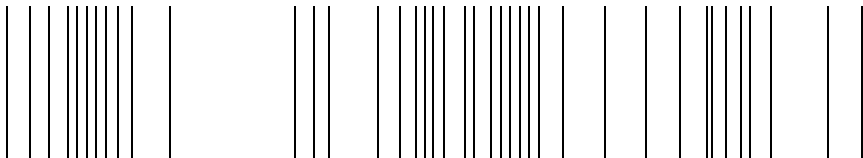


**be in motion be in motion**



POWER CONVERSION EQUIPMENT



**Feed/Feedback Unit**

**BUC 624, 625**

**Manual**

|          |             |
|----------|-------------|
| <b>E</b> | 5.96024.06a |
|----------|-------------|



|              |  |
|--------------|--|
| Title        | Manual   |
| Product      | Feed/Feedback Unit, BUC 624, 625   |
| Version      | 5.96024.06a  |
| Status       | 2004-12-28   |
| Copyright    | <p>These operating instructions may be copied by the owner in any quantity but only for internal use. For other purposes these operating instructions and extracts thereof must not be copied or reproduced.</p> <p>Use and disclosure of information contained in these operating instructions are not permitted.</p> <p>Designations and company marks contained in these operating instructions may be brand names, the use of which by third parties for their own purposes may violate the rights of the holders.</p>   |
| Obligatory   | <p>These operating instructions are part of the equipment/machine. These operating instructions must be available to the operator at all times and must be in a legible condition. If the equipment/machine is sold or moved to a different location these operating instructions must be passed on by the owner together with the equipment/machine.</p> <p>After any sale of the equipment/machine this original and all copies must be handed over to the buyer. After disposal or any other end of use this original and all copies must be destroyed.</p> <p>When the present operating instructions are handed over, corresponding sets of operating instructions of a previous version are automatically invalidated. Please notice that specifications/data/information are <b>current values according to the printing date</b>. These statements are <b>not legally binding</b> according to the measurement, computation and calculations.</p> <p>Baumüller Nürnberg GmbH reserves the right, in developing its products further, to change the technical specifications and the handling of the products concerned without prior notice.</p> <p>No liability can be accepted concerning the correctness of the operating instructions unless otherwise specified in the General Conditions of Sale and Delivery.</p> |
| Manufacturer | <p>Baumüller Nürnberg GmbH<br/>Ostendstr. 80 - 90<br/>D-90482 Nürnberg<br/>Germany<br/>Tel. +49 9 11 54 32 - 0 Fax: +49 9 11 54 32 - 1 30<br/><a href="http://www.baumueller.de">www.baumueller.de</a></p>   |

**TABLE OF CONTENTS**

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Safety Notes</b>                     | <b>5</b>  |
| <b>2</b> | <b>Technical Data</b>                   | <b>9</b>  |
| 2.1      | General                                 | 9         |
| 2.2      | Electrical data                         | 11        |
| 2.3      | Type code                               | 13        |
| <b>3</b> | <b>Transportation, Unpacking</b>        | <b>15</b> |
| <b>4</b> | <b>Assembly</b>                         | <b>17</b> |
| 4.1      | Dimensions                              | 18        |
| 4.2      | Assembly information                    | 19        |
| 4.3      | Fastening                               | 20        |
| <b>5</b> | <b>Installation</b>                     | <b>21</b> |
| 5.1      | Danger information                      | 21        |
| 5.2      | Standardization information             | 22        |
| 5.3      | EMC information                         | 24        |
| 5.4      | BUC 624 connection diagram              | 30        |
| 5.5      | Connection diagram BUC 625              | 31        |
| 5.6      | Pin assignments                         | 36        |
| 5.7      | Accessories                             | 39        |
| <b>6</b> | <b>Commissioning</b>                    | <b>41</b> |
| 6.1      | Danger information                      | 41        |
| 6.2      | Operation                               | 43        |
| 6.3      | Voltage/phase failure                   | 44        |
| 6.4      | Messages and warnings                   | 44        |
| <b>7</b> | <b>Maintenance</b>                      | <b>47</b> |
| 7.1      | Maintenance information                 | 47        |
| 7.2      | Environmental conditions                | 48        |
| 7.3      | Recommissioning                         | 48        |
| 7.4      | Disposal                                | 49        |
| <b>8</b> | <b>Appendix</b>                         | <b>51</b> |
| 8.1      | Manufacturer Declaration                | 51        |
| 8.2      | Declaration of Conformity               | 52        |
| 8.3      | General Conditions of Sale and Delivery | 53        |
| 8.4      | Index                                   | 56        |

## ABBREVIATIONS

|          |  |
|----------|--|
| AC       | Alternating current  |
| AM       | Asynchronous motor   |
| a.m.s.l. | above mean sea level   |
| BUC      | Baumüller Feed/Feed back Unit  |
| BUG      | Baumüller Basic Feed Unit  |
| BUM      | Baumüller Mono Power Unit  |
| BUS      | Baumüller Power Module   |
| DC       | Direct current   |
| DIN      | Deutsches Institut für Normung e.V. (German Standardisation Authority) |
| EMC      | Elektromagnetic compatibility  |
| EN       | European standart  |
| HS       | Main contactor   |
| PELV     | Protective extra-low voltage   |
| SELV     | Safe extra-low voltage   |
| MSL      | Main Sea Level   |
| SL       | Protective earth   |
| SM       | Synchronous motor  |
| ZK       | DC link  |

## 1 SAFETY NOTES

### Introductory remarks

During operation, the principles on which the converter and motor work, lead to leakage currents to earth which are dissipated via specified protective earth connections and which may result in a current-operated e.l.c.b. on the input side blowing prematurely.

A DC component in the fault current may occur in the event of a short-circuit to frame or earth fault which makes a triggering of the higher-level current-operated e.l.c.b. more difficult or even impossible.

The connection of the current controller to the mains using only the current-operated e.l.c.b. is prohibited (preliminary standard EN 50178 / VDE 0160 / 11.94, sections 5.2.11 and 5.3.2.1)

The units are protected against direct contact by being installed into common switching cabinets which meet the minimum protection requirements according to pr EN 50178 / VDE 0160 / 11.94, section 5.2.4.

Sheets of plastic covering the control electronics, the power stage and the device connection, additionally prevent accidental contact during commissioning and casual use of control elements located close to the equipment.

(DIN VDE 0106 Part 100, Accident Prevention Regulation VBG4 "Electrical Systems and Equipment).

The protective measures and safety regulations according to DIN/VDE are binding for personal security.

Neglecting to fit PE connections on the equipment or the motor will result in serious personal injury and/or considerable damage to material assets.

It is only permitted to use the units on earth-protected supply mains.

The discharge time of live parts is > 1 min.

The units are partly short-circuit-proof.

### General information

These operating instructions contain the information required for the application as directed of the products described herein. The document is intended for specially trained, skilled personnel who are well-versed in all warnings and maintenance activities.

The units are manufactured using the state-of-the-art technology and are safe in operation. They can be installed safely and commissioned and function without problems if the safety information below is observed.



## DANGER

When operating this electrical unit, some parts of the equipment always carry dangerous voltage.

Ignoring these safety instructions and warnings may result in death, serious personal injury and/or damage to material assets.

Only qualified personnel who are familiar with the safety information, assembly, operation and maintenance instructions may carry out work on this unit.

# Safety Notes

---

## Danger information

On the one hand, the information below is for your own personal safety and on the other to prevent damage to the described products or to other connected units.

In the context of the operating instructions and the information on the products themselves, the terms used have the following meanings:



## DANGER

This means that **death, severe personal injury or considerable damage to material assets will occur**, unless appropriate safety measures are taken.



## WARNING

This means that **death, severe personal injury or considerable damage to material assets may occur**, unless appropriate safety measures are taken.



## NOTE

This draws your attention to **important information** about the product, handling of the product or to a particular section of the documentation.

## Qualified personnel

In the sense of the safety-relevant information in this document or on the products themselves, qualified personnel are considered to be persons who are familiar with setting up, assembling, commissioning and operating the product and who have qualifications appropriate to their activities.

- Trained or instructed or authorised to commission, ground and mark circuits and equipment in accordance with recognised safety standards.
- Trained or instructed in accordance with recognised safety standards in the care and use of appropriate safety equipment.

### Application as directed



### WARNING

You may only use the unit/system for the purposes specified in the operating instructions and in conjunction with the third-party equipment and components recommended or authorised by BAUMÜLLER NÜRNBERG GmbH.

For safety reasons, you must not change or add components on/to the unit. The operator must report immediately any changes that occur which adversely affect the safety of the unit/system.

### Voltage test

BAUMÜLLER carries out a voltage test according to prEN 50178 / VDE 0160 /11.94, Section 9.4.5 for each unit.

Subsequent high-voltage tests must only be carried out by BAUMÜLLER NÜRNBERG GmbH.



### WARNING

If you want to carry out high-voltage tests for complete switch cabinet installations, disconnect all cables from BAUMÜLLER units prior to the test.





## 2 TECHNICAL DATA

### 2.1 General

The Feed/Feed back Units designated BUC 624 and BUC 625 are supply converters for feeding the DC links of BUS 62X power modules.

For control tasks there are the controller modules from Baumüller available. Thus the units can be adapted to a wide variety of requirements.

There are two types of controller.

- The BUS 6 V controller for almost all applications in constructional engineering.
- The BUS 6 T controller for highly demanding control tasks

With the digital drive controllers of the BUS 6 series, both asynchronous and synchronous motors with different encoder systems can be driven by the same unit.

The Feed/Feed back Units are divided into two classes, 18 kW and 36 kW.

The Feed/Feed back Units are designed for wide range voltage connection between  $400\text{ V} \pm 10\%$ . Starting current load relief and DC link reactor are integrated into the unit.

24 VDC external (SELV with safe isolation) are necessary for operation.

#### 2.1.1 Description of function

##### Inrush current limitation

If no measures are taken, the DC link capacitors lead to inadmissibly high levels of starting current inrush when the mains is switched on. To avoid this, the starting current is limited by a charging circuit. A current limitation device is integrated for this, which limits the charging current to approximately 2.5 A. When an DC link voltage of 500 VDC is reached, the system deactivates the current limitation device and generates mains contactor enable. Auxiliary contact X99:1,2 (BUC ready for use) is closed.

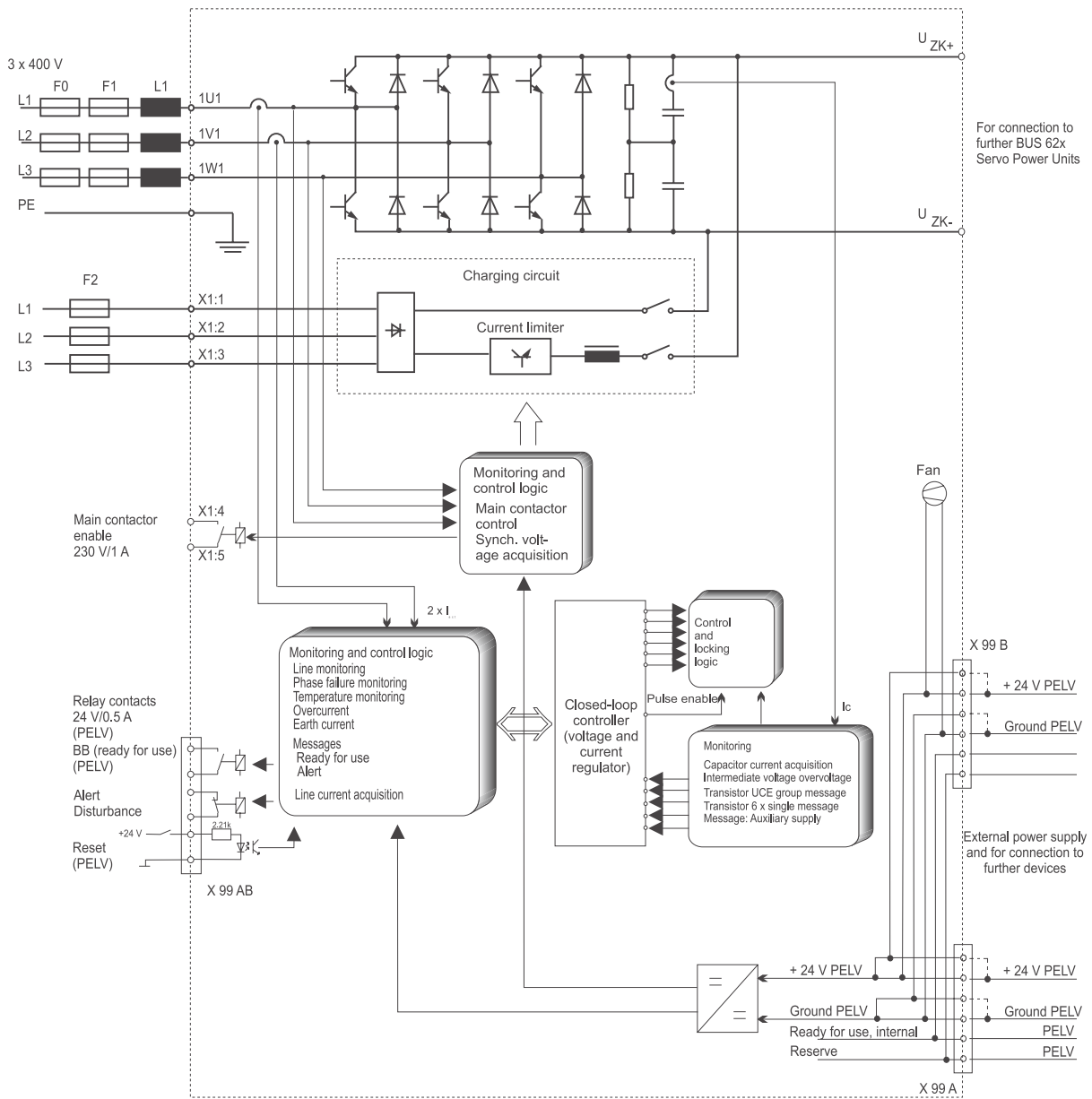
##### Feed / feed back unit

Feeding and feeding back of the DC link are implemented as a B6-IGBT circuit that is on the input side of a line commutator. In this connection, the DC link voltage is  $640\text{ V}_{\text{DC}}$ . Due to the high dynamics, distortions in the network can occur. At each operating point, the effectivity is  $\cos \varphi = 1$ .

