Danfoss
LD 302 HDR-V3
ALGI_AZFR

Software B117

CanOpen Velocitymode

Danfoss Control Board: MKII
Firmware Converter: 8.62
Firmware MCO: 5.15
Level-Converter-Control-Board: 01595/03
Level-Converter-Control-board: 01595/04

Stand: 22.02.2022

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1 General information

1.1 Copyright

1.2 Note

The following documentation of the application should be considered as supplement to the functional and safety-related documentation of Danfoss.
Operating Instruction VLT Lift Drive LD302
Product manual VLT AutomationDrive FC302
FC 300 Project planning manual VLT AutomationDrive FC301/FC302
Latest documentation of Danfoss can be found on the Internet at:
http://www.danfoss.com/Germany/BusinessAreas/DrivesSolutions/Documentation/tecnicalLiterature.htm
The latest version of the following documentation can be found at:
http://www.iba-lift.de
Please follow the operating instructions of ALGI frequency regulation system for hydraulic lifts AZFR with Danfoss frequency convertor

1.3 Application

This instruction is valid for hydraulic lifts operated with frequency convertors with ALGI drive units of the AZFR type.

1.4 Disclaimer

In spite of checking the contents of these instructions carefully, discrepancies as regards the described hardware and software could occur.
IbA Lift Components does not guarantee the accuracy of the contents of these instructions.

IbA Lift Components GmbH shall not be liable for damages due to inappropriate use or those caused as a result of unauthorised repairs or changes.

Proper use also includes compliance with and adherence to the

- Danfoss manuals
- Statutory accident prevention and environmental regulations
- Lift regulations
- Technical data and environmental conditions
- Requirements concerning trained and qualified personnel for the connection, start-up and maintenance of the drive
- this documentation

The LD 302 is not a safety-relevant component according to EN 81-A3

1.5 Pictograms

The instructions include warning notices and safety instructions in the form of pictograms that point out the dangers and tips.

Danger!
Danger due to hazardous, electrical voltage!
Can lead to death or severe physical injury.

Danger!
Death, severe injury or considerable material damage is possible!

Information
Application tips and important additional information.

1.6 Safety instructions

Please note the safety instructions of Danfoss manuals:

Operating Instruction VLT AutomationDrive LD302
Product manual VLT AutomationDrive FC302
FC 300 Project planning manual
The operating instructions of ALGI frequency regulation system for hydraulic lifts AZFR with Danfoss frequency convertors

Discharge duration!

Frequency convertors contain intermediate circuit capacitors, which can remain charged even when they are disconnected from the AC network.
The risk of reverse supply via the motor connection exists in case of operation with permanently excited synchronous machines.

Voltage (V)	Minimum waiting time (minutes)	
	4	15
200 – 240	0.25 – 3.7 kW	5.5 – 37 kW
380 – 480	0.25 – 7.5 kW	11 – 75 kW
525 – 600	0.75 – 7.5 kW	11 – 75 kW
525 - 690	n. s.	11 – 75 kW
High voltage could exist even if the warning LEDs do not glow		

Unexpected start!

If the frequency convertor is connected to an AC network, the motor can start any time and open the brakes or valves.
Ensure that the brakes and valve of the drive unit are activated by the lift control system in line with the regulations.
Ensure that all safety switches are functioning properly and that the power flow to the motor is interrupted.
Note the addition to the documentation VLT LiftDrive "Safe stop in lift systems".

Qualified staff!

All project planning, start-up and maintenance work should only be carried out by qualified staff.

Qualified staff are people, who are in a position to execute activities and, at the same time, who can detect possible hazards and prevent them on the basis of their education, experience and knowledge about the relevant standards and provisions, accident prevention regulations and operating conditions.

Danger!

Unexpected and hazardous conditions can occur due to faulty settings, defective or faulty components or incorrect connection.
Unexpected and hazardous conditions can also occur due to deficient or defective valve control.

Before each operation of the lift, the operator must ensure that neither people nor material properties are endangered.
The emergency off functions and the mechanical safety systems must be installed and operational.

High inrush current!

In order to avoid high inrush current caused by switching at the line- input L1, L2, L3 (by line on), for the devices Lift Drive LD 302 and FC 302

- the switching periods must be observed. For these devices, switching at the line- input is permitted once per minute.

or

- 3-phase line- shokes (1.5% - 2 % uk) must be installed between line and frequency converter.

Notice:

If the prescriptions concerning switching at the line-in L1, L2, L3 (line-in) are not observed, this can lead to the destruction of the devices. Prescriptions concerning switching at the line-input (line in) apply to every frequency converter with intermediate circuit and therefore apply to frequency converters in general, independent of the producer.

1.7 Mains and motor connection / earthing

Please pay special attention to the safety instructions of the Danfoss Product and project planning manual VLTAutomationDrive LD 302. in chapter "Electrical installation"

The documents can be found in www.dandoss.com - downloads

The motor cable must be shielded and connected at both the ends.
When connected to the mains supply, the frequency convertor carries voltage at levels that could cause electrocution. Severe personal injuries or even fatal injuries could be caused in case of breakdown of the device due to improper installation of the motor or of the VLT frequency convertor. Thus, always follow the instructions from the Danfoss product manual as well as the respective valid national and international regulations and safety provisions. The start-up operation should only be carried out by trained personnel.

Warning: Coming into contact with live parts is fatal even after they have been disconnected from the mains. **Note the discharge duration!**

Ensure that the device has been earthed properly in compliance with the local and national regulations. The leakage current against earth is more than 3.5 mA. The cross section of the earth cable must be at least 10 mm^2.

The shield of the motor and encoder cable should be connected to earth on both sides.

The earthing between motor and LD 302 must be connected with the lowest possible HF impedance. Poor earthing connections can lead to high interference currents via the encoder cable shield. This causes the functional reliability and control characteristics to deteriorate, which can lead to higher driving noises.

Note the instructions from the Danfoss product manual.

2 Project planning notes

2.1 p=constant; variable, load-dependend speed

Load pattern 1
Condition:
100 % load in the car (loaded car): $\mathbf{I_{mot}}$<= 125 % Converter nominal current

Load pattern 2
Condition:
100 % load in the car (loaded car): $\mathbf{I_{mot}}$<= 100 % Converter nominal current

2.2 p=constant; variable, load.dependend speed

Load pattern 1
Condition:
0 % load in the car (empty car): $\mathbf{I_{mot}}$<= 100 % Converter nominal current
und
100 % load in the car (loaded car): $\mathbf{I_{mot}}$<= 125 % Converter nominal current

Load pattern 2
Condition:
0 % load in the car (empty car): $\mathbf{I_{mot}}$<= 100 % Converter nominal current
und
100 % load in the car (loaded car): $\mathbf{I_{mot}}$<= 100 % Converter nominal current

2.3 Definition load pattern

Load pattern 1

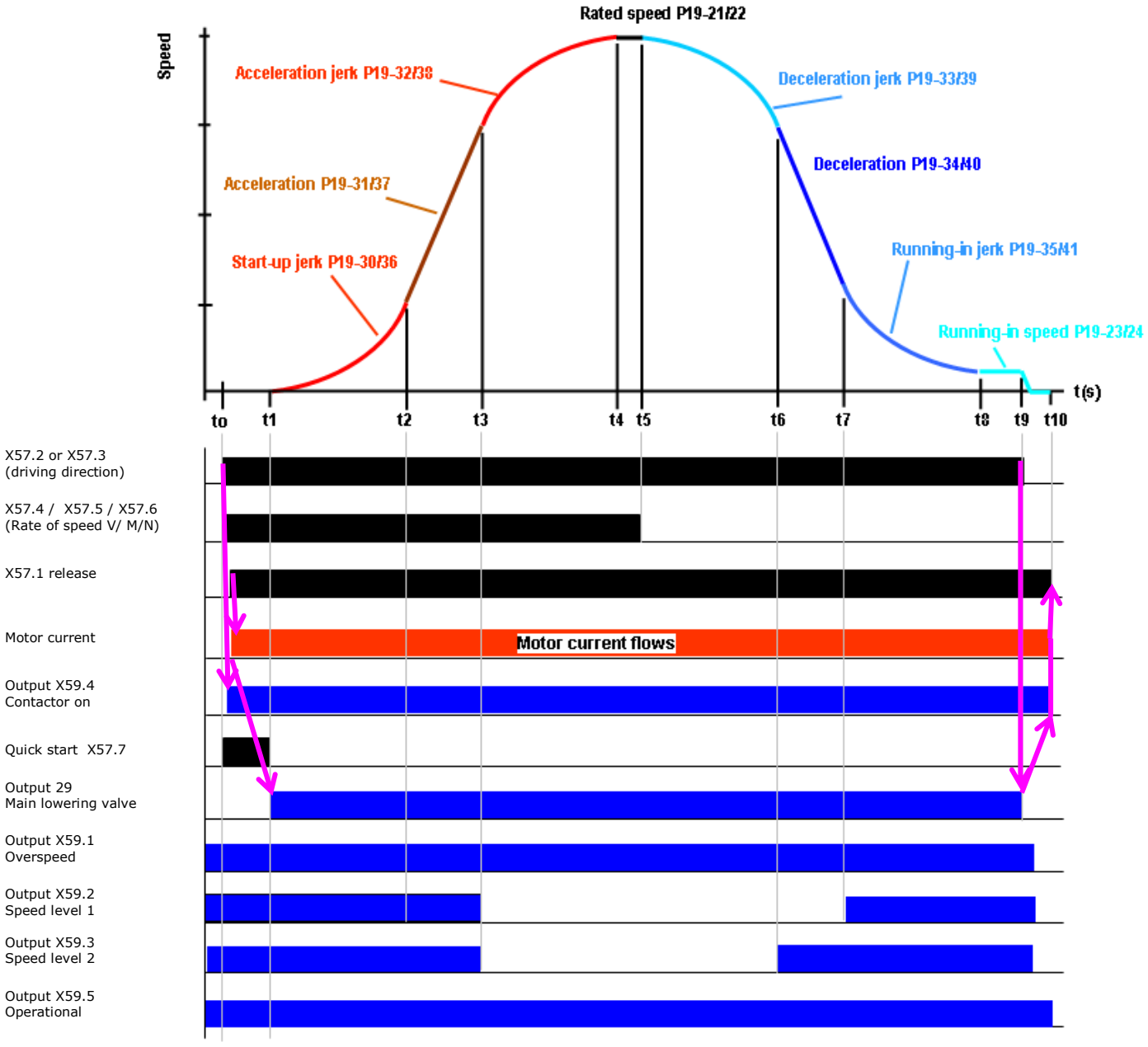
Loading car in % of the nominal load	Percentage of trips in %
0	50
25	30
50	10
75	10
100	0

Load pattern 2

Loading car in % of the nominal load	Percentage of trips in %
0	0
25	30
50	10
75	10
100	50

3 Documentation for control system engineering

3.1 General driving curves and activation



Legend:

t0: The drive is initiated by the lift control system. X57.4 and X57.5 are activated in accordance with the drive speed.

Attention: X57.4 and X57.5 must be activated with a stable signal simultaneously, preferably a little prior to X57.2 or X57.3.

The output X59.4 "contactor on" is activated with input X57.2 "Up" or X57.3 "Down" if LD 302 HDR is ready to start. As a result, the release is switched at input X57.1 and subsequently, the motor current is connected. If the quick start function is requested, X57.7 should be switched before the direction.

t1: The quick start - input X57.7 is removed and the driving curve is initiated. The down operation (output 29) cut-off valve is activated in the downward direction and the proportional valve is opened slowly. LD 302 HDR then initiates the acceleration phase with the set jerk and acceleration values. If the quick start function is not used (X57.7 continuous 0 V), the release switch is operated at time t0 and the valves are activated in case of downward direction.

t2: The speed has attained the set level 1. The output X59.2 switches to 0V.

t3: The speed has attained the set level 2. The output X59.2 switches to 0V.

t4: Acceleration is reduced and constant drive speed is attained.

t5: Input X57.4 and/or X57.5 are switched to 0 V by the lift control system. LD 302 HDR initiates the deceleration with the set jerk and deceleration values.

t6: The speed falls below the set level 2. The output X59.2 switches to 24V.

t7: The speed falls below the set level 1. The output X59.2 switches to 24V.

t8: The running-in speed is attained.

t9: The lift has almost attained the levelling position, the control system switches X57.2 "Up" or X57.3 "Down" to 0 V. LD 302 HDR switches off the cut-off valve (output 29), ramps the speed to 0 and operates the motor further to prevent the lift from going down suddenly until the down operation cut-off valve is closed.

t10: After the expiry of the valve closing time, the motor current is switched off and the output X59.4 "contactor on" is deactivated. The input X57.1 "release" is deactivated at the end of the ride.

Upwards

Speed / Input	no move	↑ $V_{re\text{-}levelling}$ (V_n) Par. 19 - 29	↑ $V_{inspect}$ (V_i) Par. 19 - 25	↑ V_{rated} (V4) Par. 19 - 21	↑ $V_{interm.}$ (V3) Par. 19 - 26	↑ V_e (V_o) Par. 19 - 23	Stop at level
X57.1 release	L	H	H	H	H	H	H ↓
X57.2 Up (upwards)	X	H	H	H	H	H	
X57.3 Down (downwards)	X	L	L	L	L	L	L
X57.4 V (rated speed)	X	L	L	H	H	L	L
X57.5 M (intermediate speed)	X	L	H	L	H	L	L
X57.6 N (re-levelling speed)	X	H	X	X	X	L	L

Downwards

Speed / Input	no move	↓ $V_{re\text{-}levelling}$ (V_n) Par. 19 - 29	↓ $V_{inspect}$ (V_i) Par. 19 - 25	↓ V_{rated} (V4) Par. 19 - 22	↓ $V_{interm.}$ (V3) Par. 19 - 26	↓ V_e (V_o) Par. 19 - 24	Stop at level
X57.1 release	L	H	H	H	H	H	H
X57.2 Up (upwards)	X	L	L	L	L	L	L
X57.3 Down (downwards)	X	H	H	H	H	H	↓
X57.4 V (rated speed)	X	L	L	H	H	L	L
X57.5 M (intermediate speed)	X	L	H	L	H	L	L
X57.6 N (re-levelling speed)	X	H	X	X	X	L	L

H = 24 V signal, L = 0 V signal, X = don't care

Attention: The braking distances for levelling position are different from the running-in speed Vo or re-levelling speed Vn.

3.2 Winter operation

The control is via terminal 19. The winter operation is intended for the connection of a thermostat switch on the ALGI power unit. The start-up behaviour and speed are thus adapted to the oil viscosity.The control is active with a high signal.

Due to the winter operation, there are slower start-up and stopping times. In the case of start-up and run-in time monitoring, it must be ensured that the times in the controller must be adjusted if necessary.

At the reduced speed, the respective braking distance can be recalculated and the differential distance can continue to be traversed at the current speed. This avoids prolonged “creeping in”.

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3.3 Error correction

In case of an alarm, the frequency convertor switches off the output for the down operation main valve and blocks the inverter, the outputs X59.5 "Ready" and X59.4 "Contactor on" are switched off and it changes to the malfunction / alarm status.

After the cancellation of the "direction", X57.2 or X57.3, the converter executes an internal "reset" through the control system, restarts and outputs the "ready" signal at output X59.5. Only then can the control system specify a new direction.

A "reset" via terminal X57.1 is necessary for some control systems. Parameter 19-69, control system compatibility adaptation is provided for this purpose. The function becomes active by entering "1" in parameter 19-69 and the converter executes an internal "Reset" after cancelling terminal X57.1.

19-69	Reset via release	0	A "reset" via terminal X57.1 is necessary for some control systems. The function becomes active by entering "1" and the converter executes an internal "Reset" after cancelling terminal X57.1.

3.4 Operation without motor contactors

LD 302 is authorised for operation without motor contactors.

Adhere unconditionally to the additional Danfoss documentation "For the use of SafeStop in lift systems (hydraulic)" and the conformity statement of TÜV "Conformity statement for type examination".

The documents can be viewed at www.danfoss.de – Downloads

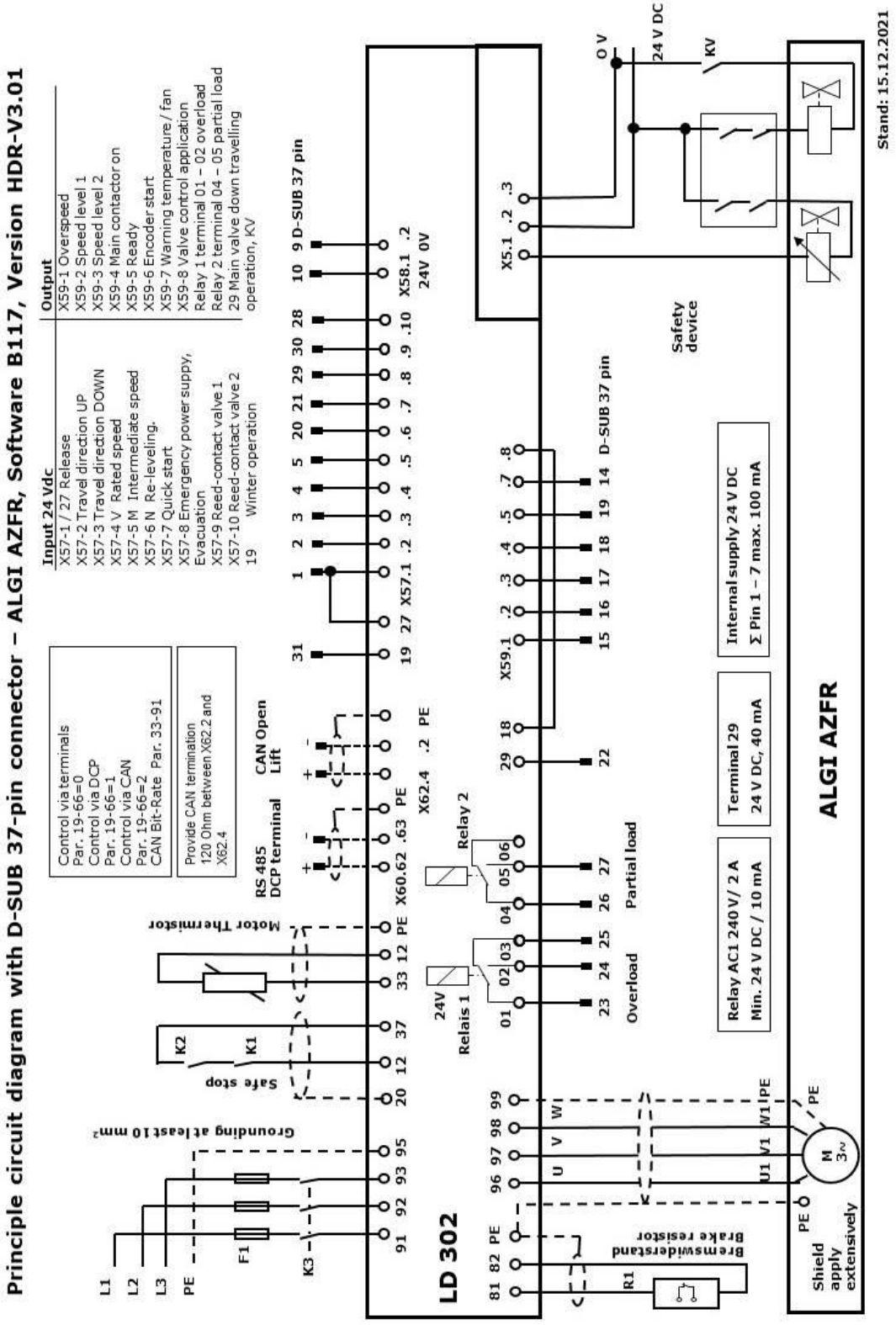
3.5 Stand-By losses Danfoss LD 302

Type	**Operation-** [W]	**Sleep - Modus** [W]
LD 302 7k5	16	13
LD 302 11k0	24	13
LD 302 18k0	30	13
LD 302 30k0	31	13
LD 302 50k0	43	13

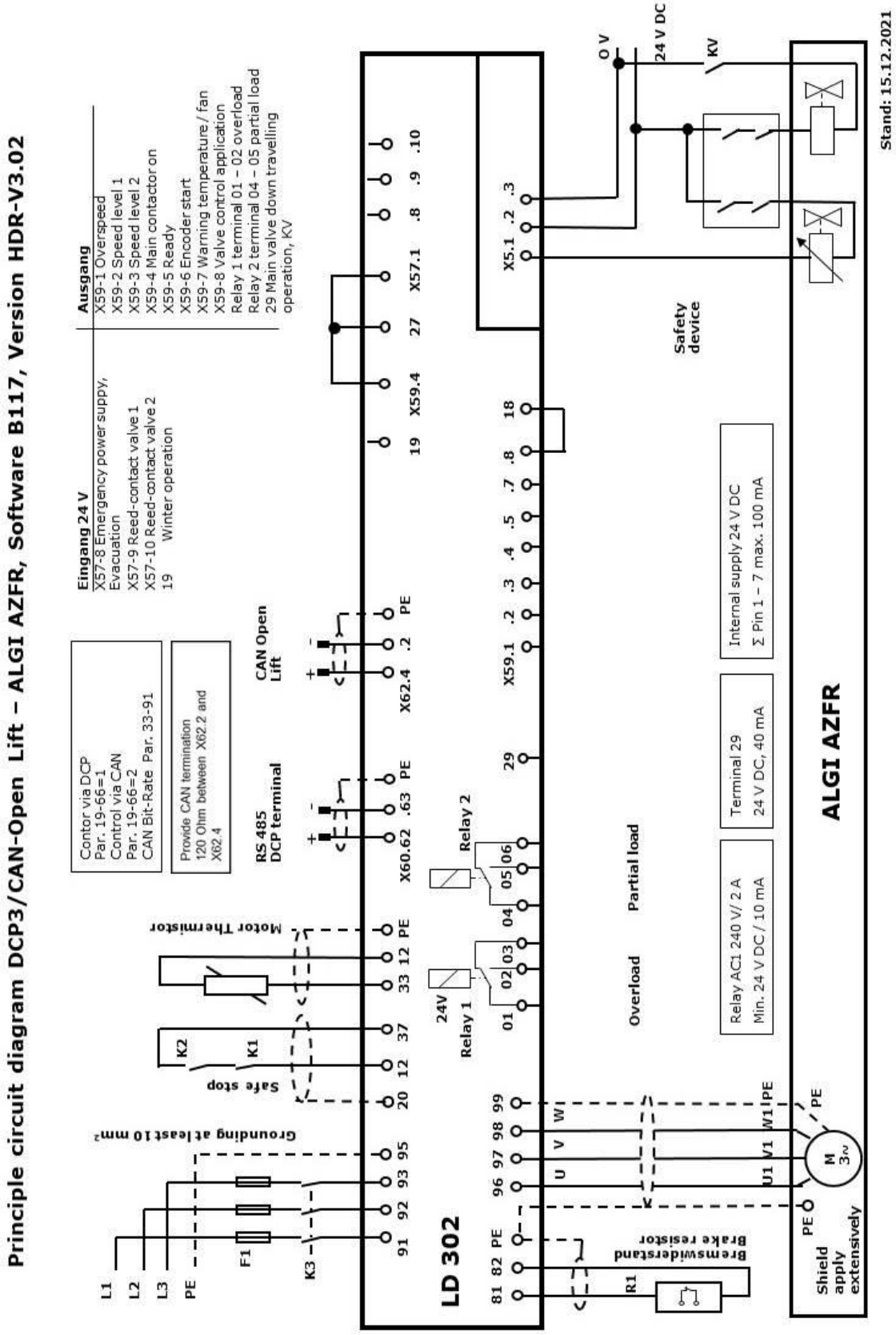
Legend:
Operation mode = converter connected to voltage, immediately ready to start
Sleep mode = converter switched off, 24 V control card supplied externally, ready to start in 2 sec

3.6 Principle circuit diagram discrete, parallel activation without motor contactors

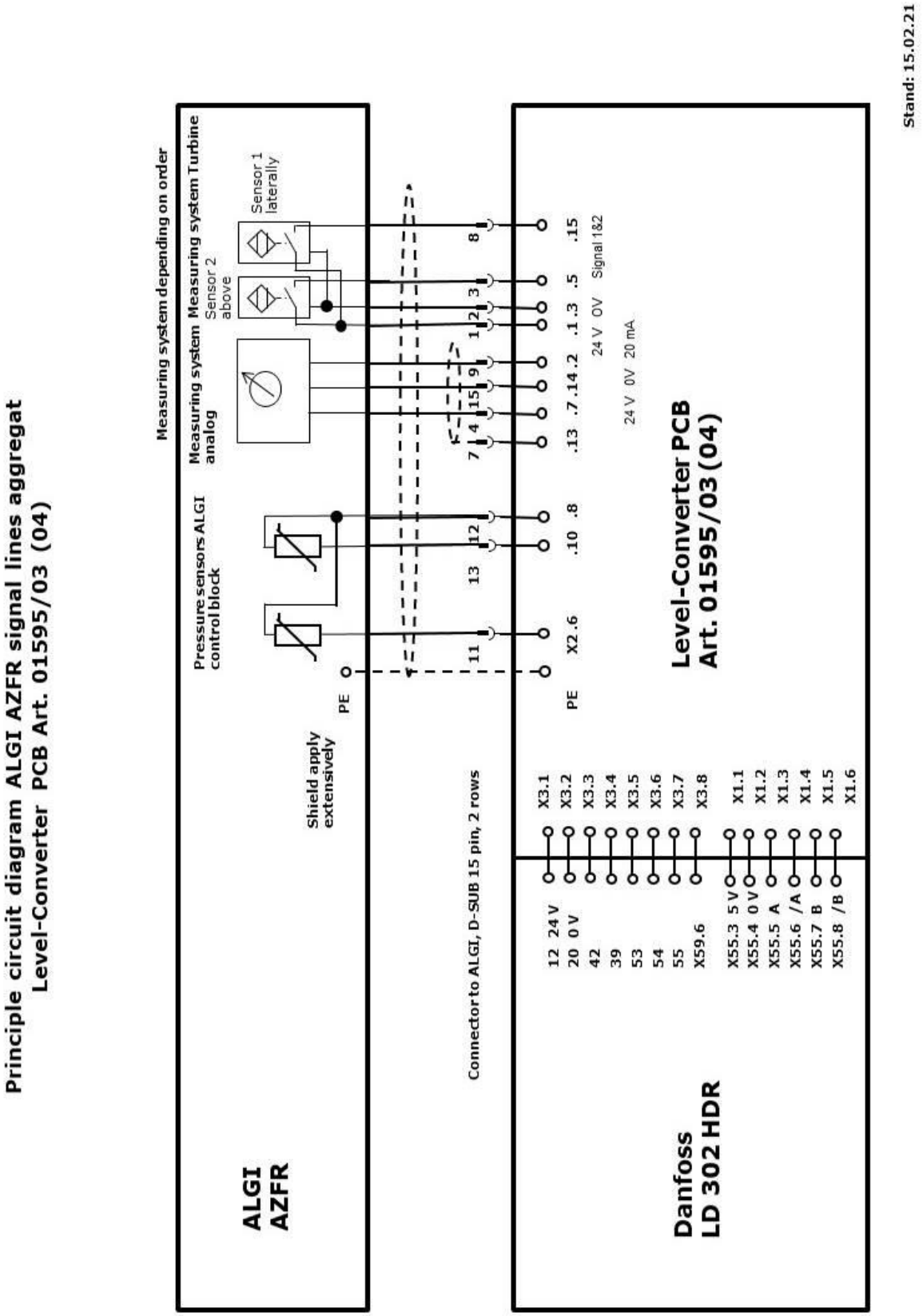
Follow the additional Danfoss documentation "For the use of SafeStop in lift systems (hydraulic)" and the conformity statement for type examination. The documents can be viewed at www.danfoss.de - Downloads.



3.7 Principle circuit diagram bus control DCP3 / CanOpen-Lift



3.8 Principle circuit diagram ALGI AZFR signals aggregate / level converter PCB



3.9 Bus control

3.9.1 Operation via DCP3

3.9.2 The following speeds can be selected:

The HDR-V3.01 version includes the wiring for discrete, parallel control via a D-SUB 37-pin connector. With the HDR-V3.02 version, this connector is omitted.

When operating under DCP3, the elevator control determines the speed mode via interface.

