DYNALIFT® E
DYNALIFT® EH

4BS0348A /002

Electronic control devices for three-phase elevator motors

Technical description and operating instructions

Grenzen überwinden **Loher**

FLENDER ATB-LOHER

Safety and operating instructions for drive inverters

in conformity with the low-voltage directive 73/23/EEC

1. General

In operation, drive inverters, depending on their degree of protection, may have live, uninsulated, and possibly also moving or rotating parts, as well as hot surfaces.

In case of inadmissible removal of the required covers, of improper use, wrong installation or maloperation, there is the danger of serious personal injury and damage to property.

For further information, see documentation.

All operations serving transport, installation and commissioning as well as maintenance are to be carried out by skilled technical personnel (Observe IEC 364 or CENELEC HD 384 or DIN VDE 0100 and IEC 664 or DIN/VDE 0110 and national accident prevention rules!).

For the purposes of these basic safety instructions, "skilled technical personnel" means persons who are familiar with the installation, mounting, commissioning and operation of the product and have the qualifications needed for the performance of their functions.

2. Intended use

Drive inverters are components designed for inclusion in electrical installations or machinery.

In case of installation in machinery, commissioning of the drive inverter (i.e. the starting of normal operation) is prohibited until the machinery has been proved to conform to the provisions of the directive 89/392/EEC (Machinery Safety Directive - MSD). Account is to be taken of EN 60204.

Commissioning (i.e. the starting of normal operation) is admissible only where conformity with the EMC directive (89/336/EEC) has been established.

The drive inverters meet the requirements of the low-voltage directive 73/23/EEC. They are subject to the harmonized standards of the series prEN 50178/DIN VDE 0160 in conjunction with EN 60439-1/DIN VDE 0660, part 500, and EN 60146/DIN VDE 0558.

The technical data as well as information concerning the supply conditions shall be taken from the rating plate and from the documentation and shall be strictly observed.

3. Transport, storage

The instructions for transport, storage and proper use shall be complied with. The climatic conditions shall be in conformity with prEN 50178.

4. Installation

The installation and cooling of the appliances shall be in accordance with the specifications in the pertinent documentation.

The drive inverters shall be protected against excessive strains. In particular, no components must be bent or isolating distances altered in the course of transportation or handling. No contact shall be made with electronic components and contacts.

Drive inverters contain electrostatic sensitive components which are liable to damage through improper use. Electric components must not be mechanically damaged or destroyed (potential health risks).

5. Electrical connection

When working on live drive inverters, the applicable national accident prevention rules (e.g. VBG 4) must be complied with.
The electrical installation shall be carried out in accordance with the relevant requirements (e.g. cross-sectional areas of conductors, fusing, PE connection). For further information, see documentation.

Instructions for the installation in accordance with EMC requirements, like screening, earthing, location of filters and wiring, are contained in the drive inverter documentation. They must always be complied with, also for drive inverters bearing a CE marking. Observance of the limit values required by EMC law is the responsibility of the manufacturer of the installation or machine.

6. Operation

Installations which include drive inverters shall be equipped with additional control and protective devices in accordance with the relevant applicable safety requirements, e.g. Act respecting technical equipment, accident prevention rules etc. Changes to the drive inverters by means of the operating software are admissible.

After disconnection of the drive inverter from the voltage supply, live appliance parts and power terminals must not be touched immediately because of possibly energized capacitors. In this respect, the corresponding signs and markings on the drive inverter must be respected.

During operation, all covers and doors shall be kept closed.

7. Maintenance and servicing

The manufacturer's documentation shall be followed.

KEEP SAFETY INSTRUCTIONS IN A SAFE PLACE!

Loher DYNALIFT E
Loher DYNALIFT EH
Technical description and operating instructions

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1. Loher DYNALIFT Control Drive

1.1. Introduction

The Loher DYNALIFT E/EH is an electronic device for two-speeds, preferably 4/16-pole three-phase eleva tor motors, with separate windings. Due to the electronic speed of the service-proved and robust asynchro nous motor no additional flywheel mass is necessary. Therefore extential advantages are obtained oppo sed to conventional elevator drives especially concerning energy saving, noise reduction, and starting cu rents.

1.2. Functioning

The functioning of the device is explained by means of a block wiring diagram (see fig.1).
Out of the driving signals the drive curve calculator produces the speed control value n+. and determine the service performance of the elevator cabin. Acceleration and deceleration, maximum and levellin speed are adjustable in wide ranges.

The actual speed value is recorded by the output signal of a d.c. tacho-machine and a rectifier circuit for the speed actual value n_{actual} which is independent from the direction of rotation, Optionally there is the possibility of acquisition via impulse generator with topped frequency/voltage transformer.

The speed controller with PI-control algorithm compares set and actual value and at its output two contr signals are preset for motor driving and decelerating torques in a way that set and actual value correspon These control signals are converted by trigger pulse amplifiers into trigger pulses $Z_{Dr/Br}$ for the respecti thyristors.

At driving torques a three-phase regulating unit triggers the high-speed winding of the motor and at dec lerating torques a rectifier triggers the low-speed winding. The stator voltage of the machine and thus t torque between zero and the respektive natural limiting torque can be adjusted as precisely required due the position of the trigger pulses concerning the mains voltage (ignition angle).

The speed torque adjusting range for the described control process is shown as an example in fig. 2.

As usual the change of direction is made by the reverse contactors which are located between control de- vice and motor. Contrary to the conventional operation in cases of suitable drive of the drive curve calcula tor these contactors are switched without current.

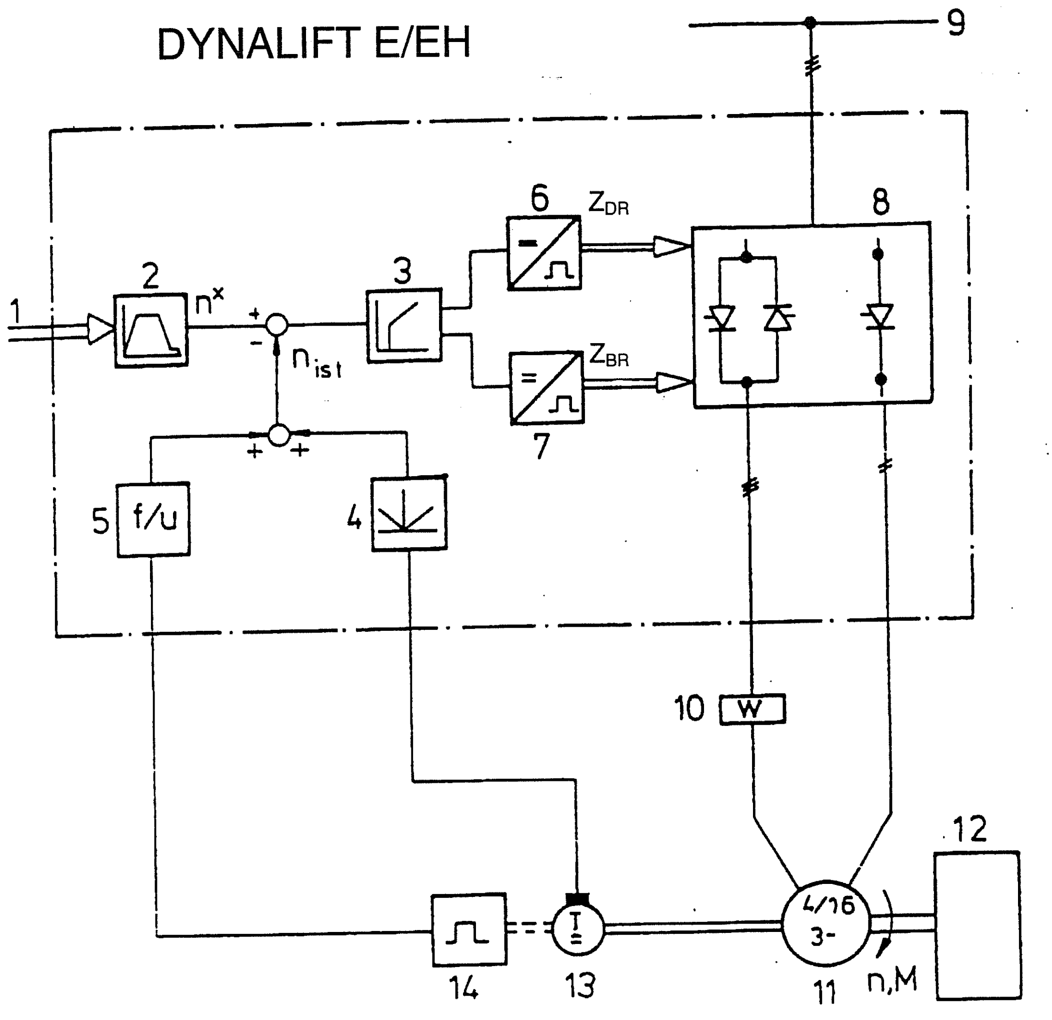

Figure 1: Block wiring diagram Loher DYNALIFT E/EH

01:	signal "driving"
02:	drive curve calculator
03:	speed controller with PI-algorithm
04:	actual value rectifier
05:	frequency/voltage transformer
06:	trigger pulse amplifier for driving
07:	trigger pulse amplifier for braking
08:	Power unit with three-phase control for driving and rectifier for braking
09:	three-phase line
10:	reverse contactors
11:	pole-changing three-phase elevator motor (4-pole: driving, 16-pole: braking)
12:	elevator
13:	D.C. tacho generator
14:	pulse generator

n*: speed set value n_{ist}: speed actual value $Z_{Dr/Br}$: trigger pulses driving/braking

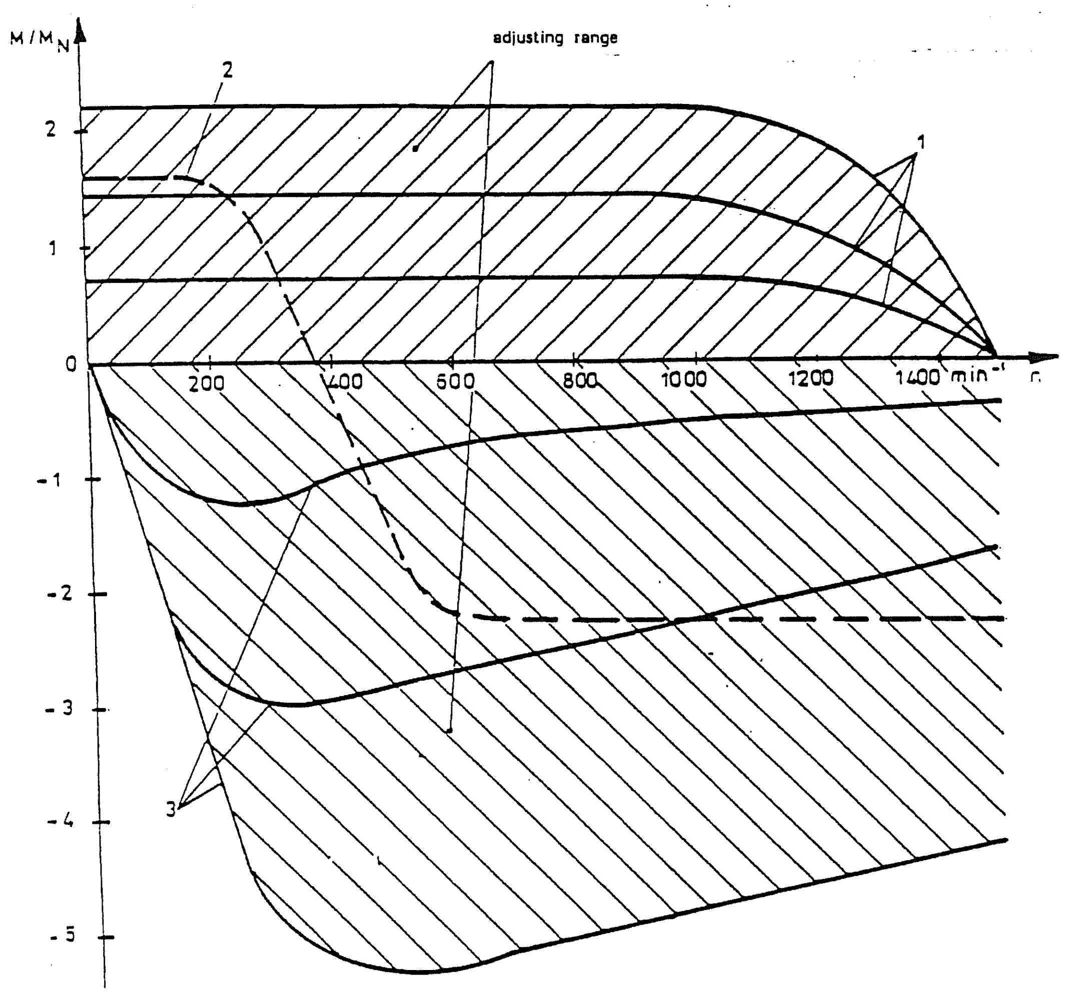

Figure 2. Speed torque range of a 4/16-pole lift motor at DYNALIFT E/EH supply:

1. Characteristics of the high-speed winding at regulating unit power supply

2. Characteristics of the low-speed winding at mains power supply

3. Characteristics of the low-speed winding at rectifier power supply

1.3. Monitoring

The device includes a monitoring equipment in case of a phase failure combined with a phase sequence control and a difference monitoring system for speed control. In case of failure the phase monitoring system releases a potential-free contact. A contact releases as well if the speed of an adjusted limited value is passed over. This contact can be looped into the safety circuit of the control system.

