Rexroth
Bosch Group

Rexroth Demo System PSP-I01.1-01 IndraDrive M with SERCOS Interface

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Users Manual

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IndraDrive M with SERCOS-Interface

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Purpose of Documentation
This documentation describes:

- Programming, parameter setting, setup of the demo system
- Handling
- Design and wiring
- Safety instructions
- Soft- and hardware requirements

Record of Revisions

Description	Release Date	Notes
DOK-SUPPL*-PSP01.1-KB01-EN-P	02/03	1st release

Validity
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Note
This document has been printed on chlorine-free bleached paper.

Inhaltsverzeichnis

1 Abbildungsverzeichnis

2 System description

2.1 Design

The demo system is designed for different purposes. These are:

- Training
- Help Desk and Troubleshooting
- Simulation of applications
- Programming and parameter settings

2.2 State of delivery

The demo system includes:

- Ready-made net cable for German wall sockets (3m)
- Set of fiber optical cables IKO 0985 (5m)
- This document

2.3 Dimensions and weight

- Height: 925 mm
- Width: 500 mm
- Depth: 450 mm
- Weight: 83 kg

2.4 Mains connection

In the state of delivery the demo system is prepared for an earthed TT-net with 230 VAC (+-10%), 50-60 Hz; less than16Amps.

Note: When required the mains voltage can be modified to different inputs like 115VAC. Refer to chapter Supplement-Rewiring for required rewiring of the demo system.

3 General Instructions

3.1 Definition of Terms, Introduction

Introduction

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instruction at all times.

The products of Bosch Rexroth Ltd. are designed and produced on actual level of technology. Before delivery all products are checked for reliability and operational safety.

The products are designed for designated purposes only. Bosch Rexroth is not liable for damages resulting from failure to observe the warnings provided in this documentation.

Warning: Improper use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including diabling of safety devices, may result in material damge, bodily harm, electrial shock or even death!.

Before use of Bosch Rexroth products the following prerequisites are fullfilled to guarantee a designated use of the products:

- Every user who works in any way with our products have to know the related safety instructions and must know and understand the designated use..
- In case of hardware products, the hardware must not be modified. Software products not decompiled or source codes modified.
- Defective or non fail-safe parts must not used or mounted.

Areas of use and application

The demo system PSP-I01.1-01 of Bosch Rexroth is designed for the use in office and laboratory.

Note: The demo system PSP-I01.1-01 may used only used with genuine parts listed in that documentation. Additional parts are not allowed.

Use only the specificated configuration and combination with the Soft- and Firmware listed in this document.

The demo system must not be used under different conditions as described in the respective application manual, mounting- or installation guide e.g. temperature, protection class, humidity, EMC..

3.2 Improper use

- Do not attempt the demo system if It is exposed to improper ambient conditions. It is not allowed to use under water, extreme temperature conditions (condensation) or temperature higher than 55 degrees Celsius.
- In applications who are not explicit released by Bosch Rexroth it is absolutely required to read the Safety instructions. Only personal who are trained and qualified for the use and operation of the equipment may work on this equipment or within its proximity.
- The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.
- Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid

3.3 Functions and Operation modes

Main Operating Modes

- Torque control
- Velocity control
- Position control
- Drive-internal interpolation
- Jog mode
- Position block mode

General Functions

Controller functions

- Extensive diagnostic options
- Base parameter loding
- Current limitation
- Speed limitation
- Excessive Position limitation
- Drive internal Failure reaction:
- Drive lock function
- Drive Halt function
- Automatical homing
- Analog I/O's
- Oscilloscope function

Warnings

Many areas are monitored in connection with operating modes and parameter settings. A warning will be generated if a state is detected that allows a proper operation for the being, but will eventually generate an error and thereby lead to a shutdown of the drive if this state continues.

Operational modes

Given drive controllers without command communications interface or if the command communications is not active (command communications could be SERCOS), then the drive switches automatically into operating-mode after the control voltage is switched on.

If the command communication is active, then the drive controller does not automatically switch into operating mode after the control voltage is switched on. Only the command communications master can switch between parametrization modes and operating modes.

Parametrization surfaces that communicate with the drive controller via the RS232/485 can switch from parametrization and operating mode as long as the drive is not in control mode and command communications is not active. Commsioning Guidelines: For commissioning drive controllers, the parametrization interface DriveTop can be used.

Errors

Errors: Many areas are monitored in connection with operating modes and parameter settings. An error message is generated if a condition is encountered which no longer allows proper operation

Backup & Restore

To save the data of the axis, all important and changeable parameters of the axis are stored in the list S-0-0192, IDN-List of backup operation data. By saving the parameters listed there with the control or parametrization surface, you can obtain a complete data backup of this axis after the first setup (Backup&Restore-function).

Parameter Buffer Mode

The drive controller is capable of storing data that is transmitted via the user data channel (e.g., service channel) either temporarily or permanently.

Firmware Update with the Dolfi Program

Firmware updates for a drive controler via the serial interface are available with the program DOLFI. The program can be ordered from Bosch Rexroth with part number: SWA-DOL*PC-INB-01VRS-MS-C1,44-COPY or material number 279804.

Overview of SERCOS Communication

The basic features of the SERCOS interface are:

- Cyclicyl data exchange command and feedback values with exact time intervals
- Synchronization of measurement point and command value input
- Overall synchronization of all drives connected to the control
- Minimum cycle time 0.5 ms / maximum cycle time 65 ms
- Baud rate selectable, either 2 or 4 MBaud
- Service channel for settings and diagnostics
- Data transfer through fiber optic ring
- Configuration of the telegram contents
- SERCOS compatibility class C, Granularity 1, i.e., a multiple of

1000 µsec can be programmed as cycle time.

The features of the interface are mentioned here briefly. More detailed information is included in the SERCOS interface specification.

Startup for the SERCOS Interface

To start the interface you have to:

- connect the fiber optic cable
- set the drive address
- check the distortion indicator
- set the transmission rate
- set the transmission power

Adjustments of the SERCOS Interface

All settings can be done with switches on the front plate of the interface

Command Communications with Analog Interface

If the SERCOS interface is not active then the analog interface can be used in both of these units as well.

Note: In case of any technical problem please call the Bosch Rexroth Dept. BRC/BMS3 (+49 9352 40-4295) or by Email: werner.klein@boschrexroth.de

4 Safety Instructions for Electric Drives and Controls

4.1 Introduction

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instructions at all times.

Do not attempt to install or start up this equipment without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation of the equipment prior to working with the equipment at any time. If you do not have the user documentation for your equipment, contact your local Rexroth Indramat representative to send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the equipment is resold, rented or transferred or passed on to others, then these safety instructions must be delivered with the equipment.

WARNING

Improper use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!

4.2 Explanations

The safety instructions describe the following degrees of hazard seriousness in compliance with ANSI Z535. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions.

Warning symbol with signal word	Degree of hazard seriousness according to ANSI
 **DANGER**	Death or severe bodily harm will occur.
 **WARNING**	Death or severe bodily harm may occur.
 **CAUTION**	Bodily harm or material damage may occur.

Fig. 4-1: Hazard classification (according to ANSI Z535)

4.3 Hazards by Improper Use

DANGER

High voltage and high discharge current! Danger to life or severe bodily harm by electric shock!

DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!

WARNING

High electrical voltage due to wrong connections! Danger to life or bodily harm by electric shock!

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!

CAUTION

Risk of injury due to improper handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock or incorrect handling of pressurized systems!

CAUTION

Risk of injury due to incorrect handling of batteries!

4.4 General Information

- Bosch Rexroth is not liable for damages resulting from failure to observe the warnings provided in this documentation.
- Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.
- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.
- Only persons who are trained and qualified for the use and operation of the equipment may work on this equipment or within its proximity.
  - The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.
  - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.
- Only use spare parts and accessories approved by the manufacturer.
- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- The equipment is designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Use only safety features and applications that are clearly and explicitly approved in the Project Planning Manual.
  For example, the following areas of use are not permitted: construction cranes, elevators used for people or freight, devices and vehicles to transport people, medical applications, refinery plants, transport of hazardous goods, nuclear applications, applications sensitive to high frequency, mining, food processing, control of protection equipment (also in a machine).
- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.
  The machine and installation manufacturer must
  - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,
  - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.

- Operation is only permitted if the national EMC regulations for the application are met.
  The instructions for installation in accordance with EMC requirements can be found in the documentation "EMC in Drive and Control Systems".
  The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.
- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

4.5 Protection Against Contact with Electrical Parts

Note: This section refers to equipment and drive components with voltages above 50 Volts.

Touching live parts with voltages of 50 Volts and more with bare hands or conductive tools or touching ungrounded housings can be dangerous and cause electric shock. In order to operate electrical equipment, certain parts must unavoidably have dangerous voltages applied to them.

DANGER

High electrical voltage! Danger to life, severe bodily harm by electric shock!

⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment.

⇒ Follow general construction and safety regulations when working on high voltage installations.

⇒ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.

⇒ Do not operate electrical equipment at any time, even for brief measurements or tests, if the ground wire is not permanently connected to the points of the components provided for this purpose.

⇒ Before working with electrical parts with voltage higher than 50 V, the equipment must be disconnected from the mains voltage or power supply. Make sure the equipment cannot be switched on again unintended.

⇒ The following should be observed with electrical drive and filter components:

⇒ Wait five (5) minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.

⇒ Never touch the electrical connection points of a component while power is turned on.

⇒ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.

⇒ A residual-current-operated protective device (RCD) must not be used on electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.

⇒ Electrical components with exposed live parts and uncovered high voltage terminals must be installed in a protective housing, for example, in a control cabinet.

To be observed with electrical drive and filter components:

DANGER

High electrical voltage on the housing!
High leakage current! Danger to life, danger of injury by electric shock!

⇒ Connect the electrical equipment, the housings of all electrical units and motors permanently with the safety conductor at the ground points before power is switched on. Look at the connection diagram. This is even necessary for brief tests.

⇒ Connect the safety conductor of the electrical equipment always permanently and firmly to the supply mains. Leakage current exceeds 3.5 mA in normal operation.

⇒ Use a copper conductor with at least 10 mm² cross section over its entire course for this safety conductor connection!

⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. Otherwise, high voltages can occur on the housing that lead to electric shock.

4.6 Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 0 and 50 Volts on Rexroth Indramat products are protective low voltages designed in accordance with international standards on electrical safety.

WARNING

High electrical voltage due to wrong connections! Danger to life, bodily harm by electric shock!

⇒ Only connect equipment, electrical components and cables of the protective low voltage type (PELV = Protective Extra Low Voltage) to all terminals and clamps with voltages of 0 to 50 Volts.

⇒ Only electrical circuits may be connected which are safely isolated against high voltage circuits. Safe isolation is achieved, for example, with an isolating transformer, an opto-electronic coupler or when battery-operated.

4.7 Protection Against Dangerous Movements

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

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

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

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

DANGER

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

⇒ Ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. Unintended machine motion is possible if monitoring devices are disabled, bypassed or not activated.

⇒ Pay attention to unintended machine motion or other malfunction in any mode of operation.

⇒ Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:

- use safety fences
- use safety guards
- use protective coverings
- install light curtains or light barriers

⇒ Fences and coverings must be strong enough to resist maximum possible momentum, especially if there is a possibility of loose parts flying off.

⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the machine if the emergency stop is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a starting lockout to prevent unintentional start.

⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone. Safe standstill can be achieved by switching off the power supply contactor or by safe mechanical locking of moving parts.

⇒ Secure vertical axes against falling or dropping after switching off the motor power by, for example:

- mechanically securing the vertical axes
- adding an external braking/ arrester/ clamping mechanism
- ensuring sufficient equilibration of the vertical axes

The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!

⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for:
- maintenance and repair work
- cleaning of equipment
- long periods of discontinued equipment use

⇒ Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such equipment cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.

4.8 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated near current-carrying conductors and permanent magnets in motors represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

⇒ Persons with heart pacemakers, hearing aids and metal implants are not permitted to enter the following areas:
- Areas in which electrical equipment and parts are mounted, being operated or started up.
- Areas in which parts of motors with permanent magnets are being stored, operated, repaired or mounted.

⇒ If it is necessary for a person with a heart pacemaker to enter such an area, then a doctor must be consulted prior to doing so. Heart pacemakers that are already implanted or will be implanted in the future, have a considerable variation in their electrical noise immunity. Therefore there are no rules with general validity.

⇒ Persons with hearing aids, metal implants or metal pieces must consult a doctor before they enter the areas described above. Otherwise, health hazards will occur.

4.9 Protection Against Contact with Hot Parts

CAUTION

Housing surfaces could be extremely hot! Danger of injury! Danger of burns!

⇒ Do not touch housing surfaces near sources of heat! Danger of burns!

⇒ After switching the equipment off, wait at least ten (10) minutes to allow it to cool down before touching it.

⇒ Do not touch hot parts of the equipment, such as housings with integrated heat sinks and resistors. Danger of burns!

4.10 Protection During Handling and Mounting

Under certain conditions, incorrect handling and mounting of parts and components may cause injuries.

CAUTION

Risk of injury by incorrect handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock!

⇒ Observe general installation and safety instructions with regard to handling and mounting.

⇒ Use appropriate mounting and transport equipment.

⇒ Take precautions to avoid pinching and crushing.

⇒ Use only appropriate tools. If specified by the product documentation, special tools must be used.

⇒ Use lifting devices and tools correctly and safely.

⇒ For safe protection wear appropriate protective clothing, e.g. safety glasses, safety shoes and safety gloves.

⇒ Never stand under suspended loads.

⇒ Clean up liquids from the floor immediately to prevent slipping.

4.11 Battery Safety

Batteries contain reactive chemicals in a solid housing. Inappropriate handling may result in injuries or material damage.

CAUTION

Risk of injury by incorrect handling!

⇒ Do not attempt to reactivate discharged batteries by heating or other methods (danger of explosion and cauterization).

⇒ Never charge non-chargeable batteries (danger of leakage and explosion).

⇒ Never throw batteries into a fire.

⇒ Do not dismantle batteries.

⇒ Do not damage electrical components installed in the equipment.

Note: Be aware of environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (danger of explosion). Dispose batteries separately from other waste. Observe the legal requirements in the country of installation.

4.12 Protection Against Pressurized Systems

Certain motors and drive controllers, corresponding to the information in the respective Project Planning Manual, must be provided with pressurized media, such as compressed air, hydraulic oil, cooling fluid and cooling lubricant supplied by external systems. Incorrect handling of the supply and connections of pressurized systems can lead to injuries or accidents. In these cases, improper handling of external supply systems, supply lines or connections can cause injuries or material damage.

CAUTION

Danger of injury by incorrect handling of pressurized systems !

⇒ Do not attempt to disassemble, to open or to cut a pressurized system (danger of explosion).

⇒ Observe the operation instructions of the respective manufacturer.

⇒ Before disassembling pressurized systems, release pressure and drain off the fluid or gas.

⇒ Use suitable protective clothing (for example safety glasses, safety shoes and safety gloves)

⇒ Remove any fluid that has leaked out onto the floor immediately.

Note: Environmental protection and disposal! The media used in the operation of the pressurized system equipment may not be environmentally compatible. Media that are damaging the environment must be disposed separately from normal waste. Observe the legal requirements in the country of installation.

Notes

5 Start up Instructions for the demo system

5.1 Minimum requirements for start-up

Abb. 5-1: 2-axis IndraDrive M demo system

Soft- and Hardware requirements

IndraDrive M 2-axis demo system with SERCOS Command Communication Interface.

Standard PC oder Laptop.

