BETRIEBSANLEITUNG

INSTRUCTION MANUAL

3

KEB COMBIVERT F4-F Lift
Version 1.4 (Lift-Servo)

Aufzugstechnik
Lift Technology

00.F4.L1B-K140

KEB
ANTRIEBSTECHNIK

10/98

Diese Betriebsanleitung
– ist gültig für den Frequenzumrichter **KEB COMBIVERT F4-F Lift** Version 1.4
– muß jedem Anwender zugänglich gemacht werden

Die in dieser Betriebsanleitung verwendeten Pictogramme entsprechen folgender Bedeutung:

Gefahr
Warnung
Vorsicht

Achtung,
Unbedingt
beachten

Information
Hilfe
Tip

Vor jeglichen Arbeiten muß sich der Anwender mit dem Gerät vertraut machen. Darunter fällt insbesondere die Kenntnis und Beachtung der Sicherheits- und Warnhinweise. Lesen Sie deshalb unbedingt die "Technische Dokumentation Teil 1".

This manual
– is valid for frequency inverter **KEB COMBIVERT F4-F Lift** Version 1.4
– must be made available to every user

The pictographs used in this manual mean:

Danger
Warning
Caution

Attention,
observe at
all costs

Information
Help
Tip

Before working with this unit you must familiarize yourself with it. Pay special attention to the safety and warning guides. Make sure to read 'Technical Documentation Part 1'.

1.1 Application

The frequency inverter **KEB COMBIVERT F4-F Lift** Version 1.4 is a drive component, which is specified for lift technology. The frequency inverter is exclusively for stepless open loop /closed loop speed control of three-phase asynchronous motors and permanent magnet motors. The operation of other electrical consumers is not permitted and can lead to the destruction of the unit.

1.2 Protective Separation

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The connections of the terminal strip and encoder inputs are safely isolated in accordance with VDE 0100. The person who installs the system/machine must make sure that the wired circuit, whether new or old, meets the VDE requirements.

1.3 Interference Protection of Electric Systems

The frequency inverter **KEB COMBIVERT** transmits electromagnetic waves of high frequency. To reduce arising interference pulses, that may effect electric systems in the vicinity of the frequency inverter, do the following:

– Install the frequency inverter in metal housing
– Shielded motor cables must be used
  The shield must be connected onto the frequency inverter PE and to the housing of the motor (connect extensive shield). Do not use the shielding as protective earthing. The shield can only operate safely when the shield is not interuppted and is as close as possible to the frequency inverter and motor.
– Good earthing (metal ribbon-cable or 10 mm^2 earth lead)
– Use radio interference suppression filters

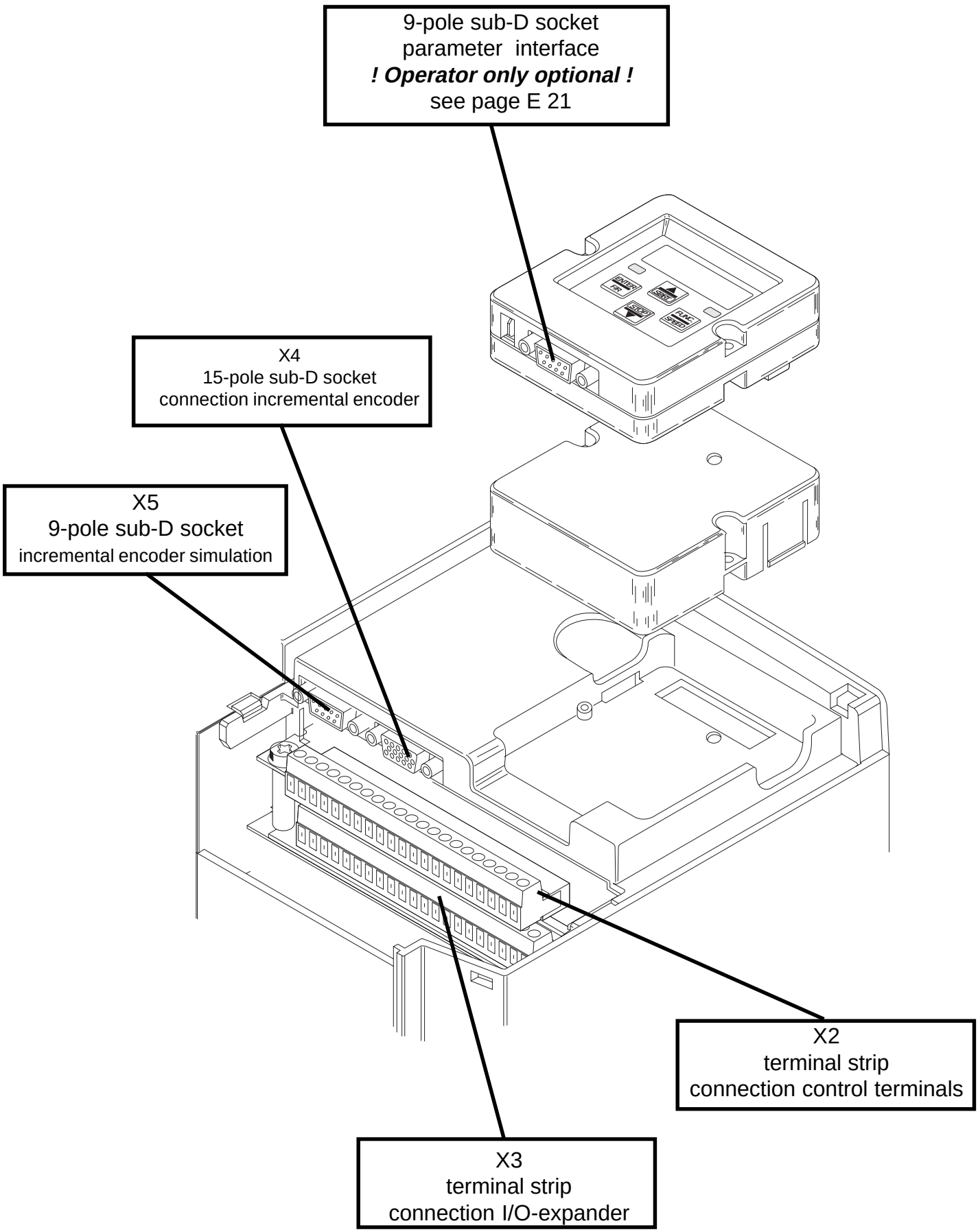
1.4 Interference Protection of the Frequency Inverter

The control and power inputs of the frequency inverter are protected against interferences.
For more operational reliability and additional protection against malfunctions take notice of these measures:

– Use of mains filter, when the mains voltage is affected by the connection of large consumers (reactive-power compensation equipment, HF-furnaces etc.)
– Protective wiring of inductive consumers (solenoid valves, relays, electromagnets) with RC elements or similar devices to absorb the energy when the unit is switched off.
– Install wires, as described in the connection directions, to avoid inductive and capacitive coupling of interference pulses.
  Paired-twisted cables protect against inductive parasitic voltages, shielding provides protection against capacitive parasitic voltages. Optimal protection is achieved with twisted and shielded cables when signal and power lines are installed separately.

! see also Instruction Manual part 2 !

GB


9-pole sub-D socket
parameter interface
! Operator only optional !
see page E 21
X4
15-pole sub-D socket
connection incremental encoder
X5
9-pole sub-D socket
incremental encoder simulation
X2
terminal strip
connection control terminals
X3
terminal strip
connection I/O-expander

3.1 Terminal X2
Control Terminals

GB

Terminal	Function	
1	Control Release	digital inputs: noise immunity: 2 kV logic 1: ± 12…30 V internal input resistor: approx. 2 kΩ PNP-logic
2	Reset	
3	Direction of travel forward	
4	Direction of travel reverse	
5	Control Mode	
6	Door drive active	
7	Door drive setpoint input	
8	Digital output signal: braking control	see page E 10
9	Digital output signal: main protection control inverted	see page E 10
10	+ 18 V voltage output	+18V (+/- 20%) ; max. 20 mA **! When external voltage is connected to terminal X2.23 then $U_{X2.10} \approx U_{X2.23}$!**
11	Ground for X2.10 and digital inputs/outputs	
12	+10 V reference voltage	+10V (+/- 3%) ; max. 6 mA
13	Ground for analog inputs/outputs	
14	Analog setpoint input **(see parameter LF.2)**	Differential voltage input / resolution: 12 Bit Ri = 40 kΩ Smoothing time: 2 ms / processing time: 1...3 ms
15		
16	Analog input of the precontrol torque **(see parameter LF.30 and LF.67)**	
17	***Option ! do not connect !***	
18	Analog output set speed	-10V…+10V / resolution: 8 Bit Ri = 100 Ω conditional short-circuit proof(<1 min) 0...10V $\hat{=}$ 0...2 x synchronous speed
19	Analog output actual speed	
20	Relay control cabinet fan control (LF.66)	30 VDC / 1 A see page E 17
21		
22		
23	External voltage supply	+ 24 ... + 30 V external voltage input for digital outputs on terminal strip X2

3.2 Terminal X3
I/O-Expander

Terminal	Function		
1	Digital input signal: contactor control (see page GB 9)	**max. voltage endurance to ground: 100V**	
2	Setpoint input control speed: V_B	**digital inputs for setpoint activation**	
3	Setpoint input positioning speed: V_E	***! only valid with LF.2 = 2 !***	
4	Setpoint input rated speed: V_N	**max. voltage endurance to ground: 100V**	
5	Setpoint input inspection speed: V_I		
6	Setpoint input intermediate speed 1: V_1	**terminal assignment with binary coded**	
7	Setpoint input intermediate speed 2: V_2	**set value selection, see page GB 24 - GB 25**	
8	***Option ! do not connect !***		
9	External supply voltage	+ 24 V external voltage input	
10		for relay outputs on terminal X3	
11	Ground for X3.9/X3.10		
12			
13	Signal: ready / overspeed	$\approx U_{X3.9/X3.10}$ / 500 mA	see page GB 10
14	Signal: switching frequency warning	$\approx U_{X3.9/X3.10}$ / 500 mA	see page GB 10
15	Relay contact: braking control	30 V DC / 1A	see page GB10
16			
17	Signal: delay control	$\approx U_{X3.9/X3.10}$ / 500 mA	see page GB11
18	Relay contact: positioning speed	30 V DC / 1A	see page GB 11
19			
20	Signal: main contactor triggering	30 V DC / 1A	see page GB 11
21			
22	Signal: DC monitoring	$\approx U_{X3.9/X3.10}$ / 500 mA	see page GB 11
23	Signal: motor temperature warning	$\approx U_{X3.9/X3.10}$ / 500 mA	see page GB 11

3.3 Function of the Digital Inputs

Terminal	Description
X2.1 Control Release	To control the power modules the input must have +24V. If the input is not set, the inverter shows the message „nOP“ (no operation). **!Observe the operating sequence of the inputs/outputs!** see also ‘Control of the main drive’ page GB 12 - GB 13 and ‘Control instructions‘ page GB 60
X2.2 Reset	With the falling edge of a +24V pulse, the error message (E.xxx) is reset. **Exception:** The error message „E.OS" (error, overspeed) and „E.EnC“ (error, encoder) can only be reset by switching off the inverter.
X2.3 Direction of Travel Forward	When the input is set at +24V a clockwise rotating field is produced on the output side. The inverter shows the direction of travel in the indication (F.xxx). The set speed has a positive display. Whether the cabin moves up or down, depends on the phase sequence of the motor wiring and how the hoist is set up in the machine room. **Note:** If the entries for forward (X2.3) and reverse (X2.4) are simultaneously set, the input forward has priority. To change the direction of travel you can only use one input (X2.3). If no direction of travel is selected and the input control release is set, then LS (low speed) appears in the display.
X2.4 Direction of Travel Reverse	When the input is set at +24 V, a reverse rotating field is produced on the output side.The inverter shows the direction of travel in the indication (r.xxx). The display of the set speed has a negative sign. Whether the cabin moves up or down, depends on the phase sequence of the motor wiring and how the hoist is set up in the machine room. **Note:** If the entries for forward (X2.3) and reverse (X2.4) are simultaneously set, the input forward has priority. A change of direction is done with input (X2.3).

Terminal	Description
X2.5 ***Control Mode***	In activating the input you can switch from open loop operation to speed controlled operation. ***! only when LF.30 = 1 !***
X2.6 ***Door Drive Active***	In addition to the main drive the inverter can also start a door drive. The activation of the input causes the switching from the main drive to door drive. **For settings, functions and drive curves of the door drive see pages GB 14 - GB 15 !**
X2.7 ***Door Drive Setpoint Input***	When the input is set with +24 V the set value of the door drive is activated. The set speed of the door drive is preset in parameter LF.46. **For settings, functions and drive curves of the door drive see page GB 14 - GB 15 !**
X3.1 ***Contactor Control***	The input X3.1 checks to see if the main contactor and the braking contactor are released. The input **must** be activated when a drive command is entered. If the input is not set, the display “S.Co” (Error, contactor open) appears in parameter LF.98. The power modules are blocked. The contactor control can be simulated, by bridging input X3.1 with output X2.9.
X3.2 ***Correction Speed*** V_B	When the input is assigned +24 V the correction speed is activated. **! also see parameter LF.40 !**
X3.3 ***Crawl Speed,*** V_E	When the input is assigned +24 V the crawl speed is activated. **! also see parameter LF.41 !**
X3.4 ***Rated Speed,*** V_N	When the input is assigned +24 V the rated speed is activated. **! also see parameter LF.42 !**
X3.5 ***Inspection Speed,*** V_I	When the input is assigned +24 V the inspection speed is activated. **! also see parameter LF.43 !**
X3.6 ***1st Intermediate Speed,*** V_1	When the input is assigned +24 V the 1st intermediate speed is activated. **! also see parameter LF.44 !**
X3.7 ***2nd Intermediate Speed,*** V_2	When the input is assigned +24 V the 2nd intermediate speed is activated. **! also see parameter LF.45 !**
Motor Temperature Detector Terminals OH/OH	Terminal motor-PTC ! **see also page GB 11, terminal X3.23**

3.4 Function of the Digital Outputs / Relay Outputs

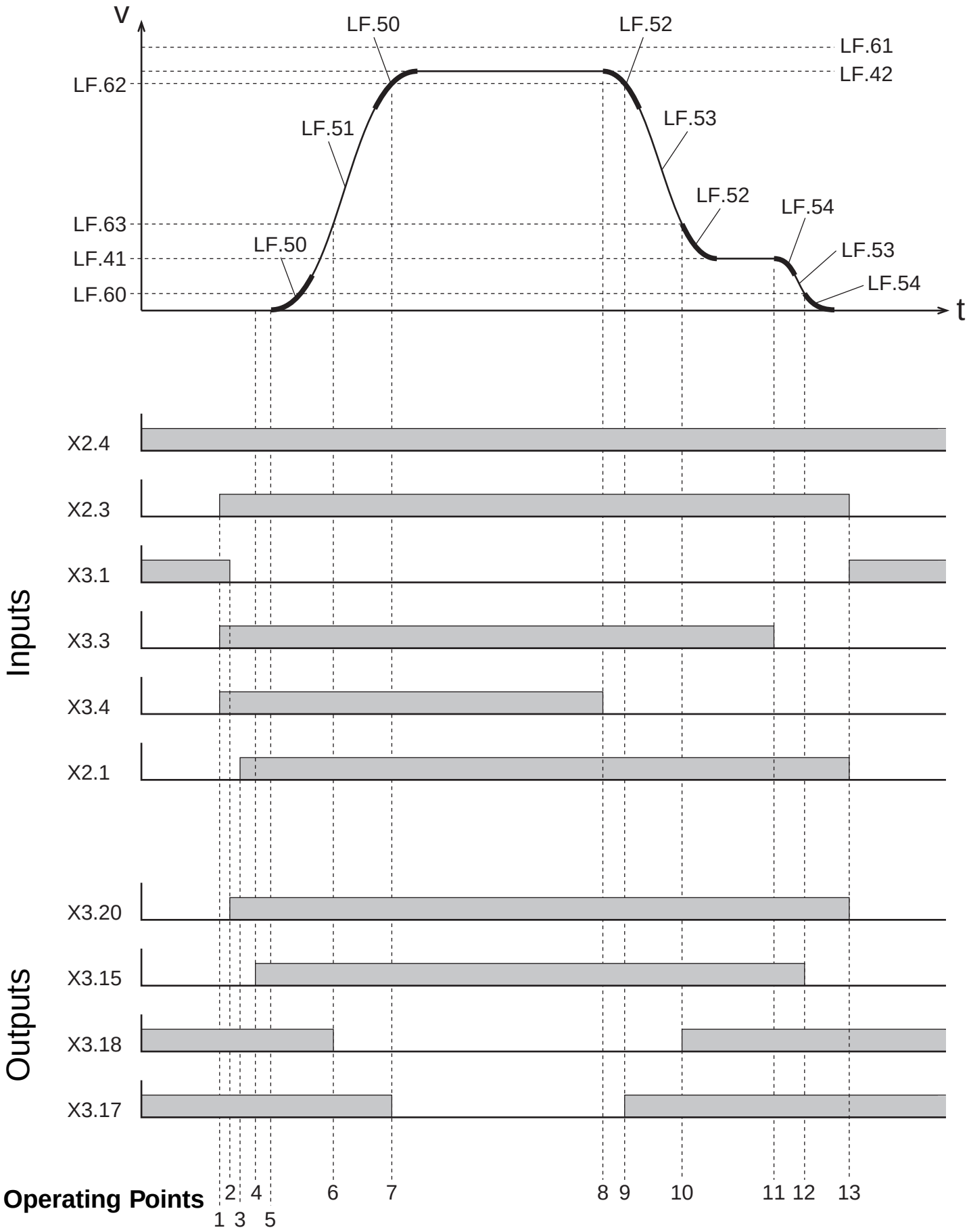
After the voltage is switched on several digital outputs need approximately 2s for initialization. All switching thresholds have 12% hysteresis, exept for output X3.22 which has 6%.
Exception: Output X3.22 has 6% hysteresis.

