EN

CDF3000

Operation Manual

Positioning Drive
Rated current 8 A
Mains 24 ... 48 V DC

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LUST

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CDF3000 Operation Manual

ID no.: 1040.20B.0-00 • **11/2005**

Valid from software version CDF V1.0

We reserve the right to make technical changes.

Overview of documentation

Document	Order designation	Purpose
Operation Manual CDF3000	1040.20B.x-xx	Installation and initial commissioning
Application Manual CDE/CDB/CDF3000	1001.22B.x-xx	Project planning and function description
Communications Manual CANopen		Project planning and function description
Communications Manual PROFIBUS-DP		Project planning and function description

Pictograms

➔ **Attention!** Misoperation may damage the drive or cause it to malfunction.

➔ **Danger from electrical tension!** Improper conduct may endanger human life.

➔ **Danger from rotating parts!** Drive may start up automatically.

➔ **Note:** Useful information

LUST

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A Appendix

B Index

1 Safety

1.1 For your safety

The instructions set out below should be read through prior to initial commissioning in order to prevent injury and/or damage to property. The safety instructions must be followed at all times.

Read the Operation Manual first!

- Follow the safety instructions!

Electric drives are dangerous:

- Rotating parts
- Hot surfaces
- Electrical tension

Protection against magnetic and/or electromagnetic fields during installation and operation.

- Persons fitted with heart pacemakers, metallic implants and hearing aids etc. must not be allowed access to the following areas:
  - Areas where drive systems are installed, repaired and operated.
  - Areas where motors are installed, repaired and operated. Motors with permanent magnets pose a particular hazard.

Note: If it is necessary to accss such areas, suitability to do so must be determined beforehand by a doctor.

Your qualification:

- In order to prevent personal injury or damage to property, only personnel with electrical engineering qualifications may work on the device.
- The said qualified personnel must be familiar with the contents of the Operation Manual (cf. IEC364, DIN VDE0100).
- Awareness of national accident prevention regulations (e.g. VBG 4 in Germany)

During installation observe the following instructions:

- Always comply with the connection conditions and technical specifications.
- Comply with the standards for electrical installations, such as regarding cable cross-section, PE conductor and earth connections.
- Do not touch electronic components and contacts (electrostatic discharge may destroy components).

Pictograms used

The safety instructions detail the following hazard classes.
The hazard class defines the risk posed by failing to comply with the safety notice.

Warning symbols	General explanation	Hazard class to ANSI Z 535
	**Attention!** Misoperation may damage the drive or cause it to malfunction.	Injury or damage to property may occur.
	**Danger from electrical tension!** Improper conduct may endanger human life.	Death or serious injury will occur.
	**Danger from rotating parts!** Drive may start up automatically.	Death or serious injury will occur.

1.2 Intended use

Drive controllers are components that are intended for installation in electrical systems or machines.

The drive controllers may not be commissioned (i.e. it may not be put to their intended use) until it has been established that the machine complies with the provisions of EC Directive 98/37/EC (Machinery Directive); EN 60204 is to be observed.

Commissioning (i.e. putting the device to its intended use) is only permitted in compliance with the EMC Directive (89/336/EEC).

CE The CDF3000 conforms to the EMC Directive 89/336/EEC.

The harmonized standards EN 61800-3 and EN 61800-5-1 are applicable to the drive controllers.

If the drive controller is used for special applications (e.g. in areas subject to explosion hazard), the required standards and regulations (e.g. EN 50014, “General provisions” and EN 50018 “Pressurized enclosure”) must always be observed.

Repairs may only be carried out by authorized repair workshops. Unauthorized opening and incorrect intervention could lead to death, physical injury or damage to property. The warranty provided by LUST would thereby be rendered void.

1.3 Responsibility

Electronic devices are fundamentally not fail-safe. The company setting up and/or operating the machine or plant is itself responsible for ensuring that the drive is rendered safe if the device fails.

EN 60204-1/DIN VDE 0113 “Safety of machines”, in the section on “Electrical equipment of machines”, stipulates safety requirements for electrical controls. They are intended to protect personnel and machinery, and to maintain the function capability of the machine or plant concerned, and must be observed.

An emergency off system does not necessarily have to cut the power supply to the drive. To protect against danger, it may be more beneficial to maintain individual drives in operation or to initiate specific safety sequences. Execution of the emergency off measure is assessed by means of a risk analysis of the machine or plant, including the electrical equipment to DIN EN 1050, and is determined with selection of the circuit category in accordance with DIN EN 954-1 “Safety of machines – Safety-related parts of controls”.

2 Mechanical installation

2.1 Notes for operation

Please ensure that ...

- no damp enters the device
- no aggressive or conductive substances are in the immediate vicinity
- no drill chippings, screws or foreign bodies drop into the device
- the vent openings are not covered over.

The device may otherwise be damaged.

2.2 Mounting, devices end-to-end

Important: In accordance with EN 61800-5-1, the device is suitable **only** for cabinet installation.

Step	Action	Comment
1	Mark out the position of the tapped holes on the backing plate. Cut a tap for each fixing screw in the backing plate.	Dimensional drawings/hole spacing see Table 2.1. The tapping area will provide you with good, full-area contact.
2	Mount the positioning drive **vertically** on the backing plate.	Pay attention to the mounting clearances! The contact surface must be metallically bright.
3	Mount the other components, such as the braking resistor etc., on the backing plate.	
4	Continue with the electrical installation in section 3.	

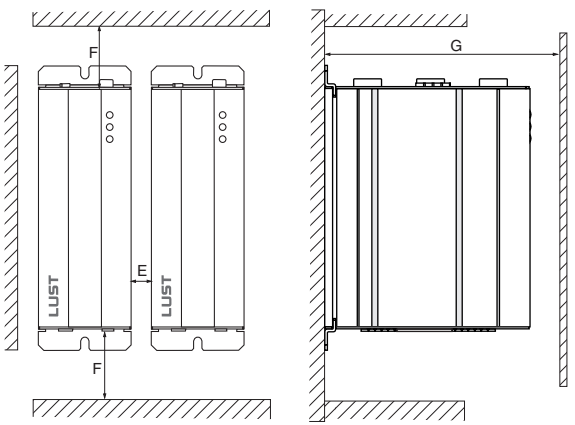
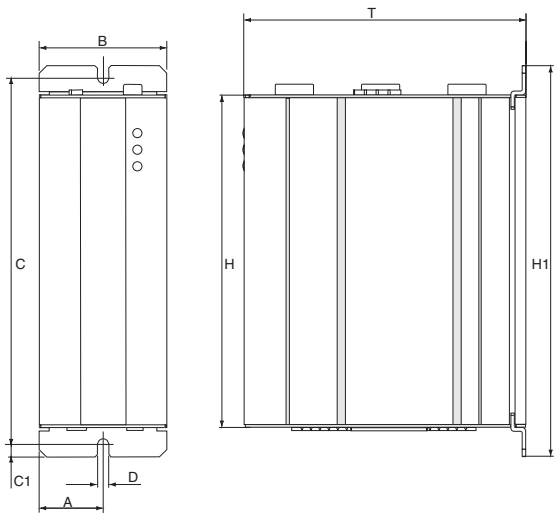


Figure 2.1 Mounting clearances (see Table 2.1)

	CDF30.008
Weight [kg]	0,8
W (width)	55
H (height)	143
D (depth)	121
A	27,5
C	157
C1	5,2
D	4,8
E	15
F	100
G	≥ 150
H1	167,5



1) For flat mounting

Table 2.1 Dimensional drawings for vertical mounting (dimensions in mm)

Note the following points:

- Air must be able to flow unhindered through the device.
- For mounting in switch cabinets with convection (= heat loss is discharged to the outside via the cabinet walls) an internal air circulation fan must always be fitted.
- The backing plate must be well earthed.

3 Electrical Installation

Important: Installation must only be carried out by qualified electricians who have undergone instruction in the necessary accident prevention measures.

3.1 Connections

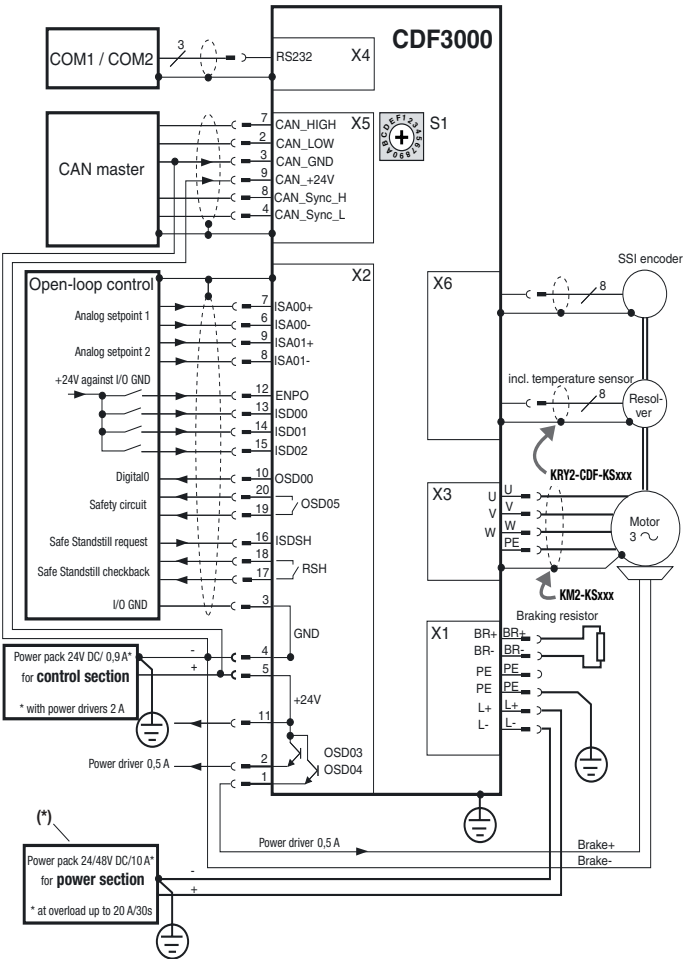


Figure 3.1 Terminal diagram, CDF3000 (overview)

* Power pack must be protected against voltage overload in regenerative operation (e.g. by a protective diode).

