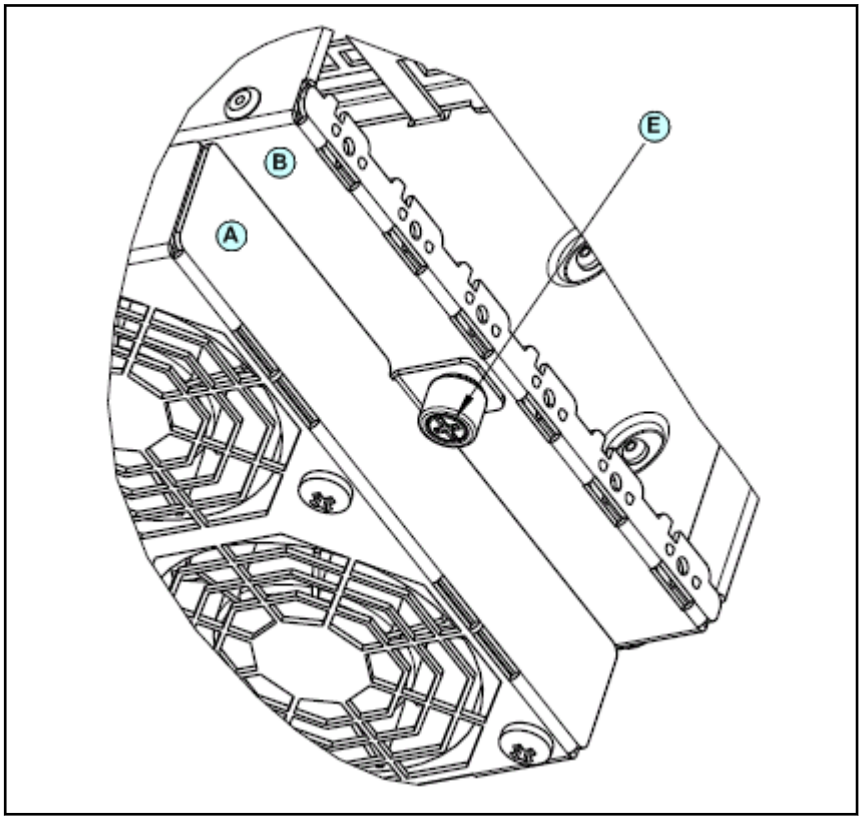


Fig. 20-9: Fan unit installation on the system housing - step 2

3. Connect plug Ⓕ of the fan unit in the header marked "FAN" on the base plate of the system housing.

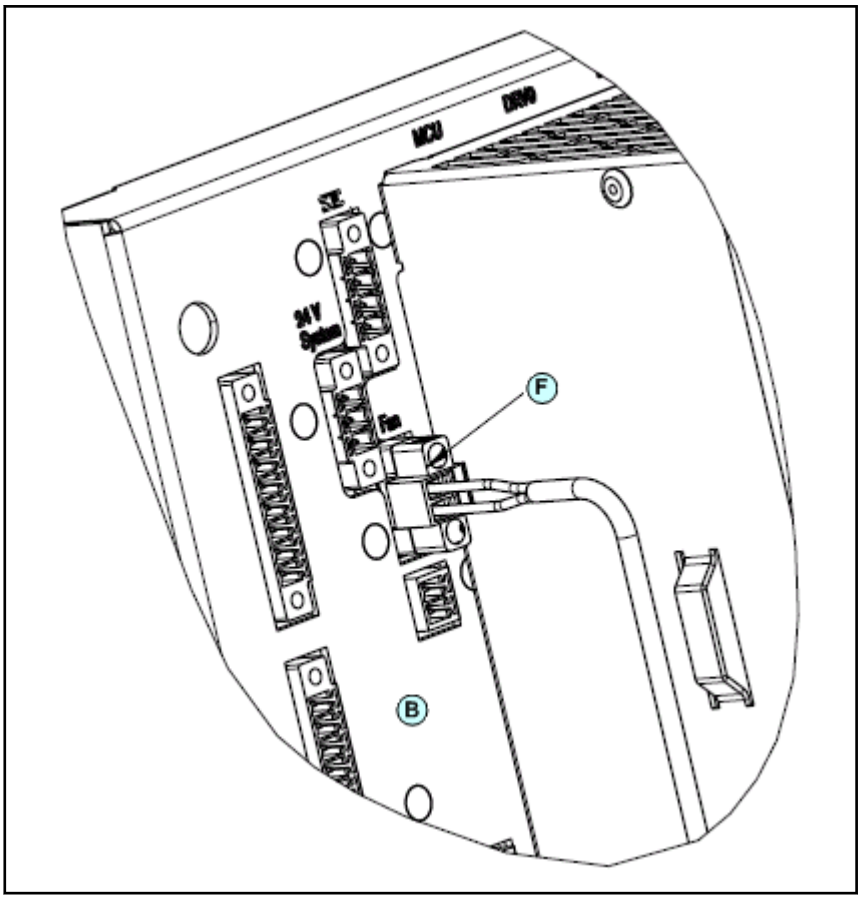


Fig. 20-10: Fan unit installation on the system housing - step 3

NOTICE **Damage to components may occur if the plug is connected in the wrong header.**

Make sure that the plug of the fan unit is connected in the header marked "FAN". The header next to the "FAN" header, marked "CAP0", should never be used to connect the fan unit.

Minimum tightening torque of the screws of the plug is 1,94 lbs*inch (0,22 Nm), maximum tightening torque is 2,21 lbs*inch (0,25 Nm).

20.6 Removal of the fan unit

First, disconnect all drive power supply plugs ("DPx" and "DP NY4130 x"). Make sure that (optional) capacitors in the system are fully discharged. Then disconnect the 24V System power supply plug.

Do the following steps to remove the fan unit from the system housing, refer to the figures in chapter 20.5 "Installation of the fan unit on the system housing" on page 160.

1. Disconnect the plug Ⓕ of the fan unit from the system housing.

2. Loosen the knurled screw Ⓔ.
3. Move the hooks Ⓒ of the fan unit Ⓐ out of th slits Ⓓ of the module holder Ⓑ.

20.7 Commissioning

The fan unit is connected to the header marked with the text "FAN" on the base plate of the system housing.

20.8 Maintenance

The fan unit has no special maintenance requirements.

21 NY4950: IEEE 1394b Cables and Chokes

The cable used between the PC and the NY4110 MCU, and between nodes with an NY4110, is also known as "FireWire cable". The following cables are available.

Identification	Cable length	Connector on cable	Part number and ordering code
NY4950	0.5 meter	straight	R911318966 NYA04.1-1394B-CABLE-B-B-00.5M-NY4950
NY4950/10	1.0 meter	straight	R911318967 NYA04.1-1394B-CABLE-B-B-01.0M-NY4950/10
NY4950/20	2.0 meter	straight	R911318968 NYA04.1-1394B-CABLE-B-B-02.0M-NY4950/20
NY4950/30	4.5 meter	straight	R911318969 NYA04.1-1394B-CABLE-B-B-04.5M-NY4950/30

Tab. 21-1: IEEE 1394b cables



Fig. 21-1: IEEE 1394b cable and NY4950/99 chokes

☞ Every IEEE 1394b cable must be installed with NY4950/99 chokes as close as possible to the connector at both ends to prevent frequency radiation from the environment to disturb the communication signals in the cable. Part number of the choke is R911322874, ordering code is NYA04.1-CHOKES-10PCS-1394B-NY4950/99 (set of 10 chokes).

22 NY4951: LMS sensor and shared sensor cables

22.1 LMS sensor extension cables

The following LMS sensor connection (extension) cables are available. These cables have a male M8 connector at one end, and a female M8 connector at the other end.

Component name	Order number	Cable length	Short name
NYA04.1-SENSORCABLE-M-F-00.6M-NY4951/00	R911174517	0.6 m	NY4951/00
NYA04.1-SENSORCABLE-M-F-01.5M-NY4951/10	R911174518	1.5 m	NY4951/10
NYA04.1-SENSORCABLE-M-F-03.0M-NY4951/20	R911174519	3.0 m	NY4951/20
NYA04.1-SENSORCABLE-M-F-05.0M-NY4951/30	R911174520	5.0 m	NY4951/30
NYA04.1-SENSORCABLE-M-F-09.0M-NY4951/40	R911174521	9.0 m	NY4951/40

Tab. 22-1: Sensor extention cable male-female

22.2 Shared sensor cable

The following shared sensor connection cable is available. The cable has a male M8 connector at both ends.

Component name	Order number	Cable length	Short name
NYA04.1-SHARED-CABLE-M-M-01.0M-NY4951/70	R911174516	1.0 m	NY4951/70

Tab. 22-2: Shared sensor cable male-male



If the distance between NY4074 or NY4079 system housings is too large for the NY4951/70 shared sensor cable, you can extend the length with a suitable LMS sensor extension cable, see chapter 22.1 "LMS sensor extension cables" on page 167.

22.3 Connection

NOTICE **LMS sensor will be damaged if M8 connector is plugged not observing keying.**

- Observe the key in the socket and connector.
- Do not plug the connector into the socket using excessive force.

NOTICE **LMS sensor may be damaged if (dis)connected while power is applied.**

Make sure power supplies are switched off before connecting or disconnecting the LMS sensor connector.

Tightening torque of the M8 connector is 0.2 Nm.

22.4 Cable specifications

Ambient conditions		
	Degree of protection	IP65
		IP67
General		
	Rated voltage	30V DC, 30V AC
	Rated current at 40 °C	1.5A
	Insertion/withdrawal cycles	≥ 100
Material		
	Flammability rating according to UL 94	HB
Cable		
	Cable type	PUR halogen-free
	External cable diameter	5.9 mm ±0.2 mm
	Conductor cross section	8x 0.14 mm^2 (signal line)
	AWG signal line	26
	Thickness, insulation	≥ 0.21 mm (signal line)
		≥ 0.38 mm (outer cable sheath)
	Shielding	Tinned copper braided shield
	Smallest bending radius, fixed installation	29.5 mm
	Smallest bending radius, movable installation	59 mm
	Number of bending cycles	2000000
	Ambient temperature (operating)	-25 °C ... 80 °C

Tab. 22-3: Cable specifications

23 NY4980: LMS Hall sensor module

23.1 Available Hall sensor modules

The following Hall sensors are available.

Component name	Order number
NYA04.1-LMS-HALLSENSOR-24-180-NY4980/00	R911173569
NYA04.1-LMS-HALLSENSOR-24-90-NY4980/10	R911173570

Tab. 23-1: Hall sensor modules

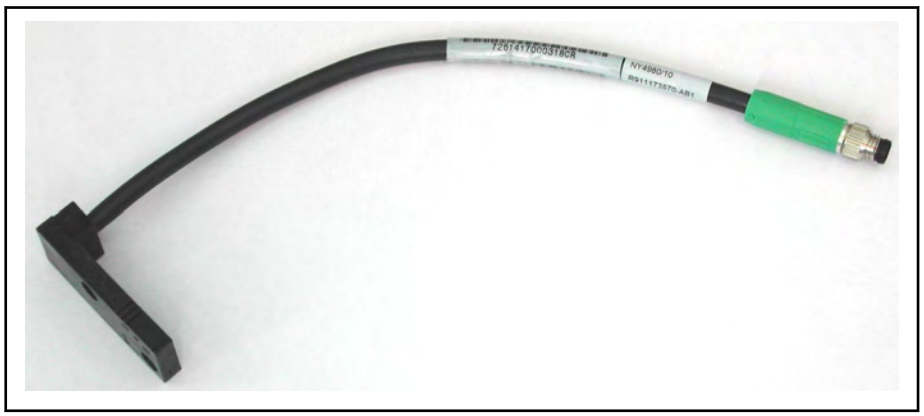


Fig. 23-1: NY4980/10 Hall sensor module

Both Hall sensor modules use the magnet plate with a pole pitch of 24 mm. The Hall sensor modules can be mounted on the coil or on the track. The attached cable length of both Hall sensor modules is approximately 20 cm.

23.2 Hall sensor dimensions

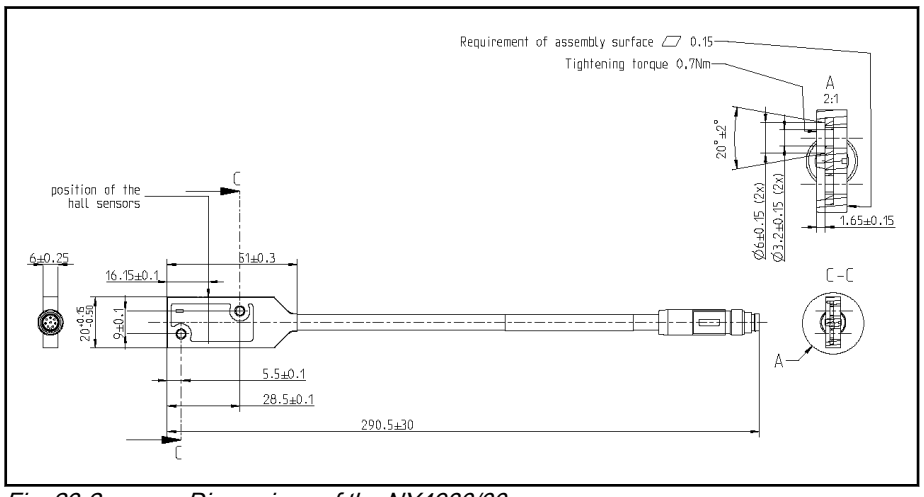


Fig. 23-2: Dimensions of the NY4980/00

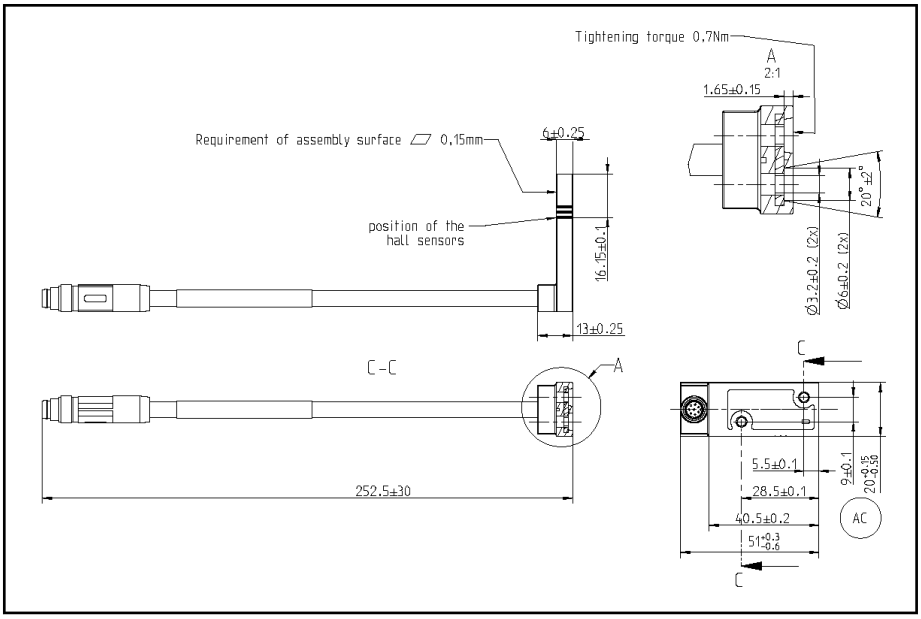


Fig. 23-3: Dimensions of the NY4980/10

23.3 Hall sensor specifications

- Nominal air gap distance: 6.5 ± 0.5 mm.
- Absolute accuracy: ± 300 µm.
- Repeatable accuracy: ± 20 µm.
- Resolution: 5 - 10 µm.
- Signal period: 24 mm.
- Power supply: +5 Vdc and –5 Vdc, typical < 5 mA (< 50 mW).
- Output voltage: 8 V_{tt} nominal, differential SinCos signal (at an air gap of 6 mm and room temperature).
- Cable connection: anchored in casting with M8 male connector.
  Minimum bending radius ≥ 29.5 mm (fixed installation).
  Minimum bending radius ≥ 59 mm (movable installation).
  Maximum number of bending cycles: 2000000.
- IP classification: IP40.
- Operating temperature: 5 °C .. 80 °C.

☞ Degradation of the magnet plate occurs at high temperatures. No problems are expected when the environmental temperature of the magnet plate is kept below 40 °C.

For connection cable specifications see chapter 22.4 "Cable specifications" on page 168.

23.4 Hall sensor connection

NOTICE **Hall sensor will be damaged if M8 connector is plugged not observing keying.**

- Observe the key in the socket and connector.
- Do not plug the connector into the socket using excessive force.

NOTICE **Hall sensor may be damaged if (dis)connected while power is applied.**

Make sure power supplies are switched off before connecting or disconnecting the Hall sensor connector.

Connect the NY4980 Hall sensor only to the NY4074 or NY4079 system housing S0 .. S9 connectors.

Both Hall sensor modules have a short connection cable with an M8 male connector. Extension cables to connect the Hall sensor module to the NY4074 or NY4079 system housing are available in several lengths, see chapter 22.1 "LMS sensor extension cables" on page 167 for detailed information.

Maximum sensor cable length is 10 m.

Tightening torque of the M8 connector is 0.2 Nm.

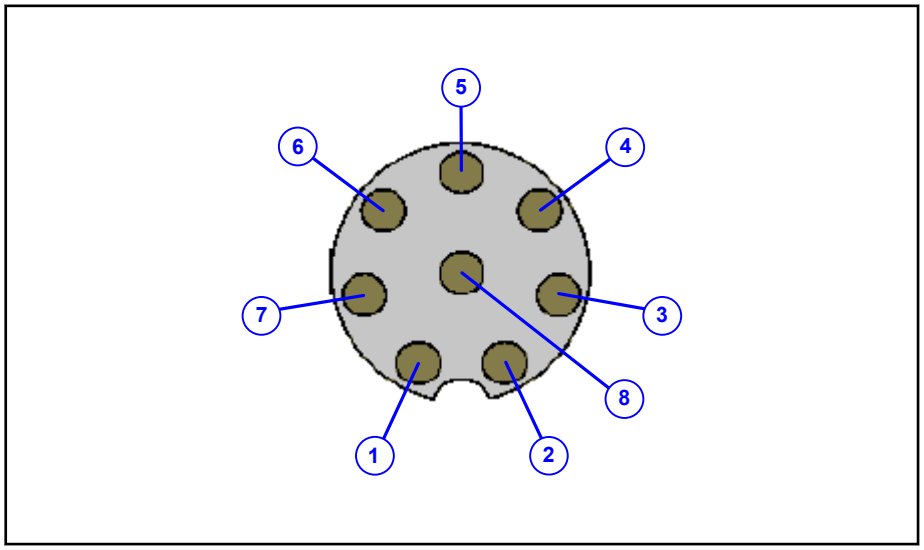


Fig. 23-4: LMS Hall sensor male connector pinout

The connector pin assignment is given in tab. 23-2 "LMS Hall sensor connection pinout" on page 172.