GB

Terminal	Description
X2.8 ***Braking Control***	The output is activated when the following conditions are met: - no error message is present - a setpoint must be selected ($V_X \neq 0$ m/s) - the contactor control input (X3.1) must be set - the control release (X2.1) must be activated - a direction of travel (X2.3/X2.4) must be selected - a motor current must flow (hardware test); The output is reset when **one** of the following conditions is met: - overspeed is recognized - a fault signal occurs - after the setpoint values are removed the operating point of the brake (LF.60) is gone below - 5 s after the setpoint values are removed
X2.9 ***Main Contactor Control inverted***	The output signal corresponds to the inverted signal of terminal X3.20. When the function of the contactor control is not used, input X3.1 must be bridged with output X2.9, to simulate the contactor control.
X2.20 ***Relay*** **X2.21** ***Control Cabinet*** **X2.22** ***Fan Control***	How the relay output is switched depends on the temperature level set (parameter LF.66). actual heat sink temperature > LF.66 Relay releases actual heat sink temperature < LF.66 - 5 K Relay picks up **! see wiring diagram page GB 17 !**
X3.13 ***Ready for Operation Common Error Overspeed***	The output is set, after the inverter has completed an internal check (after the voltage is switched on). The output is reset, when the supply voltage is switched off, when an inverter disturbance occurs or when overspeed is detected. **Note:** The overspeed detection only works when the encoder is connected, the speed controller (LF.30 ≠ 0) is switched on and a valid speed is selected. When overspeed is reached the inverter stops and the error message "E.OS" (Error, overspeed) is shown. The outputs for contactor control and braking are reset.

Terminal	Description
X3.14 ***Operating Frequency Warning***	The output is reset, when the heat sink is approx. 50°C warm. For the next drive the operating frequency is reduced to 8 kHz. After cooling down (heat sink temperature approx. 40°C) the operating frequency increases to 16 kHz and the output is set again. **! see operating frequency page GB 16 !**
X3.15 ***Braking Control***	The output emits the signal applied on terminal X3.16. See description of terminal X2.8 regarding operating frequencies.
X3.17 ***Delay Control***	The output is set until the speed level LF.62 is gone below. The function only works when the incremental encoder is connected and when the speed controller is switched on (LF.30 ≠ 0).
X3.18 ***Crawl Speed***	The output emits the applied signal on terminal X3.19. This is done until the preset speed level in parameter LF.63 is gone below. This function only works when the incremental encoder is connected and the speed controller is switched on (LF.30 ≠ 0).
X3.20 ***Main Contactor Control***	The ouput emits signals that are applied to terminal X3.21. The output occurs, when the following conditions are met at the same time: - no error message is present - setpoint must be selected - the input contactor control must be activated
X3.22 ***DC-Voltage Monitoring***	The output is set, when the dc-bus voltage exceeds the level LF.64.
X3.23 ***Motor Temperature Warning***	The output is reset, when the connection between the “OH” inputs is high-resistant. This is how the lift control receives the message that the motor is overheating. It then can stop driving and let the motor cool down. If the overheating continues, the inverter switches off, when the delay time set in LF.65 has run out. The error signal “E-dOH” (Error, drive overheat) is displayed. When the connection between the OH terminal is low resistant again, the inverter shows the message “E.nOH” (no overheat). The error can then be reset. **See parameter LF.15**

4.1 Activation of the Main Drive (LF.02 = 2)



WHAT HAPPENS WHEN? **Description of the Operating Points of the Main Drive**

1: Presetting of the setpoint for the drive speed and the selection of the direction of travel. The inverter checks whether input X3.1 (contactor control) is set. If yes the output X3.20 (main contactor control) is set. If X3.1 is not set, the display “E.Co“ is seen in LF.98 and output X3.20 is not set.

2: If X3.20 is set, then X3.1 must be reset.

3: X2.1 (control release) is set with the precontrol contact of the main contact. After this is done the inverter provides the motor with current, when the main contacts are connected (powerless switching).
When the safety Circuit is interrupted input X2.1 must be reset immediately. (see „Control instructions“ page GB 60)

4: When the motor can receive a current (“hardware test”), the output X3.15 (brake) is set. If there is not enough current flowing, you will see the display “E.nC” in LF.98 and X3.15.

5: After X3.15 is set, the brake release time (LF.70) runs out; then the motor starts to turn.

6: When exceeding the monitoring of the crawl speed (LF.63) the output X3.18 is reset.

7: When exceeding the monitoring of the deceleration check (LF.62) the output X3.17 is reset.

8: When the setpoint is removed for the rated speed (X3.4) deceleration starts.

9: When exceeding the monitoring of the deceleration check (LF.62) the output X3.17 is set.

10: When exceeding the monitoring of the crawl speed (LF.63) the output X3.18 is set.

11: When the limit switch is reached, the set value for the positioning speed is set at 0 and thus the drive keeps the cabin floating until the brake is engaged,.

12: When the operating point of the brake (LF.60) is exceeded, the output X3.15 is reset.

13: When X3.15 is reset, the modulation is switched off after two times of LF.70 (brake release time). 0,3 s later output X3.20 is reset.

4.2 Activation of the Door Drive

4.2.1 Activation of a 2nd Motor for the Door Drive

This function makes it possible to activate the main drive and the door drive with one inverter. The selection of the drive is done with the digital input X2.6.

The switching between main and door drive is only accepted in condition 'nop'.

The following is valid:

X2.6	Active Drive	Control Process
0	Main Drive	set as in LF.30
1	Door Drive	controlled

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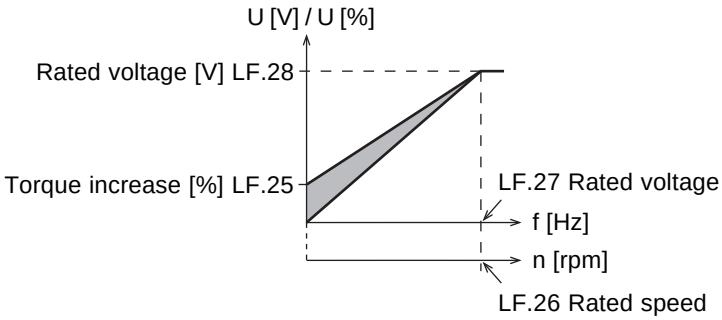
With an active door drive (X2.6 = 1)
- The outputs of the inverter are not changed
- The start up process cannot be completed
- Only the controlled mode is active (U/f-curve). The control method (LF.30) is only valid for the main drive.

4.2.2 U/f-Curve Door Drive



The U/f-curve of the door drive is defined by parameters LF.25, LF.26, LF.27,and LF.28. **The setting of parameters for the U/f-curves of the main and door drives is only possible when the main drive is active (X2.6 = 0).**

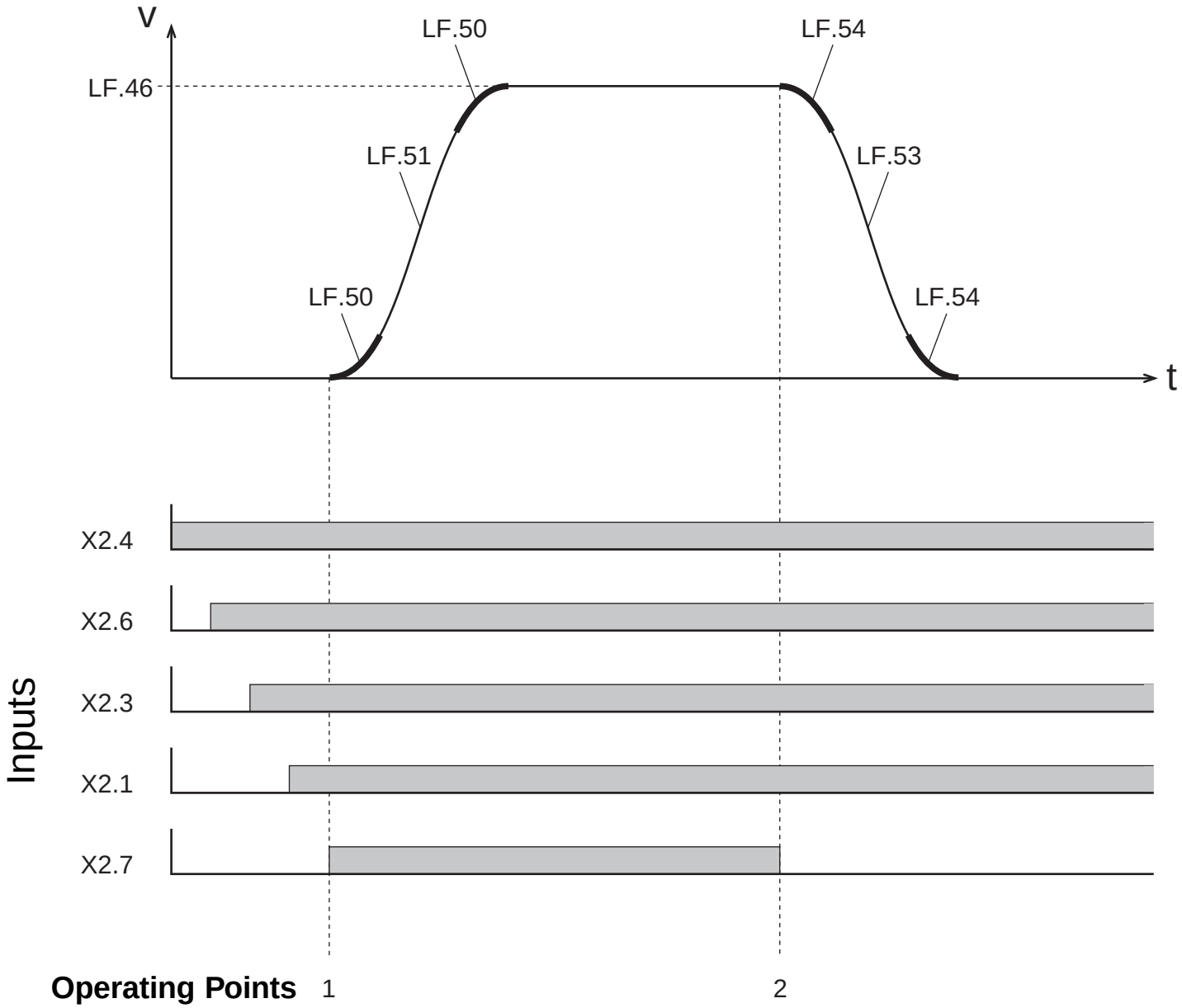
4.2.3 ACC and DEC Ramps

For the ACC and DEC ramps of the door drive the values of parameters LF.50, LF.51, LF.53 und LF.54 are valid, like with the main drive.

4.2.4 Set Speed Door Drive

The set speed (rpm) for the door drive is preset in parameter LF.46 (set speed door drive). The setpoint activation for the door drive is done with the digital input (X2.7).

4.2.5 Drive Curve Door Drive



What happens when? **Description of the operating points of the door drive.**

1: The acceleration process starts after the setpoint input is activated (X2.7 = 1).
Condition: Door drive is active (X2.6)
Control release is active (X2.1)
Direction of rotation (X2.3 / X2.4) is preset

2: When the setpoint for (X2.7) is removed deceleration begins.

5. Changes in the Operating Frequency

5.1 Temperature Dependent Changes in the Operating Frequency

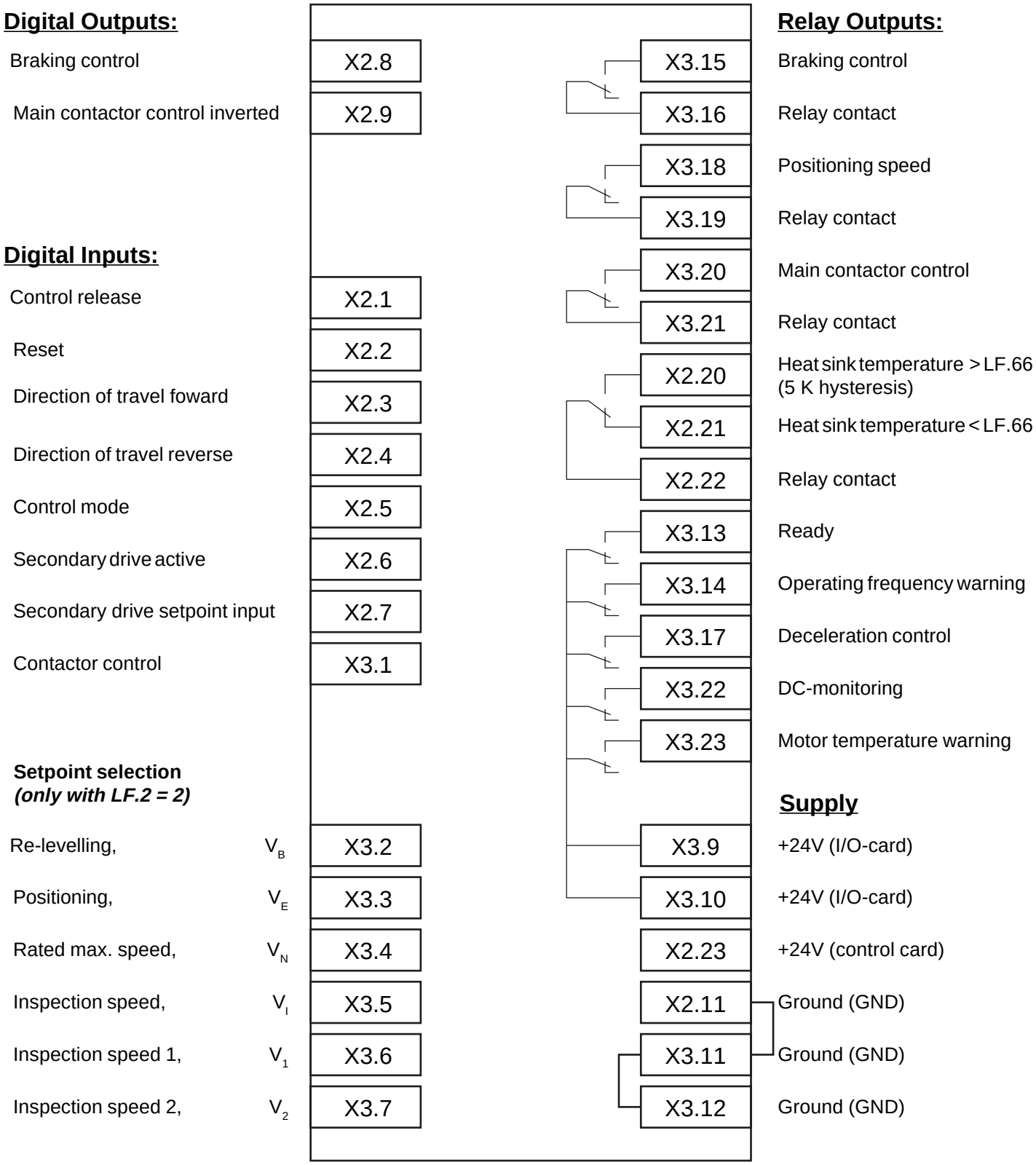
To protect KEB COMBIVERT F4-F Lift from overheating during 16kHz operation and thus prevent the lift from being interrupted, the operating frequency can be reduced dependent on the heat sink temperature (only in condition ‘nop’). Inverters with temperature dependent operating frequencies are characterized in parameter In.0 with **xx.F4.F1.-xxxx 8kHz/16kHz**.
!see also parameter LF.38!