##### Reset

Using X98:5,6, you can reset messages that the basic unit generated. A permanent reset (+24 V) may not be connected. The reset signal must be pending for at least 50 ms.

## 2.1.2 Block diagram



## 2.2 Electrical data

| Feed / Feed Back Unit   | BUC 624  | BUC 625            |
|---|--|--------------------|
| Connection Voltage <sup>4)</sup>  | 3 x 400 V <sub>AC</sub> ±10 % 50 / 60 Hz   |                    |
| Nominal Input Current <sup>3)</sup>   | 26.5 A   | 53 A               |
| Semi-conductor fuse (external)  | 40 A   | 80 A               |
| Nominal power <sup>3)</sup>   | 18 kW  | 36 kW              |
| Nominal DC link voltage   | 640 V <sub>DC</sub>  |                    |
| maximum capacity in DC link (including feed unit)   | 10 mF  | 10 mF              |
| Capacitor in the DC link  | 1500 µF  | 2250 µF            |
| maximum number of power units, which can be connected to the DC link of the feed/feed-back unit (when length of motor cable = 80 m) <sup>5)</sup> | 3  | 5                  |
| Switch on: Ready for use after overload switching the overload circuit after 10 s   | depends on capacitor in the DC link:<br>2 to 10 s  |                    |
| Low voltage power supply PELV <sup>2)</sup>   | + 24 V <sub>DC</sub> ± 20 %  |                    |
| Power consumption   | 45 W   | 45 W               |
| Power loss in nominal use without ballast   | 400 W  | 770 W              |
| Operation environmental temperature range T <sub>B</sub>  | 0 ... 45 °C (with power reduction 55 °C)   |                    |
| Coolant temperature range T <sub>K</sub>  | 0 ... 45 °C (with power reduction 55 °C)   |                    |
| Power reduction   | 3 % / °C   |                    |
| Installation height <sup>1)</sup>   | 1000 m above sea level   |                    |
| Relative air humidity   | 15 % ... 85 % no dew   |                    |
| Storage temperature range   | -30 °C ... +70 °C  |                    |
| Noise level   | >70 dB   |                    |
| Type of protection according to EN60529   | IP20   |                    |
| Climatic category   | 3K3  |                    |
| Protection class  | I  |                    |
| short-circuit-proof   | The units are partly short-circuit-proof according to prEN 50178 / VDE0160 / 11.94 section 6.3.4 |                    |
| Dimensions (BxHxD)  | 165 x 360 x 280 mm   | 198 x 360 x 280 mm |
| Weight  | 12 kg  | 16 kg              |

1) Installation height > 1000 m see characteristic curve 1

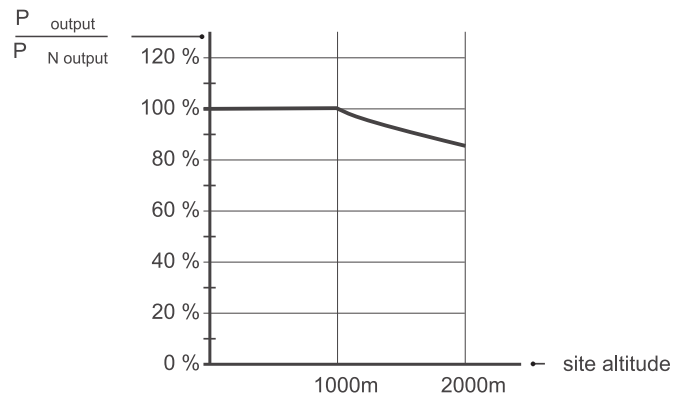
2) Power reduction (24V ventilator) in case of power supply voltage < 22.7 V<sub>DC</sub> on requirement tolerance limits according to DIN 19240

3) Mains supply voltage ≠ 400 V<sub>AC</sub>, see characteristic curve 2 - 3

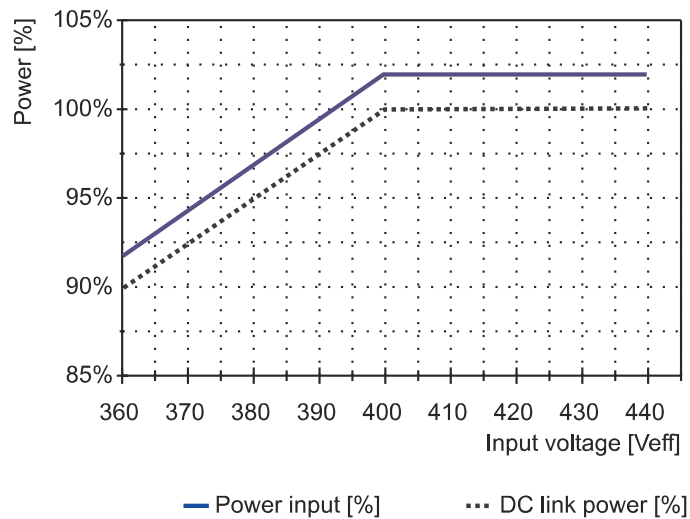
4) Connection voltage in front of the line commutator

5) IMPORTANT: This data is valid for any drive power. The units will be destroyed, if you do not observe the given limits.

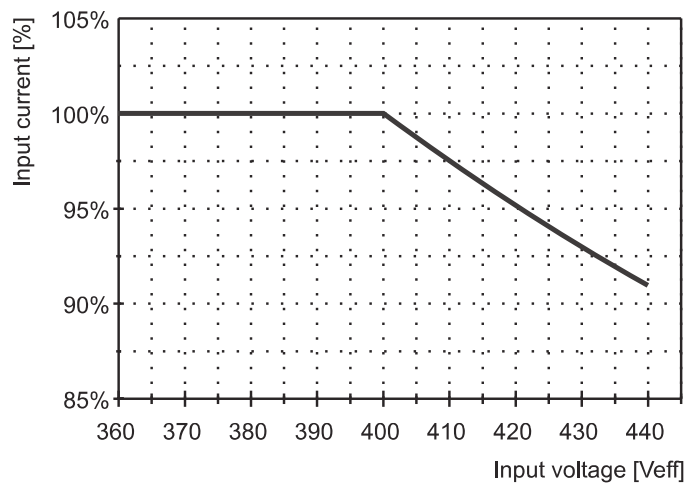
Characteristic curve 1: Load in dependence on installation height



Characteristic curve 2: Power curve at  $T_u = 25^\circ \text{C}$



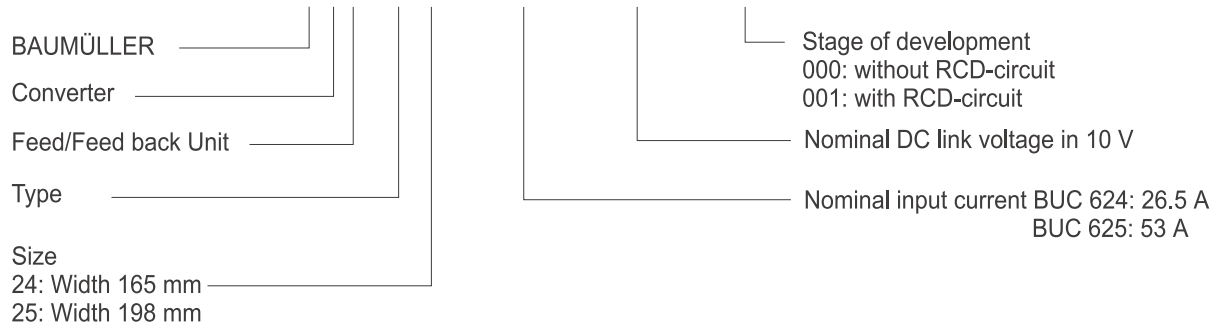
Characteristic curve 3: Current / voltage curve at  $T_u = 25^\circ \text{C}$



### 2.3 Type code

BUC 6 24 - 26.5 - 64 - 000

BUC 6 25 - 53 - 64 - 000





### 3 TRANSPORTATION, UNPACKING

The units are packed at the factory in accordance with the order.

You should avoid jarring packages in transit or jolting them, e.g. when setting them down on the ground.

After unpacking the package(s) and checking that the shipment is complete, you can start assembly.

Fibreboard, cartridge paper and/or wood are used as packaging materials and they can be disposed of in accordance with local regulations.

Report any damage in transit without delay.



**DANGER**

If the unit has been damaged in transit, do not connect it to the mains until appropriate high-voltage testing has been carried out.

Ignoring this information can result in death, severe personal injury, or considerable damage to property.





## 4 ASSEMBLY



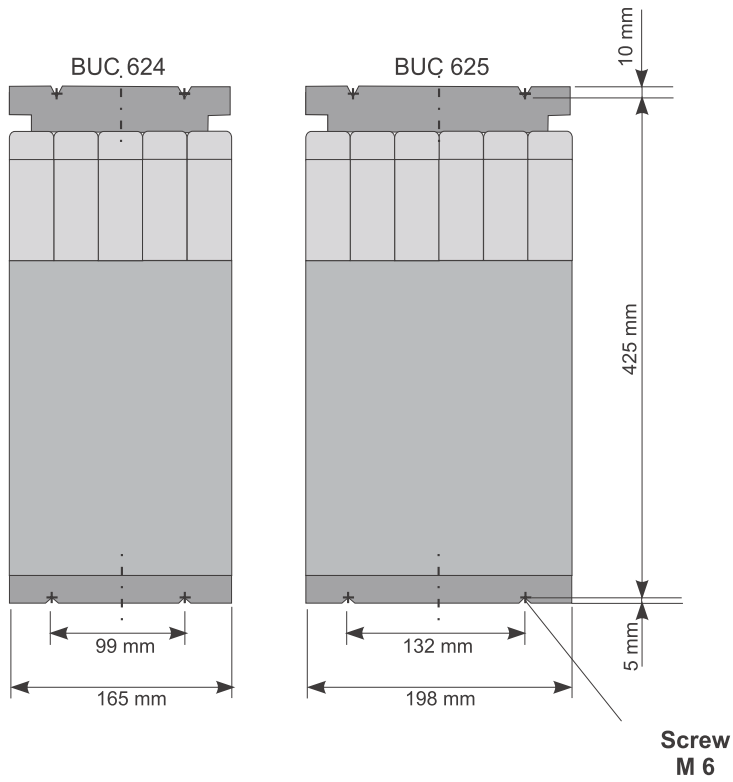
### WARNING

The user is responsible for the assembly of the unit described, the motor, and the other devices according to the safety regulations (e.g. EN, DIN, VDE) and all other relevant national or local regulations concerning the conductor ratings and protection, grounding, disconnectors, overcurrent protection, etc.

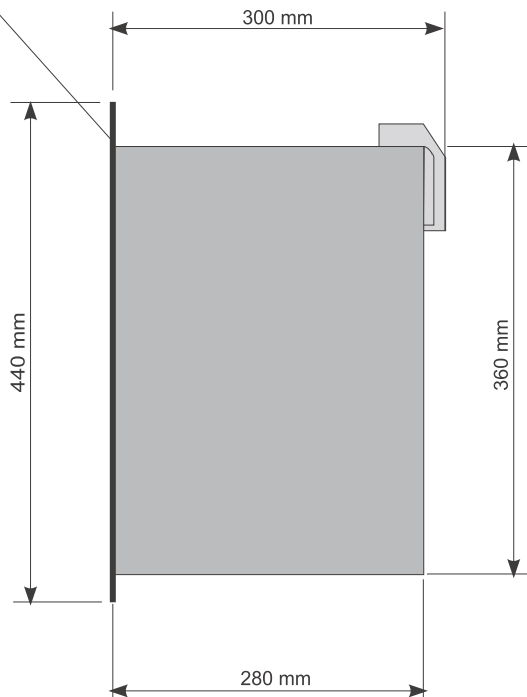
Ensure that there is no blockage of cooling air flowing into and out of the equipment and that there is enough space above and below the equipment to prevent overheating.

Sheets of plastic on the devices that cover the equipment connection act as additional guards preventing accidental contact at commissioning and in the case of casual use of control elements located close to the equipment (DIN VDE 0106 Part 100, Accident Prevention Regulation VBG4 "Electrical Systems and Equipment").