The parameters can be set via the interface to the controller.

Parameter	Value	Remark
19-20 max. speed [m/s]	500	This speed is the defined system speed based on which the overspeed and other internal speeds, amongst other things, are calculated.
19-21/22 rated speed V4 [m/s]	500	**V4** is the rated speed. Selection via **DCP** or that which is selected if the input **X57.2 "UP"** or **X57.3 "DOWN"** and **X57.4 "V4 Quick drive"** have been activated.
19-23/24 running-in speed **V0** [m/s]	35	**V0** is the running-in speed in the **"UP"** or **"DOWN"** direction. Selection via **DCP** or that which is selected if one of the direction inputs **X57.2** or **X57.3** has been activated. Determines the drive speed during running-in and readjustment.
19-25 inspection speed Vi [m/s]	250	**Vi** is the inspection speed. Selection via DCP or that which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.5 "M intermediate speed"** has been activated. Terminal **37 (SafeStop)** and terminal **X57.1** are always switched in case of inspection speed **"Stop"**. This is an instant stop during which the motor is operated. This can lead to a small drop. **Vi** can be set to max. 0.63 m/sec. **Vi** is considered to be the inspection drive till the drive stops, although other speeds are selected in the meantime.
19-26 V3 speed [m/s]	300	**V3** is the intermediate speed. Selection via **DCP** or that which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.4** and **X57.5** have been activated.
19-27 V2/speed [m/s]	300	**V2** is an intermediate speed that can be activated via **DCP**.
19-28 V1/speed [m/s]	300	**V1** is an intermediate speed that can be activated via **DCP**.
19-29 Re-levelling speed Vn [m/s]	15	**Vn** is the speed which is selected if via **DCP,** or that which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.6 "N re-levelling speed"** has been activated. Determines the drive speed during readjustment. The speed is applied until the **"stop"** level and the direction input **X57.2** or **X57.3** drops.

The driving curves in **"UP" / "DOWN"** direction can be set separately. This means that **V4** and **V0** rounding can be different in the **"UP"** / **"DOWN"** directions.
Attention: this results in different braking distances.

The present speeds can be displayed in the controller via parameter 19-93.

19-93Info speed		x	Display for service personnel only shows the DCP speeds.
		SPEED_0	1 - speed== 0m/s (quick-start)
		SPEED_VNACH	2
		SPEED_VEIN	3
		SPEED_VINSP	4
		SPEED_V1	5
		SPEED_V2	6
		SPEED_V3	7
		SPEED_V4	8
33-94 X60 MCO serial termination	0	off	
	1	on	

Additional remarks:
The outputs stated in the principle circuit diagram are also active in the DCP operation. These outputs can thus be used depending on the requirement. We recommend the use of terminal **29** further for valve activation.
The overloading and partial loading detection is signalled using relay 1 and relay 2 contacts.

The input for **X57.1** / terminal **27** release must be connected.
X57.8 should be wired optionally for the emergency power supply.
X57.10 Terminal 19 winter operation is intended for the connection of a thermostat switch on the ALGI power unit. The start-up behaviour and speed are thus adapted to the oil viscosity.

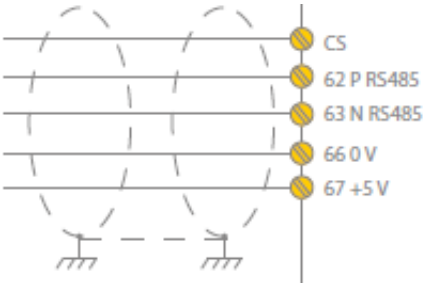
Please include varistors using the valve connection terminals. (scope of delivery Fa. ALGI).

3.9.3 DCP3 connection

The DCP3 control is connected via the MCO. Depending on the size, the connection and the connection identifier are visible. The connection itself can be accessed from above via a breakout in the housing.

The parameters that can be changed via DCP/CAN are described in a separate chapter.

DCP- connection **X60 MCO RS485** is also performed as plug-in screw terminal. Adjustment par 19-66 = 1 (DCP3)



The connection is at the top of the case. The connections must be cleared by breaking out the provided windows.

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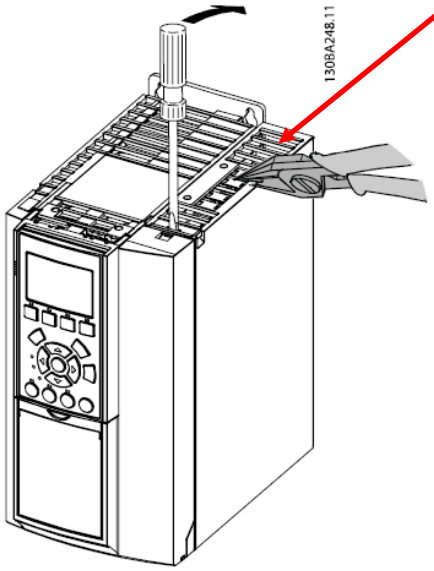
Size up to LD 302 11k0



Size LD 302 15k0 and more

3.9.4 Operation via CanOpen

The HDR-V3.01 version includes the wiring for discrete, parallel control via a D-SUB 37-pin connector. With the HDR-V3.02 version, this connector is omitted.

In principle, operation under CanOpen is similar to that of DCP3. The elevator control determines the speed mode (similar to DCP3) via the CAN interface.

As with DCP, the parameters can be set via the interface to the controller.

Parameter	**Value**	**Remark**
19-66 Dig_Serial	3	Specifies the type of control. 3= Enable the CAN-DSP-communication.
33-90 C62 MCO CAN mode ID	2	
33-91 X62 MCO CAN baud rate	21	250 kBit/sec (Klinkhammer 125 kBit/sec)

After entering parameter 19-66 Dig Serial, switch off/on to activate it.

Velocety mode

The desired speeds are parameterized in the elevator control. In order to avoid unjustified shutdowns of the converter due to overspeed, Vmax & V4 must also be parameterized on the converter side. To ensure the brevity to the floor, the run-in distances and run-in speeds set in the elevator control must have the same values as in the converter.

Parameter	**Value**	**Remark**
19-19 run-in distance [mm]	50	Positioning at the end of the travel curve to the stop, the value must be identical to the setting in the elevator control.
19-20 Max. speed [m/s]	0,5	This speed is the defined system speed on which, among other things, the overspeed and other internal speed calculations are made.
19-21/22 rated speed V4 [m/s]	0,5	**V4** is the rated speed. Selection via **CanOpen**.
19-23/24 run-in speed **V_0** [m/s]	0,035	**V_0** is the running-in speed in the **"UP"** or **"DOWN"** direction. Selection via **CanOpen**.
19-29 re-levelling speed Vn [m/s]	0,015	This speed ist he re-levelling speed that is selected. This value must be identical tot he settings in the elevator control.

The driving curves in **"UP" / "DOWN"** direction can be set separately. This means that **V4** and **V_0** rounding can be different in the **"UP"** / **"DOWN"** directions.

Attention: this results in different braking distances.

The present speeds can be displayed in the controller via parameter 19-93.

19-93 Info speed	x	Display for service personnel only shows the CanOpen speeds. SPEED_0 1 - speed== 0m/s (quick-start) SPEED_VNACH 2 SPEED_VEIN 3 SPEED_VINSP 4 SPEED_V1 5 SPEED_V2 6 SPEED_V3 7 SPEED_V4 8
19-97 Info DCP/CAN-Status	X	Display – parameters. If "1" is displayed, the connection is active, if "0" is displayed, the connection is disconnected.
33-94 X60 MCO serial termination	0 1	off on

Additional remarks:
The outputs stated in the principle circuit diagram are also active in the CanOpen operation. These outputs can thus be used depending on the requirement. We recommend the use of terminal **29** further for valve activation. The overloading and partial loading detection is signalled using relay 1 and relay 2 contacts.

The input for **X57.1** / terminal **27** release must be connected.
X57.8 should be wired optionally for the emergency power supply.
X57.10 Terminal 19 winter operation is intended for the connection of a thermostat switch on the ALGI power unit. The start-up behaviour and speed are thus adapted to the oil viscosity.

Please include varistors using the valve connection terminals. (scope of delivery Fa. ALGI).

3.9.5 Connection CanOpen Velocity Mode

The CanOpen control is connected via the MCO. Depending on the size, the connection and the connection identifier are visible. The connection itself can be accessed from above via a breakout in the housing.

The parameters that can be changed via DCP/CAN are described in a separate chapter.

The CanOpen- connection **X62 MCO RS485** is also performed as plug-in screw terminal.
Adjustment par 19-66 = 3

Connection X62	
Pin	**MCO-CAN-Bus**
1	not used
2	CAN_L
3	DRAIN
4	CAN_H
5	not used

The connection is at the top of the case. The connections must be cleared by breaking out the provided windows.

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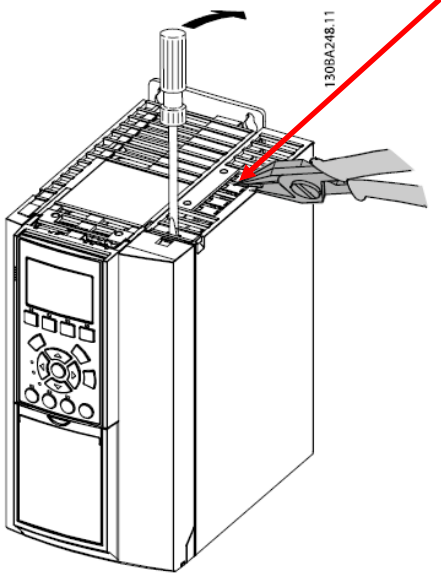
Size up to LD 302 11k0

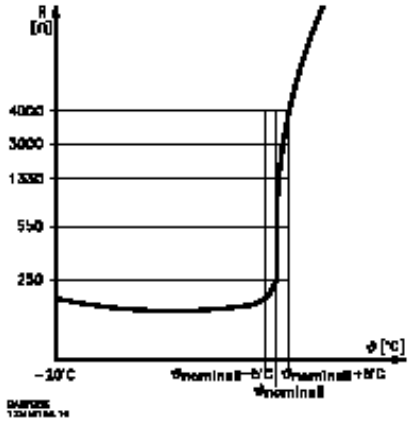


Size LD 302 15k0 and more

3.10 Motor temperature monitoring

A thermistor sensor or Klixon thermal switch wrapped in the motor winding can be connected directly to the LD 302 and evaluated by it. Switching off occurs at resistance values > 3kOhm (see tripping characteristic).

If no such motor protection is used, the thermistor input terminal 33 must be bridged with terminal 12 (alternatively terminal 13).



Tripping characteristic

If an excess temperature is detected while driving, this is shown as a warning in the LD 302 display. The error "Motor temperature" is displayed in the error memory. However, the journey that has started will still be completed. The LD 302 then issues a fault (overtemperature) and blocks any travel. Operation can only be continued once the critical temperature has been fall below.

3.11 Motor phase monitoring

The missing motor phase function detects whether the motor phase is missing during motor rotation. Alarm 30, 31 or 32 is displayed if a motor phase is missing.

In FLUX Vector mode, parameter 4-58 must be set to [2], monitoring time for shutdown must be set to 1000 msec (default setting).

If the motor control principle is switched to VVCplus operation under parameter 1-01, parameter 4-58 is also automatically set to [1] and the monitoring time for switch-off set to 100 msec.

Caution: when switching the motor control principle from VVCplus operation to FLUX-Vector operation, the monitoring time in 4-58 is not set to [2]. This must be tracked manually.

3.12 Emergency operation on UPS

For emergency operation in case of power failure the operation of a 24 Vdc supply voltage via D-option has been provided. The emergency operation is communicated to the converter via input **X57.8**. The emergency operation is intended for the **"DOWN"** direction only and is provided with twice the running-in speed **V_0**.
The prerequisite for this is the level converter circuit board item number 01595/03 or 01595/04.

Terminal **29** is set to "**1**" for the main lowering valve activation. It is thus ensured that the main lowering valve is opened during the **DOWN** drive.

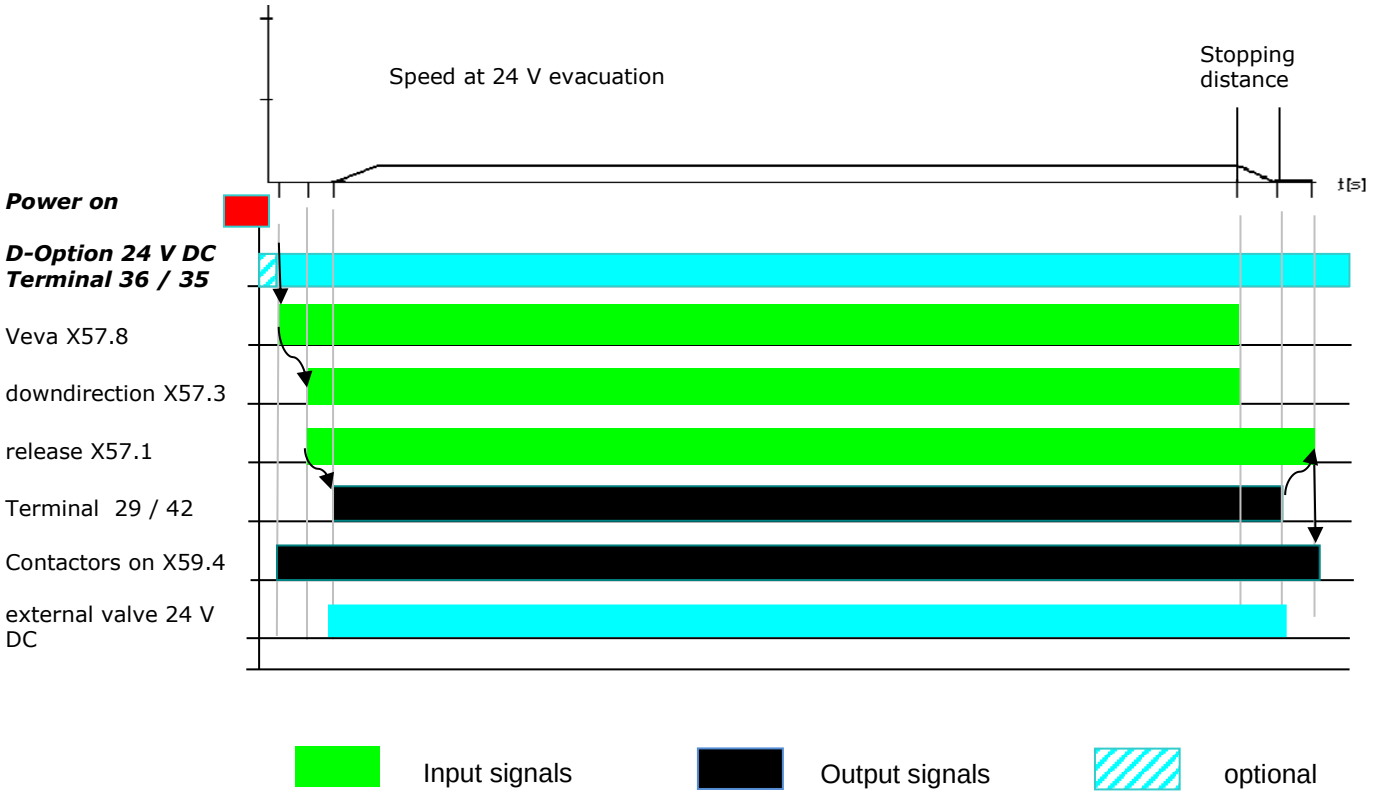
The value set in parameter **19-09** "Prop Offset " is used as a starting point for the pilot valve. The pilot valve is activated slowly. The higher the system pressure, the flatter the resulting ramp. The opening of the pilot valve results in a speed in the **"DOWN"** direction. If a movement is determined via the measuring system, the profile generator starts and outputs a target speed curve. This target speed curve is compared with the actual speed curve.

The driving curve is composed of the ramp rounding values, para. **19-08,** and the jerk values, para. **19-07**. The target speed can be driven in a regulated manner by means of the encoder signal recording.

Any driving signals that are still present must be reset before the evacuation start.

Parameter	**Value**	**Remark**
19-06 Evacuation test	0	manual input to **"1"** proceeds via the pilot value in the **"DOWN"** direction. Terminal 29 is permanently set to **"1"**. Suitable for testing the setting manually.
19-07 Eva kp	1000	Controller amplification for the proportional valve in UPS operation. Depending on how high the value is, the system can be susceptible to vibration.
19-08 Eva profile [%]	30	Ramp rounding values, rounding the evacuation and target speed value. The higher the value, the higher is the jerk.
19-09 EVA Prop Offset [%]	35	Provides the offset which the pilot valve is loaded. Excessively high values lead to a "sudden drop". As a first setting, the value is determined by determining the starting voltage.

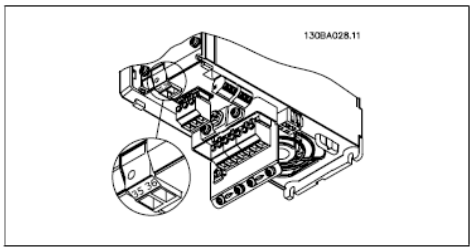
The setting must be checked on side.



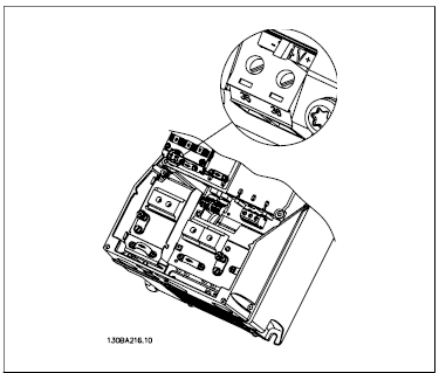
External voltage supply valves see principle circuit diagram

Specification of external 24 V DC

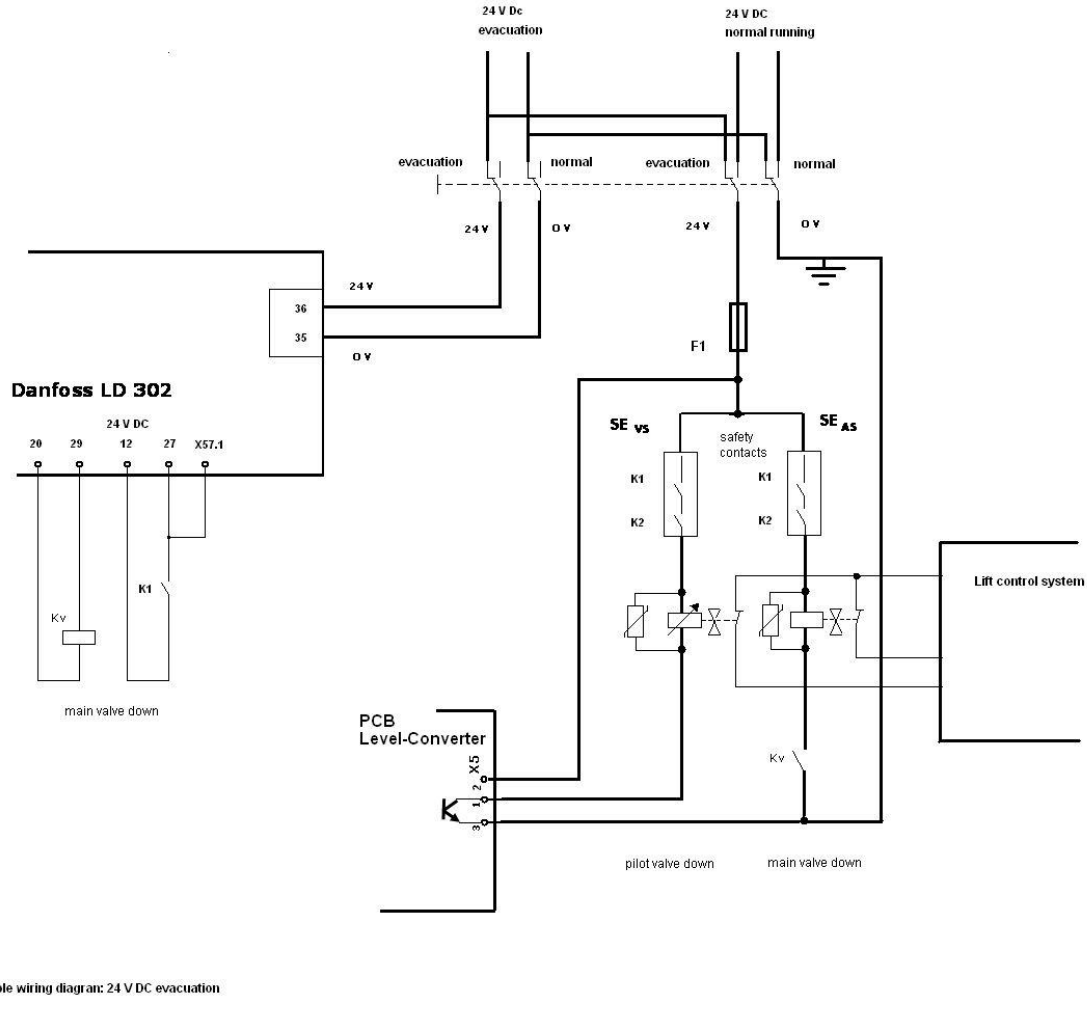
Input voltage range	24 V DC +/- 15 %
Max. Input current	2,2 A
Average input current	0,9 A
input capacitance	<10 myF
Power - up time MCO controller after power off	25 sec



Connection external 24 V DC on A3 Unit



Connection 24 V DC at A5 as C2 unit



principle wiring diagram: 24 V DC evacuation

Principle block diagram: Evacuation 24 V DC, LD 302 5k5 – 75k0

4 Principle valve control

It is assumed that two electrically controlled hydraulic valves, hydraulically put in row, are used. Each of them can decelerate or stop the cabin independently.

All elements used for controlling the valves are constructed galvanically separated from the converter supply.

All electronic components for controlling the valves serve exclusively this function. They are not safe from deficiency.

The external current supply for controlling the valves should have a tolerance of 24Vdc ± 5%.

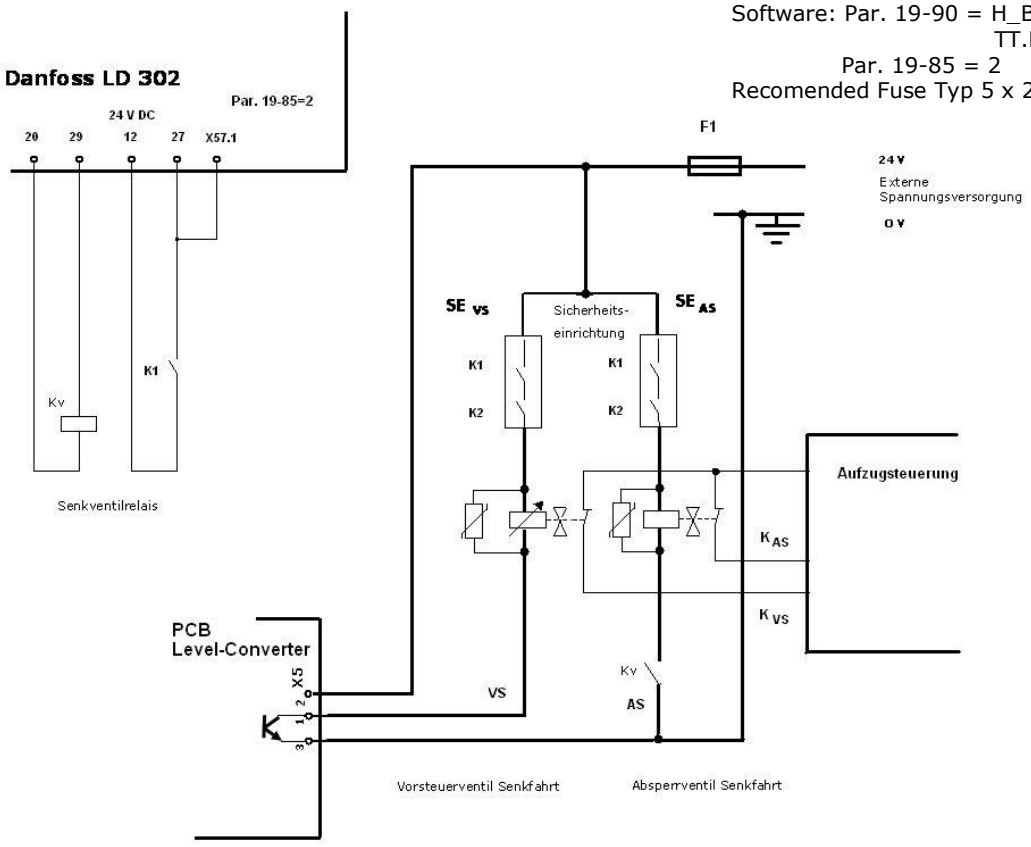
The technical data of the net and the mains supply and the fuse are measured according to the used magnet- valves. Here the EN81-20 §5.11.1.4 is to be observed.

4.1 Earthed 24 V valve voltage, monitoring by the elevator control

Follow the recommended standard circuit diagram.

Constructing the mains supply and its fuse it should be ensured that a sufficiently high short circuit current flows in case of a low Ohm earthing, in order to release the fuse.

Condition:
Software: Par. 19-90 = H_B2.10 B113
TT.MM.JJJJ
Par. 19-85 = 2
Recomended Fuse Typ 5 x 20 FF, 2,5A



Prinzipschaltbild Endlagenüberwachung nach EN 81-20 § 5.6.7.3 und Auswertung der Testsignale durch die Aufzugsteuerung

Selected fuse: 2.5 A Micro fuse: 5x 20FF
The 24 V mains supply has to be measured in a way that there is a sufficiently high current.

Summary:
It is very unlikely that a safety device is bypassed without the fuse being released.

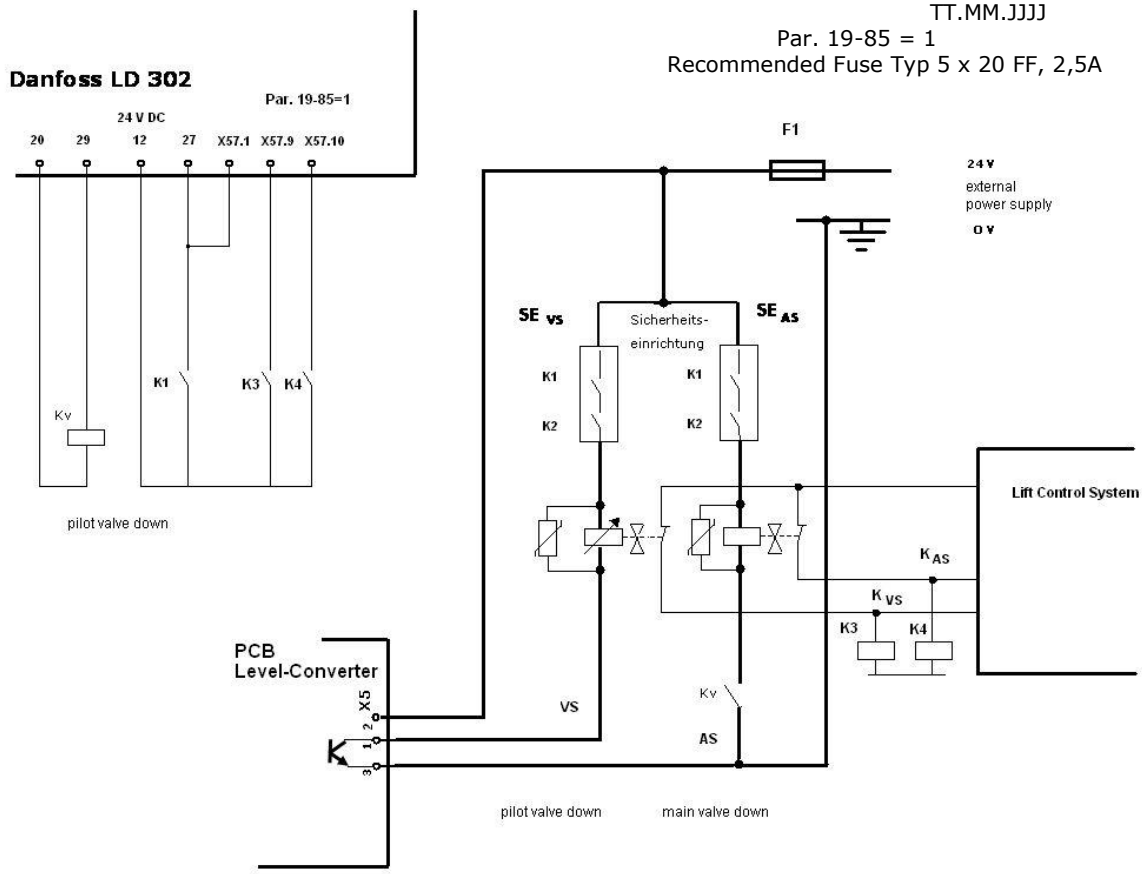
Measure:
Controlling appliance for the bypassing of safety device by double high-Ohm earthing

4.2 Earthed 24 V valve voltage, monitoring oft he test signal by the inverter

If the elevator control can not evaluate the test signals described under 3.3, the following schematic diagram example can be used.