1.4. Operation

1.4.1. Driving Performance

The requested comfort conditions concerning acceleration and deceleration can be adjusted on the drive curve calculator. As the cabin follows the adjusted drive course independent from load an optimal and comfortable driving course is guaranteed.

The Loher DYNALIFT E/EH is suitable for elevators up to the range of approx. 1 m/sec. A short positioning drive (see fig.3) guarantees the high precision of the Loher DYNALIFT E/EH elevators even if there are influences of disturbances (e.g. fluctuations of mains voltage, changes of friction value in the pit) which is important for load or bed lifts.)
Furthermore, the soft driving performance and the possible omission of additional flywheel masses are resulting in a careful handling mechanism and in a reduction of the driving noises as well as in a considerable saving of energy. Additionally the amplitude of the starting currents decreases contrary to the starting currents of conventional service.

1.5 Additional Flywheel Mass

For conventional uncontrolled elevator drives additional flywheel masses are used for adapting acceleration and deceleration. For a DYNALIFT E/EH-controlled elevator drive these additional flywheel masses are not necessary because the values of acceleration are given by the control system.
Without additional flywheel mass a considerable saving of energy as well as noise reduction are reached.

1.6 Actual value transmitter

With a DYNALIFT E/EH you have the possibility to take a D.C. tacho generator or optionally a trigger pulse generator as actual value transmitter.

1.6.1 Tacho Generator

The tacho generator supplies the actual speed value by a speed-proportionally direct voltage which is necessary for the speed control. The quality of the speed control largely depends on the perfect running of the tacho generator. Therefore special attention must be paid to the mounting. It is inavoidable to drive the tacho generator via an axial clutch.

1.6.2 Impulse Generator

The tacho generator may be replaced by an impulse generator for actual value acquisition.

The impulse generator has to release at least a nearly square wave A.C. voltage whereby 128 impulses per motor rotation are necessary. The amplitude of the square wave voltage may be +/- 50 V max. and the relationship between pulses and non-pulses of 1 : 1 may deviate by 10% maximum.

The impulse generator takes its supply from the power supply unit fitted inside the system. For this purpose supply voltages of +15V/-15V as well as the common mass point are led to the connecting block whereby the current consumption may not exceed +/- 10 mA maximum.

1.7 Installation instructions

1.7.1 General instructions

- All valid local safety regulations must be complied with for the entire installation (e.g. EN 81).
- Installation:
  The device is of a non-enclosed type (IP00) and only protected against accidental contact at the front. The protection it requires against electric shock must be provided by means of installation in a control cabinet. When installing the device in a control cabinet, make sure that the supply of cooling air to the device is not impeded; take the heat loss of the device into consideration when providing for ventilation of the cabinet.

- Power connection:
  To ensure that the device remains safe if a short circuit or component defect occurs, the device must be connected to the power supply via high-speed fuses (classification gR per VDE 0636) as quoted in the table (see section5.3).
  The devices can cause leakage currents to ground (> 3.5 mA) and are therefore intended for permanent connection in accordance with VDE 0160; they are not compatible with standard residual-current-operated protective devices. This must be taken in account particularly with regard to the "radio interference filter" option, because filters of this kind can cause a high leakage current. The protective conductor must be dimensioned in accordance with DIN VDE 1060.

1.7.2 Electromagnetic Compatibility (EMC)

Drive power converters are not devices that are ready for operation on their own; their EMC qualities can only be assessed in connection with a complete installation ("Power Drive System", i.e. device + wiring + motor + sensors, etc.). DYNALIFT devices are, according to the EMC guideline, components intended for use by expert subsequent users and are accordingly not marked with the CE mark of conformity as independent devices.

The following installation rules ensure that the protective aims of the guideline (emission and immunity per EN 50 081 / EN 50 082) are complied with.

In the case of the standard version, responsibility for choosing the most favorable solution for complying with the protective aims of the law on EMC, in accordance with the application environment (industry or household), lies with the manufacturer of the installation:

- assessment of the entire installation taking into consideration the routes along which faults can be propagated to the outside (typical example: industrial installation with its own transformer)

or

- equipping the individual drives (motor, power converter and wiring etc.) with a radio interference filter to comply with the limit values of the installation (e.g. Class B, Group 1 per EN 55 011).

Notes about installation:

Since the device is designed for being built in, the protection it requires against interference irradiation and radiant emittance must be provided by means of installation in a control cabinet. The necessary clearance from emitted interference and interference sensitivity must be guaranteed inside the control cabinet by:

- laying signal and power cable separately
  (guideline ≈ 0.25 m clearance per 10 m in length)

- laying the motor cables separately (except when high-quality, shielded cables are available)

- installing interference-emitting and interference-sensitive devices separate from one another

When using radio interference filters (optional), the following must be observed:
the filter must be mounted immediately next to the control device; the device, filter and ground connection must all make perfect contact with the common mounting plate (remove paint etc.; connections must be have as large an area as possible and be protected against corrosion). This HF connection does not substitute for the correct connection of the protective conductors of the filter and device.

The power cable "filtered" in this way must not no longer be laid unprotected in the control cabinet (either separate from the sources of interference or as a shielded cable).

Notes about wiring:

Shielded cable must be used for signal lines (e.g. tacho signal). Unless otherwise specified in the terminal diagram, the shield must be connected to ground across as large an area as possible, immediately next the device on the mounting plate.
It is not permissible to use free conductor strands of the motor cable for, e.g., signals from PTC thermistor detectors or the tachogenerator. The motor cable and the cable to the braking resistor must be shielded or equipped with concentric protective conductors (e.g. type NYCXY), so that they comply with Class B requirements.
Make sure that the shield has good contact not only with the control cabinet but also with the motor (e.g. conduit thread gland Type SHVE from Lapp Co.).

As a rule, the shields of cables do not fulfill the function of the protective conductor for providing protection against electric shock. Therefore, an additional protective conductor integrated into the motor cable must be provided if necessary.
Ground leakage currents that flow outside of the motor cable, e.g. via concrete-footing ground electrodes, can disrupt the effect of the cable shield.

Notes about radio interference filters:

In connection with the optional radio interference filters described in section 5.3, the limit values for the conducted interferences are complied with in accordance with EN 55 011, Class B, Group 1 (requirement of the basic specification EN 50 081-1 for household rooms).
These radio interference filters must only be used with a grounded-neutral system (system configuration TN or TT). With non-grounded systems (system configuration IT), decentral filtering measures are extremely problematical and must be coordinated together with the power utility companies and filter manufacturers (protection concept of the IT system, overloading of components, etc.).
For economic reasons, the current rating of the radio interference filter must be chosen in line with the installation data (similar to cable dimensioning). Section 5.3 contains common coordination with the control device.

Immunity and emission in the low-frequency range:

DYNALIFT devices are suitable for use in power systems suffering from harmonic oscillation (both public and industrial systems per 61 000-2-4).
The regulations of the local power utility company must be complied with with regard to emitted interference (harmonic oscillations) (e.g. VDEW Guidelines in Germany). DYNALIFT devices are available in versions with the harmonic numbers 5, 7, 11, 13, etc. (typical $J_{(5)}/J_{(1)} \approx 20$ %) in the line current. The number of voltage dips during braking operation can be reduced by installing the optional commutating reactor. A reactor of this kind must always be installed with devices for a rated voltage of 500 V and 660 V and with power systems with a very high short-circuit power.

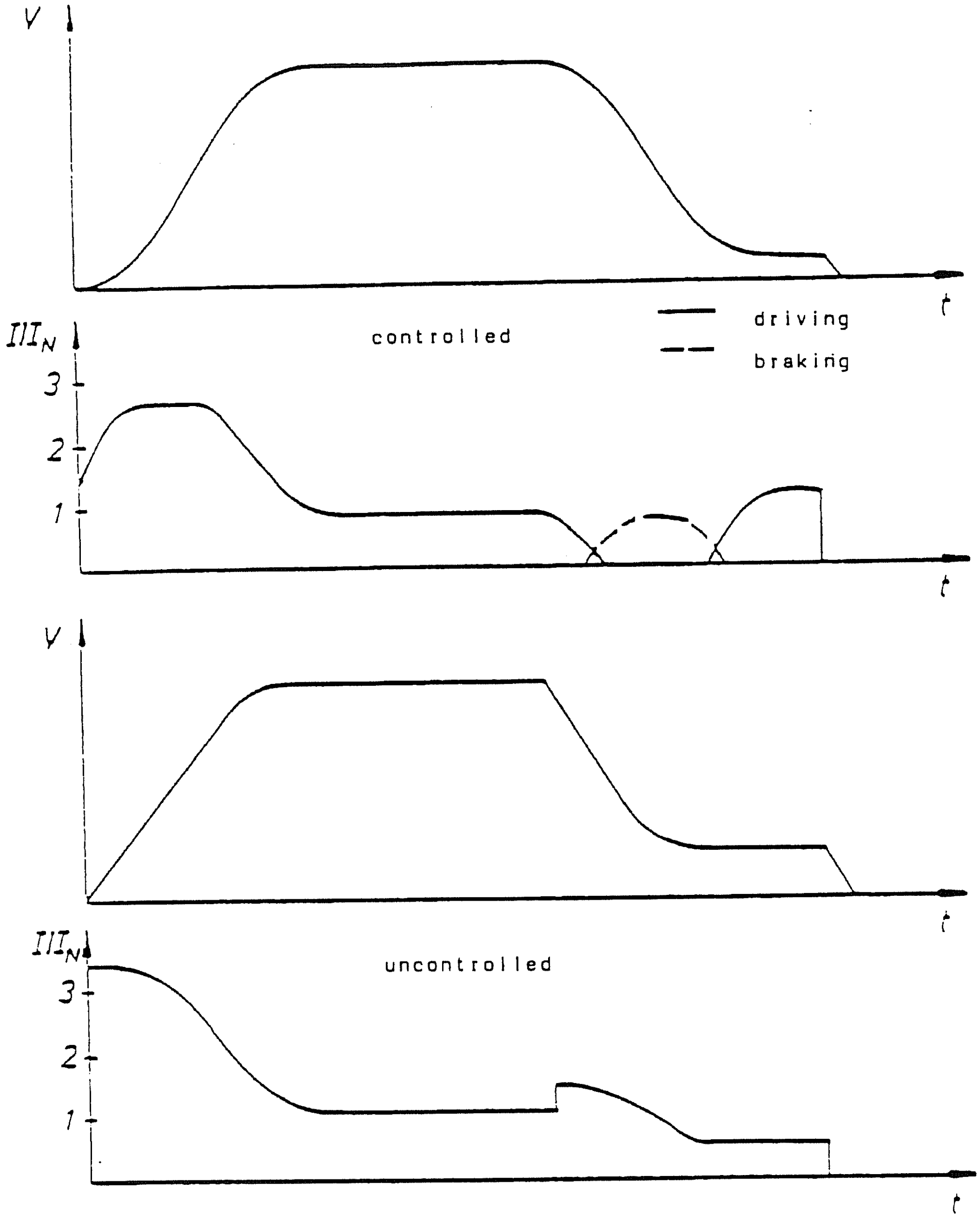

Figure 3: Drive curve of controlled and uncontrolled elevators and appertaining amplitude of supply current

2. Mechanical Layout

2.1. Loher DYNALIFT E/EH

The complete device is mounted on a base plate and includes the power unit with thyristors, diodes, and the electronic unit. The unit is designed in enclosure IP 00 and is suitable for mounting into control cabinets (see fig.4)

To ensure no accidental touching of the unit it is covered with a plate.

