C O M B I V E R T

GB

B6

Installation Manual   Housing B
1.5…2.2 kW   230 V
2.2…4.0 kW   400 V

⚠ The general EMC and safety directions at www.keb.de have to be observed!

Mat.No.	Rev.
00B60EMKB00	1G

KEB

GB

This manual describes the KEB COMBIVERT B6. Particular attention is paid to the installation, the connection as well as the basic operation. Due to the various application and programming possibilities, the application-specific connection and/or wiring diagram, the parameter adjustment as well as instructions to the start-up are to be taken from the documentation of the machine manufacturer.

A list of instruction manuals and documents giving assistance for the construction, documentation and service is provided at the end of this manual. The safety and warning notes listed in this instruction manual as well as in other documentation must be observed at any rate to ensure a safe operation. The safety and warning instructions specified in this manual do not lay claim on completeness. KEB reserves the right to change/adapt specifications and technical data without prior notice. The used pictograms have following significance:

 Danger
Warning
Caution

 Attention
observe at
all costs

 Information
Aide
Tip

The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the application. However, they are considered for information only without responsibility. This also applies to any violation of industrial property rights of a third-party.

Inspection of our units in view of their suitability for the intended use must be done generally by the user. Inspections are particulary necessary, if changes are executed, which serve for the further development or adaption of our products to the applications (hardware, software or download lists). Inspections must be repeated completely, even if only parts of hardware, software or download lists are modified. Original spare parts and authorized accessories by the manufacturer serve as security. The use of other parts excludes liability for the damages which can result from it.

Application and use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the user.

Unauthorised opening and tampering may lead to bodily injury and property damage and may entail the loss of warranty rights.

Important, absolutely read

1. Safety and Operating Instructions

Safety and Operating Instructions
for drive converters
(in conformity with the Low-Voltage Directive 2006/95/EC)

1. General

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

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

For further information, see documentation.

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

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

2. Intended use

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

In case of installation in machinery, commissioning of the drive converter (i.e. the starting of normal operation) is prohibited until the machinery has been proved to conform to the provisions of the directive 2006/42/EC (Machinery Safety Directive - MSD). Account is to be taken of EN 60204.

Commissioning (i.e. the starting of normal operation) is admissible only where conformity with the EMC directive (2004/108/EC) has been established.

The drive converters meet the requirements of the Low-Voltage directive 2006/95/EC. They are subject to the harmonized standards of the series DIN EN 50178/VDE 0160 in conjunction with EN 60439-1/ VDE 0660, part 500, and EN 60146/ VDE 0558.

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

3. Transport, storage

The instructions for transport, storage and proper use shall be complied with.

The climatic conditions shall be in conformity with EN 50178.

4 Installation

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

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

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

5. Electrical connection

When working on live drive converters, the applicable national accident prevention rules (e.g. VBG 4) must be complied with.

The electrical installation shall be carried out in accordance with the relevant requirements (e.g. cross-sectional areas of conductors, fusing, PE connection). For further information, see documentation.

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

6. Operation

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

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

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

7. Maintenance and servicing

The manufacturer's documentation shall be followed.

KEEP SAFETY INSTRUCTIONS IN A SAFE PLACE!

2. Product description

2.1 Intended use

The frequency inverter KEB COMBIVERT B6 serves exclusively for the control and regulation of asynchronous motors. The operation of other electric consumers is prohibited and can lead to the destruction of the unit.

Frequency inverter are components which are intended for the installation in electric systems or machines.

2.2 Unit identification

$$\boxed{12} . \boxed{B6} . \boxed{A} \boxed{3} \boxed{B} - \boxed{3} \boxed{9} \boxed{0} \boxed{0}$$

Cooling	
0: Heat sink	1: Flat rear

reserved

Switching frequency; short time current limit; overcurrent limit	
8: 2 kHz; 180 %; 216 %	A: 8 kHz; 180 %; 216 %
9: 4 kHz; 180 %; 216 %	B: 16 kHz; 180 %; 216 %

Input identification			
0:	1-phase 230 V AC/DC	6:	1-phase 230 V AC
1:	3-phase 230 V AC/DC	8:	1/3-phase 230 V AC
2:	1/3-phase 230 V AC/DC	9:	3-phase 400 V AC
3:	3-phase 400 V AC/DC	A:	1-phase 110 V AC

Housing type B

Accessories
0: none
1: Braking transistor (GTR7)
2: internal filter
3: Braking transistor (GTR7) and internal filter

Control type	
A: Standard (PNP)	C: Standard (NPN) *)
B: CAN (PNP)	D: CAN (NPN) *)
	*) on request

Series B6

Inverter size

2.3 Technical data
2.3.1 230 V class

Inverter size		**09**		**10**	
Housing size		**B**			
Phases		**1**	**3**	**1**	**3**
Output rated power	[kVA]	2.8		4.0	
Max. rated motor power	[kW]	1.5		2.2	
Output rated current	[A]	7.0		10	
Max. short time current	[A]	12.6		18	
OC-tripping current	[A]	15.1		21	
Input rated current	[A]	14	9.8	20	14
Max. permissible mains fuse (inert)	[A]	20	16	25	20
Rated switching frequency	[kHz]	4		4	
Max. switching frequency	[kHz]	16		16	
Power loss at nominal operating	[W]				
Input rated voltage	[VAC]	230 (UL:200…240)			
Input voltage range U_{mains}	[VAC]	180…264 ±0			
Mains forms		TN, TT, IT[2], Delta[3]			
Mains frequency	[Hz]	50…60 ±2			
Output voltage	[V]	3 x 0…U_{mains}			
Output frequency	[Hz]	0…400			
Min. motor line cross section	[mm²]	1.5		2.5	
Max. motor line length (shielded)	[m]	30 at limit value class C2			
		10 at limit value class C1			
For use in USA					
Max. mains fuse type RK5	[A]	20	15	30	25
Max. input fusing MMC type "E" 4)	[A]	16	20	25	20
With intergrated braking transistor					
Typically braking resistor	[Ω]	100		68	
Maximal braking current	[A]	9.5		12	
Leakage current with internal filter (at nOP)	[mA]	6			

2) insulating resistance at mains form IT = 2 MΩ
3) on inquiry
4) see 400 V class

ℹ️ Site altitude maximal 2000 m above sea level. With site altitudes over 1000 m a derating of 1 % per 100 m must be taken into consideration.