Minimum requirements:

- Intel 486 PC (Pentium 166 or faster recommended)
- Microsoft Windows 95, Microsoft Windows 98, Microsoft Windows ME, Microsoft Windows NT 4.0, Microsoft Windows 2000 or Microsoft Windows XP.
- installed Software DriveTop 15VRS or higher recommended.
- minimum 32 MByte RAM Memory
- minimum 60 MByte Hard disk Memory
- use small fronts for the screen in the control panel
- Start-up tool SYSDA02.X

The Start-up tool SYSDA02.X contents a SERCOS-Master unit for the Communication with the drives of the demo system.

In the state of delivery no additional adjustments have to be done for SYSDA02.x

Note: The Start-up tool, Type: SYSDA02.2 can be ordered seperately with the part number 287218.

The following start-up is based on Software DriveTop 16VRS. In other DriveTop versions the display representation can be slightly different from this documentation.

Note: The Software DriveTop 16VRS is not inluded with the demo system. DriveTop can be ordered seperately with the part number 287218.

Ready-made Parameter set

The demo system needs to be programmed with a parameter set.

Note: The above mentioned Software DriveTop 16VRS includes ready-made parameter sets for demo systems.

Additional Documentation

Additional documentation concerning the products in the demo system is available:

- DOCU CD-Rom (part number: 281882)
- Online Help system for the drive firmware
- Paper documentation
  - HVE + HVR Application manual (part number: 280604)
  - HMS Project planning description (part number: ******)
  - MHD Project planning description (part number: 272177)

5.2 Installation Hardware

Mains connection

Press the Emergency switch (Not Aus) on the IndraDrive demo system and turn the main switch into position "0 (OFF)" to be sure there is no voltage activated.

Connect the enclosed net cable at the demo system with 1 x AC 230 V ± 10% (earthed TT net); 50-60 Hz; 16 amps via a safety contact electrical outlet. When use of divergent mains voltage the internal transformer and the input of the 24V power supply need to be rewired. see chapter: Supplement-Rewiring (Modification for other net input voltages.

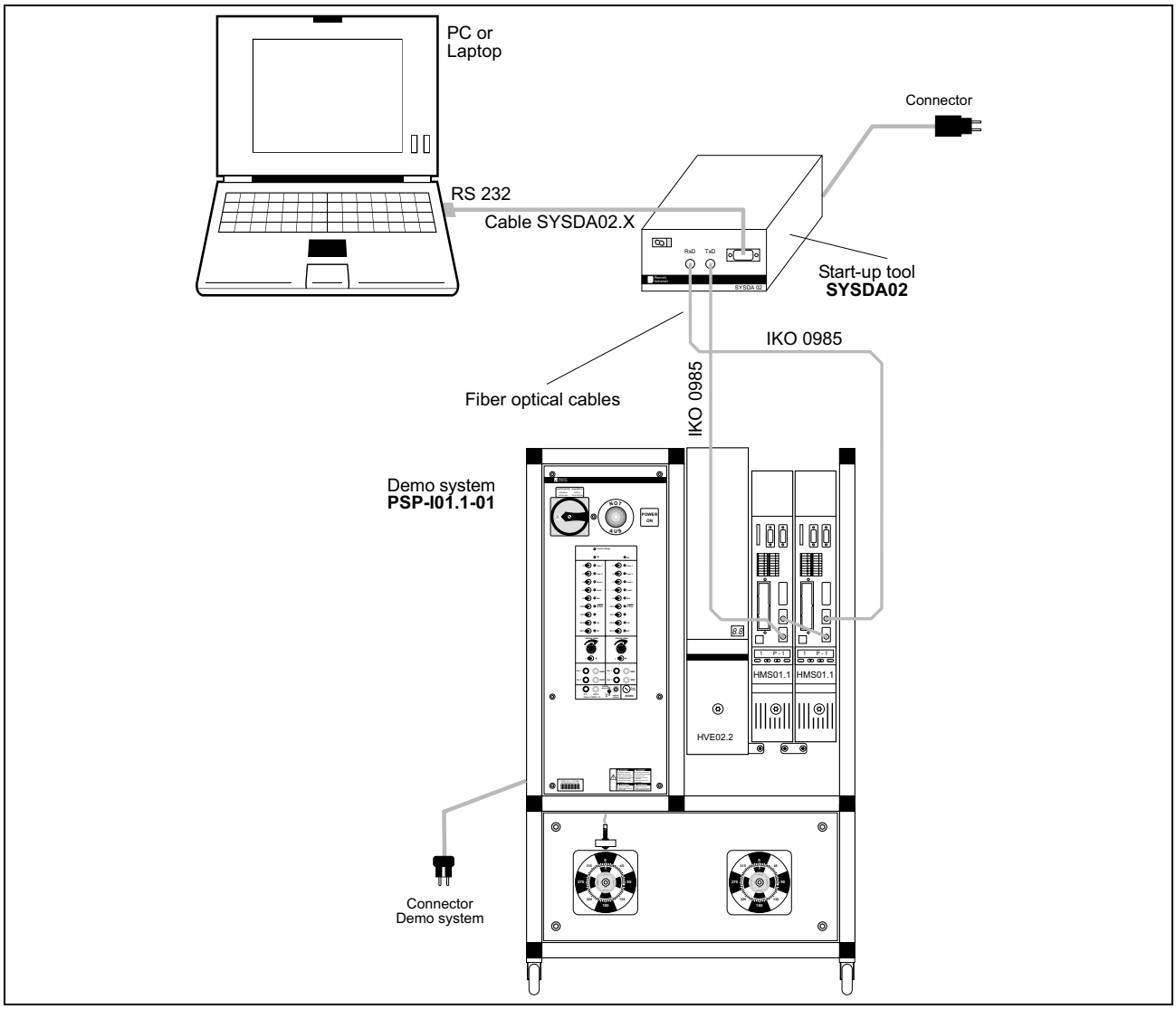

Abb. 5-2: Schematic representation of the hardware installation

SYSDA box connection

Connect one fiber optical cables IKO0985 with the SYSDA box terminal TxD and the other end with the Drive controller HMS (axis 1) terminal X20RX. Connect the the second fiber optical cable with RxD at the SYS-DA box and the other end with X20TX at the Drive controller HMS (axis 2)

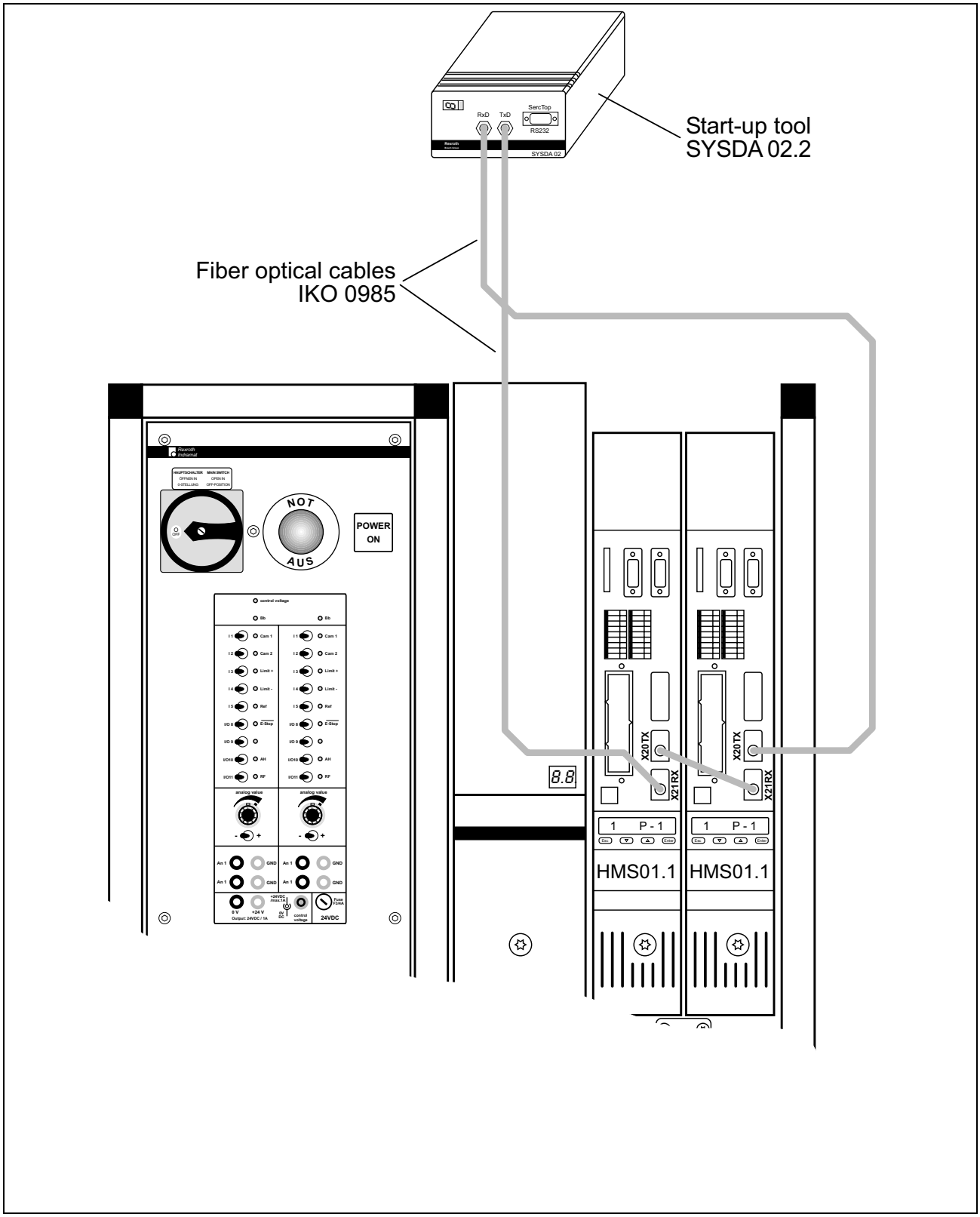

Abb. 5-3: Connection of the fiber optical cables (IKO).

5.3 Presettings

Function overview of drive diagnose module

The following functions can be executed by the Diagnose module:

- Adjustment Drive adress
- Adjustment SERCOS Transmit power
- SERCOS Autodetect Field bus transfer
- Position reference
- Failure history
- Base parameter load
- Adjustment Analog inputs

Adjustment drive address

This procedure is needed for the SERCOS-Master to identify the Drive controller modules.

The required procedure is described in the following chapter.

Note: For the adjustment of the drive controller address, the SYSDA box is not required.

Switch-On Demo system

Check if the emergency switch and the fuse on the back plane of the demo system are switched on. Turn the main switch to "1" (ON) to supply the power supply module HVE. The fans of the power supply module HVE and the drive controllers HMS are running. The diagnose display H1 at the power supply module HVE gets the message "23" (Drive failure) or already "bb" (Ready for power On). The diagnose modules of both drives display the boot routine and finally following status:

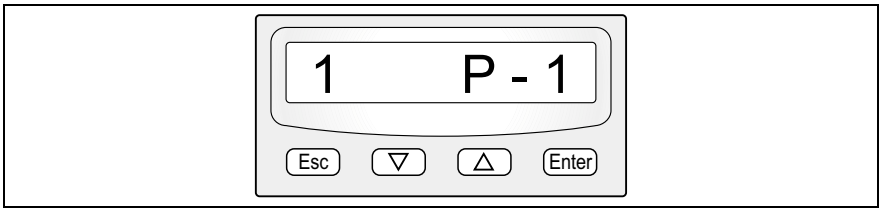

Abb. 5-4: Status after Boot routine

The following steps must be carried out completely for both drive controllers:

- press push-button "Enter" 1x

Dialog change: Menu selection

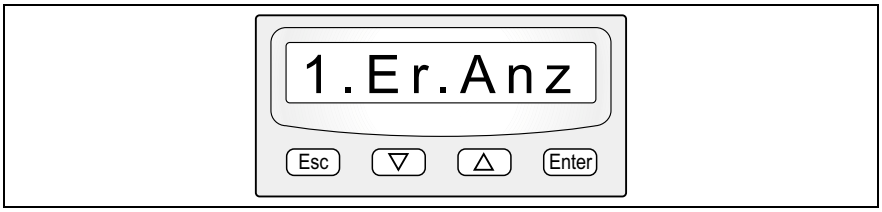

Abb. 5-5: Menu selection 1

- Press push button "△", 1x

Dialog change: Comand

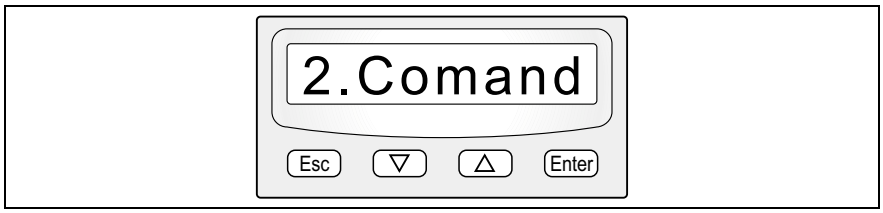

Abb. 5-6: Menu selection 2

- Press push button "Enter" 1x

Dialog change: Address selection dialog. Alternately the following indication appears

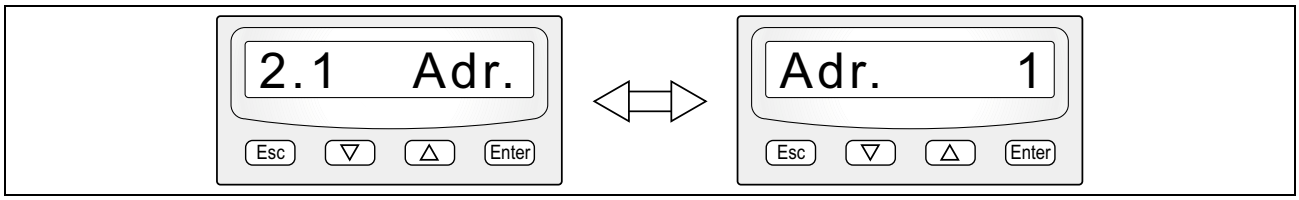

Abb. 5-7: Address selection dialog

- Press push button "Enter" 1x

.Dialog change: Address adjustment range x10

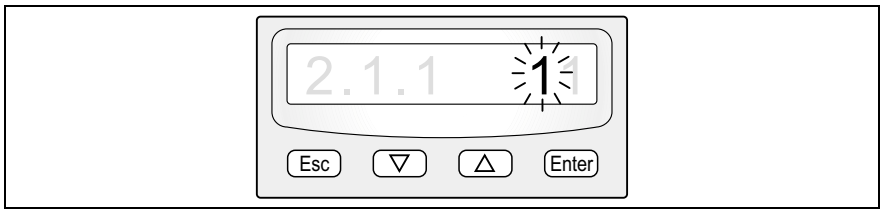

Abb. 5-8: Address adjustment range x10

The adjustment range of the decade is represented by a blinking digit in the display.

- Press push button "△" oder "▽"if necessary until the indication is without number
- Press push button "Enter"

Dialog change: Address adjustment range x1.

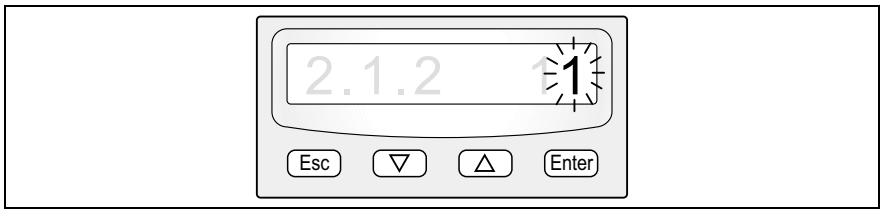

Abb. 5-9: Address adjustment range x1

The adjustment range of the one decade is represented by a blinking digit in the display.

