BAUMÜLLER



b maXX 6000

Insruction handbook Add-on module

Incremental encoder emulation IEE

SSI encoder emulation SIE

E | 5.25013.01

Read the Instruction handbook before starting any work!

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1

GENERAL

1.1 Information on this Instruction Handbook

The manual **b maXX 6000 Add-on module IEE/SIE** is an addition to the Instruction handbook **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004) for devices with

incremental encoder emulation
type code: BM6XXX-XXXXYY-X**01** and

SSI encoder emulation
type code: BM6XXX-XXXXYY-X**03**.

The basic prerequisite for safe working is compliance with all the safety and handling instructions stated in the Instruction handbooks **b maXX 6300** or **b maXX 6500**.

Additionally, the valid accident prevention regulations and general safety regulations applicable to the scope of application the device must be complied with.

Read this Instruction handbook and the Instruction handbooks **b maXX 6300** or **b maXX 6500**, particularly the safety notes chapter, completely before beginning any work on the device. This Instruction handbook is part of the product and must be kept accessible to personnel at all times in the immediate vicinity of the device.

1.2 Key to symbols

Warning notes

Warning notes are identified by symbols in this Instruction handbook. The notes are introduced by signal words that express the extent of the danger.

It is imperative that these notes be complied with and are conscientiously regarded in order to prevent accidents, personal injury and material damage.



DANGER!

....this indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING!

....this indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION!

....this indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE!

....indicates a hazardous situation which, if not avoided, may cause material damage.

Recommendations



NOTE!

....highlights useful hints and recommendations, as well as information for the efficient and trouble-free use.

1.3 Limitation of liability

All specifications and notes in these instruction handbook were compiled taking into account the applicable standards and regulations, the state of the art and our knowledge and experience of many years.

The manufacturer assumes no liability for damages due to:

- non-compliance with the instruction handbook
- usage for other than the intended purpose
- usage by untrained personnel

The actual scope of delivery can vary in case of optional equipment, laying claim to additional order options, or on account of the latest technical changes to the explanations and representations described herein.

The user bears the responsibility for performing service and initial operation in accordance with the safety regulations of the applicable standards and all other relevant governmental or local regulations concerning the dimensioning and protection of conductors, grounding, disconnectors, overcurrent protection, etc.

The person who carried out the mounting or installation is liable for any damage incurred when assembling or connecting the device.

1.4 Copyright protection

The instruction handbook must be treated confidentially. It is to be used exclusively by personnel who work with the device. The consignment of the instruction handbook to third persons without the written permission of the manufacturer is prohibited.



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1.5 Other applicable documents

Components of other manufacturers are integrated into the device. For these purchased parts, hazard assessments have been performed by the respective manufacturers. The compliance of the design construction with the applicable European and national regulations has been declared for the components by the respective manufacturers.

1.6 Spare parts



WARNING!

False or flawed spare parts can lead to damage, malfunction or complete failure, thus endangering safety.

Therefore:

- Only use original spare parts of the manufacturer.

Procure spare parts through an authorized dealer or directly from the manufacturer.

1.7 Disposal

Insofar as no take-back or disposal agreement has been made, please disassemble units correctly and properly recycle the constituent parts.

See also **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004), chapter Disposal.

1.8 Customer service

Our customer service is available to provide you with technical information.

Info on the responsible contact persons is available at all times via telephone, fax, mail or the Internet.

1.9 List of associated documentations

Instruction Handbook

	Doc No.
Instruction handbook b maXX 5000 / 5100 / 6300	5.24007
Instruction handbook b maXX 6500	5.22004

Parameter Manual

	Doc No.
Parameter Manual b maXX 6000	5.09022

Application handbooks

	Doc.-No.
Servo pump function V1 for b maXX 5000/6000	5.17002
Servo pump function V2 for b maXX 3000/5000/6000	5.17016

2

SAFETY

This section provides an overview of all of the important safety aspects for optimum protection of personnel as well as for the safe and problem-free operation.

2.1 Contents of the Instruction Handbook

Each person who is tasked with performing work on or with the device must have read and understood this Instruction handbook and the Instruction handbook of **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004) before working with the device. This also applies if the person involved with this kind of device or a similar one, or has been trained by the manufacturer.

2.2 Changes and modifications to the device

In order to prevent hazards and to ensure optimum performance, no changes, additions or modifications may be undertaken on the device that have not been explicitly approved by the manufacturer.

2.3 Use, compliant with intended purpose

The **incremental encoder emulation IEE** or **SSI encoder emulation SIE** is considered as being used compliant with its intended purpose if all notes and information of this Instruction handbook and the Instruction handbook **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004) are adhered to.



WARNING!

Danger arising from usage for an unintended purpose!

Any usage that goes beyond the intended purpose and/or any non-compliant use of the device can lead to dangerous situations.

Therefore:

- Only use the device compliant with its intended purpose.
- Note all specifications of this Instruction handbook and the Instruction handbooks **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004).
- Ensure that only qualified personnel work with/on this device.
- When configuring, ensure that the device is always operated within its specifications.
- The device may only be operated in a technically flawless condition.
- Only operate the device in combination with components approved by Baumüller Nürnberg GmbH.

2.4 Responsibility of the operating company

The device will be used in commercial areas. Thus, the proprietor of the device is subject to the legal work safety regulations.

Along with the notes on work safety in this Instruction handbook and the Instruction handbooks **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004) the safety, accident prevention and environmental protection regulations valid for the area of application of this device must be complied with. Whereby:

- The operating company must inform himself about the applicable work health and safety regulations and ascertain, in a hazard assessment, any additional hazards that could arise from the special working conditions in the use area of the device. These must then be implemented in the form of operating instructions for operation of the device.
- This Instruction handbooks must be kept accessible to personnel working with the device at all times in the immediate vicinity of the device.
- The specifications of the Instruction handbooks must be adhered to completely and without exception.
- The device may only be operated in a technically faultless and operationally safe condition.

2.5 Training of the personnel



WARNING!

Risk of injury due to insufficient qualifications!

Improper handling can lead to significant personal injury and material damage.

Therefore:

- Certain activities can only be performed by the persons stated in the respective chapters of this Instruction handbook.

In this Instruction handbook, the following qualifications are stipulated for various areas of activity:

- **Operating personnel**
  - The drive system may only be operated by persons who have been specially trained, familiarized and authorized.
  - Troubleshooting, maintenance, cleaning, maintenance and replacement may only be performed by trained or familiarized personnel. These persons must be familiar with the Instruction handbook and act accordingly.
  - Initial operation and familiarization may only be performed by qualified personnel.
- **Qualified personnel**
  - Electrical engineers authorized by Baumüller Nürnberg GmbH, and qualified electricians of the customer or a third party who have learned to install and maintain Baumüller drive systems and are authorized to ground and identify electrical power circuits and devices in accordance with the safety engineering standards of the company.
  - Qualified personnel have had occupational training or instruction in accordance with the respective locally applicable safety engineering standards for the upkeep and use of appropriate safety equipment.

2.6 Special hazards

In the following section, the remaining marginal risks will be stated that have been identified as a result of the hazard analysis.

Observe the safety notes listed here and the warning notes in the further chapters of this manual to reduce health risks and dangerous situations.

Electrical current



DANGER!

Risk of fatal injury from electrical current!

There is an immediate risk of fatal injury if live electrical parts are contacted. Damage to the insulation or individual components can be life-threatening.

Therefore:

- Switch off the electrical power immediately in case of damage to the power supply insulation.
- Only allow work on the electrical system to be performed by qualified personnel.
- Switch off the current when any kind of work is being performed on the electrical system and ensure safety before switching on again.

Danger from residual energy



DANGER!

Risk of fatal injury from electrical current!

Stored electric charge.

Discharge time of the system = discharge time of the device with the longest DC link discharge time connected to the DC link.

See Instruction handbook**b maXX 6300** (5.24007) or **b maXX 6500** (5.22004), chapter Electrical Data.

Therefore:

- Do not touch electrically live parts before taking into account the discharge time of the capacitors.
- Pay attention to the corresponding notes on the device.
- If additional capacitors are connected to the DC link, the DC link discharge can take a much longer time. In this case, the necessary waiting period must itself be determined or a measurement made as to whether the equipment is de-energized. This discharge time must be posted, together with an IEC 60417-5036 (2002-10) warning symbol, on a clearly visible location of the control cabinet.

Moving components



WARNING!

Risk of injury from moving components!

Rotating components and/or components moving linearly can result in severe injury.

Therefore:

- Do not touch moving components during operation.
- Do not open any covering during operation.
- The amount of residual mechanical energy depends on the application. Powered components still turn/move for a certain length of time even after the power supply has been switched off. Ensure that adequate safety measures are taken.

2.7 Fire fighting



DANGER!

Risk of fatal injury from electrical current!

There is a risk of electric shock if an electrically-conductive, fire-extinguishing agent is used.

Therefore:

- Use the following fire-extinguishing agent:



ABC powder / CO_2

2.8 Safety equipment



WARNING!

Risk of fatal injury due to non-functional safety equipment!

Safety equipment provides for the highest level of safety in a facility. Even if safety equipment makes work processes more awkward, under no circumstances may they be circumvented. Safety can only be ensured by intact safety equipment.

Therefore:

- Before starting to work, check whether the safety equipment in good working order and properly installed.

2.9 Behavior in hazardous situations or at accidents

Preventive measures

- Always be prepared for accidents or fire!
- Keep first-aid equipment (e.g. first-aid kits, blankets, etc.) and fire extinguishers readily accessible.
- Familiarize personnel with accident signalling systems, first aid equipment and life saving equipment.

And if something does happen: respond properly.

- Stop operation of the device immediately with an EMERGENCY Stop.
- Initiate first aid measures.
- Evacuate persons from the danger zone.
- Notify the responsible persons of the site.
- Alarm medical personnel and/or the fire department.
- Keep access routes clear for rescue vehicles.

2.10 Signs and labels

The following symbols and information signs are located in the working area. They refer to the immediate vicinity in which they are affixed.



WARNING!

Risk of injury due to illegible symbols!

Over the course of time, stickers and symbols on the device can become dirty or otherwise unrecognizable.

Therefore:

- Maintain all safety, warning and operating labels on the device in easily readable condition.



Electrical voltage

Only qualified personnel may work in work areas that identified with this.

Unauthorized persons may not touch working materials marked correspondingly.



DANGER!