Pin	Hall sensor connections
1	sine +
2	sine -
3	cosine +
4	cosine -
5	+5V
6	GND
7	-5V
8	GND
housing	cable shielding

Tab. 23-2: LMS Hall sensor connection pinout

Legacy support

The NY4980/00 and NY4980/10 are compatible with the NY4960 LMS-MUX used to connect the Hall sensor modules to the NY4073 and NY4078 system housings. However, a 15-pin sub-D connector is used on the NY4960 LMS-MUX. The following adapter cable is required to connect the NY4980 Hall sensor to the NY4960 LMS-MUX.

M8 (female) connector pin number	15-pin sub-D male connector pin number
1	1
2	9
3	2
4	10
5	4
6	3
7	11
8	3
housing shielding	housing shielding

Tab. 23-3: Adapter cable M8 female / 15-pin sub-D male

The NY4980 sensor with the adapter cable can be connected to connector X1, X2, X3, X4, or X5 on the LMS-MUX, depending on the desired sensor number in the track. See the NYCe 4000 Legacy Components Manual, chapter "NY4960: LMS-MUX for 2 axes" for detailed information.

23.5 Hall sensor installation

Tightening torque of the screws is 0.4 ... 0.7 Nm.

☞ It is mandatory that the surface of the sensor, especially at the opposite end of the cable connection side, is completely supported by the frame onto which the sensor is mounted.

If a screw with nut is used to mount the NY4980/10, there is not much space to hold the nut at the side where the cable exits the sensor (at 90 degrees angle). It is advised to use a tapped hole in the frame to mount the sensor. Further, make sure that the nut (if used) does not protrude the housing of the sensor, as this may affect the adjustment.

24 NY4981: LMS MR sensor module

24.1 Available MR sensor modules

The NY4981 MR sensor module is based on magneto-resistive sensing elements. The MR sensor module is an alternative for the NY4980 Hall sensor module. The NY4981 offers improved position accuracy compared with the NY4980. The MR sensor works in combination with an NY4985 magnetic scale, whereas the Hall sensor works in combination with the motor magnet plate. The MR sensor module uses the same interface as the Hall sensor module to the NY4074 and NY4079 system housing. The following MR sensor module is available.

Component name	Order number
NYA04.1-LMS-MRSENSOR-180-NY4981/00	R911174592

Tab. 24-1: MR sensor module

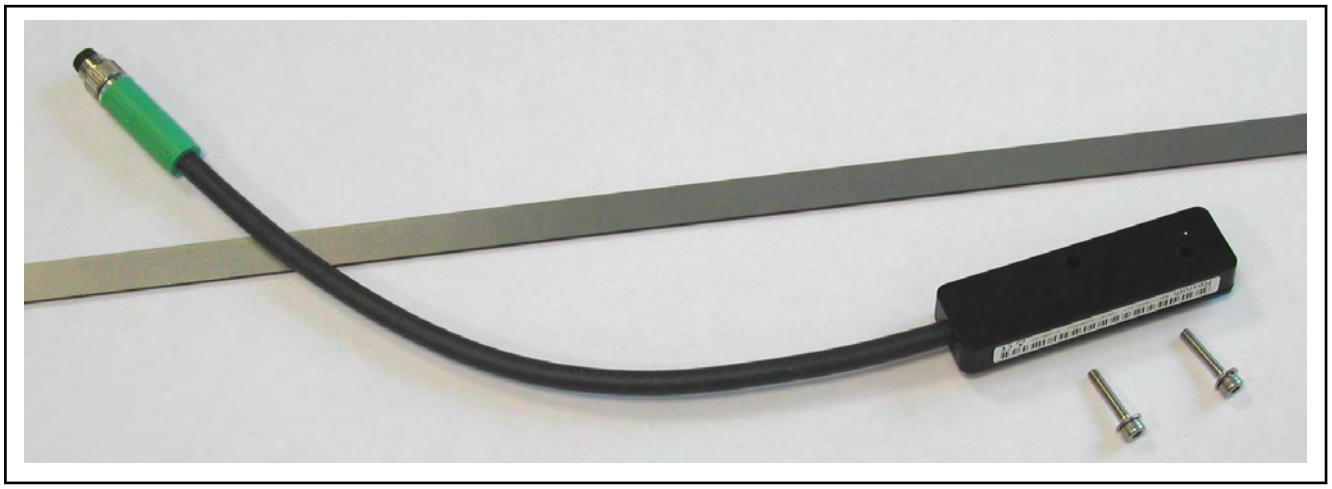


Fig. 24-1: NY4981/00 MR sensor module with M3 screws and NY4985 magnetic scale

The MR sensor modules must be mounted on the track with the two supplied M3 screws with ring. The attached cable length of the MR sensor module is approximately 20 cm.

The MR sensor module uses a magnetic scale with a pole pitch of 5 mm. The NY4985 magnetic scale is mounted on a carrier, and each carrier has its own magnetic scale. The location of the magnetic scale can be chosen freely, but external magnetic fields must not affect the magnetic field of the magnetic scale.

24.2 MR sensor dimensions

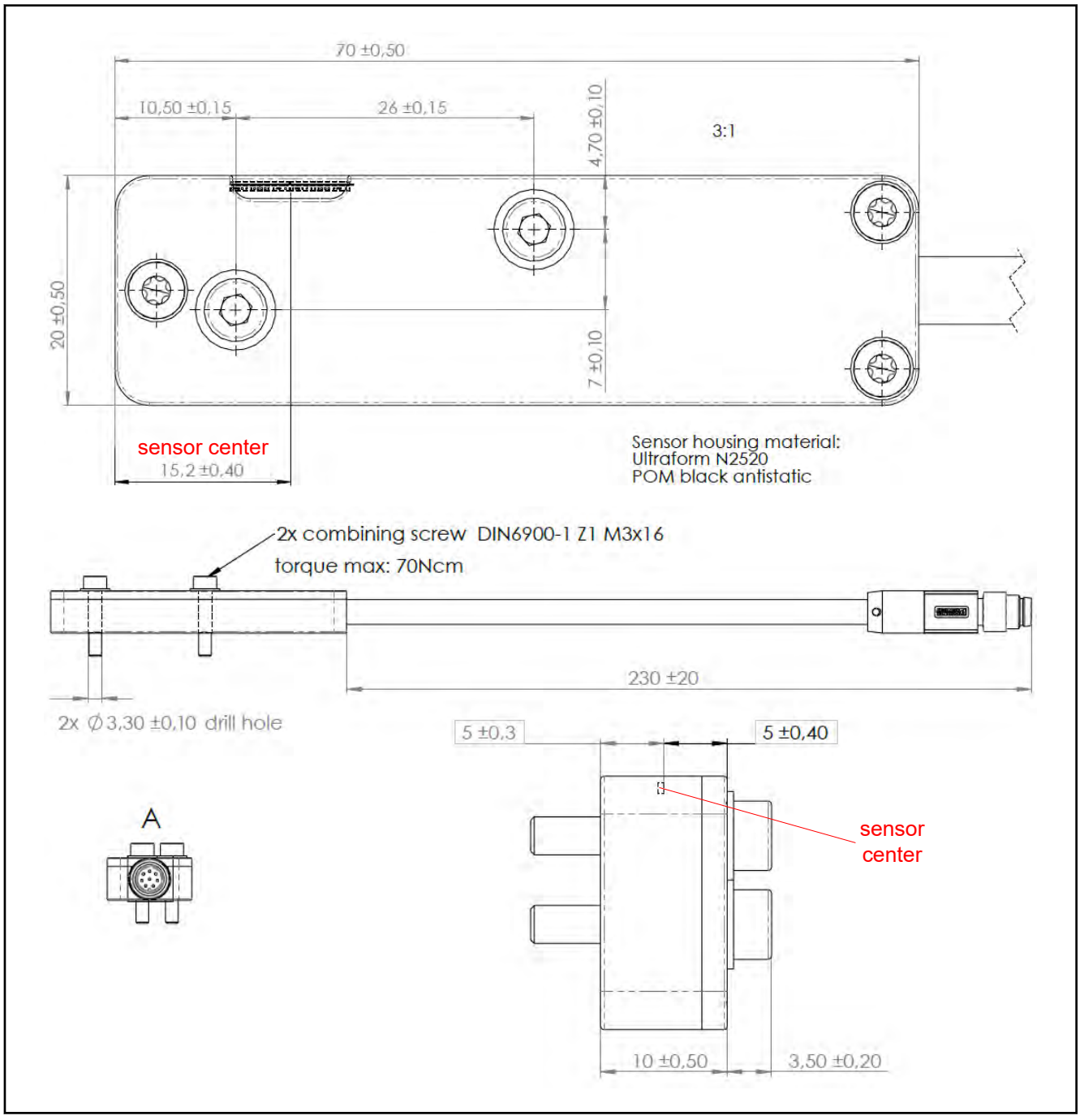


Fig. 24-2: NY4981/00 dimensions

24.3 MR sensor specifications

- Preferred air gap distance between MR sensor and magnetic scale : 1.0 mm +/-0.3 mm.

  Allowed air gap distance between MR sensor and magnetic scale : 1.0 mm +/-0.5 mm.

Note that for the allowed air gap distance the accuracy and repeatability are still within specifications.

- Positioning
  - Absolute positioning accuracy (with NY4985): ±22 µm.
  - Positioning repeatability (with NY4985): ±5 µm.

  Specified accuracy and repeatability is achieved under above mentioned air gap distance when MR sensors are (M - l * 6)) mm apart, where M is the length of the magnetic scale and l is the length of one magnetic scale pole pitch in mm (5 mm).
- Power supply: +5 Vdc / –5 Vdc ±10%, typical < 5 mA (< 50 mW).
- Cable connection: anchored in casting with M8 male connector.

  Minimum bending radius ≥ 29.5 mm (fixed installation).

  Minimum bending radius ≥ 59 mm (movable installation).

  Maximum number of bending cycles: 2000000.
- IP classification: IP40.
- Operating temperature: 5 °C .. 70 °C.

For connection cable specifications see chapter 22.4 "Cable specifications" on page 168.

24.4 MR sensor connection

NOTICE	**MR sensor will be damaged if M8 connector is plugged not observing keying.**

- Observe the key in the socket and connector.
- Do not plug the connector into the socket using excessive force.

NOTICE	**MR sensor may be damaged if (dis)connected while power is applied.**

Make sure that all power supplies are switched off before connecting or disconnecting the MR sensor connector.

☞ Connect the NY4981 MR sensor only to the NY4074 or NY4079 system housing S0 .. S9 connectors.

The MR sensor module has a short connection cable with an M8 male connector. Extension cables to connect the MR sensor module to the NY4074 or NY4079 system housing are available in several lengths, see chapter 22.1 "LMS sensor extension cables" on page 167 for detailed information.

☞ Maximum total sensor cable length is 10 m.

Tightening torque of the M8 connector is 0.2 Nm.

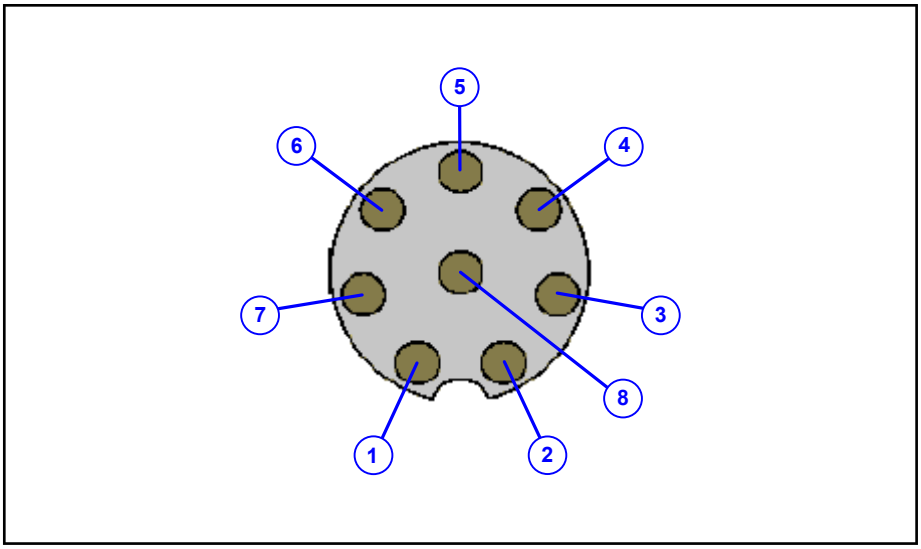


Fig. 24-3: LMS MR sensor male connector pinout

The connector pin assignment is given in tab. 24-2 "LMS MR sensor connection pinout" on page 178.

Pin	MR sensor connections
1	sine +
2	sine -
3	cosine +
4	cosine -
5	+5V
6	GND
7	-5V
8	GND
housing	cable shielding

Tab. 24-2: LMS MR sensor connection pinout

24.5 MR sensor installation

The MR sensor must be mounted on a solid frame, to avoid vibrations.

- The supplied M3 screws with ring must be in the mounting bracket for at least 4 turns.
- Tightening torque is 0.7 Nm.

Mounting specifications

For optimal performance, mount the NY4981 MR sensor module as described in tab. 24-3 "Mounting specfications for the NY4981 MR sensor module" on page 179.

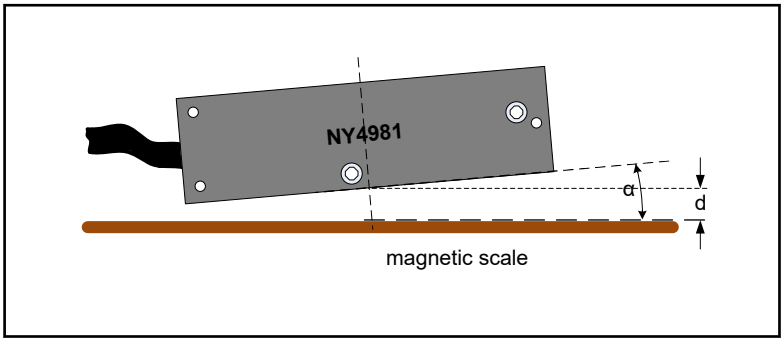


Fig. 24-4: Air gap distance and pitch angle between sensor module and magnetic scale

- Air gap is distance d, measured from the center of the MR sensor module to the surface of the magnetic scale.
- Pitch (longitudinal inclination) of the MR sensor module with respect to the magnetic scale α must be within ±1.5°.

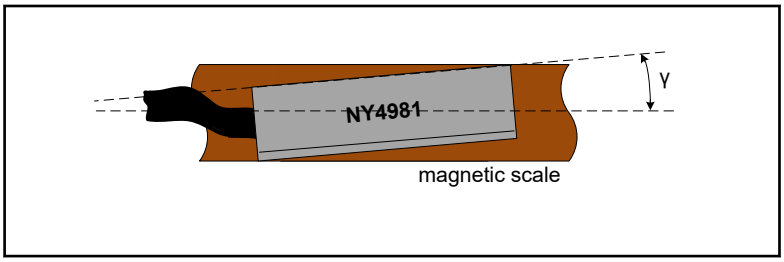


Fig. 24-5: Yaw angle of sensor module with respect to magnetic scale

- Yaw (lateral offset) of the MR sensor module with respect to the magnetic scale γ must be within ±2.0°.

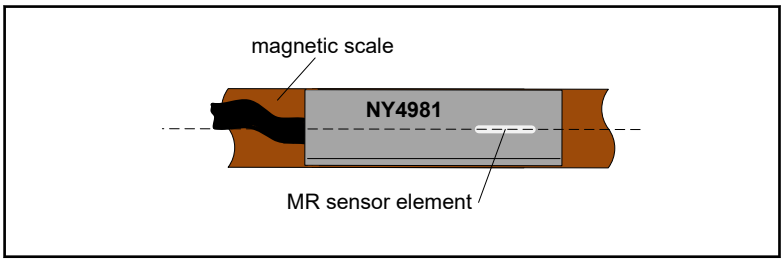


Fig. 24-6: Sensor position relative to magnetic scale

- Position of the MR sensor module is within ±1 mm of the center of the magnetic scale in movement direction.

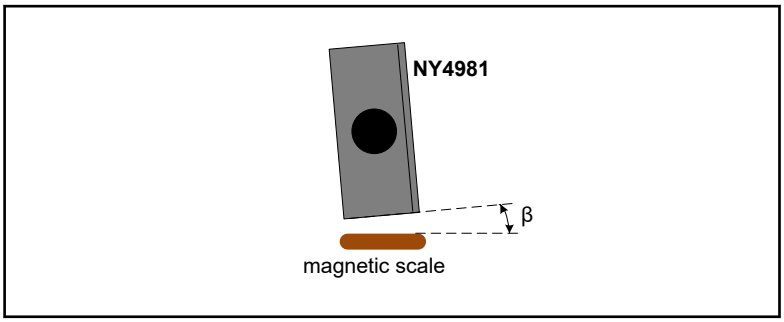


Fig. 24-7: Roll angle of sensor module with respect to magnetic scale

- Roll (lateral inclination) of the MR sensor module with respect to the magnetic scale β must be within ±2.0°.

Tab. 24-3: Mounting specfications for the NY4981 MR sensor module

25 NY4985: Magnetic scale

25.1 Introduction

The NY4985 magnetic scale is used in combination with the NY4981 MR sensor module. The NY4985 magnetic scale has a pole pitch of 5 mm. The magnetic scale is mounted on a carrier, and each carrier has its own magnetic scale. The location of the magnetic scale can be chosen freely, but external magnetic fields must not affect the magnetic field of the magnetic scale.

☞ The clear space distance between the magnetic scale and the edge of a magnet plate must be 50 mm or larger.

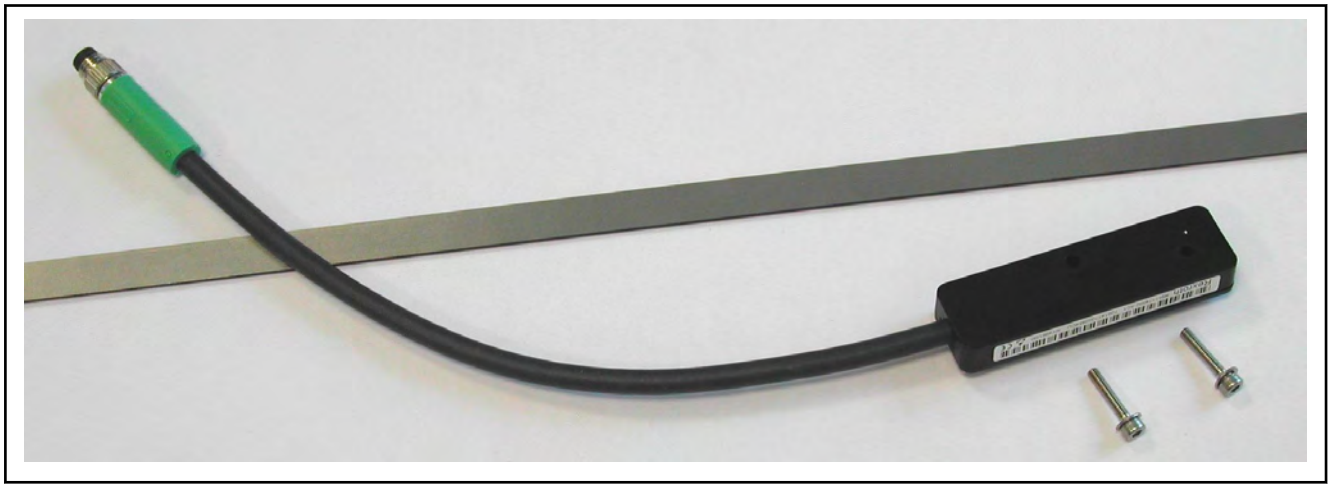


Fig. 25-1: NY4985 magnetic scale and NY4981/00 MR sensor module

25.2 Available magnetic scales

The following magnetic scales are available.

