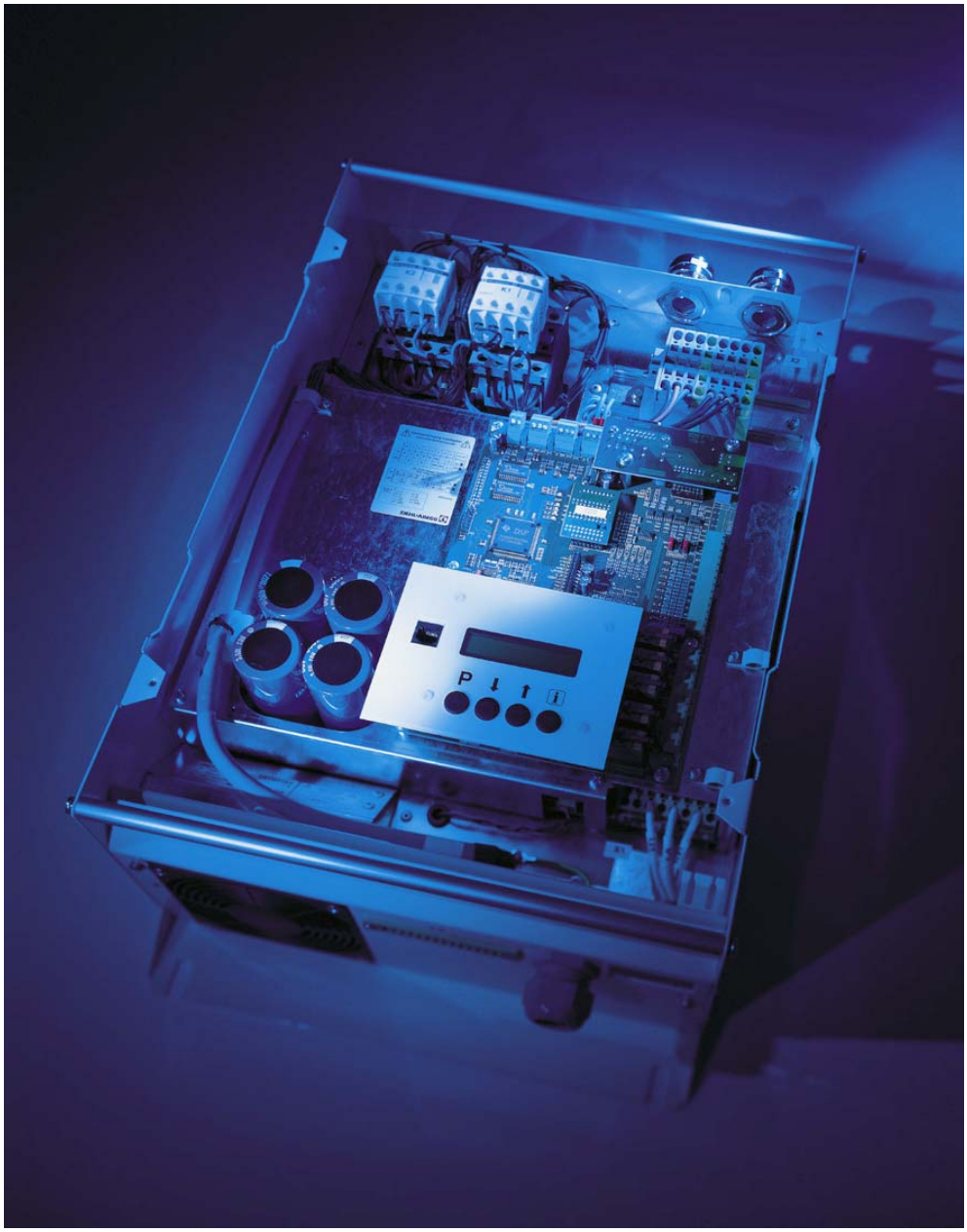
ZETADYN 2CF
ZETADYN 2SY

CE

Control system for lifts

Operation manual R-TBA05_03-GB 1011



ZIEHL-ABEGG

INTRODUCTION

The operation manual describes following equipment

Controller Series	ZETADYN 2CF and ZETADYN 2SY
With control software from version	2.45

It contains important information of

- Equipment construction
- Connections
- Operation
- Commissioning
- Accessories
- Service

of the ZETADYN 2CF and 2SY inverters.

The appendix contains **circuit diagram** and a **setting chart**.

The contents of this guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of the guide, without notice. This product is supplied with the latest version of software. If this product is to be used in a new or existing system with other inverters, there may be some differences between their software and the software in this product. These differences may cause this product to function differently.

Symbols and information

The symbols and information below warn of dangers and indicate certain safety measures that must be taken. Pay attention to this information and pass it on to other users!

Attention! General safety hazard! / Information on safe operation of the equipment**.**

Important notes!

Important information!

This information only relates to ZETADYN version 2CF

This information only relates to ZETADYN version 2SY

Notation:

All settings at the unit are carried out with the help of parameters grouped in menus. Example:
The travelling speed is located in the TRAVEL menu.

notation: /TRAVEL/ V_3.

General Information

Copyright

The copyright for this operation manual belongs to

ZIEHL-ABEGG AG, Künzelsau

This manual may not be completely or partially duplicated or distributed, used without authorization for purposes of competitive gain or passed on to third parties.
Contraventions shall result in the obligation to pay damages.

All rights reserved, especially if patents are granted or other forms of registration are submitted.

We must emphasise that these operating instructions refer only to this equipment and in no way to the complete system!

Basis for device construction

The device is constructed in accordance with the latest technology and the recognized safety regulations.

Nevertheless, use of the equipment can give rise to danger to life and limb of the user or third parties, as well as damage to the system and other assets.

- The device is intended exclusively for the duties listed in the order confirmation. Any other or extra-ordinary uses of the device (unless previously agreed by contract) are considered unauthorized. The manufacturer is not liable for damages resulting from this. The company using the equipment carries the risk alone.

Authorized use of the equipment also includes compliance with the procedures for installation, operation and maintenance described in these operating instructions.

Notes on usage

- In the interests of further development, we reserve the right to modify the design and technical data.
- We do not accept any liability for possible errors or omissions in the information contained in data, illustrations or drawings and descriptions provided.
- Before commissioning the device, ensure that you first read the information concerning installation, adjustment, operation, and maintenance.
- Apart from the operating instructions and the obligatory regulations to be followed by users relating to accident prevention, the recognized technical regulations must also be complied with (safety and specialized work in accordance with safety procedures, VDE, etc.).
- As well as these operating instructions, the information supplied by the manufacturers of the various components must also be observed

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Safety information

The electrical equipment and machinery described in this documentation are designed for use in industrial heavy current systems. They have moving and rotating parts and carry dangerous voltages during operation. Unauthorized removal of required covers or inadequate maintenance can give rise to serious injury or material damage.

Consequently those responsible for the safety of the equipment must ensure that:

- Only suitably qualified personnel* are entrusted with any work which needs to be carried out on this equipment and machinery.
- Personnel working on this equipment and machinery must always have access to the operating instructions and all product documentation supplied, and must observe the relevant instructions contained therein.
- Unskilled personnel must not be allowed to work on this equipment and machinery or in the vicinity of it.

(* Definitions as in VDE 105 or IEC 364)

Electronic devices are in principal not fail-safe. In the event of a breakdown, the user is responsible for ensuring that the drive is conveyed to a safe state in order to avoid injuries to persons and/or damages to properties.

Before touching any internal parts, the device must be disconnected from the mains supply. Work on the equipment must not start until after a waiting time of about 5 minutes, when the link circuit capacitors are discharged and have a residual voltage less than 65 V.

Work on or with the equipment may only be carried out by personnel who are authorized to do so by virtue of their training and qualifications. In addition, personnel must be authorized by the operator to carry out the work!

These safety instructions are not claimed to cover all aspects of safety.

Notes

The information on processes and sections of the circuitry contained in this documentation must be regarded as general statements only. Their transferability to other applications must be investigated; ZIEHL-ABEGG does not guarantee their suitability in such circumstances.

The modules contain components that may be damaged by electrostatic discharge. The body of the person touching them must first be discharged, for example, by touching a conductive, earthed object, (e.g. bright metal parts of a control panel), immediately beforehand.

Transport and storage

- Ziehl-Abegg controllers are packed in the factory to suit the particular agreed transport method.
- Always use the original packaging materials when transporting the controller.
- When transporting by hand, take into account the lifting and carrying strength that can reasonably be expected in a person.
- Avoid shocks and impacts to the equipment.
- Check the packaging and controller for damage.
- Store the controller in its original packaging in a dry place protected from external weather conditions.
- The device must not be exposed to the effects of extreme heat and cold.

Obligations of owner

The owner is obliged to ensure that the equipment is only operated in correct working order. It is the owner's responsibility to guard against any safety hazards arising between ZIEHL-ABEGG equipment and other client's equipment!

Electrical / electronic equipment

Work on electric components/modules may only be carried out by trained electricians in accordance with electrical engineering regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).
The employer or operator must also ensure that the electrical systems and equipment are operated and maintained in accordance with electrical engineering regulations.

- It is forbidden to carry out work on electrically live parts. The protection class of the equipment when open is IP00! It is possible to touch components carrying hazardous voltages!
- During operation, the equipment must be closed or installed in a control panel.
- Fuses may only be replaced by new ones and must not be repaired or bridged.
- Only use fuses that are specified in the electrical circuit diagram.
- The safe isolation from the supply must be checked using a two-pole voltage detector.

Any defects detected in the electrical system / modules / operating equipment must be rectified immediately. Until then there is risk of serious danger, and the equipment / system must not be operated in the defective condition.

Employment of external personnel

Repair and maintenance work is often carried out by external personnel who are often unaware of the special requirements and the resulting dangers.

- Provide these personnel with detailed information about the dangers in their working area
- Check that they are using correct working procedures and intervene immediately if this is not the case

As the supervisor, it is your responsibility to ensure the safety of external personnel!

Accessories, spare parts

PAY SPECIAL ATTENTION!

For your own safety, only use parts, sensors and supplementary equipment that have been approved or recommended by ZIEHL-ABEGG. In the case of third-party products that have not been approved or recommended, or other modifications not carried out by ZIEHL-ABEGG, it is impossible to assess whether a safety risk will arise in connection with ZIEHL-ABEGG equipment. Original ZIEHL-ABEGG parts, supplementary equipment, and other products approved or recommended by ZIEHL-ABEGG, as well as professional advice concerning their use, can be obtained from the ZIEHL-ABEGG customer service department, Tel. +49 (0) 7940/16-3 08. In the best interests of both parties , we once again ask you to observe the above information and directions:

OPERATIONAL SAFETY IS OF PRIME IMPORTANCE!

Manufacturer's address, Service address

If you have any questions concerning the use of our products or if you intend to use our products for special applications, please contact us:

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ZETADYN 2CF / 2SY System Description

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1 ZETADYN 2CF / 2SY System overview

1.1 Areas of use

ZETADYN 2CF and *2SY* controllers are designed for drives with a motor rated current up to 74 A, where high positioning accuracy and travel comfort is required.

2CF The *ZETADYN 2CF* equipment range is intended for asynchronous motors

2SY The *ZETADYN 2SY* equipment range is intended for synchronous motors

ZIEHL-ABEGG supplies complete AC drives with asynchronous motors as well as gearless synchronous drives , digital speed and absolute encoders for these applications

1.2 Functions and features

Field-oriented control

The frequency converter provides a three-phase supply with variable frequency and voltage. The motor is optimally driven at all operating points by the field-oriented control system.
This enables any required value of torque to be made available with virtually no delay.
Full rated motor torque is hence possible even when stationary (speed 0).

A microprocessor controls the drive in accordance with the time and distance dependent programs which are selected by the supervisory control system.

Features of the ZIEHL-ABEGG digital drive control system:
- The entire drive cycle is controlled from start (speed 0) to stop (speed 0).
- Accurate control response, with good dynamic response and high positioning accuracy.
- Simple to commission and operate.
- Comprehensive diagnostic and data protection functions.
- High level of safety achieved by multiple monitoring functions

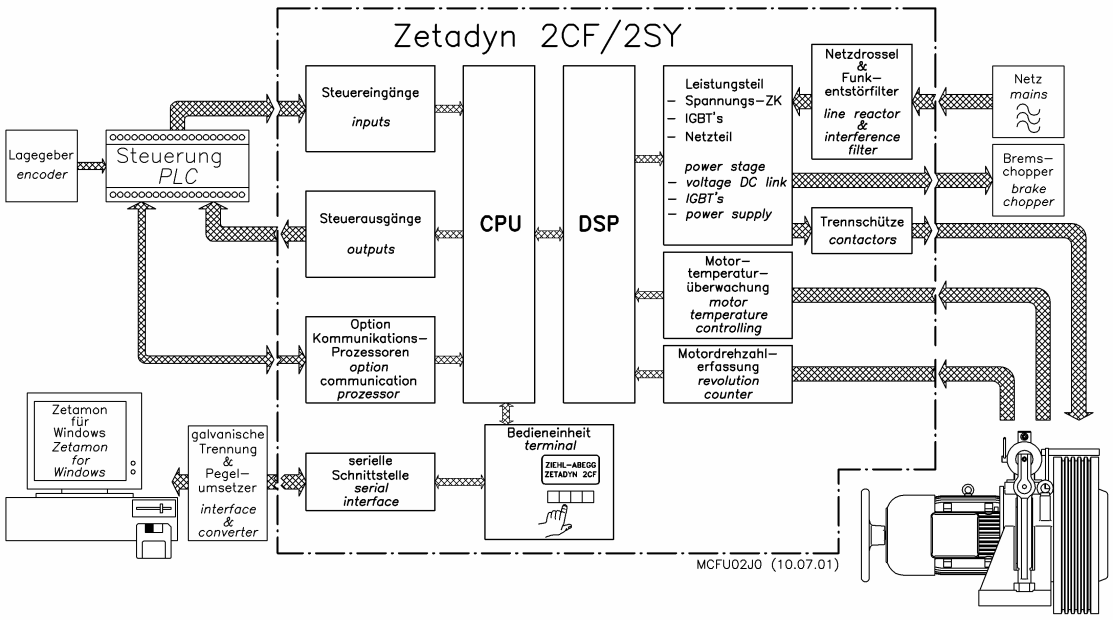


Figure 1.1 Block diagram ZETADYN 2CF / 2SY

The functional design allows the equipment to be easily adapted to various applications.

1. Control system

The supervisory control system communicates with the controller via inputs and outputs. Time and distance dependent control programs are selected by controlling the inputs. The operating condition of the drive is continually signalled back to the control system via the volt-free relay outputs.

There is a possibility of a serial link between the control unit and the elevator control system (RS 485). In this case the inputs and outputs are omitted, which reduces the wiring costs

2. Parameter setting

Commissioning, service and documentation are supported by digital computer techniques. Speeds, accelerations and other parameters specific to the system can be entered through text dialogue using the integral control and display unit. A password protects the system against unintentional settings. It is also possible to set parameters from a PC with the ZETAMON software (including connecting cable), available as an accessory.

3. Control

All programs operate under speed control and independently of the load. The control system can be used for speeds up to 2.5 m/s (higher speeds on request). The control range of up to 1:200, enables a high positioning accuracy.
The field-oriented control system uses a sophisticated control process with the following characteristics:

- high dynamic response
- good concentric running in the complete speed range
- wide speed range

4. Drive

The field-oriented control allows the specified travel curve to be precisely maintained over the complete speed range. This ensures correct travel behaviour under all load conditions. The controlled operation from speed 0 on starting to speed 0 on stopping means that there is **no** brake wear. The drive operates very quietly.

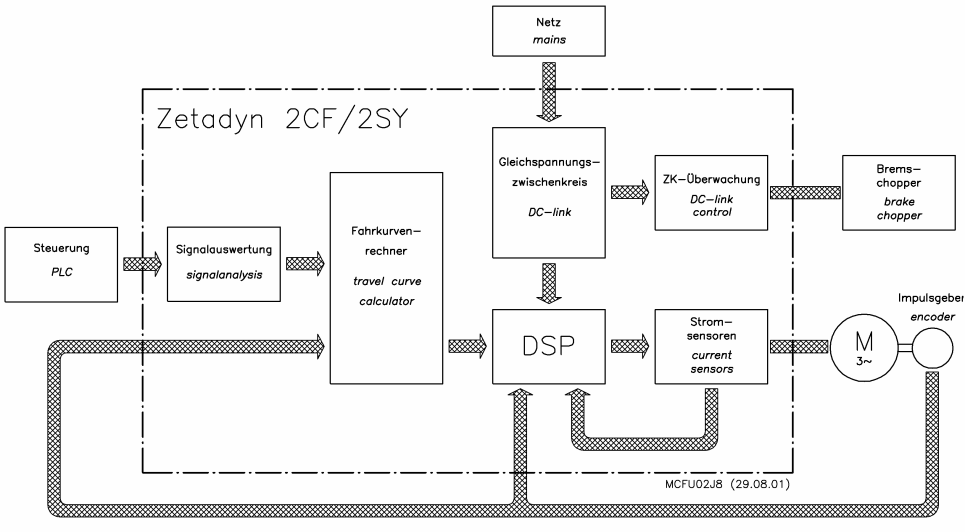


Fig. 1.2 Schematic diagram of control loop

1.3 Requirements

Ziehl-Abegg can provide optimised asynchronous and synchronous motors with suitable encoders.

If you only purchase the inverter - for example, when retrofitting an old installation - please observe the following.

Motor selection:

2CF Because of the high speed switching of the inverter transistors, a high rate of voltage rise occurs at the frequency converter output.
Because of this, the motor used must have winding insulation designed for operation with frequency inverters.

Additional balance weights should be removed, if necessary. If a high inertia handwheel is fitted, it should be replaced with a plastic or aluminium one. Besides the energy saving, additional reserves are freed up for the speed control.

Prior to the retrofit (i.e. at the design stage) it is necessary to check whether the motor previously operated correctly under all operating conditions. The motor and gears must run quietly, with no imbalance or play. Mechanical weaknesses cannot be improved by a control system, but may make a controlled operation impossible.

When modernizing old equipment, it is recommended that the speed and the current consumption of the motor (car travelling down, without load) are measured and recorded. This data is necessary for setting the controller parameters (parameters nominal speed and rated current)

2SY The ZETADYN 2SY inverter can support synchronous motors with between 1 and 30 pole pairs.

Controller selection:

The inverter can be overloaded for max. 10s. by a factor of up to 1.8. When selecting the motor, it is assumed that the motor is loaded with the design torque at the design speed. But, in addition, torque is needed for acceleration. A current of approx. 60 to 80 % of the design current is required for this.

The current drawn during acceleration must not be more than 1.8 x the design current of the frequency inverter:

$$I_{\text{nom.-controller}} \geq I_{\text{nom.-motor}}$$

Brake Chopper Selection

When choosing the brake chopper, please bear in mind that gearless systems feed back much more power than systems with gears. It is quite possible to have double the amount of power fed back with the same controller size. A calculation of the brake chopper design is essential.

Mounting the encoder:

2CF If a hollow shaft encoder (e.g. Ziehl-Abegg -ET2S-1024) cannot be mounted, there are the following possibilities:

1. Retrofitting a hollow shaft encoder with an extension shaft. Documentation: A-LEM-0923
2. On gearboxes designed for mounting an analogue speed indicator with a Euro-flange, the matching encoder G71-xx can be used. The encoder can be supplied with a shaft diameter (xx) of 10mm.
3. It is also possible to fit an encoder directly on some gearboxes.

Note:
If you are designing the system, make sure that the encoder is installed so that there is no backlash or axial displacement, with a permanent mechanical link to the motor (gear).

A sine wave encoder with a resolution of 1024 – 8192 increments / revolution or a encoder with a resolution of 1024 - 2048 increments / revolution (HTL or TTL) should be used.

2SY An absolute encoder is required for operation of a synchronous machine. To function correctly, the inverter requires the exact position of the rotor relative to the coils embedded in the stator.

It is therefore necessary to measure this position prior to operation of the motor. To do this, it is essential that the motor can move freely. Even a small load moment can distort the measurement in such a way that a correct operation of the drive is no longer possible.

The ZETADYN 2SY inverter requires an absolute encoder (AWG2S-2048/7K/05V-1) with either an ENDAT interface or an SSI protocol of the Heidenhain company. When using other manufacturer's encoders , ensure that they have an interface with the identical specification.

With inverters of M. Ziehl-Abegg, the motors are measured in the factory and the data is stored in the encoder or the inverter.

Information on the possibility of connecting other manufacturer's encoders is available on request from ZIEHL-ABBEG. (Hotline: +49 79 40 / 16-308)

2 Installation

2.1 Equipment construction

ZETADYN 2CF / 2SY inverter are designed for easy operation and maintenance.
They are designed for IP 20 protection and fulfil the requirements of VBG 4.

The controller consists of the following modules:

- case
- power section (intelligent IGBT module, switched-mode power supply)
- control section board (travel curve computer)
- voltage link circuit
- operator panel
- suppression components (RFI filter, mains choke / radio interference level B fulfilled)
- 2 motor contactors (can be omitted on the 2CF, version G, see Appendix 7.2)

The operator panel, with its 2-line illuminated display, keypad and serial port are flush-mounted in the front panel.

Sections of the front panel can be removed to connect up the controller. Make sure that the fixing screws with toothed washers are correctly fitted when reassembling..

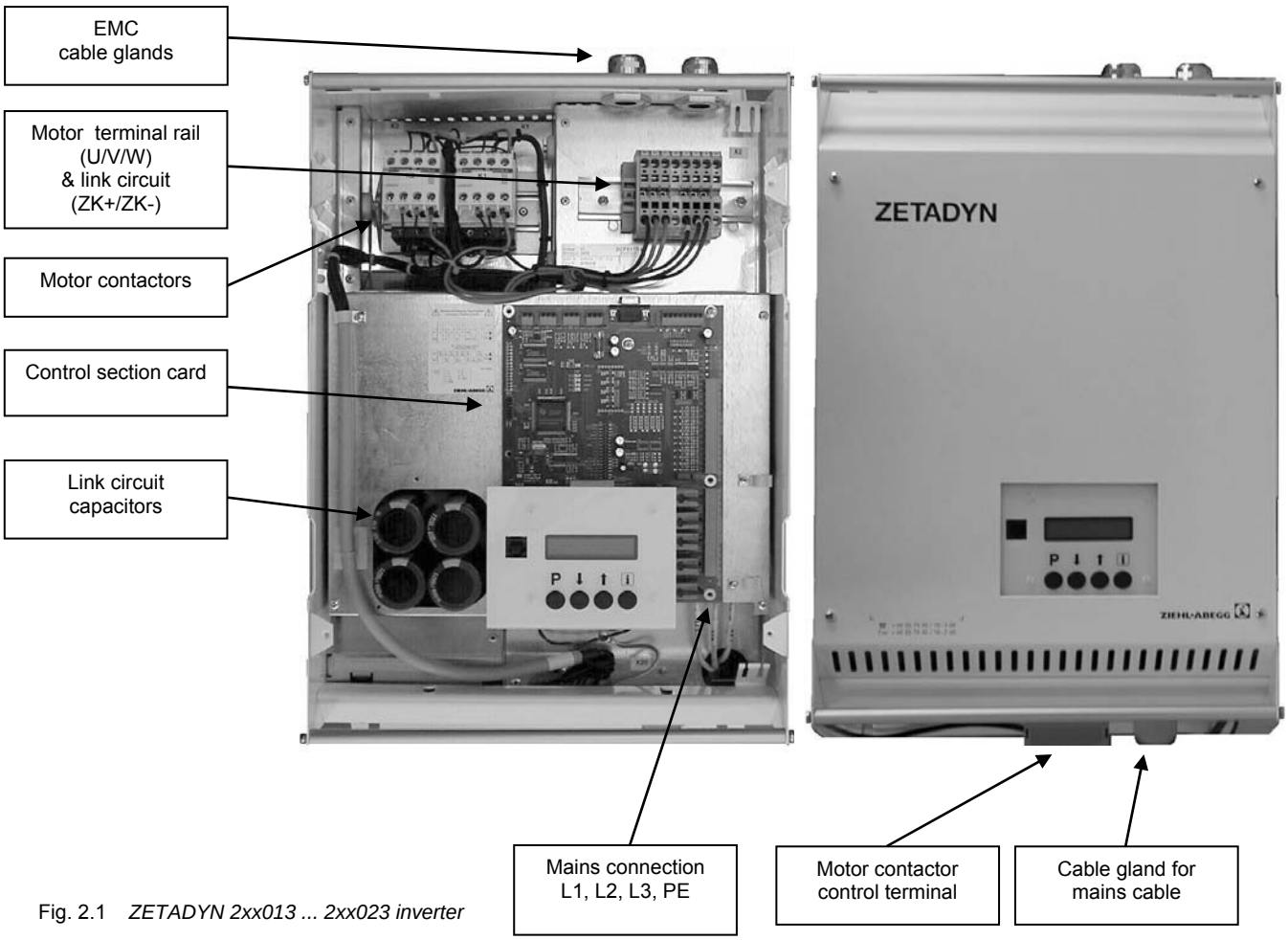


Fig. 2.1 *ZETADYN 2xx013 ... 2xx023 inverter*

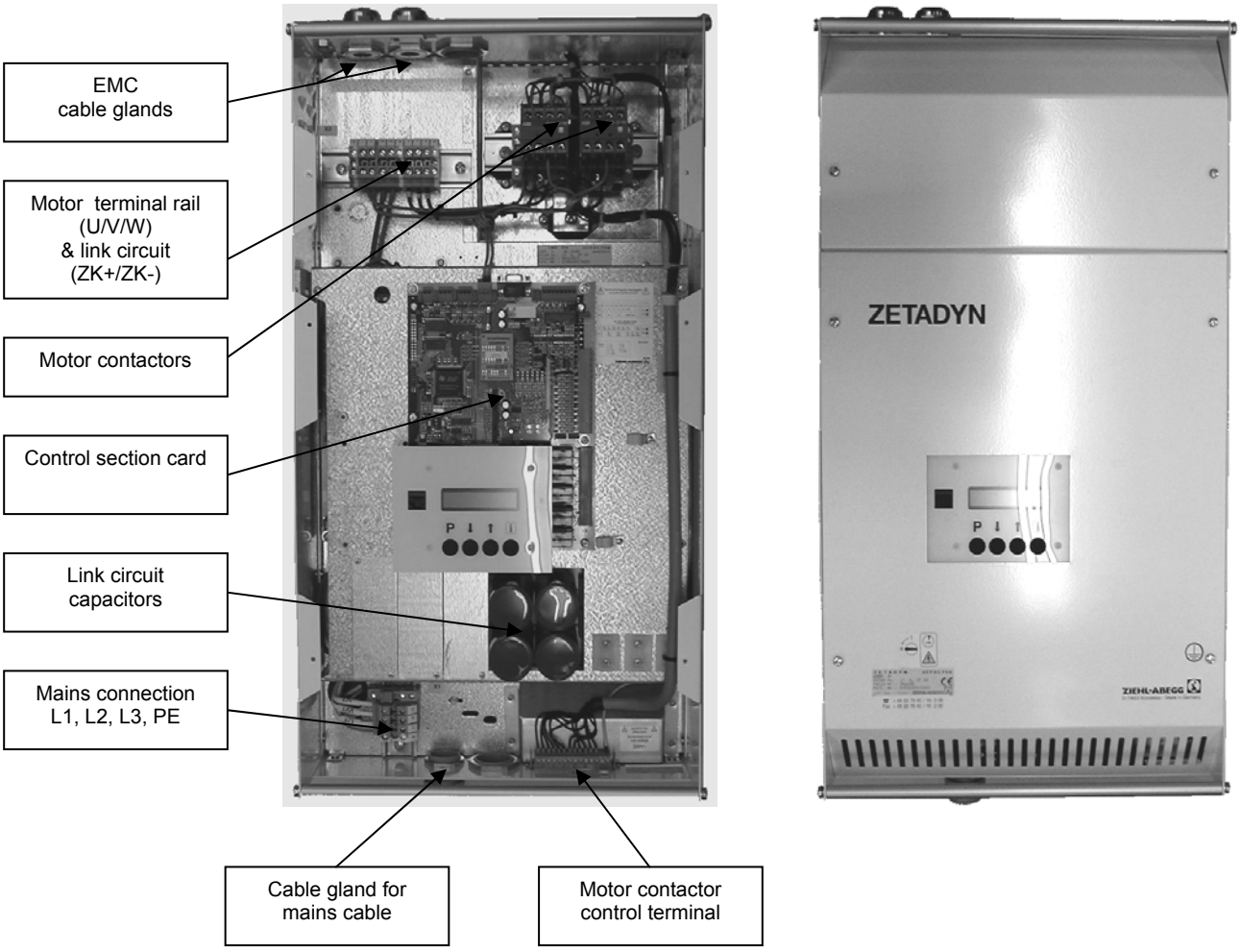


Fig. 2.2 *ZETADYN 2xx 32 ... 2xx 74 inverter*

In the case of using an EVAC 1C, the inverter in the emergency operation is supplied via the terminal L_Not with 400 V alternating voltage, reference potential is ZK -.

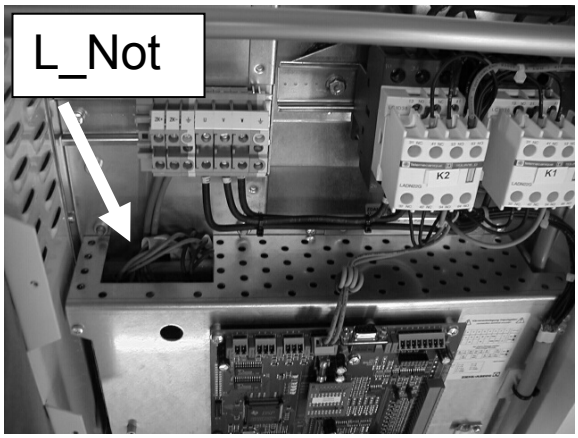


Fig. 2.3 Arrangement of the L_Not terminal with the ZETADYN 032-074

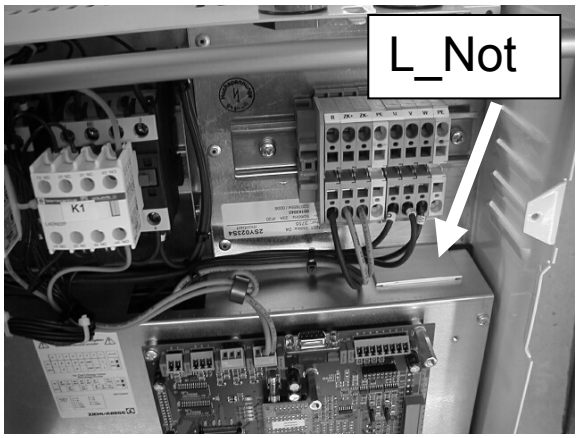


Bild 2.4 Arrangement of the L_Not terminal with the ZETADYN 013-023, the cover must be removed!

2.2 Installation conditions

The installation conditions listed in the Appendix under "Technical data" are applicable for the equipment surroundings.

Wall-mounting

- The ZETADYN inverter must be mounted vertical. The distances for the assembling have to be considered (see operation manual appendix A3).
- Mount the equipment on a clean load-bearing surface and do not brace.
- Use suitable fixings; the mounting plate supplied with the equipment can be used as a drilling template
- The cable entries must still be freely accessible
- Protect the controller from direct sunlight

Installation in control cabinet

Installing the control panel

Mount the equipment with suitable fixings in accordance with the regulations. Make sure that there is adequate airflow for ventilation. The minimum clearances given in the Appendix must be provided. Take account of the heat dissipation of the controller (see Appendix A1 & A3)!

2.3 Connection and terminal arrangement

The controller must be connected up logically in accordance with the suggested circuit (see appendix A10 / A11)

Control cables must be segregated from power cables. All control inputs and outputs of the controller are suitable for relay or PLC controls and are wired to plug-in screw terminals to simplify service work. In addition to this, there is the possibility of serial control (DCP).

If control transformers are used they should be connected between phase (L) and neutral (N). If this is not possible they should be connected between the same two phases. If they are connected between different phases, the frequency-controller cannot clearly detect a phase-failure. The possibility of a control system failure cannot be ruled out

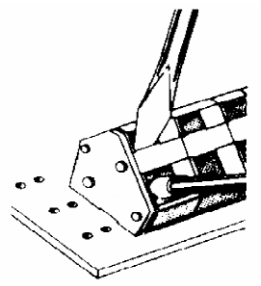
When connecting the controller, please observe the technical data (appendix A1 / A8).

2.3.1 Mains supply

Before connecting the supply, check that the information on the rating plate of the controller agrees with the values required for the supply connection.

"PE-L1-L2-L3" **Connection of the power section supply.**

Fuse protection (F1-3) can be provided by anti-surge fuses to suit the rated motor current.



The mains connection of equipment sizes 2xx013 to 032 is made via spring-loaded terminals. Always use a suitable screwdriver to avoid damaging the terminals and to ensure a secure contact. Insert the screwdriver up to the stop so that the terminal opens fully.
Solid conductors up to 6 mm² and flexible wires up to 4 mm² can be used; crimps are recommended when using flexible conductors.

Fig. 2.5 Spring-loaded terminal

Network form
The mains filter and frequency converter are designed for use in an earthed supply system. Permissible network forms are:

- TN network
- TT network

2.3.1.1 Line reactor

To achieve the lowest possible loading of the supply network (see VDE 0160/EN 50173 and VDE 0839/EN61000-3-2), the controller has an integral line reactor with a short circuit voltage of U_K = 4 %. This line reactor attenuates the commutation breaks and the mains feedback.
The fifth harmonic of the current is limited to about 30 %, as required by the electricity supply companies. The operating point for the measurements is at I_N. Furthermore, the service life for the link circuit capacitors is also increased.

Limits for harmonics up to 16 A (EN 61000-3-2)
The ZETADYN 2CF controllers are classed as equipment for professional use. There are no limits for this type of equipment > 1 kW.

Definition of “equipment for professional use”:
“...equipment which is intended for industrial use, for use in specific trades and industries, and not intended for sale to the general public. The use must be specified by the manufacturer.”

2.3.1.2 Radio interference filter

In order to avoid the need for suppression adjustments or modifications at a later stage, the equipment incorporates an RFI suppression filter with which the limits laid down in **EN 12015, EN 12016 (limit Class B / EN 55011)** are achieved.
RFI suppression using upstream suppression devices means that the converter is protected against external influences at the same time.

Please consider the indications for an EMC-compatible installation (appendix A9). The technical data and the order-numbers are listed in appendix A8.3.

2.3.1.3 Travel contactors

The isolation points required for the motor (travel contactors) are integrated in the inverter. The auxiliary contacts and contactor coils are wired to a terminal block. The use of integral contactors allows the separate installation of the power and control cables.
The dimensions of the control panel for the lift control system can be reduced accordingly.

SK1; SK2 main contacts to control the mechanical brake (in addition see also suggested circuit / Appendix A10 /A11)

2.3.1.4 Operation of a control transformer in the power supply

When using a control transformer in the power supply of the inverter and a voltage drop happens in one of the phases the transformer is connected to, the radio interference filter could be destroyed by an extreme voltage increase. The reason for the voltage increase is a resonance between the transformer and the suppressor components, which have to be used in combination with a frequency inverter.
Here it is insignificant if the voltage drop arises from the defect (or the removal) of a fuse or from the sequential switch-off of the phases (e.g. by a rotary switch).

