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ISO 9001
Q-446

KEB F5 Basic Lift Commissioning Guide

Project: _____ Control cabinet serial Nr: _____

Nominal speed: _____ m/s Roping ratio: 1:____ Compensation: YES NO

Contract load: _____ kg Inverter SW: _____

Nr. of stations: _____ Min. distance between stations _____ m

Motor Power: _____ kW RPM: _____

Current: _____ A Power factor: _____ Voltage: _____ V

Start up procedure

1. Check mains supply, control cabinet and wiring to ensure that there are no obvious problems, i.e. everything connected, correct wire and terminal colors… When using two speed motor, only windings for high speed must be used! Switch power supply on. Done ☐
2. Set motor parameters (CP1 – CP5) according to motor nameplate. Procedure is described in this document appendix 2, each parameter is explained in appendix 1. If you see different CP parameters, then there is no lift application in inverter. * Done ☐
3. Measure stator winding resistance and write result in CP6. There are two possibilities:
   a. Simplest way is measurement between terminals 5 and 6 in control cabinet. Check ohmmeter wires resistance after that (short circuit them) and subtract this value from initial measurement to get the result. If four wire connection is used, this correction is not needed.

      Measurement:_____ Ω Ohmmeter wire resistance:_____ Ω
   b. Inverter could make the measurement by itself too. Procedure is following: switch on R13 and R14 manually (by pulling out the blue pin), switch on K6 and K6A (with two screwdrivers) and set parameter CP6 to maximum (value depends on inverter; 49.99… for 11kW or less, 249.99… for 15kW or more). The measurement will be started automatically and after approx. 5 seconds correct value will be written to CP6, usually between 0.4 and 1.5Ω. Switch off K6, K6A, R13 and R14 after that.

      CP6:_____ Ω Done ☐
4. If there is an old motor, set CP22 to 1 otherwise leave this setting to 0.
   Inverter is set up properly now and you can check travel directions in maintenance mode.
   Change two phases on motor in case of wrong directions. Done ☐
5. Verify proper operation of safety chain, emergency stops and pre-limit switches.
   Done ☐

6. Switch to normal mode and make some floor runs. Drive curve with parameters that can be changed (CP13-17) is drawn in appendix 3. Increasing values means softer run and vice - versa.
   Done ☐

How to solve some problems

Problem	Solution
An error (**E...**) is displayed.	See error messages explanation in next chapter.
Contactors K6 and K6A are switched on but K9 (brake) is not.	Verify that all three phases are connected correctly from inverter to motor. Check voltage on inverter input terminals. When K6 and K6A are switched on, +24V relative to inverter terminal 23 must be on inverter terminals 16, 14 or 15, 10 or 11 or both. Repeat setup procedure described above and verify parameters CP10 – 24 (see table bellow).
Vibrations during travel, car does not move at all or current is too high.	Verify that lift is correctly balanced; guides and guide shoes must be clean and lubricated, check other mechanical problems too. Verify parameters CP1 – CP6 again. Set CP22 to 0 if there are vibrations in low speed only.
There is a jerk at start when brake is opened.	Set CP22 to 1 and experiment with some different values of CP23 (e.g. try to change it in 0.2 steps). If CP23 value is too high, vibrations may occur in low speed. Try to change brake release time (CP18).
There is a jerk at stop when brake is closed.	Increase CP19 on inverter and / or *Stabilization time* on controller (E-type or D-type). CP19 should be set so that brake is really closed in this time. Easiest way to set *Stabilization time* correctly is observing contactors K6 and K6A during stop sequence. If they are switched off immediately with brake closing then *Stabilization time* is too short. Ideally, contactors should be switched off approx. 0.5 second after brake is closed.
t_out or **busy** message is displayed occasionally.	Communication cable between operator and inverter should be separated from other cables. Shielded cable with special interfaces should be used.

Notes:

CP parameter description in enclosed booklet 00.F5.01M.KE02 corresponds to KEB production setting and **is not adapted for elevator applications**. CP parameter description from this manual must be used.

All other information in 00.F5.01M.KE02 booklet is valid.

Complete documentation (approx. 350 pages) for this inverter is available on request.

* Contact SEC.