Risk of fatal injury from electrical current!

See ▹Danger from residual energy◃ auf Seite 12.



CAUTION!

Risk of injury due to hot surface!

Therefore:

- Wear protective gloves



3

TECHNICAL DATA

3.1 Operation conditions

The operation conditions of **b maXX 6000** are valid, see Instruction handbook **b maXX 6300** (5.24007) or **b maXX 6500** (5.22004).

Transport temperature range	- 25 °C to + 70 °C
Transport climate class (K) EN IEC 60721-3-2:2018	2K12
Storage temperature range	- 25 °C to + 55 °C
Storage climate class EN IEC 60721-3-1:2018	1K22



NOTICE!

Normally, non-conductive pollution occurs. Conductive pollution is unacceptable. Conductive pollution can lead to the destruction of the device. The customer is responsible for destructions, which were caused by pollution due to conductive materials or components.

3.2 Electrical data

3.2.1 IEE - Incremental encoder emulation, 2 channels

Supply voltage (external supply)	5 V ± 5 % (without load)
Supply current (external supply)	max. 100 mA (without load)
Signal level: output high voltage at I_{0H} = - 20 mA	2.5 V
Signal level: output high voltage at I_{0L} = + 20 mA	0.5 V
Output frequency, track signals	max. 500 kHz
Switching time: rising time	< 50 ns
Switching time: dropping time	< 50 ns
Delay time	$\|t_d\|$ ≤ 50 ns
Power input	0.525 W
Current output driver	max. 15 mA

The mentioned timings are available at the module output. When selecting a cable in order to transmit the signals to an adequate evaluation unit, it must be considered, that a real cable can reduce the maximum transferable output frequency by its attenuation (change of specified signal performance).

An „adequate evaluation unit“ is an unit, which is able to sense even the smallest possible track signal changes without mistakes. The incremental encoder emulation IEE was developed in such a way, that even the smallest position variations or the encoder evaluation noise are converted into track signals. If the evaluation unit is not applicable, it can possibly occur, that the actual encoder signal varies by 1 bit, although the position is kept. The evaluation electronic then adds the variations only in one direction (because it is not in a position to sense quick changes in a correctly manner) and for the connected control the position appears like a slow drifting.

TTL square wave pulse cycles

Two TTL square wave pulse cycles A and B with a 90° electrical phase shifting and their inverted pulse cycles $\overline{A}$ and $\overline{B}$ as also a zero pulse 0 with the inverted signal $\overline{0}$ are available by way of output signals.

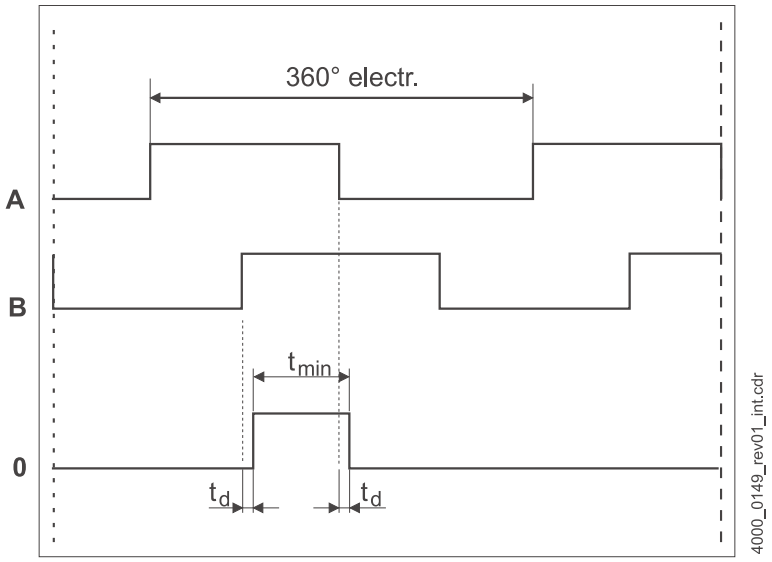


Figure 1: Pulse cycles, incremental encoder emulation IEE

3.2.2 SIE - SSI encoder emulation, 2 channels

Supply voltage (internal supply)	5 V ± 5 %
Supply current (internal supply)	max. 60 mA
Signal level	RS485
Clock frequency min.	min. 200 kHz
Clock frequency max.	max. 2 MHz
Power input	0.525 W
Current output driver	max. 15 mA
Terminating resistor (internal)	120 Ω

The mentioned timings are available at the module output. When selecting a cable in order to transmit the signals to an adequate evaluation unit, it must be considered, that a real cable can reduce the maximum transferable output frequency by its attenuation (change of specified signal performance).

Timing diagrams of data transmission

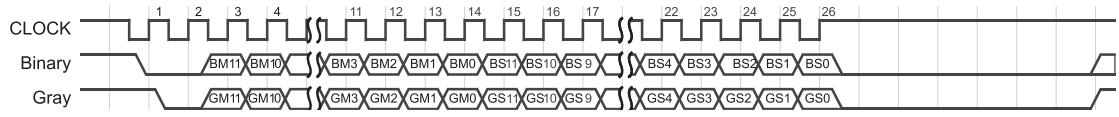


Figure 2: Timing diagram 12/12 no parity

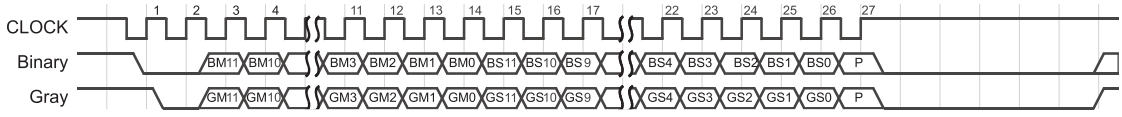


Figure 3: Timing diagram 12/12 parity

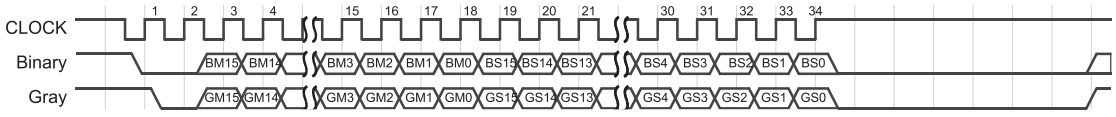


Figure 4: Timing diagram 16/16 no parity

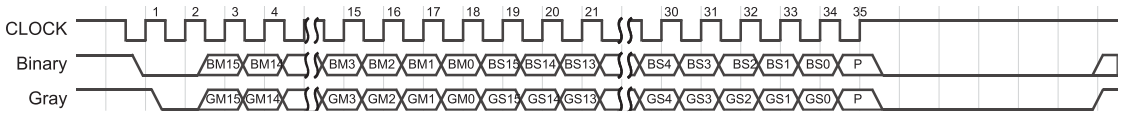


Figure 5: Timing diagram 16/16 parity

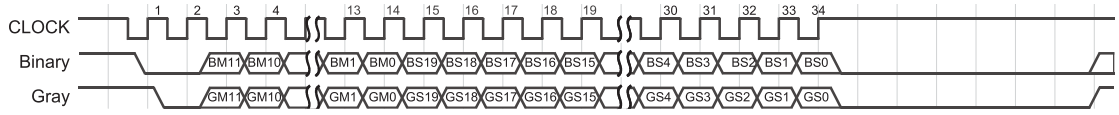


Figure 6: Timing diagram 12/20 no parity

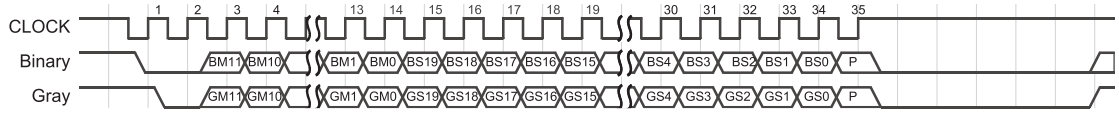


Figure 7: Timing diagram 12/20 parity

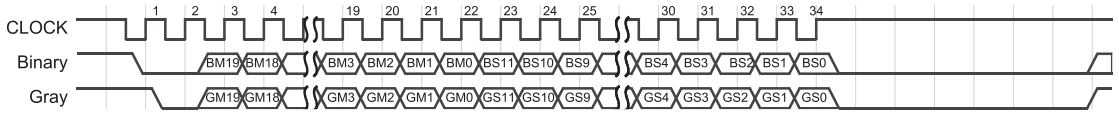


Figure 8: Timing diagram 20/12 no parity

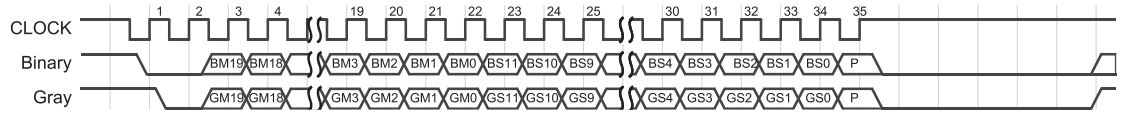


Figure 9: Timing diagram 20/12 parity

4

DESIGN AND OPERATION

4.1 Design

The **b maXX**. **6000** series consists of an (active) mains rectifier unit and one or more axis units or a mono unit with/without axis units.

b maXX 50XX **Mains rectifier unit**

This is a mains rectifier unit for supplying axis units via the DC link.

b maXX 51XX **Active mains rectifier unit**

This is an active mains rectifier unit for supplying axis units via the DC link.

b maXX 63XX **Single axis unit safety, double axis unit safety**

This is a motor inverter that is supplied from the DC link via a mains rectifier unit or active mains rectifier unit.

b maXX 65XX **Mono unit safety**

This is a mono device that can be used to implement electric drives in industrial applications.



NOTE!

Proper operation of the **b maXX axis units BM63XX** can only be ensured with Baumüller **mains rectifier units BM50XX, BM51XX** or **mono units BM6XXX**.

Controller

The controller unit controls the inverter of the power unit. The controller is operated either by means of operating software or by means of a higher-level control unit.

The incremental encoder emulation IEE is implemented in devices with type code: BM6XXX-XXXXYY-X**01**.

The SSI encoder emulation SIE is implemented in devices with type code: BM6XXX-XXXXYY-X**03**.

4.2 Add-on module IEE

NOTE!

Only devices with type code BM6XXX-XXXXYY-X**01** provide the add-on module incremental encoder emulation!

The module is built-in and cannot be changed.