## 4.1 Dimensions



Mounting attached  
individually as a  
separate part.



## 4.2 Assembly information



### WARNING

Inappropriate lifting can cause personal injury or damage to material assets.  
Qualified personnel only may lift the unit using suitable equipment.

- Install the units vertically in a switching cabinet. Mount the BUS 62X Power modules next to the BUC 624, 625 Feed/Feed back Unit and connect the DC link using the supplied connecting rails on the front rails of the BUS 62X Power module.



### DANGER

Longer lines are not allowed, since otherwise there is a risk of destroying the device!  
The live parts take more than one minute to discharge.



### WARNING

It is crucial to comply with the ventilation measures listed below. Ignoring these measures can lead to the device overheating.

- Ventilation must be in the direction from the bottom to the top.
- Ensure that the flow of air is not obstructed.
- There must be a minimum clearance above and below the devices of  
100 mm  
and you must ensure that there is enough cooling air that can circulate freely!
- The temperature of the coolant 50 mm below the modules may be up to 45° C. At higher temperatures (up to a maximum of 55° C), you must reduce the power of the devices by 3% per degree Celsius.
- Do not locate any additional sources of heat above or below the devices.
- You must avoid degrees of contamination 3 and 4 according to provisional standard EN 50178:1994 Section 5.2.15.2. The devices are suitable for use in enclosed workshops (VDE 0558 Part 1a, Sections 5.4.3.2.1 and 5.4.3.2.2).

## 4.3 Fastening

Fasten the unit via the back panel in the switching cabinet (for dimensions, see Chapter 4.1).

With devices that are mounted next to one another, the back panels must be in contact with one another.

## 5 INSTALLATION

### 5.1 Danger information



#### WARNING

This equipment carries a dangerously high voltage and has dangerous rotating parts (fans). Ignoring the safety and warning information may result in death, severe personal injury or damage to property.

The machine operator is responsible for mounting the power unit, the motor, the transformer and any other equipment in accordance with appropriate safety regulations (e.g. DIN, VDE); equally, you must ensure that all other relevant national and local regulations are met with regard to cable ratings and protection, grounding, disconnectors, overcurrent protection, etc.

Relatively high leakage to ground occurs in the converter and the motor, i.e. the drive may be incompatible with current-operated e.l.c.b.s (corresponding to provisional standard EN 50178:1994 Section 5.2.11.2).

You may only use variable-speed drives in applications that correspond to valid EN specifications.



#### DANGER

The DC link carries a voltage! It is imperative that the provided cover is used

Be particularly careful before touching the drive shaft directly or indirectly with your hands. This is only allowed when the system is deenergized and the drive is stationary.

Safety devices must never be deactivated.

## 5.2 Standardization information

Series BUC 6xx are built-in units in the sense of provisional standard EN 50178/VDE 0160/11.94, Section 5.2.6 and DIN VDE 0558 Part 1/07.87, Section 5.4.3.2.1. They are intended for installation in commercially available control cabinets whose degrees of protection meet the minimum requirements of provisional standard EN 50178/VDE 0160/11.94, Section 5.2.4 (IP 2x, possibly IP4x according to EN 60529/5.1).

Plastic covers on the equipment provide additional protection against accidental contact in the case of casual use of control elements located close to the equipment (DIN VDE 0106 Part 100, Accident Prevention Regulation VBG4 "Electrical Systems and Equipment").

If you intend to set up the equipment in closed electrical workshops according to provisional standard EN 50178/VDE 0160/11.94, Section 5.2.7 and DIN VDE 0558 Part 1/07.87, Section 5.4.3.2.2, you must implement additional measures to ensure compliance with the requirements of provisional standard EN 50178/VDE 0160/11.94, Section 5.2.4.

These power converters are intended for permanent mains connection to conventional TN and TT systems according to DIN VDE 0100 Part 410/11.83 with a diametric voltage of up to  $3 \times 500 V_{\text{eff}}$  ("and not more than 5000 rms symmetrical amperes", if UL508C has to be observed (Nov 27, 1996, Tab. 44.1)

Connecting to a system with an insulated neutral point (IT system) is only possible under special circumstances. If necessary, enquire at the factory.

During operation, the principles on which the power converter and the motor work lead to leakage currents to earth occurring that may be dissipated via the specified protective earths and may result in a current-operated e.l.c.b. on the input side blowing prematurely. In the case of a short-circuit to frame or to ground, a direct proportion may arise in the leakage current that makes triggering a higher-level current-operated e.l.c.b. either more difficult or totally impossible. This means that connecting the power converter to the mains using only the current-operated e.l.c.b. is prohibited (preliminary standard EN 50178/VDE 0160/11.94, Sections 5.2.11 and 5.3.2.1).

With regard to climatic conditions, the equipment conforms to category 3K3 for sheltered locations according to provisional standard EN 50178/VDE 0160/11.94, Section 6.1, Table 7, Line 3 or Table 1 of EN 60721-3-1,2,3,4 respectively, taking into account Remarks 1 and 3 of provisional standard EN 50178/VDE 0160/11.94, Section 6.1. The actual operating temperature range is higher and is in the range 0 .. +55°C. The information in Table 7 (lines 5 and 6) of provisional standard EN 50178/VDE 0160/11.94, Section 6.1 also applies to storage and transportation.

The storage and transportation temperature of the equipment varies from this information in as much as it may be between -30 ... +70°C (refer to Technical Data).

The units are in protection class IP 20 according to EN 60529 (DIN VDE 0470-1)

The units are equipment in protection class I corresponding to IEC 536/3 and DIN VDE 0106 Part 1 (provisional standard EN 50178/VDE 0160/11.94, Section 5.2.9).

Equipment of protection class I is equipment whose protection against dangerous shock currents is not limited to basic insulation but which also has additional safety devices. This additional protection is provided by connecting the housing and other parts to the protective earth such that if the basic insulation fails no voltage can remain. With these power converters, the entire insulation is carried out according to provisional standard EN 50178/VDE 0160/11.94, Section 5.2.9.1, at least to basic insulation standard. This also applies to the insulation between the individual circuits.

The power converters' control terminals are safely isolated from the mains and are designed for connection of SELV and PELV circuits.

At measurement of the creepage distances and clearances, the following criteria were taken into account:

- Soiling grade 2 according to provisional standard EN 50178/VDE 0160/11.94, Section 5.2.15.2, Table 2, Line 3:

Normally, only non-conducting pollutants are produced. When the equipment is out of service, brief conductivity can occur due to condensation.

- Overvoltage category III according to IEC 664-1, Table 1 for the air clearances of mains circuits to their environment according to provisional standard EN 50178/VDE 0160/11.94, Section 5.2.16.1.

- The rated insulation voltage of the mains circuits for TN and TT systems according to DIN VDE 0100 Part 410/11.83 with a diametric voltage of 3 x 500 V.

- Insulation material IIIa for creepage distances according to provisional standard EN 50178/VDE 0160/11.94, Section 5.2.17.

Series BUC 62x power converters are short-circuit-proof in the sense of provisional standard EN 50178/VDE 0160/11.94, Section 6.3.4, assuming that you use protective semiconductor fuses to protect the transistors (see Accessories).

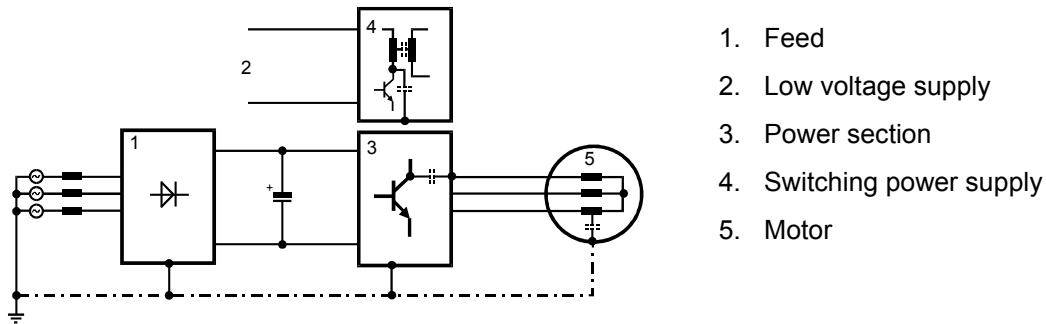
## 5.3 EMC information

### General information about converters

Modern semiconductor technologies such as MCTs and IGBTs are intended to minimize the power loss in the converter by switching more quickly and, with this, to continually reduce the size of the power section. As a result, when running converters you must meet specific conditions to avoid electromagnetic influences caused by switching operations.

Disturbances can occur due to:

- capacitive fault currents caused by high rates of voltage rise when bipolar transistors and IGBTs switch.



- high currents and high rates of current rise in the motor lines. The disturbance energy bound in magnetic fields reaches frequencies of between a few Hertz and about 30 MHz. Due to the high rates of current rise, additional electromagnetic fields occur with frequencies of up to approximately 600 MHz.
- high clock rates and fast logic circuits (electromagnetic field/16 MHz...1 GHz).
- system perturbation and harmonics caused by commutations and non-sinusoidal network loading, in particular with line-commutated converters (100 Hz ... 20 kHz).

### German EMC Law (EMVG)

This converter complies with Paragraph 5, Section 5, Sentence 3 of the German EMC Law (EMVG) dated 09.11.92.

*"Devices that are exclusively manufactured or stocked as vendor parts or spare parts for further processing by industrial companies or craftsmen or by other specialists in the field of electromagnetic compatibility do not need to comply with the protective requirements of Paragraph 4, Section 1, nor do they need EU conformity certification and marking, assuming that the devices in question cannot be run automatically."*

This does justice to the fact that EMC is heavily dependent on the individual subassemblies and components in the switching cabinet. With regard to the total costs of the machine, it is preferable to troubleshoot an entire system rather than each of its individual components.

The information on the next few pages is intended to allow you to configure your system on the basis of the latest knowledge in the field of EMC and to comply with legal regulations.

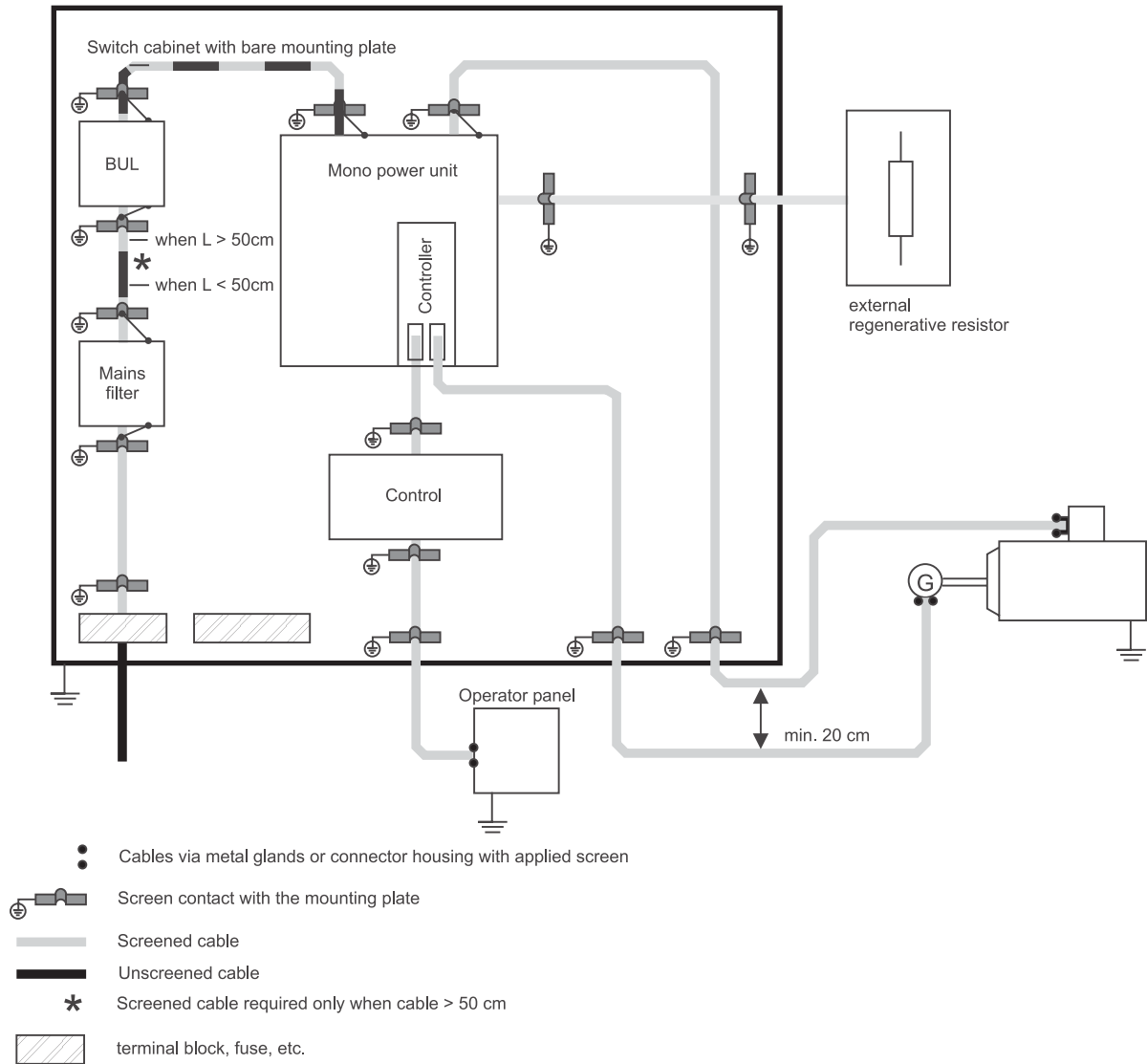
### Measures for ensuring EMC

To ensure EMC, you must observe the configuration information below.



