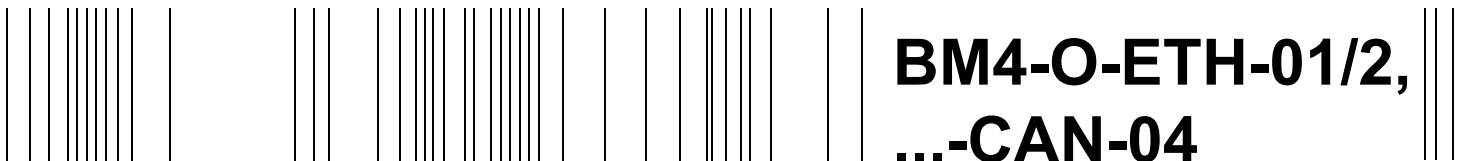


be in motion be in motion



**BM4-O-ETH-01/2,
...-CAN-04**

**Ethernet with CANopen-
Master f. b maXX drive PLC**

Operating Instructions

E

5.03001.03



Title	Operating Instructions
Product	Ethernet with CANopen-Master f. b maXX drive PLC BM4-O-ETH-01/2, ...-CAN-04
Last Revision:	28 February 2007
Copyright	<p>Owners may make as many copies as they like of these Operating Instructions exclusively for their own internal use. You are not allowed to copy or duplicate even extracts from these Operating Instructions for any other purposes. You are not permitted to exploit or communicate the contents of these Operating Instructions.</p> <p>Any other designations or company logos used in these Operating Instructions may be trademarks whose use by third parties for their own purposes may affect the rights of the owner of the trademark.</p>
Binding nature	<p>These Operating Instructions are a part of the unit/machine. These Operating Instructions must always be available to operators and be legible. If the unit/machine is sold, the owner must pass on these Operating Instructions together with the unit/machine.</p> <p>After selling the unit/machine you must pass on this original and all the copies that you made to the purchaser. After disposing of the machine in any way, you must destroy this original and all the copies that you made.</p> <p>When you pass on these Operating Instructions, all earlier revisions of the corresponding Parameter Manual are invalidated.</p> <p>Note that all the data/numbers/information that are quoted are current values at the time of printing. This information is not legally binding for dimensioning, calculation and costing.</p> <p>Within the scope of further-development of our products, Baumüller Nürnberg GmbH reserve the right to change the technical data and handling.</p> <p>We cannot guarantee this Operating Instructions is completely error-free unless this is expressly indicated in our General Conditions of Business and Delivery.</p>
Manufacturer	Baumüller Nürnberg GmbH Ostendstr. 80 - 90 90482 Nuremberg Germany Tel. +49 9 11 54 32 - 0 Fax: +49 9 11 54 32 - 1 30 www.baumueller.de



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1

INTRODUCTION

These operating instructions are an important component of your b maXX 4400; this means that you must thoroughly read this document, not least to ensure your own safety.

In this chapter, we will describe the first steps that you should carry out after getting this unit. We will define terms that are used in this documentation on a consistent basis and will inform you about the responsibilities you must consider when using this unit.

For more detailed information on operating and deploying the module, refer to the documentation entitled "b maXX drive PLC Application Manual".

1.1 First Steps

- ◆ Check the shipment see [►Packaging and transportation ◀](#) from page 15 onward.
- ◆ Pass on all the documentation that was supplied with the plug-in module to the appropriate departments in your company.
- ◆ Deploy suitable personnel for assembly and commissioning.
- ◆ Pass on these operating instructions to this personnel and ensure that they have read and understood the safety instructions and that they are following them.

1.2 Terms Used

In this documentation, we will also refer to the following Baumüller products: "BM4-O-ETH-01" (Ethernet option module), "BM4-O-ETH-02" (Ethernet option module with CANopen-Master) or "BM4-O-CAN-04" (CANopen-Master option module) as "Ethernet plug-in module" for the BM4-O-ETH-01 or BM4-O-ETH-02 or "CANopen-Master plug-in module" for the BM4-O-ETH-02 or BM4-O-CAN-04.

We will also use the term "b maXX" for the "Basic Unit b maXX 4400" product. The controller in the basic unit is also referred to as the "b maXX controller". For a list of the abbreviations that are used, refer to [►Appendix A - Abbreviations◀](#) from page 57 onward.

We will use the term "option module" on its own when the text refers to the ETH-01, ETH-02 or CAN-04 products in general.

BASIC SAFETY INSTRUCTIONS

We have designed and manufactured each Baumüller plug-in module in accordance with the strictest safety regulations. Despite this, working with the plug-in module can be dangerous for you.

In this chapter, we will describe the risks that can occur when working with a Baumüller plug-in module. Risks are illustrated by icons. All the symbols that are used in this documentation are listed and explained.

In this chapter, we cannot explain how you can protect yourself from specific risks in individual cases. This chapter contains only general protective measures. We will go into concrete protective measures in subsequent chapters directly after information about the individual risk.

2.1 Hazard information and instructions



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

The hazard information is showing you the hazards which can lead to injury or even to death.

Always observe the hazard information given in this documentation.

Hazards are always divided into three danger classifications. Each danger classification is identified by one of the following words:

DANGER

- Considerable damage to property
- Serious personal injury
- Death **will** occur

WARNING

- Considerable damage to property
- Serious personal injury
- Death **can** occur

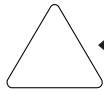
CAUTION

2.1 Hazard information and instructions

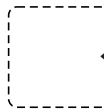
- Damage to property
- Slight to medium personal injury **can** occur

2.1.1 Structure of hazard information

The following two examples show how hazard information is structured in principle. A triangle is used to warn you about danger to living things. If there is no triangle, the hazard information refers exclusively to damage to property.



A triangle indicates that there is danger to living things.
The color of the border shows how severe the hazard is: the darker the color, the more severe the hazard is.



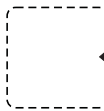
The icon in the rectangle represents the hazard.
The color of the border shows how severe the hazard is: the darker the color, the more severe the hazard is.



The icon in the circle represents an instruction. Users must follow this instruction.
(The circle is shown dashed, since an instruction is not available as an icon for each hazard advisory).



The circle shows that there is a risk of damage to property.



The icon in the rectangle represents the hazard.
The color of the border shows how severe the hazard is: the darker the color, the more severe the hazard is. (The rectangle is shown dashed, since the danger is not represented as an icon with every hazard advisory)

The text next to the icons is structured as follows:

THE SIGNAL WORD IS HERE THAT SHOWS THE DEGREE OF RISK




Here we indicate whether one or more of the results below occurs if you do not observe this warning.


- Here, we describe the possible results. The worst result is always at the extreme right.

Here, we describe the hazard.

Here, we describe what you can do to avoid the hazard.


2.1.2 Hazard advisories that are used

If a signal word is preceded by one of the following danger signs:  or  or , the safety information refers to injury to people.

If a signal word is preceded by a round danger sign: , the safety information refers to damage to property.

2.1.2.1 Hazard advisories about injuries to people

To be able to differentiate visually, we use a separate border for each class of hazard information with the triangular and rectangular pictograms.

For danger classification **DANGER**, we use the  danger sign. The following hazard information of this danger classification is used in this documentation.

DANGER



The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **electricity**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



DANGER




The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **mechanical effects**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



For danger classification **WARNING**, we use the  danger sign. The following hazard information of this danger classification is used in this documentation.

WARNING




The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

*Danger from: **electricity**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



For danger classification **CAUTION**, we use the  danger sign. The following hazard information of this danger classification is used in this documentation.

2.1 Hazard information and instructions



CAUTION

The following **may occur**, if you do not observe this caution information:

- minor to medium personal injury.

*Danger from: **sharp edges**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



CAUTION

The following **may occur**, if you do not observe this danger information:

- environmental pollution.

*Danger from: **incorrect disposal**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



2.1.2.2 Hazard advisories about damage to property

If a signal word is preceded by a round danger sign: ⓘ, the safety information refers to damage to property.



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

*Danger from: **electrostatic discharge**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



2.1.2.3 Instruction signs that are used



wear safety gloves



wear safety shoes

2.2 Information signs



NOTE

This indicates particularly important information.

2.3 Legal information

This documentation is intended for technically qualified personnel that has been specially trained and is completely familiar with all warnings and maintenance measures.

The equipment is manufactured to the state of the art and is safe in operation. It can be put into operation and function without problems if you ensure that the information in the documentation is complied with.

Operators are responsible for carrying out servicing and commissioning in accordance with the safety regulations, applicable standards and any and all other relevant national or local regulations with regard to cable rating and protection, grounding, isolators, over-current protection, etc.

Operators are legally responsible for any damage that occurs during assembly or connection.

2.4 Appropriate Use

You must always use the plug-in module appropriately. Some important information is listed below. The information below should give you an idea of what is meant by appropriate use of the plug-in module. The information below has no claim to being complete; always observe all the information that is given in these operating instructions.

- You must only install the plug-in module in series b maXX 4400 units.
- Configure the application such that the plug-in module is always operating within its specifications.
- Ensure that only qualified personnel works with this plug-in module.
- Mount the plug-in module only in the specified slot/slots.
- Install the plug-in module as specified in this documentation.
- Ensure that connections always comply with the stipulated specifications.
- Operate the plug-in module only when it is in technically perfect condition.
- Always operate the plug-in module in an environment that is specified in the technical data.
- Always operate the plug-in module in a standard condition.
For safety reasons, you must not make any changes to the plug-in module.
- Observe all the information on this topic if you intend to store the plug-in module.

You will be using the plug-in module in an appropriate way if you observe all the comments and information in these operating instructions.