DYNALIFT E 4 E 1A-01 ... - ... DYNALIFT EH 4 E 1A-03 ... - ...	max. starting current I_{max}	custumer fuse protection super-quick acting	dimensions (H x W x D) mm	weights [kg]	dimension drawing number
380 - 016 500 - 016 660 - 016	61 A	40 A	280 x 500 x 165	12	101
380 - 025 500 - 025 660 - 025	95 A	63 A	280 x 500 x 165	12	101
380 - 040 500 - 040 660 - 040	152 A	100 A	280 x 500 x 165	12	101
380 - 060 500 - 060 660 - 060	210 A	160 A	280 x 500 x 180	12,5	101
380 - 080 500 - 080	280 A	200 A	280 x 500 x 180	12,5	101
380 - 100 500 - 100	350 A	250 A	(280+45) x 500 x 200	13	101

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380 - 125 500 - 125	350 A	250 A	(280+45) x 500 x 200	13	101

Dimension drawing No. 101

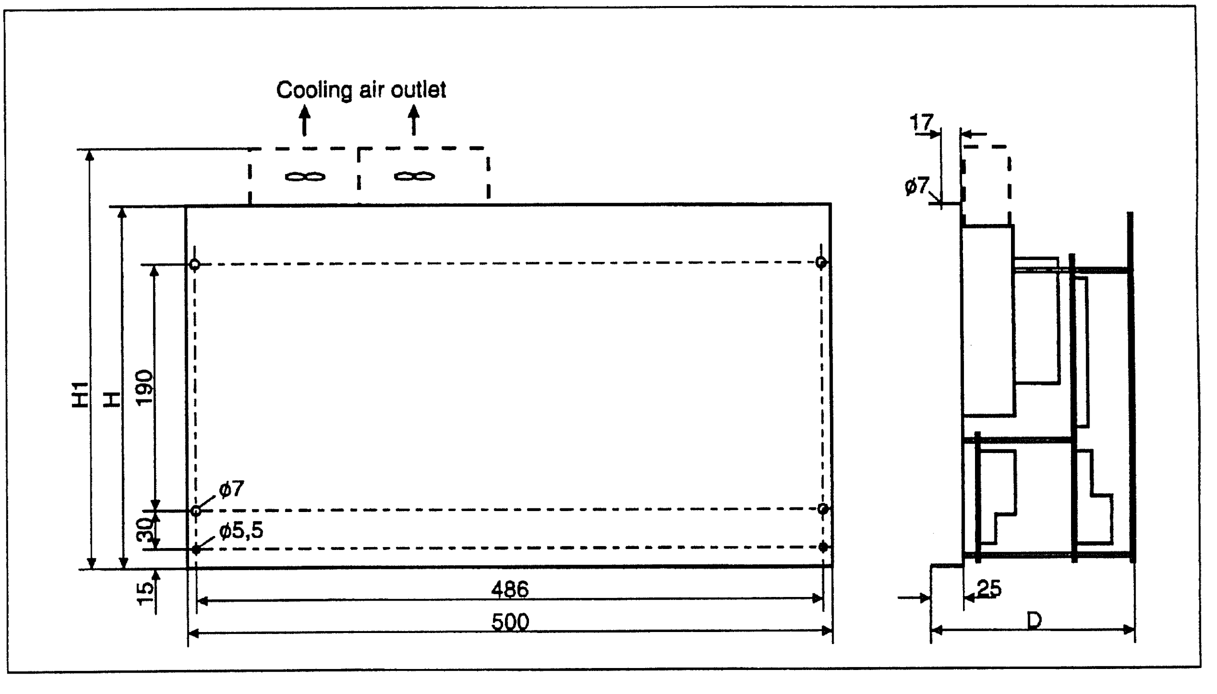


Figure 4: Dimensions

3. Electrical Design

3.1. Power Unit (Terminals L1, L2, L3, 2U, 2V 1U, 1V)

The device has to be connected to the mains supply and motor according to the wiring diagram (see fig.8 Nominal connecting voltage, frequency and permissible motor nominal current are indicated on the ratin plate of the device. The device may also be driven with smaller connection voltages by a pluggable bridg on the mains supply rate (right side of supply transformer, also see technical data).

Attention must be paid to the correct phase sequence when connecting them with the mains supply. If pha se sequence is changed or in case of phase failure the installed monitoring relay does not pull up and th signal LED "mains failure" does not light up.

The high-speed motor winding is connected with reverse contactors to the terminals 2U, 2V, and 2W an the low-speed motor winding is connected to the terminals 1U and 1V.

The tacho generator is connected to the terminals 8 and 9 of the electronic control unit whereby the junctio wire should be installed as protected as possible.

Optionally the impulse generator is connected to the plugs 9, 10, 11 and 12.

The bridges W401 and W402 on the control plate have to be removed in case of 6-pole motors.

Connections 1 and 2 are to be linked. The bridge may be replaced by a switch only closed during travelling The current is cut off electronically if switch opens.

3.2. Control System

3.2.1. Long-haul Travel

When starting the contacts S_0 and S_2 (plugs 2, 3 and 5) must be closed at the same time.
The mechanical brake and the reverse contactors pull up and the motor runs according to the set accelera tion up to the speed V_2 At the braking tag the contact S_2 is opened so that only the contact S_0 is close The motor decelerates to the levelling speed V_0. At the holding tag S_0 is opened. The mechanical brak falls in, the motor current is switched off electronically in the device and the reverse contactors open witho current.

3.2.2. Floor-to-Floor Travel

At rated speeds of up to 1 m/s, floor-to-floor travel can generally be performed at V_2. If, however, the bra king distance is so long that at the deceleration point the elevator has not yet reached its rated speed (e. in buildings with split-level floors), then floor-to-floor travel can be performed at the medium speed V_1 (S and S_1 operated). Separate braking tags in the lift shaft are provided for this case.

3.2.3. Test Running/Reverse Travel

Test running and reverse travel are also performed at speed V_1. As drive signal only the contact S_1 has be closed. As a result, the speed limit is reduced to 65 % of the synchronous speed and thermal protectio by means of the thyristor and diode module is also activated.

3.2.4. Monitoring

Potential-free contacts of monitoring relays lead to terminals 14 and 15. There is no connection between these terminals in the case of a failure. The terminals can be inserted in the safety circuit of the external control.
The speed limit for long-distance and floor-to-floor travel is 10% higher than the synchronous speed.
For test running or reverse travel the speed-monitoring device is activated at 65% of the synchronous speed. The power supply monitoring system reacts to an incorrect phase sequence, phase failure, system undervoltage and failure in the electronic voltage supply system.

Thermal protection by means of thyristors and diodes in combination with the extra-quick-acting fuses in the device which are connected in series provide a reliable protective system. However, this is only on condition that the elevator is not run for a prolonged period at speeds below half the synchronous speed.
If the contact S_0 is closed, i.e. for long-distance and floor-to-floor travel, the signal "excess temperature" is suppressed, so that a journey which has already begun can be completed.

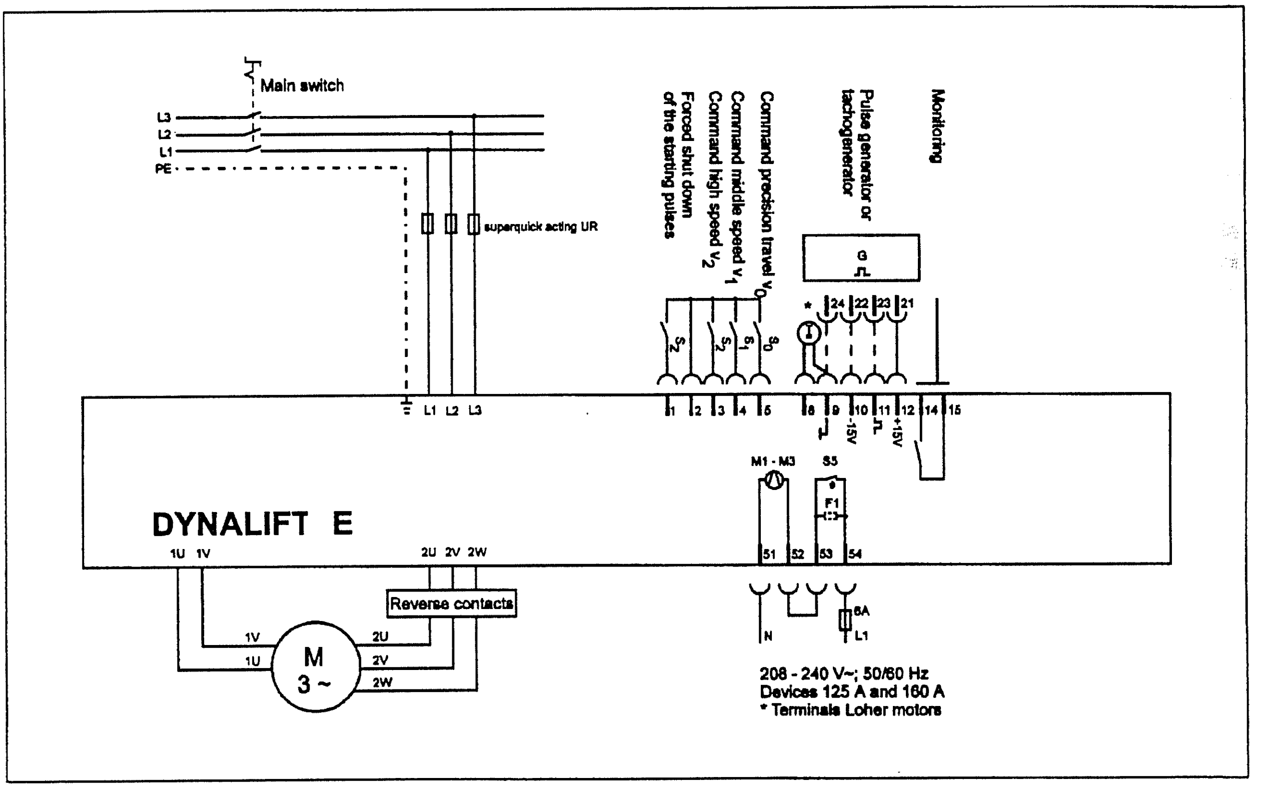


Figure 8: Connecting wiring diagram DYNALIFT E

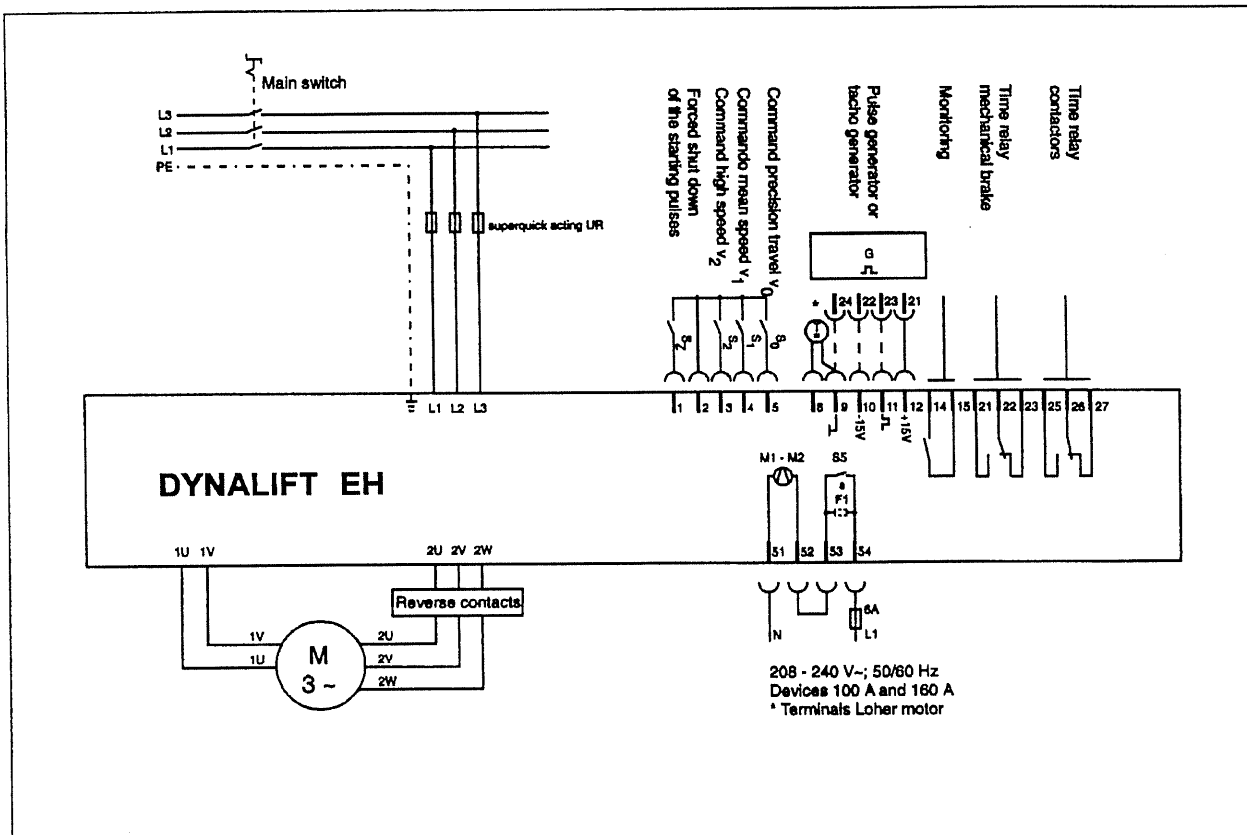
3.2.5 Mechanical Brake, Revers Contactors (Concerning DYNALIFT EH)

With normal controller operation the mechanical brake only serves as a holding brake. To avoid brakin jerks during stopping the brake should only be applied after motor standstill. This is effected by means of a internal adjustable time relay d_{MB} (terminals 21, 22 and 23) which is controlled by the pilot signals Disconnection of the brake magnet on the a.c. side as a rule results in unpermissibly long release times (> 0.4 s), especially with larger machines. In such cases switching off must be performed by means of suitable contactor on the d.c. side.