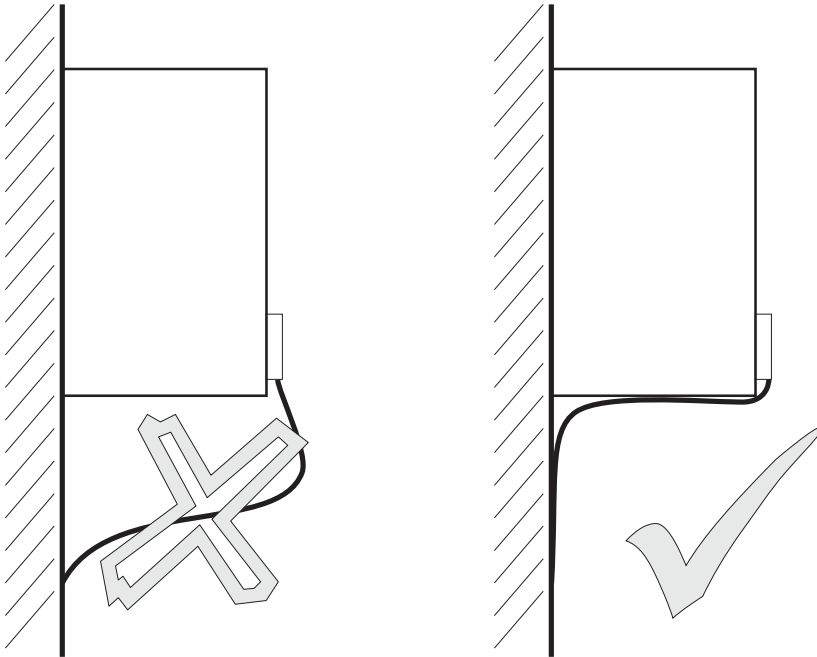
## Cabling

- To suppress radiated noise outside the converter, you should screen all the connected cabling. Also observe the topics in the section entitled "Screening".

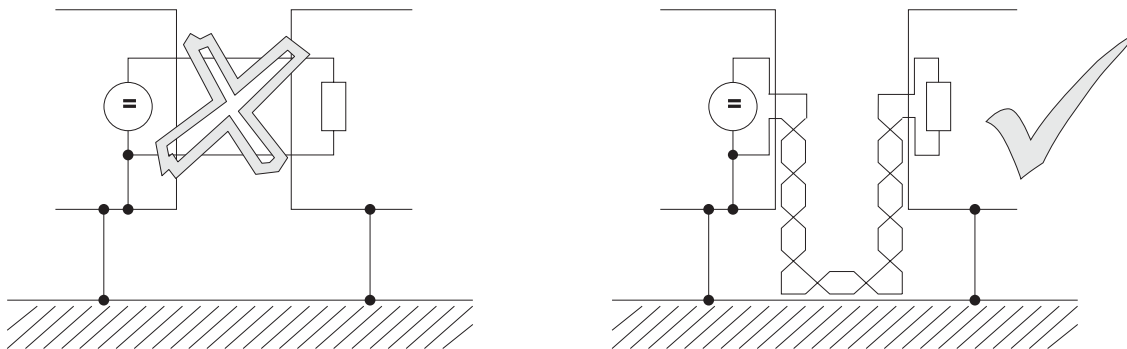


# Installation

- You achieve the lowest possible effective antenna height by routing the cable directly on the ground of the metallic rack.



- You should route all lines as close as possible to the conductors of the ground system to reduce the effective loop area for magnetic coupling.

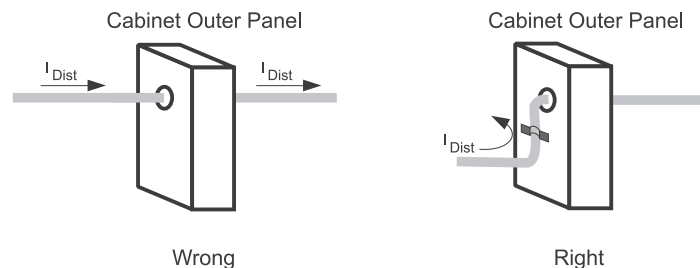


- When parallel-routing signal and control lines across power cables, the conductors must be at least 20 cm apart.
- Lines of different EMC categories should only cross at an angle of 90°.
- In the case of symmetrical signal transfer (e.g. differential amplifier inputs for the speed specified value), twist the conductors of each pair of wires together and twist the pairs of wires together.
- The converter to ground plate earth connection should be as short as possible (less than 30 cm). Use large cross-sections (more than 10 mm<sup>2</sup>).
- Sources of interference such as fuses, transformers and chokes and modules that are sensitive to interference like  $\mu$ Ps, bus systems, etc. should be located at least 20 cm away from the converter and its cabling.
- Avoid reserve loops on overlong cables.

- The grounding of reserve wires in cables is mandatory (additional screening, avoidance of capacitively coupled, hazardous contact voltages).

## Grounding

- To meet EMC requirements, the classical star grounding is no longer sufficient to reduce the noise of high frequencies caused by converter operation. Better results can be achieved by a reference surface which must be linked to the units' ground (e.g. bare metal mounting plate and housing parts)
- If a large reference surface is not possible the main equipotential bonding strip should be arranged directly at the power unit which generates the largest potential steps compared to the other components in the switch cabinet (ground connection < 30 cm if possible).
- To avoid earth loops, apply all ground connectors and screens as close as possible above the ground.
- If it is possible to ground the controller reference potential of the power unit, make the connection with as large a cross-section as possible and a short cable (< 30 cm).
- Remove insulating layers such as paint, adhesives, etc. from the ground connections. If necessary, use serrated lock washers (DIN 6798) or similar measures to ensure a permanent, conductive contact. To prevent corrosion on ground connections, use suitable metal combinations (electrochemical series of metals) and keep conductive electrolytes away from the connection by a protective coating (e.g. grease).
- Always connect screens at both ends over a large surface and conductive to ground. This is the only way to suppress the effects of magnetic or high-frequency noise. If earth loops occur (e.g. double insulation of the setpoint conductor screen), apply the receiver side galvanically and the transmitter side capacitively.
- When laying external cable screens through panels separating different EMC areas, make contact to the cable screens.  
Cables which are passed through the panels of screening housings without special measures (e.g. filtering), may impair the screening effect of these housings. For this reason, you must make a conductive connection of the cable screens at the point at which the cable enters the housing.  
The distance of the last screen contact point to the exit of the cabinet must be as short as possible

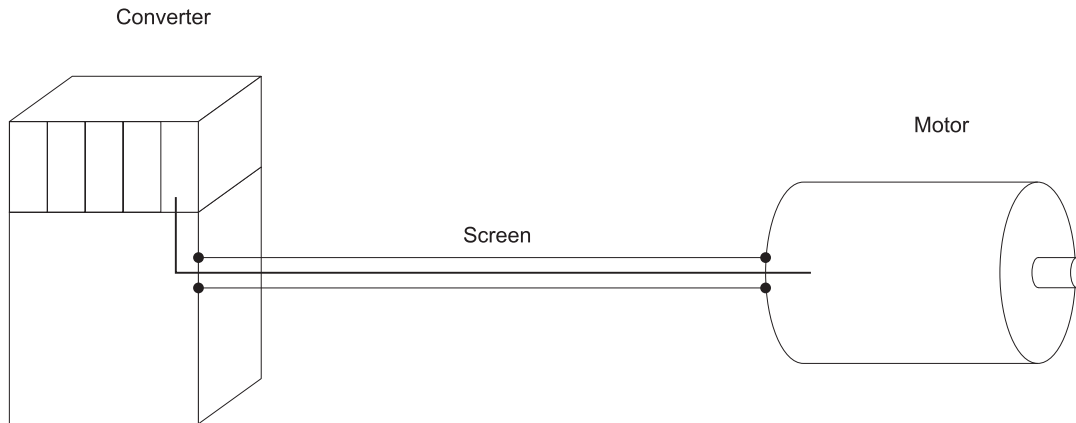


## Screening

- The screen is effective against magnetic fields if it is connected to frame ground at both ends.

With electrical fields, the screen is effective when it is connected to frame ground at one end.

However, in the case of (electrical or magnetic) fields with high frequencies (depending on the length of the line), you must always connect the screen at both ends due to the linkage (electro-magnetic field).



Connecting the screen to frame ground at both ends ensures that the conductor does not leave the screening "system housing".

- Frame-grounding of conductor screens on both sides does not entirely rule out the influence of earth circuits (potential differences on the frame ground system). However, this is very rare if you carry out the measures described in the previous sections entitled "Cabling" and "Grounding".

You can also make a capacitive RF connection of a screen to frame ground. This prevents low-frequency interference due to earth circuits.

Screened cables that pass through different EMC areas must not be separated at terminals, since screen damping would otherwise be considerably reduced. The cables should be routed to the next module without interruption.

Make the screen connection low-impedance and over a wide surface area. Cable tails that are only three centimetres long (1 cm of wire = 10 nH) reduce the screening effect in the megahertz range by up to 30 dB!



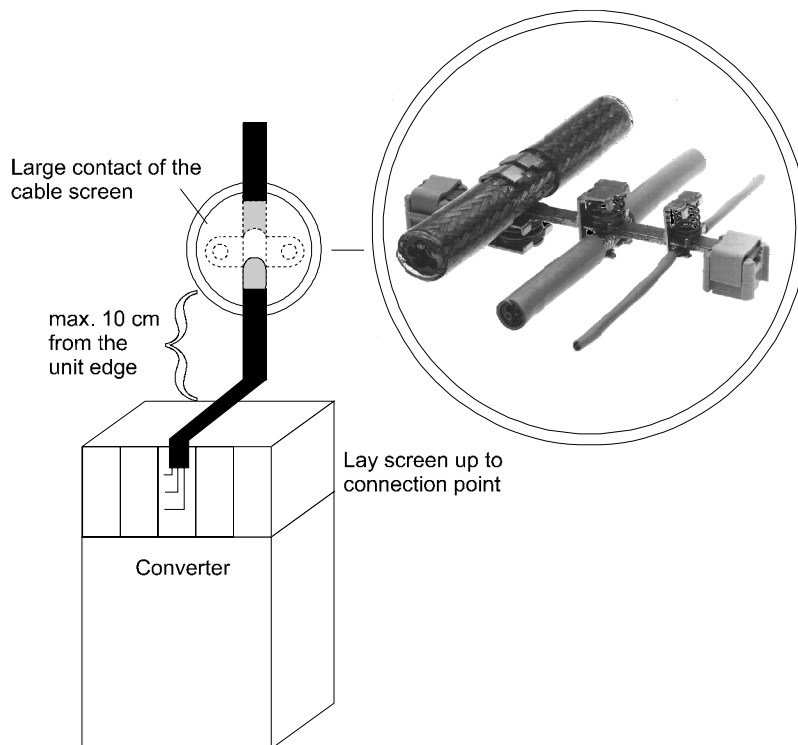
## NOTE

The screen braid must have a coverage of at least 85%.

The following cables have a particularly high interference potential:

- Motor cable
- Cable to external regenerative resistors
- Cable between mains filter and converter

- Proposal for the screen connection



## Filtering

No filters are needed for the converter to function. However, under some circumstances, filters may be needed on the input or the output side to comply with EMC regulations.

If you have any queries about filter design, please ask for the description entitled Baumüller Filters for Network Applications, BFN.

## Filter assembly

- Mount the filter directly next to the converter. With lines that are more than 30 cm long, you must screen the mains line between the converter and the filter (frame-ground on both sides).
- Physically separate the filter's input and output lines by more than 30 cm.
- Make a broad connection between the filter housing and frame ground.