Key	Explanation	Continue
X1	Power connection (6-pole plug-in terminal)	Page 3-4
X2	Control connection (2 x 10-pole plug-in terminal)	Page 3-18
X3	Motor connection (4-pole plug-in terminal)	Page 3-7
X4	RS232 connection, for operation with NOTEBOOK/DRIVEMANAGER see section 4.5/4.6 (9-pole Sub-D socket)	Page 3-12

Key	Explanation	Continue
X5	CANopen interface with DS402 profile (9-pole Sub-D pins)	Page 3-14
S1	Rotary code switch, CAN address	
X6	Resolver/ SSI encoder connection (15-pole HD Sub-D socket)	Page 3-8
⏚	PE connection **Important:** Please be sure to refer to section 3.3 “Connecting the power packs”.	Page 3-4

Table 3.1 Key to CDF3000 terminal diagram

3.2 Position plan

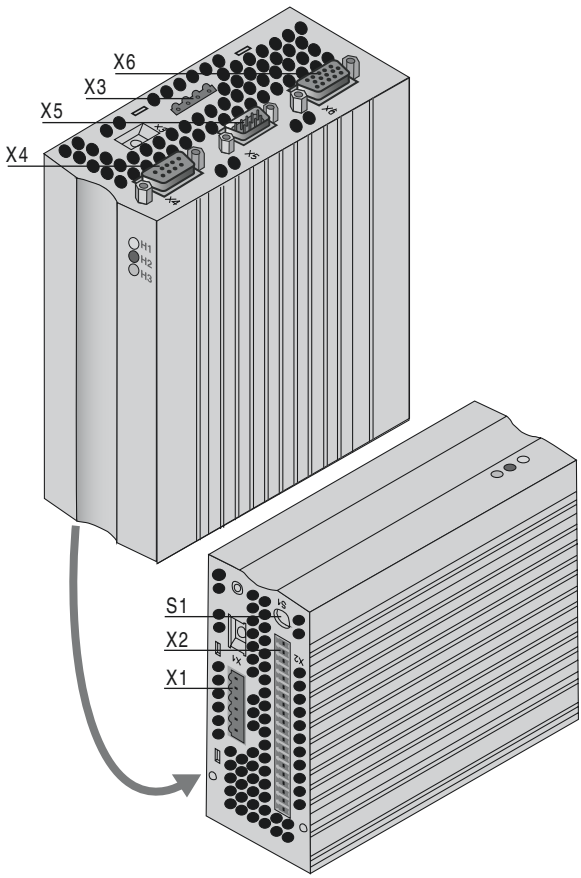


Figure 3.2 CDF3000 position plan

3.3 Connecting the power packs

The positioning drive may only be connected to power packs (stabilized and smoothed) conforming to the requirements of a functional extra-low voltage with safe isolation to EN 50178.

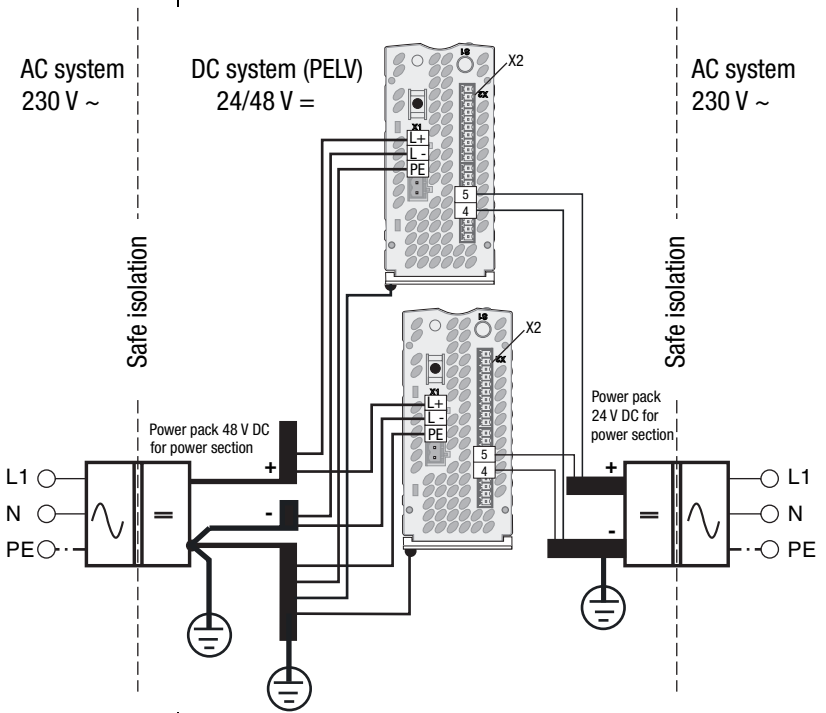


Figure 3.3 Connections of the DC network

Note: Power side 24/48 V DC: Each device must be provided with its own dedicated maximum fuse protection of 16 AgG!

Power the control units and power packs from their own dedicated power supply units!

Note the following points:

- The power packs must have energy recovery capability (e.g. in regenerative operation). The threshold for use of the braking chopper is 58 V DC.
- In view of the high dynamics of the DC link, the power supply unit of the power pack (supplied of X1) should be used only for operation of the CDF3000 (no other consumers permitted).
- Appropriate cable protection must be provided within the DC network. The cables must be protected by suitable fuses.
- The PE conductor must be laid out in star configuration to conform to the EMC standards.
- The motor cable, mains lead and control cable must be laid separately from each other.
- Avoid loops, and lay cable over short distances.
- The (–) poles of the power packs should be earthed at the feed-in point, as shown in figure 3.3.

Important: +24 V Supply voltage (X2)

To protect the device against fire, a 7 A rating fuse is integrated into the voltage supply cable inside the device. The shut-off capacity of the fuse is limited to **30 A**. If you use a voltage source with a higher maximum current, fit a 6 A back-up fuse with a switching capacity appropriate to the maximum current of the power supply unit. Always ensure the cable is protected!

3.3.1 Cable cross-section for X1 and X3

Positioning drive	Device connected load [kVA]	Cable cross-section [mm²]
CDF30.008	0,55	1.5 ... 2.5

Table 3.2 Cable cross-section (ensure compliance with VDE0298)

The CDF3000 has no precharging circuit. It therefore does not limit the charging current when the supply voltage is switched on. To utilize the current limitation of the power supply unit, the power should be switched upstream of the power supply unit (see Figure 3.4).

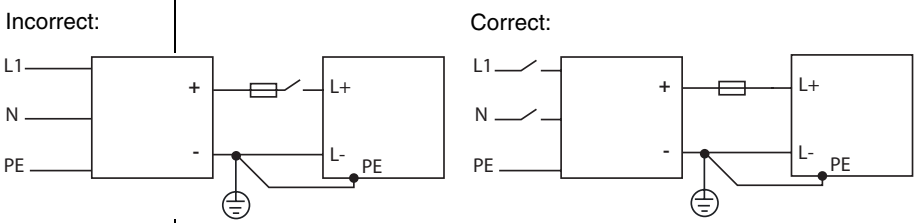
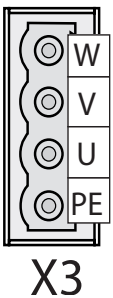


Figure 3.4 Connection of supply voltage

3.4 Motor connection

Info: The CDF3000 positioning drives are short-circuit-proof at the terminals during operation. In the event of a short-circuit in the motor cable, the power stage is disabled and an error message is delivered.



LUST synchronous servomotors are optimally attuned to the CDF3000 positioning drive. Prefabricated motor and encoder cables are also available. For more information on motors of the LSH series and on accessories refer to the “Servomotors Order Catalogue ID no. 0814.05B.x-xx”.

Step	Action	Comment
1	Select your desired synchronous motor.	Three motors are available (LST-037, LSH-050, LSH074).
2	Wire the **motor phases** U, V, W by way of a screened cable and earth the motor to X3/PE.	Use the prefabricated motor cable of **type KM2-KSxxx**
3	The connection of the PTC or KTY temperature sensor is integrated in the encoder cable (see section 3.x).	Use the prefabricated encoder cables: **KRY2-CDF-KSxxx** (resolver)

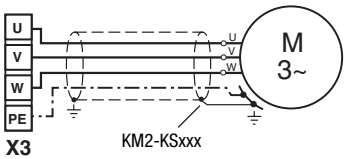


Figure 3.5 Connection of motor

Important: Motor phases U,V and W must never be reversed! If the motor phases are reversed the positioning drive has no control over the motor. The motor may buck or accelerate in an uncontrolled manner (“race”).

Important: The device is then not earth fault-proof at the motor terminals!

3.5 Encoder connection for Lust motors

Step	Action	Comment
1	Select the correct encoder type	
2	Wire the encoder connection with a screened wire	Use the prefabricated encoder cables: **KRY2-CDF-KSxxx** (resolver)

Matching motor - encoder cable - servocontroller connection

Compare the name plates of the components. Be sure to use the right components!
Earth the motor cable screen on the backing plate as close as possible to the CDF3000.

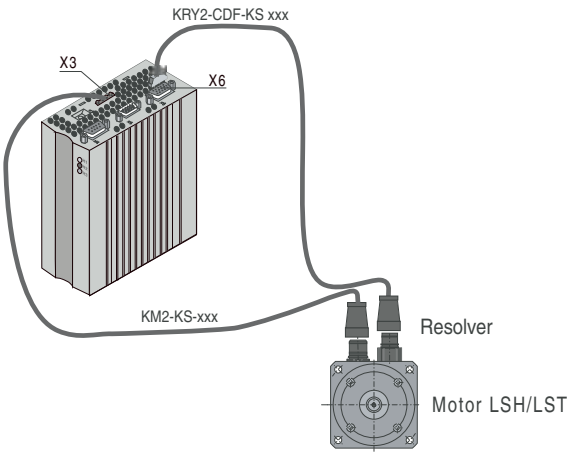


Figure 3.6 Matching motor/encoder cable

The encoder cable must not be split, for example to route the signals via terminals in the switch cabinet. Ensure that the knurled screws on the D-sub connector plug are secured!

3.5.1 Specification of interface X6

The electrical specification of the interface is given in Table 3.3, the terminal assignment in Table 3.4.

	Resolver	SSI encoder
Connection	Miniature D-SUB 15-pole socket (high-density)	
Interface	-	RS422 (differential)
Wave terminating resistance	-	DATA: 120 Ω (internal) CLK: No termination required
Max. signal frequency f_{Limit}	500 kHz	

Table 3.3 Specification of encoder interface X6

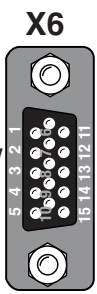
	Resolver	SSI encoder
Voltage supply	-	+ 5.2 V ±5%, max. 150 mA Not isolated from the power potential (+48 V)
Sampling rate	8 kHz	4 kHz
Interface log	-	SSI (Graycode)
Lines per revolution / resolution	-	13 bit (single-turn) 25 bit (multi-turn)
Max. cable length	20 m (longer lengths on request)	

Table 3.3 Specification of encoder interface X6

The cable type for SSI encoders should be selected according to the encoder manufacturer's specification, bearing in mind the following:

- Use only screened cables. Apply the screening on both sides.
- Connect the differential track signals A, B or CLK, DATA to each other via twisted cable strands.
- Do not separate the encoder cable, for example to route the signals via terminals in the switch cabinet.