GB

5.2 Digital Output X3.14 Operating Frequency Warning

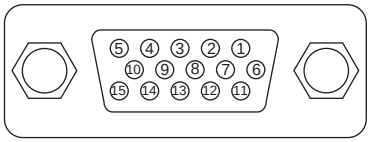
When the heat sink temperature reaches approximately 50°C, the signal at output X3.14 (operating frequency warning) is reset. With a heat sink temperature of approx. 40°C the signal at the output is set again.

6.1 Wiring Diagram: Control Terminal X2 and I/O-Expander X3



With binary coded setpoint selection (LF.2 = 1), terminal assignment see page GB 25 - GB 26

6.2 Connection X4 Incremental Encoder



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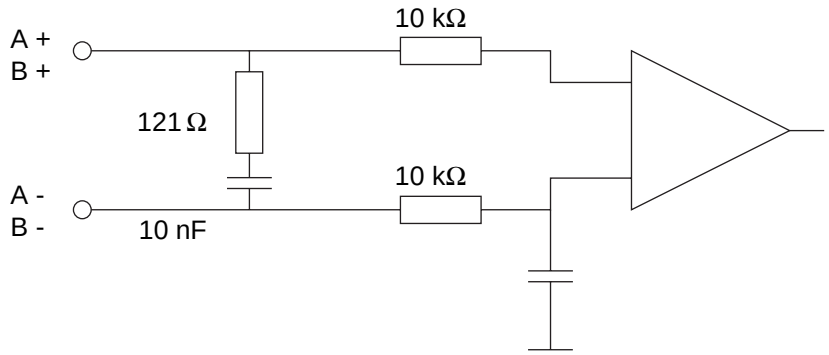
6.2.1 Connection Incremental Encoder

The incremental encoder of the motor is connected to the 15-pole sub-D-socket.

PIN-No.	Signal	PIN-No.	Signal
1	-	9	B +
2	-	10	-
3	A -	11	+ 15 V
4	B -	12	+ 5 V
5	-	13	GND
6	-	14	N -
7	-	15	N+
8	A +	housing	shield

The connector may only be connected / disconnected when the inverter and voltage supply are shut off.

Input Wiring



Encoder Specification:

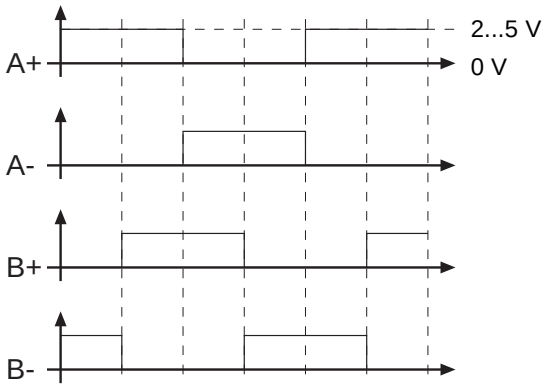
1- Voltage Supply: + 5 V (+/-10 %) max. 110 mA

2- Increments: 256 - 10000 inc. (recommended: 2500 inc.)
Observe limit frequency of encoder:

$$f_{limit} > \frac{\text{increments} \cdot n_{max}}{60}$$

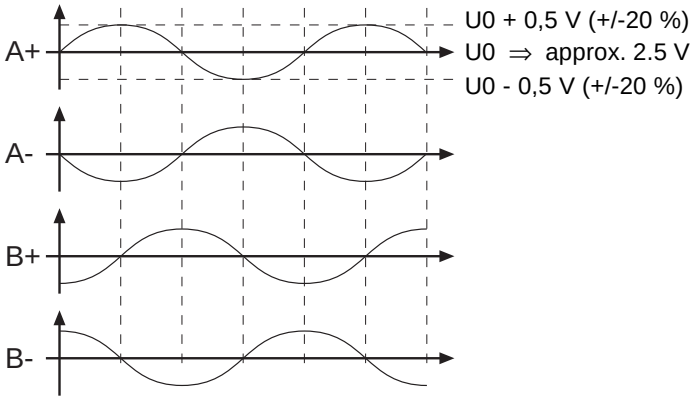
3- Output signals: Rectangular pulse signal

Two square-wave pulses that are electrically by 90° out of phase and their inverse signals

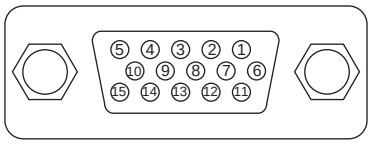


or sinusoidal 1 Vss signals

Two sinusoidal incremental signals that are electrically by 90° out of phase and their inverse signals



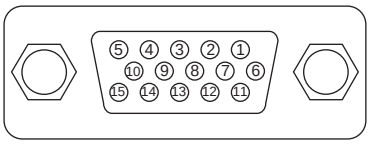
6.2.2 Connection SIN/COS Encoder



PIN-No.	Signal	PIN-No.	Signal
1	C -	9	B +
2	D -	10	
3	A -	11	
4	B -	12	+ 5 V
5		13	GND
6	C +	14	R -
7	D +	15	R +
8	A +	Housing	Shield

The connector may only be connected / disconnected when the inverter and voltage supply are shut off.

6.2.3 Connection Resolver



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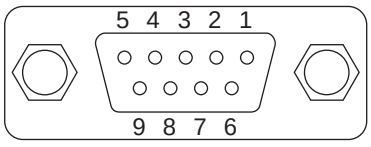
PIN-Nr.	Signal	PIN-No.	Signal
1		9	COS
2		10	SIN_REF
3	SIN_LO	11	
4	COS_LO	12	
5	SIN_REF_LO	13	
6		14	
7		15	
8	SIN	Housing	Shield

The connector may only be connected / disconnected when the inverter and voltage supply are shut off.

6.3 Connection X5 Incremental Encoder Emulation



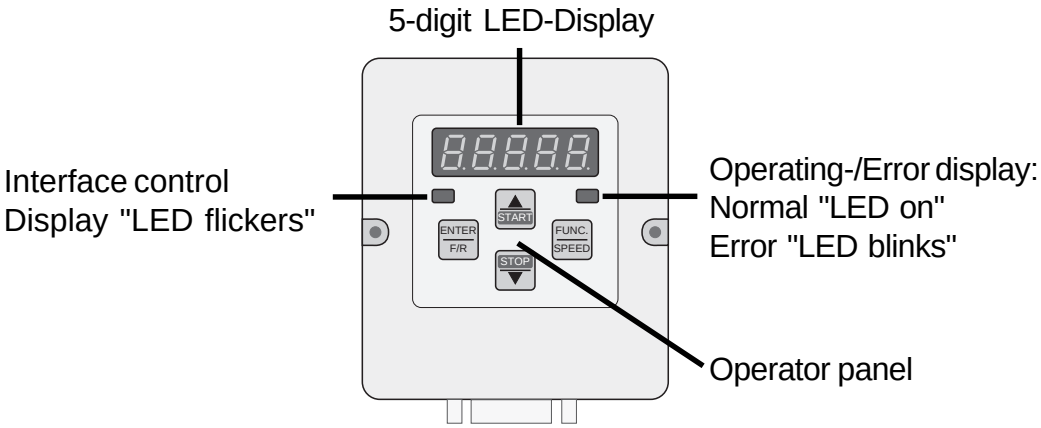
The 9-pole sub-d-socket is used as an incremental encoder output. The signals are emitted corresponding to the signals on the incremental encoder input X4 in RS422 specifications.
! see also parameter LF.3 !

PIN-No.	Signal	Meaning
1	A +	Signal Channell A
2	B +	Signal Channel B
3		reserved
4	+ 5 V	Voltage output
5	+ 24 V	external voltage supply
6	A-	inverted Signal Channel A
7	B-	inverted Signal Channell B
8		reserved
9	GND	external Mass
Housing		Shielding

7.1 Digital- / Interface-Operator

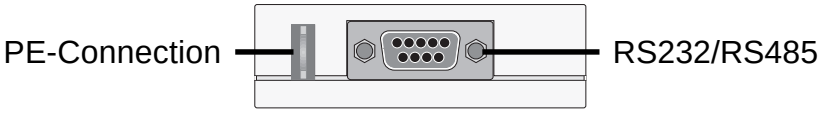
An operator is a necessary for local operation of the inverter KEB COMBIVERT F4-F. To prevent malfunctions, the inverter must be brought into ***nOP*** status (control release terminal X2.1).
The operator is not necessary for operating.
The operator is available in several versions:

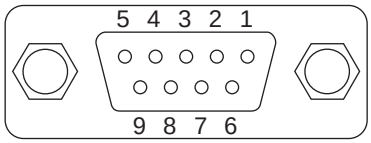
Digital-Operator
Part.-No. 00.F4.010-2009



Interface-Operator
Art.-Nr. 00.F4.010-1009

In the interface operator there is an additional isolated RS232/RS485-interface integrated.



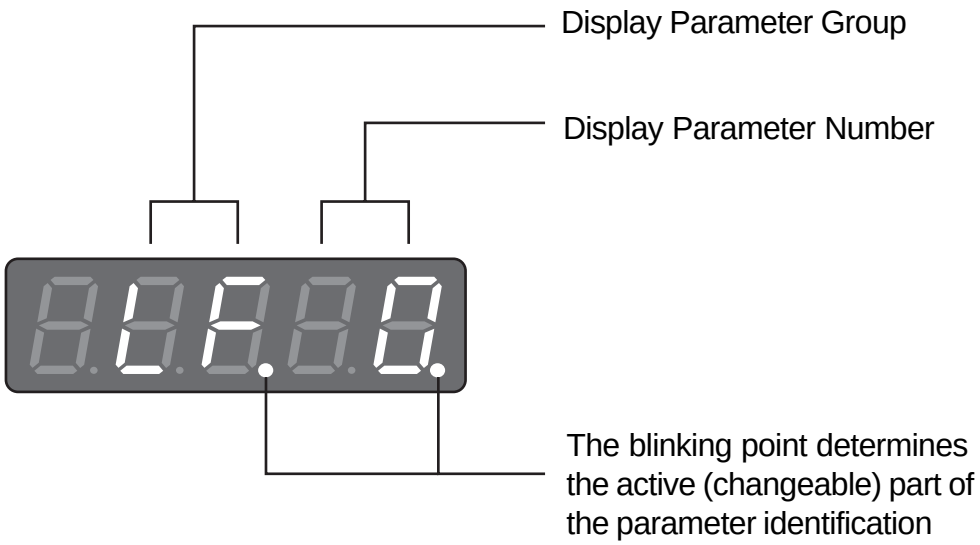


PIN	RS485	Signal	Description
1	–	–	Reserved
2	–	TxD	Transmission signal/RS232
3	–	RxD	Incoming signal/RS232
4	A'	RxD-A	Incoming signal A/RS485
5	B'	RxD-B	Incoming signal B/RS485
6	–	VP	Supply voltage plus +5V (I_{max} = 10 mA)
7	C/C'	DGND	Reference potential
8	A	TxD-A	Transmission signal A/RS485
9	B	TxD-B	Transmission signal B/RS485

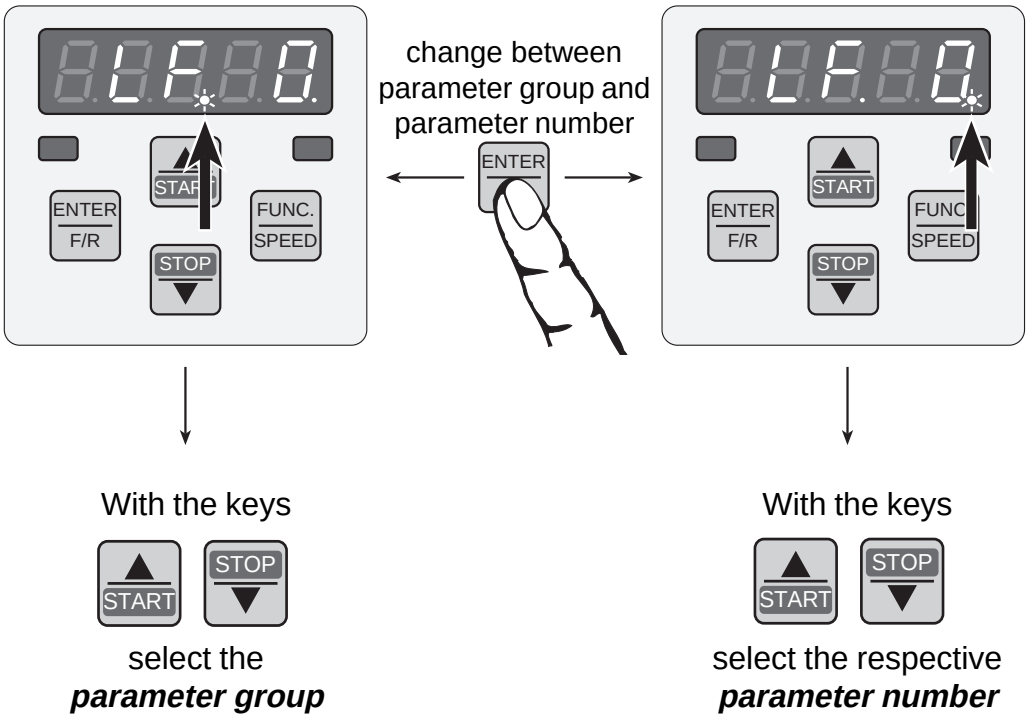
Information about other versions of operators contact KEB!

