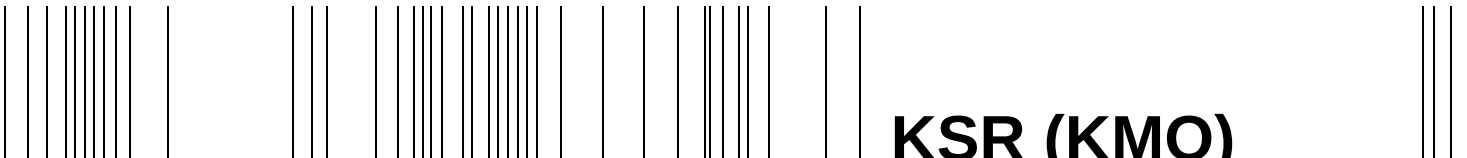


be in motion be in motion



KSR (KMO)



Manual

E

5.04032.03



Title	Manual
Product	KSR - 3A (KMO)
Version	5.04032.03
Status	22.11.2010
Item no.	386638

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Obligatory	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. 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.
------------	--

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 **current values according to the printing date**. These statements are **not legally binding** according to the measurement, computation and calculations.

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INTRODUCTION

This manual is an important component of the Compact Servo Controller **KSR - 3A**. Last but not least on behalf of safety reasons, read through the complete manual.

In this chapter we describe the first steps, which have to be done after you have received the device. We will define terms, which are continuously used throughout this manual. We also will be giving you instructions, what should be taken into consideration when handling this device.

1.1 Survey to the Compact Servo Controller KSR

The device consists of a power unit and controller in one common cabinet.

In this manual we explain the „**Compact Servo controller KSR - 3A**“, the connection and the commissioning.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

All persons, who work on and with devices **KSR - 3A**, must have this manual available at their work place and must follow the instructions and notes contained therein - especially the safety instructions.

1.2 First steps

- Check delivery, see ► [Transportation and packing](#) ◄ from page 17.
- Provide for qualified personnel for the mounting, installation and commissioning.
- Hand over this manual to the personnel for mounting, installation and commissioning. Assure that especially the safety instructions are understood and followed.

1.3 Used terms

In this manual we will also use the term "device" for the Baumüller product "**KSR - 3A**". A list of the abbreviations which are used are to be found in [►Appendix A - Abbreviations◄](#) from page 105.

1.4 Copyright and trade mark

Hiperface® is a registered trade mark of SICK/Stegmann

FUNDAMENTAL SAFETY INSTRUCTIONS

2.1 General notes

In this chapter we describe the dangers, that can arise when working with the Baumüller-device. Dangers we point up with symbols (icons). All symbols that are used in this manual are listed and explained.

How you can protect yourself against the single hazards in the concrete case, we will not explain in this chapter. This chapter contains only general protective measures. Concrete protective measures we will always give directly in the subsequent chapters after the note to the hazard.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

The safety note is showing you the dangers which can lead to injury or even to death.

Always follow the safety notes given in this manual.

2.2 Safety notes and instructions

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

DANGER

- considerable damage to property • serious personal injury • death **will** occur

WARNING

- considerable damage to property • serious personal injury • death - **can** occur

CAUTION

- light to medium personal injury or
- environmental pollution or
- damage to property - **can** occur

2.2.1 Structure of safety note

The following examples show the principle construction of a safety note. A triangle is used to warn you about danger to living things. If the triangle is displaced by a circle, the safety notes only refer to damages to property.



A triangle shows if individuals are in danger
The color of the border shows, how big the danger is - the darker the color the bigger the danger is.



The icon in the square describes the danger.
The color of the border shows, how big the danger is - the darker the color the bigger the danger is. (the square is dashed, because not at every safety note the danger is demonstrated with an icon)



The icon in the circle represents an instruction. Users must follow this instruction.
(the circle is dashed, because not at every safety note a command is existent as icon)



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



The icon in the square describes the danger.
The color of the border shows, how big the danger is - the darker the color the bigger the danger is. (the square is dashed, because not at every safety note the danger is demonstrated with an icon)

The text next to the icons is structured as follows:

HERE IS THE **SIGNAL WORD**, WHICH SHOWS THE DEGREE OF DANGER.

Here we write, if one or more of the consequences mentioned below appear, if this safety note is not followed.

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

Here we describe the danger.

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

2.2.2 Form of the sign of danger (triangular or round)

If there is a triangular figure of danger in front of a signal word: ⚠ or ⚠ or ⚠, then the safety note refers to personal injury.

If there is a round danger sign in front of a signal word: Ⓢ then the safety note refers to damage of property.

2.2.2.1 Safety note against personal injuries

In order to differentiate optically we use for every class of safety notes an own bordering for the triangular safety notes and for the square pictographs.

For the danger class **DANGER** we use the danger sign ⚠. The following safety notes of this danger classification are used in this manual.

DANGER



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

- serious personal injury
- death



*The danger is: **electricity**. If necessary, here the danger is described more exact.*

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

DANGER



The following **will occur**, if you do not observe this safety note:

- serious personal injury
- death



*The danger is: **mechanical effects**. If necessary, here the danger is described more exact.*

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

2.2 Safety notes and instructions

For the danger class **WARNING** we use the danger sign . The following safety notes of this danger classification are used in this manual.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **electricity**. If necessary, here the danger is described more exact.*

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



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **mechanical effects**. If necessary, here the danger is described more exact.*

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



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **electromagnetic radiation**. If necessary, here the danger is described more exact.*

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

For the danger class **CAUTION** against danger to personal injury or environmental pollution we use the danger sign . The following safety notes of this danger classification are used in this manual.



CAUTION

The following **can occur**, if you disregard this safety note:

- minor to medium personal injury.

*The danger is: **hot surface**. If necessary, here the danger is described more exact.*

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



CAUTION

The following **can occur**, if you disregard this safety note:

- minor to medium personal injury.

*The danger is: **sharp edges**. If necessary, here the danger is described more exact.*

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



CAUTION

The following **can occur**, if you disregard this safety note:

- minor to medium personal injury.

*The danger is: **rotating parts**. If necessary, here the danger is described more exact.*

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



CAUTION

The following **may occur**, if you do not observe this safety note:

- Environmental pollution

*The danger is: **incorrect disposal**. If necessary, here the danger is described more exact.*

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



2.2.2.2 Danger notes about damage to property

If there is a round danger sign in front of a signal word: ⓘ the safety information then refers to damage to property



CAUTION

The following **can occur**, if you disregard this safety note:

- damage to property

*The danger is: **electrostatic discharge**. If necessary, here the danger is described more exact.*

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



2.3 Information signs

2.2.2.3 Instruction signs that are used



Wear safety gloves



Wear safety shoes



Wear eye protection



wear ear protection



Use the following fire fighting devices:
Fire fighting appliances

2.3 Information signs



NOTE

This note is a particularly important information.

2.4 Fundamental instructions

This manual specifically is addressed only to technically trained persons.

The device is, according to the state-of-the-art technology, manufactured and safety in operation, it can be installed and set in operation and it functions without any problems, if it has been assured, that the notes in the manual are complied with.

The user is responsible for the execution of service and commissioning according to the safety instructions of the prevailing standards and other relevant national and local instructions concerning conductor dimensioning and protection, earthing, disconnectors, overcurrent protection and so on.

For damages, which result from the mounting or from the connection, the one is liable, who has carried out the mounting or the installation.

2.5 Appropriate use

You must always use the device appropriately. Some important information is listed below. The notes stated below shall give you a feeling of the specified application of the device. Besides the notes mentioned below, you must follow all of the specified notes given in this manual.

- Configure the application in such a way, that you always operate the device within its specifications.
- Make sure, that only qualified personnel work with/at this device.
- Mount this device only at an adequate carrying control cabinet.
- Install this device in the way as it is described in the manual.
- Make sure, that the mains always applies to the predetermined specifications.
- Only operate the device, if it is technical correct.
- Always operate the device in prescribed environment.
- Always operate the device in serialized status.
Due to safety reasons you may not rebuild the device.
- Consider all instructions referring to this, if you intend to store the device.

You are using the device according to the terms, as soon as you regard all notes and information in this operating manual.

2.6 Inappropriate use

In the following we are listing some examples of inappropriate use. The notes mentioned below shall give you a feeling, what a faulty use of the device is. However, we cannot list all possible cases of inappropriate use here. All usages, in which the instructions of this manual are disregarded are faulty and therewith forbidden, especially in the following cases:

- You disregarded the notes in this manual.
- You have not used the device according to the terms.
- The device has been
 - mounted incorrectly,
 - connected incorrectly,
 - commissioned incorrectly,
 - operated incorrectly,
 - mounted, connected, commissioned, operated and/or maintained by not qualified or inadequately qualified personnel,
 - inappropriately maintained or not maintained
(also consider the descriptions of the components),
 - overloaded,
 - operated with
 - defect safety devices,
 - not in proper form installed or without safety devices,
 - not operative safety- and protection devices,
 - not within the required environmental conditions.
- You have reconstructed the device, without having this authorized in written form from Baumüller Nürnberg GmbH.

- You have insufficiently monitored the parts, which are subject to a wearing.
- You have improperly carried out a repair.
- You have improperly combined the device with products of other manufacturers.
- You have combined the device with faulty and/or faulty documented products of other manufacturers.

2.7 Protective devices

The device KSR complies with the class of protection IP 20. By mounting the device into a control cabinet you can raise the class of protection.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death



*The danger is: **electricity**. The device fulfills IP 00 and resp. IP 20*

Operate the device in a control cabinet, which provides a protection against a direct touching of the devices and fulfills at least the demands of the EN 50178 chapter 5.2.4/VDE 0160.

2.8 Personnel training



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

Devices of Baumüller Nürnberg GmbH may only be mounted, installed, operated and maintained by qualified personnel.

Qualified personnel (skilled person) are defined as follows:

Qualified personnel

Authorized electronic engineers and skilled persons of the customer or third persons, who have learned the installation and commissioning of Baumüller drive systems and who are authorized, to put circuits and devices into operation according to the standards of the safety technology, to earth and to label.

Qualified personnel has a training or an instruction due to the local valid standards of the safety technique in maintenance and usage of an adequate safety equipment.

Requirements to the operating personnel

The operating of the drive system must only be executed by persons, who have had a training, who have been instructed and who have been authorized for this.

Troubleshooting, preventive maintenance, cleaning, maintenance and replacing parts are only to be executed by trained personnel or by personnel, who has been introduced in this. These persons must be familiar with the manual and act in accordance with this.

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

2.9 Safety precautions in normal operation

- at the location of your appliance regard the safety regulations for the plant, into which the appliance has been built in.
- if safety regulations require additional monitoring or safety devices supply your appliance with them.

2.10 Dangers due to residual energy

Electrical residual energy	After disconnecting the device from the mains, parts under voltage e. g. power connections may be touched not until after ten minutes, as the capacitors in the device are discharged not before ten minutes. Also consider the corresponding notes on the device. If you have connected the additional capacitors at the DC link, DC link discharging can last considerably longer. In this case waiting time must be determined self.
Mechanical residual energy	The mechanical residual energy is dependent upon the application. As we don't know the application, we cannot make any exact statements. Driven parts also rotate/move after disconnection of the mains supply for a certain time. Please, provide adequate safety arrangements.

2.11 Disposal of the device

The accurate disposal of the device is described in ►Disposal◄ from page 103.

2.12 Fire fighting



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **Electricity when using a conductive fire fighting device.***



Use the following fire fighting devices:
ABC powder

2.13 Responsibility and liability

To be able to work as safe as possible with this device, you must know and follow the danger notes as well as the safety instructions.

2.13.1 Observing the safety notes and safety instructions

In this manual we use visually unified safety instructions, which are intended to prevent from personal injury or damage to property.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

All persons, who work with this device, must know and regard the safety notes and the safety instructions in this manual.

Apart from this, any and all persons who work on this device must additionally know and regard to all regulations and instructions, that are valid at the location.

2.13.2 Dangers when handling this device

The device was developed and manufactured according to the state-of-the-art technology and in compliance with the valid directives and standards. It is still possible that dangers can arise during use. An overview of possible dangers is to be found in chapter [►Safety notes and instructions◄](#) on page 8.

We warn you against the acute danger at the respective places in this manual.

2.13.3 Warranty and Liability

All information in this manual is non-binding customer information; it is subject to ongoing further development and is updated on a continuous basis by our revision service.

Warranty- and liability claims against Baumüller Nürnberg GmbH are excluded, if particularly one or more of the under [►Inappropriate use◄](#) from page 13 described causes have led to the damage.

TRANSPORTATION AND PACKING

In this chapter we describe, which conditions have to be adhered to at transportation, how you check the device after receipt and what you should have to consider, if you dispose the packing.

3.1 To be considered by transportation

For the first transportation of the device, the device was packed in the manufacturer company. In case you transport the device, assure, that the following conditions are fulfilled during the whole transportation:

- 2 K 3 (climatic category)
- -30 °C to +70 °C (temperature range)
- max. 1 g (vibration, shock, repetitive shock)

3.2 Unpacking

After receipt of the device, which is still packed:

- ▶ Avoid strong transportation vibrations and severe hits (max. 1 g), e. g. when setting down.
- ▶ Check, if transportation damages are visible!

If so:

- ▶ Immediately complain to the deliverer. Let the claim be confirmed in writing and immediately contact the substitution of Baumüller Nürnberg GmbH, which is in charge for your company.

WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury • death

*The danger is: **electricity**.*

Do not operate the device, if you have recognized a transportation damage or if you assume this. In this case immediately contact Baumüller Nürnberg GmbH.



3.3 Dispose packing

If there is no transportation damage noticeable:

- Open the packing of the device.
- Check the scope of supply on basis of the delivery note.

The minimal scope of supply is:

- **KSR - 3A**
- This manual inclusively the copy of the declaration of conformity/declaration of manufacturer
- Addition
- Claim at the Baumüller substitution, which is in charge, in case the delivery is not complete.

3.3 Dispose packing

The packing is made of cardboard, plastics, metal parts, corrugated cardboard and/or wood.

- Regard the local disposal instructions, in case you dispose the packing.

DESCRIPTION OF THE DEVICE

In this chapter we describe the fundamental structure of the devices **KSR - 3A**.



NOTE

Do not use this device **KSR - 3A** in residential areas (see EN 61800-3, 6.4.2.1), because the device can cause RF-interferences in residential areas.

4.1 Structure

A device consists of a power unit and a controller, which are in a common cabinet.

4.2 Power unit

Technical data of power unit see [►Appendix D - Technical data◄](#) from page 113.

- | | |
|--------------------------|--|
| Power connection | Plug-in terminal for supply (X11), motor connection (X10) at the front side and for the connection of an external brake resistor or of a DC link at the top side of the cabinet. |
| Precharge circuit | The precharge circuit limits load current of the DC link capacitors. At the moment of switch-on, the discharged capacitors act as a short circuit. With help of a NTC resistor the current is limited to a permissible value. If the DC link voltage has reached a specified value, the NTC resistor is short-circuited with a relay, in order to avoid development of heat at the NTC resistor. |
| Brake circuit | If the servo motor runs over into braking operation, the mechanical energy supplies electrical energy to the DC link. Therewith the DC link voltage rises. In order to avoid, that the DC link capacitors are damaged due to overvoltage, a discharging of the capacitors must take place from a specified voltage on. For this a high-load resistance is connected to the DC link with the help of a power transistor. It converts the excessively energy into heat. If the voltage threshold is less than the brake transistor is inhibited again. This procedure occurs at longer braking procedures cyclically. If the braking time exceeds a specified value, a warning is generated by the controller. |

Internal line filter The mains filter circuit takes effects against electrical influences from the mains to the converter and for the suppression of interferences towards the mains, which where generated by converter.

4.3 Control unit

Interfaces

Inputs

- Input for motor temperature sensor (KTY 84), plug-in terminal
- Digital input (24 V_{DC}) for pulse enable, plug-in terminal
- Digital input (24 V_{DC}) freely usable, plug-in terminal

Outputs

- Freely programmable isolated relay contact, plug-in terminals
- Three GND-related analog outputs, plug-in terminal
- Optical sender and receiver for SERCOS-bus
- Serial interface RS 232 for PC connection, socket SUB D 9-pole

Encoder interface Connection via SUB D socket, 15-pole

Automatic detection of selected encoder types

- SinCos absolute value encoder
(SinCos signal 1 Vss) with Hiperface® or EnDat data bus
- Square wave incremental encoder
- Resolver (in preparation)

The encoder interface is, with the help of, current limiting circuits protected against short-circuit. At encoder short-circuit the encoder remains current-free.

4.4 General view with danger areas

The following general view shows the existing danger areas of the device. Use this survey, in order to get an overview of the existing danger areas, when you initiate the handling of this device. The declaration of the symbols, which are used is to be found in [► Safety notes and instructions◄](#) from page 8.

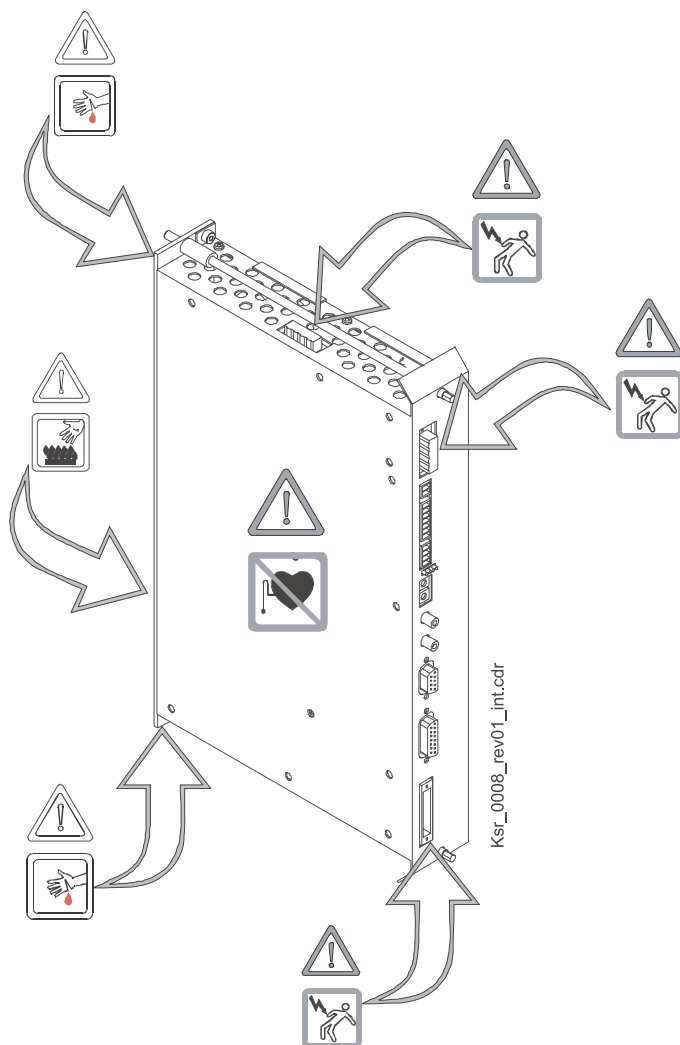


Figure 1: Danger area KSR

MOUNTING

In this chapter we describe the mechanical mounting of the device into a switching board. The control cabinet is projected with help of the application manual. Information to the installation space are also to be found in this operating instruction (see [►Installation space◄](#) from page 26).

Mounting consists of the following steps:

- 1 Prepare mounting (make the drill holes)
- 2 Install device

5.1 General safety instructions



CAUTION

The following **can occur**, if you disregard this safety note:

- damage to property

*The danger is: **electrostatic discharge**. Converters are ESD-dangerous devices.*

Regard the corresponding notes.



- Please regard to the information in chapter [►Fundamental safety instructions◄](#) from page 7.
- Pay attention to all areas at the device, which could be dangerous for you while mounting. Use this survey only for the mechanical mounting. Dangers, which, for example, result from electricity are not shown here.

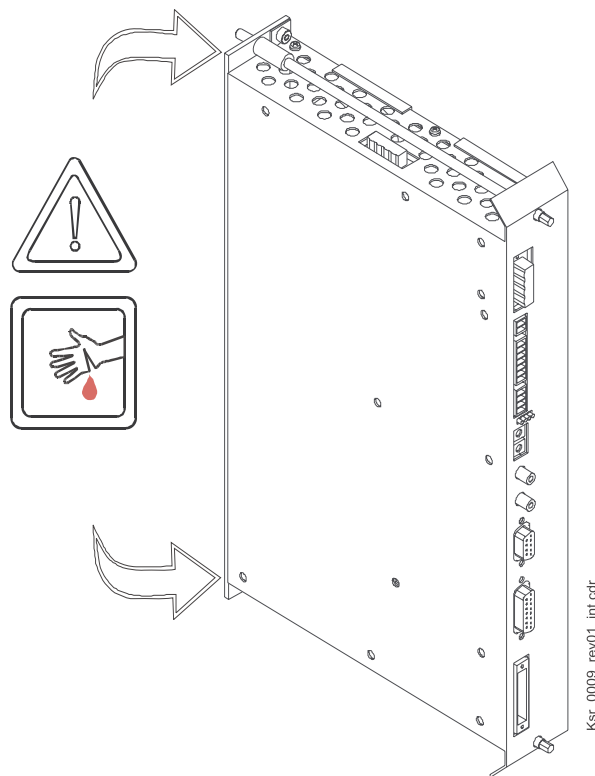


Figure 2: Danger areas at the mechanic mounting

5.2 Requirements to the executing personnel



CAUTION

The following **may occur**, if you do not observe this safety note:

- minor to medium personal injury.

*The danger is: **sharp edges**. In case, while installing, you lift a device with unprotected hands, fingers/palm can be cut. If the device falls off, your feet can be cut up.*

Assure, that only qualified personnel, who is familiar with the safety- as well as with the mounting instructions, mount this device.



Wear safety gloves



Wear safety shoes

Qualified personnel are persons, who, due to their education, experience, briefing about relevant standards and regulations and accident prevention regulations have been authorized to carry out the required operations and thereby are able to avoid possible dangers. They have been authorized by the person, who is responsible for the security of installation. The required qualifications for the work with this unit are for example: Training or instruction due to the standards of safety engineering in maintenance and use of appropriate safety equipment.

5.3 Prepare mounting

You can prepare the mounting with the configuring manual for your installation. With the configuring manual and the drill figures you can determine the dimensions for the cut-outs and for the fastening drills.



CAUTION

The following **may occur**, if you do not observe this safety note:

- minor to medium personal injury.

*The danger is: **Eye injury due to catapulting particles**. While executing the drillings and the cut-out metal particles are catapulted.*

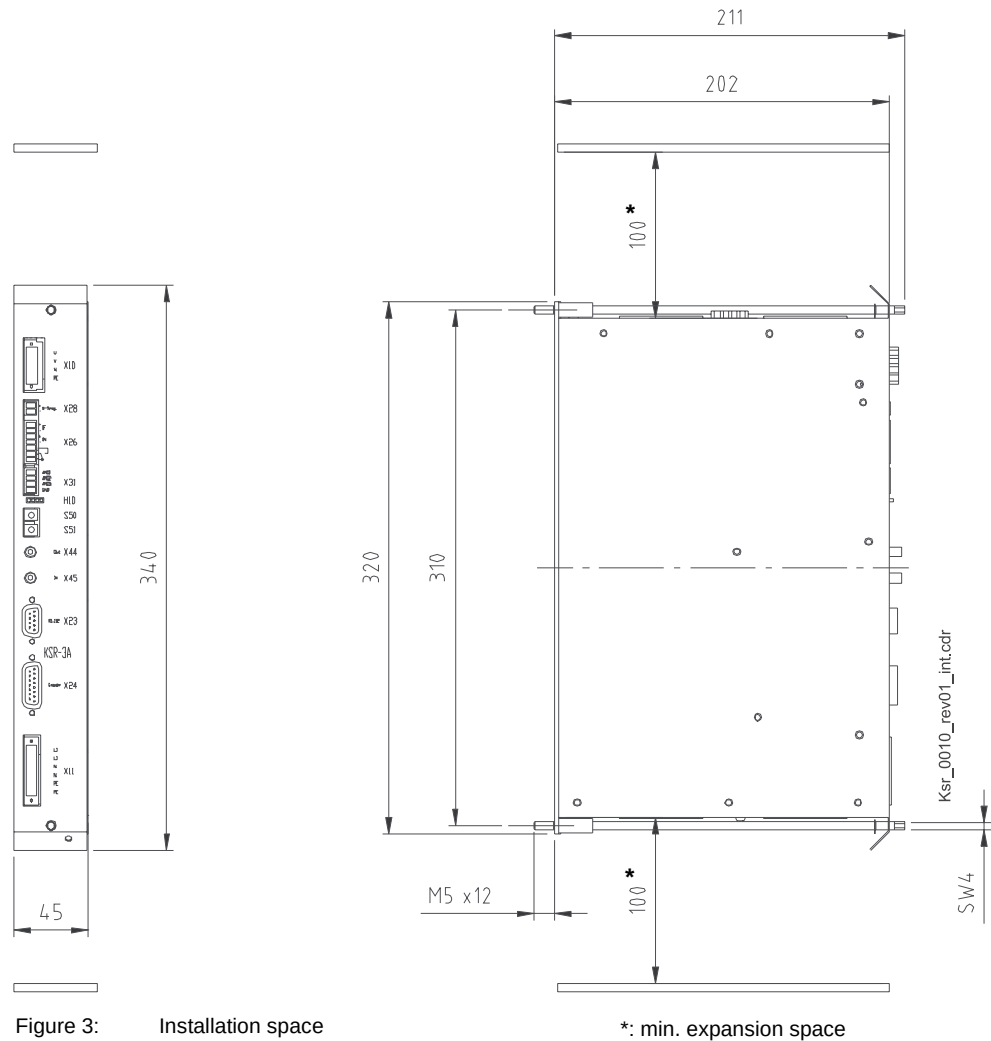


Wear eye protection

5.4 Installation space

The following drawings show the main dimensions of the devices in mm. Use these drawings, in order to determine the required space in the control cabinet.

The device can be mounted without spacing.

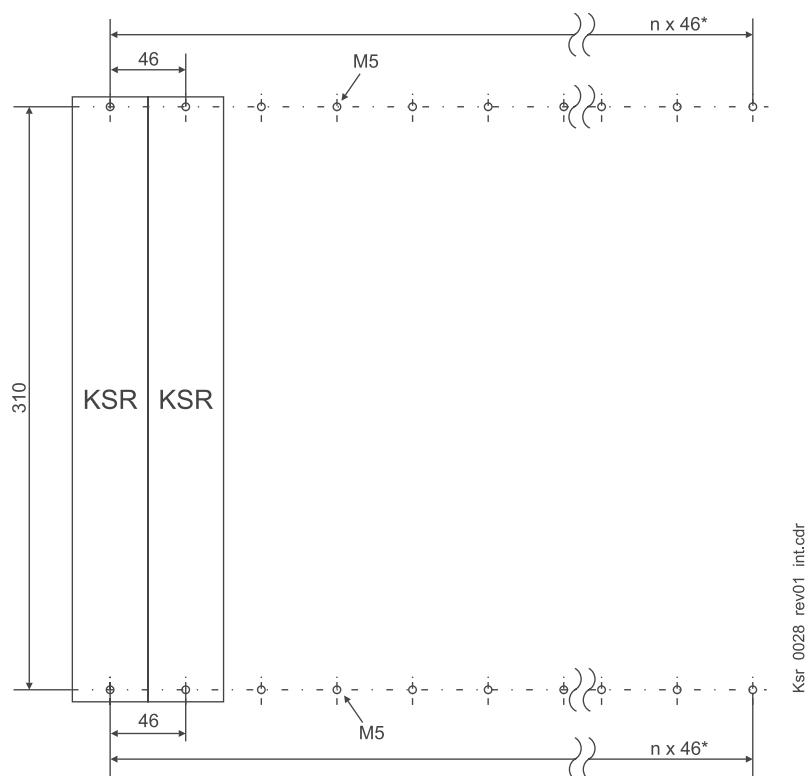


5.5 Drilling pattern

The following drawing shows the drilling pattern of the device. Use this drawing, to prepare the necessary drillings. Use the drawings under [► Installation space ◀](#) on page 26, to determine the required space in the control cabinet

Tolerance indication to the drilling pattern:

Dimensioning drill-holes	$\pm 0,2\text{mm}$
Dimensioning cut-outs	$+1,0\text{mm}$
Tolerance of any partition to each other	$\pm 0,1\text{mm}$



*: Tolerance of any partition to each other: $\pm 0,1\text{mm}$

Figure 4: Drilling pattern

5.6 Mounting instruction

The screws, which are necessary for mounting are to be found at the device (M5).

With the help of two long screws (M5) with hexagon head (SW4) the device is fastened to the mounting surface. The device can be mounted without spacing.

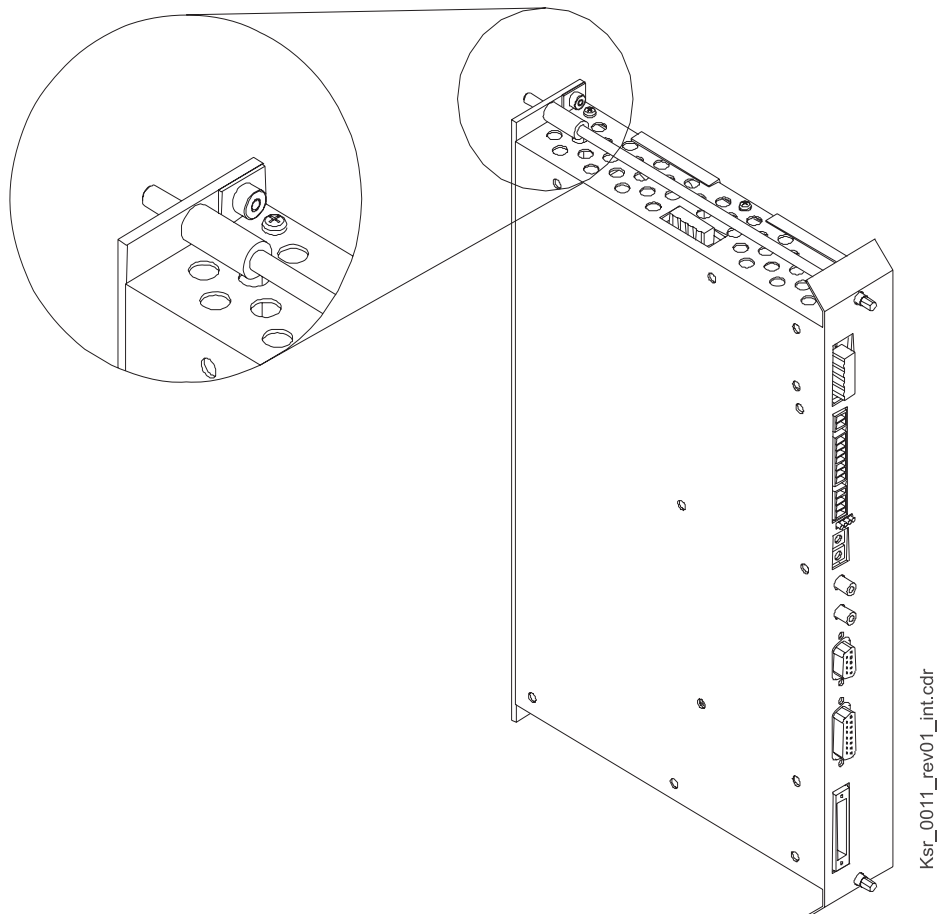


Figure 5: Mounting instruction



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

Transport the device in a way, so that it cannot fall down.

**CAUTION**

The following **can occur**, if you disregard this safety note:

- minor to medium personal injury.

*The danger is: **sharp edges**. In case, while installing, you lift a device with unprotected hands, fingers/palm can be cut. If the device falls off, the feet can be cut.*



Wear safety gloves



Wear safety shoes

INSTALLATION

In this chapter we describe the electric installation of the device. The mechanical installation we described in [►Mounting◄](#) from page 23.

Before installing assure that the technical preconditions are fulfilled:

- 1 Check the requirements to the electrical mains and check if the existing mains is suitable.
- 2 Check the requirements to the electrical cables and provide the according cables.
- 3 Check the characteristics of the connections and configure the connections accordingly.

6.1 General safety instructions

- ▶ Pay attention to the information in the chapters Basic safety instructions.
- ▶ Pay attention to all areas at the device, which could be dangerous for you while doing the electric installing.

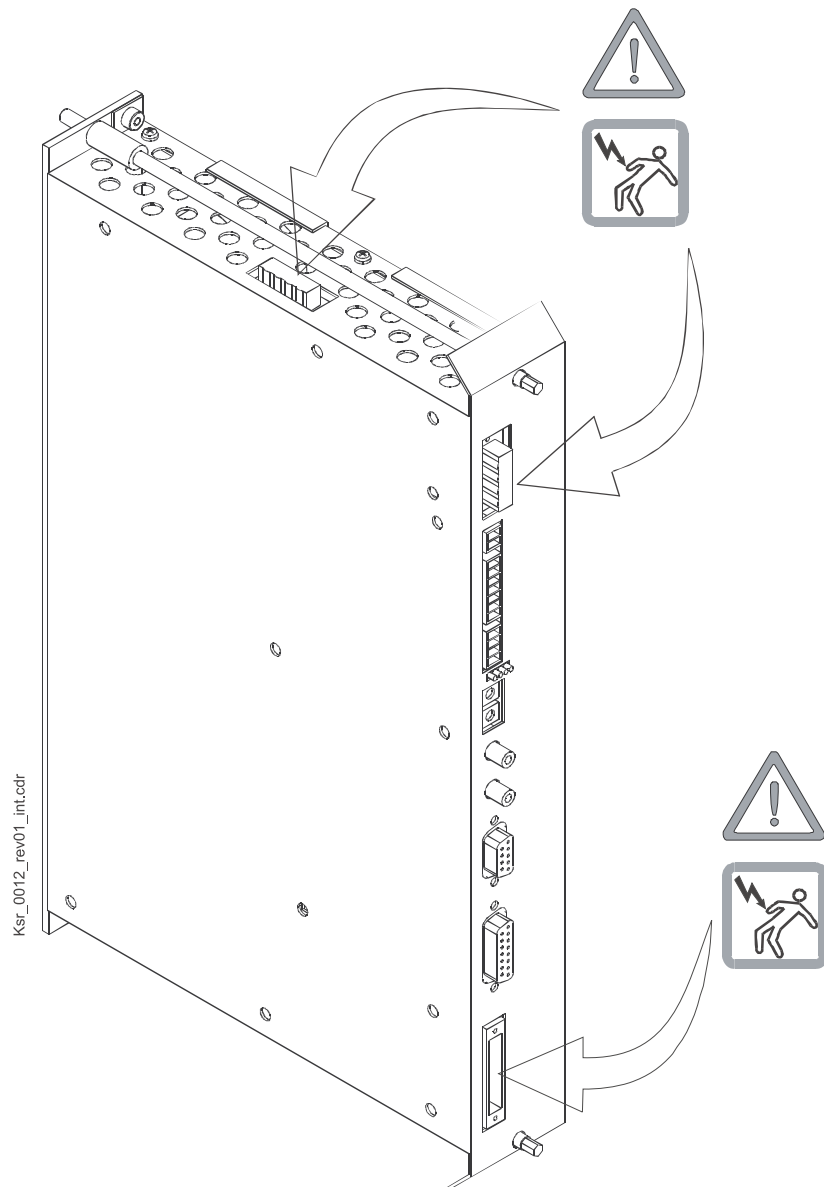


Figure 6: Danger areas at the electrical installation

6.2 Requirements to the executing personnel



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death



*The danger is: **electricity**. When operating with this electrical unit, inevitably certain parts of this unit are under dangerous voltage.*

Make sure, that only qualified personnel, who are familiar with the safety- as well as with mounting-, operating- and maintenance instructions, work on this unit.

