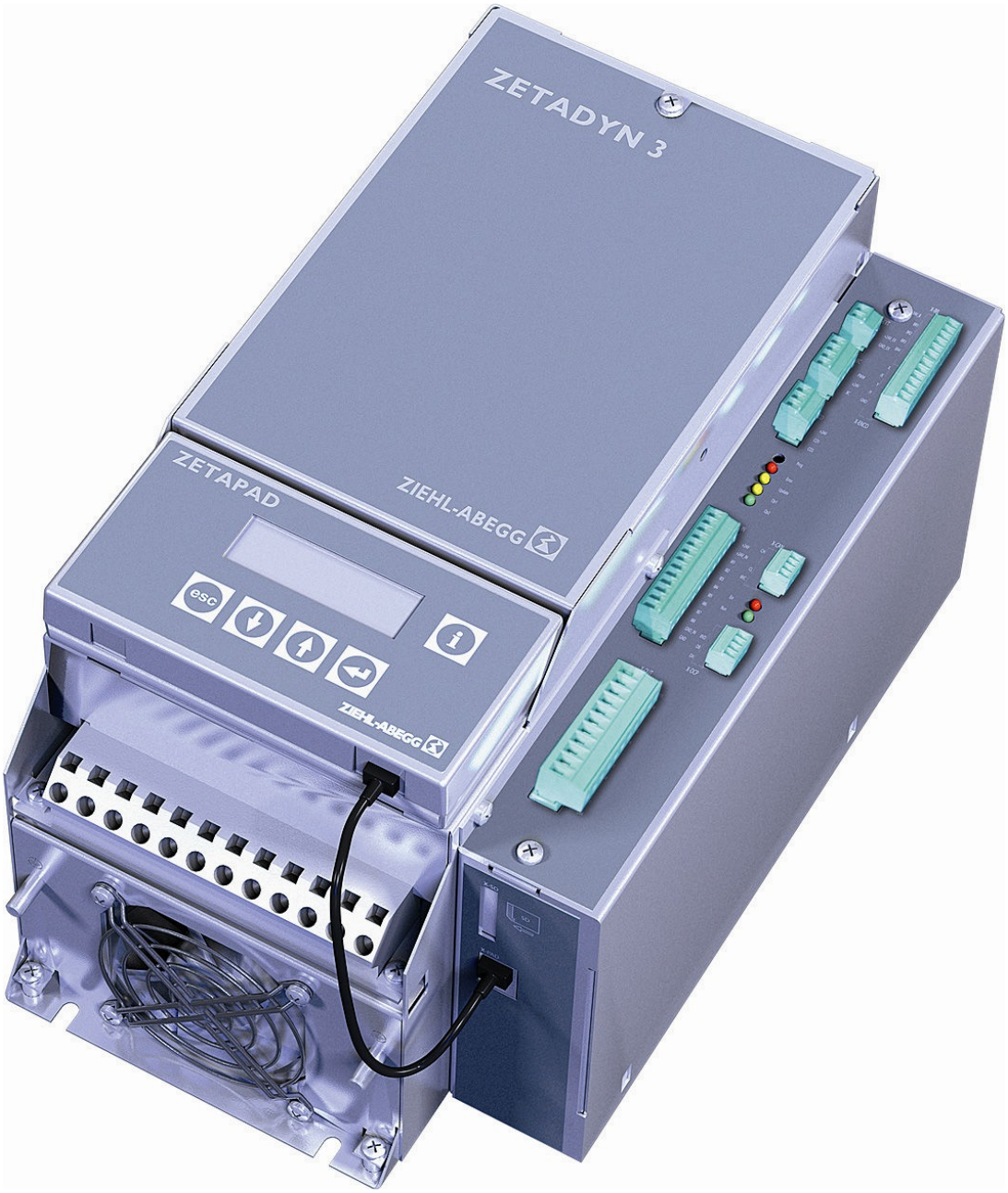
ZETADYN 3BF

Frequency inverter

Quick start-up manual



R-TBA06_02-GB 0711

ZIEHL-ABEGG

This quick start-up manual is intended only for persons who are already familiar with the ZETADYN 3BF frequency inverter operating manual!
This quick start-up manual does not substitute the operating manual!
The operating manual has to be readily accessible at all times!

1 Safety instructions

This chapter contains instructions to prevent personal injury and property damage.
These instructions do not lay claim to completeness. In case of questions and problems, please consult our company technicians.

1.1 Use as intended

The ZETADYN 3BF is a field-oriented frequency inverter for speed control of three-phase motors developed exclusively for use in elevator machines. The device is not intended for types of applications not listed here – that is considered incorrect use.
Reading the operating instructions and complying with all instructions listed there – especially the safety notifications contained therein – are considered part of intended use. Furthermore, carrying out all inspection work in the prescribed scheduled intervals is part of intended use.
Not the manufacturer, rather the operator of the frequency inverter is liable for any personal harm or material damage arising from non-intended use!

1.2 Pictographs

Safety instructions are highlighted with warning triangles and are depicted according to the degree of hazard as follows.

	**Warning!** Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!
	**Caution!** Slight bodily harm is possible if the corresponding precautions are not taken!
Caution!	Material damage is possible if the corresponding precautions are not taken!
	Warning about hazardous voltage
	**Information** Important additional information and pointers

1.3 Symbols used

A	The contents in the operating instructions refer specifically to the operation of **asynchronous motors**.
S	The contents in the operating instructions refer specifically to the operation of **synchronous motors**.

1.4 Product safety

The frequency inverter conforms with the state of the art at the time of delivery and is fundamentally considered to be reliable.
The frequency inverter and its accessories must only be used in a flawless condition and installed and operated with compliance to the operating instructions.
Exceeding the limits stated in the technical data can lead to a defect in the device.

1.5 Requirements placed on the personnel / due diligence

Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the frequency inverter must have the corresponding qualifications and skills for these jobs.
Based on their training, knowledge and experience as well as knowledge of the relevant standards, they must be able to judge the work transferred to them and be able to recognize possible hazards.

In addition, they must be knowledgeable of the safety regulations, EU directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations. Personnel to be trained or instructed and apprentices are only permitted to work on the device under the supervision of an experienced person. This also applies to personnel which are in apprenticeship.

Comply with the legal minimum age.

1.6 Commissioning

Warning!
During commissioning, unexpected and hazardous conditions can arise in the entire installation due to defective adjustments, defective components or incorrect electrical connections.

During commissioning the following has to be observed:

- Remove all persons and objects from the hazardous area
- The EMERGENCY-OFF disconnect function must be in working order
- The mechanical safety brakes must be installed in working order
- Commissioning is only permitted under compliance with the EMC directive 39/336/EEC

1.7 Working on device / Hazards through "residual voltage"

Before working on previously installed frequency inverters, disconnect the device from the mains.

Through use of capacitors, danger of death exists even after switching off through directly touching the energized parts or due to parts that have become energized due to faults.

Wait at **least 3 minutes** before working on the device.

The zero-potential is to be determined by using a two-poled voltage tester.

It is fundamentally forbidden to carry out work on current-carrying (“live”) parts. The protection class of the opened device is IP00! It is possible to come into direct contact with life-threatening voltages!

1.8 Modifications / interventions in the device

For reasons of safety, no unauthorized interventions or modifications may be made on the frequency inverter.