GB

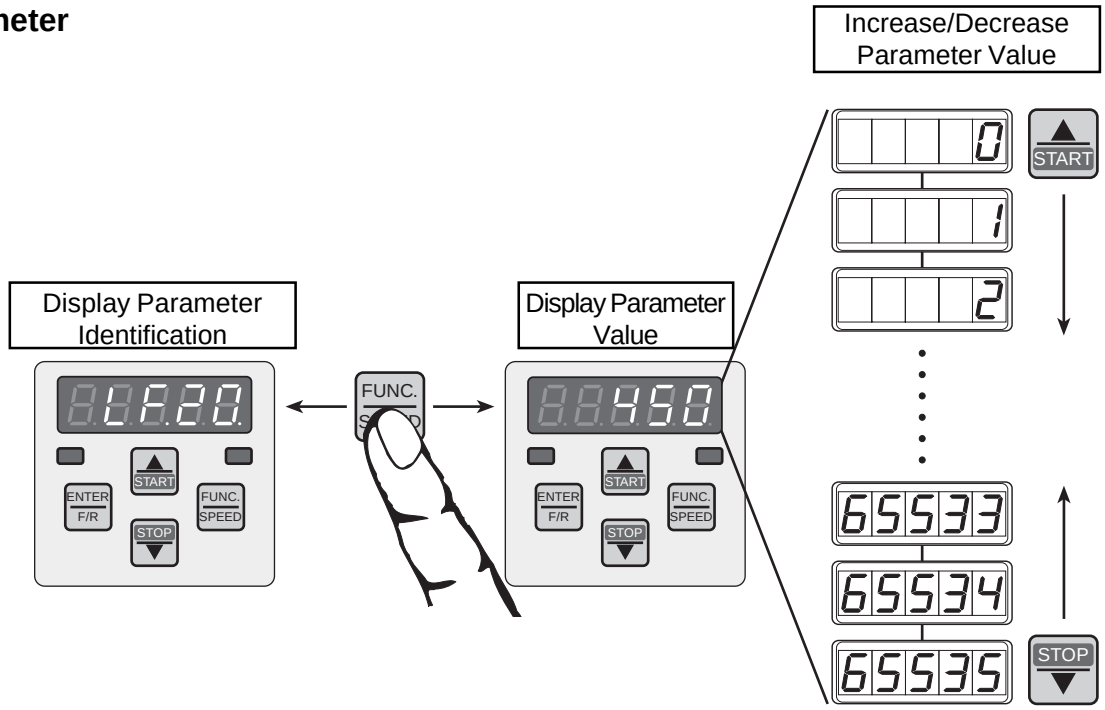
7.2 Parameter Identification



7.3 Parameter Selection



7.4 Changing Parameter Values



GB

7.5 Parameter Structure

Parameter Groups

LF-Parameter: LF. 0 ... LF. C5
ru-Parameter: ru. 0 ... ru. 32
In-Parameter: In. 0 ... In. 57

Read-Only Parameters
can only be read out but not changed
LF.76, LF.80...LF.A0
ru.0...ru.04, ru.09...ru.11,
ru.18...ru.24, ru.26...ru.32,
In.0...In.57

Programmable Parameters
can be changed

LF.0...LF.75, LF.77, LF.78,
LF.A1...LF.C5,
ru.8, ru.12, ru.25

NON-ENTER-Parameters
are programmable parameters, which when changed are immediately accepted and stored.
LF.03,LF05,...LF.17,
LF.20...LF.28,
LF.31...LF.68, LF.70...LF.75,
LF.77, LF.78, LF.A1…LF.C5,
ru.8, ru.12, ru.25

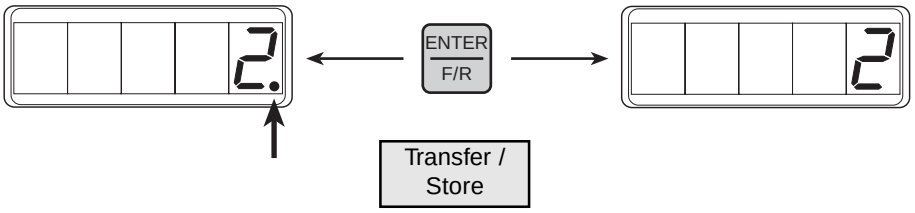
ENTER-Parameters
are programmable parameters, whose changes are first accepted and stored after the ENTER-key is pressed.
LF.0...LF.2, LF.4, LF.18, LF.19,
LF.30, LF.69

GB

7.6 Storing Parameter Values

If the parameter value of an ***ENTER Parameter*** is changed, a point appears behind the last position in the display. The adjusted parameter is transferred and permanently stored when **ENTER** is pressed.

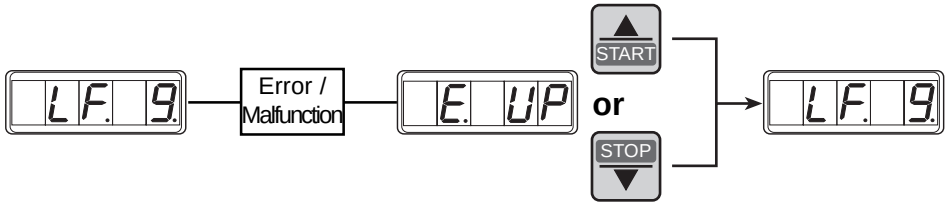
Example:



7.7 Error Messages

If a malfunction occurs during operation, the actual display is overwritten with the error message. By pressing the keys "UP" or "DOWN" the error message is reset.

Example:



Only the error message is reset with UP / DOWN. To reset the error remove the cause and reset terminal X2.2 or do a power on reset.

Inverter Status Message
(running /error message) see p. GB 44 - GB 45

8.1 LF-Parameter

Password

In order to prevent unauthorized adjustment, a password (factory setting: 440) must be entered (see also parameter LF.01). The inverter can be barred from further use by entering 400 or by switching off the supply voltage.

possible displays : - 4 = read only
- 5 = operation released

factory setting - 4

User-Defined Password

This password replaces the KEB factory password and is valid the next time you switch on the inverter. **This parameter can only be used when a valid password is entered in parameter LF.0.**

Value range: 0 ... 399, ~~400~~, 401 ... 9999
Factory setting 440

The value 400 may <u>not</u> be set in the parameter LF.1! The value 400 is only reserved to block the unit! Only KEB can enable a unit, which is blocked by LF.1

Steering/Operating Mode

This value determines the type of setpoint selection and rotation setting.

Unit: 1
Value range: 1 ... 4
Factory setting: 1

Set Value	Setpoint Selection	Rotation Selection
1	binary coded terminals X3.2, X3.3, X3.4	terminals X2.3, X2.4
2	input coded terminals X3.2, X3.3, X3.4, X3.5, X3.6, X3.7, X3.8	terminals X2.3, X2.4
3	analog setpoint, 0... +10V terminals X2.14, X2.15	terminals X2.3, X2.4
4	analog setpoint, -10V...+10V terminals X2.14,X2.15	rotation detection from analog value polarity

When LF.2 = 3 then: 0 ... +10V $\hat{=}$ 0 ... + max. system speed (LF.20)

When LF.2 = 4 then: 0 ... ±10V $\hat{=}$ 0 ... ± max. system speed (LF.20)

GB

Function of the digital setpoint inputs

	X3.2	X3.3	X3.4
V = 0	0	0	0
VB	1	0	0
VE	0	1	0
VN	1	1	0
VI	0	0	1
V1	1	0	1
V2	0	1	1
V = 0	1	1	1

First all three inputs should be set and then the non-needed inputs should be reset to avoid a wrong speed selection during a speed change.

b) Input coded setpoint selection LF.02 = 2

With this type of setpoint selection it is permissible to set several inputs at the same time. The table below shows which travelling speeds are used.

	X3.2	X3.3	X3.4	X3.5	X3.6	X3.7	X3.8
V = 0	0	0	0	0	0	0	0
VB	1	X	X	X	X	X	X
VE	0	1	0	0	0	0	0
VN	0	X	1	0	0	0	0
VI	0	X	X	1	0	0	0
V1	0	X	X	X	1	0	0
V2	0	X	X	X	X	1	0
V=0	0	X	X	X	X	X	1

Symbole: 1 = Input is set at 24 V
0 = Input may not be set
X = Setting has no effect

c) Analog setpoint selection LF.02 = 3 or 4

The analog setpoint selection is set with the terminals X2.14 / X2.15.

0 ... ±10V = 0 ... ±max. system speed (LF.20)

Terminal X3.6 is used to activate/deactivate the starting routine. The directions below must be followed in the exact sequence they are listed:

Start: 1.) Terminal X3.6 = 1 (activate starting routine/open break)
2.) Preset analog setpoint

Stop: 1.) Remove analog setpoint
2.) Terminal X3.6 = 0 (close brake)

Divider Incremental Encoder Output

With LF.3 you can preselect a divider for the signals of the incremental encoder output (X5). The adjusted value is valid after a power-on-reset.

Unit: 1
Value range: 1...128
Factory setting: 1

No divider possible with resolver connection (1 : 1)!

ASM/SSM-Selection

With parameter LF. 4 you can select, if it is an **as**ynchronous **m**otor or a three-phase **s**ynchronous **s**ervo **m**otor. **LF.4 releases the adjusted motor parameter for the selected motor and does independently a Power-On-Reset.**

Unit: 1
Value range: 0:ASM / 1:SSM
Factory setting: 0:ASM
Adjustment value: in accordance with type of the motor

Reverse Direction of Travel

With LF. 5 travel direction can be changed.

LF. 5	X2.3	X2.4	Speed setpoint	Inverter status
OFF	1	0	n_set > 0	Fxxx
OFF	0	1	n_set < 0	rxxx
ON	1	0	n_set < 0	rxxx
ON	0	1	n_set > 0	Fxxx

Unit: 1
Value range: 0:off / 1:on
Factory setting: 0:off
Adjustment value: in accordance with the direction of travel

ASM-Rated Motor Power

Unit: kilowatt
Value range: 0,00...75,00 kW
Factory setting: 4,00 kW
Adjustment value: in accordance with the motor name plate

ASM-Rated Motor Speed

Unit: rpm
Value range : 100...6000 rpm
Factory setting: 1440 rpm
Adjustment value: in accordance with the motor name plate

You may not enter the motor-synchronous speed (e.g. 1500 rpm for a 4 pole motor). Ask the manufacturer for the motor rated speed if you cannot find it on the name plate.

ASM-Rated Motor Current

Unit: ampere
Value range: 1,0...1,1 * Inverter rated current
Factory setting: 8,0 A
Adjustment value: in accordance with the motor name plate

ASM-Rated Motor Frequency

Unit: hertz
Value range: 20...100 Hz
Factory setting : 50 Hz
Adjustment value: in accordance with the motor name plate

ASM-Rated Motor Voltage

Unit: volt
Value range: 1...650 V
Factory setting: 400 V
Adjustment value: in accordance with the motor name plate

ASM-Power Factor cos φ

Unit: 1
Value range: 0,01...1,00
Factory setting: 0,86
Adjustment value: in accordance with the motor name plate

Field Weakening Speed

Unit: rpm
Value range: 0,0...6000,0 rpm
Factory setting: 1200,0 rpm
Adjustment value: approx. 80% of the synchronous speed

ASM-Encoder Pulse Number

Unit:	pulse per revolution
Value range:	256...10000 pulse per revolution
Factory setting:	2500 pulse per revolution
Adjustment value:	in accordance with the manufacturer specifications

If the incremental encoder pulse number is not correctly adjusted, it may occur that the lift drives too slowly, overspeed is reached or other unforseen conditions occur. Therefore, it is absolutely necessary to compare the set and actual speed with each other during the startup phase (LF.30=0)

ASM-Encoder Track

The encoder tracks of the incremental encoder can be changed by software with the parameter LF.18.

Unit:	1
Value range:	off / on
Factory setting:	off
Adjustment value:	dependent on rotating field

See also page GB 57 "Start-Up Assistance"

DC Voltage Compensation

Compensates the dc-bus voltage onto the adjusted level. This parameter is used to adjust the output voltage during open-loop operation (LF.30=0)

Unit:	volt
Value range:	150...500, off V
Factory setting:	400 V
Adjustment value:	supply voltage of the inverter

Rated System Speed

The speeds adjusted in parameters LF.42, LF.44 and LF.45 are limited by LF.20.

With setpoint input the following is valid:

0 ... ±10V = 0 ... ±rated system speed (LF.20)

Unit:	meter per second
Value range:	0,000...15,000 m/s
Factory setting:	0,000 m/s
Adjustment value:	maximum speed of the system

Traction Sheave Diamter

Unit: millimeter
Value range: 200...2000 mm
Factory setting: 600 mm
Adjustment value: in accordance with the available traction sheave (may be determined with a folding rule).

Gear Reduction Ratio

Unit: 1
Value range: 1,00 ... 99,99
Factory setting: 30,00
Adjustment value: in accordance with the gear name plate, (determine by counting the revolutions of the handwheel during a traction sheave revolution).

Catenary Suspension

Unit: 1
Value range: 1...8 (1:1...8:1)
Factory setting: 1
Adjustment value: in accordance with the system data

Load

Unit: kilogram
Value range: 0...65535 kg
Factory setting: 0 kg
Adjustment value: in accordance with the system data (you may need to multiply the number of people by 75kg)

Torque Increase of the Door drive

Unit: percent of the rated torque
Value range: 0,0...25,5 %
Factory setting: 6,0 %

! Door drive see pages GB 14 - D 15 !

Rated Speed of the Door Drive

Unit: revolutions per minute
Value range: 100...6000 rpm
Factory setting: 1440 rpm

! Door drive see pages GB 14 - D 15 !

Rated Frequency of the Door Drive

Unit: hertz
Value range: 20...100 Hz
Factory setting: 50 Hz

! Door drive see pages GB 14 - D 15 !

Rated Voltage of the Door Drive

Unit: volt
Value range: 1...650 v
Factory setting: 400 v

! Door drive see page GB 14 - GB 15 !

Control Method

Used to switch between the control method.

Unit: 1
Value range: 0...3
Factory setting: 0
Adjustment value: 0 → open loop operation
1 → select via terminal X2.5
2 → closed loop operation with speed feedback
3 → closed loop operation with speed feedback and precontrol torque

With open loop operation (LF.30=0) the digital outputs for craw speed, overspeed and deceleration control are not set. With SSM-selection only the closed loop operation (2 or 3) is permitted.

ASM Kp Speed

Proportional gain of the speed controller

Unit: 1
Value range: 1...65535
Factory setting : 3000
Adjustment value: dependent on ratio of inverter / motor

Vibrations occur during constant run when the KP-values are too large. If the KP-values are too small a deviation occurs between the set and actual values of the set speed characteristic.

ASM Ki Speed

Integral gain of the speed controller.

Unit: 1
Value range: 1...65535
Factory setting: 1000
Adjustment value: dependent on ratio of inverter / motor

ASM Ki Speed Offset

For a better load transfer at high efficiency gears.

Unit: 1
Value range: 0...65535
Factory setting: 1000
Adjustment value: dependent on ratio of inverter / Motor and gear type

GB

ASM Kp Current

Proportional gain of the magentization and current controllers.

Unit: 1
Value range: 1...65535
Factory setting: 1500
Adjustment value: dependent on ratio of inverter / motor

ASM Ki Current

Integral gain of the current controllers.

Unit: 1
Value range: 1...65535
Factory setting: 500
Adjustment value: dependent on ratio of inverter / motor

ASM Maximum Torque

Upper limit of the motor torque, which protects the motor from breaking down. The acceleration process will probably take longer with a full load.

Unit: newtonmeter
Value range: 0,0...5 x motor rated torque
Factory setting: 2 x LF.91
Adjustment value: approx. 2 x LF.91
(dependent on load and the motor connected)

Boast

Adjusts the u/f-curve **only during open loop** operation (LF.30=0).

Unit: % of input voltage
Value range: 0,0...25,5 %
Factory setting: 10,0 %
Adjustment value: dependent on load

If the torque is not increased enough the motor is too ‘soft’ and the load cannot be removed. If there is not enough torque vibrations may occur during deceleration and in the positioning drive.

Operating Frequency Change

Using parameter LF.38 (operating frequency) you can set, whether the operating frequency should constantly be 8 kHz or whether the automatic transfer should be activated.

Unit:	1
Value range:	0 = operating frequency constantly 8 kHz 1 = automatic operating frequency change
Factory setting:	1
Adjusted value:	as needed

If the display often shows the error message „E.OL2“ the adjustment
0= operating frequency constantly 8 kHz is recommended.

Set Value V_B, Correction Speed

Unit:	meter per second
Value range:	0.000...0.300 m/s
Factory setting:	0.000 m/s
Adjusted value:	approx. 0,02 m/s

- To improve the positioning the set speed change occurs without jerk limit.
- If the correction speed is selected for the actual set speed it is not possible to switch onto a higher set speed.

Set Value V_E, Crawl Speed

Unit:	meter per second
Value range:	0,000...0,300 m/s
Factory setting:	0,000 m/s
Adjustment value:	approx. 0,1 m/s

If the crawl speed is selected for the actual set speed it is not possible to switch onto a higher set speed.