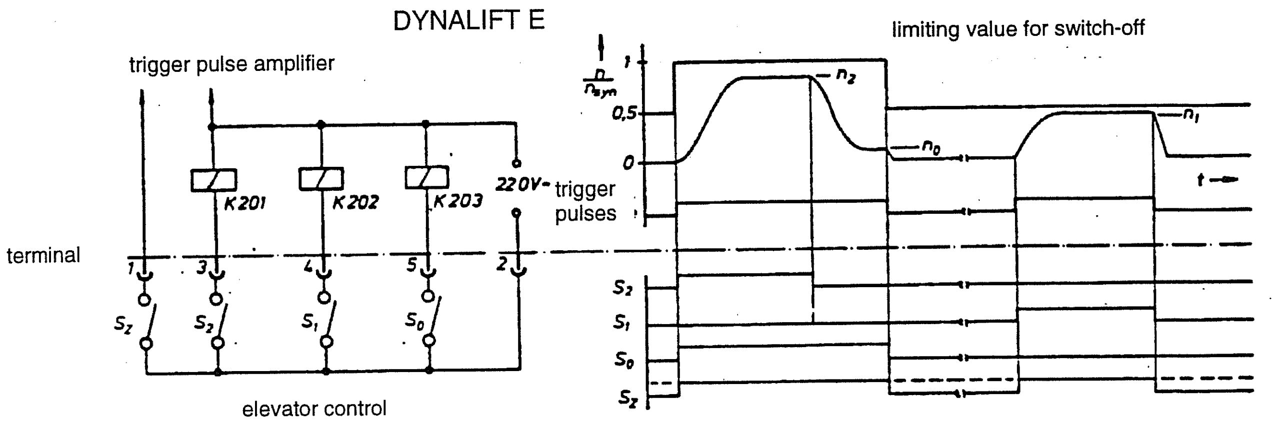
The revers contactors should only release when the mechanical brake really is applied. For this purpose th equipment has an additional time relay d_{RS} (terminals 25, 26 and 27) , which remains actuated approx. 0.5 longer than the time relay for the mechanical brake. In the controller the motor current is switched o electronically immediately before the time relay for the revers contactors releases; this means that the cor tactors are switched without power and thus have a longer service life,

<u>Note:</u>

For test runs (only S_1 actuated) the two time relays are not triggered,



<u>Figure 9: Connecting wiring diagram DYNALIFT EH</u>



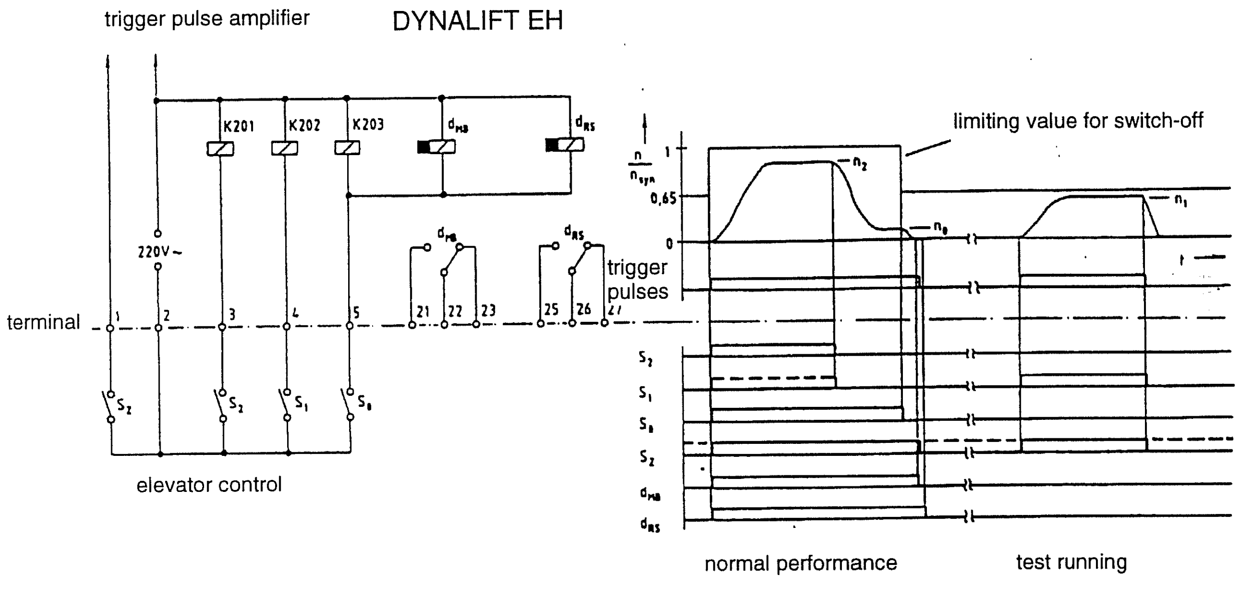


Figure 10: Drive diagram and contacting of the control system

S_0 : signal drive, equivalent to levelling (V_0)

S_1 : signal medium speed (V_1)

S_2 : signal high speed (V_2)

S_Z : enabled trigger pulses

d_{V0}, d_{V1}, d_{V2} internal set value uncoupling relays

d_{MB}: internal time relay for mech. brake, adjustable
t_B = 0.2 .... 1.5s

d_{RS}: internal time relay for revers contactors
time: t_B + 0.5s

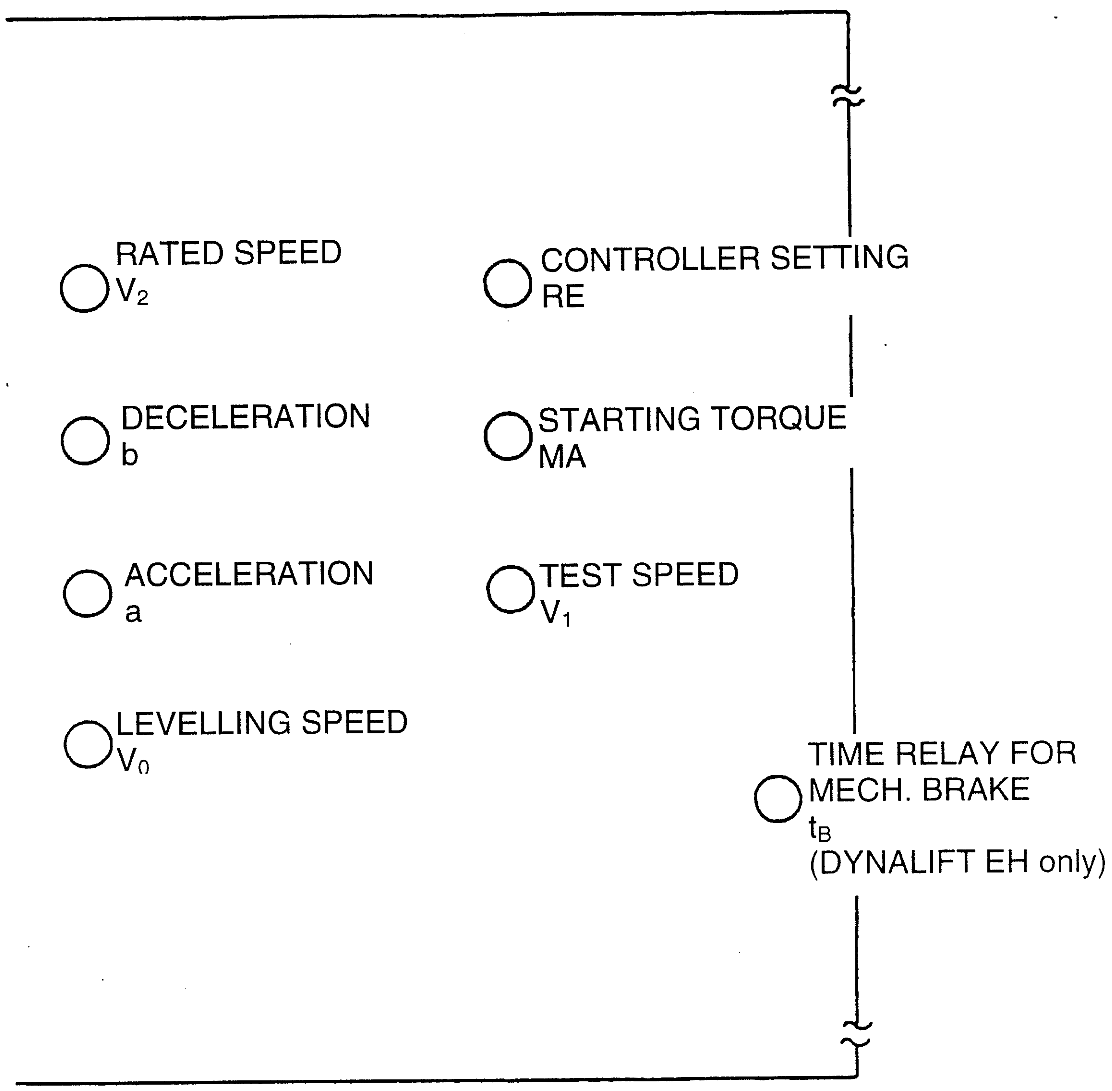


Figure 11: Location of setting potentiometers on the front panel

4. Commissioning and Adjustment

As soon as the control system is connected and all input functions and the balance of counterweight to the cabin are correct, adjustment can begin. The braking lugs must be placed accurately to the centimetre at the stops.

Figures 11, 12 and 13 show the arrangement of setting potentiometers and their function.

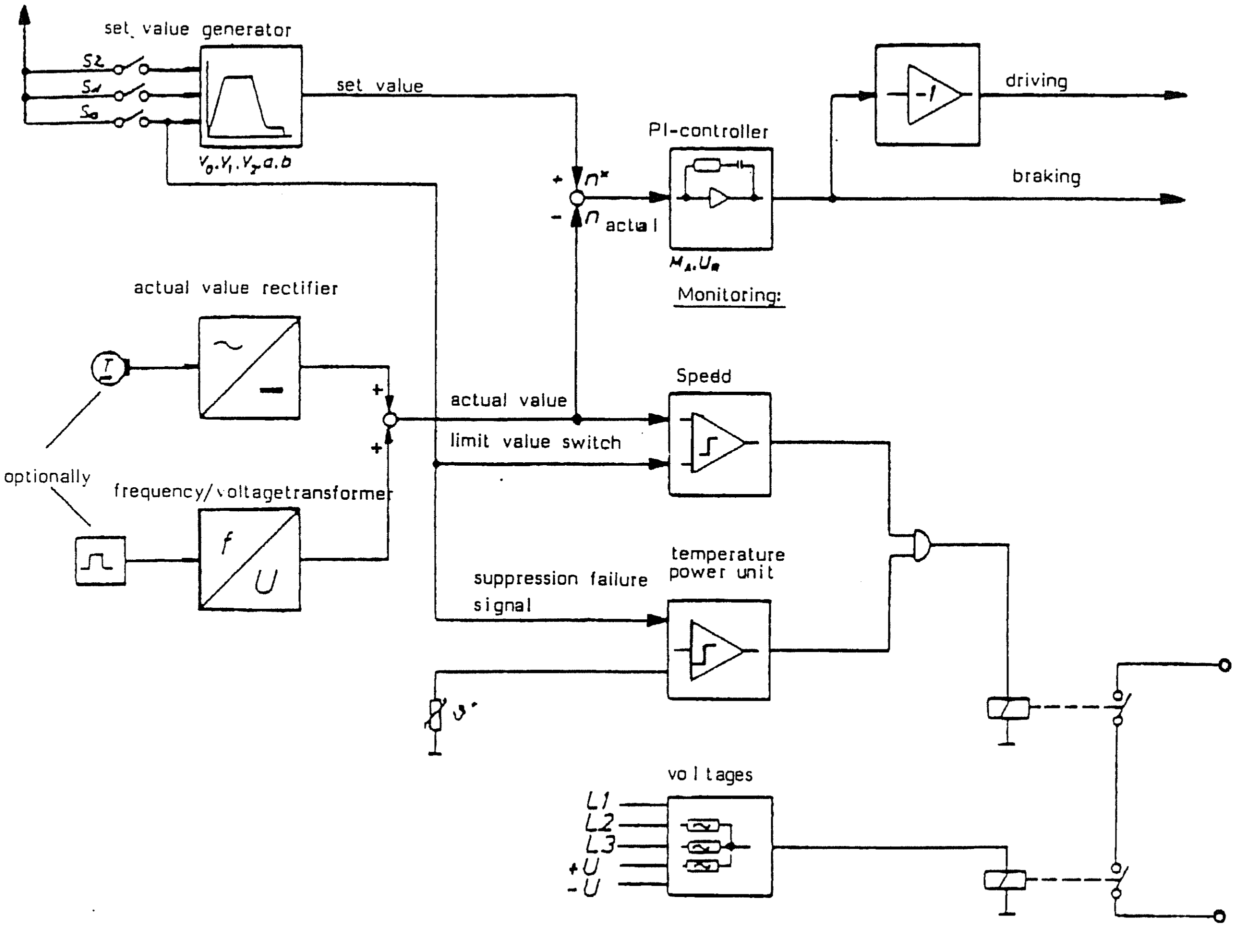


Figure 12: DYNALIFT E - Block wiring diagram of control with function of the setting potentiometers