All planned modifications must be authorized by the manufacturer in writing.

Use only genuine spare parts / genuine wearing parts / genuine accessories – these parts were specifically conceived for the device. There is no guarantee that parts from non-original sources are designed and manufactured in correspondence with load and safety requirements.

Use only parts and special equipment approved by Ziehl-Abegg. Use of other parts and special equipment is not authorized.

1.9 Operator’s obligation of diligence

The frequency inverter has been designed and constructed with consideration of a hazard analysis and after carefully selecting the harmonized standards to be complied with as well as additional technical specifications. It thus complies with the state-of-the art and ensures the highest degree of safety.

However, this safety can only be implemented in operational practice if all actions necessary for this purpose are taken. The operator of the installation has the obligation of due diligence to plan these actions and monitor their implementation.

In particular, the operator must ensure that

- The frequency inverter is only used as intended (cmp. chapter "Product description" concerning this)
- The installation is operated solely in a flawless, functional condition and that especially the safety devices are periodically checked for their properly functioning condition
- The required personal protective equipment is available to and used by the operating, maintenance and repair personnel
- The operating instructions are always readily available at the location where the frequency inverter is being used, are complete and in legible condition
- Only sufficiently qualified and authorized personnel operate, maintain and repair the installation
- This personnel is regularly instructed in all applicable questions regarding occupational safety and environmental protection and are knowledgeable regarding the operating instructions and, especially, are familiar with the safety instructions contained therein
- All safety and warning notices attached to the system are never removed and are legible.

1.10 Employment of external personnel

Maintenance and service work are frequently carried out by external employees who often do not recognize the specific situations and the thus resulting dangers.

These persons must be comprehensively informed about the hazards in their area of activity. You must monitor their working methods in order to intervene in good time if necessary.

2 Mechanical installation

2.1 General information

Warning!
The following points must be complied with during the mechanical installation to avoid causing a defect in the frequency inverter due to assembly errors or environmental influence.

Before installation

- Remove the device from the packing and check for any possible shipping damage
- Carry out installation only on a clean, level and stable foundation
- Assemble the device outside of the traffic area

During installation

- Use suitable fastening materials
- Mount the device in a tension free condition
- Do not allow drilling chips, screws and other foreign bodies to reach the device interior
- Maintain the stated minimum clearances to ensure unobstructed cooling air feed as well as unobstructed exhaust air discharge (see Fig.)
- To ensure EMC-acceptable installation, mount the device on a galvanized or chrome-plated mounting plate. When using a painted mounting plate, the paint must be removed from the contact-surface areas.

Ambient conditions

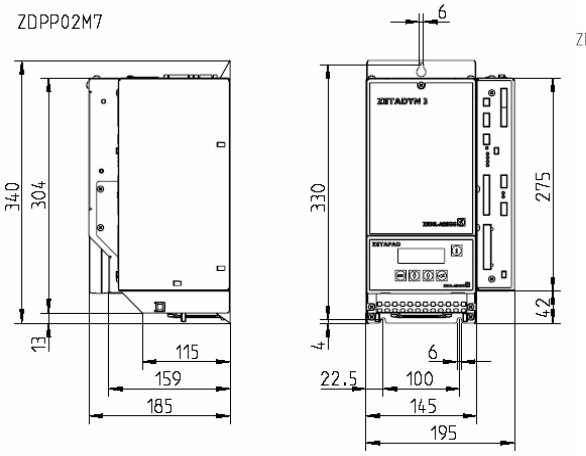
- Prevent humidity
- Avoid aggressive and conductive materials in the environment

Wall installation
The ZETADYN 3BF frequency inverter is designed for installation in a switch cabinet. Wall installation outside the switch cabinet is not permitted.

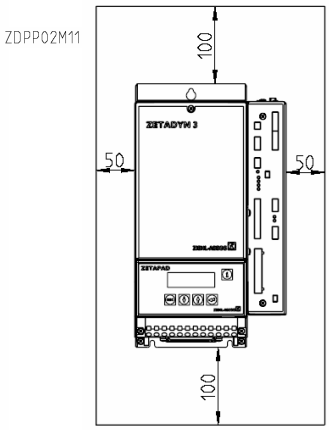
Switch cabinet installation

Caution! To ensure unobstructed airflow, you must install the frequency converter in a vertical position!

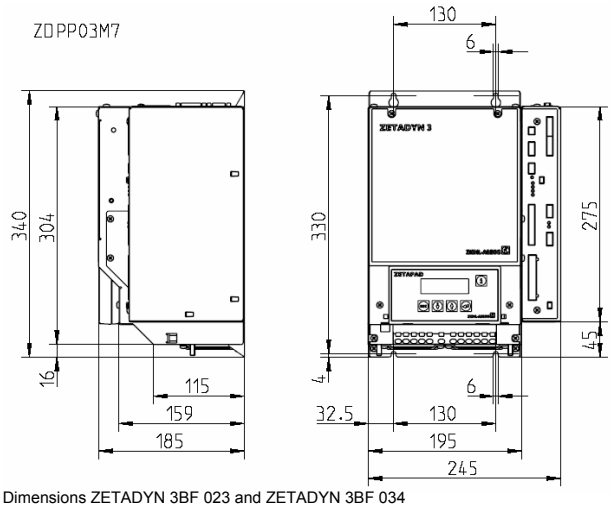
- Drill mounting holes (M6) in accordance with the technical drawings
- Mount the device vertically with the terminals face-down taking the installation clearances into account
- A sufficient ventilation of the control cabinet has to be ensured.



Dimensions ZETADYN 3BF013 und ZETADYN 3BF017



Minimum clearances ZETADYN 3BF



Dimensions ZETADYN 3BF 023 and ZETADYN 3BF 034

3 Electrical installation

Warning!

It is forbidden to carry out work on electrically live parts.
Even after disconnection, the dc-link (terminals X1:DC+ / X1:DC-) are still live.
Always wait at least 3 minutes.

Operating the frequency inverter with removed housing cover is prohibited because live parts are inside the inverter. Disregarding this regulation can lead to serious personal injury

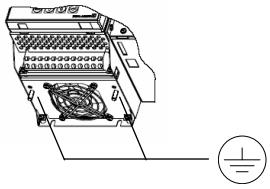
Work on electric components/modules may only be carried out by trained electricians or by persons instructed in electricity under the supervision of an electrician in accordance with electrical engineering regulations.
A second person must always be present when working on energized parts or lines who disconnects in case of emergency.
Electrical equipment must be periodically inspected: Retighten loose connections – replace damaged lines and cables immediately.
Always keep switch cabinets and all electrical supply facilities locked. Access is only allowed for authorized persons using a key or special tool.
Never clean electrical equipment with water or similar liquids.