Component name	Order number
NYA04.1-LMS-MAGNETSCALE-5-XXXX-NY4985 Magnetic scale with a customer-ordered length. XXXX specifies the length in [mm]. The range of XXXX is 0150 .. 1000 mm in increments of 5 mm.	R91117yyyy

Tab. 25-1: Magnetic scales

25.3 Magnetic scale dimensions

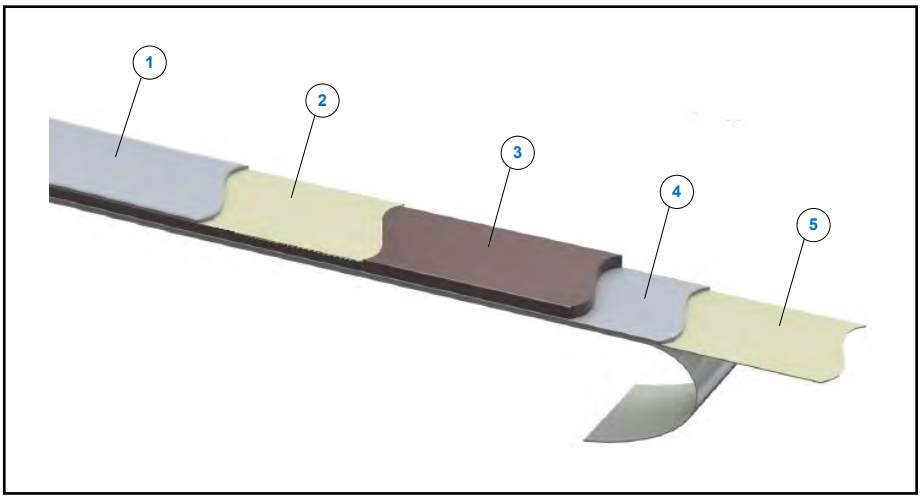


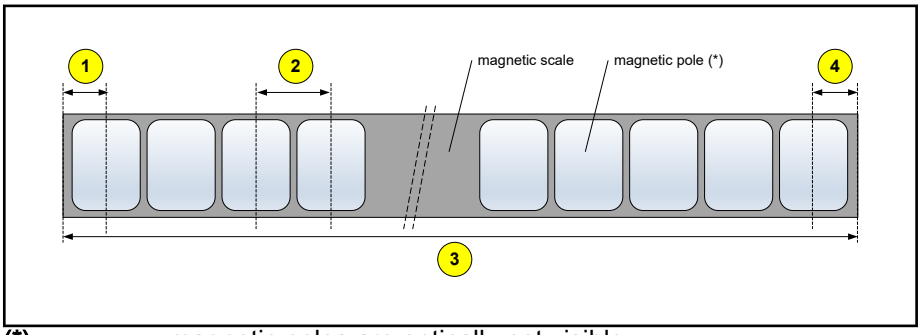
Fig. 25-2: NY4985 magnetic scale

Item	Description	Thickness
1	Stainless steel cover tape	0.1 mm
2	Adhesive tape	0.13 mm
3	Magnetic tape	1.0 mm
4	Stainless steel carrier tape	0.3 mm
5	Adhesive tape	0.13 mm
	Total thickness	1.66 mm ±0.15 mm

Tab. 25-2: Dimensions of the NY4985 magnetic scale

Width of the magnetic scale 10 ±0.2 mm.

25.4 Magnetic scale specifications



(*) magnetic poles are optically not visible

Fig. 25-3: magnetic scale dimensions

- ① distance scale edge and first pole center = 2.5 mm ±0.2 mm.
- ② distance between 2 poles = 5.0 mm. Pole deviation is ±3 µm/m.
- ③ scale length = n * 5 mm ±0.4 mm (n = number of poles).
- ④ distance scale edge and last pole center = 2.5 mm ±0.2 mm.

- Accuracy: ± 10 µm/m.
- Expansion coefficient: ~ 17 x 10^{-6}/°K.
- Minimum bending radius: 65 mm.
- Operating temperature: 5 °C .. 70 °C.
- Humidity range: see chapter 29 "Environmental Conditions" on page 223.
- Magnetic scales must be applied within 12 months of shipment / transport from Bosch Rexroth.
- The adhesive tape can be glued onto the following materials.

ABS	Polycarbonate	Galvanized steel
Aluminum	Phenolic resins	Enameled steel
Ceramics	Glass / Epoxy	Stainless steel
Hard PVC		

Tab. 25-3: Adhesive tape suitable mounting materials

25.5 Magnetic scale installation guide lines

The mounting of the magnetic scale depends on customer-specific factors. Therefore, only general guide lines are presented for the installation of the magnetic scale on a carrier.



- Do not damage the magnetic scale with sharp objects such as a knife, saw or screwdriver.
- Keep away magnetic materials, such as a screwdriver or a magnet, from the magnetic scale.
- The following storage conditions must be respected at least 24 hours before applying the magnetic scale to the carrier.

  Humidity controlled storage

  – 16 °C to 27 °C (60 °F to 80 °F)

  – 40-60% R.H.

Before you begin

Make sure that the surface of the carrier where you want to install the magnetic scale is thoroughly cleaned and degreased.

Allow sufficient time to acclimatize the carrier and the magnetic scale to the installation environment.

Put markings on the carrier where the magnetic scale must be installed.

Installation of the magnetic scale

Position the magnetic scale on the carrier taking the MR sensor mounting into account. See chapter 24.5 "MR sensor installation" on page 178 for detailed information.



The magnetic scale of **all** carriers in the LMS must be positioned such that all are within a span of 2 mm. The positioning of the magnetic scale of carrier D can never fit within a 2 mm span, compared to carriers A, B, and C.

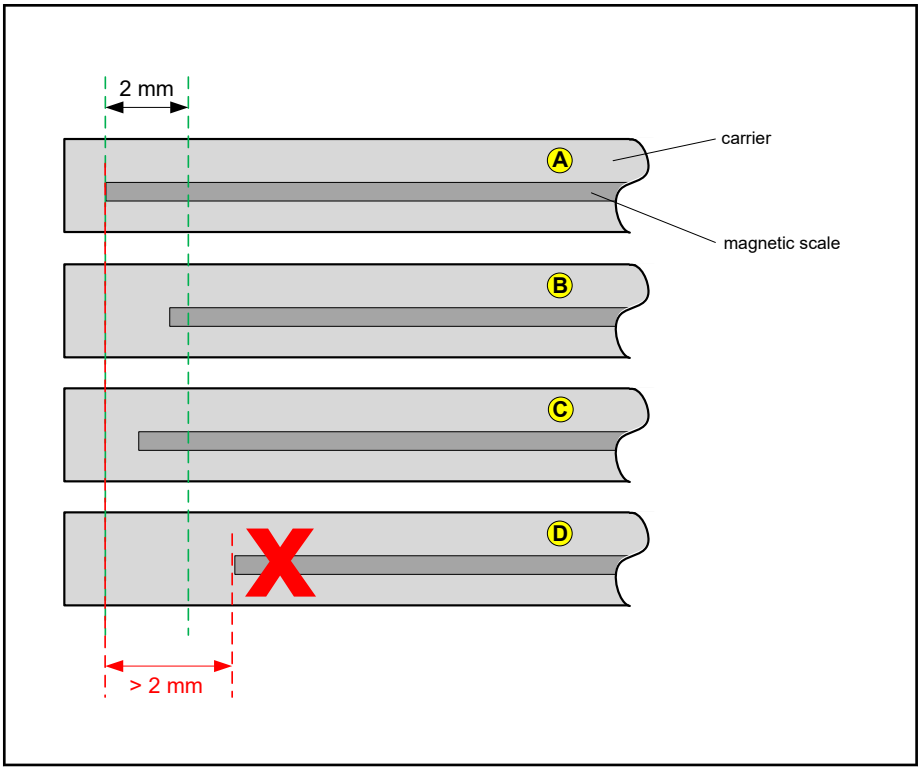


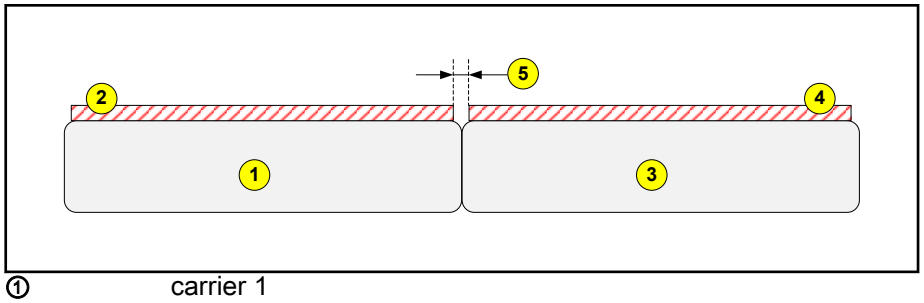
Fig. 25-4: Positioning of the magnetic scale on carriers in one LMS

Remove the adhesive protection foil as you glue the magnetic scale onto the carrier.

The distance between magnetic scales of adjacent carriers against each other depends on the type of magnetic poles facing each other. Each magnetic scale has a letter "N" or "S" marking indicating the type of magnetic pole used at each end of the scale.



Fig. 25-5: Magnetic scale N and S markings



① carrier 1
② magnetic scale on carrier 1
③ carrier 2
④ magnetic scale on carrier 2
⑤ magnetic scale distance

Fig. 25-6: Magnetic scale distance when two carriers are against each other

magnetic scale distance

- if the type of magnetic poles facing each other is identical (N and N or S and S), the magnetic scale distance must be ≥ 15 mm.
- if the type of magnetic poles facing each other is different (S and N or N and S), the magnetic scale distance must be ≥ 10 mm.
- if you do not know the type of magnetic poles facing each other, the magnetic scale distance must be ≥ 15 mm.

Apply firm finger pressure via a clean lint-free cloth along the length of the magnetic scale to ensure complete adhesion.

☞ The ultimate bonding strength at 20 °C is attained after approximately 72 hours. Heat accelerates the bonding process. The ultimate bonding strength can be attained at 65 °C after one hour.

After the installation

Clean the magnetic scale with cleaning wipes, or a clean, dry, lint-free cloth.

26 LMS coils and magnet plates

26.1 Common coil environmental specifications

- Protection class (EN 60034-5) : IP40
- Cooling mode (EN 60034-6) : IC410, self-cooling
- Thermal class (EN 60034-1): 130 (B)
- Installation altitude : 0 .. 1000 m above MSL (without derating)

26.2 TM series coils and magnet plates

The following TM series coils are available.

Component name	Order number
NYA04.1-LMS-COIL-UNIT-TM3S-3685075	R911343771
NYA04.1-LMS-COIL-UNIT-TM3Z-3685533	R911374471
NYA04.1-LMS-COIL-UNIT-TM6S-3685076	R911343770
NYA04.1-LMS-COIL-UNIT-TM6Y-104582	R911398301
NYA04.1-LMS-COIL-UNIT-TM12S-3685078	R911343769
NYA04.1-LMS-COIL-UNIT-TM18N-3685500	R911384027
NYA04.1-LMS-COIL-UNIT-TM18S-3685519	R911384029

Tab. 26-1: TM series coils

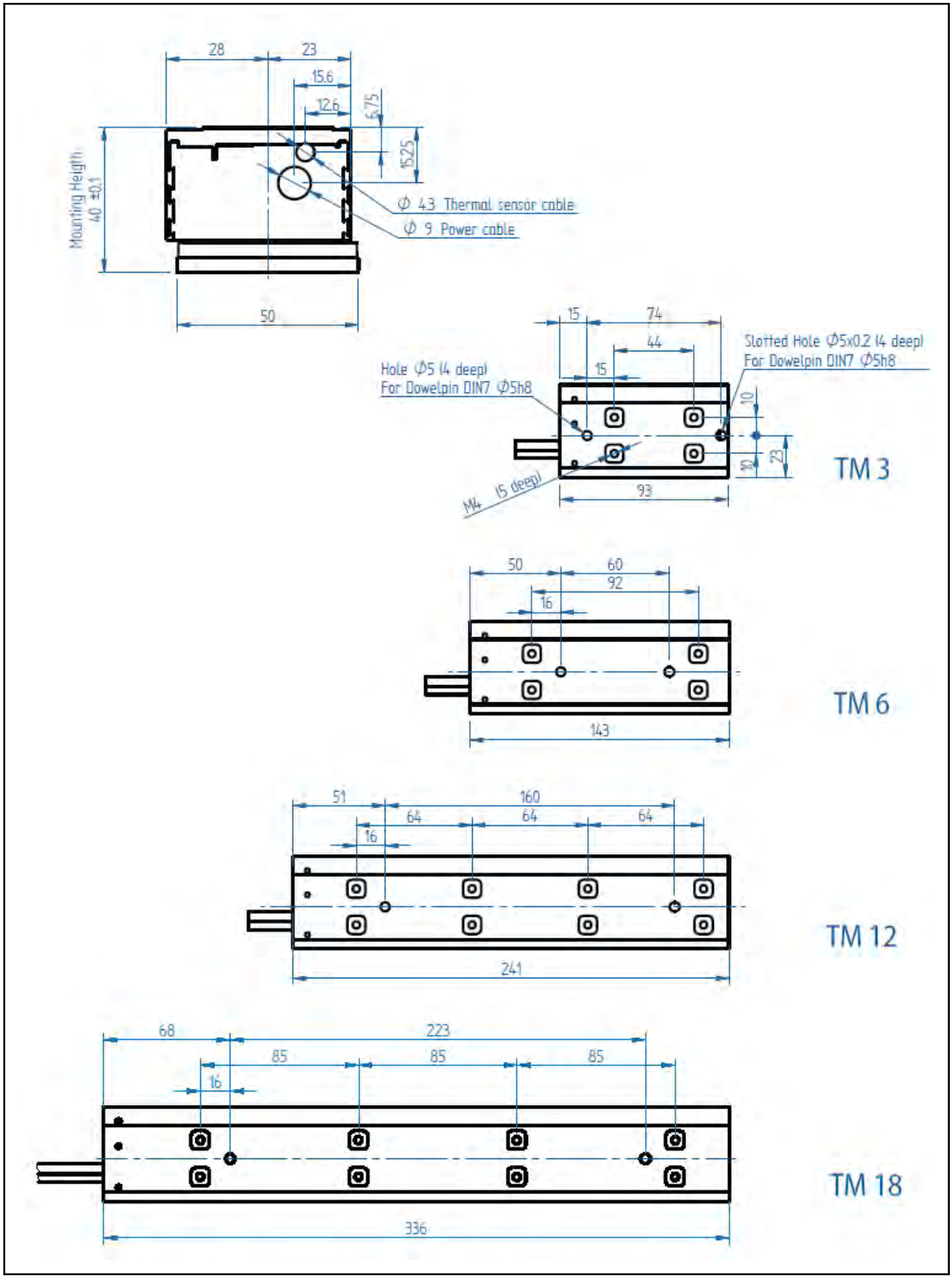


Fig. 26-1: TM series coils

	Parameter	Remarks	Symbol	Unit	TM3	TM3
Performance	Winding type				S	Z
	Motortype, max voltage ph-ph		3-phase synchronous Iron core, 400Vac rms (600Vdc)			
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	120	120
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	105	105
	Continuous Force*	coils @ 100°C	Fc	N	60	60
	Maximum Speed**	@ 600 V	vmax	m/s	12	36.6
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	39	12.9
	Motor Constant	coils @ 25°C	S	N2/W	95	95
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	4.1	12.6
	Peak Current	magnet @ 25°C	Ip	Arms	3.1	9.5
	Maximum Continuous Current*	coils @ 100°C	Ic	Arms	1.5	4.7
	Back EMF Phase-Phasepeak		Bemf	V / m/s	32	11
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	5.4	0.56
	Induction per Phase	I < 0.6 Ip	Lf	mH	35	3.65
	Electrical Time Constant*	coils @ 25°C	τe	ms	6.5	6.5
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	49	49
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	1.5	1.5
	Thermal Time Constant*	to max. coil temp.	τth	s	75	75
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122	
Mechanical	Coil Unit Weight	ex. cables	W	kg	0.6	0.6
	Coil Unit Length	ex. cables	L	mm	93	93
	Motor Attraction Force	rms @ 0 A	Fa	N	300	300
	Magnet Pitch NN		τ	mm	24	24
	Cable Mass		m	kg/m	0.18	0.18
	Cable Type (Power)	length 3 m	d	mm (AWG)	8.3 (≥18)	
	Cable Type (Sensor)	length 3 m	d	mm (AWG)	4.3 (26)	
	Cable Life (Power FLEX)***	minimum			5,000,000 cycles	
	Bending Radius Static	minimum			4x cable diameter	
	Bending Radius Dynamic	minimum			10x cable diameter	

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

*** Depending on bending radius, velocity and acceleration.

Fig. 26-2: TM3 series coil specifications

	Parameter	Remarks	Symbol	Unit	TM6	TM6
Performance	Winding type				S	Y
	Motortype, max voltage ph-ph		3-phase synchronous Iron core, 400Vac rms (600Vdc)			
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	240	240
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	210	210
	Continuous Force*	coils @ 100°C	Fc	N	120	120
	Maximum Speed**	@ 600 V	vmax	m/s	12	28.5
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	39	16.7
	Motor Constant	coils @ 25°C	S	N2/W	190	190
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	8.2	19.5
	Peak Current	magnet @ 25°C	Ip	Arms	6.2	14.7
	Maximum Continuous Current*	coils @ 100°C	Ic	Arms	3.0	7.2
	Back EMF Phase-Phasepeak		Bemf	V / m/s	32	13.6
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	2.7	0.46
	Induction per Phase	I < 0.6 Ip	Lf	mH	17	2.99
	Electrical Time Constant*	coils @ 25°C	τe	ms	6.5	6.5
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	99	99
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	0.75	0.75
	Thermal Time Constant*	to max. coil temp.	τth	s	75	75
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122	
Mechanical	Coil Unit Weight	ex. cables	W	kg	0.9	0.9
	Coil Unit Length	ex. cables	L	mm	143	143
	Motor Attraction Force	rms @ 0 A	Fa	N	500	500
	Magnet Pitch NN		τ	mm	24	24
	Cable Mass		m	kg/m	0.18	0.18
	Cable Type (Power)	length 3 m	d	mm (AWG)	8.3 (≥18)	
	Cable Type (Sensor)	length 3 m	d	mm (AWG)	4.3 (26)	
	Cable Life (Power FLEX)***	minimum			5,000,000 cycles	
	Bending Radius Static	minimum			4x cable diameter	
	Bending Radius Dynamic	minimum			10x cable diameter	