Resolver/ SSI



X6 pin	Resolver function	SSI function	TTL function
1	Sine- (S4)	-	
2	Sine+ (S2)	-	
3	-	+5V (150 mA)	+ 5 V (150 mA)
4	-	DATA+	A+
5	-	DATA-	A-
6	Cosine- (S3)	-	
7	REF- (R2) (excitation-)	-	
8	-	GND	GND
9	PTC- (KTY / Klixon)	PTC- (KTY / Klixon)	
10	PTC+ (KTY / Klixon)	PTC+ (KTY / Klixon)	
11	Cosine+ (S1)	-	
12	REF+ (R1) (excitation+ [8 kHz, approx. 7 V AC])	-	
13	n.c.	-	
14	-	CLK+	B+
15	-	CLK-	B-

Table 3.4 Assignment of encoder interface X6

3.5.2 Connection of a second encoder to X6

Parallel to the resolver connection (see section 3.5), an SSI encoder can be evaluated at X6.

When using simultaneously, as described in Figure 3.7 the SSI encoder should be used only for position control. The motor commutation and secondary speed control is then performed by way of the resolver.

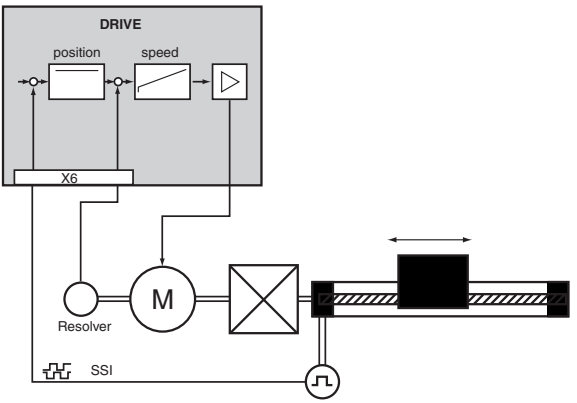


Figure 3.7 Drive with two measuring systems

3.5.3 Motor temperature monitoring

For thermal monitoring of the motor coil, a thermistor (PTC) can be connected to X6/9 and 10 over the encoder cable. The type used must be set during commissioning in parameter 330-MOPTC (factory default setting is “off”).

Sensor / Tech. data	No PTC used	Standard PTC	Linear voltage evaluation	TSS, Thermal circuit-breaker
Usable type	–	PTC to DIN 44082	KTY84-130, (tolerance band yellow)*	Klixon
Parameter 330-MOPTC =	OFF	DIN	KTY	TSS
Measurement voltage U_{MAX}	–	5 V		–
Error message		E-OTM		
* In KTX evaluation the cut-out temperature can be selected within limits (**150 °C** ... 250 °C)				

Table 3.5 Motor temperature monitoring specification

Important: When using third-party motors, it must be ensured that the motor temperature sensor used provides adequate insulation to the motor coil.

3.5.4 Project planning notes for encoder connection

The maximum number of lines per revolution of the encoder can be calculated by the following formula.

$$LR_{max} = \frac{60 \cdot f_{limit}}{n_{max}}$$

LR_{max} = Maximum number of lines of encoder in pulses per rev.

n_{max} = Maximum speed of motor in rpm

f_{limit} = Maximum input signal frequency of interface

Example of n_{max} = 6000 1/min, f_{Grenz} = 150 kHz:

Calculated: $LR_{max} = \frac{60 \cdot 150.000}{6000} = 1500$ pulses/rev.

Selected: An encoder with 1024 pulses per rev.

Minimum motor speed

Formula for calculating the minimum displayable motor speed n_{min}, depending on the lines per revolution of the encoder:

$$n_{min} = \frac{3000}{LR} \cdot \frac{1}{min}$$

LR = Number of lines of encoder in pulses per rev.

n_{min} = Minimum speed of motor in rpm

Note: A speed $<n_{min}$ cannot be measured. In this range the actual speed is constant = 0 rpm. In the range $0 < n < n_{min}$ the gain of the speed controller is reduced.

3.6 Serial interface (SIO)

The serial interface (SIO, X4) is used to connect a KEYPAD with a SMARTCARD or a notebook on which the DRIVEMANAGER PC tool is installed. This enables the CDF3000's parameters to be set.

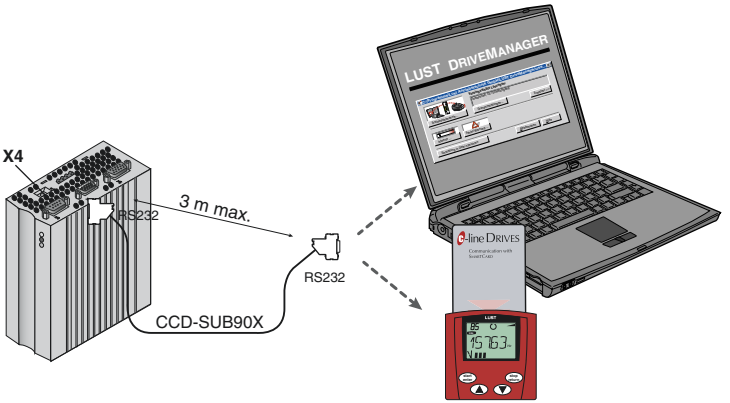
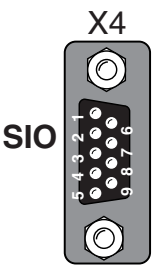


Figure 3.8 Terminal X4

Important: The RS232 interface may only be used for service and commissioning. Control via this interface is not permitted.

Please use the prefabricated RS232 cable CCD-SUB 90X (maximum length 3 m) to connect the positioning drive.

Pin assignment X4



Pin no.	Function
1	+15 V DC for operation panel KP200XL
2	TxD, send data
3	RxD, receive data
4	Do not use
5	GND for +15 V DC of operation panel KP200XL
6	Do not use
7	Do not use
8	Do not use
9	Do not use

Table 3.6 Pin assignment of serial interface X4

Important: The RS232 interface is connected to the potential of the (–) pole of the power electronics. Possible differences in potential between the earth of the (–) pole and of the notebook may cause a PE loop via the screen and the signal wires of the interface cable and the screen earth on the notebook. This may destroy the RS232, the notebook and the CDF3000! We therefore recommend using an opto-isolator in the interface cable.

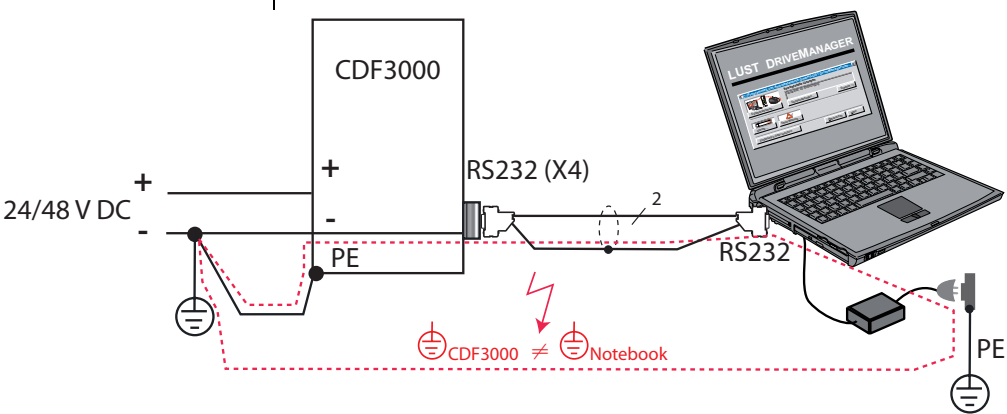


Figure 3.9 Serial interface connection

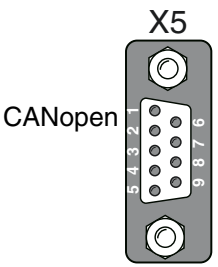
3.7 CAN_{open} interface X5

The CAN_{open} interface is built into the positioning drive. The connection is made via connector X5. The power supply to the isolated connection is provided by the customer.

Connection	Miniature D-Sub 9-pin plug
Wave terminating resistance - Bus termination -	120 Ω (internal) to be wired by customer via jumper (pin 1-2)
Max. input frequency	1 MHz
Ext. voltage supply	+ 24 V ±10% (floating to the drive controller)

Table 3.7 CAN_{open} interface connection

Assignment of connection X5:



Pin	Function
1	Wave terminating resistance 120 Ω internal for CAN by jumper between pins 1 and 2
2	CAN_LOW
3	CAN_GND
4	CAN-SYNC_LOW This pin can be optionally switched by the microcontroller as an input or output.
5	Wave terminating resistance 120 Ω internal for CAN-SYNC by jumper between pins 4 and 5
6	CAN_GND
7	CAN_HIGH
8	CAN-SYNC_HIGH This pin can be optionally switched by the microcontroller as an input or output.
9	CAN_+24 V (24 V ±10%)

Table 3.8 Pin assignment, connection X5

The CAN bus node address is set via the coding switch S1.

3.8 Multi-axis operation

The positioning drives running in regenerative operation (braking) in a multi-axis network feed power into the network which is consumed by the motor-driven positioning drives.

Networked operation of several positioning drives minimizes the power consumption from the mains and external braking resistors can be eliminated where appropriate.