- Press push button "△" or "▽" if necessary press until "1" at the left drive or 2 appear at the right drive.
- Press push button "Enter"

Dialog change: The following indication alternately seems address selection dialog.

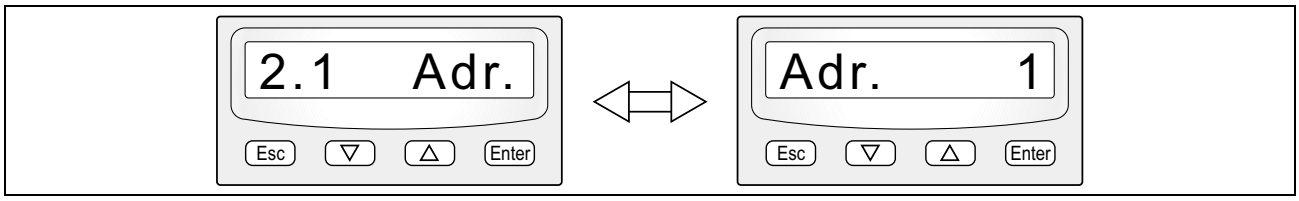

Abb. 5-10: address selection dialog

- Press push button "Esc"

Dialog change: Comand.

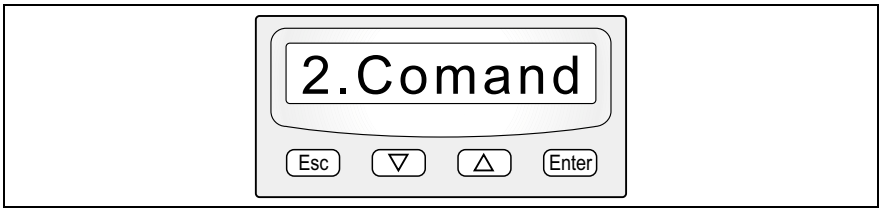

Abb. 5-11: Menu selection 2

Result: The Drive on the left side has got the address 1, the right hand side drive has got the address 2.

5.4 Analog command communication mode

Driving the drives in analog mode some additional adjustments are required. All two-way switches of the operating panel have to be in middle position (no contact).The following instructions must be carried out on both drive controllers.

Define analog mode

Note: If the display already shows the status "Command" skip the next 3 work steps!

The diagnose modules of both drive controllers display the following report after the Boot routine.

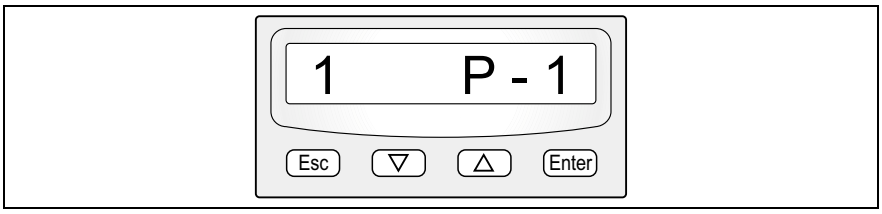

Abb. 5-12: Status after Boot routine

- Press push button "Enter" 1x

Dialog change: Menu selection

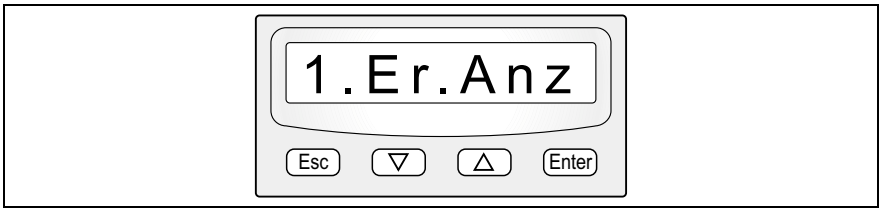

Abb. 5-13: Menu selection 1

- Press push button "△" 1x

Dialog change: Comand

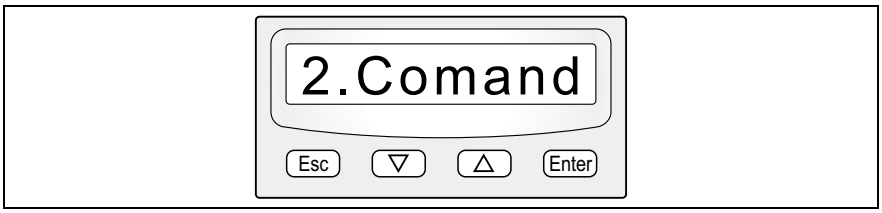

Abb. 5-14: Menu selection 2

- Press push button "Enter" 1x

Dialog change: Address selection dialog. The following indication alternately appears.

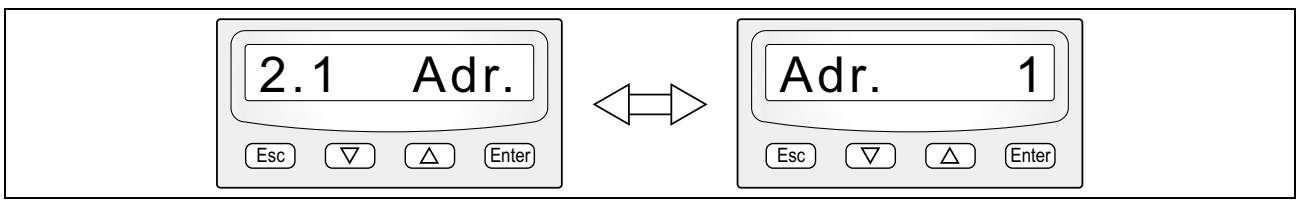

Abb. 5-15: Address selection dialog

The display of the left drive controller shows address 1 and the display of the right drive controller shows address "2".

- Press push button "△", 2x

Dialog change: Selection analog mode

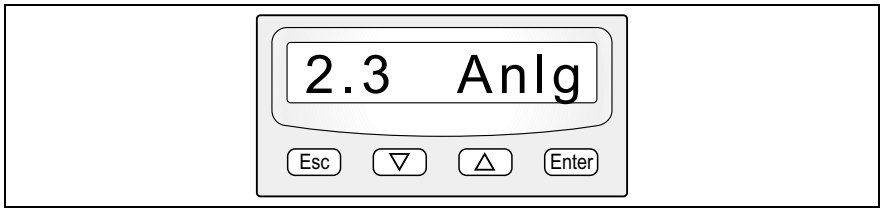

Abb. 5-16: Selection analog mode

- Press push button "Enter" 1x

Dialog change: Set point command value

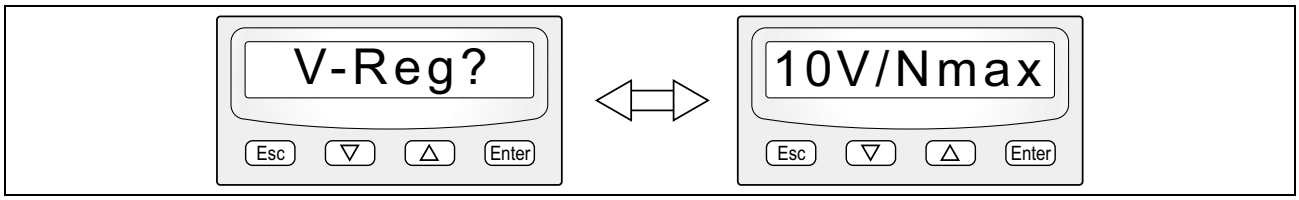

Abb. 5-17: Set point command value

- press push button "Enter" 1x

Dialog change: Warning message E-Stop active "E8034".

In addition to the warning message the drive address is displayed on the left side of the respective drive. The status "Ready for power on" is also confirmed by the green LED on top of the operating panel. The display H1 of the HVE module changes to "23".

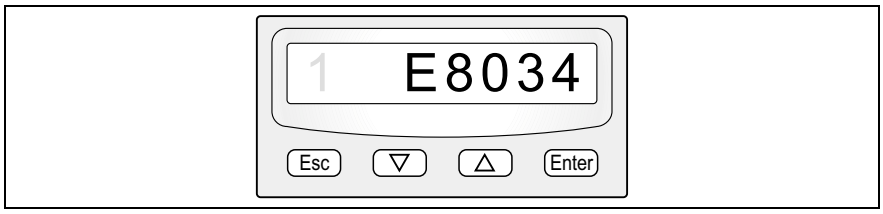

Abb. 5-18: Warning message E-Stop active "E8034"

The warning message "E8034" indicates the active E-Stop status.

- Move switch "E-Stop" (I/O 8) at the operating panel to the right position

Dialog change: Ready for power On "bb" for the respective Drive controller.

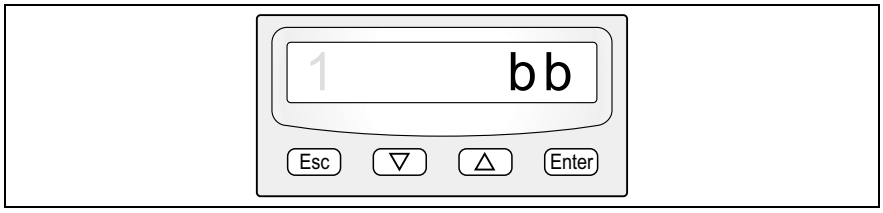

Abb. 5-19: Ready for power On "bb"

Switch Power On

Prerequisite for Power On is the status "bb" for the Drive controller and the power supply module.

- Release emergency switch
- Press push button "Power ON"

Dialog change: Drive ready "Ab" for the respective Drive controller

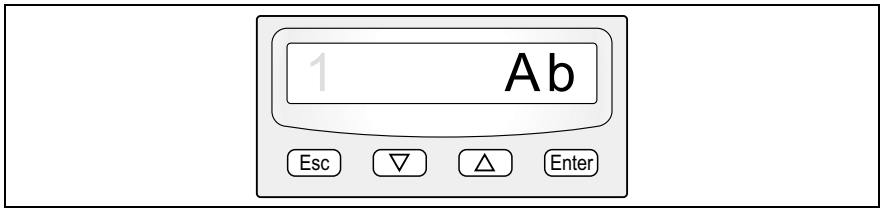

Abb. 5-20: Drive ready "Ab"

The display shows on the left side the address of the respective drive controller and on the right side the drive status. The status changes from "bb" to "Lb" Drive ready during Power On.

Run the drives

The following requirments must be fulfilled to run the drives: At the operating panel of the demo system there is a potentiometers and a switch for the direction of speed command for the respective drive. No set point is given in the middle position. (The Motor has got torque) Negativ (-) means CCR in direction of the motor rotary table

Note: For the protection against dangerous movements both potentiometers have to be set into zero position (turn counter clockwise) and both switches have to be in middle position.

- Move switch drive stop (I/O11) at the operating panel into right position

Dialog change: Drive Halt (of the respective drive controller).

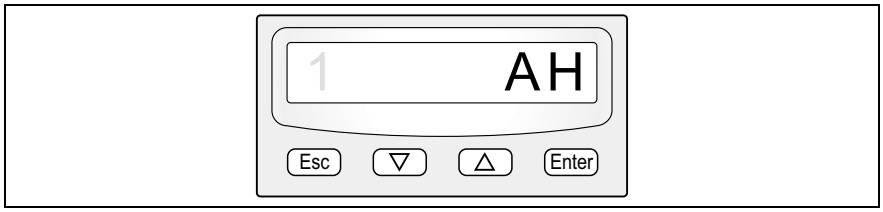

Abb. 5-21: Drive Halt (drive stop) with torque

The left side of the display shows the respective drive address. The right side shows the drive status "AH" Drive Halt.

- Move switch drive enable (I/O10) at the operating panel into right position

Dialog change: Drive enable (The respective drive controllers).

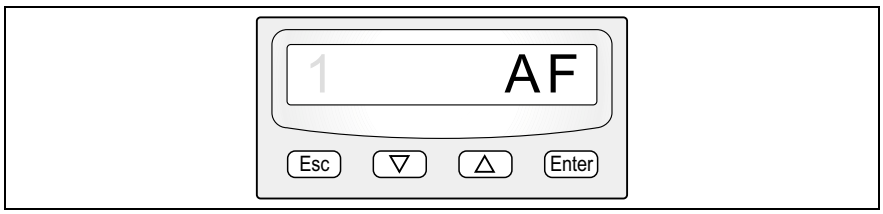

Abb. 5-22: Drive enable

The left side of the display shows the respective drive address. The right side shows the drive status "AF" Drive enable.

- Move the set point switch into right position (+)
- Turn the potentiometer to increase/degrease the speed

The drive follows the current set point and the selected direction of rotation.

5.5 SERCOS mode through SYSDA-box

In this chapter the handling of the IndraDrive demo with SERCOS communication and Setup tool SYSDA 02.2 system is described.

Note: Prerequisite for the setup is: The proper installation of the demo system, loaded parameter set, preadjusted drive addresses and the demo system must be switched on. Refer to chapter: "Installation of hardware or "xxx".

Start DriveTop

For the communication with the IndraDrive demo system the software DriveTop is needed. Drivetop Version 16 isn't contained in the scope of supply of the demo system and can be ordered separately with the part number 295178.

The following functions can be carried out with Drivetop:

- Backup/Restore Drive parameter sets
- Carry out simple commissioning and editing drive parameters
- Indication of the diagnosis and status reports
- Executing drive commands
- Failure history (log book) and delete faults
- Adjusting communication parameters

Note: Software DriveTop from version 15 VRS can be used.
This documentation was made with DriveTop 16 VRS.
Use of another software version can have a divergent representation of menu operation and dialogs.