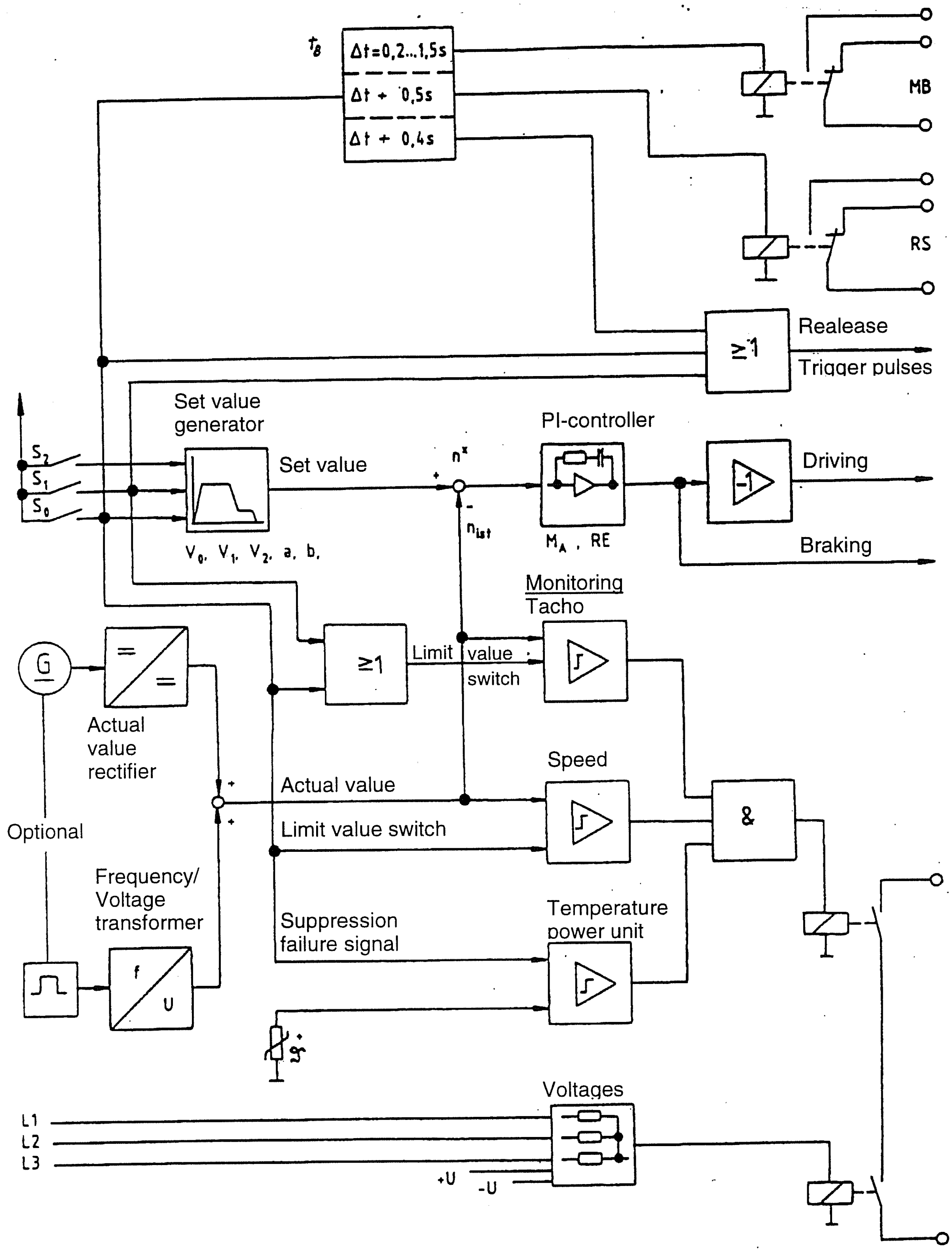


Figure 13: DYNALIFT EH - Block wiring diagram of control with function of the setting potentiometers

4.1. Feeding of the Mains Voltage

When feeding the mains voltage the installed signal LED "mains failure" must light up as otherwise two phases are exchanged or one phase is missing (check fuses). The signal LEDs for the trigger pulses may not light up.

4.2. Levelling Speed (V_0)

The contact S_0 must be operated together with the reverse contactors. The LED an the trigger pulse amplifier plate lights up. The mechanical brake releases and the elevator begins to move. The levelling speed can be set by the potentiometer V_0. With levelling signal terminated the LED on the trigger pulse amplifier switches off and the motor is decelerated by the mechanical brake until standstill. It is functional to measure the current in the mains phases L1 and L3 during travel. It should not be essentially above the double nominal current of the control device.

4.3. Long-haul Travel (V_2)

This adjustment is performed in travels through several floors. When the starting signal is given the contacts S_0 and S_2 are closing, the reverse contactor pulls up and the brake releases. The elevator begins to move. The deceleration should be set on maximum during the first travels (setting potentiometer completely clockwise) and the speed V_2 on minimum (setting potentiometer completely anticlockwise).

4.3.1. Acceleration

With the potentiometer "acceleration" the acceleration performance can be set according to optimum conditions.

4.3.2. Constant Driving Speed

The constant high driving speed must be set with the potentiometer V_2 in a way that the speed of the motor is about 20 min^{-1} lower than the nominal asynchronous speed (rating plate motor). If the cabin is moving upwards without load it has to be balanced to this speed by aid of a revolution counter. If no revolution counter is available, it is also possible to connect a high-resistive voltmeter ($\geq$ 10 kOhm/V) to the tachometer (or a frequency meter to the pulse generator) and to convert correspondingly.

4.3.3. Deceleration

The deceleration must be set at the potentiometer "deceleration" in a way that the levelling distance takes about 10% of the whole braking distance. Because of the given driving course an exact coordination between braking distance and deceleration must result. The necessary braking distance of DYNALIFT E-controlled elevators depending on speed and deceleration experience has shown that the braking distance should be 3 - 5 cm approx., however, it should be the same each floor.

4.4. Levelling Accuracy

The stopping precision is set with the potentiometer for the levelling speed V_0 in a way that the elevator stops flushly both in downward and in upward travel. (Attention: checking of the stopping lug distance will eventually be necessary).

4.5. Medium Driving Speed (V_1)

During medium driving speed V_1 only contact S_1 is closed instead of contacts S_2 and S_0 . Speed V_1 is limited internally to 50% of V_2.

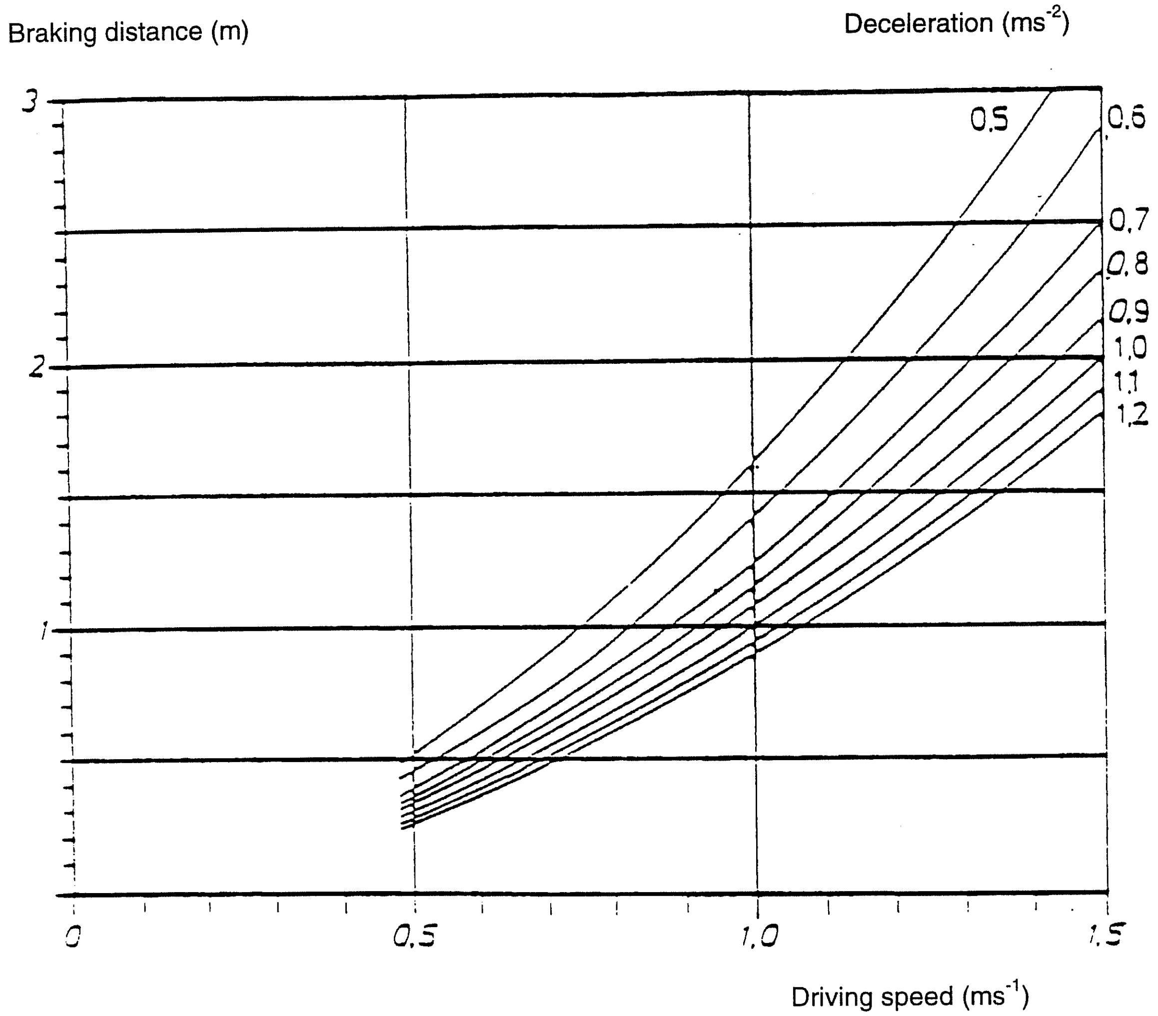


Figure 13: Correlation between driving speed and braking distance for elevators with DYNALIFT E/EH

4.6. Control Amplification

If the elevator tends to exceed the set value after having finished the acceleration phase or if low-frequency oscillation phases appear these can be removed by increasing the control amplification. The influence should only be increased as far as necessary, as otherwise there might occure high-frequence control oscillation. Furthermore attention must be paid to a smooth running of the tacho machine.

4.7. Starting Torque

At the moment of starting an adjustable torque can be given to the elevator drive by the potentiometer "starting". Sometimes this is necessary for gears with low self-interception. The potentiometer should be adjusted in a way that the elevator surely starts at "empty down" and does not jerk when starting at "empty up".

5. Technical Data

5.1. Type Code

Type designation DYNALIFT E:

4E1A-01 380-025

- 025 – motor nominal current [A]
- 380 – nominal mains voltage [V]
- 01 – developing und modification status
- 4E1A – type code

Type designation DYNALIFT EH:

4E1A-03 380-025

- 025 – motor nominal current [A]
- 380 – nominal mains voltage [V]
- 03 – developing and modification status
- 4E1A – type code

General technical data DYNALIFT E and DYNALIFT EH:

Mains voltage	V_N = 200/220/346/380 V, 3~ ± 15%, 50 Hz (suitable for 400 V ± 10% acc. to IEC 38) V_N = 415/440/500 V, 3 ~ ±15 %, 50 Hz V_N = 660 V, 3 ~ ±15 %, 50 Hz (suitable for 690 V ± 10% acc. to IEC 38) The devices are factory side adjusted to the max. possible mains voltage! Other values on request1
Output voltage	0 ... V_N / 3~, 0 ... 0,8 V_N / DC
Output frequency	corresponds to input frequency
Output current	0 ... I_N ... I_{max} (for 3s)
Set value setting	isolated contacts, load 220 V~, ca. 10 mA
Actual value taking	pulse generator 60V with 1000 min-1 or pulse input 128 pulses/rotation bipolar HTL-level processing pulse/pause ratio 1:1 ±10%, voltage supply ± 15V, possible out of control device
Fault signal	isolated contact 250 V / 6 A~ for mains, temperature and overspeed monitoring
Ambient temperature	- 10 ... + 50 °C
Installation height max.	1000 m above sea level
Type of protection	IP 00
Colour of the mounting plate	RAL 7032

6. Accessories (6 only concerning to DYNALIFT E)

6.1. Mains Choke

In order to reduce the mains reactions mains chokes can be installed. Depending on rated voltage and ra ted current of the devices various chokes are for selection (see also chapter 7).
It is advisable to install the mains choke next to the device.
The electrical connection can be seen on fig.15.