3.1 EMC-compatible installation

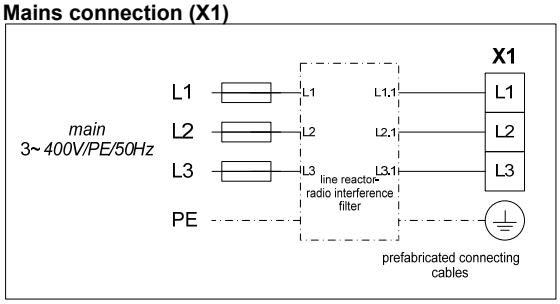
- The motor and brake chopper must be connected with shielded cables
- Use only shielded control cables
- Use only shielded encoder cables
- Maximum motor line length is 25m.
- If the shielding must be interrupted (e.g., to install a motor contactor), it must be subsequently continued with the lowest possible HF impedance
- Always connect both sides of the shielding to ground
- Use only shielded lines in the switching cabinet also
- Do not use twisted shielding braids (pigtails)
- Route control lines and power lines separated from each other
- Flawless electrical contact between the mounting plate and the metal housing of the frequency inverter must be ensured
- Provide connected inductances (brakes, motor contactors,…) with suppressors

3.2 Connection of the protective earth conductor(earthing terminal)

According to DIN EN 50178, grounding must be made by using a protective-connector connection of at least 10mm² (for copper lines).
A M6 threaded bolt is available on the frequency inverter for the protective connector.



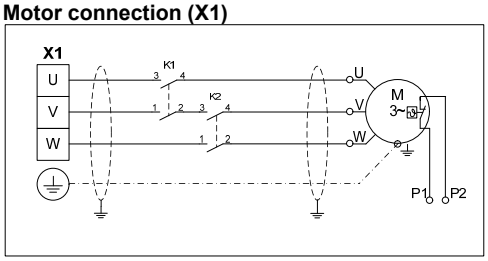
3.3 Mains connection (X1)



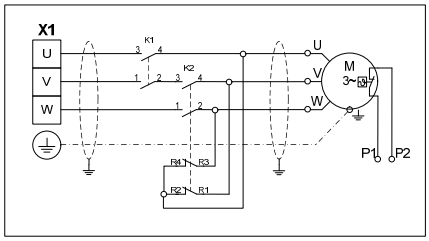
Mains connection

To comply with DIN EN 12015 (electromagnetic compatibility – electrical interference), a type NF line-reactor radio-interference filter must be installed in the mains line to the frequency inverter.

3.4 Motor connection (X1)



Asynchronous motor



Synchronous motor

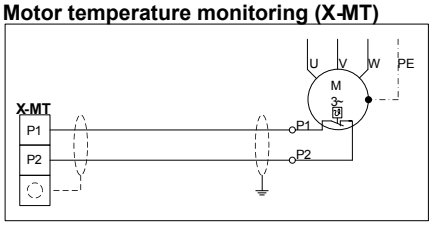
S

In synchronous motors, all phases of the cable from the frequency inverter to the motor must be connected
U ⇨ U / V ⇨ V / W ⇨ W.
Never swap the connection; not even if the rotary direction of the motor is false!
Swapping the motor phases can lead to uncontrollable motor movements.

Caution!

If an emergency evacuation is carried out by opening the brakes, the motor windings must be short-circuited for the evacuation to prevent an uncontrolled acceleration of the elevator. The short-circuit generates a speed-dependent braking torque, sufficient in most cases to limit the elevator speed to a safe level.

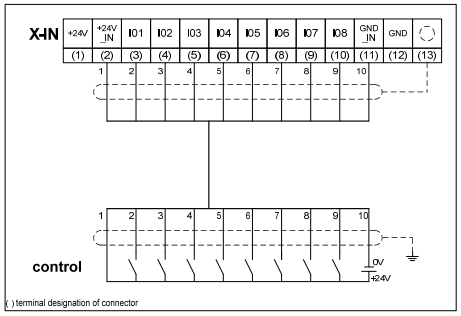
3.5 Motor temperature monitoring (X-MT)



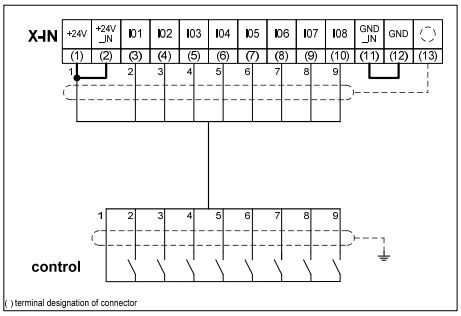
Temperate monitoring

3.6 Digital inputs (X-IN)

The inputs are pre-parameterized but can be allocated with other functions by modifying the parameters.
The electrically isolated inputs can be activated by an external 24V power supply in the control or by the internal 24V power supply of the frequency inverter.



with external voltage supply

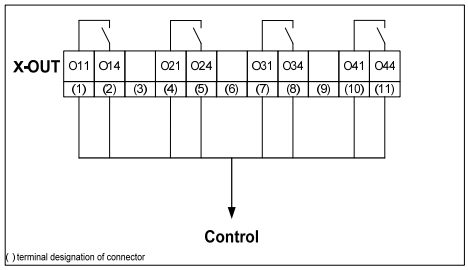


with internal voltage supply

Before connection the digital inputs, the pre-assignment need to be checked.

3.7 Digital outputs (X-OUT)

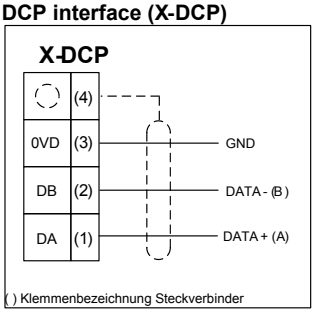
The digital outputs are implemented as potential-free relay contacts with NO-switch function. The outputs are pre-parameterized but can be allocated with other functions by modifying the parameters.



digital outputs

Before the connection of the digital outputs, the pre-assignment need to be checked.

3.8 DCP interface (X-DCP)



DCP connection

3.9 Encoder connection in asynchronous motors (X-ENC8 X-ENC9)

X-ENC9: 9-pole SUB-D jack for connection with Sub-D plug
X-ENC8: 8-pole terminal strip for discrete connection

A	Track A
/A	TrackA invers
B	Track B
/B	Track B invers
+5V_E	+5V pow er supply for Sinus- and TTL- Encoder
GND	Ground
+24V_E	+24V pow er supply for HTL-Encoder
◌	shielding

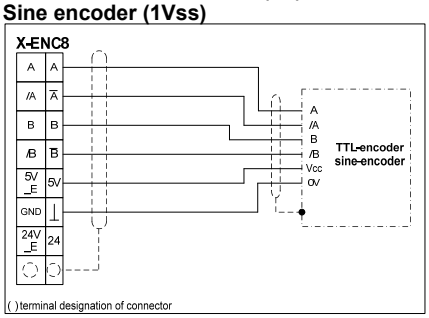
X-ENC8 terminal assignment

1	A	Track A
2	B	Track B
3	-	N.C
4	+5V_ENC	+5V pow er supply for Sinus- and TTL- Encoder
5	DGND	ground
6	/A	Track A invers
7	/B	Track B invers
8	/FAULT	Fault invers
9	DGND	Ground

X-ENC9 pin assignment

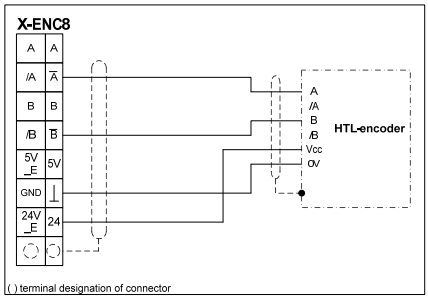
.Caution! Before the encoder can be plugged in or connected, the encoder type and the encoder resolution need to be parameterized in the ***"Encoder & BC/ENC_TYP"*** and ***"Encoder & BC/ /ENC_INC "*** menu.