At each case qualified personnel are persons, who are authorized by the responsible persons, to carry out necessary actions and who recognize the possible dangers and who are able to avoid these dangers. They have had the training, the experience, they were given instructions as well as knowledge about the relevant standards and instructions, they have knowledge of the accident prevention regulations and of the operating environments. The required qualifications for the work with this unit are for example:

- Training or instruction and to have the authorization to operate with circuits and devices according to the standards of the safety engineering, to commission, to earth and to label.
- Training or instruction due to the standards of safety engineering in maintenance and use of appropriate safety equipment.

6.3 Requirements to the electrical mains

All important data is to be found in ►[D.4 Electrical data](#)◄ on page 115. Small deviations of the electrical mains from the requirements can lead to malfunctions of the device. In case the mains deviates strongly from the requirements, the device can be destroyed. The destruction of the device can cause personnel injury.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death



*The danger is: **electricity**. In case you do not ensure the requirements to the electrical mains, the device can be damaged/destroyed and can thereby endanger persons severely.*

Assure before installation, that the requirements of the electrical mains are fulfilled.

6.4 Requirements to the connecting cables

- ◆ When selecting connection cables, you have to consider the IEC/EN 60204-1, chapter 13.
- ◆ Use 60°/75° copper cable, in case you have to consider the UL 508 C.

6.5 Protection of the device and of the cable respectively

In order to protect the device or the cables against damage/destruction by the mains, you must install fuses.

6.6 Requirements on the laying (EMC instructions device)



NOTE

This device must be in accordance with § 6 para. 9 of the EMVG from September 18, 1998.

In this Manual you will find the most important information according an EMC-compatible installation.

- Use Baumüller motor lines and Baumüller components.
- Mount all components to a single mounting board with well electroconductive surface (e. g. galvanized steel plate).
- Carry out the earth connection converter/earth plane as short as possible (< 30 cm) with fine-wired cables and a big cross section (> 10 mm²).
- When installing, attend to the correct order:
mains - fuse - device.
- Assure, that the motor cables always consist of one piece.
Do not disconnect motor cables e. g. with terminals, contactors, fuses a. s. o.
- Run the cables directly on the surface of the earthed mounting board.
(smallest possible effective aerial height).
- Keep a minimum clearance of 20 cm between signal- and control wires towards electric power cables at parallel laying.
- Cross cables with different EMC categories (signal cables - mains cables or motor cables) only in a 90° angle.
- Contact the external cable screens when passing through walls, which separate different EMC ranges.
- Connect the screen of the cables of the devices plane on both ends and highly conductive with earth.
- On principle screen **all** connected cables.

6.7 Operating sequence of installation



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **electricity**. Parts, which are under tension are perilous.*

Assure, that during the entire mounting the device, the mounting range and the parts, which are to be mounted (e. g. mains cables) are off-circuit.

Installation exists of the following steps:

1 Lay all cables EMC-compatible.

2 Connect cables.

- Connect the motor at the terminals X10:U, V, W, PE. Attend to the in-phase connection (rotational direction).
- Connect the fuses.
- Connect the mains via the terminals X11:L1, N, PE.
- Connect encoder.

6.8 Connection diagram

Individual device

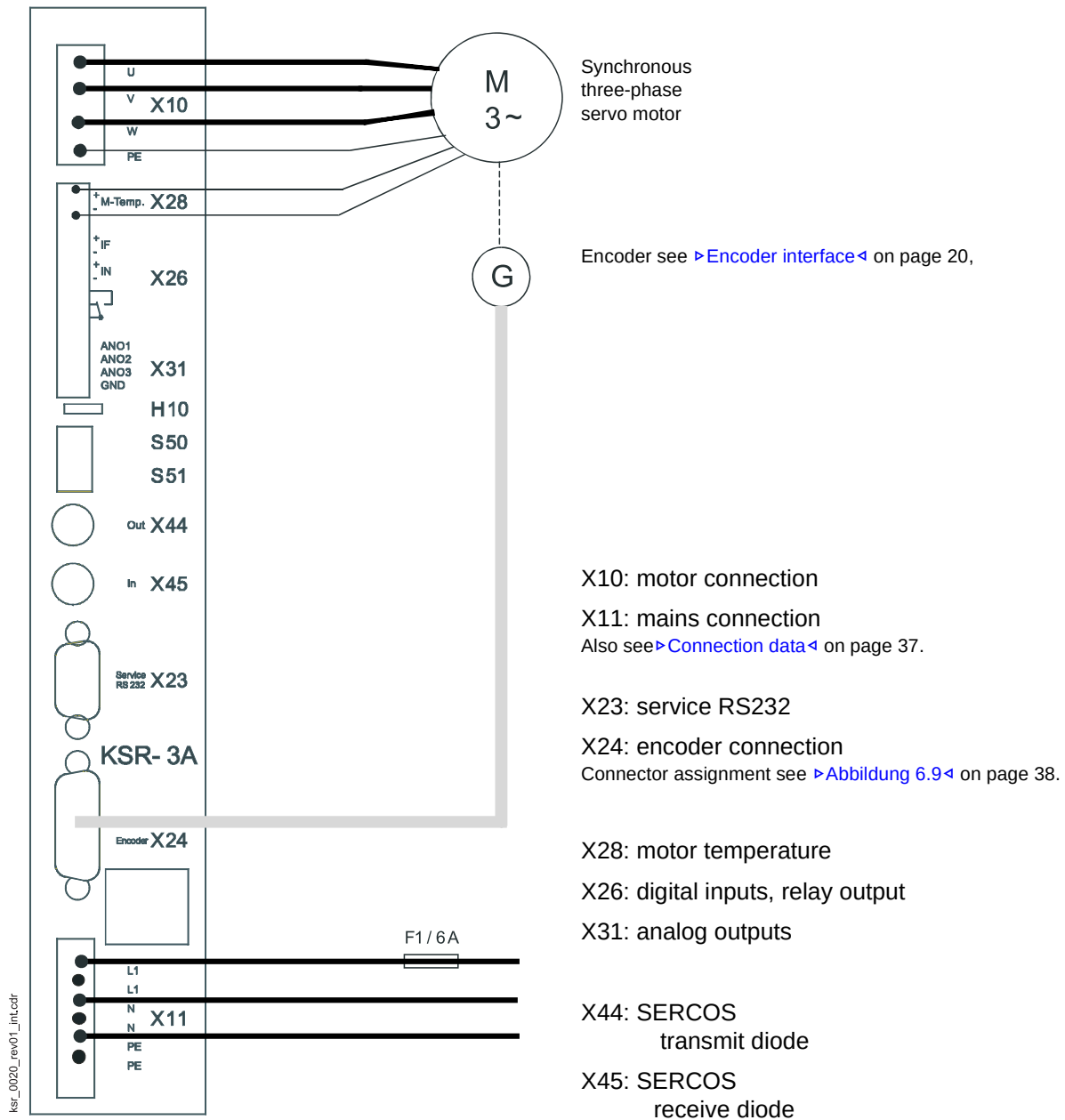


Figure 7: Connection plan individual device

Group circuit

Up to three drives can be connected to one supply and therewith fuse protection. With two drives there is a fuse protection of 10 A and with three drives there is a fuse protection of 16 A.

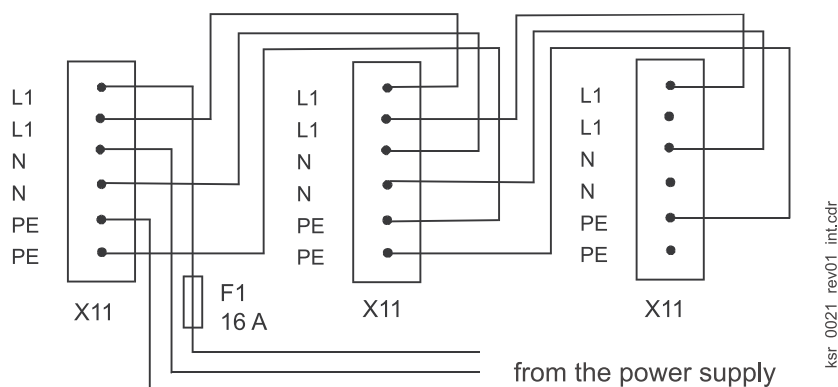


Figure 8: Connection plan group circuit

6.8.1 Connection data

X11

Mains

Max. cable cross section	Connection technology
1.5 mm ²	Screw connection, connector provided along

Top side of cabinet

Ba+ and Ba-, +U_{ZK} and -U_{ZK},

Max. cable cross section	Connection technology
1.5 mm ²	Screw connection, connector provided along

X10

Motor

Max. cable cross section	Connection technology
1.5 mm ²	Screw connection, connector provided along

6.9 Connector assignment

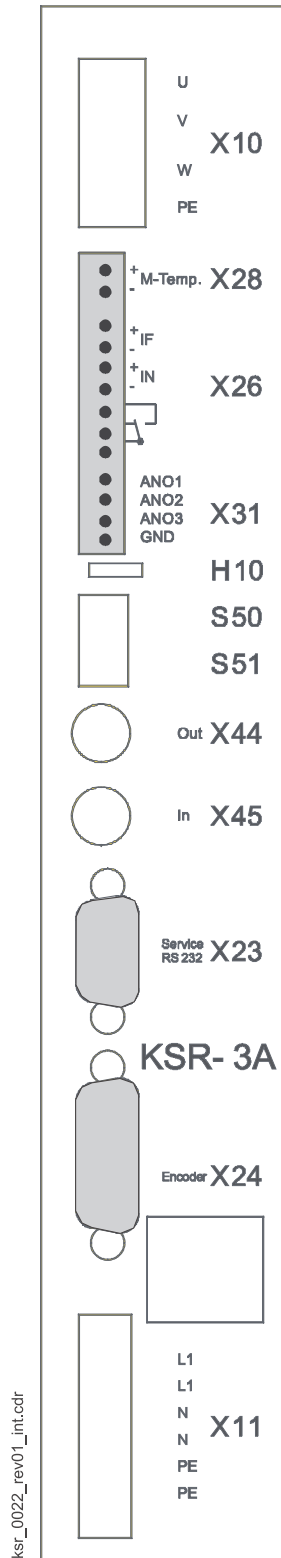
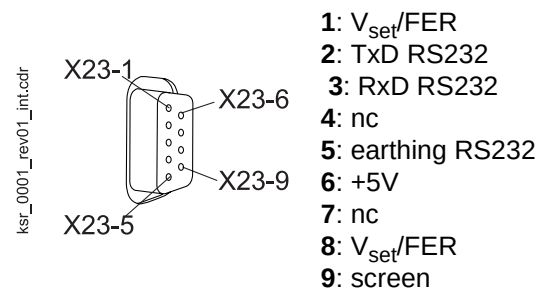
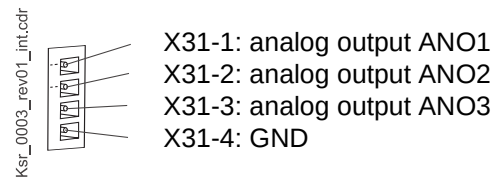
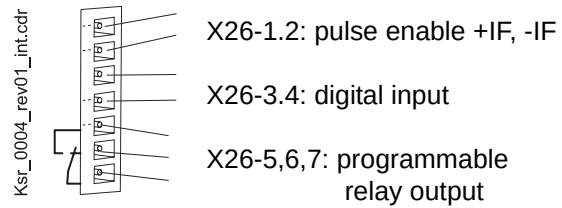
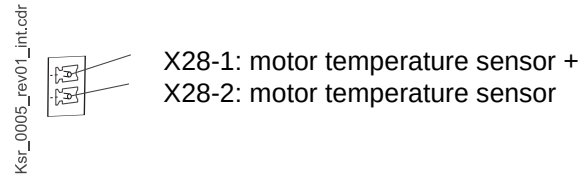
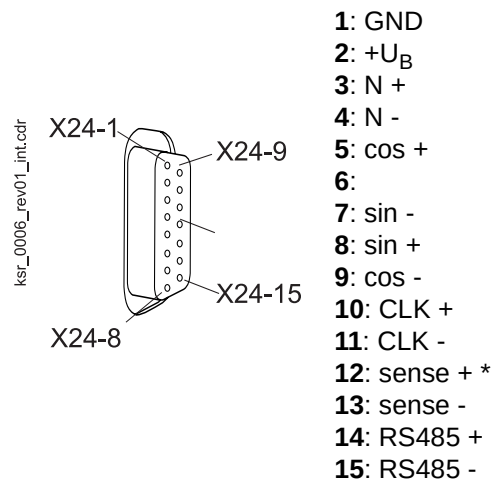


Figure 9: Connector assignment



FER = Ferraris sensor



* with SICK-Stegmann encoder RS485+ is connected here.

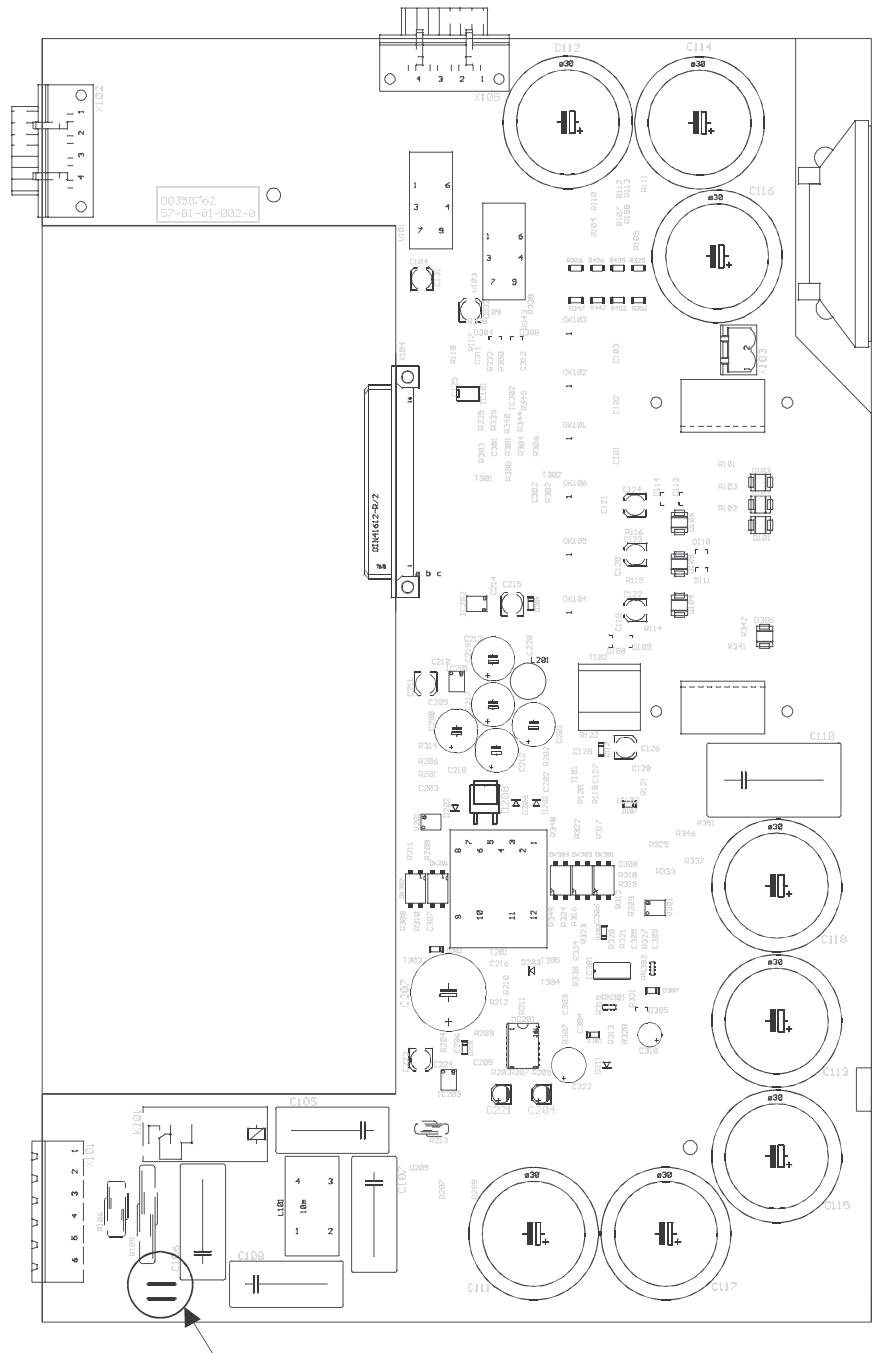
6.10 Connection values of the in-/outputs

- Pulse enable X26:1, 2
 - Low level: **0 V** to **5 V**
 - High level: **11 V** to **35 V**
- Digital input X26:3, 4
 - Low level: **0 V** to **5 V**
 - High level: **11 V** to **35 V**
- Relay output X26:5, 6, 7
 - $I_{\max} = 1 \text{ A}$ (max. current load of contacts)
 - $U_{\max} = 30 \text{ V}$
 - Fuses in the KSR
 - Safety fuse: 1.5 A, 63 V, 0.0625 Ω
 - Reversible fuse: 1.5 A, 33 V, 0.15 Ω (KMO variant)
- Encoder interface
 - The encoder interface is protected with means of a current limiting circuit against short-circuit. At encoder short-circuit the encoder remains current-free.
- Transmit power of fiber-optic cable **ID 0181** (X44)

Level	Transmit power
1	0.05 mW
2	0.2 mW
3	0.3 mW
4	0.5 mW
5	0.5 mW (dynamic)
6	0.18 mW
7	0.15 mW
8	0.12 mW

6.11 Disconnection of Y-capacitors

Due to the internal mains filter the operation of more than 30 devices at one supply via an ELCB of 30 mA is only limited possible. Reason is discharging current of the individual devices, which has summed-up and which has come from the Y-capacitors of the filters. The connection of the Y-capacitors to the PE can be disconnected (also see ►[Safety instructions](#)◄ on page 41). However, therewith filter effects are reduced.



These jumpers must be removed.

Figure 10: Disconnection of Y-capacitors

OPERATION

In this chapter we describe, how the device works during operation and how you handle the device during operation.

7.1 Safety instructions

- Refer to the safety instructions from the chapter [►Fundamental safety instructions◄](#) from page 7.



CAUTION

The following **can occur**, if you disregard this safety note:

- damage to property

*The danger is: **Environmental conditions, that do not refer to the demands.***

Assure, that the environmental conditions are referred to during operation (see [►Environmental conditions◄](#) from page 98).



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury • death

*The danger is: **electricity.** The control cabinet, in which the device is built in, shall protect against contacts with parts which are under voltage.*

Assure, that during operation all doors of the control cabinet are closed.

Assure, that during operation all safety devices work.

7.2 Requirements to the executing personnel



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **electricity**. When operating with this electrical unit, inevitably certain parts of this unit are under dangerous voltage.*

Assure, that only qualified personnel work on this unit.

At each case qualified personnel are persons, who are authorized by the responsible persons, to carry out necessary actions and who recognize the possible dangers and who are able to avoid these dangers. They have had the training, the experience, they were given instructions as well as knowledge about the relevant standards and instructions, they have knowledge of the accident prevention regulations and of the operating environments. The required qualifications for the work with this unit are for example:

- Training or instruction or to have the authorization to put into operation, earth and label current circuits and devices according to the standards of safety techniques.
- Training or instruction due to the standards of safety engineering in maintenance and use of appropriate safety equipment.

7.3 Operating concept

After the device has been taken into operation, it is parametrized (adjusted to the application). When the parameterization is completed, you can operate the device as follows:

- With a higher-level control, which checks the enable signal and the in-/outputs.

The operating software PCBASS or ELTK is not necessary during operation. The operating software PCBASS or ELTK is only then necessary, if there is an error. In case of an error the service engineer can, with the help of PCBASS or ELTK, which error has occurred.

Enable signals

These signals must have a signal level of 24 V (DC) and must be available at the connected terminals +IF and -IF.

Pulse enable

If the controller parameters have not been otherwise set, during operation the signal „pulse enable“ must continuously be present, so that the device supplies power.

The necessity of enable signal can be set with the help of the software.

7.4 Switch-on frequency

The device may not be switched on and off as often as you like. Between the switching off and the restarting it must be complied with a waiting time, in order to protect the devices and fuses.

NOTE



- Refer to the specified waiting time of at least three minutes, before restarting supply voltage again, after you have switched off the device.

In case you switch off the device beforehand, the mains protection is activated - the device is not damaged/destroyed.

7.5 Operation elements

Hex switch

Rotary switch S50 = more significant 4 bits

Rotary switch S51 = less significant 4 bits

Rotary switch codes - operation modes

Rotary switch position	Operating mode	resulting slave address
FF _{hex}	Single - Master	---
FE _{hex}	Double - Master	---
C0 _{hex}	Slave - Master	0
C1 _{hex}	Slave - Master	1
C2 _{hex}	Slave - Master	2
C3 _{hex}	Slave - Master	3
FB _{hex}	Slave - Master	59
FC _{hex}	Slave - Master	60
FD _{hex}	Slave - Master	61
00 _{hex}	Single - Slave	0
01 _{hex}	Single - Slave	1
02 _{hex}	Single - Slave	2
03 _{hex}	Single - Slave	3
BD _{hex}	Single - Slave	189
BE _{hex}	Single - Slave	190
BF _{hex}	Single - Slave	191

KSR

M Drive

7.6 Display elements - LED

On the front side of the device there are four LEDs.

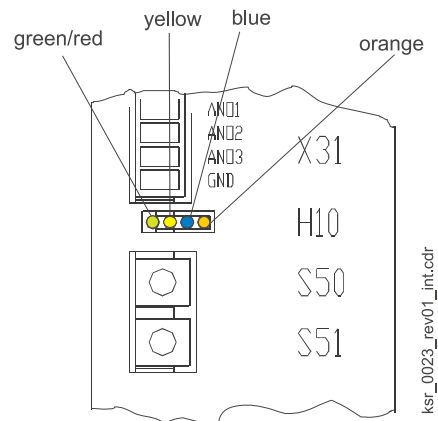


Figure 11: LED display

Operating status The current operating status is shown by flashing sequences of the yellow LED.

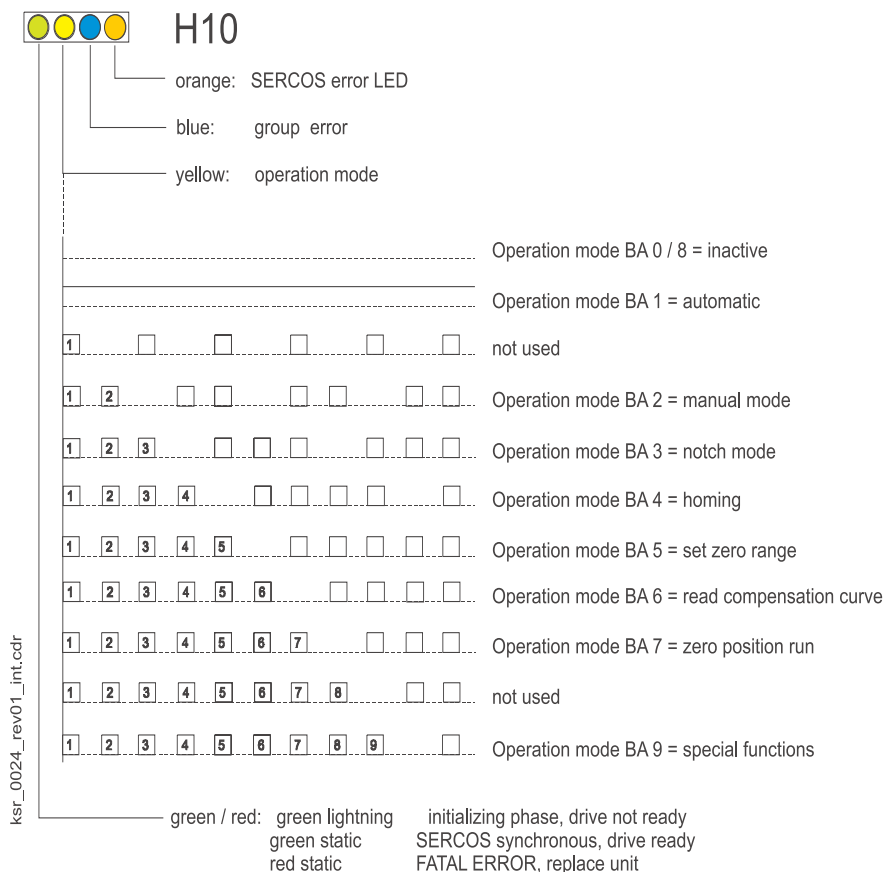


Figure 12: Display operating status

COMMISSIONING

In this chapter we describe an exemplary commissioning of a KSR device with a Baumüller motor DSD 28-M with SinCos encoder. Carry out the commissioning, to make sure that the delivered devices are in an accordant status. This commissioning is **not** for the complete installation of the device for your application.

8.1 Safety instructions

Please refer to the relevant information in chapter.



DANGER

The following **will occur**, if you do not observe this safety note:

- serious personal injury
- death

*The danger is: **electricity**. The control cabinet is equipped with power cables which carry dangerous voltages.*

Put all relevant cables off-circuit and protect them against accidental reactivation. Refer to the relevant safety rules when commissioning power electronics.

8.2 Requirements to the executing personnel

The personnel, who is assigned for commissioning, must have enough knowledge about:

- Safety technology
- PC-operation, especially in program PCBASS or ELTK.
- Connection and operating method of the device KSR.

8.3 Preconditions

The commissioning is an exemplary checking of the functionality of the device. When commissioning, make sure that the device is ready for operation.

Commissioning with Baumüller-motors

The, furthermore described, exemplary commissioning is specified to Baumüller motors. In case you select another configuration (e.g. another encoder), you must enter the values self.



WARNING

The following **may occur**, if you do not observe this safety note:

- serious personal injury
- death



*The danger is: **mechanical effects**. With a non-free-rotating motor the motor and parts which are connected to the motor can be damaged/destroyed.*

Assure, that the motor can rotate freely during commissioning.

8.4 Preparations

Precondition for the commissioning is that mounting and installation is correctly executed.

- 1 Assure, that mounting is correctly executed and especially that all safety instructions were referred to.
- 2 Assure, that the installation is correctly executed, and that especially all safety instructions were referred to.
- 3 PCBASS/ELTK must be installed to the PC/laptop.
- 4 At commissioning you can, amongst other things, set motor- and encoder data in the operating software.

Motor data

This data is to be found on the type plate of the motor,

Name	Value, e. g.
Nominal voltage U_N	310 V _{DC}
Nominal current I_N	1.5 A
Nominal speed n_N	3000 RPM
Limit current I_{limit}	1.9 A
Max. speed $n_{max.}$	3000 RPM
Pole position, if specified ¹⁾	90°

¹⁾ At pole position speed the phases V and W are current carrying, direction V → W, current value can be parameterized up to 70 % of the maximum current.

After a parameterizing time the angular value 0 is set in the absolute encoder position.

This angle corresponds with the electric angle.

This method is advantageous, because the pole position, which was set is not dependent of the pole pair number.

Encoder data

Name	Value, e. g.	is used to enter in parameter list/parameters
Encoder type	SinCos encoder Stegmann SRS 50/ 60	at SinCos encoders with Hiperface interface the encoder type is automatically entered via Hiperface interface
Line count	1024	

5 Assure

- The motor is equipped with a suitable encoder, in our example: SinCos encoder SRS50.
- The motor is connected to KSR.

6 Assure, that all safety devices are connected line- and motor sided and are ready-to-operate.**7** Assure that the encoder for motor control (SinCos encoder) is connected to a proper encoder cable.**8** Assure, that PC/laptop is connected to a serial cable (RS232/9-pole Sub D connector) with the controller!**9** Start PCBASS or the ELTK program.

8.5 Commissioning

- Preconditions**
- PC or notebook with PCBASS 4.01 or ELTK program
 - Serial interface cable 9-pole
 - Motor DSD xxx with Stegmann encoder, Hiperface
- Preparation for commissioning**
- Connect the motor- and encoder cables as well as the line cable to **KSR - 3A**.
 - Generate connection to the PC.
 - Start PCBASS V4.01 and load KSR_all.dat, select edit or
 - Start ELTK program.
- Start operation.** Operation only is made with the help of PC, no hardware signals must be set.
- At usage of PCBASS proceed as follows:
 - Describe parameter **ID 0031** (page 3) with 4 ▶ reset errors
 - Select page 10 and set the following:
 - Set parameter **ID 1654** with 1
 - Set parameter **ID 1670** with 1
 - ▶ controller enable
 - Set parameter **ID 0442** with 22
 - ▶ find pole position
 - Wait for minimum time (**ID 0477**)
 - Then set parameter **ID 0442** with 21
 - ▶ motor manager on
 - Then change to page 11
 - Set parameter **ID 0372** with 13
 - ▶ speed control
 - Back to page 10
 - Set parameter **ID 0500** with 1
 - ▶ activate set value generator (central command)
 - Set parameter **ID 0520** with 1
 - ▶ activate set value speed
 - Set parameter **ID 0522** with a value between 1 and 10 000
 - ▶ acceleration
 - Set parameter **ID 0523** with a value between 1000 and 30 000
 - ▶ set speed
 - ▶ motor shaft starts to rotate.

The **ELTK program** is described in [▶Appendix E - ELTK documentation◀](#) from page 119.

ENTIRE STRUCTURE OF THE KSR

Here we give a survey about the structures of the KSR.