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

*** Depending on bending radius, velocity and acceleration.

Fig. 26-3: TM6 series coil specifications

	Parameter	Remarks	Symbol	Unit	TM12
Performance	Winding type				S
	Motortype, max voltage ph-ph				3-phase synchronous Iron core, 400Vac rms (600Vdc)
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	480
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	420
	Continuous Force*	coils @ 100°C	Fc	N	240
	Maximum Speed**	@ 600 V	vmax	m/s	12
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	39
	Motor Constant	coils @ 25°C	S	N2/W	380
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	16.4
	Peak Current	magnet @ 25°C	Ip	Arms	12.4
	Maximum Continuous Current*	coils @ 100°C	Ic	Arms	6.0
	Back EMF Phase-Phasepeak		Bemf	V / m/s	32
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	1.35
	Induction per Phase	I < 0.6 Ip	Lf	mH	9
	Electrical Time Constant*	coils @ 25°C	τe	ms	6.5
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	197
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	0.38
	Thermal Time Constant*	to max. coil temp.	τth	s	75
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122
Mechanical	Coil Unit Weight	ex. cables	W	kg	1.6
	Coil Unit Length	ex. cables	L	mm	241
	Motor Attraction Force	rms @ 0 A	Fa	N	900
	Magnet Pitch NN		τ	mm	24
	Cable Mass		m	kg/m	0.18
	Cable Type (Power)	length 3 m	d	mm (AWG)	8.3 (≥18)
	Cable Type (Sensor)	length 3 m	d	mm (AWG)	4.3 (26)
	Cable Life (Power FLEX)***	minimum			5,000,000 cycles
	Bending Radius Static	minimum			4x cable diameter
	Bending Radius Dynamic	minimum			10x cable diameter

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

*** Depending on bending radius, velocity and acceleration.

Fig. 26-4: TM12 series coil specifications

	Parameter	Remarks	Symbol	Unit	TM18	TM18
Performance	Winding type				N	S
	Motortype, max voltage ph-ph		3-phase synchronous Iron core, 400Vac rms (600Vdc)			
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	720	720
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	630	630
	Continuous Force*	coils @ 100°C	Fc	N	360	360
	Maximum Speed**	@ 600 V	vmax	m/s	4,5	10
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	79	39
	Motor Constant	coils @ 25°C	S	N2/W	570	570
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	12,3	25.1
	Peak Current	magnet @ 25°C	Ip	Arms	9,2	18.9
	Maximum Continuous Current*	coils @ 100°C	Ic	Arms	4,5	9.3
	Back EMF Phase-Phasepeak		Bemf	V / m/s	65	32
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	3,6	0,85
	Induction per Phase	I < 0.6 Ip	Lf	mH	23	5,5
	Electrical Time Constant*	coils @ 25°C	τe	ms	6.5	6.5
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	296	296
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	0.25	0.25
	Thermal Time Constant*	to max. coil temp.	τth	s	75	75
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122	
Mechanical	Coil Unit Weight	ex. cables	W	kg	2.3	2.3
	Coil Unit Length	ex. cables	L	mm	336	336
	Motor Attraction Force	rms @ 0 A	Fa	N	1300	1300
	Magnet Pitch NN		τ	mm	24	24
	Cable Mass		m	kg/m	0.18	0.18
	Cable Type (Power)	length 3 m	d	mm (AWG)	8.3 (≥18)	
	Cable Type (Sensor)	length 3 m	d	mm (AWG)	4.3 (26)	
	Cable Life (Power FLEX)***	minimum			5,000,000 cycles	
	Bending Radius Static	minimum			4x cable diameter	
	Bending Radius Dynamic	minimum			10x cable diameter	

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

*** Depending on bending radius, velocity and acceleration.

Fig. 26-5: TM18 series coil specifications

The following TM series magnet plates are available. Magnet plates can be butted together.

Component name	Order number
NYA04.1-LMS-MAGNETTM-96MM-3685225	R911343774
NYA04.1-LMS-MAGNETTM-144MM-3685226	R911343775
NYA04.1-LMS-MAGNETTM-384MM-3685227	R911343773
NYA04.1-LMS-MAGNETTMV-144MM-120C-3685419	R911343772
NYA04.1-LMS-MAGNETTMV-384MM-120C-3685511	R911369668

Tab. 26-2: TM series magnet plates

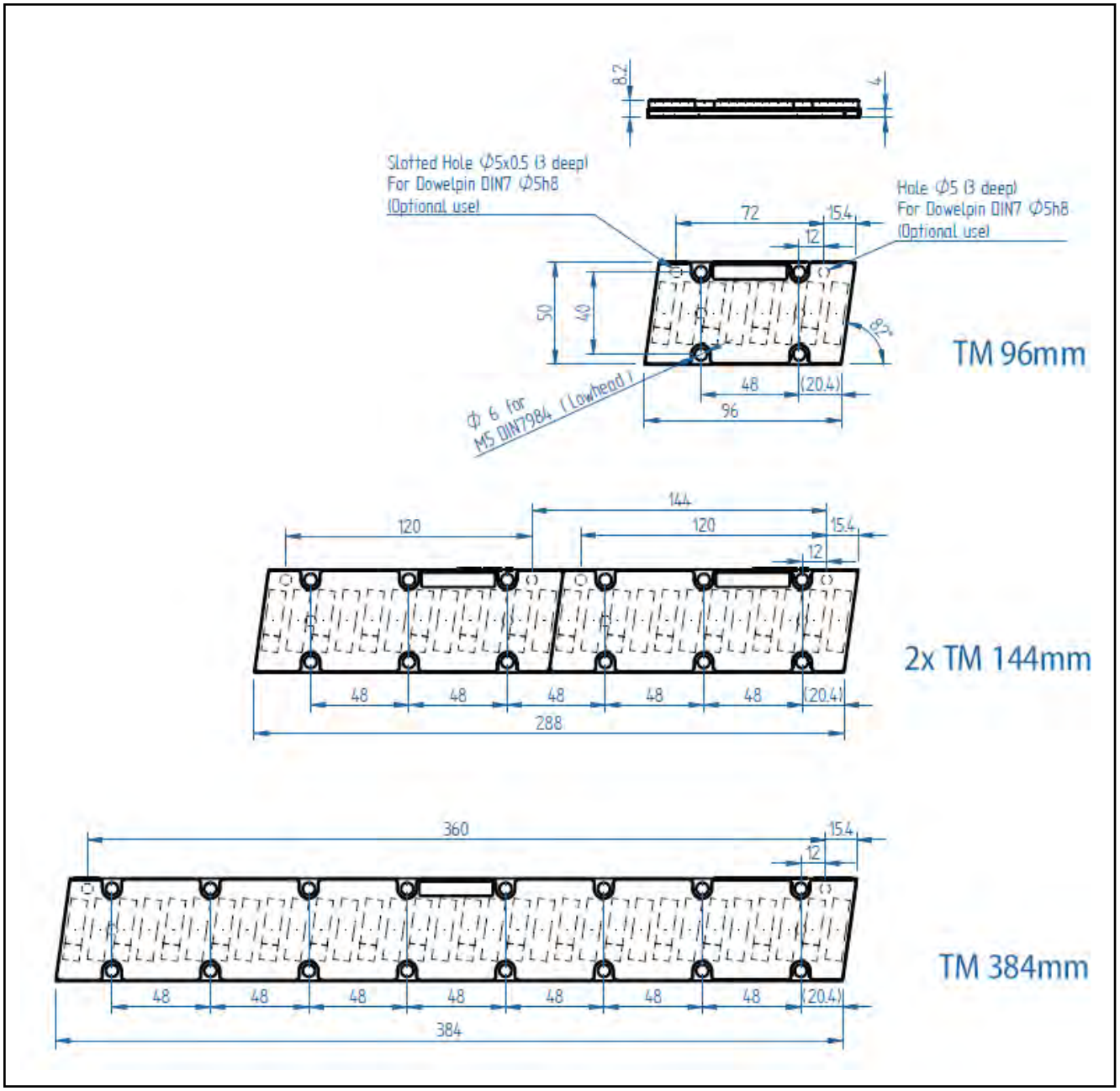


Fig. 26-6: TM series magnet plates

26.3 TL series coils and magnet plates

The following TL series coils are available.

Component name	Order number
NYA04.1-LMS-COIL-UNIT-TL6N-3697458	R911343602
NYA04.1-LMS-COIL-UNIT-TL6S-3685032	R911343601
NYA04.1-LMS-COIL-UNIT-TL9N-3685311	R911343558
NYA04.1-LMS-COIL-UNIT-TL9S-3675312	R911343559

Component name	Order number
NYA04.1-LMS-COIL-UNIT-TL12N-3697459	R911343597
NYA04.1-LMS-COIL-UNIT-TL12S-3685033	R911343435
NYA04.1-LMS-COIL-UNIT-TL15N-3687460	R911343560
NYA04.1-LMS-COIL-UNIT-TL15S-3685034	R911343561
NYA04.1-LMS-COIL-UNIT-TL18N-3685223	R911343562
NYA04.1-LMS-COIL-UNIT-TL18S-3685224	R911343603
NYA04.1-LMS-COIL-UNIT-TL24N-3685014	R911343604
NYA04.1-LMS-COIL-UNIT-TL24S-3685035	R911343605

Tab. 26-3: TL series coils

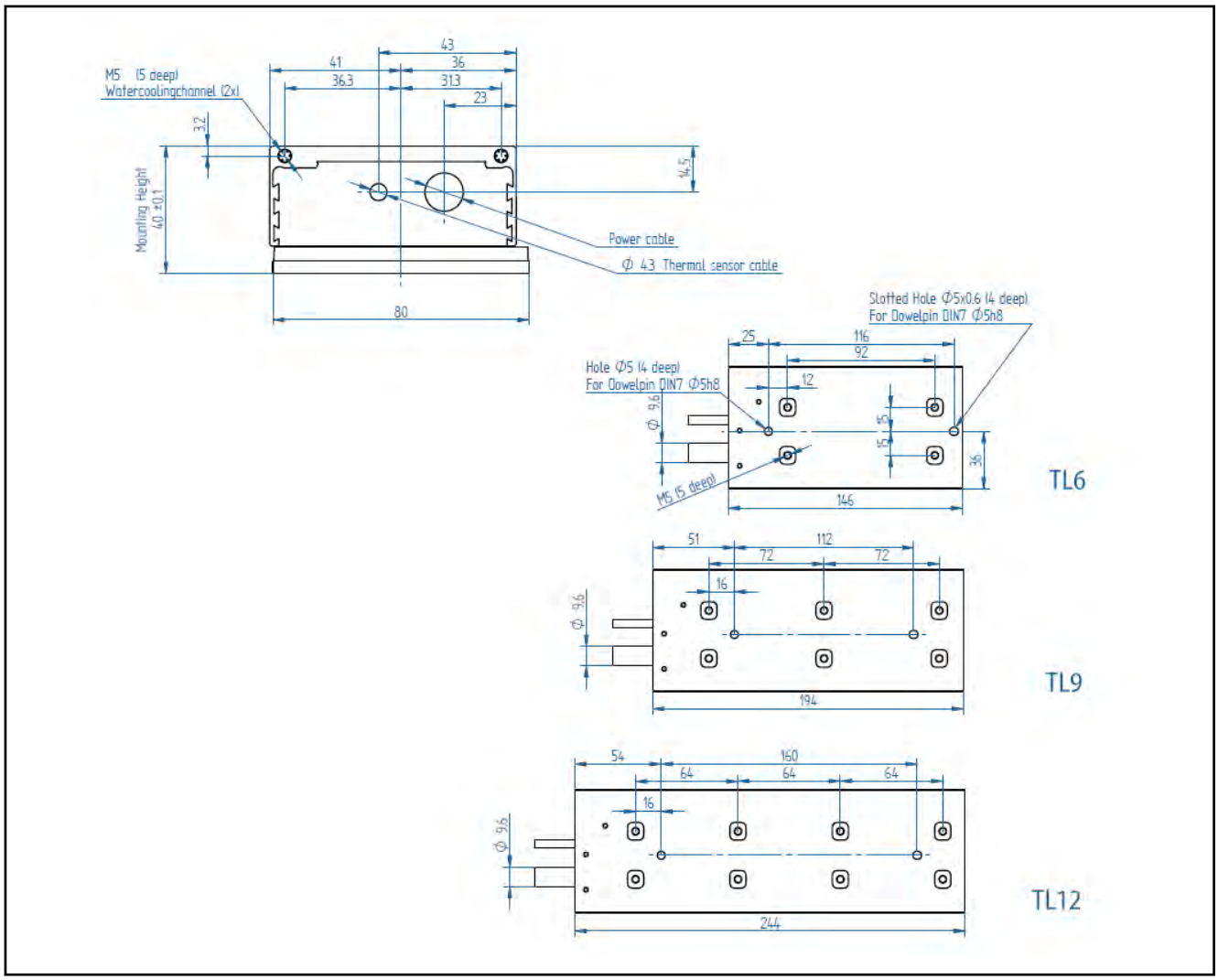


Fig. 26-7: TL6, TL9, TL12 series coils

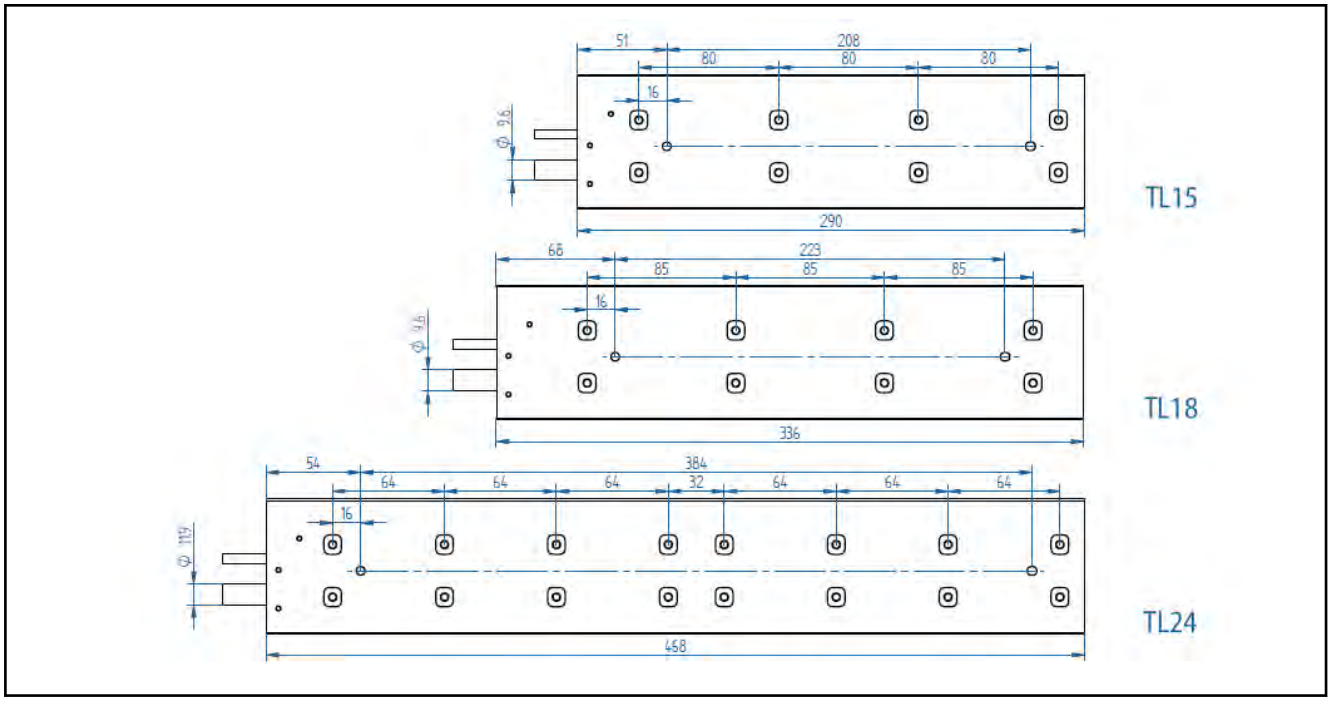


Fig. 26-8: TL15, TL18, TL24 series coils

	Parameter	Remarks	Sym	Unit	TL6		TL9		TL12	
Performance	Winding type				N	S	N	S	N	S
	Motortype, max voltage ph-ph				3-phase synchronous Iron core, 400Vac rms (600Vdc)					
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	450		675		900	
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	400		600		800	
	Continuous Force Watercooled*	coils @ 100°C	Fcw	N	210		315		420	
	Continuous Force Aircooled*	coils @ 100°C	Fc	N	200		300		400	
	Maximum Speed**	@ 560 V	vmax	m/s	3.5	7	4	7	3.5	7
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	93	46.5	140	46.5	93	46.5
	Motor Constant		S	N2/W	380		570		760	
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	6.5	13.1	6.5	19.6	13.1	26.2
	Peak Current	magnet @ 25°C	Ip	Arms	5.0	10.0	5.0	15.0	10.0	20.0
	Continuous Current Watercooled*	coils @ 100°C	Icw	Arms	2.26	4.5	2.26	6.8	4.5	9.0
	Back EMF Phase-Phasepeak		Bemf	V / m/s	76	38	114	38	76	38
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	7.2	1.80	10.8	1.21	3.6	0.90
	Induction per Phase	I < 0.6 Ip	Lf	mH	54	14	81	9.0	27	7.0
	Electrical Time Constant*	coils @ 25°C	τe	ms	7.5		7.5		7.5	
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	150		225		300	
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	0.48		0.32		0.24	
	Thermal Time Constant*	to max. coil temp.	τth	s	77		77		77	
	Watercooling Flow	for ΔT=3K	Φw	l/min	0.7		1.1		1.4	
	Watercooling Pressure-drop	order of magnitude	ΔPw	bar	1		1		2	
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122					
Mechanical	Coil Unit Weight	ex. cables	W	kg	1.5		2.0		2.6	
	Coil Unit Length	ex. cables	L	mm	146		194		244	
	Motor Attraction Force	rms @ 0 A	Fa	N	950		1325		1700	
	Magnet Pitch NN		τ	mm	24		24		24	
	Cable Mass		m	kg/m	0.18		0.18		0.18	
	Cable Type (Power)	length 1 m	d	mm (AWG)	9.6 (18)					
	Cable Type (Sensor)	length 1 m	d	mm (AWG)	4.3 (26)					

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

Fig. 26-9: TL6, TL9, TL12 series coil specifications

	Parameter	Remarks	Sym	Unit	TL15		TL18		TL24	
Performance	Winding type				N	S	N	S	N	S
	Motortype, max voltage ph-ph									
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	1125		1350		1800	
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	1000		1200		1600	
	Continuous Force Watercooled*	coils @ 100°C	Fcw	N	525		630		840	
	Continuous Force Aircooled*	coils @ 100°C	Fc	N	500		600		800	
	Maximum Speed**	@ 560 V	vmax	m/s	3.5	7	3.5	7	3.5	7
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	112	46.5	93	44.9	93	46.5
	Motor Constant		S	N2/W	950		1140		1520	
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	13.5	32.7	19.6	41	26.2	52
	Peak Current	magnet @ 25°C	Ip	Arms	10.4	25.0	15.0	31.0	20.0	40.0
	Continuous Current Watercooled*	coils @ 100°C	Icw	Arms	4.7	11.3	6.8	14.0	9.0	18.1
	Back EMF Phase-Phasepeak		Bemf	V / m/s	92	38	76	38	76	38
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	4.3	0.72	2.41	0.59	1.81	0.46
	Induction per Phase	I < 0.6 Ip	Lf	mH	32	5.4	18	4.4	14	3.4
	Electrical Time Constant*	coils @ 25°C	τe	ms	7.5		7.5		7.5	
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	375		450		600	
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	0.19		0.16		0.12	
	Thermal Time Constant*	to max. coil temp.	τth	s	77		77		77	
	Watercooling Flow	for ΔT=3K	Φw	l/min	1.8		2.2		2.9	
	Watercooling Pressure-drop	order of magnitude	ΔPw	bar	2		2		3	
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122					
Mechanical	Coil Unit Weight	ex. cables	W	kg	3.2		3.8		5.2	
	Coil Unit Length	ex. cables	L	mm	290		336		468	
	Motor Attraction Force	rms @ 0 A	Fa	N	2075		2450		3400	
	Magnet Pitch NN		τ	mm	24		24		24	
	Cable Mass		m	kg/m	0.18		0.18		0.30	
	Cable Type (Power)	length 1 m	d	mm (AWG)	9.6 (18)				11.9 (14)	
	Cable Type (Sensor)	length 1 m	d	mm (AWG)	4.3 (26)				4.3 (26)	

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

Fig. 26-10: TL15, TL18, TL24 series coil specifications

The following TL series magnet plates are available. Magnet plates can be butted together.