2.3.2 400 V class

Inverter size			10	12
Housing size			B	
Phases			3	
Output rated power		[kVA]	4	6.6
Max. rated motor power		[kW]	2.2	4
Output rated current		[A]	5.8	9.5
Max. short time current		[A]	10.4	17
OC-tripping current		[A]	12.5	21
Input rated current		[A]	8	13
Max. permissible mains fuse (inert)		[A]	16	20
Rated switching frequency		[kHz]	4	4
Max. switching frequency		[kHz]	8	8
Power loss at nominal operating		[W]		
Input rated voltage	1)	[V]	400 (UL:400…480)	
Input voltage range U_{mains}		[V]	305…528 ±0	
Mains forms			TN, TT, IT[2], Delta[3]	
Mains frequency		[Hz]	50…60 ±2	
Output voltage		[V]	3 x 0…U_{mains}	
Output frequency		[Hz]	0…400	
Min. motor line cross section		[mm²]	1.5	2.5
Max. motor line length (shielded)		[m]	30 at limit value class C2	
For use in USA				
Max. mains fuse type RK5		[A]	12	15
Max. input fusing MMC type "E"	4)	[A]	12	16
With intergrated braking transistor				
Typically braking resistor		[Ω]	270	150
Maximal braking current		[A]	10	10
Leakage current with internal filter (at nOP)		[mA]	6	

1) at mains voltage ≥460 V multiply the nominal current with factor 0.86.
2) insulating resistance at mains form IT = 2 MΩ
3) on inquiry
4) use E-MMC/ Type E - Manual Motor Controller according to UL508 / Class NKJH only. The following types are accepted:

Manufacturer	UL - File	Type	Required terminal line adaptor
Siemens	E 156943	3RV1021-1xA10	3RV1928-1H
		3RV1031-4xA10	–
ABB Stotz	E 195536	MS325-xx	S3-M3
		MS450-xx	–
Rockwell / Allen Bradley	E 205542	140M-C2E-Bxx or Cxx	–
		140M-F8E-Cxx	–
Moeller	E 123500	PKZM0-xxE (only up to 25A)	BK25/3 - PKZ0-E

Where x or xx means that here current rating or letter for current rating is given.
Use only in mains Wye 480/277 V. Delta grounding is not permitted.

Product description

2.4 Dimensions and Terminals
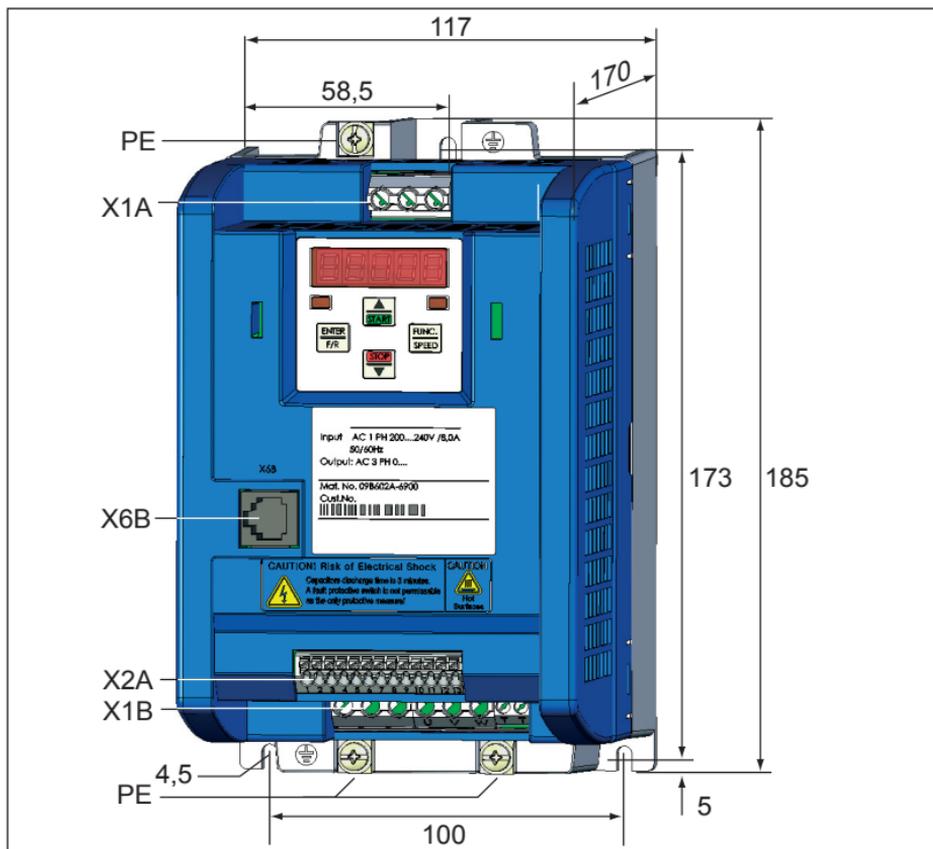
X1A	Connection for mains supply
X1B	Connection for motor, braking resistor and temperature detection
X2A	Connection for control lines
X6B	HSP5 Interface for parametrizing. Used accessories for PC connection: • Adapter SUB-D9 to RJ45 (mat.no. 00F50C0-0020) • RS232/HSP5 converter (mat.no. 00F50C0-0010)
⏚	Connection protective conductor