- Start DriveTop Software

Information about DriveTop Software version

Abb. 5-23: Information of Software version

Dialog change: automatically

- select connection "Online using SERCANS"
- confirm the Command box with "OK"

Abb. 5-24: Select connection "Online using SERCANS"

Dialog change: System overview DriveTop

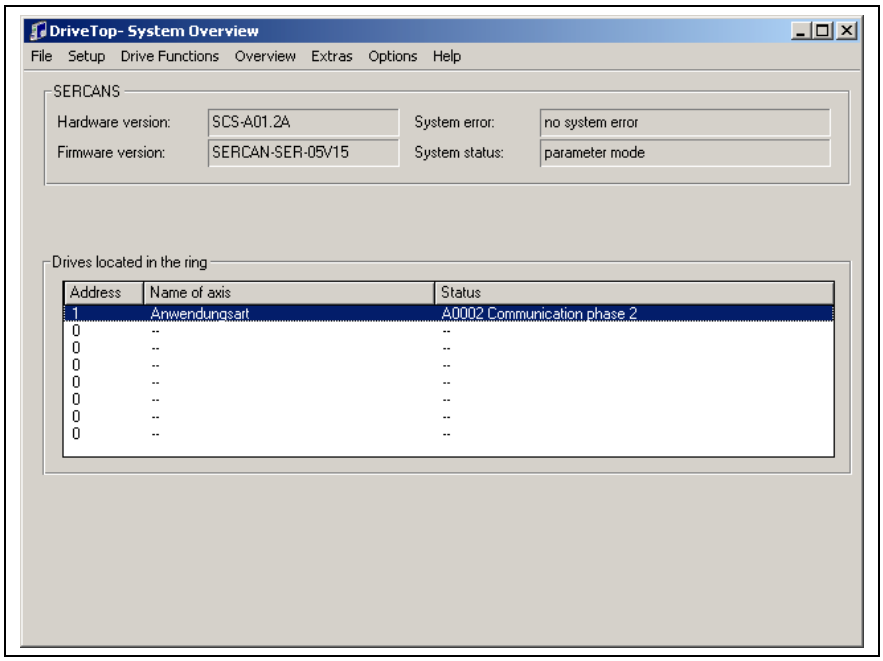

Abb. 5-25: System overview

- select menu: Setup ➡ SERCANS basic configuration ➡ System overview
- change to menu: "System overview" (SERCANS configuration)

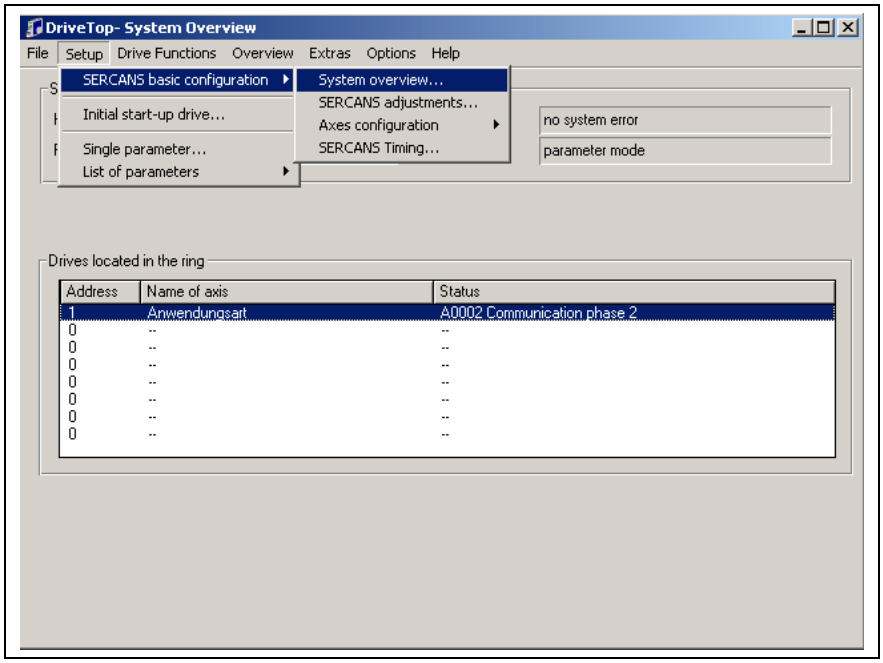

Abb. 5-26: System overview DriveTop

Dialog change: Declare SERCANS Drive address 1

- Declare SERCANS Drive address 1

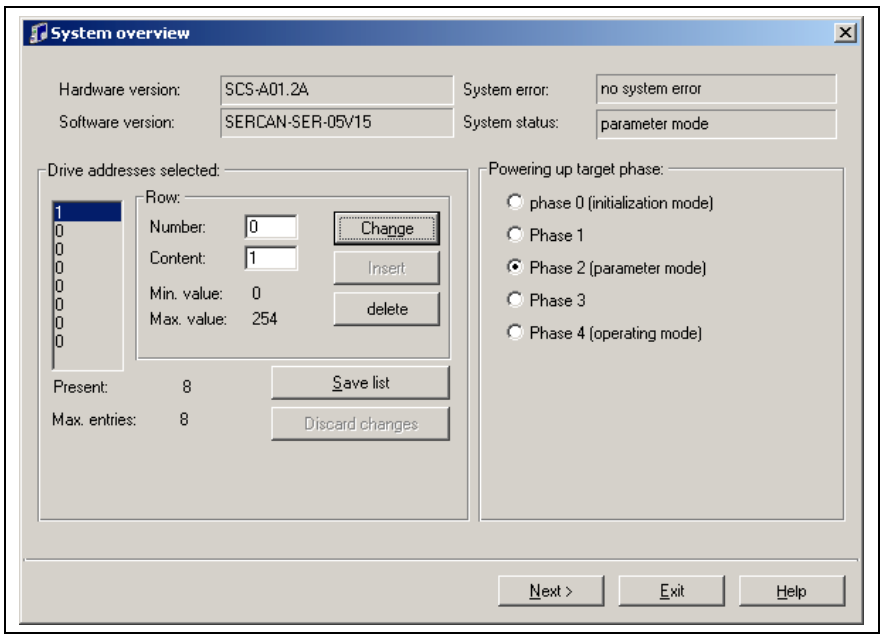

Abb. 5-27: Declare SERCANS Drive address 1

Dialog: Declare SERCANS Drive address 2

- overwrite selected drive adress (row 2) number with the value 2 in the content input window
- confirm the switch box "Change"
- confirm the switch box "Save list"
- confirm the switch box "Exit"

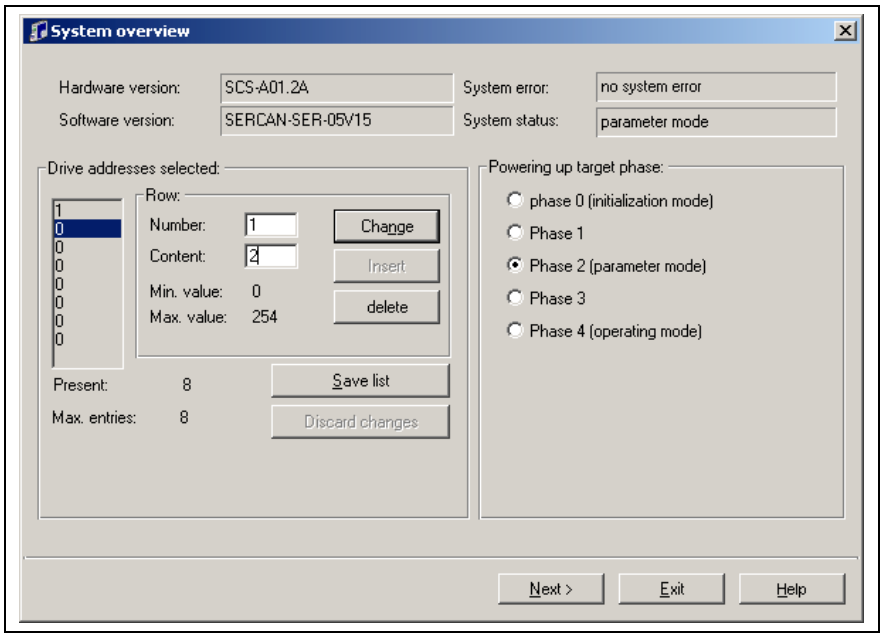

Abb. 5-28: Add SERCANS Drive address 2

Load parameter file

For an easy setup and simple trial of the drives it is required to load the parameter set into the demo system

Note: In the delivery state of the demo system a parameter set has been loaded already.In each case it is recommended to save

the current file for later use. The parameter set is enclosed in DriveTop or can be ordered by email:

elmar.glassen@boschrexroth.de

Menu selection: File ➡ Load

- change the path of the backup file into the path of the respective setup file
- adjust the loading options like in the previous dialog "load parameters"
- confirm of the switch box "OK"

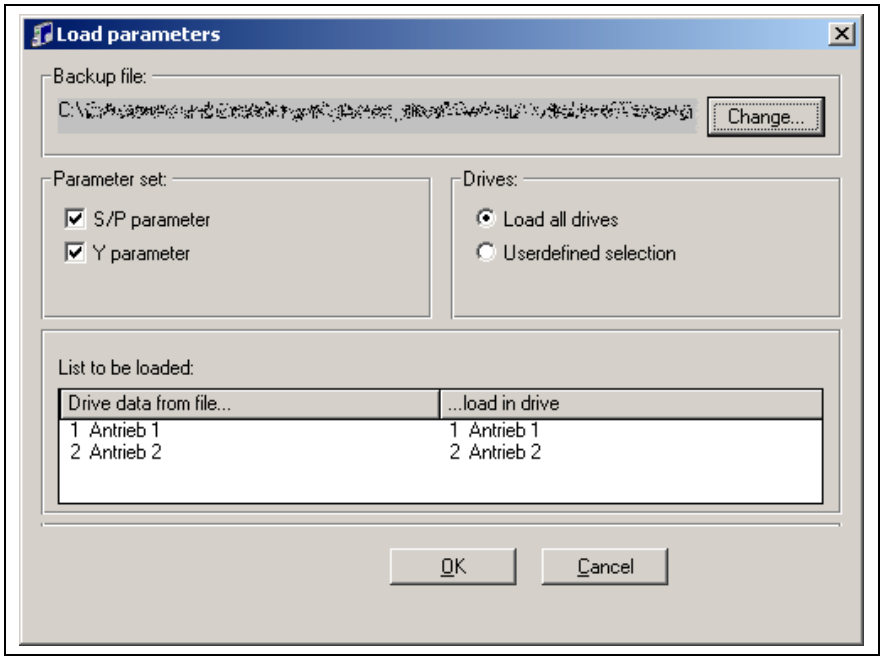

Abb. 5-29: Load parameters

Dialog change: Loading parameter file.

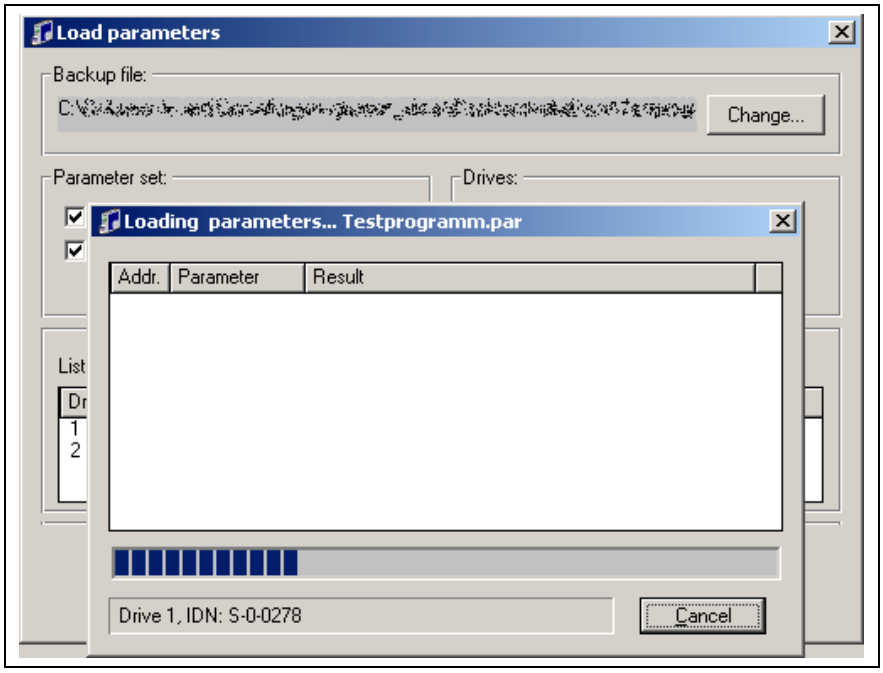

Abb. 5-30: Loading parameter file

Dialog change: After the loading event the dialog is automatically carried into the DriveTop-System Overview

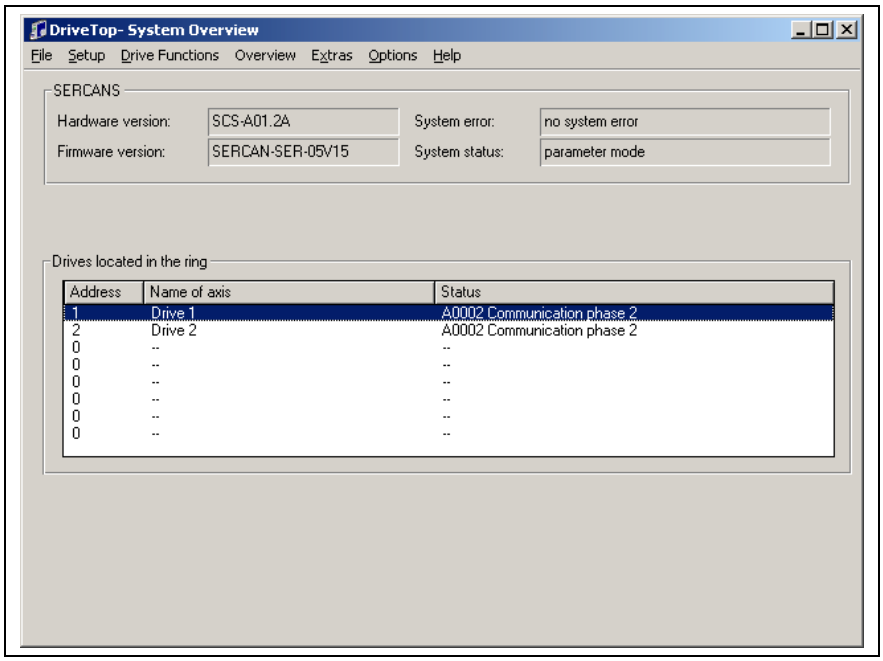

Abb. 5-31: Status after parameter upload

Switch to operating mode

Menu selection: Extras ➡ Operating mode

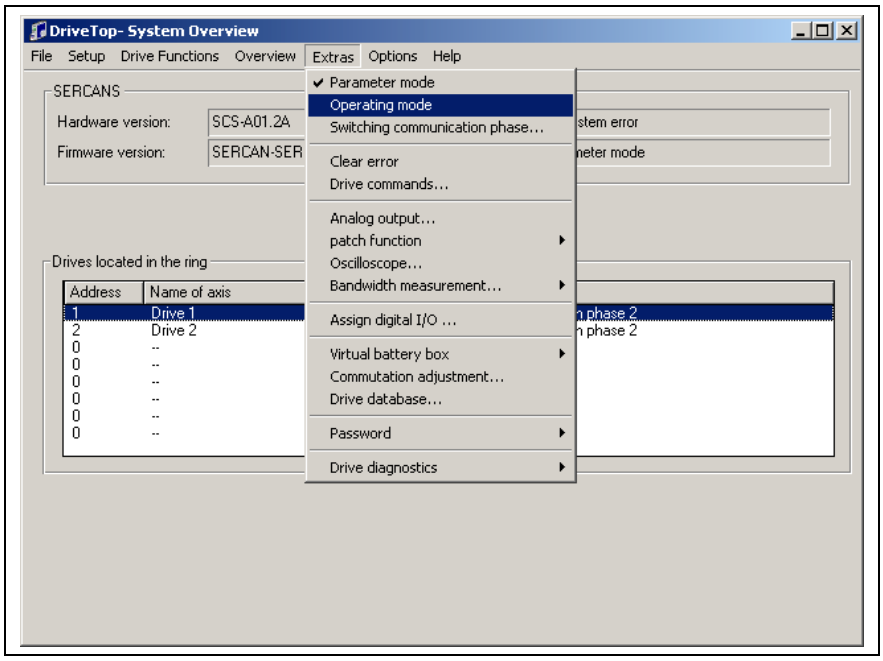

Abb. 5-32: Activate operating mode

Dialog change: Ready for power On

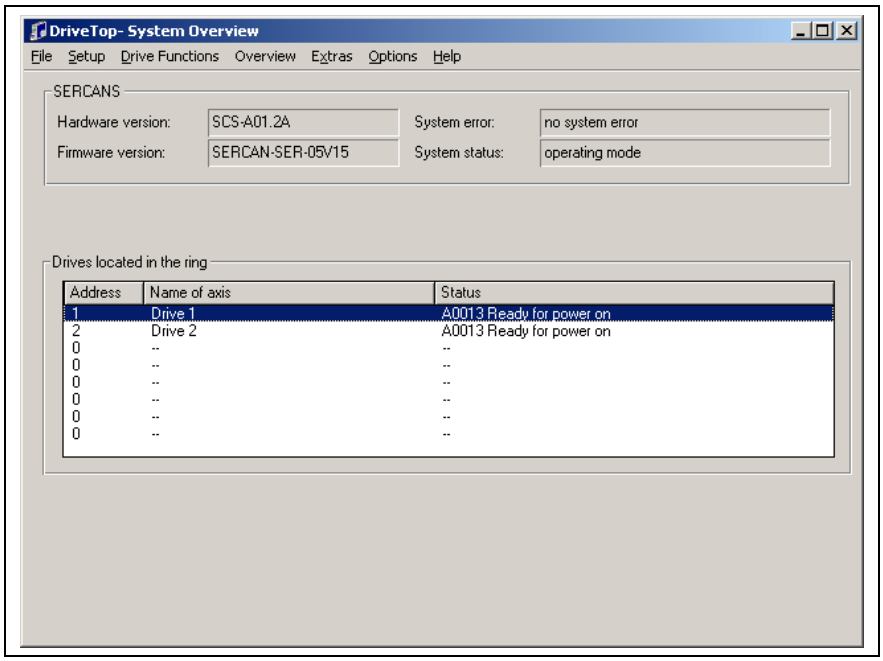

Abb. 5-33: Ready for power On

Switch Power On

- Press push button "Power On"

The supply module changes the indication at the display "H1" from "bb" to "Lb" and gives also a confirmation by the LED of the Power-On switch.