Component name	Order number
NYA04.1-LMS-MAGNETTL-192MM-3685193	R911343580
NYA04.1-LMS-MAGNETTL-288MM-3685194	R911343563
NYA04.1-LMS-MAGNETTLV-192MM-120C-3685457	R911343565
NYA04.1-LMS-MAGNETTLV-288MM-120C-3685472	R911343573
NYA04.1-LMS-MAGNETTLV-192MM-150C-3685473	R911343576
NYA04.1-LMS-MAGNETTLV-288MM-150C-3685420	R911343579

Tab. 26-4: TL series magnet plates

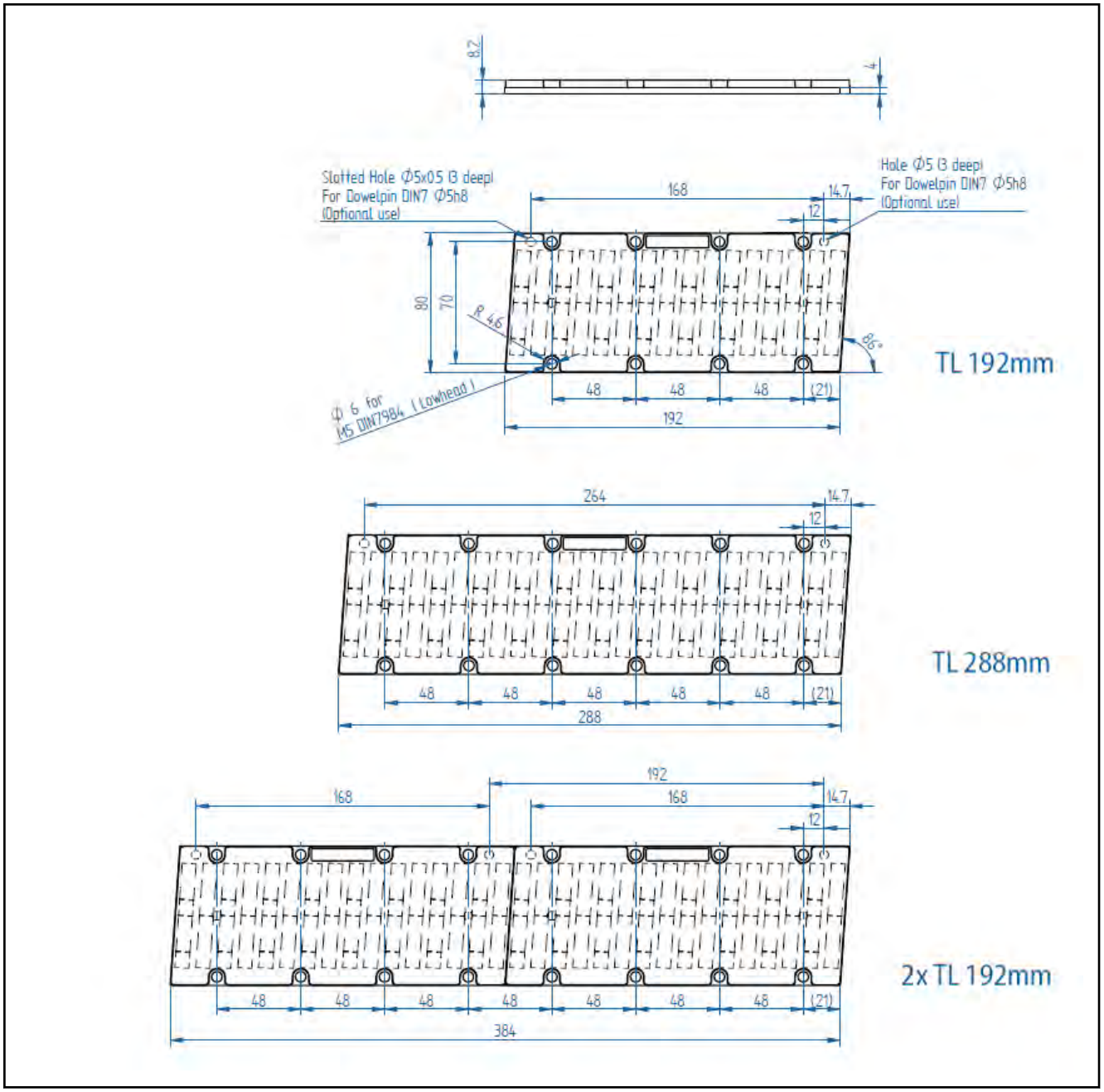


Fig. 26-11: TL series magnet plates

26.4 TB series coils and magnet plates

The following TB series coils are available.

Component name	Order number
NYA04.1-LMS-COIL-UNIT-TB12N-3685155	R911343767
NYA04.1-LMS-COIL-UNIT-TB12S-3685157	R911347637
NYA04.1-LMS-COIL-UNIT-TB15N-3685122	R911347642
NYA04.1-LMS-COIL-UNIT-TB15S-3685120	R911347643

Component name	Order number
NYA04.1-LMS-COIL-UNIT-TB30N-3685123	R911347644
NYA04.1-LMS-COIL-UNIT-TB30S-3685121	R911347645

Tab. 26-5: TB series coils

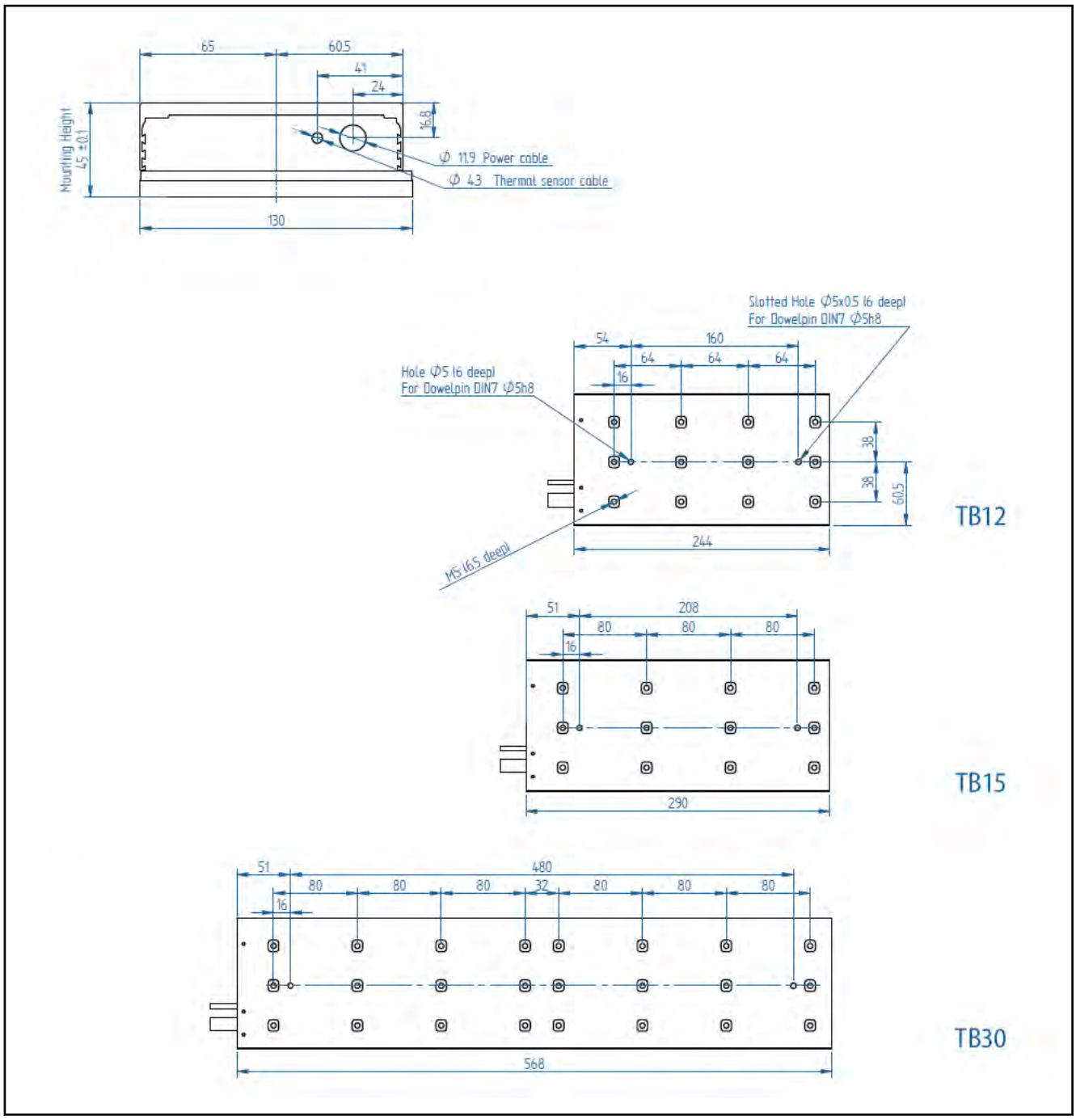


Fig. 26-12: TB12, TB15, TB30 series coils

	Parameter	Remarks	Symbol	Unit	TB12		TB15		TB30	
Performance	Winding type				N	S	N	S	N	S
	Motortype, max voltage ph-ph		3-phase synchronous Iron core, 400Vac rms (600Vdc)							
	Ultimate Force @ 10°C/s increase	magnet @ 25°C	Fu	N	1800		2250		4500	
	Peak Force @ 6°C/s increase	magnet @ 25°C	Fp	N	1600		2000		4000	
	Continuous Force*	coils @ 100°C	Fc	N	760		950		1900	
	Maximum Speed**	@ 560 V	vmax	m/s	3	6	2.5	6	2.5	6
	Motor Force Constant	mount. sfc. @ 20°C	K	N/Arms	186	93	225	93	225	93
	Motor Constant	coils @ 25°C	S	N2/W	1750		2150		4300	
Electrical	Ultimate Current	magnet @ 25°C	Iu	Arms	13.0	26	13.5	33	27	66
	Peak Current	magnet @ 25°C	Ip	Arms	10.0	20	10.0	25	20	50
	Maximum Continuous Current	coils @ 100°C	Ic	Arms	4.1	8.2	4.2	10.2	8.5	20.5
	Back EMF Phase-Phasepeak		Bemf	V / m/s	152	76	183	76	183	76
	Resistance per Phase*	coils @ 25°C ex. cable	Rf	Ω	6.3	1.6	7.6	1.3	3.8	0.65
	Induction per Phase	I < 0.6 Ip	Lf	mH	51	13	60	10	30	5
	Electrical Time Constant*	coils @ 25°C	τe	ms	8		8		8	
Thermal	Maximum Continuous Power Loss	all coils	Pc	W	430		530		1060	
	Thermal Resistance	coils to mount. sfc.	Rth	°C/W	0.15		0.12		0.06	
	Thermal Time Constant*	to max. coil temp.	τth	s	90		90		90	
	Temperature Cut-off / Sensor				PTC 1kΩ / KTY83-122					
Mechanical	Coil Unit Weight	ex. cables	W	kg	4.9		5.9		11.6	
	Coil Unit Length	ex. cables	L	mm	244		290		562	
	Motor Attraction Force	rms @ 0 A	Fa	N	3400		4150		8300	
	Magnet Pitch NN		τ	mm	24		24		24	
	Cable Mass		m	kg/m	0.3		0.3		0.3	
	Cable Type (Power)	length 1 m	d	mm (AWG)	11.9 (14)					
	Cable Type (Sensor)	length 1 m	d	mm (AWG)	4.3 (26)					

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current.

** Actual values depend on drive power voltage.

Fig. 26-13: TB12, TB15, TB30 series coil specifications

The following TB series magnet plates are available. Magnet plates can be butted together.

Component name	Order number
NYA04.1-LMS-MAGNETTB-192MM-3685221	R911343765
NYA04.1-LMS-MAGNETTB-288MM-3685222	R911343763
NYA04.1-LMS-MAGNETTBV-192MM-120C-3685474	R911343764
NYA04.1-LMS-MAGNETTBV-288MM-120C-3685475	R911343768

Tab. 26-6: TB series magnet plates

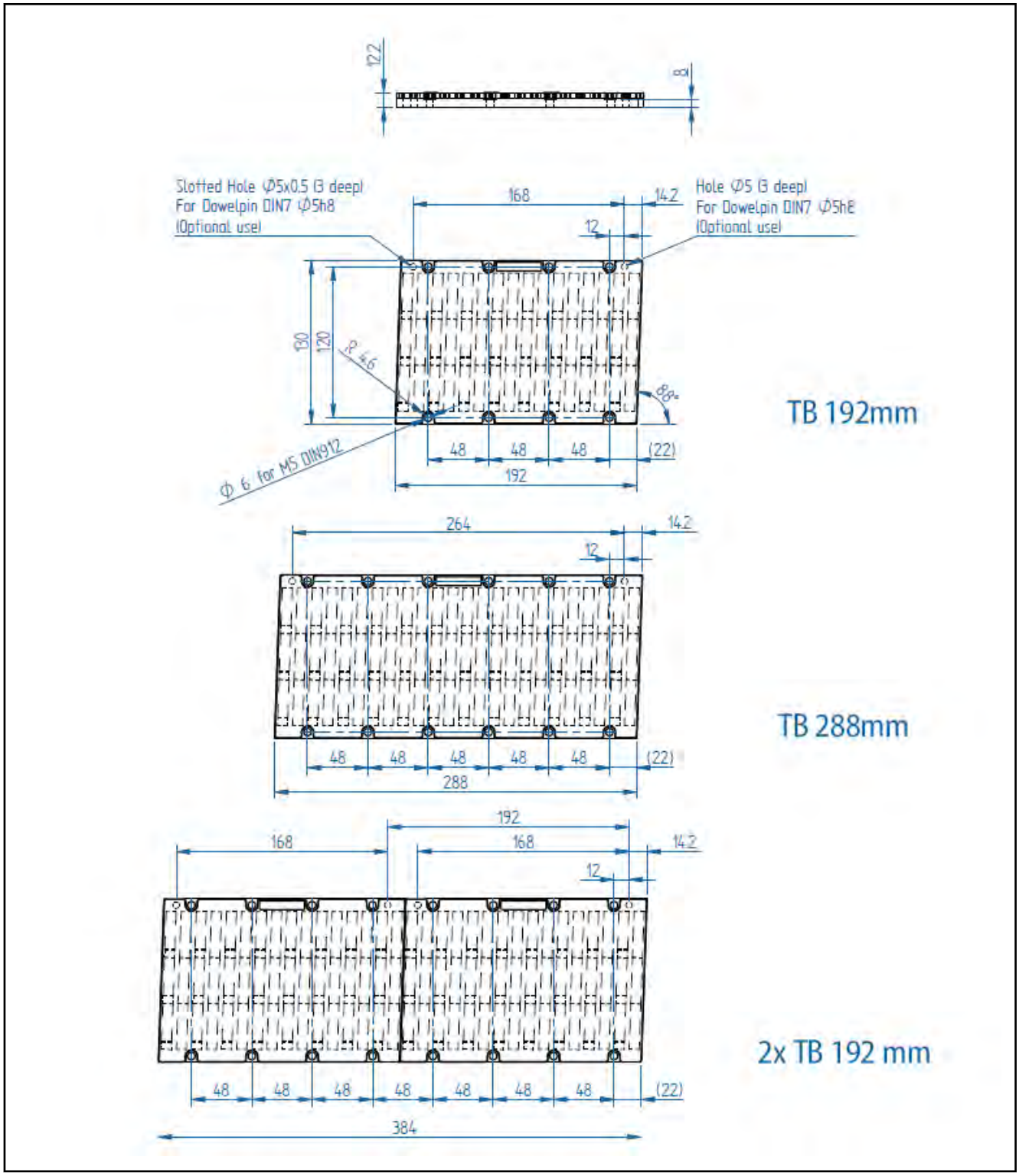


Fig. 26-14: TB series magnet plates

26.5 Coil cable connection information

The following tables list the power cable wires and sensor wires of the TM, TL, and TB coils.