KEB

3. Installation and Connection
3.1 Control cabinet installation

Protective system (EN 60529)   IP20
Operation temperature   -10…40 °C (14…104 °F)
Storage temperature   -25…70 °C (-13…158 °F)
Max. heat sink temperature   90 °C (194 °F)
Climatic category (EN 60721-3-3)   3K3
Environment (IEC 664-1)   Pollution degree 2
Vibration/Jolt according to   German. Lloyd; EN 50155

Installation position and min. distances

The flat-rear design (projected) requires cooling measures by the machine builder. This can be in the best case no further measure at all (e.g. at cyclic operation with down times) up to the dissipation of the entire, indicated heat loss at rated operation.

⚠ The COMBIVERT must be protected against aggressive gases, aerosols and conductive dust!
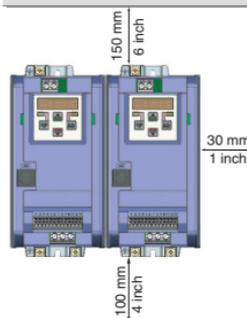
3.2 EMC conform Installation

- Always apply the shielding of motor and control cables over a large contact surface on both sides.
- Distance between control and power cables at least 10…20 cm (4…8 inch).

- Lay motor and power cable separately.
- If it cannot be avoided, cross control and power cables in a right angle.
- Install all cables as close as possible to the mounting plate - ideal in a metal cable duct.
- Mount COMBIVERT well conducting with the mounting plate. Remove the paint beforehand.

You can find further instructions regarding the EMC- conform wiring in the Internet at KEB.
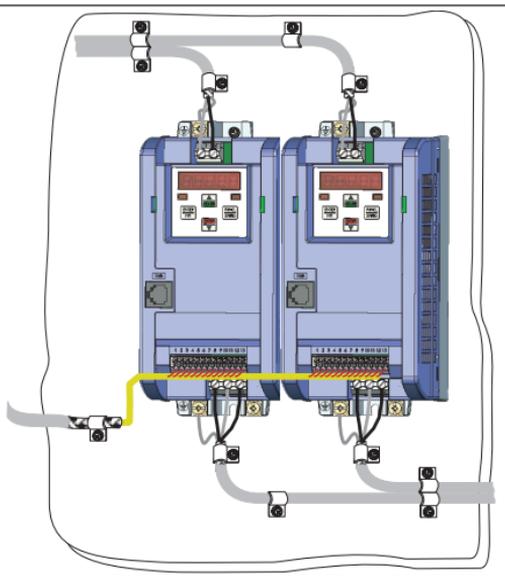
3.3 Connection of power circuit
3.3.1 Wiring instructions

Absolutely observe the connecting voltage of the KEB COMBIVERT. A 230V-unit will be immediately destructed on a 400V-power supply.

Never exchange the mains and motor cables.

Some countries demand that the PE-terminal is directly connected to the terminal box (not over the mounting plate).

3.3.2 Mains connection

Mains connection 230V class 1-phase	Mains connection 400V class 3-phase
Terminal strip X1A Input voltage 1 AC 180…264 ±0 V	Terminal strip X1A Input voltage 1 AC 305…528 ±0 V
Mains connection 230V class 3-phase	
Terminal strip X1A Input voltage 3 AC 180…264 ±0 V	

Protection
Protection (see „Technical data") or power protective switch
1-phase inverter RCD type A or type B
3-phase inverter RCMA with separator or RCD type B
Connection cross-section 1.5…4 mm² (AWG 16-11)
Tightening torque 0.6 Nm (5 lb inch)

3.3.3 DC connection

DC connection	
Input voltage 230 V-class: 250…370 V DC	
Input voltage 400 V-class: 420…720 V DC	
X1B	
Terminal strip X1B	
Tightening torque 0.6 Nm (5 lb inch)	
Connection cross-section 1.5…4 mm² (AWG 16-11)	
⚠ At DC supply pay attention to the permissible voltage range of the fuses!	

3.3.4 Motor connection

⚠ Max. motor line length see „Technical data"	

Apply shieldings over a large contact surface of the mounting plate!	Terminal strip X1B
	Tightening torque 0.6 Nm (5 lb inch)
	Connection cross-section 1.5…4 mm² (AWG 16-11)

1) Motor temperature monitoring T1, T2 (the evaluation can be activated by CP.36)

• Tripping resistance 1.65…4 kΩ

• Reset resistance 0.75…1.65 kΩ

• Design in accordance with VDE 0660 Part 302

• Do not lay connecting cable together with control cable.

• Permissible in the motor cable only with double shielding.

3.3.5 Wiring example braking resistor

Terminal strip X1B
Tightening torque 0.6 Nm (5 lb inch)
Connection cross-section 1.5…4 mm² (AWG 16-11)

*)	Temperature input T1/T2 can also be used instead of terminals I1/COM. Temperature input T1/T2 is activated with CP.36.		
F	Main fuses	S1	Push-bottom switch for switch on
K1	Line contactor with auxiliary contacts	S2	Emergency-off switch
G	KEB COMBIVERT B6	RB	Braking resistor with temperature monitoring

3.3.6 Note to the function

In the example above the locking of the line contactor K1 is interrupted in case of overheating of the braking resistor. The line contactor drops and switches off the mains voltage. The auxiliary contacts 13/14 open the error linkage circuit at terminals I1/COM (T1/T2) and release an error. The modulation is switched off. Thus the drive in generatoric operation does not regenerate further energy into the DC link circuit.