Set Value V_N, Rated Speed

Unit:	meter per second
Value range:	0.000...LF.20
Factory setting:	0.000 m/s
Adjusted value:	like LF.20 or smaller

Set Value V_I, Inspection Speed

Unit:	meter per second
Value range:	0.000...0,630 m/s
Factory setting:	0.000 m/s
Adjusted value:	approx. 0,500 m/s

If the inspection speed is selected for the actual set speed it is not possible to switch onto a higher set speed.

Set Value V_1, Intermediate Speed 1

Unit:	meter per second
Value range:	0.000...LF.20
Factory setting:	0.000 m/s
Adjusted value:	dependent on the distance between the floors

Set Value V_2, Intermediate Speed 2

Unit:	meter per second
Value range:	0.000...LF.20
Factory setting:	0.000 m/s
Adjusted value:	dependent on the distance between the floors

Set Speed of Door Drive

Unit:	rpm
Value range:	0.0...3000,0 rpm
Factory setting:	0.0 rpm

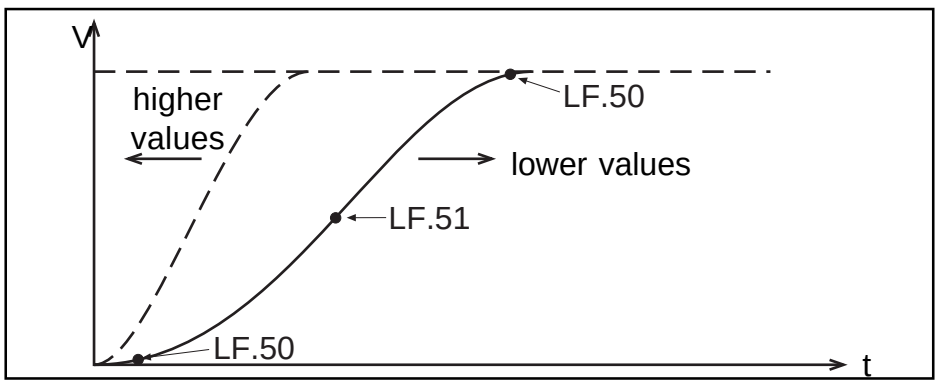
! See pages GB 14 - GB 15 !

Starting Jerk

Unit:	meter per second^3
Value range:	off, 0,11...9,99 m/s
Factory setting:	0,60 m/s^3
Adjusted value:	dependent on the mechanical system (adjustment values which are too high can lead to oscillations in the cabin)

General: The jerk or shock, which **always** occurs during the accleration process, is crucial for the comfort of passengers in a passenger lift. This causes objects on conveyor systems to topple over or sway and puts a lot of stress on the mechanical components. Each person expierences this 'shock' differently, depending on their age, physical and mental state and whether they awaited this movement or not.

Empirical values:	0.5...0.8 m/s^3	for retirement homes, hospitals, apartment buildings
	0.8...1.2 m/s^3	for office buildings, banks etc.



Acceleration

Unit:	meter per second^2
Value range:	0,10...2,00 m/s^2
Factory setting:	0,90 m/s^2
Adjustment value:	according to comfort

Empirical values: 0,5...0,8 m/s^2 for retirement homes, hospitals, apartment buildings
0,8...1,2 m/s^2 for office buildings, banks etc

Deceleration Jerk

Unit:	meter per second^3
Value range:	off, 0,11...9,99 m/s^3
Factory setting:	1,00 m/s^3
Adjusted value:	according to comfort

When the deceleration jerk is set too low, parameter LF.53 is no longer valid.

Deceleration

Unit:	meter per second^2
Value range:	0,10...2,00 m/s^2
Factory setting:	0,90 m/s^2
Adjusted value:	according to comfort

Stopping Jerk

The stopping jerk determines the ride comfort as it lowers onto the floor from the path optimization. If the setting LF.54 = off, then the stopping jerk = deceleration jerk (LF.52)

Unit:	meter per second
Value range:	off, 0,02...9,99 m/s
Factory setting:	off
Adjustment value:	according to comfort

Level Brake

Unit:	meter per second
Value range:	0,000...0,010 m/s
Factory setting:	0,005 m/s
Adjustment value:	0,005 m/s

Level Overspeed

Unit:	meter per second
Value range:	0.000...18,000 m/s
Factory setting:	1,500 m/s
Adjusted value:	approx. 1,1 x LF.42

GB

Deceleration Check

Controls whether the drive decelerates during shortened overtravel.

Unit:	meter per second
Value range:	0,000...15,000 m/s
Factory setting:	1,300 m/s
Adjusted value:	approx. 0,95 x LF.42

Level Crawl Speed

Unit:	meter per second
Value range:	0,000...0,300 m/s
Factory setting:	0,250 m/s
Adjusted value:	dependent on the running time of the door and speed

DC-Voltage Circuit Control

Unit:	Volt
Value range:	0...800 V
Factory setting:	0 V

Monitors the dc-bus-voltage. If the level is exceeded, the output X3.22 = high, hysteresis 6%.

„E.dOH“ Delay

Unit:	seconds
Value range:	0...3600 s
Factory setting:	300 s

After the delay time has run out, the inverter stops with the message „E-dOH“ (Error, motor, overheating). The malfunction can be reset, when the motor has cooled down and the frequency inverter shows the display „E.nOH“ (Error, no overheating). If the motor cools down before the delay time runs out, no fault indication is triggered.

For LF.65 = 0 (off) applies:	Stop the inverter after the control release is removed.

Heat Sink Temperature Level

Dependent on the temperature level the relay output for the control cabinet fan (X2.20 / X2.21 / X2.22) is switched.

current heat sink temperature > LF.66 switches off
current heat sink temperature < LF.66 - 5 K switches on

Unit: degrees Celsius
Value range: 20...50 °C
Factory setting: 40 °C

Pretorque Gain

If the control method with pretorque is adjusted in LF.30 =3, the analog signal at X2.16 is normed from a load weight device to a torque input.

0 V → the cabin is empty → –rated torque
5 V → cabin weight + half load = counter-weight → 0
10 V → the cabin is full → +rated torque

If the rated torque is too small or too large , it can be increased or decreased with LF.67.

Unit: 1
Value range: 0,50 … 1,50
Factory setting: 1
Adjusted value: dependent on the used pretorque

Pretorque Offset

If the balancing load is not 50 % , the pretorque can be adjusted with LF.68.

Unit: %
Value range: – 25,0 % … 25,0 %
Factory setting: 0 %
Adjusted value: dependent on the counter weight

Pretorque Direction

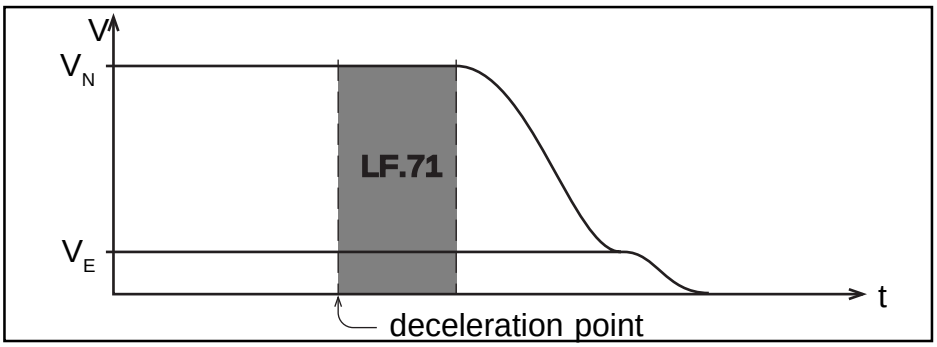
Unit: 1
Value range: off / on
Factory setting: off
Adjusted value: dependent on the requested torque direction

Brake Release Time

Unit: seconds
Value range: 0,300...3,000 s
Factory setting: 0,300 s
Adjusted value: 0,300 s

Crawl Path Optimization Rated Speed V_N

Unit: centimeter
Value range: 0,0...200,0 cm
Factory setting: 0,0 cm



Crawl Path Optimization Speed V_1

Unit: centimeter
Value range: 0.0...200.0 cm
Factory setting: 0.0 cm

Function see parameter LF.71.

Crawl Path Optimization Speed V_2

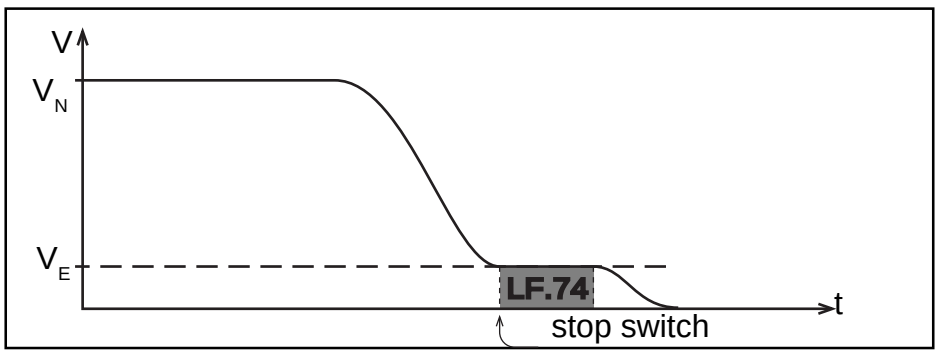
Unit: centimeter
Value range: 0,0...200,0 cm
Factory setting: 0,0 cm

Function see parameter LF.71

Crawl Path Optimization Speed V_E

Unit: millimeter
Value range: 0...300 mm
Factory setting: 0 mm

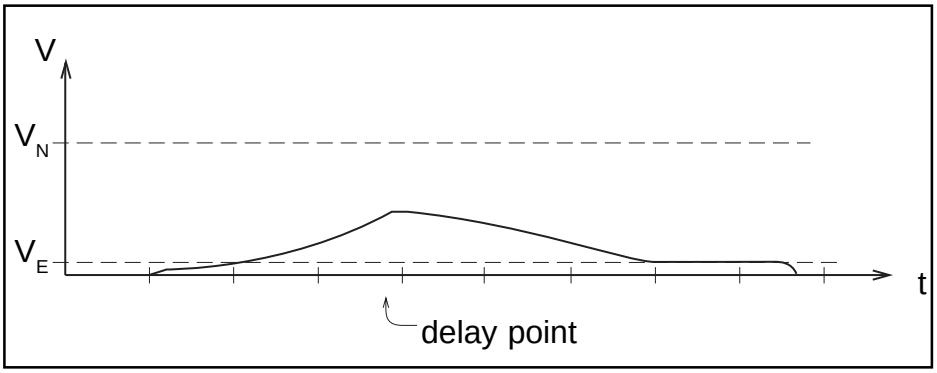
The levelling position can be exactly adjusted with the crawl path optimization. Condition: the stop switches in all floors have the same distances to the levelling position for both directions. The crawl speed (LF.41) and stopping jerk (LF.54) must be adjusted before the path optimization crawl speed.



For optimization see display LF.92!

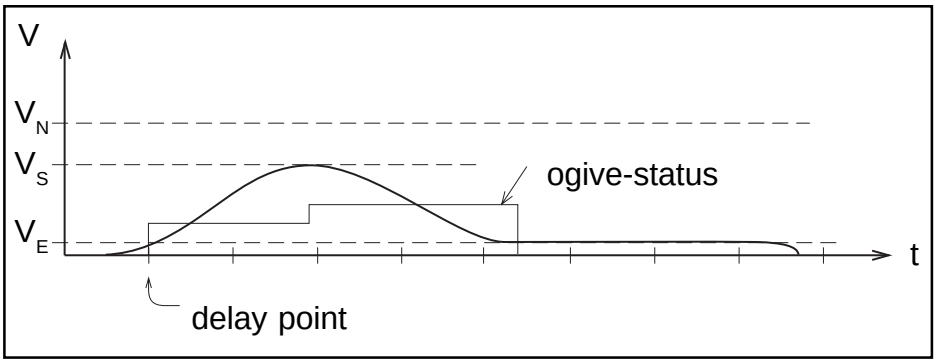
Ogive Function

If the ogive function is switched **off** the acceleration is immediately interrupted at the delay point.



LF. 75 = off

If the ogive function is switched **on** and according to the adjusted parameters LF.77 and LF.78 the drive accelerates to the braking distance calculated ogive speed and decelerates than to crawl drive. After the ogive function is switched on the drive curve of the lift should not be changed. The ogive function must be switched on again if there is a change at the drive curve.



LF. 75 = on

Unit:	1
Value range:	off / on
Factory setting:	off

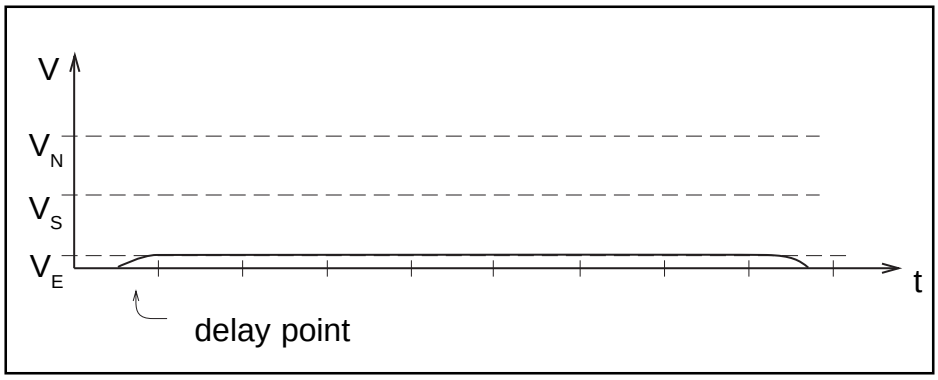
Ogive Status

GB

Messages:
0 → no ogive drive
1 → ogive drive is active
(drive accelerates to the ogive speed V_S)
2 → ogive drive is active
(drive decelerates from ogive speed V_S to crawl speed)
4 → actual speed is to high
If there are several messages active then the sum is displayed.

Special Cases:

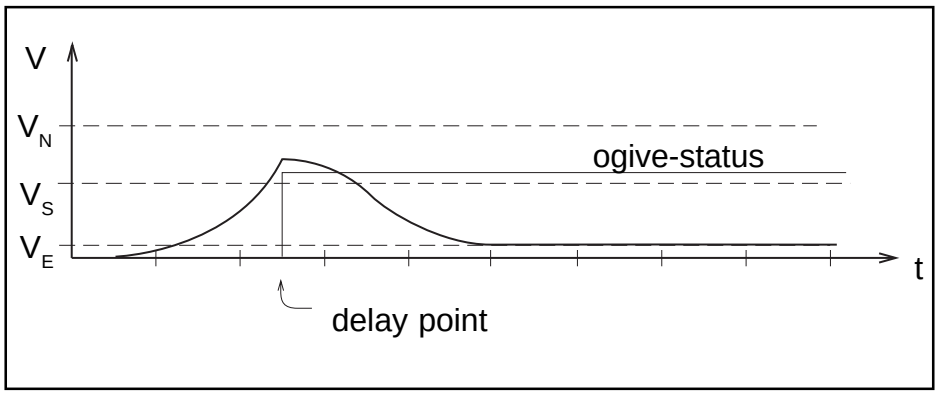
1) Switching velocity is too small



If the switching velocity < crawl speed the drive accelerates to the crawl speed. The ogive status is constantly 0, because no ogive drive will be done.

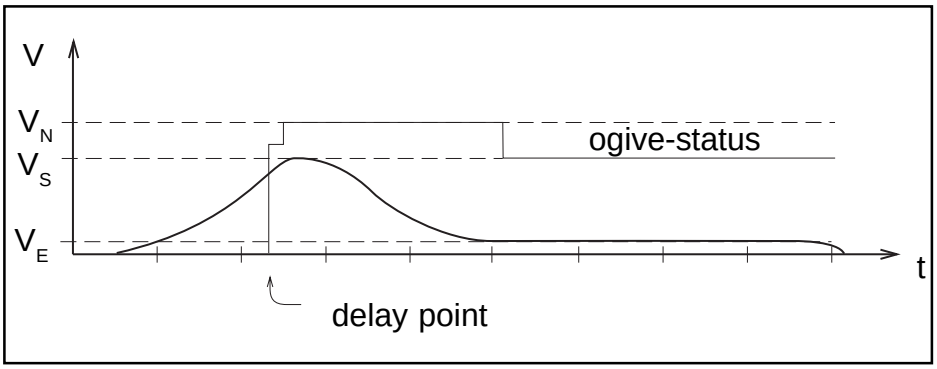
2) Switching velocity is too high

There are two different examples:
2a) switching velocity > ogive speed V_S



The drive decelerates directly into the crawl drive and the ogive status is adjusted to 4, because no ogive drive can be done.