2.5 Inappropriate Use

Below, we will list some examples of inappropriate use. The information below should give you an idea of what is meant by inappropriate use of the plug-in module. We cannot, however, list all possible cases of inappropriate use here. Any and all applications in which you ignore the information in this documentation are inappropriate; particularly, in the following cases:

- You installed the plug-in module in units that are not Series b maXX 4400.
- You ignored information in these operating instructions.
- You did not use the plug-in module as intended.
- You handled the plug-in module as follows
 - you mounted it incorrectly,
 - you connected it incorrectly,
 - you commissioned it incorrectly,
 - you operated it incorrectly,
 - you allowed non-qualified or insufficiently qualified personnel to mount the module, commission it and operate it,
 - you overloaded it,
- You operated the module
 - with defective safety devices,
 - with incorrectly mounted guards or without guards at all,
 - with non-functional safety devices and guards
 - outside the specified environmental operating conditions
- You modified the plug-in module without written permission from Baumüller Nürnberg GmbH.
- You ignored the maintenance instructions in the component descriptions.
- You incorrectly combined the plug-in module with third-party products.
- You combined the drive system with faulty and/or incorrectly documented third-party products.
- Your self-written PLC software contains programming errors that lead to a malfunction.

Version 1.1 of Baumüller Nürnberg GmbH's General Conditions of Sale and Conditions of Delivery dated 2/15/02 or the respective latest version applies in all cases. These will have been available to you since the conclusion of the contract at the latest.

2.6 Protective equipment

In transit, the plug-in modules are protected by their packaging. Do not remove the plug-in module from its packaging until just before you intend to mount it.

The cover on the b maXX units' controller sections provides IP20 protection to the plug-in modules from dirt and damage due to static discharges from contact. This means that you must replace the cover after successfully mounting the plug-in module.

2.7 Personnel training



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

Only qualified personnel are allowed to mount, install, operate and maintain equipment made by Baumüller Nürnberg GmbH.

Qualified personnel (specialists) are defined as follows:

Qualified Personnel

Electrical engineers and electricians of the customer or of third parties who are authorized by Baumüller Nürnberg GmbH and who have been trained in installing and commissioning Baumüller drive systems and who are authorized to commission, ground and mark circuits and equipment in accordance with recognized safety standards.

Qualified personnel has been trained or instructed in accordance with recognized safety standards in the care and use of appropriate safety equipment.

Requirements of the operating staff

The drive system may only be operated by persons who have been trained and are authorized.

Only trained personnel are allowed to eliminate disturbances, carry out preventive maintenance, cleaning, maintenance and to replace parts. These persons must be familiar with the Operating Instructions and act in accordance with them.

Commissioning and instruction must only be carried out by qualified personnel.

2.8 Safety measures in normal operation

- ▶ At the unit's place of installation, observe the applicable safety regulations for the plant in which this unit is installed.
- ▶ Provide the unit with additional monitoring and protective equipment if the safety regulations demand this.
- ▶ Observe the safety measures for the unit in which the plug-in module is installed.

2.9 Responsibility and liability

To be able to work with this plug-in module in accordance with the safety requirements, you must be familiar with and observe the hazard information and safety instructions in this documentation.

2.9.1 Observing the hazard information and safety instructions

In these operating instructions, we use visually consistent safety instructions that are intended to prevent injury to people or damage to property.



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

Any and all persons who work on and with Series b maXX units must always have available these Operating Instructions and must observe the instructions and information they contain – this applies in particular to the safety instructions.

Apart from this, any and all persons who work on this unit must be familiar with and observe all the rules and regulations that apply at the place of use.

2.9.2 Danger arising from using this module

The plug-in module has been developed and manufactured to the state of the art and complies with applicable guidelines and standards. It is still possible that hazards can arise during use. For an overview of possible hazards, refer to the chapter entitled [▶Basic Safety Instructions](#) ◀ from page 7 onward and to [▶Figure5](#) on page 20.

We will also warn you of acute hazards at the appropriate locations in this documentation.

2.9.3 Warranty and Liability

All the information in this documentation is non-binding customer information; it is subject to ongoing further development and is updated on a continuous basis by our permanent change management system.

Warranty and liability claims against Baumüller Nürnberg GmbH are excluded; this applies in particular if one or more of the causes listed in [▶Inappropriate Use](#) ◀ from page 12 onward or below caused the fault:

- Disaster due to the influence of foreign bodies or force majeure.

PACKAGING AND TRANSPORTATION

We package every Baumüller unit before shipping such that it is highly unlikely that it will be damaged in transit.

3.1 Transportation

The plug-in modules are packed at the factory in accordance with the order.

- ▶ Avoid severe vibrations and jolts (max. 1 g) in transit.
- ▶ Avoid static discharges to the plug-in modules' electronic components.
- ▶ Do not remove the plug-in module from its protective packaging until just before you intend to mount it.

3.2 Unpacking

After receiving the unit while it is still packaged:

- ▶ Check whether there is any visible damage!

If there is:

- ▶ Complain to the delivery company. Have your complaint confirmed in writing and contact immediately your nearest Baumüller Nürnberg GmbH subsidiary.

CAUTION



The following **may occur**, if you do not observe this caution information:

- property damage.



*Danger from: **electrostatic discharge**. If you touch the plug-in module, and especially its electronic components, and subject them to electrostatic discharges, the module can be damaged or even totally destroyed.*

When handling the plug-in module, always observe the regulations and information on handling electrostatically sensitive components.

3.3 Disposing of the packaging

If no damage is visible:

- ▶ Open the unit's packaging.
- ▶ Check the scope of supply against the delivery note.

The scope of supply is:

- BM4-O-ETH-01 Ethernet option module
- alternatively: BM4-O-ETH-02 Ethernet option module with CANopen-Master
- alternatively: BM4-O-CAN-04 CANopen-Master option module
- these Operating Instructions including the declaration of conformity/manufacturer declaration
- ▶ complain to your local Baumüller subsidiary if you find damage or if the delivery is not complete.

3.3 Disposing of the packaging

The packaging consists of cardboard and plastic.

- ▶ Observe local disposal regulations if you intend to dispose of the packaging.

3.4 Observe during transportation

The unit was packaged at the manufacturer's plant for initial transportation. If you have to transport the unit at a later date, please note the following points:

- ▶ Use the original packaging material
- or
- ▶ Use packaging that is suitable for electrostatic sensitive devices.

Ensure that the following conditions always apply during transportation:

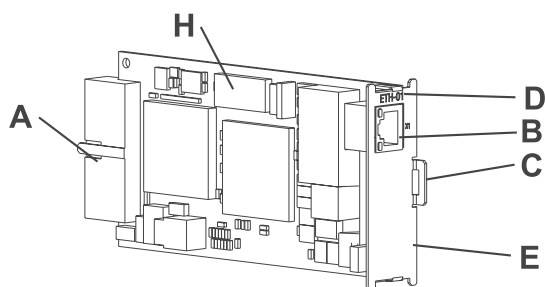
- 2 K 3 (Climatic category)
- - 30° C to + 70° C (Temperature range)
- Max. 1 g (Vibration, shock, repetitive shock)

DESCRIPTION OF THE ETHERNET WITH CANOPEN-MASTER OPTION MODULE

In this chapter, we will describe the Ethernet with CANopen-Master option module for b maXX drive PLC and will explain the type code on the plug-in module.

4.1 Structure

4.1.1 BM4-O-ETH-01 Ethernet option module



- A = Plug connector (back-mounted)
- B = Socket RJ45 (front)
- C = Grip
- D = Type code
- E = Serial number
- H = Dip switch

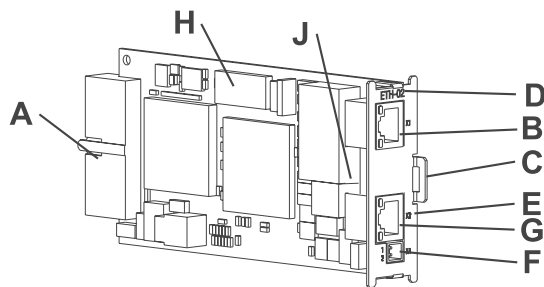
4000_st45_rev02_int.cdr

4000_st38a_rev01_int.cdr

Figure 1: Ethernet plug-in module

4.1 Structure

4.1.2 BM4-O-ETH-02 Ethernet option module with CANopen-Master



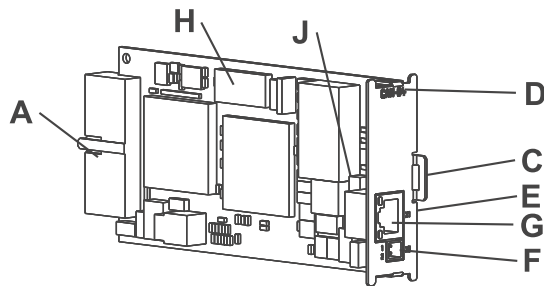
4000_st43_rev02_int.cdr

- A = Plug connector (back-mounted)
- B = Socket RJ45 (front)
- C = Grip
- D = Type code
- E = Serial number
- F = 2-pin connector (24 V)
- G = Socket RJ45 (front)
- H = Dip switch
- J = CAN terminating resistor

4000_st36_rev01_int.cdr

Figure 2: Ethernet plug-in module with CANopen-Master

4.1.3 CANopen-Master option module



4000_st35_rev02_int.cdr

- A = Plug connector (back-mounted)
- C = Grip
- D = Type code
- E = Serial number
- F = 2-pin connector (24 V)
- G = socket RJ45 (front)
- H = Dip switch
- J = CAN terminating resistor

4000_st36b_rev01_int.cdr

Figure 3: CANopen-Master plug-in module

4.1.4 Slot for all variants of the option module

Slot **G** is intended for option modules ETH-01, ETH-02 and CAN-04.