9.1 Hardware survey

Power unit

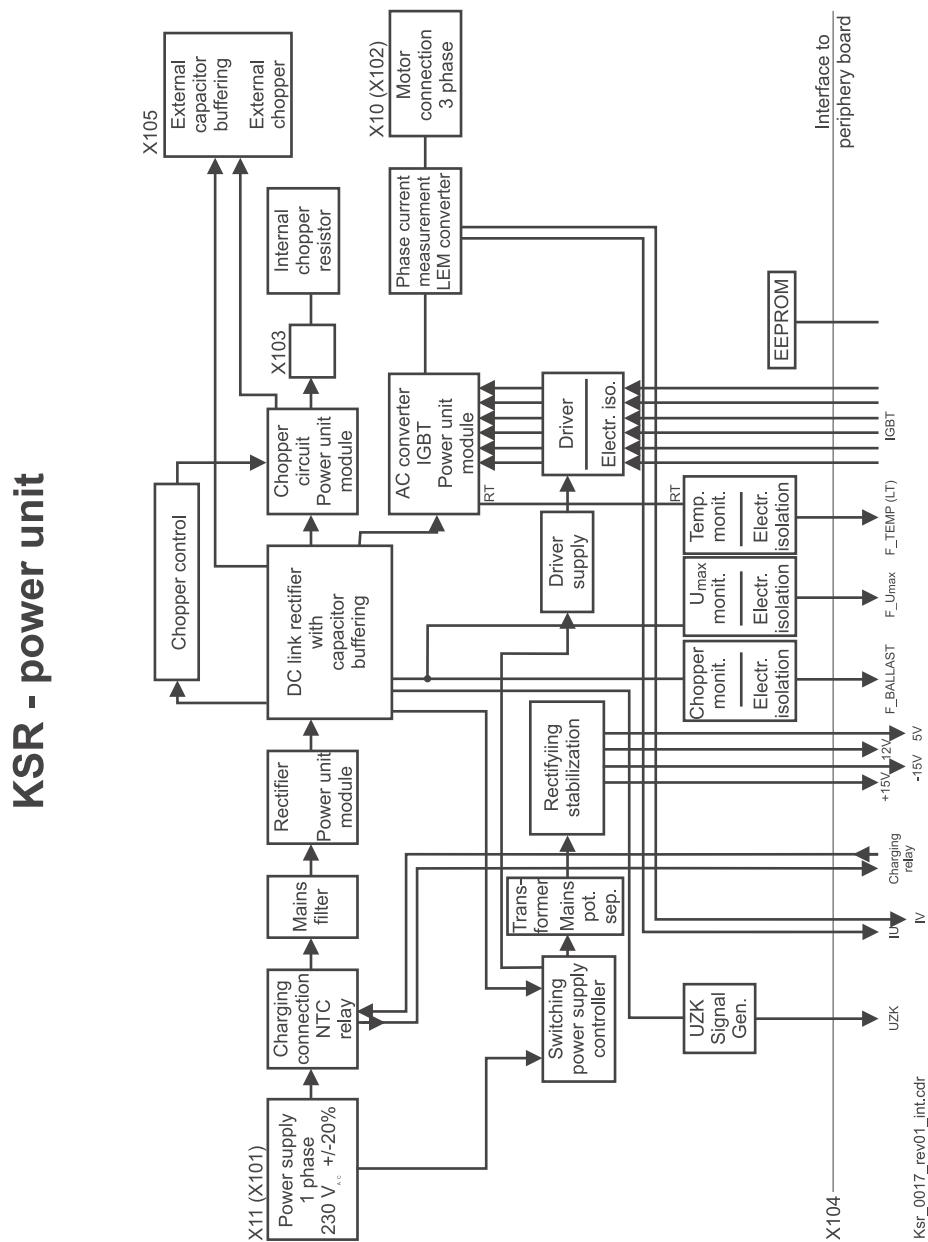


Figure 13: Survey power unit

Peripheral board

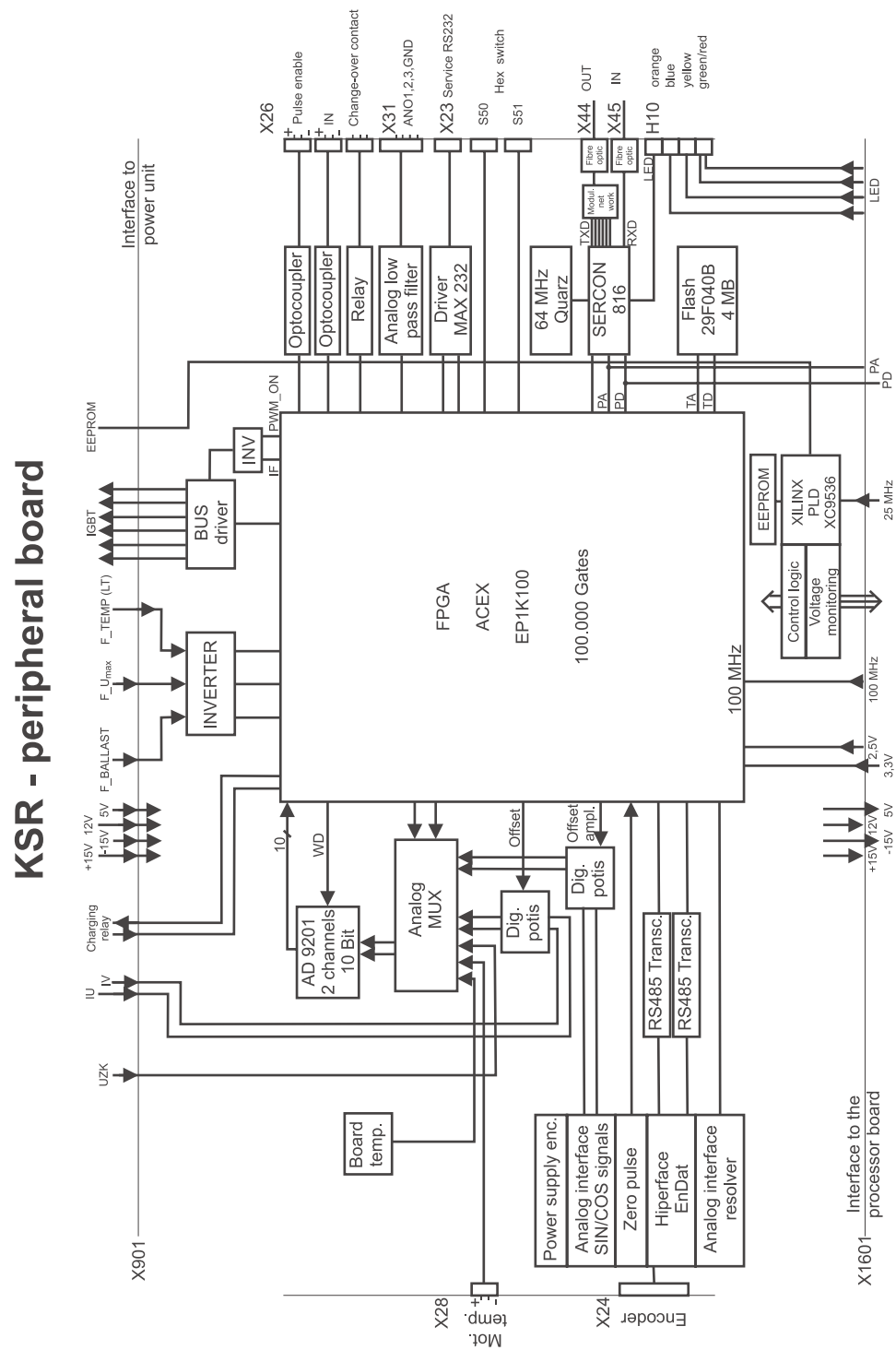


Figure 14: Survey peripheral board

Processor board

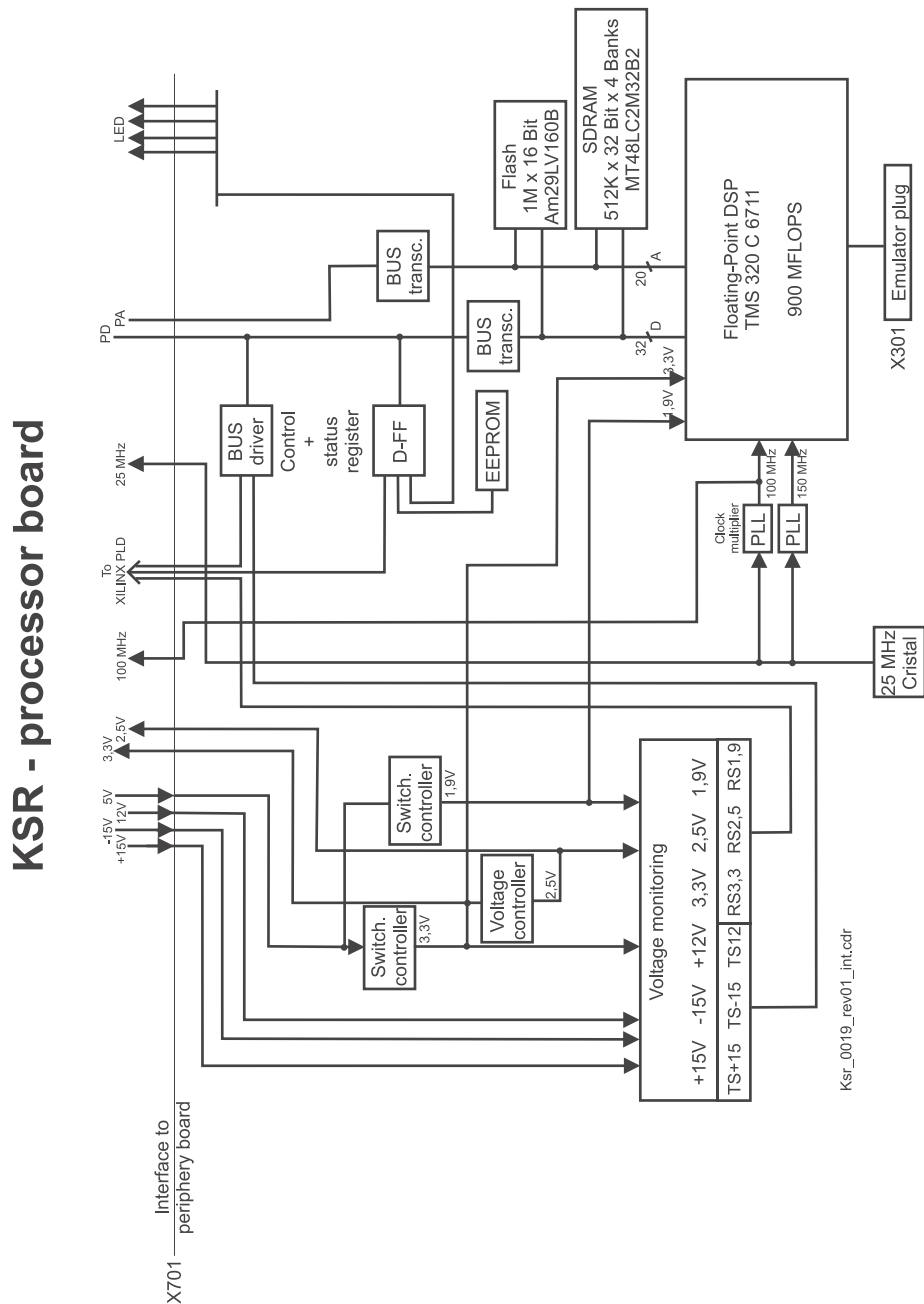


Figure 15: Survey processor board

Total structure

Structure KSR controller

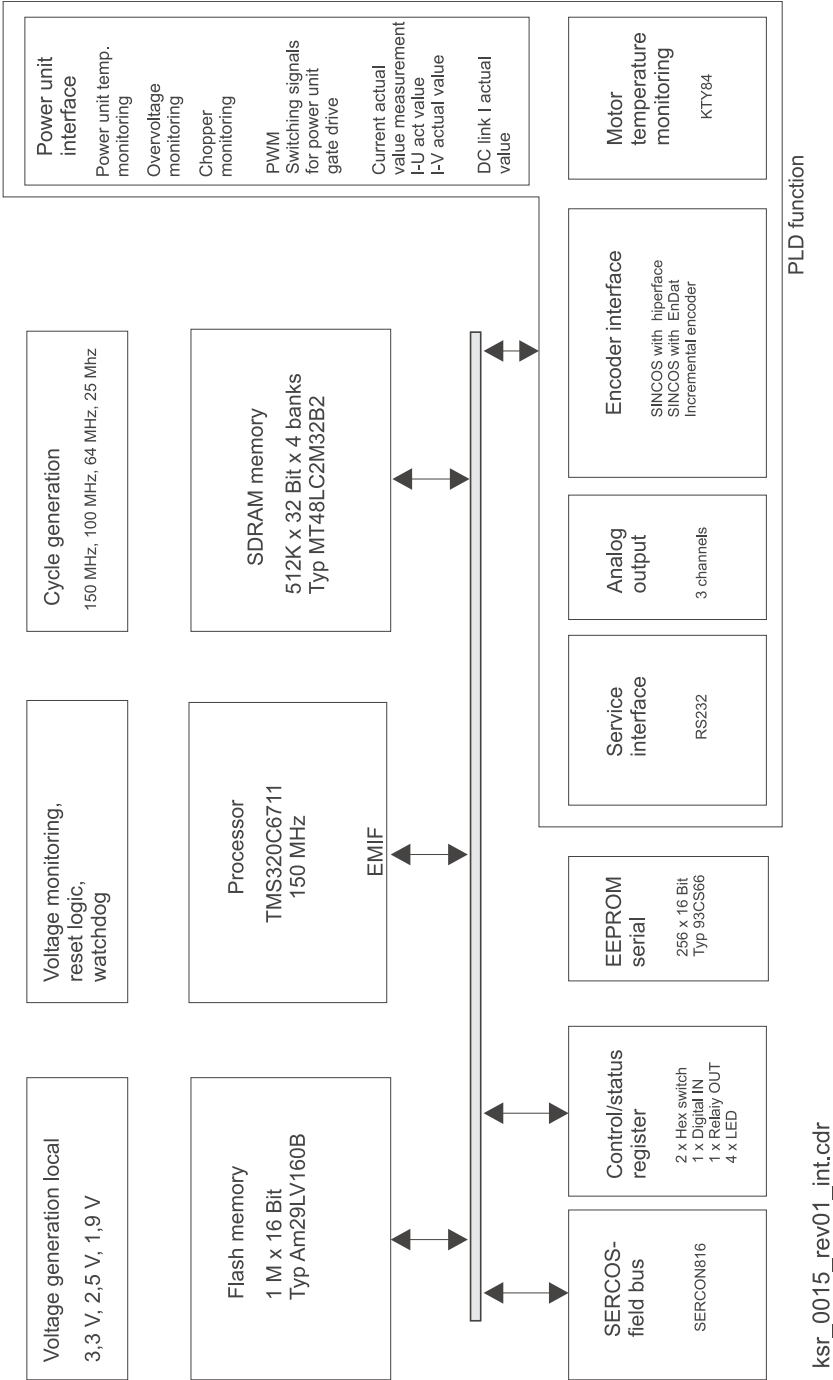


Figure 16: Total structure KSR

9.2 Survey of control structures

PLD functions

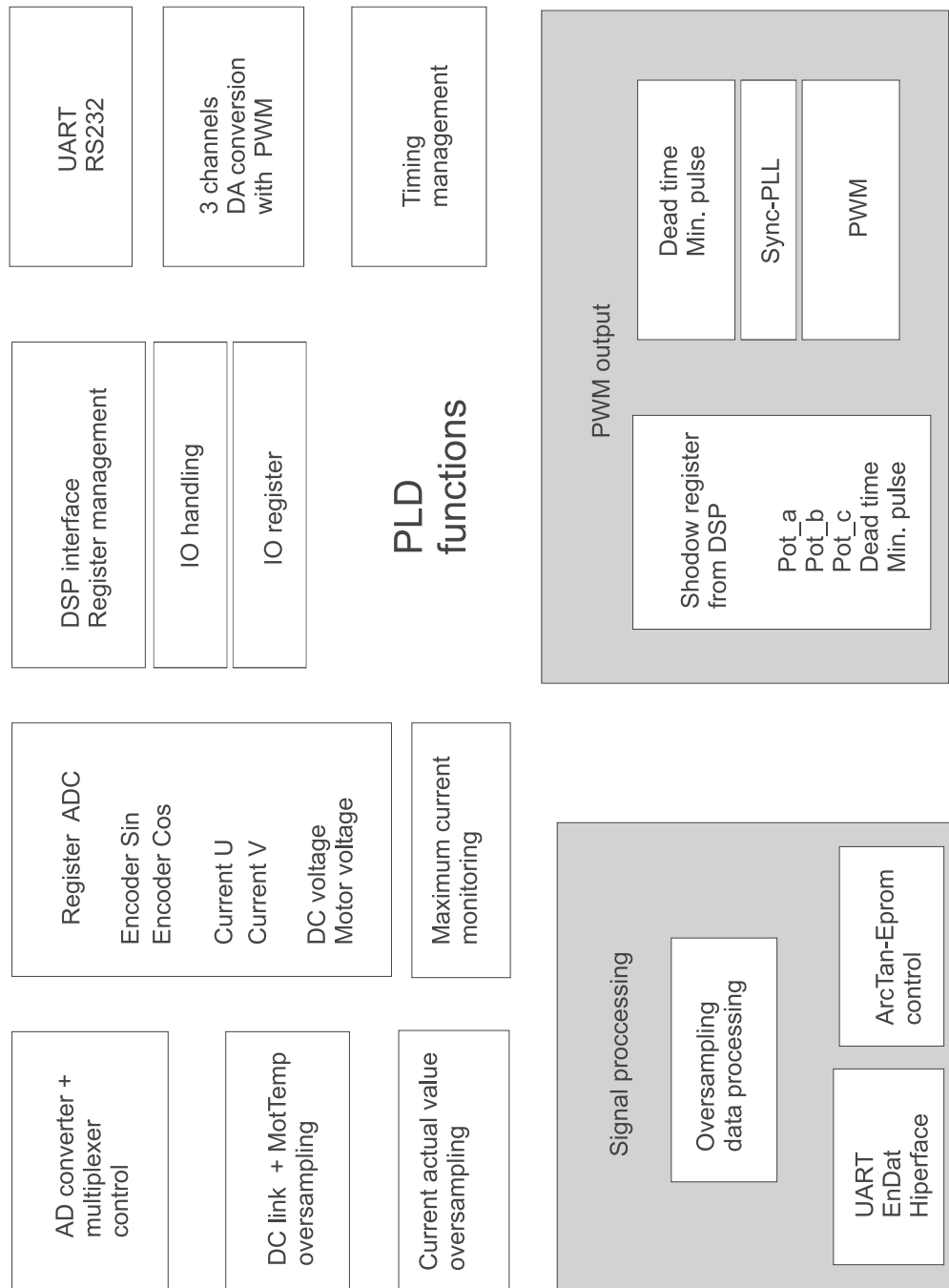
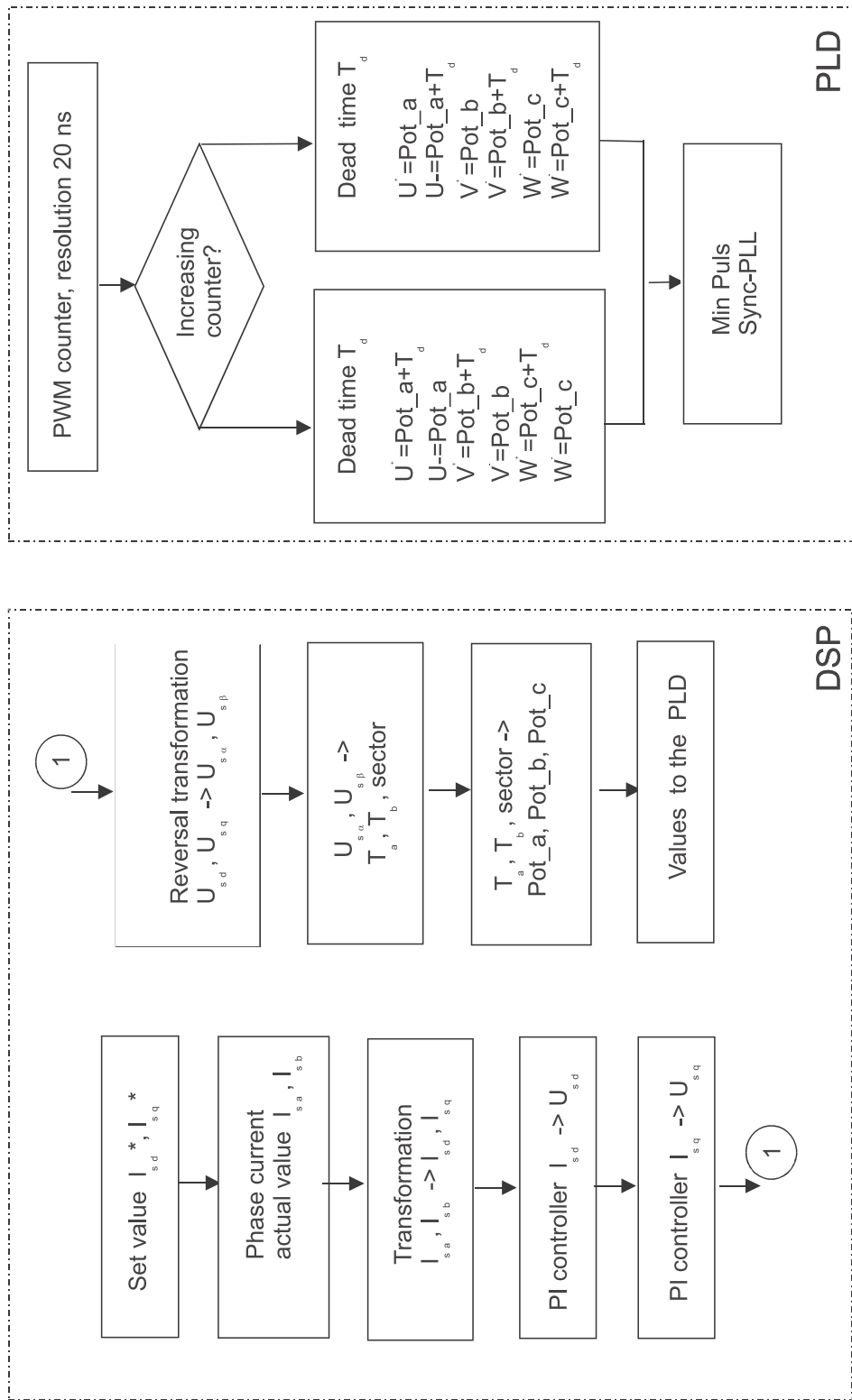


Figure 17: PLD functions

Flow chart current control and PWM



Flow chart current control and PWM

ksr_0014_rev01_int.cdr

Figure 18: Flow chart current control and PWM

SOFTWARE MODULES AND PARAMETERS

In this chapter the parameters, which are important for the KSR are described. All the other parameters, which are available are described in the M-Drive parameter manual.

All parameter descriptions are based on the following scheme:

ID 1610	I P-gain Iq	0 to 10000
	x	1.8
	Description of the function of the parameter.	

The different branches of the scheme are described below:

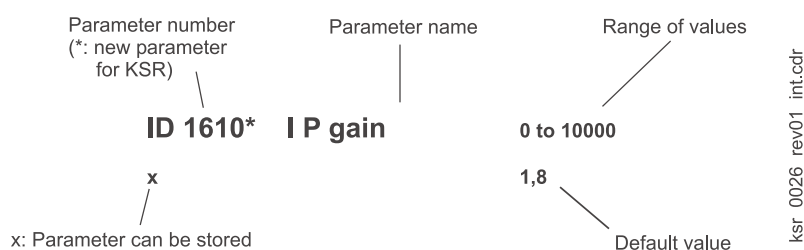


Figure 19: Parameter description scheme

A survey of all parameters, which have been described are to be found in [►Described KSR parameters◄](#) from page 147.

10.1 Field-oriented current controller

Function blocks and parameters

The module „Current controller“ includes the current control, the interface to the power unit, the sensing and monitoring of motor temperature and the synchronization between both processors - DSP and PLD (FPGA).

Survey of the individual function blocks

Function block	Parameter number
Current controller	ID 1600 to ID 1649
Power unit	ID 1650 to ID 1661
I manager	ID 1670 to ID 1676
Motor temperature monitoring	ID 1680 to ID 1687
Synchronous PLL	ID 1690 to ID 1696

10.1.1 Current controller (ID 1600 - ID 1649)

Functions

The function block current controller contains the sensing of phase currents, the control of d,q-currents as well as the control voltage for the PWM control set.

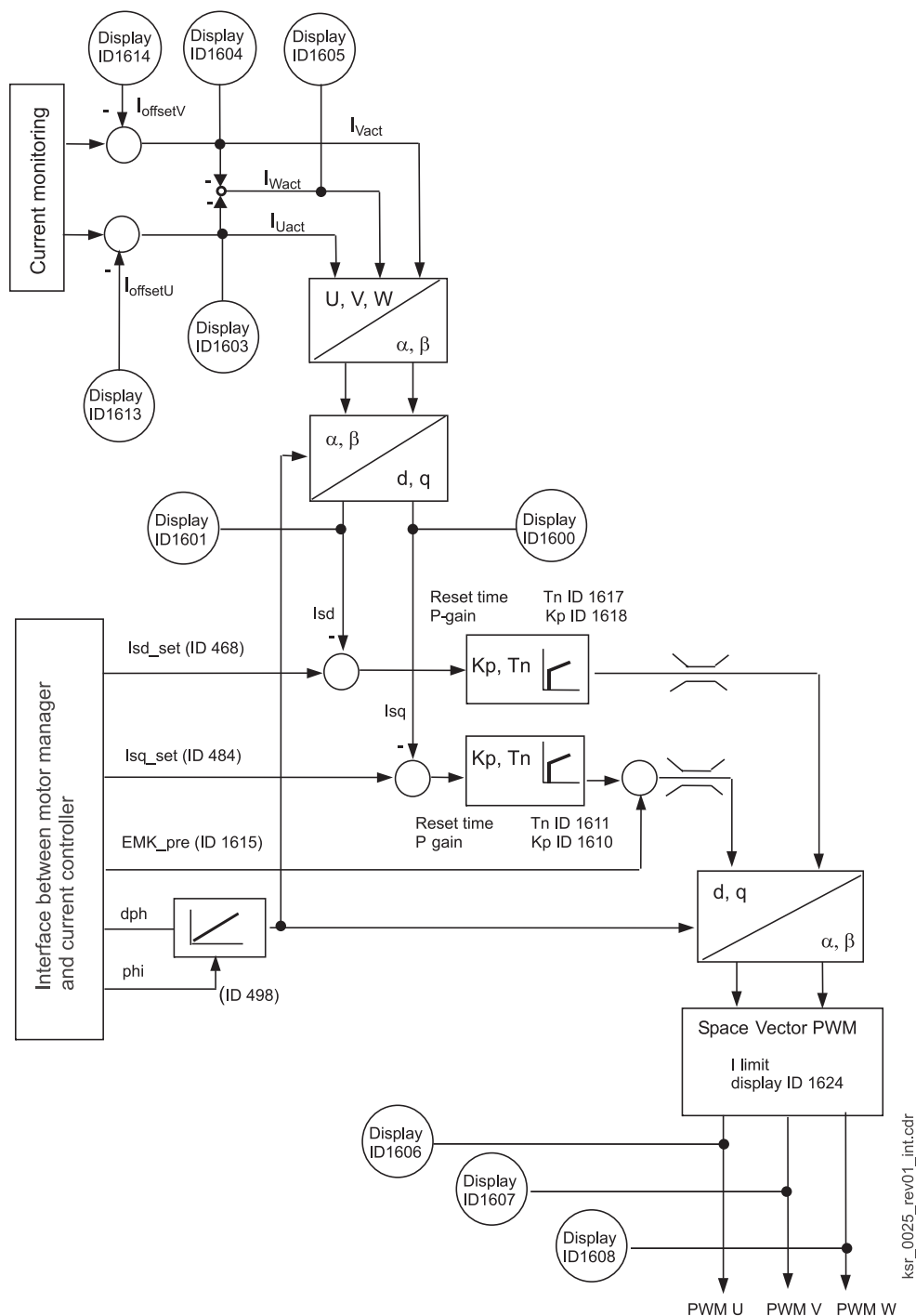


Figure 20: Function block current controller

Description of parameters

ID 1600 **I Isq act Value** -4096 to 4096 A
-

ID 1601 **I Isd act value** -4096 to 4096 A
-

Display of actual values of Isq, Isd. The values are calculated from the phase current actual values by transformation in the field coordinates. They are rms values.

ID 1603 **I lu act value** -4096 to 4096 A
-

ID 1604 **I lv act value** -4096 to 4096 A
-

ID 1605 **I lw act value** -4096 to 4096 A
-

ID 1603 I lu Act value and **ID 1604** I lv Act value are accordant to the measured phase current actual values. **ID 1605** I lw Act value results from the requirement „Sum of all currents equal 0“.

ID 1606 **I Setting of value U** -2048 to 2048
-

ID 1607 **I Setting of value V** -2048 to 2048
-

ID 1608 **I Setting of value W** -2048 to 2048
-

These parameters show the condition of pulse-width of power stage transistors. A value of ± 2048 means maximum control setting.

ID 1609 **I Status** 0000 to FFFF
-

This parameter reflects the status of internal module.

Value	Meaning
0	Stop
1	RUN I-control
5	I-controller in operating mode Isd-setting (Isd-control)
7	I-controller in operating mode Usd-setting (Usd-control)

ID 1610 x	I P gain Iq	0 to 10000 1.8
ID 1611 x	I Time constant Iq	0 to 10000 ms 30 ms

With **ID 1610** I P-gain Iq the proportional gain (kp) of the Iq-current controller is set. With **ID 1611** I Time constant Iq the reset time (Tn) of the Iq-current controller is set. The parameter **ID 1616** (kp internal Iq, only readable) is the internal operating parameter in the controller. After the optimum of magnitude and in consideration of the internal scalings, kp and Tn of the Iq current controller at **ID 1643** PWM Frequency = 8 kHz can be recommended as follows:

$$T_n = \frac{L_{sq}}{1,4 \cdot r_s} \text{ ms} \quad (r_s \text{ in } \Omega, \text{ resistance of motor winding phase})$$

$$k_p = 3,6 \cdot L_{sq} \quad (L_{sq} \text{ in mH, primary stator inductance})$$

ID 1613 -	I Offset U	-256 to 256 A -
ID 1614 -	I Offset V	-256 to 256 A -

In order to compensate the offset of current sensing, at each pulse inhibit the offset values in the software are determined and are displayed in this parameter. These offset values can be influenced via the digital potentiometer (**ID 1628**/**ID 1629**).

ID 1615 -	I EMF pre-control	-2048 to 2048 -
---------------------	--------------------------	--------------------

In this parameter the voltage set value from the EMF pre-control is shown.

ID 1616 -	I kp-internal Iq	0 to 10000 0.3
---------------------	-------------------------	-------------------

In this parameter the internal used kp parameter in the Iq controller is shown, that means the physical data of the maximum device current and the DC link voltage is taken into account here.

ID 1617* x	I P-gain Id	0 to 10000 1.8
ID 1618* x	I Time constant Id	0 to 10000 ms 30 ms

With **ID 1617** I P-gain Id the proportional gain (kp) of the Id current controller is set. Under **ID 1618** I Time constant Id the reset time (Tn) of the Id-current controller is set. The parameter **ID 1616** (kp internal Iq, only readable) is the internal operating parameter in the controller. After the optimum of magnitude and in consideration of the internal scalings, kp and Tn of the Iq current controller at **ID 1643** PWM Frequency = 8 kHz can be recommended as follows:

$$T_n = \frac{L_{sq}}{1,4 \cdot r_s} \text{ ms} \quad (r_s \text{ in } \Omega, \text{ resistance of motor winding phase})$$

$$k_p = 3,6 \cdot L_{sq} \quad (L_{sq} \text{ in mH, primary stator inductance})$$

ID 1619* -	I Usq set value	-3547 to 3547 -
ID 1620* -	I Usd set value	-3547 to 3547 -

These parameters show the value of setting of Iq/Id controller in q-d coordinates.

ID 1621* -	I I-ratio Usq	-3547 to 3547 -
ID 1622* -	I I-ratio Usd	-3547 to 3547 -

These parameters show the I-ratio of the values of setting of the Iq/Id controllers.

ID 1623 -	I Cycle time	62.5 to 125 µs 62.5 µs
---------------------	---------------------	---------------------------

This parameter shows the present cycle time of both current controllers (Iq and Id).

ID 1624 -	I Voltage limit	0 to 16 0
---------------------	------------------------	--------------

Shows if the voltage limit is reached. Value greater than 0 means, that the value of setting has reached the voltage limit. The maximum value of the parameter is equal to the cycle ratio between position controller and current controller. The greater the value the more critical is the voltage limit.

ID 1625 x	I MSVM limit	0 to 100 % 100 %
In this parameter the limit value for the modified modulation can be set. Default value is 100 %, i. e. without modified modulation. MSVM stands for „Modified Space Vector Modulation“.		
ID 1626* -	I U alpha set value	-3547 to 3547 -
ID 1627* -	I U beta set value	-3547 to 3547 -
These parameters show the value of setting of current controller in α - β coordinates.		
ID 1628* x	Isa Pot	0 to 255 -
ID 1629* x	Isb Pot	0 to 255 -
The offset voltages of the analog parts of current sensing system can be adjusted via digital potentiometer.		
With these parameters the digital potentiometers for the phase currents Isa and Isb can be set. An optimum potentiometer setting results in a better utilization of the A/D converter (i. e. ID 1613 , ID 1614 the smallest possible, e. g. under 0.1 A).		
ID 1636* x	I Test electric speed	$-5 \cdot 10^4$ to $5 \cdot 10^4$ degree/s -
The current controller can be operated in mode Usd-setting/Isd-setting for testing. In this parameter the electric speed for Usd-setting/Isd-setting can be set.		
ID 1637* x	I Test set Usd	-3547 to 3547 Inc -
In this parameter the Usd-set value for operating mode Usd-setting can be set.		
ID 1638* x	I Test set Isd	-5 to 5 A -
In this parameter the Isd-set value for operating mode Isd-setting can be set.		
ID 1640* x	PWM Dead time	2 to 10 μ s -
In this parameter the dead time of PWM generation can be set.		

ID 1641*

-

PWM Minimum pulse

0 to 10 μ s

-

In this parameter the minimum pulse time of the PWM generation can be set.
Currently this parameter is not yet implemented.

ID 1642*

-

PWM Reload value

0 to 10000 μ s

-

This parameter shows the reload value for PWM generation.

ID 1643

-

PWM Frequency

4 to 8 kHz

8 kHz

Cycle frequency of power unit can be switched over between 4 kHz and 8 kHz.

Parameterization can only occur at inhibited controller (**ID 1670** R Control = 0) and with a switched off pulse enable IF.

Currently only a value of 8 kHz is possible.

10.1.2 Power unit (ID 1650 - ID 1661)

Functions The function block power unit shows the status of supply and of the power unit.

Description of parameters

ID 1650 **LT Supply status** 0 to 17
- 0

This parameter shows the momentary status of the power unit/the supply in hex-format.

Value	Meaning
0	Ready-for-use
Bit 0 is set (01 _{hex})	Error Uzk Maximum exceeded
Bit 2 is set (04 _{hex})	Error overload chopper resistor
Bit 4 is set (10 _{hex})	Error power unit overtemperature

Uzk maximum exceeding results in error number 563, power unit overtemperature results in error number 567 and overload chopper resistor results in error number 577. Accordant error reactions can be parameterized via parameter **ID 1676 R Error Mode**.

ID 1650 **LT Status** 0 to 17
- 0

This parameter shows the status of the power unit/PWM.

Value	Meaning
0	Ready-for-use
Bit 0 is set (01 _{hex})	Error I _{max} , maximum current exceeded PLD (FBGA)
Bit 4 is set (10 _{hex})	Error sign-of-life signal PLD (FPGA)

Error I_{max} results in error number 564; error sign-of-life signal results in error number 430. At occurrence of error 564 or 430 the pulse enable is withdrawn, i. e. the drive coasts down. The evaluation and reaction is executed by the PLD (FPGA).

ID 1652 **LT Supply message** 0 to 65535
-

ID 1653 **LT Message** 0 to 65535
-

Currently not implemented.

ID 1654 **LT Reset** 0 to 1
-

With the setting of this parameter the occurring errors I_{max} or error sign-of-life signal in the PLD (FPGA) is acknowledged.

This parameter is used at a central reset.

ID 1655 **LT Pulse enable** 0 to 17
-

This parameter shows the status of the pulse enable.

Value	Meaning
0	Pulse inhibit
Bit 0 is set (01 _{hex})	Software pulse enable is existent
Bit 4 is set (10 _{hex})	Hardware pulse enable (presently always existent)

ID 1656 **LT Version** 0 to 65535
-

Here the power unit type is shown. Current value: 0.

ID 1661 **Voltage U_{zk}** 10 to 1000 V
-

Display of DC-link voltage.

10.1.3 I manager (ID 1670 - ID 1676)

Functions The function block I manager provides the interfaces for the control of the current controller.

Description of parameters**ID 1670****R Control**

0 to 16

4

This parameter controls the current control.

Value	Meaning
0	Reset/error acknowledge
1	Enable
4	I-controller inhibited/pulse inhibit
5	I-controller in operating mode Isd-setting (Isd-control)
7	I-controller in operating mode Usd-setting (Usd-control)

ID 1671**R Status**

0 to 16

4

This parameter displays the status of the current control.

Value	Meaning
0	Reset/error acknowledge
1	Enable
4	I-controller inhibited/pulse inhibit
5	I-controller in operating mode Isd-setting (Isd-control)
7	I-controller in operating mode Usd-setting (Usd-control)
16	Error group signal

ID 1676*

-

R Error mode

0 to 19

0

To certain events it can be reacted on specifically. If, e. g. at mains failure it shall still be reacted with safety stop, the I-controller must not inhibit pulse enable with an error message, whereby other modules have the possibility to initiate a safety stop.

Bit	Description
0	0: Motor temperature greater than the switch off threshold results in a canceling of pulse enable. 1: Motor temperature greater than switch off threshold doesn't result in canceling of pulse enable. → According on control the drive executes e. g. safety stop.
1	0: Uz _k Max exceeded (error message power unit) results in canceling of pulse enable → drive coasts down 1: Uz _k Max exceeded doesn't result in a canceling of pulse enable. → According on control the drive executes e. g. safety stop
2	0: Overload chopper resistor (error message power unit) results in canceling of pulse enable → Drive coasts down 1: Overload chopper resistor doesn't result in canceling of pulse enable → According on control the drive executes e. g. safety stop
4	0: Power unit error max. temperature exceeded (error message power unit) results in canceling of pulse enable. → Drive coasts down 1: Power unit error max. temperature exceeded doesn't result in a canceling of pulse enable. → According on control the drive executes e. g. safety stop

10.1.4 Motor temperature monitoring (ID 1680 - ID 1687)

Functions This function block evaluates motor temperature and protects the motor against thermic overload.

Description of parameters

ID 1680

MT Status

0000_{hex} to FFFF_{hex}

Here the module status is shown.

Bit	Meaning
0 ... 2	0: STOP 1: RUN
3	1: Error in module
4	1: Warning motor temperature has exceeded threshold 1
5	1: Warning motor temperature has exceeded threshold 2
6	1: Switch off: Motor temperature has exceeded switch off threshold
7 ... 15	always 0

ID 1681

X

MT Sensing system

0 to 1

With this parameter the method of motor temperature sensing is set.

Value	Meaning
0	Motor temperature sensing switched off
1	Temperature sensor KTY84 (Bit 4, 5, 6 in MT status valid)

If there is no KTY sensor, the I²t motor temperature monitoring is to be used, see [▶Ixt-monitoring for the power unit](#) on page 73 as well as **ID 0057** and **ID 0065** on [▶page 75](#).

ID 1682

MT Temperature

0 to 300 °C

This parameter displays the measured motor temperature, if a temperature sensor is used.

ID 1683 X	MT Threshold 1	0 to 300 °C -
	If the motor temperature exceeds the value of parameter ID 1683 , in the parameter ID 1680 bit 4 is set.	
ID 1684 X	MT Threshold 2	0 to 300 °C -
	If the motor temperature exceeds the value of parameter ID 1684 threshold 2, the warning (575) is generated and in parameter ID 1680 bit 5 is set.	
ID 1685 X	MT Switch off threshold	0 to 300 °C -
	With the parameter set here, the values measured of the temperature sensor are compared and accordant bits are set in the status word.	
	If the motor temperature is greater than the ID 1685 switch off threshold, the controller enable automatically is canceled, if in parameter ID 1676 R Error mode, the bit 0 is not set (default). If this bit is set, the pulse enable, also at motor overtemperature, is not canceled.	
ID 1686 X	MT Hysteresis 1	0 to 5 °C -
	At exceeding of a threshold the accordant bit is set and is not reset, again, before falling below the threshold minus the hysteresis.	
ID 1687 -	MT AD value	-32768 to 32767 -
	A value of the temperature sensor at the AD-converter, which is not scaled.	

10.1.5 Synchronous- PLL (ID 1690 - ID 1696)

Function The function block Synchronous-PLL serves the purpose of synchronizing between both processors DSP and FPGA. Furthermore here the software version of the FPGA is shown.