2b) switching velocity < ogive speed V_S, because a complete s-curve is not possible.



The inverter identify that the changeover speed is too high,the ogive status will be set at 4 and than a ogive drive will be executed. The drive comfort is not very good.
The ogive status is set at 4, when the ogive drive has finished. Only when the braking distance or the hight of the floor are adjusted new, the ogive status will be set at 0.

Measurements:

To provide a good driving comfort the changeover speed must be decreased. That means: by increasing the breaking distance the delay point will switch earlier. To avoid very long crawl drives when the drive goes over several levels, in parameter LF.71 the delay described above will be compensated.

Braking Distance

Distance from the delay point to the levelling signal

Unit: meter
Value range: 0,000 … 5,000 m
Factory setting: 0,000 m

Maximum Hight Of Floor

Maximum hight of the floor, in which a ogive drive can be done.

Unit: meter
Value range: 0,000 … 5,000 m
Factory setting: 0,000 m

Software Version

Display of the software version.

Software Date

Display of the software date.

X2 Input State

Terminal X2 (upper terminal)

With the X.2 input state it is easy to control whether the input signals reached the inverter control. Every input (output) has a specific valency. If some inputs are set, the sum of the valency is shown.

Value Table:

Display Combivis	Valency	Function	Input Terminal
ST	1	control release	X2.1
RST	2	reset	X2.2
F	4	direction of travel forward	X2.3
R	8	direction of travel reverse	X2.4
I1	16	control mode	X2.5
I2	32	drive active	X2.6
I3	64	door drive setpoint input	X2.7

Example: Input control release (X2.1), direction and travel up (X2.3) and external error (X2.5) are triggered with 24V .

Display value: 1+4 = **5**

X2 Output State

Terminal X2 (upper terminal)

With the X.2 output state it is easy to control, whether the outputs were set by the inverter control. Every digital output has a specific valency. If some outputs are set at the same time, the sum of the valency is shown.

Value table:

Display Combivis	Valency	Function	Input Terminal
O1	1	digital output signal: braking control	X2.8
O2	2	digital output signal: main contactor control inverted	X2.9
O3	4	relay control cabinet fan	X2.20/X2.21

X3 Input State

Terminal strip X3 (lower terminal)

see parameter LF.82 for functional description.

Value table:

Display Combivis	Valency	Function	Input Terminal
I5	1	Input signal: contactor control	X3.1
I6	2	Set value correction speed: V_B	X3.2
I7	4	Set value crawl speed: V_E	X3.3
I8	8	Set value rated speed: V_N	X3.4
I9	16	Set value inspection speed: V_I	X3.5
I10	32	Set value 1st intermediate speed: V_1	X3.6
I11	64	Set value 2nd intermediate speed: V_2	X3.7

X3 Output State

Terminal X3 (lower terminal)

See parameter LF.83 for functional description.

Value table:

Display Combivis	Valency	Function	Input Terminal
O5	1	Signal: ready overspeed	X3.13
O7	4	Relay contact: braking control	X3.15/X3.16
O8	8	Signal: operating frequency warning	X3.14
O9	16	Signal: delay control	X3.17
O10	32	Relay contact: crawl speed	X3.18/X3.19
O12	128	Relay contact: main contactor control	X3.20/X3.21
O14	1024	Signal: DC-monitoring	X3.22
O15	4096	Signal: motor temperature warning	X3.23

Actual Set Value

Display Value:	0	1	2	3	4	5	6	7
Speed:	V=0	V_B	V_E	V_N	V_I	V_1	V_2	V=0

Actual Inverter Utilization

Display of the actual inverter utilization in %.

Actual Set Speed

The value shows the actual set speed in rpm, calculated from the system data.

Actual Speed

The value shows the real speed in rpm, led from the impulses of the incremental encoder .

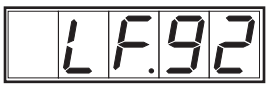
Actual Lft Speed

Display of the speed in m/s; only when the encoder is connected.

ASM - Rated Motor Torque

Using the rating plate data the inverter determines the motor rated torque in the rated point. Unit Nm.

Unit: Newton meter
Factory setting: 26,5 Nm



Positioning Drive

Display of the positioning drive in cm, after the drive has finnished.

Error State

The parameter shows the fault indications that occur during the starting process and continuous operation.

Display	Significance
StOP	no setpoint selection
S.Co	setpoint selection without contactor control
S.IO	setpoint selection without control release
S.nC	no current flows on the output side, check the wiring between motor and inverter
run	starting procedure is completed

See parameter LF.99 for more information about other fault indications.

Inverter State

a) Running Messages

Display	Value	Significance
bbl	76	base-block-time runs out, power modules are blocked for 3s (always when control release is cleared)
Facc	64	forward acceleration
Fcon	66	forward constant running
FdEc	65	forward deceleration
nOP	0	no Operation, terminal X2.1 is not set
LS	70	low speed, control release is switched but no direction of rotation is adjusted, modulation disabled
rAcc	67	reverse acceleration
r Con	69	reverse constant running
rdEc	68	reverse deceleration

b) Fault Messages

Display	Value	Description
E.buS	18	Error, bus, failure in serial communication
E.dOH	9	Error, drive-overheat, motor overheats and prewarning time has run out
E.dSP	51	Error, digital signal processor, error in signal processor
E.PrF	46	Error, prohibited rotation forward, error in the software limit switch (when the set direction of rotation is forward, the software limit switch for forward is inactive)
E.Prr	47	Error, prohibited rotation reverse, error in the software limit switch (when the set direction of rotation is reverse, the software limit switch for reverse is inactive)
E.hyb	52	Error, hybrid, error in the encoder input card
E.EnC	32	Error, encoder, error in the encoder break (reset only possible with Power-On-Reset)
E.LSF	15	Error, load shunt fault
E.OC	4	Error, overcurrent, overcurrent short-time peak overloading
E.OH	8	Error, overheated, overheating of the inverter
E.OH2	30	Error, overheat 2, electronic motor protection
E.nOH	36	Error, no overheat, overheating no longer preset, can be reset (valid for malfunction E.OH or E.OH2)
E.OL	16	Error, overload, continuous overload, for cooling down the inverter has to stay supplied with power, the cooling time depends on the previous overload time
E.OL2	53	Error overload, overloading of the inverter at output frequency < 3 Hz
E.nOL	17	Error, no overload, cooling time has run out, error can be reset
E.OP	1	Error, overpotential, overvoltage in the DC voltage circuit
E.OS	105	Error, overspeed, overspeed (can only be reset with power-on-reset
E.PuC	49	Error, power unit code, invalid power circuit recognition
E.SEt	39	Error, set, set selection error, check LF.02
E.UP	2	Error, underpotential, undervoltage im DC voltage circuit

SSM Rated Motor Output (only display)

Using the rating plate data the inverter determines the motor rated output in the rated point.
Unit: kilowatt
Factory setting: 0,00 kw

SSM Rated Motor Speed

Unit: rotations per minute (rpm)
Value range: 50 … 6000 rpm
Factory setting: 4000 rpm
Adjusted value: in accordance with the motor name plate

SSM Rated Motor Current

Unit: ampere
Value range: 0,1 A … 1,1* inverter rated current
Factory setting: 3,7 A
Adjusted value: in accordance with the motor name plate

Rated Motor Frequency

Unit: hertz
Value range: 10 … 600 hz
Factory setting: 200 hz
Adjusted value: in accordance with the motor name plate

Static Current

Unit: ampere
Value range: 0,1 … 40,0 A
Factory setting: 4,1 A
Adjusted value : in accordance with the motor name plate

SSM Rated Motor Torque

Unit: newtonmeter
Value range: 0,1 … 600,0 nm
Factory setting: 5,1 Nm
Adjusted value: in accordance with the motor name plate

SSM-EMK Voltage Stabilizer

Unit: volt 1000 rotations per minute
Value range: 0 … 2000 v/1000 rpm
Factory setting: 0 V/1000 rpm
Adjusted value: in accordance with the motor name plate

Winding Resistance (R_{U-V})

Unit: ohm
Value range: 0,1 … 50,0 Ω
Factory setting: 1,8 Ω
Adjusted value: in accordance with the motor name plate

Winding Inductance (L_{U-V})

Unit: millihenry
Value range: 0,1 … 600,0 mH
Factory setting: 8,1 mH
Adjusted value: in accordance with the motor name plate

SSM Encoder (inc/r)

Unit: impulse per revolution
Value range: 256 … 10000 Imp/r
Factory setting: 2048 Imp/r
Adjusted value: in accordance with the motor name plate

SSM Encoder Pole Pair

Unit: 1
Value range: 1 … pole pair of the motor
Factory setting: 1
Adjusted value: according to the encoder pole pair

System Position

LF.62 displays the position of the encoder to the rotor position of the motor. (see also LF.b5)

The position trimming (descriped in parameter LF.b5) must not be done if the system position of the motor and encoder is known. The position value can be written directly in parameter LF.b2.

The inverter must switch off and on to store the system position.

Unit: 1
Value range: – 32768 … 32767
Factory setting: 49A4h
Adjusted value: according to encoder position

Speed Scan Rate

Unit: 1
Value range: 0 … 5
Factory setting: 3
Adjusted value: according to speed real value smoothing

Do not change the parameter!

GB

Reso-Error-Trimming

Unit: 1
Value range: 0 … 255
Factory setting: 0
Adjusted value: according to real speed fluctuations

Do not change the parameter!

When the drive system starts-up (inverter & motor) for the first operating, the position of the encoder to the rotor position of the motor must be known.

By input of 1 into LF.b5 the system position trimming will start. The drive may not be loaded. The ropes must be picked off from the sheave!

The trimming makes several function steps which where displayed in parameter LF.b5.

Value	Significance
0	no position trimming is done
1	preset drive command
2	automatic voltage increase until rated current is flowing (Motor is set in pole position)
3	Rotation presetting control
4	store system position
5	cancel drive command
6	Power-On-Reset
7	System position has finnished

The system position is displayed and stored in LF.b2.

Unit: 1
Value range: 0 … 7
Factory setting: 0
Adjusted value: 0 Position trimming off
1 Position trimming started

SSM KP Speed

Unit: 1
Value range: 0 … 65535
Factory setting: 230
Adjusted value: dependent on ratio of inverter / motor

SSM KI Speed

Unit: 1
Value range: 0 … 65535
Factory setting: 70
Adjusted value: dependent on ratio of inverter / motor

SSM KI Speed Offset

For a better load transfer at high efficiency gears.

Unit: 1
Value range: 0 … 65535
Factory setting: 0
Adjusted value: dependent on ratio of inverter / motor and the type of the gear

SSM KP Current

Unit: 1
Value range: 0 … 65535
Factory setting: 625
Adjusted value: dependent on ratio of inverter / motor

SSM KI Current

Unit: 1
Value range: 0 … 65535
Factory setting: 70
Adjusted value: dependent on ratio of inverter / motor

SSM Torque Maximum

Unit: newtonmeter
Value range: 0,1 … 5 * motor rated torque
Factory setting: 1,5 * LF.A5
Adjusted value: according to loading case and motor

8.2 ru-Parameter

The actual operating condition of the inverter can be read in these parameters. The parameters in this group are **read-only**. Exception: parameters **ru.8, ru.12** and **ru.25** can be reset with the serial interface by entering any value. You can also use the keyboard and do the reset with the UP/DOWN keys.

Display Inverter Status

Shows the actual inverter status.

See status/error messages pages GB 44 - GB 45

Actual Torque Display

Displays actual motor torque (calculated from the active current).

Max. tolerance approx. +/-20% in the basic speed range (in the field weakening range larger tolerances are possible).
During open loop operation 0 is always shown.

Set Speed Display

In ru. 4 the set speed value, at the output of the ramp generator, is displayed. If the modulation is switched off or abnormal operating state is active, then the actual setpoint 0 rpm is shown.
During controlled operation this parameter shows the output frequency in rpm.

Peak Inverter Utilization

ru.8 makes it possible to immediately detect peak utilization within an operating cycle. In addition the highest value that occurs in LF.87 is stored in ru.8. The peak memory can be deleted by pressing the UP or DOWN key, or with Bus by writing any value onto the address of ru. 8. The memory is deleted when the inverter is switched off.

Apparent Current

Display of the actual apparent current. Resolution 0.1A

Active Current

Display of the actual active current. Resolution 0.1A
The active current is calculated from the motor parameters. The restrictions for the torque accuracy are therefore valid for the active current display as well.
During open loop operation the display is always 0.0A.

Actual DC Voltage

Display of the actual dc-bus voltage Resolution: 1V

Peak DC Voltage

Display of the maximum dc-bus voltage measured. In addition the highest value which occurs in ru.11 is stored in ru.12. (Erasing the peak storage : see parameter ru. 8)

X2 Input Terminal Status

Terminal X2 (upper terminal)

You can control whether the input signal reaches the inverter control with ru.14. Every input (output) has a certain valency. If several inputs are set, the sum is displayed.

! see parameter LF.82 !

X2 Output Terminal Status

Terminal X2 (upper terminal)

You can control whether the outputs were set by the inverter control with ru.15. The digtial outputs have a certain valency. If several outputs are simultaneously set, the sum is shown.

! see parameter LF.83 !

Actual Parameter Set

Displays the parameter set currently active (meaning the set, in which the motor presently operates).

Speed Reference Display

Shows the set speed at the input of the ramp generator. If no function with a higher priority is activated, then the inverter works at this speed.
Resolution 0,5 rpm

GB

REF 1 Display

Display of the applied analog voltage in % (10 V = 100%) at REF 1 (setpoint input).

REF 2 Display

Display of the applied anaolg voltage in % (10 V = 100%) at REF 2 (auxiliary input).

OL Counter Display

Evaluates the continuous load of the inverter, in order to prevent OL from occuring (load reduction on time). The OL error is triggered, when the OL counter reaches 100%. The counter is shown with a 1% resolution.

Peak Apparent Current

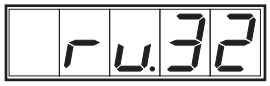
Maximum motor current that occurs during operating time. Display in [A]. The peak memory can be deleted by pressing the UP or DOWN key. The memory is also deleted when the inverter is switched off.

Heat Sink Temperature

Displays the current heat sink temperature in Celsius (°C).

Power On Counter

Shows the time that the inverter was supplied with power.
Resolution: 1 hour



Modulation On Counter

Shows how long the inverter was active. Resolution: 1 hour.
(modulation active, motor supplied with voltage).