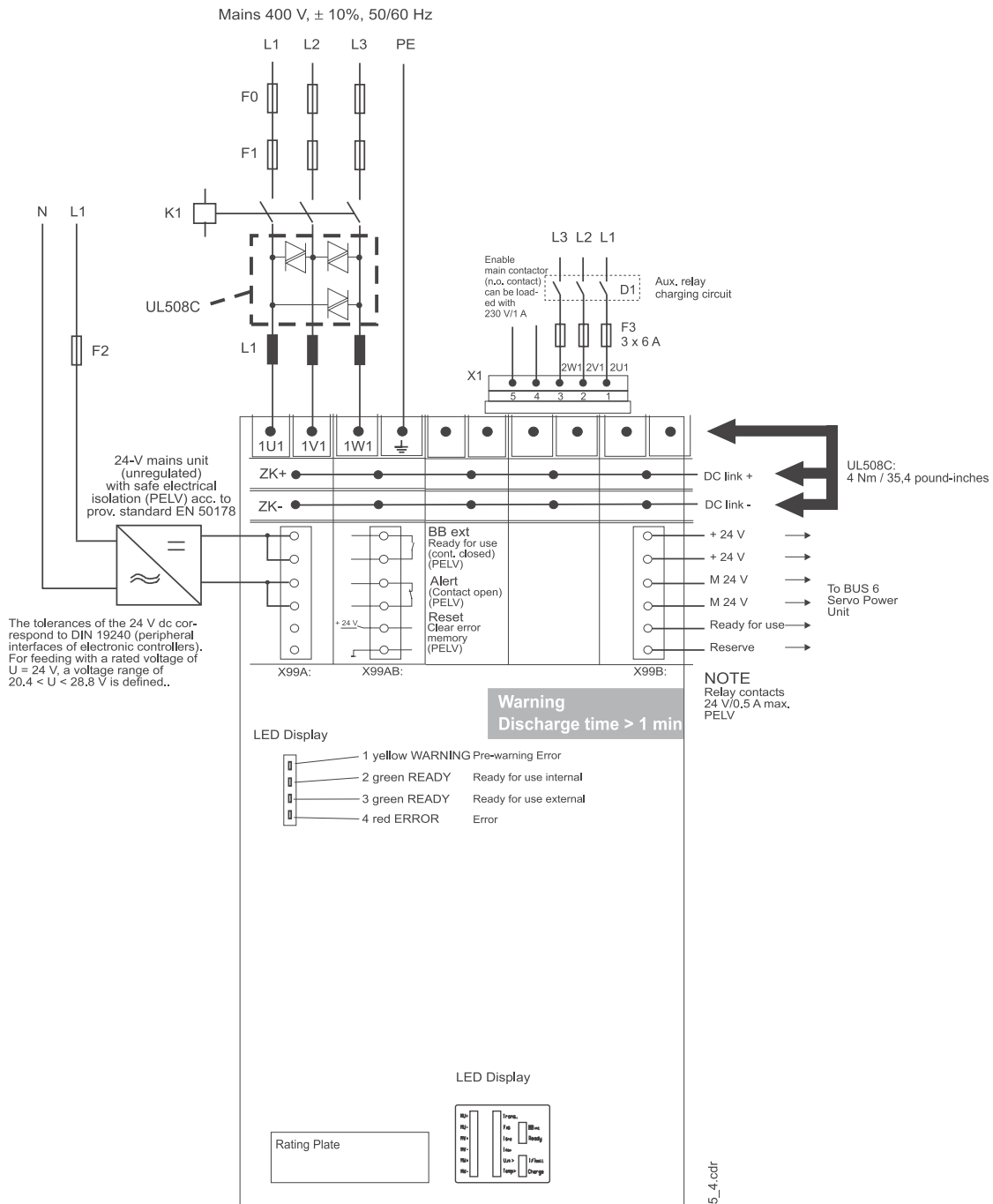
## Discharge currents

Due to the principle of operation, parasitic capacities in the filter, the mains unit, the motor cable and the motor winding cause discharge currents of around 100 mA and higher.

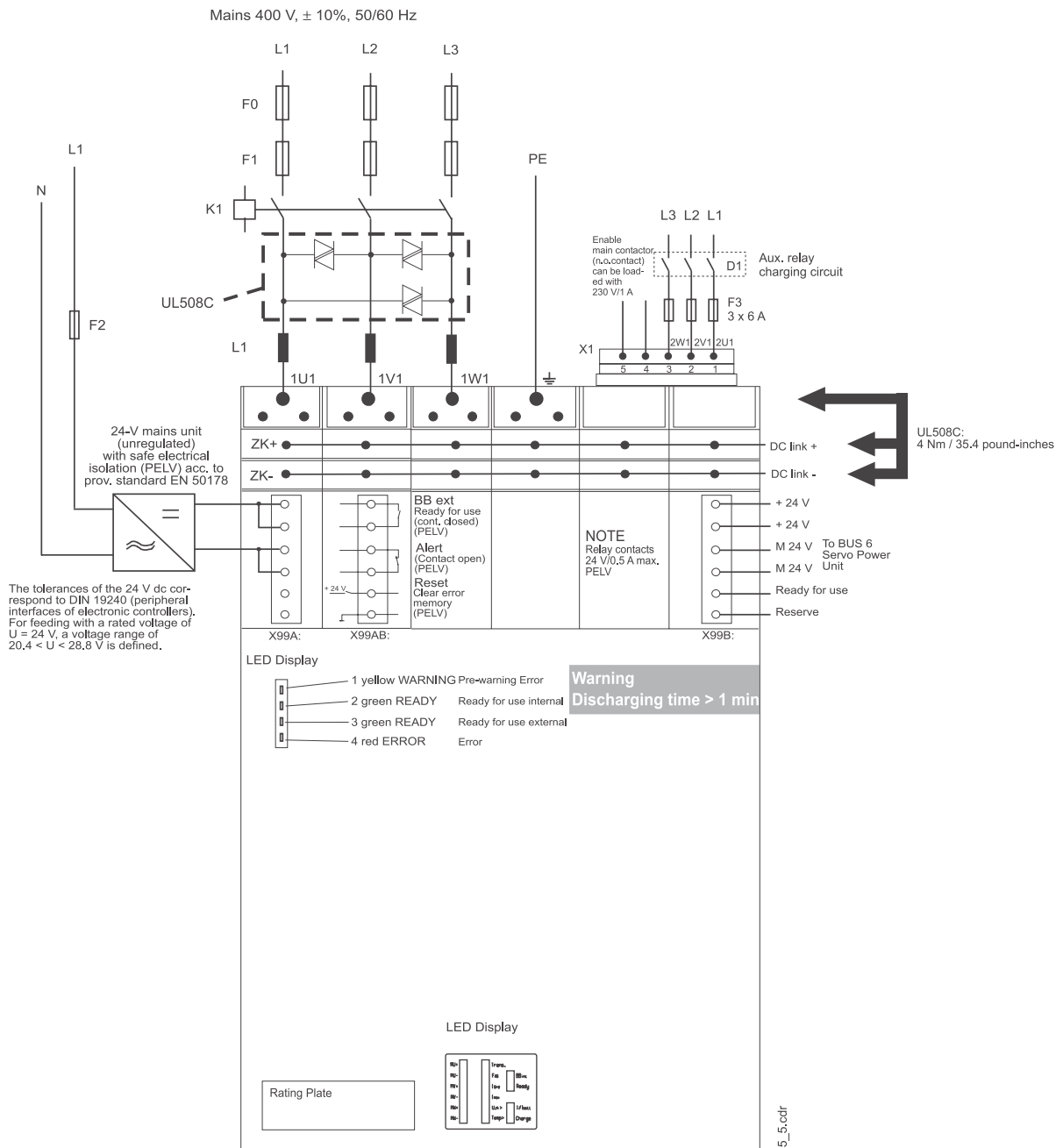
This means that converters with earth leakage circuit-breakers may be incompatible!

In this context, you should observe the safety information in provisional standard EN 50178:1994 Section 5.2.11.2.

## 5.4 BUC 624 connection diagram



### 5.5 Connection diagram BUC 625

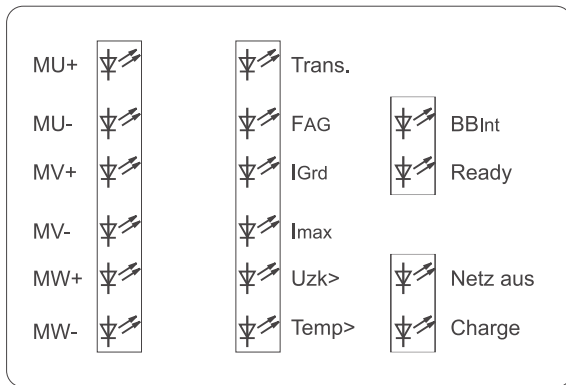


## 5.5.1 LEDs

Only for internal use, not primarily for the users information we have stated the meaning of the LEDs in the table below. When looking straight at the LED Display window, the LEDs mean (top to bottom):

| LED | colour | meaning                       |
|-----|--------|-------------------------------|
| 1   | yellow | WARNING; error pre-warning    |
| 2   | green  | READY; internal ready for use |
| 3   | green  | READY; external ready for use |
| 4   | red    | ERROR; error                  |

The LED display shown is situated on the front side of the appliance



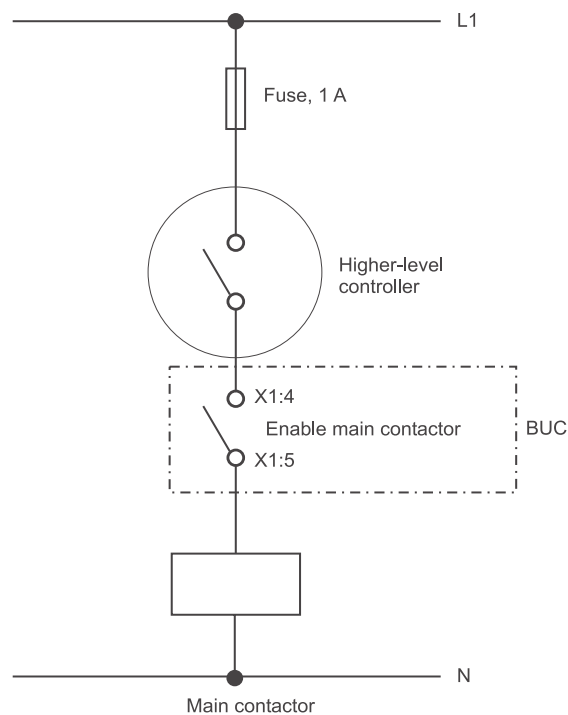
|           |  |
|-----------|--|
| MU+       | Transistor overcurrent Phase L1 up                 |
| MU-       | Transistor overcurrent Phase L1 down               |
| MV+       | Transistor overcurrent Phase L2 up                 |
| MV-       | Transistor overcurrent Phase L2 down               |
| MW+       | Transistor overcurrent Phase L3 up                 |
| MW-       | Transistor overcurrent Phase L3 down               |
| Trans.    | Transistor composite error                         |
| FAG       | Error 100 kHz auxilliary supply                    |
| IGrd      | Earth current                                      |
| Imax      | Overcurrent mains input (I-Phase > 650 A)          |
| Uzk>      | DC link voltage > 840 V or error Uzk-measurement   |
| Temp>     | Heatsink temperature for 10sec > 95 °C             |
| Mains off | Network failure message (phase failure monitoring) |
| Charge    | DC link precharge active                           |



BBint Ready-for-use BUC (for connected BUS units)  
 Accumulative message of  
 Temp>  
 Ready  
 Mains off  
 End DC link charge (Charge)  
 and  
 PLL net synchronous (without LED display)  
 BUC controller released (without LED display)

Ready Ready-for-use BUC power unit  
 Accumulative message of  
 FAG  
 IGrd  
 I<sub>max</sub>  
 U<sub>zk</sub>>

### Circuit diagram for main contactor



## Connection information

|                           |   |
|---------------------------|---|
| F0                        | Module fuse (Refer to Accessories, Fuses)<br>BUC 624: 40-A semi-conductor fuse<br>BUC 625: 80-A semi-conductor fuse (Refer to Accessories, Fuses)   |
| F1                        | Line protection fuse with reduced cross-sections only<br>(Refer to Accessories, Fuses)  |
| F2                        | Fuse depends on the mains unit being used   |
| F3                        | 6-A microfuse fast for 400 Veff connection voltage  |
| Current-operated e.l.c.b. | The principles on which the power converter and the motor work lead to leakage currents to earth, i.e. the drive may be incompatible with current-operated e.l.c.b. systems.<br><br>For configuration, take into account provisional standard EN 50178:1994 Para. 5.2.11.   |
| K1                        | Mains contactor<br>(auxiliary contact for controller enable optional, not absolutely necessary)   |
| D1                        | Auxiliary relay for charging circuit  |
| L1                        | Line commutator (see Accessories)   |
| 1U1, 1V1, 1W1,            | Cross-section of mains connection according to provisional standard EN 60204-1:1992.<br>For cable-laying, refer to EMC information.<br><br><b>If UL508C has to be observed:</b> Use 60°C / 75° C copper conductors only (UL508C, Nov 27, 1996, Tab. 39.2).<br>Nominal tightening torque of the terminal screws: 4 Nm resp. 35,4 pound-inches. |
| ZK+, ZK-                  | DC link connection to Feed Unit and to further power units.<br><br><b>If UL508C has to be observed:</b> Nominal tightening torque of the terminal screws: 4 Nm resp. 35,4 pound-inches.   |



## DANGER

The DC link carries a voltage! Always use the supplied cover.

|                   |  |
|-------------------|--|
| 24-V power supply | 24 V <sub>DC</sub> power supply for protective extra-low voltage with safe isolation (SELV) according to provisional standard DIN 19240 for supplying the electronic section.<br>Current consumption of the Feed/Feed back Unit: 1.8 A |
|-------------------|--|



NOTE

In the 24-V input, the BUC 62x has capacitors; this means that when the 24-V supply switches, absorption currents occur!

The 24-V power supply is passed on via connections to the BUS 62x Power modules; this leads to increased current consumption.