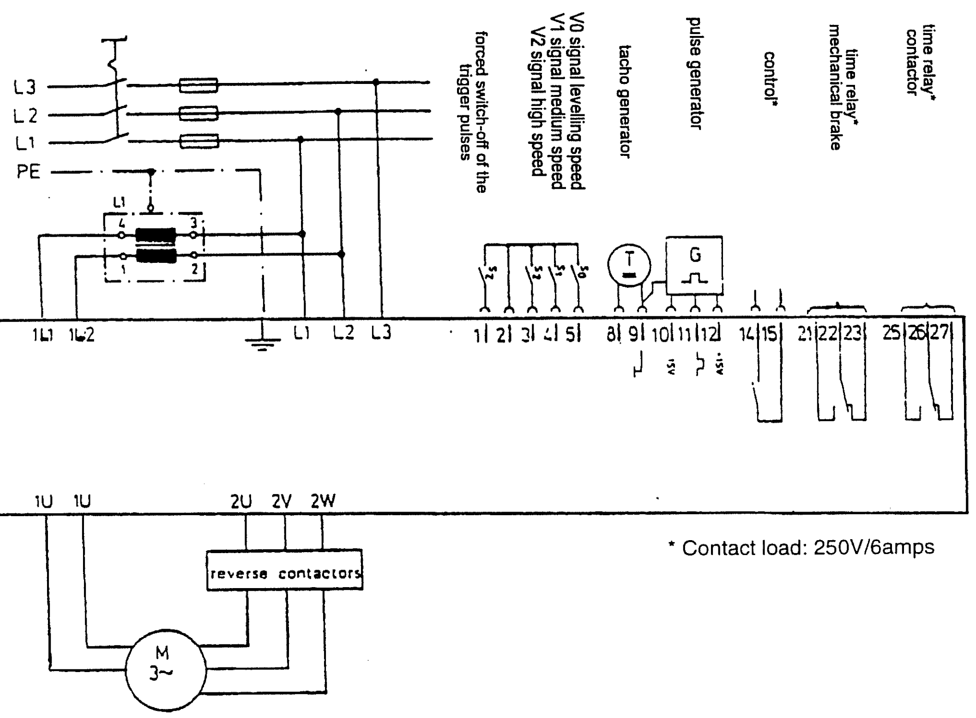


Figure 15: Connection diagram DYNALIFT E with mains choke and additional board for electrical stop

6.2. Time Relay for Electrical Stop

For special requirements concerning driving performance there is the possibility to insert an additional boa for electrical stop in the DYNALIFT E device (see fig.16).

This board has an adjustable time relay enabling delayed switch-off of the mechanical brake after the d vice has decelerated the motor from levelling speed V_0 to speed zero.

Approx. 0.4 seconds after the mechanical brake was switched-off the trigger pulses for the thyristor modu are disabled.

A further timer relay on the additional board disconnects the motor contactor approx. 0.1 second after the thyristors are disabled. The electronic switch-off of the motor current avoids sparking at the contactors.

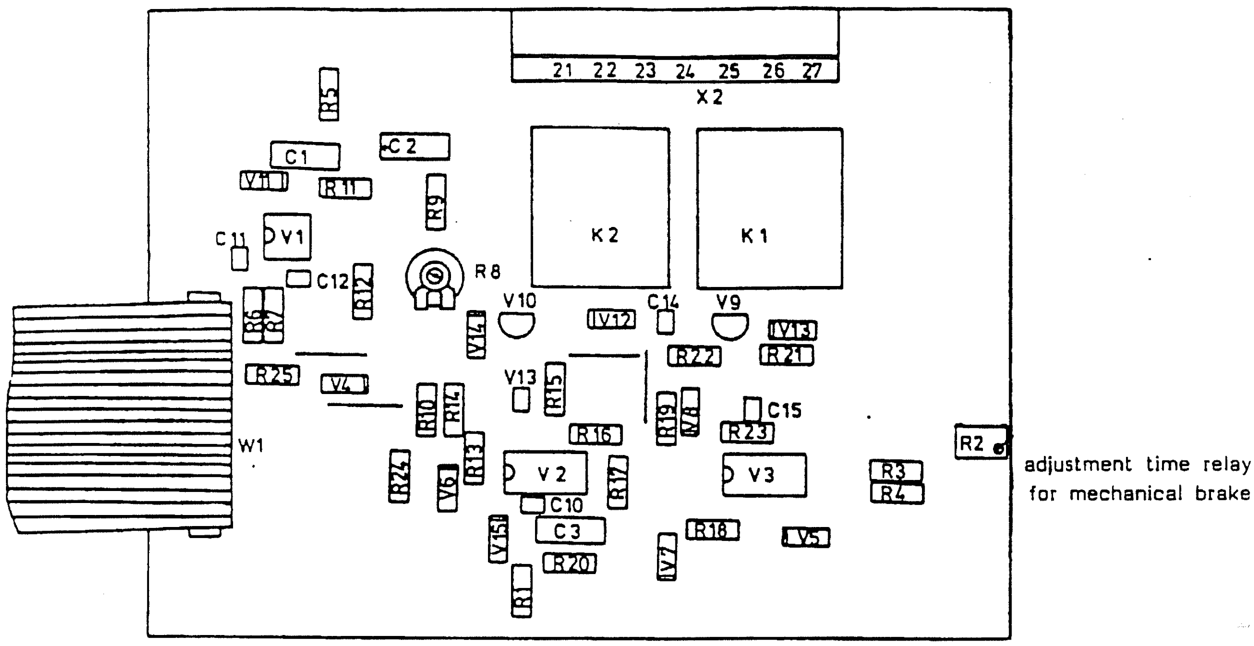


Figure 16: Additional board for electrical stop

The two delayed braking time relays are triggered by the signal "driving" S_0 and - as potential-free contacts - are led to the terminals 21, 22, 23, 25, 26 and 27 (see fig. 15). The air and leakage distances of the sectioning points correspond with VDE 0110, class C insulation, 250 V -

A common wiring diagram for the control is to be found in chapter 8

In order to stop as accurate as possible switch-off of the mechanical brake should be effected at D.C. by means of a suitable contactor triggered by the adjustable time relay by means of the terminals 21, 22, and 23.

Attention:

In case of test running (only S_1 working) the two time relays are not triggered.

Adjustment of the devices: see 4.1. to 4.7, except adjustment of the braking operation (see 4.4.) where also the time relay for the mechanical brake has to be adjusted together with the variation of the levelling speed V_0 so that the brake is released exactly the moment speed zero is reached.
The potentiometer for adjustment of this time relay is to be found at the right edge of the additional board (see fig.16)

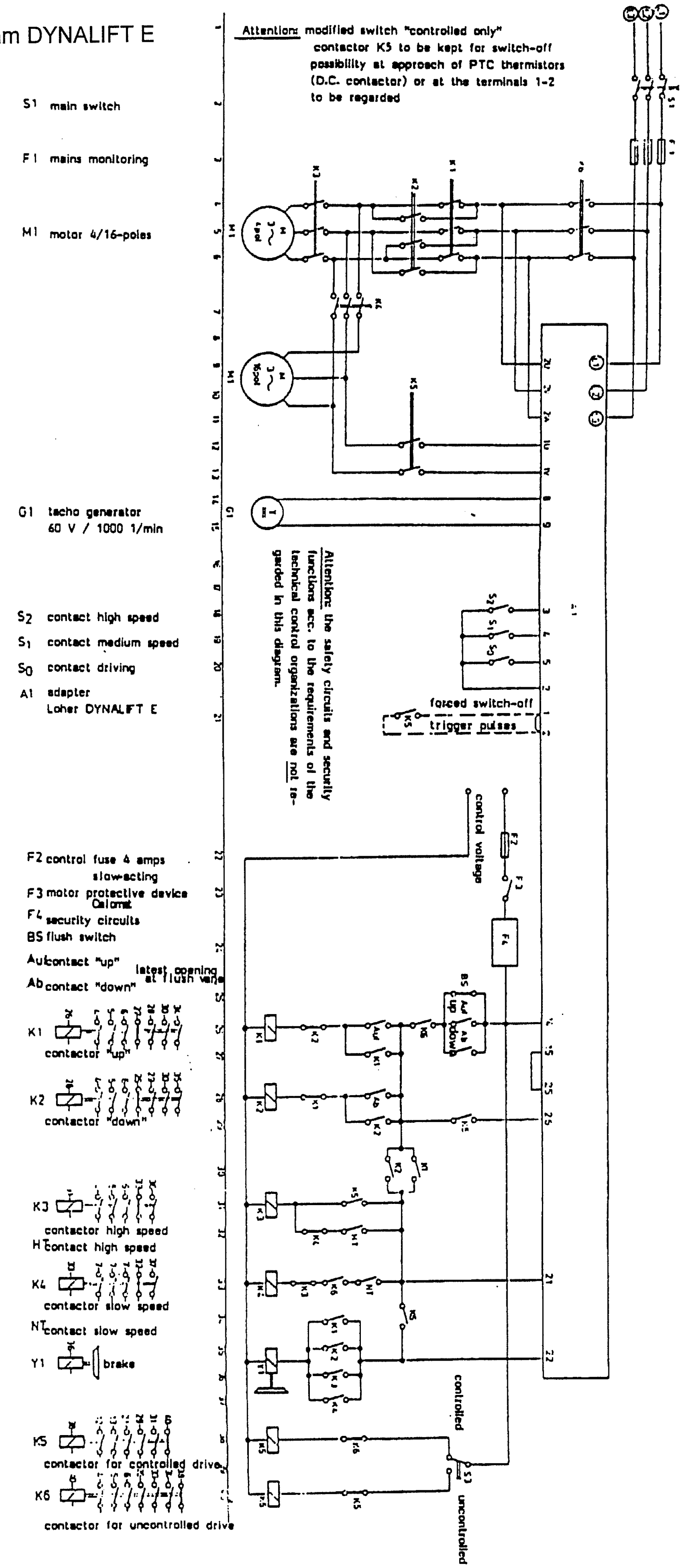
7. Spare Parts

				used in 4E1A-01 and 4E1A-03					
Spare Part Designation	Units per device	Drawing No. Type	Article No.	380-16 380-25	380-40	380-60	380-80	500-16 500-25	50 4
Board wiring 380 V	1	4 E 027 EK 030	0082057	x	x	x			
Board wiring 500 V	1	4 E 027 EK 031	0082059					x	x
Board power unit 380 V	1	4 E 027 EK 010A	0096097	x	x	x	x		
Board power unit 500 V	1	4 E 027 EK 011A	0107496					x	x
Board control unit 50 Hz	1	4 E 027 EK 001	0082063	x	x	x	x	x	x
Board control unit 60 Hz	(1)	4 E 027 EK 002	0082062	x	x	x	x	x	x
Board trigger amplifier	1	4 E 027 EK 020	0082061	x	x	x	x	x	x
Board wiring 380 V	1	4 E 080 EK 030	0096013				x		
Board time relay *)	1	4 E 027 EK 025	0107288	x	x	x		x	x
Thyristor module	4	MCC 25-12i01	0086311	x					
Thyristor module	4	MCC 40-12i01	0086913		x				
Thyristor module	4	MCC 25-16i01	0091126					x	
Thyristor module	4	MCC 40-16i01	0095647						
Thyristor module	4	MCC 55-12i01	0089559			x			
Thyristor module	4	MCC 90-12i01	0091098				x		
Diode module	1	MDD 25-12N1	0095735	x					
Diode module	1	DD 65N1400K	0069945		x	x			
Diode module	1	DD 65N1600K	0076858					x	
Diode module	1	DD 85N1200K	0091097				x		
Fine wire fuse 5 x 30	4	0.63A medium slow-acting	0079029	x	x	x	x	x	
P.T.C.thermistors compl.	1	4 E 027 EM 050 R1	0089578	x	x	x	x	x	
Flat cable DIN 41651	2	4 E 027 EL 041	0086318	x	x	x	x	x	
Mains choke *)	(1)	538-901	0085211	x				x	
Mains choke *)	(1)	541-902	0085212		x				
Mains choke *)	(1)	2538-901	0128309			x			
Mains choke *)	(1)	2541-901	0128310				x		
Mains fuse NH00									
Classification gR									
63A	3		0091081	x				x	
100A	3		0073023		x				
160A	3		0161481			x			
200A	3		0161482				x		
Radio interference suppression filter									
16A			0209937						
25A			0207835						
36A			0207834	x				x	
50A			0209938		x				
80A			0209939			x			
120A			0220510				x		