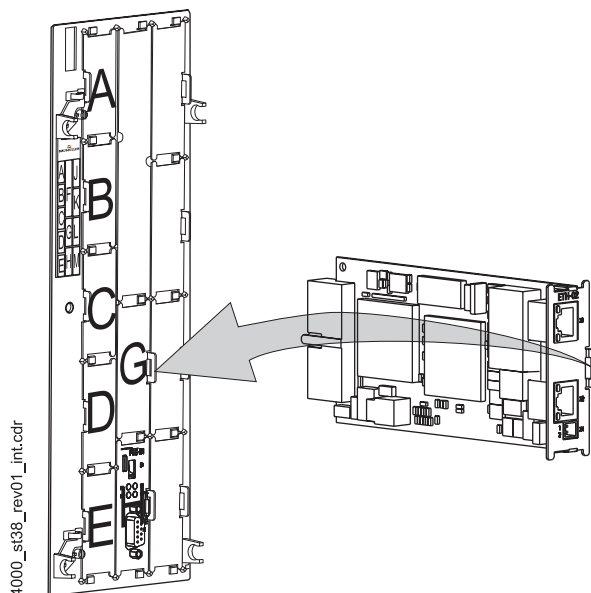


Figure 4: Ethernet with CANopen-Master option module, slot G

NOTE



if you plug a plug-in module into an unsuitable slot, it does not function. We have taken measures to ensure that the plug-in module is not damaged if you do this.

4.2 Danger zones

The b maXX 4400 basic unit that is plugged into this module represents the greatest hazard. Observe all the safety instructions of the b maXX 4400 basic unit. The illustration below gives you an overview of the danger zones in the plug-in module.

4.3 Labeling of the option module type code

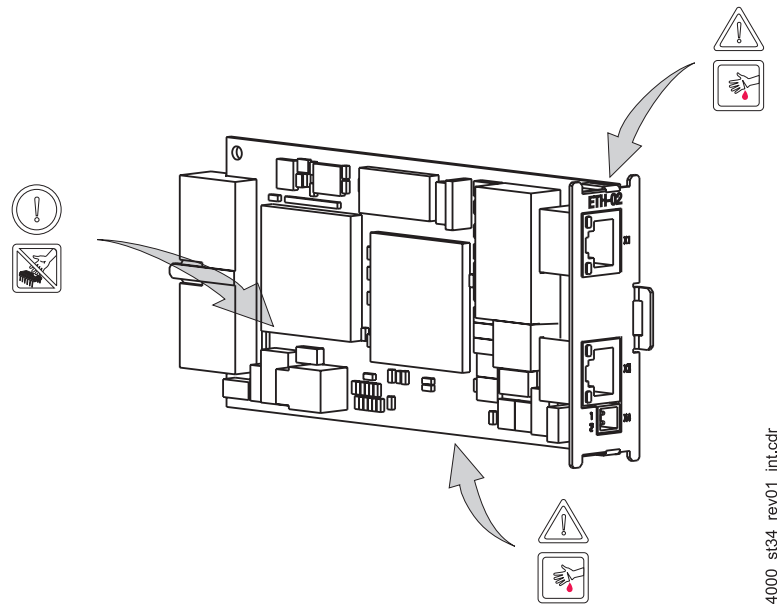


Figure 5: Danger zones

4.3 Labeling of the option module type code

On the front panel, you will find the type code ("D" in [Figure 2](#) on page 18) of the plug-in module.



NOTE

This type code applies only to the option module of series b maXX 4400. Other plug-in modules have their own type codes.

<u>BM4</u> - O - CAN - XX - YY - ZZ	Device generation in which you can install the plug-in module
BM4 - <u>O</u> - CAN - XX - YY - ZZ	Option module
BM4 - O - <u>CAN</u> - XX - YY - ZZ	Plug-in module type (for b maXX drive PLC)
BM4 - O - <u>ETH</u> - XX - YY - ZZ	
BM4 - O - ETH - <u>XX</u> - YY - ZZ	Version
	01: Ethernet
	02: Ethernet with CANopen-Master
BM4 - O - CAN - <u>XX</u> - YY - ZZ	Version module
	04: CANopen-Master
BM4 - O - CAN/ETH - XX - <u>YY</u> - ZZ	Version hardware
	00: Standard version
BM4 - O - CAN/ETH - XX - YY - <u>ZZ</u>	Version software
	00: Standard version

This type code is located on both the front and back of the front panel. The type code contains the plug-in module's basic data. On the basis of the type code, you will be able to find more data in the chapter entitled "Technical Data". For a list of all the technical data, refer to [▶Appendix D - Technical Data◀](#) from page 67 onward.

4.3 Labeling of the option module type code

ASSEMBLY AND INSTALLATION

In this chapter, we will describe mechanical assembly and electrical installation of the option module for b maXX drive PLC.

Assembly/installation consists of the following steps:

- 1 Mount the plug-in module.
- 2 Connect the plug-in module to the signal cables and the power supply.

5.1 General safety regulations

- Observe the information in chapters ►[Basic Safety Instructions](#) ◀ from page 7 onward.
- Observe all areas on the b maXX unit that could be dangerous when you are carrying out assembly.

The figure below gives you an overview of the danger zones on the plug-in module.

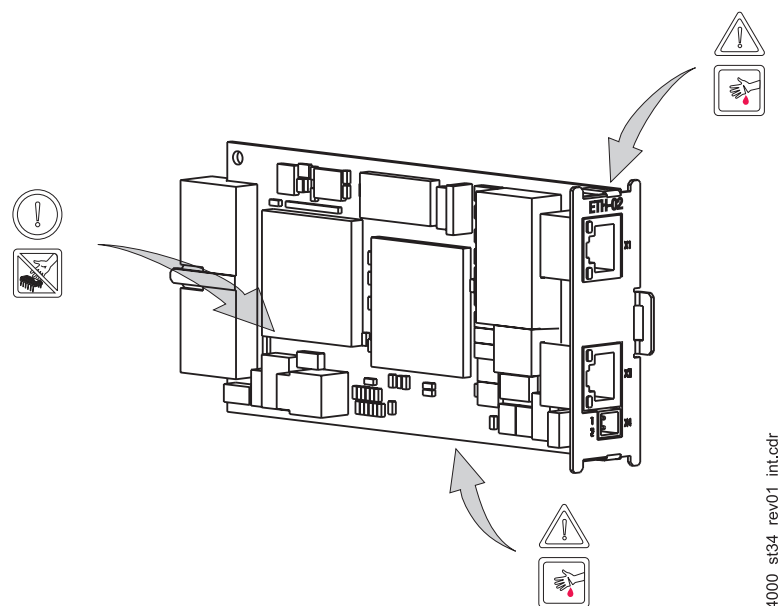


Figure 6: Danger zones

5.2 Requirements of the personnel carrying out work



DANGER

The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **electricity**. The unit and the vicinity of the control cabinet may carry dangerous voltages.*

Before starting any work, ensure that the unit and its vicinity are free of voltage.

Observe the relevant safety regulations when handling current-carrying units.

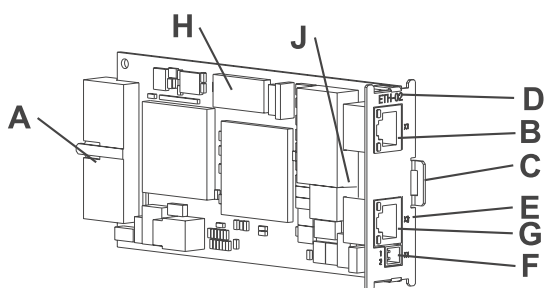
Ensure that only qualified personnel assembles and installs this plug-in module.

Qualified personnel is considered to be people whose training, experience and knowledge of relevant standards and regulations, accident prevention regulations and conditions in the plant has led to their being authorized by the plant safety manager to carry out activities that are needed in each case while recognizing and avoiding any possible hazards that might arise. The qualifications that are necessary for working with the unit include, for example:

- Trained or instructed in accordance with recognized safety standards in the care and use of appropriate safety equipment

5.3 Preparation

- Consult the type code (see "D" in [▶Figure 7](#) on page 24) to ensure that you have the correct plug-in module.



4000_st43_rev02_int.cdr

4000_st36_rev01_int.cdr

A = Plug connector (back-mounted)

B = Socket RJ45 (front)

C = Grip

D = Type code

E = Serial number

F = 2-pin connector (24 V)

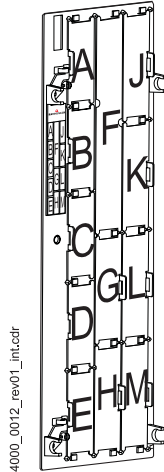
G = Socket RJ45 (front)

H = Dip switch

J = CAN terminating resistor

Figure 7: Ethernet with CANopen-Master option module for b maXX drive PLC

- Determine the correct slot (see [▶Figure 8](#) on page 25).



	Function modules										Option modules										
	BM4-F-ENC-XX (encoder 1 for motor control recommended)	BM4-F-ENC-XX (encoder 2)	BM4-F-AIO-01 (analog I/O)	BM4-F-AIO-02/03 (analog I/O)	BM4-F-DIO-XX (digital I/O)	BM4-F-FIO-XX (fast digital I/O)	BM4-F-IEE-XX (incremental encoder emulation)	BM4-F-SIE-XX (SSI-SSI encoder emulation)	BM4-F-CAN-01 (CANsync slave) in prep.	BM4-O-SER-XX (Sercos slave)	BM4-O-CAN-05 (CANsync slave)	BM4-O-PRO-01 (Profibus slave)	BM4-O-CAN-03 (CANopen slave)	BM4-O-DNT-XX (DISC-NT slave module)	BM4-O-PLC-XX (SPS)	BM4-O-CAN-06* (CANsync master)	BM4-O-CAN-04* (CANopen master)	BM4-O-IEI-XX* (incremental encoder emulation)	BM4-O-ETH-01* (Ethernet)	BM4-O-ETH-02* (Ethernet + CANopen master)	BM4-O-ECT-01 (EtherCAT slave)
A	X	-	-	-	o	o	-	o	-	-	-	-	-	-	-	-	-	-	-	-	-
B	-	X	-	-	o	o	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
C	-	-	-	-	o	o	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
D	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	-	-	X	X	o	o	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F	Controller unit, permanently installed																				
G	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	X	X	X	X	X	o
H	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	o	o	o	o	o	X
J	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	o	o	o	o	o	P
K	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	o	o	o	o	o	P
L	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	o	o	o	o	o	P
M	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	o	o	o	o	o	P

- X:** preferred slot
Baumüller Nürnberg GmbH recommends, in order to reach the highest functional range, to insert the plug-in modules into these slots.
- o:** possible slot
only if the preferred slot is occupied, we recommend in order to reach the highest functional range, to insert the plug-in modules into this slot.
- P:** only possible, if on slot G or H a PLC module (PLC) is plugged and the PLC (and not the controller) executes the communication to the field bus slave module.
- :** not possible - card doesn't work in this slot.
- *** Precondition for these cards is an inserted PLC module (PLC).