TTL incremental encoder (5V)
Sine encoder (1Vss)



TTL or sine encoder

TTL encoder (30V)



HTL encoder connection

3.10 Synchronous motor encoder connection (X-ENC15)

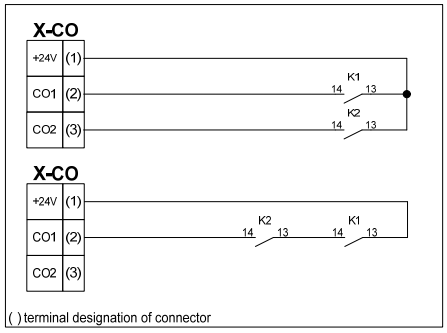
X-ENC15: 9-pole SUB-D jack for connection with Sub-D plug

1	DATA	data line for communication with the absolute encoder
2	/DATA	data line invers
3	U + sens	sensor cable + encoder voltage
4	+5V_REG	controlled +5V power supply
5	DGND	ground power supply absolute encoder
6	-	N.C
7	B	Track B
8	-	N.C.
9	/CLK	clock signal invers
10	CLK	clock signal for serial transfer
11	U - sens	sensor cable + encoder voltage
12	A	Track A
13	/A	Track A invers
14	/B	Track B invers
15	GND_A_B	Ground for the internal shielding
housing		shielding

X-ENC15 pin assignment

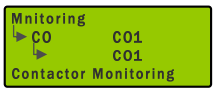
3.11 Monitoring the motor contactors (X-CO)

The frequency inverter monitors the state of the motor contactors. The contactors must be closed during the travel. Opening the contactor during travel (e.g. through chatter) leads to an immediate travel abort.



Contactor monitoring connection

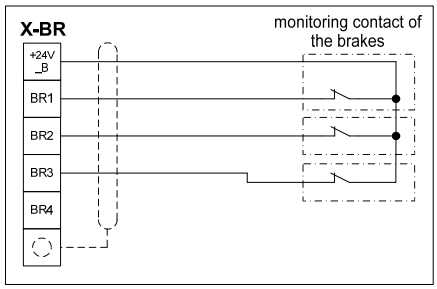
Parameter "Monitoring/*CO=CO1&CO2*"



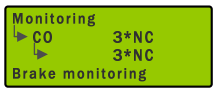
Parameter "Monitoring/*CO=CO1*"

3.12 Brake release monitoring (X-BR)

If the service brakes are used in accordance with EN81-1 as safeguard against car overspeed in the upward direction, the brake release monitoring must be definitely connected (periodical performance test)!

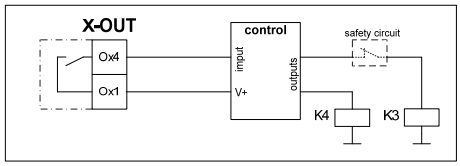


Brake release monitoring connection

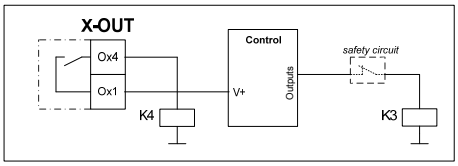


3.13 Activating the brakes

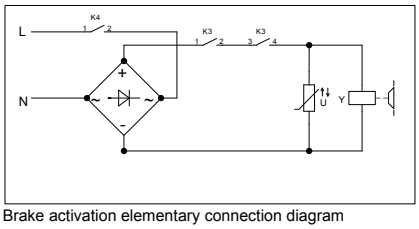
To achieve optimum travel and position behavior, the brakes must be opened and closed via the contact **instantaneously**!



Activating the brakes via the control



Activating the brakes via the frequency inverter and control

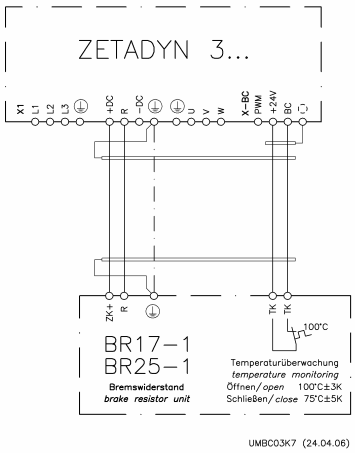


Brake activation elementary connection diagram

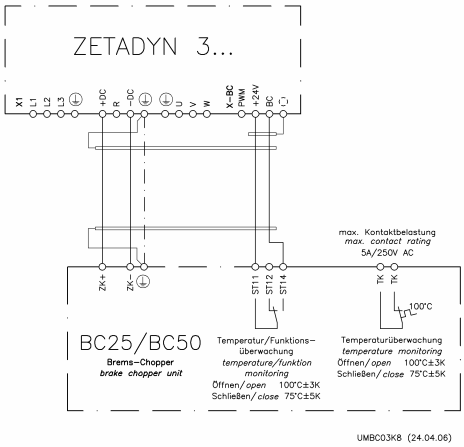
The contacts from K3 must close before the contact from K4 and are only permitted to open after the contact from K4 has opened.

3.14 Connection Brake-Chopper / Brake-Resistor

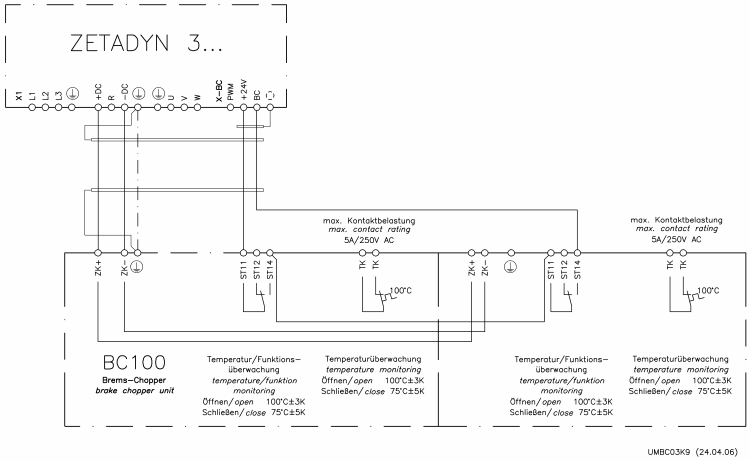
Caution! The used Brake-Resistor or Brake-Chopper need to be parameterized in the ***"Encoder & BC /BC_TYP"*** menu.