When designing the power supply unit and the fuse, ensure that a sufficiently high short-circuit current flows in the event of a low-impedance ground fault in order to trigger the fuse.

Condition:
Software: Par. 19-90 = H_B2.10 B113
TT.MM.JJJJ
Par. 19-85 = 1
Recommended Fuse Typ 5 x 20 FF, 2,5A



Principle wiring diagram: valve controlling in accordance to EN81-20 § 5.6.7.3 , evaluation of test signals by frequency converter

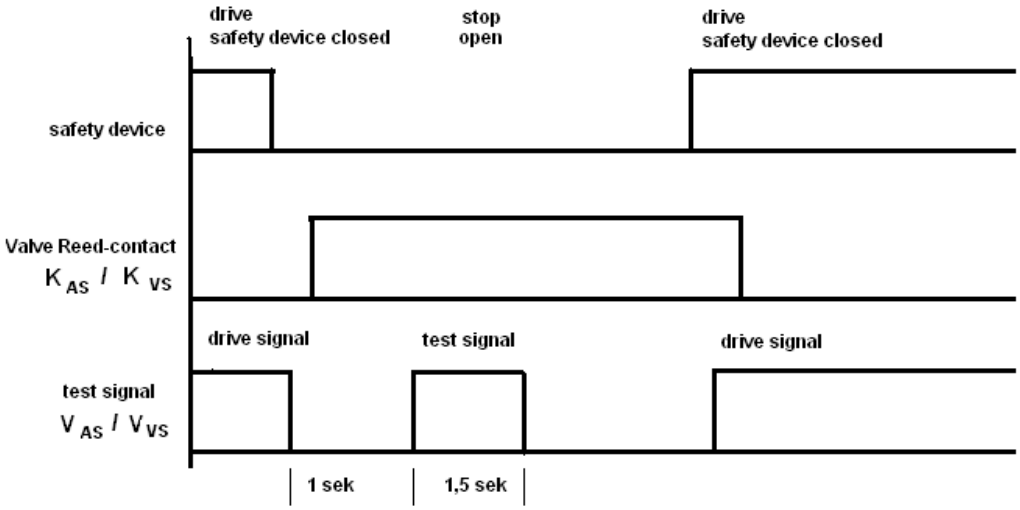
4.3 Controlling appliance for bypassing of safety device by High-Ohm earthing

In order to detect the very unlikely case of bypassing the safety device, after the stop of the lift, with an open safety device, a controlling signal for valve V_{VS} and valve V_{AS} alternating is delivered. The controlling switches that belong to the valves (Reed-contacts) must be kept inactive, closed. If there is no reaction, it can be assumed that no function relevant bypassing of the safety device has taken place.

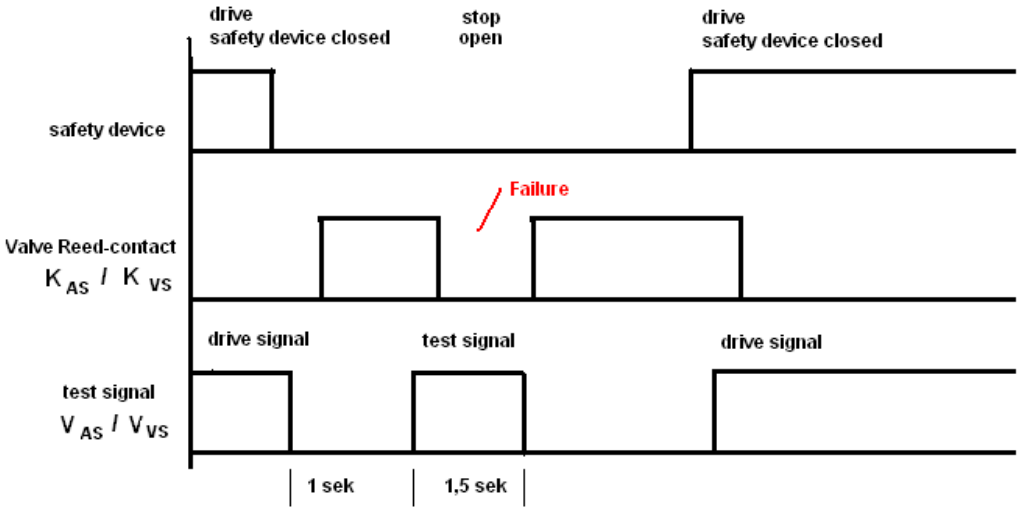
If, however, the valve opens, no movement of the cabin is the consequence, because the second valve connected in series doesn't open.

In this case the start of the engine must be prevented. The restart must be done only by a device that can be manually reset.

Signalling procedure: Good/ Ok. –state



Signalling procedure: Faulty bypassing of safety device



The monitoring and evaluation of the monitoring is the responsibility of the lift control, with parameter setting 19-85 = 2. An error is not indicated by the inverter.

When the test signals are monitored by the inverter, with the parameter setting 19-85 = 1, a restart is prevented by the inverter in case of a detected error. An error message is issued by the inverter.

Note: For protection against manipulation, the type of monitoring of the electromechanically actuated valves can only be deactivated after activation by a factory setting. It is not possible to change the contact logic.

Verification of the feedback contacts is carried out as follows:

Drive direction "UP"

During drive direction "Up" the feedback contacts are not monitored. The drive "Up" is operated by the engine. Valves/ feedback contacts are not used.

After "Halt"

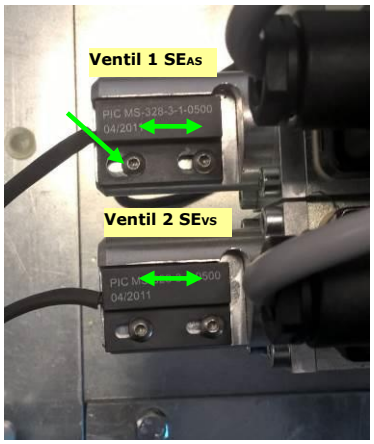
After ending a regular drive, the state "Halt" is reached, when the signal at terminal X59.4 (contactor on) is taken back and a delay time of 1 sec is over.

After checking the feedback contacts for "not actuated", the test is carried out on a double earthing fault. The test is carried out alternately, after each stop, for valve 1, terminal 29 is controlled for 1.5 sec and valve 2 is activated for 1.5 sec.

The feedback contacts are checked for "not actuated".

Adjustment of feedback contacts

The adjustment of the feedback contacts is done in standstill. Disconnect and shift until the contact is closed.



4.4 Potential-free, non-earthed 24V valve Voltage

The advantage of a potential-free, non-earthed valve voltage is its higher availability, because here the drive is not interrupted, not even with a low-Ohm first earthing.

By using an insolation monitor, however, the next drive is prevented.

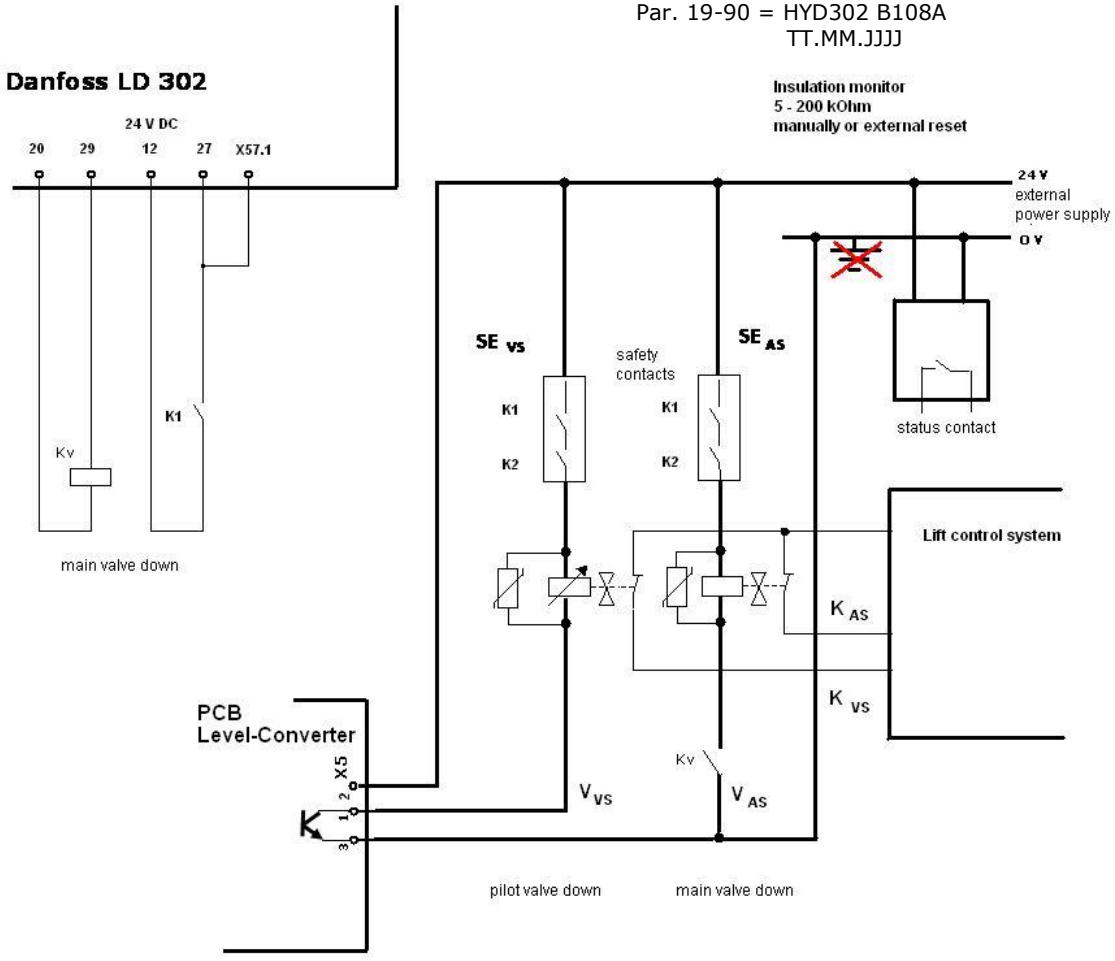
Note:

Especially suitable with non-earthed IT-networks!

Condition:
Software: Par. 19-90= H_B2.10 B113 TT.MM.JJJJ

Par. 19-85 = 0

Par. 19-90 = HYD302 B108A TT.MM.JJJJ



principle wiring diagram: not earthed valve supply, monitoring in accordance to EN81-20 § 5.11.4 by insulation monitoring

5 Wiring D-Sub-connections

D-Sub 37 Pin	Color	Connection	Connection
1	White	X57.1	Bridge to Pin - 27
2	brown	X57.2	
3	green	X57.3	
4	yellow	X57.4	
5	gray	X57.5	
20	white green	X57.6	
21	Brown Green	X57.7	
29	White-red	X57.8	
30	brown-red	X57.9	
28	brown blue	X57.10	
31	pink brown	pin - 19	
22	White yellow	29	
9	pink	X58-2	
10	blue	X58-1	
15	red	X59.1	
16	black	X59.2	
17	violet	X59.3	
18	gray pink	X59.4	
19	Red Blue	X59.5	
14	White black	X59.7	
		X59.8	Bridge to auf pin - 18
		Relais 1	
23	tawny	1	
24	white gray	2	
25	White blue	3	
		Relais 2	
26	dun	4	
27	white pink	5	
Remark: D-Sub 37 cable set 4001117-02_16			

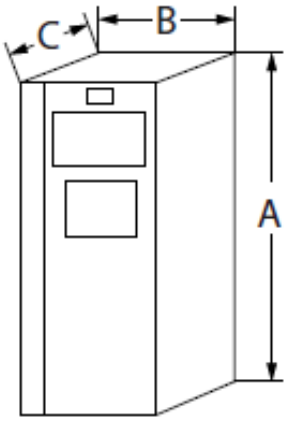
Plug	Color	Connection
X1.1	White	X55.3
X1.2	brown	X55.4
X1.3	green	X55.5
X1.4	yellow	X55.6
X1.5	gray	X55.7
X1.6	pink	X55.8
X3.1	White	pin - 13
X3.2	brown	pin - 20
X3.3	green	pin - 42
X3.4	yellow	pin - 39
X3.5	gray	pin - 53
X3.6	pink	pin - 54
X3.7	blue	pin - 55
X3.8	red	X59.6
Remark: X1 = cable set 4001101b		
Remark: X3 = cable set 4001103b		

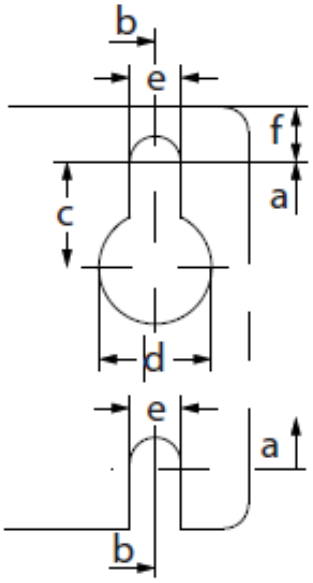
D-Sub 15 Pin	Note
1	S2 24V - Turbine 2
2	0V - Turbine 2
3	S2 - Turbine 2
4	24V – Analogencoder
5	0V – Pressure sensor
6	S1 24V - Turbine 1
7	0V - Turbine 1
8	S1 - Turbine 1
9	+ 20mA Analogencoder
10	55 – 0V Pressure sensor
11	53 – Pump pressure
12	24V – Pressure sensor
13	54 – System pressure
14	24V – Pressure sensor
15	0V Analogencoder
Remark: D-Sub 15 cable set 4001113	

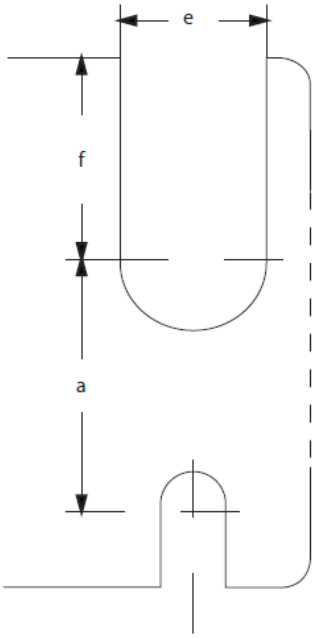
The D-Sub 37 cable set is only used with version V3.01.

6 Dimensions LD302 HDR types A3- A5, B1-B4, C1-C4

Device Type		A3	A5	B1	B2	B3	B4	C1	C2	C3	C4
IP		20	55	55	55	20	55	55	55	20	20
		7k5	7k5	11k0	18k0	11k0	15k0 – 22k0	30k0	50k0	30k0	37k0 – 55k0
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Back plate height	A	268	420	480	650	399	520	680	770	550	660
Height with shielding plate	A	374	-	-	-	420	595			630	800
Distance between the mounting holes	a	257	402	454	624	380	495	648	739	521	631
Width of the back plate with C option	B	170	242	242	242	205	230	308	370	308	370
Distance between the mounting holes	b	110	215	210	210	140	200	272	334	270	330
Depth without A/B option	C	205	200	260	260	249	242	310	335	333	333
Depth with A/B option	C	220	200	260	260	262	242	310	335	333	333
Drill holes [mm]	c	8,0	8,25	12	12	8		12,5	12,5		
	d	ø11	ø12	ø19	ø19	12		ø19	ø19		
	e	ø5.5	Ø6,5	ø9	ø9	6,8	8,5	ø9	ø9	8,5	8,5
	f	6,5	9	9	9	7,9	15	9,8	9,8	17	17
Max. Weight [kg]		6,6	13,5/ 14,2	23	27	12	23,5	45	65	35	50
Min. distance above / below to other surfaces		100	100	100	225	225	225	225	225	225	225







7 Connection of LD 302 HDR

LD 302 HDR is already pre-wired to be connected with the hydraulic power unit using D-sub 15-pole connector. A D-sub 37-pole connector is also pre-wired optionally, which is connected with the control system. Refer to the principle circuit diagram for the connector allocation.

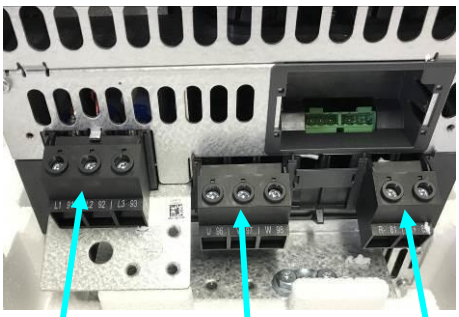
The supply and lead lines for the mains, motor and brake resistor should be implemented in accordance with the regulations.

The wiring transmitting the signal should be laid separately and not in parallel with the mains, motor and brake resistor line.

The arrangement of the connections for supply and lead lines can always be found under the illustrated position for the IP55 implementation.

The screen of the motor cable is to be put large-scale over the provided clip at the screening shield.

The screening shield is no pull-relief for the cable.



Connect the inverter according to the Circuit diagram.

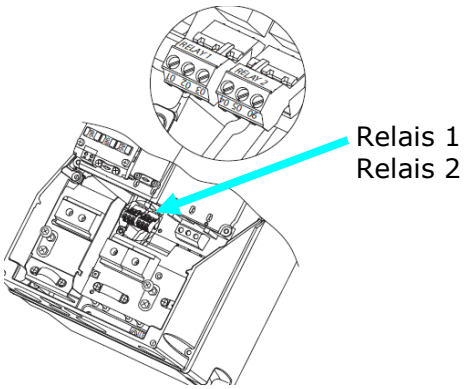
Improper earthing of the motor or shielding of the encoder cable can cause humming noises, higher motor currents, malfunction or unjustified error messages.

Unit size B4 and bigger

Unit size A3 and B3

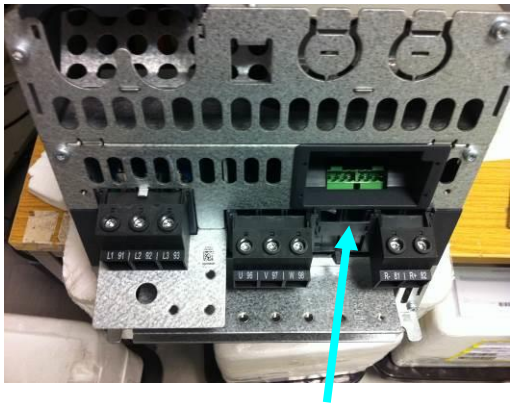
7.1 Position of the relay connections

The position of the relay connections is different depending on the installation size. In case of installation sizes B1 and B2 (11k0 and 18k0), the connections are located on the left side beside the motor connection, below the screening shield. They are in the converter base plate in case of installation sizes B3 and B4 (11k0 and 15k0). In case of installation sizes C1 and C2 (30k0 and 50k0), the connections are located on the top right beside the MCO base plate.



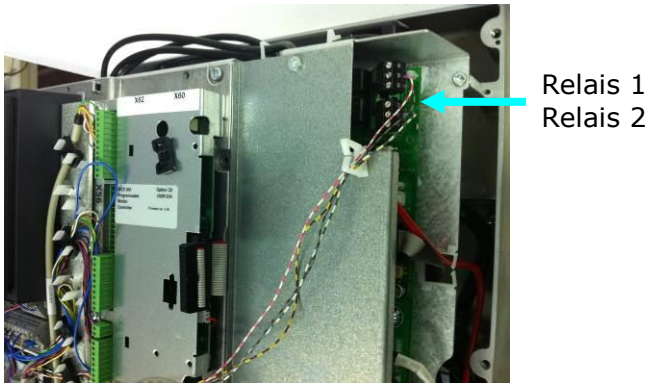
Unit size A5, B1 and B2

Unit size B3



Unit size B4

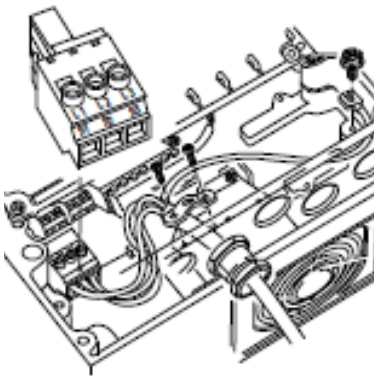
Relais 1
Relais 2



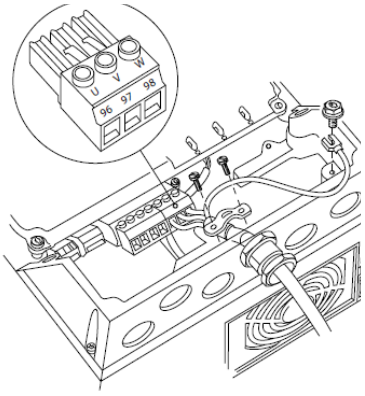
Unit size C1 and C2

7.2 Position of the mains and motor connections

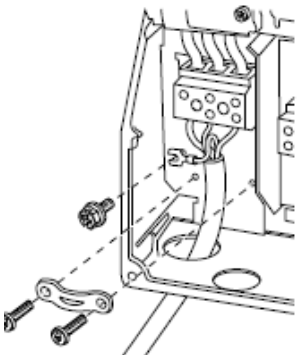
Unit size A5 Line connection



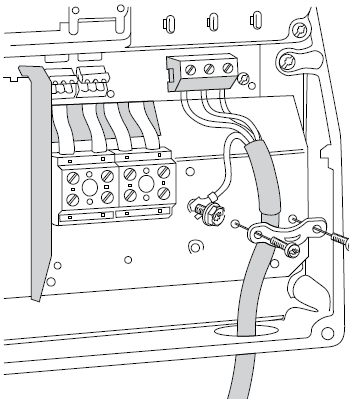
Unit size A5 motor connection



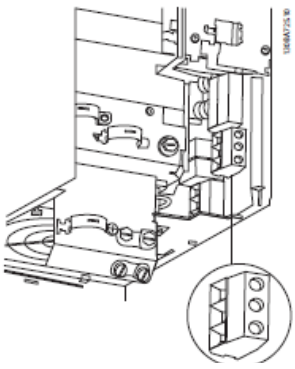
Unit size B1 / B2
Line connection



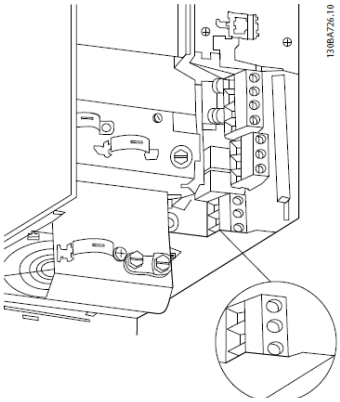
Unit size B1 / B2
Motor connection



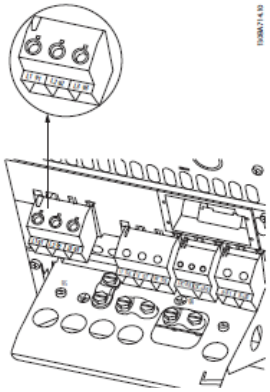
Unit size B3
Line connection



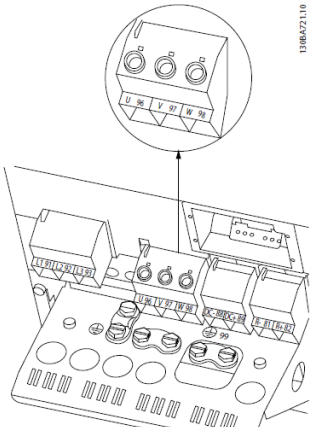
Unit size B3
Motor connection



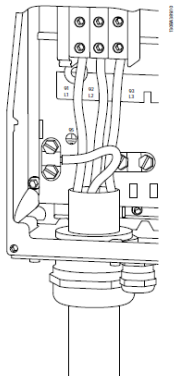
Unit size B4
Line connection



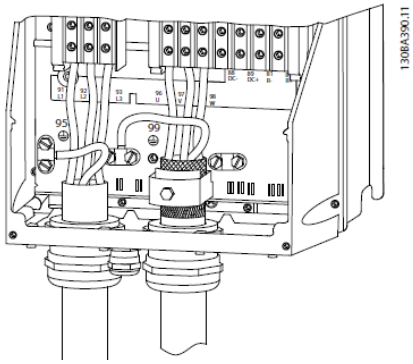
Unit size B4
Motor connection



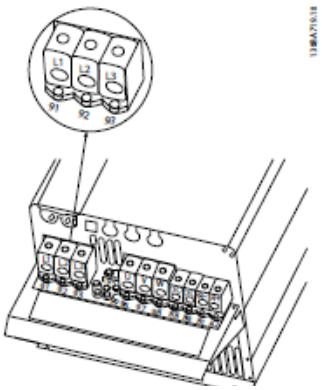
Unit size C1 / C2
Line connection



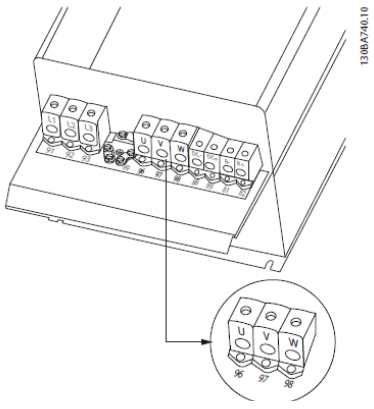
Unit size C1 / C2
Motor connection



Unit size C3 / C4
Line connection



Unit size C3 / C4
Motor connection



7.3 Brake resistor

Please refer to the annexes as well as the installation instructions and the datasheets of the respective resistance manufacturer for additional information.

Observe the INSTALLATION AND MAINTENANCE INSTRUCTIONS of the manufacturer of the brake resistors.

The correct installation and correct maintenance contribute to your safety as well as the safety of the usage and the operating environment. Apart from that, it helps increase expectations regarding the life time.

SAFETY INFORMATION

The connection of this resistor can trigger a hazardous situation and must therefore be carried out correctly and by technically qualified and competent staff .

All electrical connections to the brake resistor must be isolated and must be disconnected before every installation and every maintenance.

Resistors heat up during normal operation. Use instruction and warning plates, wherever required. Avoid proximity to combustible materials. Do not attach covers. Ensure sufficient ventilation.

An oil based coating, which protects the special stainless steel spiral elements during the production, can cause a minor smoke emission during the initial start-up.

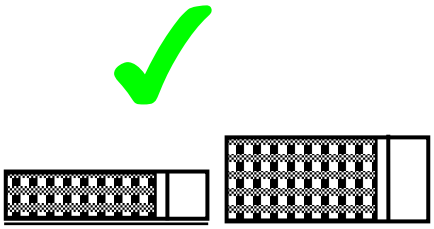
HAZARD RISK

There is a possibility after the installation that the resistor works at dangerous voltage and high temperatures are generated.

Error conditions in the integrated circuit, which feeds the resistor, or in the resistor itself, could lead to very high temperatures. Access to qualified staff only.

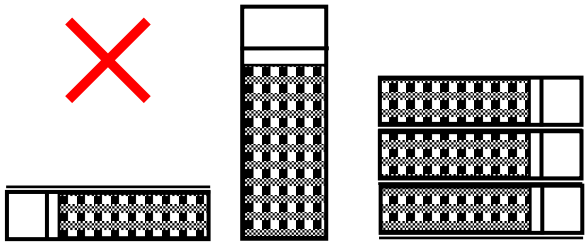
INSTALLATION

- The temperature of the circulating air as well as the ambient temperature of the case could be dangerously high. It is therefore extremely important that air can be circulated freely around the case.
- Refer to the installation and maintenance instructions of the brake resistor manufacturer for the minimum distance to other built-in components. It should not be less than 250 mm in any case.
- The ventilation openings in the casing may not be covered or glued.
- During the installation in electrical cabinets or the like, it is absolutely essential to ventilate these additionally. A forced cooling unit should be installed if the natural air circulation is not adequate.
- Inflammable materials may not come in contact with or in the proximity of the casing. This should be observed particularly in case of the resistor surface.
- If possible, the resistor should be mounted on a flat surface, ideally horizontally.
- The cable inlet and the connection block must be located lower, mainly if the case is mounted vertically. (see picture)Mounting instructions can differ from producer to producer. The authoritative method is the one prescribed by the respective producer.