Fault Messages:

If an error occurs the modulation will be switched off and an error message will be shown in the display. Error messages are always represented by an „E".

In brackets you will find the error code shown in CP.35.

Errors, its possible causes and corrective actions:

E.UP Error under potential (2); The DC bus voltage drops below the permissible value.

- Input voltage is too low or instable
- Inverter power is to low
- Voltage is not high enough because of wrong wiring
- Supply voltage through generator/transformer brakes down because ramps are adjusted too high.

E.OP Error over potential (1); The DC bus voltage rises above the permissible value.

- Input voltage is too high – install a step down transformer
- Voltage spikes on the line – install 5% line choke
- Resistance of the braking resistor is too high – verify braking resistor value (see table bellow). Undersized motor and inverter in combination with short deceleration ramp can cause this error too.
- Braking resistor is not connected or has a broken connection
- Inverter is poorly grounded

Inverter power	5,5kW	7,5kW	11kW	15kW	18,5kW	22kW
Resistor (allowed value range)	56 - 110Ω	56 - 85Ω	39 - 56Ω	25 - 42Ω	25 - 30Ω	13 - 20Ω

E.OC Error over current (4); occurs when the specified peak current is exceeded.

- Short circuit on the motor leads
- Ground fault on the motor leads – verify motor wiring
- Contacts on motor contactor are damaged or burned causing arcing – check and replace
- Inverter poorly grounded
- Incorrect motor data – verify data CP.1-CP.6
- Safety circuit bounces whilst elevator is running, e.g. door contact etc.
- Shorted output transistor

E.OL Error overload (16); time dependent overload. See overload curves in the power stage manual. Inverter has to be connected to the mains until it has cooled down. Cooling down time depends on the period of overload.

- Motor wired for wrong voltage
- Incorrect motor data – verify data CP.1-CP.6.
- Inverter is sized too small
- High mechanical load caused by wrong counter weight
- High mechanical friction caused by rails, guide shoes, brake, or gear... etc.

E.OL2 Error overload at low speed (19); time dependent overload at output frequency below 3Hz.

- See explanation for E.OL!

E.nOL Error no overload (17 + 20); the inverter has cooled down after E.OL or E.OL2 error.
E.nOL2 The errors can be reset and the inverter can be started again.

E.OH Error inverter overheat (8); the heat sink temperature rises above the permissible limit (see power stage manual).

- Insufficient cooling – increase the airflow around the inverter
- Ambient temperature is too high – add a cabin cooler
- Fan is clogged – clean fan

E.dOH Error drive overheat (9); the external motor temperature sensor tripped.

- Resistance at the terminals T1/T2 is bigger 1650 Ohms
- Motor temperature sensor indicating an overheated motor
- Factory jumper between T1/T2 missing

E.nOH Error no overheat (36 + 11); over temperature reset possible. Internal or
E.ndOH external temperature has dropped to a safe level. Error E.OH can be reset.

E.LSF Error load shunt failure (15); load shunt relay inside the inverter has not been switched on. This occurs for a short time during the switch on of the inverter, but will clear automatically if everything is okay.

- Input voltage is wrong or too low
- High resistance in the supply line
- Braking resistor connected to the wrong terminals or defective
- Braking transistor is not functioning

E.Pu Error Power Unit (12); during the initialization phase the power stage was not identified.

- Hardware failure

E.BR Error Brake (56); requested load level to release the brake is not high enough.

- One or more motor phases are missing.
- Incorrect motor data – verify data CP.1-CP.6.

Appendix 1:

	Parameter	**Default value**
CP.0	*Password* To change parameters adjust password 200	-
CP.1	*Rated Current in Amperes*	12,5A
CP.2	*Rated Speed in Revolutions per Minute*	1450min^{-1}
CP.3	*Rated Voltage on Volts*	400V
CP.4	*Power Factor cos phi*	0,88
CP.5	*Rated Frequency in Hertz*	50Hz
CP.6	*Stator Resistance in Ohms* See startup procedure paragraph 3.	1,8Ohm
CP.10	*Frequency V_3 (maintenance speed)*	15Hz
CP.11	*Frequency V_2 (rated speed)*	42Hz
CP.12	*Frequency V_1 (slow (leveling) speed)*	5Hz
CP.13	*S-Curve Time Acceleration in Seconds* *A higher value causes a softer start.*	1s
CP.14	*Acceleration Time in Seconds* A higher value causes a softer start and reduces the peak load.	2s
CP.15	*S-Curve Time Deceleration in Seconds* A higher value causes a softer deceleration.	1s
CP.16	*Deceleration Time in Seconds* A higher value causes a softer deceleration.	2s
CP.17	*S-Curve Time Landing in Seconds* A higher value causes a softer landing and longer landing path at the same time. Sometimes *Stabilization time* in E-type / D-type controller must be increased together with this value.	1s
CP.18	*Brake Release Time in Seconds* This time starts when the inverter sets the output for the brake (K9). After this time has run out, the inverter starts accelerating the motor. If this time is adjusted too short, the motor may start against the not released brake which causes a jerk whilst starting.	0,3s
CP.19	*Brake Engage Time in Seconds* This time starts when the inverter resets the output for the brake. After this time has run out, the inverter stops modulating. If this time is adjusted too short and the inverter switches off its modulation before the brake is engaged you may feel a jerk after stopping. Sometimes Stabilization time in E-type / D-type controller must be increased together with this value.	0,3s
CP.20	*Brake Engage Frequency Level*	0,2Hz

	Parameter	Default value
CP.21	*Boost* To avoid rollback and guarantee the best possible load transfer increase this value. If this value is adjusted too high (more than 15%) it is possible that the motor reaches its torque limit which can cause a worse driving comfort. If this value is adjusted too low (i.e. 2%) it is possible that the load transfer is bad or the message „E.br" (Error brake) occurs.	5%
CP.22	*Autoboost Configuration* To increase the torque at low output frequencies an automatic torque compensation can be activated. I.e. automatically the machine will get more torque at low frequencies. For that the value 1 has to be adjusted.	0:izklopljen
CP.23	*Autoboost Gain*	0,80
CP.24	*Current Limit* To protect the motor against breakdown a current limit can be adjusted. 0...199% of the inverter rated current can be adjusted (Value 200 = off).	190%

The CP-Parameters upward CP.26 are for indication only:

CP.26 *Set Frequency in Hertz*

CP.27 *Actual Frequency in Hertz*

CP.28 *Apparent Current in Amperes*

CP.29 *Actual Utilization an Percent*

CP.30 *Actual DC-Voltage (V)*

CP.31 *Active Parameter Set*

CP.32 and 33 Input (CP.32) and Output (CP.33) terminal State

If more than one input is selected the sum of all values will be shown in the display. The values 256 (IA), 512 (IB), 1024 (IC) and 2048 (ID) are used for internal inputs and should be subtracted from the displayed value.

Terminal	Input / Output	Display
X2A.16	Control Release	1 (ST)
X2A.14	Direction of travel down	4 (F)
X2A.15	Direction of travel up	8 (R)
X2A.10	Slow (leveling) speed	16 (I1)
X2A.11	Rated speed	32 (I2)
X2A.24 / X2A.26	Ready	4 (R1)
X2A.27 / X2A.29	Brake control	8 (R2)

Example:

CP32 value 1045 means 1024 + 16 + 4 + 1 (Slow speed, Direction of travel down, Control Release). Active outputs are terminals X2A.10, X2A.14 and X2A.16.

CP.34 *Power Module Temperature in Degree Celsius*

CP.35 *Last Fault Message*

You will find the error codes in the fault description.

CP.36 *Inverter State*

Displays status and fault messages. After power on the inverter starts with this parameter. Description is following:

noP	No Operation; Terminal X2.1 (Control Release) is not selected
LS	Low speed; Control Release is selected, no direction is selected, modulation off
Facc	Forward Acceleration
Fcon	Forward Constant Running
Fdec	Forward Deceleration
racc	Reverse Acceleration
rcon	Reverse Constant Running
rdec	Reverse Deceleration
bbl	Base-Block-Time; the power modules are disabled always when switching off control release or if a fault occurs.

Appendix 2:

CP parameters

This is an application adapted parameter group - lift application in this case.

Operation:

To change between parameter identification and parameter value push the „Func."-key.