⚠ Depending on the case of application (e.g. no generatoric operation) simple circuits can be used. See chapter 7 for instructions of the download. Input I1 must be programmed and inverted in the application mode to "external error".
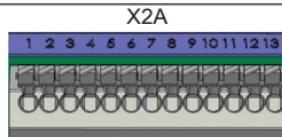
3.4 Control board xxB6Axx-xxx (default)
3.4.1 X2A Control terminal strip

⚠️ The control connections are „safety separated circuits" according to PELV requirements.

- Conductor cross-section AWG 20-16
  rigidly or flexibly   0.5…1.5 mm²
  Wire-end ferrule without plastic case   0.5…1 mm²
  Wire-end ferrule with plastic case   0.5 mm²
- Strip length   8 mm
- Use shielded / drilled cables
- Lay shield on one side of the inverter onto earth potential

X2A

PIN	Function	Name	Description
Analog input and output			
1	Analog output	AO1	Output of the actual output frequency 0…100 Hz => 0…10 V DC (max. 10 mA) Ri = 100 Ω; Resolution 11 Bit
2	Function	AN1+	Setpoint input resolution 10 Bit (reversible with CP.35) 0…10 V DC; Ri = 29 kΩ (factory setting) 0…20 mA, 4…20 mA; Ri = 500 Ω
Voltage supply			
3	Mass	COM	Mass for analog and digital inputs/outputs
4	+15 V Output	+15V	Stabilized supply voltage for digital inputs and setpoint poti +15 V DC ±8 % / max. 50 mA Observe input voltage of analog input!
Programmable digital inputs 13…30 V DC ±0 % smoothed; Ri: 2.2 kΩ; scan time: <=10 ms			
5	Control release / Reset	ST	Power modules are enabled; reset at opening
6	Forward	F	Rotation selection
7	Reverse	R	Forward has priority
8	Fixed frequency 1 (CP.19)	I1*)	I1 + I2 = fixed frequency 3 (CP.21)
9	Fixed frequency 2 (CP.20)	I2	
Programmable digital output 15 V DC ±10 % max. 50 mA			
10	Digital output	O1	Frequency dep. switch (factory setting) Output switches at actual frequency = setpoint frequency Programmable with CP.32
Programmable relay output max. 30 V DC / 0.01…1 A			
11	Relay 1 / NO contact	RLA	Fault signalling relay (factory setting) Programmable with CP.33
12	Relay1 / NC contact	RLB	
13	Relay1 / switching contact	RLC	

*) I1 can be changed in the application mode to a scan time of 2 ms.

3.4.2   Connection of the control terminal strip

0-10VDC
max. 10mA

Current signal
0…20 mA
4…20 mA

U

0-10VDC

R1

R2

1
2
3
4
5
6
7
8
9
10
11
12
13

X2A

Setpoint potentiometer R1	Dropping resistor R2
2.5 kΩ	1.15 kΩ
3 kΩ	1.3 kΩ
5 kΩ	2.1 kΩ
10 kΩ	3.7 kΩ

15V ±8 %
max. 50 mA

max. 30 V DC / 0.01…1A

⚠ To avoid interferences separate shieldings must be provided for analog and digital control lines. Depending on the use of the relay output, an extra shielding is to be used, too.

⚠ In case of inductive load on the relay outputs a protective wiring must be provided (e.g. free-wheeling diode)!

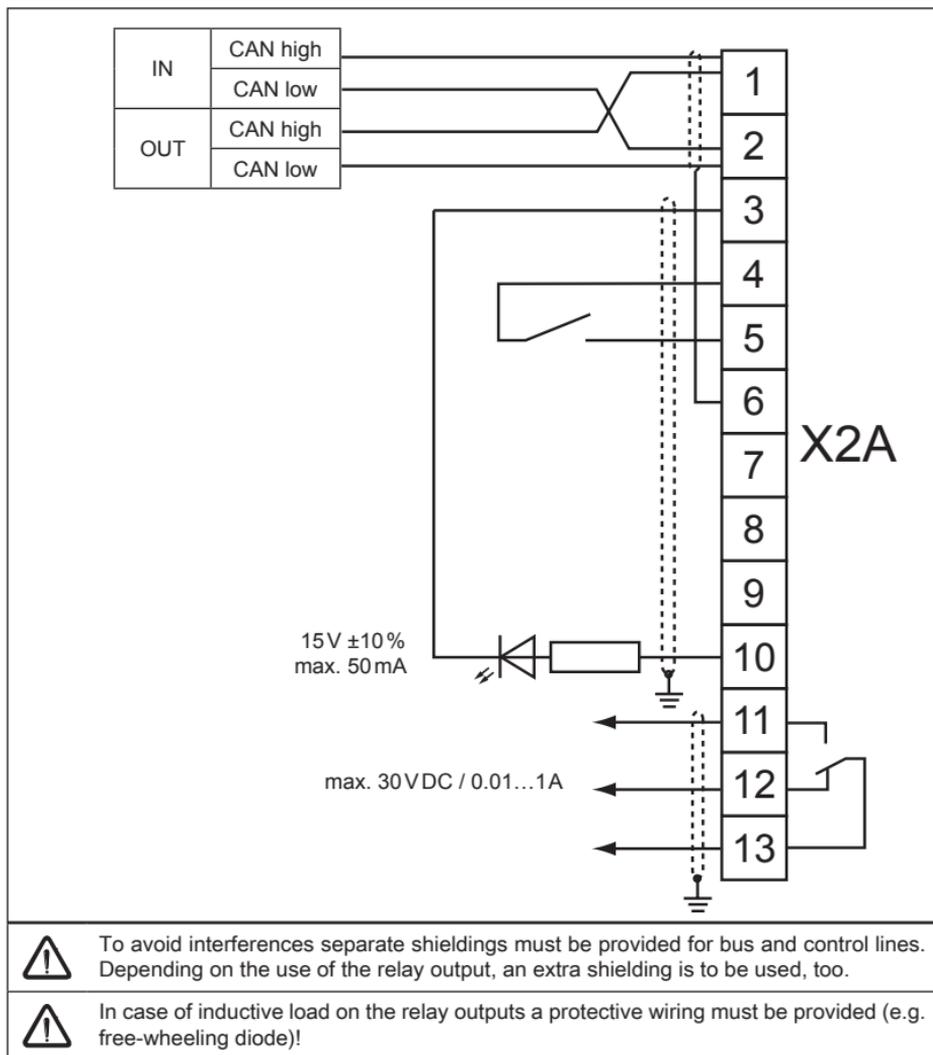## 3.5 Control board xxB6Bxx-xxx (CAN)