To prevent the voltage increase, a condenser has to be connected parallel to the control transformer (Cx in Fig. 2.6)

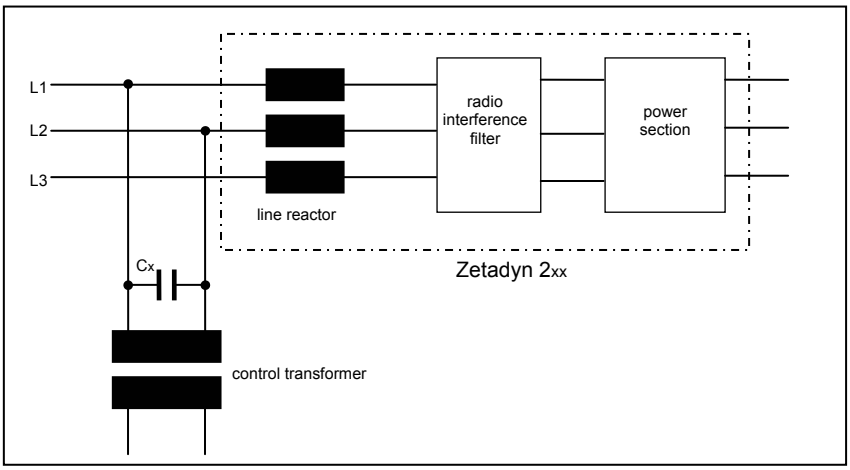


Fig. 2.6 Control transformer in the power supply of the inverter

Recommended capacitor types
:

- Epcos type B25832 10µF/640v-AC with 8mm bolt for the assembling
- Capacitors for motor start-up with following data: 10µF/450V-AC

In additional we recommend:

- when the switch-off is carried out sequential, the phases which the transformer is connected to, have to be switched-off at last
- do not oversize the transformer
- if a loaded an unloaded transformer are used, they have to be connected to the same phases

2.3.1.5 Correct EMC connection

All components required for RFI suppression are already integrated in the equipment.

There is no standard size control panel for equipment in the ZETADYN 2CF0xxS4 series.
The motor and brake chopper must be connected to the controller with screened cables.
The special EMC cable glands of the controller simplify the wiring and allow the widest possible contact area for the screen.

The harmonised standards EN 50081-2 and EN 50082-2 as well as the radio interference level Class B according to EN 55011 are complied with.

It is necessary for compliance with the Class B radio interference level for the complete lift system that all external current-consuming devices (e.g. brake, motor contactors) are fed via an additional RFI filter!

Advice for compliance with Class B interference limits - equipment without motor contactors (the user is responsible for compliance with the standards):

- cable screens must be grounded over a large contact area.
- power cables and control cables must be spatially segregated.
- a screened cable must be used for the supply cable to the motor.
- the supply cable to the motor must not be longer than **10 m** for compliance with Class B interference level

2.3.1.6 Protective measures

Depending on the regulations of the local electricity supply company, the following can be used:

- earth leakage circuit breaker (RCD)
- fault voltage protective circuit
- protective earthing
- reducing voltage to zero
- protective earth system

☞ **When using RCDs, ensure that they are AC/DC-sensitive. The use of other types of RCD is not permitted under VDE 0160/ DIN EN 50178, because a DC component in the leakage current could prevent a RCD tripping.**

☞ Some electrical loads, which cause a high leakage current at switch-on (suppression capacitors), can lead to nuisance tripping of instantaneous RCDs

☞ **To assure the fire prevention required in the DIN VDE 0100-482, AC/DC-sensitive RCDs type B with selective or short time delay tripping and conventional tripping current of I_Δ = 0.3 A have to be used**

It is not permitted to use RCDs type A in connection with frequency inverters!

2.3.2 Motor

“U-V-W” **Three-phase winding**
The three-phase winding in the motor terminal box is marked "U-V-W". A screened cable must be used to observe the EMC directives. The screen connections at the controller (EMC cable gland) and at the grounding terminal in the motor terminal box should be as short as possible and should have a extensive contact area.

With the **2SY** the motor windings of the synchronous motor are in short-circuit while the inverter standstill, thus the engine creates a speed-sensing brake torque. With demounted inverter the motor-lines must be short circuited, in order to avoid a too high speed of the car with opened brakes.

2.3.3 Brake-Chopper BC25 / BC50 / BC100

If the motor is slowed down due to a reduction of the stator supply frequency, the motor runs as a generator. As the kinetic energy of the drive is not fed into the mains, it is absorbed by the link circuit capacitors. The voltage of the link circuit increases. The link circuit voltage is monitored by an external brake chopper to ensure that it does not exceed 760. When the limit is reached, the brake chopper connects a transistor in circuit and the surplus energy is converted into heat by via a resistance.
The control action of the brake chopper is continuous via a pulse-width-modulated signal (switching frequency approx. 1 kHz).

The brake chopper is intended for equipment sizes ZETADYN 2xx 032 up to 2xx074; with smaller units, an external braking resistance is sufficient.

Connecting an external brake chopper:
- The inverter must switched off and free of voltage.
- The link circuit capacitors must be discharged, i.e. 0V DC at the terminals **(ZK+)** and **(ZK-)**
- The brake chopper is connected to the terminals **ZK**+ and **ZK-.** .

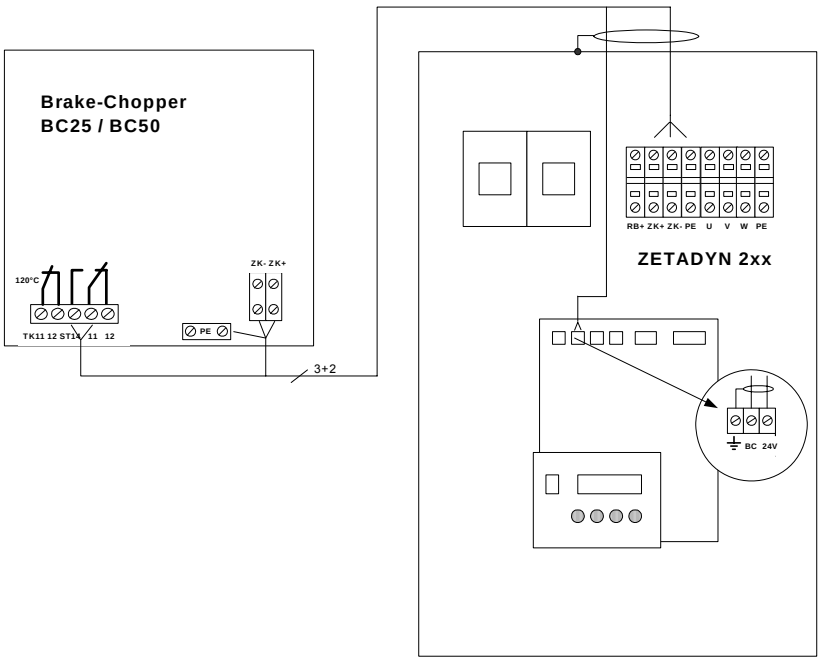


Fig. 2.7 Connection of the brake chopper BC25 / BC50 / BC100 (supply from the link circuit of the frequency inverter)

It It must be ensured that opening of the thermal switch (TK1 and TK2 of the braking resistance) is monitored by the controller. Otherwise the braking resistance could burn out in the event of a fault.

2.3.4 Braking resistance BR17-1 / BR25-1

The ZETADYN 2xx 013 / 017 / 023 equipment sizes only require an external braking resistance. The required control electronics are integrated into the ZETADYN 2xx controller .

Connection of an external braking resistance:

- The inverter must switched off and free of voltage.
- The link circuit capacitors must be discharged, i.e. 0V DC at the terminals **(ZK+)** and **(ZK-)**
- The brake chopper is connected to the terminals **R** and **ZK+.** .

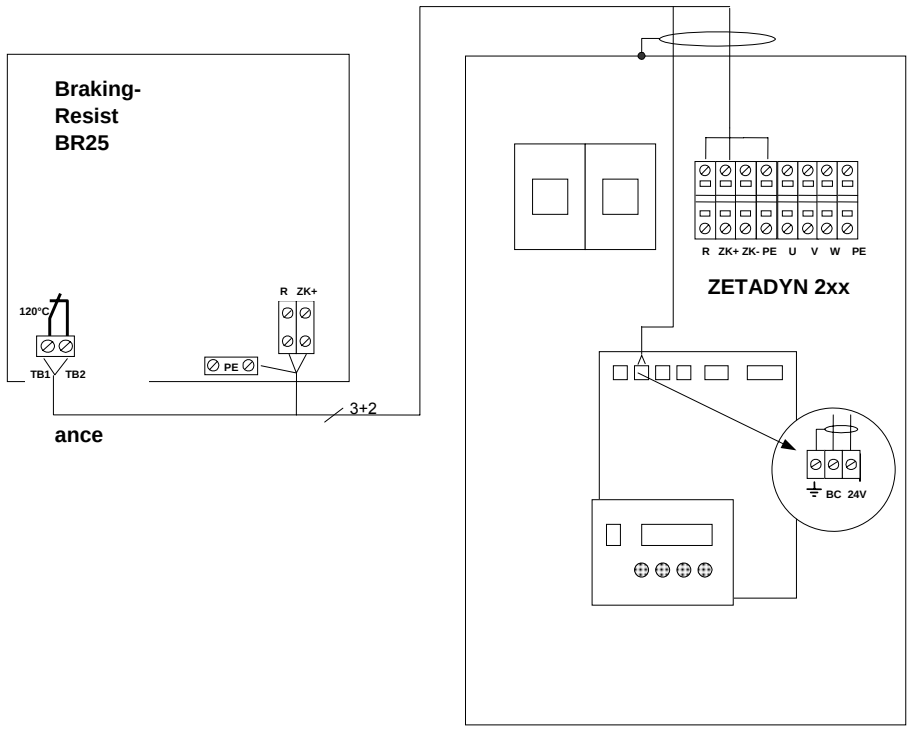


Fig. 2.8 Connection of the braking resistance BR17-1 / BR25-1

It must be ensured that opening of the thermal switch (TK1 and TK2 of the braking resistance) is monitored by the controller. Otherwise the braking resistance could burn out in the event of a fault.

IF THE BRAKE-RESISTOR IS CONNECTED TO THE TERMINALS ZK+ AND ZK-, HE HAS A CONTINUOUS OUTPUT OF 8 KW. THE CONSEQUENCE IS AN EXTREME OVERHEATING OF THE BRAKE-RESISTOR. IF THE FAILURE-CONTACT IS NOT CONNECTED, THE BRAKE-RESISTANCE WILL BE DESTROYED BY THE OVERHEATING.

2.3.5 Control inputs

Options for controlling the inverter:

a) The control system connects the inverter voltage terminal "+24V" to the appropriate input via a volt-free contact.

b) The control applies an external voltage of +24V to the input. The "GND" terminal serves as reference potential.

* Conductor arrangement for the connection cable set (X_I)

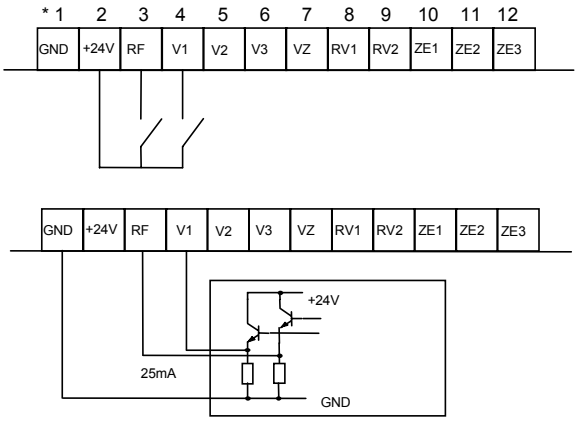


Fig. 2.9. Control options

c) Serial control via DCP-protocol (see chapter. 3.1.2 & 3.3.b)

Control inputs:

"GND" Reference potential

"+24V" Control voltage
DC output of approx. 21V for controlling the inputs.

"RF" Controller clearance
The "RF" input must be enabled during travel (safety circuit).

"V1" Positioning speed (distance-dependent)
"V2" Intermediate speed (distance-dependent)
"V3" Travel speed (distance-dependent)
"VZ" Adjustment speed (not distance-dependent)
The adjustment speed has priority over all other speeds; if this speed is selected, all other speeds are ignored.

"RV1" Direction setting 1 UP
"RV2" Direction setting 2 DOWN
If the controller is connected according to the suggested circuit (Appendix 7.9), the motor is factory set to turn anti-clockwise when input "RV1" is selected; if "RV2" is selected it turns clockwise (looking at the drive end of the shaft).

"ZE1" Additional input [default setting: V_ZE1]
"ZE2" Additional input [default setting: V_ZE2]
"ZE3" Additional input [default setting: OFF]
The distance dependency is inactive when these inputs are selected. Hence the inputs can be used for inspection and return operation.

2.3.6 Monitoring functions

"P1" **PTC thermistor / motor temperature monitoring**

"P2" Connection of the PTC thermistor (to DIN 44 081) for monitoring the motor temperature. If the monitoring is not carried out by the controller, then a wire link must be connected between these two terminals.

"BC" **Monitoring of the brake chopper thermal switch**
see Section 2.3.3

"BR" **Release monitoring of mechanical brake**
The monitoring function is activated in the INTERFACE \ BR \. menu. Up to three brake monitoring switches can be attached. The second contact is attached to ZE3, if three contacts are used, the third contact must be attached to ZE2.

"CO" **Monitoring of motor contactors**
The wiring of the auxiliary switches for the monitoring of the motor contactors hs to be made in accordance to the wiring suggestions in appendix A10 & A11
The motor contactors are not integrated in the inverter.

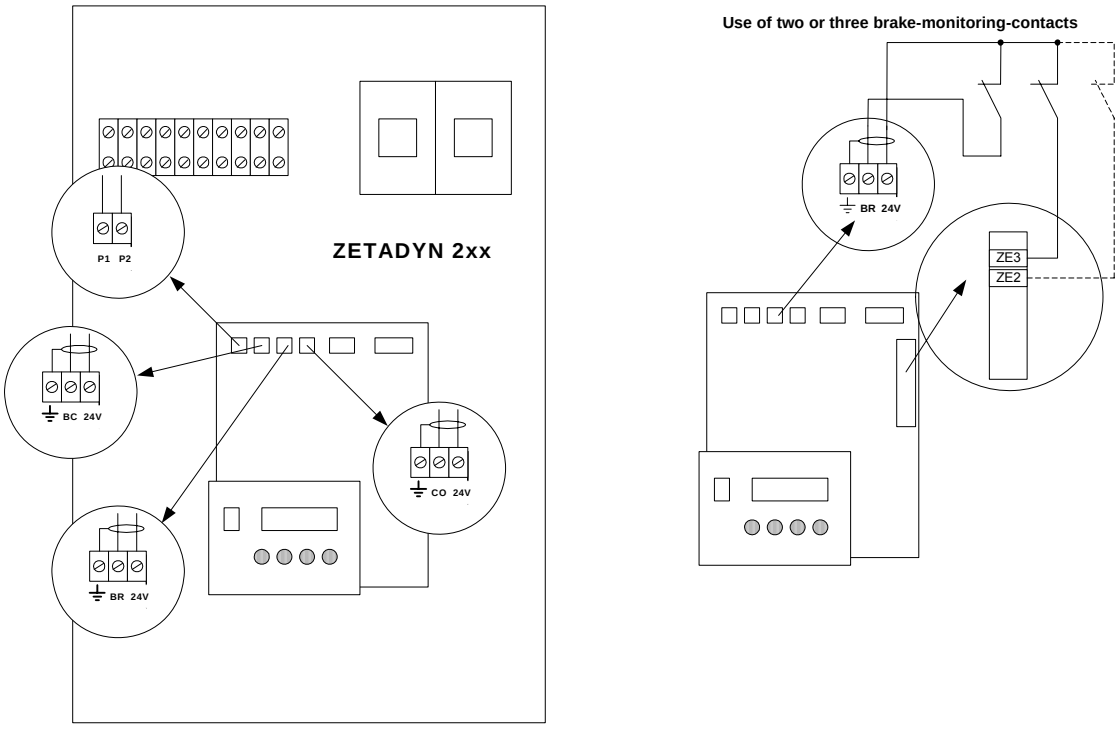


Fig. 2.10 Inputs of monitoring functions

2.3.7 Encoder for asynchronous motors

2CF The encoder is connected to the 9-pin sub-D socket (5V encoder) or to the 8-pin connector (5V or 24V Ecoder).

Pin layout for 9-pin sub-D

PIN	Signal
1	Track A
2	Track B
3	Unused
4	Vcc (+ 5 V)
5	GND
6	A/
7	B/
8	Unused
9	GND

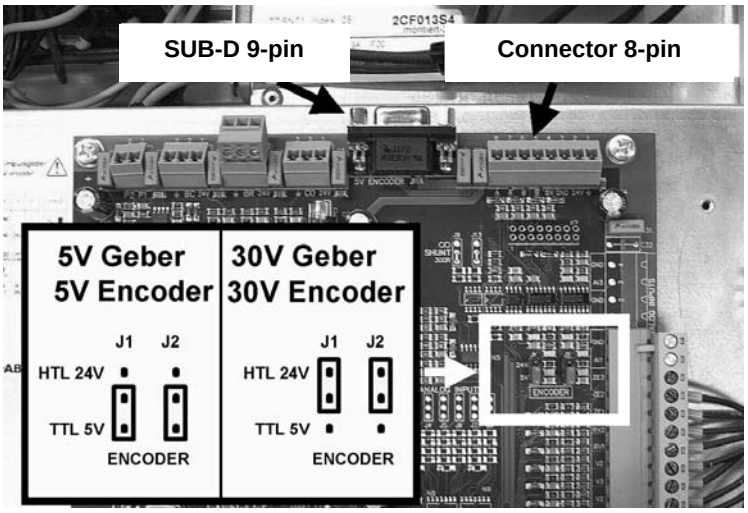


Fig. 2.11 Setting the encoder voltage

Pin layout for 8-way connector

Terminal	Signal	
1	"PE"	Screen
2	"+24 V"	Supply - encoder (HTL)
3	"GND"	Reference potential - encoder
4	"+5 V"	Supply - encoder (TTL)
5	"/B"	Signal track /B - encoder
6	"B"	Signal track B - encoder
7	"/A"	Signal track /A - encoder
8	"A"	Signal track A - encoder

Connection arrangement for various types of encoder

Encoder	Inverter ZETADYN 2CF / 2SY +24 V GND +5 V B /B A /A Screen

TTL ENCODER (5V) **SINE WA. ENC.1.2VSS)**		**0 V**	**+ Volt. 5 V**	**Track B**	**Track B/**	**Track A**	**Track A/**	**Screen**	
⚠	**JUMPERS J1, J2 MUST BE SET FOR 5 V. BEFORE POWERING UP FOR THE FIRST TIME, MAKE SURE THAT THE SUPPLY IS CORRECTLY CONNECTED. IF IT IS WRONGLY CONNECTED (OVER-VOLTAGE 24 V), TTL ENCODERS ARE DESTROYED**								

HTL-encoder (30V)	**+ V 24 V**	**0 V**			**Track B**		**Track A**	**Screen**	
⚠	**Jumpers J1, J2 must be set for 24 V.**								

A screened cable must be used. Make sure that the screen is connected correctly to the clamping points and not to ground. The screen must be run continuously from the inverter to the motor.

The Encoder may never be plugged in or out with a switched on inverter, it could be destroyed. Always switch off and wait, until all LED are off.

2.3.8 Absolute encoder for synchronous motors

2SY The absolute encoder is connected to a 15-pin sub-D connector. Original cables can be supplied in 3m length and 10m length. If other cables are used, the correct function of the absolute encoder can no longer be guaranteed. An absolute encoder is required for synchronous motors; an adaptor card with a 15-way sub-D connector is provided for this on the ZETADYN 2SY.

The maximum permissible cable length is 10 m.

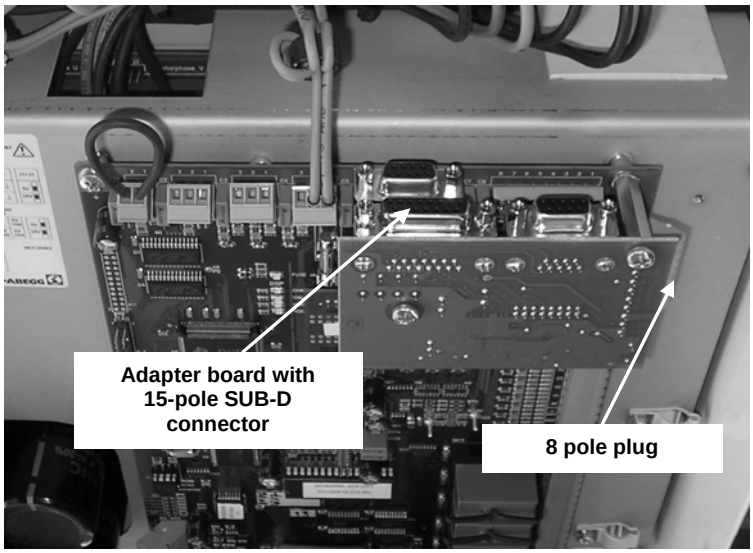


Fig. 2.12 Connection of an absolute encoder

Connection arrangement for 15-way sub-D Connector

Pin	Signal	
1	DATA	Data line for communication with absolute encoder
2	/DATA	Negated data signal
3	5V Sense	Sensing line for tracking encoder voltage
4	+5V	Supply for absolute encoder
5	GND	Ground for the supply to absolute encoder
6	NC	
7	B	Track B
8	NC	
9	/CLK	Negated clock for the serial transmission
10	CLK	Clock line for serial transmission
11	GND Sense	Ground for sensing line
12	A	Track A
13	/A	Negated track /A
14	/B	Negated track /B
15	not connected	

2.3.8 Encoder simulation

The encoder simulation is available in all ZETADYN 2SY inverters.
Retrofitting is necessary in the ZETADYN 2CF if the control panel needs the encoder signals for the positioning of the cabine.

The encoder simulation card converts the signals of the encoder, which is mounted on the motor, to differential signals according to ANSI standard RS485. The resolution of the encoder simulation is identical to the resolution of the connected encoder.

The encoder simulation is applicable for the encoder types mentioned below.

inverter type	encoder type	encoder signal	connection
ZETADYN 2CF	square wave encode sine wave encoderr	5V TTL $1V_{ss}$	SUB-D 9-pin SUB-D 9-pin
ZETADYN 2SY	sine wave encoder with ENDAT interface	$1V_{ss}$	SUB-D 15-pin

It is possible to supply the encoder with an external power supply. Thereby the encoder could be operated when in inverter is switched off.

The external power supply may only be connected to the encoder when the inverter is switched off!

Electrical specifications:

Connection plug: 8-pin, screw connection
Max. wire cross section: 2,5mm²

output signal	min.	max.	
high-level	2,8V		I_{OH}=-8mA I_{OL}=4mA
low-level		0,4V	

output load	
R_{loadt}	>=300 Ω

Connection of the encoder simulation

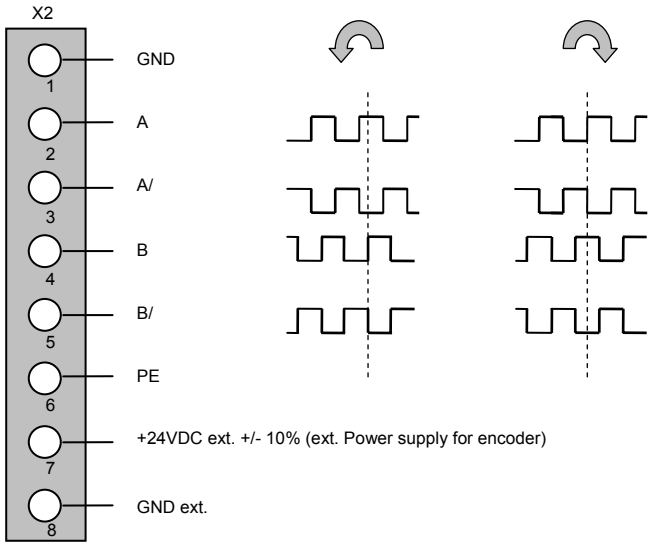


Fig. 2.13 wiring diagram of the encoder simulation

For communication with the encoder, the ZETADYN 2SY controller supports the EN-DAT interface and the SSI protocol of Heidenhain. When using other absolute encoders, ensure that they can be operated via one of the protocols.

For test purposes, it is possible to operate an asynchronous motor with a ZETADYN 2SY inverter. The same connection options as with the ZETADYN 2CF inverter is available for this. These terminals are located below the card for connection of the absolute encoder. As they are not necessary for the authorised use of the unit, the mating section of the plug-in screw terminals is not supplied. Remove the encoder card for connection of these terminals. The 9-pin sub-D connector is readily accessible. It is situated below the connector for connection of the absolute encoder.

A synchronous drive cannot be operated with a normal encoder. Only asynchronous motors can be operated with this type of encoder.

A **screened** cable must be used. Make sure that the screen is connected correctly to the clamping points and **not** to ground. The screen towards the motor may not be interrupted at all..

The Encoder may be never plugged in or out with switched on inverterr, the inverter could be destroyed. Always switch off and wait, until all LEDs are off.

The Encoder may be never plugged in or off with switched on controller, these can thereby be destroyed. Equipment always switch off and wait, until all LED out are.

2.3.9 DCP Interface

The RS485 interface allows the inverter to be controlled using a digital protocol. Through this, wiring time and cost are reduced to a minimum. The X-I and X-O cables are not needed.

The use of a digital protocol enables the inverter to be controlled remotely via the control system. The inverter parameters can be set via the remote keypad and display, and the controller can be mounted also in an inaccessible position.
This is of particular advantage on installations with no lift motor room, if the inverter is installed in the lift shaft.

RS485 terminal

1 Signal track A
2 Signal track B
3 GND (ground connection)
4 PE (screen connection)

The connectorfor RS485 is located on the bottom left side on the printed circuit board MCFU04.

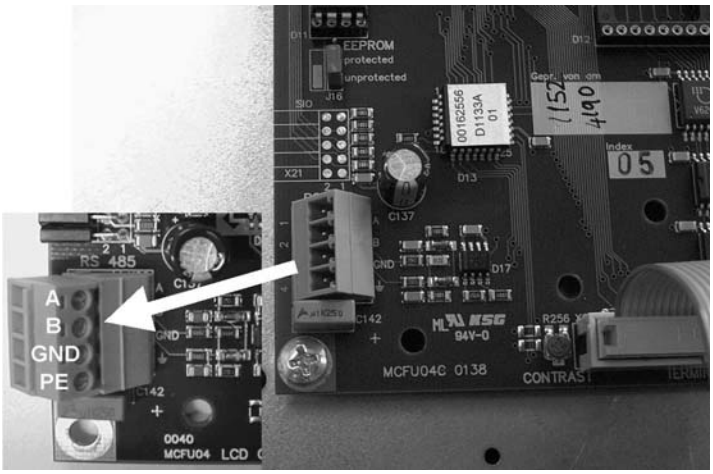
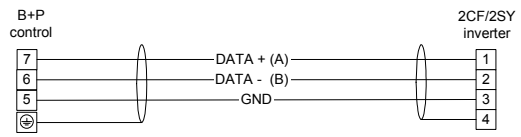
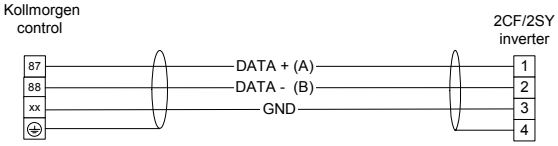
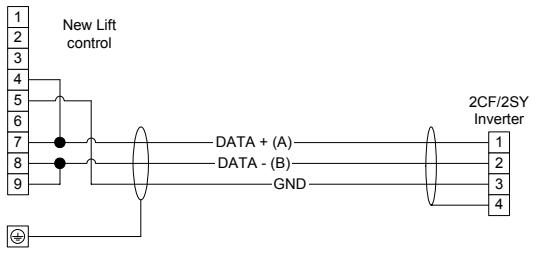


Figure 2.14 RS485 Interface

For the RS485 connection between the inverter and the controller a screened cable must be used. The cable must be run directly without additional terminals.
The screen must be grounded at both ends.
The maximum cable length is 50 m.

Bp 304 / 302 / 115 (Böhnke & Partner): Co-processor terminal rail 5 Ground (GND) 6 Signal track B 7 Signal track A	
MPK 4000 (Kollmorgen) X1 terminal rail 87 Signal track A 88 Signal track B xx Ground (GND)	
FST (New Lift) Sub D 9-polig X12 7,4 (connected) Signal track A 8,9 (connected) Signal track B 5 Ground (GND)	

ZIEHL-ABEGG

2.3.10 Control outputs

The outputs are change-over contacts

The special contacts "SK1"-"SK3" can be programmed in the MENU /INTERFACE differently to the factory setting and used for other functions.

"ST"- Fault
Contact ST1-ST2 is closed when no fault is present.

"MB"- Electromagnetic blocking brake
This output switches the electromagnetic brake via an external auxiliary contactor.

The control system must apply and release the brake instantaneously via this contact to achieve optimum start and positioning behaviour.

"SK_1"- Special contact 1 Factory setting: RB (enable)contactor
When this contact closes, the control system must switch the motor contactors instantaneously. Contact K11-K12 is closed when the system is at a standstill.

"SK_2"- Special contact 2 Factory setting: V<V_G1; G1 = 0.3m/s
Contact K21-K22 is closed when the **speed is higher than 0.3 m/s**.

“SK_3”- Special contact 3 Factory setting V<1, 1xV_3
Contact K31-K32 is closed when the maximum speed V_3 is exceeded by more than 10 % In addition, the fault relay signals an alarm if the nominal speed is exceeded (error 25&26 “speed alarm”).

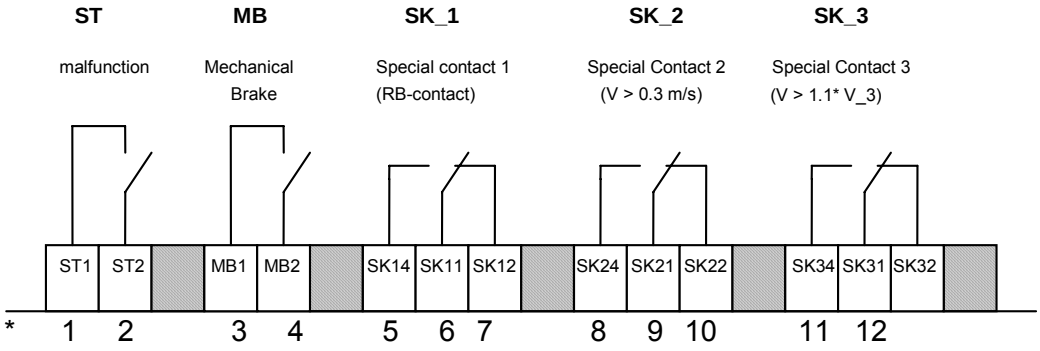


Fig. 2.15 Control outputs

* Conductor identification for connection cables (X_O) / Cable cross-section is 0.75 mm², max. permissible fuse protection 6 A

2.3.10.1 Controlling of motor contactors

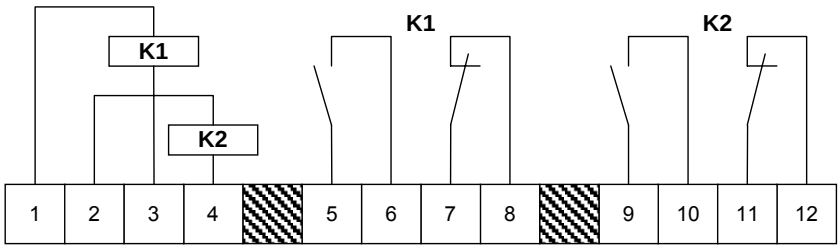


Fig. 2.16 Control of motor contactors

* Conductor identification for connection cables (X_K)

2.3.11 Inverter interfaces overview MCFU04

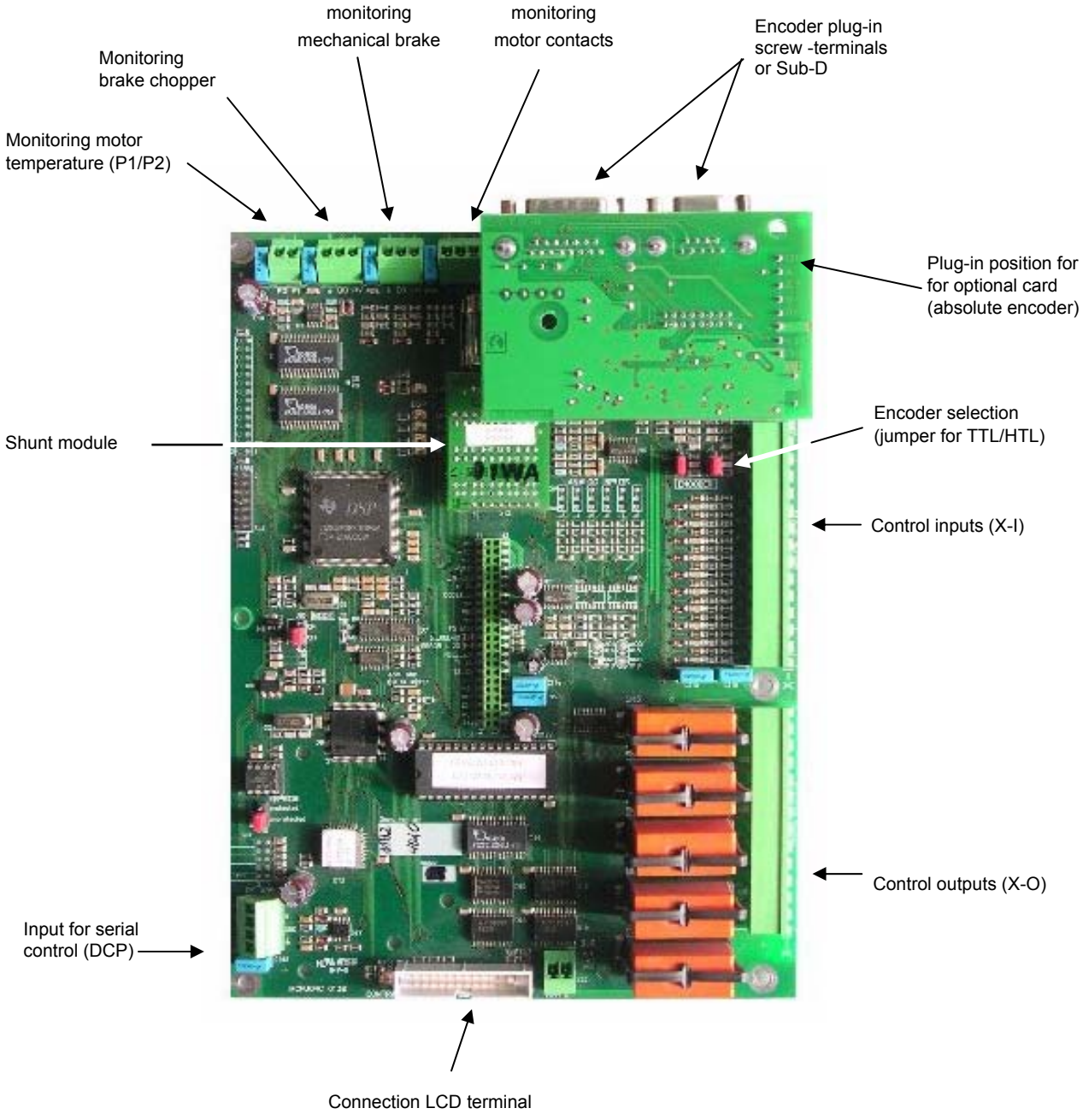


Fig. 2.17 Control section card

3 Control system and inverter functions

The functional equipment of the ZETADYN 2xx inverter allows to adapt it to a very wide range of applications. In the following we give a short description of the factory pre-setting.
Section 3.1 describes the general control system of the inverter.
Section 3.2 gives a detailed description of the function of individual items of equipment.

Overview: factory pre-setting

Normal travel mode:

Travel with high speed "V3" and positioning with "V1"
Travel with intermediate speed "V2" and positioning travel with "V1"

In both cases, the decelerating distance is controlled dependent on distance, i.e. when the travel command "V3" or "V2" is switched off, the distance covered during deceleration is always the same, irrespective of the actual speed (arch travel).
Requirement: distance dependency must be switched on.(S_ABH)

Adjustment:

Adjustment option with speed "VZ".