Figure 8: Combinations of slots

Check the plug-in jumper on the PCB (J in >Figure 7 on page 24). The plug-in jumper must be fitted if the CANopen-Master is at the start or the end of the bus. This terminates the CAN bus.



Figure 9: Plug-in jumper X7100

5.4 Assembly

- 1 Switch off the b maXX 4000 unit and secure it from being unintentionally restarted during assembly.

DANGER



The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **electricity**. The unit and the vicinity of the control cabinet may carry dangerous voltages.*

Before starting any work, ensure that the unit and its vicinity are free of voltage. Observe the relevant safety regulations when handling current-carrying units.

- 2 Pull the cover forward from the controller section: you can now see the slots.
- 3 Look for the intended slot (**G**) on the controller section.

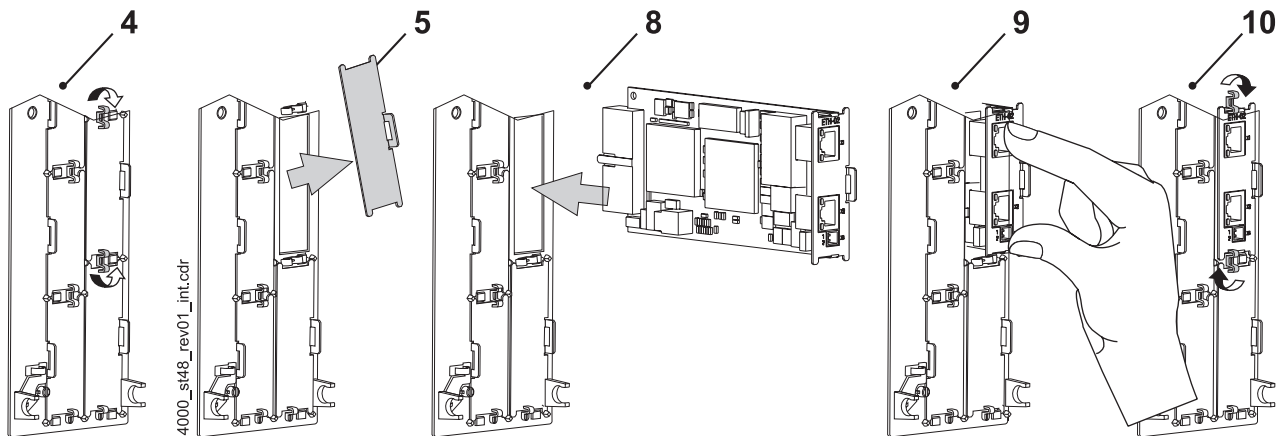


Figure 10: Assembly

- 4 Turn the spagnolet locks above and below this slot by 90°. The spagnolet locks are now horizontal.
- 5 Take out the front panel cover forward. Keep this cover. If you remove plug-in cards, you must close the unit again using the cover.

CAUTION



The following **may occur**, if you do not observe this caution information:

- property damage.



Danger from: electrostatic discharge. The option module for b maXX drive PLC contains ESD components.

Observe the described ESD measures when handling the plug-in module.

Only hold the plug-in module by the gripping piece (see "C" in ▶Figure 7 on page 24).

- 6 Observe the described ESD measures when handling the modules.
- 7 Remove the option module for b maXX drive PLC from the transportation packaging: Avoid contact with the plug-in module's electronic components.
 - Ethernet
Use DIP switches 1 to 5 (S5000) to set the IP address of the Ethernet option module.

	DIP switches 5 4 3 2 1 IP address 0 1 0 0 1	Example: IP address: 192.168.1.10
	DIP switches 10 9 8 7 6 Reserved 0 0 0 0 0	

The IP address results from
 192.168.1.“1+DIP switch“

This is the default address. You can change the address in software after commissioning (see the Application Manual for Ethernet with CANopen-Master). The default setting for the subnet mask is 255.255.255.0; for the gateway, it is 0.0.0.0, i.e. a gateway is not used. You can also change the subnet mask and the gateway in software after commissioning.

- CANopen
Check whether jumper X7100 is fitted. This activates the (120-Ohm) CAN terminating resistor. The CANopen-Master option module must be physically at the start or the end of the CANopen bus system. Ensure that the opposite side of the CAN bus is also terminated with 120 Ohm.

- 8 Plug the option module for b maXX drive PLC into the slot's guide rails. The gripping piece must face the same way as the other gripping pieces in this slot rail slot rail (in the case: the right-hand side).

- 9 Keep pressing two fingers on the front panel until you feel the card engage in the end position inside the unit.
- 10 Turn the spagnolet locks above and below this slot by 90° to the vertical position (locked position).
- 11 Remount the cover on the unit.



NOTE

If you only want to replace the option module for b maXX drive PLC within the scope of repairs with a card of the same type, the rest of the procedure is considerably shorter. In this case, you only need to restore the connections to the module, put the front cover back on and switch the unit on again.

This completes assembly of the option module for b maXX drive PLC. Connecting lines and commissioning is shown in the following sections.

5.5 Installation

At installation, carry out cabling of the option module for b maXX drive PLC.

5.5.1 Connection diagram

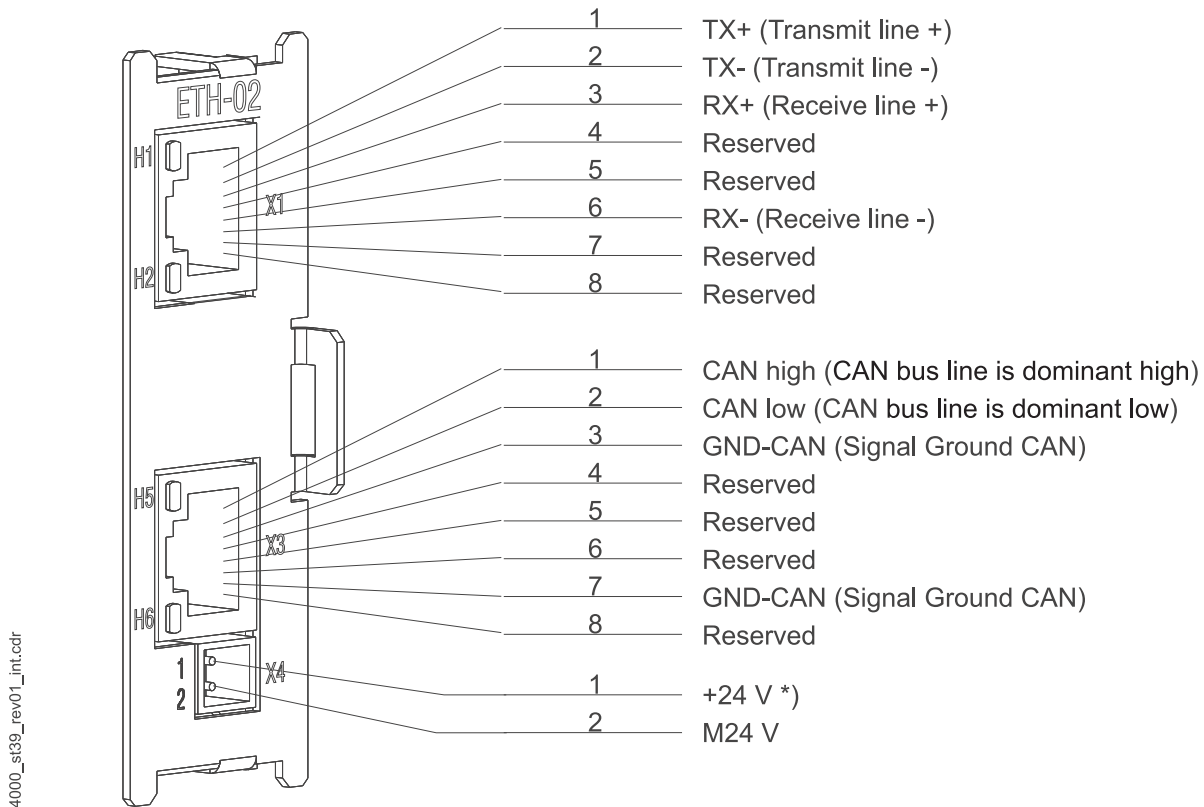


Figure 11: Connection diagram for Ethernet with CANopen-Master option module for b maXX drive PLC

NOTE

*) If you are taking into account UL 508 C: limit the current to 4 A.



5.5.2 Requirements of electrical connection



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

Danger from: **electrical voltage**. *If you are not able to ensure the plug-in module's requirements of the electrical connection, the plug-in module can be damaged or destroyed.*

Ensure that you comply with the connection values that are specified in the technical data and that the connections were made in accordance with the stipulations.

Prevent short-circuits between inputs/outputs. In the case of a short-circuit between inputs/outputs, the plug-in module can be destroyed.

To be able to comply with Standard EN 60 204-1 (Electrical Equipment of Machines), you must use the cables that are suggested in the standard. The connectors must not drop; otherwise, there is a risk of short-circuits or external voltages, etc.