Description of parameters

ID 1693* -	PWM Version KSR	0.00 to 99.99 0.01
	In this parameter the software version of the PLD (FPGA) program is shown.	
ID 1694* -	PWM Sync time	0 to 126 μ s -
	In this parameter the timer value for PWM synchronization is shown.	
	Working method: P-Controller (P-gain parameter ID 1695) with:	
	• Actual value At moment of interrupt the timer value is measured via EDMA and set in parameter ID 1694 (at PWM counter value equal 0 the FPGA initiates an interrupt at the DSP) • Set value Fixed value (30 μs) plus an offset (parameter ID 1696) • Actuating value: P-controller output + fixed value (3122*20 ns = 62.44 μs) as PWM reload value	
ID 1695* -	PWM PLL amplification	0 to 2 0.2
	In this parameter the gain of PLL synchronization can be set.	
ID 1696* -	PWM PLL Offset	-30 to +30 μ s 0 μ s
	In this parameter the offset of PLL synchronization is set.	

10.1.6 Commissioning

For the commissioning of the I-controller the operating software PCBASS or ELTK is required.

The following parameters must be set before commissioning or their values must be checked:

ID	Name	Value
1610	IP-gain Iq	e. g. 90, by calculation and experiment
1611	I Time constant Iq	e. g. 3 ms, by calculation and experiment
1617	I P-gain Id	e. g. 35, by calculation and experiment
1618	I Time constant Id	e. g. 1 ms, by calculation and experiment
1625	MSVM Limit	100 %
1628	Isa Pot	e. g. 105
1629	Isb Pot	e. g. 105
1640	PWM Dead time	e. g. 2 μ s
1643	PWM Frequency	e. g. 8 kHz
1676	R Error mode	e. g. 0
1681	MT Sensing system	1 - ON with error monitoring
1683	MT Threshold 1	e. g. 130
1684	MT Threshold 2	e. g. 140
1685	MT Switch off threshold	e. g. 150
1686	MT Hysteresis 1	e. g. 5
1695	PWM PLL amplification	e. g. 0.2
1696	PWM PLL Offset	e. g. 30 μ s

General note:

The optimum current controller setting is to be matched to the accordant combination converter/motor.

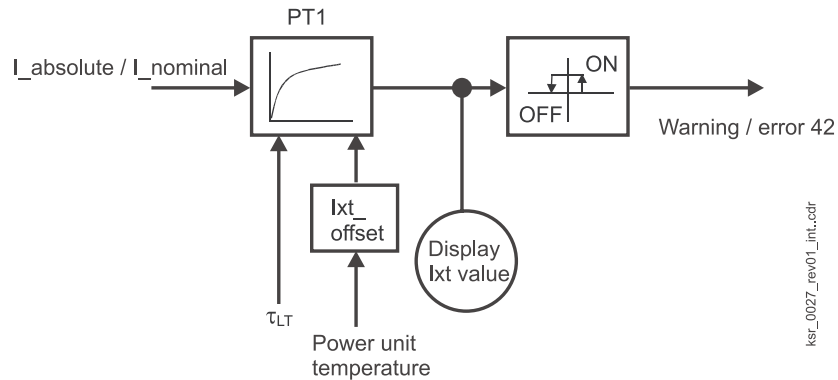
At parameterization of the current controller it should be started with conventional setting (small k_p , great T_n). The optimization of k_p and T_n is to be checked with the visualization of the step response.

10.2 Power unit and motor monitoring

This software module for the **KSR - 3A** disposes of the functionalities power unit Ixt monitoring and motor I²t monitoring.

10.2.1 Ixt-monitoring for the power unit

This monitoring protects the power unit against thermal overload. Thereby by a Ixt model the temperature of the power unit is emulated and monitored.



$\tau_{\text{power unit}}$: thermal time constant, only dependent of power unit parameter.

- Power unit maximum permitted current **I_{max}**
- Power unit nominal current **I_{nom}**
- Power unit overload time **T₀**

$$U_{\max} = \frac{I_{\max}}{I_{\text{nom}}}$$

$$\tau_{\text{power unit}} = - \frac{T_0}{\ln\left(1 - \frac{1}{U_{\max}}\right)}$$

$$\text{Ixt Offset} = \frac{\text{Power unit temperature} - 45^{\circ}\text{C}}{85^{\circ}\text{C} - 45^{\circ}\text{C}}$$

Parameterization of power unit monitoring

The value of $I_absolute_value$ considers not only **ID 1600** torque current but also **ID 1601** field current. Values for the parameter **ID 0054** (maximum allowable power unit current I_{max}), **ID 0055** (power unit nominal current I_{nom}) and **ID 0056** (power unit overload time T_0) can be taken from the table (see [▶Table power unit◀](#) on page 76).

Till the automatically power unit detection is implemented and in order to use power units, which eventually are not recognizable, the values I_{max} , I_{nom} and T_0 must be set via operating program PCBASS or ELTK.

At an lxt-value of 100 % error code 42 is enabled. The reaction follows via the higher-level module operation manager.

The lxt-monitoring is switched off if the parameter **ID 0056** LT overload time has been set to 0.

The lxt-monitoring is no alternative for the power unit's temperature monitoring. The module temperature monitoring (**ID 1657** - **ID 1659**) is not influenced.

10.2.2 I²t-monitoring of the motor

The monitoring protects the motor against thermal overload. By use of a model the motor temperature is simulated and monitored.

Monitoring is initialized by the use of momentary motor temperature.

$$\begin{aligned} 40\text{ °C} &\hat{=} 0\% \\ 155\text{ °C} &\hat{=} 100\% \end{aligned}$$

The parameter **ID 0057** Thermal time constant τ_{motor} , is to be taken from the data sheet of motor and is to be set in seconds. The value $I_absolute_value$ considers not only **ID 1600** Torque current but also **ID 1601** Field current. I_nom_motor is calculated with **ID 0470** I_{sq_nom} and **ID 0469** I_{sd_nom} .

If I^2t -value reaches a threshold value, error 37 is activated. If the time constant $\tau_{motor} = 0$ is set, this overload monitoring is switched off.

The I^2t -monitoring is no alternative for the motor temperature monitoring. The module motor temperature monitoring (**ID 1680** - **ID 1687**) is not influenced.

Parameter description

ID 0052	Monitoring LT lxt Value	0 to 1000 %
----------------	--------------------------------	-------------

-

-

This parameter shows the lxt value of the overload monitoring at the moment. At a value of 100 % the error 42 is signaled. If the lxt value is less than 95 % and if also the $I_absolute_value$ is less than 95 % of I_{LTnom} , so the error message is deactivated again.

ID 0053

X

Auto LT detection 1/0

0 to 1

-

This parameter always is 0, e. g. the automatic detection of power unit is switched off. The values of **ID 0054** I_{max} , **ID 0055** I_{nom} and **ID 0056** overload time must have been set.

ID 0054

X

Monitoring LT max current

0 to 1000 A

-

At **ID 0053** = 1 this parameter is for the display of the maximum permitted current of power unit.

At **ID 0053** = 0 here the maximum permitted current of the power unit for monitoring must be set.

ID 0055

X

Monitoring LT nom current

0 to 1000 A

-

At **ID 0053** = 1 this parameter displays the nominal current of power unit.

At **ID 0053** = 0 here the nominal current of the power unit for monitoring must be set.

ID 0056

X

LT Overload time

0 to 1000 s

-

At **ID 0053** = 1 this parameter displays the overload time of power unit.

At **ID 0053** = 0 the overload time of the power unit here can be parameterized.

During the overload time the power unit can be operated with maximum current **ID 0054**. After that the error message error 42 is generated.

The Ixt-monitoring is switched off in case this parameter is set smaller than 0.

ID 0057

X

Motor time constant

0 to 1000 s

-

Here the thermal time constant τ_{Motor} is set in seconds. The value τ_{Motor} is to be taken from data sheet of the motor. If $\tau_{Motor} = 0$ is set, the motor overload monitoring is switched off.

ID 0058

X

Monitoring motor I_{2t} threshold

0 to 1000 %

-

At exceeding this limit value a warning message is signaled. 100 % is accordant to nominal load.

10.3 An example for parameterization

ID 0059 **Monitoring motor I2t value** 0 to 1000 %

-

-

Display value to parameter **ID 0058**.

Scaling: 100 % $\hat{=}$ nominal load

ID 0065 **Monitoring MT temp. In** 0 to 200 °C

-

-

If there is no motor temperature sensor (**ID 1681** = 0), the motor temperature for I2t initialization must be set, otherwise the I2t initialization is calculated from the current motor temperature.

≤ 40 °C $\hat{=}$ 0 % I2t-value

155 °C $\hat{=}$ 100 % I2t-value

10.3 An example for parameterization

For KSR power unit, 8 kHz PWM, with motor DSD28

Parameters	Name	Presettings	Setting	Unit	Note
ID 0053	Auto LT detection 1/0	1	0		Manually setting of ID 0054 , ID 0055 , ID 0056
ID 0054	Monitoring LT max current		4.5	A	ID 0446 must be set to 5 A
ID 0055	Monitoring LT nom current		3	A	
ID 0056	LT overload time		2	Second	
ID 0057	Motor time constant		600	Second	Ten minutes
ID 0058	Monitoring M I2t threshold	0	100	%	Permit nominal load on a continuing basis

10.4 Table power unit

Power unit parameters of KSR:

Devices	I _{nom} 8 kHz [A]	I _{max} 8 kHz [A]	T ₀ [second]
KSR - 3A	3	4.5	2

ERROR DETECTION AND TROUBLE-SHOOTING

In this chapter we describe the error indications of the device: error- and warning messages, their meanings and how you can react.

11.1 Safety instructions

- Refer to ► [Fundamental safety instructions](#)◄ from page 7.

11.2 Requirements to the executing personnel

The personnel, who works with the **KSR - 3A** device, must be introduced in the safety instructions and in the operation of the device and must be familiar with the accurate operating of the device. Especially the reaction to failure indications and -conditions requires special knowledge, which the operator must have.

11.3 Monitoring functions

Error message If there is an error the display occurs by PCBASS/ELTK or by the higher-level control. The error status is displayed by the blue LED H10.

A survey of the most important monitoring functions and of the from the monitoring functions generated warning-/error messages you will find in the following table.

Monitoring function	Warning/error	Warning	Error	Threshold adjustable	Reaction adjustable	Reaction
DC-link voltage	Mains undervoltage	X	X	-	-	IS
	Mains overvoltage	X	X	-	-	IS
Overcurrent	Overcurrent motor	-	X	-	-	IS
ZK	DC-link-overvoltage	-	X	-	-	IS
Ixt-threshold	Peak current	X	X	X	-	IS
I ² t monitoring	I ² t-threshold exceeded	-	X	-	-	IS
Motor temperature	Threshold 1 exceeded	X	-	X	-	-
	Threshold 2 exceeded	X	-	X	-	-
Position controller	Following error	-	X	X	-	SH
Encoder	Cable break	-	X	-	-	IS
	Overspeed	-	X	X	-	IS
Block monitoring	Drive blocked	-	X	X	-	IS

IS: Pulse inhibit
SH: Quickstop

Settings and error messages see [►Error messages current controller◄](#) on page 80 and [►Error messages power unit / motor monitoring◄](#) on page 80

Explanatory notes

Overcurrent	This monitoring function checks, if the motor current is bigger than 1.3 x output peak current (7.9 A). It serves as „disaster prevention“ in case of an output-sided short-circuit.
ZK	This monitoring function checks the voltage of the DC-link. In case the voltage exceeds an certain value, the error "DC-link-overvoltage" is signaled from the controller and an immediate pulse inhibit follows.
Ixt-threshold	This monitoring function checks the momentary load thereupon, if the power unit at the time can supply peak current or max. nominal current at the time. In case the peak current is not possible, the message "Ixt-threshold exceeded" is signaled.
I ² t overload	This monitoring function checks the temperature of the motor. In case the I ² t-threshold is exceeded, the controller signals the error "I ² t-overload".
Motor temperature	In case the adjusted temperature threshold 1 is exceeded, the warning "temperature-threshold 1 exceeded" is generated by the controller. In case the adjusted temperature threshold 2 is exceeded, the warning "temperature threshold 2 exceeded" is generated by the controller.
Position controller	This monitoring function checks the following error limit. In case the current following error is greater than the adjusted following error limit, the error message „following error“ is generated. and an immediate pulse inhibit follows.
Block monitoring	This monitoring function checks the motor speed and the motor current. If, for the period of time "block monitoring time" the following conditions are fulfilled, the error/warning "drive blocked" is signalled to the controller and an immediate pulse inhibit operates. • Motor speed = 0 • The motor current which is supplied by the device is the same as the adjusted motor limit current (current limit).

11.4 Troubleshooting

The devices of the series **KSR - 3A** signal an error status via the lighting up of the blue LED H10 (front side of the device). The error codes can be read by the operation software via PC/laptop (meaning of error codes see [►Error table for guide bar drives◄](#) from page 81).

- ❶ The error number is displayed in **ID 0036**.

Acknowledge errors

If the blue error LED lights up at least one error is detected. By error acknowledge continuously all error messages are reset. An individual error acknowledge is not possible. Still existing errors cannot be acknowledged.

- ❷ Set the parameters **ID 0031** (error module) or **ID 0560** (operation mode BA handler module) to 4, in order to execute a general reset.
- ❸ Set the parameters **ID 0031** or **ID 0560** to 5, in order to reset the modules with error messages.

11.5 Error messages current controller

Error number	Cause	Reaction
430	Sign-of-life signal	Fatal error, pulse enable is withdrawn
563	Uzk max exceeded	Dependent of ID 1676 R error mode
564	I _{max} exceeded	Fatal error, pulse enable is withdrawn
567	LT overtemperature	Dependent of ID 1676 R error mode
573	Switch off: Motor temperature switch-off threshold exceeded	Dependent of ID 1676 R error mode
575	Warning: Motor temperature threshold 2 exceeded	Warning
576	Charge relay not yet activated	Current controller cannot be switched on
577	Overload chopper resistor	Dependent of ID 1676 R error mode
578	Automatic offset adjustment doesn't converge.	

11.6 Error messages power unit / motor monitoring

Error number	Cause	Troubleshooting
37	Motor I _{2t} threshold reached	• Increase threshold or • In case of incorrect temperature sensing switch off motor I_{2t} monitoring (ID 0057 = 0).
41	Inconsistency between automatic power unit detection and ID 446 (maximum current converter)	• Enter with correct value in ID 0446 or • In case of a power unit detection error switch off auto detection (ID 0053 = 0).
42	Power unit error monitoring has responded	• Check parameter ID 0055 LT Inom current or • Check drive system parameterization.

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
4	9001	link module error double or incorrect ID	drive remains in initialization phase; error in DSP program • check DSP program version and load again.	voltage off/on; contact system programmer
5	9001	link module error	drive remains in initialization phase; error in DSP program • check DSP program version and load again.	voltage off/on; contact system programmer
6	9001	link/activate module error	drive remains in initialization phase; error in DSP program • check DSP program version and load again.	voltage off/on; contact system programmer
7	9001	link/activate module error	drive remains in initialization phase; error in DSP program • check DSP program version and load again	voltage off/on; contact system programmer
8	9001	activate module error	drive remains in initialization phase; error in DSP program • check DSP program version and load again	voltage off/on; contact system programmer
9	9001	activate module error	drive remains in initialization phase; error in DSP program • check DSP program version and load again	voltage off/on; contact system programmer
11	9002	error during loading of data set	current drive status (BA) remains; incorrect parameter values, e. g. limits exceeded • load the checked data set	reset drive after troubleshooting
12	9001	error during indirect function call	error in DSP program • check DSP program version and load again	voltage off/on
13	9001	the interrupt is missing	CPU mode is set incorrect • load the checked data set	voltage off/on
17	9001	unexpected system interrupt	drive remains in initialization phase; error in DSP program • check DSP program version and load again	voltage off/on
20	9002	parameter value not accepted	incorrect parameter values, e. g. limits exceeded • load the checked data set	voltage off/on
21	9002	parameter value is not accepted (smaller than minimum value)	incorrect parameter values, e. g. limits exceeded • load the checked data set	voltage off/on
22	9002	parameter value is not accepted (greater than maximum value)	incorrect parameter values, e. g. limits exceeded • load the checked data set	voltage off/on
23	9002	number of the general parameters do not correspond	incorrect data set • load the checked data set	voltage off/on
24	9002	ROM data set is greater than RAM data set	incorrect data set • load the checked data set	reset drive after troubleshooting
25	9002	during restore the data was not accepted	incorrect data set • load the checked data set	reset drive after troubleshooting

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
26	9002	address error	e. g. ID 0025 EEPROM address is set incorrectly • load the checked data set	reset drive after troubleshooting
27	9001	incorrect block size	error in DSP program • check DSP program version and load again.	reset drive after troubleshooting
28	9001	not programmable	EEPROM cell could not be written • repetition	reset drive after troubleshooting
29	9001	access errors	EEPROM cell could not be read • repetition	reset drive after troubleshooting
30	9002	checksum error parameter set	checksum error of parameters • load the checked data set	voltage off/on
31	9001	checksum error particular parameters	checksum error of particular parameters • define zero passage (possibly pole position detection, not at absolute encoder systems)	reset drive after troubleshooting
33	9001	diagnosis incorrect pointer	error in DSP program • check DSP program version and load again.	voltage off/on
34	9024	exceeding positive maximum speed	the monitoring threshold was exceeded (parameterization error, encoder error or similar) • encoder or similar check or • load the checked data set	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
35	9024	exceeding of negative maximum speed	the monitoring threshold was exceeded (parameterization error, encoder error or similar) • encoder or similar check or • load the checked data set	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
37	9013	overload	the monitoring threshold was exceeded (parameterization error, higher torque requirement), motor I ² t monitoring • check mechanical friction • load the checked data set • check temperature measuring	reset drive after troubleshooting
38	9024	exceeding positive position deviation	the monitoring threshold was exceeded (parameterization error, higher torque requirement) • check mechanical friction • load the checked data set	after troubleshooting reset drive and activate again (e. g. selection of BA Automatic)
39	9024	exceeding negative position deviation limit	the monitoring threshold was exceeded (parameterization error, higher torque requirement) • check mechanical friction • load the checked data set	after troubleshooting reset drive and activate again (e. g. selection of BA Automatic)
41	9015	power unit identification is not correct	power unit identification or value in ID 0446 not correct • ID 0446 check max. current converter • change power unit	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
42	9015	power unit monitoring has responded and max. torque current was limited	power unit monitoring has responded and torque current was limited • check mechanical friction • load the checked data set • check temperature measuring	
60	9001	converter timeout	error at analog input • change of controller	voltage off/on

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
80	9006	error at strobe configuration of selected modules	incorrect data set • load the checked data set	reset drive after troubleshooting
81	9006	invalid channel type	incorrect parameter values • load the checked data set	reset drive after troubleshooting
82	9006	the calculated conversion factor is 0	incorrect parameter values • load the checked data set	reset drive after troubleshooting
110	9002	invalid mode for axis selected	incorrect parameter values • load the checked data set	reset drive after troubleshooting
111	9001	non-initialized axis addressed	error in DSP program • check DSP program version and load again.	voltage off/on
114	9001	not enough memory space for encoder access existent	error in DSP program • check DSP program version and load again.	voltage off/on; (non-resettable error); contact system programmer
115	9002	synchronization error with a definitely specified angle	incorrect parameter values • load the checked data set	after troubleshooting activate drive again
116	9007	invalid encoder signals/encoder connection	no usable encoder signal • check encoder cable and encoder (pole position detection, not at absolute encoder system)	after troubleshooting activate drive again
117	9007	non-existent encoder	no usable encoder signal • check encoder cable and encoder (pole position detection, not at absolute encoder system)	after troubleshooting activate drive again
118	9002	encoder line count was initialized invalid = 0	incorrect data set, ID 0088=0 is set • load the checked data set	reset drive after troubleshooting
119	9001	error in the programmable logic (ALTERA module)	encoder evaluation error • reboot or • change controller	voltage off/on, (non-resettable error; Contact system programmer
120	9007	max. signal amplitude of encoder track exceeded	no encoder adjustment; incorrect parameter values; no usable encoder signal (adjusting); possibly defective encoder; • carry out encoder adjustment • check data set • adjust encoder • check encoder/replace	after troubleshooting activate drive again
121	9007	max. signal amplitude of encoder track exceeded	no encoder adjustment; incorrect parameter values; no usable encoder signal (adjusting) • carry out encoder adjustment • check data set • adjust encoder • check encoder/replace	after troubleshooting activate drive again
123	9007	encoder self diagnosis signalizes an error	encoder system signalizes error (e. g. over-temperature or pollution) • clean encoder • carry out HW encoder reset (voltage off/on) • if necessary replace encoder system	voltage off/on
128	9007	error at reading of the absolute value for synchronous motors	axis moves during the controller switch-on phase; read error absolute position; non-existent pole position • wait for the axis to stop; • carry out HW encoder reset (voltage off/on) • carry out pole position detection	voltage off/on

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
129	9007	max. permissible variance of encoder signals exceeded	no encoder adjustment; incorrect parameter values; no usable encoder signal (adjusting); possibly defective encoder • carry out encoder adjustment • check data set • adjust encoder • check encoder/replace	after troubleshooting activate drive again
130	9002	no encoder line count has been set from active axis	controller isn't parameterize or incorrect data set; • load the checked data set	after troubleshooting activate drive again
140	9007	distance-coded referencing: reference marks outside of the parameterized range	incorrect parameterization or incorrect linear measuring (at the time there are max. 16 number of pulses ID 2322 : 8 number of pulses) • ID 2322 : Ref Mark Delta: check number of pulses	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
150	9007	non-existent Ferraris sensor	unrealized Ferraris sensor was activated • connect Ferraris sensor • check cabling • check Ferraris sensor	after troubleshooting activate drive again
200	9016	there is no cycl. communication at SERCOS slave	incorrect parameter values (baud rate, cable length or similar), connection of SERCOS ring interrupted, SERCOS module in the controller defective • check of SERCOS connection • possibly change of controller	reset drive after troubleshooting
310	9001	USS timeout	incorrect parameterization of baud rates, connection interrupted, RS485 connection at the controller defective • check of parameterization of baud rates, check connection, possibly change of controller	after troubleshooting activate drive again
370	9002	incorrect parameterization source target	incorrect parameter values • load the checked data set	voltage off/on, (non-resettable error)
371	9026	synchronous machine has no pole position	synchronous machine has no pole position • carry out pole position detection	carry out pole position detection
424	9015	error switch-on sequence safety relay and pulse enable	incorrect wiring in control cabinet • check wiring in control cabinet	voltage off/on
430	9001	PWM set value timeout (controller error)	if current controller is activated the CPLD signalizes a current set value timeout • error reset and restart • at repeatedly occurring of error load ALTERA file again or replace controller	
440	9013	overcurrent	short-circuit motor cable, motor defective, power unit defective • check motor cables • check motor and power unit	reset drive after troubleshooting
441	9002	incorrect parameterization in the motor manager	incorrect parameter values • load the checked data set	voltage off/on, (non-resettable error)
442	9026	synchronous machine has no pole position	synchronous machine has no pole position • carry out pole position detection	carry out pole position detection
443	9007	timeout at reading of SIN COS encoder	encoder cable or encoder error • encoder cable and encoder check	reset drive after troubleshooting

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
444	9001	software module encoder evaluation is missing	error in DSP program • reload DSP program	voltage off/on, (non-resettable error; contact system programmer)
445	9007	reading error of SIN-COS encoder absolute position	reading error • check encoder cable and encoder (pole position detection, not at absolute encoder system)	reset drive after troubleshooting
446	9007	absolute value is read although the synchronous motor rotates	axis moves inadmissible • repeat at standing axis	repeat at standing axis
447	9007	writing error of electr. angle in the absolute encoder	communication error due to electr. interfering radiation; no connection; possible faulty encoder system • repeat function • check cable running (e. g. distance to motor cable) • check cabling and encoder system	after troubleshooting reset drive and activate again
448	9007	read-after-write check error of electr. angle from absolute encoder	communication error by electr. interfering radiation; no connection; possible faulty encoder system • repeat function • check cable running (e. g. distance to motor cable), check cabling and encoder system	after troubleshooting reset drive and activate again
449	9007	tolerance error between written and read electr. angle too high	at ending of pole position detection drive is not yet in pole position (drive has mechanical friction, disadvantageous setting of parameter) • repeat function check parameterization • if necessary slightly turn drive and repeat function	after troubleshooting reset drive and activate again
450	9007	absolute interface not ready for writing of electrical angle	communication error due to interfering radiation; no connection; possible defective encoder system • repeat function • check cable running (e. g. distance to motor cable), cabling and encoder system	after troubleshooting reset drive and activate again
525	9002	maximum distance exceeded	overflow ID 0529 SG distance • only possible with active set speed generator	after troubleshooting reset drive and activate again
526	9002	minimum distance exceeded	underflow ID 0529 SG distance • only possible with active set speed generator	after troubleshooting reset drive and activate again
560	9015	power unit has reset controller enable	power unit error • reboot	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
562	9001	there is no controller module	error in DSP program • reload DSP program	reset drive after troubleshooting and activate again (e. g. selection of BA AUTOMATIC)
563	9015	LT UZK max exceeded	mains voltage too high, braking energy too high (e. g. incorrect curve data) • check mains voltage • check curves	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
564	9013	LT I _{max} exceeded	power cables or motor damaged • check power cables or motor	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
565	9015	LT current leakage monitoring	power cables or motor damaged • check power cables or motor	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
566	9015	LT auxiliary voltage monitoring	error in internal switching controller • change controller	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
567	9015	LT overtemperature	power unit overtemperature • remove overload of axis	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
571	9015	LT error, general error	power unit error • change controller	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
573	9029	LT error, MT > switch-off threshold	mechanical friction, incorrect parameters, incorrect curve was set, temperature sensor, - cable or -connection defective (parameter motor temperature approx. 285 °C) • check mechanic • check connection (X28) and cable motor temperature	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
574	9015	LT error, general controller error	power unit error • change controller	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
575	9029	LT error MT > 2nd warning threshold	mechanical friction, incorrect parameters, incorrect curve was set, (threshold 2 ID 1684 motor temperature exceeded) • check mechanic • check data set, check curves	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
576	9015	LT error, charge relay not yet activated	current controller was activated before DC link charging was completed • wait for DC to be charged • if necessary check/replace controller	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
577		Overload chopper resistor		after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
578		error offset adjustment	automatic offset adjustment doesn't converge.	
580	9031	inaccessible state in the operating mode manager	error in DSP program • check DSP program version and load again	
581	9031	incorrect/non-existent BA selected	a non-existent operating mode was selected (invalid operating mode number) • select valid operating mode	
950	9016	initialization error at configuration identification	drive controller has an initialization error at determination of SERCOS configuration • check SERCOS connections • check operating status of axes	
951	9031	error central SPS command, drive information missing	a SPS command was assigned without the previous selection of a drive-/offset series number • select drive-/offset series number and re-assign command	
952		store parameter data set at BA!= INACTIVE not permitted (via DC-link);	via a central command the storing of parameter data set was initiated although the current operating mode is INACTIVE • switch drive in operating mode INACTIVE and after that initiate central command once more	acknowledge errors

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1050	9016	SERCOS ring error (drive ring)	error in connection, interface or reset of an axis or incorrect cycle time has been set. • check connections • check operating status of axes	reset drive after troubleshooting
1051	9016	SERCOS user error	error in axis interface • check operating status of axes	reset drive after troubleshooting
1070	9016	SERCOS ring error ring 2 (master ring)	error in the connection, axis interface or reset of an axis or wrong cycle time has been set • check connections • check operating status of axes	reset drive after troubleshooting
1071	9016	SERCOS user error ring 2	error in axis interface • check operating status of axes	reset drive after troubleshooting
1902	9002	parameterized resolution of master axis too high	incorrect parameter values ID 1909 > 24 bit • load the checked data set	voltage off/on, (non-resettable error)
1903	9002	non-existent/active axis selected	in the SERCOS module a non-existent axis was selected • load the checked data set	voltage off/on, (non-resettable error)
1904	9001	not enough memory space existent	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error)
1905	9001	no pattern data parameters existing	error at the linking of DSP program • check DSP program version and load again	voltage off/on, (non-resettable error)
1906	9001	error at internal communication with parameter USS command	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error; contact system programmer)
1907	9001	no cam parameters existing	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error; contact system programmer)
1908	9001	SERCOS slave synchronization data are not available	error in DSP program • check DSP program version and load again	reset drive after troubleshooting
1909	9001	modules cannot be deactivated	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error; contact system programmer)
1910	9002	sending buffer for sequential cyclic data was not filled up in time	Run time overflow (cyclic time too short, axis number too high) • parameterization check (cycle, axis number and similar)	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1912	9001	error at initialization of parameter read-/write function	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error); contact system programmer
1913	9025	no current pattern data existent	via SERCOS no new data existent (master dropped out, no pattern data, SERCOS ring interfered) • check if drive runs with auxiliary pattern, RESET, continue	reset drive after troubleshooting
1917	9017	there are no valid operation data available	the main shaft still rotated at switch-off • define zero range (possibly pole position detection, not at absolute encoder systems)	define zero range (possibly pole position detection, not at absolute encoder system)
1918	9001	at collecting/distributing of operation data an error has occurred	error in DSP program • check DSP program version and load again	voltage off/on

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1919	9001	invalid message at control operating data	error in DSP program • check DSP program version and load again	voltage off/on
1920	9015	DC-link voltage falls below the permissible value; drive waits until main shaft stops and then changes into operating mode INACTIVE	switching off of machine, defective in supply • re-start of machine • check mains supply and fuses, • replace BUG	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1921	9031	change into selected operating mode invalid	change into selected operating mode invalid • select valid operating mode	reset drive after troubleshooting
1922	9031	current operating mode can/must not be exited	current operating mode can/must not be exited • provide conditions for change of operating mode (e. g. stop main shaft)	stop main shaft and then try operating mode change once more
1923	1923	main shaft rotates beyond the permissible range	main shaft was rotated in switched off or inactive state • run main shaft in green range, reset	run main shaft in green range and then execute reset
1924	1924	position deviation of guide bar greater than parameterized value	guide bar was moved in switch-off status or inactive state • run main shaft in green range, reset	run main shaft in green range and then execute reset
1925	9017	main shaft is in the red range	main shaft is in the red range • run main shaft into green range	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1926	9024	position deviation too high at homing	incorrect parameter values, axis mechanically blocked, incorrect motor angle (not at absolute encoder system) • load the checked data set, check mechanics, pole position detection (not at absolute encoder system)	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1927	9007	no distance marks recognized at distance-coded system	no distance marks recognized at distance-coded system • repeat • check encoder, possibly clear	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1928	9028	start compensating curve zero interpolation point incorrect	incorrect parameter values (e. g. encoder resolution) • load the checked data set	reset drive after troubleshooting
1929	9028	read compensation curves was exited before ending	read compensation curve was exited before ending • repeat compensation curve read	repeat compensation curve read
1930	9001	pulse enable is/has switched off	pulse enable is/has switched off • wiring check	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1931	9001	current controller is/has switched off	current controller is/has switched off (high position deviation error, maximum speed exceeded, power unit error) is in BA INACTIVE • load the checked data set, • reset, restart	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1932	9001	motor manager is/has switched off	motor manager is/has switched off is in BA INACTIVE • load the checked data set, • reset, restart	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1933	9001	position, speed controller has switched off	position, speed controller has switched off is in BA INACTIVE • load the checked data set, • reset, restart	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1934	9007	homing with distance-coded system not possible	encoder reference marks are not recognized, possible soiling of encoder • repeat • check encoder, possibly clear	reset drive after troubleshooting
1935	9026	pole position detection canceled early	pole position detection canceled early • selection BA INACTIVE, repeat	repeat pole position detection
1936	9031	operating mode because of general drive error switched off	general drive error (another than ID 1930 - ID 1933) • drive check	voltage off/on,
1937	9024	permissible position deviation error exceeded in notch position	permissible position deviation error exceeded in notch position • load the checked data set • slow down speed • check mechanical friction	reset drive after troubleshooting
1938	9024	permissible position deviation exceeded outside notch position	permissible position deviation exceeded outside notch position • load the checked data set • slow down speed • check mechanical friction	reset drive after troubleshooting
1939	9015	warning, power unit temperature has exceeded permissible range	bad heat discharge, power unit defect, overload of axis, environmental temperature too high • stopping the machine • check control cabinet ventilation • check mechanical friction • check of specified curves • possibly change of power unit	reset drive after troubleshooting
1940	9022	main shaft rotates backwards via the permissible angle range	main shaft rotates backwards via the permissible angle range • load the checked data set • check brakes or similar	reset drive after troubleshooting
1941	9007	absolute position cannot be read via the serial interface	encoder, cable or communication fault • repeat • check encoder and cable, possibly clear	reset drive after troubleshooting
1942	9022	main shaft rotates, during BA INACTIVE, POLE POSITION DETECTION or HOMING active	main shaft rotates during BA INACTIVE, POLE POSITION DETECTION or HOMING active • check brake, reset	reset drive after troubleshooting
1943	9024	static position deviation too high	static position deviation too high (probably axis is blocked) • check static position deviation, check if axis is blocked	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1944	9028	curve shape of compensation curve is invalid	difference between two interpolation points is greater than the defined maximum value • check maximum value and compensating curve	reset drive after troubleshooting
1945	9007	no guide bar encoder existent	guide bar encoder, cable or controller defective • check guide bar encoder, cable or • check controller	reset drive after troubleshooting
1946	9022	no main shaft encoder existent	main shaft encoder, cable or controller defective • check main shaft encoder, cable or controller	reset drive after troubleshooting

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1947	9013	torque-generating current is greater than the blocking threshold and the parameterized time	possibly axis blocked or parameters incorrectly set • check if axis is mechanically blocked or check data set	after troubleshooting reset drive and activate again (e. g. selection of BA AUTOMATIC)
1948	9007	correction of electrical angle not permissible	too high angle deviation • repeat distance-coded referencing • increase ID 1920, restart pole position detection	reset drive after troubleshooting
1949	1949	not in pattern	axis is not in the pattern arrangement • with inching motion synchronize pattern arrangement; additionally after define zero position: message main shaft zero position on	reset drive
1950	9017	motor angle and operation data invalid	after switching on the motor angle and the operation data are invalid • pole position detection • define zero position	pole position detection, define zero position
1951	9017	operation data invalid	after switching on: operating data invalid • define only zero position	define zero position
1952	9007	with absolute encoder: plausibility check of motor encoder angle signals error	encoder position is not correctly detected • heating operation, restart	voltage off/on, (non-resettable error) (non-resettable error)
1953	9022	with absolute encoder: plausibility check of master axis encoder angle signals error	encoder position is not correctly detected • heating operation, restart	voltage off/on, (non-resettable error) (non-resettable error)
1954	9002	Master-Master: incorrect user number	no user was set • parameterization check	reset drive after troubleshooting
1955	9016	no new data was received	transmission error in SERCOS ring 2 • check SERCOS ring 2	reset drive
1956	9031	BA0 cannot be exited	in a controller module RESET is demanded • reset at control cabinet necessary	reset drive
1957	9007	serial interface motor encoder not active	encoder- or interface error • check encoder	voltage off/on
1958	9022	serial interface main shaft encoder not active	encoder- or interface error • check encoder	voltage off/on
1959	9017	erase of operation data sector failed	operation data sector could not be erased although several attempts were made • repeat attempt • replace controller	voltage off/on,
1960	9017	operation data sector could now be erased	after preceding error 1959 it however was managed to erase operation data sector	reset drive
1961	9031	extended define zero position is only permitted in green range	the function extended define zero position has been selected during the drive not being in BA AUTOMATIC. • go in green range with machine and • then activate function define extended zero position again	reset error (reset)
1962	9031	extended define zero position only at standing main shaft permitted	the function extended define zero position was selected while the main shaft is rotating • stop machine and • then activate function extended define zero position again	reset error (reset)