3.5.1 X2A Control terminal strip

⚠️ The control connections are „safety separated circuits" according to PELV requirements.

• Conductor cross-section AWG 20-16	X2A
rigidly or flexibly 0.5…1.5 mm²	
Wire-end ferrule without plastic case 0.5…1 mm²	
Wire-end ferrule with plastic case 0.5 mm²	
• Strip length 8 mm	
• Use shielded / drilled cables	
• Lay shield on one side of the inverter onto earth potential	

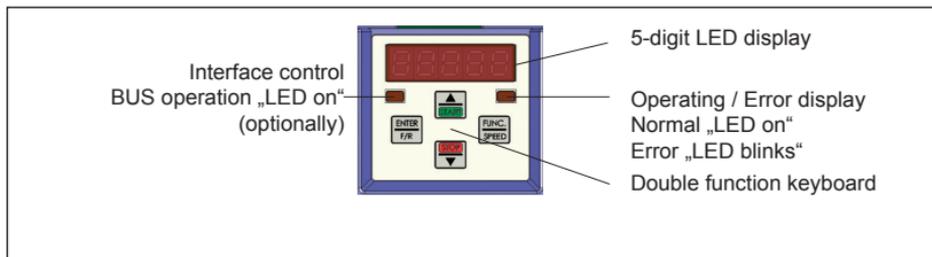| PIN	Function	Name	Description
CAN interfaces			
1	CAN high	CAN-H	Input and output of the CAN bus are parallel con-
2	CAN low	CAN-L	nected to the corresponding terminals high and low.
Voltage supply			
3	Mass	COM	Mass for digital inputs/outputs
4	+15V Output	+15V	Stabilized supply voltage for digital inputs and set-point poti +15 V DC ±8 % / max. 50 mA
Programmable digital inputs 13…30 V DC ±0 % smoothed; Ri: 2.2 kΩ; scan time: <=10 ms			
5	Control release / Reset	ST	Power modules are enabled; reset at opening
CAN interfaces			
6	CAN shielding	CAN	Connection for shielding of the bus cables.
7	-reserved-	–	
8	-reserved-	–	
9	-reserved-	–	
Programmable digital output 15 V DC ±10 % max. 50 mA			
10	Digital output	O1	Frequency dep. switch (factory setting) Output switches at actual frequency = setpoint frequency Programmable with CP.32
Programmable relay output max. 30 V DC / 0.01…1 A			
11	Relay 1 / NO contact	RLA	Fault signalling relay (factory setting) Programmable with CP.33
12	Relay1 / NC contact	RLB	
13	Relay1 / switching contact	RLC	

Installation and Connection

3.5.2 Connection of the control terminal strip

IN	CAN high	1
	CAN low	2
OUT	CAN high	
	CAN low	

X2A

15 V ±10 %
max. 50 mA

max. 30 V DC / 0.01…1 A

⚠ To avoid interferences separate shieldings must be provided for bus and control lines.
Depending on the use of the relay output, an extra shielding is to be used, too.

⚠ In case of inductive load on the relay outputs a protective wiring must be provided (e.g. free-wheeling diode)!

4 Operation of the Unit

4.1 Overview of the operating elements

5-digit LED display

Interface control
BUS operation „LED on"
(optionally)

Operating / Error display
Normal „LED on"
Error „LED blinks"
Double function keyboard

4.2 Keyboard operation

4.2.1 Parameter numbers and values

When switching on KEB COMBIVERT B6 the value of parameter CP.1 appears.

The function key changes between the parameter value and parameter number.

With UP (▲) and DOWN (▼) the parameter number or at changeable parameters the value is increased/decreased.

Principally during a change, parameter values are immediately accepted and stored non-volatile. However, with some parameters it is not useful that the adjusted value is accepted immediately. In these cases the adjusted value is accepted and stored non-volatile by pressing ENTER. When this type of parameter is changed a point appears behind the last digit.

By pressing „ENTER" the adjusted value is accepted and non-volatile stored.

4.2.2 Resetting error messages

If a malfunction occurs during operation, the actual display is overwritten by the error message. The error message in the display is reset by ENTER.

$$\boxed{C P. \ 3} \quad — \text{Error} —> \quad \boxed{E. \ UP} \quad \boxed{\text{ENTER F/R}} \quad \boxed{C P. \ 3}$$

> With ENTER only the error message in the display is reset. In order to reset the error, the cause must be removed and a reset or a power-on reset must be made.