The adjustment speed has priority over other speeds. This means that when the adjustment speed is selected, the lift cannot travel faster, even if a higher speed is selected.

Manual and service operation:

In addition, three speeds "V_ZE1", "V_ZE2" and "V_ZE3" are available which are not controlled distance-dependent.

Example:
V_ZE1 return
V_ZE2 inspection
V_ZE3 fast inspection speed

Output: Controller operation - "SK_1" (RB contactor)

The inverter switches the contactors of the motor via the "SK1" output.

Output: Mechanical brake - "MB"

The inverter switches the contactor for the mechanical brake via the "MB" output.

Monitoring functions:

Checking the speed of travel (0.3m/s) via output "SK_2".
Checking the maximum speed via "SK_3".

Additional functions:

The inputs "ZE_1", "ZE_2" and "ZE_3" and the outputs "SK_1", "SK_2" and "SK_3“can be programmed with special functions.

Examples:
- Changing over between two completely separate parameter sets.
- Switching over for emergency evacuation (battery operation or standby-generator)

Fault message:

The controller signals a fault via the "ST" output.

The following functions are monitored:

- brake chopper / braking resistance
- mains failure
- rotating field
- short circuit of the motor windings
- link circuit over voltage
- link circuit under voltage
- heat sink over temperature
- motor temperature
- function of the encoder / defect cable of the encoder
- start-up monitoring
- parameter setting
- deceleration monitoring
- speed monitoring
- overload

3.1 Control of the inverter

3.1.1 Control via inputs and outputs

Figure 3.1 shows a simple journey between two stops, referred to as *NORMAL TRAVEL*. Please ensure that the circuit layout shown in the Appendix A10 / A11 is complied with.

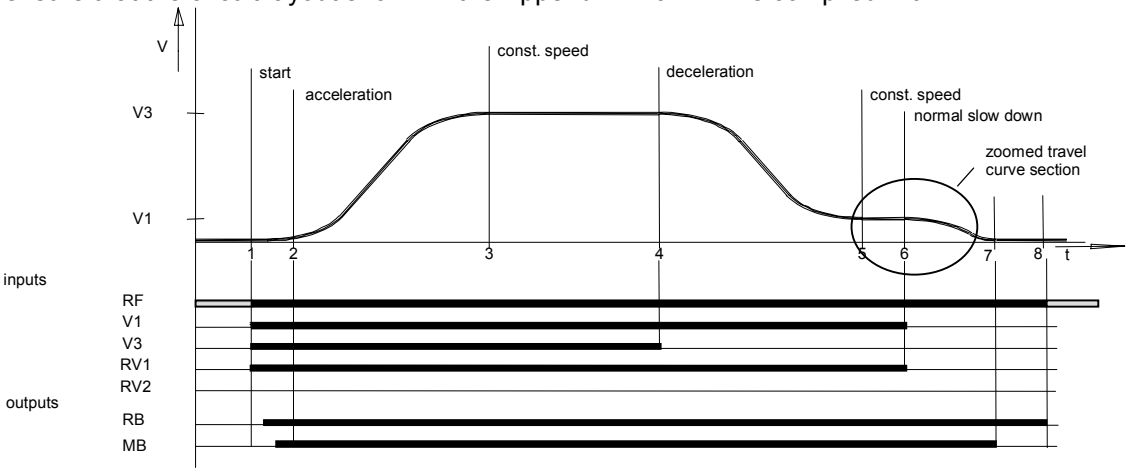


Fig. 3.1 Normal travel

(1) The supervisory control system sets the direction of travel via the inputs "RV1/RV2" and selects the inputs for the speed of travel (in this case "V1" and "V3"). The inverter clearance "RF" can already be applied. It is also possible to connect this together with the direction and the speed signals.
The inverter indicates that the input signals were accepted and that it is ready for a new journey via the "Controller operation -RB" output. When the "RB" output is operated, the motor isolating contactors must be closed.. When the "Mechanical brake -MB" output is operated the control system must release the brake immediately.
(2) The drive accelerates until the preset speed is reached.
(3) This is followed by travel at a constant speed until the selection of high speed ("V3") is cleared.
(4) The drive decelerates to the positioning speed "V_1".
(5) After a short distance covered, the positioning speed is switched off.
(6) The drive continues to decelerate.
(7) When speed 0 is reached, the inverter switches off the "MB" output . The lift control system must apply the brake immediately.
(8) The motor contactors must be closed until the contact "RB" is switched off.

The **electromagnetic brake** must be switched on and off by means of the **"MB" relay** without delay. This is the only way to ensure that the inverter can control starting and stopping without any jerking.

The **motor contactors** must be switched on and off by means of the **"RB" relay** without delay. This is the only way to ensure that starting and stopping is possible without any jerking.

When a **fault** occurs (the **"ST" relay** drops off), the lift control system must ensure that the mechanical brake and the motor contactors are immediately switched off. The control system allows RB and MB to drop off on a fault condition.

3.1.2 Control with DCP

The DCP interface offers serial control of the ZETADYN 2CF and ZETADYN 2SY inverters via an RS485 interface. Control inputs and outputs are managed by the bi-directional serial control via a two-wire or three-wire connection. Wiring costs are thus reduced to a minimum.

3.1.2.1 Elevator control without absolute encoder (DCP_01 /_03)

The principle of operation of the serial control is similar to a conventional control via the control inputs (terminals X-I) and the control outputs (terminals X-O)
The lift control transmits the necessary control signals (B0 to B6) to the inverter and receives status messages (S0 to S6) of the frequency converter as return information.

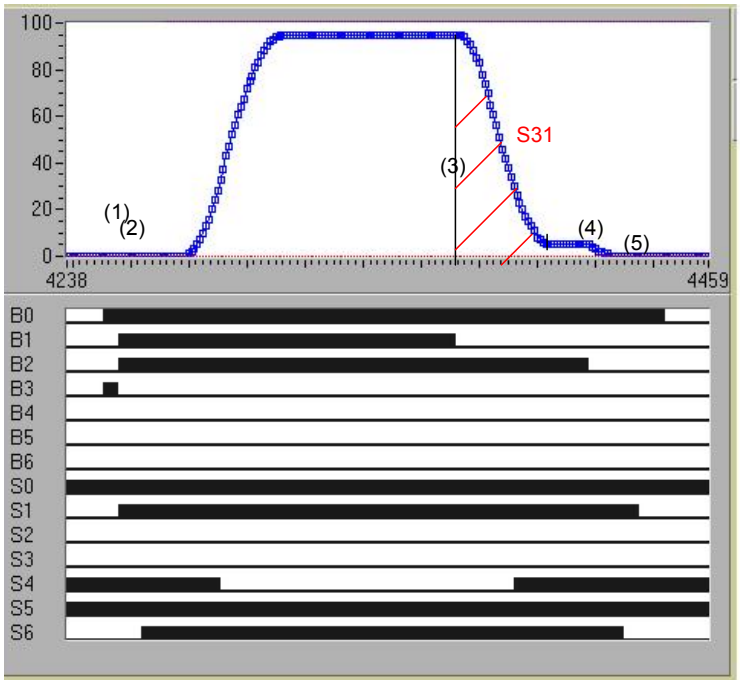


Fig. 3.2 Travel with DCP03

Command byte		**Status byte**	
B0	Inverter clearance (RF)	S0	Inverter ready for next journey
B1	Travel command (Start)	S1	Travel active (RB)
B2	Stop switch (Switch off V_1)	S2	Early warning active
B3	Speed of travel	S3	Common fault active (ST)
B4	Direction of travel (RV1 or RV2)	S4	Speed monitoring (interface / V_G1)
B5	Speed change	S5	Distance set point /speed accepted
B6	Remaining distance telegram	S6	Mechanical brake (MB)
B7	Error in the last telegram	S7	Error in the last telegram from 2CF

Speed preset byte	
G0	Slow speed (V1)
G1	Adjustment speed (Vz)
G2	Speed 0
G3	Return (V_ZE2)
G4	Inspection (V_ZE1)
G5	Reserved
G6	Intermediate speed (V2)
G7	High speed (V3)

3.1.2.2 Elevator control with absolute encoder (DCP04)

On a start command, the control system presets a distance remaining to the next floor for the frequency inverter. The distance remaining is constantly updated during the journey. If there is no call for this floor before the required deceleration distance at the latest, the distance remaining is again extended by one floor.
The course of travel from acceleration through constant speed to deceleration is determined by the inverter.

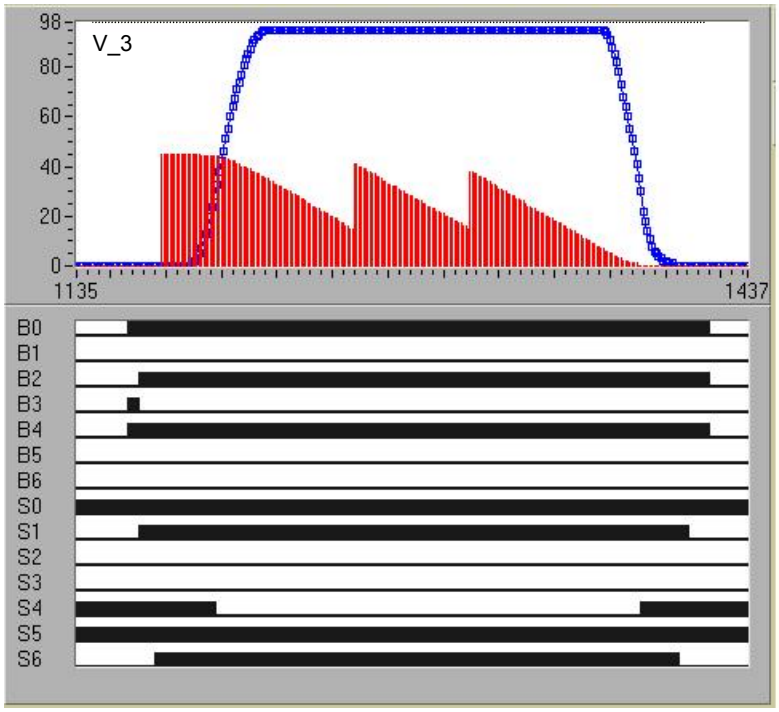


Fig. 3.3 DCP04

Command byte		**Status byte**	
B0	Inverter clearance (RF)	S0	Inverter ready for next journey
B1	Travel command (Start)	S1	Travel active(RB)
B2	Stop switch (Switch off V_1)	S2	Early warning active
B3	Speed	S3	Common fault active (ST)
B4	Direction of travel (RV1 or RV2)	S4	Speed monitoring (interface/V_G1)
B5	Speed change	S5	Distance set point /speed accepted
B6	Remaining distance transmission	S6	Mechanical brake (MB)
B7	Error in the last telegram	S7	Error in the last telegram

Speed preset byte	
G0	Slow speed (V1)
G1	Adjusting speed (Vz)
G2	Speed 0
G3	Return (V_ZE2)
G4	Inspection (V_ZE1)
G5	Reserved
G6	Intermediate speed (V2)
G7	High speed (V3)

3.2 Description of individual inverter functions

3.2.1 Switching on and off

When the power supply is switched on, the inverter carries out a self-test. When the link circuit is fully charged (**approx 8sec**), the output relay "ST" is actuated. The inverter ignores the state of the control inputs until this point.

When the power supply to the inverter is switched off, the relay outputs open immediately and the inverter isolates the power semiconductors.
The supervisory control system must apply the mechanical brake and open the motor contactors. If the inverter is switched off whilst the lift is in motion, the drive is decelerated by the braking torque of the electromechanical brake.

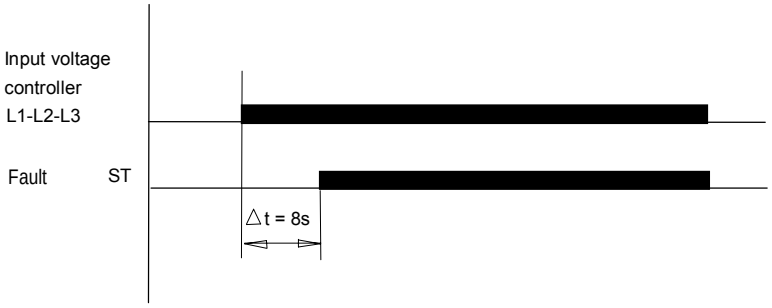


Fig. 3.4 Controller switch-on and switch-off

3.2.2 Start and acceleration

(1) The supervisory control system activates the inputs "Speed of travel - V_" together with a "Direction setting - RV_". The controller closes the controller operation relay "RB" and the mechanical brake relay "MB".

(2) The supervisory control system releases the electromagnetic brake. The controller accelerates up to the highest selected speed in accordance with the set acceleration with rounded transitions.

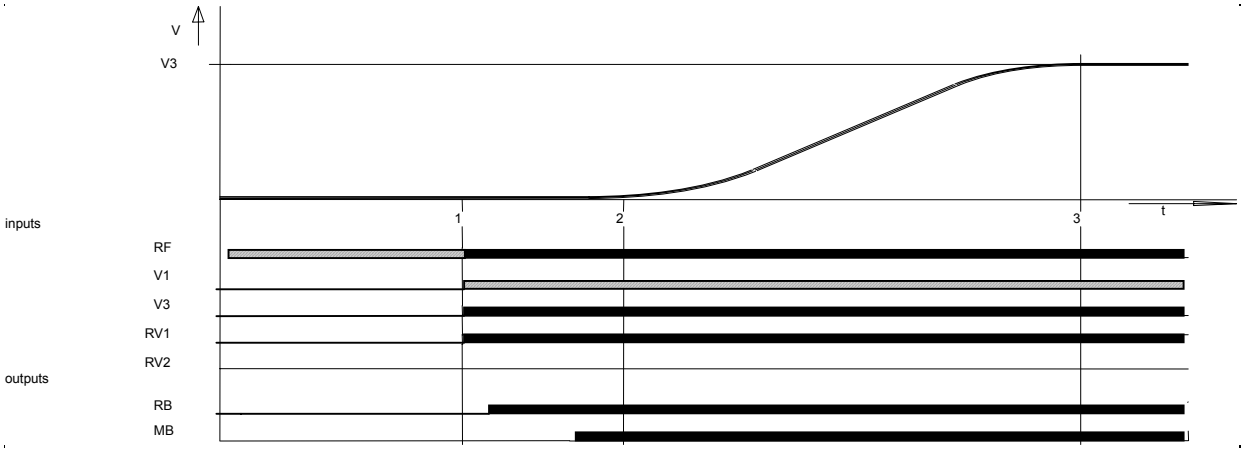


Fig. 3.5 Start and acceleration

3.2.3 Quick start / speed 0

With the “Close door” command the motor is already energised and the mechanical brake released. The drive holds speed 0. The journey starts after the door is closed.

We must emphasise that the quick start function can only be used in the door zone range on lift installations with an adjustment feature. The requirements of EN81 must be observed.

3.3 Control

a) Parallel

The additional input ZE_2 must be programmed for the function "SPEED 0".

"SPEED 0" with ZE2 as well as enable (RF) and direction are selected. The motor is energised and the mechanical brake MB is released. Further travel commands will be ignored.
After "SPEED 0" is switched off, the journey starts, provided that the speed commands are already present.
The speed commands must be present within 150msec after "SPEED 0" is switched off.

The control system must only request speeds (V1, V3) after "SPEED 0" is switched off.
.

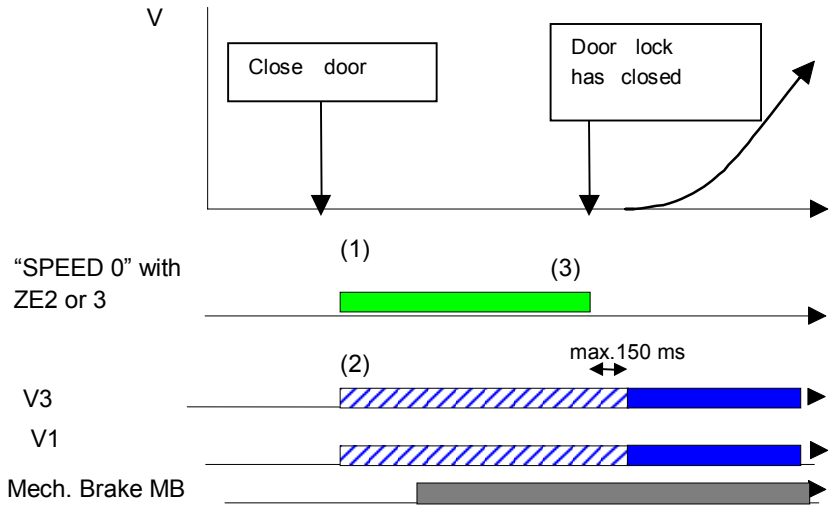


Fig. 3.6

If, following the "Close door" command, there is an interruption in the photoelectric barrier or the door pressure strip is operated, and consequently the "Open door" action is initiated, the control system must switch off ZE_2 and other travel commands.

b) via DCP-protocol

(1) With the "Close door“ command, the control system sends one or more ”speed pre-set“ telegrams with which the G2 bit is set, until the door lock is closed.
All other speed pre-set bits set are ignored.

(2) When the stop switch bit B2 and / or the travel command bit B1 are set, the drive is energised (magnetised) and the brake is released via MB. The drive maintains speed 0.

(3) The journey starts immediately if a speed preset telegram is sent, in which the G2-bit is cleared and another speed bit is set at the same time.

The maximum changeover time from clearing G2 and setting a new speed is 150msec.

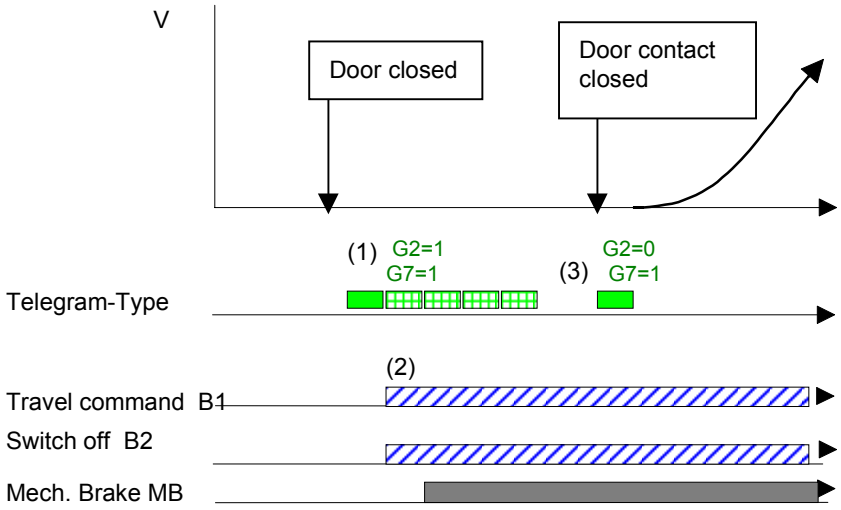


Figure 3.7 Normal travelling

2CF-monitoring functions:

a) If the G2 bit is set for more than 20 seconds, the inerter switches off with the error message **59 "Quick start >20s?"**.
b) If the G2 bit is set during the journey, the inverter carries out a quick stop.
c) Monitoring time of the encoder T_EMON only starts after the G2 bit is switched off.

If the drive moves by more than +/- 7 mm at speed 0, the drive is switched off with the error message **27 "Travel with v=0 ?"**.

Quick start cancel: If, following the "Close door" command, there is an interruption in the photoelectric barrier or the door pressure strip is operated, and consequently the "Open door" action is initiated, the controller must switch off:

the travel command bit	B1,
the stop switch bit	B2 and
the converter clearance	S0.

3.3.2 Distance-dependent deceleration - ARCH travel

The distance-dependent deceleration during deceleration travel is carried out by the travel commands V3 or V2 to the positioning speed V1.
For this, the parameter **/DECELERATION/S_ABH** has to be **ON** (factory setting).
With all other changeovers between speed presets the travel curve is implemented as a time-dependent function.

Advantages:
The distance-dependent deceleration offers advantages if the final speed (V3 or V2) cannot be reached on journeys between floors which are close together.
In such a case, the controller carries out an arch travel.
The controller ensures a constant crawling distance and the shortest possible backlash time (see comparison in Fig 3.8) **independently of the speed achieved at the decelerating point (4)**..

Method of operation:
If the final speed set (Figure 3.8) has not been reached at the decelerating point (4), the drive continues to accelerate.
The inverter determines the point X from which the deceleration has to be initiated in order to reach the stop with the positioning speed V1. Now the inverter rounds off the running curve and decelerates by means of the set deceleration A_NEG .

Because of that, with ARCH TRAVEL and NORMAL TRAVEL, the decelerating distances S_31(4 -> 5) and the positioning distance s_1 (5 ->6) are the same.

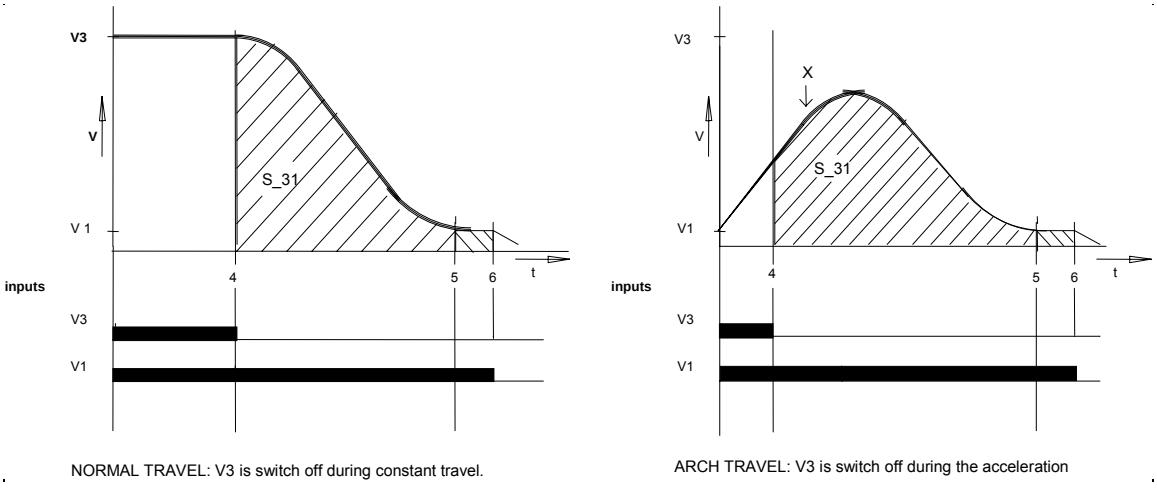


Figure 3.8 Comparison normal travel and arch travel

Control:

The elevator control system must send the travel command V1 prior to the removal of the travel command V3 (or V2).

When speed V-3 is switched off momentary, the inverter decelerates to the lowest selected speed (e.g.: V1)
The inverter does not accelerate if V_3 is now requested again. This is only possible after removal of the positioning speed and a new travel command request.

3.3.3 Distance-delayed switch-off of "V3", "V2" and "V1" Crawling distance optimisation, direct approach

ZETADYN 2CF inverters are designed for drives demanding high positioning accuracy.

It is possible to optimise the crawling distances without additional outlay, that they are comparable with a direct approach,.

Why optimise the crawling distances?

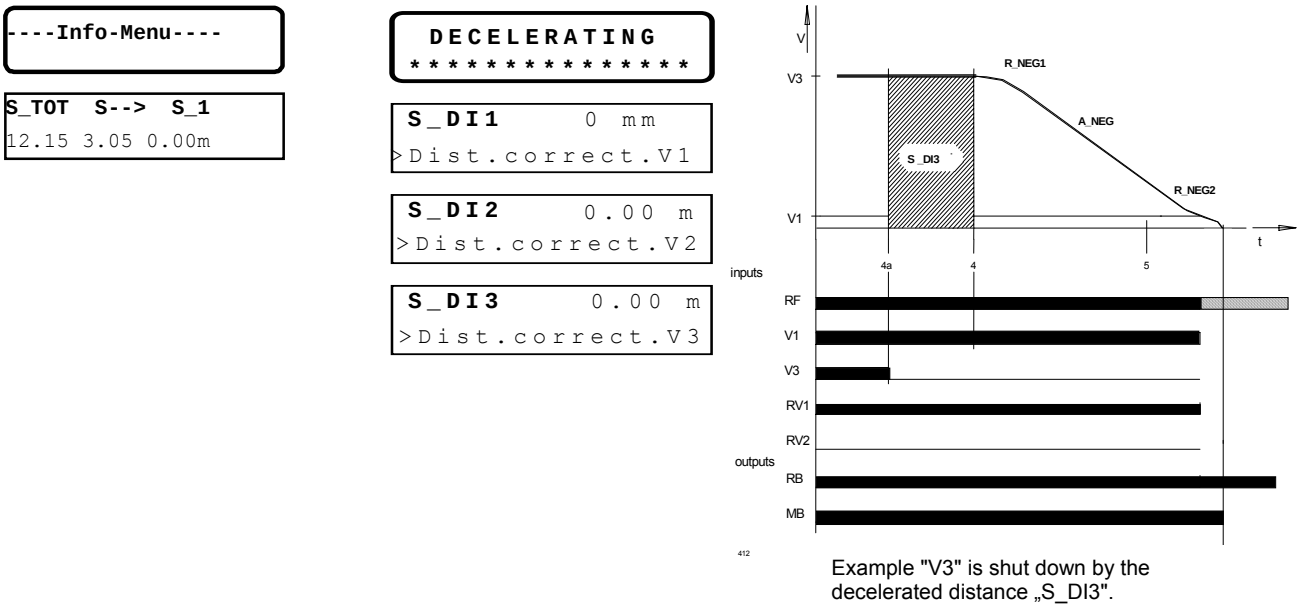
- To increase the carrying capacity by reducing the crawl travel.
- Passenger protection for lifts with early-opening doors.
  The lift is almost flush with the floor level when the doors start to open. A shorter crawling distance in the region of the door zones lowers the risk of tripping over a step.

Requirements for an optimisation of the crawling distance:

- No delay times or dead times in the lift control system
- Lift systems with digital shaft reproductions or magnets.

If the switch-off points are generated from a digital shaft reproduction, the crawling distance can be reduced to 1 to 2 cm. With these crawling distances, the passenger does not notice any difference between this approach and a direct approach.

If the crawling distances are equal for all floors with the speed V2 and V3 respectively (check in menu "Info" / S_1), then the crawling distance can be reduced in the menu "Decelerate“ / S_DI2 and S_DI3 respectively.



Example "V3" is shut down by the decelerated distance „S_DI3".

Fig. 3.9:

Parameter description

S_DI1 / S_DI2 / S_DI3
Distances for delayed switch-off of speeds "V1", "V2" and "V3" by the inverter.

3.3.4 Time-dependent deceleration

With the exception of the deceleration transitions from "V3" to "V1" and "V2" to "V1", all other speed transitions are controlled as time-dependent functions.

After the current speed setting is switched off, the controller decelerates in time-dependent mode to the highest speed still selected, according to the set deceleration curve with rounded transitions.

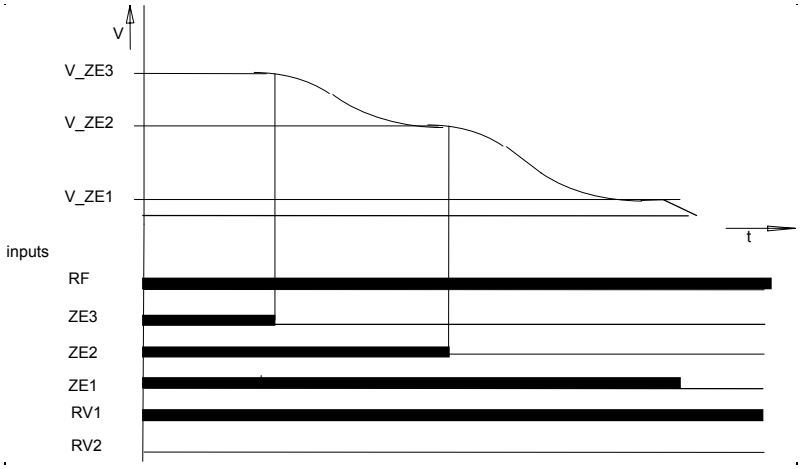


Figure 3.10 Control DECELERATION (Example manual control with V_ZE1, V_ZE2 and V_ZE3)

3.3.5 Normal stop

The supervisory control system no longer selects the "V_x" speed input or the "RV_x" direction setting input. The inverter decelerates down to a standstill in accordance with the set deceleration /DECELERATING/A_NEG with rounded transitions. When speed 0 is reached, the controller opens the "mechanical brake - MB" output relay, so that the electromagnetic brake drops. The controller isolates the power semiconductors and opens the "Controller ready - RB" output relay.

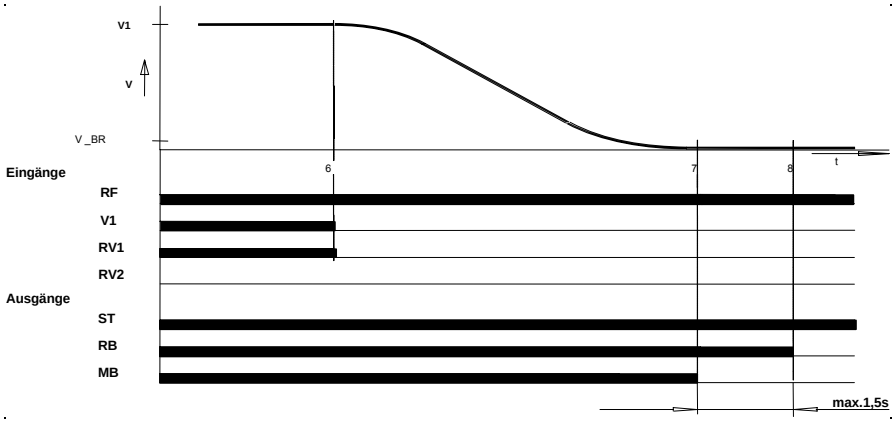


Figure 3.11 Controlling NORMAL STOP showing control signals against time

3.3.6 Adjustment

To adjust for the correction of the elongation of the suspension cables when the lift car is released, the travel command "V_Z" is selected.

In order to avoid oscillations, the lift control system must wait for a suitable time until the cables come to rest.

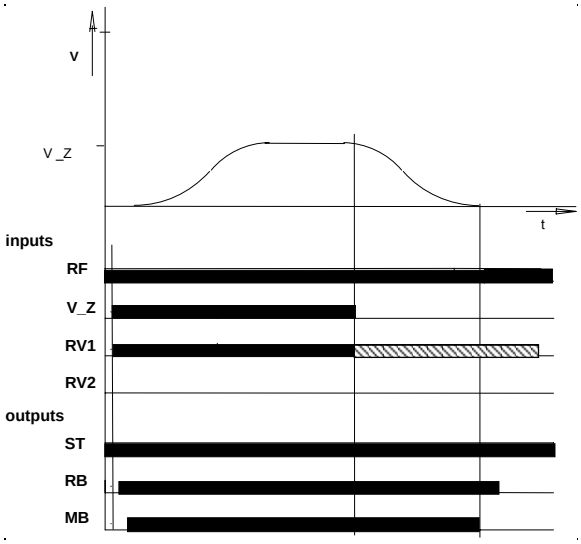


Figure 3.12 Adjustment with the "V_Z" input

3.3.7 Fault

The controller monitors

- mains voltage (phase failure)
- heat sink temperature
- motor start
- short circuit
- link circuit under voltage
- rotating field
- brake chopper temperature
- motor direction of rotation
- link circuit current
- speed
- encoder signals
- motor temperature
- link circuit overvoltage

The current travel program will be cancelled if the inverter detects a fault. The inverter isolates the power semiconductors. The output relays "MB -mechanical brake" and "ST - Fault" switch off immediately.
The main control system must apply the electromagnetic brake and open the motor contactors. If a fault occurs which makes it necessary to isolate the power section from the power supply (e.g. brake chopper over temperature), an internal shutdown of the input rectifier takes place immediately.
If a fault occurs during a journey, the drive decelerates because of the braking torque of the electromechanical brake.

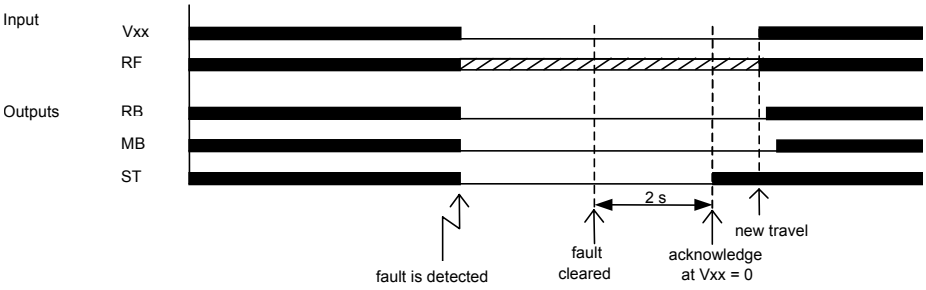


Figure 3.13 Effect of fault and acknowledgement

Acknowledgement

The acknowledgement of the inverter fault (ST relay picks up) occurs two seconds after the cause of the fault is cleared. The acknowledgement is conditional on the removal of all selected speeds (Vxx). If speed Vxx is requested again before the two seconds have elapsed, no acknowledgement occurs.

Exceptions to this type of acknowledgement:

- With error 91 (BC alarm) the inverter must be switched off and then on again to acknowledge the error.
- With error 20 (wrong direction) and error 8 (no encoder pulse), RF and Vxx must be removed (the same condition also applies here: if Vxx and RF are requested again before the two seconds have elapsed, no acknowledgement occurs)

These errors cannot simply be acknowledged from the keypad of the operator terminal.

 Individual controller monitoring functions can be switched off in /ZA_INTERN/MASK1 to MASK5
(described in Section 4.3.12).

3.4 For safe operation of the controller

Basically, electronic equipment is not fail-safe. The user is responsible for ensuring that the drive is conveyed to a safe condition in the case of controller failure. It is essential to observe the following instructions:

 The **electromagnetic brake** must be switched on and off immediately by the **"MB" relay**. This is the only way to ensure that the inverter can control starting and stopping without any jerking.

 The **motor contactors** must be switched on and off immediately by the **"RB" relay**. This is the only way to ensure that starting and stopping is possible without any jerking.

 When a **fault** occurs (the **"ST" relay** drops off) the lift control system must ensure that the mechanical brake and the motor contactors are switched off immediately.

The link circuit capacitors can still be charged up**, which is dangerous to life for up to 5 minutes after switch-off.**

4 Control and setting options

The user can easily adapt the inverter to the service requirements. Four communication concepts are available for the simplest possible commissioning and control:

1. Control via the keypad and the LCD display with simple text dialog.

2. Remote control via the keypad and the LCD display with the RCP1 remote control kit.

3. Remote control from a PC with ZETAMON for Windows software (available as an accessory).

4. Remote control via the lift control system if this supports the DCP protocol.

The parameter menu structure has a uniform arrangement for all communication methods.
The parameters set can be protected against unintentional or unauthorised change by means of a **password** (number in the range 1 to 9999).

Parameters may only be changed when the drive is stationary.

4.1 Control via keypad and LCD display

Using the LCD and keypad directly at the inverter, the operator can:
- set all the parameters required for commissioning
- perform simple measuring and control functions and
- record the operating conditions.

If the inverter is mounted in the lift shaft, the display can removed and mounted in the control panel using the RCP01 remote control kit.

Operation is very simple, by means of the three keys. The parameters available are sub-divided into menus according to correlation.
The current operating conditions can be displayed via a further key (Info).

Menus are selected using the arrow keys (see Fig. 4.1).
By pressing the [P] key, you change to the parameters assigned to the menu.
A parameter is selected using the arrow keys.
By pressing the [P] key, the parameters can be changed using the arrow keys.
By pressing the [P] key, you return to the parameter selection.
By pressing the key [↓] and [↑] keys at the same time, you return to the menu selection.