Connection BR17 / BR25



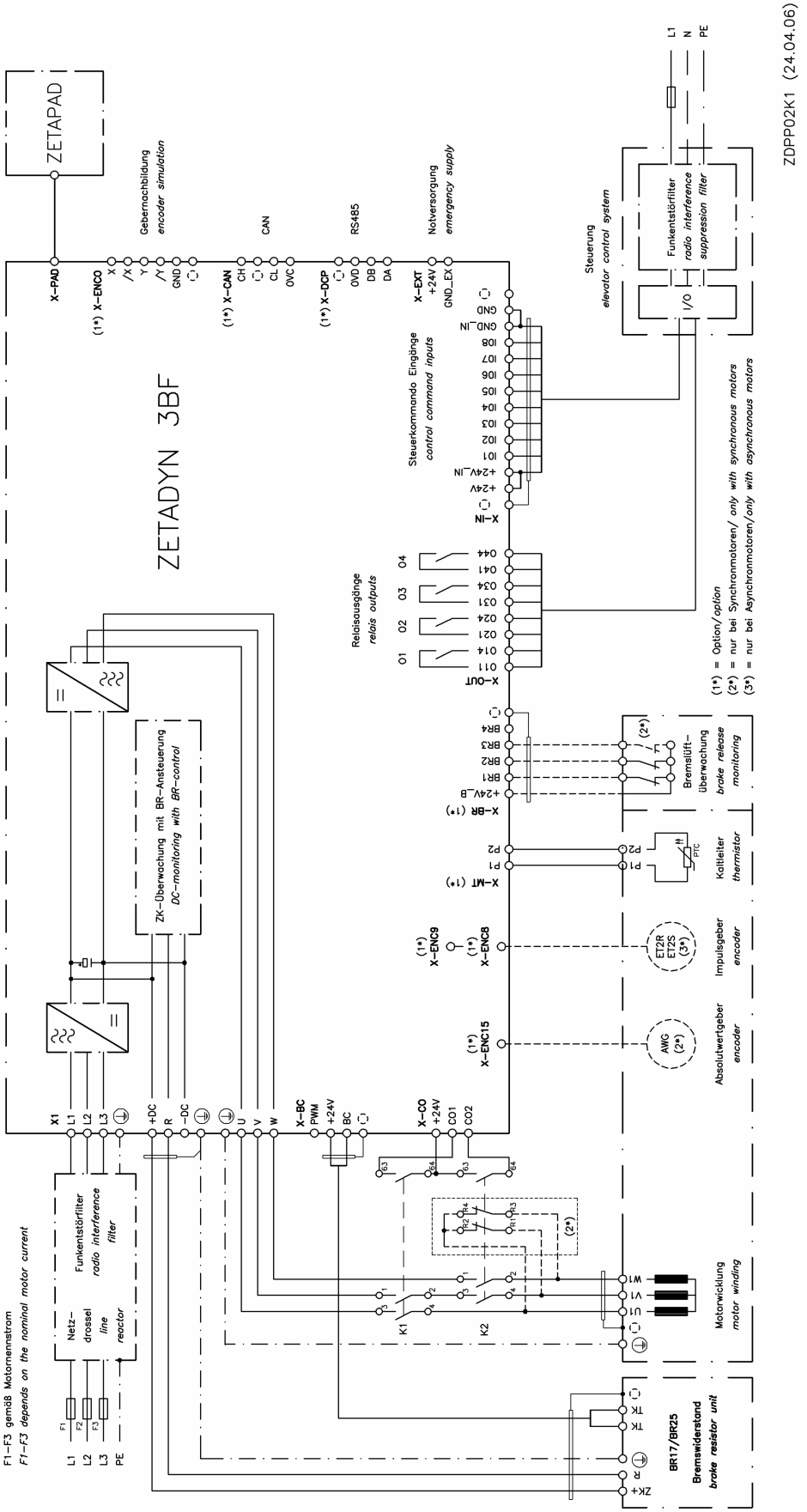
Connection BC25 / BC50



Connection BC100

ZIEHL-ABEGG

3.15 Circuit connection suggestion



ZIEHL-ABEGG

4 Operation / menu navigation

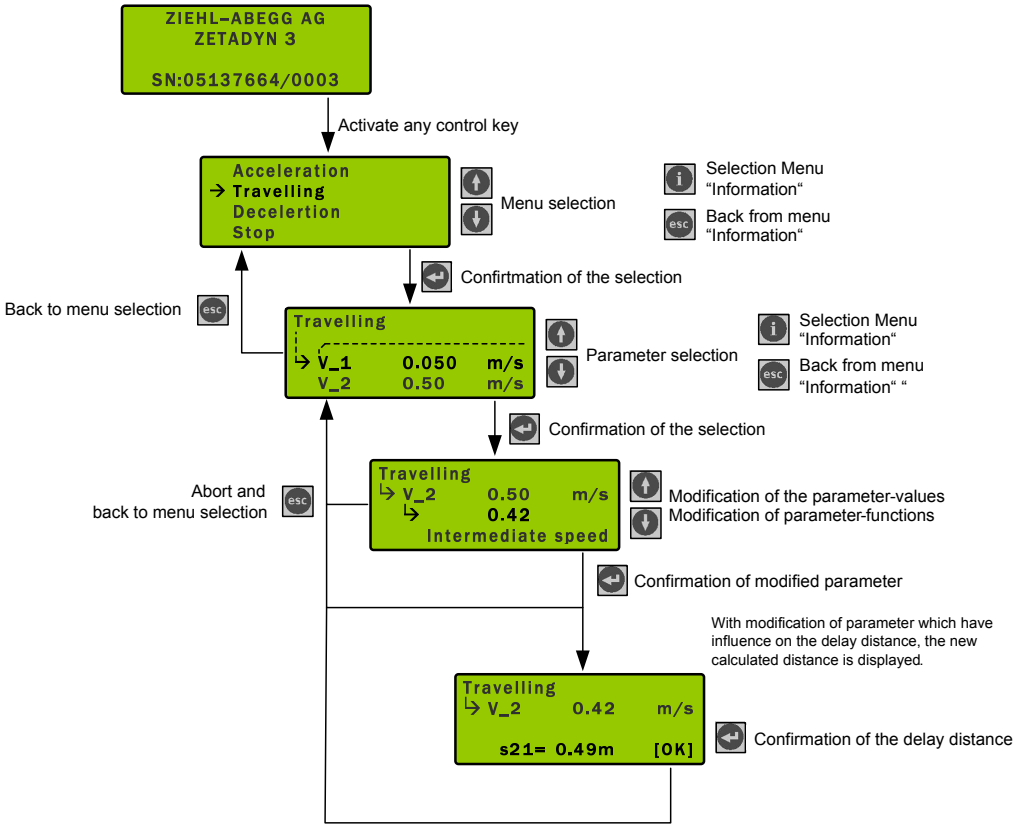
Operate the frequency inverter through the five buttons on the ZETAPAD operating terminal.

Modifying parameters is only possible when the machine is at standstill!

ZETAPAD operating terminal

Control key functions:

- esc
  - Back to menu selection
  - Back to parameter selection
  - Answering no to yes-no queries
- Menu selection
  - Parameter selection
  - Reducing parameter values
- Menu selection
  - Parameter selection
  - Increasing parameter values
- Confirming:
  - Menu selection
  - Parameter selection
  - Parameter values
  - Answering yes to yes-no queries
- Display current operational states



5 Commissioning

Caution!
Defective connections can cause the motor to start unexpectedly or lead to uncontrolled motor movements.

Reversed connections cause the motor to rotate in the wrong direction. That can cause serious machine damage.

Caution! Incorrectly wired connections can destroy the electrical/electronic components.

Electrostatic processes/electrical malfunctions can be hazardous to the electronic components and lead to errors in the software.