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1963	9031	BA5: after traversing the parameterized distance no stop was found	no stop existent (e. g. there was no washer mounted) • remove error (mount stop, mount washer)	
1964	9031	BA5: stored correction distance too large	stored correction distance greater than the parameterized maximum distance for fine adjustment • reduce stored correction distance (ID 2014) or enlarge maximum distance for fine adjustment (ID 2024)	
1965	9031	BA5: traversed correction distance on the right too large	in the mode fine adjustment the correction distance, which has been traversed to the right, has reached the maximum permissible distance for fine adjustment • traverse correction distance to the left or enlarge maximum distance for fine adjustment (ID 2024)	
1966	9031	BA5: the traversed correction distance on the left too large	in the mode fine adjustment the correction distance, which was traversed to the left has reached a maximum permissible distance for fine adjustment. • traverse correction distance to the right or enlarge maximum distance for fine adjustment (ID 2024)	
1967	9031	BA5: define master axis encoder zero; only permissible at inactive „set value generation guide bar drive“	define master axis encoder zero was selected in BA5 at active set value generation guide bar drive“ • start BA5 without active set value generation guide bar drive“ or alternatively select BA0 or BA8	
1968	9027	the maximum permissible correction distance of fineness was exceeded on the right	it was attempted to exceed the maximum permissible correction distance to the right in the operation mode "automation correction of fineness" • traverse correction distance to the left or enlarge the maximum permissible correction distance (ID 2024)	
1969	9027	the maximum permissible correction distance of fineness was exceeded on the left	it was attempted to exceed the maximum permissible correction distance to the left in the operation mode automated correction of fineness" • traverse correction distance to the right or enlarge the maximum permissible correction distance (ID 2024)	
1970	9027	division by zero occurred at functionality automated correction of fineness"	BA9, operation mode „automated correction of fineness“: division by zero because V1 manual mode" (ID 1929) or needle set value equal zero • set parameter ID 1929 to $\neq 0$ and/or move drive out of zero position	
1971		position deviation guide bar drive by sine-shaped or oscillating movement	the position deviation of the guide bar drive was caused by the interruption (emergency off) of sine-shaped movement or of the oscillating movement • drive moves after error reset to its set position	acknowledge errors
1980	9001	initialization error set value generator	error in DSP program check DSP program version and load again.	voltage off/on (non-resettable error); contact system programmer

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1981	9020	initialization error arrangement of exchange threshold values	the number of notchings in a curve do not comply with arrangement mode • check parameter numbers and values in the curve • temporarily: load all previous curves	voltage off/on (non-resettable error)
1982	1982	working range exceeded on the right	working range exceeded on the right • load the checked data set • move axis back into working range • Reset	reset drive
1983	1983	working range exceeded on the left	working range exceeded on the left • load the checked data set • move axis back into working range • Reset	reset drive after troubleshooting
1984	9017	undefined operation data	at switch-off no back-up of operation data was made • define zero range (possibly pole position detection, not at absolute encoder sys- tems)	reset drive after troubleshooting
1985	1930	arrangement too large, arrangement had to be limited	transition to a new curve, incorrect param- eter values, incorrect data from the pattern processor • reset until the new arrangement has been overtaken • load the checked data set	reset drive after troubleshooting
1986	9030	arrangement limit switch exceeded	arrangement limit switch exceeded, pattern or pattern + manual offset too large • load the checked data set	reset drive after troubleshooting
1987	9024	STOP in notch position; there is no current mas- ter axis position avail- able	data is missing (master without operation data, no computer data of pattern, SERCOS ring interrupted) • start master • check pattern processor • check SERCOS connection (in BA INAC- TIVE, reset, restart)	change into BA INACTIVE; reset drive; select desired operation mode again
1988	9025	data timeout	pattern data is not available on time (main shaft offset or speed too large) • check main shaft offset and speed	reset drive after troubleshooting
1989	9016	at standing main shaft no receiving of encoder position	transmission error in SERCOS ring • check SERCOS ring	after troubleshooting reset drive and acti- vate again (e. g. selection of BA AUTO- MATIC)
1990		oscillating movement only permissible in BA AUTOMATIC	function oscillating movement was selected, while the drive was not in BA AUTOMATIC • select BA AUTOMATIC and after that acti- vate the function oscillating movement again	reset error (reset)
1991		oscillating movement only permissible at standing main shaft	function oscillating movement was selected, while the main shaft is rotating • stop machine and then activate the func- tion oscillating movement again	reset error (reset)
1992		oscillating movement only permissible in green range	oscillating movement only permissible in green range • traverse machine into green range and activate function oscillating movement then again	reset error (reset)

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
1993		set value generator "sine-shaped movement" cannot be activated ;	the set value generator "sine-shaped movement" can not be activated, because it is situated in the phase "synchronized stopping" at the moment • wait until set value generator is in status "stop" (if necessary send synchronous signal) and then activate set value generator anew;	reset error (reset)
1994		for the function "sine-shaped movement" a negative amplitude is obtained;	the current actual position is larger than the position of arrangement limit switch (internal machine image no longer complies with the actual machine status) define zero position; • (if necessary pole position detection, not at absolute encoder system);	reset error (reset)
1995		setting operation only can be activated in the operation mode AUTOMATIC (BA1)	it was attempted to activate the setting operation although the drive was not situated in operation mode AUTOMATIC (BA1) • switch drive into operation mode AUTOMATIC (BA1) and then activate setting operation once more	acknowledge errors
1996		setting operation can only be activated/deactivated at standing main shaft	it was attempted to activate/deactivate setting operation at rotating main shaft • stop main shaft and once more activate/deactivate setting operation again	acknowledge errors
1997		setting operation can only be deactivated in the "green" range	it was attempted to deactivate setting operation in the "red" range • move main shaft into the "green" range and then deactivate setting operation once more	acknowledge errors
1998		main shaft is rotating during the deactivating phase of setting operation	the main shaft starts to rotate during the deactivation phase of setting operation • stop main shaft in the "green" range	acknowledge errors
1999		main shaft is in the red range during the deactivation phase of setting operation	the main shaft is (was stopped) during the deactivation phase of the setting operation in the red range • move main shaft into "green" range	acknowledge errors
2000		compensating distance setting operation greater than parameterized value	the compensation distance, which has to be moved is greater than the defined max. deviation of ID 1951 , in order to deactivate the setting operation • generate reset; (compensation distance then is traversed)	
2025	9025	Checksum error EEPROM	transmission error from the pattern processor • check of cables • reset, restart	reset drive after troubleshooting
2026	9025	Protocol error	parameter in the pattern processor or controller is incorrect • check parameters in the pattern processor and controller	reset drive after troubleshooting
2027	9001	error at memory assignment in the software module communication pattern control processor	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error); contact system programmer
2028	9002	max. permissible drive number exceeded	incorrect parameter values • load the checked data set	reset drive after troubleshooting

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
2029	9001	error at switchover of USS operation mode	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error)
2030	9001	index overflow	error in DSP program • check DSP program version and load again	contact system programmer
2031	9025	data is useless	transmission error • check cables	reset drive after troubleshooting
2032	9001	main shaft position can not be read from the software module communication pattern control processor	error in DSP program • check DSP program version and load again	voltage off/on, (non-resettable error)
2033	9025	error in rotating sequence	pattern data does not comply with master axis position • define main shaft encoder zero, pattern processor remove line trigger error	reset drive after troubleshooting
2034	9025	invalid arrangement detection	invalid arrangement data • check pattern data	reset drive after troubleshooting
2035	9025	selected an invalid drive address	drive address of arrangement is not existent in the controller • check arrangement data	reset drive after troubleshooting
2036	9025	maximum value arrangement exceeded	maximum value arrangement exceeded • check parameters or arrangement data	reset drive after troubleshooting
2037	9025	pattern telegram missing	not received pattern data (e. g. SERCOS- or cable error) • check requirements for pattern data transmission (e. g. SERCOS, cables)	reset drive after troubleshooting
2038	9025	axis number incorrectly parameterized	axis number incorrectly parameterized (in the controller or in the machine table) • load the checked data set or • make corrections on machine table	reset drive after troubleshooting
2039	9001	data backup is missing	error in DSP program • check DSP program version and load again.	after troubleshooting reset drive; contact system programmer
2040	9001	re-securing is missing	error in DSP program • check DSP program version and load again.	after troubleshooting reset drive; contact system programmer
2041	9001	no memory available	error in DSP program • check DSP program version and load again.	after troubleshooting reset drive; contact system programmer
2042	9017	details acc. error 1917: error at memory assignment in software module safe operation data	error in DSP program • see error 1917	voltage off/on, (non-resettable error); contact system programmer
2043	9017	details acc. error 1917: error at collecting operation data	error in DSP program • see error 1917	see error 1917
2044	9017	details acc. error 1917: inconsistency of operation data between memory module and application module	error in DSP program • see error 1917	see error 1917

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
2045	9017	details acc. error 1917: stored operation data are invalid (invalidated)	error in DSP program • see error 1917	see error 1917
2046	9017	details acc. error 1917: not enough memory space in the flash	error in DSP program • see error 1917	see error 1917
2047	9017	details acc. error 1917: buffer in S-RAM for programming too small	error in DSP program • see error 1917	see error 1917
2048	9017	details acc. error 1917: no valid program found	error in DSP program • see error 1917	see error 1917
2049	9017	details acc. error 1917: programming position already assigned	error in DSP program • see error 1917	see error 1917
2050	9017	details acc. error 1917: application parameter range too big	error in DSP program • see error 1917	see error 1917
2051	9017	details acc. error 1917: flash module type not identified	error in DSP program • see error 1917	see error 1917
2052	9017	details acc. error 1917: error at flash programming	error in DSP program • see error 1917	see error 1917
2053	9017	details acc. error 1917: general programming error	error in DSP program • see error 1917	see error 1917
2054	9017	details acc. error 1917: error at erasure of sector	error in DSP program • see error 1917	see error 1917
2055	9017	details acc. error 1917: address error special parameter address too big	error in DSP program • see error 1917	see error 1917
2056	9017	details acc. error 1917: block size not correct	error in DSP program • see error 1917	see error 1917
2057	9017	details acc. error 1917: checksum error	error in DSP program • see error 1917	see error 1917
2060	9031	change in selected operation mode not possible, because operation data is invalid	operation mode change only possible with valid operation data • create condition for change of operation mode (e. g. define zero position)	after troubleshooting try operation mode change once more
2061	9031	change in selected operation mode not possible, because motor angle is invalid	operation mode change only permissible with valid motor angle • create condition for operation mode change (e. g. pole position detection)	after troubleshooting try operation mode change once more
2062	9031	change in selected operation mode not possible, because an error at distance-coded referencing has occurred	operation mode change only permissible after successful distance-coded referencing • create conditions for operation mode change (remove error at the function space-distance referencing)	after troubleshooting try operation mode change once more
2063	9031	change in selected operation mode not possible	change of operation mode only permissible with functioning encoder system • create condition for operation mode change (remove errors in the encoder system)	after troubleshooting try operation mode change once more

11.7 Error table for guide bar drives

Error	SPS group	Name	Status/cause/ • Note	SPS reaction
2064	9031	change in selected operation mode not possible, because there still is an error	operation mode change only permissible, if there is no error • create conditions for operation mode change (reset errors)	after troubleshooting try operation mode change once more
2065	9031	change in selected operation mode not possible, because of undefined drive status	operation mode change only permissible with defined drive status (fatal error) • check DSP program version and reload	contact system programmer
2066	9031	change in selected operation mode not possible, because homing has not yet been completed	operation mode change only permissible if function homing is not active • create condition for operation mode change (wait until homing has been completed)	after troubleshooting try operation mode change once more
2067	9031	change in selected operation mode not possible, because pole position detection is not yet completed	operation mode change only permissible if function pole position detection is not active • create condition for operation mode change (wait until pole position detection is completed)	after troubleshooting try operation mode change once more
2068	9031	change in selected operation mode is not possible, because drive is not ready	operation mode change only permissible if the drive has signalled, that it is ready • create condition for operation mode change (wait until the drive signals, that it is ready)	after troubleshooting try operation mode change once more
2069		at active setting operation the change into the selected operation mode is not permissible	it was tried at active setting operation to change in an invalid operation mode (only BA0 and BA1 are permissible) • exit setting operation and then select new operation mode once more	acknowledge errors
2100	9020	access to curve generator with an interpolation angular value, which is too large	error in DSP program • check DSP program version and load again.	after troubleshooting reset drive; contact system programmer
2101	9017	checksum error when reading the curve generator data	checksum error in the flash • re-enter curve data, possibly change controller	reset drive after troubleshooting
2150	9002	access to cam-contact group, which is not initialized	incorrect parameter values • load the checked data set	reset drive after troubleshooting

MAINTENANCE

In this chapter we describe, how you can safely maintain your device.

12.1 Safety instructions

- refer to [►Fundamental safety instructions◄](#) from page 7.
- refer to the danger areas of the devices.

12.2 Danger areas

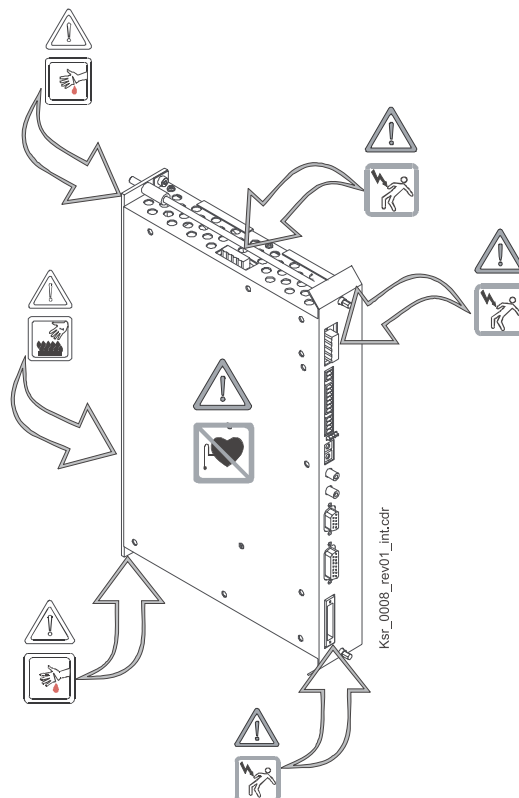


Figure 21: Danger area KSR

12.3 Environmental conditions

If the prescribed environmental conditions are complied with, the device is maintenance-free. The most important prescribed environmental conditions are:

- dustless ambient air
- Temperature: min. 5 °C to max. 55 °C
- Relative air humidity: 5 % to 85 %, no condensation
- (operational-) height: until 1000 m over mean sea level

12.4 Inspection intervals - maintenance notes

We recommend a permanent checking of the environmental conditions. Thus you will receive the possibility, to react immediately, in case the actual conditions deviate from the prescribed conditions.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **electricity**. The unit carries dangerous voltages and currents, as well as residual charges in the DC-link.*

Assure, that when working in the control cabinet, that all devices in the control cabinet are off-circuit and are safe against re-starting.

Await the discharge of the DC-link, before you install the safety relay. The capacitors which are used in the device are **10 min.** after interruption of the supply voltage automatically discharge so far, that the terminals can be demounted without danger. If you have additional capacitors connected to the DC-link, the DC-link decharging also can last much longer. In this case you must determine the necessary waiting time self.

- check the devices at the control cabinet at least once a day, which ensure the environmental air (e.g. air filters)
- maintain the air filters according to the indications of the manufacturer.

In the case of polluted environmental air, the required cooling air rate can not be reached anymore, if dirt deposits narrow/block up the ventilation slots. In case the devices are polluted, contact Baumüller, in order to initiate a maintenance operation or send the device to the company for inspection.



WARNING

The following **can occur**, if you disregard this safety note:

- serious personal injury
- death

*The danger is: **electricity**. The device can be damaged by incorrect maintenance in such a way, that a safe operating isn't possible anymore.*

Do not maintain the device yourself.

Never remove dirt deposits especially in the inside of the device with sharp objects or by the usage of e. g. compressed air, high-pressure cleaner

REPAIR

In this chapter we describe the where the devices are repaired.

WARNING



The following **can occur**, if you disregard this safety note:

- serious personal injury
- death



*The danger is: **electricity**. After a faulty repair the device doesn't fulfill the safety instructions anymore.*

have the devices only be maintained by Baumüller Nürnberg GmbH or authorized service locations



SETTING OUT OF OPERATION, STORAGE

In this chapter we describe, how you shutdown and store the device.

14.1 Safety instructions

► refer to ► [Fundamental safety instructions](#) ◄ from page 7.

The shutdown of the device may only be carried out by this qualified personnel.



DANGER

The following **will occur**, if you do not observe this safety note:

- serious personal injury
- death

*The danger is: **electricity**. Electrical connections, which are not switched current-free, carry dangerous voltage. The modules in the device (e. g. capacitors) can contain dangerous charges!*

Assure, when working in the control cabinet, that all electrical connections in the control cabinet are off-circuit and are safe against re-start.

Before working, check at the electrical connections with suitable measuring devices, that the connections are off-circuit.

Remove the connections not until you have verified yourself of the isolation from supply.

The capacitors which are used in the device are **10 min.** after interruption of the supply voltage automatically discharge so far, that the terminals can be demounted without danger. If you have additional capacitors connected to the DC-link, the DC-link decharging also can last much longer. In this case you must determine the necessary waiting time self.

14.2 Requirements to the executing personnel

The personnel, who is appointed to setting out of operation, must have the required knowledge and instructions, which are necessary for an execution according to the rules. Select the personnel in such a way, that the safety instructions, which are mounted to the device and its parts as well as to the terminals, are understood and applied to.

14.3 Set out of operation

Carry out the setting out of operation as follows:

- 1 Put the device off-circuit and assure the device against unintentional switching on.
- 2 Check the isolation from supply of all connections (earliest 10 min. after switching off).
- 3 Demount the connections and protect the connections according to the safety instructions.
- 4 Document the setting out of operation.

14.4 Demounting

The demounting assumes a completed, documented setting out of operation.

- 1 Secure the device against falling off/out.
- 2 Loosen all mechanical connections
- 3 Lift the device out of the control cabinet.
- 4 Store the device in a suitable packing.
- 5 At transportation pay attention to, that the device is not damaged by incorrect storage or severe shocks, also see

In case you want to dispose the device, you will find further information in chapter.

14.5 Storage conditions

The device is maintenance-free. If you keep to the environmental conditions during the entire period of storage, you can assume, that the device will not be damaged. In case the environmental conditions during storage are not kept, you should assume that the device is damaged after storage.



CAUTION

The following **may occur**, if you do not observe this safety note:

- damage to property

*The danger is: **incorrect environmental conditions**. Incorrect storage can damage/destroy the device.*

Assure, that the environmental conditions are kept during the entire period of storage:

- Climatic category 1 K 4
- Temperature range - 30 °c to + 70 °c

*The danger is: **recommissioning without forming of the capacitors**. From six months storage period on, the capacitors are destroyed during commissioning, if they are not formed beforehand.*

- Reform the capacitors

14.6 Recommissioning

Carry out commissioning as with a new device, see [► Installation ◄](#) from page 31

DISPOSAL

In this chapter we describe the correct and safe disposal of the device KSR. During the disposal you will mainly get metal parts (iron- and non-iron metal), electrical scrap and plastics.

15.1 Safety instructions

► refer to ► [Fundamental safety instructions](#) ◄ from page 7.



DANGER

The following **will occur**, if you do not observe this safety note:

- serious personal injury
- death

*The danger is: **electricity**. The containing components in the device (e. g. capacitors) can contain dangerous charges! The capacitors used in the device are discharged after **10 min.** automatically so far, that they can be demounted without danger.*

If you have additional capacitors connected to the DC-link, the DC-link discharging also can last much longer. In this case you must determine the necessary waiting time self.

Demount the capacitors only then, if you have verified yourself of the isolation from supply.

The device can completely be disposed as electronic scrap.



CAUTION

The following **may occur**, if you do not observe this safety note:

- Environmental pollution

*The danger is: **incorrect disposal.***

You may only dispose under consideration of the safety instructions. If necessary, also refer to the local regulations. In case you cannot carry out a secure disposal, contact a certified disposal business.

During a fire dangerous materials may be generated or set free.

Do not expose electronic components to high temperatures.

The inner insulation e. g. various power semiconductors hold beryllium oxide. When opened, the beryllium dust is dangerous to your health.

Do not open the electronic components.



CAUTION

The following **may occur**, if you do not observe this safety note:

- Environmental pollution

*The danger is: **incorrect disposal.***

Capacitors, semiconductor modules and electronic scrap is to be recycled as special waste.

Capacitors	(E) Capacitors are to be recycled as special waste. Thereby refer to the relevant instructions.
Semiconductor modules	(F) Semiconductor modules are to be recycled as special waste. Thereby refer to the relevant instructions.
Electronic scrap	(G) The electronic scrap from PCBs, which no further can be demounted, must be recycled as special waste. Thereby refer to the relevant instructions.

15.2 Recycling plants/offices

Assure, that the disposal is carried out according to your company's regulations and the regulations of the disposal companies and official administrations. In case of doubt, contact the local business administration, which is responsible for your company or the environmental office.



APPENDIX A - ABBREVIATIONS

A	Ampere	PELV	Protective extra-low voltage with safety separation, earthed
AC	Alternating current	RA	Function module relay output
BASS	Baumüller drives serial link	RF	Controller enable
BB	Ready-to-operate	RS	Controller inhibit
DC	► Direct current ► drive control	r_S	Phase resistance motor winding
DIN	Deutsches Institut für Normung e.V. (German Institute for Standardization)	SE	Shield earth
ELTK	EL: Electrical guide bars TK: Toolkit for Perl (programming surface)	SELV	Safety extra-low voltage with safety separation
EMF	Electromotive force	SH	Quickstop
EMC	Electromagnetic compatibility	SL	Protective conductor
EN	European standard	SM	Synchronous motor
ESD	Electrostatic discharge	U	Voltage
EXT, ext	external	Ū	Peak voltage
FI	Residual current	U_{AC}	RMS value, alternating voltage
I_{AC}	RMS value, alternating current	U_{DC}	RMS value, direct-current voltage
I_{DC}	RMS value, direct current	U_{eff}	Effective value, alternating voltage
KSR	Compact Servo Controller	U_{ZK}	DC-link voltage
LED	Light-emitting diode	V	Volt
L_{Sq}	Phase inductance q-direction	VBG	German Administrative Occupation Co-operative
LT	Power unit	VDE	Union of German Technical Engineers
MSVM	Modular Space Vector Modulation	X	Terminal strip
n = 0	Speed = 0	ZK	DC-link
n_{is}	Speed actual value		
n_{Max}	Maximum speed		
n_{min}	Minimum speed		
NN	Altitude over sea level		
n_{soll}	Speed set value		
PCBASS	Baumüller operating program		





APPENDIX B - ACCESSORIES

For the **KSR** Baumüller Nürnberg GmbH up to now no accessories are available.

The cable connectors must be made self.

In case you have questions and suggestions according the accessories, do not hesitate to contact our product management.





APPENDIX C - DECLARATION OF CONFORMITY/BY MANUFACTURER

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

C.1 What is an EU directive?

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

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

C.2 What the CE symbol indicates

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

...

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

...

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

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

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

As all converters and control systems comply with the requirements of the harmonized standards EN50178, EN 60204-1, EN 60529 and HD625.1 S1, the protection targets of 73/23/EEG are reached.

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

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

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

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

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

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

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

C.3 Definition of the term Declaration of Conformity

A Declaration of Conformity as defined by this documentation is a declaration that the electrical equipment brought into circulation conforms to all the relevant fundamental safety and health requirements.

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

C.4 Definition of the term Manufacturer's Declaration

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

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

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

C.5 Declaration of Conformity

EU-Konformitätserklärung

Declaration of Conformity

gemäß EG-Richtlinie 73/23/EWG (Niederspannung) vom 19.02.1973

geändert durch: 93/68/EWG vom 22.07.1993

in accordance with EC directive 73/23/EWG (low voltage) dated 19.02.1973

changed by: 93/68/EWG dated 22.07.1993

Kompakt-Servo-Regler KSR - 3A

Das obige Gerät wurde entwickelt und konstruiert sowie anschließend gefertigt in alleiniger Verantwortung von:

The unit specified above was developed and constructed as well as manufactured under liability of:

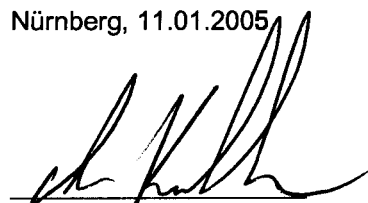
Baumüller Nürnberg GmbH, Ostendstr. 80 - 90, D-90482 Nürnberg

Berücksichtigte Normen - used standards:

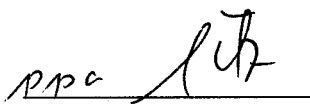
Norm / standard

EN 50178	Ausrüstung von Starkstromanlagen mit elektrischen Betriebsmitteln Electronic equipment for use in power installations
EN 60204-1	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen Safety of machinery - Electrical equipment of machines
EN 60529	Schutzarten durch Gehäuse (IP Code) Degrees of protection provided by enclosures (IP Code)
HD 625.1 S1	Isulationskoordination für elektrische Betriebsmittel in Niederspannungsanlagen Insulation coordination for equipment within low-voltage systems

Nürnberg, 11.01.2005



Andreas Baumüller
Geschäftsführer
Head Division



ppa. Dr. Fritz Götz
Leiter Sonderentwicklung
Head of special development

C.6 Manufacturer's Declaration

EU-Herstellererklärung

Declaration by Manufacturer

gemäß EU-Richtlinie 98/37/EG (Maschinen) vom 22.06.1998

geändert durch: 98/79/EG vom 27.10.1998

in accordance with EC directive 98/37/EG (machinery) dated 22.06.1998

changed by: 98/79/EC dated 27.10.1998

Kompakt-Servo-Regler KSR - 3A

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

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

Bei der Entwicklung und Konstruktion des Geräts wurden folgende Normen beachtet:

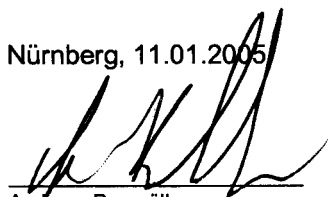
The development and construction of the unit is complied with following standards:

Norm / standard

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

Baumüller Nürnberg GmbH, Ostendstr. 80 - 90, D- 90482 Nürnberg

Nürnberg, 11.01.2005



Andreas Baumüller
Geschäftsführer
Head Division



ppa Dr. Fritz Götz
Leiter Sonderentwicklung
Head of special development



APPENDIX D - TECHNICAL DATA

In this chapter the detailed technical data to the device series **KSR - 3A**.

D.1 Requirements on the power supply

D.1 Requirements on the power supply

Rated mains input voltage/-frequency (U_{AC})	single phase 1 x 230 V ± 20 % 50/60 Hz
---	--

Auxiliary power for the controller with switching controllers from the DC-link are prepared.

D.2 Required environmental conditions

Transportation temperature range	- 30 °C to + 70 °C
Transportation climatic category	2 K 3 ¹⁾
Storage temperature range	- 30 °C to + 70 °C
Storage climatic class	1 K 4 ¹⁾
Operational environment	outside of residential areas ²⁾
Operation climatic class	3 K 3 ¹⁾
Mounting height	until 1000 m over mean sea level
Relative humidity (operation)	5 % to 85 % no condensation ¹⁾
Ionized and non-ionized radiation	< measurable area
Vibration, shock and repetitive shock	max 1 g ³⁾
Degree of pollution	2 ⁴⁾
Environmental conditions (EN 60721-3-3)	3 K 3, 3 B 1, 3 C 3 except salt-fog, 3 S 2, 3 M 3

¹⁾ EN 50178, table 7

²⁾ at use in residential areas you must assume the risk of high frequency disturbances (EN 61800-3, 6.3.2.3)

³⁾ EN 50178, chapter 9.4.3.2

⁴⁾ EN 50178, table 2

D.3 Non-electrical data

Device	Dimensions (W x H x D)	Weight
KSR - 3A	340 x 200 x 45 mm	2.3 kg

D.4 Electrical data

Input rated power ¹⁾	0.7 kVA
Input rated current (I^{eff})	3 A _{AC}
Input current max.	4.3 A _{AC}
DC link rated voltage ¹⁾²⁾ (U _{DC})	325 V _{DC} Ready-for-use at U _{ZK} 150 V
DC link capacity (internal) ²⁾	8 X 180 µF = 1440 µF
Output voltage ^{1) 2)}	3 X 215 V _{AC}
Output frequency	0 to 400 Hz
Motor power, typical ¹⁾	0.4 kW
Output rated current ^{1) 3)}	3 A _{AC}
Output peak current ^{1) 3)}	max. 4.5 A _{AC}
Max. Peak current time	2 s
Power loss power electronics	30 W
Power loss controller electronics	15 W
External braking resistor	≥ 80 Ω

¹⁾ All rated values refer to a supply voltage of 230 V/50.

²⁾ At a DC-link connection of several devices the synchronization of braking chopper is not guaranteed and therefore **cannot** be allowed.

³⁾ RMS value for Cold Plate Technique

Data in-/outputs

- Digital inputs
 - Opto-isolated
 - Input resistor $R_i=5.5\text{ k}\Omega$
 - 1 digital input is permanently assigned to the function "pulse enable IF".
 - Pulse enable (X26:1.2)
 - Digital input 1 (X26:3.4)

Low level	0 V to 5 V
High level	11 V to 35 V

- Relay output (X26:5,6,7)
 - In reset status or after a hardware reset the relay is current-free.
 - The relay output exists of one changeover contact

Maximum current $I_{\max}$ (max. current loading of contacts) ¹⁾	1 A
maximum voltage $U_{\max}$	30 V

¹⁾ Relay contacts and related pcb tracks are protected against overcurrents with 1.5 A fuse.
Safety fuse: 1.5 A / 63 V / 0.0625 Ω
reversible fuse: 1.5 A / 33 V / 0.15 Ω (KMO variant)

Data controller

DSP TMS 320 C 6711 pulse frequency	150 MHz
RAM memory	8 MByte
Permanent memory flash	2 MByte
PLD	ALTERA EP1K100
Field bus	SERCOS with SERCON 816
AD- and DA-converter resolution	10 Bit
Cycle times current controller	62.5 μs
Cycle times speed controller	$\geq 250\text{ }\mu\text{s}$
Cycle times position controller	$\geq 250\text{ }\mu\text{s}$
Cycle times SERCOS	1 ms or 2 ms
Transmission speed	2 or 4 MBaud

D.5 Pin assignment between power unit and controller

Interface power unit

Pin assignment between power unit and controller, DIN41612 (reflected).

Name	Power unit	Controller	Meaning
G_1	A1	A16	Gate IGBT1, U+
G_2	A2	A15	Gate IGBT2, U-
G_3	A3	A14	Gate IGBT3, V+
G_4	A4	A13	Gate IGBT4, V-
G_5	A5	A12	Gate IGBT5, W+
G_6	A6	A11	Gate IGBT6, W-
Gnd	A7	A10	
+5V_reg	A8	A9	5V-supply for power unit logic
Gnd	A9	A8	
I_V	A10	A7	Output current converter in phase V
I_U	A11	A6	Output current converter in phase U
Gnd	A12	A5	
Rel_ON	A13	A4	Control signal for precharging relay ¹⁾
In_Rel_ON	A14	A3	Acknowledgement for precharging relay ²⁾
DO	A15	A2	EEPROM Signal DO (SER_EE_DO)
DI	A16	A1	EEPROM Signal DI (SER_EE_DI)
nc	B1	B16	B1 to B9 or B16 to B8 nc
nc	B9	B8	
GND_V	B10	B7	GND for current signal V (quasi-differential-signal)
GND_U	B11	B6	GND for current signal U (quasi-differential-signal)
nc	B12	B5	
nc	B16	B1	B12 to B16 or B5 to B1 nc
+5V	C1	C16	from power supply
+5V	C2	C15	from power supply
Gnd	C3	C14	
Gnd	C4	C13	
+15V	C5	C12	from power supply
-15V	C6	C11	from power supply

Name	Power unit	Controller	Meaning
Gnd	C7	C10	
+12V_encoder	C8	C9	from power supply
Gnd_encoder	C9	C8	
F_Temp	C10	C7	Error signal: max. LT-temp. exceeded ³⁾ Low-active
F_Umax	C11	C6	Error signal: max. UzK exceeded ⁴⁾
F_chopper resistor	C12	C5	Error signal: Overload chopper resistor ⁵⁾
U_ZK	C13	C4	Analog UzK: 0-10 V (measuring range: 0 - 450 V)
nc	C14	C3	
CS	C15	C2	EEPROM Signal CS (SER_EE_LT)
SCK	C16	C1	EEPROM Signal SCK (SER_EE_CLK)

nc: not connected

Relevant error numbers

- ¹⁾ Control signal for precharging relay is set, after the DC-link voltage stabilizes to the end value.
- ²⁾ Acknowledgement for precharging relay: 1: off; 0: on
Error number 576: When switching on the current controller the charging relay is not yet activated,
Error reaction: current controller is not able to be switched on
- ³⁾ Error signal max. power unit temperature exceeded leads to
error no. 567
Error reaction: dependent of parameter **ID 1676 R** error mode
- ⁴⁾ Error signal max. UzK exceeded leads to
error no. 563
Error reaction: dependent of parameter **ID 1676 R** error mode
- ⁵⁾ Error signal overload chopper resistor leads to
error no. 577
Error reaction: dependent of parameter **ID 1676 R** error mode



APPENDIX E - ELTK DOCUMENTATION

E.1 Installation of program environment

Win95, Win98, WinMe

The Perlinterpreter must be installed:

Therefore, at first the Windows-installer must be installed:

Execute InstMsi.exe and follow the instructions.

Win2000

Then initiate the next step.

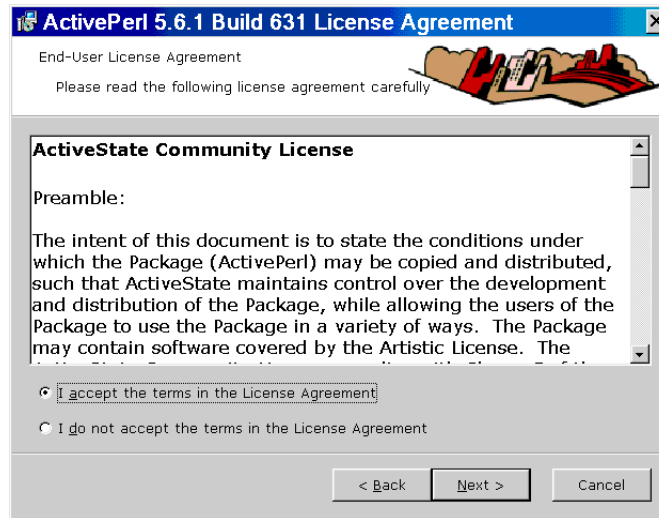
Install ActivePerl:

- Start ActivePerl-5.6.1.631-MSWin32-X86.msi.



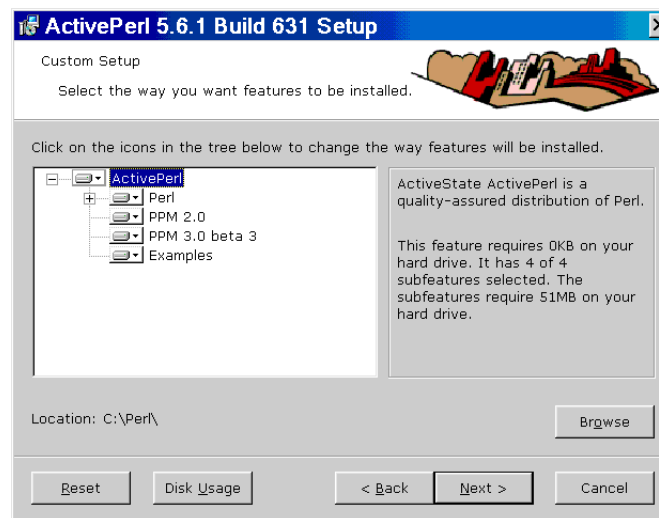
Next>

Accept license conditions:



Next>

Determine directory



- With 'Browse' installation path of „c:\Perl\“ can be changed.