The indications of the drive controllers changing from "bb" to "Ab".

Dialog change: Control and Power section ready for operation

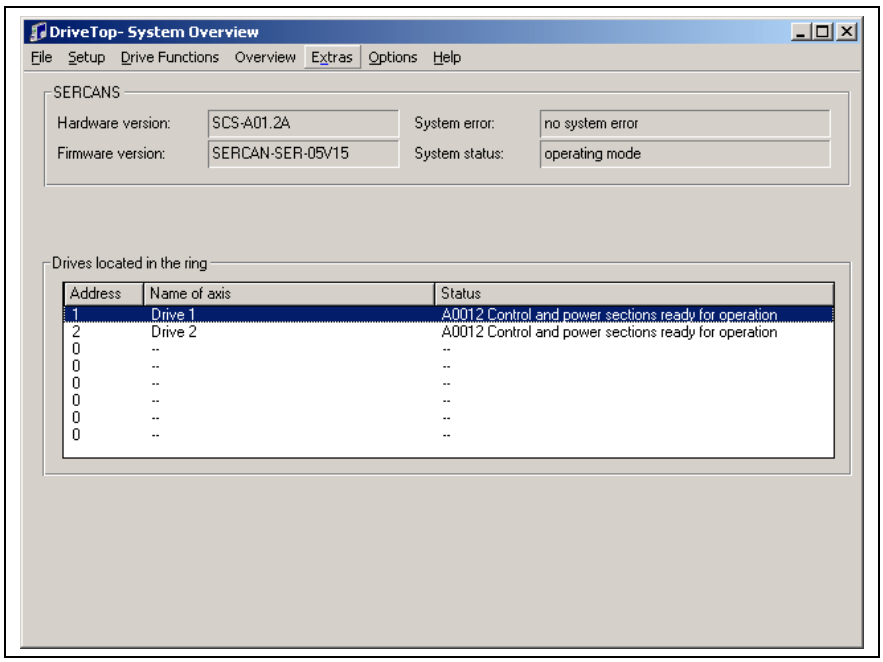

Abb. 5-34: Control and Power section ready for operation

Activate command generator

Menu selection: Extras ➡ Virtual battery box ➡ Virtual battery box selection....

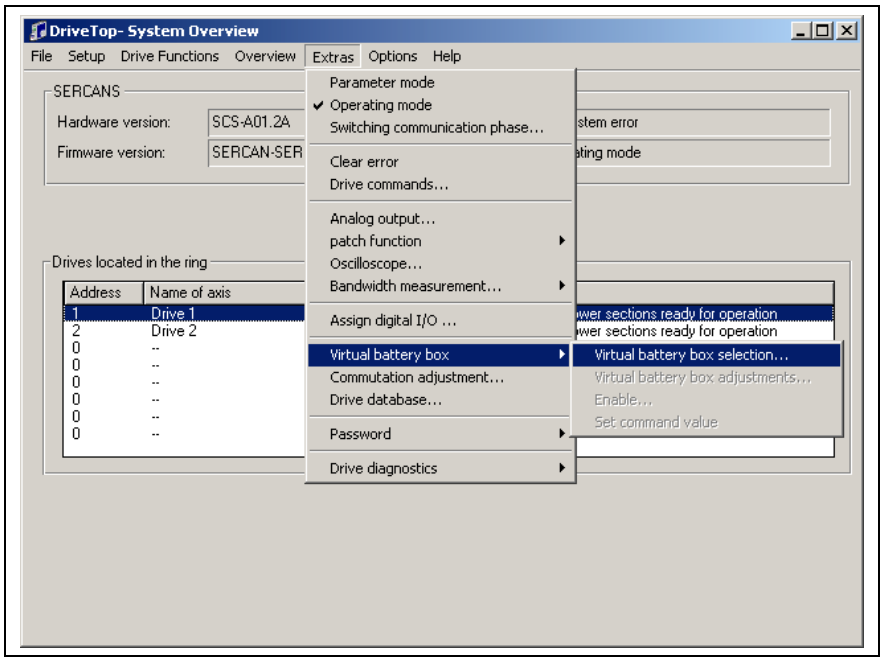

Abb. 5-35: Virtual battery box selection

Dialog change: Command generator selection

- activate the option button "configured"

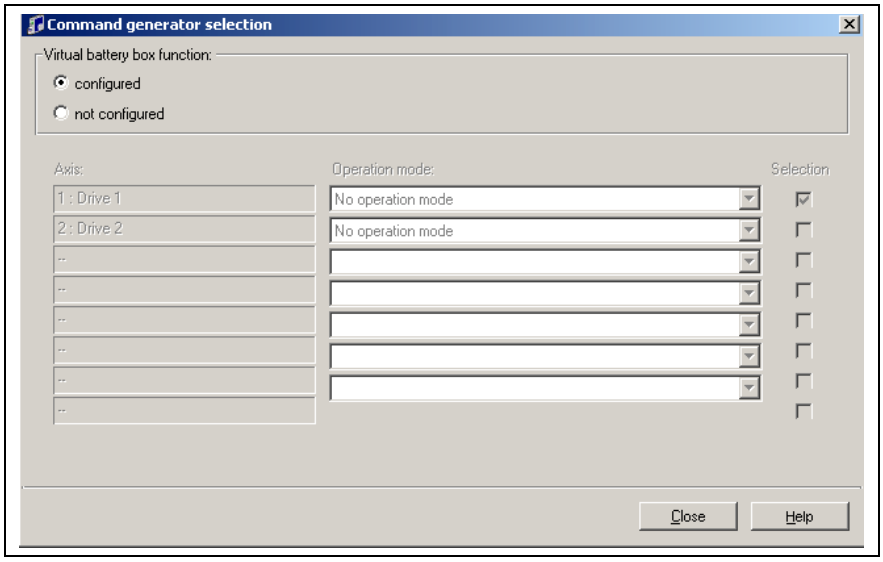

Abb. 5-36: Command generator selection

Note: The combination of various firmware releases of the SYSDA box and the software DriveTop can diplay different notes or require to shift the SERCOS mode. In that case confirm the dialogs with "Close" or "OK".

Dialog change: System Overview.

- Menu selection: Extras ➡ virtual battery box ➡ Virtual battery box adjustments....

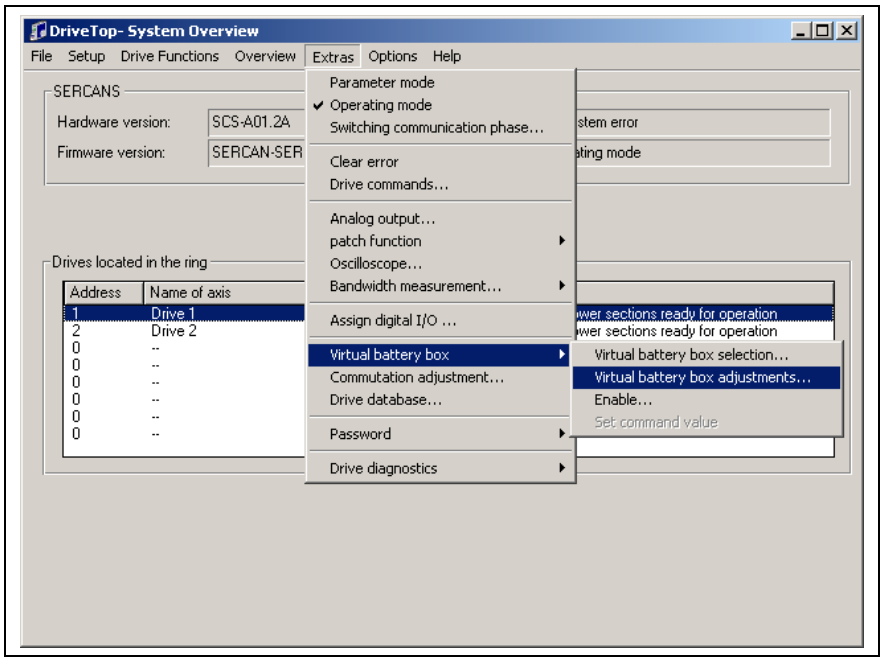

Abb. 5-37: Menu "virtual battery box adjustments"

Dialog change: Command generator

Drive enable

- Select the switch box "Enable"

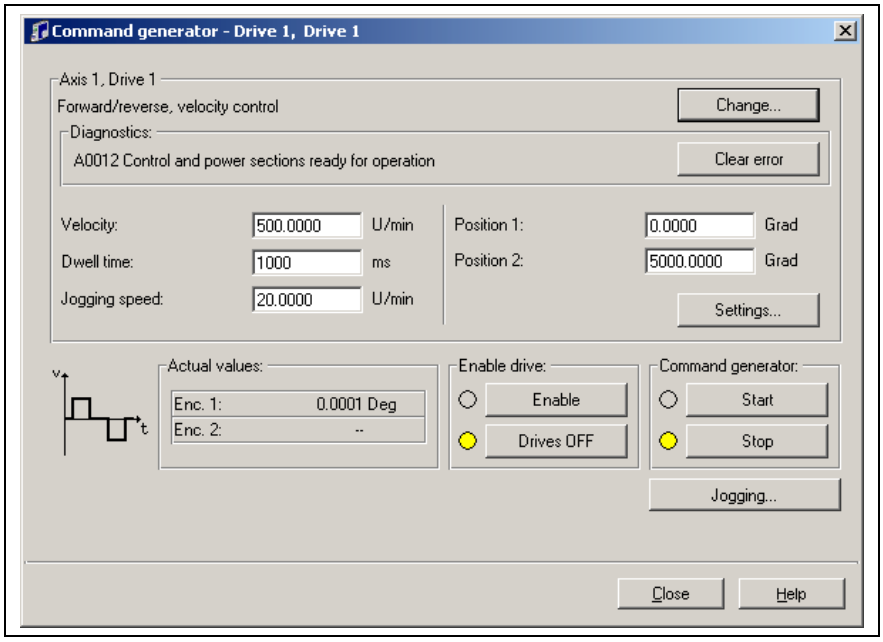

Abb. 5-38: Enable drive

Dialog change: Warning! Dangerous Axis Movements!

Note: Read the following warning notes in the dialogue. The measures of the safety instruction have to be noticed!

- select switch box "OK"

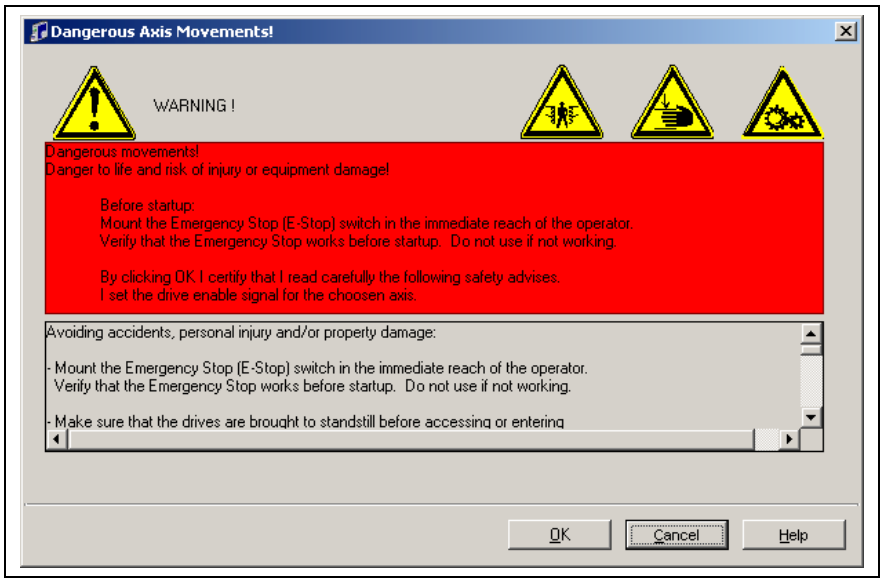

Abb. 5-39: Warning! Dangerous Axis Movements!

Note: An additional dialog "Drives OFF" occurs after the confirmation "Dangerous Axis Movements!". This dialog "Drives OFF" works as a virtual Emergency stop and shutdown the Drive enable.

An active command profile will be interupted instantly.

Enable command for Drive 1

Dialog change: Command profile ready to start.

- select switchbox "Change"

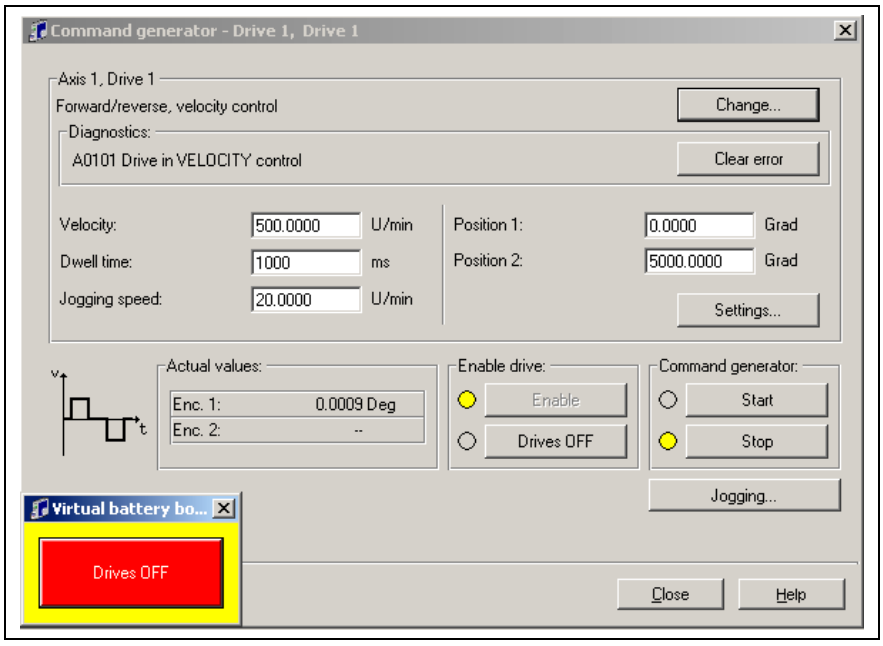

Abb. 5-40: Command profile ready to start

Drive 1 is active with the preadjusted command profile. The command profile can be variated with the settings of velocity, dwell time, position1 and position 2.