It is forbidden to remove the yellow front cover.

The incremental encoder emulation provides 2 channels (output X1 and X2).

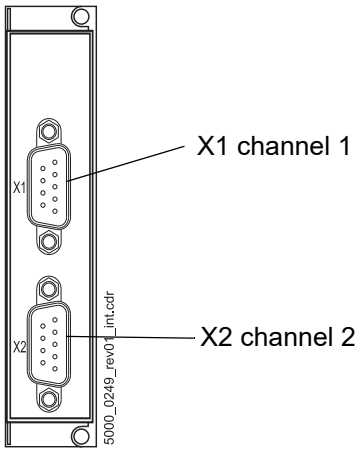


Figure 10: Front view add-on module IEE

Set values for the incremental encoder emulation can be obtained from the sources given below:

- Position actual values encoder 1 or encoder 2,
  see examples 1 and 2 in ▹Figure 13◃ on page 31
- Position actual values (e. g. internal from positioning)
- Field bus set value (external set via bus),
  see example 3 in ▹Figure 13◃ on page 31.

The signal generated can either be used for synchronization of the following axis, see examples 1 and 3 in ▹Figure 13◃ on page 31 or for position measuring of the axis by a master control, see example 2 in ▹Figure 13◃ on page 31.

4.3 Add-on module SIE

NOTE!

Only devices with type code BM6XXX-XXXXYY-X**03** provide the add-on module SSI encoder emulation!

The module is built-in and cannot be changed.

It is forbidden to remove the yellow front cover.

The SSI encoder emulation provides 2 channels (output X1 and X2).

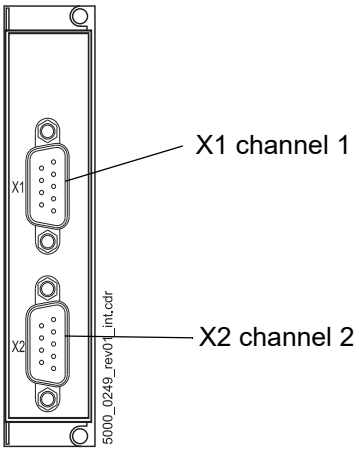


Figure 11: Front view add-on module SIE

Set values for the SSI encoder emulation can be obtained from the sources given below:

- Position actual values encoder 1 or encoder 2,
  see examples 1 in ▹Figure 15◃ on page 34
- Position actual values (e. g. internal from positioning)

The generated signal can be used for position measuring of the axis by a master control, see example 2 in ▹Figure 15◃ on page 34.

4.4 Identification of the device

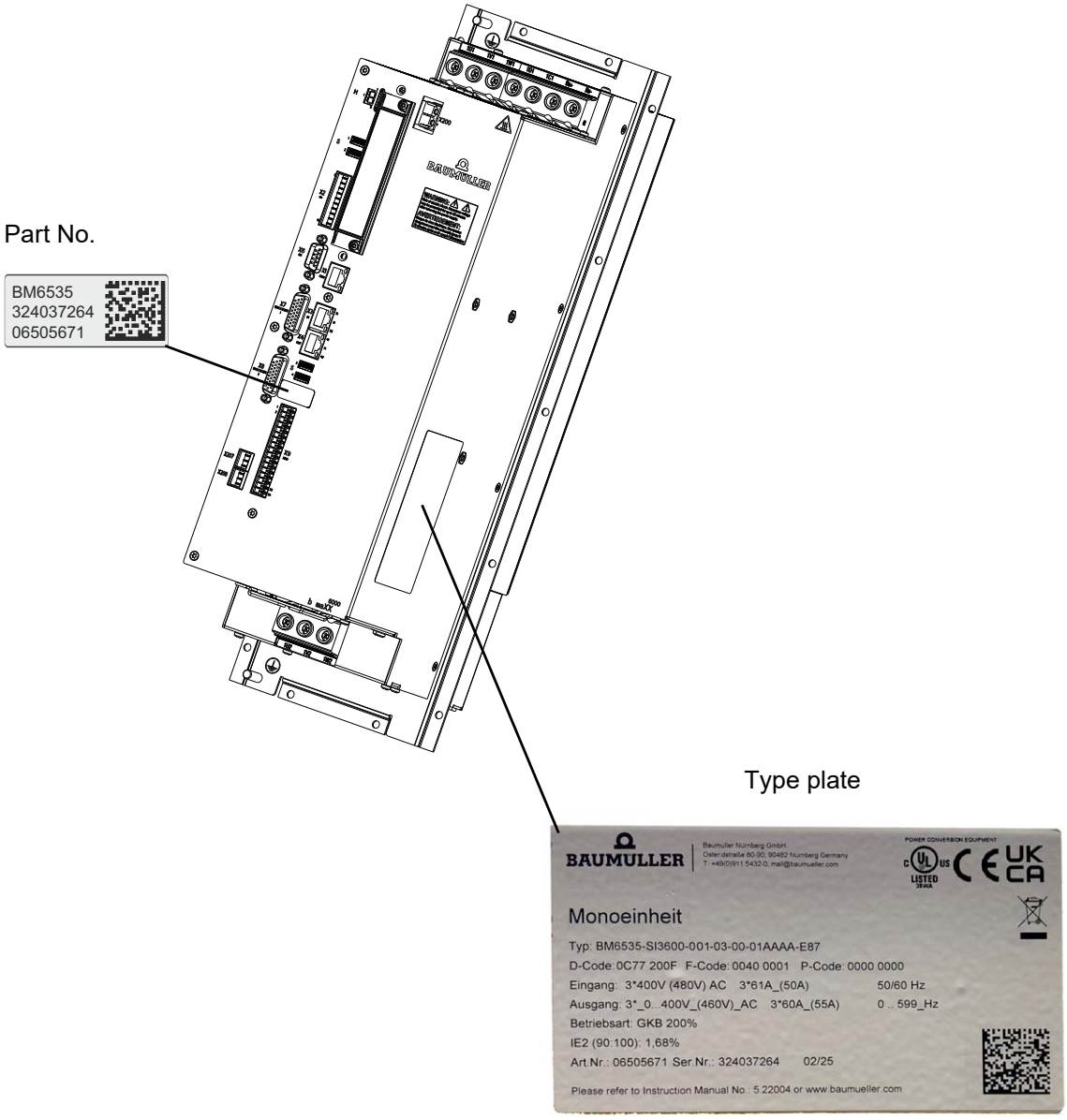


Figure 12: Location of part number / type code

NOTE!

The values in brackets are for UL applications.

4.4.1 Type code

The type code has the format: BMXXXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX

BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Manufacturer
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Device generation
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Device design
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Housing size
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Current grading (output rated current)
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Type of cooling
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Type of power supply system
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Controller generation
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Power unit type
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Option brake resistor
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Customer identification
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	**Add-on module** 00: without module **01: Option module IEE with external power supply** **03: Option module SIE with internal power supply**
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Fieldbus configuration
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Specific requests
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Incompatible firmware release controller
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Compatible firmware release controller
BM6XXX-XXXXYY-XXX-XX-XX-XXXXXX-EXX	Software functionality



NOTE!

Only devices with type code BM6XXX-XXXXYY-X**01** provide the add-on module incremental encoder emulation IEE!

Only devices with type code BM6XXX-XXXXYY-X**03** provide the add-on module SSI encoder emulation SIE!



NOTE!

Only the operation with ProDrive is described. If the software is not available, please contact Baumüller Nürnberg GmbH or visit our Website www.baumueller.com for download.

4.4.2 Danger areas

Please observe the safety notes in instruction manuals **b maXX 6000** or **b maXX 6500**.

4.5 Display and operation elements

The add-on module **incremental encoder emulation IEE** or **SSI encoder emulation SIE** has no display or operation elements.

The LED H14 and H24 of **b maXX 6000** / **b maXX 6500** respectively the emulation of the LED in ProDrive displays all device errors, even the errors occurring in connection with the add-on modules **IEE** or **SIE**.

5

INSTALLATION

This chapter describes the electrical installation of the **b maXX 6000** add-on module **IEE/SIE**.

5.1 Safety notes



DANGER!

Risk of fatal injury from electrical current!

Inevitably, when operating this electrical device, certain parts of it are energized with hazardous voltage.

Therefore:

- Pay heed to areas on the device that could be dangerous during the electrical installation.
- Pay heed to areas on the device that could still be electrically energized after operation.



WARNING!

Danger because of faulty installation and initial commissioning!

Installation and commissioning require qualified personnel with adequate experience. A installation fault can cause danger situations or large damage of property.

Therefore:

- Only personnel from manufacturer or qualified personnel operate while installation and initial commissioning

5.2 Demands on the power supply

In order to comply with the standard EN 60 204-1(electrical equipment of machines), the cable specified therein must be used. The connecting plugs must not drop - otherwise there is a danger of short circuits, external voltage, etc.



NOTICE!

The danger is: **electrical voltage.**

1 Ensure that the electrical power connection parameters as specified in the Technical Data are adhered to and that the connections are made in accordance with the stipulated data.

2 Avoid short circuit between input and output points.



NOTE!

Pay attention to EMC compatible cabling, see Instruction handbook **b maXX 6300** or **b maXX 6500**, chapter Installation requirements with regard to EMC.

5.3 Requirements to the connection cables

Completely assembled cables are not available, assembly of a connection cable see ▹Connecting cable IEE◃ from page 33 or ▹Connecting cable SIE◃ from page 36.