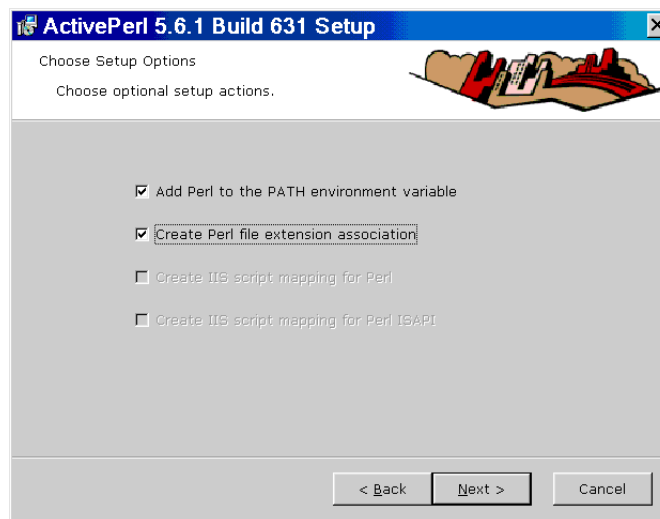
Next>

PPM3



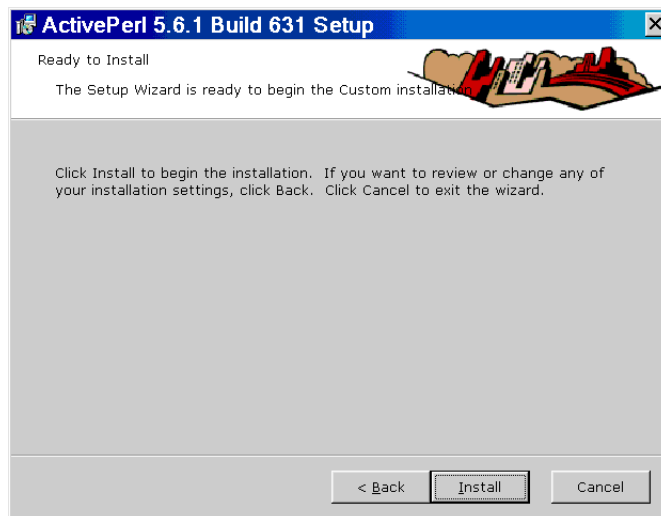
Next>

Add path in environment



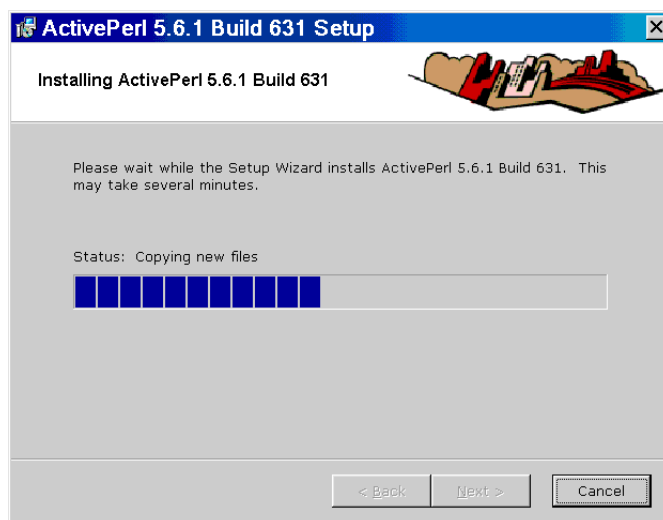
Next>

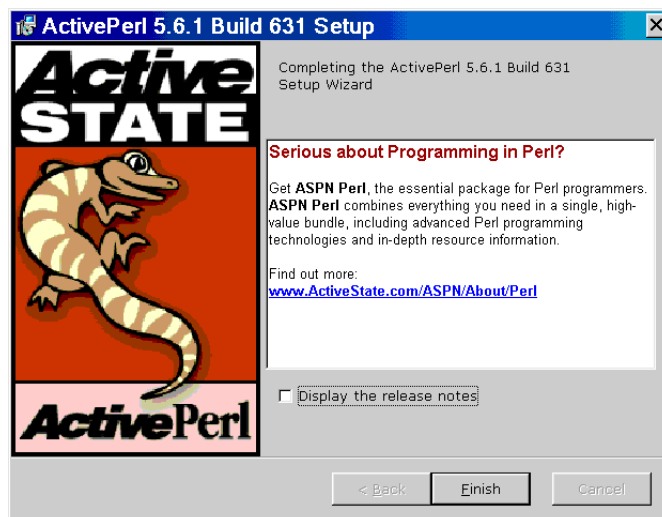
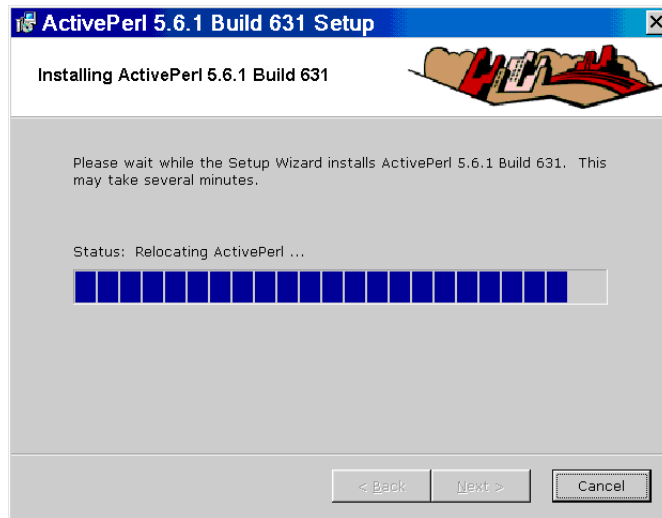
Begin installation



Next>

Installation



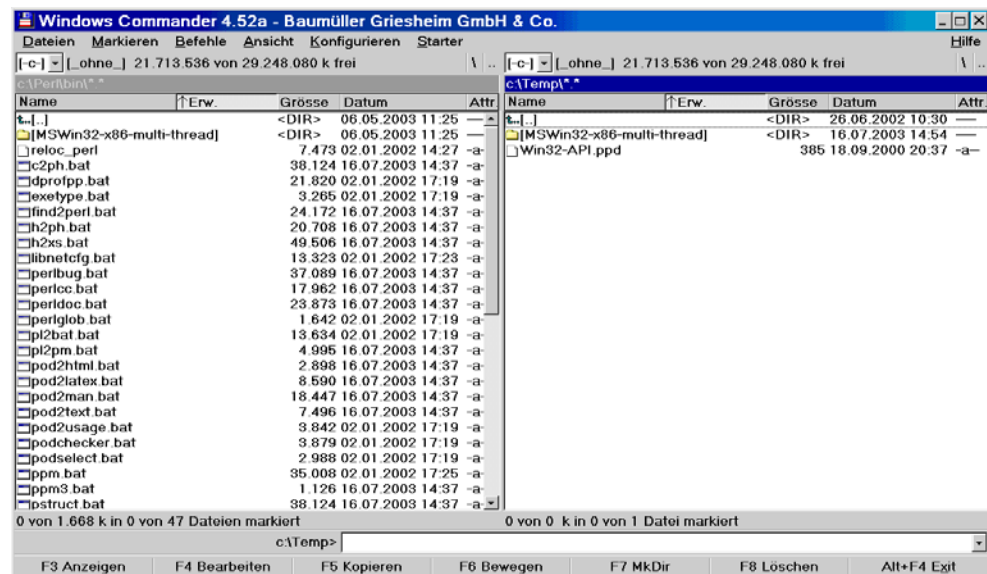


► Deselect Display release notes.

Finish

Install Module Win32 in Perl:

Copying of a directory and of a file



- Copy directory: „MSWin32-X86-multi-thread“ and file: „Win32-API.ppd“ to „c:\Perl\bin“ or in accordant directory.

Installation of module

```
Eingabeaufforderung
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>cd c:\perl\bin

C:\Perl\bin>ppm install Win32-API.ppd
Installing package 'Win32-API.ppd'...
Writing C:\Perl\site\lib\auto\Win32\API\packlist

C:\Perl\bin>
```

- Initiate the MS-prompting message.
With `cd c:\perl\` change over to Perl directory.
- "ppm install WIN-32-API.ppd execute"
Some files are installed.
- Exit prompting message.

E.2 Install ELTK

ODBC-driver existent?

You can also skip over this section and only then can fall back upon it, if there are ELTK at error display.

Win95, Win98, WinMe

In Start -> Settings -> System control

Win2000

Start -> settings -> system control -> administration -> data sources (ODBC)

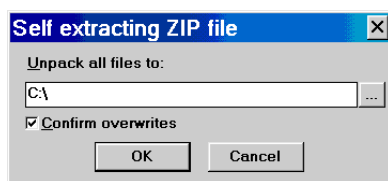
In this directory there must be a driver „Microsoft Access Database" "Microsoft Access Driver (*.mdb)". If this directory is existent, after the first starting of the error display in the ELTK program, automatically the entry "eltk_error" "driver to Microsoft Access (*.mdb)" is installed.

If the directory „Data source (ODBC)" or the driver „Microsoft Access Driver (*.mdb)" is not existent, please contact your administrator, who is in charge for your operating system.

E.2.1 Decompressing of ELTK program

The file „ELTKxxxx.exe" (xxxx ...is the version number at the moment 0153) is a self-decompressing zip file with all necessary files for the ELTK program. The connecting directory „ELTK" is packed within.

NOTE: If an update or upgrade shall occur and the personal compilation of the parameter online pages should be kept, then the file "elparam_ini.xml" should beforehand be secured in another directory and after decompressing be copied again.



NOTE: At an update or upgrade the point „Confirm overwrites" should be deselected.

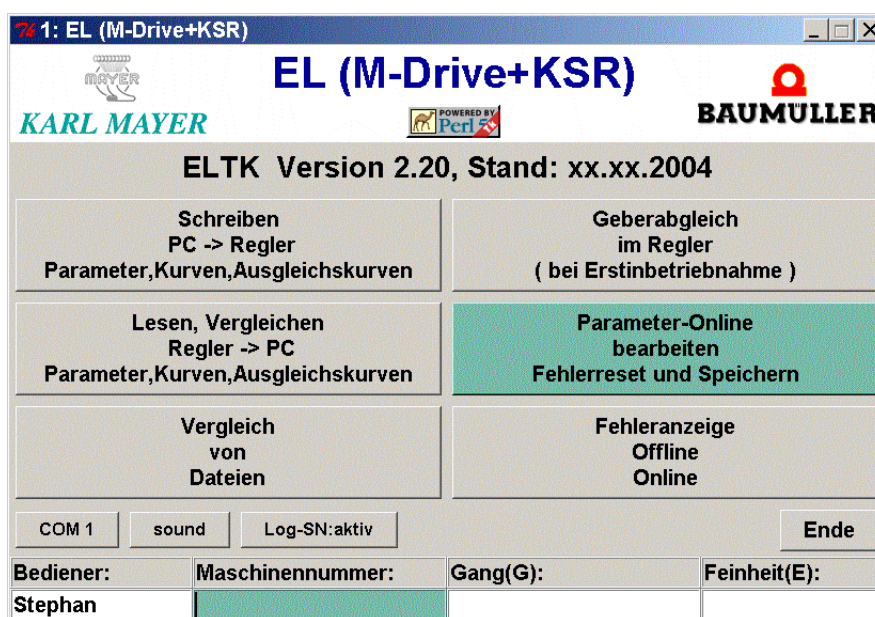
In this example the files are decompressed in „c:\".

Setting of a link on the desktop

- In the directory „/ELTK“ select the file „ELTK.pl“.
 - With the right mouse key select „Send to“ and „Desktop (generate linking“.
- On the desktop you will find „Linking with ELTK.pl“, which can be renamed as desired.

E.2.2 Start ELTK program screen

After the calling of linking you receive the following starting screen:



In the window - title the number of the selected interface is prefixed.

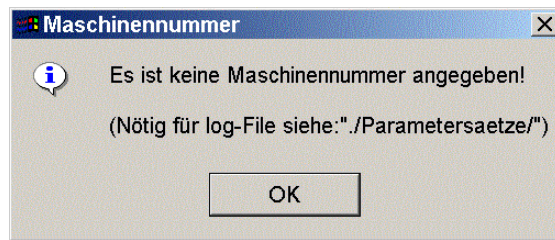
In the heading the version and the status is to be seen.

- At actuation of button "COM 1" the interface port for all functions of COM 1 to COM 9 can be changed.
- With the button "Sound" a sound can be activated, in order to indicate the end of an action (the loud speakers at the PC must be switched on) or ("still") must be deactivated.

With the button "LOG-SN:active" or ("LOG-SN:passive") it is displayed, that there is a separate log file generated (or not generated) to each serial number of the devices.

For the points „writing...“, „reading...“ and „encoder adjustment...“ a log file is generated.

This file is generated accordingly to machine number and the current date.



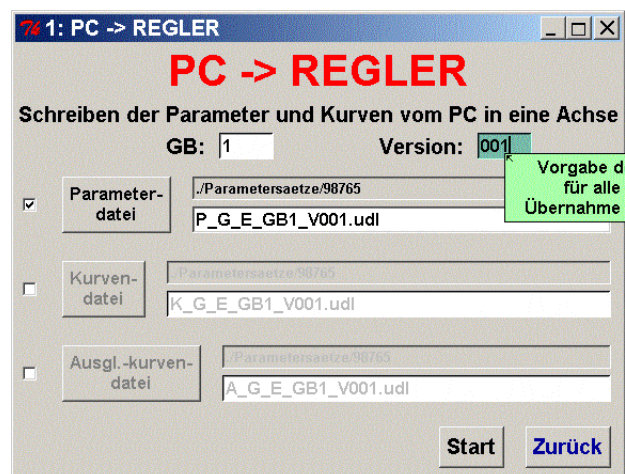
Therefore, for these steps, the specification of a machine number is required.

NOTE: If the mouse indicator is over certain fields, a auxiliary text is displayed.

E.3 Functions

E.3.1 Writing ...

Selection of files



When writing in the PC the machine number is not automatically taken over into the file name. The reason is, that in this case normally a specification file shall be transmitted.

The file conventions are determined as follows:

P_ ...parameter file
K_ ...curve file
A_ ...compensation curve file
Pmmmm_Ggggg_Eee_GBbb_Vvvv.udl ...parameter file
mmmm ...machine number
gggg ...motion
ee ...fineness
bb ...bar or GB number
vvv ...version number

The GB number can be written into the upper field after <ENTER> the value is taken over into all file names.

The same is valid for the version number of the file (it is only a preassignment of the file name).

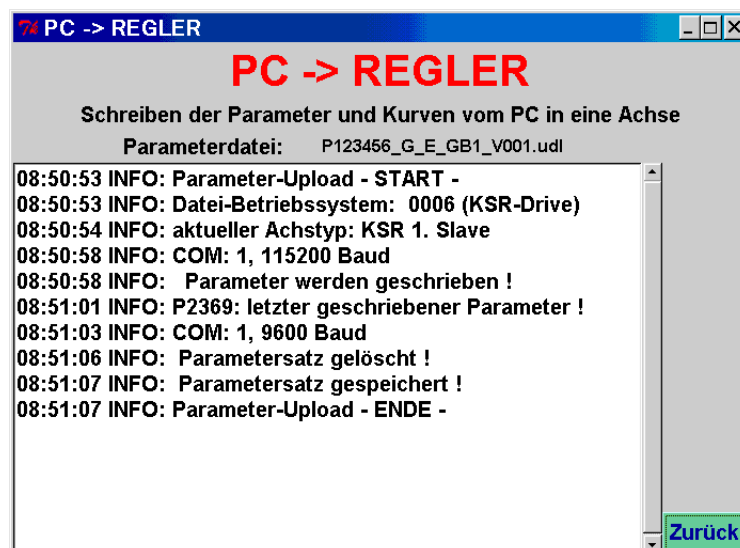
These preassignments for GB and version are only possible as long as via „Parameter file“, „Curve file“ or „Compens. curve file“ a concrete file has been selected (otherwise the file names would not match with selected files anymore).

A certain file may also be selected via the button „Parameter file“ (also is valid for the curves).

NOTE: If the mouse is over certain fields, an auxiliary text is displayed as shown here.

Go on with „Start“.

Writing in the controller



In the header the file name is displayed.

The information shows the following:

It is displayed from which operation system the file is read.

„INFO:current axis type: KSR 1. Slave" shows, which drive type and which address was recognized.

„INFO:COM:1, 115200 Baud" informs about the baudrate which is used. The next lines show the progress while writing. The original parameter set is erased and the new one is stored.

NOTE: In path „Parameter sets\log" in the log files also later the results are available.

Go on with „Back“.

E.3.2 Reading ...

Selection of files

The screenshot shows a software window titled "REGLER -> PC" with a red title bar. Below the title, it says "Lesen der Parameter und Kurven von der Achse in den PC". There are two input fields: "GB: 1" and "Version: 001". A green tooltip points to the "Version" field with the text "Vorgabe für alle Übernahmen". Below these are three groups of file selection options, each with a checkbox and two text boxes:

- Parameter-datei:** Checked. Text boxes contain ".\Parametersaetze" and "P123456_G_E_GB1_V001.udl".
- Vergleichs-datei:** Unchecked. Text boxes contain ".\Parametersaetze" and an empty box.
- Kurven-datei:** Unchecked. Text boxes contain "K123456_G_E_GB1_V001.udl" and an empty box.
- Vergleichs-datei:** Unchecked. Text boxes contain an empty box and an empty box.
- Ausgl.-kurven-datei:** Unchecked. Text boxes contain "A123456_G_E_GB1_V001.udl" and an empty box.
- Vergleichs-datei:** Unchecked. Text boxes contain an empty box and an empty box.

At the bottom right are two buttons: "Start" and "Zurück".

When writing in the controller the machine number is automatically taken over in the file name.

The file conventions are determined as follows:

P_ ...parameter file
K_ ...curve file
A_ ...compensation curve file
Pmmmm_Ggggg_Eee_GBbb_Vvvv.udl ...parameter file
mmmm ...machine number
gggg ...motion
ee ...fineness
bb ...bar or GB number
vvv ...version number

The GB number can be entered in the upper field after <ENTER> the value is taken over in all file names.

The same is valid for the version number of the file (it is only a preassignment of the file name).

These preassignments for GB and version are only possible as long as via „Parameter file“, „Curve file“ or „Compens. curve file“ a concrete file has been selected (otherwise the file names would not match with selected files anymore).

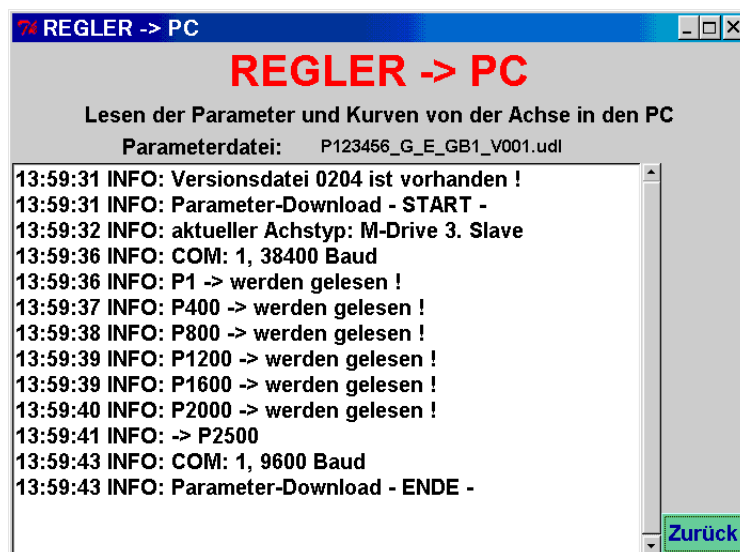
Also a certain file can be selected via the button „Parameter file“ (the same is valid for the curves).

With the button „Comparison file“ a file can be selected, where the read file can immediately be compared.

NOTE: If the mouse is over certain fields, an auxiliary text (as shown above) is displayed.

Go on with „Start“.

Reading from the controller



In the header the file name is displayed.

The information shows the following:

At first the operation system version was read. If this version is new, a new version file is uploaded. The version file contains the names, min. and max. values of the parameters as well as the unit.

„INFO:Version file existent" shows, that this version has already been recognized. Therewith only the current values of the parameter are uploaded. The rest (name, unit ...) is to be taken from the version file.

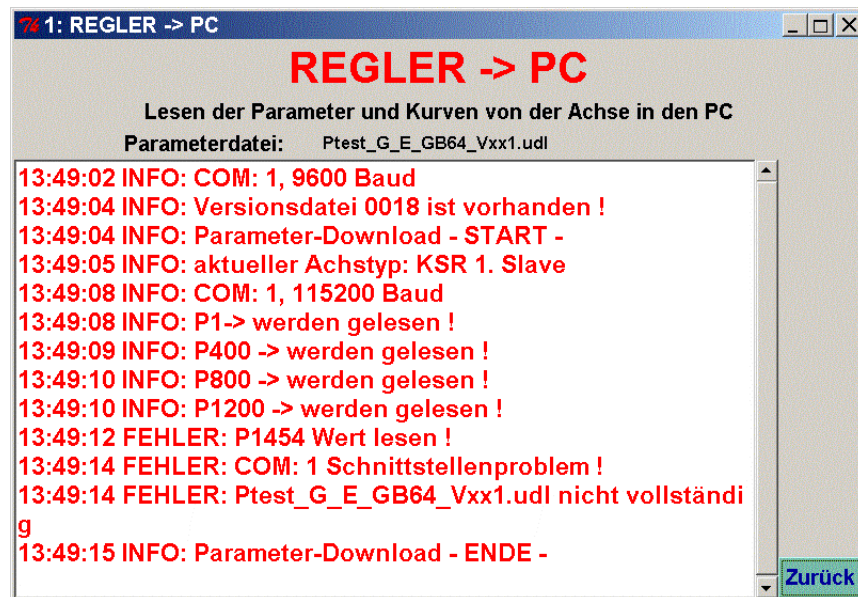
„INFO:current axis type: M-Drive 3rd slave" shows, which type of drive and which address was recognized.

„INFO:COM:1, 38400 Baud" informs about the baudrate, which is read with. The next lines show the progress at reading.

NOTE: In the path „Parameter sets\log" in the log files also later the results are available.

Go on with „Back“.

Reading from the controller with error



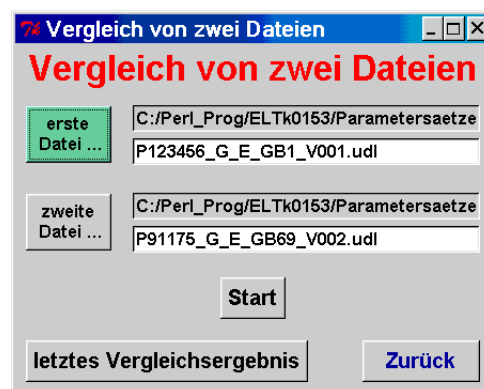
At case of error the cause is shown in the display. The file is not written anymore. All of the letter are enlarged and red.

NOTE: In the path „Parameter sets\log“ in the log files also later the results are available.

Go on with "Back".

E.3.3 Comparing ...

Selection of files

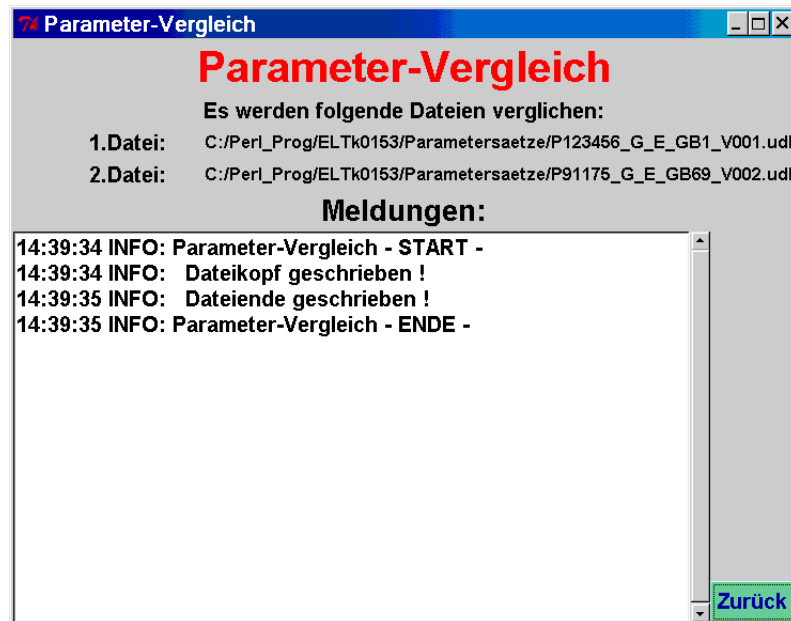


The files, which are to be compared are selected.

By means of the first file name it is checked, if the second file has an identical file type.

Go on with „Start“.

Comparison



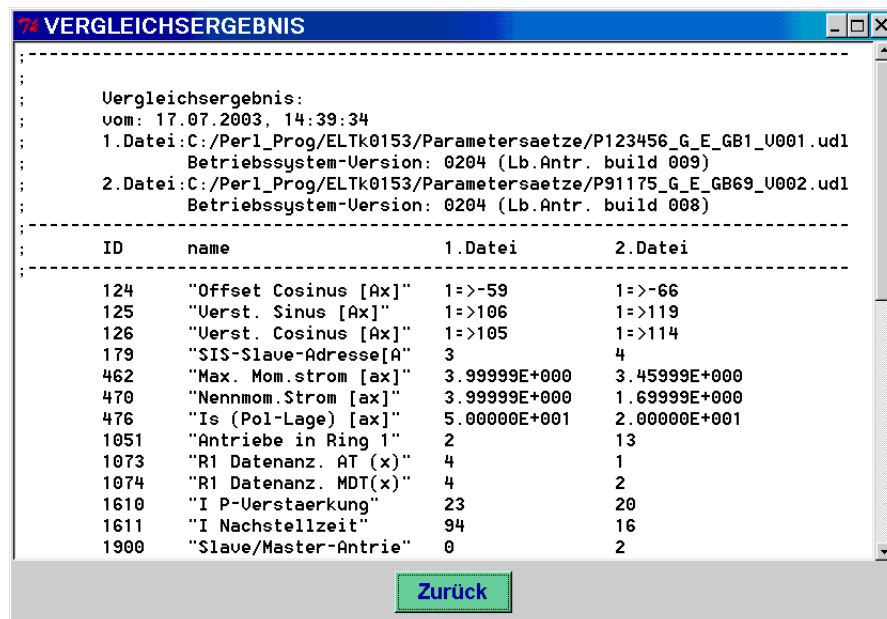
The operating sequence is shown.

The result is automatically shown.

Comparison result Attributes and units of the parameters are not compared!

A parameter is defined as different, if the difference is greater than 0.06 %.

(curve- and compensation curve values are defined as different, if the difference is greater than 0.5 %).



In the header both file names are notified.

All parameters, which are not identical are shown in tabular form.

Only the values are compared and shown, without consideration to decimal places.

The display "1=>-59" means, that this parameter in level 1 possesses the value -59.

NOTE: In the path „Parameter sets\log“ in the log files also later the results are available.

Go on with „Back“.

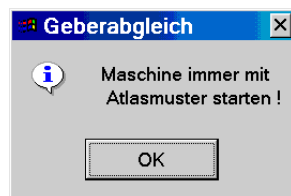
E.3.4 Encoder adjustment ...

Atlas pattern

The encoder adjustment is used in the M-Drive or KSR as correction of encoder signals.

BACKGROUND INFORMATION:

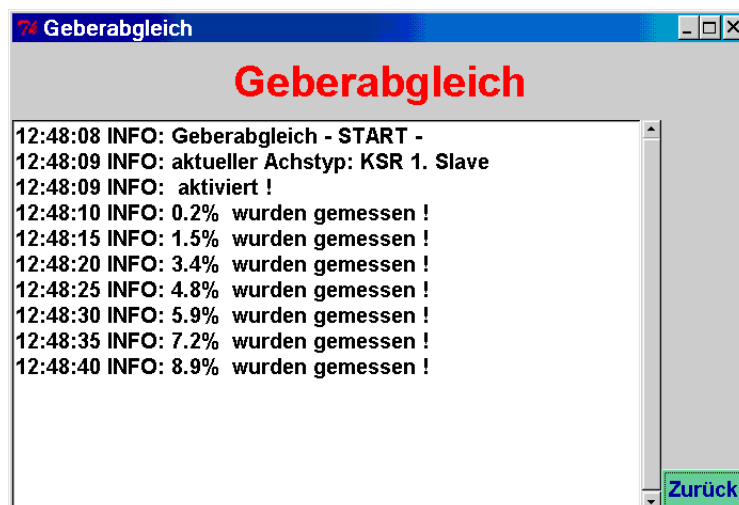
The ideal case would be, if the sine- and cosine tracks in the X-Y-representation at the oscilloscope are viewed that the image shows a circle. The deviation from this circle can be diminished by changing of the gain factors and of the offsets for both tracks. This procedure takes place automatically in the controller. An efficient result is reached, if the encoder executes at least one full rotation. The corrections are very low after about approx. 1000 rotations, that the adjustment is completed.



So that the encoders move with at least one rotation, the machine should run in „Atlas pattern“.

Go on with „OK“.

Start



The axis, where the PC as been connected at first is started.

„INFO:current axis type:KSR 1st slave"

shows which drive type and which address was recognized.

„INFO:activated !"

shows, that the encoder adjustment has been started.

If at further axes an adjustment shall be started, only the interface cable need to be pulled off and be plugged to the next controller.

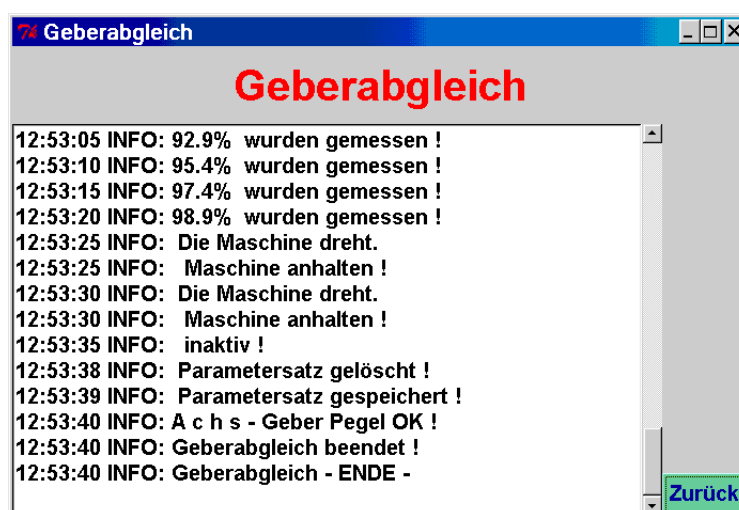
NOTE: Naturally the pulling off of an interface cable is an error display. Regardless of that, at the activated axes the encoder adjustments are active.

Again the axis type is shown and with "INFO:activated!" is shown, that the adjustment has started. This procedure can now be repeated at all axes of the machine (in the background it is counted how many axes have been started.)

„INFO:8.9 % were measured!"

shows, how far the adjustment advanced. At 100 % adjustment is completed.

Completion



If the 100 % have been reached, the determined data should be stored. For this the machine must stand still.

Before the machine is stopped, you should check, if each axis has reached the 100 %. For this you must change the interface cables.

NOTE: If at one axis it is waited too long, the INFO "encoder adjustment completed" is shown. In this case you must leave the window with the button „Back“ and start the encoder adjustment again in the main window.

„INFO: The machine rotates.“

„INFO: Stop machine !" requests to stop the machine.

If all axes have reached 100 %, you can stop the machine.

„INFO: Inactive!" ...adjustment is stopped.

„INFO: Parameter set erased!“

„INFO: Parameter set stored!“

„INFO: A x i s - encoder level OK!“...

It is displayed if the level is OK. In the case of error all the values are displayed one by one. In the Master-Master also the master axis encoder in addition to the axis encoder is adjusted. Accordingly, also this result is shown.

„INFO: Encoder adjustment completed!“...

In this axis the adjustment therewith is completed. If further axes have been activated, the number of the remaining active axes are displayed. By replugging of interface cables to the next controller all encoder adjustments are completed in the manner, which was shown.

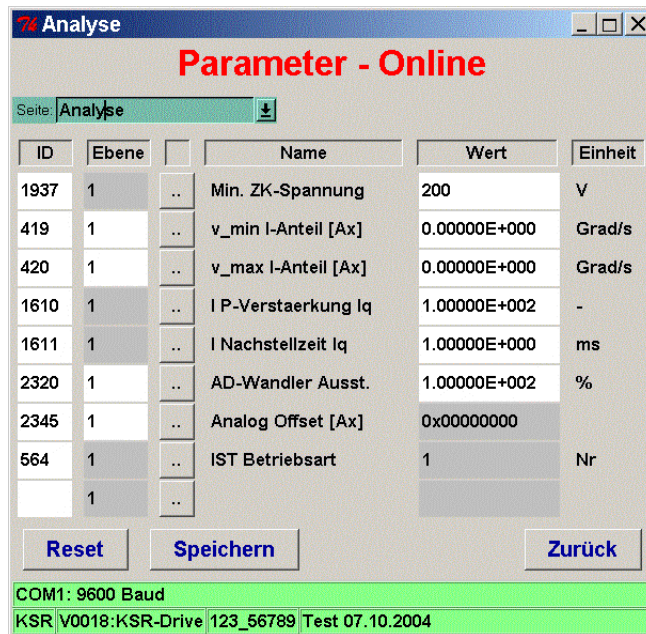
„INFO: Encoder adjustment - COMPLETED -“

NOTE: In path „Parameter sets\log“ in the log files also later the results are available. Go on with „Back“.

E.3.5 Description of Parameter online page

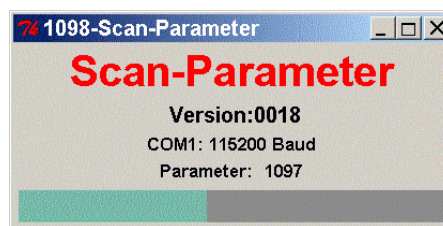
Parameters-online If a new controller type with a new version is recognized, automatically a scan of the parameters begins. Therewith all names, maximum and minimum values and units are read.