Observe the following points to prevent machine damage or life-threatening injuries when commissioning the machine:

- Only suitably qualified personnel are to be entrusted with commissioning the machine. They must comply with the safety instructions
- Before starting work, make sure all tools and external parts have been removed from the machine
- Activate all safeguards and the emergency-off switches before commissioning
- Only specifically trained personnel are to be entrusted with commissioning the machine. They must comply with the safety instructions
- Make sure no unauthorized persons are in the machine working area and that no other persons can be endangered when the installation is started up
- Inspect the electrical connections before the first start
- Pay special attention to the protective measures (e.g. grounding, ...) for the electrostatically endangered components
- Also read the chapter "General Safety Instructions"

This commissioning-instruction assumes the factory default settings for the digital inputs and outputs, encoder inputs and monitoring contacts have not been modified!

The preconditions for an error-free commissioning:

- Mains line is connected
- Motor is connected
- Controller and monitoring inputs are connected
- Encoder is connected

5.1 Procedure

The parameters of the menus listed below must be entered and/or check in the in the indicated order:

1. **Motor name plate**
2. **Encoder & BC**
3. **Installation**
4. **Control system**
5. **Monitoring**

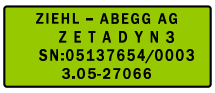
5.2 Preset inverters

Inverters which are preset by Ziehl-Abegg are signed with following information-sticker:

With these inverters the parameters are preset with the customized data of the installation by Ziehl-Abegg.
An entering of the parameters is no longer necessary, but they must be checked before commissioning.

5.3 Switching on the frequency inverter

After a self-test, the frequency inverter is switched on when the mains voltage is applied. The following appears in the display:



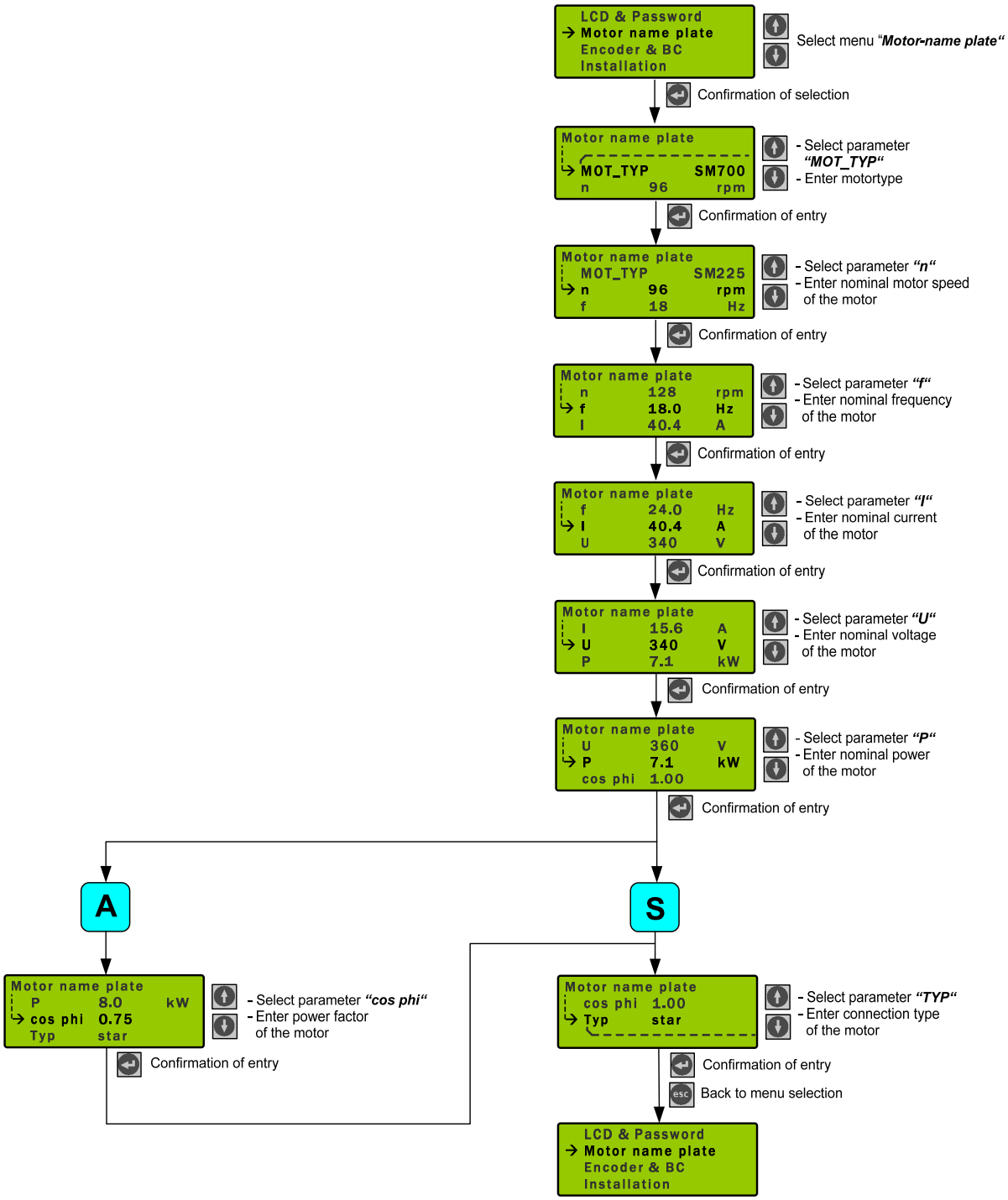
5.4 Enter the motor specifications

The specifications for the motor must be entered one time before the first travel in the menu ***"Motor name plate"***.

The motor data are enters according the specifications on the motor name plate.

With asynchronous motors the nominal speed at nominal load must be entered (e.g. 1450 rpm). With entering the synchronous speed (e.g. 1500 rpm with a 4-pole motor) an error message wll be displayed as soon as a travel command is connected.

When a Ziehl-Abegg motor is purchased in connection with a frequency inverter, the motor specifications are already pre-programmed.
Generally, the specifications have to be reviewed before the first travel.

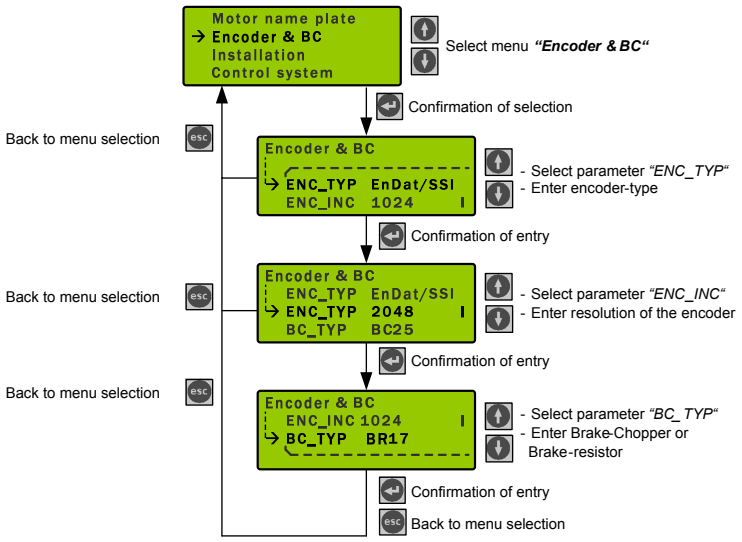


5.5 Enter Encoder-data, Brake-Chopper / Brake-Resistor

Enter of:

- Encoder-type
- Encoder-resolution
- Brake-Chopper or Brake-Resistor

in the menu ***"Encoder & BC"***.