5.4 Installation IEE

5.4.1 Connection diagram IEE

Example 1

- Set value IEE from encoder
- Signal IEE to following axis

Example 2:

- Set value IEE from encoder
- Signal IEE to master control

Example 3:

- Set value IEE from master control
- Signal IEE to following axis

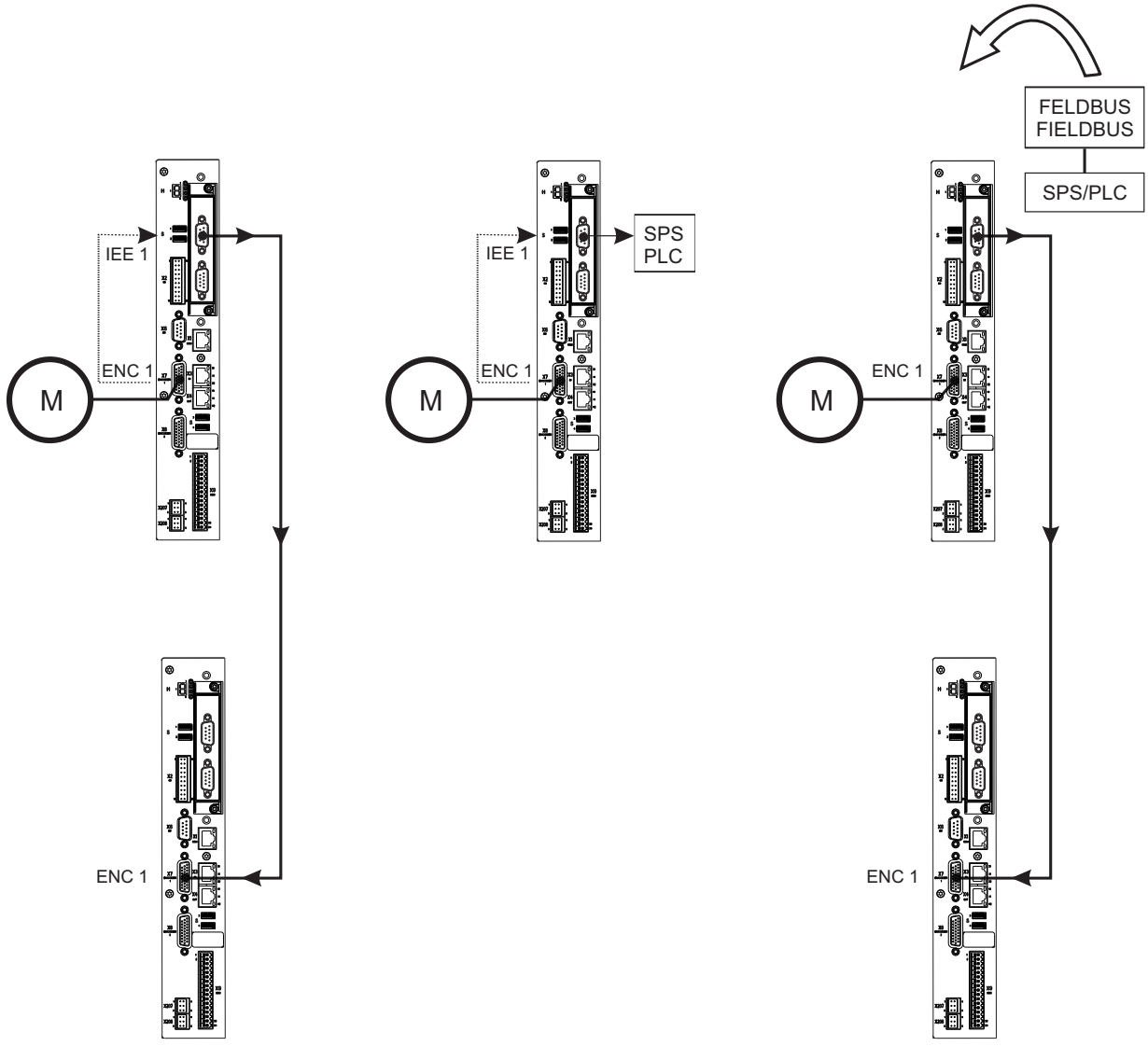


Figure 13: Connection diagram incremental encoder emulation IEE

5.4.2 Installation procedure IEE

Depending on the desired application you now are able to connect the incremental encoder emulation with further system components (see ▹Figure 13◃ on page 31).

1 Make sure that the **b maXX 6000** has been switched off voltage.

2 Connect an output (e.g. X1) of the incremental encoder emulation IEE with the encoder input of the higher-level control (see example 2 in ▹Figure 13◃ on page 31).
Pin assignment see ▹Pin assignment IEE◃ on page 32,
Cable see ▹Connecting cable IEE◃ on page 33;

or

3 Connect an output (e.g. X1) of the incremental encoder emulation IEE with the encoder input of the next b maXX drive (see example 1 in ▹Figure 13◃ on page 31).
Pin assignment see ▹Pin assignment IEE◃ on page 32,
Cable see ▹Connecting cable IEE◃ on page 33.

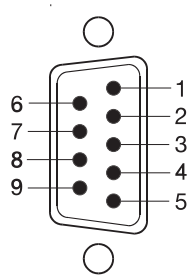
4 Tighten the lock screws of the sub-D connector.

5 Install the connecting cable(s) in the switching cabinet according the standards.

5.4.3 Pin assignment IEE

Pin assignment of the Sub-D connectors (male) at the front of the incremental encoder emulation IEE:

Pin assignment



Sub-D connector
9-pole, male

Pin No.	Meaning
1	Ground incremental encoder emulation
2	External power supply +5 V IEE
3	Incremental encoder emulation track 0
4	Incremental encoder emulation track -0
5	Incremental encoder emulation track B
6	not assigned
7	Incremental encoder emulation track -A
8	Incremental encoder emulation track A
9	Incremental encoder emulation track -B

5.4.4 Connecting cable IEE

The connection cable has to be manufactured by the user:

1 use following materials:

- cable: LiYCY LiYCY 3 x (2 x 0,14 mm²) + 2 x 0,34 mm² Cu-braiding.
- Sub-D connector: 9-pole, female (IEE side)
- e.g. Sub-D connector: 26-pole, male (b maXX 6000 side)
- cables from the incremental encoder emulation to the further control units must provide paired cables per track! (track -0/0, -A/A, -B/B)

2 connect

- the cable shield with the housing of the Sub-D male / Sub-D female connector
- the 9-pole female connector (IEE side) with the cable
- e.g. the 26-pole Sub-D male connector (b maXX 6000 side, pin assignment see Instruction handbook **b maXX 6300** or **b maXX 6500** with the other end of the cable.

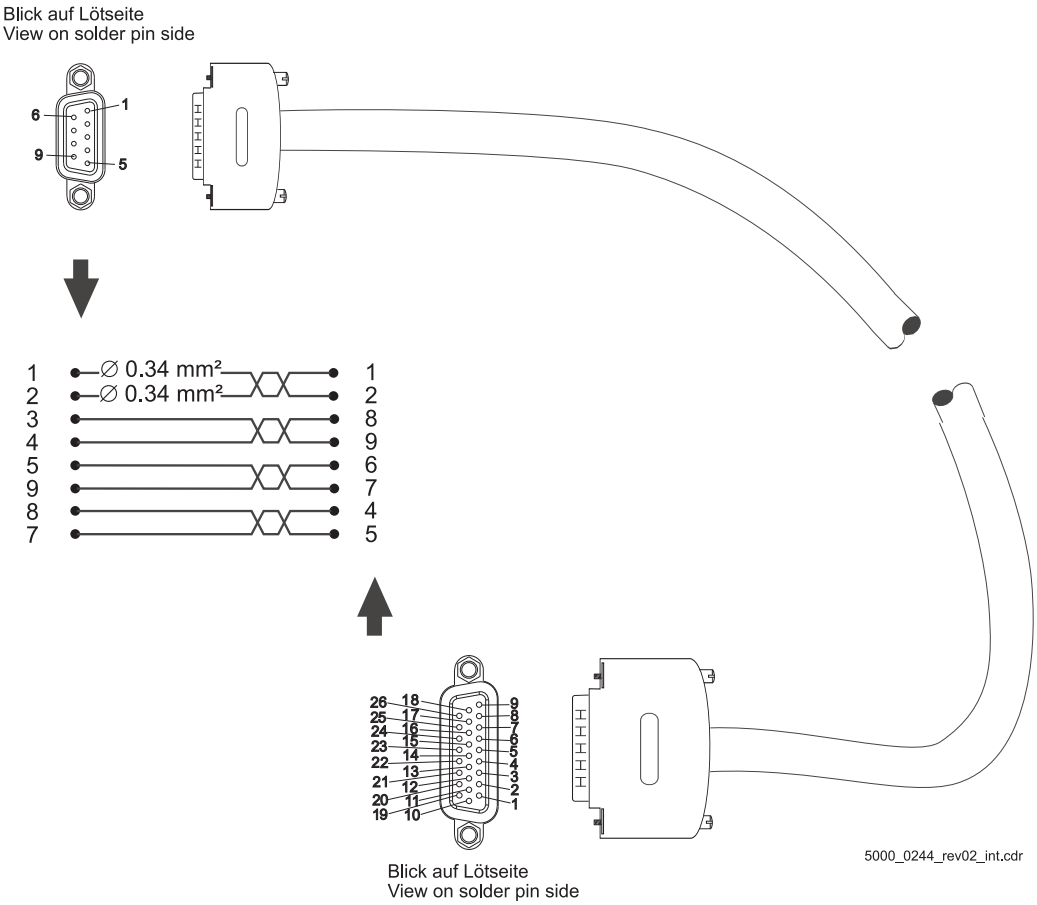


Figure 14: Connection cable IEE with b maXX 6000

NOTE!

The connection cable must be manufactured according the above mentioned instruction with the ▹Pin assignment IEE◃ on page 32!

The cable is not working with another pin assignment!

5.5 Installation SIE

5.5.1 Connection diagram SIE

Example 1:

- Set value SIE from encoder
- Signal SIE to master control

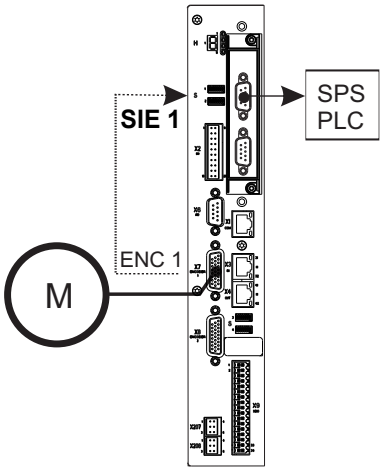


Figure 15: Connection diagram SSI encoder emulation SIE

5.5.2 Installation procedure SIE

Depending on the desired application you now are able to connect the incremental encoder emulation with further system components (see ▹Figure 15◃ on page 34).

1 Make sure that the **b maXX 6000** has been switched off voltage.

2 Connect an output of the SSI encoder emulation SIE with the encoder input of the master control (see example 1 in ▹Figure 15◃ on page 34).
Pin assignment see ▹Pin assignment SIE◃ on page 35,
Cable see ▹Connecting cable SIE◃ on page 36;

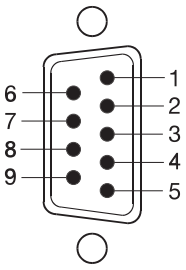
3 Tighten the lock screws of the sub-D connector.