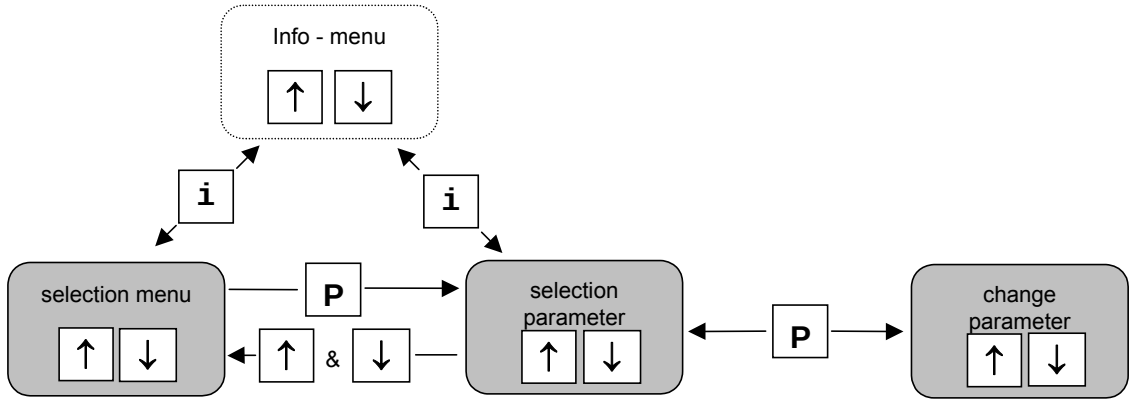


Figure 4.1 Function of the keys

There are two ways of changing the parameters and two types of display:

V_3 1.20 m/s > Travel speed	Set by entering a numerical value (here: 1.20 m/s)
RS232 ZETAMON > RS232 function	Set by selecting from given options (here: RS232 function)
RF:RV12:V123:VZ ● ● ●	Display using luminous spot representation
N_REAL 1200 min^{-1} ▮▮▮▮▮▮▮▮▮▮▮▮	Display using "bargraph" and numerical value representation

Figure 4.2 Examples

Example of setting the parameters

Speed V-3 is to be changed in the /TRAVEL menu (see figure 4.3).

1. After the control section card is powered up, the switch-on message :"ZIEHL-ABEGG – ZETADYN 2CF"and "ZIEHL-ABEGG – ZETADYN 2SY" respectively appears after a short self-test

2. Press any key; the first menu, the *MONITOR* menu appears in the display.

3. Press the [↓] key to scroll to the *TRAVEL* menu.

4. Activate the list of parameters by pressing the (P) key. The first parameter V_1 will appear in the display.

5. Press the [↓] key to scroll to parameter V_3.

6. Press the [P] key to activate the setting field. An arrow will flash on the left, in the second line. The lower comments line is replaced by the setting field. If this changeover does not occur, the input is already protected by a password (see Section 4.3.11).

7. The value can be changed using the [↓] or [↑] keys.

8. Confirm the value in the setting field by pressing the [P].key The set value changes to the top of the display. The new value is accepted. The arrow stops flashing and the parameter explanation reappears in the second line.

9. Press the [↓] and [↑] keys <u>at the same time</u>; the *TRAVEL* menu reappears in the display.

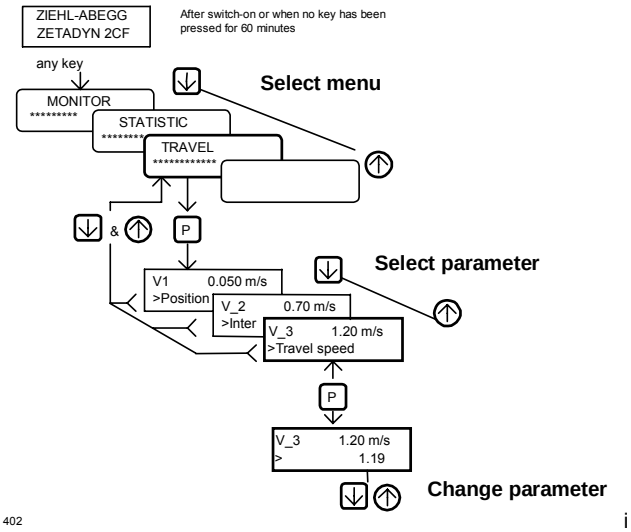


Fig. 4.3 Example for parameterisation

4.1.1 The APC function (Automatic Parameter Control)

APC is the abbreviation for Automatic Parameter Control.
APC checks the plausibility of the values entered for individual parameters.

The **APC** function should prevent incorrect entry. The user must confirm the message with OK (Info key)

- APC limits entries (**L**imit), example:

I_NENN 23.0 A > 40.0	Entry of a nominal motor current value I_NOM = 40 A with a 23A controller
Limit I_NENN L004 [OK]	The warning message Limit I_NOM appears because the motor current is too high for the controller value; the message must be confirmed with [OK] = Info key.
I_NENN 28.7 A * Nom. motor current	After confirming with [OK] I_NOM is limited to 28.7 A.

- APC sets parameter (**S**et), example:

CO ON > OFF	The contactor monitoring function INTERFACE \ CO is switched off
Set T_CO off S001: [OK]	The warning message Set T_CO off appears; when this is confirmed with [OK] = Info key, the parameter ZA-INTERN \ T_CO is set to "0.0 ms" (Motor contactor break time)
CO OFF Contactor monitoring	After confirming with [OK] the contactor monitoring function is OFF
T_CO 0.0 ms Mot.cont. break	The motor contactor break time T_CO in the ZA-INTERN \ menu is set to "0.0 ms".

- the function APC checks all the setted parameters and changes (**U**pdate, only if one parameter is not setted or is wrong setted)

The APC function can be set to OFF in the ZA_INTERN menu; the factory setting is ON.

Particular APC-functions cold get masked in the menueZA-INTERN \ MASKxx

Set – function with: Error number Sxxx + 1000 set into desired error mask
(e.g. S001 Set T_CO off ➔ set 1001 in desired MASK)

Limit – Funktion: Error number Lxxx + 2000 set into desired error mask
(e.g. L004 Limit I_NENN ➔ set 2004 in desired MASK)

The **APC** function should only be switched off after consulting the Ziehl-Abegg Hotline

4.2 *ZETAMON* software for Windows

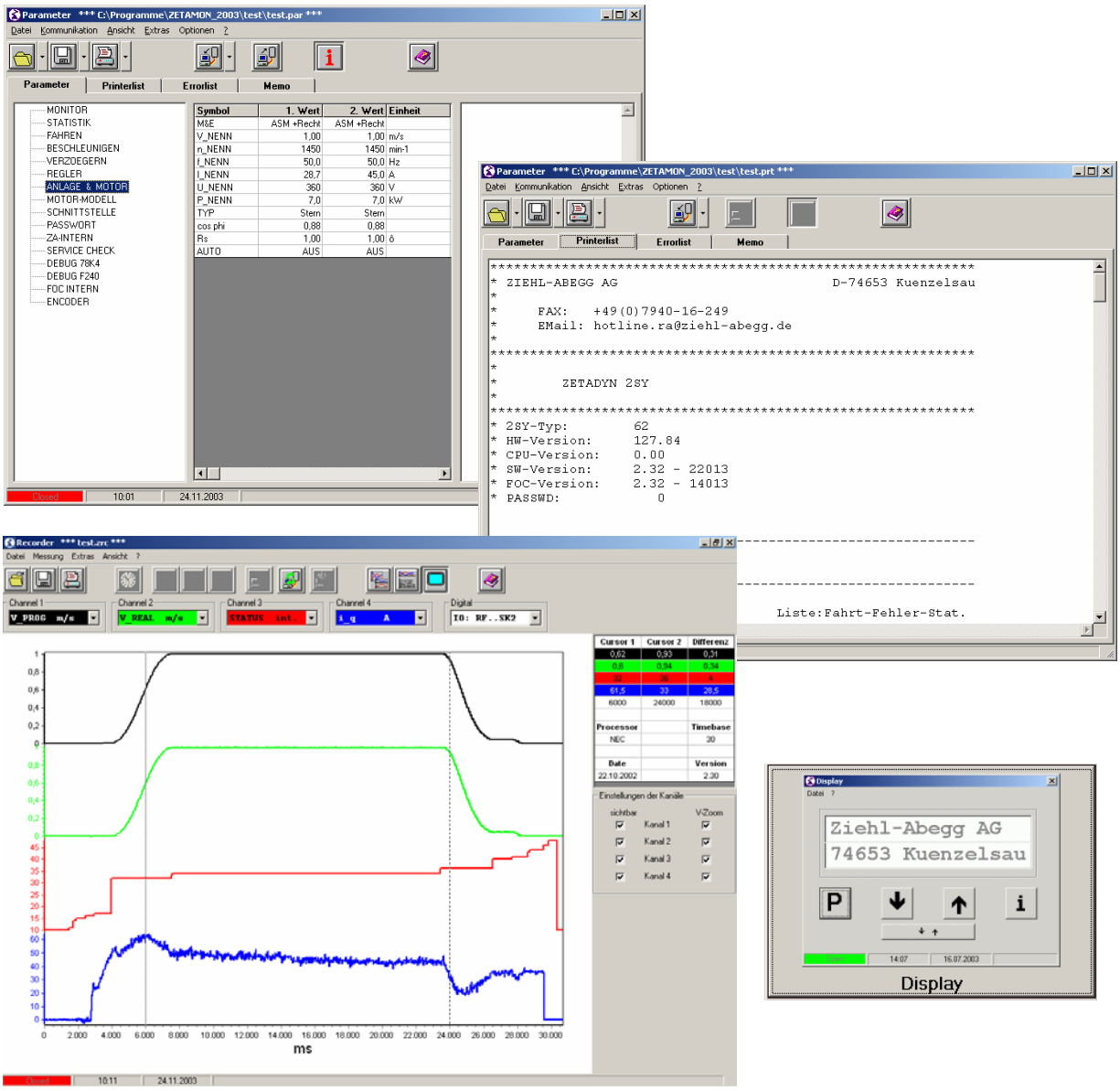
The ZIEHL-ABEGG *ZETAMON* software, the operator has the ability to:

- set parameters,
- commission the drive,
- evaluate, save and copy travel diagrams and data sets, and
- take measurements of travel curves and control signals.

The software *ZETAMON* for Windows is available as accessory.

System requirements:

- Windows 95/98/NT4/ME/2000/XP
- Pentium 133 / 32 MB RAM
- 800x600 / at least 256 colours
- ZETAMON-transmitting line
- Serial interface RS232 (or USB-adaptor to RS232-serial)

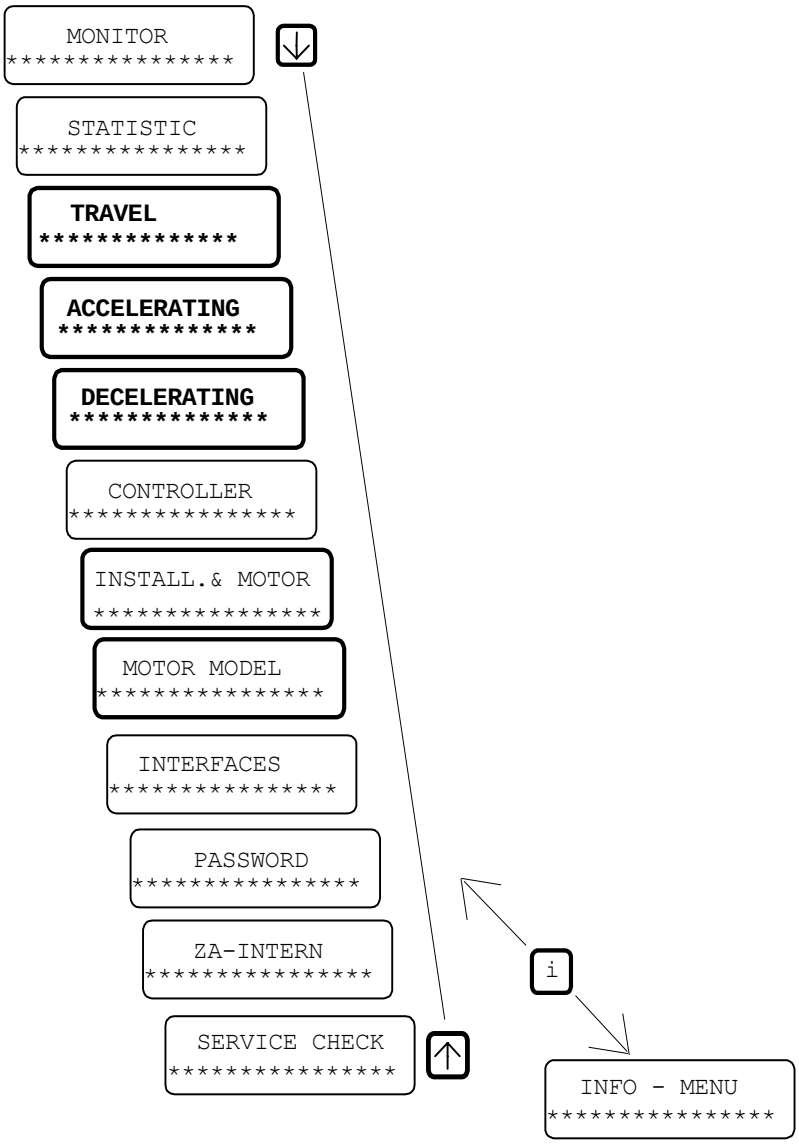


4.3 Overview of parameters

The parameters are subdivided into menus (see Fig. 4.4). **For commissioning the the five highlighted menus are important..**

With other manufacturer's motors, the motor rating plate data, the encoder offset (only with ZETADYN 2SY for synchronous motors) and installation data must be entered in the **"INSTALLATION & MOTOR"** menu. If the AUTO parameter is selected in this menu, the parameters are preset according to the installation data and the **MOTOR MODEL** menu.

This data are preset with motors supplied by Ziehl-Abegg.



Display: actual state of the inputs and outputs,
actual and desired speed

Display: Statistical reports and error list management

Input: Travel speeds

Input: Acceleration ramp and start behaviour

Input: Deceleration ramp and braking behaviour

If required: control action of the speed controller

One off entry prior to the first travel
Installation and motor data

One off auto calculation prior to the first travel
Motor data for field orientation

If required: change of the factory settings of inputs and outputs, as well as encoder resolution

If required: option of allocating a password If required:

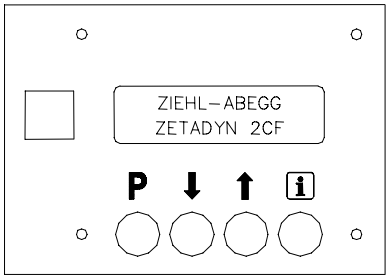
Reserved for special applications

I

nfo. menu for display of values

Figure 4.4 Menu overview

4.3.1 The "Info" menu



The information menu can be accessed by pushing the control key.
The "Info"menu the displays the most important measure- and display values of the inverter.
This also serves as a further aid during commissioning, servicing and troubleshooting.

----- INFO ----- **ID:12345678/0001**	Indication of the serial number of the inverter
S_GES S--> S_1 12.0 2.05 0.01m	Display of the total distance travelled, the deceleration distance from switching off high speed until reaching V_1, the measured travel distance at constant speed V1
RF.RV1.V1....V3 ST.RB.MB.....	Display of the actual inputs and outputs
N_SOLL N_IST 1451 1450	Display of desired and actual speed
S I U + 12% 8.5A 353V	Display of slip, motor current and motor voltage
Temp f_PWM U_dc *42C 8.0k 540V	Display of the temperature of the power section (* → fan = ON), indicates the actual PWM frequency, and display of the link circuit voltage
V_NEN V_3 GEBER 1.00 1.00 1024	Display of nominal and travelling speed, as well as encoder resolution
Type4: SW: FOC: 2CF74 2.45 2.01	Display of the controller size and software version
Status: RV1 0.00m 5- 6- 10-12-> 10	Display of the controller status (region of travel curve, see also Appendix A5). Display of the travel direction and the position of the car. (reference point for the extended error memory, refer also to the STATISTIC menu)
0.0kWps 0.0kW + 0% 0.0A 0V	Display of thereal power [P] and apparent power]S] Display of the slip, motor current and motor voltage
--- INFO-END --- [ESC]	End of the "Info" menu; additional menu items apply with control via DCP protocol (see technical information TIA99_77) or with a synchronous motor.

4.3.2 The "MONITOR" menu "

Contents: The "Monitor" menu displays the status of the control inputs and outputs. An active signal is displayed by a "luminous spot". In addition, values of desired speed and actual speed, the inverter outputs and measured values are displayed.

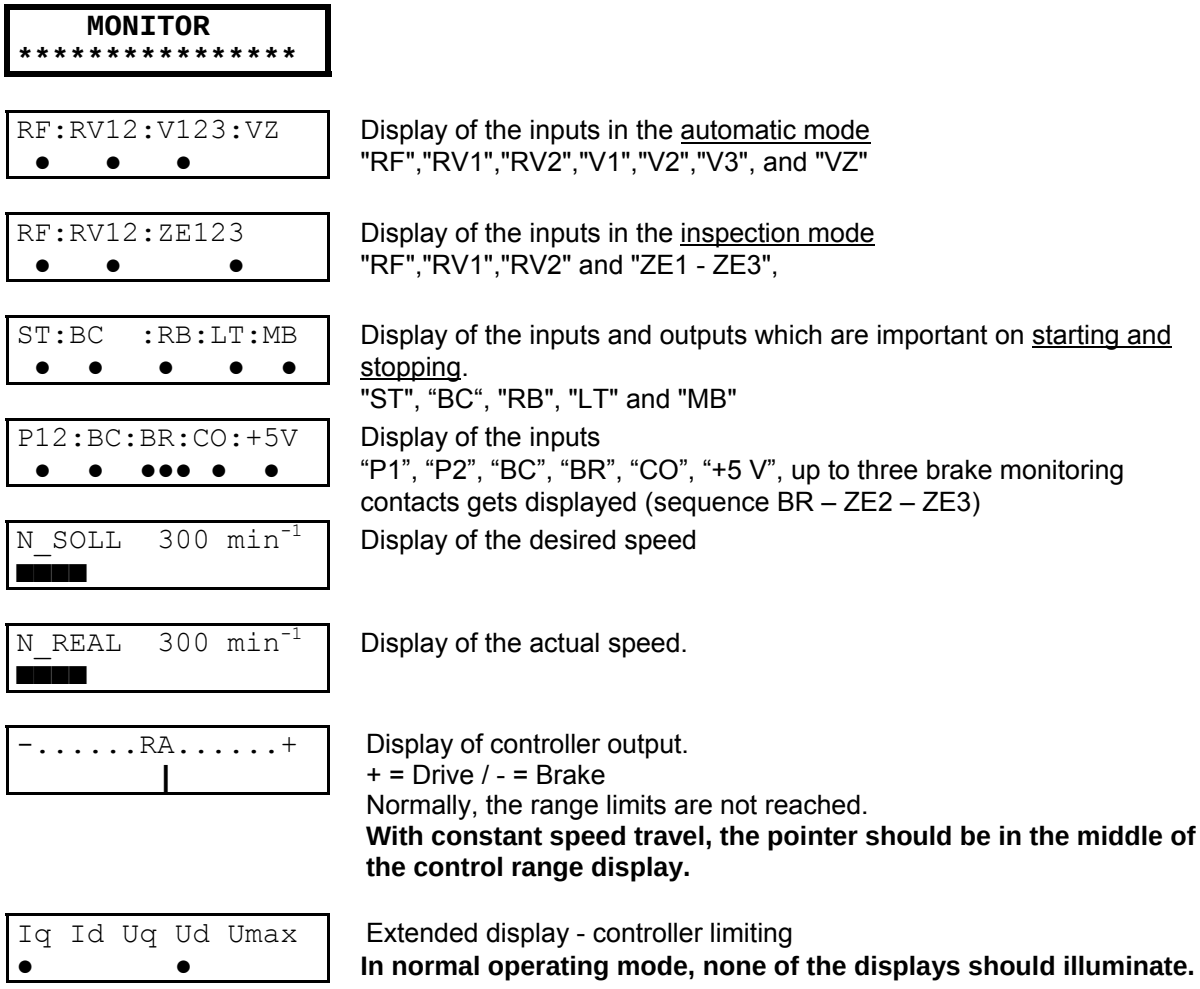


Fig. 4.5 "Monitor" menu

4.3.3 The "STATISTICS" menu

Contents: The "Statistics" menu is used to display statistical data and for error list management. The data are retained when the controller is switched off.

STATISTIC **********	
STAT0 Error list:...	Error list
STAT1 0000308h Operating hours total	Display of the total operating hours
STAT2 0.000.759 Number of travels	Display of the number of journeys
STAT3 16 Number of phase failers	Display of supply failures
STAT4 0 Number of travel aborts	Display of journey interruptions (switch-off of RF during travel operation).
STAT5 OFF Clear errorlist	This parameter enables you to clear the error memory (STAT0, STAT3 & STAT4).

Fig. 4.6 "Statistics" menu

Information about STAT0:

The error list is accessed like a normal parameterTo scroll through the error list use the [↓] and [↑] keys.

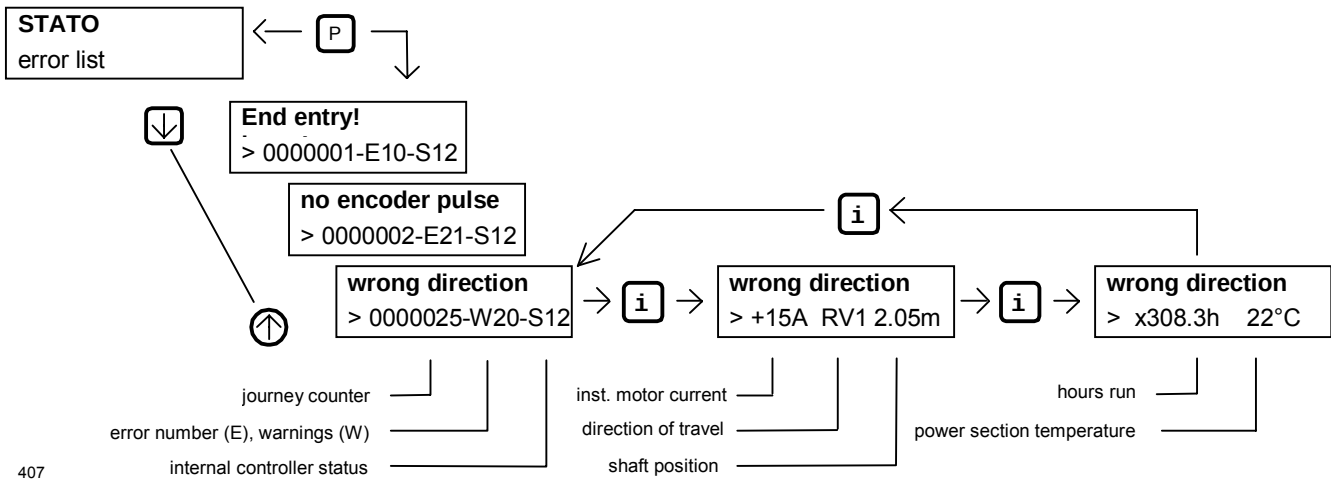
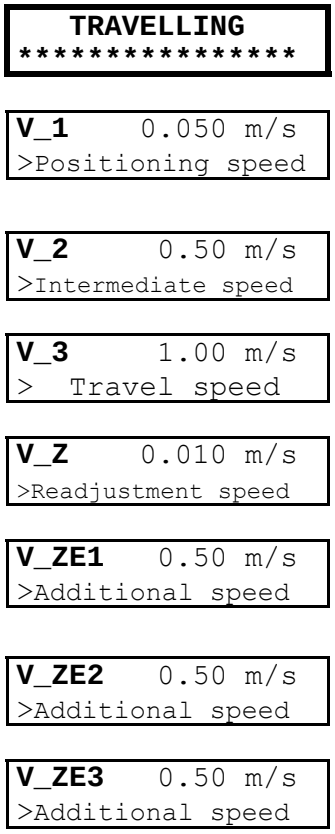


Fig. 4.7 Parameter "STAT0" error list

A total of 75 error messages are managed. If more than 75 errors occur, the oldest entries will be cleared. The most recent error is displayed first when the error list is accessed. Operating hours, error number, controller status, temperature of the power section and journey number are displayed as additional information.
A description of the entries is provided in the Appendix A4.

4.3.4 The "TRAVEL" menu

Contents: The travel speeds will be set in the "TRAVEL", menu. When entering the data following condition has to be observed: V1 < V2 < V3.



Positioning speed V_1.

If necessary, intermediate speed for normal travel mode.

High speed for normal travel mode.

With installations with adjustment, the additional speed V_Z must be used.

The speeds V_ZE1, V_ZE2 and V_ZE3 are preferably to be used for return control, inspection travel or manual control.

Fig. 4.8 "Travel" menu

The ZE_2 and ZE_3 parameters must be set in the Interface menu in accordance with V_ZE2 and V_ZE3 (factory setting V_ZE3 = OFF).

When using the serial control with DCP-protocol, the maximum speed of V_ZE1 is limited to 0,63 m/s!

4.3.5 The "ACCELERATING" menu

Contents: The acceleration ramp will be defined in the "Accelerating" menu. In addition it is possible to optimise the start-up behaviour.

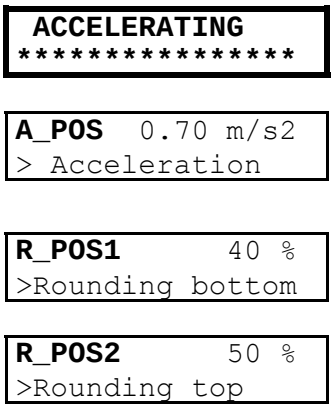


Fig. 4.9 Menu "Accelerating"

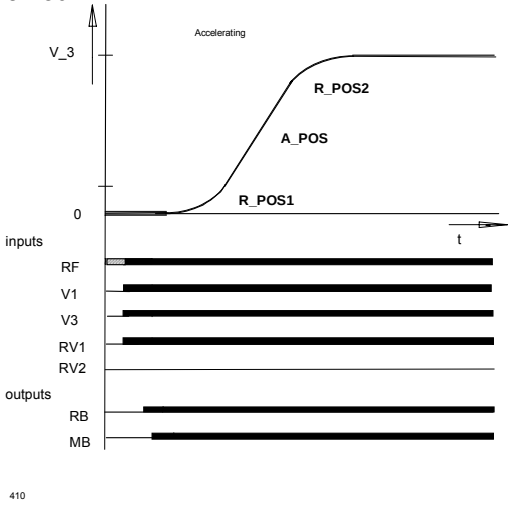


Fig. 4.10 Effect of the parameters

Description of the parameters:

A_POS Pre-setting of the positive acceleration

R_POS1 changing the upper or lower
R_POS2 roundness, if required
A higher value causes a smoother radius roundness.

To have a optimum start behaviour it is important that the motor contactor is switched by the "SK_1/RB" output.

After the motor contactor has closed, the motor is energised to build up a magnetic flux in the rotor. After the flux build-up time, the mechanical brake will be released by the output relay MB.

-> The optimisation of the start behaviour is described in detail in chapter 5 Commissioning.

4.3.6 "DECELERATING" menu

Contents: The deceleration ramp is defined in the "Deceleration" menu. In addition it is possible to optimise the positioning behaviour.

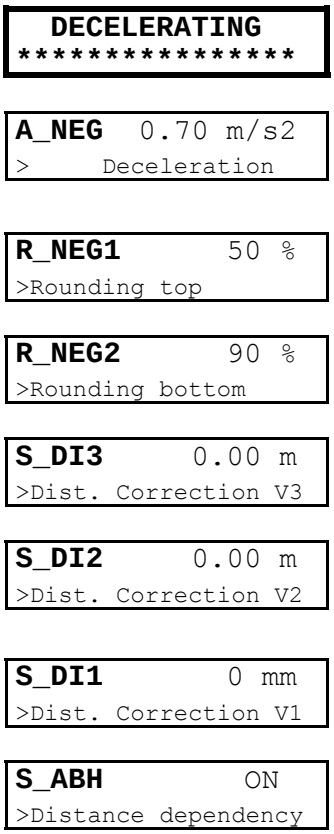


Fig. 4.11 Menu structure

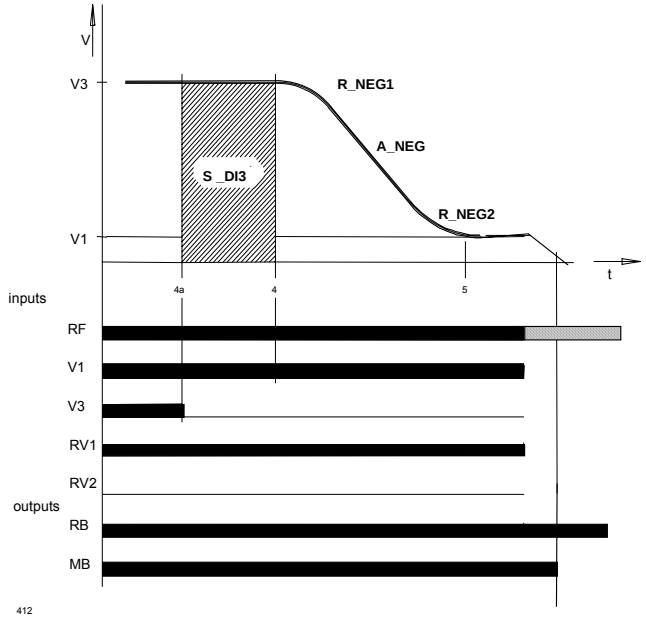


Fig. 4.12 Effect of the parameter

Description of the parameters:

A_NEG Pre-setting of the negative acceleration - deceleration.
R_NEG1 Changing the upper or lower
R_NEG2 roundness.. A higher value causes a softer roundness.

S_DI1 The travel command
S_DI2 will be switched off delayed
S_DI3 depending on the entered distances

When speed 0 is reached, relay "MB" will be switched off. During the time until the mechanical brake is actually applied, the motor is electrically held at speed 0.
After a preset time, the power output stage is isolated and the relay "RB" drops off. If the control system switches the motor contactors by this relay contact, it is guaranteed that that the contacts are currentless when the contactor opens.

S_ABH Selection of the course of arch travel:
- **ON** The course of the arch travel during deceleration transitions from V3 -> V1 and V2 -> V1 is distance-dependent.
- **ON+S10** Special function way-dependent positioning, the entered distance (in ZA_INTERN \ S_10) gets driven from the point of switching off V1 to standstill.
- **OFF** The course of the arch travel during all deceleration transitions is time-optimised.

With control via DCP-protocol, further parameters are available (see TIA99_77).

4.3.7 The "CONTROLLER" menu

Contents: The parameters of the PI-speed controller (proportional plus integral controller) will be set in the "Controller" menu.

CONTROLLER **********	
K_nr 2.0 > Amplification	Speed controller gain, gain of the PI controller during travel
T_nr 100 ms > Integration time	Speed controller reset time , reset time of the PI controller during travel

Fig. 4.12 "Controller" menu structure

With the parameters K_nr and T_nr the setting of the speed controller active during travel cab ve optimised.

High dynamic is achieved with high values for the gain and short reset times.
A soft controller setting gives smoother travel.

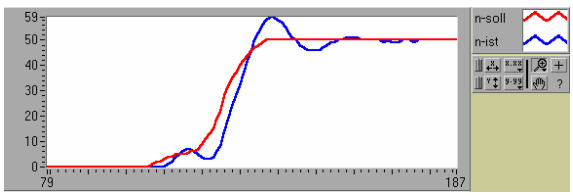
The speed controller is primarily affected by its gain. If distinct speed differences occur during travel (especially at speed transitions), the controller setting is too "soft".
In this case, the gain (**K_nr**) can be increased or the reset time (**T_nr**) reduced.
If the drive is noisy or the frequency-controller switches off, the gain is set too high and must be reduced.

In general, the following applies:
Set the gain of the speed controller as high as necessary and as low as possible.

Optimisation of the start-up behaviour and the speed controller is described in more detail in chapter 5

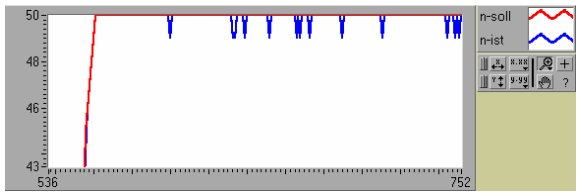
Examples:

Setting too soft:
Leads to under- and overshoots



Knr: increase value
Tnr: decrease value

Setting too hard:
Leads to vibrations

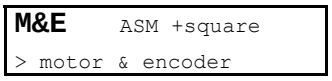


Knr: decrease value
Tnr: increase value

With operation of synchronous motors in no load operation the speed controller gain must be set to 1,00!

4.3.8 The "INSTALLATION & MOTOR" menu

Contents: Installation-dependent values have to be entered in the "INSTALLATION & MOTOR" menu prior to the first travel. This data only has to be entered once. The motor data can be set in accordance with the motor rating plate details.



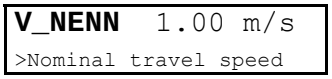
Enter motor and encoder type

ASM + square: asynch. motor with square wave encoder
ASM + sine: asynch. motor with sine wave encoder

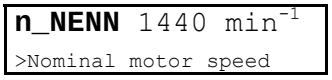
2CF

ZETATOP: synchronous motor with absolute encoder
SM225: synchronous motor with absolute encoder
SM850: synchronous motor with absolute encoder
SM700: synchronous motor with absolute encoder
SMxxx: synchronous motor is no Ziehl Abegg product

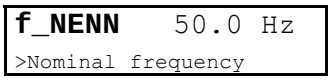
2SY



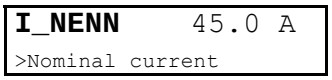
Enter nominal speed of the lift car at the nominal motor speed N_NOM.



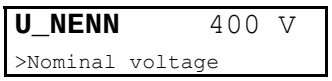
Enter nominal speed of the motor.



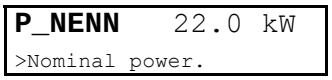
Enter nominal frequency of the motor.



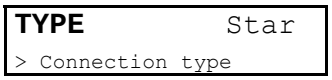
Enter nominal current of the motor.



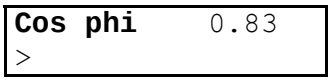
Enter nominal voltage of the motor.



Enter nominal power of the motor.

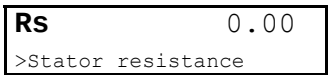


Enter connection type of the motor



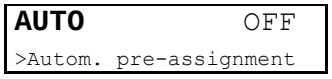
Enter power factor (cos. phi) of the motor

2CF



Enter value of the stator resistance

2SY



Automatic parameter preloading:
- **OFF** No effect
- **ON** Travel data & motor data can be preloaded. After the preloading, AUTO is at "OFF" again.

Figure 4.13 Menu structure

AUTO

question : new travel data? — The parameters in the /TRAVELLING, /ACCELERATING and /DECELERATING menus are preloaded once only, according to the type of installation, nominal speed of the car and nominal speed of the motor.

question: new motor data? — The parameters in the /MOTOR-MODEL menu are calculated and preloaded once only, according the motor data.

Calculation of the nominal speed / V_NOM

$$V\_NOM = \frac{n \cdot \pi \cdot D}{60 \cdot i}$$

n - nominal speed [r.p.m.]
D - traction sheave diameter [m]
i - i_gear ratio * i_suspension

Help: There is a calculator function in the ZA-INTERN menu(/CALCULATOR)

Example:

n = 1430 r.p.m.