In the case of continuous operation below 24 V -10% (22.7 V), the cooling power of the internal fan is reduced. Power reduction of the feed unit is available on request.

X1:1, X1:2, X1:3  
2U1, 2V1, 2W1

Cross-section of mains connection according to provisional standard EN 60204-1:1992

For cable-laying, refer to EMC information.

X1:4, X1:5

Control line, enable main contactor according to provisional standard EN 60204-1:1992

For cable-laying, refer to EMC information.

## 5.6 Pin assignments

### 5.6.1 Power terminals

- **1U1, 1V1, 1W1, PE**

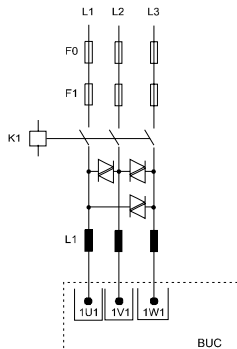
1U1, 1V1, 1W1:

PE:

Unit input voltage 400 V<sub>AC</sub>

Control cabinet ground

M 6 terminals



**If UL508C has to be observed:** Use 60°C / 75° C copper conductors only (UL508C, Nov 27, 1996, Tab. 39.2).

Nominal tightening torque of the terminal screws: 4 Nm resp. 35,4 pound-inches.

To observe UL 508C, Nov 27, 1996, section. 35.9 it is imperative to connect a overvoltage protector on the mains side.

Use UL-listed varistors with an operating voltage of 550V<sub>eff</sub> and a continuous power of at least 1W for example SIOV-S20K550, SIEMENS (Baumüller no. 3.19005301)

- **ZK+, ZK-**

Terminal for connecting the BUS 62x Power modules to the DC link of the feed unit via the current rails supplied with the BUS 62x power modules.

M 6 terminals.



### NOTE

Longer lines are not allowed, since otherwise there is a risk of destroying the device!

Only a limited number of power modules may be attached to the BUC 62x

BUC 624: max. 3 power modules

BUC 625: max. 5 power modules

**If UL508C has to be observed:** Nominal tightening torque of the terminal screws: 4 Nm resp. 35,4 pound-inches.

- **X1 on the top of the unit (refer to connection plan)**

X1:1, X1:2, X1:3: connection voltage 400 V<sub>AC</sub>

2U1, 2V1, 2W1 Push-on terminal strip connection for charging circuit

X1:4, X1:5 Enable main contactor contact, can be loaded with a maximum of 230 V<sub>AC</sub> and 1 A

Connect push-on terminal strip

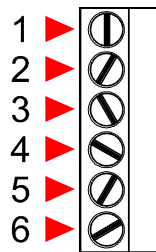
### 5.6.2 Control terminals



### WARNING

All the control voltages connected from outside must be PELV or SELV.

- **Sub-unit terminal X99A / X99B**

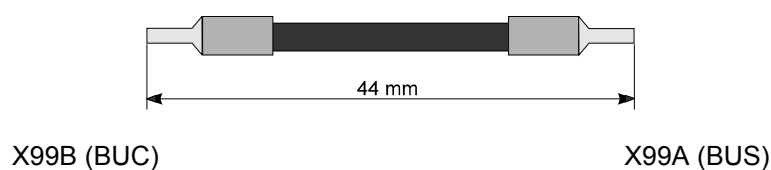


| Terminal-No. | Assignment   |
|--------------|--|
| 1, 2         | + 24 V (PELV)<br>Connection for mains unit supply of the devices, both connections are jumpered internally; use second connection with mains unit currents above 10 A            |
| 3, 4         | 24-V Frame ground (PELV)<br>Connection for mains unit supply of the devices, both connections are jumpered internally; use second connection with mains unit currents above 10 A |
| 5            | BB int (PELV)<br>Ready for use signal of the supply converter to all the devices connected to the DC link  |
| 6            | Reserve (PELV)   |

All terminals are connected to each other (i.e. terminal 1 of X99A is connected to terminal 1 of X99B ...). Because of this they can be used as BUS-connection from one Baumüller unit to the other.

Due to the connection of X99A (BUC) to the X99B of the next BUS-device in the chain, the system can execute the signals as a bus connection.

Line length of the connection: 44 mm.

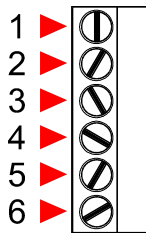




## WARNING

The allowed maximum current of 10 A per terminal connection must not be exceeded, otherwise there is a risk of damaging the devices. With higher current requirements, there must be several, separate current feeds.

- **Sub-unit terminal X99AB**



| Terminal-No. | Assignment  |
|--------------|---|
| 1, 2         | BB ext (PELV)<br>Relay output: Ready for use of supply converter<br>24 V, 0.5 A max.  |
| 3, 4         | Alert (PELV)<br>Relay output: Alert of supply converter<br>24 V, 0.5 A max.   |
| 5            | + Reset with 24-V signal (PELV)<br>Input for resetting error messages of the supply converter<br>(potential-free optocoupler input, 10 ... 15 mA) |
| 6            | Ground reset (PELV)<br>Reference point for resetting error messages of the<br>supply converter (potential-free optocoupler input)                 |

## 5.7 Accessories

- Fuses**

|                             | <b>BUC 624</b>       | <b>BUC 625</b>                  |
|-----------------------------|----------------------|---------------------------------|
| Module fuse                 |                      |                                 |
| Semiconductor fuses         | 50 A / 1000 V        | 80 A / 1000 V                   |
| Works number                | 19008529             | 19008531                        |
| Size according to DIN 43620 | 0                    | 0                               |
| Fuse                        | 35 A medium time-lag | With reduced cross-section only |

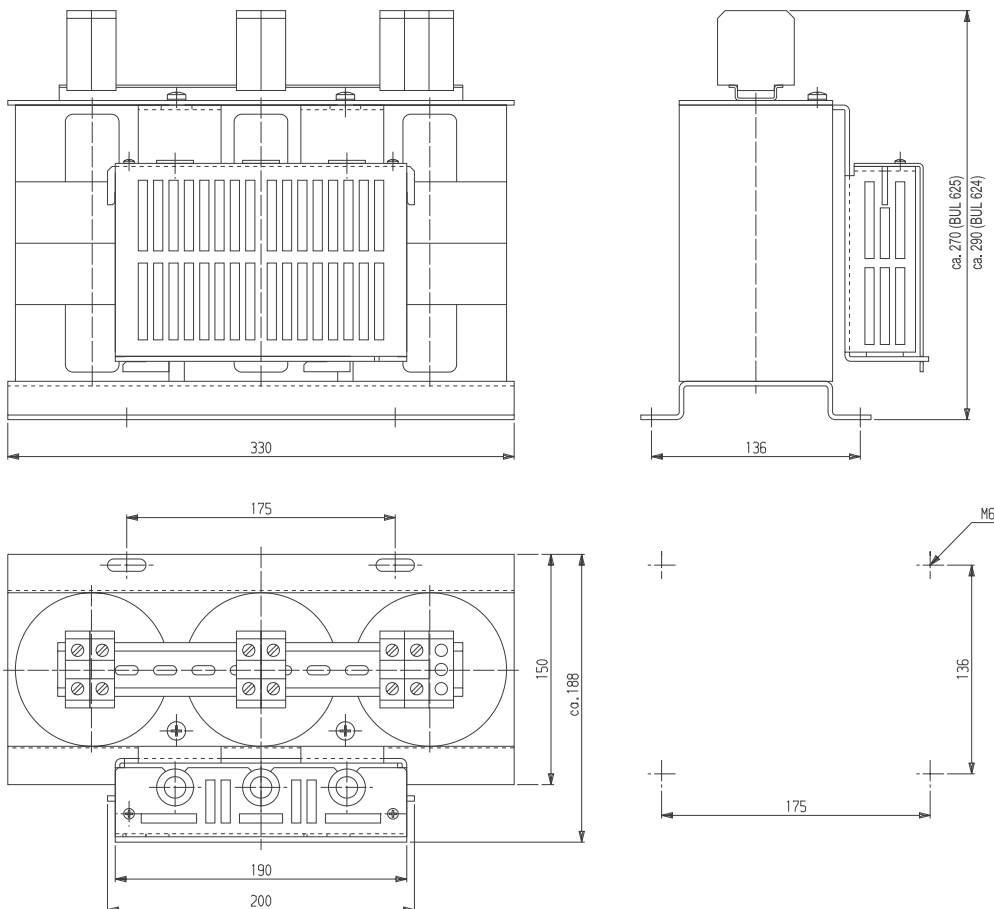
- EMC-package**

Can be supplied on request

- EMC filter
- Screened cables
- Connection pieces

- Line commutating reactor**

|                | <b>BUL 624</b> | <b>BUL 625</b> |
|----------------|----------------|----------------|
| Reactor type   | 30 A / 1 mH    | 60 A / 1 mH    |
| Article number | 232514         | 244975         |







## 6 COMMISSIONING

### 6.1 Danger information



#### WARNING

This unit carries a dangerous voltage and contains dangerous rotating parts (fans). Ignoring the safety and warning information may result in death, severe personal injury or damage to property.

You are responsible for mounting the power unit, the motor, the line reactor and any other equipment in accordance with appropriate safety regulations (e.g. DIN, VDE); equally, you must ensure that all other relevant national and local regulations are met with regard to cable ratings and protection, grounding, disconnectors, overcurrent protection, etc.

The most important factors for protecting people are the DIN/VDE protective measures and safety regulations. If there are no protective earth connections on the equipment, commutating reactor or the motor, personal injuries are inevitable, since the surfaces may carry dangerously high voltages.

During operation, the principles on which the power converter and the motor work lead to leakage currents to earth that are dissipated via the specified protective earths and may result in a current-operated e.l.c.b on the input side blowing prematurely.

In the case of a short-circuit to frame or to ground, a direct proportion may arise in the leakage current that makes triggering a higher level current-operated e.l.c.b either more difficult or totally impossible. Make the PE connection in accordance with DIN EN 60204/VDE 0113 Part 1/06.93; Section 8.2.2 taking into account provisional standard EN 50178/ VDE 0160/11.94, Sections 5.3.2.1 and 8.3.4.4.

Before carrying out commissioning, check whether the plastic covers over the power stage connections are in place.

When an error occurs, the drive is de-energised and the motor coasts to stop. This fact must be taken into account particularly for hoist and lifting drives.



## WARNING

Before switching on the drive, you must carefully check the functions of all the higher level safety equipment to prevent injury to people.

### Faulty drive response

During initial commissioning, faulty or uncontrolled motion of the driven machine elements is always possible. At this stage, you should therefore proceed with particular care.

### Contact Protection In Accordance with Paragraph 4 Section 4 VBG 4

Protection against direct contact comprises all the measures against danger that can result from touching the active parts of electrical equipment.

Sheets of plastic covering the control electronics, the power stage and the device connection, additionally prevent accidental contact during commissioning and casual use of control elements located close to the equipment. (DIN VDE 0106 Part 100, Unfallverhütungsvorschrift „Elektrische Anlagen und Betriebsmittel“ VBG4).

Switching cabinets must have an emergency off facility to switch off any voltages that could be dangerous. This does not include equipment which, if switched off, would cause an even more dangerous situation. The emergency off releasing element must be arranged in such a way that it can be reached quickly in case of danger. In the case of work that is considerably more dangerous than usual, another person must be present.

The machine minder must ensure that unauthorized people do not work at the machine.

The machine minder must report immediately any changes that occur at the machine which adversely affect safety.

When dismantling safety equipment during commissioning, repair and maintenance work, you must ensure that the machine is taken out of commission in accordance with applicable regulations. You must remount and check safety equipment immediately after completing commissioning, repair and maintenance work.

## 6.2 Operation

### Switch-on sequence

First of all, auxiliary relay D1 must supply power to the charging circuit.

After the charging time of between 2 and 10 seconds (depending on the DC link capacitance) has expired, the device switches on the main contactor itself via contact X1:4/5 "Enable main contact".

Now the external controller has to switch off the charging circuit from mains with die auxiliary relay D1.

After the "Enable main contact" is generated, the external controller can switch K1 on and off independently of D1.

If the main contactor is off, the system generates internally the mains failure message and deactivates internally and externally Ready for use. This message is not stored.

### Reset

Resets operating messages that the Feed/Feed back Unit stores:

- Set reset input on plug X99AB:5,6
- Switch off the +24-V supply voltage



### NOTE

In the case of a reset, the system generates a pulse disable that disables the ready for use at the same time.

Using reset X98:5,6, you can reset messages that the basic unit generated. A permanent reset (+24 V) may not be connected. The reset signal must be pending for at least 50 ms.

You do not need to make any settings on the BUC 624, 625 Feed/Feed back Unit!

## 6.3 Voltage/phase failure



### NOTE

This message is not stored.

- In the case of a mains failure, the system disables the Ready for use of the Feed/Feed back Unit.
- The Feed/Feed back Unit generates the Alert/Disturbance message.
- When the mains voltage is restored, the charging circuit must be activated by D1 (see **Switch on Sequence**). After charging is completed, the Feed/Feed back Unit goes into Ready for use status. When the charging circuit is activated, auxiliary contact X1:4,5 is open with the enable for the main contactor being inactive.

## 6.4 Messages and warnings

For monitoring to function, the +24-V auxiliary voltage (X99A or X99B) must be present.