Operation of the Unit

4.2.3 Password input CP.0

The KEB COMBIVERT is outfitted with an extensive password protection. Dependent on the entered password the following modes are possible:

Display	Mode	Password [1]
CP_ro	End customer menu (CP-Parameter) read-only	100
CP_on	End customer menu (CP-Parameter) read/write	200
CP_SE	Service menu (like end customer menu, but with the original parameters)	330
APPL	Application menu (all parameter groups and parameters are visible)	[2]
see 4.2.4	Drive mode (COMBIVERT can be put into operation by the keyboard)	500

1) The passwords must be made unrecognizabel for protection against unauthorized access.

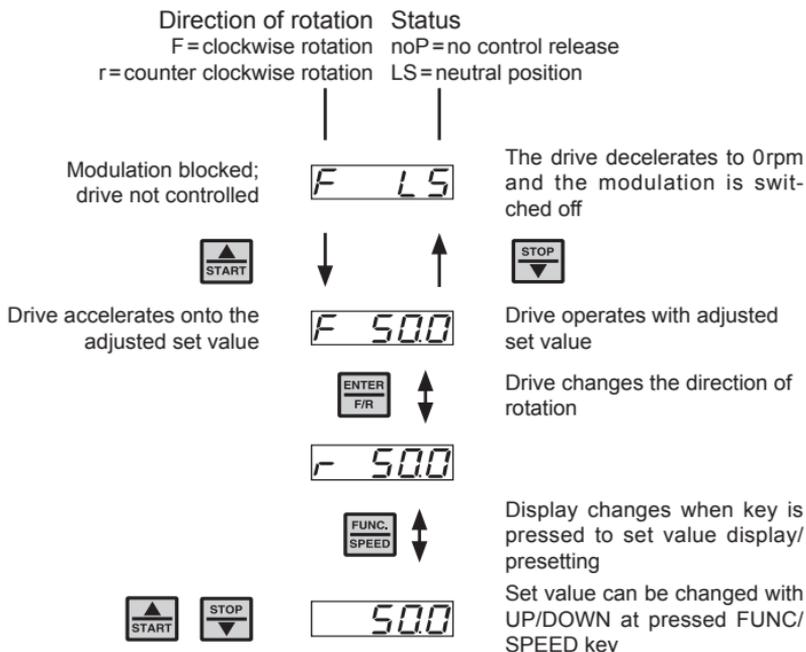*2) The password for the application menu is described in the application manual.*

The menue admissible for the application is defined by the machine builder. The password input is generally made over the parameter CP.0. The adjusted password/menu is maintained even after switching off.

Example: Changing the CP-parameter from read-only to read/write
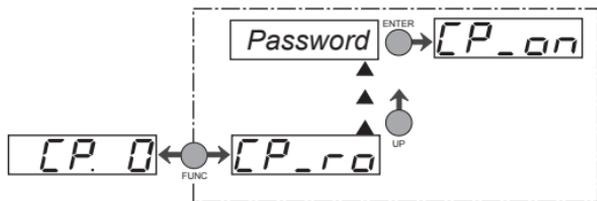
4.2.4   Drive mode

The Drive Mode is an operating mode of KEB COMBIVERT that permits the manual starting of the drive by the keyboard. After switching the control release the set value and rotation setting are effected exclusively over the keyboard. In order to activate the drive mode the corresponding **password** (see 4.2.3) must be entered **in CP. 0** . The display switches over as follows:

Direction of rotation Status
F = clockwise rotation noP = no control release
r = counter clockwise rotation LS = neutral position

Modulation blocked;
drive not controlled

$F \quad LS$

The drive decelerates to 0rpm and the modulation is switched off

▲START   ↓   ↑   STOP ▼

Drive accelerates onto the adjusted set value

$F \quad 50.0$

Drive operates with adjusted set value

ENTER F/R ↕

Drive changes the direction of rotation

$r \quad 50.0$

FUNC. SPEED ↕

Display changes when key is pressed to set value display/ presetting

▲START   STOP ▼

50.0

Set value can be changed with UP/DOWN at pressed FUNC/ SPEED key

To exit the drive mode the inverter must be in status "stop" (Display noP or LS). Press the FUNC and ENTER keys simultaneously for about 3 seconds to leave the drive mode. The CP-parameters appear in the display.