D = 0.5 m

i_gear ratio = $\frac{35}{2}$, i_suspension= $\frac{2}{1}$, i = $\frac{35}{2} * \frac{2}{1} = 35$

$$V\_NOM = \frac{1430 \cdot 3{,}141 \cdot 0{,}5m}{60s \cdot 35} = 1{,}07m/s$$

4.3.9 The "MOTOR MODEL" menu

Contents: In the menu "MOTOR-MODELL", after setting the motordata in the menu INSTALLATION & MOTOR, the following parameters will be preassigned. Normally these values must not be changed again. If it is necessary to change the values manual, the parameter "MM E" must be switched on.

```
  MOTOR MODEL
**********
```

I_0 18.3 >No-load current	Calculated value for the magnetising current Parameter only accessible with asynchronous motors	2CF
T_ROT 180 ms >Rotor time constant	Calculated value for the rotor time constant Parameter only accessible with asynchronous motors	2CF
PSI 0.38 Vs > Magnetic Flux	Enter the magnetic flux Parameter only accessible with synchronous motors	2SY
Ls 0.100 >Stator induct.	Calculated value for the stator inductance	
sig 0.04 > sigma	Calculated value for sigma Parameter only accessible with asynchronous motors	2CF
p 2 > Pol paires	Display of the number of pole pairs for the motor	
MM_ED OFF >Motor-Model-Editmodus	For manual changes set MM_ED to on. If MM_ED is off, it is not possibleto change the values.	

4.3.10 The "INTERFACE" menu

Content: The **factory-set** functions of the programmable inputs and outputs can be changed in the "INTERFACE" menu.

INTERFACES ********** **GEBER** 1024 > Encoder resolution	Enter of the encoder resolution (pulses/revolution) of the encoder mounted on the motor. Factory setting:1024
ST Fix 2 S > Output ST	Lock-function: further travels will be locked because of the repeated successive occurrence of a fatal error (1, 2, 3 times). See next Pages.
SK_1 RB -CONT. > Output SK1	Functions of the special contacts SK_1, SK_2 and SK_3 (see next page)
SK_2 V<V_G1 > Output SK2	
SK_3 V<1.1*V_3 > Output SK3	
ZE_1 V_ZE1 > Input ZE1	Function of the special inputs ZE_1, ZE_2, ZE_3 (see next page)
ZE_2 V_ZE2 > Input ZE2	
ZE_3 OFF > Input ZE3	
V_G1 0.30 m/s > Speed level 1	Limit 1
V_G2 0.80 m/s > Speed level 2	Limit 2
V_G3 0.50 m/s > Speed level 3	Limit 3 (information only output via DCP)
BR OFF > Brake Control	Brake monitoring, up to three brake monitoring contacts can be attached (Input BR, ZE3, ZE2) - OFF - Contact normally open: 1*, 2*, 3* **NO**, contact is open when brake is in rest-position - Contact normally closed: 1*, 2*, 3* **NC**, contact is closed when brake is in rest-position
CO ON >Contactor control	Monitoring of the travel contactors (ON / OFF)
MO_DR LEFT > Motor direction	Reversing the motor's direction of rotation (ANTI-CLOCKWISE / CLOCKWISE)
RS232 ZETAMON > Function of RS232	Setting the serial interface - **ZETAMON** when using the ZA Software ZETAMON for windows - MONITOR when using a terminal program (e.g. Windows / terminal.exe) - SERVICE - reserved for Ziehl-Abegg

CTRL STANDARD >Extern Control-Func.	The frequency inverter can be controlled by the inputs and outputs (STANDARD) or alternatively by a bus system (DCP versions DCP_01 / _02 / _03 / _04)
COPY OFF >Copy parameter sets	The inverter has two sets of parameters (see special input ZE_2 / 3). - PARA1 -> 2 the data from parameter set1 are copied into parameter set 2 - PARA2 -> 1 the data from parameter set2 are copied into parameter set 1 - OFF no function, or cancel function
LCD ENGLISH > Language	Choice of languages (DEUTSCH, ENGLISH, TÜRKCE, NEDERLAND, ESPANOL)

Functions of the special contacts SK_1, SK_2 and SK_3

The special contacts are designed as volt-free changeover contacts (x2/x1/x4).

Factory settings:	SK_1: RB contactor	
	SK_2: V < V_G1	V_G1: 0.30m/s
	SK_3: V < 1.1 * V_3	

The corresponding relay contacts (X_1, X_4) pick up when...

- OFF	no function
- Fault	no controller error present
- Early-warning	no early warning of a fault present; the inverter completes the current journey and the lift control system prevents any further travel
- V<1.1*V_3	the actual speed has not exceeded the 1.1 x V_3 limit
- V < V_G2	the set limit V_G2 is not exceeded.
- V < V_G1	the set limit V_G1 is not exceeded.
- RB_Invers	system is at a standstill.
- RB_contactor	system is in a travel cycle.
- Evac.Dir.	direction when evacuating: Rest-position ➔ car lighter then counterweight switched position ➔ care more heavy then counter weight

Function of the special inputs ZE_1, ZE_2 and ZE_3

Factory setting:	ZE_1: V_ZE1	
	ZE_2: V_ZE2	
	ZE_3: AUS	

ZE1

-	V_ZE1	additional speed. The speed “V_ZE1“ is entered in the “TRAVEL“ menu.
-	Zero Speed	hold speed zero
-	EVA. 3*AC	emergency evacuation with stand-by power supply
-	EVA.>60VDC	emergency evacuation with storage battery
-	EVA. 1*AC	Evacuation with USP
-	PARASET 2	changeover to second set of parameters
-	DecMonitor	deceleration monitoring (see below)
-	Funkti. CO2	only with separate monitoring of the main switches
-	UPS	Evacuation with USP (with reduced power supply)

ZE2

- V_ZE2 additional speed. The speed “V_ZE2“ is entered in the “TRAVEL“ menu.
- BR_2 Brake monitoring, only used when monitoring three separate brakes the contacts are attached to BR, ZE_2 and ZE_3
- Zero Speed hold speed zero
- EVA. 3*AC emergency evacuation with stand-by generator
- EVA.>60VDC emergency evacuation with storage battery
- EVA. 1*AC Evacuation with USP
- PARASET 2 changeover to second set of parameters
- DecMonitor deceleration monitoring (see below)
- UPS Evacuation with USP (with reduced power supply)

ZE3

- V_ZE3 additional speed. The speed “V_ZE3“ is entered in the “TRAVEL“ menu.
- BR_2 Brake monitoring, only used when monitoring three separate brakes the contacts are attached to BR, ZE_2 and ZE_3
- Load load weighting function, used for special function ZA-INTERN \ M0, Load-sensitive torque adjustment to compensate gear tolerance. Only for asynchronous motors suitably, (see chapter ZA-INTERN)
  Low (=0 V) : < 50 % nominal load
  High (=24 V) : > 50 % nominal load
- Zero Speed hold speed zero
- DecMonitor deceleration monitoring (see below)
- OFF

Special function „deceleration monitoring“

The function "deceleration monitoring" monitors if the deceleration to V1 has been started when the lift is travelling in the safety zone.
In the shaft a signal with the following function has to be generated:

- LOW (= 0V): The elevator is in the upper or lower security zone
- HIGH (= 24 V DC): The elevator is between the security zones

Function mode of the deceleration monitoring:

The elevator must not drive with V2 or V3 in the security zone. If one of these signals is still activated, the inverter will be switched off and the error message:

ERROR "55 Dec alarm" appears

Depending on the setting of INTERFACES / ST this error can lead to the blockage of the inverter.

Lock-function

The lock-function blocks further travels due to the repeated successive occurrence of a fatal error (1, 2, 3 times). The errors must occur in directly following driving attempts. By a travel without error the error counter is set to 0.

Under menu option INTERFACES \ ST the following settings are possible:

- Fix 2 s.: Without lock-function, ST relay drops in the case of error after 2 sec.
- Lock 3: Lock-function after 3 errors, ST relays remains dropped (blockage)
- Lock 2: Lock-function after 2 errors, ST relays remains dropped (blockage)
- Lock 1: Lock-function after 1 error, ST relays remains dropped (blockage)

In the case of locked inverter the reference text "ZETADYN LOCK [OFF]" appears in the display. After pressing the i-button the inverter changes again into normal operation.

4.3.11 The "PASSWORD" menu

Contents: The controller can be protected from access by third parties by assigning a password in the "Password“ menu.

PASSWORD ********** **PW_E** .... > Password input	If it is not possible to change parameters when the drive is at standstill, the set password must be entered in this parameter. **No password preassigned by Ziehl-Abegg.**
PW_N .... > New password	Assign or change a max. four-digit password in the range from 1 to 9999. A password should only be entered if the commissioning has been completed.
SE_NR .... > Code of Passw.	Display of the current password in coded form. In the event of the password being lost, please inform the manufacturer of the contents of SE_NR (Hotline 07940/16-308)
PW_CLR OFF > Clear password	Cancellation of a password.To cancel the password, the correct password must first be entered in PW_E. - OFF; no function

Example: Assigning the password with the number 12

1. enter 12 in PW_N
2. enter 12 a second time in PW_N
3. the following messages flashes on the display

```
NEW PASSWORD
----->        12
```

4. Pressing any key bars all parameters except for PW_E.
5. The password (12 in this example) must be re-entered in Parameter /PW_E to be able to change parameters again.

4.3.12 The "ZA INTERN" menu

Contents: Controller internal settings are stored in the "ZA Intern" menu.

ZA-INTERN ********** **Start-Opti** ----------	
ANF_D 1 >Start attenuation	Adjustment of the start behaviour. Available start procedures: 1 / 2 / 3 / 1+s / 2+s / 3+s / 4 / 5 For details see chapter 5.4 point 7
FK_start 2.0 >Anplif. Factor at start	K_nr – gain boost during start; PI controller gain during the start process
S_start 0.1 mm >only if ANF_D 2/42/4	(only with ANF_2 and ANF_4) distance within an jumping on the traction sheave leads not to an switching-off from FK_Start and or the position controller
T_0 0.5 s >Mot.Cont.sw.-on time	Max. time from signalising a travel command until the motor contactors are closed.
T_1 0.2 s >Mag. flux build up time	Flux build-up time, time from signalising a travel signal until the mechanical brake is released.
T_2 1.0 s >Mech.Brake open time	Time until the mechanical brake is released
T_3 0.1 s > Max. hold time.	Max. hold time of speed 0
V_T3 0 mm/s > Min. speed.	Within the time T3 it is possible to drive with the very small speed V_T3 in place of speed 0. A jerk while starting can be avoided. (particularly with the direct drive ZETATOP
Stop-Opti: ----------	
T_4 0.1 s > Max hold time	Time for maintaining "speed 0
T_5 1.0 s >Mech. Brake close time	Time until brake is applied
T_5b 0.3 s >Mot.Volt switch-off time	Time until the motor-current is zero (fading away function, use only with the synchronous motor SM 225).
T_6 0.5 s >Mot.Cont.sw.-off time	Maximum time until motor contactors are opened

Error suppress: ----------	
MASK1 83 > Error mask 1	Five error messages can be suppressed by entering the appropriate error number
MASK2 0 > Error mask 2	
MASK3 0 > Error mask 3	
MASK4 0 > Error mask 4	
MASK5 34 > Error mask5	
STATUS 10 internale State	displays the internal status of the inverter
Überwachung: ----------	
Control funct.:	
T_GUE 3.5 s >Encoder check time	If no speed transmitter signal from the encoder occurs within the time T_GUE the controller switches to fault and displays the error message "22 Encoder drop out".
T_Imax 3.0 s > Overload time	Timer for special function overcurrent, exceeds the torque-bilding-current i_q for the time T_Imax the value specified in the parameter Imax, a travel abort is released. The fault- relay ST drops, error message "96 Overload" is displayed.
I_max 130 % >Overload curr.=%I_NENN	Limit of the torque-building-current i_q for the special function overload, in %, related to the engine rated current I_NENN. 100 % corresponds to I_NENN, factory setting is 130 %.
S_MB 0.50 m >Dist. without brake	If pulses are still detected from the encoder even though the relay MB has dropped off the error message "Travel with brake applied" is displayed will be displayed when the set distance is reached.
U_ZK_MIN 380 V >min. DC-link voltage	Minimum link circuit voltage. The frequency inverter switches off if the actual voltage exceeds the limit.
U_ZK_MAX 760 V >min. DC-link voltage	Maximum link circuit voltage. The frequency inverter switches off if the actual voltage exceeds the limit.
TEMP_MAX 70 C >max. heat-sink temp.	Maximum heat-sink temperature. The frequency inverter switches off if this value is exceeded.
T_VENT AUTO+15s > Afterrunning fan	Control and run-on time of integral built-in fan. AUTO: t > 42° C = ON; t < 38° C= OFF after 15 sec. The after-run-on time can also be set manually (15 min, 10 min, and 5 min or AUTO+ 5 min). The fan is switched on for the corresponding after-run-on time after removal of the controller clearance (end of journey).
T_BR 0.04 s >Brake control timing	Debouncing time of the micro switches on side the mechanical brake
T_CO 0.2 ms >Mot Contactor control	Duration of the interruption time from the motor contactors. After this time the inverter is switching off the PWM. (with T_CO = 0 ms the monitoring is switched off).

I_CTRL ON > I-Control funct.E97	Monitoring of the motor current
APC ON >Aut. Para. Controll.	Automatic Parameter Control ON / OFF, see chapter 4.1.1
Hardware-Check: ----------	
TM4 0 Encoder input	Hardware check of the encoder: the pulses of the encoder are counted
Service: ----------	
RESET 0 >load factory setting	Load factory setting (see Section 4.3.13)
Evac. with accu.: ----------	
U_ACCU 120 V >Accu nominal voltage	Enter nominal voltage of the storage battery
Evac. with UPS.: ----------	
P_UPS 1,0 kW > max. Load UPS	Enter power of the UPS
STOP OFF > Stop function	When function is activated, the brakes will be closed, when the V1 is switched off. The accuracy of the stopping process will be increased.
S_STOP 0 mm >	STOP function and DCP 02 / 04 must be activated: The brake will be closed when the entered distance before flushness is reached
CALCULATOR ----------	Calculator function - Helps to calculate the nominal speed.
D **0.630 m** >Diameter tract.sheave	
A **1:1** > Suspension	
i1 **1** > Gear ratio i1	
i2 **31** > Gear ratio i2	
V* **1.53 m/s** Calc.V_NENN at N_NENN	

Speci. Function: ----------

S_10 20 mm > Dist. V1-> 0	Special function way-depended positioning, the entered distance is covered from removal of the speed V1 up to the stop. Function is active only if the parameter DECELERATING / S_ABH stands on "ON+S10"
M0 0 % >if gear clearance	Special function, load-sensitive torque adjustment to compensate gear tolerance. Only for asynchronous motors suitably Input ZE3 must be used for load weighing function (INTERFACE / ZE3 = Load) Low (=0 V): < 50 % nominal load High (=24 V): > 50 % nominal load
DCP_F 1.00 mm > DCP-Filter	DCP Filter for DCP_02 and DCP_04: switches from the shaft encoder to the motorencoder. The switching pointis set in mm. Not active with 0mm. Works only with S_ABH = DCP comf. In menu DECELERATING
A_MAX 1.00m/s2 > Max. deceleration	Limits the decelerating

4.3.13 Load factory settings (Reset)

With the parameter **/ZA-INTERN/RESET** the inverter can be preloaded with standard values .

With the RESET function the parameter and counter levels will be cleared and then preassigned again. No RESET should be carried out on controllers which have been factory set; these controllers are identified by a sticker on the front panel of the display.

The following reset functions are possible:

Reset value	Effect
10	Journey counter will be cleared (STAT2)
88	Clears the company logo
90	Error list, all parameters will be cleared, encoder offset ECOFF is retained, without hardware check
99	Error list, all parameters will be cleared, **the encoder offset ECOFF is cleared as well,** the reset is followed by a detailed hardware check
	The encoder offset value is **definitely** required with synchronous motors, where the encoder is supplied without mechanical adjustment or has been replaced. If the offset value is lost, operation with synchronous motors is no longer possible. The encoder offset can only be determined with the motor turning freely without the cable. The value of the encoder offset can be displayed with the APD (SERVICE-CHECK / APD) menu.

RESET 0 xx	Enter the reset value **xx** in the ZA-INTERN / Reset menu, confirm possible "Set" or "Limit" inquiry with [OK] All parameters and error entries are cleared.
Are you sure? [NO] [YES]	Confirm the "Are you sure" inquiry with [YES] (i-key)
Select Type ! [2CF] [2SY]	From software version 2.20 and reset value 90 / 99: select controller type (2CF for asynchronous motors, 2SY for synchronous motors). The motor type cannot subsequently be changed manually.
Clear..... Error List 1	"Clear....", appears in the display, data are cleared
-------TestMode---- !RS232 =HW TEST!	The ....TEST-MODE.... message appears, the display flashes.
RS232 HW TEST OFF	With reset value 99: In the "INTERFACE \ RS232" menu set to ZETAMON, confirm with P

Switch off the mains supply to the controller for 10 seconds.

4.3.14 The "SERVICE CHECK" menu

Contents: Various internal parameters of the inverter for diagnostic purposes are displayed in the "Service Check" menu. This information is intended to be forwarded by telephone to the Ziehl-Abegg hotline during commissioning or troubleshooting.

Service Check ********** **APD** OFF >Aut. Para. Diagnostic.	Access the automatic parameter diagnosis function
TM4 0 Encoder input	Display of encoder pulses
Iq_max 6.0A max. Moment current	Display of maximum moment current
C1 107 Code LT1	Display of coding of power section
C2 137 Code LT2	Display of coding of power section
ADC1 0 Offset ADC1	Offset display of analog / digital converter 1
ADC2 0 Offset ADC2	Offset display of analog / digital converter 2
CPU 1.97 CPU index	Display of processor index
PHF 1 Phase error counter	Display of number of phase errors
SW-DATE 1401.2 Software-date	Display of software date (application processor)
SW-FOC 1401.2 Software FOC	Display of software date (signal processor)
@TI_XOR 24771 TI xor summe	Display of DSP - TI_XOR Checksum
PA_ERR 0	Error display parameter number
T2real 0.0s Meas.brake release time	Measured brake release time (only with active brake monitoring)
f_PWM 8.0 kHz * actual PWM-Frequency	Shows the actual PWM frequency. With high temperature of the power stage the frequency gets reduced

The APD function (Automatic Parameter Diagnosis)

APD is the abbreviation for Automatic Parameter Diagnosis.
The APD function is accessed in the SERVICE CHECK menu with APD = ON.
Individual parameters are checked one after another for plausibility and limit values; invalid parameters are displayed, each message must be confirmed with [OK] = i-key.
In addition, equipment functions are checked and functional errors reported.

The **APD** function checks relevant parameters and functions and offers support during troubleshooting. APD is accessed manually.

There are 3 types of message, shown by these examples:

```
Intern BC = OFF!
W105          [OK]
```

1. Warning messages **W...**
   If the brake chopper transistor is switched off with controllers that can control an external braking resistance.

```
SSI encoder fail
E003          [OK]
```

2. Error messages **E**... (Error):
   The error message E003 SSI encoder fail indicates a functional fault in the SSI encoder.

```
SE_NR = .....
T001          [OK]
```

3. Comments **T**... (Tips):
   Controller safeguarded by password.

The **APD** function should be accessed at the end of commissioning and when parameters are changed to check the controller settings.

4.3.15 The CO interruption indication

If the journey is interrupted by opening the contacts of the contactors through the controller, the indication "CO interruption" appears in the display for 2 seconds. This error is not stored, the STAT4 journey interruption counter counts up.

"Contactor flutter" whilst travelling and timing problems on start-up are indicated by the CO interruption message. In this case the message appears at the end of each journey.

It is assumed that the contactor monitoring function is active (INTERFACE \ CO = ON).

```
CO interruption
!..............!
```

The message can appear with the following examples:
1. Inspection travel
2. Safety circuit is opened (caused by a safety beam gate, for example)
3. The controller is switching the contactors off too early (timing problem)

5 Commissioning

5.1 Requirements

When commissioning the device on site no test instruments are required.

Before starting the commissioning, the following points have to be checked:

1. The controller has been installed and connected according to this operation manual.

2. Commissioning personnel is familiar with the control of the equipment and the setting options.

3. The control system of the inverter has been installed and checked according to this operation manual.

The drive may only be commissioned when all three requirements are fulfilled.

The controller parameters must be adjusted to the installation before the first journey.

The information in this operation manual must be observed.
With special versions of the controller, the accompanying instructions must be observed before commissioning.

Before every travel, the operator must make sure himself that neither personnel nor equipment are at risk.

5.2 Fast setting for installation work

① Enter the installation and motor data:

The data on motor rating plate data be entered once before the first journey.

This entry is not necessary with a controller where the data has been preloaded By Ziehl-Abegg! Also no RESET operation should be carried out! See Reset function Section 4.3.13

INSTALL. & MOTOR **********	
M&E ASM +square >motor & encoder	Enter type of motor & encoder
V_NENN 1.00 m/s >Nominal travel speed	Enter the nominal speed of the lift car at nominal motor speed n_NOM.
n_NENN 1440 min^{-1} >Nominal motor speed	Enter the nominal speed of the motor.
f_NENN 50.0 Hz >Nominal frequency	Enter the nominal frequency of the motor
I_NENN 45.0 A >Nominal current	Enter the nominal current of the motor.
U_NENN 400 V >Nominal voltage	Enter the nominal voltage of the motor.
P_NENN 22.0 kW > Nominal Power	Enter the nominal power of the motor.
TYPE Star > Connection type	Enter the connection type of motors
Rs 0.83 Ohm > Stator resistance	Enter the stator resistance **2SY**
p.f. 0.83 >power factor	Enter the power factor (cos phi) of the motor. **2CF**
AUTO ON >Autom.preloading	Automatic parameter preloading: **OFF** No effect **ON** Travel data & motor data can be preloaded. After the preloading, AUTO is at "OFF" again.
New travel data? [NO] [YES]	After the preloading, the speeds are set as listed in the following table. In addition, the Accelerating and Decelerating menus are preset. The calculated values of the motor data are displayed in the "MOTOR MODEL" menu. Under normal circumstances, no further changes will be required in this menu.
New motor data? [NO] [YES]	

Travel speeds after automatic parameter preloading

Parameter	Designation	Preloaded value
V_1	Positioning speed	5 cm/s
V_2	Intermediate speed	50% V_NOM
V_3	Travel speed	100 % V_NOM (2SY) 95% V_NOM (2CF)

② If required, adjustment to "INTERFACE" menu

If functions of the additional inputs and special outputs are required that differ from the factory settings, the corresponding changes must be made in the "INTERFACE" menu.

First test run:

-> Check whether the operation of the drive is correctly regulated in **both** directions.

If controlled operation is not possible, check the motor cable connections. Controlled operation is only possible when U of the inverter is connected to U of the motor, V of the inverter is connected to V of the motor, and W of the inverter is connected to W of the motor.

If the car moves in wrong direction, the parameter INTERFACE/MO_DR has to be changed. Under no circumstances must two wires of the motor cable be changed!

Compare the actual speed and the desired speed in the **"MONITOR"** or **"INFO"** menus. A tolerance of +/- 3 1/min can be accepted. If the deviation is greater than this, the cause is mostly the screening of the encoder cable.

➔ Check / improve screening if required. The encoder cable must only be extended with original encoder extension cables. The plugs must be screwed into one another. .

➔ Wherever possible, the encoder and motor cable routes should be installed separate. This separation is particularly important if the cables which are longer than 10 m.

5.3 On-site setting of the switch-off points

◆ Switch-off points for the high travel speed "V3"

There are two possibilities of determining the required braking distance.

a) The braking distance can be taken from the **diagram** Fig. 5.1. It should be noted that the values only apply if the factory settings for the roundness R_NEG1 = 60 % and R_NEG2 = 90 % remain unchanged. Furthermore it is assumed that the control system relays the switch-off points to the controller without delay.

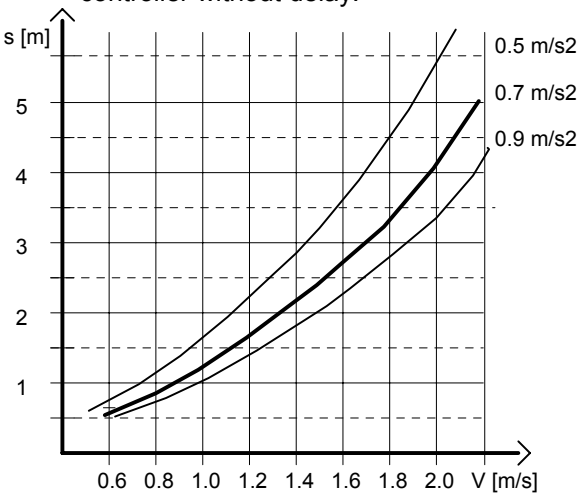


Fig. 5.1 Diagram of the braking distance

b) The braking distance can also be readout **directly at the controller**. For this, all parameters which affect the decelerating distance have a special function (see Fig. 5.2). If one of these parameters is selected and adjusted, then the calculated decelerating distance from V_3 to V_1 is displayed instead of the comment line when you return to this level.

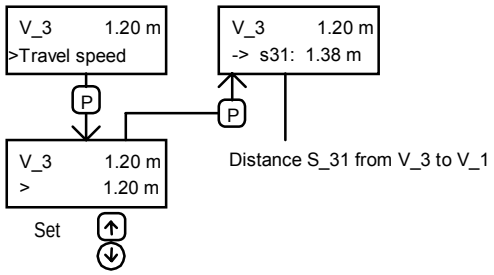


Fig. 5.2 Special functions of the parameters V_1, V_2, V_3, R_NEG1, R_NEG2 and A_NEG
V_2 for S_21 (distance from V_2 to V_1)

Recommendation:
The switch off point should - if possible - be set to a longer distance than the determined braking distance, to have scope for the optimisation of the travel behaviour. Later on, it is possible to avoid a possible subsequent reduction of the switch-off point distances in the shaft, as the switch-off point can be moved internally from the controller up to distance S_D13 with the /DECELERATE/S_DI3 parameter. In order to achieve a positioning travel as short and equal as possible at all floor levels with "V1", the switch-off points must be set with an accuracy of **+/- 1 cm.**

◆ Switch-off points for the positioning speed "V1"

The switch-off points for "V1" must be set with an accuracy of +/- **1mm, 5cm** before the flush position.

◆ Switch-off points for the average travel speed "V2"

If required:
The switch-off points for the travel command "V2" are set as far as possible from the flush position. At fist it has to be checked if required braking distance s_21 (Fig. 5.2) is less than or equal to the available braking distance. If not, the speed "V2" must be reduced to avoid an over travel during commissioning.
On installations with **adjustment**, this feature must be switched off from the control system to allow unimpeded working.

5.4 Adjustment

❶ Checking the controller action

- Control journey over several floors
- Observe the actual speed, desired speed and control deviation RA displays in the "Monitor" menu.

N_ACT 300min-1 ▬	• Actual and desired speeds must be equal.
N_SET 300min-1 ▬	• The pointer RA must not reach the limits of the range.
-.....RA.....+ ▮	• During constant travel, the pointer should only move very slightly about the mid-position; during speed transitions the pointer should only move within a narrowest possible band around the mid-position.

❷ Checking the distances

The accuracy of the set switch-off points can be checked in the "INFO" menu (press the "**i**" key).

S_TOT	S-->	S_1
3.25	1.15	0.01m

S_TOT	Measured total travel distance from start to standstill.
S -->	Measured decelerating distance from V_3 to V_1.
S_1	Measured positioning distance with speed "V_1".

❸ General setting information

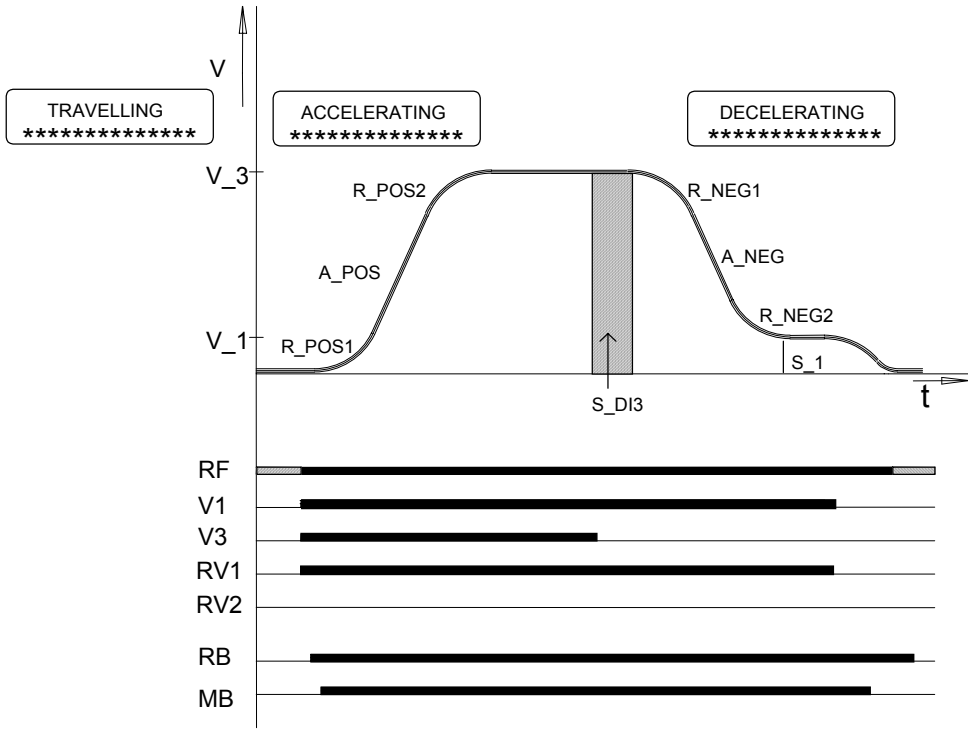


Fig. 5.3: Travel curve with setting options

Unlike the AUTO preloading, the travel curve can be changed by the parameters shown in figure 5.3.

Advice, if the decelerating distance has to be reduced:
- Increase A_NEG or reduce R_NEG1 to 40 %.
- With lifts, leave R_NEG2 generally at 90 %.

? Arch travel with several different distances between floors.
Recommendation: Set R_POS2 to 90 % so that the controller generates an optimally rounded travel curve even in the most unfavourable case.

? Balance weight
If it is not possible to remove unnecessary balance weights when old installations are retrofitted, it may be necessary to set the roundness R_POS2 and R_NEG1 as large as possible.

? Parameter / inverter / gain, reset time
With lower values of speed controller gain, the control loop is increasingly damped, i.e. the response of the control loop is weaker and there can be control deviations during the speed transitions.

If it is not possible to find a satisfactory setting, or if the control deviation is moving rapidly to and fro over a wide range during constant high speed travel, it has to be checked whether the controller can correctly record the motor speed. This applies particularly when other encoders than hollow shaft encoders are used. The incremental speed transmitter must be fitted free from play and vibrations. Possible mechanical defects (e.g. clamping of a guide socket) can affect the control in the same way.

Another source of errors is the encoder cable line used:
- Screening?
- Connection of the screening

? Encoder
The mark-space ratio of the encoder signal must be within the range of 45 % to 55 %. The phase displacement between the signals must be 90° (see Appendix A.1).

In case of problems with the speed regulation, connect a screened encoder cable with the shortest possible length direct from the motor to the controller. If this eliminates the problems, the existing encoder cable must be checked and possibly changed.

❹Optimisation of the positioning distance S_1

- Select parameter /INFO/**S_1**.
- Check whether the crawling distances are nearly equal on all floors **(S1 > 0!)**.
- With the parameter /DECELERATING/**S_DI3** it is possible to adjust the switch-off point, until the crawling distance is about 5 cm.

❺ Flush level setting

If the lift car cabin comes to a stop on all floors at the same distance from the flush level, it is possible to adjust the switch-off point by using the parameter /DECELERATING/S_D1. If the distances are not the same, the correction has to be made directly in the shaft.

❻ Setting the medium speed V2

With installations where the medium speed is used, V2 must be increased until the crawling distance is identical to the crawling distance when decelerating from high speed V3. There is also the possibility to delay the switch-off point for V2 by the distance /DECELERATING/S_DI2.

❼ Optimising the starting behaviour

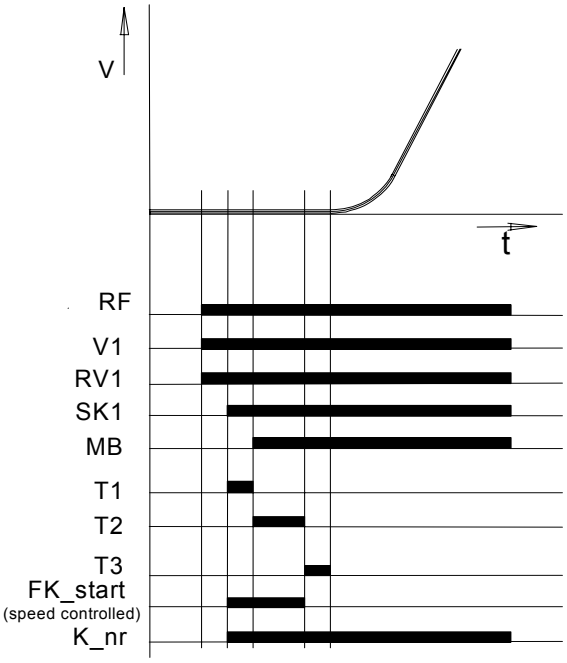
This final optimisation assumes that the guide rails, the gearbox oil level and the lift car suspension etc. are in good order. An optimal soft start is only possible if the mechanical conditions permit it.

Requirement:
To optimise the start process, the car should be empty and the counterweight fully loaded. This is the only way of optimising the start settings for all load situations.

The speed controller setting which is active during the journey (CONTROLLER / K_nr & T_nr) must be adjusted correctly. There must be no overshoots or undershoots during the journey.

The different start procedures can be adjusted in the parameter ZA_INTERN/**ANF_D** (start attenuation).

Description of the start procedures

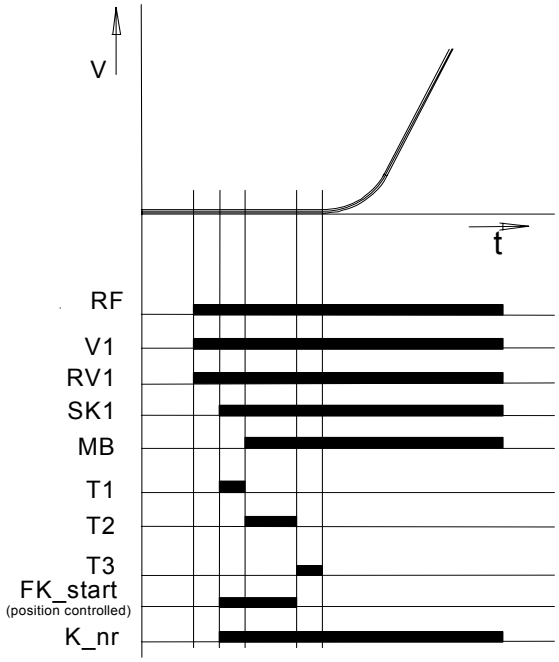


ANF_D =1:

With adjusted ANF_D=1 the motor will be speed-controlled. Until the end of T2 it will be controlled with a desired value of 0 RPM. A change of the position of the motor shaft will not be corrected. The parameter FK_start is used for increasing the gain of the speed-controller. It will be activated with the start of T1 and deactivated with the end of T2.

ANF_D=2

Equal to the function ANF_D=1. In addition the parameter s_start is activated. If the position of the motor shaft is changing by the value set in parameter s_start, FK_start will be switched off. Thereby a damage of the motor due to a too high adjusted FK_start will be prevented.