- Ensure EMC-appropriate laying of the connection cables.

5.5.3 Requirements of the connection cable

Baumüller has released the following cables for use:

- CANopen communication cables BM4-CAN-K-31-xx, BM4-CAN-K-32-xx, BM4-CAN-K-33-xx (see Appendix [►B.1 List of all accessories◄](#) on page 59)
- Ethernet cable K-ETH-33-0-xx and crossover adapter or coupling (see Appendix [►B.1.4 Ethernet cable◄](#) from page 61 onward)
- Power supply cable with cross-section of 0.5 mm²; for more information, refer to [►Appendix D - Technical Data◄](#) from page 67 onward.

5.5.4 Sequence of installation

- Ensure that the b maXX unit is deenergized
- Remove the front cover from the unit.
- The option module for b maXX drive PLC is in slot G, see [►Figure 8](#) on page 25.
- With option modules BM4-O-ETH-01 and BM4-O-ETH-02 only:
Connect 8-pin RJ45 female connector X1 on the option module's front panel to the Ethernet communication cable (CAT5 twisted pair); for the connection assignment, see [►D.2 Pin assignment of RJ45 female connector for Ethernet◄](#) on page 68.
The Ethernet option module detects network types 10BaseT (10 Mbit) and 100BaseTX (100 Mbit) by the ongoing traffic and sets itself automatically. As an option to connecting with a star coupler (hub or switch), you can also connect the option module directly to a PC. In this case, you must, however, use a cross-link cable.
- With option modules BM4-O-ETH-02 and BM4-O-ETH-04 only:
Connect 8-pin RJ45 female connector X3 on the front panel of the CANopen-Master for b maXX drive PLC option module to the CANopen communication cable; for the connection assignment, see [►D.3 Pin assignment of RJ45 female connector for CANopen◄](#) on page 69.

- ▶ Plug in a terminating resistor connector (see ▶[B.1.2 Terminating resistor connector](#)◀ on page 60) to the last node of the CAN bus if the CANopen-Master is the start of the bus and the plug-in jumper is fitted (see ▶[Preparation](#) ◀ from page 24 onward).
- ▶ With option modules BM4-O-ETH-02 and BM4-O-CAN-04 only:
Connect the 2-pin male connector on the front panel to a 24 V power supply, for the connection assignment, see ▶[D.4 Pin assignment of 2-pin male connector](#)◀ on page 69.
- ▶ Remount the cover on the unit.
- ▶ Lay the connecting lines as stipulated in the control cabinet

This completes installation.

COMMISSIONING

In this chapter, we will describe how you commission the option module for b maXX drive PLC that you just assembled and installed (see [►Assembly and installation ◄](#) from page 23 onward). Commissioning ensures that the Ethernet with CANopen-Master option module functions correctly. For more information on programming refer to the "b maXX drive PLC Application Manual" and the "Ethernet with CANopen-Master for b maXX drive PLC Application Manual".

Before starting commissioning, ensure that the following conditions have been met:

- 1 The plug-in module has been assembled correctly.
- 2 The plug-in module has been installed correctly.
- 3 All the safety equipment has been commissioned.
- 4 The b maXX unit is ready for use.

6.1 General safety regulations

- Observe the [►Basic Safety Instructions ◄](#) from page 7 onward.

DANGER



The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death



Danger from: **mechanical effects**. *At commissioning, the drive can rotate.*

Keep far enough away from the rotating parts. Note that when drives are starting up machine parts can be set in motion. In all cases, activate the machine's safety devices.

6.2 Requirements of the personnel carrying out work

Commissioning work must only be carried out by trained specialists who have understood the safety regulations and information and can implement them.

6.3 Description/inspection of the safety and monitoring systems

6.3 Description/inspection of the safety and monitoring systems

Before you commission the option module for b maXX drive PLC, you must eliminate any errors/error messages that may be present on the b maXX 4400 basic unit. These errors may be due to faulty assembly (e.g. defective cables) or faulty installation (e.g. no power supply). You must not continue with commissioning until you have eliminated the errors.

6.4 Description and inspection of the controls and displays

6.4.1 Sample Configuration

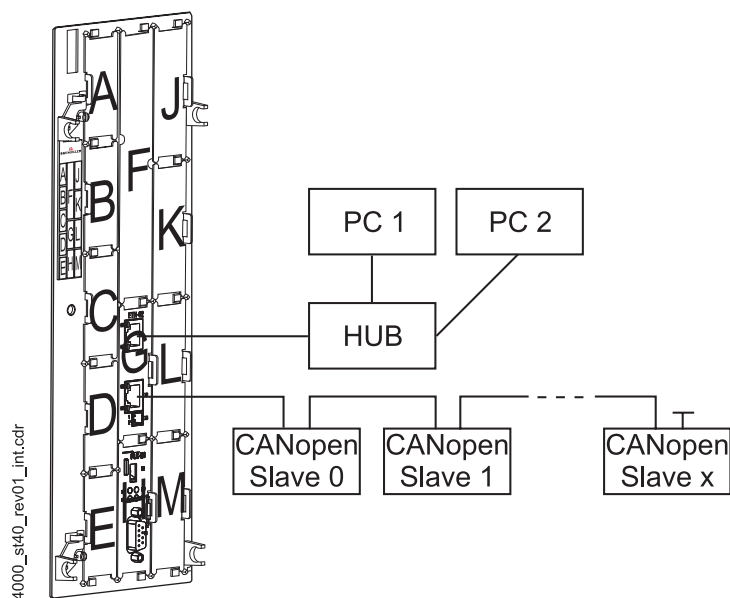


Figure 12: b maXX with Ethernet with CANopen-Master option module in option slot G and PLC in option slot H

6.4.2 LEDs

RJ45 female connector X1 for Ethernet has two LEDs (one green and one green/orange) that will be referred to below as H1 and H2. The LEDs have different meanings during initialization and during operation.

RJ45 female connector X3 for CANopen-Master also has two LEDs (one green and one red), that will be referred to below as H5 and H6. The LEDs have different meanings during initialization and during operation.

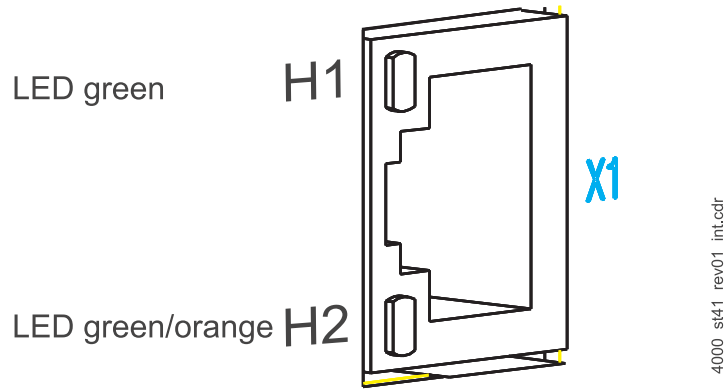


Figure 13: Magnified representation of the LEDs on Ethernet connection X1

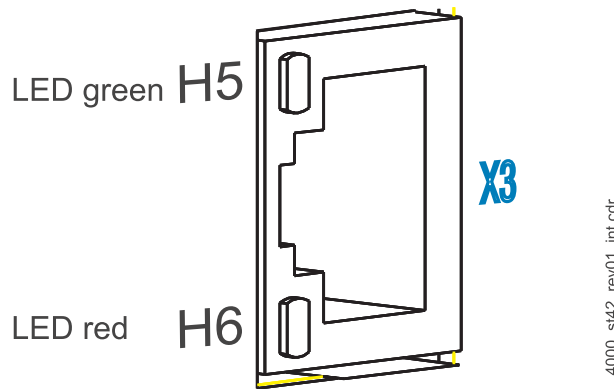


Figure 14: Magnified representation of the LEDs on CANopen connection X3

The patterns of the individual LEDs are described below. The flashing patterns are based on the following time scheme:

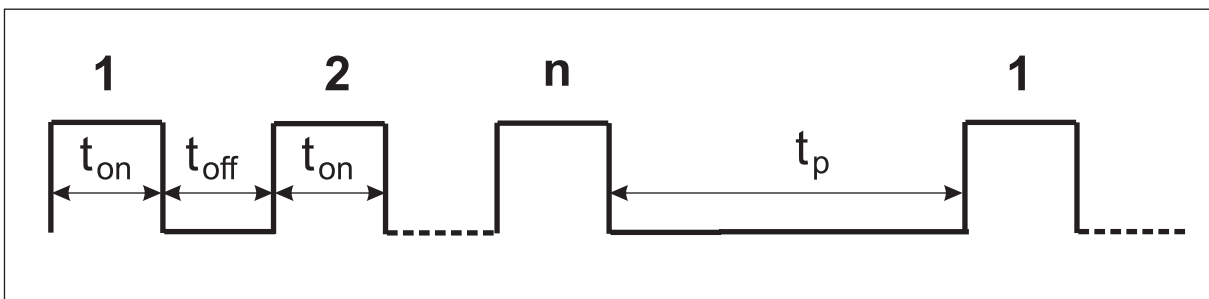


Figure 15: Flashing patterns of the LEDs

6.4 Description and inspection of the controls and displays

6.4.2.1 Activating and initializing

After switching on, the option module goes through the initialization stage. This takes approximately 5 seconds. During initialization, the following patterns are displayed:

Pattern	Meaning
H1 green: ON H2 green/orange: Flickering	There is a connection to the network via Ethernet
H5 green, H6 red: 3 s Continuous asynchronous flickering	The program is being copied from ROM to RAM

6.4.2.2 Operation

The option module is ready for operation after approximately 5 seconds. Communication via Ethernet is possible and the application program can carry out CANopen initialization. The following LED patterns are possible during operation:

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H1 (green): flickering H2 (green): ON	Ethernet: Operation at 100 Mbps and data traffic is taking place.	
H1 (green): flickering H2 (orange): ON	Ethernet: Operation at 10 Mbps and data traffic is taking place.	
H1 (green): OFF H2 (green): ON	Ethernet: Operation at 100 Mbps. No data traffic.	
H1 (green): OFF H2 (orange): ON	Ethernet: Operation at 10 Mbps. No data traffic.	
H5 (green): OFF H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 0 \text{ ms}$, $t_p = 1000 \text{ ms}$, $n = 1$	CANopen: Error initializing CAN-Controller. The CAN-Controller could not be initialized	Check the settings of the initialization routine in the application. If the error continues, replace the option module.
H5 (green): OFF H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 200 \text{ ms}$, $t_p = 1000 \text{ ms}$, $n = 2$	CANopen: Error initializing Rx data. Data reception could not be initialized	Check the settings of the initialization routine in the application.
H5 (green): OFF H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 200 \text{ ms}$, $t_p = 1000 \text{ ms}$, $n = 3$	CANopen: Error starting CAN-Controller. The CAN-Controller could not be started	Check the settings of the initialization routine in the application. If the error continues, replace the option module.