Power cable		Color code TM/TL/TB	Standard housing Motor connection
3-phases	L1	black "1"	U
	L2	black "2"	V
	L3	black "3"	W
Protective Earth		green/yellow	PE
Shield		Metal shield	PE

Tab. 26-7: Coil power cable wire identification

Temperature sensor	Wire color	Standard housing PTC connection
PTC	white	PTC input +
	brown	PTC input -
KTY	yellow	Not possible
	green	Not possible
Shield		Not connected

Tab. 26-8: Coil sensor cable wire identification

The KTY sensor cannot be connected to the standard housings NY4074 and NY4079, but can be connected to IndraDrives.

27 NYCe 4000 Hardware Glossary

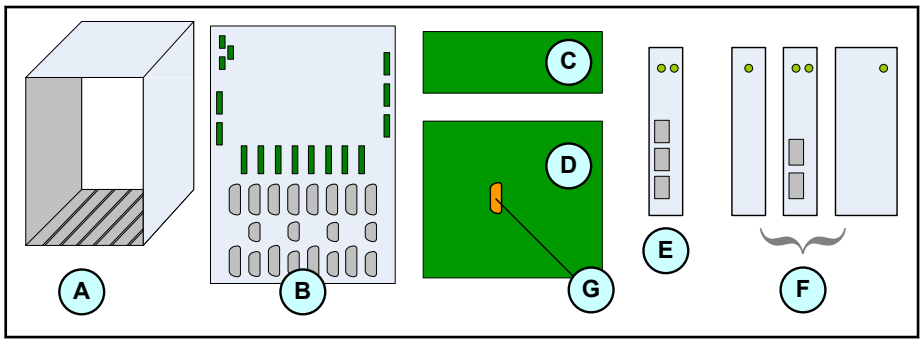


Fig. 27-1: NYCe 4000 components

Component	Name	Type number	Remarks
A	module holder	-	-
B	base plate	-	-
C	system backplane	-	Interconnect between MCU module and other NYCe 4000 motion node modules.
D	I/O backplane	-	Connection panel between NYCe 4000 drive modules and motor and I/O headers.
E	MCU	NY4110, NY4112, NY4114	Motion Control Unit. This is not a "drive" but actually a unit, because it can be used ‘stand-alone’. If an MCU is put in a system housing, you can communicate with it.
F	drive module	NY41xy, where xy = 20, 25, 30, 40, 50	These components are not "units" because they cannot be used ‘stand-alone’. If only a drive module is put in a system housing, you cannot do any useful work with it. Drive module can also be I/O module, power supply module, or SERCOS III Master module.
G	header	-	For clear identification the ‘connector’ at the end of a cable is called "plug" and the ‘connector’ on a [system, I/O] backplane is called "header".

Tab. 27-1: Identification names of the components

Combination	Name	Type number	Remarks
A + B	metalwork	NY44xx NY46xx	This is a term only for internal use.
C + D	backplane	NY45xx	This is a combination of a system backplane and I/O backplane on a single board.
A + B + C + D	system housing	NY40x2 NY40x3 NY407x NY47xx	-
A + B + C + D + E + n*F	node	-	n ≥ 0 A node on the NYCe 4000 network is capable of controlling up to 10 axes.
m * node	NYCe 4000 system	-	m ≥ 1

Tab. 27-2: Identification names of combined components

Expression	Definition
MCU module	Motion Control Unit, a module containing the motion processor. A "Motion Controller" which takes care of the communication to the Industrial PC, and acts as a local motion controller.
Drive module	Module containing the drive technology for stepper motor, and/or brushless AC servo motor, and/or brushless DC servo motor, and/or DC servo motor and analog and digital I/O. A module can control one or more axes.
Drive power	Incoming supply voltage for the power stages on the drive modules.
System power	Incoming supply voltage for the logic of NYCe 4000 node.
I/O power	Digital I/O supply voltage.
Quadrature encoder	A digital position encoder that generates two block wave signals with 90° phase shift relative to each other and an optional index signal. Also known as A/B encoder, S0S90 encoder and 3-channel digital incremental encoder.

Tab. 27-3: Explanation of other expressions

28 Installation, Earthing, Shielding, EMC, Electrical Connections, Cooling

28.1 Introduction

This chapter describes how the NYCe 4000 system must be installed to comply with regulations regarding EMC. The following topics are addressed.

- chapter 28.2 "Connection Diagram Overview" on page 205 shows connection diagrams of the NY40x3 system housing. These diagrams give you insight of the connections, required shielding and protective earth connections.
- chapter 28.3 "General EMC Measures for Design and Installation" on page 207 describes the general measures needed to comply to regulations regarding EMC. chapter 28.4 "EMC-optimal Installation in Machine and Control Cabinet" on page 208 gives guidelines for an optimal installation in a control cabinet.
- chapter 28.4 "EMC-optimal Installation in Machine and Control Cabinet" on page 208 describes the EMC-optimal installation of components in a machine and control cabinet.
- chapter 28.5 "Ground Connections" on page 212 describes the ground connections of all metal parts and components in the cabinet.
- chapter 28.6 "Installation of Signal Cables" on page 213 describes how signal cables are best routed in a cabinet.
- chapter 28.7 "Protective Earth Connection and Machine Frame" on page 213 describes the protective earth connection for all components and metal parts of the machine.
- chapter 28.8 "Control Cabinet Cooling" on page 214 describes the control cabinet cooling possibilities.
- chapter 28.9 "Installation of the NYCe 4000 System Housing" on page 216 describes the mechanical installation of the NYCe 4000 system .
- chapter 28.10 "Connection of NYCe 4000 Systems" on page 217 describes the cable connections for NYCe 4000 systems.
- chapter 28.11 "Power Supply" on page 218 describes power supply requirements and connection.
- chapter 28.12 "PC" on page 221 describes the connection of the PC.

Modifications that are needed if you upgrade an installation with NY40x2 system housings to an installation with NY40x3 system housings are described in chapter 28.13 "Installation Differences for NY40x2 and NY40x3 System Housings" on page 221.

28.2 Connection Diagram Overview

fig. 28-1 "NYCe 4000 NY40x3 system housing connection diagram overview" on page 206 gives an overview of the electrical connections, shield connections, and protective earth connections for an NY40x3 system housing. Connections for the NY4074 and NY4079 LMS nodes are similar.

The GND connection of the 24V digital I/O must be connected to PE, whereas the GND connection of the drive power supply must **not** be connected to PE.

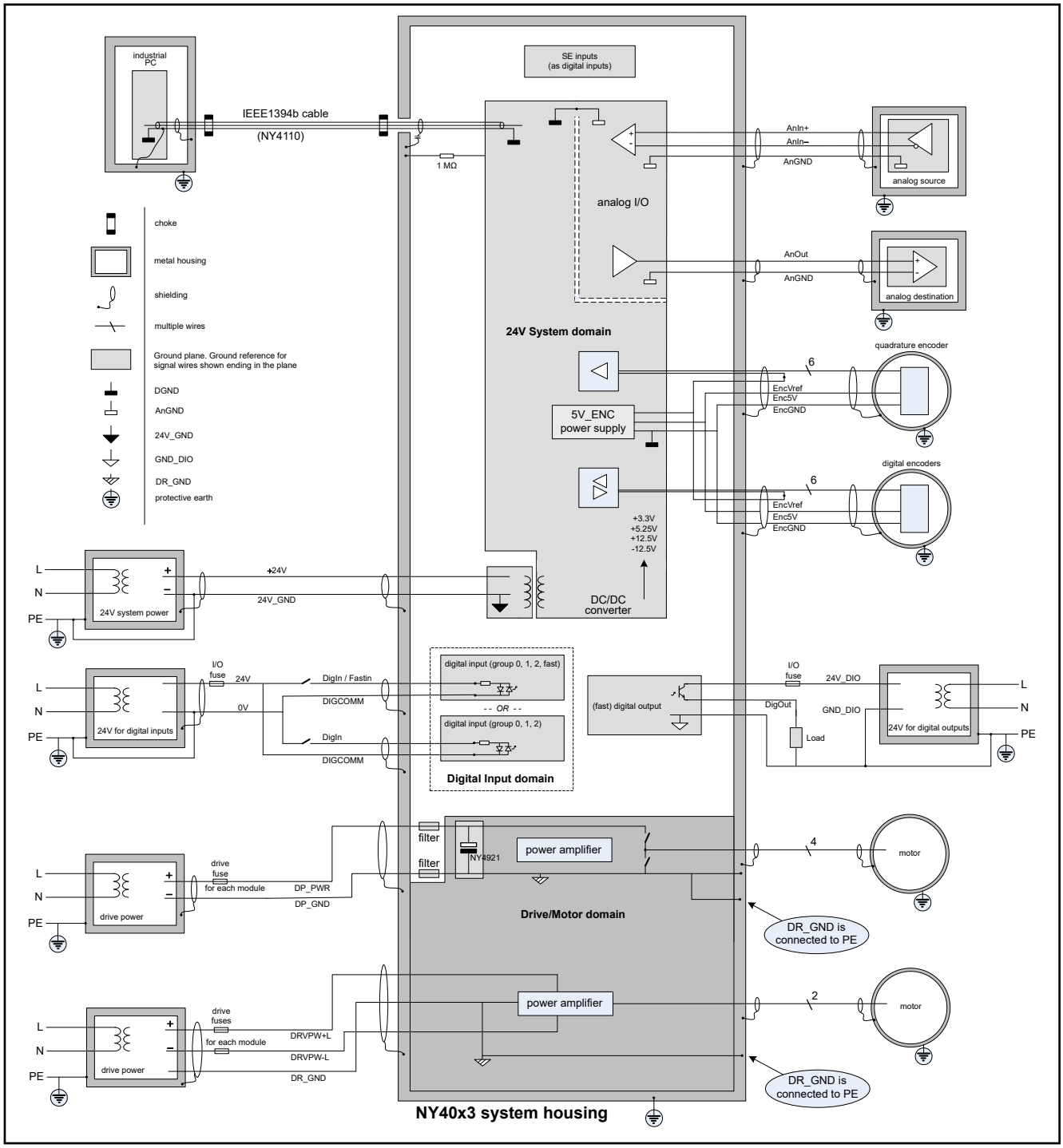


Fig. 28-1: NYCe 4000 NY40x3 system housing connection diagram overview

28.3 General EMC Measures for Design and Installation

The following rules are the basics for the design and installation of a NYCe 4000 system in compliance with EMC.

Control cabinet grounding

Connect all metal parts (frame, side walls, top, bottom, and door) of the cabinet with one another over the largest possible surface area to establish a good electrical connection.

Cable routing

Avoid coupling between cables with high levels of noise and noise-free cables. For this reason, you must route signal cables, motor cables, and power cables separated from another. Keep a minimum distance of 100 mm between the cables of each type. Install separating sheets between the power cables and signal cables. Ground the separating sheets several times. Cables with high levels of noise are, for example, the following cables.

- Cables for the mains connection.
- Cables for the motor connection.
- Cables for the DC power supply connection.

In general, interference injection is reduced when cables are routed close to grounding sheet metal plates. For this reason, do not route cables and wires freely in the cabinet, but route cables and wires close to the cabinet housing or mounting panels.

Interference suppression elements

Install interference suppression combinations, if the following components are installed in the control cabinet.

- Contactors.
- Relays.
- Solenoids.
- Electromechanical operation hours contactors.

Cables for measuring systems (encoders)

Cables for measuring systems must be shielded with a braid. The shield must be connected to the machine frame at both ends of the cable and over the largest possible surface area. The shield may not be interrupted, for example by using intermediate terminals. Use metallized plastic or metal shells for D-sub connectors on the system housing.

Cables for digital input and digital output signals

Connect the shield of digital signal cables at both ends to ground over the largest possible surface area and with low impedance. If a bad ground connection exists between transmitter and receiver, additionally route a bonding conductor of minimum 10 mm^2. Braided shields are better than foil shields. Use metallized plastic or metal shells for D-sub connectors.

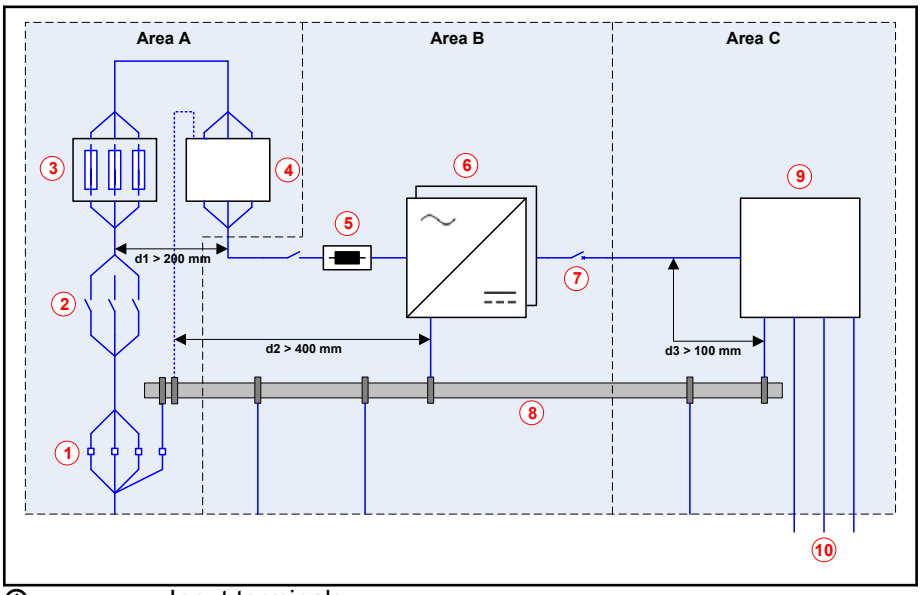
Cables for analog input and analog output signals

Connect the shield of analog signal cables at both ends over the largest possible surface area and with low impedance. This avoids low-frequency (mains frequency range) interference currents in the shield. Use metallized plastic or metal shells for D-sub connectors.

28.4 EMC-optimal Installation in Machine and Control Cabinet

28.4.1 Introduction

Spatial separation of interference-free areas and interference susceptible areas is recommended for EMC-optimal installation. The separation is realized by dividing the control cabinet into different interference areas.



① Input terminals
② Mains switch
③ Mains fuses
④ Mains filter
⑤ Optional mains choke
⑥ Power supply units
⑦ Switch or circuit breaker
⑧ Earth terminal strip
⑨ NYCe 4000 system
⑩ Drive - motor, encoder, I/O

Fig. 28-2: EMC interference-free and interference-susceptible areas

Three different EMC interference areas can be identified in the cabinet.

1. Area A - interference-free area.
2. Area B - interference-susceptible area.
3. Area C - strongly interference-susceptible area.

28.4.2 Interference-free area (area A)

Components in area A include the following.

- Supply feeder, input terminal, mains fuse, mains switch, mains side of mains filter for drives and associated connection cables.

- Control voltage or auxiliary voltage connection with power supply units and other parts, unless connection is via the mains filter of the AC drives.
- All components that are not electrically connected with the drive system.

Comply with a distance of at least 200 mm (distance "d1" in fig. 28-2 "EMC interference-free and interference-susceptible areas" on page 208) between components and electrical elements (such as switches, pushbuttons, fuses, and terminal connectors) in area A and components and electrical elements in the other areas B and C.

Comply with a distance of at least 400 mm (distance "d2" in fig. 28-2 "EMC interference-free and interference-susceptible areas" on page 208) between magnetic components, (such as transformers, mains chokes and DC voltage chokes that are directly connected to power connections of the drive system) and the interference-free components and wiring between mains filter and the power supply units.

28.4.3 Interference-susceptible area (area B)

Components in this area include the following.

- Mains connection betweenpower supplies and mains filters for drives, mains switch.
- Interface wires of the drive controller.

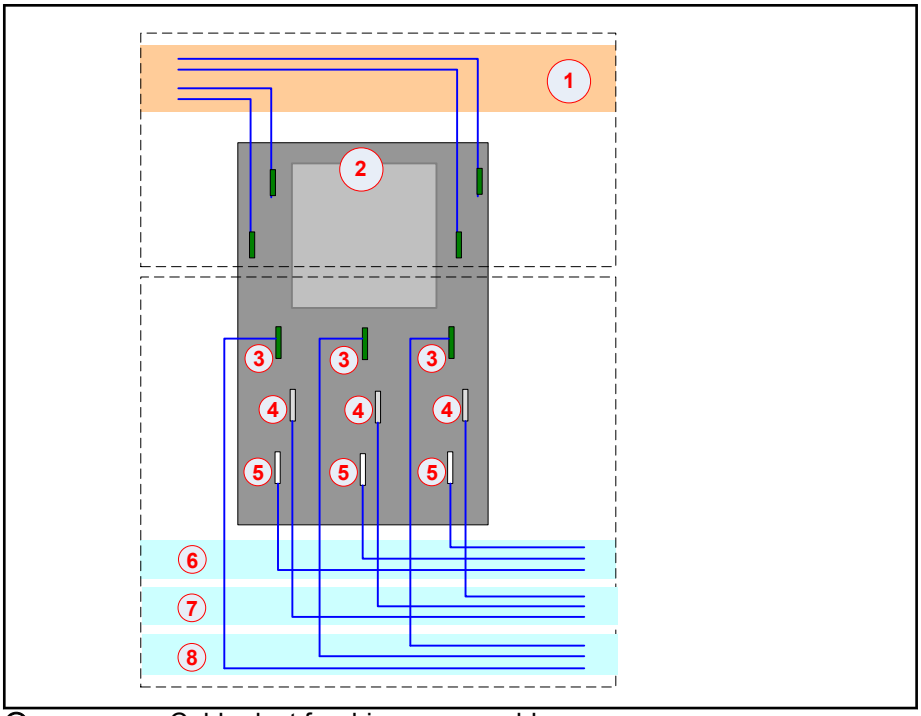
Modules, components and cables in area B should be placed at a distance of at least 200 mm (distance "d1" in fig. 28-2 "EMC interference-free and interference-susceptible areas" on page 208) from components and cables in area A. Alternatively, shield components and cables in area B from components and cables in area A by distance plates mounted vertically on the mounting plate or use shielded cables.

Guide the cables along grounded metal surfaces to minimize radiation of interference fields to area A (transmitting antenna effect).

28.4.4 Strongly interference-susceptible area (area C)

Components in this area include the following.

- Motor power cables.
- Encoder cables.
- I/O cables.



① Cable duct for drive power cables
② NYCe 4000 system
③ Motor cable with cable shield and support bracket
④ Encoder connection
⑤ I/O connection
⑥ Cable duct for I/O cables
⑦ Cable duct for encoder cables
⑧ Cable duct for motor cables

Fig. 28-3: NYCe 4000 system installation with cable ducts

Never put drive power cables in parallel with motor, encoder, or I/O cables to prevent unwanted interference injection from one area to the other area. Use the shortest possible connection cables.

It is recommended for complex systems to install power supplies in one cabinet and the NYCe 4000 nodes in a separate cabinet.