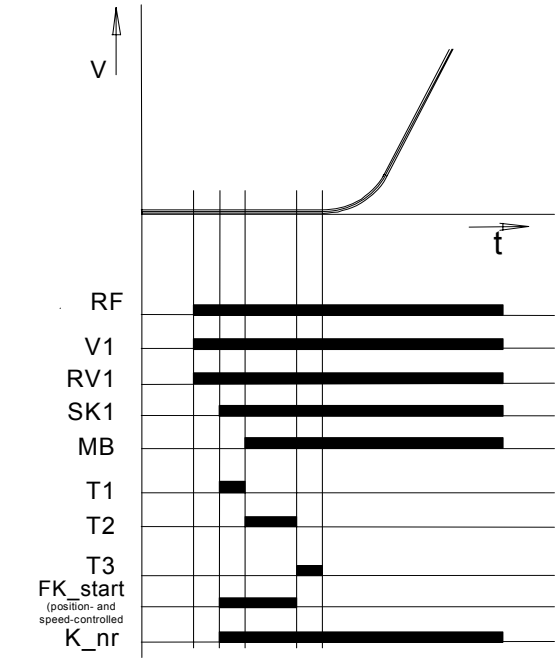


ANF_D =5:

With adjusted ANF_D=5 the drive will be position-controlled until the end of T2. The position of the motor shaft is measured and a change will be corrected.
The parameter FK_start is used for adjusting the gain of the position-controller. It will be activated with the start of T1 and deactivated with the end of T2.

ANF_D =4:

Equal to the function ANF_D=5. In addition the parameter s_start is activated. If the position of the motor shaft is changing by the value set in parameter s_start, FK_start will be switched off. Thereby a damage of the motor due to a too high adjusted FK_start will be prevented.



ANF_D =3:

With adjusted ANF_D=3 the drive will be position- and speed-controlled. It has to be observed that both controls will be adjusted with FK_start and thus they are interdependent.
The position- and speed-control will be activated with the start of T1 and deactivated with the end of T2.

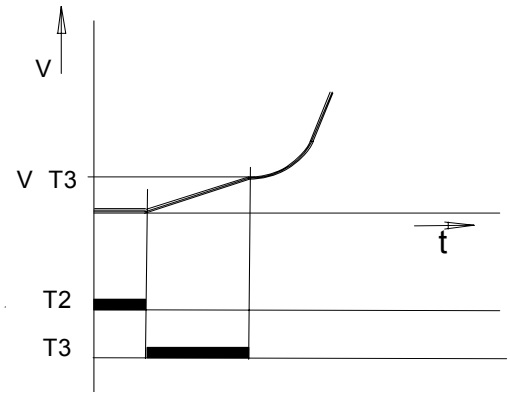
ANF_D=1+S / ANF_D=2+S / ANF_D=3+S

The functions are equal to the above-mentioned start procedures ANF_D=! / ANF_D=2 / ANF_D=3. Additionally the desired value of the speed will be retarded during the first three rotations of the motor shaft. An overshoot due to a too high system deviation will be prevented.
This additional option is provided to be used with systems with high static friction and high self locking.

Only to be used with asynchronous motors!

For all start procedures:

Attenuation of the jerk on starting



To reduce a jerk on starting, there is the possibility to accelerate up to the speed V_T3 during the time T3.
Thereby the static friction of the system will be overcome and the jerk on starting will be reduced.

Brake monitoring

With an activated brake monitoring, the timer T2 can be optimised. As soon as the brakes are open, the timer T2 will be interrupted and the timer T3 will be started.
As precondition the brakes have to be equipped with monitoring contacts.

Procedure for adjusting the start behaviour

1.) Set the installation to "Return" that external calls do not impede the optimisation.

2.) Release the mechanical brake manually and check whether the drive starts to move.
If the drive does not start to move, set parameter ZA-INTERN/ANF_D to “1+S”.
A jerk on starting can scarcely be avoided; this is due to the mechanism.

If the drive starts to move when the mechanical brake is released manually

3.) Set the parameter ZA-INTERN/**T_GUE** (encoder monitoring time) to **5 sec,**
Set ZA_INTERN/**ANF_D** (start attenuation) to “1”.

4.) Set the time ZA_INTERN /Start optim./**T2** (time in which the brake is released → FK start active) to **1sec**.

5.) Set the time **T3** in the ZA_INTERN /Start optim./**T3** menu (time from requesting a travel signal until the set point starts) to **1sec**.
If a travel command is now given, the drive only starts after 2sec (T2+T3). Until then, the speed set point remains at zero.

6.) For good starting behaviour, it is important that the drive can take up the braking moment quickly enough when the mechanical brake is released. To achieve this, increase the parameter ZA-INTERN/**FK_start** to a value high enough such that the drive moves only slightly when the mechanical brake is released.

If this is not possible, or if noises occur in the motor, reduce the value again and increase the setting of ZA-Intern / **T1** parameter in stages.

7.) Then reduce the value for the time ZA-INTERN/**T2** in stages as long as the start behaviour does not change (example up to 0.2 sec).

8.) Set time **T3** in the ZA_INTERN/ Start Optim.:/**T3** menu to a value of **0 — 0.1 sec**.

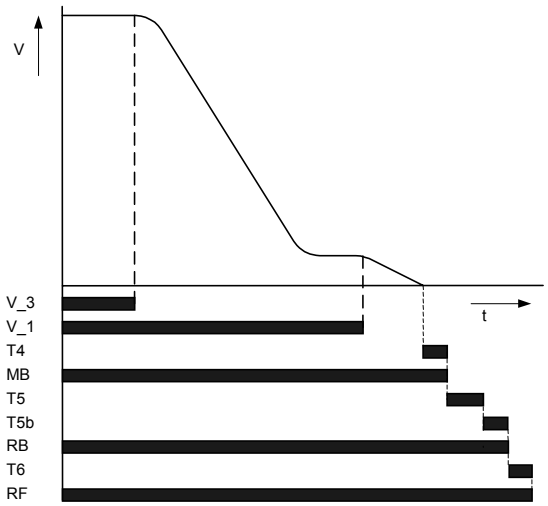
9.) Set the parameter ZA-INTERN/Monitoring/**T_GUE** (encoder monitoring time) to the desired value (**2.4 sec**).

Time optimisation on starting

10.) If it is necessary to optimise the start time, change the parameter ZA-INTERN/START_D experimental to the value “2” or “3”. Programmes are stored here in which the T2 and T3 timers are optimised independently→ See Section 4.3.12 menu ZA-INTERN menu /troubleshooting plan.

Also take note of the information in chapter A6/ troubleshooting plan.

Stopping process



After reaching speed 0 the timer T4 starts and the brake is applied.

If the drive turns back during braking, the setting of timer T5 must be increased.

The power section remains active during time T5.

Within the time T_5b the motor-current is fading away to zero (fading away function, only with the synchronous motor SM 225 necessarily).

5.5 Completion of the commissioning

When the commissioning is finished, the current parameters settings must to be entered in the setting chart (Appendix).

The error list can be cleared via parameter /STATISTIC/STAT5.

If access is possible for third parties (e.g. facilities manager), data entry should be protected by means of a password (/PASSWORD/PW_N see Section. 4.3.11).

6 Service

6.3 Maintenance work

Within the scope of usual maintenance work, the following checks should be carried out:

a) General visual check for possible dust build-up.

b) Check the controller connections for correct mounting.

c) Possibly check the /STATISTIC/STAT0 error memory, to see whether any faults have occurred since the last maintenance check.

6.4 Fault clearance

Because of the digital construction of the controller, numerous possible causes of faults are displayed in plain text. Normally, the cause of the fault can be located with the support of these messages and the explanatory notes in the Appendix and troubleshooting plan.

The following procedure is recommended here:

a) If a fault occurs (display flashes, error text and number are displayed), consult the general error explanatory notes.

b) If no fault is directly displayed by the controller, check the error memory /STATISTIC/STAT0 to see whether any faults have occurred since the last maintenance check. The first entry displayed is the error which occurred most recently.

   In order to save costs and time for queries, the questions in the Appendix A13 must be answered before telephoning the

ZIEHL-ABEGG HOTLINE

6.5 Repairs

If any work is carried out inside the controller, or even when there are structural modifications to the enclosure, the manufacturer's warranty is invalidated.

Appendix

A1 Technical data
A2 Type designation
A3 Dimensions sheet
A4 Error list
A5 Controller status
A6 Troubleshooting plan
A7 DCP error diagnostics
A8 Additional equipment
A9 Important installation notes for EMC compatible installation
A10 Suggested circuit for ZETADYN 2CF
A11 Suggested circuit for ZETADYN 2SY
A12 Encoder alignment with synchronous motors
A13 Differences between the ZETADYN 2CF and ZETADYN 2SY equipment:
A14 HOTLINE NOTES
A15 Setting chart

Appendix

A1 Technical Data

Electrical data

Equipment designation		ZETADYN 2CF / 2SY xxxS4							
		013	017	023	032	037	046	062	074
Rated terminal voltage	V	3~ - 400 (absolute +10/-15 %)							
Network form		TT TN							
Nominal Power	kW	5.5	7.5	11	15	18.5	22	30	37
Mains frequency	Hz	50 / 60 +/- 1.5 Hz							
Nominal current for 60 % duty cycle, 8 kHz switching frequency	A	13	17	23	32	37	46	62	74
Nominal current for 60 % duty cycle, 12 kHz switching frequency	A	11*	15*	20*	27	31	39	53	63
Nominal current for 60 % duty cycle, 16 kHz switching frequency	A	10*	13*	17*	24	28	35	46	55
Max. operating current for 10 sec	A	24	31	42	58	67	83	112	134
Power loss (system at standstill)	W	60							
Power loss (240 journeys/hr)	kW	< 0.3	< 0.3	< 0.4	< 0.5	< 0.6	< 0.7	< 0.9	< 1.1
Mains fuses (anti-surge)	A	16	20	25	35	50	50	63	80
Terminal size mains / motor	mm²	6* / 6	6* / 6	6* / 6	10	10	16	35	35
Min. conductor size (motor cable)	mm²	2.5	4	4	6	10	10	16	25
Min. conductor size (brake chopper cable)	mm²	6							
Clamping range cable gland (motor)	mm	12-21	12-21	12-21	16-28	16-28	19-28	21-35	26-35
Clamping range cable gland (mains supply)	mm	9-21	9-21	9-21	9-21	9-21	18-27	21-35	21-35

When using a switching frequency >8 kHz generally a Brake Chopper type BC 25 must be installed!

The cross-sections given for the conductors are recommended minimum values. The system designer must check the information for his particular installation. He carries sole responsibility for the design of the system.

Ambient conditions

Permissible ambient temperature	°C	0 bis 40 above 40°C with a reduction of power of 1,66% per 1K increase of temperature
Storage and transport temperature	°C	-20 bis 60
Height of installation	above sea level	< 1000 m with rated current above 1000m with a reduction of power of 1,0% per 100m maximal 2000m
Protection class DIN 40050, IEC 144		IP 20. fulfils VBG 4 No ingress of aggressive particles, fog, water or moisture into the equipment is permitted.
Relative humidity	%	90, non-condensing

Device data

Weight (without packaging)		kg	25.0	36.0	36.3	38.0	41.6	43.6
Packaging weight		kg	6.1					
Dimensions	H	mm	600			730		
	W	mm	358			358		
	D	mm	190			251		

Control inputs	Current input: typical 25 mA/input. Voltage between "+24V" and "GND": unstabilised 20 to 24 V DC	
Relay outputs	Contact rating: 2A 230V AC for p.f. > 0.4 Minimum switching duty 12 V / 2 mA	
Auxiliary contact motor contactors	Minimum switching duty 17 V / 5 mA	
Encoder	Max. frequency: 500 kHz (10.000 Impulse/rev.; 3000 min^{-1}); See Section 2.3.4, Control inputs, “encoder“ section	
Motor PTC thermistor connection "P1-P2"	Motor-temperature monitoring for PTC thermistor to DIN 44 081. - Fault is triggered with a resistance at "P1/P2" greater than 3.6k ohm.	
EMC and RFI suppression	The controllers are immune to interference and are tested to ICE 801-4. RFI suppression to DIN EN 55011, Part 11 (Class B limit) is achieved using a type FEF RFI filter. To comply with Class B RFI limits, the motor cable must be screened and must not be longer than 10 m.	
Sound pressure (fan is in work)	Inverter size 2CF / 2SY 110	Sound pressure level
		typical 52 dB(A)
	The stated sound level was measured (following DIN 45635) in a weakly reflective room with a sound-reflecting floor. The distance to the inverter is 1m. The measuring microphone was placed at fan height. The stated data are only intended for comparative purposes. In practical operation and under other conditions deviating measurement values will arise. The sound-pressure level in the air flow (measured 1m underneath the inverter) will be approx. 6 dB(A) above the stated measurement values (valid for all inverter sizes)	
	With the controller 2SY the motor windings of the synchronous motor are short-circuited by the motor contactors, thus the motor develops a speed-depending braking torque. Without installed inverter the motor cable must be short circuited, in order to avoid high speed of the car with opened brakes.	
	Never connect or disconnect anything to the inverter while power is turned on! Hazardous voltage could be touched and the inverter or the encoder could be destroyed. Switch off the power and wait at least. 5 minutes before starting to work on the inverter.	
	The protective grounding of the inverter has to be realised by an at least 10mm² Cu wire. (see EN 50 178 (VDE0160)). With inverter size 013 – 023 the protective grounding terminal of the main supply of the inverter must be wired up with 4mm² AND 6mm² (the sum is 10mm²).	

A2 Type designation

ZETADYN 2CF023S4

- Nominal voltage 3~ 4: 400 V
- S: Version with motor contactors
  G: Version without motor contactors
- Nominal current
  013: 13 A
  017: 17 A
  023: 23 A
  032: 32 A
  037: 37 A
  046: 46 A
  062: 62 A
  074: 74 A
- Frequency controlled for:
  CF: Asynchronous motors
  SY: Synchronous motors

g. A2.1 Type designation

ZETADYN 2SY023S4
400 V 3~
50/60 Hz, 23 A, IP20
Part No..:352153
Manuf. No.:01xxxxxx/0001
ZIEHL-ABEGG

Fig. A2.2 Rating plate

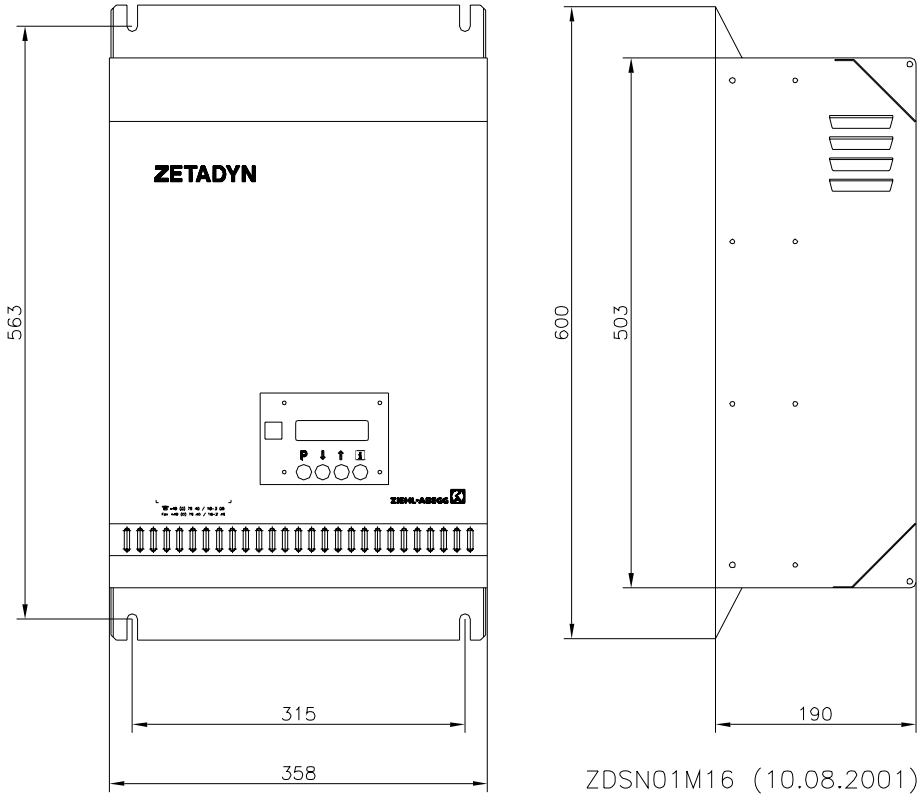
Converter type 2CF	Part No.
ZETADYN 2CF013S4 *	352141
ZETADYN 2CF017S4 *	352142
ZETADYN 2CF023S4 *	352143
ZETADYN 2CF032S4	352104
ZETADYN 2CF037S4	352105
ZETADYN 2CF046S4	352106
ZETADYN 2CF062S4	352107
ZETADYN 2CF074S4	352108
ZETADYN 2CF013G4 *	352119
ZETADYN 2CF017G4 *	352120
ZETADYN 2CF023G4 *	352121
ZETADYN 2CF032G4	352114
ZETADYN 2CF037G4	352115
ZETADYN 2CF046G4	352116
ZETADYN 2CF062G4	352117
ZETADYN 2CF074G4	352118

Converter type 2SY	Part No.
ZETADYN 2SY013S4 *	352151
ZETADYN 2SY017S4 *	352152
ZETADYN 2SY023S4 *	352153
ZETADYN 2SY032S4	352154
ZETADYN 2SY037S4	352155
ZETADYN 2SY046S4	352156
ZETADYN 2SY062S4	352157
ZETADYN 2SY074S4	352158
ZETADYN 2SY110B4	352150

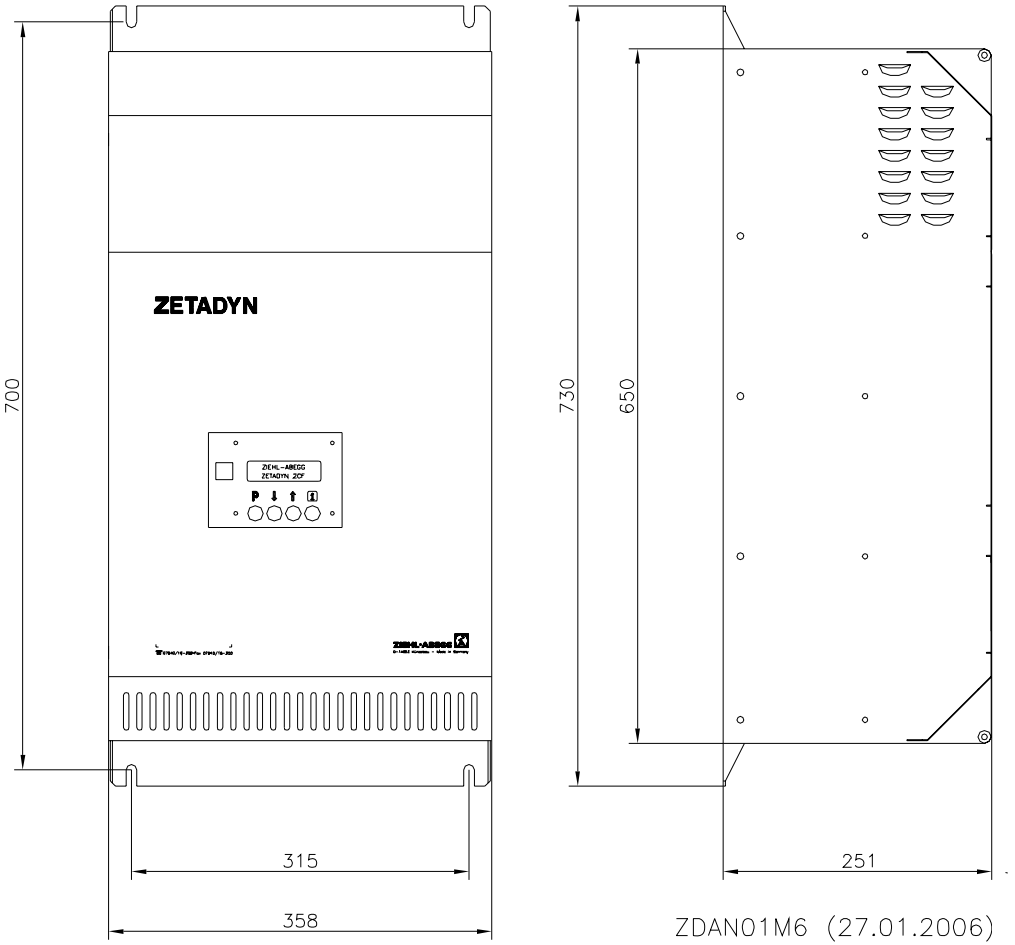
* small enclosure versions

A3 Dimension sheet

Installation clearances: min. 50 mm at each side, min. 100 mm above and below.
Mount the controller vertically with the cable connection terminals at the bottom



ZETADYN 2xx013 -
ZETADYN 2xx023



ZETADYN 2xx032 -
ZETADYN 2xx074

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A4 Error list

The controller terminates the current travel program if a fault occurs. The display starts to flash and the error is displayed with a code and plain text → press any key to clear the error message.
All messages are stored in the **/STATISTIK/STAT0** error list.
Individual monitoring functions can be disabled in the /ZA_INTERN menu using the parameters MASK1 to 5. The corresponding error number must be entered for this.
Maskable errors are marked by "M".

The MASK function should be used only for the fault searching. For permanent operation of the lift the corresponding cause of fault must be eliminated. With the masking of errors other seuence errors can occur.
Errors may be masked only after consulting the ZIEHL-ABEGG Hotline.

Errors marked with "S" will lock the inverter (only with activated lock-function)

No.	Error text	Cause	M	S
0	**Memory empty**	No error		
1	**HW: code failure**	The shunt adjustment (setting DIP switch) at the DSP differs from the arrangement of jumpers on the switched-mode power supply card	**M**	
2	**HW: fuse 5V ?**	Encoder supply (5 V) fuse blown. Encoder is wrongly connected or short circuited	**M**	
3	**HW: ADC-equalize?**	Error with adjustment of the analogue inputs (current sensors)	**M**	
4	**SSI Modul fail**	Adaptor card for the absolute encoder is not fitted	**M**	**S**
5	**SW: vers. Error**	Software versions of DSP and travel curve computer are not compatible	**M**	
6	SW: Update DSP!	The software in the DSP should be reloaded. Inform Hotline	**M**	
7	**HW: Shutdown**	Is entered when there is a phase failure at standstill. Entry only occurs when Mask x = 7 is entered, not active in as-delivered condition.	**M**	
8	**SW: Stacktop-end**	Memory error, switch off the inverter for short time, inform Hotline	**M**	
9	**SW: Switch error**	Program error, inform Hotline		
10	**Stop input !**	A travel command has been requested whilst a parameter was being changed.	**M**	
11	**V1 < V2 < V3**	V1 must be less than V2 and V2 must be less than V3	**M**	
12	**V3 <= V_NENN**	Range limit / V3 must not be higher than V_NOM	M	
13	**CPU: Com-Error!**	No communication between NEC and TI processor	**M**	
14	**Para. GEBER 2048!**	Only with ZETADYN 2SY: wrong encoder type set with Ziehl-Abegg synchronous motor	**M**	
15	**S31 to long**	The calculated deceleration distance „S31“ is too long. → increase A_NEG		
16	**ParaSet2 empty!**	Para set 2 is activated, but is empty		
17	**Error motor data**	Incorrect motor data		
18	**Error SM datas**	Incorrect motor data (synchronous motor)		
20	**Wrong direction**	The drive has moved a greater distance in the wrong direction	**M**	**S**
21	**No starting**	No encoder signal since the beginning of travelling		**S**
22	**Encoder drop out**	No encoder signal received since start of travel	**M**	**S**
23	**Travel at MB = OFF**	The drive moves after having reached standstill (the mechanical brake is applied via output “MB”) - occurs when brake is released manually - otherwise check whether contact MB is directly applying the brake without delay (without control system effect)	**M**	
24	**V > 150 % V_NENN**	Speed 50 % above V_NOM	**M**	**S**
25	**Speed alarm 10 %**	Speed deviation of 10 % N_NOM	**M**	**S**
26	**Speed alarm 5 %**	Speed deviation of 5 % N_NOM	**M**	
27	**Quickstart alarm**	Quick start function active for more than 10 s.	**M**	
28	**V > 110 % V_3**	Actual speed around 10 % higher than V3	**M**	**S**
29	**Speed to low**	Speed deviation around 15 %	**M**	**S**

30	**Phase failure**	Mains failure loss of one phase of supply during travel	**M**	
31	**DC: u < U_ZK_MIN**	The link circuit voltage has fallen below the minimum limit (ZA-INTERN/U_ZK_MIN)		**S**
32	**PS: Temp. Fault**	Over temperature of the power section during the travel	**M**	
33	**PS: Temp. Warning**	Over temperature of the power section during the start	**M**	
34	**MOT: Temp. Fault**	Motor temperature monitoring has operated during the travel (terminals P1, P2)	**M**	
35	**MOT: Temp. Warning**	Motor temperature monitoring has operated during the start (terminal P1, P2)	**M**	
36	**Phase failure !**	Phase failure phase missing during travel (extended phase evaluation)	**M**	
37	**BR: fault start!**	Contact is not in normal position before switch-on of MB		**S**
38	**BR: Alert t > T2**	Time limit exceeded on starting, mechanical brake has not released		**S**
39	**BR: fault travel**	Brake monitoring has operated	**M**	**S**
40	**DCP: Time out**	Transmission error DCP protocol	**M**	
41	**DCP: Dist. Error**	Transmission error DCP protocol	**M**	
42	**DCP: G0-G7 fail**	Transmission error DCP protocol; speed program missing	**M**	
43	**DCP: Startdis.<=0**	Transmission error DCP protocol; no remaining distance transmitted (DCP_02)	**M**	
44	**DCP: s_rest =0 ?**	Transmission error DCP protocol; a remaining distance of 0 mm was transmitted Error message is then only active if the error number entered in ZA-Intern/MASK x = 44 (inverted logic / diagnostic function)	**M**	
45	**DCP: Init fail**	DCP initialization missing (error entry only on DCP_03 / _04)	**M**	
46	**DCP: Delay fail**	Remaining distance increasing by more than 5 cm while decelerating	M	
47	**DCP: ZE2_3_ParaER**	V_ZE" / 3 controlled via DCP, ZE_2 / ZE_3 used for different functions	M	
48	**DCP: PositionCor.**	Only with DCP02 / 04 and activated DCP-Filter, correction of distance during stopping, error will not be indicated, but listed in the error memory		
49	**DCP: Dist. Fail**	Only with DCP04. The calculated remaining distance didn`t change during the travel. Problem with absolute shaft encoder.	**M**	**S**
50	**Mode: EVA ->Norm**	Information only / changeover from evacuation operation to normal operation		
51	**Mode: Norm -> EVA**	Information / changeover from normal operation to evacuation operation.		
52	**BY: Fehler (RF)**	Brake contactor on the input BY is not switching during the start (NC contact)	**M**	**S**
55	**DecMon Alert**	In the security zone the elevator may not drive no more with V2 or V3. One of these signals were switched on (only if Input ZE_x = DecMonitor		**S**
56	**Mode: Safety Brk**	Only with activated safety brake function		
57	**RF-failure**	RF signal is turned off while MB or RB is still activated. Message will only be stored as an error when the error number is put into the ZA-Intern/Mask x=57 (inverted logic), otherwise only the display will start flashing and return to normal operation after a few seconds.	**M**	
58	**v0 at travel ?!**	The "quick-start function“ has been selected during set travel. Function can only be selected at standstill.	**M**	
59	**Quick Start >20s**	The "quick start function" (hold speed ZERO until door closes) is active for longer than 20 sec	**M**	
60	**FOC: Para Error**	Communication error between DSP and travel curve processor		
61	**FOC: Timeout**	Communication error between DSP and travel curve processor		
62	**FOC: OFFLINE**	Communication error between DSP and travel curve processor		
63	**FOC: Encoder**	Communication error between DSP and encoder (only 2SY)		
64	**SSI: Ampl. Fail**	SSI Encoder Error		**S**
65	**SSI: Posit fail**	SSI Encoder Error		**S**
66	**Sin-Encoder**	No sine encoder recogniced.	**M**	**S**

	missing			
67	**SSI: Light fail**	SSI Encoder Failure (Photoelectric Scanning)		**S**
68	**SSI value fail**	Absolute encoder counter level faulty (only on 2SY), check encoder connection (screen etc.)		**S**
69	**SSI: Supply fail**	Power supply to encoder incorrect		**S**
70	**IPM: i > i_max**	Over current / incorrect encoder resolution set, faulty encoder connection, error in FOC parameter.	**M**	**S**
71	**IPM: short circuit**	Over current occurs before the mechanical brake is lifted (short circuit or earth fault)		**S**
72	**IPM: Encodersig!**	No encoder pulse received at the time of the over current		**S**
73	**IPM: Temp. Fault**	Switch-off at max. temperature of the IGBT Module (IGBT_Temp > 111° C)		
74	**IPM: KMOT open!**	Motor contactors are not closed		**S**
75	**IPM: u > u_max**	Maximum voltage of the Inverter has been exceeded.		**S**
77	**BR: T2 to low**	Timer T2 is set too low (brake release time, only when brake monitoring is activated)		**S**
78	**BR: T5 to low**	Timer T5 is set too low (brake closing time, only when brake monitoring is activated)		**S**
79	**IPM: Protect Mode**	Result of a temperature alarm or faulty IGBT.		**S**
80	**KMOT: ON !?**	Motor contactors have not picked up 5s after switching RB		**S**
81	**KMOT: OFF !?**	Motor contactors have not dropped off 5 s after switching off RB		**S**
83	**CO interrupt**	The motor contactors were interrupted during travel	**M**	
84	**KMOT: Iu = 0A**	Phase current Iu is less than 2 A / check cable from inverter to motor	**M**	
85	**KMOT: current fail**	Phase current Iv is not analog Iu / check cable from controller to motor	**M**	
86	**MC: Chk DBD Sig.**	Only when monitoring of the main contactors is activated: before or after travel one of the contactors has not dropped		
90	**BC: No function**	The fault relay of the BC has not picked up within 5s afterthe inverter has been switched on		
91	**BC: fault**	A fault occurred in the brake chopper during travel. Fault relay opened	**M**	
92	**BC: u > U_ZK_MAX**	The DC-link voltage has increased above the limit (ZA-INTERN/U_ZK-MAX)		**S**
93	**Phase failure**	Loss of one phase of supply during travel	**M**	**S**
94	**Encoder fault**	Happens if the real speed = 0 and the programmed speed > 10cm/s. No encoder signals!	**M**	**S**
95	**B6: U_ZK = 0V**	DC link voltage 0V, Rectifier defective		
96	**Overload !**	Current limit Imax was exceeded (time longer than T_Imax)		**S**
97	**ADC: Over current**	Overcurrent, value at the analog input on the DSP too high		**S**

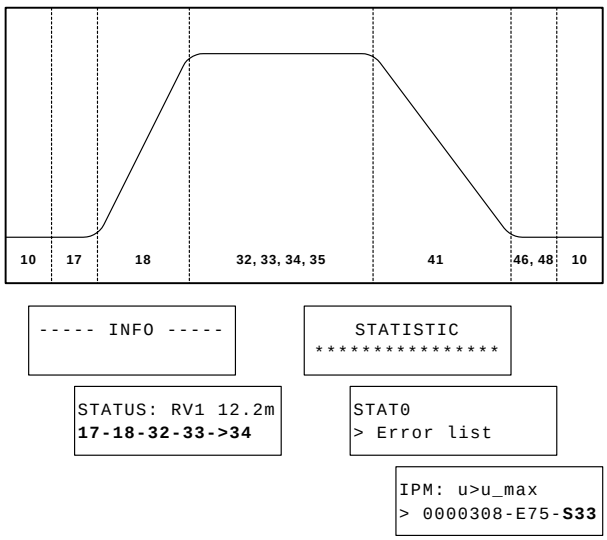
Information text

Phase rotation wrong	change power supply phase rotation
Supply phase failure	check supply phases (L1, L2, L3)
Error message	(for example E300 Object 0) call Ziehl-Abegg-HOTLINE
ZETADYN-LOCK!	Inverter is locked depending on the parameter settings in the Interface menue ST
CO-Interrupt !	The motor contactors are opened to early through the controller. (increased contactor wear)
RF- Interrupt !	Signal RF gets switched off to early (increased contactor wear)

A5 Controller-status

The travel curve computer of the ZETADYN 2xx inverter divides the travel curve in different segments. Every segment is assigned to a status number that refers to the inverter status. If a fault occurs, this status is saved along with the error number and operating hours, which simplifies the determination of the source of the problem. (see Section 4.3.3, Fig. 4.7).

Status	Internal designation	Status	Internal designation
0	WAIT	32	WEG_ABH_V3a / DIST_DEP_V3a
1	ZK_LT_LADEN / charge link circuit	33	WEG_ABH_V3b / DIST_DEP_V3b
2	ZK_LT_ENTLADEN / discharge link circuit	34	WEG_ABH_V3c / DIST_DEP_V3c
3	PRÜFE BC / check brake chopper	35	WEG_ABH_V3d / DIST_DEP_V3d
4	PARAMET_TI	36	WEG_ABH_V3e / DIST_DEP_V3e
5	ZK_MESSEN / measure link circuit	39	VERZ_Vx / DECEL_Vx
6	ADC_ABGLEICH / offset ADC	40	KONSTANT_V1 / constant V1
8	Check IGBT	41	VERZ_0 / DECEL_0
10	ANLAGE_AUS / installation off	42	SCHNELL_HALT / FAST STOP
11	ANLAGE_BEREIT / installation ready	43	DREHZAHL_0_BEI_HALT / speed 0 at stop
12	LÜFTER_ANLAUF / fan start	44	WARTE_AUF_MB_ZU / wait for MB close
13	ANFAHR_CHECK / start check	45	MOT_ID
14	WARTE_AUF_KMOT_EIN / wait for mot cont. ON	46	WARTE_AUF_KMOT_AUS / wait for motor cont. OFF
15	AUFMAGNETISIEREN / magnetisation	47	FAHRT_ABBRUCH / journey interrupt.
16	WARTE_AUF_BEWEGUNG / wait for rotation	48	FAHRT_ENDE / end of journey
17	ANFAHREN / start	50	WARTE_AUF_RF_AUS /wait for controller clearance OFF
18	BESCHL_Vx / accelerating_Vx	51	ST_DELAY
19	KONSTANT_Vx / constant _Vx	52	ZK_UNTERSPANNUNG / link circuit under voltage
20	BESCHL_SPITZ_V2 / accel peak V2	53	ZK_ÜBERSPANNUNG / link circuit over voltage
21	KONSTANT_V2 / constant V2	54	Motor temp. alarm
22	WEG_ABH_V2a / DIST_DEP_V2a	55	BC_STÖRUNG / BC fault
23	WEG_ABH_V2b / DIST_DEP_V2b	56	NMI
24	WEG_ABH_V2c /DIST_DEP_V2c	57	NMI_TEMPERATUR
25	WEG_ABH_V2d / DIST_DEP_V2d	58	NMI_QUITTIERUNG / NMI acknowledge
26	WEG_ABH_V2e / DIST_DEP_V2e	59	PARA_WECHSEL / parameter change
30	BESCHL_SPITZ_V3 / accel peak V3	60	Phase failure
31	KONSTANT_V3 / constant _V3	61	SHUTDOWN
		62	AUSSCHALTEN / switch off



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A6 Troubleshooting plan

Error messages during commissioning due to basic mistakes in connections or selections. For troubleshooting check the instructions below.

Condition for controlled operation:

Are the output terminals U-V-W of the inverter connected to the terminals U-V-W of the motor (observe phase sequence!)?
Has the encoder been connected correctly? (screening?)
Has the correct type of encoder been set in the / INTERFACES / Encoder menu?
Have the jumpers J1 and J2 (encoder) been set correctly?