Scan-parameters



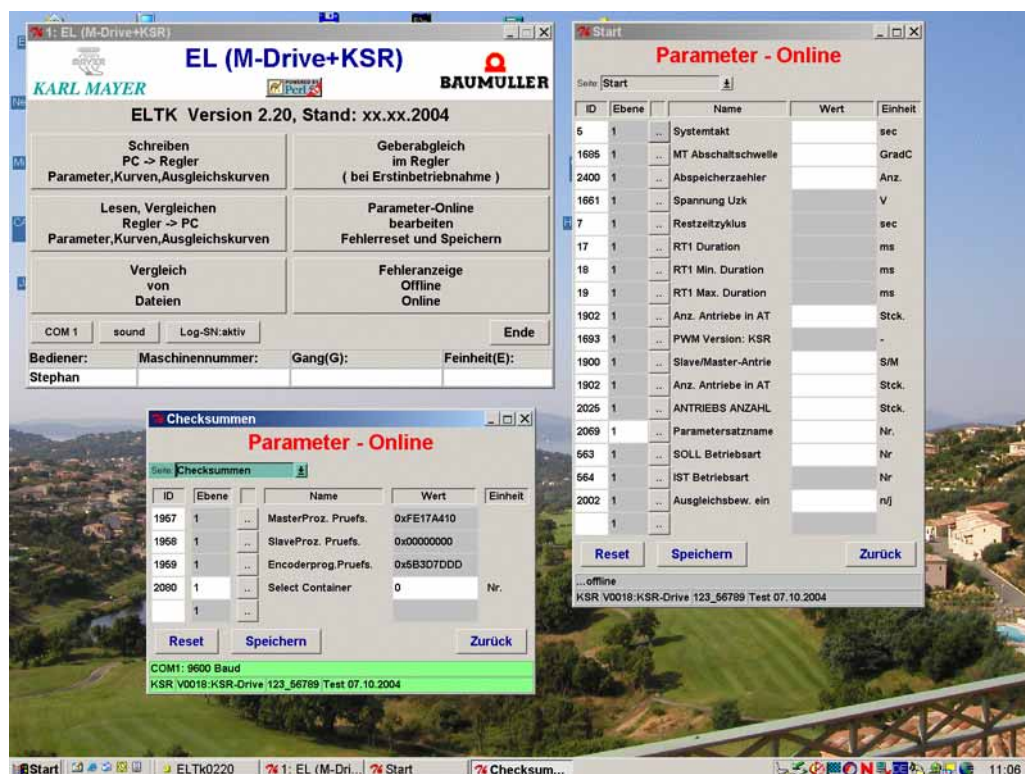
Deviant from this image in the footer is to be read "...offline | Controller type | BS version"

The window opens automatically, which shows the reading advancement by a bar and incrementing of the parameter numbers. At the same time the recognized operating system version and the baud rate, which is used to read, is visualized.



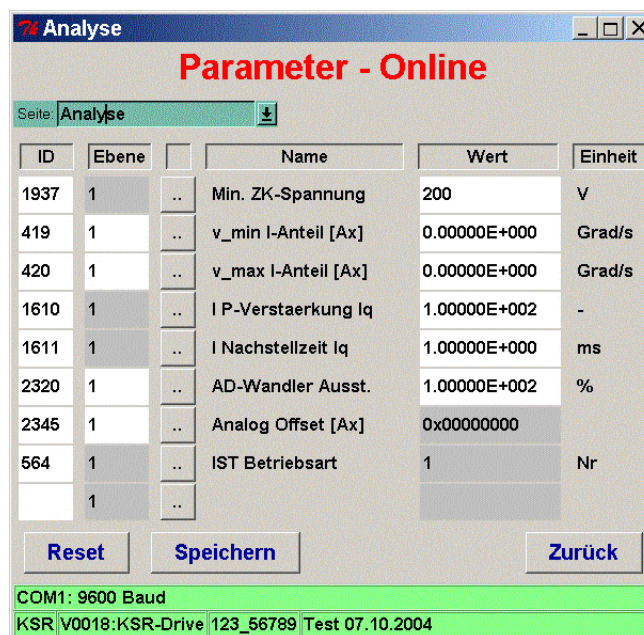
Parameter-online can be called-up multiple times

Parameter-Online can be opened several times. Therewith different pages can be opened at the same time. The window name and therewith the marking in the footer of the desktop show the page name of the selected page.



NOTE: The communication only is active in the focussed window.

Description of Parameter Online Page



In the list box "Page" a page can be selected.

If the focus is on this list box, with "Page up" and "Page down" the page can be changed.

In the header "ID level Name Value Unit" can be shown with the mouse an auxiliary text.

The parameter lines are adaptable to the required number of parameters. If on a page the lower parameter is not completely to be seen because of its low screen resolution, simply a new page should be generate. Therewith the number of parameters per page can be halved.

The "Reset" Button serves as error reset.

With the "Store" button the parameter set is stored.

First footer:

Information via the interface, pending controller errors or other messages are shown.

Second footer:

Starting on the left the controller type, the operating system version, the serial number and the parameter set name is shown.

Go on with "Back".



With a double click on the field of the parameter set name a window opens for the processing of the name

NOTE: After "Change" indeed is changed but not stored yet!

Compilation of the parameters of one page

Parameter - Online

Seite: Checksummen

ID	Ebene	Name	Wert	Einheit
1958	1	SlaveProz. Pruefs.	0x00000000	
1959	1	Encoderprog.Pruefs.	0x1995282B	
2080	1	no name	read error	no
	1			

Buttons: Reset, Speichern, Zurück

Status: KSR V0006:KSR-Drive

Tooltip: Parameter-ID (Ändern, Löschen [Namen löschen und Enter])(Hinzufügen (nur in der

On each page the desired parameters can be changed with two different methods.

NOTE: If the mouse is over certain fields, an auxiliary text is displayed as shown!

- 1 The ID directly can be changed. In the example the 2080 is erased and another parameter ID is set. After ENTER the new parameter is read in.

Parameter - Online

Seite: Checksummen

ID	Ebene	Name	Wert	Einheit
1957	1	MasterProz. Pruefs.	0x3B8C45B1	
1958	1	SlaveProz. Pruefs.	0x00000000	
1959	1	Encoderprog.Pruefs.	0x1995282B	
2080	1	no name	read error	no
	1			

Buttons: Reset, Speichern, Zurück

Status: KSR V0006:KSR-Drive

Tooltip: Auswahl der Parameter nach ihren Namen

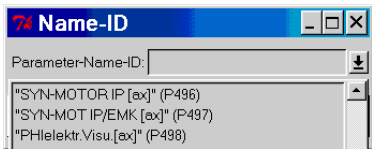
- 2 With the button the parameter, according to the name can be selected.

Name-ID

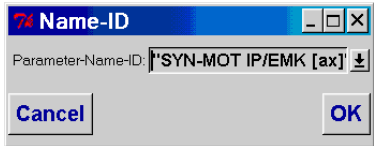
Parameter-Name-ID:

Buttons: Cancel, OK

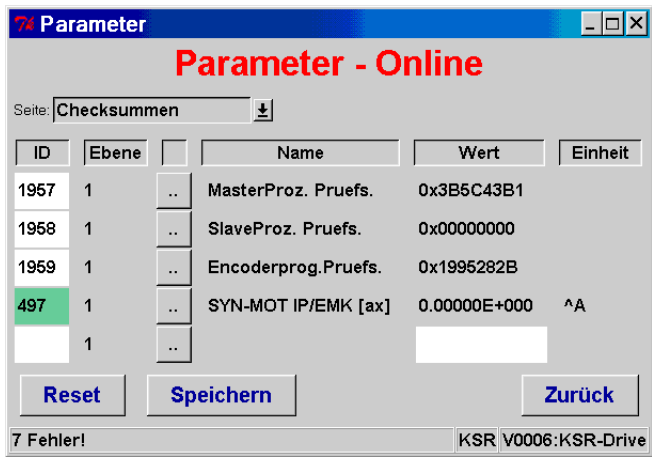
After clicking on the button with the arrow a selection window for the parameters opens.



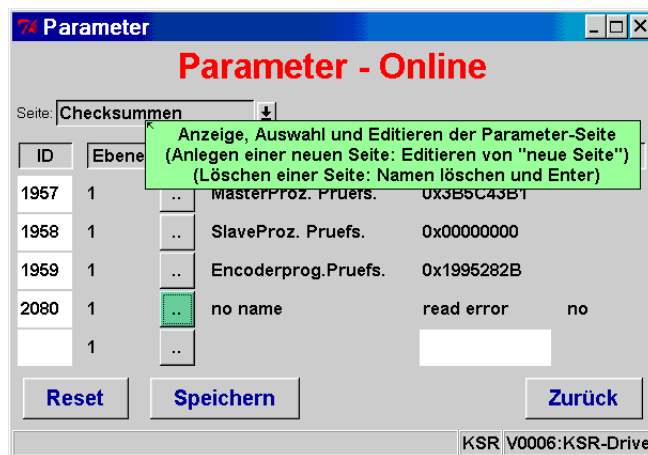
Here all parameters are specified with name and ID. By clicking on the desired parameter the selection window is closed and the parameter is displayed.



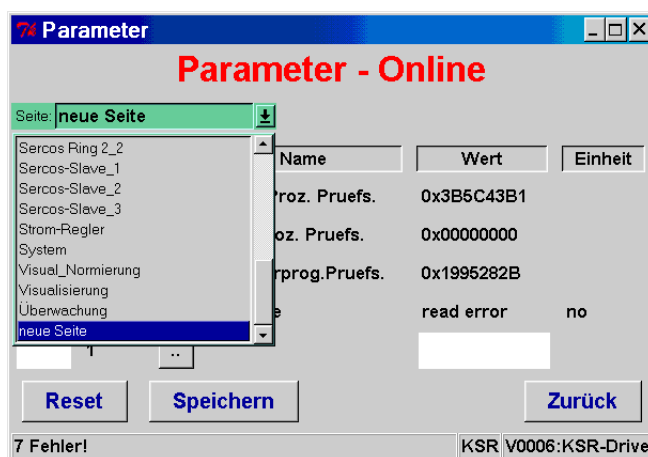
With „Cancel“ nothing happens. With „OK“ this parameter is accepted.



Creating a new page



After clicking on the button with the arrow a selection window opens for the page.
The pages are arranged in an alphabetical order.



It can either be called up a page, which already has been created or at selection of the entry "new page" a new page can be created.

With the renaming of "new page" in e. g.:"my page"...

ID	Ebene	Name	Wert	Einheit
1957	1	MasterProz. Pruefs.	0x3B5C43B1	
1958	1	SlaveProz. Pruefs.	0x00000000	
1959	1	Encoderprog.Pruefs.	0x1995282B	
2080	1	no name	read error	no
	1			

Buttons: Reset, Speichern, Zurück

Status: 7 Fehler! KSR V0006:KSR-Drive

...and a following ENTER can provide the new page, as in the previous chapter described with new parameters.

ID	Ebene	Name	Wert	Einheit
1	1	System Status	1	
	1			

Buttons: Reset, Speichern, Zurück

Status: 7 Fehler! KSR V0006:KSR-Drive

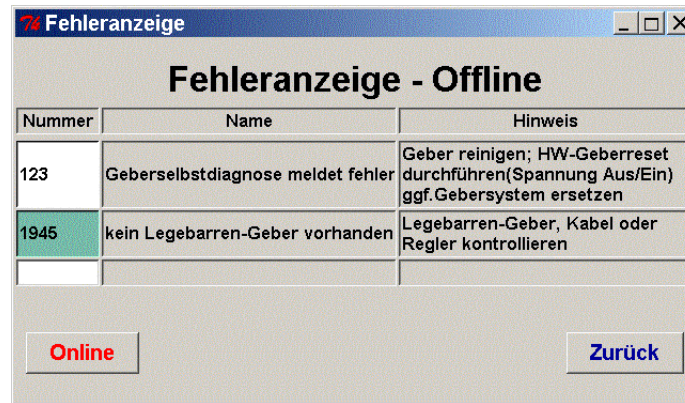
The last page configuration is automatically stored after exiting and is available at the next call again.

NOTE: If an update or upgrade should be made and the personal compilation of the parameter online pages should be kept, then the file "seiten.xml" beforehand should be secured in another directory and after decompressing be copied again.

Go on with "Back".

E.3.6 Error display

Error display of- fline



Nummer	Name	Hinweis
123	Geberselbstdiagnose meldet fehler	Geber reinigen; HW-Geberreset durchführen(Spannung Aus/Ein) ggf.Gebersystem ersetzen
1945	kein Legebarren-Geber vorhanden	Legebarren-Geber, Kabel oder Regler kontrollieren

Online Zurück

Offline up to three errors can be displayed at the same time.

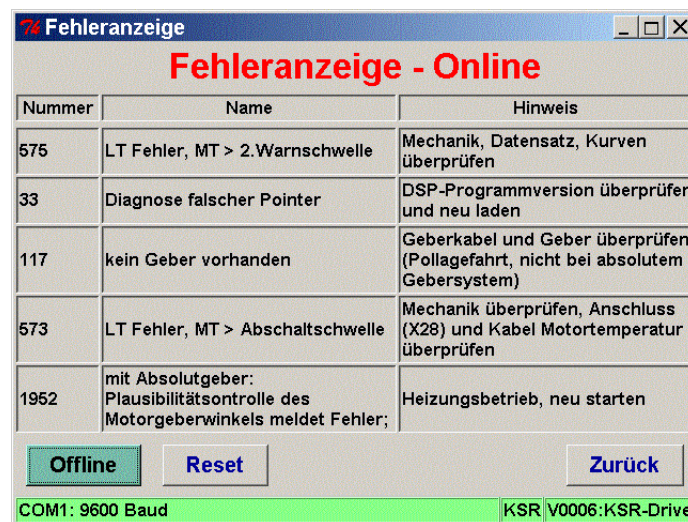
The window title is written black, there is no footer.

With the input of error „Number“ in the database the „Name“ and the accordant „Note“ is read.

With „Online“ all errors can be read out and can be displayed from a controller, which is connected to a COM1.

Go on with „Back“.

Error display on- line



Nummer	Name	Hinweis
575	LT Fehler, MT > 2.Warnschwelle	Mechanik, Datensatz, Kurven überprüfen
33	Diagnose falscher Pointer	DSP-Programmversion überprüfen und neu laden
117	kein Geber vorhanden	Geberkabel und Geber überprüfen (Pollagefahrt, nicht bei absolutem Gebersystem)
573	LT Fehler, MT > Abschaltschwelle	Mechanik überprüfen, Anschluss (X28) und Kabel Motortemperatur überprüfen
1952	mit Absolutgeber: Plausibilitätskontrolle des Motorgeberwinkels meldet Fehler;	Heizungsbetrieb, neu starten

Offline Reset Zurück

COM1: 9600 Baud KSR V0006:KSR-Drive

Online all errors, which occur in the controller are displayed.

The window title is written red, there is no footer.

With „Offline“ it can be switched back into offline mode.

The „Reset“ button serves as error reset.

Footer: On the left information about the interface are displayed.

Footer: On the right the controller type and the operation system version are displayed.

Go on with „Back“

E.4 Log file

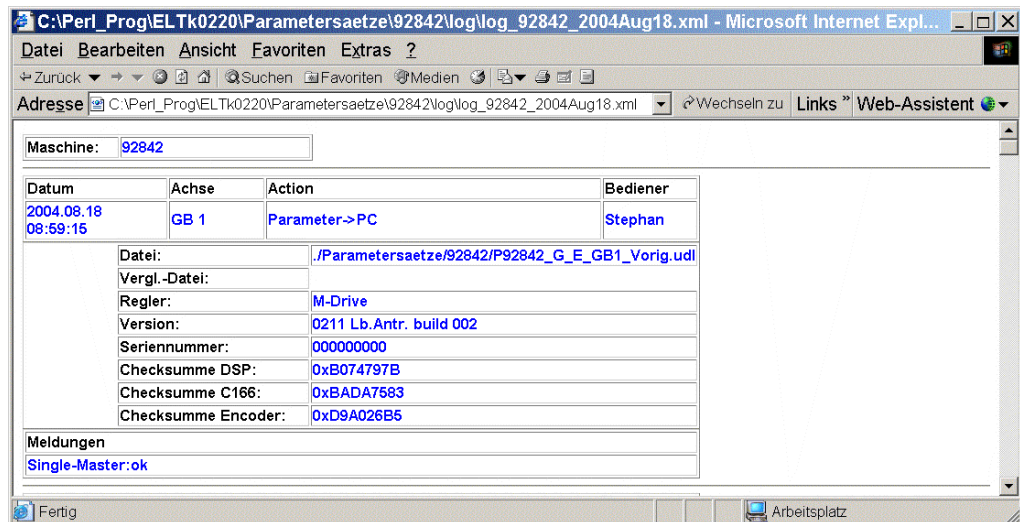
Machine and series number log file are "xml" files.

They are to be found in the path "Parameter sets\machine number\log".

As long as these files remain in their directory, they can be read after a double click in the independently opening internet explorer.

E.4.1 Machine log file

In the explorer behind the address the complete path and the log file name can be read.



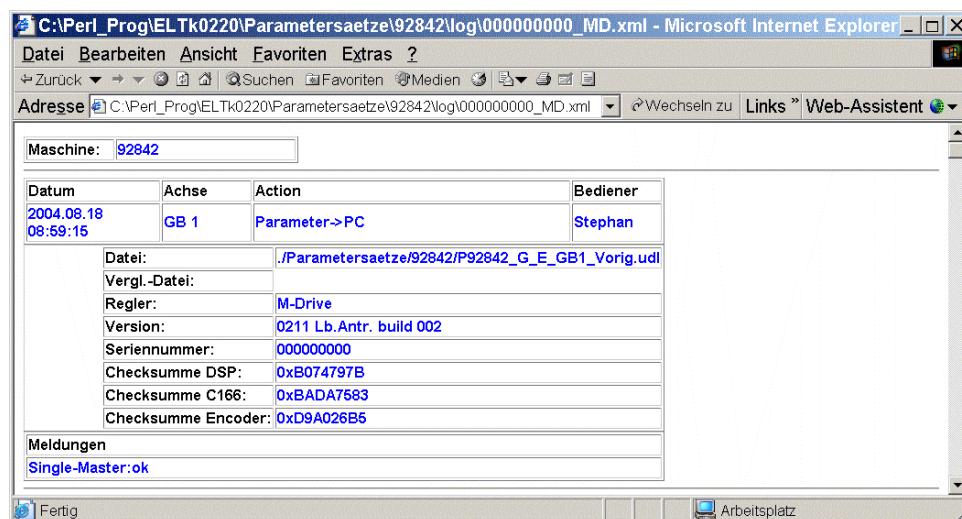
Firstly the machine number is specified.

For each action a separate section is provided. Here the date, the axis or GB, the action and the user (log-in name for windows) is specified.

Additionally the involved files, controllers, versions (operation system version of the controller), serial number, and the three check sums are specified.

In the end the result is announced under Messages.

E.4.2 Serial number log file



The structure accords to the „Machine log file“.

NOTE: At M-Drives there often is no serial number, therefore all these M-Drives are summarized in the file "000000000_MD.xml".

E.4.3 Internal log file

In the path "Parameter sets\log" the internal log files are to be found e. g. "log2004Aug20.txt". Here messages, which could be useful for an extended check are filed.



Described KSR parameters

Parameter		Range	Parameter can be stored	Standard value	Page
ID 0052	Monitoring LT lxt Value	0 to 1000 %	-	-	72
ID 0053	Auto LT detection I/O	0 to 1	X	-	73
ID 0054	Monitoring LT max current	0 to 1000 A	X	-	73
ID 0055	Monitoring LT nom current	0 to 1000 A	X	-	73
ID 0056	LT Overload time	0 to 1000 s	x	-	73
ID 0057	Motor time constant	0 to 1000 s	x	-	73
ID 0058	Monitoring motor I2t threshold	0 to 1000 %	X	-	73
ID 0059	Monitoring motor I2t value	0 to 1000 %	-	-	74
ID 0065	Monitoring MT temp. In	0 to 200 °C	-	-	74
ID 1600	I Isq act Value	-4096 to 4096 A	-	-	58
ID 1601	I Isd act value	-4096 to 4096 A	-	-	58
ID 1603	I Iu act value	-4096 to 4096 A	-	-	58
ID 1604	I Iv act value	-4096 to 4096 A	-	-	58
ID 1605	I Iw act value	-4096 to 4096 A	-	-	58
ID 1606	I Setting of value U	-2048 to 2048	-	-	58
ID 1607	I Setting of value V	-2048 to 2048	-	-	58
ID 1608	I Setting of value W	-2048 to 2048	-	-	58
ID 1609	I Status	0000 to FFFF	-	-	58
ID 1610	I P gain Iq	0 to 10000	x	1.8	59
ID 1611	I Time constant Iq	0 to 10000 ms	x	30 ms	59
ID 1613	I Offset U	-256 to 256 A	-	-	59
ID 1614	I Offset V	-256 to 256 A	-	-	59
ID 1615	I EMF pre-control	-2048 to 2048	-	-	59
ID 1616	I kp-internal Iq	0 to 10000	-	0.3	59
ID 1617*	I P-gain Id	0 to 10000	x	1.8	60
ID 1618*	I Time constant Id	0 to 10000 ms	x	30 ms	60
ID 1619*	I Usq set value	-3547 to 3547	-	-	60
ID 1620*	I Usd set value	-3547 to 3547	-	-	60
ID 1621*	I I-ratio Usq	-3547 to 3547	-	-	60
ID 1622*	I I-ratio Usd	-3547 to 3547	-	-	60
ID 1623	I Cycle time	62.5 to 125 µs	-	62.5 µs	60
ID 1624	I Voltage limit	0 to 16	-	0	60
ID 1625	I MSVM limit	0 to 100 %	x	100 %	61
ID 1626*	I U alpha set value	-3547 to 3547	-	-	61
ID 1627*	I U beta set value	-3547 to 3547	-	-	61
ID 1628*	I _{sa} Pot	0 to 255	x	-	61
ID 1629*	I _{sb} Pot	0 to 255	x	-	61
ID 1636*	I Test electric speed	-5*10 ⁴ to 5*10 ⁴ degree/s	x	-	61
ID 1637*	I Test set Usd	-3547 to 3547 Inc	x	-	61
ID 1638*	I Test set Isd	-5 to 5 A	x	-	61



Parameter		Range	Parameter can be stored	Standard value	Page
ID 1640*	PWM Dead time	2 to 10 μ s	x	-	61
ID 1641*	PWM Minimum pulse	0 to 10 μ s	-	-	62
ID 1642*	PWM Reload value	0 to 10000 μ s	-	-	62
ID 1643	PWM Frequency	4 to 8 kHz	-	8 kHz	62
ID 1650	LT Status	0 to 17	-	0	63
ID 1650	LT Supply status	0 to 17	-	0	63
ID 1652	LT Supply message	0 to 65535	-	-	64
ID 1653	LT Message	0 to 65535	-	-	64
ID 1654	LT Reset	0 to 1	-	0	64
ID 1655	LT Pulse enable	0 to 17	-	0	64
ID 1656	LT Version	0 to 65535	-	0	64
ID 1661	Voltage Uzk	10 to 1000 V	-	330 V	64
ID 1670	R Control	0 to 16	-	4	65
ID 1671	R Status	0 to 16	-	4	65
ID 1676*	R Error mode	0 to 19	-	0	66
ID 1680	MT Status	0000 _{hex} to FFFF _{hex}	-	-	67
ID 1681	MT Sensing system	0 to 1	X	-	67
ID 1682	MT Temperature	0 to 300 °C	-	-	67
ID 1683	MT Threshold 1	0 to 300 °C	x	-	68
ID 1684	MT Threshold 2	0 to 300 °C	x	-	68
ID 1685	MT Switch off threshold	0 to 300 °C	x	-	68
ID 1686	MT Hysteresis 1	0 to 5 °C	x	-	68
ID 1687	MT AD value	-32768 to 32767	-	-	68
ID 1693*	PWM Version KSR	0.00 to 99.99	-	0.01	69
ID 1694*	PWM Sync time	0 to 126 μ s	-	-	69
ID 1695*	PWM PLL amplification	0 to 2	-	0.2	69
ID 1696*	PWM PLL Offset	-30 to +30 μ s	-	0 μ s	69



List of all parameters

ID	Name	Min	Max	Unit
1	System Status	0	1	
2	System Command	0	4	S/R
3	Systemfehler	1	19	
4	System Mode	0	3	Si/SI/M
5	Systemtakt	7.22666591173	0.00050000002	sec
6	Auslast.Systemstack	0	0	%
7	Restzeitzyklus	0.0009765625	0.17650000751	sec
8	Restzeit	0.00043752003	0.00050000002	sec
9	System Uhr	0	9.99999968028	sec
10	Select Memory	0	0	-
11	Free Memory	0	2147483647	DW
13	Par.Historie[]-ID	0	20	ID
14	Par.Historie[]-Wert	0	1.99999996964	
15	Par.Historie[]-Achs	0	0	Ax
16	RT1 ModuleNumber	-1	53	Nr
17	RT1 Duration	0	9999989760	ms
18	RT1 Min. Duration	0	9999989760	ms
19	RT1 Max. Duration	0	9999989760	ms
20	DSV-Command	7	9	R/S/C
21	DSV-Mode	0	9	P-G
22	Fehlernummer	20	31	
25	EEPROM-Adresse	0	0	
26	EEPROM-Datum	-2147483648	2147483647	
27	Fehler bei ID [ix]	0	0	Nr.
28	Fehlerindex [ix]	0	0	
29	Fehlernummer [ix]	-14	31	Nr.
30	Errormodul Status	0	4	
31	Command	0	5	
32	Fehler Reset[Ax]	4	4	
33	Resetquelle	0	15	TSPW
34	Mode	0	1	S/M
35	First_Error [Ax]	1	9999	
36	Error[Count]	0	0	
37	Last_Error[Ax]	1	9999	
38	Fehlernr. Ziel 1	0	0	
39	Fehlernr. Ziel 2	0	0	
40	Achsfehlernr. Ziel	0	0	
42	n=0 Meldung [ax]	-1	5	
46	pos.max.Geschw.[ax]	0	1000000	Grad/s
47	neg.max.Geschw.[ax]	-1000000	0	Grad/s
48	n=0 Grenze [ax]	0	1000000	Grad/s
49	BL Momentenrichtung	0	0	0/1
50	Lagedif.pos.max[ax]	0	20000	Grad



ID	Name	Min	Max	Unit
51	Lagedif.neg.max[ax]	-20000	0	Grad
52	Uebw. LT lxt wert	0	1000	%
53	Auto LT Kennung 1/0	0	1	on/off
54	Uebw. LT max. Strom	0	1000	A
55	Uebw. LT nenn Strom	0	1000	A
56	LT Ueberlastzeit	-10	1000	S
57	Motor Zeitkonstant	0	10000	S
58	Uebw.M. I2t Schwell	0	1000	%
59	Uebw.Motor I2t Wert	0	1000	%
65	Uebw. MT-Temp. In	0	200	°C
84	Strobemode [Ax]	0	19	
85	Geberanbau [Ax]	0	0	M/L
86	Sel. Si-Einheit Ax	0	0	Grad_s
87	Ref.weglaenge [Ax]	0	1000	Grad
88	Geberstrichzahl[Ax]	0	2097152	Inc
89	Interne Aufloesung	4	360000000	INC
90	Max-Weg-LimMotor[Ax	0	2000	m
91	AbsCod Grundabst.Ax	100	10000	Inc
92	AbsCod RefmarZahlAx	0	5000000	
93	AbsCod max.WegIncAx	1	1073741824	Inc
98	Trigger-Flag [Ax]	0	0	
102	Strobe-Flag [Ax]	0	0	
110	SICO-Modulstatus	0	6	
111	Sincos-Modulcommand	0	6	
112	Geber aktiv [Ax]	0	1	
113	Auswertemodus [Ax]	0	7	
114	SICO-Achsstatus Ax	0	30	
115	SICO-Achscommand Ax	0	30	
116	SICO-Modulfehler	110	169	Nr.
117	SICO-Achsfehler Ax	-124	110	Nr.
119	Konvergenzanzahl Ax	0	2147483647	
121	Gebersinus [Ax]	-32768	32767	V-INC
122	Gebercosinus [Ax]	-32768	32767	V-INC
123	Offset Sinus [Ax]	-127	128	
124	Offset Cosinus [Ax]	-127	128	
125	Verst. Sinus [Ax]	0	0	
126	Verst. Cosinus [Ax]	0	0	
127	Glaettungsfakt.[Ax]	1	65000	
129	Freq.Gesch.FilterAx	0	470	Hz
130	Geschw.nur Regl. Ax	-1000000000	1000000000	Inc/TAB
132	Geschwindigkeit Ax	-1000000000	1000000000	INC/TAB
133	Geschw. gefiltertAx	-1000000000	1000000000	INC/TAB
134	SICO_Sync_flag [Ax]	0	1	V-INC
135	Motorwinkel [AX]	0	3600000	INC
136	SICO_Sync_pos. [Ax]	0	2147483647	INC



ID	Name	Min	Max	Unit
137	Absolutposition Ax	0	2147483647	INC
138	Modulo_position Ax	0	3600000	INC
139	Itera. p. Cyc. [Ax]	0	0	
140	Mot.Winkel Komp. AX	0	0	
154	Geschw. gefiltertAx	-1000000000	1000000000	Grad/s
155	Mod_pos gueltig Ax	0	1	V-INC
156	Drehrichtung Ax	-1	1	
157	Mod_pos Last Ax	0	3600000	INC
158	Mod_pos Last Ax	0	3600000	Grad
159	Auflösung Last Ax	0	1310720000	INC
160	SICO-Analogpos.[Ax]	0	0	INC
162	AutoPara on/off	0	1	
163	Geschw.Laufzeitk.Ax	-1000000000	1000000000	INC/TAB
164	Umdrehg.Last [Ax]	0	127	UMD
165	MaxUmdrehg.Last[Ax]	1	128	UMD
170	SIS-Kommando[Ax]	0	0	-
171	SIS-Status[Ax]	0	0	-
172	SIS-Mode[Ax]	0	0	-
173	SIS-Basis-Adr.[Ax]	2147483647	2147483647	Hex
174	SIS-Baudrate[Ax]	2	2	MBit/s
175	SIS-Phase[Ax]	0	0	Ph/Ind
176	SIS-Zykluszeit[Ax]	62	62	ms
177	SIS-Delay [Axx]	0	0	ms
178	SIS-Slave-Anzahl[Ax]	1	1	-
179	SIS-Slave-Adresse[A]	1	1	-
180	SIS-Timeout	10	10	Sek.
181	SIS-1.LWL-Sender[Ax]	1	1	.Stufe
182	SIS-2.LWL-Sender[Ax]	1	1	.Stufe
183	SIS-LWL-Eingang[Ax]	0	0	-
184	SIS-Daten-Länge[Ax]	1	1	Worte
185	SIS-Cont.-Anz.[Ax]	1	1	-
186	SIS-Telegramm[Ax]	1	1	-
187	SIS-Container[Ax]	1	1	-
188	SIS-Control[Ax]	0	0	-
189	SIS-Control-Info[Ax]	0	0	-
192	SIS-Status[Ax]	0	0	-
193	SIS-Status-Info[Ax]	0	0	-
194	SIS-Istwert 1[Ax]	-10000	10000	-
195	SIS-Istwert 2[Ax]	-10000	10000	-
208	SIS-ID-Write 1[Ax]	0	0	ID
209	SIS-ID-Write 2[Ax]	0	0	ID
210	SIS-ID-Read 1[Ax]	0	0	ID
211	SIS-ID-Read 2[Ax]	0	0	ID
212	SIS-Test	0	0	-
213	SIS-T-Control 1	0	0	-



ID	Name	Min	Max	Unit
214	SIS-T-Control 2	0	0	-
215	SIS-T-Control 3	0	0	-
216	SIS-T-Control 4	0	0	-
225	Phase_Sync_Bit	0	0	V-INC
260	S-0-0041	-2147483648	2147418112	U/min
261	S-0-0042	0	2147418112	U/s^2
262	S-0-0147	0	0	
280	G-Ueberw.Command Ax	0	8192	
281	G-Ueberw.Status[Ax]	0	8192	
282	G-Ueberw.error_mask	0	4096	
283	G-Ueberw.info.Ax	0	4096	
284	G-Ueberw.minwert Ax	18000	523265	
285	G-Ueberw.maxwert Ax	18000	523265	
286	G-Ueberw.Adapt_Zykl	100	2147483647	
287	G-Ueberw.DiagZykl	1	864000	s
288	G-U. Max DiffSpeed	-1000000000	1000000000	Grad/s
289	G-Ue Varianz norm	-3.4028234663	3.40282346638	%
290	Ferraris-Geberkanal	0	0	Kanal
291	Ferraris Offset	-127	128	INC
292	Ferraris-Verst„rkun	0	0	INC
293	Ferraris-Normierung	-1000000000	1000000000	SI/V-IN
294	Ferraris-Analogwert	-32767	32767	V-INC
295	Ferraris-Beschleunig	-899999989760	899999989760	INC/TAB
296	Ferraris-Geschw.	-1000000000	1000000000	INC/TAB
297	Fer-drift-estimated	-899999989760	899999989760	INC/TAB
298	Daempfung Ferraris	0	100	
299	Eck_Freq. Ferraris	0	100000	Hz
300	Fer_Speed_Int[Ax]	-1000000000	1000000000	Inc/TAB
301	TP2 F_eck B_SIGNAL	0	1000	Hz
302	TP2 Daempf B_SIGNAL	0.10000000149	1	-
303	F-Beschl nach PT2	-899999989760	899999989760	INC/TAB
304	Notch-Filter Feck	10	1000	Hz
305	Notch.Bandbreite	0	1000	Hz
306	Ferr-Beschl. Output	-899999989760	899999989760	INC/TAB
307	Ferraris ConfigBits	0	0	A E A E A E
370	Status Regler[Ax]	0	4	
371	Command[Ax]	0	4	
372	Soll-BA[Ax]	10	14	V-INC
373	Ist-BA[Ax]	10	14	V-INC
374	Modulfehlernummer	370	399	
375	Achsfehlernummer	370	399	
377	Rechentzeit [Ax]	0	1000	us
378	Achsanzahl	0	0	
379	bl_regler_aktiv	0	0	
380	bl_start_ende	0	0	



ID	Name	Min	Max	Unit
382	Quelle x2 [Ax]	0	0	ID
383	Quelle w1 [Ax]	0	0	ID
384	Quelle w2 [Ax]	0	0	ID
385	Quelle w3 [Ax]	0	0	ID
386	Quelle isq_soll[Ax]	0	0	ID
389	Ziel fuer ,isq'[Ax]	0	0	ID
394	Quellindex isq [Ax]	0	0	
396	w2-Vorst. EIN [Ax]	0	2	
397	w3-Vorst. EIN [Ax]	0	2	
398	Zeit x-Trigger [Ax]	0	1.99999996964	us
399	speed_faktor[Ax]	0.5	10	
401	Para 0/1/2 copy[Ax]	0	0	
402	Para_neu Zeit [Ax]	0	10000	ms
403	Fakt. isq_soll [Ax]	-1000	1000	
404	Ks Verst. [Ax]	0	10000000	G/s ² /A
405	Kp n-Regler [Ax]	0	10000000	1/s
406	Tn n-Regler [Ax]	0	10000000	s
407	Max. I-Anteil [Ax]	0	100	%
408	Kv Lageregler [Ax]	0	10000000	1/s
410	Kp1 n-Regler [Ax]	0	10000000	1/s
411	Tn1 n-Regler [Ax]	0	10000000	s
413	Kv1 Lageregler [Ax]	0	10000000	1/s
415	Kp2 n-Regler [Ax]	0	10000000	1/s
416	Tn2 n-Regler[Ax]	0	10000000	s
418	Kv2 Lageregler [Ax]	0	10000000	1/s
419	v_min I-Anteil [Ax]	0	10000000	ø/s
420	v_max I-Anteil [Ax]	0	10000000	ø/s
421	FKp3 B-Regler	-10000000	10000000	1/TAB
424	RESET I-Anteil [Ax]	0	1	
425	Getriebe RESET [Ax]	0	1	
426	Lageoffset w/x [Ax]	0	9.99999984824	
430	x2 Visu. [Ax]	-9.9999999338	9.99999993381	INC/TAB
431	w2 Visu.[Ax]	-9.9999999338	9.99999993381	INC/TAB
432	e2=w2-x2 Visu.[Ax]	-9.9999999338	9.99999993381	INC/TAB
433	x1 Visu. [Ax]	-9.9999999338	9.99999993381	INC
434	w1 Visu. [Ax]	-9.9999999338	9.99999993381	INC
435	e1=w1-x1 Visu. [Ax]	-9.9999999338	9.99999993381	INC
436	isq Visu. [Ax]	-9.9999999338	9.99999993381	A
437	w3 Visu.[Ax]	-9.9999999338	9.99999993381	INC/TAB
438	Mod.Pos_vorz [Ax]	0	2147483647	INC
439	Mod.Position [Ax]	0	2147483647	INC
440	MOTOR ACHS_MASK	0	255	
442	MOTOR Soll-BA [ax]	20	22	AEP
443	MOTOR Ist-BA [ax]	20	22	AEP
444	Modulfehlernummer	440	469	