FUNC. SPEED   +   ENTER F/R   for 3 seconds

5.   Parameter Description

CP-Parameter [1)		Setting Range	Resolu-tion	Default	Unit	[2) ↵	[3) Based on
CP.00	Password input	0…9999	1	–	–	–	ud.01
CP.01	Actual frequency display	-400…400	0.0125	0	Hz	–	ru.03
CP.02	Set frequency display	-400…400	0.0125	0	Hz	–	ru.01
CP.03	Inverter status	0…255	1	0	-	–	ru.00
CP.04	Apparent current	0…6553.5	0.1	0	A	–	ru.15
CP.05	Apparent current / peak value	0…6553.5	0.1	0	A	–	ru.16
CP.06	Utilization	0…65535	1	0	%	–	ru.13
CP.07	DC link voltage	0…1000	1	0	V	–	ru.18
CP.08	DC link voltage / peak value	0…1000	1	0	V	–	ru.19
CP.09	Output voltage	0…778	1	0	V	–	ru.20
CP.10	Minimal frequency	0…400	0.0125	0	Hz	–	op.06
CP.11	Maximum frequency	0…400	0.0125	70	Hz	–	op.10
CP.12	Acceleration time	0.00…300.00	0.01	5	s	–	op.28
CP.13	Deceleration time (-0.01=CP.12)	-0.01…300.00	0.01	5	s	–	op.30
CP.14	S-curve time	off; 0.01…5.00	0.01	off	s	–	op.32
CP.15	Boost	0.0…25.5	0.1	LTK	%	–	uf.01
CP.16	Rated frequency	0…400	0.0125	50	Hz	–	uf.00
CP.17	Voltage stabilization	0…649, off	1	off	V	E	uf.09
CP.18	Switching frequency	0…LTK	1	LTK	–	E	uf.11
CP.19	Fixed frequency 1	-400…400	0.0125	5	Hz	–	op.21
CP.20	Fixed frequency 2	-400…400	0.0125	50	Hz	–	op.22
CP.21	Fixed frequency 3	-400…400	0.0125	70	Hz	–	op.23
CP.22	DC braking / mode	0…9	1	7	–	E	pn.28
CP.23	DC braking / time	0.00…100.00	0.01	10	s	–	pn.30
CP.24	Max. ramp current	0…200	1	140	%	–	pn.24
CP.25	Max. constant current	0…200	1	200:off	%	–	pn.20
CP.26	Speed search / condition	0…15	1	8	–	E	pn.26
CP.27	Motor protection / response	0…6	1	6	–	–	pn.14
CP.28	Motor protection / mode	0…1	1	1	–	–	dr.11
CP.29	Motor protection / rated current	0.0…370.0	0.1	LTK	A	–	dr.12
CP.30	Analog output / function	0…26	1	2	–	E	an.31
CP.31	Analog output / amplification	-20.00…20.00	0.01	1	–	–	an.33
CP.32	Transistor output / function	0…80	1	20	–	E	do.00
CP.33	Relay output / function	0…80	1	4	–	E	do.02
CP.34	Relay output / switching level	±30000.00	0.01	100.00	–	–	le.02
CP.35	Set value selection	0…2	1	0	–	E	an.00
CP.36	Select 50/60Hz mode	0…1	1	0	–	E	ud.06

*1) The CP-Parameter group is a selection of more than 500 parameters and 8 parameter sets for simple applications.
Each CP-Parameter (not CP.00) can be individually assigned so a special final customer menue is generated.
Further documentation is specified at the end of this manual.*
2) ENTER parameter see 4.2.1
3) The origin parameters are indicated in the service menue (CP_SE) and in the application menue.

CP.03 Inverter status

The actual operating condition of the frequency inverter is displayed in parameter „inverter status". In the case of an error the current error message is displayed, even if the display has already been reset with ENTER (error-LED on the operator is still blinking).

nOP	„no Operation"; control release not bridged; modulation switched off; output voltage = 0 V; drive is not controlled.
LS	„Low Speed"; no direction of rotation preset; modulation switched off; output voltage = 0 V; drive is not controlled.
FAcc	„Forward Acceleration"; drive accelerates with direction of rotation forward.
FdEc	„Forward Deceleration"; drive decelerates with direction of rotation forward.
rAcc	„Reverse Acceleration"; drive accelerates with direction of rotation reverse.
rdEc	„Reverse Deceleration"; drive decelerates with direction of rotation reverse.
Fcon	„Forward Constant"; drive runs with constant speed and direction of rotation forward.
rcon	„Reverse Constant"; drive runs with constant speed and direction of rotation reverse.

Status messages and information about the cause and removal are to be found in *www. keb.de > Service&Downloads > Downloads ==> status_gb.pdf.*

CP.17 Voltage stabilization

With this parameter a regulated output voltage in relation to the rated frequency can be adjusted. For that reason voltage variations at the input as well as in the intermediate circuit only have a small influence on the output voltage (U/f-characteristic). The function allows, among other things, an adaption of the output voltage to special motors.

CP.22 DC braking / mode

With DC braking the motor is not decelerated by the ramp. Quick braking is caused by DC voltage, which is applied onto the motor winding. This parameter determines how the DC braking is triggered.

Value	Activation
0	DC braking deactivated
1	DC braking at switch off of the direction of rotation and upon reaching 0 Hz. The braking time is CP.23 or until the next direction of rotation.
2*	DC braking as soon as setting for the direction of rotation is absent.
3*	DC braking as soon as the direction of rotation changes or is absent.
4*	DC braking at switch off of the direction of rotation and upon reaching 4 Hz.
5*	DC braking when the real frequency falls below 4 Hz and the drives decelerates
6*	DC braking as soon as the set value falls below 4 Hz.
7	reserved
8	reserved
9	DC braking after switching on the modulation.

* Braking time depends on the actual frequency.

CP.24 Max. ramp current

This function protects the frequency inverter against switching off through overcurrent during the acceleration ramp. When the ramp reaches the adjusted value, it is stopped so long until the current decreases again. CP.03 displays "LAS" at active function.

CP.25 Max. constant current

This function protects the frequency inverter against switch off through overcurrent during constant output frequency. When exceeding the adjusted value, the output frequency is reduced until the value drops below the adjusted value. CP. 03 displays "SSL" at active function.

CP.26 Speed search / condition

When connecting the frequency inverter onto a decelerating motor, an error can be triggered by the differing rotating field frequencies. With activated speed search the inverter searches for the actual motor speed, adapts its output frequency and accelerates with the adjusted ramp to the given set value. During speed search CP.03 displays "SSF". The parameter determines on what conditions the function operates.

In case of several conditions the sum of the value must be entered. Example: CP.26 = 12 means after reset **and** after auto-reset UP.

Value	Condition
0	Function off
1	at control release
2	at switch on
4	after reset
8	after auto-reset UP

CP.27 Motor protection / response

The motor protective function protects the connected motor against thermal destruction caused by high currents. The function corresponds largely to mechanical motor protective components, additionally the influence of the motor speed on the cooling of the motor is taken into consideration. The load of the motor is calculated from the measured apparent current (CP.04) and the adjusted rated motor current (CP.29).