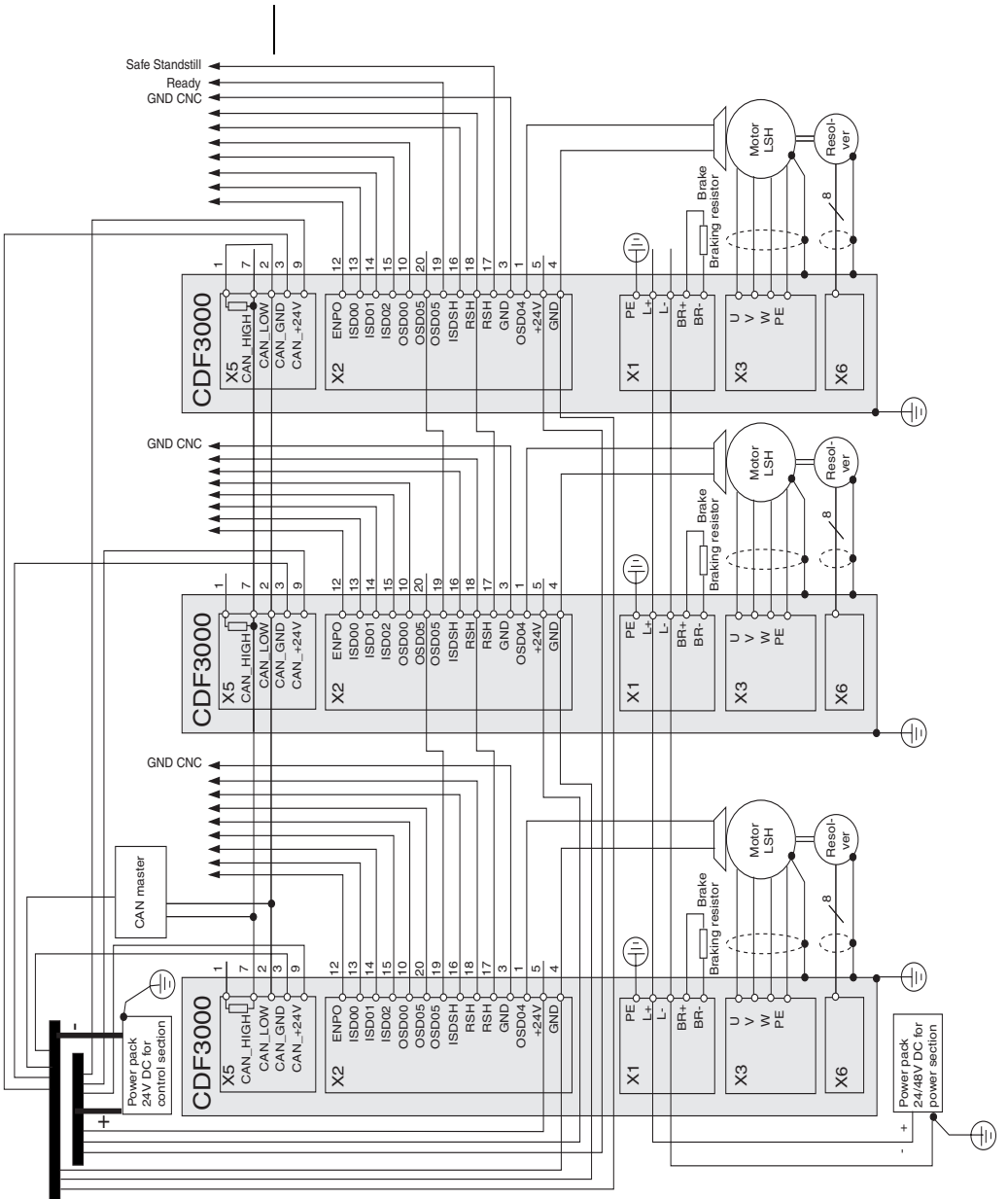


Figure 3.10 CDF3000 network diagram

3.9 Braking resistor (RB)

Important: Braking the drive is important to the safety of the machine or system!
Commissioning should include a test for safe functioning of the braking system! Incorrect dimensioning (overload) could lead to destruction of the braking resistor or the braking electronics, and damage to the machine or system. Overload (failure of the braking device) can also lead to serious or fatal physical injury to human beings, for example in lifting applications!

In regenerative operation, e.g. braking the drive, the motor feeds energy back into the positioning drive. This increases the voltage in the DC-link. If the voltage exceeds a threshold value, the internal braking transistor is activated and the regenerated power is converted into heat by way of a braking resistor.

The switching transistor is installed as standard. The design of the external braking resistor depends on a number of drive factors: for example the load to be moved, the required dynamics of the drive or the braking and cycle duration.

The RB+ and RB- terminals are not short-circuit and overload proof.

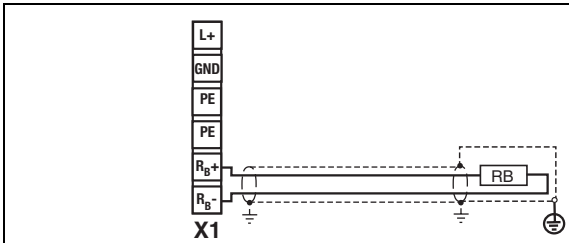


Figure 3.11 Braking resistor connection

Note the following points:

- The design of the braking resistor must be clarified at the project planning stage.
- For details of the permissible minimum ohmic resistance of an externally installed braking resistor for the individual positioning drives refer to Appendix A.2.

For further information please consult your project engineer.

Important: The braking resistor should be mounted such that in the event of failure of the chopper transistor (e.g. if it shorts) no fire risk is posed by the braking resistor and measures are put in place to cut power to the resistor.

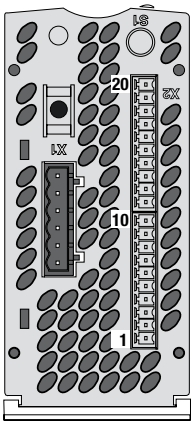
3.10 Control connections

Step	Action	Comment
1	Check whether you already have a **SmartCard** or a **DriveManager data set** with a complete device setup, i.e. the drive has already been planned as required.	
2	If this is the case, a special control terminal assignment applies. Please contact your project engineer to obtain the terminal assignment!	**Bulk customers** For details of how to load the data set into the positioning drive refer to section 4.2.
3	Choose a terminal assignment.	**Initial commissioning** There are various preset solutions available to make it easier to commission the device.
4	Wire the control terminals with screened cables. The only essential signals are the ENPO and ISDSH signals and a start signal (for control via terminal).	Earth the cable screens over a wide area at both ends. Cable cross-section maximum 1.5 mm² or two strands per terminal at 0.5 mm²
5	Keep all contacts open (inputs inactive).	
6	Check all connections again!	Continue with commissioning in section 4.

Note the following points:

- Always wire the control terminals with screened cables.
- Lay the control cables separately from the mains lead and motor cable.
- The CDF3000 Application Manual presents more preset drive solutions.
- A cable type with double copper braiding with 60 – 70% coverage must be used for all screen connections.

3.10.1 Specification of control connections



X2	Des.
20	OSD05
19	OSD05
18	RSH
17	RSH
16	ISDSH
15	ISD02
14	ISD01
13	ISD00
12	ENPO
11	+24 V
10	OSD00
9	ISA01+
8	ISA01-
7	ISA00+
6	ISA00-
5	+24 V
4	GND
3	GND
2	OSD03
1	OSD04

Control terminal X2 is located on the underside of the device.

Des.	Terminal X2	Specification	floating
Analog inputs differential			
ISA00+ ISA00-	7 6	U_{IN} = ± 10 V DC R_{IN}=101 kΩ Resolution 10-bit Scan cycle on terminal = 1ms Tolerance: U = ±1% of final value	no
ISA01+ ISA01-	9 8		no
Digital inputs Note: In the range >4.8 V/<18 V the behaviour of the inputs is undefined.			
ISD00 ISD01 ISD02	13 14 15	• Cut-off frequency 500 Hz • Switching level Low/High: <4.8 V / >18 V DC • I_{max} at 24 V = typ. 3 mA • Internal signal delay time ≈ 100µs • Terminal scan cycle = 1ms	yes
ENPO	12	• Power stage enable = High level • Switching level Low/High: <4.8 V / >18 V DC • I_{max} at 24 V = typ. 7.5 mA • R_{IN} = 3 kΩ • Internal signal delay time ≈ 10ms • Terminal scan cycle = 1ms	yes
Digital outputs			
OSD00	10	• Short-circuit-proof • I_{max} = 50 mA • Internal signal delay time ≈ 250µs • Terminal scan cycle = 1ms • Protection against inductive load • High-side driver	yes

Table 3.9 Specification of control connections

Des.	Terminal X2	Specification		floating
OSD03 OSD04	2 1	• Short-circuit-proof • I_{max} = 500 mA • Internal signal delay time ≈ 250µs • Terminal scan cycle = 1ms • High-side driver • for actuation of up to two motor holding brakes		yes
Safe Standstill Note: For more information see section **3.11** "Safe Standstill"				
ISDSH	16	**"Safe Standstill" request** • Cut-off frequency 500 Hz • PLC-compatible • Switching level Low/High: <4.8 V / >18 V DC • I_{max} at 24 V = typ. 3 mA • R_{IN} = 3 kΩ • Internal signal delay time ≈ 100µs • Terminal scan cycle = 1ms		yes
RSH	18 17	**"Safe Standstill" checkback** • Relay, 1 NO contact • 24 V / 0,2 A AC, usage category AC1, cos φ = 1 (ohmic load) • 30 V / 0,2 A DC, usage category DC1, cos φ = 1 (ohmic load) • Operating delay approx. 10 ms		yes
Relay output				
OSD05	20 19	• 24 V / 1 A AC, usage category AC1, cos φ = 1 • 30 V / 1 A DC, usage category DC1, cos φ = 1 • Operating delay approx. 10 ms		yes

Table 3.9 Specification of control connections

Des.	Terminal X2	Specification	floating
Voltage supply			
+24 V	5 11	• Ext. +24 V ± 2 V feed for control electronics • essential for operation of CDF3000 • I_{max_in} = 0,9 A + currents of outputs OSD00, OSD03 and OSD04	–
GND	3 4	• Reference point for control electronics	

Table 3.9 Specification of control connections

3.11 Safe Standstill

3.11.1 Function description

The CDF3000 positioning drive supports the “Safe Standstill” safety function, providing protection against unexpected start-up, in accordance with the requirements of EN 954-1, category 3.

“Safe Standstill” to EN 954-1 designates a protective measure as an interlocking or control function. Category 3 signifies that when a single fault occurs the safety function is maintained. The safety-related parts must be designed such that:

- a single fault in any of the said parts does not result in loss of the safety function and
- whenever feasible in an appropriate manner, the single fault is detected.

For the “Safe Standstill” function to EN954-1, category 3, the drive controllers are fitted with an integrated circuit with a checkback contact. The logic cuts the power supply to the pulse amplifiers to activate the power stage. Combined with the “ENPO” controller enable, a two-channel block is placed on the occurrence in the power circuit of a pulse pattern suitable to generate a rotating field in the motor.

This variant offers the following advantages over the solution with a motor contactor:

- No need for the external motor contactor
- So less wiring
- Space-saving
- Improved EMC based on full screening of the motor cable.

3.11.2 Additional safety instructions for the “Safe Standstill” function

Installation/commissioning

Always draw up a validation plan. The plan details the tests and analyses you employed to establish the compliance of the solution (e.g. the proposed circuit diagram) with the requirements arising from your particular application case.

Action in case of emergency to EN 13850

Emergency Stop for shutdown in case of emergency
Emergency stop is an emergency action designed to bring a hazardous process or motion to a stop (EN60204-1).

Emergency Off for switch-off in case of emergency
Emergency off is an emergency action designed to shut off the power supply sources if there is a risk of electric shock or other electrical risk (EN60204-1).

Danger:

- When the positioning drive is in “Safe Standstill” mode, the motor cable and mains power lead, the braking resistor and the DC link voltage cables route voltages to the PE conductor.
- “Emergency off” is not possible with the “Safe Standstill” function without additional measures. There is no electrical isolation between the motor and the positioning drive! This means there is a risk of electric shock or other electrical risk.

Danger:

- If introduction of force from an external source, such as from a suspended load, is expected when the “Safe Standstill” safety function is active, this motion must be prevented by additional measures, such as a mechanical brake or a balance weight.
- Shorts in two remote branches of the power pack may activate a short-time axis movement dependent on the number of poles of the motor.
  Example – synchronous motor: With a 6-pole synchronous motor the movement may be a maximum of 30 degrees. For a directly driven ball screw, e.g. 20 mm per revolution, this corresponds to a one-time maximum linear movement of 1.67 mm.
- The “Safe Standstill” function does not replace the “Safe Shutdown” function to EN 60204 part 1.
  “Safe Shutdown” is not a separate function, but rather describes a process which can be realised by means of the control.