CORRECT INSTALLATION

Base plate below
Lateral or downward cable connection



INCORRECT INSTALLATION

Base plate above prevents air flow
Cable connection even at the top, casing one on top of the other, prevents air supply

- Before starting the installation, ensure that the electrical power supply is disconnected.
- Remove the case over the connection block to gain access to the terminals
- Mount the base plate
- The cables enter via the openings; if required, holes must be drilled in the covering.
- Connect the brake resistor with the corresponding dimensioned, heat-resistant cables. The polarity on the resistor is insignificant.
- The casing can be hot; do not use it to connect any cable to it or on it.
- Connect the thermal switch.
- Ensure that all connected cables (inclusive of the earthing) are connected firmly before you close the cover of the cable connection again.
- Before the start-up, ensure that there are no objects preventing proper ventilation.

Caution: when using two resistors, they must be connected in parallel!

MAINTENANCE
Only a low maintenance effort is required; however, an inspection at regular intervals should ensure that the brake resistor continues to function reliably.

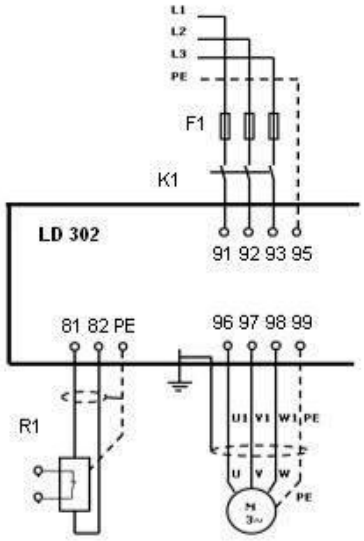
Before starting with the maintenance work, ensure that the electrical connection is cut off and that the cable is isolated.

- Check that all openings in the casing are free and are not covered
- Remove the case and remove all depositions of dust and dirt from the stainless steel spiral, using a soft brush.
- Check all cable connections for firmness
- Check whether all important cables are clean and undamaged.
- Close the casing again.

Notes as regards environmental protection
The operation of these air-cooled brake resistors has hardly any influence on the environment.
All materials used for manufacturing are non-hazardous.

Recycling
All metal components can be recycled. The remaining components cannot be recycled and must be disposed of according to the regulations.

Principle connection diagram



Thermoschalter / Thermal switch
24 V / 0,5 A AC/DC
zur Verarbeitung durch die Steuerung nach
to be controlled by lift controller acc. to
EN81-20 $ 5.10.4.3

Bei Dauerüberhitzung Trennung des Widerstandes von der Energiezufuhr durch Schaltkontakt

in case of continouosly overheating switch of energy by contact

R1 Bremswiderstand
Brake Resistor

8 The graphical control unit LCP 102

The basic function explanation of the LCP control unit for lifts is given below.
Refer to the product manual FC 300 for details regarding LCP control unit.

8.1 Status displays

LED displays

LED ON must glow, signalises voltage on. The background light of the display lights u

If not, check the mains connection, frequency convertor and 24 V DC supply.

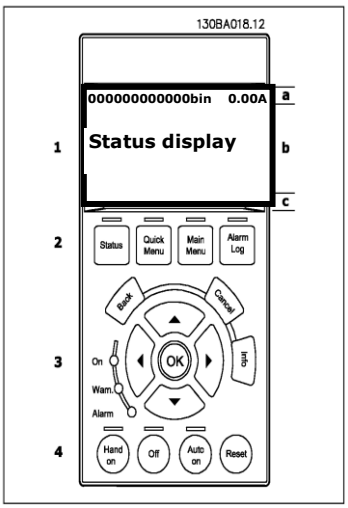
LED Warn (except when using Safe Stop, terminal 37) and **LED Alarm** should not glc for details).

If the LCP display is not connected, the status of the LEDs continues to be displayed at frequency convertor.

The alarm and / or warning LED glow if specific limit values are exceeded.

Warning persists until the cause is no longer applicable. The motor can continue to be Warning messages can, but do not necessarily have to be critical.

"Auto On" LED must glow, or press the **Auto On** button.



Rotary encoder plausibility

Status – arrow in **row 1 a** signals the direction of rotation determined via the encod a first inference on the encoder function is possible.

Activation status

"000000000.bin – series" in **row 1 b** signals the status of the control signals terminal X57 starting from right with terminal X57.1 (response time of approx. 5 seconds).

0 0 0 **0 0 0 0 0 0 0 0 0 0 bin**

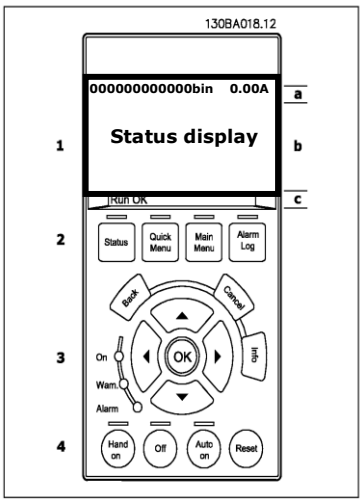
- 1 = 24 V at X57.1
- 1 = 24 V at X57.2
- 1 = 24 V at X57.3
- 1 = 24 V at X57.4
- 1 = 24 V at X57.5
- 1 = 24 V at X57.6
- 1 = 24 V at X57.7
- 1 = 24 V at X57.8
- 1 = 24 V at X57.9
- 1 = 24 V at X57.10

Motor current

0.00A in **row 1 b** displays the present current.

Alarm Log displays the last 10 frequency convertor errors. The error description is displayed using the **OK** button.

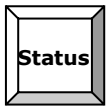
8.2 Parameter input



Save: All changes and inputs made by you are saved by pressing the **"OK"** button.

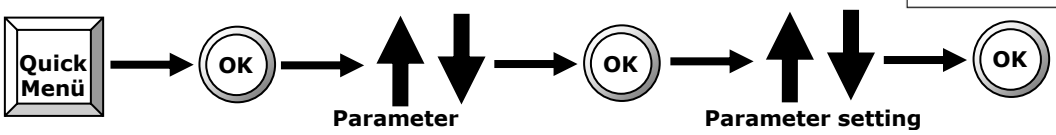
All internal calculations are initiated once again by pressing the **"OK"** and **"Cancel"**

The inputs can also be saved via parameter **19-64 = "1"**.



Resetting the converter to the factory setting is possible by simultaneously pressing the "**Reset**" and "**Off**" buttons.

The **Quick Menu** button leads via User Menu 1 to the Quick Menu for Lifts (default parameters)

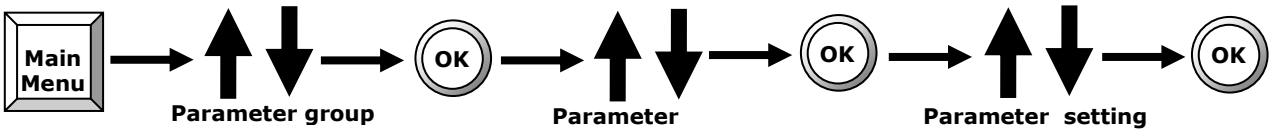


LD 302 HDR provides a structured menu for simple parameterisation of the converter for lifts. All required basic inputs are consolidated.

All standard parameters can be entered for the drive, for the driving speeds and for the comfort area.

LD 302 HDR expects at least the input of the relevant motor data before the motor can be supplied with current.

Main Menu button leads to all parameter groups, **group 19** contains all lift parameters.



The frequency convertor reports with the operation mode after switching on.

The **operation mode** is the mode in which the lift is operated. All parameters can be changed here. LD 302 HDR is automatically in this mode after the initial start-up as well as after initialisation.

Back button: Cursor returns to the menu
Cancel button: Input is cancelled
OK button: Input
Arrow buttons: Manoeuvre the cursor

8.2.1 Factory setting

The factory setting of the converter can be executed by pressing the "**Reset**" and "**Off**" buttons simultaneously. Converter reset to the factory setting can be viewed with the "factory setting" display in the LCP after a short time. Please keep the buttons pressed until then.

Attention: all changed setting values are lost.

8.2.2 Saving and prepairing the data record

Download the data using **MCT 10** and archive it.

After setting the system successfully, there exists the option of saving the MCO data record and even that of LD 302 HDR in the **LCP**.

Parameter		Value	Remark
00-50	LCP copy	1	Copies the converter data to the LCP

Due to the **"optimizations"** of the driving comfort at the building site, it can happen that the basic parameters can be adjusted and the system can thus no longer operate properly. The data record saved earlier can be restored here. The voltage should be switched after restore.

Parameter		Value	Remark
00-50	LCP copy	3	Restoring the converter data from the LCP (only MCO functions)
		2	Restoring the complete data with LD functions.

8.2.3 Control unit LCP 102 access protection

Activation of access protection for the main menu

Main Menu button

Parameter	Value	Remark
0-60	XXXX	Define and enter password (please note down the password).
0-61	1	[read-only]

Voltage off / on, access protection is switched on.

Activation of access protection for quick menu

0-65	XXXX	Define and enter password (please note down the password).
0-66	1	[read-only]

Voltage off / on, access protection is switched on.

Turn off access protection

"Main Menu" button
Select any parameter
"Access protection" display appears
After a few seconds, the input request appears: Password XXXXXXXXXXX
Enter the password entered above in the 4 right positions.
With that, the LCP 102 is activated until the next voltage "**OFF / ON**".
Long term activation through:

Parameter	Value	Remark
0-61	0	[complete] for Main menu
0-66	0	[complete] for Quick menu

9 Installation

Before the operation, check whether all parameter inputs correspond to your system data.

Attention: important notice

* Check whether the device has been installed and connected in accordance with the description.

* Please follow the information of

Danfoss product manual VLT AutomationDrive FC 300

* And also the operating instructions of ALGI frequency regulation system for hydraulic lifts AZFR with Danfoss frequency convertor

Please observe the following in particular:

Safety instructions and general warnings

* Ensure that this device is activated corresponding to the description.

* Only trained personnel may operate this device.

* Observe the applicable occupational safety guidelines

Note:

The speeds and braking distances are dependent on the accuracy of the oil flow collection. For this, please follow the ALGI oil specification to minimize a viscosity influence.

9.1 Before switching on the voltage

Please observe the following:

* Contact with electric parts, even after separating the device from mains, can be fatal.

Residual voltage after separation from mains
When using LD 302 devices up to a power of
7.5 kW: Waiting period of up to 4 minutes
> 7.5 kW: Waiting period of min. 15 minutes

Danger!
Unexpected and hazardous conditions can occur due to faulty settings, defective components or incorrect connection.
Before each operation of the lift, the operator must ensure that neither people nor material properties are endangered.
The emergency- off functions and the mechanical safety systems must be installed and operational.

9.2 Switching on the voltage

Before the operation, check whether all parameter inputs correspond to your system data.

LD 302 HDR is switched on via a charging circuit to reduce the charging currents of the DC link. In spite of that, the DC capacitors are charged with each switching. Therefore, avoid functionally conditional switching of the frequency convertor input.

Note the maximum switching on of the converter per minute.
Maximum number of switching on per minute FC/LD 302 up to 7k5 <= 2 switching/min
Maximum number of switching on per minute FC/LD 302 more than 7k5 > 1 switching/min
Maximum number of switching on per minute FC 302 more than >= 90kW = 0.5 switching/min

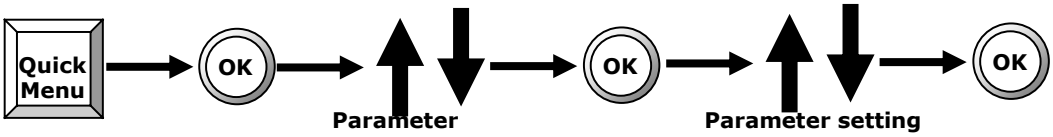
LCP control unit signals after approx. 20 sec. Run-up time from voltage "off" to operating state "**Operation mode**".

If the background light of the LCP display and even the status LEDs of LD 302 HDR have not illuminated, there is a short-circuit in the 24 V supply of LD 302 HDR. Check the connection of the convertor in this case.

Improper earthing of the motor or shielding of the encoder cable can cause humming noises, higher motor currents, malfunction or unjustified error messages.

9.3 Parameter setting

The basic setting enables LD 302 HDR to operate the lift. The following inputs are made in the Quick menu of the converter.



9.3.1 Motor setting

Please refer to the documentation of the lift system and the specification plate on the container lid for this information.
Standard setting: All ALGI motors have been listed in the following table. By entering the motor number, all relevant data are loaded in the converter, and the system then becomes ready to start.

Entering the motor data is required in case of an external motor (modernisation).

Parameter	**Value**	**Remark**
19-01 Motor number .	0	Enter the motor number corresponding to the motor table. Entering additional motor data is then no longer required. After the acceptance of the motor, the motor number continues to be displayed. The motor power is displayed for control. The value from the motor list is checked and defined before writing on the parameter limits of P1-20. **Input "0" = not standard motor**. The following motor values and the cos Phi in par. 19-02 must be entered. Please complete the entry with par 19-63 = 3 (motor regulation parameter is recalculated).
1-20 Rated motor power	x	Enter the rated motor power. Enter the rated motor power corresponding to the specification plate. The value from the motor list is checked and defined before writing on the parameter limits of P1-20.
1-22 Rated motor voltage	x	Enter the rated motor voltage in Volt. Enter the rated motor voltage corresponding to the specification plate.
1-23 Rated motor frequency	x	Enter the motor frequency in Hz. Enter the rated motor frequency corresponding to the specification plate.
1-24 Rated motor current	x	Enter the rated motor current in A. Enter the rated motor current corresponding to the specification plate.
1-25 Rated motor speed	x	Enter the rated motor speed in 1/min. Enter the rated motor speed corresponding to the specification plate.
19-02 Cos Phi	69 – 99	Enter Cos Phi from the specification plate.
19-63 Motor adaption	0	VLT LiftDrive has an automatic function for motor optimisation. The function can be useful if no motor number in par. **19-01** is selected. Do not execute this function if a motor number is entered. Input = 3 for calculating the motor regulation parameter from the entered motor data.

Type 50Hz	**Parameter 19-01**	**Type 50Hz**	**Parameter 19-01**
7.7 kW D400V 50Hz S3-2-77-T690N	**01**	24 kW D400V 50Hz S4-2-24-T690N	**09**
9 kW D400V 50Hz S4-2-9-T690N	**02**	29 kW D400V 50Hz S4-2-29-T690N	**10**
9.5 kW D400V 50Hz S3-2-95-T690N	**03**	33 kW D400V 50Hz S7-2-33-T690N	**11**
11 kW D400V 50Hz S3-2-11-T690N	**04**	40 kW D400V 50Hz S7-2-40-T690N	**12**
13 kW D400V 50Hz S4-2-13-T690N	**05**	47 kW D400V 50Hz S7-2-47-T690N	**13**
14.7 kW D400V 50Hz S4-2-147-T690N	**06**	60 kW D400V 50Hz S7-2-60-T690N	**14**
16 kW D400V 50Hz S4-2-16-T690N	**07**	77 kW D400V 50Hz S7-2-77-T690N	**15**
20 kW D400V 50Hz S4-2-20-T690N	**08**		

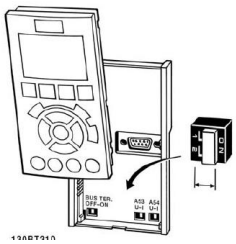
9.3.2 Setting power unit and system parameter

Please refer to the documentation of the lift system and the specification plate on the container lid for this information.

Parameter	Value	Remark
19-10 pump volumes [l/min]	250	Enter the rated conveyed volume of the pumps at 2740 U/min in [l/min].
19-11 meas. syst volumes [l/min]	230	Enter the rated volumes of the tur measuring system bine in [l/min] at 1 kHz.
19-12 Suspension	1	The details of whether the cabin is suspended directly or indirectly are specified here. Data value = 1 is equivalent to direct, Data value = 2 is equivalent to indirect,
19-13 d piston [mm]	110	Enter the diameter of the piston.
19-14 Number of pistons	1	Number of pistons in the system

9.4 Check the pressure sensors

Ensure that the DIP switch **A53** and **A54** below LCP 102 are at **"I"**.



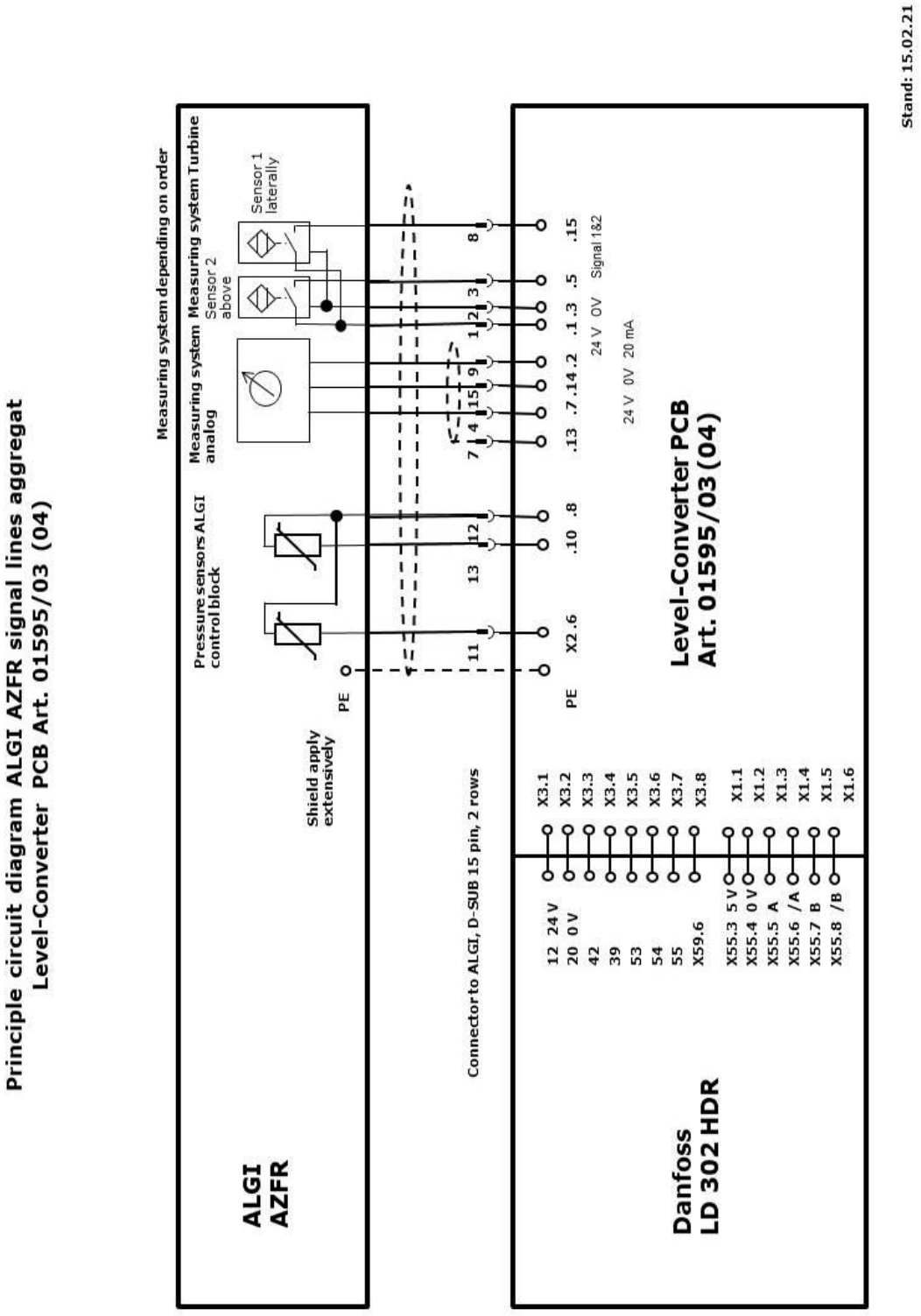
Check:

Parameter	Value	Remark
16-61 Input terminal 53	Current	Pump pressure
16-62 Input terminal 53	>3.8 mA	The smallest value displayed is at 3.8 mA. Then the pump is not under pressure.
16-63 Input terminal 54	Current	System pressure
16-64 Input terminal 54	>4.0 mA	The smallest value displayed is > 4.0 mA. Shows the system pressure. The value displayed is equal to the pump pressure if emergency drain has been activated in case of blocked valve.
19-91 Current load X		Displays the current weight of the cabin and total load in kg (plausibility check for terminal **54**)
19-98 Pump pressure X		Displays the current pump pressure in bar (plausibility check for terminal **53**)
19-99 System pressure X		Shows the current system pressure by cabin and total load in bar (plausibility check for terminal **54**)

9.5 Level-Converter-PCB

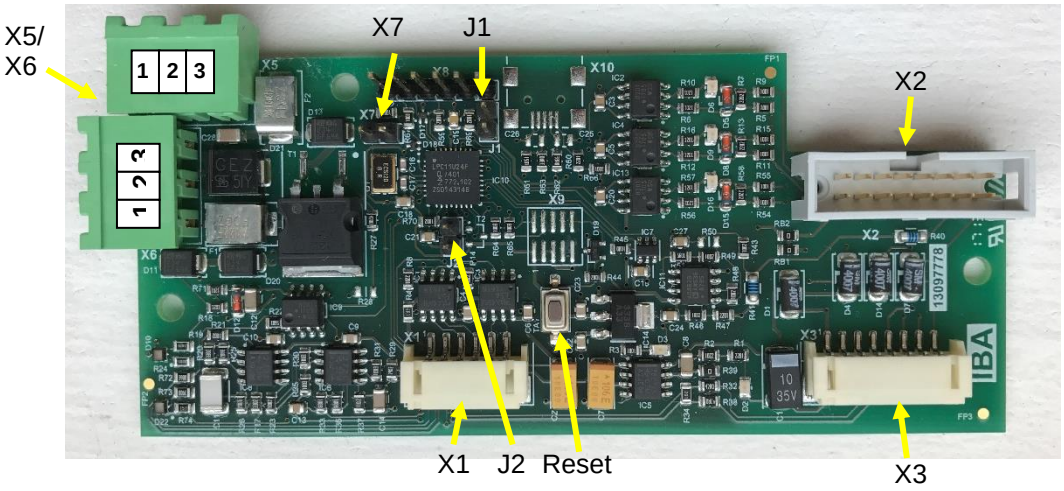
9.5.1 Principle circuit diagram ALGI AZFR signal line Aggregate / Level-Converter PCB

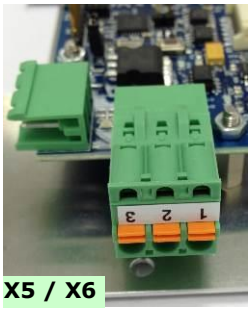
The circuit board is available in 2 versions, which differ only in the processor version. Item number 01595/03 and item number 01595/04.



9.5.2 Level-Converter-PCB for analogue measuring and turbine

PCB for implementation of hydraulically produced encoder signals





Connections:

X1 = encoder cable to X55 MCO
X2 = connection for D-Sub 15 pole via ribbon cable
X3 = internal converter wiring
X5/6 = external voltage supply 24 Vdc with controlling line pilot valve

1	Controlling voltage pilot valve
2	24 Vdc
3	0V

Faulty wiring of plug X5/6 can lead to malfunction of the PCB.

Attention: When wired correctly, the LED D10 shows a green light. When wired incorrectly, LED D10 is not on!

External voltage supply: 24 Vdc + 5%

Jumper:

J1 = for setting the operation mode
J2 = limitation for analogue measuring system
X7 = boot mode

In general, the jumpers must be set in a dead-voltage state only.

Jumper J1

Position open: operation mode measuring system turbine
Position closed: operation mode analogue measuring system

Jumper J2

The analogue measuring system has mechanic connections defined as follows:
Position open: electrical terminal for orifice 1
Position closed: electrical terminal for orifice 2

9.5.3 Decription of PCB

The PCB converts the signals of the encoder of the measuring system turbine resp. the analogue measuring unit in 5 V/TTL encoder signals for frequency converters.

Operation mode analogue measuring system:
Jumper J1 position closed

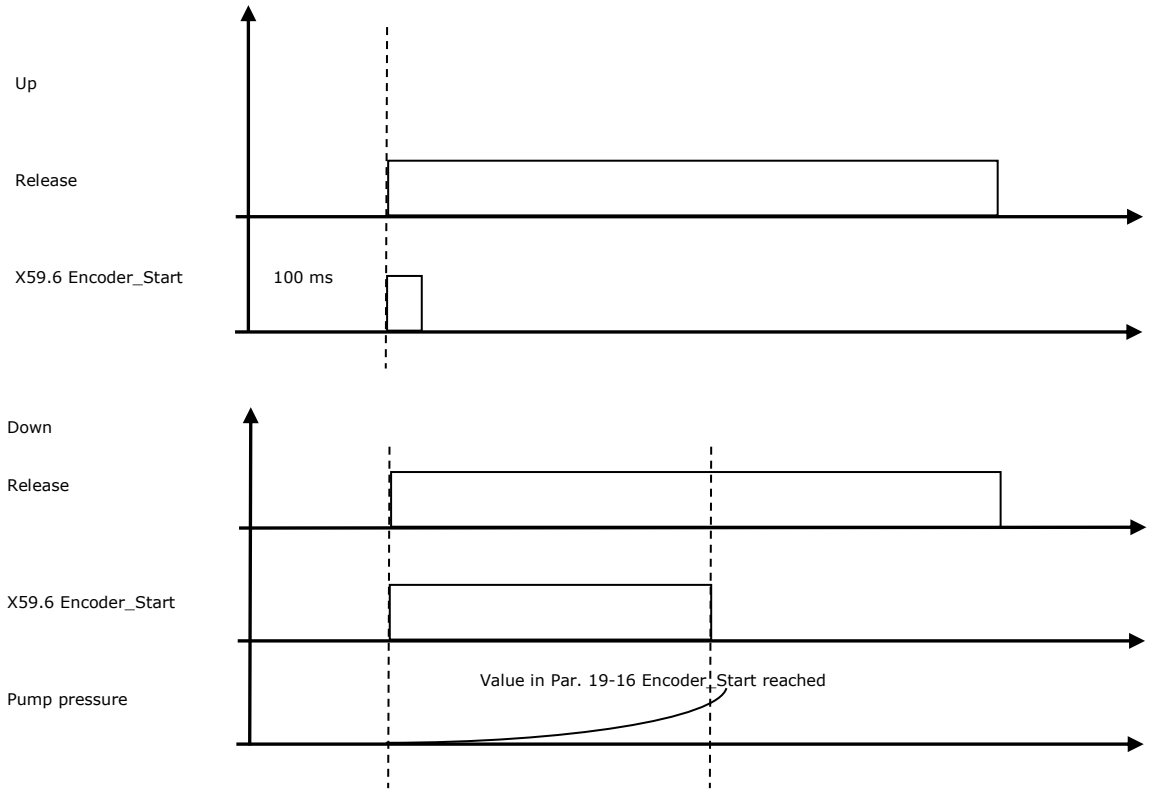
The level-converter converts the analogue 4- 20 mA- value of the measuring system into a clockwise resp. counter-clockwise rotating encoder signal with max.30 kHz.
At 12 mA (sensor adjustment/ oil power= 0) a 30 Hz fundamental frequency in positive direction is put out.

Attention: As a consequence of the higher resolution, for par. 19-74 (KProp) and 19. 75 (FFVEL) significantly lower values should be adjusted.

Via parameter 19- 26 Encoder Start the reference for oil flow = 0 of the analogue measuring system is imported, with the negative edge at output X59.6, when the preset pump pressure value is gained, in order to conduct a jerk-free, convenient operation.

Attention: The negative edge must always be operated before the activation of position control LD 302. Encoder Start par.19-16 < start pump par. 19-56

The positive edge at output X59.6 is set with release X57.1.
The difference between the two analogue values of the measuring system is subtracted after 2 sec within 1 sec.