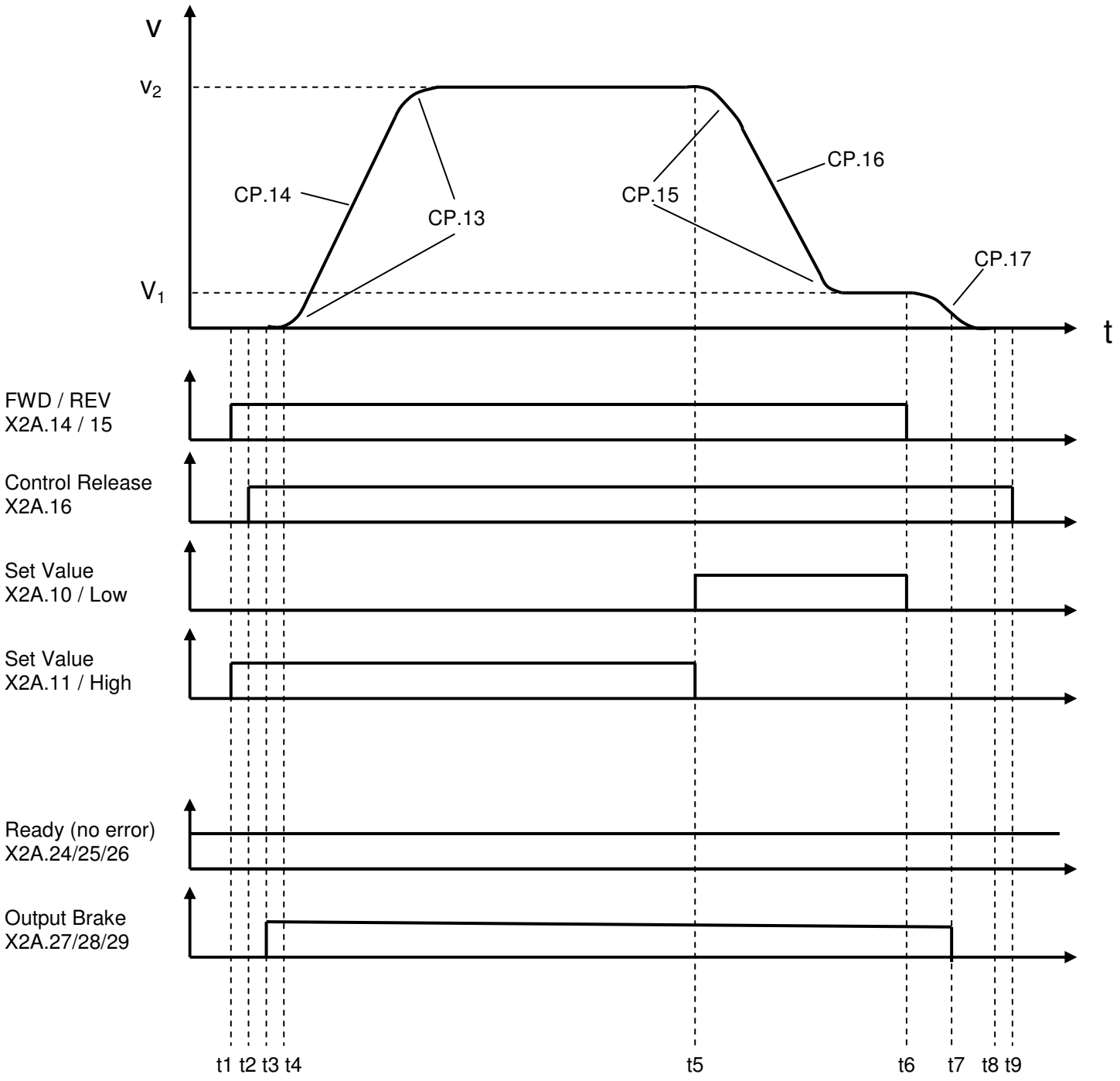
To change the parameter values push the „Start"- or „Stop"-key.

To store the parameter values push the „Enter"-key.