Badly connected control cabinet doors act as antennas. For that reason, connect large doors to the cabinet at the top, in the middle and at the bottom of the door via short equipment grounding conductors. Small doors can be connected with one short equipment grounding conductor. The equipment grounding conductor must have a cross section of at least 6 mm^2 or, even better, is a grounding strap with the same cross section. Make sure that the connection points have good contact.



Fig. 28-4: Example of a braid wire to connect to a machine frame

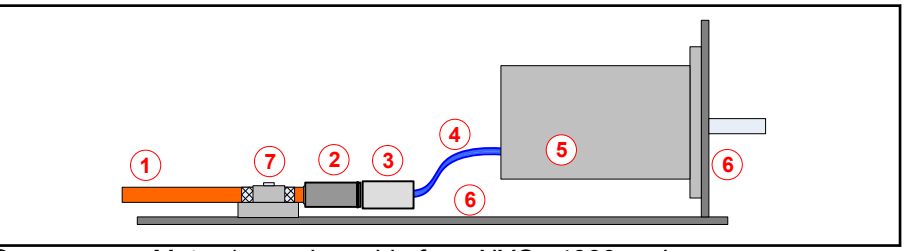
Route the cables along grounded metal surfaces, in order to minimize radiation of interference fields to area A (transmitting antenna effect).

Route the motor cables and encoder cables along grounded metal surfaces, both inside the control cabinet and outside the control cabinet, in order to minimize radiation or interference fields. If possible, route the drive power cables and motor cables in metal-grounded cable ducts. Route motor cables and encoder cables, if possible, with a distance of at least 100 mm to interference-free cables, and a distance of 100 mm to signal cables. Also, if possible, route motor cables in a separate duct, and route encoder cables in a separate duct.

Shield connection of motor and encoder cables

Connect the cable shield immediately at the motor / encoder in the shortest and most direct possible way, and make the connection with the largest possible surface area.

If the connector, attached to the motor or encoder cable is made of non-conducting material, connect the shield of the connection cable near the connector to the metal mounting plate with a shield terminal connection block and with the largest possible surface underneath the shield connection terminal block.

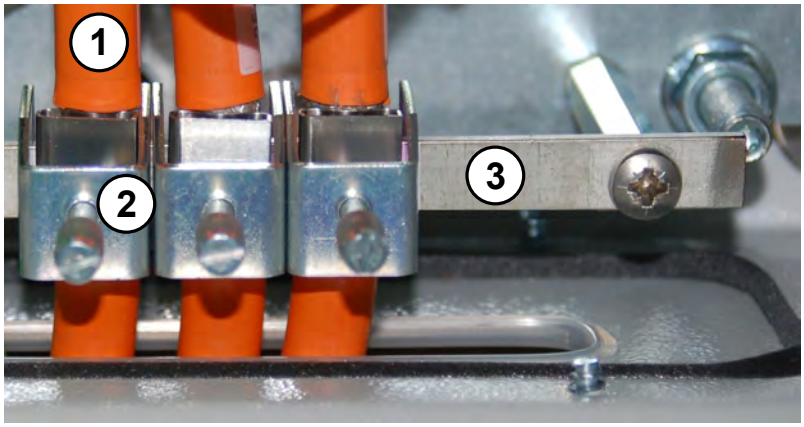


① Motor / encoder cable from NYCe 4000 node
② Motor / encoder connector (non-conducting material)
③ Motor / encoder connector (non-conducting material)
④ Motor / encoder cable to motor / encoder
⑤ Motor / encoder
⑥ Metal mounting plate
⑦ Shield connection terminal block

Fig. 28-5: Motor / encoder cable with non-conducting connector housing

EMC class B measures

If EMC class A is not sufficient for your application, but EMC class B is required, you can implement the following additional EMC measures.



① Motor cables
② Shield connection terminal block
③ Metal connection bar

Fig. 28-6: Additional EMC measures for shielding of motor and encoder cables

Mount the shield of the motor cable at the NYCe 4000 node side directly underneath the node with connection terminal blocks. The contact surface of the shield must cover the largest possible surface underneath the shield connection terminal block.

28.5 Ground Connections

Housing and mounting plate

It is possible to reduce the emission of interference by using appropriate ground connections, because interference is fed to ground via the shortest possible way.

Ground connections of the metal housings of EMC-critical components, such as filters, devices of the drive system, and connection points of cable shields, must be well contacted over a large surface area. This also applies to all screw connections between mounting plates and the control cabinet, and the mounting of a ground bus to the mounting plate.

Metal surface

Always use connection elements (screws, nuts, plain washers) with good electro-conductive surface. Anodized, yellow chromatized, black gunmetal finish or lacquered metal surfaces have bad electro-conductive properties.

Ground wires and shield connections

For connection of ground wires and shield connections, it is not the cross section of the cable but the size of contact surface that is important. Always connect cable shields, especially of the motor power cables, to ground potential over a large surface area.

28.6 Installation of Signal Cables

The following measures are recommended for signal cables.

- Route signal cables separated from power supply cables at a minimum distance of 100 mm (distance "d3" in fig. 28-2 "EMC interference-free and interference-susceptible areas" on page 208). The optimum way is to route signal cables and power supply cables in separate cable ducts. If possible, enter signal cables into the control cabinet at one point.
- If signal cables cross power supply cables, route the cables at an angle of 90º to minimize interference injection.
- Connect both ends of not used wires to ground, so that they do not have any antenna effect. If wires are connected at one side, but not used, connect the other end to an appropriate voltage or ground.
- Keep cables as short as possible.
- Guide cables as close as possible along grounded metal surfaces (reference potential).

28.7 Protective Earth Connection and Machine Frame

fig. 28-7 "Block schematic NYCe 4000 system grounding scheme" on page 213 gives an overview of the ground connections for all equipment. As you can see, all parts of the machine, power supplies, NYCe 4000 systems, and PC must have a good connection to the metal parts of the machine.

The industrial PC must have a separate PE connection. This PE connection must be connected to the PE terminal block of the machine. If a desktop PC is used you must connect the PE of the power supply to the PE terminal block of the machine which must be connected to PE.

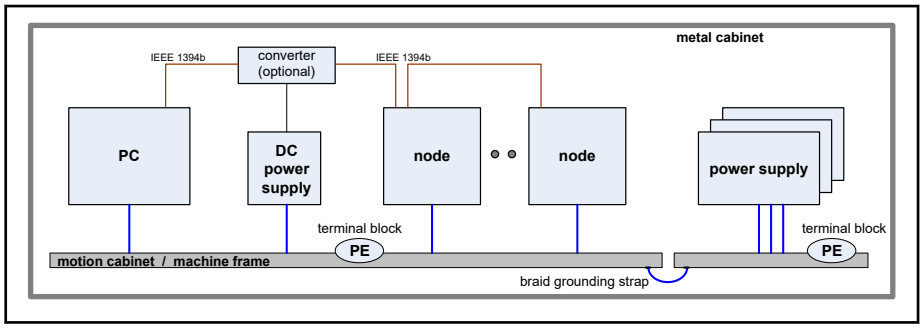


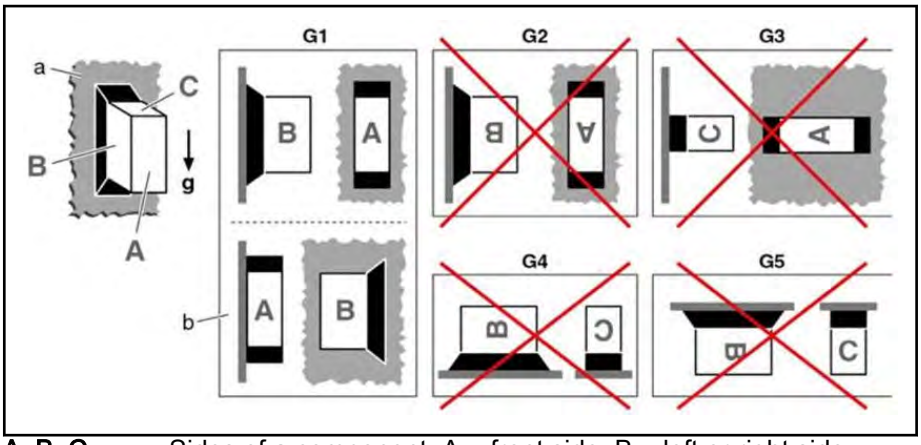
Fig. 28-7: Block schematic NYCe 4000 system grounding scheme

- The system housing must be connected to the Protective Earth using the M5 threaded post on the system housing marked with the ⏚ symbol.
- Follow the applicable safety rules for connecting all equipment, including the NYCe 4000 system housing, to protective earth.
- Each protective earth connection may be routed in the most convenient manner for the piece of equipment concerned. The NYCe 4000 system places no extra requirements on the protective earth wiring – no central earth point or similar constraint.
- The protective earth connection must be realized using a green-yellow cable of sufficient diameter or a braided band with a faston at the system housing side. The protective earth connection is fastened on the

M5 threaded post of the system housing using a ring, the faston with the cable or braided band, a spring washer and a nut, in that order. You must adhere to the installation requirements of your country.

28.8 Control Cabinet Cooling

Allowed mounting position

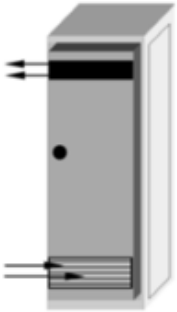
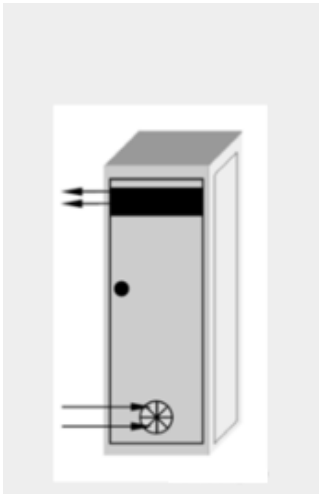
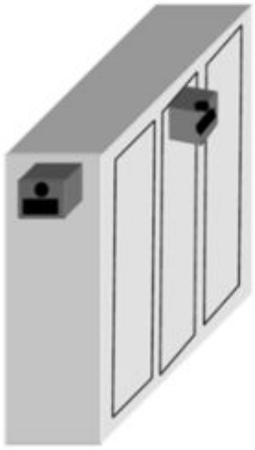


A, B, C Sides of a component: A = front side, B = left or right side, C = top side.
a Mounting surface in control cabinet.
b Mounting position G1, when side B of component directly mounted to mounting surface.
g Direction of gravitational force.
G1 **Normal mounting position:** the natural convection supports the forced cooling air flow. This avoids the generation of pockets of heat in the component.
G2 180° to normal mounting position
G3 90° to normal mounting position
G4 Bottom mounting; mounting surface on bottom of control cabinet.
G5 Top mounting; mounting surface at top of control cabinet.

Fig. 28-8: Allowed mounting position of the components

☞ The only mounting position allowed for supply units and drive controllers to be installed in control cabinets is G1.

Possibilities of heat dissipation

Closed control cabinet with air circulation	Closed control cabinet with heat exchanger	Control cabinet with fan	Closed control cabinet wit air conditioning unit
			
P_Q ~ 400 W	P_Q ~ 1700 W	P_Q ~ 2700 W	P_Q ~ 4000 W

P_Q Dissipated heat output

Tab. 28-1: Possibilities of heat dissipation

The following section describes the possibility "control cabinet with fan".

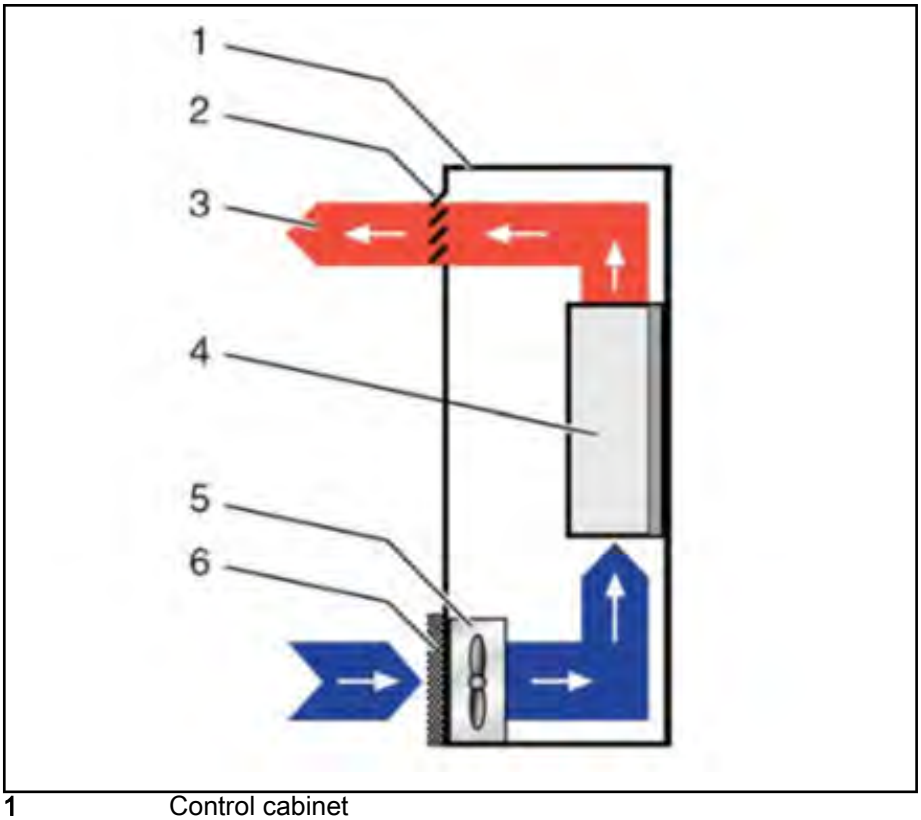
Requirements for control cabinets with fan

NOTICE **Risk of damage by unclean air in control cabinet!**

Operating a control cabinet with a fan, but without the corresponding filters, can damage the devices or cause malfunction.

Combining the individual components

- Install filters at the air intake opening of the control cabinet so that impure air cannot get into the control cabinet.
- Service the filters at regular intervals according to the dust loading in the environment.
- Only replace the filters when the fan has been switched off, because otherwise the fan sucks in the dirt coming off the filter and the dirt gets into the control cabinet.



1	Control cabinet
2	Air outlet opening
3	Heat discharge
4	Device in control cabinet
5	Control cabinet fan
6	Filter at air intake opening

Fig. 28-9: Control cabinet ventilation (schematic diagram)

Only clean air gets into the control cabinet through the filter at the air intake opening. The control cabinet fan behind the air intake opening delivers the air into the control cabinet and generates overpressure in th control cabinet. This overpressure prevents unclean air from entering into the control cabinet through potentially leaky points (leaky cable passages, damages seals, etc.).

28.9 Installation of the NYCe 4000 System Housing

The galvanic insulation in the NYCe 4000 system housing between the different functions is not intended for a deliberate potential difference between the functions. It is solely intended to control the paths available for interference currents, in order to minimize the effects of electrical noise, eliminate ground loops, etc.

The guidelines ensure proper functioning and EM compatibility in most applications. In extreme environments, for example motor connection with unshielded cable, or if extra restrictions on the radiated or conducted emission exist, modifications and/or additional measures may be necessary.

To ensure proper system operation, several galvanic insulated domains are implemented within the system. These domains are:

- 24V_System domain, includes encoder, analog I/O, and PC connection
- digital I/O domain
- drive/motor domain, connected to PE
- housing as a mechanical Faraday cage

Each area has its own 0V reference earth. The connections to the outside world can be realized with shielded cables. All shields must be connected to the metal parts of the housing. These housing / shields connections play a central role for EMC and noisy disturbances. It is important that the housing is connected with an excellent connection to the central earth of the machine, where the motors and power supplies are also connected.

Mechanical Mounting

- Mount the NYCe 4000 node on a vertical metal surface, and ensure electrical contact between the housing and this surface, either by means of spring washers under the M4 screw heads or by making use of the protective earthing post on the housing with spring washers and nuts.
- When mounting other equipment on a metal frame or mounting base, ensure that there is electrical contact between the housing and the mounting base of each piece of equipment.

28.10 Connection of NYCe 4000 Systems

28.10.1 General Cabling Remarks

- Shielded cable for all high-frequency signalling is mandatory. Shielded cable for motor connection is mandatory.
- The maximum length of any cable may not exceed 15 meter. Note that manufacturers of other equipment, such as encoders, may have more restrictions on cable specifications and cable lengths.

28.10.2 Power Supply Cables

Connect the shield of the power supply cable at the system housing side to the shield pin in the connector or to the connector housing. It is mandatory that the shield of the cable at the power supply side is connected to the chassis.

28.10.3 Motor Cables

Shielded cable for motors is mandatory.

Every motor cable must be installed with the NY4910 motor shield and support bracket. The shielding of the motor cable must make a good electrical contact with the bracket. Connect the shield on the other side to the motor housing or to the metal mounting plate on which the motor is mounted.

In a typical application, motors are mounted on a metal plate. The metal plate is connected to the metal chassis of the machine.

28.10.4 Encoder and/or Hall Sensor Cable, Analog Input, Analog Output

- Separate shielded cables for encoder signals and analog signals is mandatory.
- Connect the shield at the NYCe 4000 side to the connector housing and tighten the screw(s) of the connector backshell to ensure good electrical contact.

- If the equipment housing at the "other side" is metal, connect the shield of the encoder cable to the equipment housing.
- If the equipment housing at the "other side" is non-metal, connect the shield of the encoder cable to the motor housing with an as short as possible wire.

☞ **Never** connect the ground/minus wires of these signals to other grounds, otherwise malfunction of the module is possible.

28.10.5 Fast Digital I/O, Digital I/O

Fast digital I/O

Shielded cable is mandatory for fast digital I/O connections.

Connect the shield at the system housing side to the connector housing. Connect the shield at the "other" side to a convenient metal part or leave it unconnected.

The cable with the signal wire(s) must also contain the return current path for every signal in the cable. It is acceptable for a single wire to carry the return currents of more than one signal, as long as the current rating of the wire is not exceeded.

Digital I/O

Shielded cables are recommended for digital I/O connections.

If shielding is used, connect the shield at the system housing side to the connector housing. Connect the shield at the "other" side to a convenient metal part or leave it unconnected.

For unshielded digital I/O, the cable with the signal wire(s) must also contain the return current path for every signal in the cable. It is acceptable for a single wire to carry the return currents of more than one signal, as long as the current rating of the wire is not exceeded.

28.11 Power Supply

28.11.1 Requirements on Mains Circuits

- Mains Circuits of overvoltage category II up to 300 V AC rms.

28.11.2 Combination of Power Supplies

- Three 24V power supply connections may be needed for the NYCe 4000 system housing.
  - One for system power
  - One for all fast digital inputs, fast digital outputs and digital outputs
  - One for digital inputs

  The separation of these power supplies at the NYCe 4000 system housing allows optimization of the cabling, especially in widely distributed and/or complex systems, where it may be desirable to separate the "noisy" functions (for example the power supply for the digital outputs) from the "quiet" functions (for example the power supply for the internal logic).