4 Install the connecting cable(s) in the switching cabinet according the standards.

5.5.3 Pin assignment SIE

Pin assignment of the Sub-D connectors (male) at the front of the SSI encoder emulation SIE:

Pin assignment



Sub-D connector
9-pole, male

Pin No.	Meaning
1	Ground SSI encoder emulation
2	not assigned
3	not assigned
4	not assigned
5	DAT +
6	not assigned
7	CLK +
8	CLK -
9	DAT +

NOTE

The data and clock lines (DATA+/DATA- and CLK+/CLK-) are terminated on the SSI encoder emulation internal with 120 Ω.. At the CNC-control you must still attach terminating resistors, if this hasn't been done by the manufacturer yet.

5.5.4 Connecting cable SIE

Cable length

The dependence of the maximum clock frequency to the cable length is shown in the diagram below:

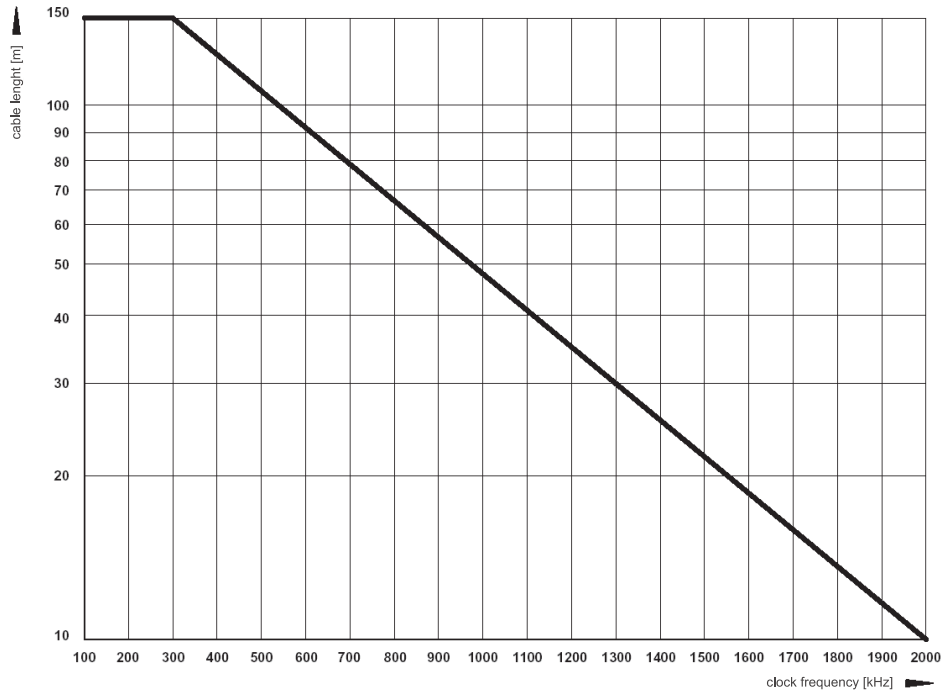


Figure 16: Cable length SSI encoder emulation

The connection cable can be used for following:

1 Use the following materials:

- Cable: data cable, paired drilled, Cu braiding, e.g. LiYCY 2 x (2 x 0.14 mm²) + 1 x 0.34 mm²).
- Sub-D connector: 9-pole, female (SSI encoder emulation side).
- Cables from SSI encoder emulation to CNC control must be paired drilled cables per track! (CLK+/CLK-, DATA+/DATA-).
  See also ▹Pin assignment SIE◃ on page 35.

2 Connect

- the cable shielding with the housing of the Sub-D connector
- the 9-pole Sub-D connector with the cable
- e.g. the 26-pole Sub-D male connector (b maXX 6000 side, pin assignment see Instruction handbook **b maXX 6300** or **b maXX 6500**) with the other end of the cable.

NOTE

The data and clock lines (DATA+/DATA- and CLK+/CLK-) are terminated on the SSI encoder emulation internal with 120 Ω.. At the CNC-control you must still attach terminating resistors, if this hasn't been done by the manufacturer yet.

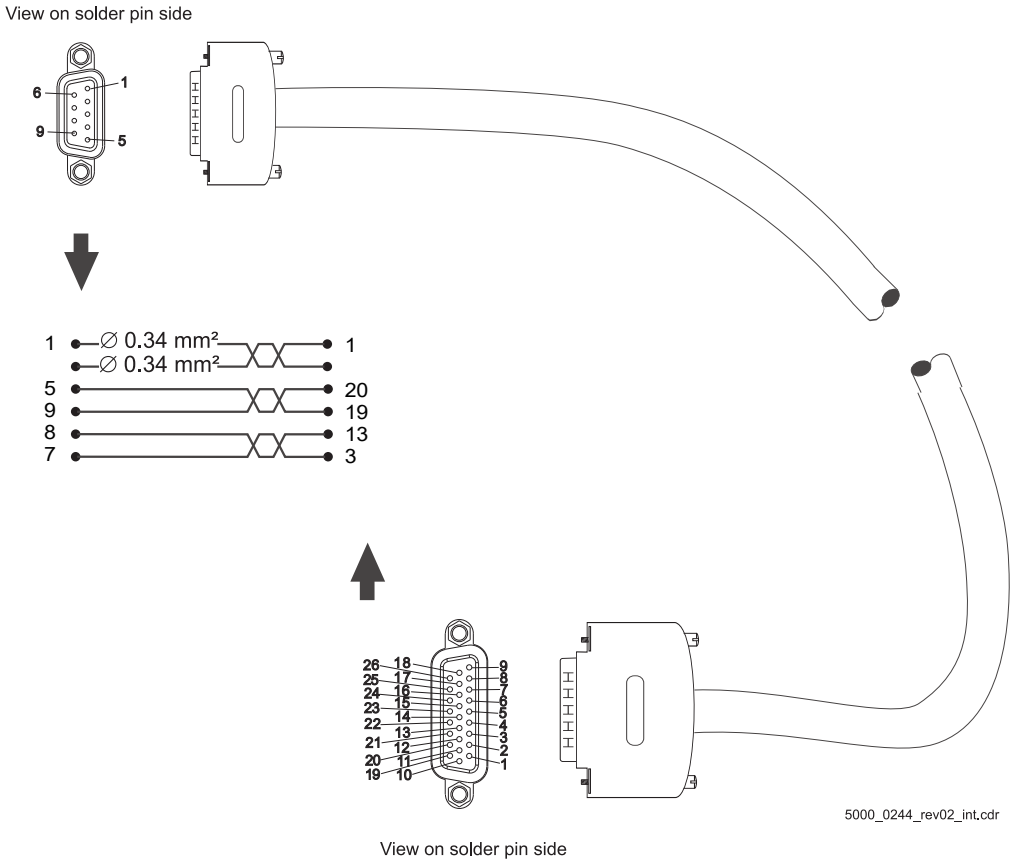


Figure 17: Connection cable SIE with **b maXX 6000**

6

COMMISSIONING/OPERATION

The commissioning ensures that the **b maXX 6000 Add-on module IEE/SIE** functions correcly. For further information on commissioning and parameterization see Parameter manual **b maXX 6000**.

Before commissioning, ensure that the following prerequisites are met:

1 Wiring of the **incremental encoder emulation IEE** or **SSI encoder emulation SIE** is done properly (IEE as shown in example 1 or 2 in ▹Figure 13◃ on page 31 and SIE as shown in example 1 in ▹Figure 15◃ on page 34.

2 The switching cabinet is closed properly and all the safety devices have also been put into operation.

3 The **b maXX 6000** is ready for use.

6.1 Safety notes

Basics



WARNING!

Risk of injury due to improper operation!

Improper operation can lead to severe personal injury or material damage.

Therefore:

- Perform all operational steps according to the details of these Instruction handbook.
- Before beginning any work, ensure that all coverings and protective devices are installed and are functioning properly.
- The control cabinet in which the device is installed should be protected against contact with electrically live parts.
  Keep all doors of the control cabinet closed during operation.

6.2 Commissioning procedure IEE

The commissioning is divided into the following tasks:

1 Recognition of the **incremental encoder emulation IEE**

2 Configuring the **incremental encoder emulation IEE**

3 Function test

6.2.1 Recognition of the incremental encoder emulation IEE

While starting the device, the control unit reads out the identifier of the incremental encoder emulation (s) automatically.

After that, check with ProDrive whether the **incremental encoder emulation IEE** has been identified as correct:

1 Switch on **b maXX 6000**

2 Wait till the system has booted.

3 Open the window „**Startpage**“ in ProDrive.

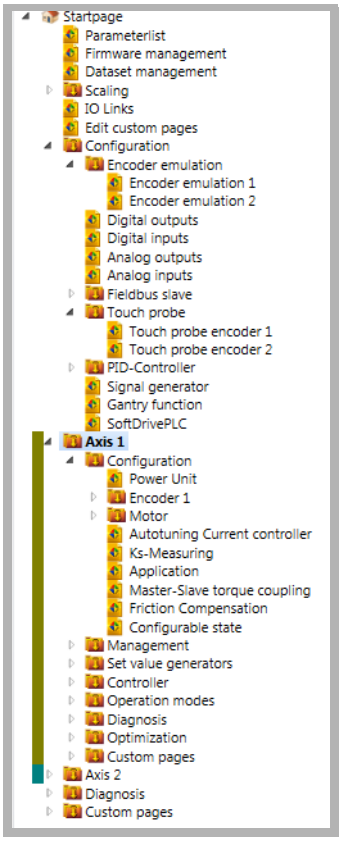


Figure 18: .ProDrive Navigation

4 Choose sub-menu „Axis 1/management“

and reset any faults/error messages eventually existing in the **b maXX 6000**. These errors might have been caused by faulty mounting (e.g. defective cable) or some mistake(s) in installation (e.g. supply voltage absent). Only after having eliminated the errors, the commissioning can be continued.