3.11.3 Wiring and commissioning

For the “Safe Standstill” function to EN954-1, the drive controllers are fitted with an integrated electronic circuit with a checkback contact. The logic cuts the power supply to the pulse amplifiers to activate the power stage. Combined with the “ENPO” controller enable, a two-channel block is placed on the occurrence in the power circuit of a pulse pattern suitable to generate a rotating field in the motor.

The internal function inside the device and the connection for the CDF3000 is shown in Figure 3.12.

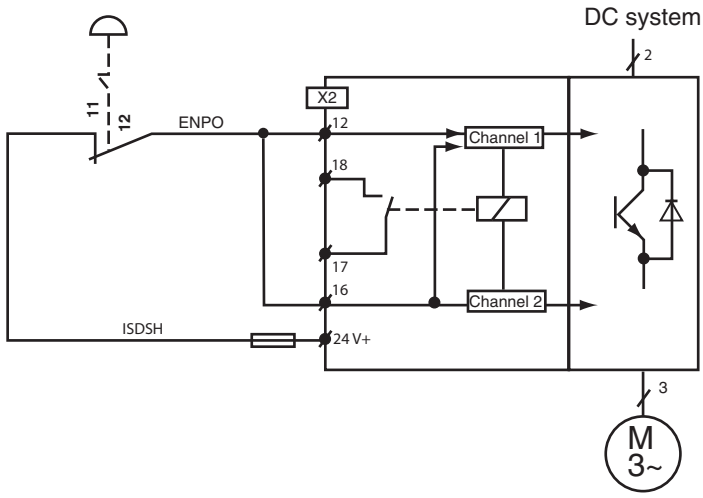


Figure 3.12 Connection example with Emergency Off button

ENPO	ISDSH	Safe Standstill	Controller state	Relay [1] RSH
L	L	ON[3]	Power stage disabled over two channels. Hardware restart lockout active.	
L	(L) ➜ H	ON	Power stage disabled over two channels. Hardware restart lockout active.	
(H) ➜ L	H	OFF	Power stage disabled over one channel.	
H	L	ON	Power stage disabled over two channels. Hardware restart lockout active.	
H	(L) ➜ H	ON	Power stage disabled over two channels. Hardware restart lockout active.	
(L) ➜ H[2]	H[2]	OFF[3]	Power stage ready.	

( ) Preceding state
1) 3 x 10^6 switching cycles at 200 mA (rest: NO contact)
2) To deactivate the restart lockout, the control signals must be set simultaneously (max. error 5 ms) to High (H) or ISDSH must be set safely before ENPO to High (H).
3) Switching combination for Safe Standstill, category 3

Table 3.10 Logic table for operation of Safe Standstill

3.11.4 Testing

The applied control signals “ISDSH” and “ENPO” must always be tested by the operator or a higher-level control for plausibility to the SH checkback.

If an implausible state occurs, this indicates an error in the system (installation or positioning drive). In this case the drive must be switched off and the error eliminated.

Important: You must always check the correct functioning of the “Safe Standstill, protection against unexpected start-up” function:

- on initial commissioning
- after any modification of the system wiring
- after any replacement of one or more items of system equipment.

4 Commissioning

Important: Commissioning must only be carried out by qualified electricians who have undergone instruction in the necessary accident prevention measures.

4.1 Choice of commissioning

Mode of commissioning	Commissioning steps	Continued on
• Project planning and commissioning are already complete. • Loading of an existing data set.	Serial commissioning	Page 4-2
• Initial project planning and commissioning of the drive system	Initial commissioning	Page 4-5
• Project planning and basic setting of the drive system have been carried out.	Test run	Page 4-15

4.2 Serial commissioning

Apply this mode of commissioning if you want to put several identical drives into operation (serial commissioning). The same positioning drive type and the same motor must be used for each drive in an identical application.

If you already have a complete data set, skip the subsection headed "Save data set to SMARTCARD" (with KP200XL) or *"Save data set from device to file"* (with DRIVEMANAGER).

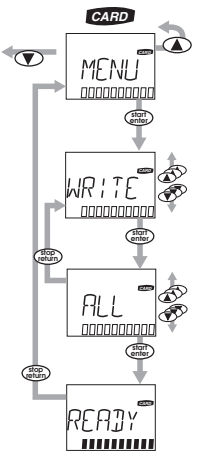
4.2.1 Serial commissioning with KEYPAD

Precondition:

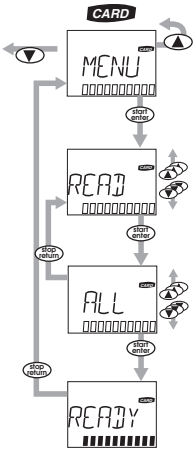
- All positioning drives are fully connected.
- The **first** drive is already fully commissioned into operation.
- KEYPAD connected to positioning drive (X4) via a RS232 interface cable.

Important: The CARD menu can only be selected when the **drive is not active**!

Save data set to SMARTCARD

Step	Action	Comment	Presentation
1	Connect the KEYPAD to the positioning drive of the **first** drive, insert a SMARTCARD and switch on the power.		
2	Select the CARD menu.	= load/save with SMARTCARD	
3	Choose WRITE.	= Save data set	
4	Choose ALL and start the save operation with the *Start/Enter key*.	= Complete data set is saved	
5	READY appears.	= Save operation completed without error	
By this procedure you have written your data set to a SMARTCARD.			

Download data set from SMARTCARD to next positioning drive

Step	Action	Comment	Presentation
1	Connect the KEYPAD to the positioning drive of the **next** drive, insert the SMARTCARD with the desired data set and switch on the power.		
2	Select the CARD menu.	= load/save with SMARTCARD	
3	Choose READ.	= Load data set	
4	Choose ALL and start the load operation with the *Start/Enter key.*	= Complete data set is loaded	
5	READY appears.	= Load operation completed without error	
	Repeat this procedure on each of the other drives.		

Note: Data set is automatically stored in positioning drive.

4.2.2 Serial commissioning with DRIVEMANAGER

Save data set from device to file

Precondition:

- All positioning drives are fully connected.
- The **first** drive is already fully commissioned into operation.
- A notebook running the DRIVEMANAGER user software is connected.

Step	Action	Comments
1	Connect your notebook to the positioning drive of the **first** drive and switch on the power to the positioning drive (X4).	Use a standard serial cable (9-pin D-SUB, plug-and-socket) and an opto-isolator.
2	Start DRIVEMANAGER.	Automatically connects to the linked positioning drive.
	If the connection fails, check the settings in the **Tools**>**Options** menu and try again by way of icon. 	
3	Save the current data set with icon, either in the parameter database (directory: c:/../userdata) of the DRIVEMANAGER or to a floppy disk (a:/). 	With the icon the current data set of the connected device is always saved. Give the file a name of your choice.
4a	Disconnect from all devices with icon 	
4b	Connect your notebook to the positioning drive of the **next** drive and switch on the power to the positioning drive.	
5	With icon establish a link between the DRIVEMANAGER and the newly connected device. 	
6	With icon load the data set saved in step 4 into the device. 	
7	With icon select the main window. Save the setting with button  -> 	
	Repeat steps 4 ... 7 on each of the other drives.	

Download data set from file into device

Remember to save the setting.

For more information on the DRIVEMANAGER refer to the DRIVEMANAGER manual.

4.3 Initial commissioning

Preconditions:

- The positioning drive is fully connected; see Section 3
- Installed DRIVEMANAGER version V3.4 or higher
- Motor database for motors is installed on notebook
- Device is connected to notebook via RS232 interface (X4)

Important: Never wire or disconnect electrical connections while they are live!

Connect input ENPO = low level at terminal X2/12 to prevent unintentional start-up of the motor (power stage disabled, positioning drive power on).

Preparations:

- Switch on the CDF3000 positioning drive.
  A self-test is carried out.
- Start the DRIVEMANAGER.

DRIVEMANAGER
Connect
or:
Communication>Connect...

Set up the connection to the device.

DRIVEMANAGER *or:*
Active device >
Change settings

Open the main “CDF3000 Setup” window:

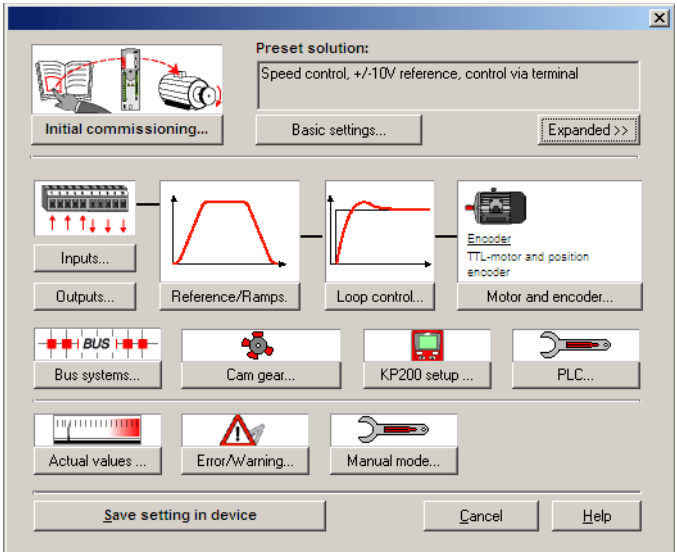
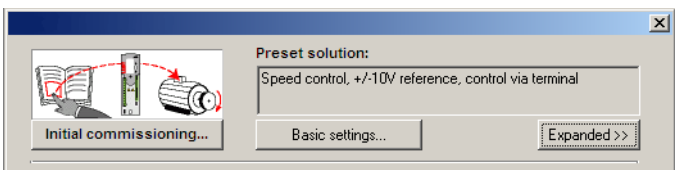


Figure 4.1 Main window for the various settings in the DRIVEMANAGER.

Continue with:



4.3.1 Preset solutions

Preset solutions are complete parameter data sets which are provided to handle a wide variety of typical application movement tasks.

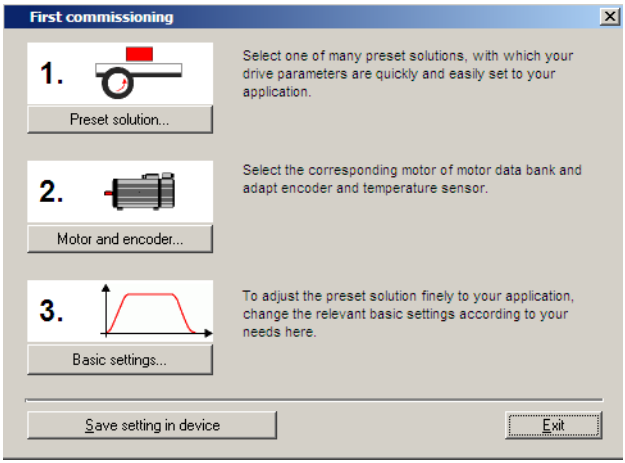


Figure 4.2 Initial commissioning

Loading a preset solution into the RAM automatically configures the positioning drive. The parameters are set for the following:

the control location of the drive controller,

- the setpoint source
- the assignment of the inputs and outputs for the signal processing and
- the control mode.