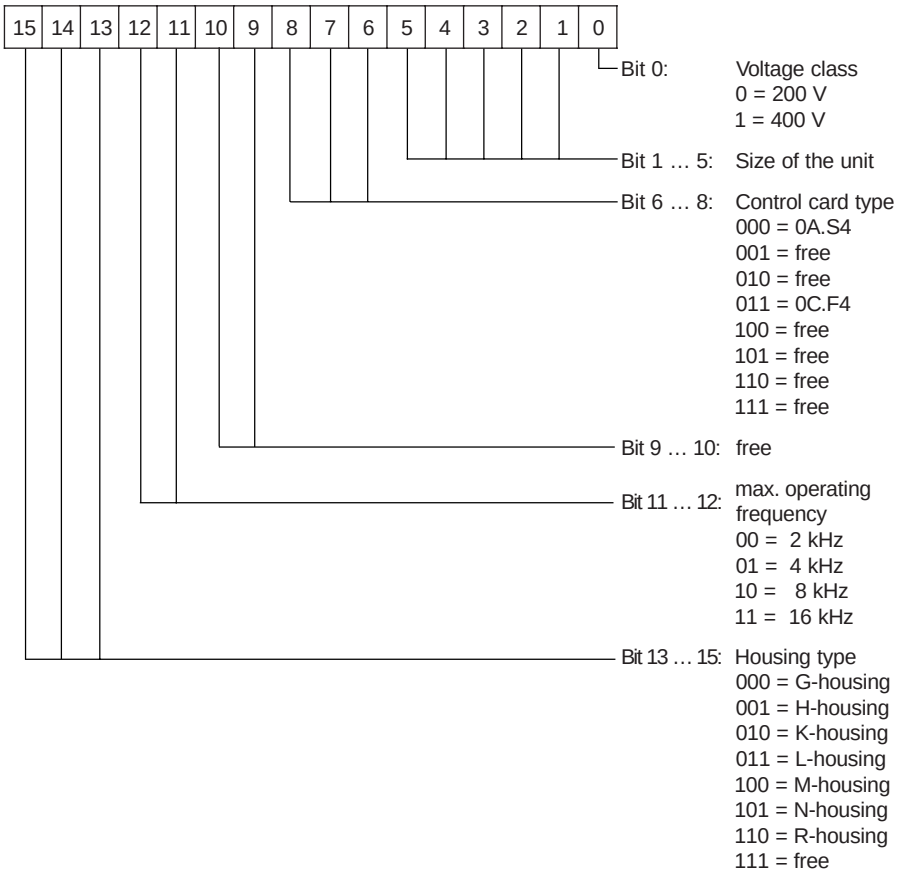
8.3 In-Parameter

Data about the frequency inverter are read out in these parameters

Inverter Type Display

Value (hex)	Significance
1CDA	13.F4.FXG, 200V, 16 kHz

Value of the display (hex)



Rated Inverter Current

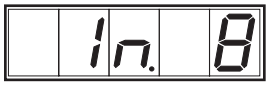
Display of the rated inverter current A (resolution 0,1 A).

Configfile Number

Contains a software identifier used by KEB COMBIVIS. The configuration automatically starts when COMBIVIS is activated and the inverter is connected.

Serial Number High

Displays the serial number of the unit.



Serial Number Low

Displays the serial number of the unit.

Serial Number Order No. High

Displays the serial number of the unit.

Serial Number Order No. Low

Displays the serial number of the unit.

Customer Number HIGH

Displays the customer number.

Customer Number LOW

Displays the customer number.

Last Error

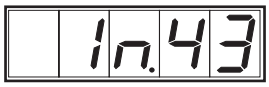
Displays the last error that occurred.
(see LF.99)

Error Counter OC

Shows the total number of errors that occur of each type. The maximum value is 255.

Error Counter OL

Shows the total number of errors that occur of each type. The maximum value is 255.



Error Counter OP

Shows the total number of errors that occur of each type. The maximum value is 255.

Error Counter OH

Shows the total number of errors that occur of each type. The maximum value is 255.

Error Counter WD

Shows the total number of watchdog errors (Bus) that occur of each type. The maximum value is 255.

Software ID Version DSP

The software version number and the control software are coded in this parameter.

Software Date DSP

Displays the software date. The day, month and year (but only the last digit of the year) are shown.

Example: Display = 1507.4
Date = 15.07.94

Feedback System Channel 1

Shows which feedback system is suited for the inverter.

0 = incremental encoder
3 = Resolver

Feedback System Channel 2

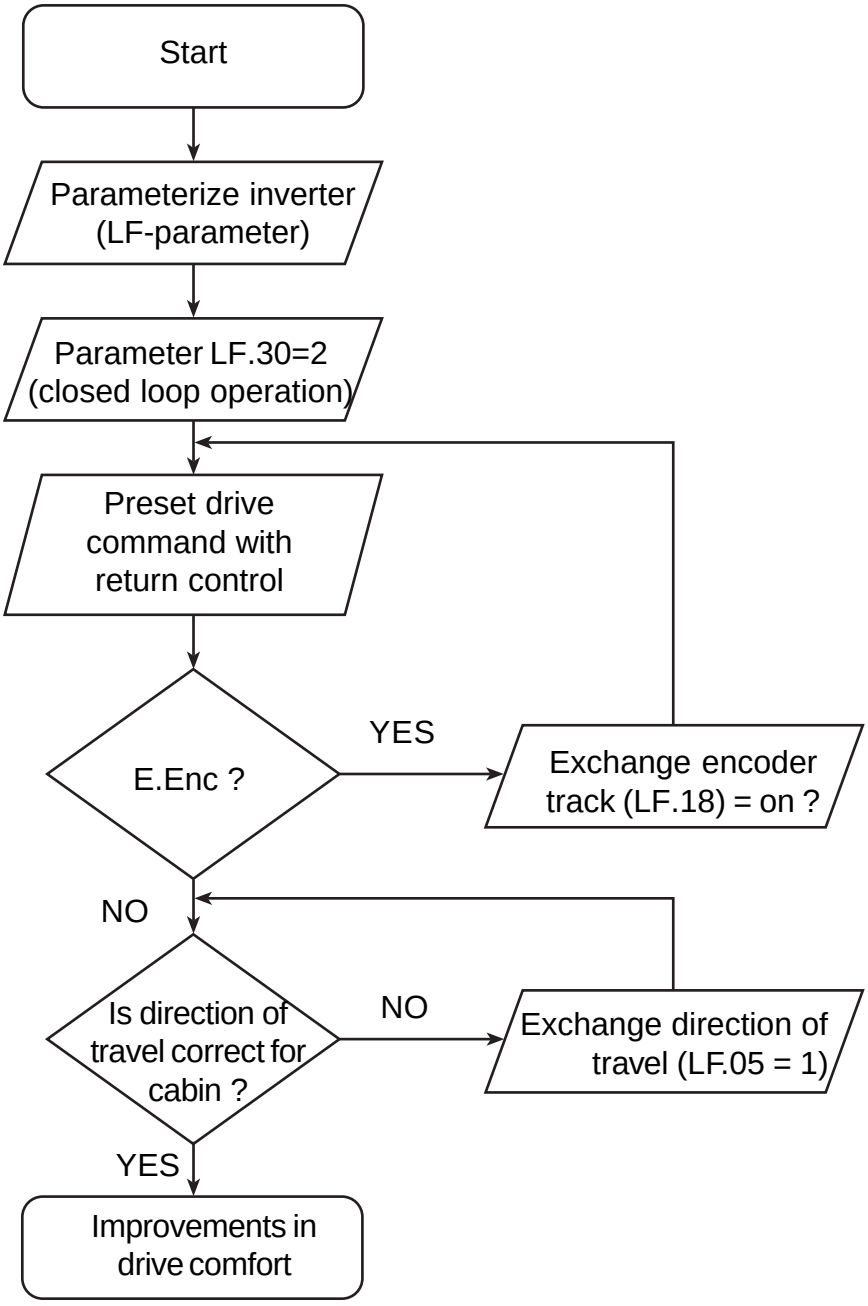
Shows which feedback system is suited for the inverter.

6 = separable incremental encoder output
7 = direct incremental encoder output

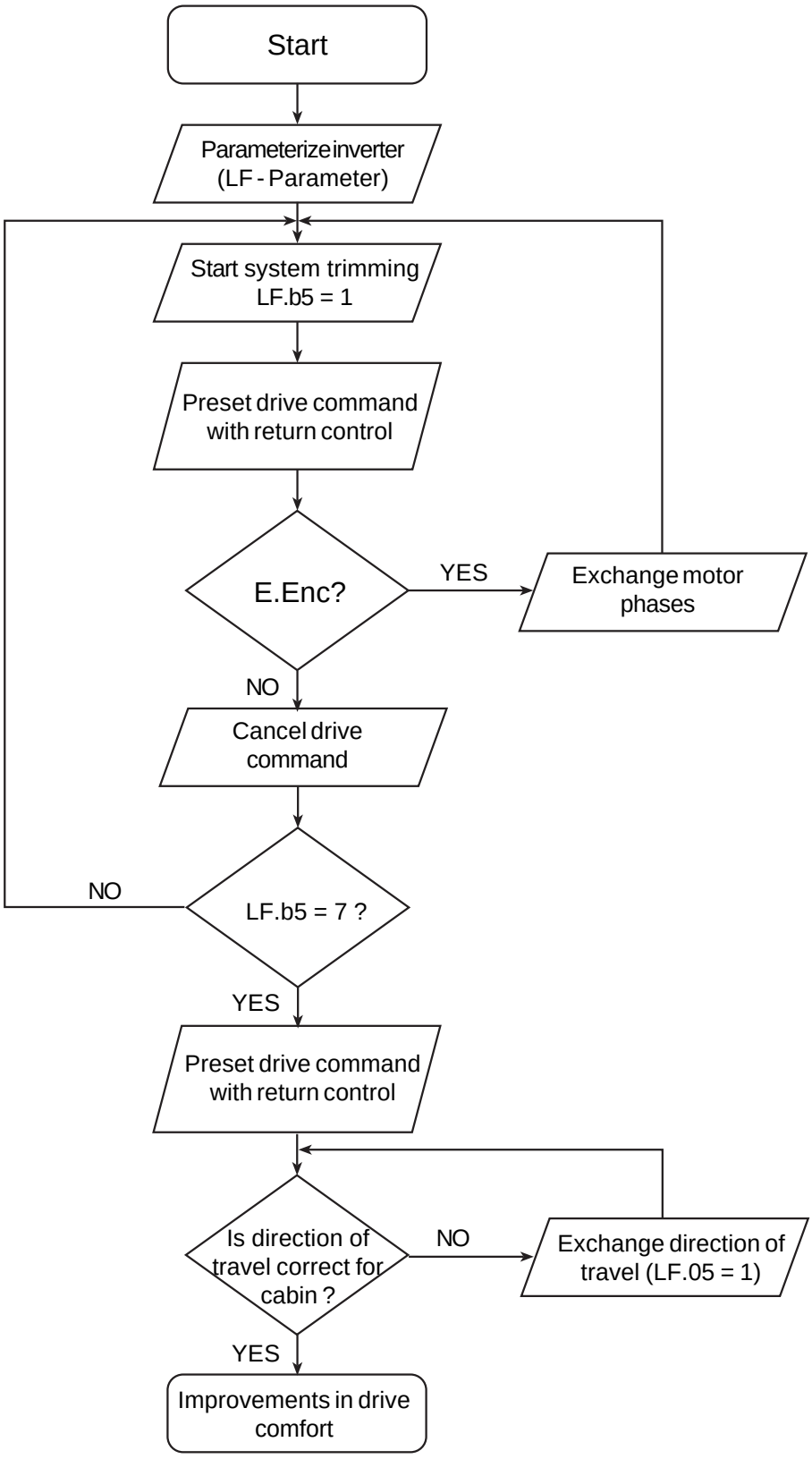
GB

9.1 Inital Start-Up

a) To start KEB COMBIVERT F4-F Lift Version 1.4 with an asynchronous motor do as follows:



b) To start KEB COMBIVERT F4-F Lift Version 1.4 with a three-phase synchronous motor do as follows:



9.2 Adjustment Assistance for Conventional Lift Motors

The inverter KEB COMBIVERT F4-F Lift is suited for modern lift/ industrial motors as well as conventional lift motors and thus for modernization.

In contrast to modern lift motors and industrial motors, conventional and old lift motors have a 'soft' torque-speed-characteristic. This can be seen in the rated speeds. Typical for modern machines is 1450 rpm (with 4-pole motors) and with conventional motors 1380 rpm or 880 rpm (6-pole machines).

Often the specifications on the name plate are inadequate or non-existant. In this case the motor data must be adjusted on-site for the system.

If the lift does not reach the rated speed during 'no-load-downward-drive' (display LF.90), do the following:

1.) Decrease field weakening speed (LF.16) to approx. 2/3 of the synchronous speed (approx. 1000 rpm with 4-pole motors; approx. 680 rpm with 6-pole motors).

2.) Set cos phi (LF.15) to 0,9

3.) Decrease rated motor speed LF.11 in steps of 20 until the rated speed is reached during a downward drive.

When the power consumption of the motor is too high (display in ru.02 or LF.87) it helps to increase LF.11 in steps of 10. At the same time control whether the 'no-load downward-drive' can be driven with rated speed.

If possible remove hand wheels with big inertia. If this is not possible, then the starting jerk (LF.50) and acceleration (LF.51) should be low (both values approx. 0.4), so that the motor is not overstressed.

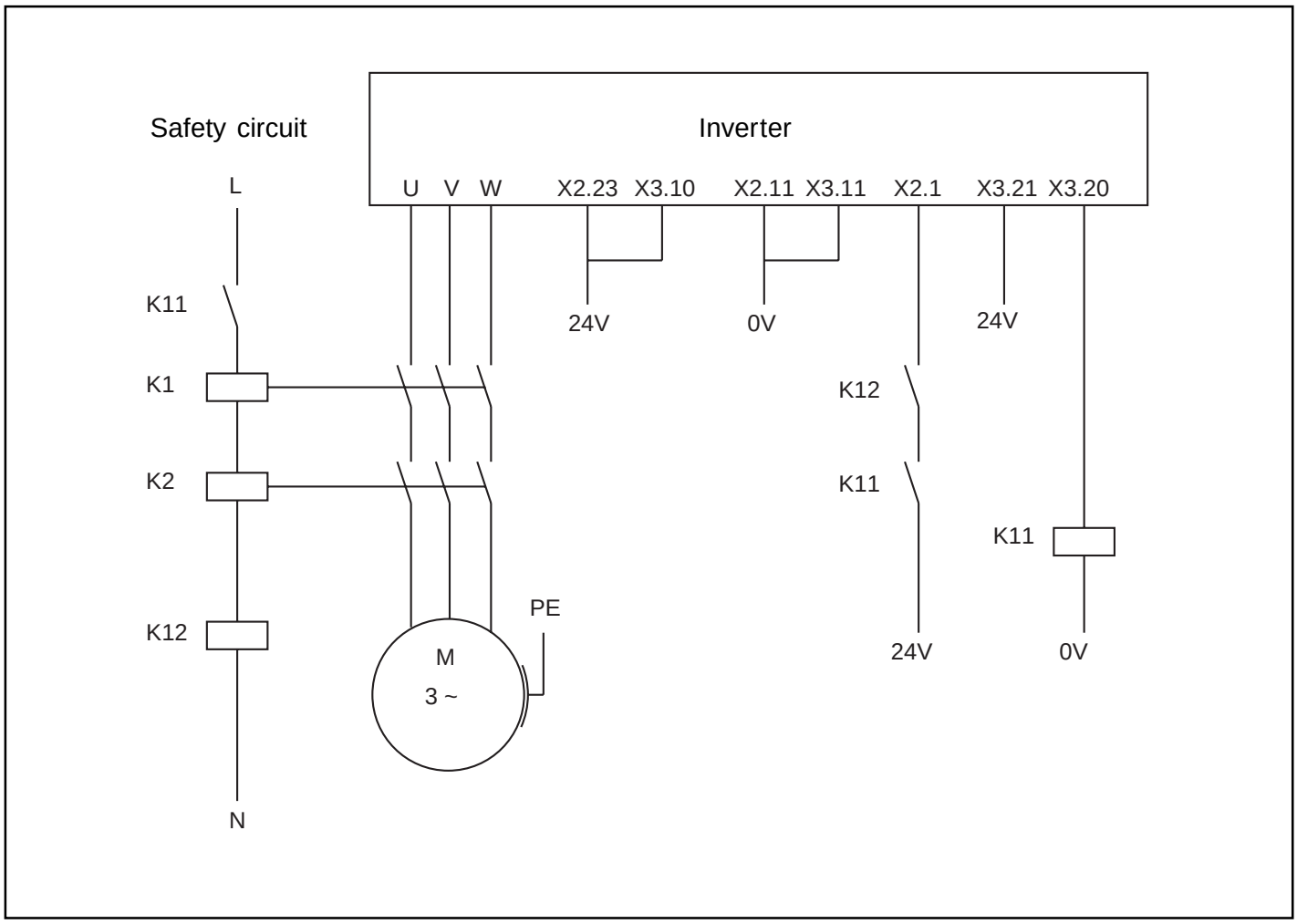
10.1 New functions from Version 1.4

- Connection of a resolver
- Operation of a servo motor (LF.A0-LF.C5)
- Reverse Direction of travel (LF.05)
- Regulated operation with precontrol torque (LF.67-LF.69)
- Better ogive function
- Display of the positioning drive (LF.92)
- Error display E.OL2 at frequency < 3 Hz
- Error display E.EnC at encoder failure
- No-load switching of the drive contactor