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 (green): $t_{on} = 200 \text{ ms}$, $t_{off} = 0 \text{ ms}$, $t_p = 200 \text{ ms}$, $n = 1$ H6 (red): OFF	CANopen: The CANopen-Master option module is waiting to be initialized by the application	
H5 (green): ON H6 (red): OFF	CANopen: The CANopen-Master option module is initialized and ready for data traffic	
H5 (green): OFF H6 (red): ON	CANopen: The CAN bus is in the bus OFF status	Check the bus cable. Check all the other nodes and remove them step by step. Check the baud rate.
H5 (green): - H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 200 \text{ ms}$, $t_p = 0 \text{ ms}$	CANopen: The CAN bus controller reports „CAN error passiv“	Check the bus cable. Check all the other nodes and remove them step by step. Check the baud rate.

Ethernet nodes continuously transfer data across the Ethernet. The green LED H1 indicates all data traffic in the associated network segment of the Ethernet, i.e. it also signals data traffic that is not intended for the option module.

To find out how to eliminate the cause of the error, refer to [►Finding and eliminating disturbances ◀](#) from page 43 onward.

6.4.2.3 system errors

System errors are errors that can lead to a system stop of the option module. It is very unlikely that a system error will occur; if it does, you must replace the option module.

In the case of a system error, it is not possible to communicate via Ethernet, CANopen and with the PLC. If a system error of this type occurs, LEDs H5 and H6 indicate this.

The following LED patterns indicate system errors:

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 1$	Processor: Undefined Instruction	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 2$	Processor: Software Interrupt	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 3$	Processor: Abort During Instruction Prefetch	Replace the option module

6.4 Description and inspection of the controls and displays

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 4$	Processor: Abort During Data Access	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 5$	Processor: Address Error	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 6$	RAM: RAM error (size, access, ..)	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 7$	FPGA: FPGA could not be loaded	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 8$	Operating system: Unknown IRP 1	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 9$	Operating system: Unknown IRP 2	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 10$	Configuration: No MAC address present	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 11$	Operating system: Standard I/O port could not be initialized	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 12$	Operating system: System thread 1 could not be initialized	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 13$	Operating system: System thread 2 could not be initialized	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 15$	Power-On self-test: Error Test DMA internal	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 16$	Power-On self-test: Error Test RAM <-> DMA	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 17$	Power-On self-test: Error Test Ethernet loop-back	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 18$	Power-On self-test: Error Test IRP generation	Replace the option module

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 19$	Power-On self-test: Error Test MII Interface	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 20$	Power-On self-test: Error Test Cache	Replace the option module

6.5 Commissioning sequence

Commissioning is divided into the following procedures:

- 1 Activation.
- 2 Testing the function.

6.5.1 Activation.

- Read and observe the [►General safety regulations ◀](#) from page 33 onward.
- You must have carried out correctly section "Assembly and Installation".
- Switch on the b maXX 4400 basic unit.

NOTE



You must not remove or plug in the option module while the b maXX 4400 basic unit is switched on. Switch the unit off first.

6.5.2 Testing the function

After switching on, the option module runs initialization routines. The option module is ready for operation after approximately 5 seconds. The LEDs indicate one of the operating status conditions stated in [►Operation ◀](#) on page 36.

7

OPERATION

For a guide to operating the option module for b maXX drive PLC, refer to the Ethernet with CANopen-Master for b maXX Application Manual and to the b maXX drive PLC Application Manual as well as to the PROPROG wt II Programming Manual or to the Online Help System of ProProg wt III.



8

FINDING AND ELIMINATING DISTURBANCES

In this chapter, we will describe disturbance displays on the option module for b maXX drive PLC. We explain the meanings of each disturbance display and how you can respond to them.

8.1 Safety regulations

- Observe the [►Basic Safety Instructions ◀](#) from page 7 onward.

8.2 Requirements of the personnel carrying out work

The personnel who work with the b maXX basic unit must have been instructed in operating the unit and be familiar with correctly operating it. Responding to error displays and status conditions in particular requires special knowledge that operators must demonstrate. Below, we will inform you about the various disturbances and the error messages that result from them. These disturbances can have mechanical or electrical causes.

8.3 Error messages (error list) responses to errors

The option module for b maXX drive PLC indicates errors by flashing LEDs H5 (green) and H6 (red).

A differentiation is made between operating errors and system error.

- Operating errors occur in normal operation and are generally due to operators making wrong configuration settings.

8.3 Error messages (error list) responses to errors

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 (green): OFF H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 0 \text{ ms}$, $t_p = 1000 \text{ ms}$, $n = 1$	CANopen: Error initializing CAN-Controller. The CAN-Controller could not be initialized	Check the settings of the initialization routine in the application. If the error continues, replace the option module.
H5 (green): OFF H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 200 \text{ ms}$, $t_p = 1000 \text{ ms}$, $n = 2$	CANopen: Error initializing Rx data. Data reception could not be initialized	Check the settings of the initialization routine in the application.
H5 (green): OFF H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 200 \text{ ms}$, $t_p = 1000 \text{ ms}$, $n = 3$	CANopen: Error starting CAN-Controller. The CAN-Controller could not be started	Check the settings of the initialization routine in the application. If the error continues, replace the option module.
H5 (green): OFF H6 (red): ON	CANopen: The CAN bus is in the bus OFF status	Check the bus cable. Check all the other nodes and remove them step by step. Check the baud rate.
H5 (green): - H6 (red): $t_{on} = 200 \text{ ms}$, $t_{off} = 200 \text{ ms}$, $t_p = 0 \text{ ms}$	CANopen: The CAN bus controller reports „CAN error passiv“	Check the bus cable. Check all the other nodes and remove them step by step. Check the baud rate.

- System errors
indicate an internal error in the option module. You must replace the option module.

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 1$	Processor: Undefined Instruction	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 2$	Processor: Software Interrupt	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 3$	Processor: Abort During Instruction Prefetch	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 4$	Processor: Abort During Data Access	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300 \text{ ms}$, $t_p = 2 \text{ s}$, $n = 5$	Processor: Address Error	Replace the option module

Pattern	CANopen-Master with Ethernet	Remedy in the case of errors
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 6$	RAM: RAM error (size, access, ..)	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 7$	FPGA: FPGA could not be loaded	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 8$	Operating system: Unknown IRP 1	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 9$	Operating system: Unknown IRP 2	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 10$	Configuration: No MAC address present	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 11$	Operating system: Standard I/O port could not be initialized	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 12$	Operating system: System thread 1 could not be initialized	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 13$	Operating system: System thread 2 could not be initialized	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 15$	Power-On self-test: Error Test DMA internal	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 16$	Power-On self-test: Error Test RAM <-> DMA	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 17$	Power-On self-test: Error Test Ethernet loop-back	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 18$	Power-On self-test: Error Test IRP generation	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 19$	Power-On self-test: Error Test MII Interface	Replace the option module
H5 green, H6 red, synchronous: $t_{on} = t_{off} = 300$ ms, $t_p = 2$ s, $n = 20$	Power-On self-test: Error Test Cache	Replace the option module

8.3 Error messages (error list) responses to errors



NOTE

For more details, refer to the "b maXX PLC Operating Instructions" and the "Ethernet with CANopen-Master Application Manual".

9

MAINTENANCE

If you comply with the environmental operating conditions specified in [▶Appendix D - Technical Data](#) from page 67 onward, the option module for b maXX drive PLC is maintenance-free. If you find a defect in your option module or think that it is defective, contact Baumüller Nürnberg GmbH.



10

OVERHAUL

You cannot overhaul a defective option module for b maXX drive PLC; contact Baumüller Nürnberg GmbH to obtain a replacement unit.



DISMANTLING, STORAGE

In this chapter, we will describe how you decommission the option module for b maXX drive PLC and store it.

11.1 Safety regulations

- Observe the [►Basic Safety Instructions ◀](#) from page 7 onward.

WARNING



The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death



*Danger from: **electricity**. The unit carries dangerous voltage and current and residual charges in the intermediate circuit.*

Ensure that all the electrical connections have been deenergized and are secured against re-starting.

Wait until the intermediate circuit has discharged before starting any dismantling work. The capacitors that are used in the unit have discharged automatically **10 min.** after the supply voltage is switched off such that you can dismount the connections without any risk.

Before starting work on the electrical connections, use appropriate measuring equipment to ensure that the connections are dead.

Do not dismount the connections until you are certain that they are dead.

11.2 Requirements of the personnel carrying out work



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

The danger is: **electrical destruction**. *The sub-assembly may get destroyed electrically if it is removed with the supply voltage on .*

Ensure that all the electrical connections have been deenergized and are secured against re-starting.

Wait until the intermediate circuit has discharged before starting any dismantling work. The capacitors that are used in the unit have discharged automatically **10 min.** after the supply voltage is switched off such that you can dismantle the connections without any risk.