Monitoring functions of the analogue measuring system:
Monitoring functions cannot be switched off.

Encoder monitoring:
With analogue current less than 4 mA or more than 20 mA, 4>I< 20, the encoder signal is switched off for 1 sec. Thus an encoder error is displayed in the frequency converter and saved in the error memory. The encoder monitoring (par. 32-09 On (2) = 2 channel monitoring) of LD 302 must be activated.

Consequence: By switching off the encoder signals the status LEDs at the MCO are switched off and the error message "encoder error" is generated. The LED shows a red light.

Monitoring mechanical stop of the measuring system:
The analogue measuring system has mechanical stops defined as follows:

Jumper J2 open:
Electrical terminals for orifice 1: min. 6.8 mA, max. 16.8 mA

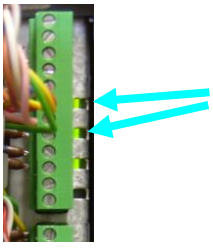
Jumper J2 closed:
Electrical terminals for orifice 2: min.5.005 mA, max. 18.950 mA

When the limit values are reached or surmounted for 0.05 sec, an error is generated. By switching off the encoder input of the converter,an error is shown for 1 sec .

Consequence: By switching off the encoder signals the status LEDs at the MCO are switched off and the error message "encoder error" is generated.

LED D22 shows a red light.

The encoder monitoring of LD 302 must be activated. Parameter 32-09 encoder monitoring On (2) = 2 channel monitoring.



Monitoring standstill:
If the active current during drive is < 11.5 mA or > 12.5 mA, the encoder signal is switched off for 1 sec. Thus an encoder error is displayed in the converter and saved in the error memory.
The encoder monitoring (parameter 32-09 On (2) = 2 channel monitoring) of LD 302 must be activated.

Consequence: By switching off the encoder signals the status LEDs at the MCO are switched off and the error message "encoder error" is generated. LED D22 shows a flashing red/blue light.

Adjustment of the analogue measuring sensor:

Before the adjustment of the sensor the main switch must be switched off and the clamping bolts released.

Then switch on voltage. When the converter has booted, shift the sensor horizontally until LED D22 shows a blue light. Then fix the sensor again.

Alternatively to the adjustment the function "Protocols" in LCP can be used. This is to be done the following way:

Push button „Quick Menu"

Press „Loggings"

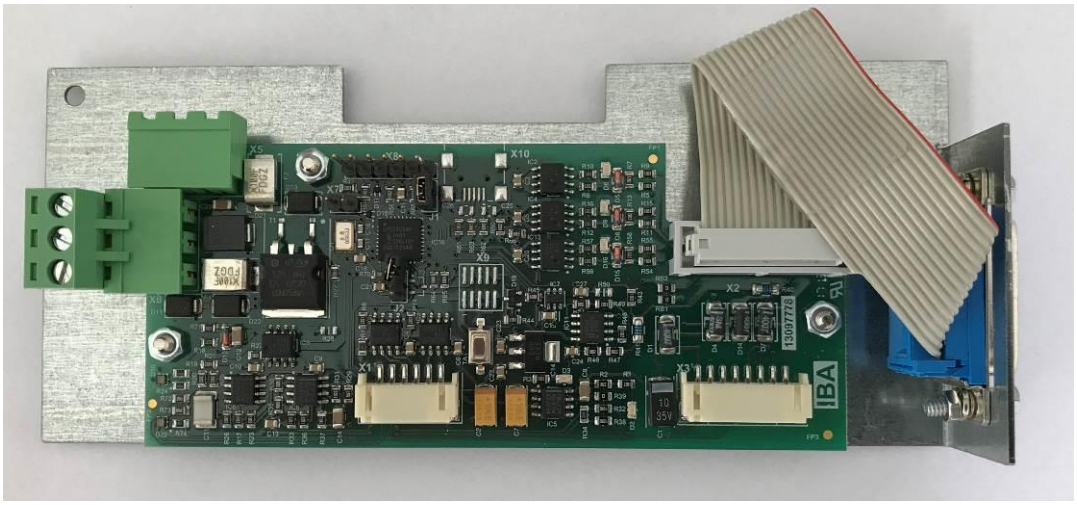
Here you see the actual deviation of the sensor from the zero position in "Actual velocity". The displayed value should actually be between + 200 and – 200.

Operation mode measuring system turbine:

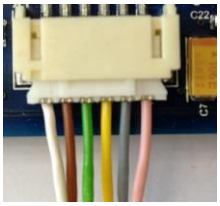
Jumper J1 position open
The signals are transferred directly to connection X55 by both encoders via a signal converter.

9.5.4 Mounting of PCB

The PCB is fixed on a metal carrier. There are two types of carriers, the carrier box for size A3 and B3 to be put into the converter, and the carrier for all other converter sizes that is fixed on the MCO.



X1 : Encoder cable to X55 MCO
Here the ready-for-use encoder cable (4001101b) is connected.

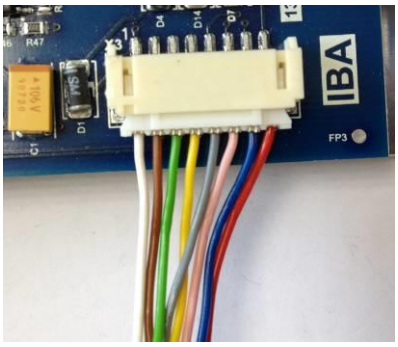


Pin	Colour	Terminal FU
1	white	X55.3 – 5V
2	brown	X55.4 – 0V
3	green	X55.5 – A+
4	yellow	X55.6 – A-
5	grey	X55.7 –B+
6	pink	X55.8 – B-

X2 = connection for D- Sub, 15 poles via ribbon cable
Here the D-Sub ribbon cable is connected with the D-Sub- connector, 15 poles, double-row (4001113). The ribbon cable has variable lengths so that it is possible to equip IP 55 case as well.

Pin D-Sub	Name	Pin D-Sub	Name
1	S2 24V – turbine 2	9	+20 mA analogue encoder
2	0V- turbine 1/ 2	10	55 - 0V pressure sensor
3	S2- turbine 2	11	53 - pump pressure
4	24 V – analogue encoder	12	24V- pressure sensor
5	0V- pressure sensors	13	54- system pressure
6	S1 24V – turbine 1	14	24V- pressure sensors
7	screen internal	15	0V analogue encoder
8	S1- turbine 1		

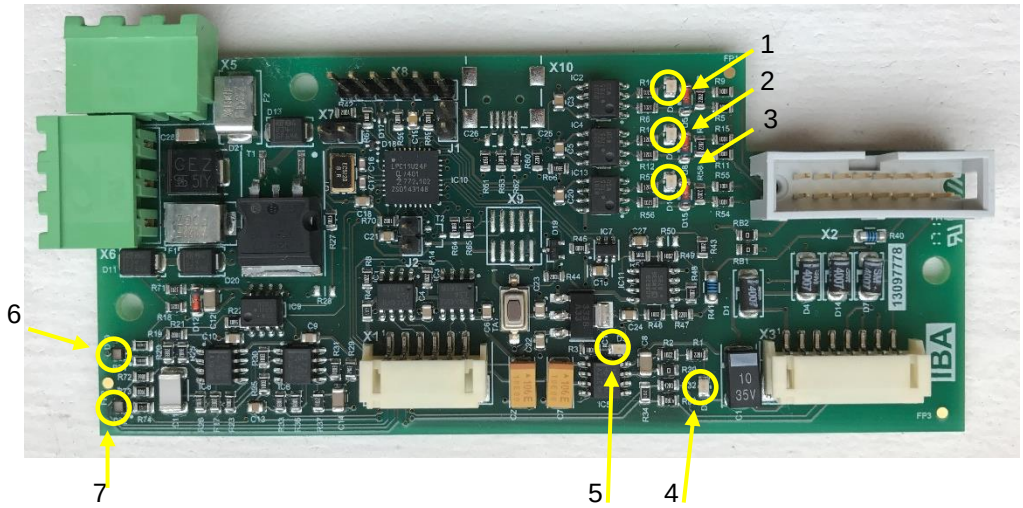
X3 = Internal Wiring (4001103b)



Pin	Colour	Terminal
1	white	13- 24V
2	brown	20- 0V
3	green	42- +20 mA
4	yellow	39- -20mA
5	grey	53- pump pressure
6	pink	54- system pressure
7	blue	55- 0V
8	red	X59.6 – Determines the point, from which the pump pressure of the analogue encoder is set to zero.

9.5.1 Monitoring the LEDs and their function

1) LED D6 –encoder line turbine 1 (S1)
2) LED D9- encoder line turbine 2 (S2)
3) LED D16- Signal encoder start X59.6
4) LED D2- voltage supply 24 Vdc (X3.1)
5) LED D3- voltage supply 5 Vdc from encoder entrance X55
6) LED D10- indication valve control voltage
7) LED D22- Monitoring and adjustment assistance, see table



LED D10 Display operation voltage prop- valve

LED D10 has two functions:

a) With correct wiring (voltage supply works) LED D10 shows a green light. With incorrect wiring LED D10 is not on!

b) LED changes to yellow - the valve is controlled by PWM. The wider the valve opens the more intensive the yellow colour.

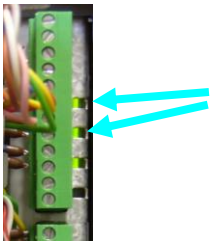
LED D22 Monitoring and adjustment assistance

LED D22 has several functions that are shown in the following table.

Function	I [mA]	Impact LED D22	Impact Function	State FU (Par 32-09=2)
Standstill monitoring				
	< 11,8	red/blue blinking	Encoder signals switched off	encoder error
	> 12,2	red/blue blinking	Encoder signals switched off	encoder error
Stop monitoring				
J2 open	< 6,51	red blinking	Encoder signals switched off	encoder error
	> 17,49	red blinking	Encoder signals switched off	encoder error
J2 closed	< 4,73	red blinking	Encoder signals switched off	encoder error
	> 19,27	red blinking	Encoder signals switched off	encoder error
Encoder monitoring				
	< 4	red	Encoder signals switched off	encoder error
	> 20	red	Encoder signals switched off	encoder error
Setting aid encoder				
	< 11,9	green	Movement car down	-
	11,9< I <12,1	blue	standstill	-
	> 12,1	yellow	Movement car UP	-
Setting aid spindle S				
	11,9< I <12,1	blue/white blinking	At Movement car	-

9.5.2 Monitoring the direction of rotation and function

The measuring system is wired by a 15-poles D-Sub-plug, coming from the hydraulics aggregate.



The evaluation of the speeds signals is done via encoder interface X55.
The screen of the encoder line must be put on the screening shield of the MCO next to plug X55.

The rotation direction of the measuring system must match the driving direction.

Select par.34-50, main menu.
Move cabin upwards by pump, the value in par. 34-50 must increase.
Move cabin downwards by emergency safety valve, the value in par. 34-50 must decrease.
The yellow control- LEDs (D6 & D 9) on the LC- printed circuit board must blink during action.

In case of incorrect the rotation direction
Operation mode measuring system turbine: The connection plugs of the measuring turbine sensors must be exchanged.
Operation mode analogue measuring system: The sensor must be turned.

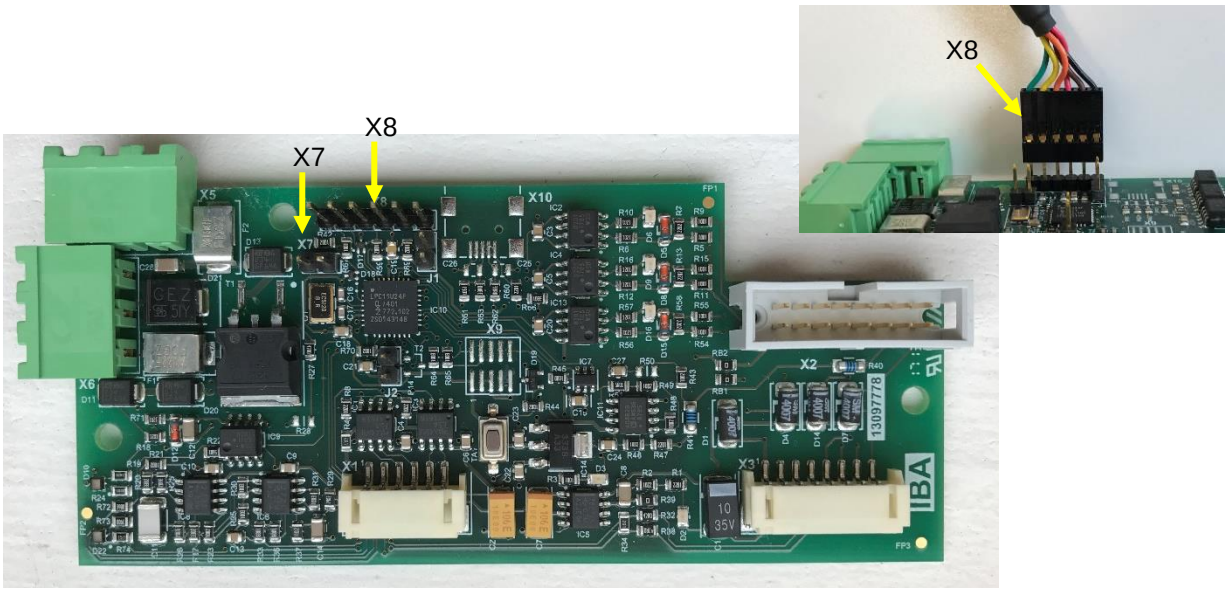
In par. 34-50 the actual speed is indicated. This parameter can also be used in order to adjust the zero-point of the analogue measuring system. (value about 255- 255) It is better, however, to adjust via LED D22.

Parameter	Value	Remark
34-50 actual position	0	During drive “up” the value must increase, during drive “down” The value must decrease.
34-58 actual speed	0	During drive the speed is indicated in 1/ 100 mm/sec.

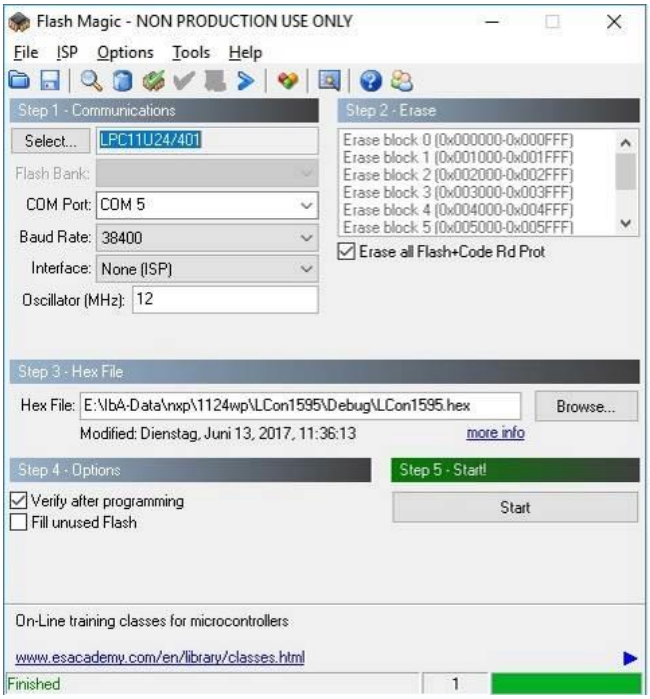
9.5.3 Putting new firmware on PCB

In deenergized state plug in Jumper X7 and connect via plug connector X8 to the computer. Implementing the software is done with the program "Flash Magic" via converter cable.
Typ: FTDI Chip, TTL-232R-3V3, Kabel, USB-open/up-UART

Attention: the black wire must be on the right, see picture. Then switch on voltage.



Start software "Flash Magic" that can transfer the program.



The following adjustments must be done:

Step 1:
Select CPU Typ: 1595/03: LPC11U24/401
1595/04: LPC11U24/301

Select
Adjustment COM Port
Baud Rate
Interface
Oscillator

Step 2:
No entry– tick off

Step 3:
Input of the file with the hex file to be transferred

Step 4:
No entry– tick off

Step 5:
Start transter

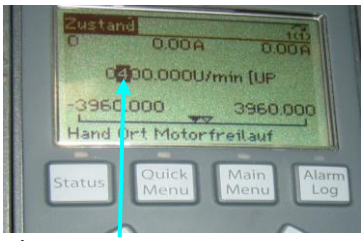
In voltage-free state remove Jumper X7. Then switch on Voltage.

9.6 Checking the motor connection

A) Operate the system using the releveling control.
It can now be operated manually if the safety chain is closed. The motor is not connected correctly if the pump cavitates. Please exchange the two motor phases.
Alternatively, **"1"** "Change rotational direction of motor" can be entered in parameter **1-06**.

B) Enter a call if the releveling control is not available.
The drive is now initiated if the safety chain is closed. Switch off the system immediately if the pump cavitates. The motor is not connected correctly. Please exchange the two motor phases.
Alternatively, **"1"** "Change rotational direction of motor" can be entered in parameter **1-06**.

C) Alternatively, it can also be operated manually using the converter.
Stop all drives.
Close the stopcock of the hydraulic system.
Enter **"1"** for parameter **19-59**.
Press the **"Manual On"** button. It can now be operated manually if the safety chain is closed.
Increase the motor rotational speed by pressing the **"Upward arrow button"**.
The motor is not connected correctly if pressure does not build up at a low rotational speed (1000,000 rpm) or if the pump cavitates. Please exchange the two motor phases.
End the process by pressing the **"Off"** button.



Íncrease the rotational speed value by 100 rpm in each

Parameter	Value	Remark
19-59 Pressure-relief valve setting	0	An irregular operating mode is activated using this parameter, which enables setting the pressure-relief valve or an irregular operation. After activation (1), press the "**Manual ON**" button. The safety chain must be closed to enable activation of the drive. Adjust the rotational speed in the range of the rated motor speed before you start setting up the valve. End the process with the "OFF" button. In case of DCP operation, the overpressure test can be conducted with the direct input of the motor rotational speed. It is started if terminal 37, terminal 57.1 and the UP direction, terminal 57.2 are all switched. The motor operates via a fixed ramp of 10 sec at the set rotational speed, and then persists. If one of the terminals deactivates, the rotational speed value is set to "0".
1-06 Change direction of rotation of motor	0	The direction of rotation of the motor is changed by entering the value **"3"**. Data value changes should be documented.

9.7 Determining the start-up voltage

The system can be installed safely with the given default values.

For the first trip, however, a calibration should be carried out with an empty cabin at an ambient temperature between 10°C and 30°C.

a) Determine the speed coefficient "Start rpm down"

The motor speed pre-control is determined and stored in 19-57 "Start rpm down". The value must be >"0".

The value will be determined in the "UP" direction of travel.

Set parameter 19-06 = index "2" and give a call in "UP" direction. The index is set to "0" after the end of the journey.

b) Valve release voltage determination for normal driving and evacuation

The value will be determined in the "DOWN" direction of travel.

Set parameter 19-06 = index "3" and give a call in "DOWN" direction. The index is set to "0" at the end of the journey.

After the end of the journy, the determined value of the starting voltage for normal driving is stored in 19-51 "Prop Offset Start DOWN". The value determined for the evacuation is stored in parameter 19-09 "Eva Prop Offset" without a decimal place.

The setting must be checked on site!

9.8 Valve check

The valve check can be carried out either at the start of the journey or when running in.

The setting is made in parameter 19-06 "Evacuation test". If you enter "0x" (x any entry), the valve test is carried out during running-in. If you enter "1x" (x any entry), the valve check is carried out at the beginning of the journey.

Valve check during running-in, parameter 19-06 = 0x:

Parameter 19-03 "Valve measured value" shows the maximum time that the valve needed to adjust from the target pressure (50% - 80% system pressure) to 50% system pressure. The value is displayed in seconds. If the valve threshold exceeds the time set in 19-04 "Valve Threshold", the system is assumed to be faulty. A valve error will be displayed.

Valve check at the start of the journey, parameter 19-06 = 1x:

In parameter 19-03 "Valve measured value" the difference from 19-95 to 19-51 is displayed in percent at the start of the journey. If the difference falls below that value in 19-04 "Valve Threshold", it is assumed that the system is faulty. A valve error will be displayed.

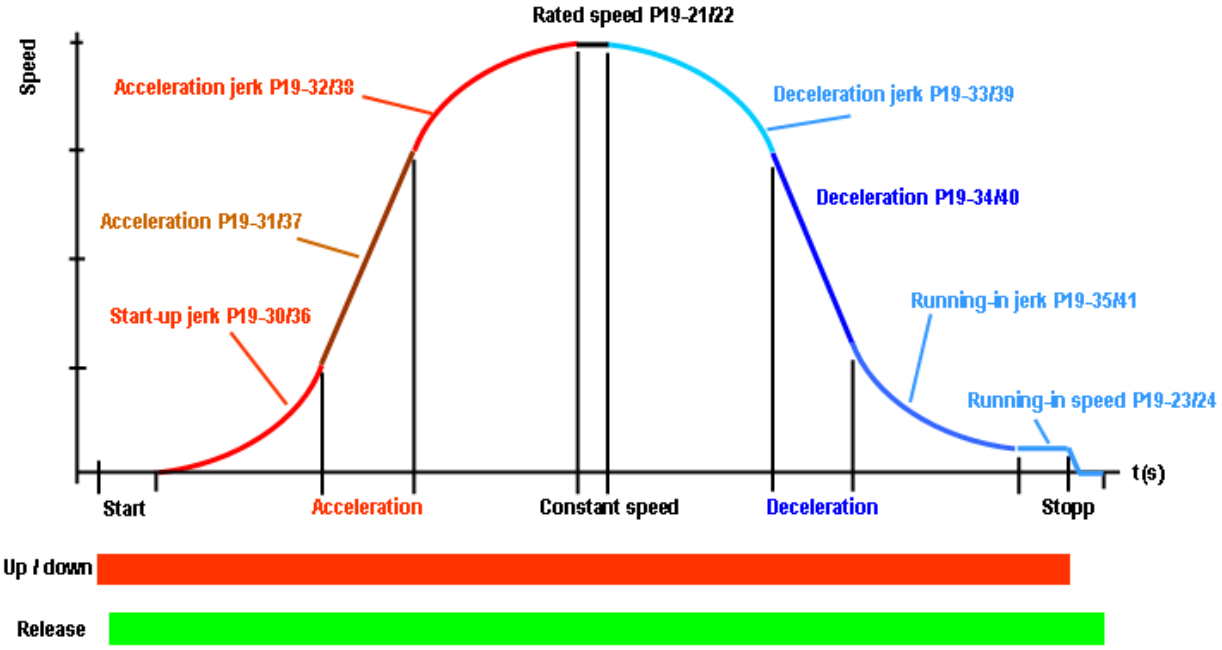
9.9 Driving curve parameter

As one can see on the basis of the curve, it is divided into an acceleration curve, a constant drive and a deceleration curve. All shown curve sections can be affected and the driving comfort can be adapted individually depending on the driving direction

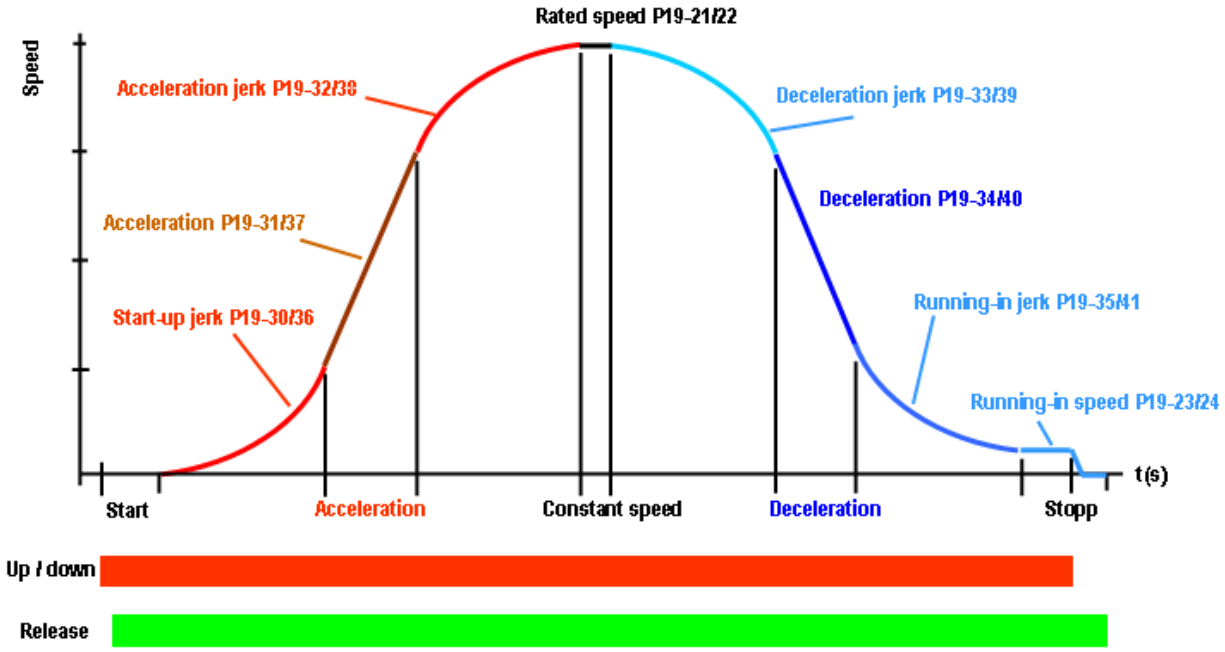
The settings made are saved by pressing the **OK** button.

If you want to reset all the entries made, to the previous status, copy back the data record saved in the LCP.

The individual curve sections are dealt with below.

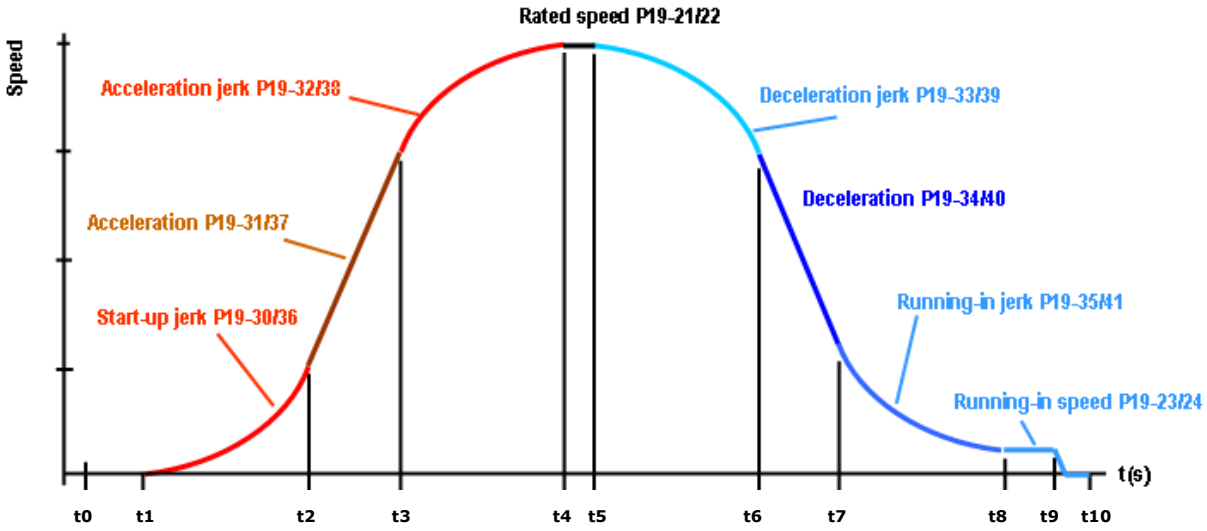


Parameter	Value	Remark
19-20 max. speed [m/s]	500	This speed is the defined system speed based on which the overspeed and other internal speeds, amongst other things, are calculated.
19-21/22 Rated speed V4 [m/s]	500	The rated speed is selected if the input **X57.2 "UP"** or **X57.3 "DOWN"** and **X57.4 "V4 Quick drive"** has been activated. **V4** can also be activated via **DCP**.
19-23/24 Running-in speed **Vo** [m/s]	35	The running-in speed is selected if one of the direction inputs **X57.2** or **X57.3** has been activated. Determines the drive speed during running-in and readjustment. **Vo** can also be activated via **DCP**.
19-25 Inspection speed Vi [m/s]	250	The inspection speed is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.5 "M intermediate speed"** has been activated. **Vi** can also be activated via **DCP**. Terminal **37 (SafeStop)** and terminal **X57.1** is always switched in case of inspection speed **"Stop"**. This is an instant stop during which the motor is operated. This can lead to a small sudden drop. **Vi** can be set to max. 0.63 m/sec. **Vi** is considered to be the inspection drive till the drive stops, although other speeds are selected in the meantime. If **Vi** is 80% larger than **Vmax**., the pilot valve is not regulated to 50% system pressure. **ATTENTION** This leads the cabin to drop suddenly!
19-26 V3 speed [m/s]	300	This speed is the first intermediate speed "Z_1" which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.4** and **X57.5** has been activated. **V3** can also be activated via **DCP**.
19-27 V2/speed [m/s]	300	This speed is an intermediate speed that can be activated via **DCP**.
19-28 V1/speed [m/s]	300	This speed is an intermediate speed that can be activated via **DCP**.
19-23/24 Re-levelling speed Vn [m/s]	15	The re-levelling speed is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.6 "N re-levelling speed"** has been activated. Determines the drive speed during readjustment. The speed is applied until the **"stop"** level and the direction input **X57.2** or **X57.3** drops. **Vn** can also be activated via **DCP**.