GB

Pay special attention to the new adjustments of the control method LF.30

10.2 Control instructions



10.3 Parameter list

Para.	Name	Address	E	R	Res.	Lower Limit	Upper Limit	Default	Unit
LF.00	Password	3500	E		1	0	9999	-4	-
LF.01	User-Defined Password	3501	E		1	0	9999	440	-
LF.02	Steering/Operating Mode	3502	E		1	1	4	1	-
LF.03	Divider Incremental Encoder Output	3503			1	1	128	1	-
LF.04	ASM / SSM - Selection	3504	E		1	0	1	0	-
LF.05	Reverse Direction of Travel	3505			1	0	1	0	-
LF.10	ASM-Rated Motor Power	350A			0,01	0,00	75,00	4,00	kW
LF.11	ASM-Rated Motor Speed	350B			1	100	6000	1440	rpm
LF.12	ASM-Rated Motor Current	350C			0,1	1,0	1,1*Inv	8,0	A
LF.13	ASM-Rated Motor Frequency	350D			1	20	100	50	Hz
LF.14	ASM-Rated Motor Voltage	351E			1	1	650	400	V
LF.15	ASM-Power Factor	351F			0,01	0,01	1,00	0,86	-
LF.16	Field Weakening Speed	3510			0,1	0,0	6000,0	1200,0	rpm
LF.17	ASM-Encoder Pulse Number	3511			1	256	10000	2500	Imp/U
LF.18	ASM-Encoder Track	3512	E		1	0	1	0	-
LF.19	DC Voltage Compensation	3513	E		1	150	500	400	V
LF.20	Rated System Speed	3514			0,001	0,000	15,000	0,000	m/s
LF.21	Traction Sheave Diamter	3515			1	200	2000	600	mm
LF.22	Gear Reduction Ratio	3516			0,01	1,00	99,99	30,00	-
LF.23	Catenary Suspension	3517			1	1	8	1	-
LF.24	Load	3518			1	0	65535	0	kg
LF.25	Torque Increase of the Door Drive	3519			0,1	0,0	25,5	6,0	%
LF.26	Rated Speed of the Door Drive	351A			1	100	6000	1440	rpm
LF.27	Rated Frequency of the Door Drive	351B			1	20	100	50	Hz
LF.28	Rated Voltage of the Door Drive	351C			1	1	650	400	V
LF.30	Control Method	351D	E		1	0	3	0	-
LF.31	ASM- KP Speed	351E			1	1	65535	3000	-
LF.32	ASM- KI Speed	3520			1	1	65535	1000	-
LF.33	ASM- KI Speed Offset	3521			1	0	65535	1000	-
LF.34	ASM- KP Current	3522			1	1	65535	1500	-
LF.35	ASM- KI Current	3523			1	1	65535	500	-
LF.36	ASM-Maximum Torque	3524			0,1	0,0	5*Mn	2*Mn	Nm
LF.37	Boast	3525			0,1	0,0	25,5	10,0	%
LF.38	Operating Frequency Change	3526			1	0	1	1	-
LF.40	Correction Speed	3528			0,001	0,000	0,300	0,000	m/s
LF.41	Crawl Speed	3529			0,001	0,000	0,300	0,000	m/s
LF.42	Rated Speed	352A			0,001	0,000	LF.20	0,000	m/s
LF.43	Inspection Speed	352B			0,001	0,000	0,630	0,000	m/s
LF.44	Intermediate Speed 1	352C			0,001	0,000	LF.20	0,000	m/s
LF.45	Intermediate Speed 2	352D			0,001	0,000	LF.20	0,000	m/s
LF.46	Set Speed of Door Drive	352E			0,1	0,0	3000,0	0,0	rpm
LF.50	Starting Jerk	3532			0,01	0,11	9,99	0,60	m/s^3
LF.51	Acceleration	3533			0,01	0,10	2,00	0,90	m/s^2
LF.52	Deceleration Jerk	3534			0,01	0,11	9,99	1,00	m/s^3
LF.53	Deceleration	3535			0,01	0,10	2,00	0,90	m/s^2
LF.54	Stopping Jerk	3536			0,01	0,02	9,99	off	m/s^3
LF.60	Level Brake	353C			0,001	0,000	0,010	0,005	m/s
LF.61	Level Overspeed	353D			0,001	0,000	18,000	1,500	m/s
LF.62	Deceleration Check	353E			0,001	0,000	15,000	1,300	m/s
LF.63	Level Crawl Speed	353F			0,001	0,000	0,300	0,250	m/s
LF.64	DC-Voltage Circuit Control	3540			1	0	800	0	V
LF.65	"E.dOH"-Delay	3541			1	0	3600	300	s
LF.66	Heat Sink Temperature Level	3542			1	20	50	40	°C

Para.	Name	Address	E	R	Res.	Lower Limit	Upper Limit	Default	Unit
LF.67	Pretorque Gain	3543			0,01	0,50	1,50	1,00	-
LF.68	Pretorque Offset	3544			0,1	-25,0	25,0	0	%
LF.69	Pretorque Direction	3545	E		1	0	1	0	-
LF.70	Brake Release Time	3546			0,001	0,300	3,000	0,300	s
LF.71	Crawl Path Optimization Vn	3547			0,1	0,0	200,0	0,0	cm
LF.72	Crawl Path Optimization V1	3548			0,1	0,0	200,0	0,0	cm
LF.73	Crawl Path Optimization V2	3549			0,1	0,0	200,0	0,0	cm
LF.74	Crawl Path Optimization Ve	354A			1	0	300	0	mm
LF.75	Ogive Function	354B			1	0	1	0	-
LF.76	Ogive Status	354C			1	0	127	0	-
LF.77	Braking Distance	354D			0,001	0,000	5,000	0,000	m
LF.78	Maximum Hight of Floor	354E			0,001	0,000	5,000	0,000	m
LF.80	Software Version	3550		R					-
LF.81	Software Date	3551		R					-
LF.82	X2-Input State	3552		R	Table				-
LF.83	X2-Output State	3553		R	Table				-
LF.84	X3-Input State	3554		R	Table				-
LF.85	X3-Output State	3555		R	Table				-
LF.86	Actual Set Value	3556		R	1	0	7		-
LF.87	Actual Inverter Utilization	3557		R	0,1				%
LF.88	Actual Set Speed	3558		R	0,5				rpm
LF.89	Actual Speed	3559		R	0,5				rpm
LF.90	Actual Lft Speed	355A		R	0,001				m/s
LF.91	ASM-Rated Motor Torque	355B		R	0,1				Nm
LF.92	Positioning Drive	355C		R	0,1				cm
LF.98	Error State	3562		R	Table				
LF.99	Inverter State	3563		R	Table				
LF.A0	SSM Rated Motor Output	3564		R	0,01				kW
LF.A1	SSM Rated Motor Speed	3565			1	50	6000	4000	rpm
LF.A2	SSM Rated Motor Current	3566			0,1	0,1	1,1*Inv	3,7	A
LF.A3	SSM Rated Motor Frequency	3567			1	10	600	200	Hz
LF.A4	Static Current	3568			1	0,1	40,0	4,1	A
LF.A5	SSM Rated Motor Torque	3569			0,1	0,1	600,0	5,1	Nm
LF.A6	SSM- EMK Voltage Stabilizer	356A			1	0	2000	0	V/1000rpm
LF.A7	Winding Resistance (Ru-v)	356B			0,1	0,1	50,0	1,8	Ohm
LF.A8	Winding Inductance (Lu-v)	356C			0,1	0,1	600,0	8,1	mH
LF.b0	SSM Encoder (inc/r)	356E			1	256	10000	2048	Imp/U
LF.b1	SSM Encoder Pole Pair	356F			1	1	SSMpol	1	-
LF.b2	System Position	3570	E		1	-32768	32767	49A4h	-
LF.b3	Speed Scan Rate	3571			1	0	5	3	-
LF.b4	Reso-Error-Trimming	3572			1	0	255	0	-
LF.C0	SSM KP Speed	3578			1	1	65535	230	-
LF.C1	SSM KI Speed	3579			1	1	65535	70	-
LF.C2	SSM KI Speed-Offset	357A			1	0	65535	0	-
LF.C3	SSM KP Current	357B			1	1	65535	625	-
LF.C4	SSM KI Current	357C			1	1	65535	70	-
LF.C5	SSM Torque Maximum	357D			0,1	0,0	5*Mn	1,5*Mn	Nm

Para.	Name	Address	E	R	Res.	Lower Limit	Upper Limit	Default	Unit
ru.00	Display Inverter Status	2000		R	Table				-
ru.02	Actual Torque Display	2002		R	0,1				Nm
ru.04	Set Speed Display	2004		R	0,5				rpm
ru.08	Peak Inverter Utilization	2008			0,1				%
ru.09	Apparent Current	2009		R	0,1				A
ru.10	Active Current	200A		R	0,1				A
ru.11	Actual DC Voltage	200B		R	1				V
ru.12	Peak DC Voltage	200C		R	1				V
ru.14	X2 Input Terminal Status	200E		R	Table				
ru.15	X2 Output Terminal Status	200F		R	Table				
ru.18	Actual Parameter Set	2012		R	Table				
ru.20	Speed Reference Display	2014		R	0,5				rpm
ru.22	Ref1 Display	2016		R	0,1				%
ru.23	Ref2 Display	2016		R	0,1				%
ru.24	OL Counter Display	2018		R	1				-
ru.25	Peak Apparent Current	2019		R	0,1				A
ru.29	Heat Sink Temperature	201D		R	1				°C
ru.31	Power On Counter	201F		R	1				h
ru.32	Modulation On Counter	2020		R	1				h
In.00	Inverter Type Display	2C00			Table				
In.01	Rated Inverter Current	2C01			0,1				A
In.06	Configfile Number	2C06		R	1				
In.07	Serial Number High	2C07			1	0	65535	0	
In.08	Serial Number Low	2C08			1	0	65535	0	
In.09	Serial Number Order No. High	2C09			1	0	65535	0	
In.10	Serial Number Order No. Low	2C0A			1	0	65535	0	
In.11	Customer Number High	2C0B			1	0	65535	0	
In.12	Customer Number Low	2C0C			1	0	65535	0	
In.40	Last Error	2C28			1	0	63	0	
In.41	Error Counter OC	2C29			1	0	255	0	
In.42	Error Counter OL	2C2A			1	0	255	0	
In.43	Error Counter OP	2C2B			1	0	255	0	
In.44	Error Counter OH	2C2C			1	0	255	0	
In.45	Error Counter WD	2C2D			1	0	255	0	
In.54	Software ID Version DSP	2C36		R					
In.55	Software Date DSP	2C37		R					
In.56	Feedback System Channel 1	2C38		R					
In.57	Feedback System Channel 2	2C39		R					

10.4 Customer application parameter

Size	Customer adjustment	Unit
LF.00		-
LF.01		-
LF.02		-
LF.03		-
LF.04		-
LF.05		-
LF.10		kW
LF.11		rpm
LF.12		A
LF.13		Hz
LF.14		V
LF.15		-
LF.16		rpm
LF.17		Imp/U
LF.18		-
LF.19		V
LF.20		m/s
LF.21		mm
LF.22		-
LF.23		-
LF.24		kg
LF.25		%
LF.26		rpm
LF.27		Hz
LF.28		V
LF.30		-
LF.31		-
LF.32		-
LF.33		-
LF.34		-
LF.35		-
LF.36		Nm
LF.37		%
LF.38		-
LF.40		m/s
LF.41		m/s
LF.42		m/s
LF.43		m/s
LF.44		m/s
LF.45		m/s
LF.46		rpm

Size	Customer adjustment	Unit
LF.50		m/s^3
LF.51		m/s^2
LF.52		m/s^3
LF.53		m/s^2
LF.54		m/s^3
LF.60		m/s
LF.61		m/s
LF.62		m/s
LF.63		m/s
LF.64		V
LF.65		s
LF.66		°C
LF.67		-
LF.68		%
LF.69		-
LF.70		s
LF.71		cm
LF.72		cm
LF.73		cm
LF.74		mm
LF.75		-
LF.77		m
LF.78		m
LF.A1		rpm
LF.A2		A
LF.A3		Hz
LF.A4		A
LF.A5		Nm
LF.A6		V/1000rpm
LF.A7		Ohm
LF.A8		mH
LF.B0		Imp/U
LF.B1		-
LF.B2		-
LF.B3		-
LF.B4		-
LF.C0		-
LF.C1		-
LF.C2		-
LF.C3		-
LF.C4		-
LF.C5		Nm

Karl E. Brinkmann GmbH
Försterweg 36 - 38 • D - 32683 Barntrup
Telefon 00 49 / 52 63 / 4 01 - 0 • Fax 00 49 / 52 63 / 4 01 - 1 16
Internet: www.keb.de • E-mail: info@keb.de

KEB Antriebstechnik GmbH & Co. KG
Wildbacher Str. 5 • **D** - 08289 Schneeberg
Telefon 0049 / 37 72 / 67 - 0 • Telefax 0049 / 37 72 /67 - 2 81
E-mail: info@keb-combidrive.de

KEB Antriebstechnik Austria GmbH
Ritzstraße 8 • **A** - 4614 Marchtrenk
Tel.: 0043 / 7243 / 53586 - 0 • FAX: 0043 / 7243 / 53586 - 21
Kostelni 32/1226 • **CZ** - 370 04 Ceské Budejovice
Tel.: 00420 / 38 / 731 92 23 • FAX: 00420 / 38 / 733 06 97
E-mail: info@keb.at

KEB Antriebstechnik
Herenveld 2 • **B** - 9500 Geraadsbergen
Tel.: 0032 / 5443 / 7876 • FAX: 0032 / 5443 / 7898
E-mail: koen.detaeye@keb.de

KEB China
Xianxia Road 299 • **CHN** - 200051 Shanghai
Tel.: 0086 / 21 / 62350922 • FAX: 0086 / 21 / 62350015
Internet: www.keb-cn.com • E-mail: info@keb-cn.com

Société Française KEB
Z.I. de la Croix St. Nicolas • 14, rue Gustave Eiffel
F - 94510 LA QUEUE EN BRIE
Tél.: 0033 / 1 / 49620101 • FAX: 0033 / 1 / 45767495
E-mail: sfkeb.4@wanadoo.fr

KEB (UK) Ltd.
6 Chieftain Buisiness Park, Morris Close
Park Farm, Wellingborough, **GB** - Northants, NN8 6 XF
Tel.: 0044 / 1933 / 402220 • FAX: 0044 / 1933 / 400724
Internet: www.keb-uk.co.uk • E-mail: info@keb-uk.co.uk

KEB Italia S.r.l.
Via Newton, 2 • **I** - 20019 Settimo Milanese (Milano)
Tel.: 0039 / 02 / 33500782 • FAX: 0039 / 02 / 33500790
Internet: www.keb.it • E-mail: kebitalia@keb.it

KEB - YAMAKYU Ltd.
711 Fukudayama, Fukuda
J - Shinjo-Shi, Yamagata 996 - 0053
Tel.: 0081 / 233 / 29 / 2800 • FAX: 0081 / 233 / 29 / 2802
E-mail: kebjs001@d4.dion.ne.jp

KEB Taiwan Ltd.
1F, No.19-5, Shi Chou Rd., Tounan Town
R.O.C. - Yin-Lin Hsian / Taiwan
Tel.: 00886 / 5 / 5964242 • FAX: 00886 / 5 / 5964240
E-mail: keb_taiwan@mail.apol.com.tw

KEBCO Inc.
1335 Mendota Heights Road
USA - Mendota Heights, MN 55120
Tel.: 001 / 651 / 4546162 • FAX: 001 / 651 / 4546198
Internet: www.kebco.com • E-mail: info@kebco.com