- In many installations, however, it is quite acceptable for these functions to be combined and connected to a single power supply. In a custom I/O backplane, this may even be done in the backplane itself.
- Never combine the drive power supply in case it is also 24 Volt with the other functions, even if the drive power has enough reserve capacity. (One reason: during regenerative braking of a motor, the supply voltage may swing up to a high value, considerably higher than the value for which the other functions are designed.)
- Any floating "grounds" in individual pieces of equipment will in general be fixed to safety earth potential by the detailed installation rules below.

28.11.3 24V System Power Supply

The 24V power supply for the system housing, connected to the 24V System header must be an SELV power supply with the required insulation barriers.

28.11.4 Drive Power Supply

The power supply for the motors must be a power supply with the required insulation barriers. A fuse between the drive power supply and the system housing is mandatory.

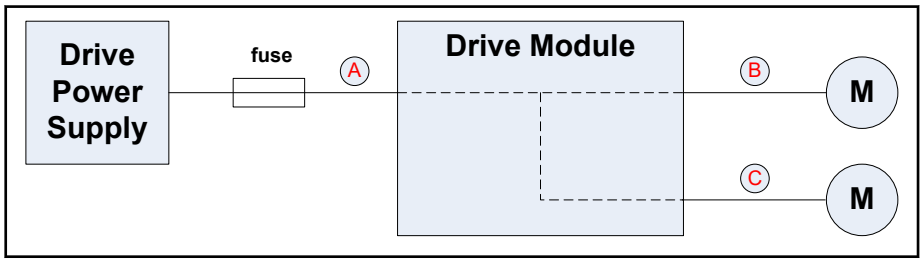


Fig. 28-10: Drive power supply, fuse, and motor cabling

The drive power supply connection cable, Ⓐ in fig. 28-10 "Drive power supply, fuse, and motor cabling" on page 219, and the cables from the system housing to the motors (Ⓑ and Ⓒ) must have the same diameter. The rating of the fuse depends on the used cables and application requirements of the motion profiles. The fuse certified for DC rating, has to be UL recognized under CCN JDYX2/8, also IEC 60127-1 certification has to be provided.

See also "Power switch on/off precautions" in the NYCe 4000 Hardware System manual (NY4120 or NY4140 chapter), if the drive power supply is connected to a drive slot that contains an NY4120 or NY4140 drive module.

28.11.5 (Fast) Digital I/O 24V Power Supply

The 24V power supply for the fast digital I/O and digital I/O must be an SELV power supply with the required insulation barriers. A fuse between the 24 Volt power supply and the system housing is mandatory.

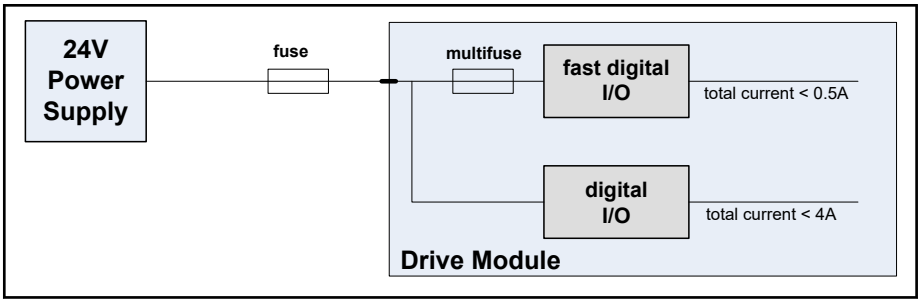


Fig. 28-11: Connection and fuses for the (fast) digital I/O

The rating of the fuses depends on the used cables and total current. The fuses certified for DC rating, have to be UL recognized under CCN JDYX2/8, also IEC 60127-1 certification has to be provided.

28.11.6 Fuse Rating and Wire Diameter

The following tables list for typical currents within the NYCe 4000 system the required fuse and wire diameter according to UL and IEC norms, together with a possible usage.

current [DC]	Fast Acting fuse (UL) ① [nominal DC current]	Wire gauge number ② [AWG, minimum]	example of usage
1.0 A	2 A	24	Drive power NY4130 (+/- 26V)
2.0 A	3 A	20	Drive power NY4130 (+/- 15V)
4.5 A	6 A	16	Digital I/O
6.0 A	8 A	16	Drive power NY4140
12.0 A	15 A	12 ③	Drive power NY4120

① Fuses must be certified for DC rating, Fast Acting, have to be UL recognized under CCN JDXY2/8.

② Wire gauge as a function of ambient temperature are derived from the NFPA-79:2012. Insulation temperature of wires is assumed to be 60 °C (140 °F) or 75 °C (167 °F).

③ If using wires with AWG smaller than or equal 12, two pins for the (+) and (-) connection must be used on the drive power connectors.

*Tab. 28-2: Typical currents, fuse ratings and wire gauge numbers for **UL** fuses in a NYCe 4000 system*

current [DC]	Fast Acting fuse (IEC) ① [nominal DC current]	Wire cross section ② [mm^2, minimum]	example of usage
1.0 A	1 A	0.20	Drive power NY4130 (+/- 26V)
2.0 A	2 A	0.52	Drive power NY4130 (+/- 15V)
4.5 A	5 A	0.82	Digital I/O

current [DC]	Fast Acting fuse (IEC) ① [nominal DC current]	Wire cross section ② [mm², minimum]	example of usage
6.0 A	6 A	1.31	Drive power NY4140
12.0 A	12 A	3.31 ③	Drive power NY4120

① Fuses must be certified for DC rating, Fast Acting, have to be IEC 60127-1 certified.

② Wire cross section as a function of ambient temperature are derived from the EN 60204-33:2011. Insulation temperature of wires is assumed to be 60 °C or 75 °C.

③ If using wires with a cross section larger than or equal 2 mm², two pins for the (+) and (-) connection must be used on the drive power connectors.

*Tab. 28-3: Typical currents, fuse ratings and wire cross sections for **IEC** fuses in a NYCe 4000 system*

28.12 PC

If the PC uses a FireWire PCI controller card and one IEEE 1394b cable to connect to the NYCe 4000 node, make sure that the FireWire PCI controller card in the PC is fixed with a screw to the metal housing of the PC. Further, make sure that a choke is installed on the IEEE 1394b cable as close as possible to the FireWire connector at both ends.

☞ Do **not** strip the insulation of the IEEE 1394b cable.

The PC must be connected to the same ground as the motion installation.

If a FireWire-b to IEEE 1394b Cat-5e/Cat-6 media converter is installed, the "–" of the DC power supply must be connected to the PE terminal block of the machine.

28.13 Installation Differences for NY40x2 and NY40x3 System Housings

Due to improved design for EMC behavior of the NY40x3 system housing, compared to the NY40x2 system housing, you must make the following changes in the machine installation if you upgrade the NYCe 4000 motion control with NY40x2 system housing(s) to NY40x3 system housing(s).

☞ If you replace NY40x2 system housings with NY40x3 system housings in the motion application, you must replace all system housings.

A mix of NY40x2 and NY40x3 system housings is not allowed.

- It is recommended that for the 24V power supply units (system power and digital I/O) for NY40x2 and NY40x3 system housings, the minus terminal (0V) at the secondary side of the power supply unit remains connected to the Protective Earth connection.

- It is recommended that for drive power supply units for NY40x3 system housings the minus terminal (0V) at the secondary side of the power supply unit is **not** connected to the Protective Earth connection. If the minus terminal (0V) of the drive power supply cable remains connected to the Protective Earth connection, large ground currents may flow over

the shield, because in the NY40x3 system housings the 0V of the drive power supply is connected to PE.

⇒ Remove the connection from the minus terminal (0V) to PE.

- The shield of the 24V power cables (for system power and digital inputs) for NY40x2 and NY40x3 system housings remains connected to the ground pin at the power supply unit side.

- The shield of the drive power cables for NY40x2 system housings is connected to the minus terminal (0V) at the secondary side of the power supply unit.

  ⇒ Disconnect the shield of the drive power cables from the minus terminal (0V) at the secondary side of the drive power supply unit for NY40x3 system housings. Connect the shield at the drive power supply unit side to the metal chassis of the power supply unit.

- The motor connector headers on the NY40x2 system housing are 8-pin male. The motor connector headers on the NY40x3 system housing are 7-pin female.

  ⇒ Replace the 8-pin female plug on the motor cable (at the system housing side) with a 7-pin male plug

  – The 8-pin connector header on the NY40x2 system housing has a SHIELD pin to which the shield of the motor cable is connected. The 7-pin connector header on the NY40x3 system housing does not have a SHIELD pin. Instead, you must use the NY4910 motor cable shield and support bracket (order number R911172999).
  – The motor cable is mounted on a metal bar underneath the NY40x2 system housing with the shield connected to the metal bar. This installation is needed for cable support and proper shield connection to the machine. The NY4910 motor cable shield and support bracket is used on the NY40x3 system housing for these purposes, but it is not necessary to remove the motor cable installation on the metal bar.

- The PE screw on the NY40x2 system housings is M4, the PE screw on the NY40x3 system housing is M5.

29 Environmental Conditions

29.1 Thermal

Operating

- Temperature : +5 °C … +55 °C
- Relative Humidity : 10% … 90% (non condensing)

Storage

- Temperature : –40 °C … +85 °C
- Relative humidity : 5% … 95% (non condensing)

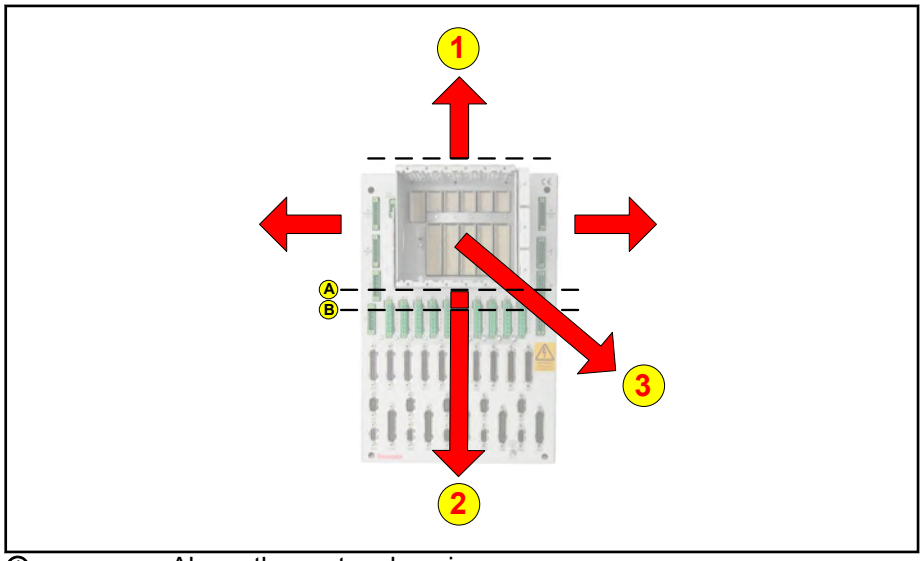
Thermal compatibility

	Used standard
Cold	EN 60068-2-1:2007
Dry heat	EN 60068-2-2:2007
Change of temperature	EN 60068-2-14:2009
Damp heat	EN 60068-2-30:2005

Tab. 29-1: Thermal compatibility

29.2 Free clearance space

Free clearance space around a system housing is needed for cooling air flow and for cables and connectors.



① Above the system housing
② Below the system housing
③ In front of the system housing

Fig. 29-1: System housing free air distances

Airflow for module holder (all system housings)

- Minimum distance above and below (A) the system housing is 200 mm for convection cooling.
- Minimum distance above and below (B) the system housing is 100 mm for forced cooling.

Ensure that above and below the system housing air can flow freely in a vertical direction through the ventilation holes. Typical free distances are 100

mm for forced cooled systems, and 200 mm for convection cooled systems. The indication line (A) represents the bottom of the module holder for a convection cooled system. The indication line (B) represents the bottom of the fan unit (not shown in the figure) for a forced cooled system. Bend the cabling away from the ventilation holes as near to the connectors as possible to improve air flow through the module holder. Note that for small system housings, for example the NY4013, the height of the connector area on the base plate is less than the required free space, thus free space is required on the mounting plate below the system housing.

- For convection cooled systems the housing must be installed vertically to allow free air flow from the bottom to the top through the module holder.
- For forced cooled systems using an NY4922 fan unit, the housing is allowed to be installed horizontally.

Airflow for base plate (NY4074 & NY4079)

The NY4074 and NY4079 system housings contain electronic circuits on the backplane. The NY4074 and NY4079 require cooling for the module holder **and additionally** for the base plate. For this reason, the NY4074 and NY4079 housings must always be installed vertically, unless you provide forced cooling for the base plate.

Frontal free clearance

Free clearance space in front of the module holder (“F”) is needed for the optional strain relief bracket(s) and for bending IEEE 1394b cable(s) for NY4110, ethernet cables for NY4112 and NY4114, and (optional) SERCOS III cables for NY4150. As a rule of thumb, 100 mm is sufficient. If the NY4130 is installed, the minimum clearance distance is 35 mm.

Side-way free clearance

The free distance on the right (R) and left (L) of the system housing must be sufficient to access the connectors at those sides.

29.3 Shock and Vibration

	Used standard
Mechanical, non-operating	
Shock	IEC 60068-2-27:2008
Mechanical, operating	
Vibration	IEC 60068-2-6:2007
Vibration, broad-band	IEC 60068-2-64:2008

Tab. 29-2: Shock and vibration

29.4 Electromagnetic Compatibility

Emission

Standard IEC 61000-6-4:2018 is met.

Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments.

Immunity

Standard IEC 61000-6-2:2005 is met.

Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments.

	Used standard in general	Used standard for NY4074, NY4079, NY4980, NY4981
Electrostatic discharge	EN 61000-4-2:2008	
Radiated, RF electromagnetic field	IEC 61000-4-3:2020	
Electrical fast transient (burst)	IEC 61000-4-4:2012	EN 61000-4-4:2012
RF conducted disturbances	IEC 61000-4-6:2013	EN 61000-4-6:2013

Tab. 29-3: Electromagnetic compatibility (EMC)

29.5 Environment

Degrees of protection provided by enclosures: IP20.
Pollution degree (operating / storage and transport): 2.
Overvoltage category: II.
Maximum altitude: 4000 m.

30 Cleaning, Disposal and Environmental Protection

30.1 Cleaning

Softly wipe the surface with a dampened cloth using a diluted neutral detergent or alcohol, and then wipe the surface again with a dry cloth. For systems without a fan, use a compressor or vacuum cleaner to blow off the accumulated dust in the ventilating channel of the housing and inside the housing.

☞ Do not use a compressor or vacuum cleaner on systems with a fan. Remove the fan before cleaning the system.

30.2 Disposal

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

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.

30.3 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
- Motors

  Motors mainly contain:

  – steel

- aluminum
- copper
- brass
- magnetic 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.

31 Service and Support

31.1 Helpdesk

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries.

Contact us

- Bosch Rexroth Service
  Bgm-Dr.-Nebel-Str. 2
  97816 Lohr a.Main
  Germany
- Telephone: +49 9352 40 50 60
- Email: service@boschrexroth.de
- Internet: www.boschrexroth.de/service

Please contact your nearest supplier or representative in your country first before contacting Service Deutschland, if you are outside Germany.

31.2 Service-Hotline

After helpdesk hours, contact our service department directly at

+49 9352 40 50 60.

Please check the internet company addresses for hotline call numbers outside Germany.

31.3 Internet

At www.boschrexroth.com you may find additional notes about service, repairs and training in the Internet, as well as the actual addresses of our sales- and service facilities.

31.4 Before contacting us...

For quick and efficient help, please have the following information ready.

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your telephone number and e-mail address, so we can contact you in case of questions.

32 Appendix - EU declaration of conformity - housings

rexroth
A Bosch Company

EU declaration of conformity – *Original*

Doc. No.: DCTC-30329-101
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: system housing
Type: NY4013, NY4023, NY4033, NY4043, NY4053, NY4063, NY4073, NY4074, NY4078, NY4079, NY4702, NY4703, NY4705, NY4710, NY4711

Ordering code	Part number	
NYS04.2-ST-01-ULNN-NY4013	R911172904	
NYS04.2-ST-02-ULNN-NY4023	R911172905	
NYS04.2-ST-03-ULNN-NY4033	R911172966	
NYS04.2-ST-04-ULNN-NY4043	R911172906	
NYS04.2-ST-05-ULNN-NY4053	R911172907	
NYS04.1-ST-03-4125-NY4063	R911172218	
NYS04.2-ST-02-LMSN-NY4073	R911172908	
NYS04.2-ST-02-LMSN-NY4074	R911378504	
NYS04.1-ST-01-LMS-SERCOS-NY4078	R911172617	*)
NYS04.1-ST-01-LMS-SERCOS-NY4079	R911378505	*)
NYS04.1-US-02-FEAP-NY4702	R911172139	*)
NYS04.1-US-05-FEDC-NY4703	R911171190	*)
NYS04.1-US-05-FEP3-NY4705	R911172622	*)
NYS04.1-US-01-FEBA-NY4710	R911171818	*)
NYS04.1-US-03-FEEN-NY4711	R911171817	*)

Trade name: Rexroth
Year of construction: as of 2009

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. 32-1: EU declaration of conformity, page 1

EU declaration of conformity – *Original*

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DCTC-30329-101: 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 ,	2020-07-15	ppa.	i.V.
Place	Date	Joachim Hennig (LoP2/PT) Plant Manager	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. 32-2: EU declaration of conformity, page 2

33 Appendix - EU declaration of conformity - accessories

rexroth
A Bosch Company

EU declaration of conformity – *Original*

Doc. No.: DCTC-30329-103
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: accessories
Type: NY4199, NY4921, NY4921/10, NY4960/10, NY4980/00, NY4980/10, NY4981/00

Ordering code	Part number	
NYM04.1-ESC-NNNN-NY4199	R911320450	*)
NYA04.1-CAP-100V-NY4921	R911325079	
NYA04.1-CAP-200V-NY4921/10	R911325082	
NYA04.1-LMS-MUX2-10VTT-5V-NY4960/10	R911320451	*)
NYA04.1-LMS-HALLSENSOR-24-180-NY4980/00	R911173569	*)
NYA04.1-LMS-HALLSENSOR-24-90-NY4980/10	R911173570	*)
NYA04.1-LMS-MRSENSOR-180-NY4981/00	R911174592	*)

Trade name: Rexroth
Year of construction: as of 2009

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. 33-1: EU declaration of conformity, page 1

EU declaration of conformity – *Original*

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DCTC-30329-103: 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 , 2020-07-15 ppa.
Place Date
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. 33-2: EU declaration of conformity, page 2

Notes

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R911337672

DOK-NY4000-HOUSING*ACC-PR18-EN-E