Using a preset solution makes commissioning of the positioning drive much quicker and easier. By changing individual parameters, the preset solutions can be adapted to the needs of the specific task. Preset solutions modified in this way are stored in the device as user data sets. In this way you can arrive more rapidly at your desired movement solution.

A total of 20 preset solutions covers the typical application areas with the CDF3000 controller.

Abbreviation	Setpoint source	Start control via/ Bus control profile
TCT_1	+/-10V-analog - torque	I/O terminals
SCT_1	+/-10V-analog	I/O terminals
SCT_2	Fixed speed table	I/O terminals
SCC_2	Fixed speed table	CANopen field bus interface - EasyDrive profile “Basic”
SCB_2	Fixed speed table	Field bus option module (Profibus) - EasyDrive profile “Basic”
SCC_3	CANopen field bus interface	CANopen field bus interface - EasyDrive profile “Basic”
SCB_3	Field bus option module (Profibus)	Field bus option module (Profibus) - EasyDrive profile “Basic”
SCP_3	PLC	PLC
SCT_4	PLC	I/O terminals
SCC_4	PLC	CANopen field bus interface - EasyDrive profile “Basic”
SCB_4	PLC	Field bus option module (Profibus) - EasyDrive profile “Basic”
PCT_2	Tables driving set	I/O terminals
PCC_2	Tables driving set	CANopen field bus interface - EasyDrive profile “TabPos”
PCB_2	Tables driving set	Field bus option module (Profibus) - EasyDrive profile “TabPos”
PCC_1	CANopen field bus interface	CANopen field bus interface - DSP402-profile position mode - DSP402-profile velocity mode
PCB_1	Field bus option module (Profibus)	Field bus option module (Profibus) - EasyDrive profile “DirectPos”
PCP_1	PLC	PLC
PCT_3	PLC	I/O terminals
PCC_3	PLC	CANopen field bus interface - EasyDrive profile “PlcPos”
PCB_3	PLC	Field bus option module (Profibus) - EasyDrive profile “PlcPos”

Table 4.1 Preset solutions for speed control with CDF3000

All preset solutions have their own individual basic setting window in the DRIVEMANAGER.

Select the preset solution matching your application.

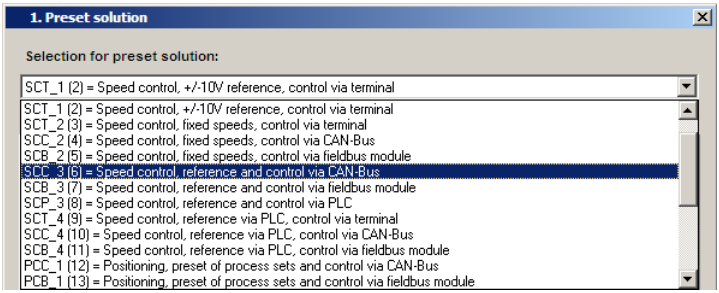
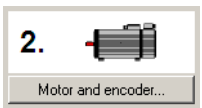


Figure 4.3 Selection of preset solution

Note: For detailed information on preset solutions and on terminal assignment refer to the CDF3000 Application Manual.

4.3.2 Setting the motor and encoder



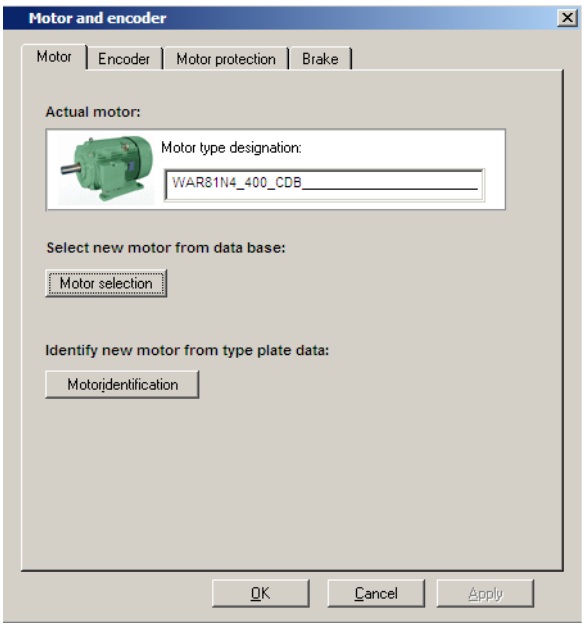


Figure 4.4 Motor and encoder setup

Setting up the motor data via the motor database

This setting should be made if a suitable motor data set or a complete motor database is available. Using the correct motor data set ensures

- that the electrical parameters of the motor are correctly set,
- that the motor protection (“Motor protection” tab) is correctly set and
- that the control circuits of the drive are preset.

Note: The torque controller is set up optimally, so no further adjustments are necessary.
The setting of the speed controller is based on the assumption that the machine moment of inertia reduced onto the motor shaft is equal to the motor moment of inertia.
The speed and position controllers offer a high degree of damping, and so are also suitable for loop control of elastic mechanisms.

For special settings to optimize the speed and position control loops, please use the CDF3000 Application Manual.

Setting of the encoder

The encoder connected to the motor is set up on the Encoder tab. It is also possible to work with two encoders. The first encoder is used for commutation and speed control of the motor (motor encoder) and the second for position control. Both functions can also be implemented with just one encoder.

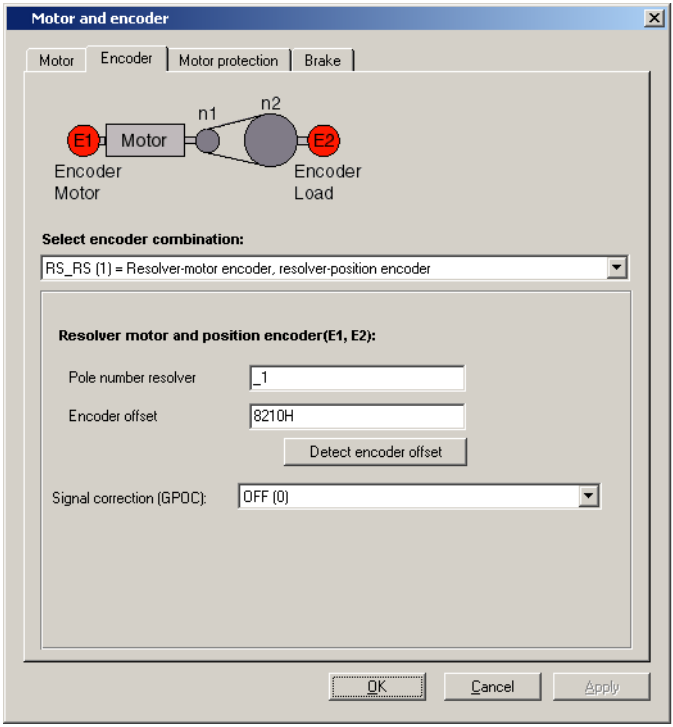


Figure 4.5 Encoder configuration

Every encoder combination has a special setup screen.

For more information on setting up the encoders, refer to the CDF3000 Application Manual.

Checking the encoder

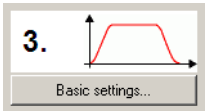
To check the encoder the motor shaft is rotated by hand.

Important: Before touching the shaft with your hands, make sure the CDF3000 is set to “Safe Standstill” mode.

The viewing angle when checking is from the front onto the shaft end (flange). The “CDF3000 setpoint and actual values” status display, under “n_{ist}, Actual speed”, must indicate a positive speed in clockwise rotation and a negative speed in counter-clockwise rotation. If the speed is incorrect, check the following points:

- Is the encoder cable correctly connected to the motor and the positioning drive?
- Is the encoder cable in use the correct one for the type of encoder?

4.3.3 Making basic settings



Custom setup screens are provided for fine adjustment of each preset solution. You can use them to adapt the drive to your application. For a detailed description of the individual functions, refer to the CDF3000 Application Manual.

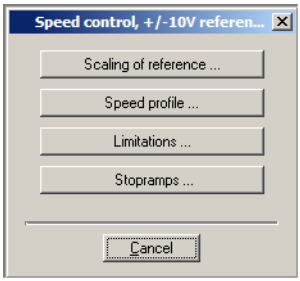


Figure 4.6 Flux control

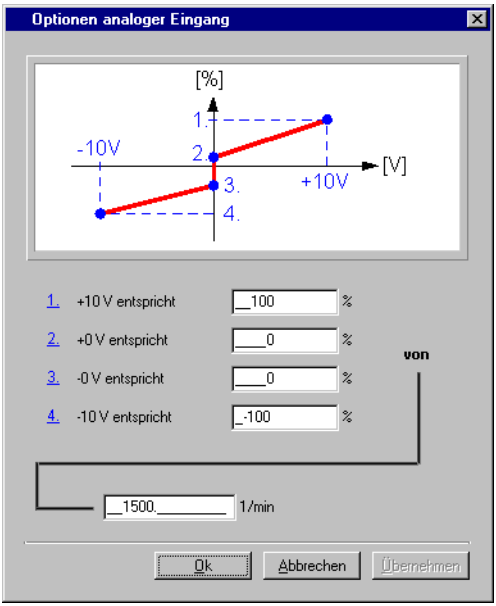


Figure 4.7 Analog input options

4.3.4 Saving the settings

DRIVEMANAGER
CDF3000 setup

or:
Active device > Change settings

DRIVEMANAGER
CDF3000 setup

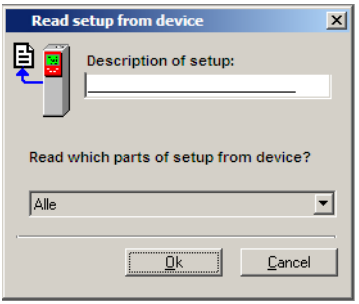
or:
Active device > Save device settings to >file

Saving the settings in the device

Any changes which are to be stored permanently in the device must be saved by way of the *CDF3000 setup* screen.

The changes made can also be saved to a file.

Saving the settings to a file <



Choose the file name (e.g. mydata). All parameters are saved under the chosen file names (e.g. mydata) with the appropriate extension (*.00D). The device data can be assigned a description prior to saving.

Continue with: “Test run”, see section 4.4.

4.4 Test run

Important: Test run with installed motor:
In this case it must be ensured that the test does not damage the system! In particular, pay attention to positioning range limits.
Please note that you yourself are responsible for safe operation. Lust Antriebstechnik GmbH cannot be held responsible for any damage incurred.

Danger to life from uncontrolled rotation!
Before motors with a feather key at the shaft end are commissioned, the feather key should be secured against being ejected, if this cannot be prevented by drive elements such as pulleys, couplings, or the like.

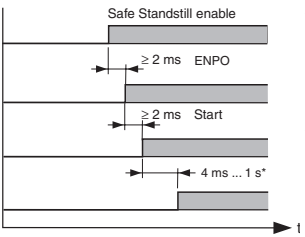
Preset solution, torque control:
In this preset solution the drive must not be run without load torque, otherwise the motor shaft would accelerate uncontrolled up to the preset speed limit.