Parameter	Value	Remark
19-30/36 Start-up jerk,Up/down [m/s³]	100/150	The set value determines the jerk in the first phase of the acceleration for the **"UP" /"DOWN"** driving direction. Smaller values result in a smoother acceleration during start-up.
19-31/37 Acceleration, Up/down [m/s²]	300	The set value determines the maximum acceleration for "UP" / "DOWN" on the target speed.
19-32/38 Acceleration jerk,Up/down [m/s³]	300	The set value determines the jerk at the end of the acceleration for the "UP" / "DOWN" driving direction. An overshoot after attaining the target speed can be prevented with higher values, especially in case of difficult mechanical conditions.
19-33/39 Deceleration jerk, up/down [m/s³]	600	The set value determines the jerk in the first phase of the deceleration for the "UP" / "DOWN" driving direction. Higher values, in combination with par. 19-32/33 and 19-36/37, result in a shorter braking distance.
19-34/40 Deceleration, up/down [m/s²]	700	The set value determines the maximum deceleration for UP / DOWN on the running-in speed.
19-35/41 Running-in jerk,up/down [m/s³]	150	The set value determines the jerk when the running-in speed for driving direction "UP" / "DOWN" is attained. Higher values lead to a forceful running-in with shorter braking distances.

9.10 Driving curve „UP" adjustment – Main Menu



Legend:

t0: The drive is initiated by the lift control system.
If there is a shutdown, a restart is only possible when the actual speed is less than 0.01 m/s. This ensures that it cannot be started against a rotating motor in case of an "instant stop". Using the direction switch, the converter controls whether the pressure sensors are available. A minimum value of 3.8 mA is expected. The output "contactor on" is activated if LD 302 HDR is ready to start. As a result, the release is switched and subsequently, the motor current is connected. If the quick start function is requested, this should be switched with the direction. The parameters depending on encoders (KPROP, FFVEL,VELMAX and POSFC_Z) are loaded according to driving direction.

t1: The quick start is cancelled and LD 302 HDR starts-up with a linear ramp. The starting speed, using which the initial pressure is generated, is calculated from P19-15 "Reference pressure". The larger the value, the smoother is the start-up. Operation in winter is started with half the value. The change from constant speed increase to the start-up jerk takes place if the system pressure is increased by 1 bar. As a result, it is then operated with the set jerk and acceleration values. If the quick start function is not used, the release switch is operated at time **t0**.

t2: The speed has attained the set control speed 1.

t3: The speed has attained the set control speed 2.

t4: The acceleration is reduced and a constant drive speed is attained.

t5: The concerned drive speed is switched to 0 V. The converter initiates the deceleration with the set jerk and deceleration values.

t6: The speed has attained the set control speed 2.

t7: The speed has attained the set control speed 1.

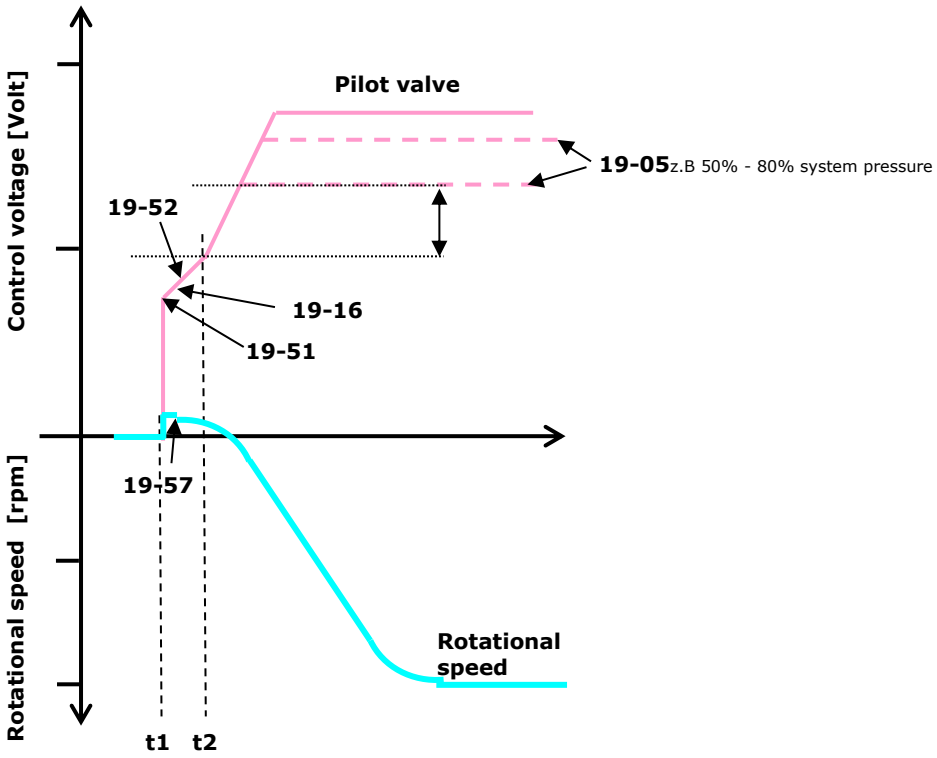
t8: The running-in speed is attained.

t9: The lift has almost attained the levelling position; the control system switches off. The converter ramps down from the running-in speed $\mathbf{V_0}$ through zero in the negative speed range and the down operation main valve is closed safely.

t10: After the expiry of the idle time, the motor current is switched off and the output "contactor on" is deactivated.

9.11 Advanced driving curve „DOWN" setting – Main Menu

9.11.1 Parameter for downward start up



Legend:

t1 : If there is a shutdown, a restart is only possible when the actual speed is less than 0.01 m/s. As a result, it is ensured that it cannot be started against a rotating motor in case of "instant stop". The converter is activated using **"DOWN"** direction, contactor output on has been set, the release is now applied and output X59.6 is on. The motor is supplied with current and the pilot valve is pilot-controlled as per **19-51**.

t1 to t2: The converter sets the motor to the value set in **19-57**. With that, the pump builds up slight pressure. The pilot valve is loaded simultaneously with increasing voltage (ramp **19-52**).

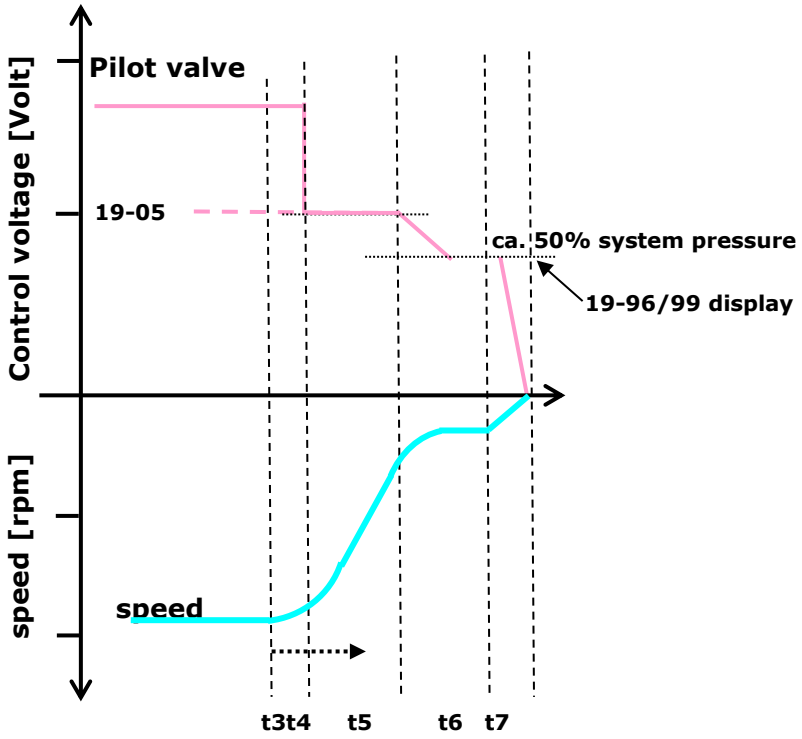
With the analogue measuring system via the encoder start **(19-16)** the point is determined from which the pump pressure of the encoder is set to zero. When the adjusted pressure is gained, the output X59.6 is switched off. The adjustment value must always be lower than the value from par**. 19-56.**

If the pump pressure - consisting of the pressure components from the pump (19-57) and the opening ramp of the opening pilot valve (19-51) - reaches the pressure value (t2) set in Par 19-56, 19-52 is further ramped up by 2% .

ab t2: The motor speed is accelerated in a controlled manner in the negative (downward) direction. The oil flow increases with that. The oil flow rate is set depending on the load and the system. The increasing oil flow rate generates a motion of the measuring system. The regulation is switched abruptly and the drive is accelerated further with the jerk values from par. **19-36**. The pilot value is activated with the ramp gradient specified in par. **19-53**.

If the applied speed of speed V4, Para. (19-21/22), the pilot valve is further ramped up by 2% after reaching the pump pressure from Par 19-56 and then to a value from Param. 19-05 (e.g. 70% system pressure). As a result, a shortened emergency stop path is achieved due to the reduced pilot valve position, small remaining travel.

9.11.2Parameter for downward running-in



Legend:

T3: The pilot valve has a manipulated variable from the control on Param. 19-05 (e.g. 70% of the system pressure). The run-in speed is commanded and the drive decelerates with the value specified in par. 19-39. During the deceleration, the control value of the pilot valve is frozen. If the pump pressure falls below half the system pressure during this time, the valve will be adjusted (opened). The valve is further regulated to half the pump pressure. The elevator is further decelerated to running-in speed using par. 19-40 and 19-41. The speed control (oil flow) is still active.

T4 bis t5: The lift is decelerated further to the running-in speed using par. **19-40** and **19-41**.

T5: The voltage of the pilot valve is reduced according to the pump pressure to approx. 50% system pressure. The speed control (oil flow) is still active.

T6: Stop: All jerk values are set to 3 times the value. The engine is run at speed 0. The valve is completely closed. When the valve closes, the motor is switched off and the pilot valve and output 29 are de-energized. At the speed Vnach (or Vo as Vnach) the valve is closed immediately.

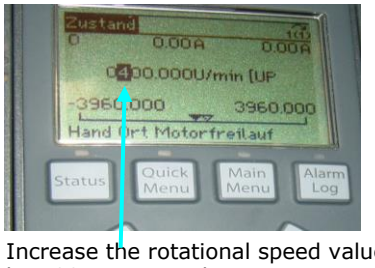
T7: The motor continues to be energized for a short time to prevent sagging. The direction of travel down is no longer applied, the elevator is switched off.

The function of the pilot valve is always monitored when it is supposed to readjust the pressure. There are 2 test parameters for this purpose, Par. 19-03 and Par. 19-04 (not accessible via DCP or CanOpen).

10 Additional functions

10.1 Inspection of safety valve

Stop the cabin in the lowermost stopping position. Ensure that there are no passengers in the cabin or that they are not entering the cabin.
Stop all drives.
Close the stopcock of the hydraulic system.
Enter **"1"** for parameter **19-59**.
Press the **"Manual On"** button. It can now be operated manually if the safety chain is closed.
Increase the motor rotational speed by pressing **"Upward arrow button"** until the pressure displayed on the pressure gauge remains constant.
End the process by pressing the **"Off"** button.



Increase the rotational speed value by 100 rpm in each case.

Parameter	Value	Remark
19-59 Pressure-relief valve setting	0	An irregular operating mode which enables setting the pressure-relief value is activated using this parameter. After activation (1), the "**Manual ON**" button must be pressed. The safety chain must be closed to enable the activation of the drive. Adjust the rotational speed in the range of the rated motor speed before you start setting up the valve. In case of DCP operation, the overpressure test can be conducted with the direct input of the motor rotational speed. It is started if terminal 37, terminal 57.1 and the UP direction, terminal 57.2 are all switched. The motor operates via a fixed ramp of 10 sec at the set rotational speed, and then persists. If one of the terminals deactivates, the rotational speed value is set to "0".
19-98 Pump pressure	0	Current measured value on the pump pressure sensor I. Check the plausibility of the displayed pressure [mbar]
19-99 System pressure	0	Current measured value on the system pressure sensor II Check the plausibility of the displayed pressure [mbar]

10.2 Overload detection (output relay 1)

LD 302 HDR enables load detection using a special evaluation of the system pressure sensor.
LD 302 HDR determines the loaded pressure [bar] and thereby the total weight using the connected pressure sensor II. If the total set weight in parameter **19-72** is exceeded, relay 1 is switched according to the selection in parameter **19-71**. The selection in parameter **19-71** depends on lift control system.

The following adjustments of the relay 1 are possible:

Parameter 19-71	Overload	Relay 1
0	X	off
1	No	off
1	Yes	on
2	X	on
3	No	on
3	yes	off

Parameter	Value	Remark
19-71 Load weighing	0 (2)	Using this function, the total weight (cabin + load) can be evaluated and, if required, used for overload detection. Enter "1"(3) for activation.
19-72 Max. weight total [kg]	10000	Here, enter the total permissible weight (cabin + load capacity) for weighing the load. The result of the evaluation can vary slightly depending on the floor.
19-76 Max. value pressure sensor	100	The rated pressure of the pressure sensor is set here. Please refer to the datasheet for the data.
19-91 Current load [kg]	X	Display the existing total determined load and cabin. The displayed value can vary depending on the floor
16-71 Relay outputs	0000**1**0000	Display of relay output 1 active

10.3 Partial load evaluation (output relay 2)

LD 302 HDR determines the loaded pressure using the connected pressure sensor II. Relay 2 is switched if the set switching threshold [bar] in **19-73** is exceeded.
Parameter **19-99** displays the current system pressure in bar.

Parameter	Value	Remark
19-73 Switching threshold 1	1	If the set pressure is exceeded, output relay 2 is active. For instance, this function can switch on relay 2 from a specific pressure (load) onwards. Relay 2 provides a changeover contact.
19-99 Current pressure	X	Current measured value on system - pressure sensor II (system pressure). Check the plausibility of the displayed pressure [bar]
16-71 Relay outputs	00000**1**000	Display the relay output 2 active

10.4 Variable conveying speed

The variable conveying speed helps in limiting the power input on the mains side. LD 302 HDR determines the total weight of the cabin and passengers by means of pressure measurement. The maximum speed for this load condition is calculated from this, taking into consideration the power limitation in the parameter **19-46**.
The entry way compensation function can be switched on using the parameter **19-78** off. This means that the converter itself calculates the braking point for attaining $\mathbf{V_0}$ with the load-dependent speed, and the differential distance is driven further with the applied speed. The same applies for the intermediate speeds **V3** to **V1**.

Note:
In case of activated variable conveying speed function, it must be ensured that the speed **Vi** should be used exclusively for **inspection operation**. If "quick" inspection had to be selected, the converter operates, if applicable, in accordance with the braking distance calculation.

Parameter	Value	Remark
19-45 Variable speed	0	The maximum output power on the motor can be reduced using this function. **0= function deactivated, 1= function active**. This function should only be activated or deactivated if this is specified in accordance with the system design.
19-46 Max. Motor power [kW]	4,500	This parameter is used in the variable speed operating mode to limit maximum motor power.
19-47 K Fact up [%]	55	Optimisation parameter for the variable speed operating mode; Enter the power factor for the **"UP"** direction in %. In case of upward drive, if the value displayed in par. **16-10** is larger than the value set in par. **19-46**, please decrease par. **19-47.**
19-48 K Fact down [%]	40	Optimisation parameter for the variable speed operating mode; Enter the power factor for **"DOWN"** direction in %. In case of downward drive, if the value displayed in par. **16-10** is larger than the value set in par. **19-46**, please decrease par. **19-48.**
19-78 Run in correction comp.	0	Calculation of the differential distance from the loaded braking point calculation for attaining $\mathbf{V_0}$. The function is equally active for variable conveying speed as well as for operation in winter. **0= function deactivated, 1= function active.**
16-10 Power [kW]	X	Displays the current power consumption in Watt.

10.5 Operation in winter

All jerks, all accelerations, the rated speed **V4** as well as the intermediate speeds **V3** to **V1** are reduced internally. The inspection speed is set to the running-in speed. The starting rotational speed is reduced to half.

In case of reduced speed, the respective braking distance is re-calculated and the differential distance is covered further with the applied speed (for this, refer to the braking distance calculation section). With that, an extended "slip-in" is prevented. The entry way compensation function can be switched on using the parameter **19-78** off.

Operation in winter results in slower start-up and stopping times. In case of start-up and running-in time monitoring, it should be ensured that the times in the control system should be adapted, if required.

Note:
If the operation in winter function is activated, it must be ensured that the speed **Vi** should be used exclusively for the inspection operation. If "quick" **inspection** had to be selected, the converter operates, if applicable, in accordance with the braking distance calculation.

Parameter	**Value**	**Remark**
19-78 Run in correction	0	Calculation of the differential distance from the loaded braking point calculation for attaining **V_0**. The function is equally active for variable conveying speed as well as for operation in winter. **0= function deactivated, 1= function active.**
19-79 Operation in winter	0	The operation in winter can be set manually using this function. **0= function deactivated, 1= function active**. Or activation takes place via **terminal 19** (thermostat) for the operation in winter. Activation is active with a 24 V signal.

10.6 Brake distance adaption (entry way compensationn)

If the control system has **"calibrated drive"** function, the **"variable conveying speed"** and / or **"operation in winter"** function should be switched off.

The braking distance calculation calculates the distance from the braking point until $\mathbf{V_0}$ is attained, depending on the respective applied load. The speed-dependent, current stop distance is displayed in para. **19-94**. An allowance of about 100 mm should be considered for the stop distance position in the control system.

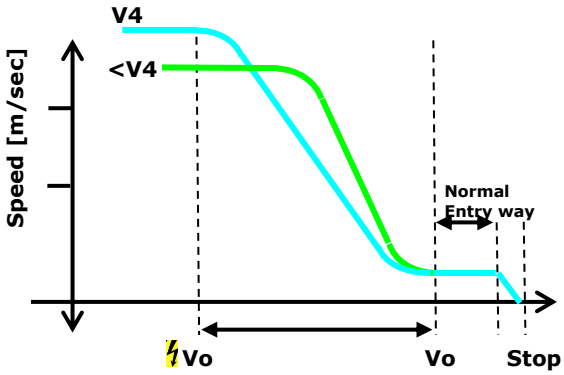
V4 braking distance up to $\mathbf{V_0}$ is calculated by the known value from **V4** and the associated deceleration with the corresponding jerk values. The respective braking distance is recalculated from the current values in case of deviating, load-dependent **V4** target speed. The resultant differential distance is driven further with the concerned speed. With that, extended entry way distances are avoided. The same applies for all pre-determined target speeds from **V3** to **V1**.

The stop distance is calculated in case of variable conveying speed and operation in winter for all speeds that cannot be added to the respective target speeds.

The entry way compensation function can be switched on using the parameter **19-78** off. Separate switching is not possible for only one operating mode.

If one of these speeds is used as **inspection speed**, a delayed braking action should be taken into account. Due to this, we recommend the use of the inspection speed and the running-in speed for the inspection operation.

Attention: Calibration drives only if the operation in winter function is switched off and P = const.
Par. 19-45 / 19-79 = 0 and operation in winter input pin 19 = 0 V.



Distance calculation

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Parameter	Value	Remark
19-49 Correction distance [mm]	0	Possible error sources from turbine signal and oil viscosity can be balanced out with this parameter. If the running-in distance is too short, the distance can be extended by increasing the setting value. The value can also have a negative input.
19-78 Run in correction	0	Calculation of the differential distance from the loaded braking point calculation for attaining $\mathbf{V_0}$. The function is equally active for variable conveying speed as well as for operation in winter. **0= function deactivated, 1= function active.**
19-94 Deceleration distance [mm]	X	Displays the current stop distance from the currently driven speed in mm.

10.7 Proportional valve test operation mode turbine

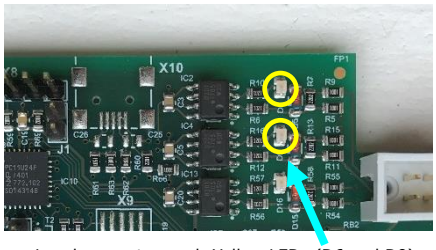
The following function helps in setting the spindle "S'. Note the instructions of the hydraulic power unit manufacturer.

For this, operate the lift at least one floor in the **"UP"** direction. The pilot valve is supplied with 9 Vdc by entering the value **"2"** in parameter **19-58** and a subsequent call in the "**DOWN**" direction.

Level-Converter PCB: LEDs **D6 & D9** should flicker.

Follow the setting instructions of ALGI.

After the setting process ends, the process is aborted by switching value **"2"** to **"0"** twice.



Level converter card: Yellow LEDs (D6 and D9) show the signals of the measuring turbine and must "flicker"

Parameter	Value	Remark
19-58 Prop valve test	0	The valve is opened with 9 Vdc in case of stationary motor, by entering the value **"2"** and by a subsequent call in the **"DOWN"** direction. The function displays flickering of LEDs **D6 & D9**. The process is aborted by switching value **"2"** to **"0"** twice. Otherwise a synchronisation error results in an abort; the converter restarts.

11 Parameters for parameterization and Main Menu

11.1 Parameter lists for parameterization

Access to the parameters can be restricted. For this purpose, the selection of the accessible parameters can be defined in parameters 19-88. These parameters are then only visible. With the bus control, the parameters are grouped together to make it easier to find your way around.

19-88 Param.selection 0

0= Function deactiviert, **factory setting**
1= Fast Boot Function activ. When the function is activated, the 19th parameter set is switched on when the voltage is switched on not visible uploaded. The display can be activated for the LCP by saving with "OK" "Cancel".
2= operation. The parameters that are not relevant for operation are hidden here.

Parameter list

The parameters can be reached via the quick menu, the main menu or the bus control. Accessibility is listed below.

Parameter	Remark	Quick Menü	Factory Main Menü	Operation Main Menü	DCP/CAN
001	Language	x	x		x
106	Direction of rotation				x
120	Rated motor power"	x	x		x
122	Rated motor voltage		x		x
124	Rated motor current		x		x
125	Rated motor speed		x		x
164	Resonance damping		x		x
165	Reson.damp. time constants		x		x
1401	Clock frequency		x		x
1403	Overmodulation		x		x
1450	EMV-Filter		x		x
1662	Input terminal 53		x		x
1664	Input terminal 54		x		x
1671	Relay outputs		x		x
1901	Motor number		x		x
1902	Cos Phi		x		x
1903	Valve measured value		x	x	x
1904	Valve timeout		x		x
1905	Setpoint pressure		x		x
1906	Evacuation test		x		x
1906	01 = Evacuierung test			x	
1906	02 = Speed coefficient UP			x	
1906	03 = Control voltage DOWN			x	
1907	Eva Kp		x		x
1908	Eva profile		x		x
1909	Eva prop.offset		x		x
1910	Pump volumes	x	x		x
1911	Measure system volumes	x	x		x
1912	Suspension	x	x		x
1913	d piston	x	x		x
1914	Number ofpistons	x	x		x
1915	Ramp start UP		x		x
1916	Encoder start		x		x
1917	KKOR		x		x
1918	P1-66		x		x
1919	Run-in distance		x	x	x
1920	Max. speed	x	x		x
1921	V4 UP fast	x	x	x	x
1922	V4 DOWN fast	x	x	x	x
1923	V0 UP running-in	x	x	x	x
1924	V0 Down running-in	x	x	x	x
1925	Vi inspection	x	x	x	x
1926	V3 intermediate speed	x	x	x	x
1927	V2 intermediate speed		x	x	x
1928	V1 intermediate speed		x	x	x
1929	Vn relevelling speed.	x	x	x	x
1930	Start-up jerk UP		x	x	x
1931	Acceleration UP	x	x	x	x
1932	Acceleration jerk UP		x	x	x
1933	Deceleration jerk UP		x	x	x
1934	Deceleration UP	x	x	x	x

Parameter	Remark	Quick Menü	Factory Main Menü	Operation Main Menü	DCP/CAN
1935	Running-in jerk UP		x	x	x
1936	Start-up jerk DOWN		x	x	x
1937	Acceleration DOWN	x	x	x	x
1938	Deceleration jerk DOWN		x	x	x
1939	Deceleration jerk DOWN		x	x	x
1940	Deceleration DOWN	x	x	x	x
1941	Running-in jerk DOWN		x	x	x
1942	Reserved			x	
1943	Control speed V1		x	x	x
1944	Control speed V2		x	x	x
1945	Variable speed P const		x		x
1946	Max. Motor power		x		x
1947	K-Factor UP		x		x
1948	K-Factor DOWN		x		x
1949	Correction distance		x		x
1950	Max.prop.valve distance		x		x
1951	Prop.offset start DOWN		x		x
1952	Open valve speed 1		x		x
1953	Open valve speed 2		x		x
1954	Prop offset Down running-in		x		x
1955	Close valve speed		x		x
1956	Pump pressure start Down		x		x
1957	Start rotational speed DOWN		x		x
1958	Prop. valve test		x		x
1959	Pressure-relief value setting		x	x	x
1960	Start valve close		x		x
1961	DCP/Can-Status		x		x
1962	DCP/Can-Command		x		x
1963	Motor adaption		x		x
1964	Save		x		x
1965	------				
1966	Dig.Serial		x	x	x
1967	------				
1968	Time delayed release		x		x
1969	Compatibility activation		x		x
1970	------				
1971	Load weighing	x	x	x	x
1972	Max. weight total	x	x	x	x
1973	Switching threshold 1	x	x	x	x
1974	KPROP		x		x
1975	FFVEL		x		x
1976	Max. value pressure		x		x
1977	------				
1978	Entry way compensation		x	x	x
1979	Winter operation		x	x	x
1980	Error number		x	x	x
1981	Error code		x	x	x
1982	Error time		x	x	x
1983	Reset error log		x	x	x
1984	Offset adjustment		x		x
1985	Monitoring valve		x		x
1986	Reserved		x		x
1987	Reserved		x		x
1988	Parameter Selection		0	2	
1989	USER PAR 89		x		
1990	H_B_3.00 B117		x	x	x
1991	Info current load		x	x	x
1992	Info status		x	x	x
1993	Info speeds		x	x	x
1994	Info deceleration distance		x	x	x
1995	Info valve theshold		x	x	x
1996	Info prop.-valve		x	x	x
1997	Info DCP/CAN-status		x	x	x
1998	Info pump pressure		x	x	x
1999	Info system pressure		x	x	x
3267	Max. tolerated positi.error		x		x
3450	Actual position		x		x