ID	Name	Min	Max	Unit
445	Fehlernummer [ax]	440	469	
446	Max.Strom Umr.[ax]	0.00999999977	10000000	A
447	ASM-MOTOR [ax]	-1000	1000	^A
448	Nennschlupf(_2)[ax]	0	10000000	Hz
449	Temperatur_2 [ax]	-30	230	Grad_C
450	Temperatur_1 [ax]	-30	100	Grad_C
451	Zeit-Temp-Mod.[ax]	0	3600	s
452	SYN-MOTOR [ax]	-1000	1000	^A
455	x2-Quelle [ax]	0	0	ID
458	Nennndrehzahl [ax]	10	60000	U/min
459	Nennleistung [ax]	1	60000	kW
460	Polpaarteilung [ax]	9.99999974737	100000	Grad
461	Index MOT-GEB [ax]	0	0	
462	Max. Mom.strom [ax]	0	10000000	A
464	MOT/GEB(Zaehl.)[ax]	1	10000000	
465	MOT/GEB(Nenn.)[ax]	1	10000000	
466	Getr.MOT/GEGER [ax]	1.00000000317	3.40282346638	
468	Feldstrom [ax]	-100000	10000000	A
469	Nennfeldstrom [ax]	-100000	10000000	A
470	Nennmom.Strom [ax]	0.00999999977	10000000	A
471	Schlupf(_1)[ax]	0	3	Hz
472	Schlupf=f(Temp)[ax]	0	10000000	Hz
473	isq_fakt gener.[ax]	0	2	
474	EMK Vorst. [ax]	0	0	V/Nnenn
475	Pol-Lage O.K. [ax]	0	0	
476	Is (Pol-Lage) [ax]	0	100	%
477	Max.Zeit Rastpo[ax]	0	60	s
478	PHI_SYN_OFFSET[ax]	-360	360	ø
479	Winkelkomp. [ax]	-180	180	ø/600ø/
480	FREQ-I-Filter [ax]	0	3000	Hz
481	not used Filter	0	20	
482	not used Filter	0	5	
483	MOTOR 4Q-BA [ax]	-1	1	T/B
484	isq Visu. [ax]	-9.9999999338	9.99999993381	A
485	ir Visu. [ax]	-9.9999999338	9.99999993381	A
486	is Visu. [ax]	-9.9999999338	9.99999993381	A
487	Geschw. Visu. [ax]	2147483647	-2147483648	INC/TAB
492	PHI_el aktiv	0	4095	bl
493	ASM-MOTOR IP [ax]	-1000	1000	^A
494	ASM-MOT IP/EMK [ax]	-1000	1000	^A
495	Rampe Rastpo [ax]	0	60	s
496	SYN-MOTOR IP [ax]	-1000	1000	^A
497	SYN-MOT IP/EMK [ax]	-1000	1000	^A
498	PHIelektr.Visu.[ax]	2147483648	-2147483648	INC
500	SWG Command (cent.)	0	0	



ID	Name	Min	Max	Unit
501	SWG Status	0	0	
502	SWG Fehlernr(local)	500	500	Nr
503	SWG Drehrichtung	-1	1	
504	W1 (Lagesollw.)[Ax]	-2147483648	2147483647	INC
505	W2 (Geschw.)[Ax]	-2147483648	2147483647	INC/TAB
506	W3 (Beschl.)[Ax]	-2147483648	2147483647	INC/TAB
507	SWG-Ausgang [Ax]	0	2147483647	
508	Mech.Getr.fakt.[Ax]	1.00000000317	1.00000001504	
509	Drehrichtung[Ax]	-1	1	
510	U1 Lagesoll in [Ax]	-2147483648	2147483647	INC
520	SG Geschw. aktiv	0	0	n/j
521	SG Geschw. Fehler	520	520	Nr
522	Soll Beschl.[Ax]	0	100000000	INC/TAB
523	SG Geschw. Soll	-100000000	100000000	INC/TAB
525	SG Vmem aktiv	0	0	n/j
526	SG Vmem Fehler	525	526	Nr
527	Soll Beschl.[Ax]	0	100000000	INC/TAB
528	SG Geschw. Soll	-100000000	100000000	INC/TAB
529	SG Weg	-18000000000	18000000000	INC
530	SG Position. aktiv	0	0	n/j
531	SG Position. Fehler	520	520	Nr
532	Sollw.-Zeiger [Ax]	0	2147483647	
560	Command (central)	0	0	
561	BAHDL Status	0	0	
562	Fehlernr(local)	-580	580	Nr
563	SOLL Betriebsart	0	0	Nr
564	IST Betriebsart	0	0	Nr
565	Betriebsart Diag.	10	10	
566	Systemfehler	1	1	Nr
567	Fehlermaske	0	1	
568	Index Soll-BA-His.	-19	0	Nr
569	Soll-BA-History	0	0	
570	BA-AUS Diagnose	10	100	
571	BA-Automatik Diag.	10	100	
572	BA-Hand Diag.	10	100	
573	BA-Rasterf. Diag.	10	100	
574	BA-Bezugsf. Diag.	10	100	
575	BA-Nullp. Diag.	10	100	
576	BA-Ausglk. Diag.	10	100	
577	BA-Pollagef. Diag.	10	100	
578	BA-Verf.in BA0 Diag	10	100	
579	Save Data	0	0	
580	Geber-Kommando [Ax]	0	0	
581	Geber-Status [Ax]	0	0	
582	Geber-Info [Ax]	0	0	



ID	Name	Min	Max	Unit
583	Geber-Mode(SCS)[Ax]	0	0	
584	Geber-Aktiv [Ax]	0	0	
585	Akt-Umdrehungen[Ax]	0	0	UMD
586	Geber-Pos (in) [Ax]	0	360	GRAD
587	Geber-Pos (in) [Ax]	0	2147483647	INC
588	Geber-Pos(out) [Ax]	0	2147483647	INC
589	Geber-Fehler [Ax]	0	0	
591	SCS Analog Wert	-3.4028234663	3.40282346638	V-INC
592	Geber-Pos erw.(in)A	0	2147483647	INC
593	INC/U 1INC=nm[Ax]	0	65535	
594	Geber LIM/ROD [Ax]	0	0	
595	RS485 INC/U nm [Ax]	0	8388608	
596	Geber-Multiturn[Ax]	0	0	UMD
597	Geber-Serien Nr.	0	2147483647	
598	Geber SW Version	0	2147483647	
599	Geber Datum	0	2147483647	
640	Visu Status	0	1	
641	Visu-Command	0	1	
642	Kanal Achse	0	0	0/1
643	Mode (un/begr.)	0	0	ul/l
644	Allg.-Normung [Ax]	-3.4028234663	3.40282346638	Unit/V
645	Kraft-Normung [Ax]	0	2147483647	N/V
646	Strom-Normung [Ax]	-3.4028234663	3.40282346638	A/V
647	Spann.-Normung [Ax]	-3.4028234663	3.40282346638	V/V
648	Weg-Normung [Ax]	-3.4028234663	3.40282346638	Si/V
649	Geschw.-Normung[Ax]	-3.4028234663	3.40282346638	Si/V
650	Beschl.-Normung[Ax]	0	2147483647	Si/V
651	Moment-Normung [Ax]	0	2147483647	Nm/V
652	ID K 0 Ax0:W2 (Gesc	0	0	INC/TAB
653	ID K 1 Ax0:isq Visu	0	0	A
654	ID K 2 Ax0:e1=w1-x1	0	0	INC
660	Kanal 0 Wert:	-9.9999999338	9.99999993381	Grad/s
661	Kanal 1 Wert:	-9.9999999338	9.99999993381	A
662	Kanal 2 Wert:	-9.9999999338	9.99999993381	Grad
668	Testeingabe[Ax]	-1000000	1000000	V-INC
670	BASS Telegramm	0	0	-
672	Basis-Achs-Adresse	1	1	-
673	Index-Anzahl	1	1	-
674	Bass Ident	1	1	-
803	POS_STEUWO_1 [Ax]	0	0	V-INC
804	POS_STEUWO_2 [Ax]	0	0	V-INC
805	POS_STEUWO_3 [Ax]	0	0	V-INC
806	POS_STEUWO_4 [Ax]	0	0	V-INC
807	POS_STEUWO_5 [Ax]	0	0	V-INC
808	bl POS_mode_1 [Ax]	0	2147483647	V-INC



ID	Name	Min	Max	Unit
809	bl POS_mode_2 [Ax]	0	2147483647	V-INC
810	bl POS_mode_3 [Ax]	0	2147483647	V-INC
811	bl POS_mode_4 [Ax]	0	2147483647	V-INC
812	bl POS_MODE_5 [Ax]	0	2147483647	V-INC
813	bl POS_status1[Ax]	0	2147483647	V-INC
814	bl POS_status2[Ax]	0	2147483647	V-INC
815	bl POS_status3[Ax]	0	2147483647	V-INC
816	bl POS_status4[Ax]	0	2147483647	V-INC
817	bl POS_status5[Ax]	0	2147483647	V-INC
818	Rel.Soll-Weg_1[Ax]	-2000000000	2000000000	GRD
819	Rel.Soll-Weg_2 [Ax]	-2000000000	2000000000	GRD
820	Rel.Soll-Weg_3[Ax]	-2000000000	2000000000	GRD
821	Rel.Soll-Weg_4[Ax]	-2000000000	2000000000	GRD
822	Rel.Soll-Weg_5[Ax]	-2000000000	2000000000	GRD
823	Abs.Soll-Weg_1[Ax]	-2000000000	2000000000	GRD
824	Abs.Soll-Weg_2[Ax]	-2000000000	2000000000	GRD
825	Abs.Soll-Weg_3[Ax]	-2000000000	2000000000	GRD
826	Abs.Soll-Weg_4[Ax]	-2000000000	2000000000	GRD
827	Abs.Soll-Weg_5[Ax]	-2000000000	2000000000	GRD
828	Geschw.-Soll_1 [Ax]	0	2000000000	GRD/s
829	Geschw.-Soll_2 [Ax]	0	2000000000	GRD/s
830	Geschw.-Soll_3 [Ax]	0	2000000000	GRD/s
831	Geschw.-Soll_4 [Ax]	0	2000000000	GRD/s
832	Geschw.-Soll_5 [Ax]	0	2000000000	GRD/s
833	Beschl.-Soll_1 [Ax]	0	2000000000	GRD/s*s
834	Beschl.-Soll_2 [Ax]	0	2000000000	GRD/s*s
835	Beschl.-Soll_3 [Ax]	0	2000000000	
836	Beschl.-Soll_4 [Ax]	0	2000000000	GRD/s*s
837	Beschl.-Soll_5 [Ax]	0	2000000000	GRD/s*s
838	Geschw.-Fakt_1[Ax]	-3.4028234663	3.40282346638	
839	Geschw.-Fakt_2[Ax]	-3.4028234663	3.40282346638	
840	Geschw.-Fakt_3[Ax]	-3.4028234663	3.40282346638	
841	Geschw.-Fakt_4[Ax]	-3.4028234663	3.40282346638	
842	Geschw.-Fakt_5[Ax]	-3.4028234663	3.40282346638	
843	Minres.Geschw1[Ax]	0	2000000000	GRD/s
844	Minres.Geschw2[Ax]	0	2000000000	GRD/s
845	Minres.Geschw3[Ax]	0	2000000000	GRD/s
846	Minres.Geschw4[Ax]	0	2000000000	GRD/s
847	Minres.Geschw5[Ax]	0	2000000000	GRD/s
848	ABS. Ist-Weg_1[Ax]	-2000000000	2000000000	GRD
849	ABS. Ist-Weg_2[Ax]	-2000000000	2000000000	GRD
850	ABS. Ist-Weg_3[Ax]	-2000000000	2000000000	GRD
851	ABS. Ist-Weg_4[Ax]	-2000000000	2000000000	GRD
852	Abs. Ist-Weg_5[Ax]	-2000000000	2000000000	GRD
853	Wichtung_1 [Ax]	0	2147483647	



ID	Name	Min	Max	Unit
854	Wichtung_2 [Ax]	0	2147483647	
855	Wichtung_3 [Ax]	0	2147483647	
856	Wichtung_4 [Ax]	0	2147483647	
857	Wichtung_5 [Ax]	0	2147483647	
858	Weg-Offset_1 [Ax]	-2000000000	2000000000	GRD
859	Weg-Offset_2 [Ax]	-2000000000	2000000000	GRD
860	Weg-Offset_3 [Ax]	-2000000000	2000000000	GRD
861	Weg-Offset_4 [Ax]	-2000000000	2000000000	GRD
862	Weg-Offset_5 [Ax]	-2000000000	2000000000	GRD
863	bl POSgesperrt[Ax]	0	2147483647	
864	Mod.Ref-weg_1[Ax]	0	36000000	GRD
865	Mod.Ref-weg_2[Ax]	0	36000000	GRD
866	Mod.Ref-weg_3[Ax]	0	36000000	GRD
867	Mod.Ref-Weg_4[Ax]	0	36000000	GRD
868	Mod.Ref-weg_5[Ax]	0	36000000	GRD
977	Status ZK Save Para	-66	1	b/r/e
978	receive-com-par_si	0	2147483647	
987	Com.-command	0	3	
988	Com.-status	0	4	
989	AntrAdr. Masterring	0	0	
990	AntrAdr. Slaving	0	0	
991	Identnr. com-manag.	0	0	Nr.
992	ax_index com-manag.	0	0	ax
993	index com-manag.	0	0	ix
994	usign-Dat. com-man.	0	2147483647	
995	int-Dat. com-man.	-1073741824	1073741824	
996	float-Dat. com-man.	-9.9999996802	9.99999968028	
997	Regl.out_poi [Ax]	0	2147483647	
998	transmit-com-par[x]	0	2147483647	
999	receive-com-par[x]	0	2147483647	
1420	TESTFELD (x)	-100000	100000	
1421	TESTFELD_2 (x)	-100000	100000	
1451	Kp3 n-Regler [Ax]	0	10000000	1/s
1452	Tn3 n-Regler [Ax]	0	10000000	s
1454	Kv3 Lageregler [Ax]	0	10000000	1/s
1456	Kp4 n-Regler [Ax]	0	10000000	1/s
1457	Tn4 n-Regler [Ax]	0	10000000	s
1459	Kv4 Lageregler [Ax]	0	10000000	1/s
1470	IO In Register	0	1	-
1471	IO Out Register	0	1	-
1550	Timer-Queue-Nr.	0	2	
1551	Rechenzeit Queue	0	0	us
1552	Time-ms	0	2147483647	ms
1553	Time-us	0	2147483647	us
1554	Ti.Qu-state	-1	0	



ID	Name	Min	Max	Unit
1555	Anz. Timer	-1	2147483647	
1556	freie Timer	-1	2147483647	
1557	lauf. Timer	-1	2147483647	
1558	Ti.Typ single	-1	2147483647	
1559	Ti.Typ cyclic	-1	2147483647	
1560	Ti.Typ static	-1	2147483647	
1600	I Isq Istwert	-4096	4096	A
1601	I Isd Istwert	-4096	4096	A
1603	I lu Istwert	-4096	4096	A
1604	I lv Istwert	-4096	4096	A
1605	I lw Istwert	-4096	4096	A
1606	I Stellwert U	-2048	2048	-
1607	I Stellwert V	-2048	2048	-
1608	I Stellwert W	-2048	2048	-
1609	I Status	0	0	-
1610	I P-Verstaerkung Iq	0	10000	-
1611	I Nachstellzeit Iq	0	10000	ms
1613	I Offset U	-256	256	A
1614	I Offset V	-256	256	A
1615	I EMK-Vorsteuer	-2048	2048	V-INC
1616	I Kp-Intern	0	10000	-
1617	I P-Verstaerkung Id	0	10000	-
1618	I Nachstellzeit Id	0	10000	ms
1619	I usq sollwert	-3547	3547	V-INC
1620	I usd sollwert	-3547	3547	V-INC
1621	I i-Anteil usq	-3547	3547	V-INC
1622	I i-Anteil usd	-3547	3547	V-INC
1623	I Zykluszeit	62.5	125	us
1624	I Spannungsgrenze	0	0	-
1625	MSVM Grenze	0	0	%
1626	I U Alpha sollwert	-3547	3547	V-INC
1627	I U Beta sollwert	-3547	3547	V-INC
1628	Isa Poti	0	0	INC
1629	Isb Poti	0	0	INC
1636	I Test el. Geschw.	-50000	50000	Grad/s
1637	I Test Soll Isd	-5	5	A
1638	I Test Soll Usd	-3547	3547	V-INC
1640	PWM Dead Time	2	10	us
1641	PWM Min Pulse	0	10	us
1642	PWM Reload Wert	0	10000	Ticks
1643	PWM Frequenz	4	4	kHz
1650	LT Einsp Status	0	0	HEX
1651	LT Status	0	0	HEX
1652	LT Einsp Meldung	0	0	-
1653	LT Meldung	0	0	-



ID	Name	Min	Max	Unit
1654	LT Reset	0	0	-
1655	LT Impuls-Freigabe	0	0	Hex
1656	LT Version	0	0	-
1661	Spannung Uzk	10	450	V
1670	R Control	0	0	-
1671	R Status	0	0	-
1676	R Fehler Mode	0	0	-
1680	MT Status	0	0	-
1681	MT Erfassungssystem	0	0	-
1682	MT Temperatur	10	185	°C
1683	MT Schwelle 1	10	10	°C
1684	MT Schwelle 2	10	10	°C
1685	MT Abschaltsschwelle	10	10	°C
1686	MT Hysterese 1,2,3	0	5	°C
1687	MT AD-Wert	0	0	-
1693	PWM Version: KSR	0	9999	-
1694	PWM Sync Time	0	126	us
1695	PWM PLL-Verst.	0	2	
1696	PWM PLL-Offset	-30	30	us
1711	BASS/SV Baudrate	9600	9600	Baud
1800	RealTime Counter	0	0	
1801	Auslast.Reststack	0	0	%
1829	ID-Liste [x]	0	0	PNr.
1900	Slave/Master-Antrie	0	0	S/M
1901	Modulfehler	-1959	1959	
1902	Anz. Antriebe in AT	0	0	Stck.
1903	Fehlermaske ATG	0	2147483647	
1904	Info rechts/links	0	0	
1905	Hauptwellenposition	0	16777215	INC
1906	Leitachsgeberpos.	0	16777215	INC
1907	n=0 Hauptwelle	0	0	j/n
1908	Leitachsg.-nullpos.	0	16777215	INC
1909	Aufl. Leitachsgeber	0	16777215	INC
1910	CAN-Steuerwort	0	0	
1911	CAN-Statuswort	0	0	
1912	CAN AchsNr. Steuerw	0	0	Nr.
1913	CAN AchsNr ParaKana	0	0	Nr.
1914	CAN ID-Bedarfsdaten	0	0	Nr.
1915	CAN Datum Bedarfsd.	0	2147483647	
1916	CAN Timeout	0	3600	s
1917	SM Sendedaten (x)	0	2147483647	
1918	SM Empfangsdaten(x)	0	0	
1919	Hilfsmuster aktiv	0	0	n/j
1920	Max.Anp.Motorwinkel	0	45	Grad
1921	Start HW rot 1	0	719.999023437	Grad



ID	Name	Min	Max	Unit
1922	Ende HW rot 1	0	719.999023437	Grad
1923	Start HW rot 2	0	719.999023437	Grad
1924	Ende HW rot 2	0	719.999023437	Grad
1925	Start HW-Nullpos.	0	719.999023437	Grad
1926	Ende HW-Nullpos.	0	719.999023437	Grad
1927	Start Parkpos 1	0	719.999023437	Grad
1928	Ende Parkpos 1	0	719.999023437	Grad
1929	V1 Handbetrieb	0	10000	mm/s
1930	V2 Handbetrieb	0	10000	mm/s
1931	T1 Handbetrieb	0	10	s
1932	T2 Handbetrieb	0	10	s
1933	TZ Rasterfahren	0	10	s
1934	Max. Rueckdrehw. HW	0	359.998992919	Grad
1935	Max. Abweichung HW	0	359.998992919	Grad
1936	Max. Abw. LB rot	0	10	mm
1937	Min. ZK-Spannung	0	0	V
1938	Start HW rot 3	0	719.999023437	Grad
1939	Ende HW rot 3	0	719.999023437	Grad
1940	Gebertyp Legebarren	0	0	Typ
1941	max. Referenzierweg	0	100	mm
1942	max. Ref.Schleppf.	0	100	mm
1943	Start HW rot 4	0	719.999023437	Grad
1944	Ende HW rot 4	0	719.999023437	Grad
1945	Start Parkpos 2	0	719.999023437	Grad
1946	Schleppf. in Rast	0	1000	mm
1947	Schleppf.nicht in R	0	1000	mm
1950	Ende Parkpos 2	0	719.999023437	Grad
1951	Max. Abw. LB gruen	0	10	mm
1952	Max.Diff.STP-Wert	0	10	mm
1953	Schleppf. bei HW0	0	1000	mm
1954	max. isq Blockier	0	1000	A
1955	max. Blockierzeit	0	1000	s
1956	Gruppenfehlermeld.	1	9999	
1957	MasterProz. Pruefs.	0	1	
1958	SlaveProz. Pruefs.	0	1	
1959	Encoderprog.Pruefs.	0	1	
1960	SG Legebarre aktiv	0	0	n/j
1961	SG Legebarre Fehler	63556	63556	Nr.
1962	Hauptwellenversatz	-180	180	Grad
1963	Feinheit	0	10	mm
1964	Wichtung Korr.wert	0	100	%
1965	Dyn. Winkelversch.	-0.0450000017	0.04500000178	Grd/Umi
1966	Legebarrennullpos.	-360000000	360000000	Inc
1967	Softwareende links	-102300	102300	Raster
1968	Softwareende rechts	-102300	102300	Raster



ID	Name	Min	Max	Unit
1969	Norm.faktor Grad/mm	1.00000001168	1000	Grd/mm
1970	Kommando SWG Legeb.	0	0	
1971	SWG, Verf. Offset	-16777216	16777216	INC
1972	SWG,Ueberlegung ung	0	0	
1973	SWG, Unterl.1 ung.	0	0	
1974	SWG, Unterl.2 ung.	0	0	
1975	SWG,Ueberlegung ger	0	0	
1976	SWG, Unterl.1 ger.	0	0	
1977	SWG, Unterl.2 ger.	0	0	
1978	SWG, aktuelle Leg.	0	0	
1979	Betriebsdat. gltig	0	0	n/j
1980	2erVK ung Versatz	-359.99899291	359.998992919	Grad
1981	2erVK ung S-Unterl1	-359.99899291	359.998992919	Grad
1982	2erVK ung Stuetzp.	0	0	
1983	2erVK ung Wert	0	1	
1984	3erVK ung Versatz	-359.99899291	359.998992919	Grad
1985	3erVK ung S-Unterl1	-359.99899291	359.998992919	Grad
1986	3erVK ung S-Unterl2	-359.99899291	359.998992919	Grad
1987	3erVK ung Stuetzp.	0	0	
1988	3erVK ung Wert	0	1	
1989	2erVK ger Versatz	-359.99899291	359.998992919	Grad
1990	2erVK ger S-Unterl1	-359.99899291	359.998992919	Grad
1991	2erVK ger Stuetzp.	0	0	
1992	2erVK ger Wert	0	1	
1993	3erVK ger Versatz	-359.99899291	359.998992919	Grad
1994	3erVK ger S-Unterl1	-359.99899291	359.998992919	Grad
1995	3erVK ger S-Unterl2	-359.99899291	359.998992919	Grad
1996	3erVK ger Stuetzp.	0	0	
1997	3erVK ger Wert	0	1	
1998	Kommando Verfahrk.	0	0	
2000	Legungsende links	-102300	102300	Raster
2001	Legungsende rechts	-102300	102300	Raster
2002	Ausgleichsbew. ein	0	0	n/j
2003	Motorwinkel gltig	0	0	n/j
2004	LA-Winkel gltig	0	0	n/j
2005	Temp.Komp.Dehnung	0	1	mm/ø
2006	SWG Oszil.Bew.aktiv	0	0	n/j
2007	Oszil. Frequenz	1	1	Hz
2008	Oszil. Amplitude	0	0	%Fein
2009	SWG SinusfBew.aktiv	0	0	n/j
2010	SinusfBew. Frequenz	1	1	Hz
2011	Betriebsmode BA9	0	0	
2012	Status BA9	0	0	
2013	Gruppennummer	0	0	Nr.
2014	BA5 Korrekturweg	-2147483648	2147483647	INC



ID	Name	Min	Max	Unit
2015	Mask BA INAKTIV ATG	0	2147483647	
2016	AutoModeeinstellung	0	0	Off/On
2017	SchaltZ. Bremse AUF	0.00499999988	10	Sec
2018	SchaltZ. Bremse ZU	0.00499999988	10	Sec
2019	Mode Nullgasse def.	0	0	Std/Erw
2020	Verfahrw.Nullg.def.	0	1000	mm
2021	max. isq Nullg.def.	0	100	%isq m
2022	BA5 Feinjust. aktiv	0	0	n/j
2023	BA5 max.WegAnschlag	0	1000	mm
2024	BA5 max.WegFeinjust	0	0	%Fein
2025	ANTRIEBS ANZAHL	1	31	Stck.
2026	FEHLER	-2026	2044	Nr.
2027	Akt. Ueberlegung	0	16777215	Soll
2028	1. Unterlegung	0	16777215	Soll
2029	2. Unterlegung	0	16777215	Soll
2030	Max. Grenze Ueberl.	0	1023	Nadeln
2031	Max. Grenze Unterl.	0	1023	Nadeln
2032	MaxGrenz Korrekturw	0	15	Soll
2033	HM Ueberlegung ung.	0	1023	Nadeln
2034	HM Unterlegung ung.	0	1023	Nadeln
2035	HM Ueberlegung ger.	0	1023	Nadeln
2036	HM Unterlegung ger.	0	1023	Nadeln
2037	Daten gueltig	0	0	n/j
2038	MSR, Kommando	0	0	
2039	Max. Wert Ueberl.	0	1023	Nadeln
2040	Max. Wert Unterl.	0	1023	Nadeln
2041	MaxWert Korrekturw.	0	15	Soll
2042	MSR Datenfehler	0	0	
2047	KorrWertResFeinheit	-0.1000000014	0.10000000149	mm
2050	Ref.fahrt unterb.	0	0	j/n
2051	Init.phase Antrieb	0	0	
2052	Ax abs.Referenziert	0	0	j/n
2053	AP abs.Referenziert	0	0	j/n
2054	Maske Info r/l	0	0	
2055	Buffer_info r/l	0	0	
2056	Neue Daten vorhande	0	0	n/j
2057	Verfahrweg Referenz	-10000000	10000000	INC
2058	Ausschaltpos. Leita	0	16777215	INC
2059	Ausschaltpos. LB	0	16777215	INC
2060	Anhaltepos. Legeb.	0	16777215	INC
2061	Offset Motorwinkel	0	16777215	INC
2062	Visu rote Bereiche	0	9.99899959564	
2063	BDAT Speicherpuls	0	32767	V-INC
2064	BDAT Status	0	0	
2065	Master-Leitachspos.	0	16777215	INC



ID	Name	Min	Max	Unit
2066	Versatzreihe Status	0	0	
2067	BA5 Stat AutoNullID	-2	1	
2068	GB Nummer	0	0	Nr.
2069	Parametersatzname	0	2147483647	Nr.
2070	LA-EZBit R1 In ax	0	0	Bit
2071	LA-EZBit R1 Out ax	0	0	Bit
2074	GeberabgleichStatus	0	0	
2075	Bezugsfahrt Status	0	0	
2080	Select Container	0	0	Nr.
2081	Select Disp.-Mode	0	0	
2082	USIGN Var.-Wert	0	2147483647	
2083	INT Var.-Wert	2147483647	2147483647	
2084	FLOAT Var.-Wert	-1000000000	1000000000	
2085	History Anwahl	-255	0	Nr.
2086	Ringspeicherwert	0	2147483647	
2087	Testmodus	0	0	n/j
2088	Read-Pointer	0	2147483647	Adresse
2090	Info Swg-Lb no Data	0	0	n/j
2091	Info BDAT ungültig	0	0	
2092	Result. Feinheit	0	10	mm
2093	Anhaltep. sinusfBew	0	2147483647	INC
2094	Leitachsgeschw.	-1000000	1000000	INC/TAB
2095	Nadelistwert	0	1024000	Fein
2096	LB-Offset [Fein]	0	1024000	Fein
2097	HM-Zeilenanzahl	2	2	Zeilen
2100	KVG Kommando	0	0	
2101	KVG-Fehler	63436	63436	
2102	KVG Stuetzpunktanz.	0	0	Stck.
2103	KVG Stuetzpunkt	0	0	
2104	KVG Kurvendatum[Stp	-33554432	33554432	
2105	KVG intern Dyn.Kdat	1.00000000317	1.00000001504	
2106	KVG-Visu Select	0	0	Nr.
2107	KVG-Visu Trigger	0	0	V-INC
2108	KVG Visu. Kurve	1.00000000317	1.00000001504	
2109	KVG Feldkommunikat.	-33554432	33554432	
2150	NKS Fehler	-2150	2150	
2151	NKS Quell-ID	0	0	Nr.
2152	NKS Quell-Index	0	0	
2153	NKS Startwinkel	0	359.998992919	Grad
2154	NKS Endwinkel	0	359.998992919	Grad
2155	NKS +/- Hysterese	0	359.998992919	Grad
2156	NKS Nockenwert	0	0	Off/On
2200	KSR-Drive	100	9999	Vers.
2201	Modul: Regler	0	0	Nr
2202	Modul: Motor Manag.	0	0	Nr



ID	Name	Min	Max	Unit
2203	Modul: I-Regler	0	0	Nr
2204	Modul: System	0	0	Nr
2205	Modul: Fehler Manag	0	0	Nr
2206	Modul: SIS Std 3.4	0	0	Nr
2207	Modul: Legebarrenan	0	0	Nr
2208	Modul: Mod.-Mayer P	0	0	Nr
2209	Modul: Mod.-Mayer P	0	0	Nr
2210	Modul: Geberauswert	0	0	Nr
2211	Modul: Sin/Cos-Sign	0	0	Nr
2212	Modul: Geberueberwg	0	0	Nr
2213	Modul: DSV	0	0	Nr
2214	Modul: Bass Telegr.	0	0	Nr
2215	Modul: Visualis.	0	0	Nr
2216	Modul: sabsgeb	0	0	Nr
2217	Modul: Dig-IO	0	0	Nr
2218	Modul: Kurvengenera	0	0	Nr
2219	Modul: Nockenschalt	0	0	Nr
2220	Modul: Dummy Parame	0	0	Nr
2221	Modul: MSR_COM	0	0	Nr
2222	Modul: BA Manager	0	0	Nr
2223	Modul: BA Inaktiv	0	0	Nr
2224	Modul: BA Pollagefa	0	0	Nr
2225	Modul: BA Automatik	0	0	Nr
2226	Modul: BA Nullposit	0	0	Nr
2227	Modul: BA Hand def.	0	0	Nr
2228	Modul: BA Rasterf.	0	0	Nr
2229	Modul: BA Bezugsf.	0	0	Nr
2230	Modul: BA Ausgleich	0	0	Nr
2231	Modul: BA Verfahren	0	0	Nr
2232	Modul: BA Nullposit	0	0	Nr
2233	Modul: BA MustergZf	0	0	Nr
2234	Modul: BA Feinjust.	0	0	Nr
2235	Modul: SWG Manager	0	0	Nr
2236	Modul: SG Geschwind	0	0	Nr
2237	Modul: SG V m. kum.	0	0	Nr
2238	Modul: SG Positioni	0	0	Nr
2239	Modul: SWG Legebarr	0	0	Nr
2240	Modul: SWG Oszil.Be	0	0	Nr
2241	Modul: SWG Sinusf.B	0	0	Nr
2242	Modul: com-manager	0	0	Nr
2243	Modul: Debug Varaib	0	0	Nr
2244	Modul: -	0	0	Nr
2245	Modul: -	0	0	Nr
2246	Modul: -	0	0	Nr
2247	Modul: -	0	0	Nr



ID	Name	Min	Max	Unit
2248	Modul: -	0	0	Nr
2249	Modul: -	0	0	Nr
2250	Modul: -	0	0	Nr
2251	Modul: -	0	0	Nr
2252	Modul: -	0	0	Nr
2253	Modul: -	0	0	Nr
2254	Modul: -	0	0	Nr
2255	Modul: -	0	0	Nr
2320	AD-Wandler Ausst.	50	150	%
2323	sico_geb_ctr_com[Ax	0	65535	
2324	Sync Modulo Pos Ax	0	3600000	INC
2325	Sync Speed Ax	-1000000000	1000000000	Inc/TAB
2326	Diff Ana.u.Ser-Pos	0	3600000	INC
2327	Sin Signal Offset	-3.4028234663	3.40282346638	V-INC
2328	Cos Signal Offset	-3.4028234663	3.40282346638	V-INC
2329	Sin Signal Amp	-3.4028234663	3.40282346638	V-INC
2330	Cos Signal Amp	-3.4028234663	3.40282346638	V-INC
2331	quadr. Fehler Sin	-3.4028234663	3.40282346638	V-INC
2332	quadr. Fehler Cos	-3.4028234663	3.40282346638	V-INC
2333	Anzahl Messwerte	250	14400000	
2334	Geber Kor. Status	0	256	
2335	Geber Kor. Command	0	256	
2336	Kor_amp_2 [Ax]	0	1024	INC
2337	Kor_phase_2 [Ax]	-1024	1024	INC
2338	Kor_amp_4 [Ax]	0	1024	INC
2339	Kor_phase_4 [Ax]	-1024	1024	INC
2340	Oversampling Faktor	0	0	
2341	CPLD-Vers.Geberausw	0	0	-
2342	-3dB Grenzfrequenz	0	3.40282346638	Hz
2343	Reale Aufloesung	0	2147483647	INC
2344	Reale Mod Pos	0	2147483647	INC
2345	Analog Offset [Ax]	0	2147483647	
2346	SINCOS Achsfehler	-114	-114	Nr.
2360	G-Ue Mittelw. norm	-3.4028234663	3.40282346638	Inc
2361	G-Ue Max Varianz	0	3.40282346638	%
2362	G-Ueberw Messwert	0	523265	
2363	G-Ue V	-3.4028234663	3.40282346638	
2364	Abs. Schwankungsbr.	0	200	%
2365	G-Ue Toleranz	0	100	%
2366	G-Ue Ansprechzeit	0	100	ms
2367	Statistik Wert	-1	3.40282346638	
2368	Statistik Index	-3	511	
2369	G-Ue Getr. Faktor	-3.4028234663	3.40282346638	
2400	Abspeicherzaehler	0	16777215	Anz.



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Revision survey

Version	Status	Changings
5.04032.01	2005-01-11	First edition
5.04032.02	2005-06-09	Error correction in chapter monitoring functions
5.04032.03	2010-11-22	Drilling pattern added

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

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