Before starting work on the electrical connections, use appropriate measuring equipment to ensure that the connections are dead.

Do not dismantle the connections until you are certain that they are dead.



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

The danger is: **Uncontrollable characteristics of the machine/system**. *Removal of the module with switched on supply voltage can change the characteristics of the machine/system.*

Ensure that all the electrical connections have been deenergized and are secured against re-starting.

Wait until the intermediate circuit has discharged before starting any dismantling work. The capacitors that are used in the unit have discharged automatically **10 min.** after the supply voltage is switched off such that you can dismantle the connections without any risk.

Before starting work on the electrical connections, use appropriate measuring equipment to ensure that the connections are dead.

Do not dismantle the connections until you are certain that they are dead.

11.2 Requirements of the personnel carrying out work

The personnel that carries out dismantling must have the necessary knowledge and have been trained appropriately to carry out this work. Choose these persons such that they understand and can apply the safety instructions printed on the unit and parts of it and on the connections.

11.3 Dismantling

- ▶ Make available the following material before starting dismantling:
 - Suitable packaging for the option module; if possible, the original packaging.
 - Cover plate to cover the slot.
 - Suitable tools for pulling out the board (e.g. pointed electronic pliers)

Carry out dismantling in the following sequence:

- 1 Deenergize the b maXX 4400 basic unit and secure it from unintentional switch-on.
- 2 Wait ten minutes (the capacitors discharge).
- 3 Open the switching cabinet.
- 4 Remove the b maXX 4400 basic unit's cover.
- 5 Remove the male connectors from the sockets.
- 6 Turn the spagnolet locks above and below the option module's front panel slot by 90° (in the horizontal position, they are unlocked).

CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

*Danger from: **electrostatic discharge**. The electronic components on the PCB can be damaged or destroyed if you touch them with your hands.*

Only touch the CANopen-Master option module by the handle on the front panel.



CAUTION

The following **may occur**, if you do not observe this caution information:

- minor to medium personal injury.

*Danger from: **sharp edges**. The components of the b maXX drive PLC option module, sheet steel parts, PCBs can have sharp edges!*

Watch out for sharp edges and wear appropriate gloves.



- 7 Pull the option module by the handle forwards out of the b maXX basic unit.
- 8 Place the module in the prepared packaging – when doing this, only touch the plug-in module by the handle.
- 9 Now fit a cover (or a new option module for b maXX drive PLC) in the open slot (the handle must be pointing toward the right-hand side of the unit).
- 10 Turn the spagnolet locks by 90° (in the vertical position the locks are fastened).
- 11 Remount the cover on the unit.
- 12 Close the switching cabinet.
- 13 Document dismantling (or replacing) the option module.

You can now switch the unit back on. If you want to dispose of the module, refer to chapter ▶ [Disposal](#) ◀ from page 55 onward for more information.

11.4 Storage conditions

Store the option module for b maXX drive PLC in suitable packaging according to the storage conditions in [▶Appendix D - Technical Data◀](#) from page 67 onward.

11.5 Recommissioning

If you want to recommission the option module for b maXX drive PLC, observe the storage conditions in [▶Appendix D - Technical Data◀](#) from page 67 onward. Then, carry out commissioning again.

DISPOSAL

In this chapter we will describe how you can correctly and safely dispose of the option module for b maXX drive PLC. Most of the waste is electronic scrap.

12.1 Safety regulations

- Observe the [Basic Safety Instructions](#) on page 7.



CAUTION

The following **may occur**, if you do not observe this caution information:

- minor to medium personal injury.

*Danger from: **sharp edges**. The components of the option module, sheet steel parts, etc. can have sharp edges! If you do not hold an option module by the handle, you can cut your fingers or the palm of your hand.*

You must only ever hold the option module by the handle on the front panel.



CAUTION

The following **may occur**, if you do not observe this danger information:

- environmental pollution.

*Danger from: **incorrect disposal**.*

You must only carry out disposal in accordance with the safety regulations. If necessary, you must also comply with any local regulations. If you cannot safely dispose of the unit yourself, commission a suitable disposal company to carry it out on your behalf.

In case of fire, dangerous compounds may result or hazardous materials may be released.

Do not subject electronic components to high temperatures.

Some high-performance semi-conductors, for example, use beryllium oxide as the internal insulation. The beryllium dust that results on opening is a health risk.

Do not open the electronic components.



12.2 Requirements of the personnel carrying out work

The personnel that carries out disposal/dismantling must have the necessary knowledge and have been trained appropriately to carry out this work. Choose these persons such that they understand and can apply the safety instructions printed on the b maXX 4400 basic unit and parts of it.

12.3 Disposal guide

Conditions	<ul style="list-style-type: none">• The option module has already been correctly dismantled.• All the necessary technical aids for dismantling are ready for use and are in perfect technical condition.
Sheet steel	The front panel is made of galvanized sheet steel. Dispose of the sheet steel in your local reusable ferrous metal system.
Electronic scrap	You must dispose of the electronic scrap (PCB) that cannot be further dismantled as special waste. When doing this, observe the applicable regulations.

12.4 Disposal locations/official bodies

Ensure that you carry out disposal in accordance with your company's guidelines and with the regulations of the responsible disposal locations and official bodies. If in doubt, contact the Trade Supervisory Authority that is responsible for your company or the Environmental Protection Authorities.



APPENDIX A - ABBREVIATIONS

API	Applications Programming Interface	EPROM	Erasable Programmable Read-Only Memory
ARP	Address Resolution Protocol	ESD	Electrostatic sensitive devices
BACI	Baumüller Component Interface	FTP	File Transfer Protocol
BUB	Ballast unit	HD	Hamming distance
BUC	Baumüller feed/return feed unit	HTML	Hypertext Markup Language
BUG	Baumüller converter basic feed unit	HTTP	Hypertext Transfer Protocol
BUM	Baumüller individual power unit	I/O	Input/Output
BUS	Baumüller power module	ICMP	Internet Control Message Protocol
CAL	CAN Application Layer	IP	Internet Protocol
CAN	Controller Area Network	IRP	Interrupt
CiA	CAN in Automation	ISO	International Organization for Standardization
COB	Communication Object	LAN	Local Area Network
COB-ID	Communication Object Identifier	LED	Light Emitting Diode
CSMA/CD	Carrier Sense Multiple Access / Collision Detection	LSS	Layer Setting Services
CSMA/CA	Carrier Sense Multiple Access / Collision Avoidance	MAC	Media Access Control
CPU	Central Processing Unit	OSI	Open Systems Interconnect
DC	d.c. current	PDD	Process Data Directory
DCF	Device Configuration File	PDO	Process Data Object
DHCP	Dynamic Host Configuration Protocol	PLC	Process Loop Controller (PLC)
DIN	Deutsches Institut für Normung e.V. (German Standards Institute)	RAM	Random Access Memory
DP-RAM	Dual-port RAM	SAP	Service Access Point
DR	Draft Recommendation	SDO	Service Data Object
DS	Draft Standard	SMS	Short Message System
DSP	Draft Standard Proposal	SMTP	Simple Mail Transfer Protocol
EDS	Electronic Data Sheet	PLC	Programmable Logic Controller
EMC	Electromagnetic compatibility	SRD	SDO Requesting Device
EN	European standard	SRDO	Safety Relevant Data Object
		TCP	Transport Control Protocol
		Telnet	Terminal over Network

UDP	User Datagram Protocol
URL	Uniform Resource Locator
USS	USS protocol function module
USS[®]	Trademark of Siemens, universal serial interface
VDE	Verband deutscher Elektrotechniker (German Association of Electrical Engineers)
WWW	World Wide Web
16#	Prefix for hexadecimal numbers



APPENDIX B - ACCESSORIES

In this appendix, you will find a list of all the accessories that are available for Baumüller Nürnberg GmbH's option module for b maXX drive PLC.

If you have any queries about accessories or suggestions for improvements, Baumüller's Product Management will be pleased to hear from you.

B.1 List of all accessories

B.1.1 Available CANopen communication cables

Line type: BM4-CAN-K-33-xx (RJ male connector, RJ male connector):

Type	Length [m]	Article Number
BM4-CAN-K-33-0,5	0,5	353315
BM4-CAN-K-33-01	1	346577
BM4-CAN-K-33-02	2	353317
BM4-CAN-K-33-03	3	353321
BM4-CAN-K-33-04	4	353327
BM4-CAN-K-33-05	5	351766
BM4-CAN-K-33-10	10	353329

Line type: BM4-CAN-K-31-xx (RJ male connector, SUB-D male connector):

Type	Length [m]	Article Number
BM4-CAN-K-31-0,5	0,5	353334
BM4-CAN-K-31-01	1	346568
BM4-CAN-K-31-02	2	353335
BM4-CAN-K-31-03	3	346571

B.1 List of all accessories

Type	Length [m]	Article Number
BM4-CAN-K-31-04	4	353337
BM4-CAN-K-31-05	5	351764
BM4-CAN-K-31-10	10	353339

Line type: BM4-CAN-K-32-xx (RJ male connector, SUB-D female connector):

Type	Length [m]	Article Number
BM4-CAN-K-32-0,5	0,5	353330
BM4-CAN-K-32-01	1	346572
BM4-CAN-K-32-02	2	353331
BM4-CAN-K-32-03	3	346573
BM4-CAN-K-32-04	4	353332
BM4-CAN-K-32-05	5	351765
BM4-CAN-K-32-10	10	353333

B.1.2 Terminating resistor connector

CAN terminating resistor connector for RJ45 and Sub-D

Type	Article Number
BM4-CAN-T01	RJ45 346408
K-CAN-T1-O	9-pin SUB-D male connector 313910
K-CAN-T2-O	9-pin SUB-D female connector 313911

B.1.3 Power supply connector

Order designation Article number
2-pin plug-in connector 312630

B.1.4 Ethernet cable

Crossover package comprising cross coupling (Art. No. 365463) and Cat5 cable 0.5 m (Art. No. 325160)

Type	Article Number
K-ETH-CROSS-ADAPTER	365464

Modular coupling, RJ45 female connector - RJ45 female connector, crossover, Cat5, screened

Type	Article Number
K-ETH-CROSS-KUPPLUNG	365463

Line type: K-ETH-33-0-xx (RJ male connector, RJ male connector)

Type	Length [m]	Article Number
K-ETH-33-0-0,5	0,5	325160
K-ETH-33-0-01	1	325161
K-ETH-33-0-02	2	325162
K-ETH-33-0-03	3	325163
K-ETH-33-0-04	4	325317
K-ETH-33-0-05	5	325164
K-ETH-33-0-10	10	325165



APPENDIX C - MANUFACTURER DECLARATION

In this section we provide general information about EU directives, the CE symbol and the Declaration by Manufacturer.