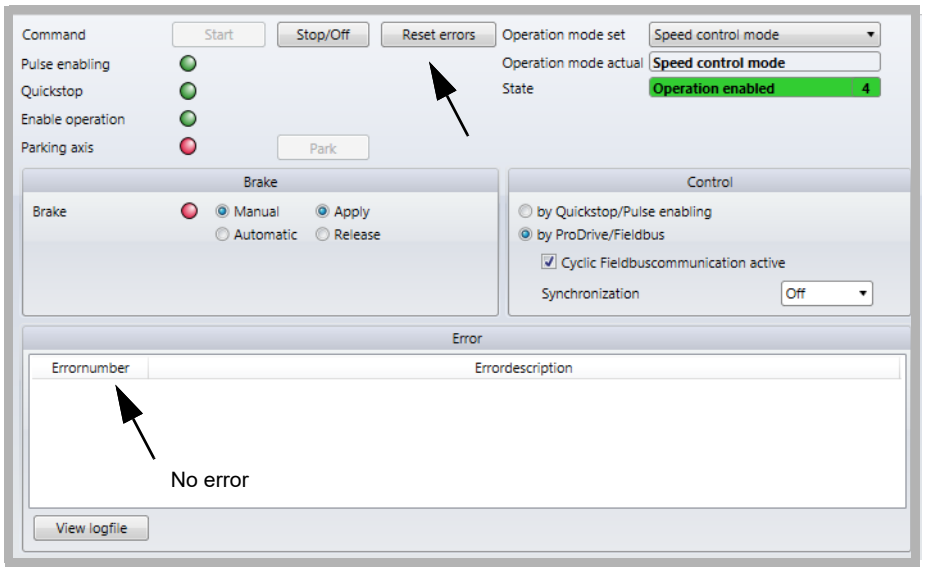


Figure 19: Drive management, reset errors

5 Activate encoder emulation in Configuration/Encoder emulation
Choose „Encoder emulation 1“ or „Encoder emulation 2“

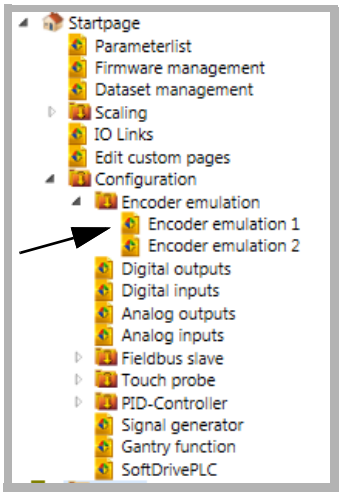




Figure 20: ProDrive, activate encoder emulation

If the **b maXX 6000 b maXX 6000 Add-on module IEE/SIE** has not been identified as correct or if it is not available, following error message is generated after activating the incremental encoder emulation.

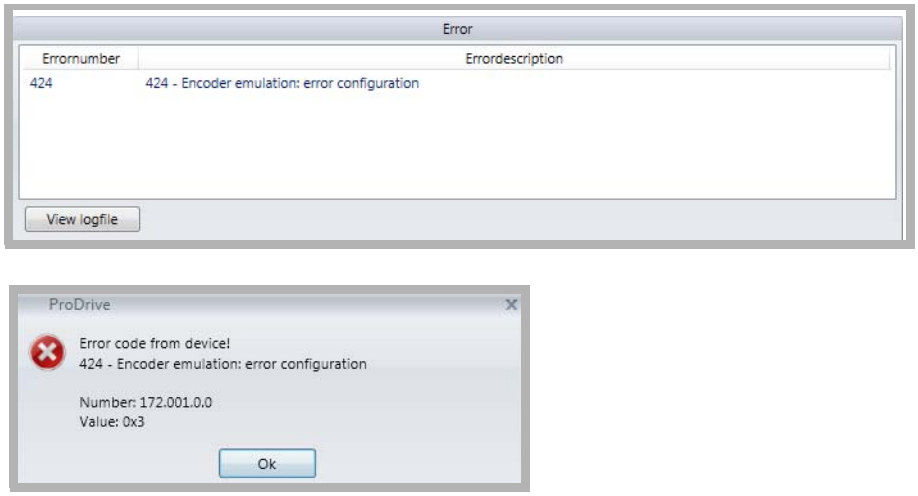


Figure 21: Drive management, IEE cannot be identified

NOTE

All error parameters of the incremental encoder emulation can be found in chapter ▹Troubleshooting and fault correction◃ from page 53.

- Check the type code of the **b maXX 6000** whether the device provides an **add-on module IEE**.
  Re-boot the device and check if the **add-on module IEE** is identified correctly, now.
- The **b maXX 6000** with **add-on module IEE** is damaged if it is still not identified. For replacement contact Baumüller Nürnberg GmbH.

6.2.2 Parameter setting IEE

The parameter setting influences the behavior of the incremental encoder emulation IEE while operating. The parameters are set in ProDrive.

1 Open ProDrive „Navigation“

2 Choose in configuration/Encoder emulation „Encoder emulation 1“ or „Encoder emulation 2“

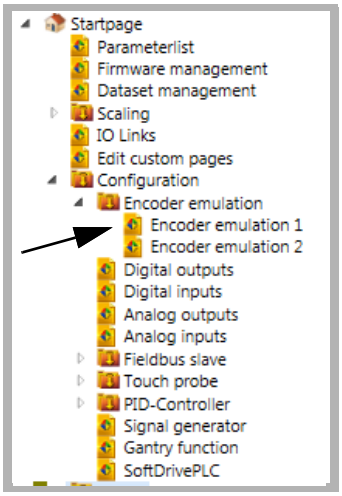


Figure 22: ProDrive, encoder emulation

3 In window „Encoder emulation 1“ all IEE relevant parameters referring to channel 1 (connector **X1**) can be set.

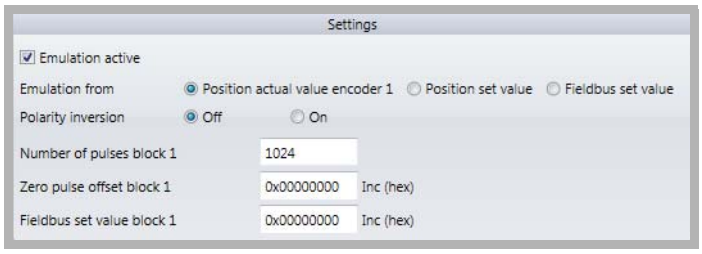


Figure 23: IEE relevant parameters channel 1

4 In window „Encoder emulation 2“ all IEE relevant parameters referring to channel 2 (connector **X2**) can be set.

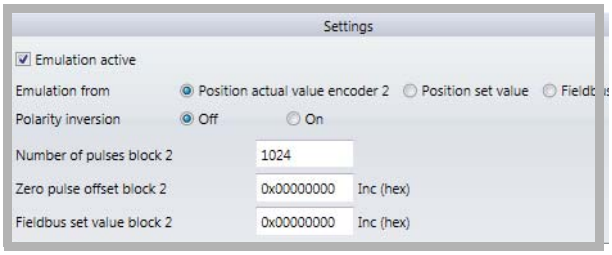


Figure 24: IEE relevant parameters channel 2

6.2.3 Function test IEE

The incremental encoder emulation can be tested with **b maXX 6000**, motor and encoder, only.

Requirements

1 Drive is in operating state (see parameter manual **b maXX 6000**). Encoder 1 connected with **X7 Encoder 1** for motor control.

2 **b maXX 6000** switched off again after successful first commissioning.

3 Connect output of **add-on module IEE** with input of **X8 Encoder 2** (connecting cable see ▹Connecting cable IEE◃ auf Seite 33).

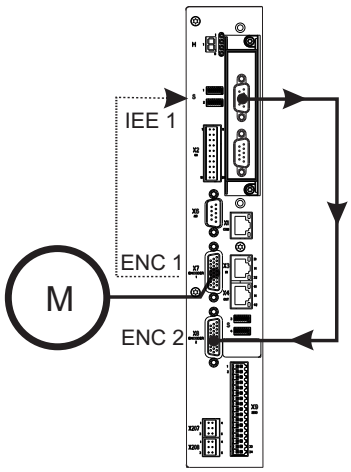


Figure 25: Connection incremental encoder and IEE

NOTE

If you want to use some other configuration, please turn to examples 2 and 3 in ▹Figure 13◃ on page 31. In the following the above mentioned configuration is described, however.

4 Switch on **b maXX 6000**

5 Start ProDrive

6 Choose ProDrive Navigation, „Configuration/Encoder emulation 1“

7 All values and selections must be made according following ▹Figure 26◃ in this window. The settings correspond with the signal of a square wave incremental encoder with 1024 increments.

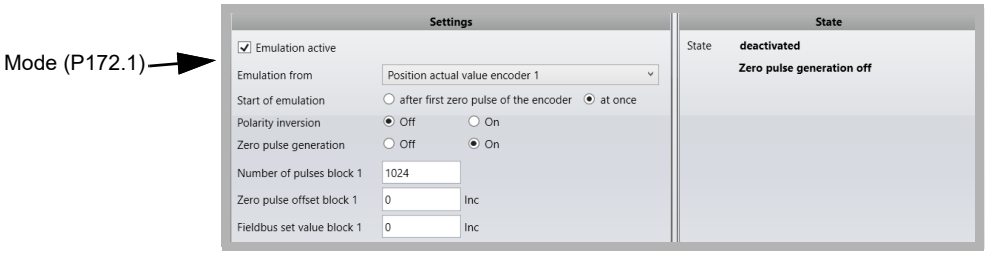


Figure 26: Encoder emulation 1 - settings

This corresponds with the following settings of the parameter list.

Parameter	Value
Mode (172.1)	0x0000 0001 (1_{dez})
No. of increments (172.3)	1024_{dez}
Zero pulse offset (172.4)	0x0000 0000 (0_{dez})

NOTE

If the set value for the IEE is not generated by an encoder, as described in example above, the „Source“ (regarding **7**) in window encoder emulation must be set to „Position set value“ or „Fieldbus set value“.

8 Choose in ProDrive Navigation „Configuration/Encoder/Encoder 2“

9 Set all values and selections according ▹Figure 27◃ in this window.

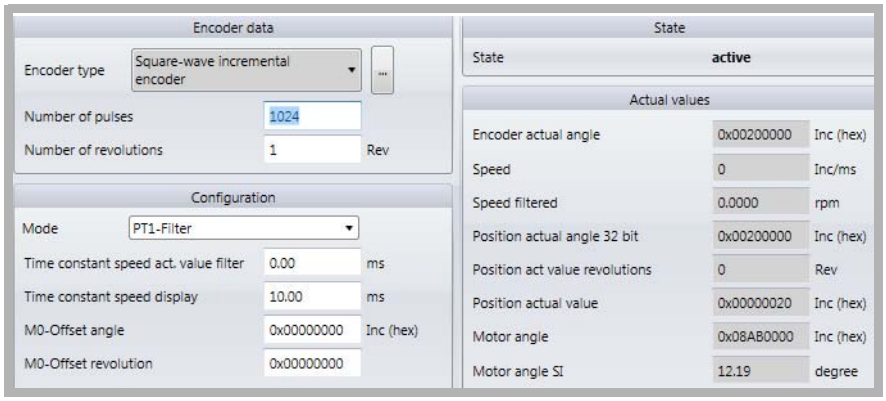


Figure 27: Window Encoder 2 - Configuration

10 Choose in ProDrive Navigation „Set value generator/Ramp function generator“.



Figure 28: Window Ramp function generator

11 Set following parameters:

- Ramp function generator input

➲ Set value „10“ [%] beside „Input 32 bit“. Accept with „Enter“.