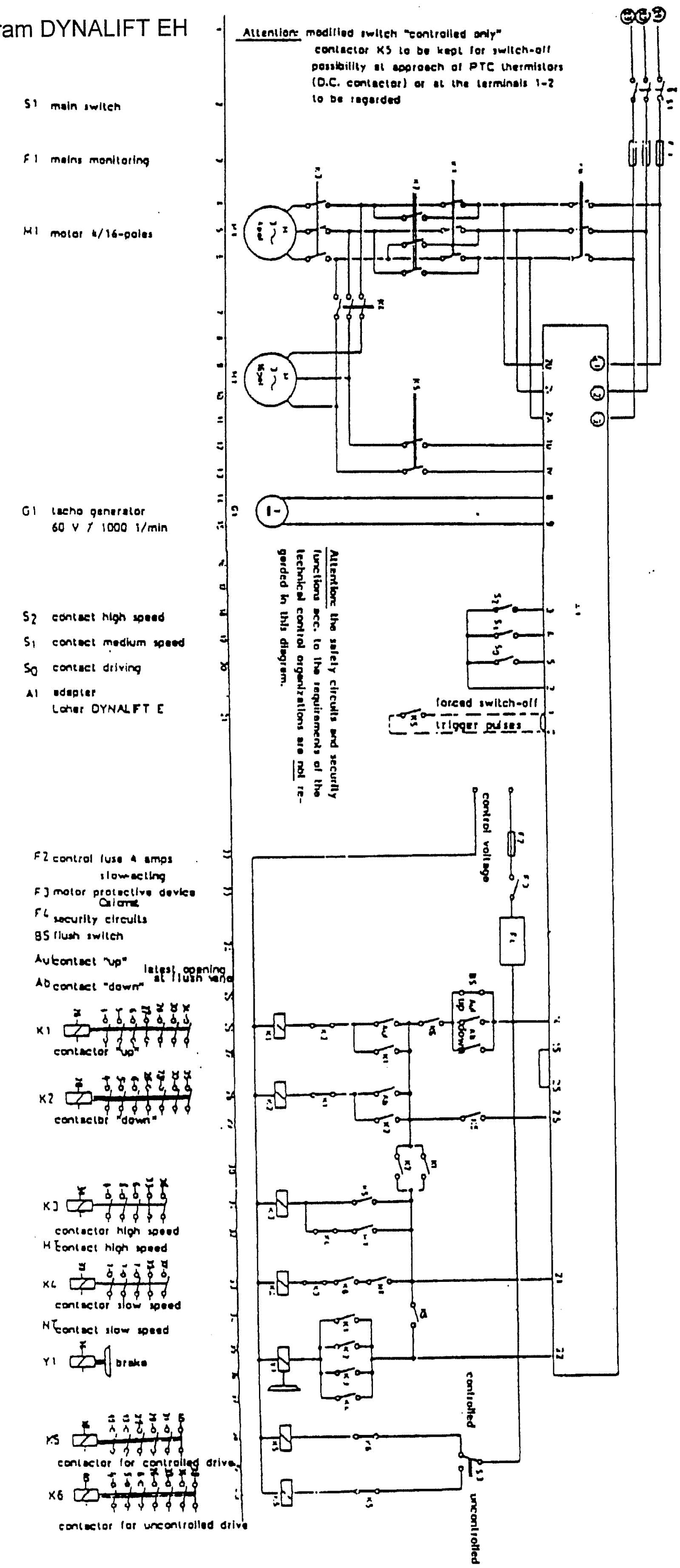
*) special accessory

8. Wiring Diagram

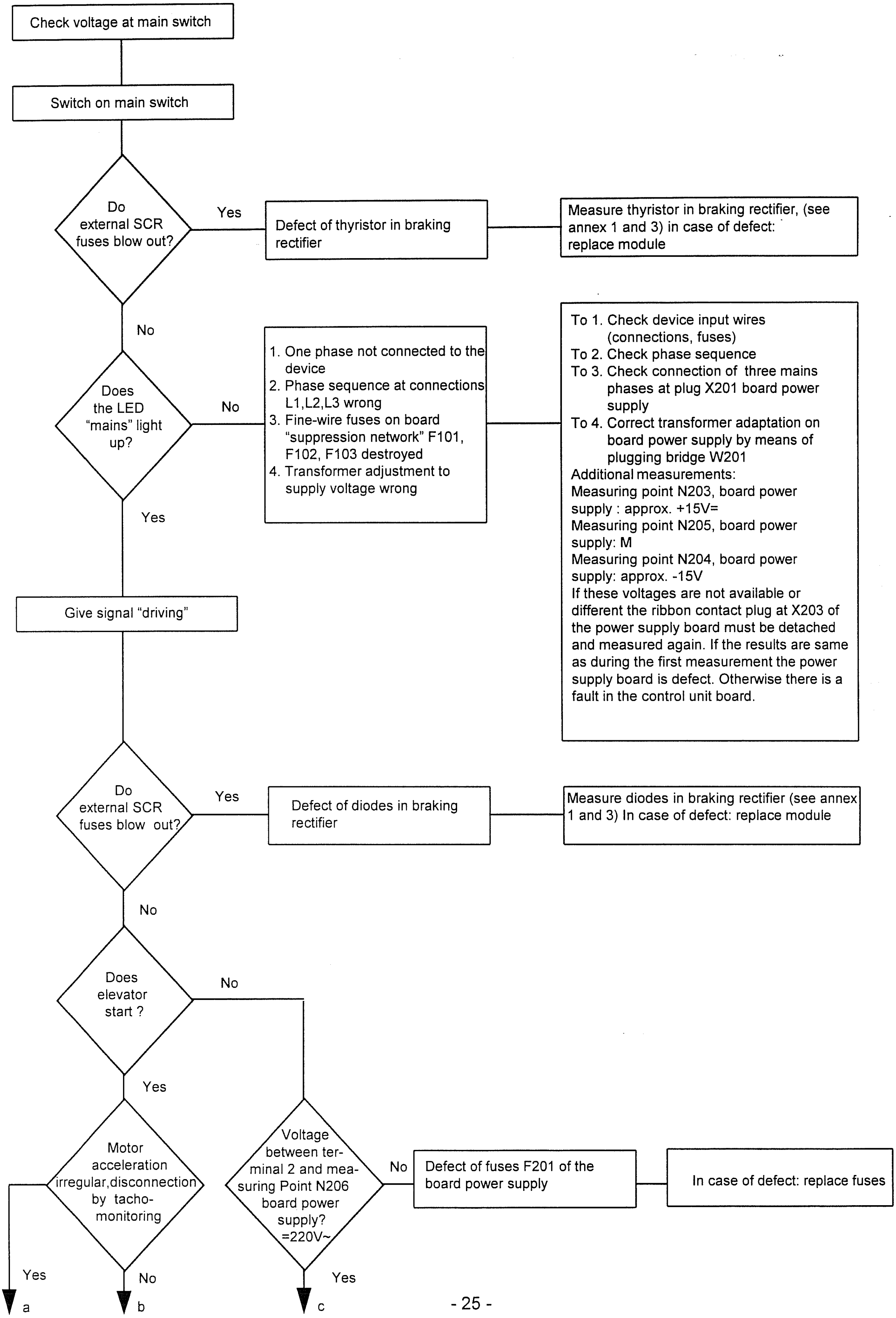
8.1 Wiring Diagram DYNALIFT E

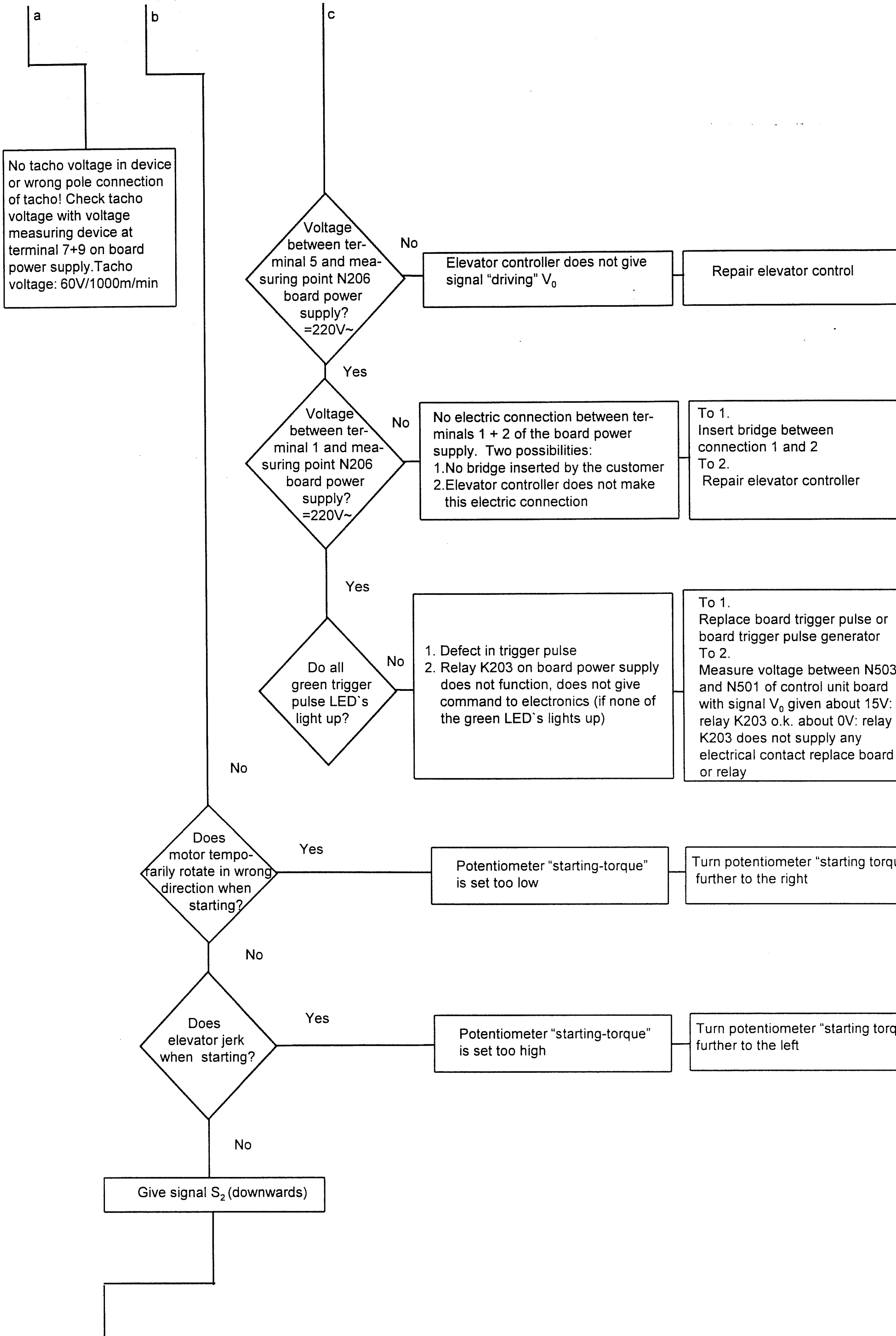


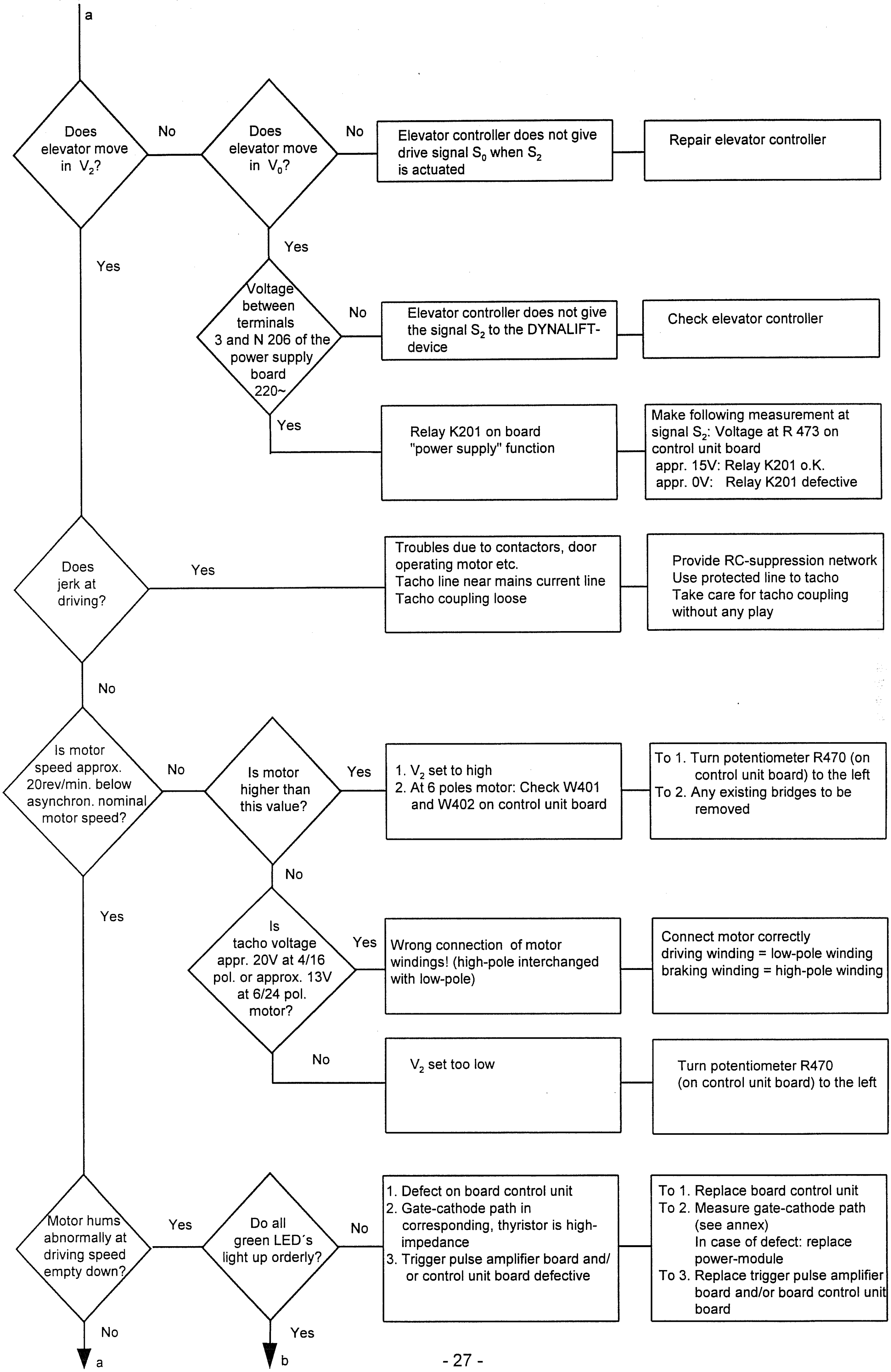
8.2 Wiring diagram DYNALIFT EH

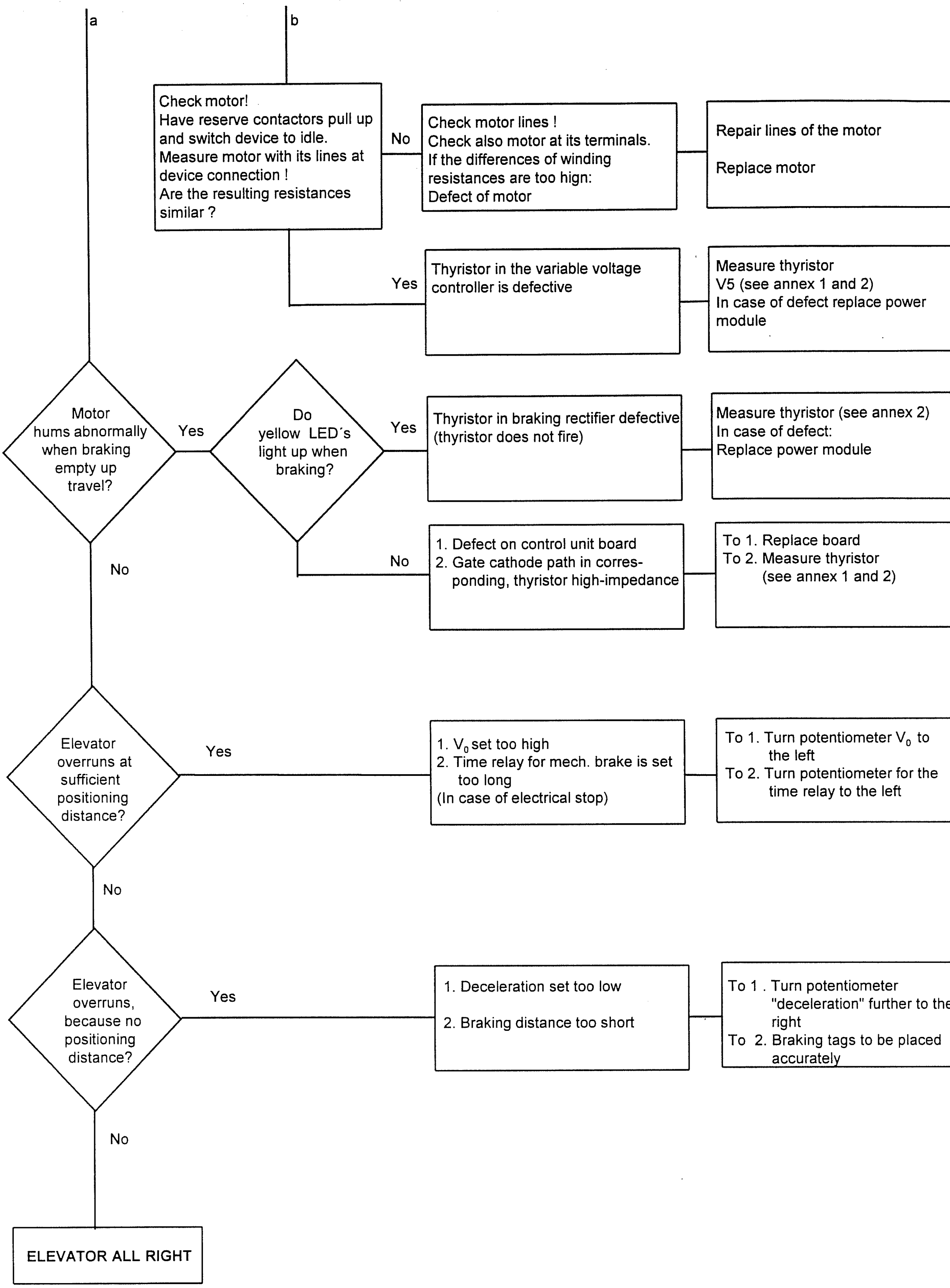


9. Diagnostic program




a
b
c
No tacho voltage in device or wrong pole connection of tacho! Check tacho voltage with voltage measuring device at terminal 7+9 on board power supply.Tacho voltage: 60V/1000m/min
Voltage between terminal 5 and measuring point N206 board power supply? =220V~
No
Elevator controller does not give signal "driving" V_0
Repair elevator control
Yes
Voltage between terminal 1 and measuring point N206 board power supply? =220V~
No
No electric connection between terminals 1 + 2 of the board power supply. Two possibilities:
1.No bridge inserted by the customer
2.Elevator controller does not make this electric connection
To 1.
Insert bridge between connection 1 and 2
To 2.
Repair elevator controller
Yes
Do all green trigger pulse LED`s light up?
No
1. Defect in trigger pulse
2. Relay K203 on board power supply does not function, does not give command to electronics (if none of the green LED`s lights up)
To 1.
Replace board trigger pulse or board trigger pulse generator
To 2.
Measure voltage between N503 and N501 of control unit board with signal V_0 given about 15V: relay K203 o.k. about 0V: relay K203 does not supply any electrical contact replace board or relay
No
Does motor temporarily rotate in wrong direction when starting?
Yes
Potentiometer "starting-torque" is set too low
Turn potentiometer "starting torq
further to the right
No
Does elevator jerk when starting?
Yes
Potentiometer "starting-torque" is set too high
Turn potentiometer "starting torq
further to the left
No
Give signal S_2 (downwards)
a

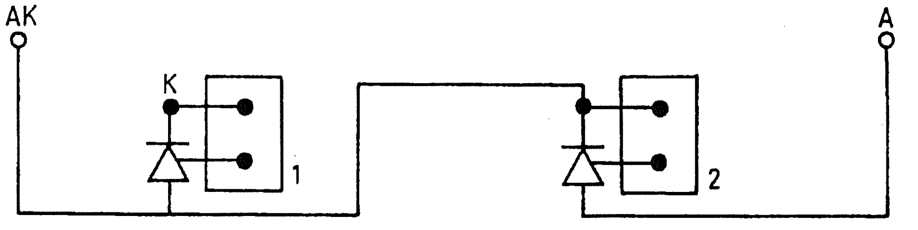

a
Does elevator move in V2?
No
Does elevator move in V0?
No
Elevator controller does not give drive signal S0 when S2 is actuated
Repair elevator controller
Yes
Yes
Voltage between terminals 3 and N 206 of the power supply board 220~
No
Elevator controller does not give the signal S2 to the DYNALIFT-device
Check elevator controller
Yes
Relay K201 on board "power supply" function
Make following measurement at signal S2: Voltage at R 473 on control unit board
appr. 15V: Relay K201 o.K.
appr. 0V: Relay K201 defective
Does jerk at driving?
Yes
Troubles due to contactors, door operating motor etc.
Tacho line near mains current line
Tacho coupling loose
Provide RC-suppression network
Use protected line to tacho
Take care for tacho coupling without any play
No
Is motor speed approx. 20rev/min. below asynchron. nominal motor speed?
No
Is motor higher than this value?
Yes
1. V2 set to high
2. At 6 poles motor: Check W401 and W402 on control unit board
To 1. Turn potentiometer R470 (on control unit board) to the left
To 2. Any existing bridges to be removed
No
Yes
Is tacho voltage appr. 20V at 4/16 pol. or approx. 13V at 6/24 pol. motor?
Yes