Conditions in order that the controller can control starting and stopping without jerking:
Settings to perform a jerk free performance:

Is the electromagnetic **brake** switched on and off immediately by the **relay "MB"?**

Are the motor contactors switched on and off immediately by the **relay "RB"?**
In case the control system does not evaluate the contact "RB":
Are the motor i contactors switched on at the latest when the travel command is set
Do the contactors switch off time delayed after the brake drops (after the RB relay has dropped off)

Troubleshooting is divided into the following sections:

A 6.1 Error messages before controlled operation is possible
A 6.2 Error message at standstill
A 6.3 Drive does not start. Brake does not release and isolation contactors do not switch on.
A 6.4 Drive does not start, or accelerates and switches off Brake releases and isolation contactors switch on.
A 6.5 Drives switches off when decelerating
A 6.6 Drive fault when stopping
A 6.7 Checking the encoder

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A6.1 Error messages before controlled operation is possible (on the first journey)

17 Error motor data	Range limits detected whilst checking the motor data ⇒ check motor data in the MOTOR MODEL and INSTALL & MOTOR menus
20 Wrong direction	The motor has moved in the wrong direction in accordance with the encodersignals. The motor phases U-V-W are not connected correctly to the U-V-W outputs of the inverter
22 No encoder pulse	The inverter is not receiving enough pulses or none at all. The fault could be caused by the following: - the motor is locked, because e.g. the brake has not released - the encoder signals are incorrect caused by wrong connection - wrong cable has been used to extend the encoder cable - check whether there is a broken wire in the cable
23 Travel with MB=OFF	a) Mechanical brake was released manually. b) Control error: The drive starts to move although the"MB" contact is open
30 Mains failure	Loss of a phase of the power supply. The error is reported when a zero point of a phase is missing or displaced.
32 LT: Temp. Alarm (during the travel) **33** LT: Temp. Warning (during the start)	The heat-sink temperature has exceeded the limiting value (/ZA-INTERN/TEMP_MAX). Check whether the external fan of the inverter is working. (see also menu ZA-INTERN/T_VENT
34 MOT: Temp. Alarm (during the travel) **35** MOT: Temp. Warning (during the start)	Motor temperature monitoring operates... a) If the monitoring is not required. - fit a link between terminals "P1" und "P2". b) If the motor is hot: - Are balance weights fitted? - Number of journeys too high? - Is the external fan working (if fitted)? c) If the motor is cold: if the display is flashing, press any key several times. if the error message clears, the error message occurred some time ago and the motor has since cooled down (see b) above) . Otherwise, if the error message does <u>not</u> dissapear: - Check that the inverter is working correctly: Switch the equipment off. Fit link between "P1" and "P2". Error message should not occur any longer. - Check the PTC thermistor: The resistance must be less than 2.5k ohm for a cold motor. Caution when using electrical continuity testers! The maximum permissible test voltage of the PTC thermistor is 2.5 V.
36 Phase failure	Loss of a phase of the power supply. The error is reported when a zero-crossing of a phase is missing or displaced.
New version Continue with key [P]	This information is displayed when the software is changed. The unit has to be switched off and then on again after a successful reinitialisation.
MB relay doesn't operate	- The Inverter is not receiving a valid travel signal e.g the enable or the direction is missing. - Contactor monitoring (input CO) is not connected. - Motor contactors are not closing.
No selection detected	The inverter is not receiving a valid travel signal Example: enable “RF” is missing or both travel directions “RVx”are selected at the same time or not at all.

70 IPM: i>i_max	The error occurs immediately after a travel command is signaled, the drive moves slightly, or only moves at very low speed and no acceleration is possible a) check whether the output terminals U-V-W are connected to the motor terminals U-V-W (observe phase-sequence) b) check whether the encoder is connected correctly
71 IPM: IO/short circuit	The permissible link circuit current has been exceeded. The error occurs immediately after a travel command is signaled, but still before the drive starts to move. a) Disconnect the motor cable directly at the terminals in the inverter. If the same error occurs again when a travel command is rsignaled , it could be an internal short circuit (equipment faulty) b) If the fault no longer occurs after test a), reconnect the motor cable and remove the connections in the motor terminal box (Warning: insulate cable ends!!) If the same error occurs again when a travel command is signaled, check: - the motor cable for short circuits or earth faults - the contacts of the motor contactors (damage/wear)
72 IPM: encoder Signal	This error message is triggered if the current limit of the inverter is exceeded because of incorrect or missing impulses from the encoder. - Check the desired speed and actual speed in the "MONITOR" menu during a constant-speed travel at medium speed. If a deviation greater than +/- 3 RPM occurs, the encoder and the screen of the encoder cable must be checked.
80 KMOT: ON! ?	5sec. after signaling RB to the controller the motor contactors have not been switched on.,
90 BC: Function fault **91** BC: Alarm/Fault	The thermal contact of the brake chopper has opened, the temperatureis higher than 100° C. Check a) Whether the minimum installation clearances have been complied with. b) Whether the brake chopper is working correctly (resistances may only heat up during deceleration) c) whether the ambient air temperature is too high d) Check LEDs on BC If this function is not used, fit a link between the terminals "+24 V" and "BC".
94 **Encoder fault**	real speed = 0 RPM and the programmed speed > 10cm/s. No encoder signals!
96 **Overload!**	Current limit Imax was exceeded (time longer than T_max)

A6.2 Error messages at standstill

New version Continue with key [P]	This information is displayed when the software is changed. The unit has to be switched off and then on again quickly after a successful re-initialisation.
6 SW: Update DSP!	There is a new version of the software in the EPROM. EPROM has probably been replaced ⇒ inform Hotline!
23 Travel with MB=OFF	a) Mechanical brake was released manually. b) Control error:: The drive starts to move although the"MB" contact is open.
30 Phase failure	- Loss of a phase of the mains supply. The error is reported when a zero-crossing of a phase is missing.
32 LT: Temp. Alarm (during the travel) **33** LT: Temp. Warning (during the start)	The heat-sink temperature has exceeded the limit (/ZA-INTERN/TEMP_MAX). Check whether the fan of the inverter is running (see also menu ZA-INTERN/T_VENT
34 MOT: Temp. Alarm (during the travel) **35** MOT: Temp. Warning (during the start)	Motor temperature monitoring operates... a) If the monitoring is not required. - fit a link between terminals "P1" und "P2". b) If the motor is hot: - Are balance weights fitted? - Number of journeys too high? - Is the external fan working (if fitted)? c) If the motor is cold: if the display is flashing, press any key several times. if the error message clears, the error message occurred some time ago and the motor has since cooled down (see b) above) . Otherwise, if the error message does <u>not</u> dissapear: - Check that the inverter is working correctly: Switch the equipment off. Fit link between "P1" and "P2". Error message should not occur any longer. - Check the PTC thermistor: The resistance must be less than 2.5k ohm for a cold motor. Caution when using electrical continuity testers! The maximum permissible test voltage of the PTC thermistor is 2.5 V.
36 Mains failure	- Loss of a phase of the power supply. The error is also reported when a zero-crossing of a phase is missing.
90 BC: Function fault **91** BC: Alarm/Fault	The thermal contact of the brake chopper has opened, the temperature has risen above 100° C. Check a) Whether the minimum installation clearances have been complied with. b) Whether the brake chopper is working correctly (BC may only heat up during deceleration operation) c) whether the ambient temperature is too high d) Check LEDs on BC If this function is not used, fit a **link** between the terminals "+**24 V**" and "**BCT**".

A6.3 Drive does not start

- Electromagnetic brake not releasing
- Motor isolation contactor not switching on

Error No. **11, 12, 15, 17**	Range limit for parameter has been reached. - Change the value for the parameter in accordance with instructions.
10 Stop entry	Travel command has been signaled although a parameter was still being changed. Press any key and stop parameter setting.
No error message	The control unit is not signaling a complete travel signal. The following signals must be sent for the inverter to be able to start: - controller enable (terminal RF) - direction signal (terminal RV1 **or** RV2) - at least one speed (e.g. terminal V1)

A6.4 Drive does not switch off when accelerating or does not start

- Brake releasing
- Motor isolation contactor closing

20 Wrong direction	The drive has moved in the wrong direction according to the encoder. The motor phases U-V-W are not correctly connected to the U-V-W outputs of the controller.
21 No start	The inverter receives no encoder signal within the encoder monitoring time (/ZA-INTERN/T_EMON). a) Motor does not accelerate and switches off → Check encoder connections (see Section 2.3.7 & 2.3.8 / Encoder). b) Motor does not turn but there is noise → Motor locked or mechanical brake not releasing
22 No encoder pulse	Encoder signal ("A" / "B") has failed Check encoder (see appendix A6.7)
70 IPM: i>i_max	a) Check whether the Inverter terminals U-V-W are connected to the motor terminals U-V-W b) Check if the encoder has been connected correctly. In case all of those steps are carried out propperly exchange the two signals /A and /B. The rotation of the motor can be changed in the interface menu MO_DRf c) If the installation still does not run after checking a) and b), then change over two phases to the motor. If controlled operation is still not possible, then exchange the encoder tracks /A and /B again.
72 IPM: Encoder signal	This error message is shown if the current limit for the inverter is exceeded because of incorrect or missing pulses from the encoder. - Check the desired speed and actual speed in the "MONITOR" menu during a constant-speed run at medium speed. If a deviation greater than +/- 3 RPM occurs, the encoder and the screen of the encoder cable must be checked.
29 Speed too low	Speed deviation around 15 % - incorrect setting of the encoder resolution - incorrect motor data - gain (controller K_nr) too low
31 DC:U<U_ZK_min	The link circuit voltage has droped below the limit. - wrong terminals used/faulty motor connection - incorrect setting of the encoder resolution - incorrect motor data
36 Phase failure !	Phase missing during travel (extended phase evaluation) - incorrect motor data - phase shift of the supply (see also Section 2.3 "Connection and terminal arrangement" → controler transformers)
96 **Overload!**	Current limit Imax was exceeded (time longer than T_Imax)

A6.5 Drive shuts down when decelerating

92 **BC: u > U_ZK_MAX**	The link circuit voltage has increased above the limit (ZA-INTERN/U_ZK-MAX)
83 KMOT: Interruption	Normal travel: The motor contactors were interrupted during a travel. Can be caused by bouncing contact in the safety chain. Inspection /Return: The inspection or return speed is higher than 1/3 of nominal speed.

A6.6 Drive switches to fault when stopping

23 Travel with MB=OFF	a) Motor still turns even though the mechanical brake should have been applied already. Contact "MB" does not operate the electromagnetic brake directly. b) The mechanical brake is set to soft so the cabin travels further than set in the ZA_INTERN/S_MB when the inspection signal is switched off. that the drive covers a longer distance when inspection is switched off than the distance set in the ZA_INTERN/S_MB parameter

A6.7 Checking the encoder

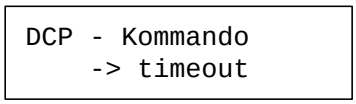
Check jumpers **J1, J2** (see chapter 2.3.6 & 2.3.7 - Encoder).

- Is the encoder connected correctly?
  When connecting other encoders, check whether the technical data has been complied with.
- Check the actual speed at the controller: /MONITOR/N_ACT, INFO-Menu
  or ZA-INTERN/TM4 (pulse counter)
- Release the brake by hand and check the actual speed (or value TM4).

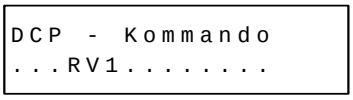
A7 DCP error diagnostics

No communication between the inverter and the controller during standstill.

If there is no DCP-connection between the inverter and the controller, following message will be displayed in the menu \Info\DCP-Kommando -> timeout ".

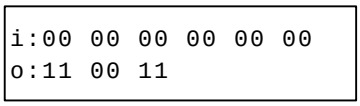


fault: no communication

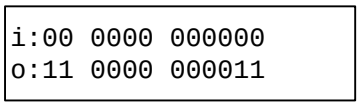


correct message during standstill

During standstill the inverter should be in status 10 (see menu \Info\Status). The DCP-telegram should have the values listed below (see \Info):



DCP01/02



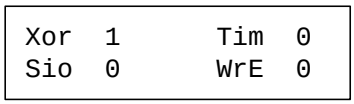
DCP03/04

- The value "i: 00..." in the input-telegram indicates, that no travel command is existing
- The value "o: 11..." in output-telegram (status-byte of the inverter) indicates, that the inverter is in standby-mode and no error is existing.

Possible error causes are:
- The controller or the inverter is no set to DCP-operation.
- The controller and the inverter are adjusted to different DCP-modes
- The DCP-cable is broken or not connected correctly.

Intermittent failures of the DCP-connection (transmission errors):

Transmission errors can be observed in the menu \Info. The meter reading will arise if transmission errors appear during operation.
With knowing the moment when the error occurs, it is possible to find out the error cause (e.g. error during stopping ➔ brake is not equipped with a suppressor element)



The denotation of the counters:
- Xor the inverter recognizes a transmission error in the telegram of the controller
- Tim Timing (the controller does not answer, occurs during switch-on)
- Sio always 0 from software 2.00
- WrE the controller recognizes an transmission error to controller

Possible error causes are:
- The shield of the DCP-cable is not connected to ground (in the controller as well as in the Inverter).
- No shielded and twisted pair cable is used.
- The DCP-cable between inverter and controller should be installed without additional terminals.
- Components without suppressor elements are mounted in the cabinet (contactors, brakes, neon lamps etc.).
- The varistor for the radio interference suppression of the brake must be connected in the terminal box of the brake.
- The shield of the motor-wires and brake-chopper wires are not connected to ground.

Indications for commissioning with DCP4

Before starting the travel the required stopping distance of the inverter will be transmitted to the control. The controller records the covered distances directly by an absolute encoder in the shaft. The inverter calculates the required distances by the encoder of the motor. The calculated values of the inverter are only correct if the correct transmission ratio (gearbox, traction sheave, suspension) is used to calculate V_NENN and the motor data (N_NENN) are correct. If the settings are not correct, the calculated distances and travel speeds are incorrect. No flush stopping, a pass over of the flush position and long crawling distances could be the result.

Through the indication of the real speed in menu \Info, the accordance of V_NENN with the calculated values of the controller (indication "real") can be checked. The inverter acquires the real nominal speed of the cabin by 2 positioning telegrams of the controller. If there is a deviation between V_NENN and real, the parameter V_NENN (menu \INSTALL. & MOTOR) have to be adjusted and the absolute encoder of the control has to be checked respectively.

```
V_NENN = 1.50 m/s
real   = 1.50 m/s
```

To have the assumption for a correct indication of the real speed, 2 correct position telegrams have to be transmitted from the control to the inverter. The first travel after switching-on acquires no correct speed. Negative values for the position are invalid (check flush position of the control). Short distances with low speed and slip of the rope lead to inaccurate results.

A8 Additional equipment

A8.1 Brake chopper BC25 / BC50 / BC 100

These transistor brake choppers are supplied as a complete unit that includes the braking resistors.
The peak braking current is 25 A or 50 A respectively.

Brake chopper	BC 25	BC50	BC100
Peak braking current (10 % ED with reference to 120s)	25 A	50 A	100 A
Clocking frequency	1.1 kHz	1.1 kHz	1.1 kHz
Intervention voltage	680 V	680 V	680 V
Cooling	Convection	Convection	Convection
Maximum power output (at 10 % ED)	1.6 kW	3.2 kW	6,4 kW
Dimensions W x H x D	300 x 300 x 220 mm	300 x 300 x 220 mm	550 * 300 * 220 mm
Mounting dimension W x H (for M5 bolt)	280 x 250 mm	280 x 250 mm	530 * 250 mm
Protection class	IP20	IP20	IP20
Weight	4.9 kg	5.3 kg	11,3 kg

Installation position:
Vertical (max. 10° inclination), Connection terminals, bottom right

Cooling:
By convection. The minimum installation clearances must be observed to ensure adequate convection.

Mounting and operating the brake-chopper:

Assembly place:
- mounting only outside the cabinet because of the large energy dissipation
- Must be installed only on **non flammable** underground.

Installation position:
- Perpendicularly, max. 10° bevel, connecting terminals right side down

Cooling, place of assembly:
- By convection. Sufficient convection must be provided by keeping the minimum distances.
- max. temperature of the cooling air 40° C
- relative air humidity 0 .. 90 %, non condensing
- max. installation altitude: 2.500m (reduced performance above 1.000m)

Minimum clearances:
- see fig. 8.1.1
- **200 mm** to non flammable materials (fire classification A1 according to EN 13501-1)
- **600 mm** to materials of low flammability without smoke emission and without burning dripping (fire classification B, C-s1 d0 according to EN 13501-1)

Temperature monitoring:
- **Operating without temperature monitoring is not allowed.**
- The switching of the failure-contact must be observed by the inverter. Otherwise the brake chopper can start to burn when an error occurs.

Danger:
- When overloading the brake chopper the air within 200mm distance can reach 400°C. The minimum clearances must be kept.
- **Risk of fire, do not cover the brake chopper.**

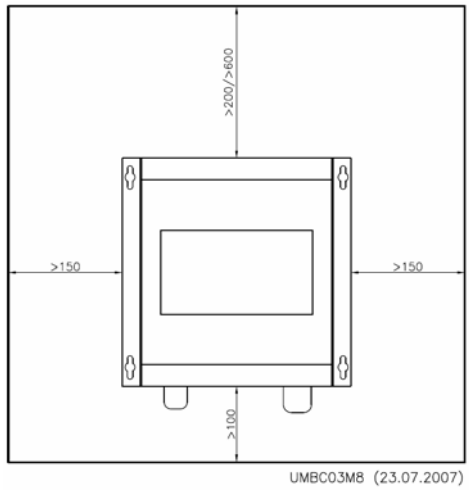


Fig. 8.1.1 Minimum clearances BC25/BC50
200 mm to non flammable materials
(fire classification A1 according to EN 13501-1)
600 mm to materials of low flammability without smoke emission and without burning dripping
(fire classification B, C-s1 d0 according to EN 13501-1)

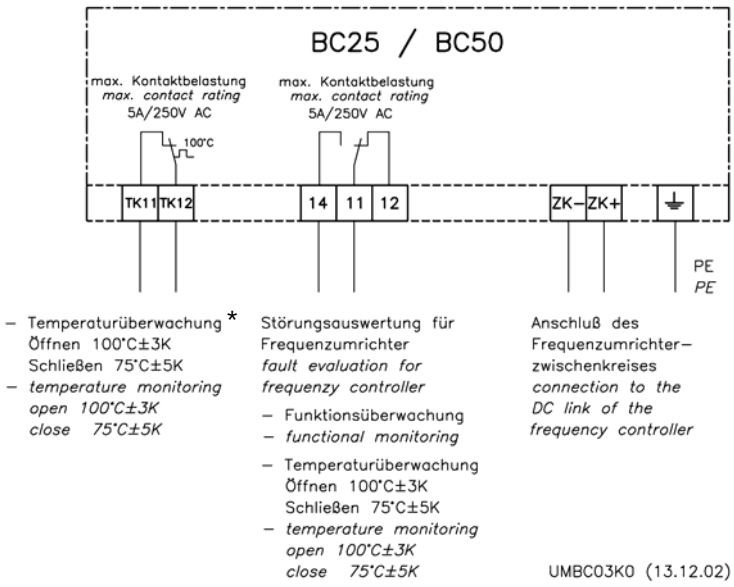


Fig. 8.1.2 Connection diagram BC25/BC50

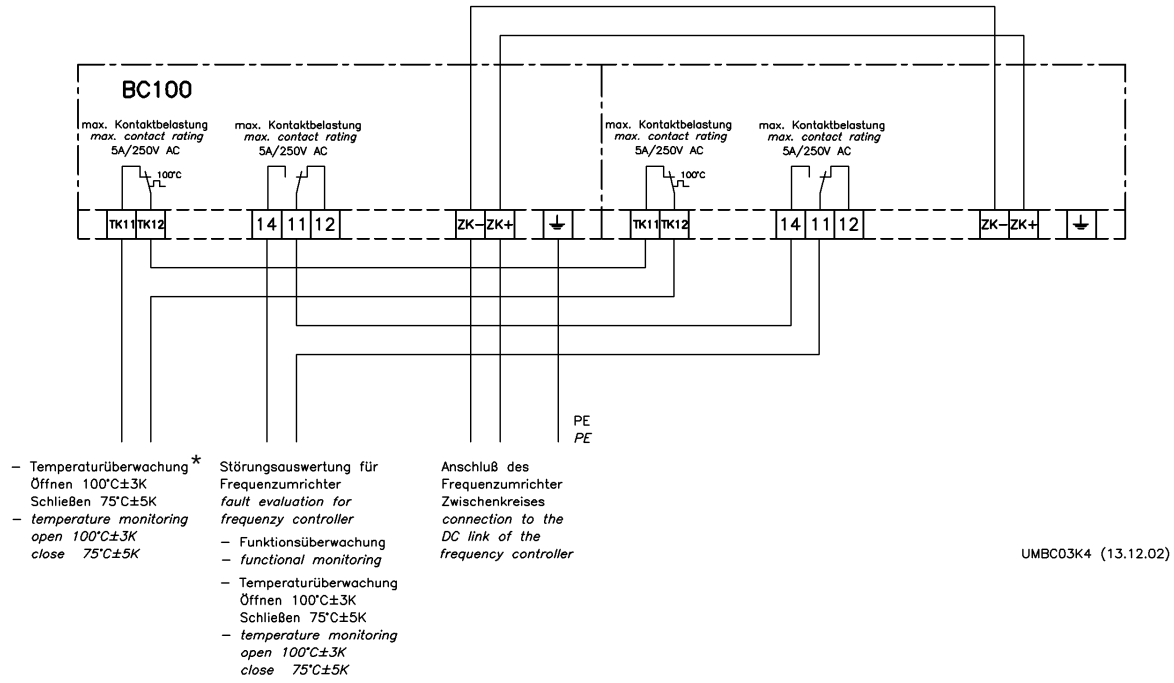


Fig. 8.8.3 Connection diagramm BC100

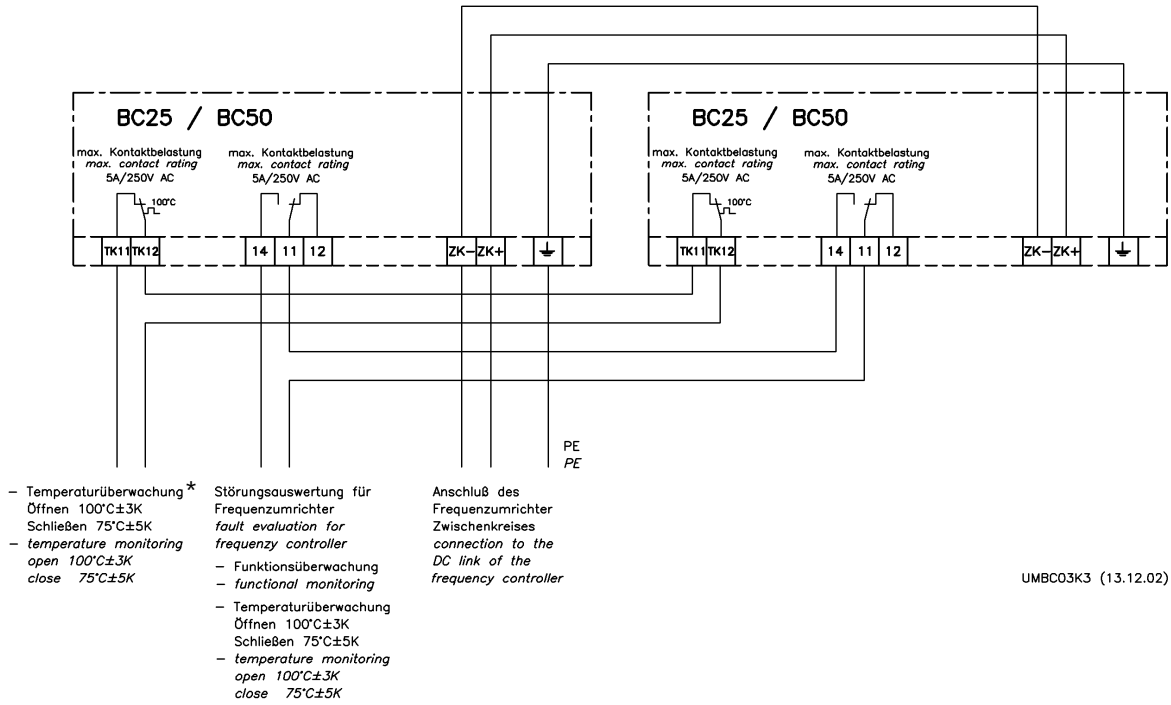


Bild 8.1.4 Connection diagram BC25 / BC50 parallel

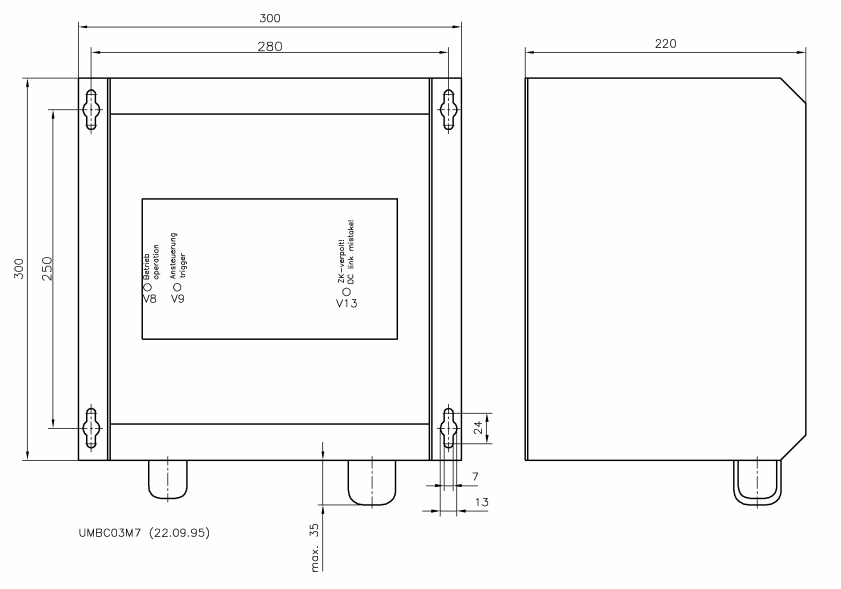


Fig. 8.1.5 Dimensions sheet BC25 / BC50 with position of the LED display

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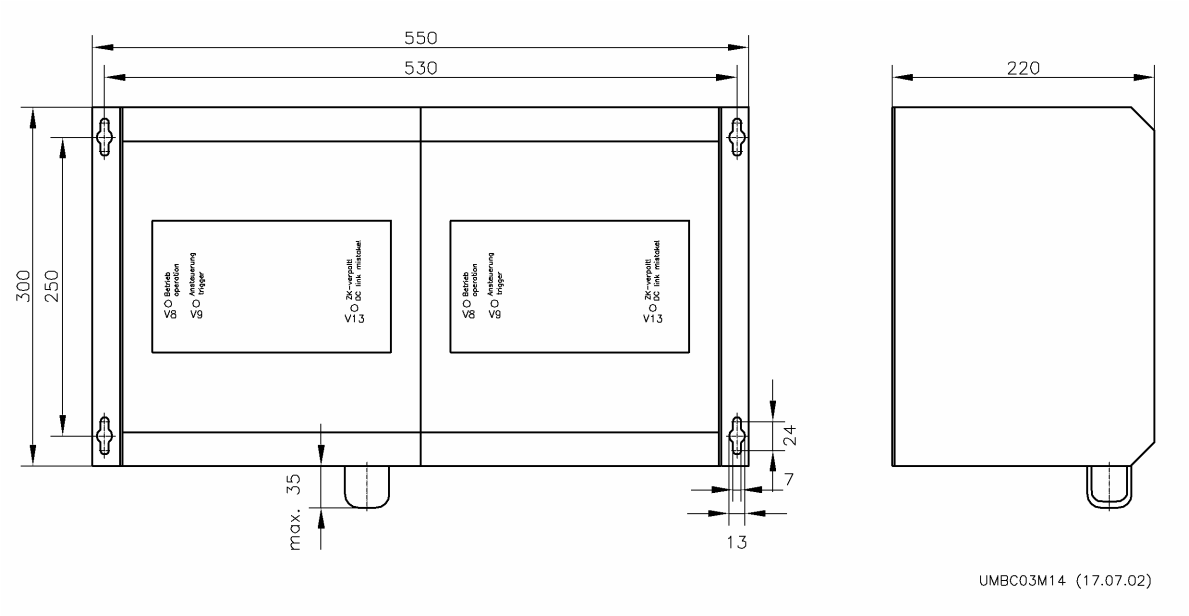


Bild 8.1.6 Dimensions sheet BC100 with position of the LED display

LED V8 (operation)
This yellow LED illuminates as soon as the link circuit voltage of the connected inverter has reached ist operating voltage.

LED V9 (control)
This green LED starts to glow as soon as the link circuit voltage has increased to a value >680 V DC, and the brake chopper converts the energy generated by the motor into heat.

LED V13 (link circuit reverse polarity)
This red LED illuminates when the link circuit of the inverter is connected in reverse polarity.

A8.2 Brake-Resistor BR17-1 / BR25-1

The braking resistance is offered as a unit and is intended for equipment sizes ZETADYN 2xx 013 / 017 / 023, the required control electronics are already integrated in the controller.

Braking Resistor	BR 17-1	BR 25
Peak braking current (10 % ED with reference to 120 s)	17 A	25 A
Cooling	Konvektion	Konvektion
Maximum power output (at 10 % ED)	1,19 kW	1,74 kW
Dimensions W x H x D (mm)	300 * 185 * 155	300 * 185 * 155
Mounting dimensions W x H (for M5 bolt)	280 * 141	280 * 141
Protection class	IP20	IP20
Weight	2,2 kg	2,2 kg

Trigger-voltage 680 V

In assigning the brake choppers to the particular converter type, typical installation values were assumed. In order to avoid brake chopper failures or over temperatures, design calculations for the installation are required.

Mounting and operating the Brake-Resistor:

Assembly place:
- mounting only outside the cabinet because of the large energy dissipation
- Must be installed only on **non flammable** underground.

Installation position:
- Perpendicularly, max. 10° bevel, connecting terminals right side down

Cooling, place of assembly:
- By convection. Sufficient convection must be provided by keeping the minimum distances.
- max. temperature of the cooling air 40° C
- relative air humidity 0 .. 90 %, non condensing
- max. installation altitude: 2.500m (reduced performance above 1.000m)

Minimum clearances:
- see fig. 8.2.1
- **200 mm** to non flammable materials (fire classification A1 according to EN 13501-1)
- **600 mm** to materials of low flammability without smoke emission and without burning dripping (fire classification B, C-s1 d0 according to EN 13501-1)

Temperature monitoring:
- **Operating without temperature monitoring is not allowed.**
- The switching of the failure-contact must be observed by the inverter. Otherwise the brake chopper can start to burn when an error occurs.

Danger:
- When overloading the brake chopper the air within 200mm distance can reach 400°C. The minimum clearances must be kept.
- **Risk of fire, do not cover the brake chopper.**

further information:
- If the brake-resistor is connected to the terminals ZK+ and ZK-, he has a continuous output of 8 kW. The consequence is an extreme overheating of the brake-resistor. If the failure-contact is not connected, the brake-resistance will be destroyed by the overheating.
- By using an **EVAC1C** it is not possible to use a brake-resistance, because the terminal R is not available in the EVAC 1C. In connection with an EVAC 1C a Brake-Chopper must be used!

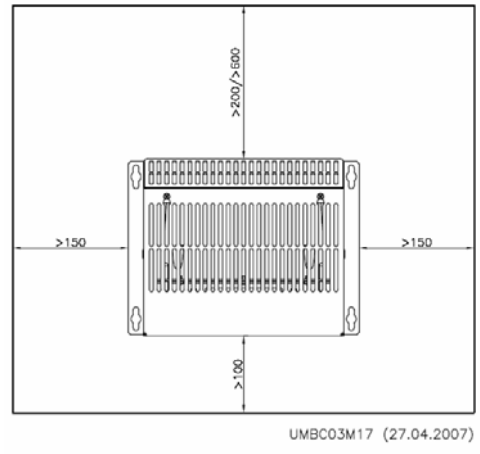


Fig. 8.2.1 Minimum clearances BR17-1 / BR25-1
200 mm to non flammable materials
(fire classification A1 according to EN 13501-1)
600 mm to materials of low flammability without smoke emission and without burning dripping
(fire classification B, C-s1 d0 according to EN 13501-1)

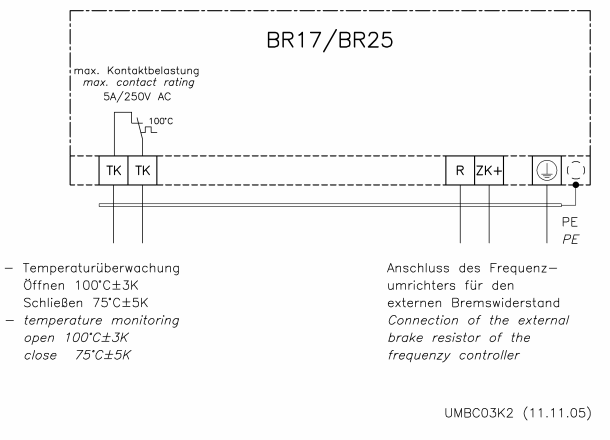


Fig. 8.2.2 Connection diagram BR17-1 / BR25-1

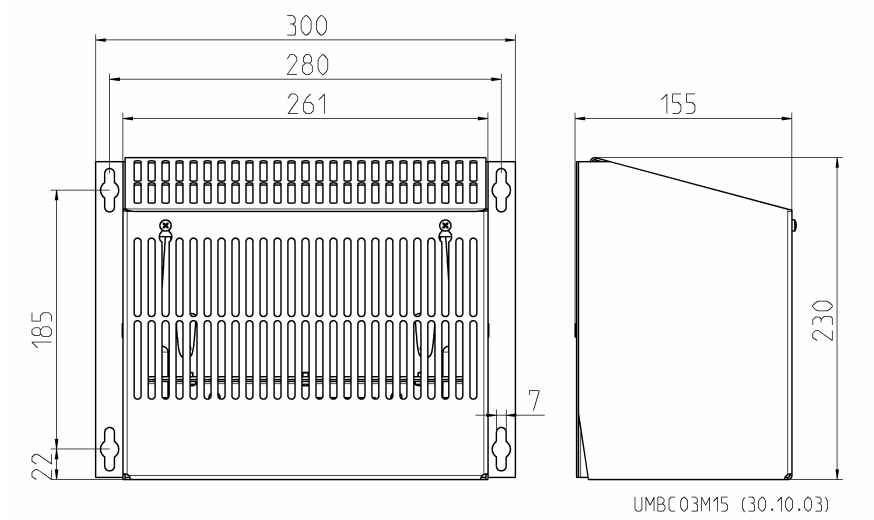


Fig. 8.2.3 Dimension sheet BR17-1 / BR25-1

Assignment of Brake-Chopper and Brake-Resistor

Converter type 2CF	Part No.	BR / BC	Part No.
2CF013S4	352141	BR17-1*	357016
2CF017S4	352142		
2CF023S4	352143	BR25-1*	357036
2CF032S4	352104	BC25	357031
2CF037S4	352105		
2CF046S4	352106	BC50	357032
2CF062S4	352107		
2CF074S4	352108	BC100	357033

Converter type 2SY	Part No.	BR / BC	Part No.
2SY013S4	352151	BR17-1*	357016
2SY017S4	352152		
2SY023S4	352153	BR25-1*	357036
2SY032S4	352154	BC25	357031
2SY037S4	352155		
2SY046S4	352156	BC50	357032
2SY062S4	352157		
2SY074S4	352158	BC100	357033

In assigning the brake choppers to the particular converter type, typical installation values were assumed. In order to avoid brake chopper failures or over temperatures, design calculations for the installation are required.

*When working with a switching frequency > 8kHz a Brake-Chopper Type BC25 must be used!

A8.4 External Control Panel RCP1 (Remote Control Panel - retrofit kit)

Intended for inverter, which are mounted in inaccessible positions, the RCP1 allows the inverter to be programmed in the accustomed manner. The RCP1 is snapped onto a DIN-rail in the control system control panel, the displays and controls are easy to see and operate. The RCP1 is designed as a retrofit kit, and hence can also be fitted on existing installations (from software version 2.10).
Installation is simple, the display of the ZETADYN is replaced by an interface card with a blank cover plate The display is then plugged into the RCP1 card frame in the control panel, and the connecting cable connected. Operation and menus are unchanged. The RCP1 is powered from the inverter so no separate power supply is required.