- **Monitoring:**
  - Overcurrent
  - DC link voltage
  - Switching conditioning of the power transistors
  - Auxiliary voltage supply
  - Mains and phase failure
  - Temperature



### NOTE

Messages that are still pending cannot be cleared!

- **Overcurrent Message**

The system monitors the incoming current in the supply conductors and generates an overcurrent message if the line current is exceeded by 30% of the allowed peak current. This message is saved and results in a pulse disable. The system disables the internal and external Ready for use.

The overcurrent message is indicated by the red LED "I<sub>max</sub>" and can be reset by means of an external reset.



### NOTE

The overcurrent message is intended as protection; the controller ensures limitation of the allowed peak currents of the line currents.

- **DC link Monitoring**

The level of the DC link voltage is monitored in the BUC. The system generates a message if the DC link voltage exceeds 840 V. The internal and external Ready for use are disabled.

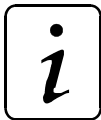
The response of the DC link monitoring is indicated by the red LED "U<sub>ZK</sub>>" and can be reset by means of an external reset.

- **Monitoring the Switching Conditions of Power Transistors**

For the duration of the power transistors' switch-on command, the system monitors the collector-emitter saturation voltage. If too high a saturation voltage is detected in conducting status, overcurrent of the power transistor is present; this can be due to a short circuit of the motor terminals, for example, and a controlled shutdown is being carried out that switches off the transistor and generates a message (red LED "Trans."). In addition can be evaluated about the LED's "MU+", "MU-", "MV+", "MV-", "MW+" and "MW-" which transistor has produced the message.

This message can be reset by means of an external reset.

Announcement and resetting the message see description of the controller.



## NOTE

To ensure recovery of the transistor after switch-off due to overcurrent, the message cannot be cleared for at least five (or typically ten) seconds.

- **Monitoring the Auxiliary Voltage Supply**

The system monitors the auxiliary voltage supply of the power unit and issues a message if an undervoltage occurs. The internal and external Ready for use are disabled.

This message is indicated by the LED "FAG" and can be reset by means of an external reset.

- **Mains and Phase Failure Monitoring**

This monitoring facility prevents an internal and external Ready for use if at least one phase of the mains supply is missing; in addition, a pulse disable is generated in the BUC. If the DC link voltage falls below 500 VDC, the system displays the alert message (X99 AB : 3,4 relay contact open). When the charging circuit is activated, auxiliary contact X1:4,5 is open with the enable for the main contactor being inactive.

With power failure there shines the yellow LED " Netz aus " so long no mains exists.

With phase failure and with left rotating field the yellow LED " Netz aus " flashes while phase failure error/left rotating field error is present at the terminals.

The system does **not** save this message.

- **Temperature Monitoring**

In the case of an overload, i.e. the heat sink temperature is above 90° C, the LED "Temp>" indicates "overtemperature" and the controller sets the Alert message ( X99 AB : 3,4 relay contact open).

After ten seconds, the system saves tripping of the monitoring and prevents internal and external Ready for use.

When a warning is issued, this makes it possible to place the machine in a defined operating state before the drive prevents Ready for use and shuts down.

This message can be reset by means of an external reset.

- **Ready for Use**

The external Ready for use closes signal contact X99AB:1,2 when the power unit Ready for use is pending and no monitoring has tripped. At the same time, the system generates internal Ready for use. This signal is evaluated by the devices connected to X99A/X99B. Ready for use is indicated by the green LED "BB int". The Feed/Feed-Back unit is ready for use if none of the before named messages queues.



## NOTE

A missing Ready for use can result in a saved message with the connected devices. You must clear the message by resetting at each of the devices individually.

- **Reset**

Activating the reset input (apply +24 V to X99AB/5 and M24V to X99AB/6, optocoupler input) clears the memory of the feed unit messages without the +24-V auxiliary voltage supply needing to be switched off. For the duration of the reset, the system deactivates the internal and external Ready for use. The reset signal must be pending for at least 50 ms.

- **Feed Monitoring**

Monitoring of the Feed Unit does not have direct influence on the power unit.

The Ready for use message to the feed unit, terminal strip X99A and X99B terminal 5 and the "Reserved" terminal 6 are fed as an isolated signal to the controller and processed in the controller (see manual of the controller).

## 7 MAINTENANCE



### WARNING

This equipment carries a dangerously high voltage and has dangerous rotating parts (fans). Ignoring the safety and warning information may result in death, severe personal injury or damage to property.

You may only carry out maintenance and corrective maintenance work when the unit is deenergized.

Do not begin work on the power stage and the connections until you have made sure that the system has been deenergized.

When dismantling safety equipment during commissioning, repair and maintenance work, you must ensure that the machine is taken out of commission in accordance with applicable regulations. You must remount and check safety equipment immediately after completing commissioning, repair and maintenance work.

After carrying out any work involving intervention in the machine - regardless of whether this involves the motor, the actual value acquisition or the power converter - the owner must carry out acceptance testing of the machine and document it chronologically in the machine log. Failure to do this may result in the owner being faced with consequences relating to liability legislation.

### 7.1 Maintenance information

This units are maintenance-free

#### **Prohibition of unauthorized modifications**

For safety reasons, unauthorized additions or modifications to the drive are not allowed.

## 7.2 Environmental conditions

If you keep to the environmental conditions during the entire period of storage, you can assume, that the device will not be damaged.



### WARNING

From six months storage period on, the capacitors are destroyed during commissioning, if they are not reformed beforehand.

Reform the capacitors by supplying the device ready-for use for at least 48 hours with supply voltage, but no impulse enable.

## 7.3 Recommissioning

Carry out commissioning as with a new device.



### WARNING

From six months storage period on, the capacitors are destroyed during commissioning, if they are not reformed beforehand.

Reform the capacitors by supplying the device ready-for use for at least 48 hours with supply voltage, but no impulse enable.



## 7.4 Disposal

For the most part, the equipment consists of the following components and materials:

| Component   | Material   |
|---|--|
| Various spacers, housing of current converter and unit fan, etc.    | Plastic  |
| PCBs on which all the open- and closed-loop electronics are mounted | Base material: Epoxy-resin fibreglass woven material, copper-coated on both sides and plated-through, various electronic components such as condensers, resistors, relays, semi-conductors, etc. |

For technical reasons, electronic components might need to contain dangerous materials.

If the components are used correctly, there is no danger to human beings or to the environment.

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

Electronic components must not be opened, since beryllium oxide is used as internal insulation e.g. in diverse semiconductors.

The beryllium dust set free when the components are opened, is dangerous to your health.

You must dispose of or recycle equipment or components according to national regulations as well as any applicable local or regional ordinances.



## 8 APPENDIX

### 8.1 Manufacturer Declaration

# HERSTELLERERKLÄRUNG IN SINNE DER EG-MASCHINENRICHTLINIE 89/392/EWG, ANHANG IIB

## Manufacturer Declaration in Accordance with the EC-Machine Guidelines 89/392/EEC, Appendix II B

Hiermit erklären wir, daß es sich bei dieser Lieferung um die nachfolgend bezeichnete Maschinenkomponente handelt und daß ihre Inbetriebnahme solange untersagt ist, bis festgestellt wurde, daß die Maschine, in die diese Komponente eingebaut ist, den Bestimmungen der EG-Maschinenrichtlinie 89/392/EWG, Anhang II B entspricht.

We herewith declare that this delivery includes the following specified machine component and that its putting into operation is prohibited until the declaration is made that the machine, in which this component is built in, complies with the regulations of the EC-machine guideline 89/392/EWG, appendix II B.

**Bezeichnung der Maschinenkomponente:**  
**Specification of the machine component:**

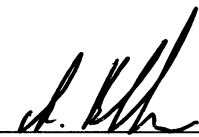
**Typenbezeichnung:**  
**Type:**

Einspeise-/Rückspeise-Einheit

BUC 62.-.-64-..

Nürnberg, den 28.12.2004

Hersteller-Unterschrift:  
Signature of the Manufacturer:

 11/1/2005  
\_\_\_\_\_  
Andreas Baumüller  
Geschäftsleitung  
Head Division

 10.1.2005  
\_\_\_\_\_  
ppa. Dr. Peter Heidrich  
Entwicklungsleiter  
Head of Development

8.2 Declaration of Conformity

**KONFORMITÄTSERKLÄRUNG  
IM SINNE DER  
EG-NIEDERSPANNUNGSRICHTLINIE 73/23/EWG**

EG Declaration of conformity of equipment regarding low voltage directive 73/23/EWG

Bezeichnung der Maschinenkomponente:

Typenbezeichnung:

Specification of the machine component:

Type:

Einspeise-/Rückspeise-Einheit

BUC 62.. - .. - 64

Die Übereinstimmung des bezeichneten Produkts mit den Vorschriften der Richtlinie wird nachgewiesen durch die Einhaltung folgender Normen:

Conformity of the signficated product with the guidelines will be proved by following rules:

EN 50178: 1994 (VDE 0160/11.94)

"Ausrüstung von Starkstromanlagen mit elektronischen Betriebsmitteln"

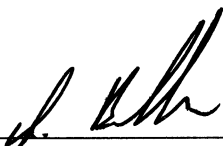
EN 50178: 1994 (VDE 0160/11.94)

"Equipment of power installation concerned electronic operating materials"

Nürnberg, den 28.12.2004

Hersteller-Unterschrift:

Signature of the Manufacturer:

 11/11/2005

Andreas Baumüller

Geschäftsleitung  
Head Division

 10.1.2005

ppa. Dr. Peter Heidrich

Entwicklungsleiter  
Head of Development

## 8.3 General Conditions of Sale and Delivery

### 1. Obligation and Conclusion of Contract

- a) Deliveries of goods and provision of services shall be effected exclusively based on these trading conditions. They are an essential component of the contracts for delivery and shall be considered as having been accepted by the placing of an order. In the case of constant business relations, they also apply for the future contracts.
- b) Agreements diverging from the contract and verbal collateral agreements shall only be binding if they have been confirmed in writing by Baumüller Nürnberg GmbH (hereinafter referred to as Baumüller). Diverging trading conditions on the behalf of the purchaser shall be without obligation, even where these have not been expressly objected to. These General Conditions of Sale and Delivery shall be considered as having been accepted by the purchaser at the latest when the delivery is accepted.
- c) In as far as deliveries of goods are subject to separate external obligations in accordance with the Law Concerning Foreign Trade and Payments with respect to the Federal Office for Economics, the purchaser has to observe the relevant conditions at his/her own responsibility.

### 2. Price and Offers

Offers are subject to confirmation, not binding and apply subject to material supply possibilities. Supplements and amendments require written confirmation. Prices are ex works and are subject to confirmation. Invoicing takes place in accordance with the prices valid on the date of delivery.

### 3. Extent of Delivery and Delivery Time

- a) Specified delivery periods/dates are without obligation, in as far as nothing else to the contrary has been expressly agreed upon in writing. Delivery periods do not commence until the purchaser has fulfilled all duties of co-operation, in particular regarding details of performance. In the event that the agreed deposits for orders are delayed, then the delivery time shall be extended accordingly.
- b) The purchaser is entitled, in particular in the event of a delay in delivery of longer than 3 months, to set an appropriate period of grace and after its expiry, to withdraw from the order. Claims to compensation due to non-fulfilment or delay shall be excluded, in as far as Baumüller is not responsible for intent or gross negligence.
- c) Baumüller is entitled at any time to effect partial deliveries and partial services, as well as to invoice these accordingly.

### 4. Delivery Problems

- a) Delays/preventions in the delivery of goods or the provision of services due to force majeure entitle Baumüller to delay the production and delivery by the duration of the obstruction plus an appropriate period of time or to withdraw in part or in whole from the order.
- b) Industrial disputes or other circumstances which substantially impede or render impossible the delivery, such as, in particular, disturbances in the operating processes, problems in procuring materials, official directives also apply as force majeure, irrespective of

whether they arise with regard to Baumüller or suppliers.

- c) In these cases, Items 4 a), b), the purchaser shall have no claim to compensation due to non-fulfilment or delay of the delivery.

### 5. Packaging

Items for sale and delivery items are packaged and transport insurance policies are taken out according to the instructions of and at a cost to the purchaser.

Upon demand, the packaging material has to be returned without delay, free of freight charges and expenses.

### 6. Dispatch and Passing of Risk

Deliveries shall be made ex works. The dispatch shall be effected at a cost to and at the risk of the recipient of the service/the purchaser. The risk passes to the recipient of the delivery/purchaser as soon as the delivery items leave the works. This shall apply at the latest, from the transferral of the delivery items to the person carrying out the transport, forwarding agent or carrier.

### 7. Warranty

- a) The period of warranty amounts to 12 months from the day of dispatch.  
In the event that a delivery item is defective, Baumüller shall deliver an additional replacement or make a subsequent improvement at its own choice. Multiple subsequent improvements are permissible. Other warranty claims on the behalf of the purchaser, in particular also due to direct or indirect consequential damage are excluded. The pre-condition for any warranty is the normal contractual use of the delivery items. In the event of the utilisation of warranty services, the motor, the replacement part or the device has to be sent in free of freight charges, packaging costs or customs duties after prior co-ordination with Baumüller. Baumüller is exempted from any warranty if the party ordering returns the goods complained about without prior co-ordination or contrary to agreement. Warranty claims expire one month after rejection of a defect on which notice is given, in as far as the purchaser remains silent in this respect.