Enable command for Drive 2

- Interrupt command generator for drive 2 with switchbox "Stop".
- Confirm the switchbox "Change"

Dialog change: Axis selection Drive 2

- Highlight the input "Selection" Drive 2
- confirm the switchbox "Close"
- confirm again the switchbox "Start" after the automatical change into the menu Command generator

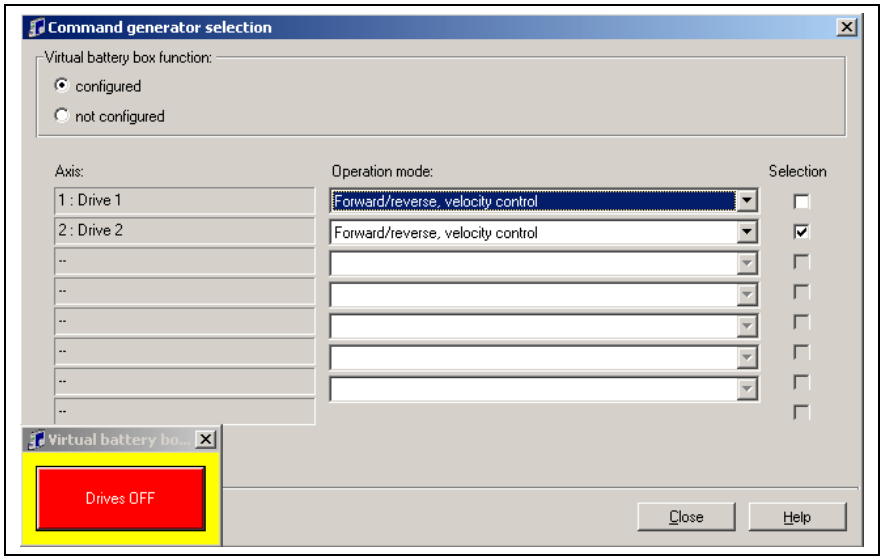

Abb. 5-41: Axis selection Drive 2

Drive 2 is active with the preadjusted command profile. The command profile can be variated with the settings of velocity, dwell time, position1 and position 2.

Shutdown demo system

- press the red switchbox "Drives OFF" to disable all axis
- finish the Software Drivetop (Menu selection: File ➡ Exit
- press the Emergency Stop at the demo system
- switch off the main switch

6 Extended parameter settings

6.1 Introduction

To be continued with release of firmware version MTH02VRS

7 Attachment

7.1 Switchboard of the demo system

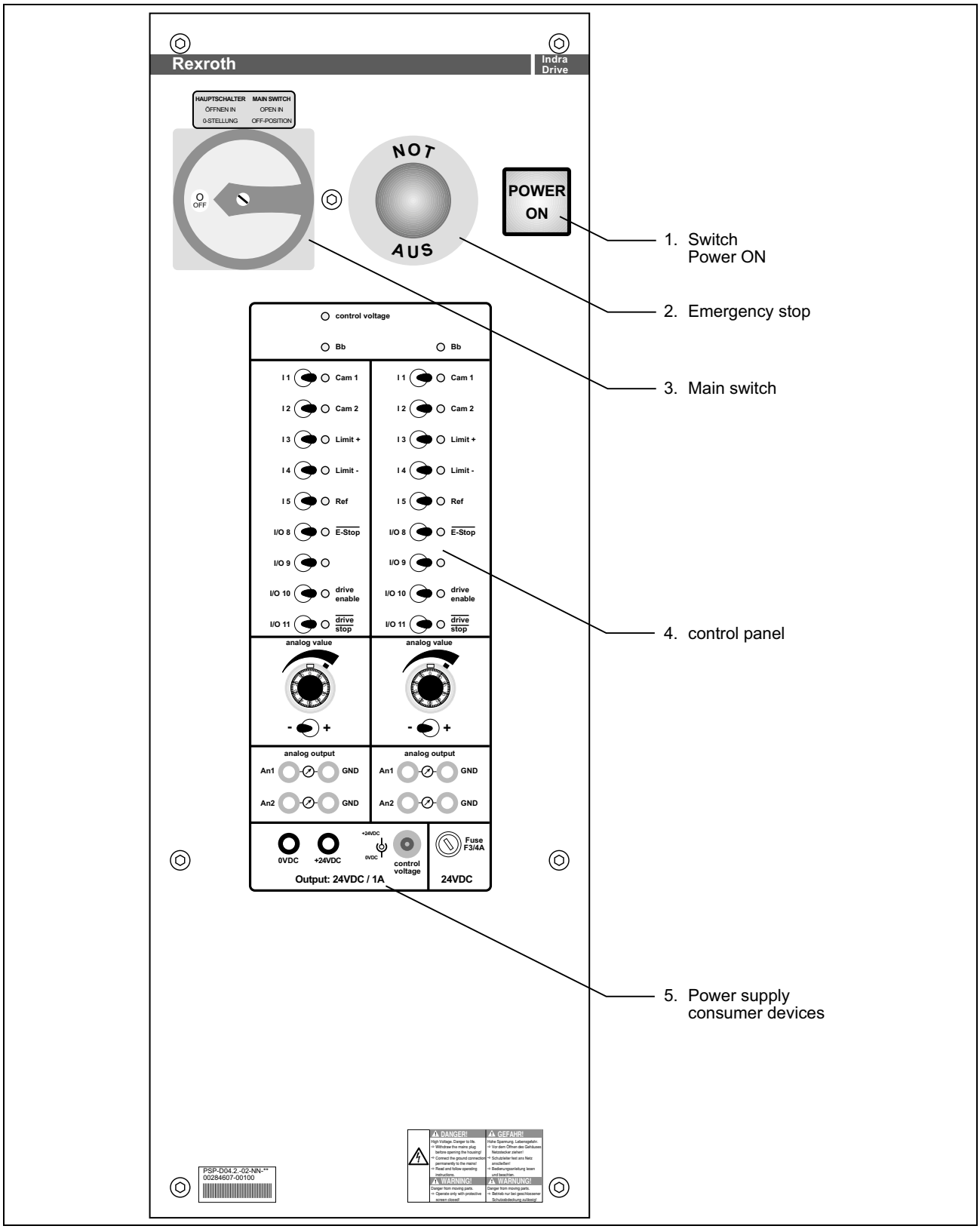

Abb. 7-1: Design of the switchboard, PSP-I01.1-01

Description of the switchboard

1. Main switch

The main switch enables the power supply for the internal components and the multicontact socket.

2. Emergency Stop

The operation of the Emergency stop switch disables the power contactor in the power supply module HVE. Result: The DC-bus-voltage will be discharged and the motors come to a standstill.

DANGER

High voltage and high discharge current! Danger to life or severe bodily harm by electric shock!

⇒ At the terminal connector (HVE) are still approx. 500V connected.

⇒ The discharge time of the DC-bus is bigger than 5 min.

3. Power ON switch

The Power On switch activates the Mains contactor in the HVE-module. After pressing Power-On the DC-bus voltage is connected to the drive modules.

4. Operating panel

Different machine conditions like travel limits, position reference etc. can be simulated with the switches. Programmable outputs can be used for separate drive status signals. 2 analog inputs per axis can simulate external reference voltages or setpoints e.g. analog command communication via 2 potentiometers. 2 analog outputs can forward voltages for external use.

Note: In the state of delivery the I/O's are already programmed and predefined.

5. 24 VDC output - For external consumers -

External 24V-consumers can be connected up to max. 1A.

Note: An overload can disturb the overall function of the demo system!

7.2 Operating panel

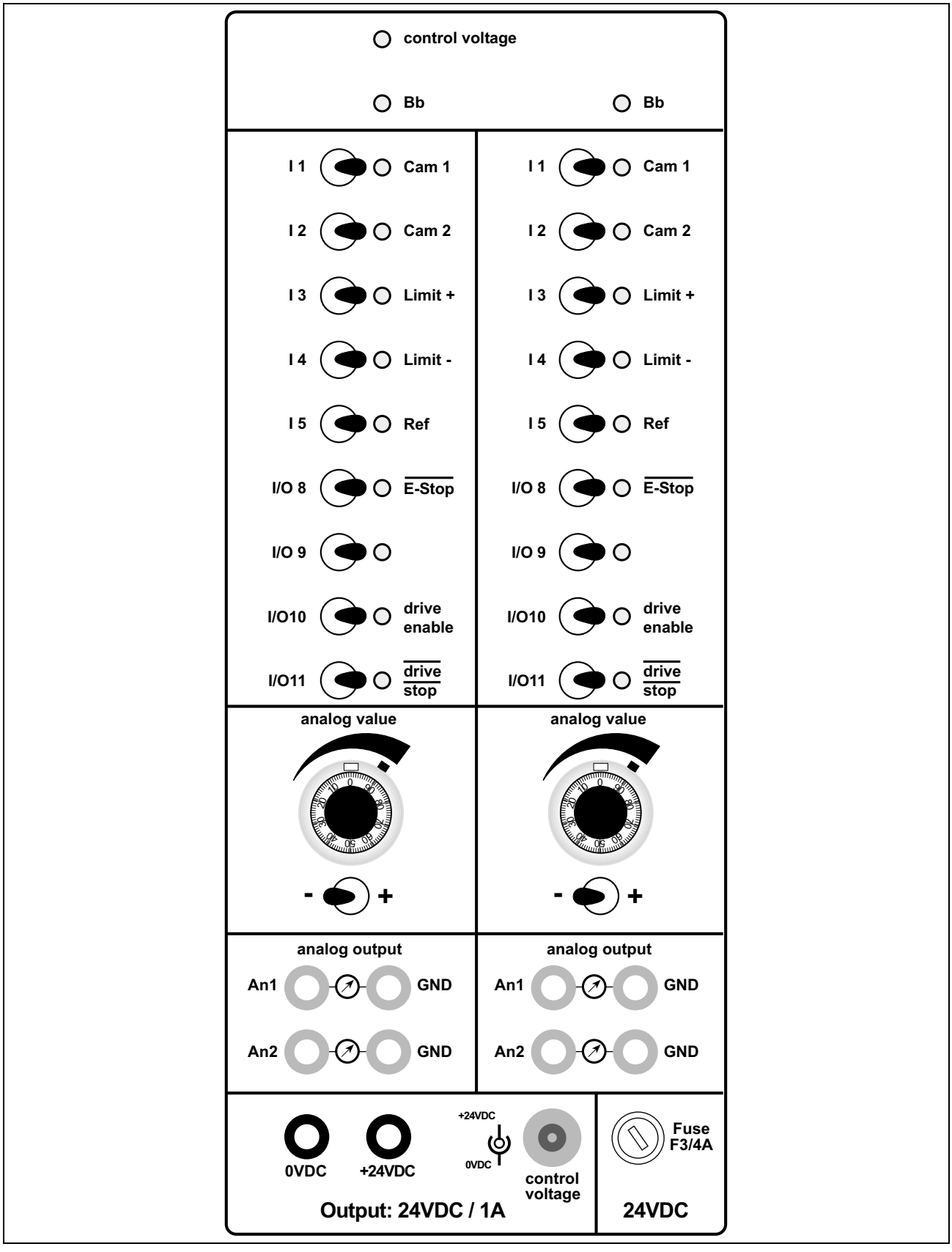

Abb. 7-2: Operating panel

Description of the operating panel

In this chapter the function and design of the operating panel is described.

control voltage Status 24VDC internal power supply - control voltage -

Bb The green LED confirm the ready signal of the respective drive.

Inputs I1 - I5

Label	Defaultassignment	Default-IDN
I1 - Cam 1	Cam probe switch 1	S-0-0401
I2 - Cam 2	Cam probe switch 2	S-0-0402
I3 - Limit +	Travel limit switch pos.	P-0-0422
I4 - Limit -	Travel limit switch neg.	P-0-0422
I5 - Ref.	Reference switch	S-0-0400

Abb. 7-3: Allocation table E1 - E5

The Acknowledge of the Inputs I1-I5 is selectable via 2-way switches. On the left position it is a push-button function; on the right position it is a permanent confirmation. The respective LED confirm a "1" status.

Bidirectional In-/Outputs I/O8 - I/O11

Label	Defaultassignment	Default-IDN
I/O8 - $\overline{\text{EStop}}$	$\overline{\text{EStop}}$	P-0-0223
I/O9	n.c.	
I/O10 - drive enable	Drive enable	P-0-4028
I/O11 - drive stop	Drive Halt	P-0-4028

Abb. 7-4: Allocation table E/A8 - E/A11

I/O8 - I/O11 used as Inputs The Acknowledge of the Inputs I8-I11 is selectable via 2-way switches. On the left position it is a push-button function; on the right position it is a permanent confirmation. The respective LED confirm a "1" status.

I/O8 - I/O11 used as Outputs The Acknowledge of the Outputs O1-O5 is selectable via 2-way switches. On the left position it is a push-button function; on the right position it is a permanent confirmation. The respective LED confirm a "1" status.

Analog inputs

Label	Defaultassignment	Default-IDN
I6/An+ - Analog-In (+)	Setpoint potentiometer	P-0-0213
I7/An- - Analog-In (-)	Setpoint potentiometer	P-0-0213

Abb. 7-5: Allocation table I/An+ - I/An-

The analog setpoint can be given with the potentiometer. The respective switch controls the direction of the motor. "+" means clockwise turn in direction to the rotaty table motor; "-" counterclockwise turn of motor.

Analog outputs

Label	Defaultassignment	Default-IDN
An1	Analogausgan 1	P-0-0427
An2	Analogausgang 2	P-0-0427

Abb. 7-6: Zuweisungsliste An1 - An2

24VDC Output Via this output external consumers can be supplied. The current is limited to max. 1 A..

Fuse 24VDC The fuse F3 (4A) limit the current for the overall 24V supply. The OK-status is also displayed via the LED Control voltage on top of the operating panel.

7.3 Mounting plate motors

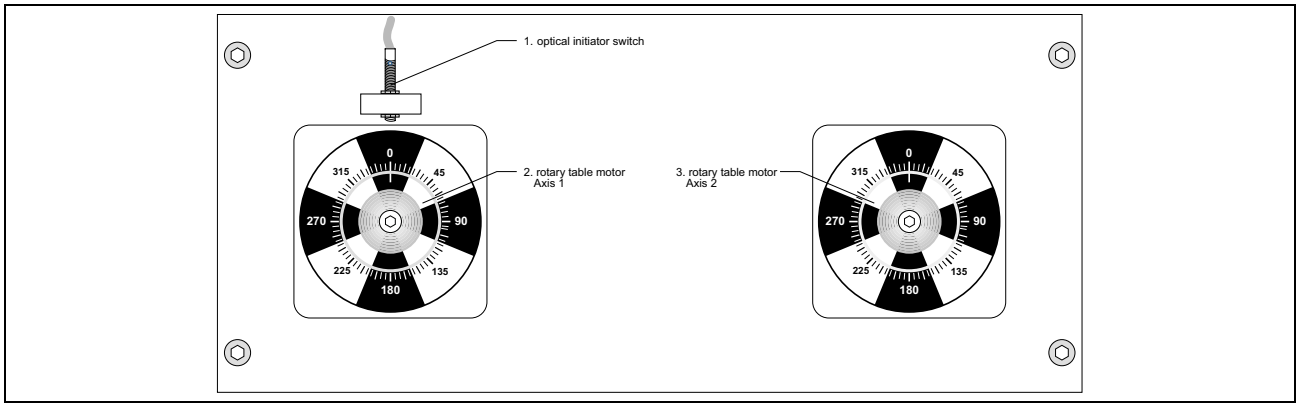

Abb. 7-7: mounting plate motors

Information for motor mounting plate or motor replacement

DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements

⇒ The protection against dangerous movements is made via a transparent plastic cover. Don't use the Demo system without this protection cover.

6. Initiator switch

The optical intitiator switch simulates a reference switch of a linear axis..

7. Motor rotary table Axis 1

The motor rotary table is mounted on a motor MHD041B-144.NG0-KN with a Single-Turn-Feedback.