Important: Destruction of the motor:
The motors are intended for operation on the positioning drive. Direct connection to the mains may lead to destruction of the motor.
High surface temperatures may occur on the motors. Temperature-sensitive items should therefore not be placed on top of or attached to the motors. Protective measures may be needed to prevent touching.
The temperature sensor installed in the coil is to be connected to the direct drive controller in order to prevent overheating of the motor by the temperature monitor.
The motor brake (if installed) should be checked for fault-free functioning before installation of the motor.
The optionally installed standstill holding brake is only designed for a limited number of emergency brakings. Use as a working brake is prohibited.

The drive is tested without the coupled mechanism. The test run is carried out in speed controlled mode, independently of the chosen preset solution.

A test run is still possible even if the motor is already coupled to the system:

1. **Enable Safe Standstill**
   High level at terminal X2/16
2. **Set ENPO power stage enable**
   High level at terminal X2/12



Safe Standstill input

ENPO input

Start

Device status: “Technology ready”

Pay attention to the time response of the inputs.
* After controller initialization resulting from a parameter change

3. **Control with DRIVEMANAGER:**
   Select “Speed control” and start the drive, e.g. with setpoint 100 rpm.

DRIVEMANAGER
Open-loop control

or:
Active device > Open-loop control> Basic operation modes

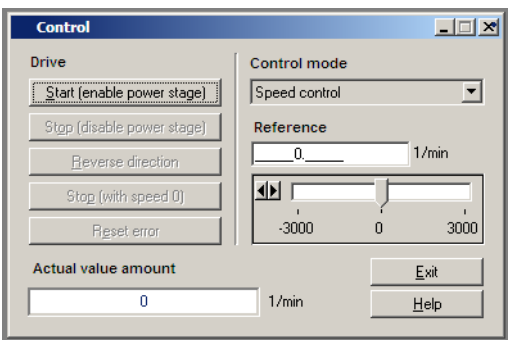


Figure 4.8 Open-loop control

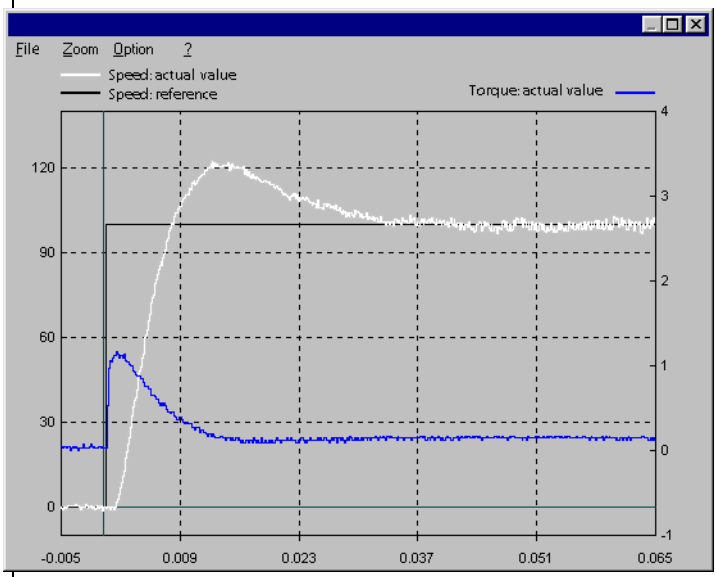
DRIVEMANAGER
Digital scope
or:
Active device > Monitoring > Quickly changing digital scope values

Check the drive response

Now you can assess the drive response with the aid of step responses, which can be recorded using the DRIVEMANAGER digital scope function.
Select the following four recording variables:

- 0: Speed:Setpoint
- 1: Speed:Actual
- 2: Torque:Setpoint
- 3: Torque:Actual

Trigger condition:
Channel 0; rising edge, pretrigger 10%; level: 30 rpm



Start the drive with a setpoint value of 100 rpm for example
.
Compare the step response of your drive with the diagram. With resolvers the overshoot of the actual speed should be around 20 %; with sin/cos incremental encoders around 30 % (referred to the setpoint value). Make sure the drive system exhibits small signal response (the torque setpoint value must be less than the maximum).

If the torque setpoint reaches its maximum, reduce the speed step.

The time response (rise time, correction time) of the speed control loop is independent of the speed step.

Result:

If the step response of your drive more or less matches the diagram, you can be sure that the motor phases are correctly wired, the encoder is correctly connected, and the CDF3000 parameters are set to the correct motor.

If the step response deviates severely from the diagram, it is to be assumed

- that the motor data set was selected incorrectly, or
- that the cabling is faulty.

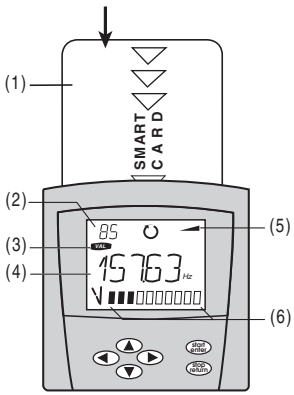
Check the individual steps from Section 3 “Electrical Installation” and Section 4.3 “Initial commissioning” and repeat the test run.

The step response may also deviate if the ratio of the machine moment of inertia reduced onto the motor shaft relative to the motor moment of inertia is very high. Here the loop control settings must be optimized. For special settings to optimize the speed and position control loops, please use the CDF3000 Application Manual.

4.5 Operation with KEYPAD KP200XL

Overview - KEYPAD KP200XL

The KEYPAD can be connected to positioning drive (X4) via a RS232 interface cable.



(1) SMARTCARD chipcard to save and transfer settings

(2) 3-digit display, e.g. for parameter number

(3) Current menu

(4) 5-digit display for parameter name and value

(5) Acceleration or braking ramp active

(6) Bar graph display, 10-character

Important:

The RS232 interface may only be used for service and commissioning.

Control of the CDF3000 via this interface is not permitted!

start enter — Call up menu branches or parameters; Save changes; Start in “Control drive” mode

stop return — Quit menu branches; Cancel changes; Stop in “Control drive” mode

▲ — Select menu, subject area or parameter; Increase setting

▼ — Select menu, subject area or parameter; Reduce setting

Table 4.2 Operating and display elements of the KEYPAD KP200XL

Menu structure

The KEYPAD KP200XL offers a user-friendly menu structure.

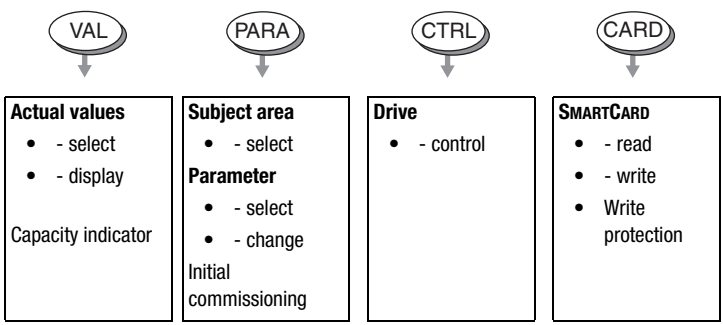


Figure 4.1 Functions of the menus

Example - parameter setting (PARA menu)

- The parameters in the PARA menu are grouped into subject areas according to their functions, in order to provide a clearer overview.
- Only the parameters to which the current user level permits access can be changed.

1. Select PARA menu.

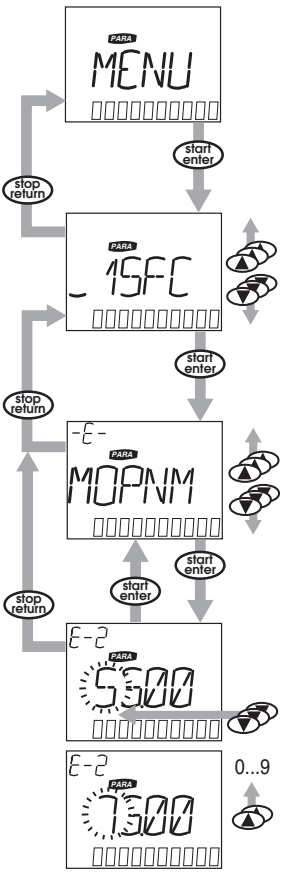
2. Select desired subject area with cursor keys and confirm with **Start/Enter**.

3. Select desired parameter with cursor keys (user level 1-MODE = 2).

4. The current value is displayed, with the last character flashing. Switch to the next character using the **down** key. Use the **up** key to change the flashing character. The fifth character at the extreme left indicates the preceding sign: (–) = minus.

The last character can be entered as an exponent.

Save new value with **Start/Enter** or cancel (without saving) with **Stop/ Return.**



CARD MENU

Read from/write to SMARTCARD:

- In this menu positioning drive settings can be saved to the SMARTCARD and transferred to other positioning drives.
- In every storage operation, **all** parameters are always saved to the SMARTCARD. For read operations, either all parameters or only parameters from one subject area (per read operation) can be read-in.

Function	Meaning
READ > ALL	Read all parameters from SMARTCARD
READ > _27RS	Read-in parameters from subject area, e.g. B. _27RS (setpoint structure)
WRITE	Store all parameters on the SMARTCARD
LOCK	Write-protect the SMARTCARD
UNLOCK	Cancel the write protection

For more information on operation with the KEYPAD refer to the KEYPAD KP200XL Operation Manual.

Important: The RS232 interface may only be used for service and commissioning. Control via this interface is not permitted.

4.6 Operation with DRIVEMANAGER

Precondition:

- DRIVEMANAGER user software version V3.2 or higher installed on the notebook.
- The CDF3000 has been installed in accordance with the instructions in section 3.

Important: Make sure that both the enclosure of the CDF3000 and the GND connection (control voltage 0V) are connected to PE conductor potential. Otherwise the serial interface of the CDF3000 may be destroyed by shifts in potential (see section 3.3).

Important: The RS232 interface may only be used for service and commissioning. Control via this interface is not permitted.

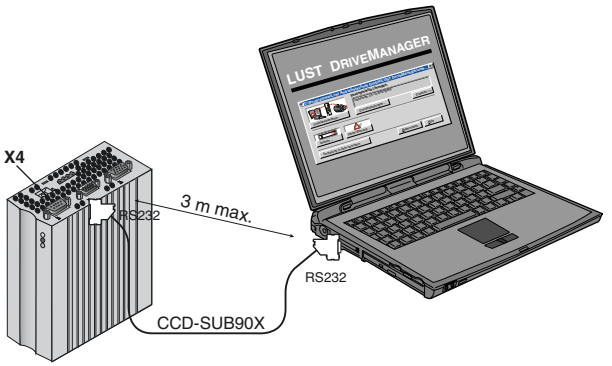


Figure 4.2 Positioning drive connection to notebook/DRIVEMANAGER

Important: The RS232 interface is connected to the potential of the (–) pole of the power electronics. Possible differences in potential between the earth of the (–) pole and of the notebook may cause a PE loop via the screen and the signal wires of the interface cable and the screen earth on the notebook. This may destroy the RS232, the notebook and the CDF3000! We therefore recommend using an opto-isolator in the interface cable.