5.6 Enter the installation specifications

The specifications for the elevator installation must be entered one time before the first travel in the menu ***"Installation "***.

To assure a correct calculation of the speed amplification *"SPD_C"*, **all parameters** of the menu ***"Installation "*** must be entered.

Enter of the installation-motor-speed *"n*",

The installation-motor-speed *"n*"* at the nominal travel speed *"V*"* can be parameterised in two different ways:

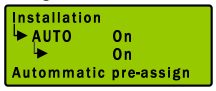
- direct input of *"n*"*
- input of the installation specifications (*"D"*, *"iS"*, *"i1"*, *"i2"*) and calculation of *"n*"* by the software of the ZETADYN 3BF (see flow-chart)

5.7 Automatic operating-curves defaults

Using the automatic operating-curve defaults, the parameters responsible for operating curves and travel speeds are pre-assigned dependent on:

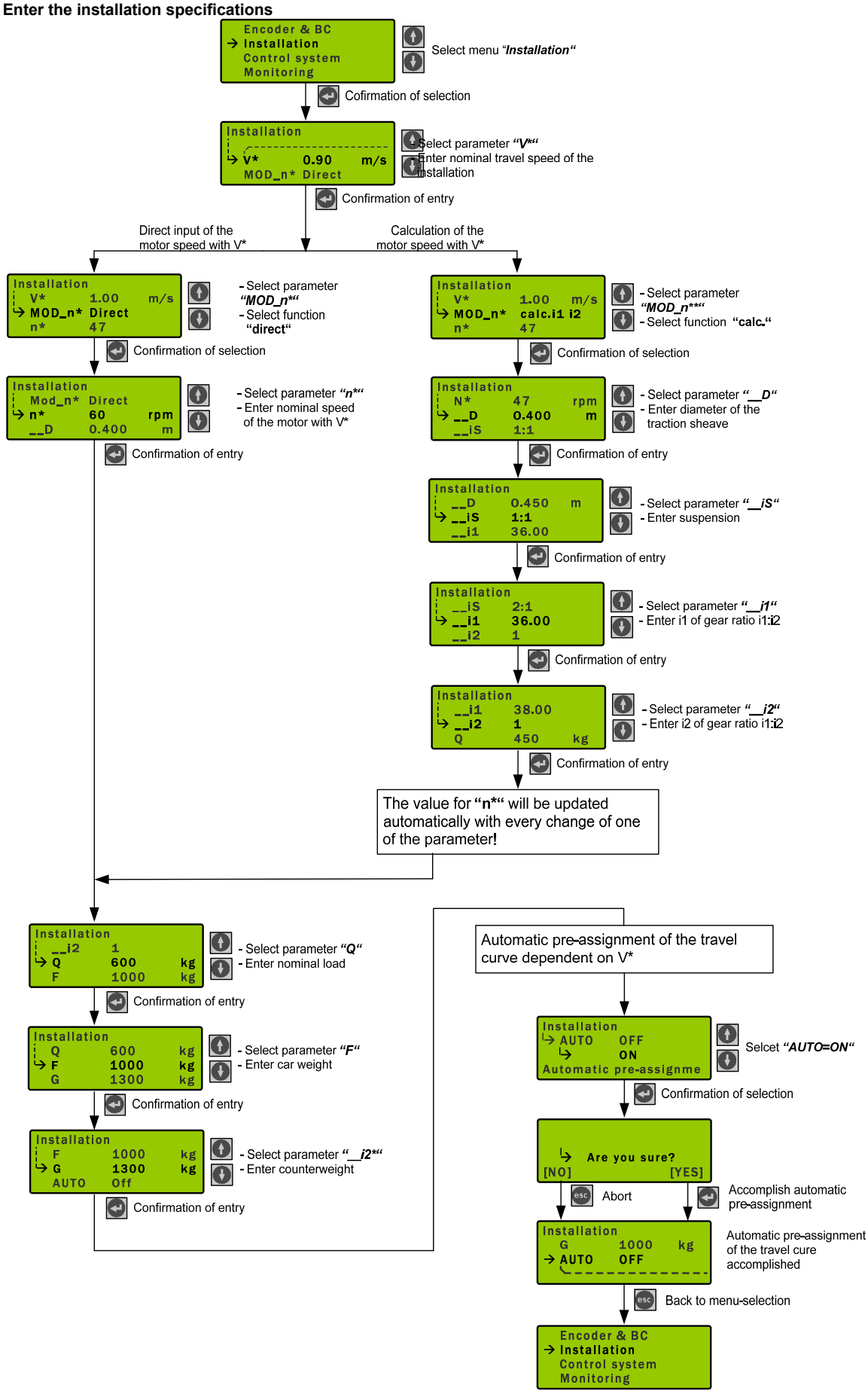
- Installation nominal velocity *"V*"*

The automatic operating defaults are started in the "***Installation /Auto"*** menu



Acceleration menu	Deceleration menu	Travel menu
A_POS R_POS1 R_POS2	A_NEG R_NEG1 R_NEG2	V_2 V_3

Enter the installation specifications



ZIEHL-ABEGG

5.8 Traveling speed default

After entering the installation specifications and carrying out the automatic parameter assignment, the travelling speeds *V_2* and *V_3* are pre-configured in the ***"Travelling"*** menu, dependent on *V**.

Description	Parameter	Default
Intermediate speed V_2	V_2	50% V*
Travel speed V_3	V_3	100% V*

The speeds listed in the table below are permanently preset and thus independent of *V**.

Description	Parameter	Default
Positioning speed V_1	V_1	0,05 m/s
Readjustment speed VZ	V_Z	0,05 m/s
Additional speed V_4	V_4	0,32 m/s
Additional speed V_5	V_5	0,32 m/s
Additional speed V_6	V_6	0,32 m/s
Additional speed V_7	V_7	0,33 m/s

All values for the speeds can be modified in the ***"Travelling"*** menu depending on the installation-specific requirements. While doing so, note that:

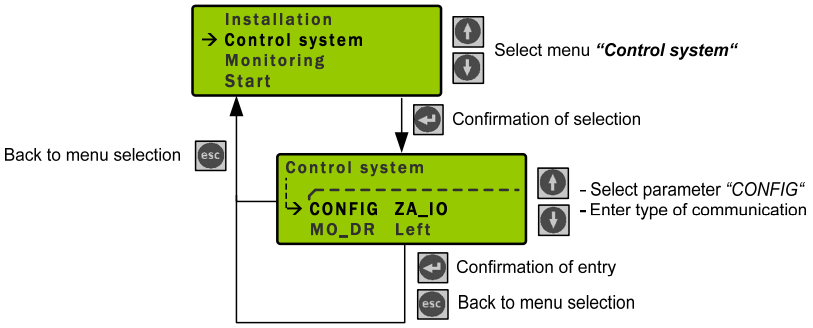
Travel speed V_3 > Intermadiate speed V_2
Intermediate speed V_2 > Positioning speed V_1

5.9 Enter type of communication

Configuration of the used type of communication between the frequency inverter and the elevator control.

By the configuration following parameters will be pre-configured in the menu ***"Control system"***:

- digital inputs *"f_I01 … f_07"*
- digital outputs *"O1 … O4"*
- extern control-function



5.10 Activate the monitoring functions

The monitoring functions must be configured and/or checked in the menu ***"Monitoring"***.