8. Motor rotary table Axis 2

The motor rotary table is mounted on a motor MHD041B-144.PG0-KN with a Multi-Turn-Feedback.

8 Supplement

8.1 Internal Wiring of components

Note: The schematics display the state of delivery!

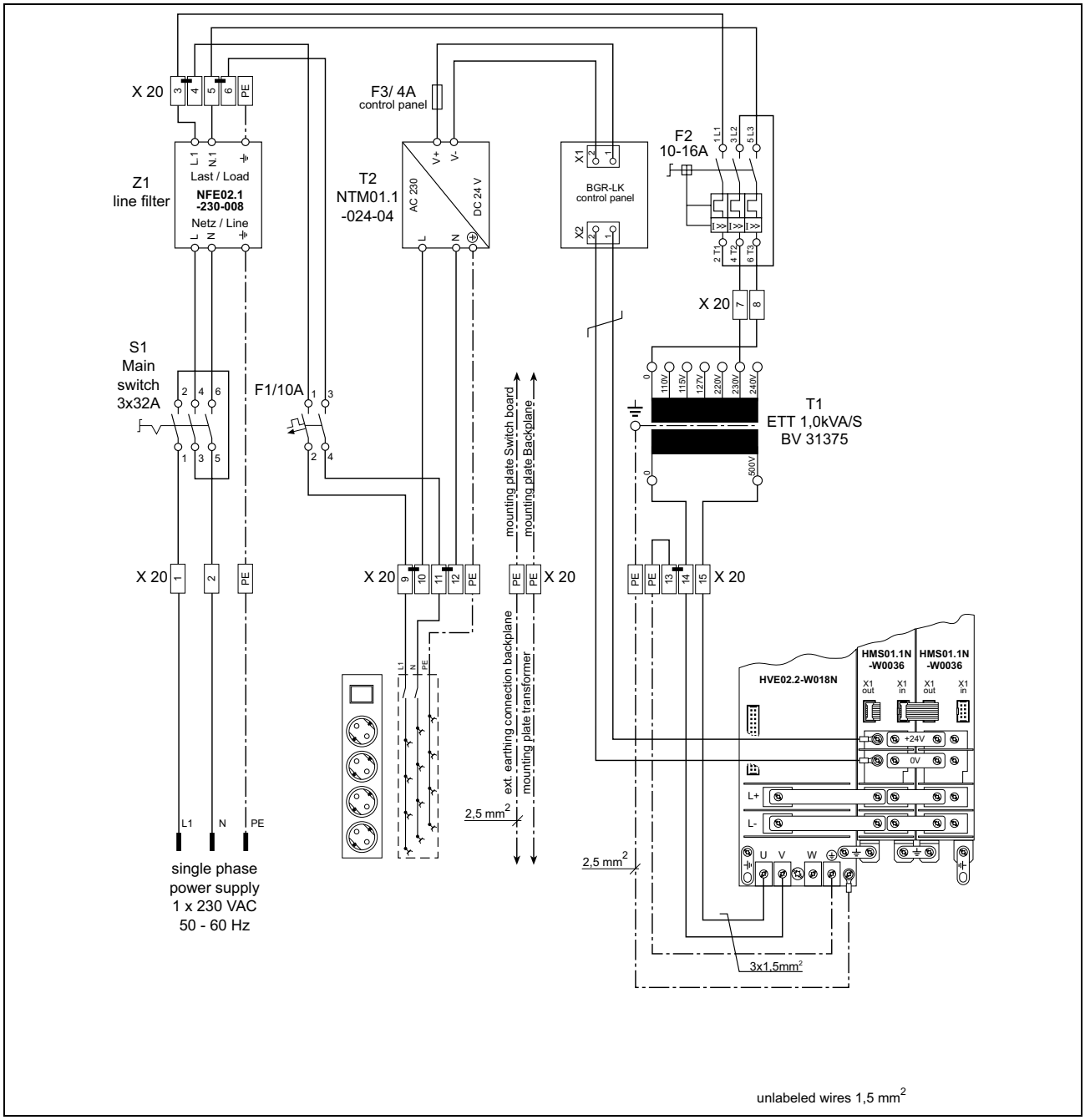

Abb. 8-1: wiring internal components

Note: The multicontact socket, the circuit breaker Q1 and the automatic breaker F1 are mounted on the back side of the demo system. The circuit breaker current is adjusted to 10 Amps.

8.2 Wiring power supply module HVE

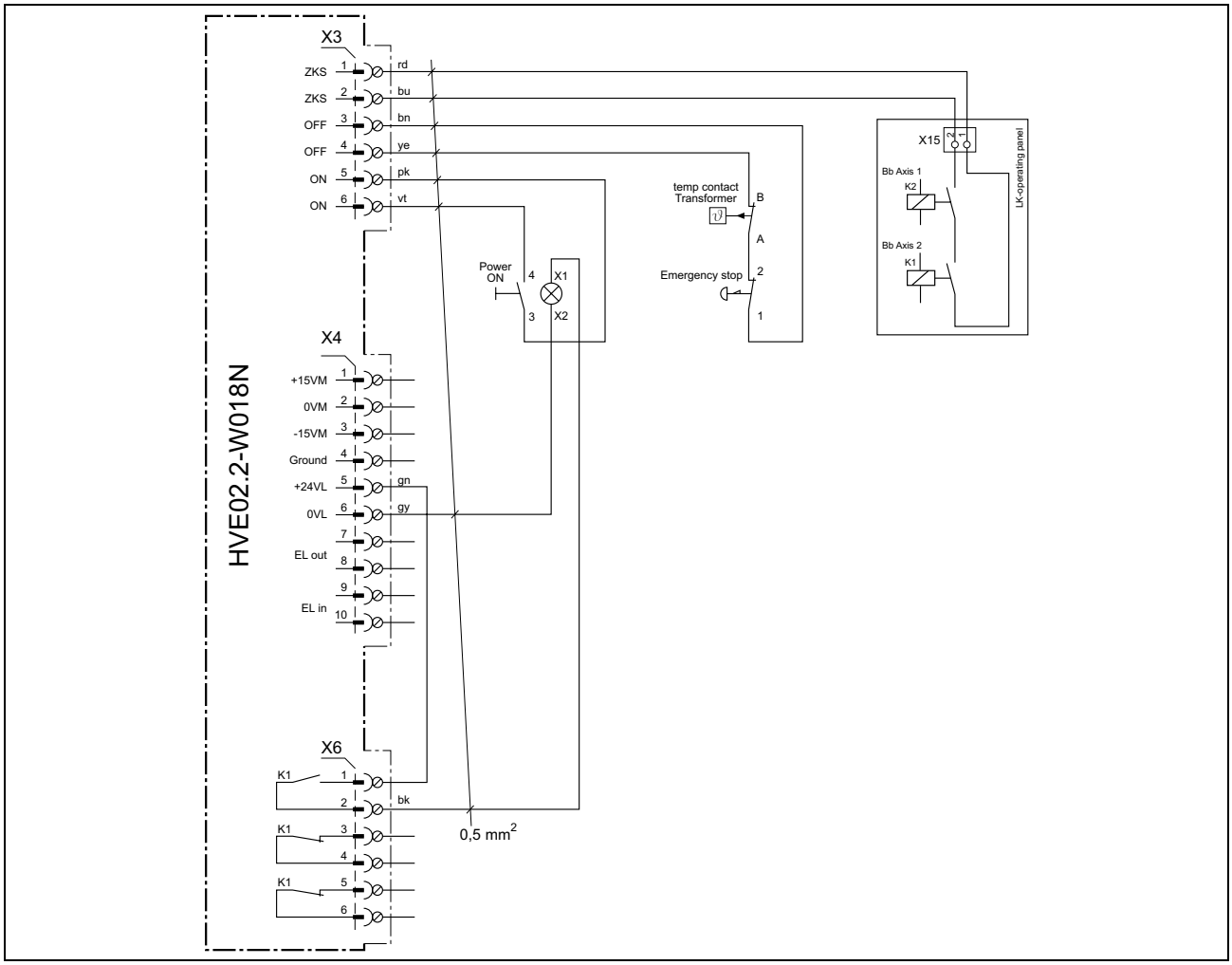

Abb. 8-2: control voltage wiring HVE02.2

DANGER

High electrical voltage! Danger to life, severe bodily harm by electrical shock!

⇒ For the use with a single phase connection the phase monitoring has been **deactivated!**

⇒ **In case of a three phase connection there is no monitoring for the power connection.**.

8.3 Wiring control voltage drives

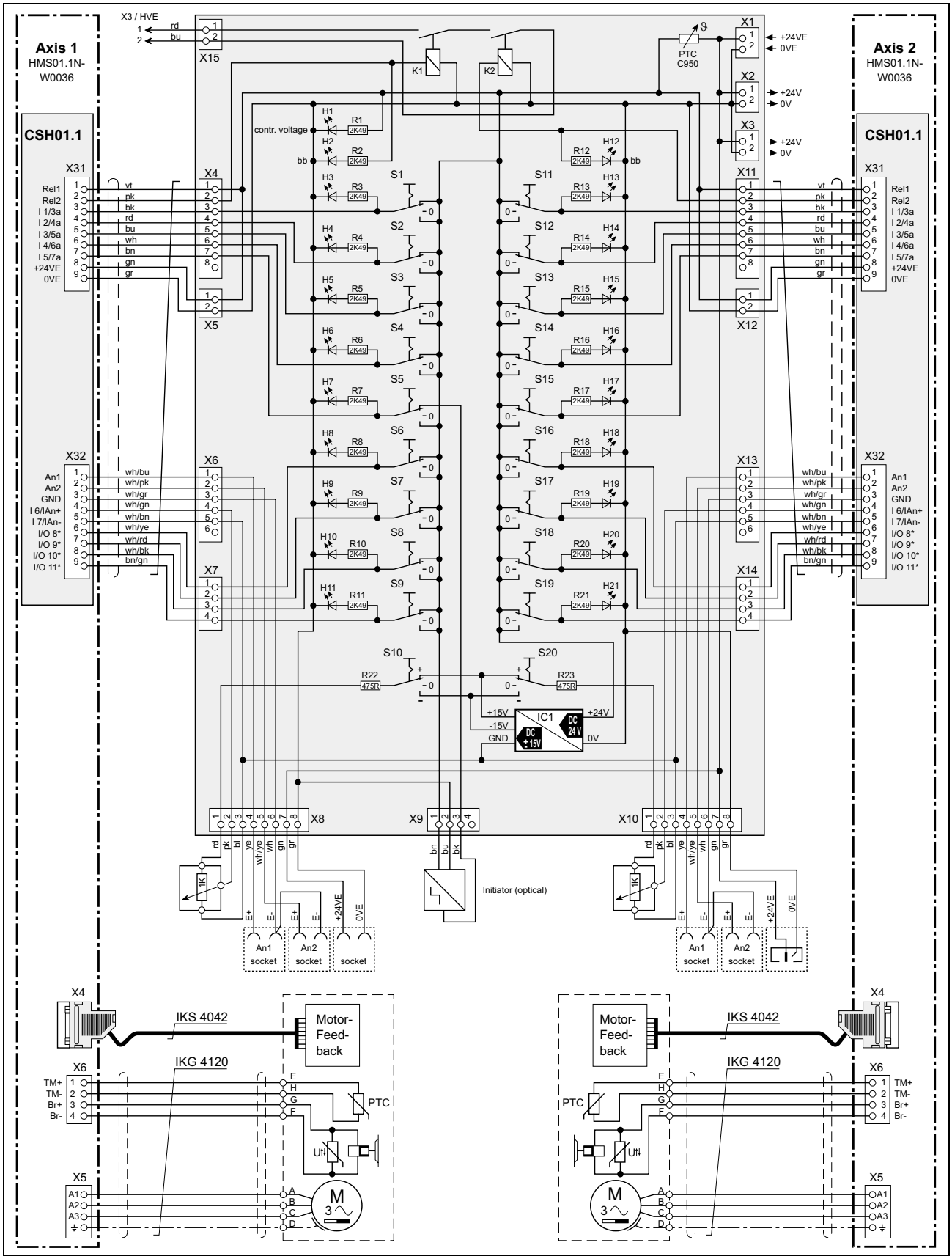

Abb. 8-3: control voltage wiring HMS02.*

8.4 Rewiring for optional Mains voltages

DANGER

High electrical voltage! Danger to life, severe bodily harm by electrical shock!

⇒ The rewiring of the demo system for persons who are qualified and have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions. Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment

⇒ Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid!

⇒ The output voltage of the multicontact socket is equal to the input voltage! It is absolutely required to modify in case of rewiring the sign "Supply Voltage" with the new values.

⇒ Disconnect the mains plug and check if the system has been discharged.

⇒ Remove the plate on the left side of the demo system.

To be continued..