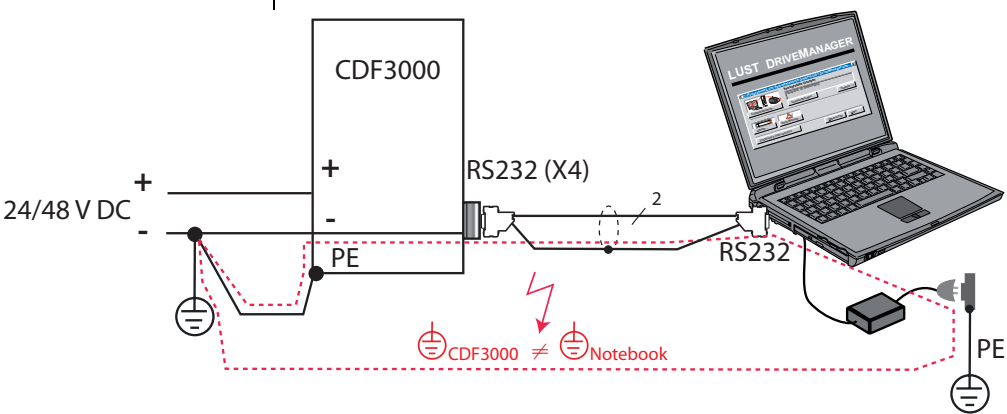


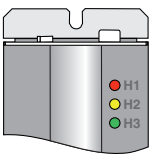
Figure 4.3 Serial interface connection

The key functions

Icon	Function	Menu
	Change setting of active device	Active device > Change settings
	Print parameter data set	Active device > Print settings
	Digital scope	Active device >m Monitoring > Quickly changing digital scope values
	Control drive	Active device > Open-loop control > Basic operation modes
	Connect to device	Communication > Connect > Single device
	Bus initialization, Change setting	Communication> Bus configuration
	Disconnect all devices	Communication> Disconnect
	Save data set of active device to file	Active device > Save device settings to
	Data set transfer from file to active device	Active device > Load device settings from

5 Diagnosis/Troubleshooting

5.1 LEDs



At the top right of the positioning drive there are three status LEDs colored red (H1), yellow (H2) and green (H3).

Device status	Red LED (H1)	Yellow LED (H2)	Green LED (H3)
Power* on	-	-	●
Ready to start [1)]	❍	●	●
In service/Auto-tuning active	❍	✳	●
Warning	●	● / ✳	●
Error	✳ (flash code)	❍	●

❍ LED off, ● LED on, ✳ LED flashing

+ 24 V at control terminal X2

[1)] Precondition: "Safe Standstill" and ENPO set one after the other.

5.2 Error messages

If an error occurs during operation it is indicated by a flash code from LED H1 (red) on the positioning drive. The code indicates the type of error. If a KP200XL is adapter-connected, the KP200XL indicates the error type as an abbreviation.

Flash code of red LED H1	Display KeyPad	Explanation	Cause/Remedy
1x	E-CPU	Collective error	The exact error code can be read from the KeyPad or DriveManager.
2x	E-OFF	Undervoltage shut-off	Check power supply. Also occurs briefly in response to normal power-off.
3x	E-OC	Current overload shut-off	**Short-circuit, earth fault**: Check cabling of power connections, check motor coil (see also section 3, Electrical Installation). **Device setup not correct**: Check parameters of control circuits. Check ramp setting.
4x	E-OV	Voltage overload shut-off	**Voltage overload from mains**: Check mains voltage. Restart device. **Voltage overload resulting from feedback from motor** (regenerative operation): Slow down braking ramps. If not possible, use a braking resistor.
5x	E-OLM	Motor protection shut-off	**Motor overloaded** (after I x t monitoring): Slow down process cycle rate if possible. Check motor dimensioning.
6x	E-OLI	Device safety shut-off	**Device overloaded**: Check dimensioning
7x	E-OTM	Motor temperature too high	**Motor PTC correctly connected**? **Parameter MOPTC correctly set**(type of motor PTC evaluation)? **Motor overloaded**? Allow motor to cool down. Check dimensioning.
8x	E-OTI	Positioning drive overheated	**Ambient temperature too high**: Improve ventilation in cabinet. Load too high during driving/braking: Check dimensioning
1) For more information see also **CDE/CDB/CDF3000 Application Manual**			

Table 5.1 Error messages

Helpline

If you have any technical queries about project planning or commissioning of the drive device, please contact our Helpline.

You can reach us:

Mon.-Thur.: 8 a.m. - 4.30 p.m.
Fri.: 8 a.m. - 4 p.m.

Tel.: +49 (0) 6441/966-180
Fax: +49 (0) 6441/966-177

e-mail: helpline@lust-tec.de

Service/Repairs

If you need further assistance we – the Lust Service specialists – will be glad to help.

You can reach us:

Mon.-Thur.: 8 a.m. - 4.30 p.m.
Fri.: 8 a.m. - 4 p.m.

Tel.: +49 (0) 6441/966-171
Fax: +49 (0) 6441/966-211

e-mail: service@lust-tec.de

5.3 User errors in KeyPad operation

Error	Cause	Remedy
ATT1	Parameter cannot be changed at current user level or is not editable.	Select user level 1-MODE higher.
ATT2	Motor must not be controlled via the CTRL menu.	Cancel start signal from a different control location.
ATT3	Motor must not be controlled via the CTRL menu because of error state.	Reset error.
ATT4	New parameter value impermissible	Change value.
ATT5	New parameter value too high	Reduce value.
ATT6	New parameter value too low	Increase value.
ATT7	Card must not be read in current state.	Reset start signal.
ERROR	Invalid password	Enter correct password.

*Table 5.2 KeyPad USER ERROR: Reset with **Start/Enter***

5.4 User errors in SmartCard operation

Error	Meaning	Remedy
ERR91	SmartCard write-protected	Use different SmartCard
ERR92	Error in plausibility check	
ERR93	SmartCard not readable, wrong positioning drive type	
ERR94	SmartCard not readable, parameter not compatible	
ERR96	Connection to SmartCard broken	
ERR97	SmartCard DATA invalid (checksum)	
ERR98	Insufficient memory on SmartCard	
ERR99	Selected area not present on SmartCard, no parameters transferred to SmartCard	

*Table 5.3 SmartCarderror: Reset with **Stop/Return***

5.5 Reset

The reset function is divided into two areas with differing effects. Parameter reset restores to the last value stored in the device. Device reset restores the entire data set to the factory setting (delivery defaults).

Parameter reset with KEYPAD

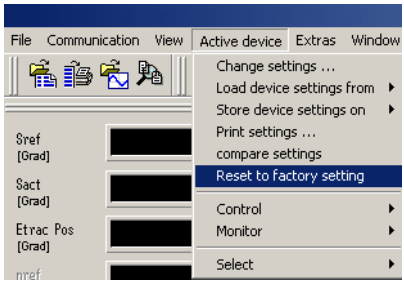
If you are in the setup mode of a parameter and press the two cursor keys simultaneously, the parameter you are currently editing will be reset to the last setting stored (= saved with parameter 150-SAVE).

Factory setting with KEYPAD

Press both cursor keys simultaneously during positioning drive power-up to reset all parameters to their factory defaults and the system is reinitialized.

Factory setting with DRIVEMANAGER

In the “Active device” menu, the “Reset to factory setting” option can be used to restore the delivery defaults of the device.



Note: Important! The factory setting also resets the selected preset solution. Check the terminal assignment and functionality of the positioning drive in this operation mode, or load your own user data set.

A Appendix

A.1 Technical data

CDF30.008

Technical data	CDF30.008
Output, motor side	
Voltage	16.5 V ... 33 V AC
Continuous current (RMS) (I_N)	8.0 A
Peak current 2 x I_N for 5 s	16 A
Rotating field frequency	0 ... 400 Hz
Switching frequency of power stage	8, **16** kHz
Input, mains side	
Mains voltage	1 x 24 VDC -10 %/ 48 VDC +10 %
Device connected load	480 VA
Power loss	25 W
Braking chopper power electronics	
Minimum ohmic resistance of an externally installed braking resistor	3.9 Ω -10 % at 48 V DC 2.2 Ω -10 % at 24 V DC*
* Important: set Parameter DCIN!	

Table A.1 Technical data

A.2 Ambient conditions

Characteristic		Positioning drive
Temperature range	in operation	-10..0.40 °C
	in storage	-25 ... +55 °C
	in transit	-25 ... +70 °C
Relative air humidity		15 ... 85 %, condensation not permitted
Protection	Device	IP20 (NEMA 1)
Touch protection		VBG 4
Mounting height		up to 1000 m above MSL, above 1000 m above MSL with power reduction 1% per 100 m, max. 2000 m above MSL
Voltage load on the motor winding		Typical voltage steepness 3 - 6 kV/µs
Maximum contamination		2 (to EN 61800-5-1)

Table A.2 Ambient conditions

Important: Do not install the drive controller in areas where it subject to continuous vibration/shaking.

A.3 UL approbation

Additional measures to achieve compliance with the UL approval:

- The devices must be installed in a control cabinet.
- Contamination level 2
- Fusing of each individual device by means of UL-approved Branch Circuit Breaker, max. 16 A.
- Mains connection: Tightening torque for mains terminals (X1): 5 ...7 LbIn
- Copper conductor, UL approved, AWG14, min. 75 °C
- The short circuit ability of the supply network (upstream of the power supply unit) may be max. 5000 A.

Appendix B Index

P

Q

R

S

T

U

V

W

Hinweis zur EN 61000-3-2 DE	Notes on EN 61000-3-2 EN
(rückwirkende Netzbelastung durch Oberwellen) Unsere Positionierregler und Servoregler sind im Sinne der EN61000 "professionelle Geräte", so daß sie bei einer Nennanschlußleistung ≤1kW in den Geltungsbereich der Norm fallen.Beim direkten Anschluß von Antriebsgeräten ≤1kW an das öffentliche Niederspannungsnetz sind entweder Maßnahmen zur Einhaltung der Norm zu treffen oder das zuständige Energieversorgungsunternehmen muß eine Anschlußgenehmigung erteilen. Sollten Sie unsere Antriebsgeräte als eine Komponente in ihrer Maschine/ Anlage einsetzen, dann ist der Geltungsbereich der Norm für die komplette Maschine/ Anlage zu prüfen.	(limits for harmonic current emissions) Our frequency inverters and servocontrollers are "professional devices" in the sense of the European Standard EN 61000, and with a rated power of ≤1kW obtained in the scope of this standard. Direct connection of drive units ≤1kW to the public low-voltage grid only either by means of measurements for keeping the standard or via an authorization of connection from the responsible public utility. In case our drive units are used as a component of a machinery/ plant, so the appropriate scope of the standard of the machinery/plant must be checked.

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