C.1 What is an EU directive?

EU directives specify requirements. The directives are written by the relevant bodies within the EU and are implemented by all the member countries of the EU in national law. In this way the EU directives guarantee free trade within the EU.

An EU directive only contains essential minimum requirements. You will find detailed requirements in standards, to which references are made in the directive.

C.2 What the CE symbol indicates

a) The CE marking symbolizes conformity to all the obligations incumbent on manufacturers for the product by virtue of the Community directives providing for its affixing.

...

b) The CE marking affixed to industrial products symbolizes the fact that the natural or legal person having affixed or been responsible for the affixing of the said marking has verified that the product conforms to all the Community total harmonization provisions which apply to it and has been the subject of the appropriate conformity evaluation procedures.

...

Council Decision 93/465/EEC, Annex I B. a) + c)

We affix the CE mark to the equipment and to the documentation as soon as we have established that we have satisfied the requirements of the relevant directives.

All converters and control systems supplied by the Baumüller Nürnberg GmbH satisfy the requirements of 73/23/EEC (Low Voltage Directive).

As all converters and control systems comply with the requirements of the harmonized

standards EN50178, EN 60204-1, EN 60529 and HD625.1 S1, the protection targets of 73/23/EWG are reached.

With specified application of this Baumüller equipment in your machinery, you can act on the assumption that the equipment satisfies the requirements of 98/37/EG (machinery directive). Therefore the equipment is developed and constructed in such a way, that the requirements of the harmonized standard EN 60204-1 can be met by the electrical installation.

Compliance with 89/336/EEC (EMC Directive) depends on how the equipment is installed. Since you are performing installation yourself, it is you who are responsible for complying with 89/336/EEC.

A declaration of conformity on the EMC directive therefore cannot be issued.

We will provide you with support in the form of EMC information. You will find this information in the operating manual and in “filters for main applications”. When you have complied with all the requirements we impose in this documentation, you can assume that the drive satisfies the requirements of the EMC Directive.

The limit values and requirements for variable-speed electrical drives are determined in the harmonized product standard EN61800-3. If you are erecting an installation, for which a declaration of conformity on the EMC directive must be generated, it may be necessary to specify several harmonized standards, which you have used for the compliance of the protection targets of the directive. The harmonized product standard EN 61800-3 has to be used with electrical drives.

To enable you to market your machine within the EU, you must be in possession of the following:

- Conformity mark (CE mark)
- Declaration(s) of Conformity regarding the directive(s) relevant to the machine

C.3 Definition of the term Declaration by Manufacturer

A Declaration by Manufacturer as defined by this documentation is a declaration that the machine/safety component brought into circulation conforms to all the relevant fundamental safety and health requirements.

By issuing the Declaration of Conformity in this section the Baumüller Nürnberg GmbH declares that the equipment conforms to the relevant fundamental safety and health requirements resulting from the directives and standards which are listed in the Declaration of Conformity .

The Baumüller equipment is integrated into a machine. For health and safety, of the users for example, it is important for the entire machine to conform to all the relevant fundamental safety and health requirements. For this reason the Baumüller Nürnberg GmbH draws attention in the Declaration by Manufacturer to the fact that it is prohibited to put the machine as a whole into operation before it has been declared that the machine conforms to the provisions of the Machinery Directive.



C.4 Manufacturer Declaration

EU-Herstellererklärung 2003

Declaration by Manufacturer 2003

gemäß EU-Richtlinie 98/37/EG (Maschinen) vom 22.06.1998
geändert durch: 98/79/EG vom 27.10.1998

in accordance with EC directive 98/37/EG (machinery) dated 22.06.1998
changed by: 98/79/EC dated 27.10.1998

Optionsmodul Ethernet mit CANopen-Master für b maXX PLC BM4-O-ETH-01, BM4-O-ETH-02 und BM4-O-CAN-04

Die Inbetriebnahme der Maschine, in die dieses Gerät eingebaut wird, ist untersagt bis die Konformität der Maschine mit der obengenannten Richtlinie erklärt ist.

The machinery into which this unit is to be incorporated must not be put into service until the machinery has been declared in conformity with the provisions of the directive mentioned.

Bei der Entwicklung und Konstruktion des Geräts wurden folgende Normen beachtet:
The development and construction of the unit is complied with following standards:

Norm / standard

EN 60204-1	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen Safety of machinery - Electrical equipment of machines
------------	---

Baumüller Nürnberg Electronic GmbH & Co. KG, Ostendstr. 80 - 90, D- 90482 Nürnberg

Nürnberg, 07.10.2003

Dr. Peter Kreisfeld
Geschäftsführer
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i.V. Dr. Peter Heidrich
Entwicklungsleiter
Head of development

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APPENDIX D - TECHNICAL DATA

In this appendix, you will find the technical data for Baumüller Nürnberg GmbH's option module.

D.1 Connection values

BM4-O-CAN-04

CAN baud rate	1 Mbps, 800 kbps, 500 kbps, 250 kbps, 125 kbps, 100 kbps, 50 kbps, 20 kbps, 10 kbps
CAN Physical Layer	ISO 11898
CAN electrical isolation	Optocoupler, DC/DC converter
CAN plug-in connector	RJ45 female connector
CAN operating voltage	+24 V, external
Current consumption	Max. 100 mA external
Ambient conditions	Same as b maXX 4400 basic unit
Storage conditions	Same as b maXX 4400 basic unit

BM4-O-ETH-01

Ethernet network types	10BaseT, 100BaseTX
Ethernet plug-in connector	RJ45 female connector
Ambient conditions	Same as b maXX 4400 basic unit
Storage conditions	Same as b maXX 4400 basic unit

D.2 Pin assignment of RJ45 female connector for Ethernet

BM4-O-ETH-02

Ethernet network types	10BaseT, 100BaseTX
CAN baud rate	1 Mbps, 800 kbps, 500 kbps, 250 kbps, 125 kbps, 100 kbps, 50 kbps, 20 kbps, 10 kbps
CAN Physical Layer	ISO 11898
CAN electrical isolation	Optocoupler, DC/DC converter
Ethernet plug-in connector	RJ45 female connector
CAN plug-in connector	RJ45 female connector
CAN operating voltage	+24 V, external
Current consumption	Max. 100 mA external
Ambient conditions	Same as b maXX 4400 basic unit
Storage conditions	Same as b maXX 4400 basic unit

D.2 Pin assignment of RJ45 female connector for Ethernet

Pin No.	Assignment
1	TX+ (Transmit line +)
2	TX- (Transmit line -)
3	RX+ (Receive line +)
4	Reserved
5	Reserved
6	RX- (Receive line -)
7	Reserved
8	Reserved

D.3 Pin assignment of RJ45 female connector for CANopen

Pin No.	Assignment
1	CAN high (CAN bus line is dominant high)
2	CAN low (CAN bus line is dominant low)
3	GND-CAN (Signal Ground CAN)
4	CAN-SYNC - (SYNC signal negative)
5	CAN-SYNC + (SYNC signal positive)
6	Reserved
7	GND-CAN (Signal Ground CAN)
8	Reserved

D.4 Pin assignment of 2-pin male connector

Pin No.	Assignment
1	+24 V
2	M24V

Supplied plug-in connector:

Max. cable cross-section	Connection technology	Load carrying capacity
0.5 mm ²	Cage clamp	4 A

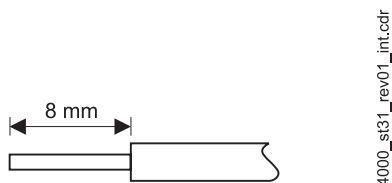


Figure 16: Strip the 8-mm cable



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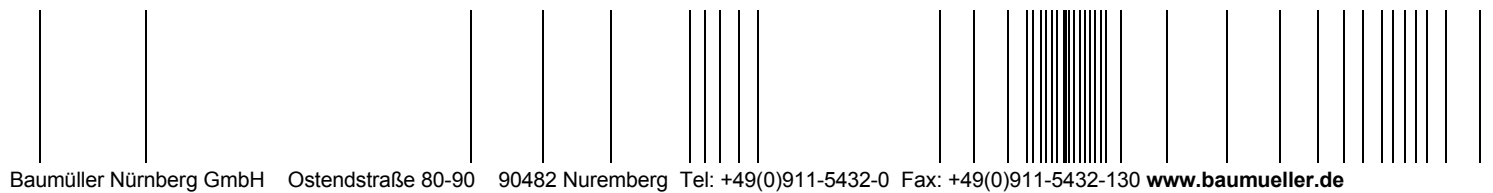
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be in motion



All the information in these Operating Instructions is non-binding customer information; it is subject to ongoing further development and is updated on a continuous basis by our permanent change management system. Note that all the data/numbers/information that are quoted are current values at the time of printing. This information is not legally binding for dimensioning, calculation and costing. Before using the information listed in these Operating Instructions as the basis for your own calculations and/or applications, make sure that you have the latest most current information. This means that we accept no responsibility for the accuracy of the information.