11.1.1 Parameter groups for remote parameterization via DCP3 / CanOpen:

Param.	Remark
Category	Motor
1901	Motor number
120	Rated motor power
123	Rated motor frequency
124	Rated motor current
125	Rated motor speed
1902	Cos Phi
106	Direction of rotation
1963	Motor adaption
1964	Save
Category	Speeds
	Running-in way
1920	Max. speed.
1921	V4 UP fast
1922	V4 Down fast
1923	V0 UP running-in
1924	V0 Down running-in
1925	Vi Inspection
1926	V3 intermediate speed
1927	V2 intermediate speed
1928	V1 intermediate speed
1929	Vn relevelling speed
1930	Start-up jerk UP
1931	Acceleration UP
1932	Acceleration jerk UP
1933	Deceleration jerk UP
1934	Deceleration UP
1935	Running-in jerk UP
1936	Start-up jerk Down
1937	Acceleration Down
1938	Acceleration jerk Down
1939	Deceleration jerk Down
1940	Deceleration Down
1941	Running-in Down
1943	Control speed V1
1944	Control speed V2
1964	Save
Category	Ups-Operation
1906	Evacuation test
1907	Eva KP
1908	Eva profile
1909	Eva prop. offset
1964	Save

Param.	Remark
Category	Valve
1950	Max. distance of prop valve
1951	Prop. offset start Down
1952	Open speed 1 valve
1953	Open speed 2 valve
1954	Prop offset valve off
1955	Speed valve off
1905	Setpoint pressure
1956	Pump pressure start Down
1957	Start speed Down
1960	Start valve close
1958	Prop. Valve tst
1959	Set over pressure
1904	Valve timeout
1903	Valve measured value
1985	Valve control
1964	Save
Category	Hydraulics
1910	Pump volumes
1911	Measure system volumes
1912	Suspension
1913	d piston
1914	Number of pistons
1915	Ramp start Down
1916	Encoder start
1917	KKOR
1964	Speichern
1976	Max.Wert Drucksensor
Category	Load capacity
1945	Var. Speed.P const.
1946	Max. Motor power
1947	Correction factor up
1948	Correction factor down
1949	Correction factor distance
1971	Load weighing
1972	Max. Total weight
1973	Pressure Switching threshold 1
1964	Save
Category	Regulation
1966	Dig_serial
1979	Winter operation
1974	KPROP
1975	FFVEL
1978	Running-in dist. compens.
1964	Save

Param.	Remark
Category	Error log
1980	Error number
1981	Error code
1982	Error time
1983	Delete error mem.
Category	Actual values
1990	Hyd 302 B117
1991	Info Current load
1992	Info status
1993	Info speeds
1994	Info deceleration distance
1995	Info valve threshold
1996	Info prop. valve
1997	Info DCP/CAN status
1998	Info pump pressure
1999	Info system pressure
123	Motor frequency
124	Motor current
1983	Delete error mem.
Category	Service
	Language
	P1-66
164	Resonance damping
165	Reson.damp. Time constants
1401	Clock frequency
1403	Overmodulation
1450	EMC filter
1968	Time-delayed release
1969	Activation compatibility
1988	Parameter selection
1986	KL Parameter
1987	KL Value
3267	Max. tolerated positi. error
3450	Actual position
1662	Analoge input terminal 53
1664	Analoge input terminal 54
1671	Relay outputs
1964	Save

11.2 List of relevant parameters - Main Menu

Parameter	Value	Remark
00-50 LCP copy	1	Copies the converter data to the LCP
00-50 LCP copy	3	Restoring the data of the converter from the LCP
0-60 Access protection	XXXX	Define and enter the password (please note down the password).
0-61 Access protection	0	[complete]
0-61 Access protection	1	[read-only]
1-01 Control principle	1 [0]	Setting Flux vector without encoder. Attention: check parameter 4-58 after changing Setting VVCplus. Attention: check parameter 4-58 after changing
1-06 Clockwise direction	0	The direction of rotation of the motor is changed by entering the value **"1"**. Data value changes should be documented.
1-20 Rated motor power	x	Enter the rated motor power. Enter the rated motor power corresponding to the specification plate.
1-22 Rated motor voltage	x	Enter the rated motor voltage in Volt. Enter the rated motor voltage corresponding to the specification plate.
1-23 Rated motor frequency	x	Enter the motor frequency in Hz. Enter the rated motor frequency corresponding to the specification plate.
1-24 Rated motor current	x	Enter the rated motor current in A. Enter the rated motor current corresponding to the specification plate.
1-25 Rated motor speed	x	Enter the rated motor speed in 1/min. Enter the rated motor speed corresponding to the specification plate.
1-30 Stator resistance	x	Stator resistance input in Ohm. Enter the stator resistance. Take the value from the motor datasheet
1-35 Main reactance Xh	x	Main reactance input in Ohm. Enter the value in Ohm. Take the value from the motor datasheet
1-64 Resonance damping	10	Resonance occurring in the overall system can be influenced by reducing this value
1-65 Reson.damp. Time const.	25	The arising tonal size can be influenced by changing this value
2-15 Brake test error	5	Monitoring whether a braking resistor is connected with voltage on. Value [5] trip lock
2-20 Open brake by motor current	1.5	Min. Motor current for energize valve. If the value is too high, error message A63 appears
3-13 Reference value spec.	3	Linked to H/A MCO- This parameter defines the priority of the reference value specification
4-58 Motor phase monitoring	2	In FLUX Vector mode, parameter 4-58 must be set to [2], monitoring time for shutdown must be set to 1000 msec (default setting). If the motor control principle is switched to VVCplus operation under parameter 1-01, parameter 4-58 is also automatically set to [1] and the monitoring time for switch-off set to 100 msec.
4-59 Motor Check at Start	1	Monitoring of the motor phases at start. [0] disables monitoring. Possible error message A30, A31, A32 for phases U, V and W
14-01 Clock frequency	12	12 kHz clock frequency is recommended for the converter. If the value is changed, the new clock frequency is activated after voltage "on / off".
14-03 Overmodulation	0	On [1] means that the full output voltage can be obtained. Off [0] means that there is no overmodulation, and thus a torque ripple is prevented for specific, fast running motors.
14-24 Current limit dec. time	1	The deceleration time can be set to 1 sec here since the converter is not supposed to be operated beyond its current limits. As a result, the current limit error is written in the error memory.
14-50 EMC filter	1	The internal filter is switched off upon entering a zero. As a result, the leakage currents against earth are reduced (earth leakage circuit breaker). While par 14-50 = 0, the drive is operated with 3 kHz clock frequency for all speeds.
16-10 Power [kW]	X	Displays the current power consumption in Watt.
16-61 Input terminal 53	Current	Pump pressure
16-62 Input terminal 53	>3.8 mA	The smallest value displayed is at 3.8 mA. Then the pump is not under pressure.
16-63 Input terminal 54	Current	System pressure
16-64 Input terminal 54	>4.0 mA	The smallest value displayed is > 4.0 mA. Shows the system pressure. The value displayed is equal to the pump pressure if emergency drain has been activated in case of blocked valve.
16-71 Relay outputs		0000**1**0000 Display of relay output 1 active
16-71 Relay outputs		00000**1**000 Display the relay output 2 active
19-01 Motor number	0	Enter the motor number corresponding to the motor table. Entering additional motor data is then no longer required. After the acceptance of the motor, the motor number continues to be displayed. The motor power is displayed for control. **Input "0" = not standard motor**. The motor values and cos Phi in par. 19-02 must be entered. Please complete the entry with par 19-63 = 3 (motor control parameter is recalculated).
19-02 Cos Phi	69 – 99	Enter Cos Phi from the specification plate.

Parameter	Value	Remark
19-03 Valve measured value	sec	With setting 19-06 "0x" the maximum time is displayed here that the valve needed to adjust from the setpoint to 50% system pressure when retracting or with setting 19-06 "1x" the difference from parameter 19-95 becomes 19 -51 displayed at the start of the journey. The value is updated by every start. If the displayed value exceeds or falls below the value specified in 19-04, it is assumed that the system is faulty. This can be: the pre-filters are clogged or the pilot control valve control card is defective.
19-04 Valve timeout	3,000	Maximum allowed control time in x.xxx seconds. Setting between 0 and 30 seconds. Or maximum deviation in x.xx.x from 19-95 to 19-51.
19-05 Setpoint pressure	70%	Adjustment of the operating point of the pilot valve. After reaching the pump pressure, from Par 19-56, the pilot valve is further ramped up by 2% and then regulated to the value of the pressure setpoint size, from Parameter 19-05, of the system pressure. Adjustment between 50% and 80%.
19-06 Evacuation test	X	"x=01" Evacuation test: The pilot valve is used to move in the "Down" direction. Terminal 29 is permanently set to "1". Suitable for checking the setting by hand. "x=02" Speed coefficient: Measurement in the direction of travel "UP" to determine the speed coefficient Param. 19-57. "x=03" Control voltage: Measurement in the direction of travel "Down" to determine the control voltage of the pilot valve Param. 19-51 and Param. 19-09 "x=0x" Valve test time setting during deceleration. "x=1x" Valve check setting at the start of the journey.
19-07 Eva kp	1000	Controller amplification for the proportional valve in UPS operation. Depending on how high the value is, the system can be susceptible to vibration.
19-08 Eva profile [%]	30	Ramp rounding values, rounding the evacuation and target speed value. The higher the value, the higher is the jerk.
19-09 Eva Prop Offset [%]	35	Provides the offset using which the pilot valve is loaded. Excessively high values lead to a "sudden drop". Excessively low values could lead to cavitation. As the first setting, the value from parameter 19-95 (valve threshold) can be taken with a load of 10%.
19-10 pump volumes [l/min]	250	Enter the rated conveyed volume of the pumps at 2740 U/min in [l/min].
19-11 Turbine volumes [l/min]	230	Enter the rated volumes of the turbine in [l/min] at 1 kHz.
19-12 Suspension	1	The details of whether the cabin is suspended directly or indirectly are specified here. Data value = 1 is equivalent to direct, Data value = 2 is equivalent to indirect,
19-13 d piston [mm]	110	Enter the diameter of the piston.
19-14 Number of pistons	1	Number of pistons in the system
19-15 Ramp start Up (bar)	10.0	The LD 302 HDR has a ramp. The starting speed, with which the initial pressure is generated, is calculated from the reference pressure. The larger this value, the more gentle is the approach.
19-16 Start encoder (bar)	3.0	Determines the point from which pump pressure of the encoder the encoder evaluation is started, switches X59.6 when adjusted pressure is reached. X59.6 connection to level-converter-PCB X3.8
19-17 KKOR	1.0	Corrects all speed values in direction "down". Higher values reduce speed.
19-18 P1-66	100%	Travel direction AB. Sets the injected current in relation to the nominal current during the start and deceleration phases. Is active in the flux vector control principle.
19-19 Run-in distance [mm]	40	Positioning path to the end of the travel curve to the stop, the value must be identical to the setting in the elevator control. Is active in CanOpen operation.
19-20 Max. speed [m/s]	0.500	This speed is the defined system speed, based on which, amongst other things, overspeed and other internal speeds are calculated.
19-21 V4 Up fast (m/s)		"Up" and **X57.4 "V4 Quick drive"** has been activated. **V4** can also be activated via **DCP**
19-22 V4 Up fast(m/s)	0.500	This speed is the rated speed which is selected if the input **X57.3 "down"** and **X57.4 "V4 fast drive"** has been activated. **V4** can also be activated via **DCP.**
19.23 Vo Up Running-in (m/s)	0.035	This is the speed that is selected if one of the direction inputs **X57.2** has been activated, determines driving speed during running-in and readjustment. **Vo** can also be activated via **DCP.**
19-24 Vo Down Running-in (m/s)	0.035	This is the speed that is selected if one of the direction inputs **X57.3** has been activated, determines driving speed during running-in and readjustment. **Vo** can also be activated via **DCP.**
19-25 Inspection speed Vi [m/s]	0.250	This speed is the speed which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.5 "M intermediate speed"** has been activated. **Vi** can also be activated via **DCP**. Terminal **37 (SafeStop)** and terminal **X57.1** is always switched in case of inspection speed **"Stop"**. This is an instant stop during which the motor is operated. This can lead to a small sudden cabin drop. **Vi** can be set to max. 0.63 m/sec. **Vi** is considered to be the inspection drive until the drive stops, although other speeds are selected in the meantime. If **Vi** is 80% larger than **Vmax**., the pilot valve is not regulated to 50% system pressure. **ATTENTION** This leads the cabin to drop suddenly!
19-26 V3 speed [m/s]	0.300	This speed is the first intermediate speed "Z_1" which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.4** and **X57.5** has been activated. **V3** can also be activated via **DCP** .
19-27 V2/speed [m/s]	0.300	This speed is an intermediate speed that can be activated via **DCP**.
19-28 V1/speed [m/s]	0.300	This speed is an intermediate speed that can be activated via **DCP**.
19-29 Re-levelling speed Vn [m/s]	0.015	This speed is the speed which is selected if one of the direction inputs **X57.2** or **X57.3** and **X57.6 "N re-levelling speed"** has been activated. Determines the drive speed during readjustment. The speed is applied until the **"stop"** level and the direction input **X57.2** or **X57.3** drops. **Vn** can also be activated via **DCP**.

Parameter	Value	Remark
19-30 Start- jerk Up [m/s³]	0.100	The set value determines the jerk in the first phase of the acceleration for the driving direction **"UP" / "DOWN"**. Smaller values result in a smoother acceleration during start-up.
19-31 Acceleration [m/s²]	0.300	The set value determines the maximum acceleration for "UP" ~~/ "DOWN"~~ on the target speed.
19-32 Acceleration jerk Up (m/s³)	0.300	The set value determines the jerk at the end of acceleration for direction "Up". With higher values overswinging after reaching the reference speed,, especially under difficult mechanic circumstances,can be avoided.
19-33 Deceleration jerk Up(m/s³)	0.600	The set value determines the jerk in the first period of deceleration for direction "Up" . Higher values combined with par.19-32/33 and 19-36/37 result in shorter braking distance.
19-34 Deceleration Up (m/s²)	0.700	The set value determines that the max. deceleration for " Up" is the same as the running-in speed.
19-35 Running-in jerk Up (m/ s³)	0.150	The set value determines the jerk when the running-in speed for direction "Up" is gained. Higher values lead to forceful running-in with shorter braking distances.
19-36 Start jerk Down (m/ s³)	0.150	The set value determines the jerk in the first period of acceleration for direction "Down". Smaller values lead to smoother acceleration during start.
19-37 Acceleration Down (m/ s²)	0.300	The set value determines that the max acceleration for direction "Down" is the same as the reference speed.
19-38 Accel. Jerk Down (m/ s³)	0.300	The set value determines the jerk at the end of acceleration for direction "Down". With higher values overswinging after reaching the reference speed,, especially under difficult mechanic circumstances can be avoided.
19-39 Deceleration jerk Down [m/s³]	0.600	The set value determines the jerk in the first phase of the deceleration for driving direction " / "DOWN". Higher values, in combination with par. 19-32/33 and 19-36/37, result in a shorter braking distance.
19-40 Deceleration Down [m/s²]	0.700	The set value determines the maximum deceleration for DOWN at the running-in speed.
19-41 Running-in jerk Down [m/s³]	0.150	The set value determines the jerk when attaining the running-in speed for the driving direction "DOWN". Higher values lead to a forceful running-in with shorter braking distances.
19-43 Control V1 [m/s]	0.400	Setting value for the output on the digital output **X59.2**. Enter the limit value for the speed at which the output **X59.2** should be switched off. Output **X59.2** supplies 24V if the speed undershoots. Output supplies 0V on exceeding this. In case of some lift control systems, it is necessary to obtain a signal that the drive has fallen below the rated speed so as to determine that a deceleration is initiated. For that, this parameter can be set about 15% below the rated speed and this functionality can thus be obtained.
19-44 Control V2 [m/s]	0.200	Setting value for the output on the digital output **X59.3**. Enter the limit value for the speed at which the output **X59.3** should be switched off. This can be used for instance to obtain a signal for doors that open early. For this, set the speed at which the doors should open. Output **X59.3** supplies 24V if the speed undershoots. Output supplies 0V on exceeding this.
19-45 Variable speed(const.)	0	The maximum output power on the motor can be reduced using this function. **0= function deactivated, 1= function active**. This function should only be activated or deactivated if this is specified in accordance with the system design.
19-46 Max. Motor power [kW]	4,500	This parameter is used in the variable speed operating mode to limit maximum motor power.
19-47 K Fact up [%]	55	Optimisation parameter for the variable speed operating mode; Enter the power factor for the correction value **"UP"** direction in %. In case of upward drive, if the value displayed in par. **16-10** is larger than the value in par. **19-46**, please decrease par. **19-47.**
19-48 K Fact down [%]	40	Optimisation parameter for the variable speed operating mode; Enter the power factor for **"DOWN"** direction in %. In case of downward drive, if the value displayed in par. **16-10** is larger than the value set in par. **19-46**, please decrease par. **19-48.**
19-49 Correction distance [mm]	0	Possible error sources from measuring system and oil viscosity can be balanced out with this parameter. If the running-in distance is too short, the distance can be extended by increasing the setting value. The value can also have a negative input.
19-50 max. prop. valve distance	100%	Specifies the distance limit of the pilot valve. Smaller values result in quicker closure in case of emergency stop and inspection. **Attention:** The valve must open wide enough for the downward drive with the rated speed. The pilot valve is set to the parameters specified in Param. 19-05 set value of the system pressure.
19-51 Prop Offset start down	20%	Specifies the offset with which the pilot valve is loaded before the valve is ramped up according to par. 19-52. The maximum possible offset is determined by parameter 19-50. The value will through measurement during calibration from the valve threshold Param. 19-95 determined.
19-52 Open valve speed 1	2,0%/s	Specifies the steepness (voltage increase/sec) of the first ramp of the control voltage with which the pilot valve is controlled, based on the offset par. 19-51. Entering 10% corresponds to a gradient of 2.4 V in one second. Smaller values result in the valve opening more slowly. If there are loud hissing noises during the first approach movement, the value should be increased. This value is Moderately set by default and should only be changed by experts. The range of adjustment is between 1.0%/s and 2.0%/s.
19-53 Open valve speed 2	1,0	Specifies the steepness factor (voltage increase/sec) of the second ramp of the control voltage with which the pilot valve is controlled, starting from par. 19-52. ATTENTION: This value is default set moderately and should only be changed by experts.
19-54 Prop Offset down	100%	The input determines the value of the pilot valve control voltage for the deceleration. The pilot valve voltage jumps to the reduced value. Values that are too small can lead to cavitation to lead. (See pars. 19-96). ATTENTION: This value is moderately set by default. Since the valve is based on the percentage system pressure from Param. 19-05, it should only be changed by an expert.
19-55 Close valve speed	1,0%/s	Indicates the steepness of the control voltage with which the pilot valve is controlled, based on the offset par. 19-54. Based on the offset value, the pilot valve closes at approx. 50% of the system pressure until standstill is reached. Closing to 0 takes place in a short controlled ramp.

Parameter	Value	Remark
		ATTENTION: This value is moderately set by default. Since the valve is based on the percentage system pressure parameters 19-05, it should only be changed by the Expert.
19-56 Pump start down	8,000bar	The pilot valve opens with the first ramp according to par. 19-52 to the pump pressure set here [bar] and then opens with a second ramp 19-53 up to the value from parameter 19-51. The valve offset threshold at this point is displayed in par. 19-95. If there is a sluggish system (old jack with jammed seals, sliding guide) the starting point can be influenced via the pump pressure. Attention: This value is set moderately by default and should only be changed by the expert.
19-57 Start speed down	500	Specifies the speed factor that determines the positive speed for pump pressure build-up. The pressure is needed to avoid sagging at takeoff. The value is determined by measuring at the Calibration determined in driving direction UP.
19-58 Prop valve test	0	By entering the value "1" and then set the call "DOWN" direction, the valve is opened when the engine is stopped. This allows the influence of the mechanical components (jerking when starting) to be assessed. The elevator car only moves very slowly over the gap losses. The process is aborted by switching the value "1" to "0". Otherwise a lag error will lead to an abort and the converter will restart. The value in par. 19-51 must be set to 100000. Attention: reset the value after the test. By entering the value "2" and then set the call "DOWN" direction, the valve is opened with 9 Vdc when the motor is at a standstill. Spindle "S" is set correctly by unscrewing spindle "S" until LEDs D5 & D8 "flicker". The process is aborted by switching the value "2" twice to "0". Otherwise a lag error will lead to an abort and the converter will restart.
19-59 Pressure-relief valve setting	0	An irregular operating mode which enables setting the pressure-relief value is activated using this parameter. After activation (1), the "**Manual ON**" button must be pressed. The safety chain must be closed to enable the activation of the drive. Adjust the rotational speed in the range of the rated motor speed before you start setting up the valve. In case of DCP/Can operation, the overpressure test can be conducted with the direct input of the motor rotational speed. It is started if terminal 37, terminal 57.1 and the UP direction, terminal 57.2 are all switched. The motor operates via a fixed ramp of 10 sec at the set rotational speed, and then persists. If one of the terminals deactivates, the rotational speed value is set to "0".
19-60 Start valve closed	100%	Specifies the starting point from which speed decrease, 100% is the starting point 19-54 Prop Offset valve closed, from which the valve should ramp down. ATTENTION: This value is set moderately by default and should only be changed by the expert.
19-63 Motor adaption	0	VLT LiftDrive has an automatic function for motor optimisation. The function can be useful if no motor number in par. **19-01** is selected. Only a reduced AMA, selection "2 Basic data adaptation" is possible. The safety circuit must be closed for execution. Do not execute this function if a motor number has been entered. Input = 3 for calculating ESB data from the entered motor data.
19-64 Save	0	Enter **"1"** for the activation of the saving process. This way, all internal calculations are re-initiated. Releases converter after input of **"-1".**
19-66 Dig_Serial	0	The converter is discretely activated using terminal **X57** for the setting "0". The bus activation DCP3 is active via terminal **X60** for the setting "1". The bus activation CanOpen is active via terminal **X62** for the setting "3". Attention: termination
19-68 Time-delayed release	45	Additional debouncing time in msec of inputs terminal **X57**. The time, in which relay bouncing is not taken into consideration for this time, can be entered here.
19-69 Compatibility activation	0	A "reset" via terminal **X57.1** is necessary for some control systems. The function becomes active by entering **"1"** and the converter executes an internal "Reset" after cancelling terminal **X57.1**
19-71 Load weighing	0 (2)	Using this function, the total weight (cabin + load), according to controlling, can be evaluated and, if required, used for overload detection. Enter "1" (3) for activation.
19-72 Max. weight total [kg]	10000	Here, enter the total permissible weight (cabin + load capacity) for weighing the load. The result of the evaluation can vary slightly depending on the floor.
19-73 Switching threshold 1	1	If the set pressure is exceeded, output relay 2 is active. For instance, this function can switch on relay 2 from a specific pressure (load) onwards. Relay 2 provides a changeover contact.
19-74 KPROP	400	Proportional share.Excessively high values lead to noises and vibrations; the motor cannot proceed if the values are too low.
19-75 FFVEL	130000	The pilot control supports the start-up and is active over the entire driving curve. Set smaller values if the lift operates at an over-speed. The same applies for oscillations during the constant drive.
19-76 Max. value pressure	100	The rated pressure of the pressure sensor is set here. Please refer to the datasheet for the data.
19-78 Entry way compensating	0	Calculation of the differential distance from the loaded braking point calculation for attaining **V_0**. The function is equally active for variable conveying speed as well as for operation in winter. **0= function deactivated,** **1= function active.**
19-79 Operation in winter	0	If the setting is "1", the system switches over manually to winter mode - caretaker mode. Control via terminal 19 is not possible in this state. The start-up jerk, the acceleration and the speed are reset. Or for winter operation, control is via terminal 19 (thermostat). The control is active with a 24 V signal.
19-80 Error number	0	Error memory of MCO control card. The application errors are stored here. Input range 1 to 10.
19-81 Error code	0	The error code for the error numbers is displayed here.
19-82 Error time	0	Error time for the error numbers.
19-83 Reset error log	0	Input 1 resets the error memory.

Parameter	Value	Remark
19-84 Offset adjustment	10bar	The value entered indicates the increase by 1% point. The level of adjustment of parameter 19-51 results from the difference between the current system pressure and the reference pressure of 25 bar. The parameter is only effective for system pressures < 25 bar. At system pressures >25bar the pressure increase is fixed to 1% per 10bar. The setting is between 1bar and 10bar.
19-85 Monitoring valve	0	**0= function deactivated** **1= function activated .** Monitoring valves by inverter, input **X57.9** and **X10.** When the function is active, it can only be reset by factory setting **2= function activated .** Monitoring valves by controlling**.** When the function is active, it can only be reset by factory setting -1 = activates test function for feedback contact valve 1 (SEAS), input X57.9 -2 = activates test function for feedback contact valve 2 (SEVS), input X57.10
19-88 Paramerter selection	0	0= function disabled, factory setting 1= Fast Boot function active. When the function is activated, the 19er parameter set is uploaded invisibly when the voltage is switched on. The display can be activated for the LCP by saving with "OK" "Cancel". 2= operation. The parameters that are not relevant for operation are hidden here.
19-90 Software Version		Only display Build_HYD302 BXXX date
19-91 Info Current load	X	Only display. Displays the current weight of the cabin and total load in kg (plausibility check terminal **54**) The displayed value can vary depending on the floor
19-92 Info Status		Only display for service personnel
19-93 Info Speeds		Only display for service personnel; display of the DCP speeds. SPEED_0 — 1 - Speed== 0m/s (quick start) SPEED_VNACH [SPEED_re-levelling] — 2 SPEED_VEIN [SPEED_running-in] — 3 SPEED_VINSP — 4 SPEED_V1 — 5 SPEED_V2 — 6 SPEED_V3 — 7 SPEED_V4 — 8
19-94 Info Decel. distance [mm]	X	Only display. Shows the deceleration distance to be expected from the existing applied speed from **V1** to **V4** to the value **Vo**.
19-95 Info valve threshold	X	Display only. Indicates the threshold value that results from par. 19-56 when the pump pressure is reached. (Transfer value for the offset para. 19-51 - 6%). The value should level off between 40% and 50%. Values outside the range require a correction of spindle "S".
19-96 Info Proportional valve	X	Only display. Outputs the level of the activation voltage of the pilot valve in %, which is set during the running-in.
19-97 Info DCP/CAN status	X	Only display. The connection is active for display "1"; the connection is separated for display "0".
19-98 Info Pump pressure	X	Only display. Current measured value on the pump pressure sensor I. Check the plausibility of the displayed pressure [mbar] (plausibility check terminal **53**)
19-99 Info System pressure	X	Only display. Current measured value on system - pressure sensor II (system pressure). Check the plausibility of the displayed pressure [bar] (plausibility check terminal **54**)
32-09 Encoder monitoring	On (2)	With the analogue measuring system the encoder monitoring must be switched on. Determines the mode of monitoring the encoders as to interruption and short circuit. Off (0) = no monitoring; On (2) = 2-channel-monitoring. An encoder error initiates error code 192.
32-12 User unit numerator	X	Displays a value per meter in QC, which is calculated from the geometry.
32-67 Max. tolerated positi. error	2000	The max. tolerated positional error should be entered as QC in parameter 32-67. The distance in meter will be calculated with Parameter 32-67 / 32-12. (Reference value 2000 for digital measurement system und 20000 for analogue measurement system)
33-91 X62 MCO CAN-Baud rate	125kBit/s	Setting at KLST 125 kBit/s, other 250 kBit/s
33-94 X60 MCO serial termination	0 1	OFF ON
34-50 Actual position	0	When travelling in "UP" the value must increase and when travelling in "DOWN" the value must decrease.
34-56 Track error	X	Displays the actual track error in 1/100 mm.
34-58 Actual speed	X	Displays the actual speed in 1/100 mm/sec.
40-50 FluxVector Model Shift	1	Must be set to 1 so that the direction of travel down is correctly interpreted.

12 Troubleshooting and error correction

12.1 General

LD 302 does not have any programmable safety functions at all.

As hardware solution, only the operation without motor contactors is included as the safety-relevant function. The conformity statement for type examination and the "Addition to the VLT LiftDrive documentation for the use of Safe Stop in lift systems" should be followed for this purpose.

LD 302 is not a safety-relevant part in accordance with EN 81-A3

12.2 Error list

A warning or an alarm is signalled by the corresponding LED on the front side of the frequency convertor and is displayed on the screen with a code. Warning persists until the cause is no longer applicable. The motor can continue to be operated here if necessary. Warning messages can, but do not necessarily have to be critical.