### 8. Notification of Defects

- a) The purchaser shall examine the subject matter of the contract and delivery items immediately and give notice of any defects without delay, however, no later than 7 days after receipt of the delivery. In case of non-obvious defects notice has to be given in writing without delay after their discovery, however, no later than 6 months from the point of delivery. In the event that the purchaser does not give notice of any defects in writing within this period of time, then the subject matter of the contract shall be considered as having been approved.
- b) The purchaser shall allow Baumüller a suitable inspection of defects of which notice is given and shall place all necessary/requested technical information, in particular, inspection records and test reports at Baumüller's disposal. In the event that the purchaser fails to do so, then the delivery items shall be considered as not having been complained about and as being approved. In the event that the purchaser alters the delivery items, then he/she shall lose his/her warranty claims.

- c) In the event of an established material defect or performance defect, Baumüller can eliminate the defect or supply a replacement. The purchaser can demand rescission or a reduction after the expiry of an appropriately set period of grace. Further claims on the behalf of the purchaser, in particular to the reimbursement of dismantling costs or installation costs are excluded. The same applies to damages which do not affect the delivery item itself.
- d) Natural wear and tear and damage which arises after the transferral of risk, in particular also due to incorrect or negligent handling, excessive demands or other unsuitable use not in conformity with the contract are excluded from the warranty. The same applies in particular for defects which are attributable to atmospheric discharges, overvoltages and chemical influences.
- e) If no case of warranty is in existence or in the event that this subsequently turns out to be the case, the purchaser shall remunerate the utilisation or the use of an item or of a right, as well as services provided and expenses to an appropriate amount. Baumüller is entitled to a right of control as referred to in §§ 315 ff. BGB [German Civil Code].

## 9. Liability

Contractual or legal claims on the behalf of the purchaser against Baumüller are limited to intent and gross negligence. This does not apply in as far as claims from the ProdHaftG [Product Liability Act] have been enforced. Baumüller shall only be held liable to the amount of the damage foreseeable in accordance with the purpose of the contract. Material damage which exceeds the value of a delivery/service is not foreseeable in this sense. The liability is limited in terms of amount to the remuneration contractually owed.

## 10. Payments

- a) Invoices are payable at the time agreed in the contract, at the latest within 30 days after the invoice date, in cash and without deductions. The purchaser can only offset with claims which are final and absolute or undisputed. The same applies to the exercising of rights of retention.
- b) In the event of a delay in payment on the behalf of the purchaser, interest to the rate of 4 % above the respective minimum lending rate of the German Federal Bank, however at least 10 % has to be paid, without separate proof being required.
- c) Failure to comply with the terms of payment or circumstances which endanger the credit worthiness of the purchaser result in all claims immediately becoming due. In these cases, deliveries shall only be made against payment in advance.
- d) Cash payments, bank transfers or cheque and bill payments shall not be considered as payment/fulfilment of the obligation before the amount due for payment has been irrevocably received by Baumüller or credited to Baumüller's account.
- e) Payments have to be made directly to Baumüller. The field staff are not entitled to accept payments or to issue extensions or waivers without separate written authority.

## 11. Reservation of Ownership

- a) The ownership of delivery items remains reserved up to the fulfilment of all existing claims against the

purchaser from the business relation. Any bundling with other items shall be effected by the purchaser for Baumüller. Then, the entire product shall be considered as reserved goods.

- b) The purchaser is entitled to sell the reserved goods in orderly business transactions. All claims to which the purchaser is entitled from this sale or other legal grounds shall be assigned by him/her in advance to Baumüller. Baumüller shall accept the assignment. In the event that the reserved goods are bundled or sold with other items standing in the possession of third parties, then the assignment shall only apply to the amount of the invoice value of the reserved goods. The purchaser is authorised to collect these assigned claims. Upon request, he/she has to make notice of the assignment to the debtor.
- c) The purchaser shall inform Baumüller without delay of impending and enforced access on the behalf of third parties to the reserved goods or to the assigned claims. The purchaser shall bear the costs incurred by this.
- d) The authorisation on the behalf of the purchaser to dispose of the reserved goods and to collect assigned claims expires in the event that the terms of payment are not complied with, in particular, also in the case of bill and cheque protests. In this case, Baumüller is entitled to take possession of the reserved goods. The purchaser bears the costs incurred by this. The taking back of goods shall only represent a withdrawal from the contract when this is expressly stated.
- e) In the event that the value of the securities granted exceeds the secured claims in terms of amount by more than 20 %, then Baumüller shall renounce the securities exceeding this value.

## 12. Drawings and Documentation

Baumüller is entitled to the exclusive property right and copyright to cost estimates, drawings and all other documentation. These documents may not be made accessible to third parties without prior written consent. In the event that a contract is not concluded, not implemented or otherwise ended, then all documents have to be returned immediately and unsolicited. There shall be no right to retention to these documents.

## 13. Copyright (in particular Software / Licence)

- a) Baumüller is exclusively entitled to all rights to the software/edited versions, in particular property rights and copyrights to the relinquished software, in particular for the controlling of machines, systems and installations.
- b) Baumüller grants the purchaser/buyer the non-exclusive, non-transferable right to use the relinquished software in the framework of the contractual purpose at the contractually intended location/on the places in existence at the time of purchase (single licence). The software shall only be used on the associated purchased contractual item. Any use extending beyond this is prohibited. In the event of a use extending beyond this, Baumüller shall have the rights referred to in Items 14 c), 14 d).
- c) It is prohibited to make copies of the relinquished software, whether in whole or in part, in as far as the making of copies of the machine-readable material in the framework of the required data backup or as copies for internal company use has not separately been

agreed upon with prior written consent from Baumüller. Processing of the relinquished software, in particular by means of alteration, translation or by bundling with other programs shall only be permitted after prior written consent from Baumüller. Protection notices from Baumüller on/in the software may not be removed and also have to be adopted onto copies and edited versions. Copies produced contrary to this condition shall come under the possession and copyright of Baumüller. Baumüller can prohibit the use of such copies and elect to demand the immediate surrender or complete destruction with proof of this destruction.

- d) The buyer is not permitted to extend the licence in terms of location/work places/machines/machine types or to grant rights of utilisation or grant sub-licences. The extension of the licence shall be permitted by Baumüller exclusively against a separate remuneration which has to be agreed upon in writing.

**14. Applicable Law**

The law of the Federal Republic of Germany is authoritative for all rights and obligations from and in connection with this contract. The regulations of the UN Sales Convention (CISG) are excluded.

**15. Place of Performance and Place of Jurisdiction**

The place of performance for delivery and payment is the seat of Baumüller. The place of jurisdiction for all disputes from and in connection with this contract, in particular also for cheque and bill liabilities is the seat of Baumüller.

**16. Miscellaneous**

In the event that individual or several conditions of these Conditions of Sale and Delivery should be or become ineffective in part or in whole, then the validity of the remaining conditions shall remain unaffected by this. The parties shall complement/replace the ineffective or incomplete condition with an appropriate regulation which most extensively corresponds to the economic purpose of the contractually desired regulation. The same applies for the case of the presence of a gap in the regulations.

For the case that acceptance and installation are also agreed upon, then the following conditions, Items 17 and 18 shall also apply:

**17. Acceptance**

- a) The inspection of the delivery items ready for acceptance shall take place in the Baumüller works. The purchaser shall bear the costs of this inspection. In the event that the purchaser fails to perform the inspection, then the delivery items shall be considered as having been delivered in conformity with the contract when they leave the works.
- b) The purchaser is obliged to take delivery of goods and services from Baumüller without delay. Immaterial defects do not entitle the purchaser to refuse the acceptance.
- c) In the event that the purchaser does not declare within 7 days after notification of the readiness for acceptance on the behalf of Baumüller or after receipt of the contractual service in writing and with exact, examinable specification of reasons that he/she refuses the acceptance, then the acceptance shall be considered as having been declared and the orderly performance of the contract as having been ascertained.

- d) The agreed service shall be considered as having been accepted when the item delivered has been put into operation by the purchaser himself/herself or upon his/her instructions by third parties beyond the functional test required to carry out the acceptance. This also applies in the event that the purchaser refuses the functional test/the acceptance without sufficient cause.
- e) Experts to be designated by both parties shall take part in the acceptance inspection. The result of the functional test shall be entered in a record to be signed by the purchaser in consideration of the technical specifications.

**18. Erection and Installation**

Erection and installation shall only be effected in the case of express agreement at the following further conditions:

- a) The purchaser makes required workers and material available at his/her own expense.
- b) Before the commencement of installation works the purchaser shall make available unsolicited all required specifications, in particular concerning the location of power lines which have been laid such that they are hidden and similar installations, as well as the required static specifications.
- c) Before the commencement of the erection/installation, the delivery items required for the commencement of works have to be on site and all preliminary works progressed to the extent that the erection/installation can immediately begin and be completely carried out without interruption.
- d) In the event that the erection, installation or putting into operation is delayed due to circumstances for which Baumüller is not responsible, then the purchaser shall bear the costs for idle time and journeys required on the behalf of the installation personnel.
- e) The installation personnel working time has to be certified weekly by the purchaser. The purchaser shall present to the installation personnel a written certification regarding the ending of the erection/installation without delay.
- f) Baumüller shall not be held liable for the installation personnel works, in as far as the works are not connected to the delivery and the erection or installation.
- g) Trial runs on systems not supplied by Baumüller shall not be carried out by the installation personnel.

## 8.4 Index

### A

|                      |    |
|----------------------|----|
| assembly             | 17 |
| assembly information | 19 |

### B

|               |    |
|---------------|----|
| block diagram | 10 |
|---------------|----|

### C

|                           |    |
|---------------------------|----|
| cabling                   | 25 |
| capacity of DC link       | 11 |
| commissioning             | 41 |
| connection voltage        | 11 |
| coolant temperature range | 11 |

### D

|                           |    |
|---------------------------|----|
| DC link capacitor         | 11 |
| declaration of conformity | 52 |
| dimensions                | 18 |
| discharge current         | 29 |
| disposal                  | 49 |

### E

|                          |    |
|--------------------------|----|
| electrical data          | 11 |
| EMC information          | 24 |
| EMC package              | 39 |
| Environmental conditions | 48 |

### F

|                 |    |
|-----------------|----|
| fastening       | 20 |
| filter assembly | 29 |
| filtering       | 29 |

### G

|   |    |
|---|----|
| general conditions of sale and delivery | 53 |
|---|----|

### H

|              |    |
|--------------|----|
| heat sources | 19 |
|--------------|----|

### I

|                     |    |
|---------------------|----|
| installation        | 21 |
| installation height | 11 |

### L

|                          |    |
|--------------------------|----|
| low voltage power supply | 11 |
|--------------------------|----|

### M

|                          |    |
|--------------------------|----|
| mains failure monitoring | 45 |
| maintenance              | 47 |
| maintenance information  | 47 |
| messages                 | 44 |

### P

|                          |    |
|--------------------------|----|
| phase failure monitoring | 45 |
|--------------------------|----|

### R

|                 |    |
|-----------------|----|
| ready for use   | 46 |
| Recommissioning | 48 |
| reset           | 46 |

### S

|                             |    |
|-----------------------------|----|
| safety notes                | 5  |
| sub-unit terminal X99A/X99B | 37 |

|                         |    |
|-------------------------|----|
| sub-unit terminal X99AB | 38 |
|-------------------------|----|

### T

|                |    |
|----------------|----|
| technical data | 9  |
| type code      | 13 |

### U

|            |    |
|------------|----|
| unpacking  | 15 |
| Uzk+, Uzk- | 36 |

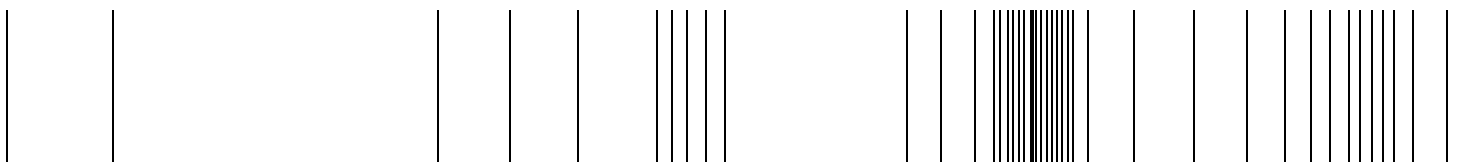
### X

|       |    |
|-------|----|
| X99AB | 38 |
|-------|----|





**be in motion**



Baumüller Nürnberg GmbH Ostendstraße 80-90 90482 Nürnberg T: +49(0)911-5432-0 F: +49(0)911-5432-130 [www.baumueller.de](http://www.baumueller.de)

All information given in this manual is customer information, subject to change without notice. We reserve the right to further develop and actualize our products continuously using our permanent revision service. Please notice, that specifications/data/information are current values according to the printing date. These statements are not legally binding according to the measurement, computation and calculations. Before you make any information given in this manual to the basis of your own calculations and/or applications, please make sure that you have the latest edition of the information in hand. No liability can be accepted concerning the correctness of the information.