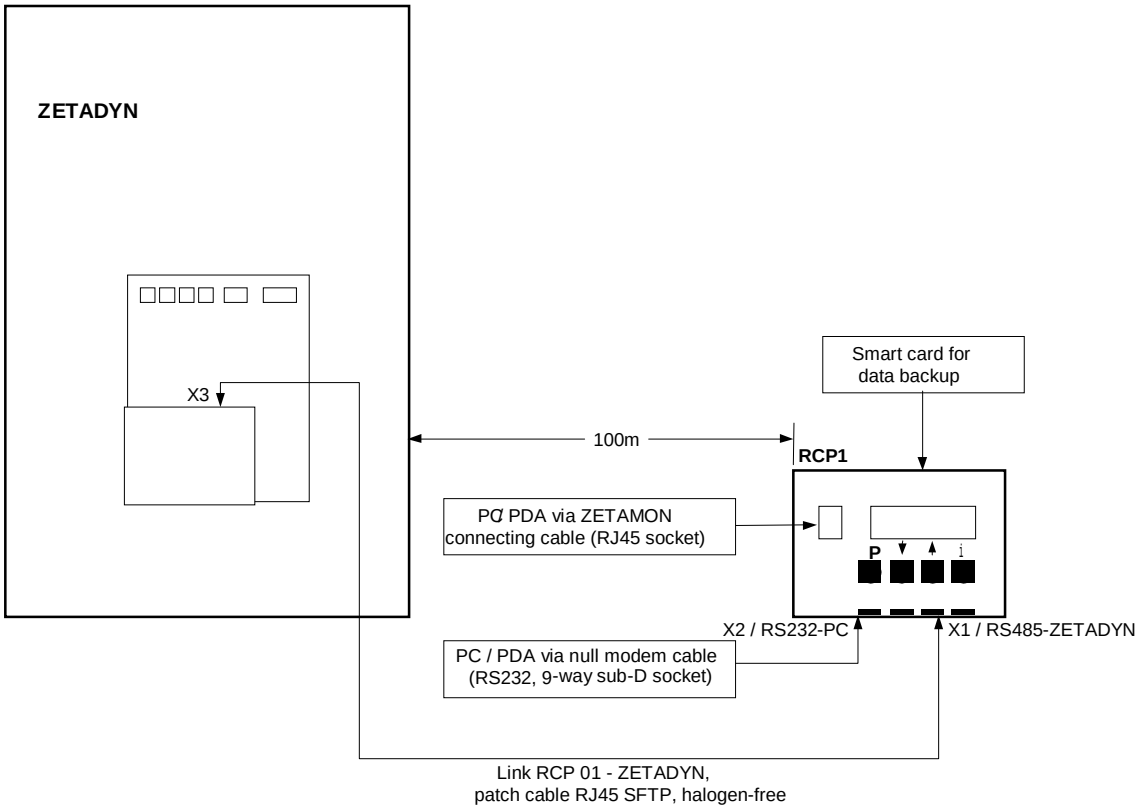


Fig. 8.4.1 Connection of the RCP1

Control

Contrast of the LCD display can be optimized by turning the potentiometer "LCD-Contrast", located bottom right.

After switching on the controller, the following status message is shown in the display of the RCP01:

* RCP01 *
V2.04-R-281201-1

V2.04 = Versionsnummer, R = RCP01-Kennung,
281201 = Softwaredatum, 1 = Hardwareindex

The switch-on message is displayed for 3 seconds. If any key is pressed during this time, the display is held until the key is released. When the time has expired, the operator interface of the ZETADYN 2CF / 2SY controller is shown in the display. The frequency controller can be controlled in the accustomed manner.

Connection of a notebook or PDA via the ZETAMON transmission cable

Data transmission of the RCP01 has to be changed over to the ZETAMON mode prior to connection of the ZETAMON transmission cable by simultaneously pressing the p and the i keys for 3 seconds.

`Wait !!!`	An indication for the changeover appears for about 1 second
`*-- ZETAMON ---*` `-> [RCP]`	Status message for ZETAMON operation

The ZETAMON transmission cable is connected to RJ-45 socket on the cover plate of the display, the data are transmitted to the controller via the connecting cable. If the ZETAMON transmission cable is used, the interfaces of the PC and the RCP01 are galvanically isolated.

To terminate the ZETAMON mode, remove the data cable first, then switch back to remote control mode using the i-key. After indication of the changeover, the controller menu is displayed again.

Connection of a notebook or PDA via the RS232 interface

The RCP01 is equipped with a 9-way RS232 interface (sub-D). A PC or PDA which is similarly equipped with a 9-way serial interface RS232 can be connected using a null modem cable (e.g. Bürklin, Part No. 13M2942).

Data transmission is automatically changed over to the RS232 mode when the ZETAMON software is started.

`Wait !!!`	An indication for the changeover appears for about 1 second
`*--- RS-232 ---*`	Status message for RS232 operation

The RS232 interface is protected against over voltage due to ESD, however, it is not galvanically isolated. It is recommended that only battery-operated devices without a mains connection are used.

When the ZETAMON software is terminated, the RCP01 returns to the remote control mode.

Data back-up of controller parameters on smart card

With the RCP1, the control parameters can be backed up on the smart card supplied. To do this, insert the memory card into the contacts inside the cardholder; the card is detected and the memory function is activated:

`Wait !!!`	An indication for the changeover appears for about 1 second
`*--SmartCard---*` `[->ZA]  [<-ZA]`	Status message for smart card mode

The memory function is selected with the P and i keys:

i: Data is transferred from the ZETADYN to the memory card

`Load from ZA  ?` `[yes]  [no]`	After confirmation with P, data is written to the memory card, **existing data is cleared during this process.**
`WAIT....!` `SC<- 1:123:0102`	The data storage process continues, duration approx 2 minutes. Do not switch off the controller or remove the card during the data storage process.
`Remove Data Card`	The data storage process is terminated; remove the card. The RCP01 returns to the remote control mode.
`Error Data Card` `[press any key]`	**Error message** with faulty or wrongly inserted memory card

P: Data is transferred from the memory card into the parameter memory of the ZETADYN control system

`Transfer to ZA ?` `[yes]  [no]`	After confirmation with P, data is written to the parameter memory of the controller, **existing data is cleared during this process.**
`WAIT....!` `->ZA  1:123:0102`	The write process continues, duration approx. 4 minutes. Do not switch off the controller or remove the card during the data storage process.
`Remove Data Card`	The write process is terminated, remove the card. The RCP01 returns to the remote control mode.
`Data Card Empty` `[press any key]`	Error message - memory card empty or wrongly inserted.

The controller software cannot be updated via the remote control. The LCD control panel has to be directly connected to the controller for requests for confirmation during initialisation of the new software. For this short time, the LCD has to be plugged into the controller. The controller must be opened to change the memory chip (Eprom).

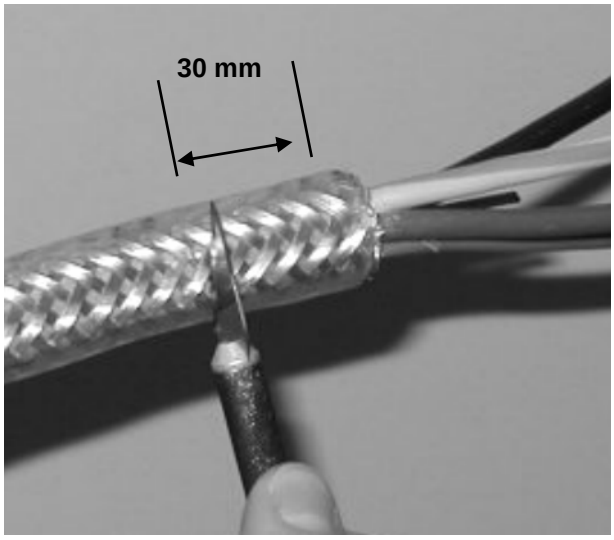
A9 Important installation notes

- The ZETADYN-Controller must be mounted vertically. The minimum clearances must be strictly observed (Section A3).
- The toothed washers must be used when fitting the front panel. The EMC characteristics of the controller are affected if the washers are not fitted.
- A screened cable must be used for the cable to the motor. The installation notes must be strictly observed (Section A9
- The installation instructions and minimum clearances of the brake chopper and braking resistor must be strictly observed (Section A7)
- The installation position of the controller with brake chopper and braking resistance should be chosen so that it is inaccessible to unauthorized persons. There is a fire risk if the brake chopper or braking resistance are covered by flammable material.
- The installation position of the controller should be chosen so that the noise produced by motor contactors cannot travel over areas without acoustic damping. The contactor mountings are decoupled in the controller, however the resultant sound transmitted by air cannot be avoided. The same applies to the noise generated by the fan.
- During installation, no moisture, drilling swarf, metal parts of the screen braiding, bolts or other foreign bodies must be allowed inside the controller. The ventilation openings must not be covered. The controller could be destroyed.
- For compliance with Class B RFI limit, the length of the motor cable must be **10 m max**.

Correct EMC connection

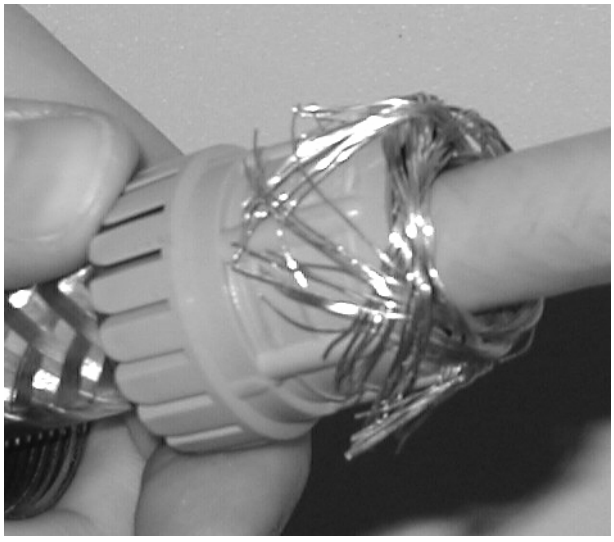
The quality of the connection and hence the screen transitions have a decisive influence on the overall effect of the screen.
The controller's special EMC cable glands simplify wiring and reduce installation time.

1.



Cut back the outer sheath of the screened cable by a length of 30 mm.
The inner sheath must **not** be removed!

2.



Turn the screen braid back over the plastic bush.
The wire ends of the screen must not jut out beyond the recessed collar.

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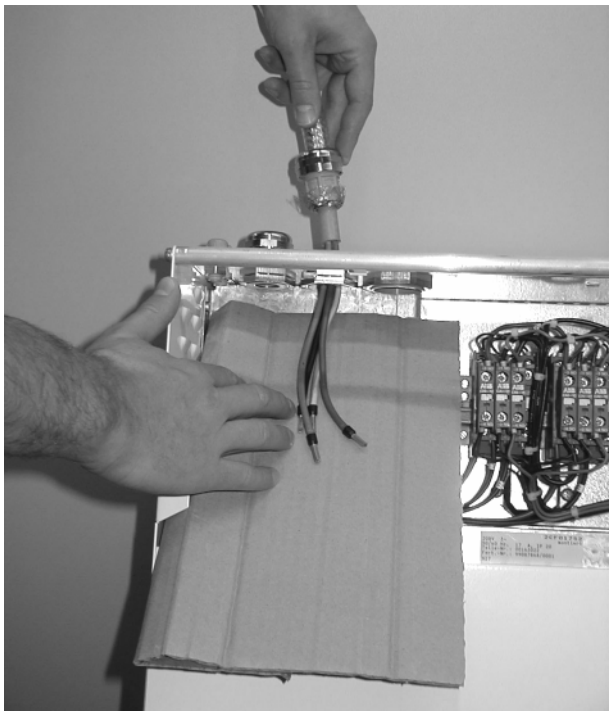
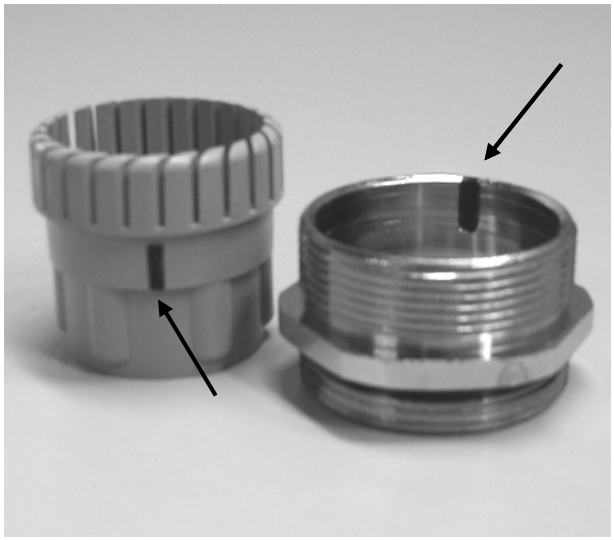
3.



ATTENTION!

The ventilation holes of the power section must be covered when the cable is being brought into the controller.
Make absolutely sure that no cut off wire strands of the screen get inside the controller!
Non-observance can lead to controller malfunction, or possibly to destruction of the controller.

4.

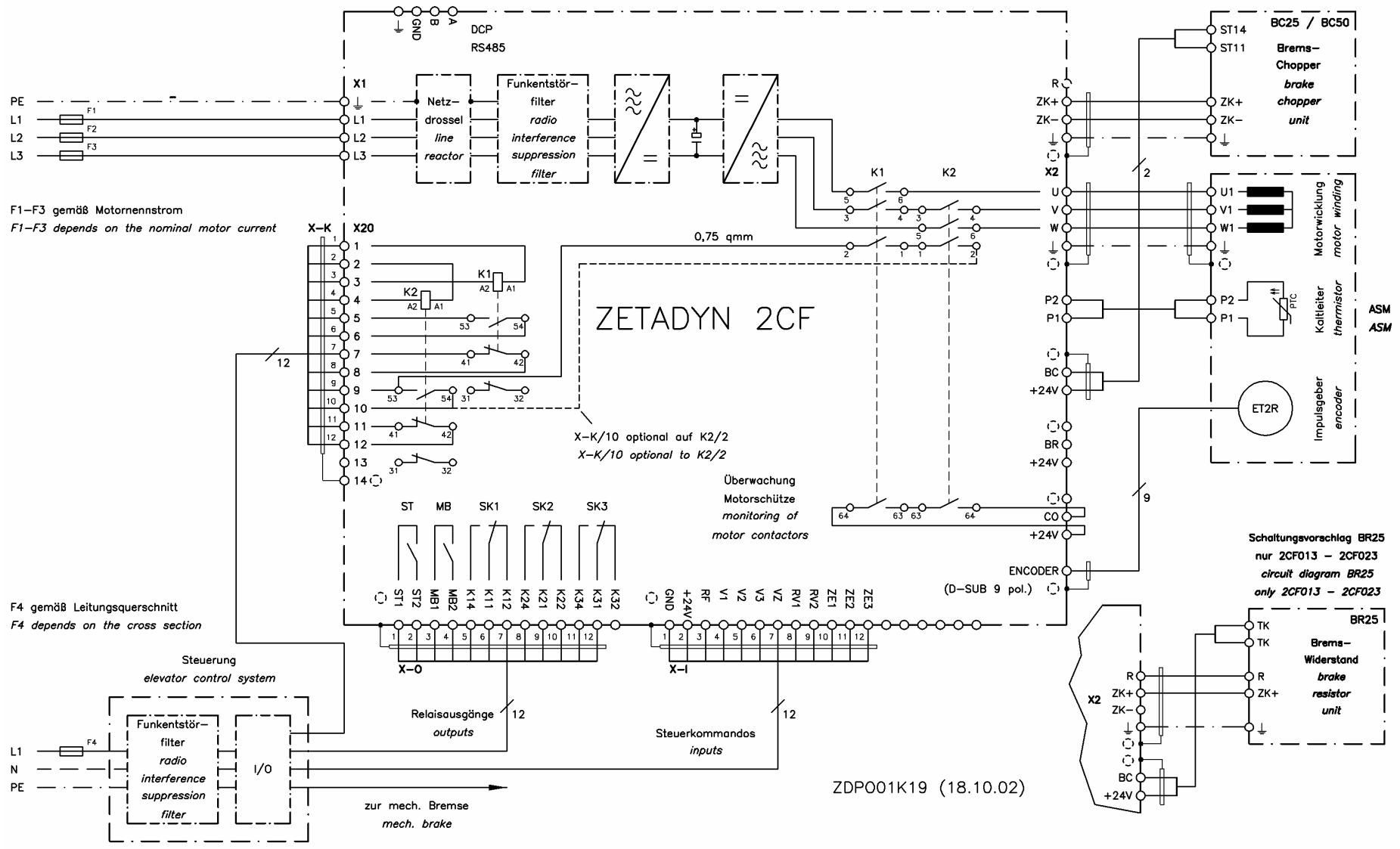


Ensure correct positioning of the tongue and groove when inserting the plastic bush.

5.

If you have any further questions, we'll be pleased to help. Please contact us (Tel: +49 79 40 16-3 08).

A10 Suggested circuit for ZETADYN 2CF:



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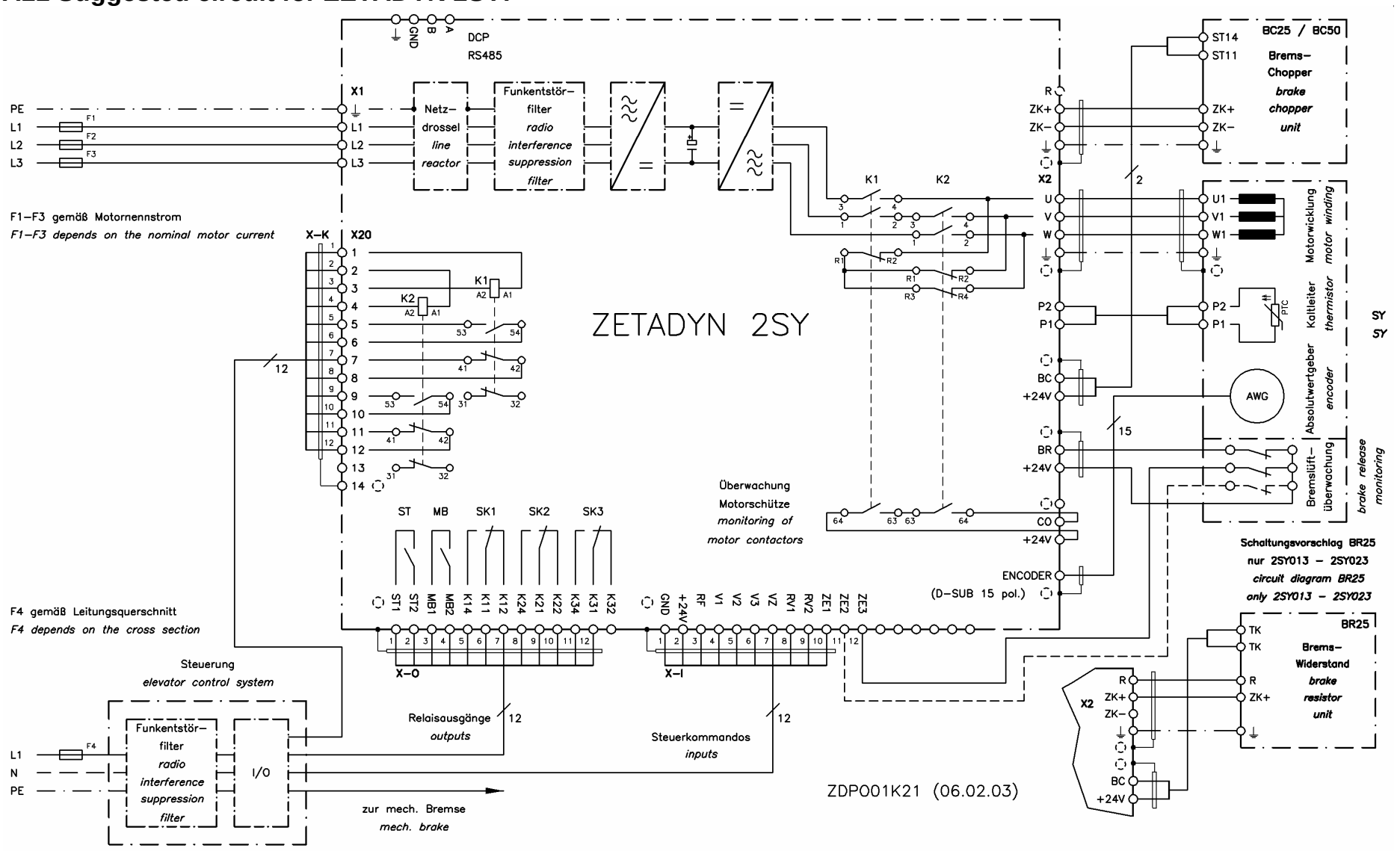
A11 Suggested circuit for ZETADYN 2SY:



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A12 Encoder alignment with synchonous motors

The ENCODER menu is hidden during normal operation. Simultaneously pressing the up and down arrows for 3 seconds makes it visible.

```
    ENCODER
***************
```

```
@ECPOS          10
 Encoder Position
```

Display of the incremental position detector value
Per motor revolution 0...[4*ENCODER]-1. *(starting from TI 2.23)*

```
@ECOFF           0
> Encoder-Offset
```

Encoder offset [default 0 !!!]

```
@ECID         OFF
> Enocoder Ident
```

Start of the encoder offset identification

Carrying out manual calibration with SSI encoder

Preparation:
Preparation:

- Configure the installation and motor specifications
- for no-load operation (without rope)
- Configure the brake monitoring (INTERFACE \ BR=Off)
- Configure the motor contactor monitoring (INTERFACE \ CO=Off)
- **The ECOFF parameter must be set to 0 !!! ➔ Verify**
- The contactor monitoring must be connected to the CO input.
- Reduce the rated current (\ INSTALLATION & MOTOR \ I_NOM) to 71 % (= $1/\sqrt{2}$) of the originally set value. Please be sure to note down the old value!

  Only with ZETADYN 2SY062 – 110:
  Activate an inspection travel until the motor contactors have switched. Abort the inspection travel as soon as the motor contactors have switched

During manual encoder calibration, the motor is powered with direct current. During this, the rotor jumps to the middle of the nearest pole. The absolute rotary encoder must be calibrated to its exact absolute zero-point in this position of the rotor.
With ZETASYN motors, it is recommended to mount the encoder in such a way that the encoder clamping-screw can be easily accessed via the encoder flange openings for calibration. For that, connect the encoder to the drive before mounting on the encoder flange and turn it as exactly as possible to the zero point (value in menu ENCODER \ @ECPOS). Then, without twisting the encoder axle, mount it in such a position that the clamping screw is easily accessible.

Alternatively, the encoder can be adjusted to the value of any pole (in table 1) (possibly necessary if the clamping screw is not accessible in pos. “0“).

Perform the encoder calibration:

```
@ECID         ON
              ON
```

In the „ENCODER“ menu:
Start the encoder offset-identification with "ON"

```
 Select ID-Mode
[MANU]     [AUTO]
```

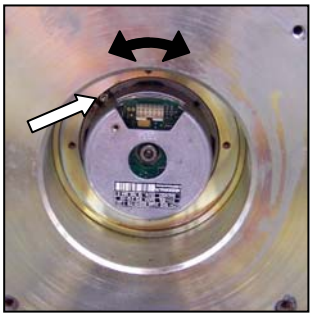
Select MANU with the P key

```
Press inspection
          [exit]
```

- Press the inspection switch.

ECOFF	0

- The motor is powered in phase U with the rated current. The motor shaft revolves to the zero-point of one pole.



By turning, adjust the encoder as exactly as possible to 0 ±1. During this, carefully tighten the clamping screw and correct the ECOFF value (possibly by lightly tapping on the encoder, or similar). The displayed value corresponds to the 4-fold encoder resolution, and during adjustment of the zero-point jumps between 0 and max (generally 8191 in the 2048 encoder)

The encoder must be tightly fastened and the ECOFF value must be set to 0 at the end of the procedure.

- End with switching off the inspection ride.

Do not forget at the end !!!

- **Configure the rated current to the original value**
- **Configure the brake monitoring (INTERFACE \ BR)**

Pole pair	ZETATOP machine SM 225	ZETASYN machine SM 700, SM 850
	10 pole pairs	15 pole pairs
1	0	0
2	818	546
3	1636	1092
4	2455	1638
5	3273	2185
6	4091	2731
7	4909	3277
8	5727	3823
9	6546	4369
10	7364	4915
11	-	5461
12	-	6007
13	-	6554
14	-	7100
15	-	7646

Table 1

Carrying out manual calibration with EnDat encoder

No mechanical adjustment is necessary in the EnDat encoder model.

Preparation:

- Configure the installation and motor specifications
- for no-load operation (without rope)
- Configure the brake monitoring (INTERFACE \ BR=Off)
- Configure the motor contactor monitoring (INTERFACE \ CO=Off)
- **The ECOFF parameter must be set to 0 !!! ➔ Verify**
- The contactor monitoring must be connected to the CO input.
- Reduce the rated current (\ INSTALLATION & MOTOR \ I_NOM) to 71 % (= $1/\sqrt{2}$) of the originally set value. Please be sure to note down the old value!

Only with ZETADYN 2SY062 – 110:

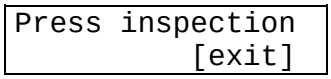
- Activate an inspection travel until the motor contactors have switched. Abort the inspection travel as soon as the motor contactors have switched!

The motor is powered with direct current. During this, the rotor jumps to the middle of the nearest pole. The offset value is stored in the encoder at the end of the calibration procedure. This sets the encoder to the “0“ position.

Perform the encoder calibration:

In the „ENCODER“ menu:
Start the encoder offset-identification with "ON"

Select MANU with the P key



- Press the inspection switch (for ca. 5 sec. Until the rotor is standing absolutey still)

- The motor is powered in phase U with the rated current. The motor shaft revolves to the zero-point of one pole.
- End with switching off the inspection ride.
- In the EnDat encoder, this stores the offset value in the encoder.

Do not forget at the end !!!

- Configure the rated current to the original value
- Configure the brake monitoring (INTERFACE \ BR=On)
- Configure the motor contactor monitoring (INTERFACE \ CO=On)

Carrying out automatic calibration

Automatic encoder calibration is to be used **for SSI and EnDat encoder models**. (See chap. 1)

Preparation:

- Configure the installation and motor specifications
- for no-load operation (without rope)
- Configure the brake monitoring (INTERFACE \ BR)
- **Set the ECOFF parameter to 0. To be safe, please note down the old value.**
- The contactor monitor must be connected to the CO input.
- Reduce the rated current (\ INSTALLATION & MOTOR \ I_NOM) to 71 % (= $1/\sqrt{2}$) of the originally set value. Please be sure to note down the old value!

@ECID ON
> ON

In the „ENCODER“ menu:
Start the encoder offset-identification with "ON"

Select ID-Mode
[MANU] **[AUTO]**

Select Auto with the I key

↓

Press inspection
[exit]

- **Press the inspection switch for ca. 2 min.**
- or abort the measurement with [exit].

Iu = 20.0 A
Iv = 10.0 A

- In the first step, the motor is impressed in phase U of the rated current. In the V and W phases, the current amounts to -50 % of U.
- The rotor thus rotates to the 0 pole-position.

ACT: M1 p: 15123
POLE: 1 r: 15200

Determination of the encoder offset runs automatically. It takes ca. 2 minutes (dependent on the number of poles) The motor shaft rotates one full revolution. The offset is determined at each pole.

Status display during automatic measurement

- “ACT: M1 " displays the current action:

M1 M2: Measurement ½
-> <- : Rotor turns slowly to the approach of one pole
>> << : Rotor rotates quickly to the next pole

"POLE: 1" shows the current pole-pair number (1...10 in ZETATOP e.g.)

p: 15123 = actual current-display position
r: 15200 = current encoder position within one pole

Stop inspection!

Let go of the inspection switch.

EOF: -200: 20
[OK]

The averaged offset value is displayed.
Here, the deviation lies at –200 / 32676.
The largest deviation between measurements lies at a total of 20 / 32676.

- Continue with [OK]

Save new ECOFF ?
[YES] [NO]

- with [YES], the determined offset value is taken over into the ECOFF parameter of the drive
- [NO] value is not saved.

Do not forget at the end !!!

- Configure the rated current to the original value
- Configure the brake monitoring (INTERFACE \ BR)
- Configure the motor contactor monitoring (INTERFACE \ CO=On)

Error messages during the encoder alignment

The following problems can appear during offset adjustment:

EC-ID-Error 1 **[EXIT]**

General error message, which can arise during identification.

No.	Cause
1	Inspection switch was released too soon. / SIK interruption
10	Unsymmetrical current sharing (12.5%) -> check the motor connection
20	CO already operative -> Check the CO connection (the CO adjustment has no effect!).
30	BR already active if MB is still off -> check the setting and connection of BR. or switch BR off.
31	.-)
40	CO does not operate -> check the CO connection (the CO adjustment has no effect!).
50	BR does not switch after 2s if MB = ON -> Check the BR setting and connection. or switch BR off.

A13 Differences between the ZETADYN 2CF and ZETADYN 2SY equipment:

2CF	2SY
Suitable for the following motors:	
Asynchronous motors which are suitable for operation with a frequency converter.	Synchronous motors with between 1 and 30 pole pairs • ZETATOP • ZETASYN SMxxx
Suitable for the following encoders:	
Square-wave pulse encoders 5V (TTL) Square-wave pulse encoders 24V (HTL) Sine wave encoder	• absolute encoders (included in the motor delivery package)
Encoder interface for conversion of sine wave to square-wave pulses (encoder simulation for the control system)	
option	• standard (included in delivery package)
	•
	•
	•
	•
	•
Motor contactors:	
• Motor contactors with 3 make contacts as main contacts • Spare main contact available	• Motor contactors with 2 break / 2 make contacts as main contacts • Motor windings short circuited at standstill • No spare main contact available
Setting options in the "INSTALL. & MOTOR" menu:	
• Type of motor and encoder (M&E): ASM +square: asynchronous motor with square-wave pulse encoder ASM + sine: asynchronous motor with sine wave encoder • Power factor	• Type of motor and encoder (M&E): ZETATOP: synchronous motor with absolute encoder • SM850: synchronous motor with absolute encoder SM700: synchronous motor with absolute encoder Stator resistance Rs
Setting options in the "MOTOR MODEL" menu:	
Magnetising current I_0 • rotor time constant T_ROT • sigma	• magnetic flux PSI

A14 HOTLINE NOTES

Please check the following points before calling:

Tel.: +49 (0) 79 40-16-3 08
Fax: +49 (0) 79 40-16-2 49
e-mail: hotline.ra@ziehl-abegg.de

Location: .....

Equipment type: ZETADYN 2CF.....

Manufacturing No**.**:.....

Equipment status:
- O New
- O Overhauled/modified
- O System operated without faults since .....
- O Commissioning - installation operation
- O Commissioning - automatic operation

Type of installation
- O Passenger lift
- O Goods lift
- O Hoist unit
- O Landing-gear
- O Gear ratio .....
- O Lifting height, approx. ..... m
- O Lift motor room in basement
- O Nominal speed ..... m/s

Error text .....

Error entry STAT0 [.....] - [E.....]-[S.....]-[....A]-[RV....]-[.....m]-[.....h]-[.....°C]

Fault/problem occurs
- O on switch-on
- O on starting
- O when accelerating
- O at constant travel
- O when decelerating
- O on stopping
- O in both directions
- O only on empty DOWN
- O only on empty UP
- O fault is reproducible
- O fault occurs intermittently

.....

.....

.....

.....

Encoder type and resolution .....

Motor type and motor number.....

Control-system manufacturer: .....

Company:.....

Name: .....

Tel:..... **Fax:**..... **e-mail:**.....

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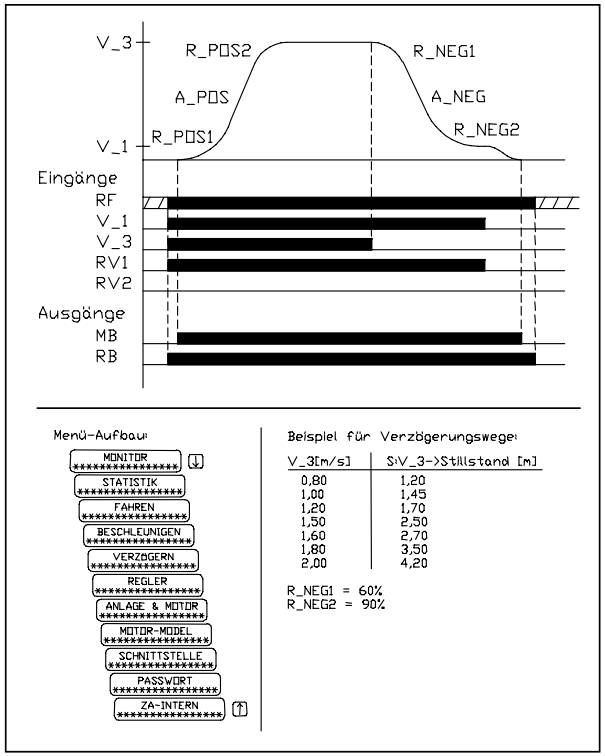
A15 Setting chart



System:

TRAVEL

V_1		m/s
V_2		m/s
V_3		m/s
V_Z		m/s
V_ZE1		m/s
V_ZE2		m/s
V_ZE3		m/s

ACCELERATING:

A_POS		m/s^2
R_POS1		%
R_POS2		%

DECELERATING:

A_NEG		m/s^2
R_NEG1		%
R_NEG2		%
S_DI1	[0]	mm
S_DI 2	[0]	m
S_DI 3	[0]	m
S_ABH	OFF	ON

CONTROLLER:

K_nr	[2.0]
T_nr	[100ms]

INSTALL.& MOTOR:

M & E		
V_NENN		m/s
n_ NENN		min^{-1}
f_ NENN		Hz
I_ NENN		A
U_ NENN		V
P_ NENN		kW
Type		circuit
Cos phi	(2CF)	
Rs	(2SY)	Ohm

MOTOR MODEL:

I_0	(2CF)	A
T_ROT	(2CF)	ms
Ls		H
PSI	(2SY)	Vs
sig	(2CF)	
p		

Notes:

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INTERFACE:

Encoder	☐ 1024		

SK_1	Works:	RB protection
	Other:	
SK_2	Works:	V < V_G1
	Other:	
SK_3	Works:	V < 1.1*V_3
	Other:	
ZE_1	Works:	V_ZE1
	Other:	
ZE_2	Works:	V_ZE2
	Other:	
ZE_3	Works:	OFF
	Other:	

V_G1	Works:	0.30 m/s
	Other:	
V_G2	Works:	0.80 m/s
	Other:	
V_G3	Works:	0.50 m/s
	Other:	
BR	Works:	off
	Other:	
CO	Works:	on
	Other:	

MO_DR	☐	LEFT	☐	RIGHT

RS_232	Works:	off
	Other:	
CTRL	Works:	STANDARD
	Other:	
LCD	Works:	deutsch
	Other:	

PASSWORD:

PASSWORD	
SE_NR	

ZA INTERN:

Start optim:	ANF_D	OFF		
	FK_start			[1.0]
	S_ANF		mm	[0.1]
	S_UM		mm	[0.1]
	T0		s	[0.0]
	T1		s	[0.1]
	T2		s	[0.2]
	T3		s	[0.0]
Stop optim.:	T4		s	[0.0]
	T5		s	[0.2]
	T6		s	[0.0]
Error suppression:	MASK1	0		
	MASK2	0		
	MASK3	0		
	MASK4	0		
	MASK5	0		
Monitoring:	T_GUE	1.0 s		
	S_MB	1 m		

Notes:

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