In case of an **alarm**, the frequency convertor switches off the output for the down operation main valve, blocks the inverter, the outputs **X59.5** "Ready" and **X59.4** "Contactor on" are switched off and it changes to the malfunction / alarm status.
After the cancellation of the "direction", **X57.2** or **X57.3**, the converter executes an internal "reset" through the control system, restarts and outputs the "ready" signal at output **X59.5**. Only then can the control system specify a new direction.

A "reset" via terminal **X57.1** is necessary for some control systems. Parameter **19-69** is provided for this purpose; reset via release. The function is active by entering **"1"** in **19-69** and the converter executes an internal "Reset" after cancelling terminal **X57.1**.

The system is blocked if the internal "reset" is executed five times consecutively.

If an alarm cannot be acknowledged, it could be due to the fact that the cause has still not been resolved.

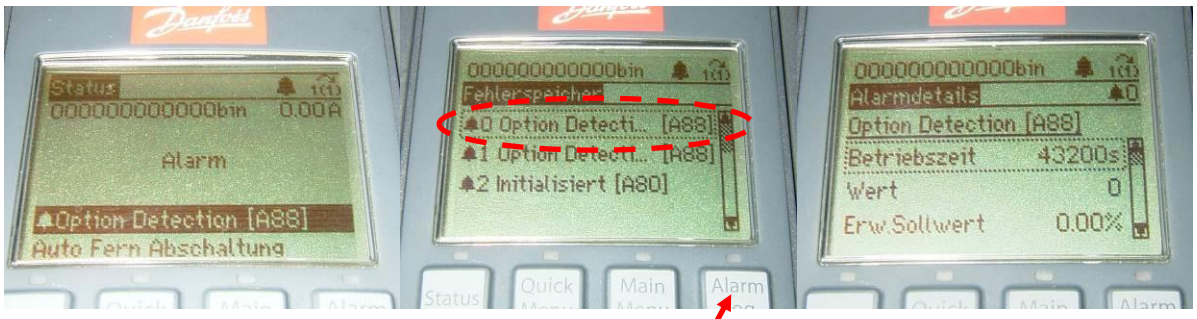
If the **lift drive application software** determines malfunctions, these are treated as **alarms**.

A softstop is initiated if a malfunction is ascertained.
In case of a softstop, the motor is supplied further with current for 3sec in case of **"DOWN drive"** and 1s in case of **"UP drive"** after attaining speed 0. Rotational speed shares, which result from the synchronisation errors (KPROP), are ramped to 0 within one second.

An immidiate stop, in which case the motor is disconnected immediately from power supply, is only possible in case of removal of release **X57.1** or terminal **37**.
If release **X57.1** is set, but **terminal 37** is not set within 5 sec, the terminal **X59.4 "main contactor on"** is reset.

The error and alarm messages of the converter are displayed on the screen under **"Alarm log"** and the lift application errors under the parameters **19-80** to **19-82**.

"Alarm Log" displays a list of the last 10 alarms. The last error has the number "0". To obtain additional information concerning an alarm status, select the relevant alarm number with the help of the arrow buttons, and press **"OK"**. You can thus obtain the alarm details, which are useful to analyse the causes.



Alarm displayed in LCP

Alarms displayed after pressing the alarm log button

Displayed operating time in seconds of the last alarm "0"

The time must be synchronised with the operating hours under parameter **15-00** in order to have a time view of the error occurrence.

Example:

Parameter 15-00 = 12h

Alarm log time = 43200 sec

Error occurrence: 43200 / 3600 = 12 h, according to the convertor life under voltage

The error had just occurred.

The approach for the lift alarms is identical in parameter **19-80**.
Select the error using par. **19-80**, determine the cause of the selected error in par. **19-81** and specify the time of the error with the time display in par. **19-82**.

The last error has the number **"1"**, which however deviates from that of the frequency convertor, and the time of the occurrence of the error is displayed for lift alarms in **hours**.

Parameter	**Value**	**Remark**
19-80 Error number	1	Display a list of the last 10 alarms / errors. The last error has the number **"1"**. Select the relevant alarm number using the arrow buttons and press **"OK"**.
19-81 Error code	0	You can obtain information regarding the MCO error code by means of a drive abort through the safety chain
		210 - Overspeed error
		108 - Tracking error
		192 - Encoder error
		214 - Overload load weighing- system does not operate
		215 - Pressure sensors – system does not operate Cause: P-Pump > P-System + 3Bar, Checking the **up** or **down** drive before beginning the drive. (Typical: exchanged sensors. Checking value < 3 mA))
		216 - Sensor P_Pumpe [P_pump] - cause: I terminal 53 <3mA, check only in case of down drive, there is a Softstop during the drive in case of malfunction
		217 - Sensor P-System - Cause: I terminal 54 <3mA, check only in case of down drive, there is a Softstop during the drive in case of malfunction
		218 - measuring system error
		219 - Excess temperature of heat sink – switches the clock frequency
		220 - Valve error - cause: setting 19-06 "0X" - the proportional valve does not manage to regulate down to half the system pressure within x seconds (adjustable in P19-04 0-30sec) in the event of a fault there is a soft stop. Cause: Setting 19-06 "1X" - the proportional valve does not manage the differential value (adjustable in P19-04 x.xxx.x) there is a soft stop in the event of a fault. – Valve error blocked after 5x. - switch voltage
		221 - Communication Error DCP / CanOpen
		222 - Auto-reset after 5x locked. Switch voltage.
		223 - valve 1 end position – release necessary
		224 - valve 2 end position – release necessary
		225 - Motor temperature – The motor temperature monitoring has triggered, after cooling down the monitoring is reset.
		299 - Mistakes that are not documented in more detail. Please check Alarm Log.
19-82 Error time	0	Displays the time of when the error occurred from the time of commissioning, in hours.

12.3 Alarm – and error massages

Extract from: Product manual MG.33.AH.03 - VLT® AutomationDrive FC 300

No.	Description	Warning	Alarm/ Switch off	Alarm/ Trip block	Parameter Target value
1	10 Volt low	X			
2	Signal error	(X)	(X)		6-01 Signal drop-out function
3	No motor	(X)			1-80 function in case of stop
4	Mains imbalance	(X)	(X)	(X)	14-12 Mains phases imbalance
5	DC voltage high	X			
6	DC voltage low	X			
7	DC excess voltage	X	X		
8	DC low voltage	X	X		
9	WR overload	X	X		
10	Motor temp. ETR	(X)	(X)		1-90 Thermal motor protection
11	Motor thermistor	(X)	(X)		1-90 Thermal motor protection
12	Torque limit	X	X		
13	High current	X	X	X	
14	Earth fault	X	X	X	
15	Incompatible hardware	X	X		
16	Short-circuit	X	X		
17	Control word timeout	(X)	(X)		8-04 Control word timeout function
20	Temp. Input error				
21	Par. Error				
22	Mech. Brake	(X)	(X)		Parameter group 2-2*
23	Internal fans	X			
25	Brake resistor short-circuit	X			
26	Brake resistor power limit	(X)	(X)		2-13 Brake resistor Power monitoring
27	Brake IGBT error	X	X		
28	Brake test error	(X)	(X)		2-15 Brake resistor test
29	Heat sink temp.	X	X	X	
30	Motor phase U missing	(X)	(X)	(X)	4-58 Motor phases monitoring
31	Motor phase V missing	(X)	(X)	(X)	4-58 Motor phases monitoring
32	Motor phase W missing	(X)	(X)	(X)	4-58 Motor phases monitoring
33	Inrush error	X	X		
34	Field bus communication error	X	X		
35	Option error				
36	Mains failure	X	X		
37	Phase imbal.	X			
38	Internal error	X	X		
39	Heat sink encoder	X	X		
40	Digital output 27 is overloaded	(X)			5-01 terminal 27 function
41	Digital output 29 is overloaded	(X)			5-02 terminal 29 function
43	Ext. Supply unit (option)				
45	Earth fault 2	X	X	X	
46	Power element supply unit	X	X		
47	24-V-supply unit – error	X	X	X	
48	1.8-V supply unit – error	X	X		
49	Rotational speed limit	X			
50	AMA calibration error	X			
51	Check AMA-motor data	X			
52	Check AMA rated motor current	X			
53	AMA-motor too big	X			
54	AMA-motor too small	X			
55	AMA-data outside the range	X			
56	AMA abort	X			
57	AMA timeout	X			
58	AMA-internal error	X	X		
59	Current limit	X			
60	Ext. Locking device	X	X		
61	Actual value error	(X)	(X)		4-30 Rotary encoder monitoring function
62	Output frequency limit	X			
63	Mechanical brake	(X)			2-20 Brake open for motor current
64	Motor voltage	X			
65	Control card excess temperature	X	X	X	
66	Temperature too low	X			
67	Optional configuration has been changed	X			
68	Safe stop	(X)	(X)		5-19 terminal 37 safe stop
69	Power element excess temp.	X	X		
70	Invalid FC configuration	X			
72	Hazardous error				
73	Safe stop autom. Restart	(X)	(X)[1)]		5-19 terminal 37 safe stop
76	Power element conf.	X			
77	Red. power	X			14-59 Number of active inverters
78	Rotary encoder error	(X)	(X)		4-34 Rotary encoder monitoring function
79	Invalid power element configuration	X	X		
80	Initialised	X			
81	CSIV damaged	X			
82	CSIV param.	X			
89	Mechanical brake slips	X			
90	Rotary encoder monitoring	(X)	(X)		17-61 Rotary encoder monitoring

No.	Description	Warning	Alarm/ Switch off	Alarm/ Trip block	Parameter Target value
91	Analogue input 54, incorrect settings			X	S202
250	New spare part	X			14-23 type code setting
251	Type code new		X	X	

Table 5.1 Alarm /warning code list from VLT® AutomationDrive FC 300 product manual

The malfunctions marked with **YELLOW** are set to **WARNING**.
The malfunctions marked with **BLUE** are set to **deactivated**.

(X) Parameter-dependent
[1)] Cannot be acknowledged automatically using *14-20 Acknowledgement function*

LED display	
Warning	yellow
Alarm	flashes red
Trip block	yellow and red

Troubleshooting and error correction, MCO
Extract from: Programmable Motion Controller – MCO - product manual.

All messages are displayed on the LCP display in an abbreviated form.

Error no.	LCP Display	Error text
102	Too many CAN objects	Additional CAN objects are not available (CANINI).
103	Invalid axis no.	Axis is not in the system.
105	Error not reset	Error not acknowledged.
106	Reference point not attained	Error for reference point movement
107	Reference point speed 0	Speed of reference point movement 0
108	Position error	Position error
109	Index not found	Index impulse (rotary encoder) not found.
110	Unknown command	Unknown command
111	SW final limitation	Software final limitation activated.
112	Unkno. Param.	Invalid parameter number.
113	FU not activated	VLT error condition
114	Too many loops.	Too much interlocking
115	Par. saving failed	INLONG command has invalid string
116	Param.memory	Parameters in memory are defective.
117	Progr. memory	Programs in memory are defective.
118	Reset by CPU	Reset by CPU.
119	Abort by user	Abort by user.
121	No other SDO channels	Number of SDO channels exceeded.
125	HW end limitation	Limit switch activated.
149	Too many interrupts.	Max. Number of interrupt functions exceeded.
150	No ext. 24 V	This error means that the external 24V supply for the digital inputs is not available (or voltage too low?). The external supply is activated with parameter 33-85
151	Too many GOSUB	Too many nested GOSUB commands.
152	Too many returns	Too many RETURN commands.
154	Digital output overloaded	Digital output overloaded.
155	Link error	LINKGPAR failed.
156	Invalid double arg.	A floating point function has been called with an invalid argument.
160	Internet interrupt error	Interrupt occurred but the interrupt address is no longer valid.
162	Memory error	Error during test
170	Too many DIM arrays	Too many DIM arrays defined.
171	Array too small	Array too small
175	Outside the array memory	Memory space no longer available for the new array defined by DIM.
176	Incorrect array size	Array size does not correspond to the size of the available array.
179	Waiting index timeout	Timeout while waiting for index.
184	Too many ONTIME	Too many ONTIME or ONPERIODS interrupts.
187	Not enough memory space	Not enough memory space for variables
188	Error during CAN command	A command error has occurred.
189	CAN transmission / reception error	CAN transmission or reception error
190	Memory blocked	Memory blocked
191	Invalid curve no.	Invalid curve no. in SETCURVE.
192	Rotary encoder error	Rotary encoder error
193	Sequence overrun	Sequence overrun: Too many local variables or nested function calls
194	Outside the dynamic memory	Outside the dynamic memory
195	Too many test indices	Too many test indices in the data log command
196	Code too old	Code is too old for the current firmware
198	Limit switch damage	Incorrect direction after switching off the limit switch and resetting error
199	Int MCO error	Int MCO error

Table 7.1 Warnings and error messages from: Programmable Motion Controller – MCO - product manual.

Implementation of the alarm / warning messages from VLT® AutomationDrive FC 300 product manual and error messages from: Programmable Motion Controller – MCO - product manual. (Error no. 102 – 199)

WARNING/ALARM 2
Signal error:

The signal at terminal 53/54 is less than 50% of the value, set in par. 6-12 terminal *53 Scal. Min. current or* par. 6-22 terminal *54 scal. Min. current*

WARNING/ ALARM 3
No motor:

Motor is not connected at the output of the frequency convertor.

WARNING/ALARM 4
Mains imbalance:

Failure of phase on the supply side, or excessively high imbalance in the supply voltage. This message is displayed in case of an error in the input rectifier of the frequency convertor. Control the supply voltage and the supply currents to the frequency convertor.

WARNING 5
DC voltage high:

The DC link voltage (direct current) is higher than the excess voltage limit of the control system. The frequency convertor is still active.

WARNING 6
DC voltage low

The DC link voltage (DC) lies below the voltage limit of the control system. The frequency convertor is still active.

WARNING/ALARM 7
DC excess voltage:

If the DC link voltage exceeds the limit value, the frequency convertor switches off after some time.

Possible corrective actions: Connect braking resistor or check wiring
Reduce deceleration.
Check brake resistor design

WARNING/ALARM 8
DC low voltage:

If the DC link voltage (VDC) drops below the "Lower voltage limit value" (refer to table), the frequency convertor checks whether an external 24 V supply is connected. If an external 24 V supply is not connected, the frequency convertor switches off after a specified time (depending on the device).

Refer to the *General technical data* to balance the supply voltage with the specifications of the frequency convertor.

WARNING/ALARM 9
Inverter overload:

The frequency convertor switches off on account of overload (excessively high current for too long a time). The counter for electronic inverter protection outputs a warning at 98% and switches off with an alarm at 100%. The frequency convertor can only be reset if the counter has fallen below 90%. The motor has been loaded with more than 100% for too long a time.

WARNUNG/ALARM 11,
Motor thermistor over temperature:

Check if the connection to the thermistor is disconnected.
Troubleshooting: Check the motor for overheating.
Check whether the motor is mechanically overloaded. When using terminals 33 (digital input), check that the thermistor is correctly connected between the digital input terminal used and terminal 12.

WARNING/ALARM 12
Torque limits:

The torque is higher than the value in par. 4-16 *motor torque limit* (for motor operation) or in par. 4-17 *generator torque limit* (for generator operation).

The torque limit can also be generated by the following:

1. The motor data is incorrect. Check the parameter setting.
If you do not use standard motors for frequency convertor operation, carry out automatic motor adaptation.

2. The acceleration torque is too high.
Reduce the values for the acceleration par. 19-30 or, if necessary, for the deceleration
Par. 19-31. Alternatively, increase the limit values for the acceleration par. 4-16 or the deceleration par. 4-17.

WARNING/ALARM 13
Excess current:

The peak current limit of the inverter (about 200 % of the rated current) has been exceeded. The warning lasts for about 8-12 s after which the frequency convertor switches off and an alarm is sent out. Switch off the frequency convertor and check whether the direction of rotation of the motor shaft can be changed and whether the motor size corresponds to that of the frequency convertor.

When selecting the enhanced mechanical brake control system, switch off can be reset externally.

ALARM 14
Earth fault:

There is an earth fault between the output phases and earth, either in the cable between the frequency convertor and motor, or in the motor. Switch-off the frequency convertor and remove the earth fault.

ALARM 16
Short-circuit:

There is a short-circuit in the motor cable, in the motor or at the motor terminals. Switch-off the frequency convertor and remove the short-circuit.

WARNING/ALARM 17
Control word timeout:

There exists no communication with the frequency convertor. The warning is only active if par. 8-04 *Control word timeout function* is not set to OFF.

If par. 8-04 *Control word timeout function* is set to *Stop* and *Switch-off*, a warning is displayed. The frequency convertor executes a ramp down and switches off with an alarm. Par. 8-03 Control word *Timeout-time* can probably be increased.

WARNING 23
Internal fans:

The function is an additional protection with which it is checked whether fans are available and are running. The warning can be deactivated [0] in par. 14-53 *Fan monitoring* Fan monitoring.

WARNING 24
External fans:

The function is an additional protection with which it is checked whether fans are available and are running. The warning can be deactivated [0] in par. 14-53 *Fan monitoring* Fan monitoring.

WARNING 25
Brake resistor short-circuit:

The brake resistor is monitored during the operation. In case of a short circuit, the brake function is aborted and the warning is given out. Switch-off the frequency convertor and replace the brake resistor (refer to par. 2-15 *Brake resistor test).* Regular lift operation is no longer possible.

Warning: In case of a brake transistor short circuit, there exists the risk of a considerable power transmission to the brake resistor.

WARNING/ALARM 26
Brake resistor power limit:

The power transmitted to the brake resistor is determined as the average value for the last 120 seconds on the basis of the resistance value of the brake resistor (par. 2-11 *Brake resistor (Ohm))* and the DC link voltage in percent. The warning is active if the transmitted brake power is higher than 90%. If in par. 2-13, *Brake resistor, Power monitoring alarm [2]* has been selected, the frequency convertor switches off with an alarm if the discharged brake power is more than 100 %.

WARNING/ALARM 27
Brake IGBT error:

The brake transistor is monitored during this operation. In case of a short circuit, the brake function is aborted and the warning is given out. The frequency convertor can continue to be operated; however, owing to the short-circuit, a high power is delivered to the brake resistor even though it is not braked.

Switch-off the frequency convertor. Check the brake resistor.

Warning: In case of a brake transistor short circuit, there exists the risk of a considerable power transmission to the brake resistor.

WARNING/ALARM 28
Brake test error:

Error in the brake resistor: The brake resistor is not connected / does not function.

ALARM 29
Convertor excess temperature:

In case of protection degree IP20 or IP21/NEMA 1, the switch-off limit for the heat sink temperature is 95 °C +5 °C. The temperature error can only be acknowledged when the heat sink temperature has again fallen below 70 °C + 5 °C.

Possible causes: Ambient temperature too high or motor cable too long.

ALARM 30
Motor phase U missing:

Motor phase U between the frequency convertor and the motor is missing. Switch-off the frequency convertor and check the motor phase U.

ALARM 31
Motor phase V missing:

Motor phase V between the frequency convertor and the motor is missing. Switch-off the frequency convertor and check the motor phase V.

ALARM 32
Motor phase W missing:

Motor phase W between the frequency convertor and the motor is missing. Switch-off the frequency convertor and check the motor phase W.

ALARM 33
Inrush error:

Switched on too many times within too short a period. The permissible number of switch-ons within one minute has been specified in the *General technical data* section.

WARNING/ALARM 35,
Option error

The option alarm is received. The alarm is option-specific. The most probable cause is an error in case of mains on or during the communication.

WARNING/ALARM 36
Mains failure:

This warning / this alarm is only active when the supply voltage of the frequency convertor has been interrupted and par. 14-10 mains failure function is not set to OFF. Check the fuses of the frequency convertor.

ALARM 37
Phase imbalance:

There is a current imbalance between the power units.

ALARM 38
Internal error:

If this alarm is given out, you probably need to contact your Danfoss suppliers. Some typical alarm messages:

0	The serial communication interface cannot be initialised. Severe hardware error
256	The EEPROM power data is defective or too old
512	The EEPROM data on the control card is defective or too old
513	Timeout while reading EEPROM data
514	Timeout while reading EEPROM data
515	AOC does not detect EEPROM data
516	Write not possible in EEPROM since a write process is executed
517	Timeout for the write process
518	Error in the EEPROM
519	Missing or invalid BarCode data in EEPROM 1024– 1279 CAN telegram cannot be sent (1027 displays a possible hardware error).
1281	Timeout for the digital signal processor
1282	The versions of the power micro software do not correspond
1283	The versions of the EEPROM power data do not correspond
1284	Software version of the digital signal processor cannot be read
1299	Option software in socket A is too old
1300	Option software in socket B is too old
1311	Option software in socket C0 is too old
1312	Option software in socket C1 is too old
1315	Option software in socket A not supported (not allowed)
1316	Option software in socket B not supported (not allowed)
1317	Option software in socket C0 not supported (not allowed)
1318	Option software in socket C1 not supported (not allowed)
1536	An AOC exception has been determined. Error correction information in LCP
1792	DSP Watchdog is active. Error correction in the transfer of MOC power data
2049	Power data restarted
2315	Missing software version of drive
2816	Sequence overrun at control card module
2817	Planning slow tasks
2818	Quick tasks
2819	Parameter thread
2820	LCP sequence overrun
2821	Overrun at the serial interface
2822	Overrun at the USB interface
3072-	Parameter value does not lie in the permissible limit range.
5122	Execute an initialisation. Parameter number, which has triggered the alarm: Alienate the value 3072 from the code. Example: Error code 3238: 3238-3072 = 166 (outside the limit value range)
5125	Option in socket C0: Hardware with control card hardware not compatible

ALARM 39
Heat sink encoder

No actual value of heat sink temperature encoder. The signal from IGBT temperature sensor is not provided to the power element. There could be a problem with the power element, the gate control card or the flat ribbon cable between the power element and the gate control card.

WARNING 40
Digital output 27 is overloaded

Check the load on terminal 27, or remove the short-circuit. Par. 5-00 *switching logic* and par. 5-01 *Terminal 27 function*.

WARNING 41
Digital output 29 is overloaded:

Check the load on terminal 29, or remove the short-circuit. Par. 5-00 *switching logic* and par. 5-02 *Terminal 29 function*.

ALARM 45
Earth fault 2:

A leakage current flows from the output phases to earth, either in the cable between frequency convertor and motor, or in the motor itself. Switch-off the frequency convertor and remove the short-circuit. This alarm is detected during the start-up sequence.

ALARM 46,
Power element supply unit

The power supply of the power card lies outside the range. There are three power supply types which are generated by the switch-mode power supply (SMPS) at the power card: 24 V, 5 V, +/- 18 V. Only the power supplies 24 V and 5 V are monitored in case of supply unit with 24 V DC with the option module MCB 107. All three supply phases are monitored when supplying with three-phase mains voltage.
Error correction
Check whether the power card is defective.
Check whether the control card is defective.
Check or ensure a reasonable supply power when using a 24 V DC power supply. Option card is defective.

WARNING 47
24-V supply unit error:

The external 24 V DC control unit supply is possibly overloaded. Otherwise, contact your Danfoss suppliers.

WARNING 48
1.8-V supply unit – error: Please contact Danfoss service.

WARNING 49
Rotational speed limit:

The rotational speed does not lie within the range specified in par. 4-11 *Min. Rotational speed [UPM]* and par. 4-13 *Max. Rotational speed [UPM]*.

ALARM 50
AMA calibration error:

The motor is not suitable for the frequency convertor size. *Restart* the AMA in par. 1-29 *Autom. Motor adjustment,* if required, with reduced AMA-function. If the error continues to occur: check the motor data.

ALARM 51
Check the AMA motor data:

The setting of motor voltage, motor current and motor power is probably incorrect. Check whether the settings are correct.

ALARM 52
AMA rated motor current low:

The setting of the motor current is probably too low. Check the settings.

ALARM 53
AMA motor too big:

Please check the power of the motor on the specification plate and the settings in par. 1-20. The motor is possibly too big for this convertor.

ALARM 54
AMA motor too small:

The connected motor is probably too small for the AMA implementation.

ALARM 55
AMA data outside the range:

The parameter values found in the motor lie outside the permissible range.

ALARM 56
AMA abort by user: AMA has been aborted by the user.

ALARM 57
AMA timeout:

Try restarting the AMA until the AMA is executed. Repeated AMA operation can lead to heating up of the motor, which can again cause an increase in the resistance Rs and Rr. However, this is normally not critical.

ALARM 58
AMA-internal error: Please contact Danfoss service.

WARNING 59
Current limit:

The output current has exceeded the limit value in par. 4-18 *Current limit*. Reduce the values for acceleration par. 19-30 or, if necessary, for the deceleration 19-31. Alternatively, increase the limit value par. 4-18.
Check the motor and load.

ALARM 61
Rotary encoder deviation:

The limit in parameter 4-31 for the deviation from the desired value has been exceeded. KP start and KP drive should likewise be checked, as for encoder connection and encoder function.

WARNING 62
Output frequency limit:

The output frequency exceeds the set value in par. 4-19 *Max. Output frequency.* This is a warning in the VVCplus mode and an alarm (switch-off) in the flux mode.

WARNING 64
Motor voltage limit:

The load and rotational speed characteristics require a higher motor voltage than what the current DC link voltage can provide.

WARNING/ALARM/SWICTH-OFF 65
Control card excess temperature:

Excess temperature has been determined on the control card. The switch-off temperature of the control card is 80 °C.

WARNING 66
Temperature too low:

The heat sink temperature lies at 0 °C. Since a temperature sensor failure can also not be eliminated, the built-in fans run at maximum rotational speed (power supply or control card are probably very hot).

ALARM 67
Option configuration has been changed:

One or several options have been added or removed since the last mains-off.

WARNING 68
Safe stop:

The "Safe stop" function has been activated by the control terminal 37 (signal 0 V). The normal operation is started again after the deactivation of the safe stop. Warning: Automatic restart!

ALARM 69
Convertor excess temperature

The temperature sensor on the power element is either too hot or too cold.

Troubleshooting and error correction:
Check the function of the door fan.
Ensure that the filters for the door fans are not blocked.
Ensure correct installation of the bottom plate for frequency convertors with IP21 and IP54 (NEMA 1 and NEMA 12).

ALARM 70
Invalid FC configuration:

The current combination of the control card and the power card is invalid.

WARNING 73
Safe stop, autom. Restart

Safe stop activated. Attention: If automatic restart is activated, the motor can start-up unexpectedly after error correction.

ALARM 80
Device initialised:

The parameter settings have been initialised with the standard setting after a manual reset.

WARNING 90
Rotary encoder:

The rotary encoder has not been connected (correctly). The cabling, particularly, the screening must be checked.

Error 105
Error not reset:

Execution of the movement command has been attempted although an actual error notification has not been acknowledged.

Error 107
Reference point speed 0 (overspeed error):

An increased speed has been determined.

WARNING 108
Position error (synchronisation error)

The rotary encoder has not been connected (correctly). The cabling, particularly, the screening must be checked.

Error 115
Error during parameter storage:

Please contact your Danfoss service.

WARNING 116
Parameter memory error:

Please contact your Danfoss service.

WARNING 117
Program memory error:

Please contact your Danfoss service.

Error 119
Abort by user:

The autostart program has been aborted by the user. Or the [CANCEL] button has been pressed during a switch-on and a master reset has been initiated.

WARNING 150
External 24 V supply:

The external 24 V supply of the MCO is defective. Check the supply voltage (only for the external supply unit of MCO circuit board)

Error 154
Digital output overloaded:

Digital output overloaded.

WARNUNG/ALARM 157
Power Limit Motor:

The output power exceeds the value defined in parameter 4-82 Power Limit Motor Mode.

WARNING 162
Memory error:

Please contact your Danfoss service.

WARNING 192
Encoder error:

Check the encoder and its wiring. Observe the status of the encoder signal LEDs.

WARNING 199
MCO internal error:

Please contact your Danfoss service.

ALARM 250
New spare part:

The power card or switch-mode power supply card has been replaced. The type code of the frequency convertor must be restored in the EEPROM. Select the correct type code in par. 14-23 type code setting of the specification plate of the device. Finally select the "save in EEPROM" implicitly.

ALARM 251
Type code new:

The frequency convertor has a new type code.

13 Technical data

The technical data and the latest documentation for the frequency converters LD 302 and FC 302 are under
Operating Instruction VLT LiftDrive LD302 and
Engineering Manual VLT AutomationDrive FC301 / FC302

In the Internet of Danfoss under:
www.danfoss.de – Downloads