Wrong connection of motor windings! (high-pole interchanged with low-pole)
Connect motor correctly
driving winding = low-pole winding
braking winding = high-pole winding
No
V2 set too low
Turn potentiometer R470 (on control unit board) to the left
Motor hums abnormally at driving speed empty down?
Yes
Do all green LED´s light up orderly?
No
1. Defect on board control unit
2. Gate-cathode path in corresponding, thyristor is high-impedance
3. Trigger pulse amplifier board and/ or control unit board defective
To 1. Replace board control unit
To 2. Measure gate-cathode path (see annex)
In case of defect: replace power-module
To 3. Replace trigger pulse amplifier board and/or board control unit board
No
a
Yes
b


a
b
Check motor!
Have reserve contactors pull up and switch device to idle.
Measure motor with its lines at device connection !
Are the resulting resistances similar ?
No
Check motor lines !
Check also motor at its terminals.
If the differences of winding resistances are too hign:
Defect of motor
Repair lines of the motor
Replace motor
Yes
Thyristor in the variable voltage controller is defective
Measure thyristor
V5 (see annex 1 and 2)
In case of defect replace power module
Motor hums abnormally when braking empty up travel?
Yes
Do yellow LED´s light up when braking?
Yes
Thyristor in braking rectifier defective
(thyristor does not fire)
Measure thyristor (see annex 2)
In case of defect:
Replace power module
No
1. Defect on control unit board
2. Gate cathode path in corres-ponding, thyristor high-impedance
To 1. Replace board
To 2. Measure thyristor (see annex 1 and 2)
No
Elevator overruns at sufficient positioning distance?
Yes
1. V_0 set too high
2. Time relay for mech. brake is set too long
(In case of electrical stop)
To 1. Turn potentiometer V_0 to the left
To 2. Turn potentiometer for the time relay to the left
No
Elevator overruns, because no positioning distance?
Yes
1. Deceleration set too low
2. Braking distance too short
To 1 . Turn potentiometer "deceleration" further to the right
To 2. Braking tags to be placed accurately
No
ELEVATOR ALL RIGHT

Annex 1 - 3

1. Measuring a thyristor in the thyristor-module:

For measuring purposes the device must be dead!
Interchanging the test leads an ohm -meter has to be connected to AK and to K or A, depending on the thyristor, as shown in the following wiring diagrams. There must always a resistance value of more than 200 kΩ be measured. Otherwise the thyristor is defective.



2. Measuring the thyristor Gate-cathode path

Device to be dead!
Depending on the thyristor, the ohm-meter has to be connected to both contacts of the plug 1 or 2.
If the resistance is less than 100 Ω the thyristor is all right. Otherwise the gate-cathode path is defective.

3. Measuring a diode

For this purpose an ohm-meter has to be connected to the anode and the cathode of the diode by interchanging the test leads. In one case there must be a resistance of less than 100 Ω , the other measurement must show a value of about ∞ Ω. Otherwise there is a defect in the diode.

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