Information to the monitoring functions:

MOD_ST: Definition of the behaviour of the inverter in case of an error

CO: Definition of the connected contactor monitoring

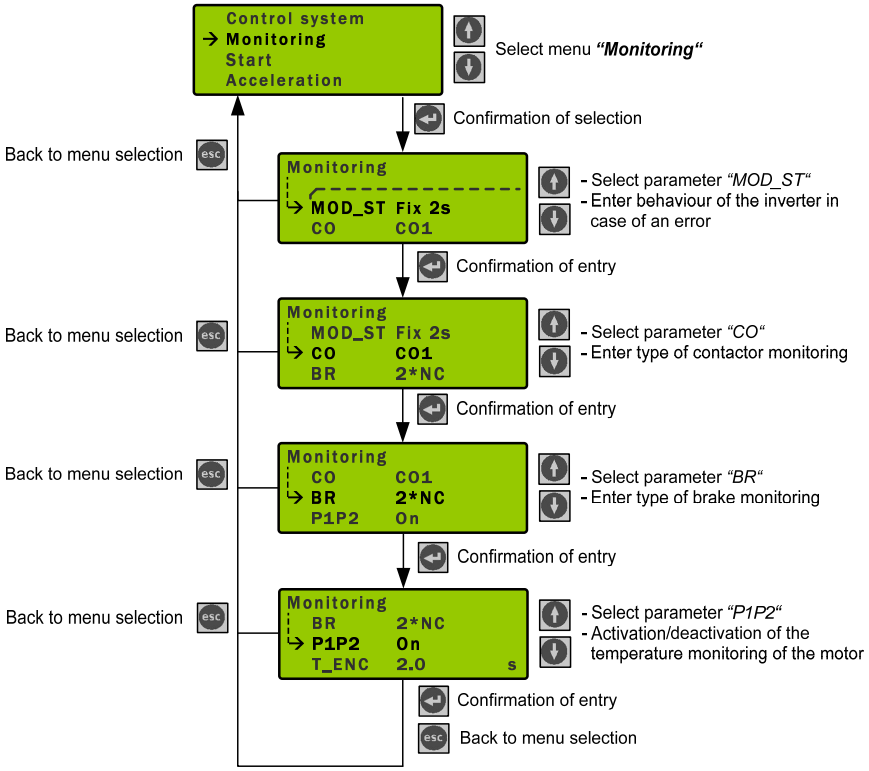
Caution! The contactor monitoring must be connected to the frequency inverter!

BR: Definition of the brake monitoring

If the brake is used as protection device against uncontrolled movement of the cabine in the up-direction according to EN81-1, the brake monitoring must be connected (regularly function monitoring)!

P1/P2: Monitoring of the motor temperature

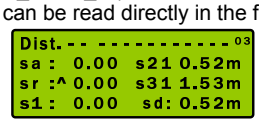
To activate the monitoring of the motor temperature, the inverter must be equipped with the option module EM3-MOT-TEMP.



5.11 On-site Installation of the switch-off points

5.11.1 Switch-off points for travel speed V_3

The deceleration distance (s31) of
V_3 to V_1 or
V_3 to V_0 (with DCP2 / DCP4 protocol)
can be read directly in the frequency inverter display.



Display of the calculated way of deceleration V_3 ⇨ V_1 or V_3 ⇨ standstill

The following parameters influence the deceleration distance:

- V_1 (Positioning speed)
- V_3 (Travel speed)
- R_NEG1 (upper round-off)
- R_NEG1 (lower round-off)
- A_NEG (Deceleration)

When a parameter is changed, the new calculated deceleration distance is displayed after confirming the modification.

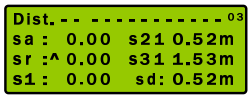
Display of the calculated way of deceleration V_3 ⇨ V_1 or V_3 ⇨ standstill after changing V_3

To have some play to optimize the travel behaviour, the switch-off point is set - if possible – to a deceleration distance larger than the calculated.

The declaration distance can be shortened later on the inverter in the ***"Decelerate /S_ DI_3"*** menu. To reach almost identical positioning on all floors, the interrupt points must be set with a precision of **± 1cm**.

5.11.2 Switch-off points for intermediate speed V_2

The deceleration path (s21) of
V_2 to V_1 or
V_2 to V_0 (with DCP2/DCP4 protocol)
can be read directly on the frequency inverter display.



Display of the calculated way of deceleration V_2 ⇨ V_1 or V_2 ⇨ standstill

The following parameters influence the deceleration path:

- V_1 (Positioning speed)
- V_2 (Intermediate speed)
- R_NEG1 (upper round-off)
- R_NEG1 (lower round-off)
- A_NEG (Deceleration)

When a parameter is changed, the new calculated deceleration distance is displayed after confirming the modification.

Display of the calculated way of deceleration V_3 ⇨ V_1 or V_3 ⇨ standstill after changing V_3

If the floor separation is smaller than the calculated deceleration distance, the speed for V_2 must be decreased until the deceleration distance is smaller than the floor separation.

5.11.3 Switch-off points for positioning speed V_1

To avoid a ride over of the flush position, the switch-off point for V1 must be set in dependence of the deceleration "A_NEG" between **2 … 5cm** before flush position. If the travel stops before the flush position is reached, an adjustment of the switch-off point is necessary.

To reach almost identical positioning on all floors, the interrupt points must be set with a precision of **± 1mm**.

5.12 Carrying out the first test travel

Caution!

S

Operating without encoder offset can cause uncontrolled motor movements in synchronous motors.

With synchronous motors, an encoder offset must be carried out before the first trip. For the encoder offset, the motor must be on no-load operation (no ropes on the traction sheave).

When a Ziehl-Abegg motor is purchased in connection with a frequency inverter, the offset is already programmed.

When using external motors, the offset must be made as in the following (get information from the manufacturer):
Connect the motor winding to direct current: U ⇨ + and V and W ⇨ -.
Offset value = 0

The first trip must be carried out with the return control or as an inspection trip.

If this trip can be carried out without any problems and without any fault messages, a normal trip can be made as the next step.

If fault messages appear, an error list is available in the operating instructions with the corresponding error causes.

If you need support during commissioning or trouble shooting, we would be glad to help.

HOTLINE		
	Tel.	+49 (0) 7940 16-308
	Fax	+49 (0) 7940 16-249
	email	hotline.ra@ziehl-abegg.de

5.13 Changing the rotating direction of the motor

If the travel directions "UP" and "DOWN" are changed, it is possible to change the rotating direction of the motor in the menu ***"Control system / MO_DR"***.

Caution!

The rotating direction of the motor may only be changed, if the travel with the wrong direction could be accomplished without an error message.

HOTLINE 	Tel. +49 (0) 7940 16-308 Fax +49 (0) 7940 16-249 email hotline.ra@ziehl-abegg.de

Ziehl-Abegg AG
Heinz-Ziehl-Straße · 74653 Künzelsau · Germany
Tel. +49 (0) 7940 16-0 · Fax +49 (0) 7940 16-249
drives@ziehl-abegg.com · www.ziehl-abegg.com

R-TBA06_02-GB 0711
Art.-Nr. 00163277-GB