8.5 Rewiring of the internal transformer

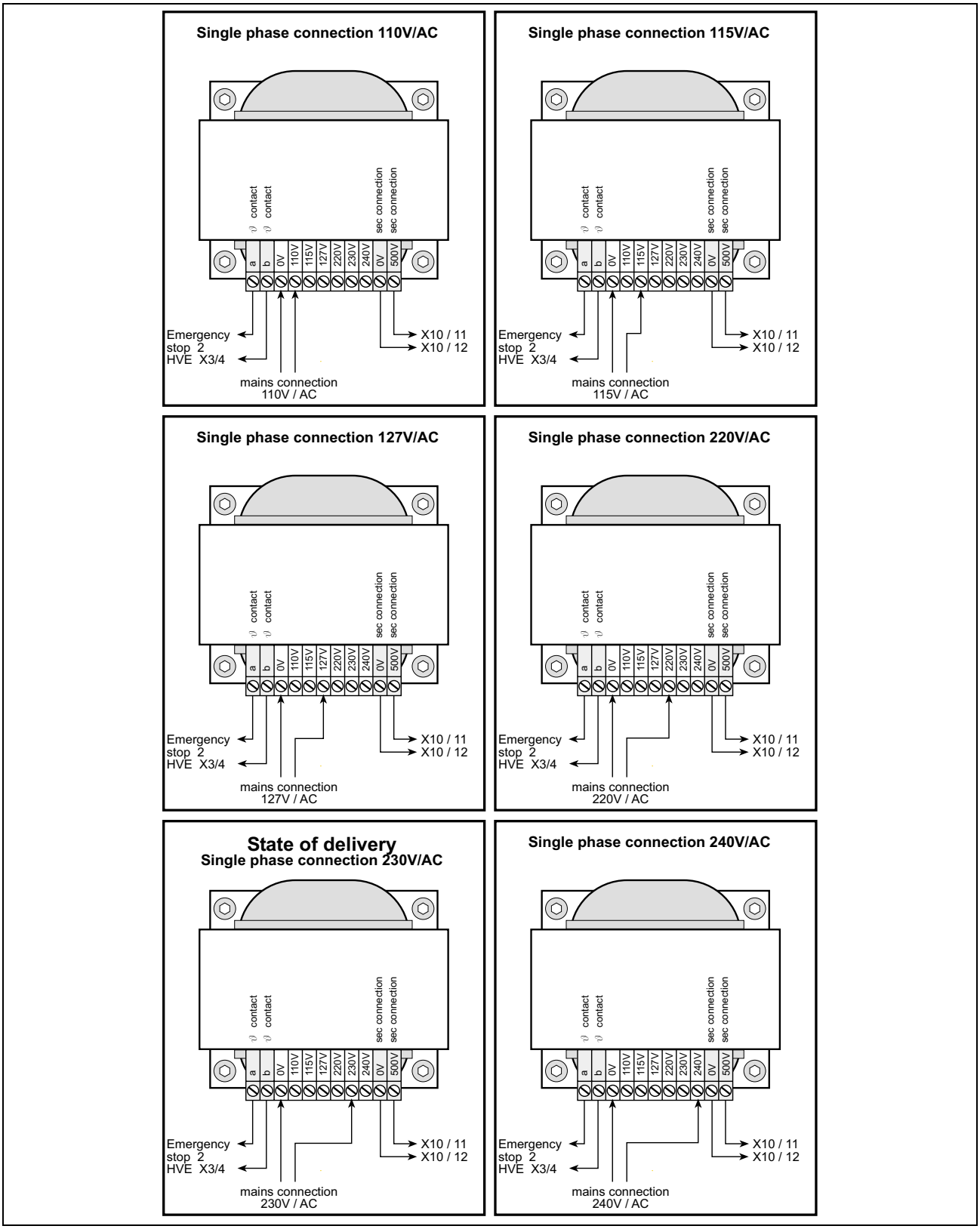

Abb. 8-4: Rewiring of the internal transformer

8.6 Rewiring the internal 24V power supply module

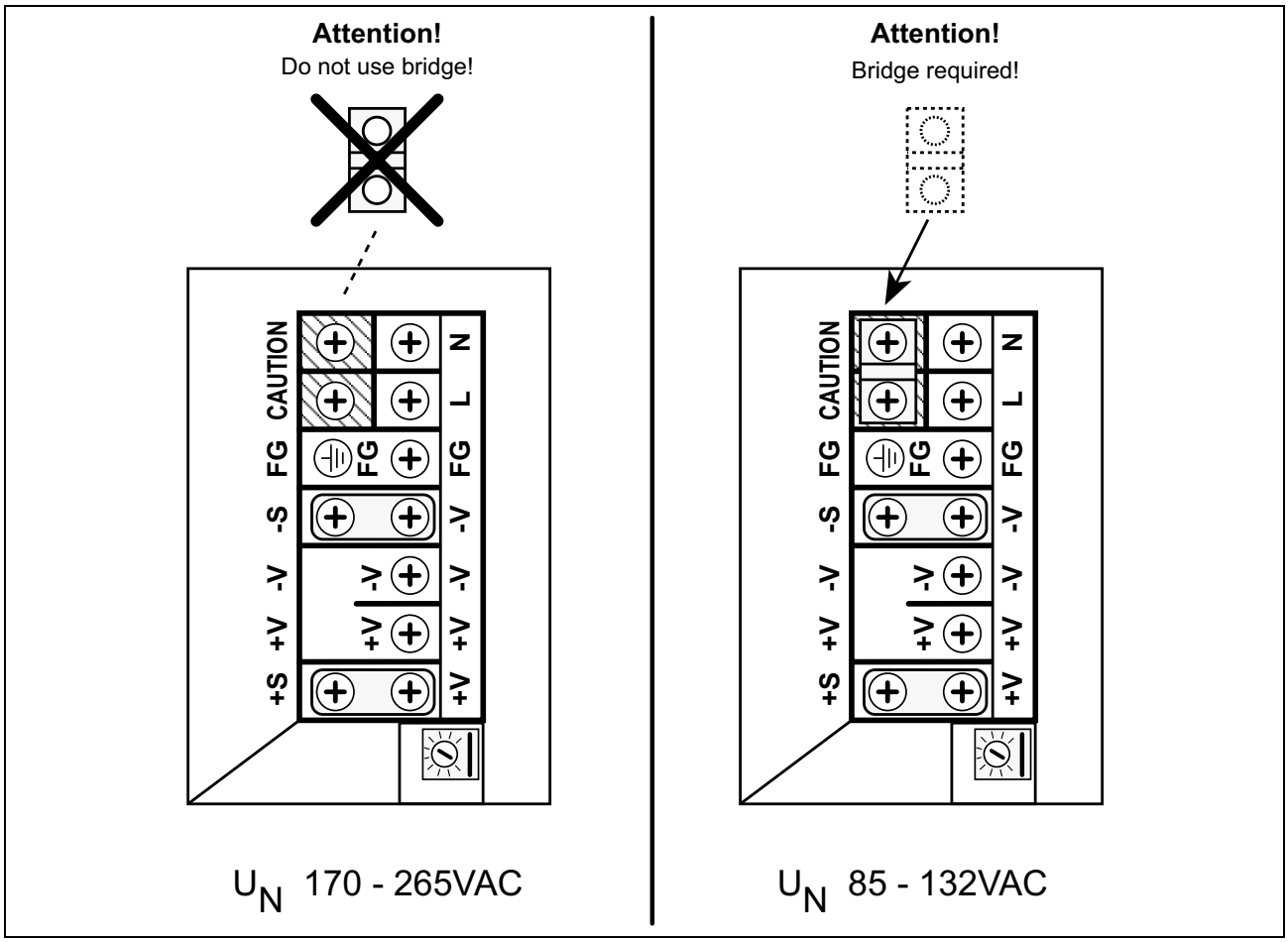

Abb. 8-5: Rewiring the internal 24V power supply module

9 Service & Support

9.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- telefonisch - by phone: **49 (0) 9352 40 50 60**
  über Service Call Entry Center Mo-Fr 07:00-18:00
  - via Service Call Entry Center Mo-Fr 7:00 am - 6:00 pm
- per Fax - by fax: **+49 (0) 9352 40 49 41**
- per e-Mail - by e-mail: **service@boschrexroth.de**

9.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26

oder - or **+49 (0) 172 660 04 06**

9.3 Internet

Unter **www.boschrexroth.de** finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.

☐ Verkaufsniederlassungen
▒ Niederlassungen mit Kundendienst

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit unserem für Sie nächstgelegenen Ansprechpartner auf.

*) Die Angaben in der vorliegenden Dokumentation können seit Drucklegung überholt sein.

At **www.boschrexroth.de** you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.

☐ sales agencies
▒ offices providing service

Please contact our sales / service office in your area first.

*) Data in the present documentation may have become obsolete since printing.

9.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

detaillierte Beschreibung der Störung und der Umstände.

Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.

Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

10 Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

vom Ausland: (0) nach Landeskennziffer weglassen!
from abroad: don't dial (0) after country code!

Vertriebsgebiet Mitte Germany Centre	**SERVICE** **CALL ENTRY CENTER** **MO – FR** **von 07:00 - 18:00 Uhr** **from 7 am – 6 pm**	**SERVICE** **HOTLINE** **MO – FR** **von 17:00 - 07:00 Uhr** **from 5 pm - 7 am** **+ SA / SO**	**SERVICE** **ERSATZTEILE / SPARES** verlängerte Ansprechzeit - extended office time - ♦ nur an Werktagen - only on working days - ♦ von 07:00 - 18:00 Uhr - from 7 am - 6 pm -
Rexroth Indramat GmbH Bgm.-Dr.-Nebel-Str. 2 / Postf. 1357 97816 Lohr am Main / 97803 Lohr **Kompetenz-Zentrum Europa** Tel.: +49 (0)9352 40-0 Fax: +49 (0)9352 40-4885	**Tel. +49 (0) 9352 40 50 60** service@boschrexroth.de	**Tel.: +49 (0)172 660 04 06** **oder / or** **Tel.: +49 (0)171 333 88 26**	**Tel. +49 (0) 9352 40 42 22**
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Rexroth Indramat GmbH Landshuter Allee 8-10 80637 München Tel.: +49 (0)89 127 14-0 Fax: +49 (0)89 127 14-490	Bosch Rexroth AG Regionalzentrum West Borsigstrasse 15 40880 Ratingen Tel.: +49 (0)2102 409-0 Fax: +49 (0)2102 409-406	Bosch Rexroth AG Service-Regionalzentrum Süd-West Siemensstr.1 70736 Fellbach Tel.: +49 (0)711 51046–0 Fax: +49 (0)711 51046–248	Bosch Rexroth AG Regionalzentrum Südwest Ringstrasse 70 / Postfach 1144 70736 Fellbach / 70701 Fellbach Tel.: +49 (0)711 57 61–100 Fax: +49 (0)711 57 61–125
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from abroad: don't dial (0) after country code, Italy: dial 0 after country code

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- service: +34 9 43 31 84 60
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Rexroth Indramat Division
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Fax: +46 (0)8 647 32 77

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Fax +41 (0) 55 46 46 222

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Russia - Russland ELMIS 10, Internationalnaya 246640 Gomel, Belarus Tel.: +375/ 232 53 42 70 +375/ 232 53 21 69 Fax: +375/ 232 53 37 69 elmis_ltd@yahoo.com	Turkey - Türkei Bosch Rexroth Otomasyon San & Tic. A..S. Fevzi Cakmak Cad No. 3 34630 Sefaköy Istanbul Tel.: +90 212 541 60 70 Fax: +90 212 599 34 07	Slowenia - Slowenien DOMEL Otoki 21 64 228 Zelezniki Tel.: +386 5 5117 152 Fax: +386 5 5117 225 brane.ozebek@domel.si	

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China Bosch Rexroth China Ltd. 15/F China World Trade Center 1, Jianguomenwai Avenue Beijing 100004, P.R.China Tel.: +86 10 65 05 03 80 Fax: +86 10 65 05 03 79	China Bosch Rexroth China Ltd. Guangzhou Repres. Office Room 1014-1016, Metro Plaza, Tian He District, 183 Tian He Bei Rd Guangzhou 510075, P.R.China Tel.: +86 20 8755-0030 +86 20 8755-0011 Fax: +86 20 8755-2387	China Bosch Rexroth (China) Ltd. A-5F., 123 Lian Shan Street Sha He Kou District Dalian 116 023, P.R.China Tel.: +86 411 46 78 930 Fax: +86 411 46 78 932	China Melchers GmbH BRC-SE, Tightening & Press-fit 13 Floor Est Ocean Centre No.588 Yanan Rd. East 65 Yanan Rd. West Shanghai 200001 Tel.: +86 21 6352 8848 Fax: +86 21 6351 3138
Hongkong Bosch Rexroth (China) Ltd. 6th Floor, Yeung Yiu Chung No.6 Ind Bldg. 19 Cheung Shun Street Cheung Sha Wan, Kowloon, Hongkong Tel.: +852 22 62 51 00 Fax: +852 27 41 33 44 alexis.siu@boschrexroth.com.hk	India - Indien Bosch Rexroth (India) Ltd. Rexroth Indramat Division Plot. A-58, TTC Industrial Area Thane Turbhe Midc Road Mahape Village Navi Mumbai - 400 701 Tel.: +91 22 7 61 46 22 Fax: +91 22 7 68 15 31	India - Indien Bosch Rexroth (India) Ltd. Rexroth Indramat Division Plot. 96, Phase III Peenya Industrial Area Bangalore - 560058 Tel.: +91 80 41 70 211 Fax: +91 80 83 94 345 mohanvelu.t@boschrexroth.co.in	India - Indien Bosch Rexroth (India) Ltd. 1st Floor, S-10 Green Park ext. Market New Delhi – 110016 Tel.: +91 1 16 56 68 88 Fax: +91 1 16 56 68 87
Indonesia - Indonesien PT. Rexroth Wijayakusuma Building # 202, Cilandak Commercial Estate Jl. Cilandak KKO, Jakarta 12560 Tel.: +62 21 7891169 (5 lines) Fax: +62 21 7891170 - 71	Japan Bosch Rexroth Automation Corp. Service Center Japan Yutakagaoka 1810, Meito-ku, NAGOYA 465-0035, Japan Tel.: +81 52 777 88 41 +81 52 777 88 53 +81 52 777 88 79 Fax: +81 52 777 89 01	Japan Bosch Rexroth Automation Corp. Rexroth Indramat Division 1F, I.R. Building Nakamachidai 4-26-44, Tsuzuki-ku YOKOHAMA 224-0041, Japan Tel.: +81 45 942 72 10 Fax: +81 45 942 03 41	Korea Bosch Rexroth-Korea Ltd. Electric Drives and Controls Bongwoo Bldg. 7FL, 31-7, 1Ga Jangchoong-dong, Jung-gu Seoul, 100-391 Tel.: +82 234 061 813 Fax: +82 222 641 295
Korea Bosch Rexroth-Korea Ltd. 1515-14 Dadae-Dong, Saha-Ku Rexroth Indramat Division Pusan Metropolitan City, 604-050 Tel.: +82 51 26 00 741 Fax: +82 51 26 00 747 gyhan@rexrothkorea.co.kr	Malaysia Bosch Rexroth Sdn.Bhd. 11, Jalan U8/82, Seksyen U8 40150 Shah Alam Selangor, Malaysia Tel.: +60 3 78 44 80 00 Fax: +60 3 78 45 48 00 hockhwa@hotmail.com rexroth1@tm.net.my	Singapore - Singapur Bosch Rexroth Pte Ltd 15D Tuas Road Singapore 638520 Tel.: +65 68 61 87 33 Fax: +65 68 61 18 25 sanjay.nemade @boschrexroth.com.sg	South Africa - Südafrika TECTRA Automation (Pty) Ltd. 71 Watt Street, Meadowdale Edenvale 1609 Tel.: +27 11 971 94 00 Fax: +27 11 971 94 40 Hotline: +27 82 903 29 23 georgv@tectra.co.za
Taiwan Rexroth Uchida Co., Ltd. No.17, Alley 24, Lane 737 Cheng Bei 1 Rd., Yungkang Tainan Hsien Tel.: +886 6 25 36 565 Fax: +886 6 25 34 754 indra.charlie@msa.hinet.net	Thailand NC Advance Technology Co. Ltd. 59/76 Moo 9 Ramintra road 34 Tharang, Bangkhen, Bangkok 10230 Tel.: +66 2 943 70 62 +66 2 943 71 21 Fax: +66 2 509 23 62 sonkawin@hotmail.com		

Nordamerika – North America

USA Headquarters - Hauptniederlassung	USA Central Region - Mitte	USA Southeast Region - Südwest	USA SERVICE-HOTLINE
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USA East Region – Ost	USA Northeast Region – Nordost	USA West Region – West	
Bosch Rexroth Corporation Rexroth Indramat Division Charlotte Regional Sales Office 14001 South Lakes Drive Charlotte, North Carolina 28273 Tel.: +1 704 5 83 97 62 +1 704 5 83 14 86	Bosch Rexroth Corporation Rexroth Indramat Division Northeastern Technical Center 99 Rainbow Road East Granby, Connecticut 06026 Tel.: +1 860 8 44 83 77 Fax: +1 860 8 44 85 95	Bosch Rexroth Corporation 7901 Stoneridge Drive, Suite 220 Pleasant Hill, California 94588 Tel.: +1 925 227 10 84 Fax: +1 925 227 10 81	
Canada East - Kanada Ost	Canada West - Kanada West	Mexico	Mexico
Bosch Rexroth Canada Corporation Burlington Division 3426 Mainway Drive Burlington, Ontario Canada L7M 1A8 Tel.: +1 905 335 55 11 Fax: +1 905 335-41 84 michael.moro@boschrexroth.ca	Bosch Rexroth Canada Corporation 5345 Goring St. Burnaby, British Columbia Canada V7J 1R1 Tel. +1 604 205-5777 Fax +1 604 205-6944 david.gunby@boschrexroth.ca	Bosch Rexroth Mexico S.A. de C.V. Calle Neptuno 72 Unidad Ind. Vallejo 07700 Mexico, D.F. Tel.: +52 5 754 17 11 +52 5 754 36 84 +52 5 754 12 60 Fax: +52 5 754 50 73 +52 5 752 59 43 mariofelipe.hernandez@boschrexroth.com.mx	Bosch Rexroth S.A. de C.V. Calle Argentina No 3913 Fracc. las Torres 64930 Monterrey, N.L. Tel.: +52 8 333 88 34...36 +52 8 349 80 91...93 Fax: +52 8 346 78 71 mario.quiroga@boschrexroth.com.mx

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