12 Click to the icon „Drive management“.

In addition window „Drive manager dialog“ appears.

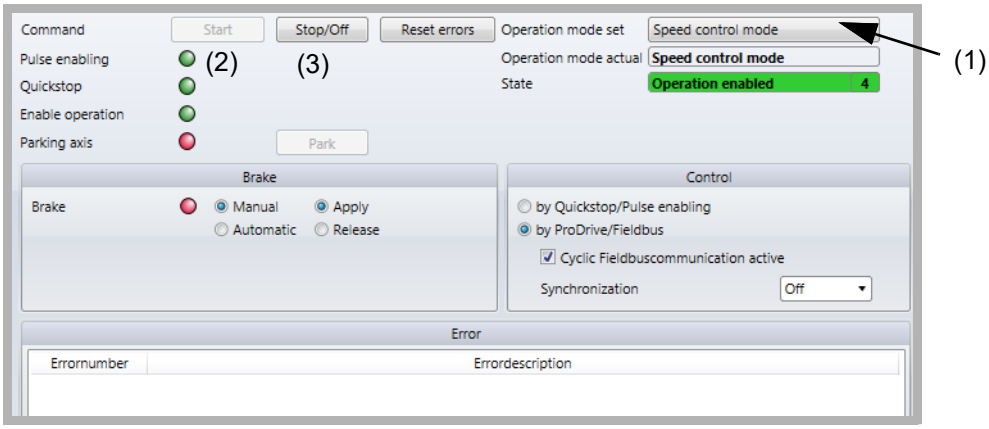


Figure 29: Ramp function generator - window with drive manager dialog

13 Select in scroll list (1) the operation mode „Speed control“

14 Switch on Pulse enable and No Quickstop

15 Click on button „Start“ (2) in drive management dialog.

The motor should rotate with 10 % of the maximum speed.

Control:

16 Choose in ProDrive Navigation „Configuration/Encoder/Encoder 1“.

17 In this window:
Speed smoothed: approx. 10 %



NOTE

Do not click on button „Stop“ (3) in the drive management dialog! First check if the speed actual value is transmitted to encoder 2 via the incremental encoder emulation IEE.

18 Choose in ProDrive Navigation „Configuration/Encoder/Encoder 2“.

19 In this window:
Speed smoothed: approx. 10 %



NOTE

If the generated signal of the **add-on module IEE** is processed in a higher-level control, please check the position values there.

Stop the drive after having checked the proper functioning of the **add-on module IEE**:

- Click on „Stop“ (3) in drive manager dialog menu
- Disable Quickstop release and pulse enable
- Switch off **b maXX 6000** and disconnect the connections
- Record the successful commissioning.

6.3 Commissioning procedure SIE

The commissioning is divided into the following tasks:

1 Recognition of the **SSI encoder emulation SIE**

2 Configuring the **SSI encoder emulation SIE**

3 Function test

6.3.1 Recognition of the SSI encoder emulation SIE

While starting the device, the control unit reads out the identifier of the encoder emulation automatically.

After that, check with ProDrive whether the **b maXX 6000 add-on module SIE** has been identified correctly:

1 Switch on **b maXX 6000**

2 Wait till the system has booted.

3 Check the window „**Startpage**“ in ProDrive.

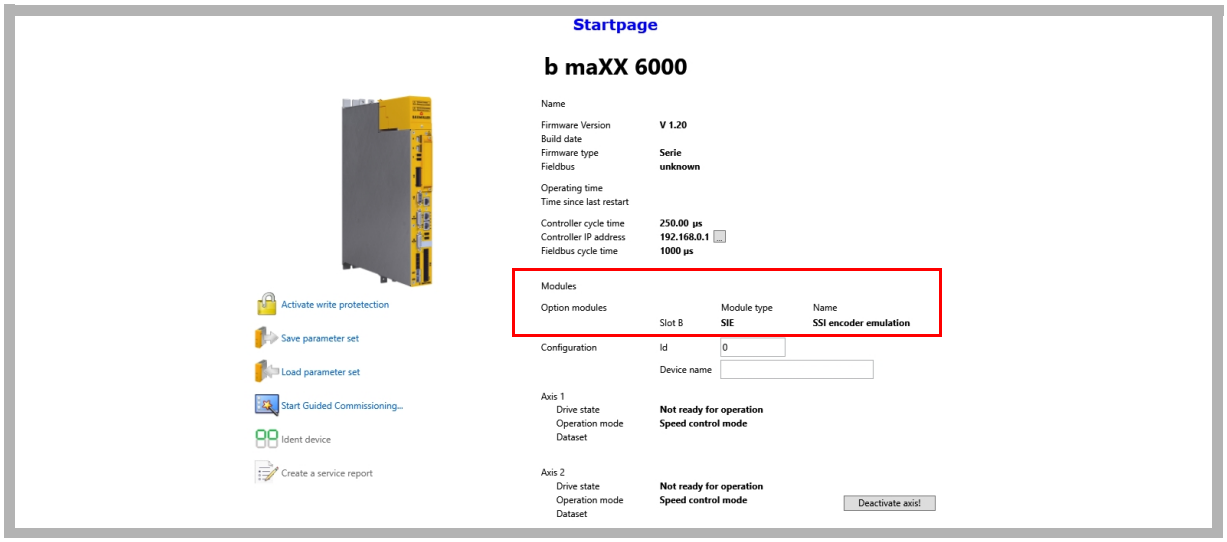


Figure 30: ProDrive Start page

4 Choose sub-menu „Axis 1/management“

and reset any faults/error messages eventually existing in the **b maXX 6000**. These errors might have been caused by faulty mounting (e.g. defective cable) or some mistake(s) in installation (e.g. supply voltage absent). Only after having eliminated the errors, the commissioning can be continued.

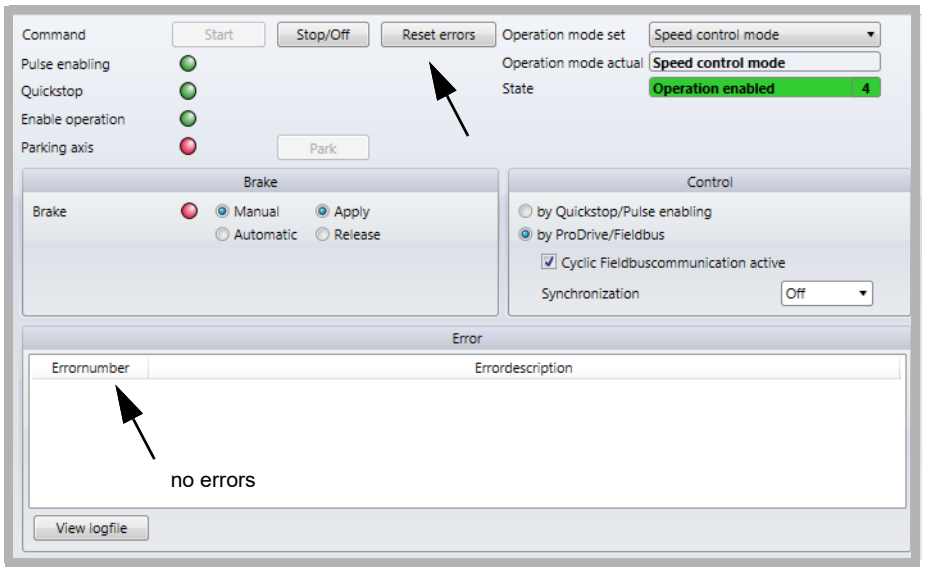
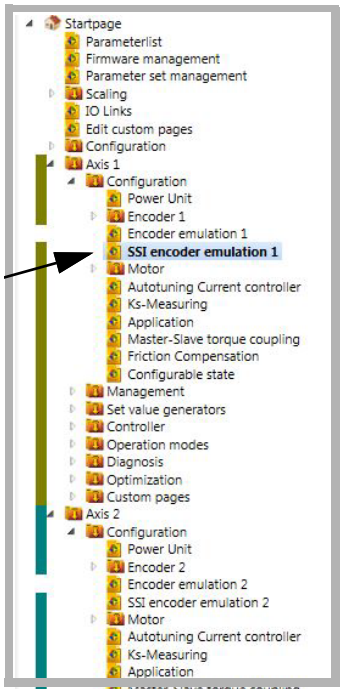


Figure 31: Drive management, reset errors

5 Activate encoder emulation e.g.
in Axis 1/Configuration/SSI encoder emulation1



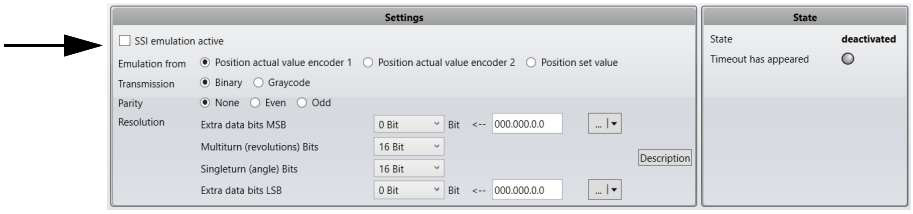


Figure 32: ProDrive, activate SSI encoder emulation

If the **b maXX 6000 Add-on module IEE/SIE** has not been identified correctly or if it is not available, following error message is generated after activating the incremental encoder emulation.