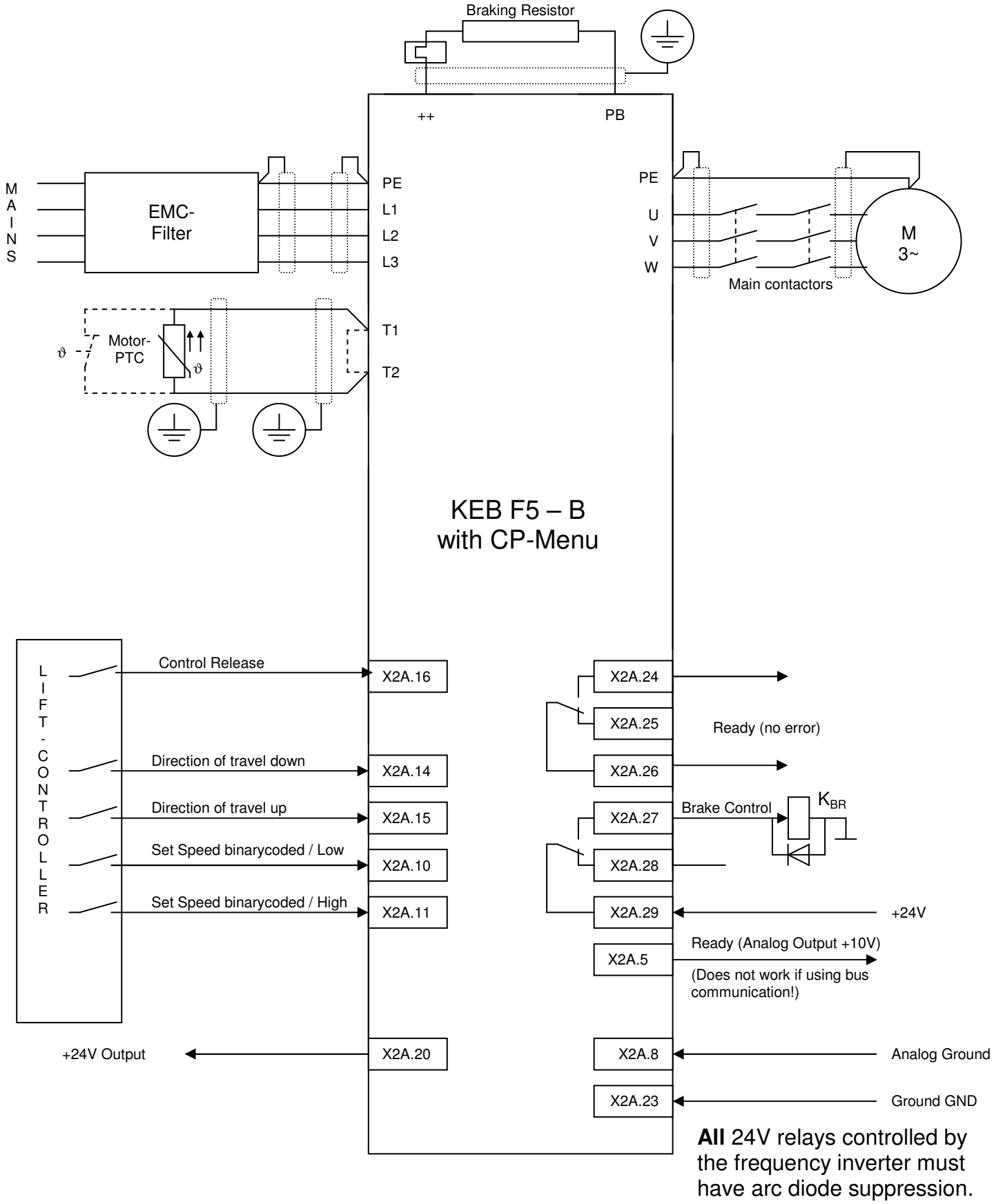
A fault message will overwrite the actual display if an error occurs during operation. By pushing the „Enter"-key only the fault message can be reset. To reset the fault itself switch off the inverter after eliminating cause of the error.

Appendix 3:

Operating Sequence for KEB F5B Lift binarycoded



Example connection diagram for F5B Lift binarycoded



All 24V relays controlled by the frequency inverter must have arc diode suppression.