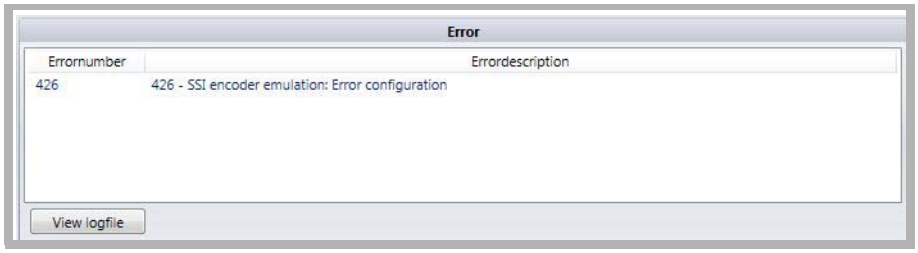




Figure 33: Drive management, SIE cannot be identified

NOTE

All error parameters of the SSI encoder emulation can be found in chapter ▷Troubleshooting and fault correction◁ from page 53.

- Check the type code of the **b maXX 6000**, wether the device provides an **add-on module SIE**.
  Re-boot the device and check if the **add-on module SIE** is identified correctly, now.
- The **b maXX 6000** with **add-on module SIE** is damaged if it is still not identified correctly. For replacement, contact Baumüller Nürnberg GmbH.

6.3.2 Parameter setting SIE

The parameter setting influences the behavior of the SSI encoder emulation SIE while operating. The parameters are set in ProDrive.

1 Open ProDrive „Startpage“

2 Choose in Axis 1/Configuration/SSI encoder emulation 1 or in Axis 2/Configuration/SSI encoder emulation 2

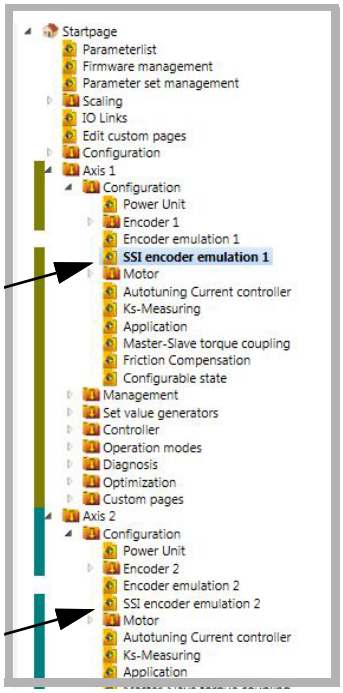


Figure 34: ProDrive, SSI encoder emulation

3 In window „Axis 1/SSI Encoder emulation 1“ all SIE relevant parameters referring to channel 1 (connector **X1**) can be set.

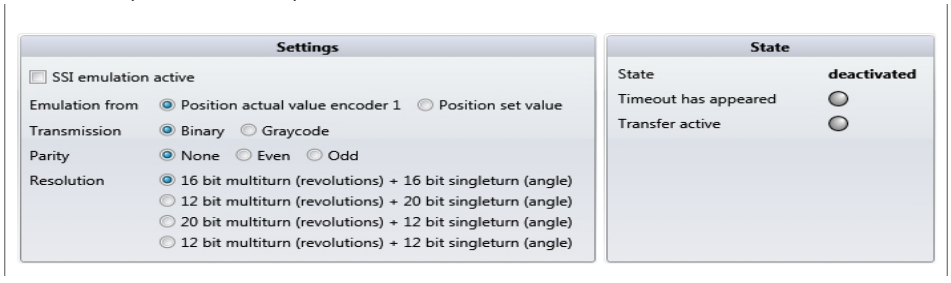


Figure 35: SIE relevant parameters channel 1

4 In window „Axis 2/SSI encoder emulation 2“ all SIE relevant parameters referring to channel 2 (connector **X2**) can be set.

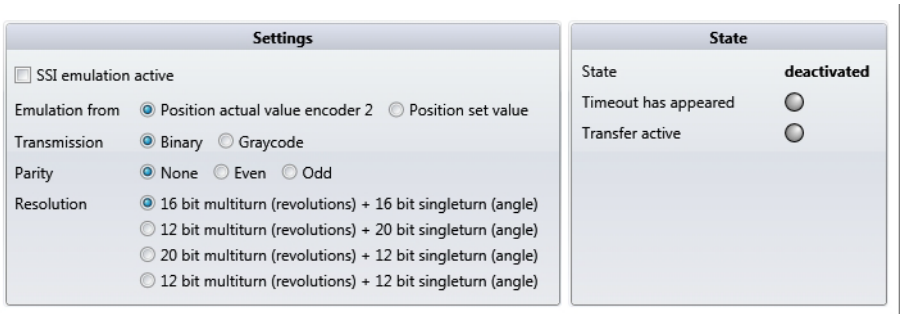


Figure 36: SIE relevant parameters channel 2

6.3.3 Function test SIE

The SSI encoder emulation can be tested with a CNC control unit, only.

7

TROUBLESHOOTING AND FAULT CORRECTION

7.1 Behavior in case of malfunctions

Basic information



DANGER!

Risk of fatal injury from electrical current!

Inevitably, when operating this electrical device, certain parts of it are energized with hazardous voltage.

Therefore:

- Pay heed to areas on the device that could be dangerous.



WARNING!

Risk of injury due to improper fault correction!

Therefore:

- Only qualified personnel may work on this device!
- Personnel that work with the **b maXX** device must be trained in the safety regulations and the handling of the device, and be familiar with the correct operation of it. In particular, reacting to error indications and conditions requires that the operator must have special knowledge.

7.2 Error detection

The fault can be caused by mechanical or electrical malfunctions.

LED

The occurrence of an error state is signalized by the lighting up of the red LED H14 or H24 on the front side of the housing.

NOTE!

In case of warnings or errors without error reactions, the LEDs H14 or H24 **blink** „Malfunction“. Only error messages with error reaction will be signalized by **constant lighting up**.

7-segment display

In the status error the error numbers are shown in the display. Depending on the state of bit No. 16 in parameter P135.1 (further information see Parameter manual **b maXX 6000**) all error messages (with/without error reaction) or warnings are displayed.

The display of an error code starts therewith, that „F“ is displayed for 1.5 s. Then the four characters of the error code are displayed. The separate characters are displayed for about 0.8 s, interrupted by a short break. If there are other errors, these are displayed in the same manner. The procedure is repeated as soon as all errors were displayed.

Example: Error 702 and 2418 are existing:

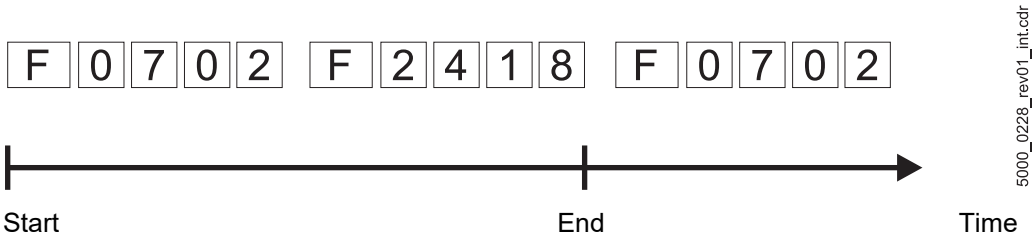


Figure 37: 7-segment display: errors and warnings

For further information on the subjects of error messages and error numbers, see „Parameter manual **b maXX 6000**.

Operating software ProDrive

Furthermore the error message is shown in the operating software:

NOTE!

The controller software version and the operating software version must be compatible to use ProDrive with all functions.

7.3 Error handling

NOTE!

The device is provided with predefined error reactions. You are able to set the error reaction of the device in „Depending on settings“ in the column „Reaction“ marked error messages. An exception here are errors, which have to have an immediate pulse inhibit as a consequence. This error reaction can not be changed due to safety reasons.

7.3.1 Quit errors

If the red error LEDs H14 or H24 light up, at least one error exists.

Error acknowledgments cause all error messages to be reset. Individual acknowledgment of errors is not possible. An acknowledgment causes deletion of the errors, if deletion was possible on account of the error circumstances.

There are 4 methods of acknowledging an error:

- Via ProDrive:
  Button “Quit errors” (either in the dialogue box “Device manager” or on the page “Device manager“.
  That means, that you inform the device, that you have noted the error, that you have removed it or that you want to pass over it. Due to error reset all error messages are reset. An individual error reset is not possible. The button Quit errors causes a resetting of the error, in case the cause for the error message exists no longer.



Figure 38: ProDrive Drive manager

- Via writing access to control word
- Via a digital input
- Via the pulse enable input:
  Precondition is, that the drive is only controlled via the hardware inputs (that means that the motor guide is neither set via the operating software nor via another communication source). Furthermore the option “Quit error via pulse enable” must be active. With the first rising edge of pulse enable the errors then are reset. But the drive still does not start. Therefore you then need a second rising edge for the enable.

Additional data according the subject resetting of error messages is available in the „Parameter manual **b maXX 6000**“.

7.3.2 Error messages

In the column „Reaction“ the reaction of the system to the error is shown:

- „adjustable“ = the error reaction can be set via ProDrive (Window „Drive management“, toolbar button „Error reaction“).

IEE

Error No.	Error description	Reaction	Troubleshooting
424	Configuration error, further details in status P172.2: o Bit10: IEE add-on module is not available o Bit11: Start after zero pulse selected and encoder is not an incremental encoder	adjustable	 o Bit10: Use controller with IEE add-on module o Bit11: Use incremental encoder for source encoder or select option „Start: immediately“.
425	Run time error, further details in status P172.2: o Bit 8: Output frequency to high add-on module IEE cannot generate the required number of pulses Cause: The product from set value change and no. of increments is too high o Bit 9: Error in set value source IEE switches off, because of an error in set value source	adjustable	 o Bit 8: Reduce no. of increments of IEE or reduce the drive speed, from which the set value is generated or reduce the set speed from the higher-level control according following formula: $f = n*N$ f. no. of increments per sec n: Speed [revolution per sec.] N: No. of increments [inc/rev] $n_{max} = f_{max}/N$ Frequency limit=500 kHz, with N=10 000 inc/rev: $n_{max} \leq 50$ rev/s ≤ 3000 rev/min o Bit 9: Check set value source and correct problem

SIE

Error No.	Error description	Reaction	Troubleshooting
426	Configuration error, further details in status P173.2: ○ Bit12: Add-on module SIE is not available	adjustable	○ Bit12: Use controller with SIE module
427	Run time error, further see status P173.2: ○ Bit 14: Time out The clock signal of the SSI master is missing	adjustable	○ Bit 14: Check SSI encoder **in**put and connection cables

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Version	Edition	Changes
5.25013.01	18-Aug-2025	First issue

Notes

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