For motors with separately driven fan or rated frequency of a self-ventilated motor following tripping times (VDE 0660, part 104) apply:

1.2	•	Rated current	≤	2 hours
1.5	•	Rated current	≤	2 minutes
2	•	Rated current	≤	1 minute
8	•	Rated current	≤	5 seconds

In case of failure CP.27 activates the motor protection function and adjusts the corresponding response as follows:

CP.27	Response	Description
0	Error, restart after reset Error message E.xx	Immediate switch off of the modulation. Correct the error for the restart and activate reset. The prewarning changes into an error. The drive remains in the error state until a reset signal is recognized.
		further on next side

CP.27	Response	Description
1	Quick stopping, modulation off, restart after reset Status message A.xx	Fast stop - switch off of the modulation after reaching 0 Hz. Correct the error for the restart and activate reset. The drive remains in condition fast stop until a reset signal is recognized.
2	Quick stopping, holding torque, restart after reset Status message A.xx	Fast stop - holding torque on reaching 0 Hz. Correct the error for the restart and activate reset. The drive remains in condition fast stop until a reset signal is recognized.
3	modulation off, automatic restart Status message A.xx	Immediate switch off of the modulation; the drive returns automatically to normal operation, as soon as the fault no longer exists.
4	Quick stopping, modulation off, automatic restart Status message A.xx	Fast stop - switch off of the modulation after reaching 0 Hz. the drive returns automatically to normal operation, as soon as the fault no longer exists.
5	Quick stopping, holding torque, automatic restart Status message A.xx	Fast stop - holding torque on reaching 0 Hz. the drive returns automatically to normal operation, as soon as the fault no longer exists.
6	Warning signal by digital output, no message	No effect to the drive. Error is being ignored. Switching conditions (CP.32 and CP.33) value „10" are set.

CP.28 Motor protection / mode

The cooling mode of the motor is adjusted with these programmable parameters.

Value	Condition
0	Motor with separate cooling
1	Motor with self-cooling

For self-ventilated motors the tripping times decrease with the frequency of the motor. The motor protective function acts integrating, i.e. times with overload on the motor are added, times with underload are substracted. After triggering the motor protective function, the new tripping time is reduced to 1/4 of the specified value, if the motor has not been operated for an appropriate time with underload.

CP.29 Motor protection / rated current

This parameter specifies the rated current (= 100% utilization) for the motor protective function. The motor protection-load is calculated as follows:

$$\text{Motor protection load} = \frac{\text{Inverter apparent current (CP.04)}}{\text{Motor protection / rated current (CP.29)}}$$

CP.30 Analog output 1 / function

CP.30 defines the function of analog output 1. The output at the analog output is always made in a range of 0…+10 V. Negative values are inverted and the output is displayed in a positive value.

Value	Function	Scaling factor 0…100 % (0…±100 %)
0	Absolute actual frequency CP.1	0…100 Hz
1	Absolute set frequency CP.2	0…100 Hz
2	Actual frequency CP.1	0…±100 Hz
3	Set frequency CP. 2	0…±100 Hz
4	Output voltage CP.9	0…500 V
5	DC link voltage CP.7	0…1000 V
6	Apparent current CP.4	0…2 • rated current
7	Active current ru.17	0…2 • ±rated current
8…10	reserved	–
11	Absolute active current ru.17	0…2 • rated current
12	Power stage temperature ru.38	0…100 °C
13…21	reserved	–
22	Analog input before amplification (ru.27)	0…100 %
23	Analog input after amplification (ru.28)	0…400 %
24…25	reserved	–
26	Active power ru.81	0…±2•Rated power

CP.32 Transistor output / function (term. X2A.10)

The switching level of CP.32 is pre-set to 4,00. Value range see CP.33.

CP.33 Relay output 1 / function (terminals X2A.11...13)

The switching level of CP.33 is adjusted by CP.34.

Value	Function
0	No function (generally off)
1	Generally on
2	Run signal; also by DC-braking
3	Ready signal (no error)
4	Fault relay
5	Fault relay (without auto-reset)
6	Warning or error message at abnormal stopping
7	Overload pre-warning (OL)
8	Overtemperature pre-warning (OH)
9	External overtemperature
10	Motor protection pre-warning (OH2)
11	Interior temperature pre-warning (OHI)
12	Cable breakage 4...20 mA on analog input 1
14	max. constant current (Stall, CP.25) exceeded
15	max. ramp current (LA-Stop, CP.24) exceeded
16	DC-braking active
20	Actual value = set value (CP.3=Fcon; rcon; not at noP, LS, error, SSF)
21	Accelerate (CP.3=FAcc, rAcc, LAS)
22	Decelerate (CP.3 = FdEc, rdEc, LdS)
	further on next side

KEB

Value	Function
23	Real direction of rotation = set direction of rotation
24	Utilization (CP.6) > switching level
25	Active current > switching level
26	Intermediate circuit voltage (CP.7) > switching level
27	Real value (CP.1) > switching level
28	Set value (CP.2) > switching level
31	Absolute set value at AN1 > switching level
34	Set value at AN1 > switching level
40	Hardware current limit activated
41	Modulation on
44	Inverter status > switching level
47	Ramp output value > switching level
48	Apparent current (CP.4) > switching level
49	Forward running (not at nOP, LS, abnormal stopping or error)
50	Reverse running (not at nOP, LS, abnormal stopping or error)
63	Absolut ANOUT1 > switching level
65	ANOUT1 > switching level
73	Absolute active power > switching level
74	Active power > switching level
80	Active current > switching level
84	Actual value < minimum setpoint

No listed values are only for the application mode.

CP.35 AN1 Set value selection

The setpoint input (AN1) of the control can be triggered with different signal levels. In order to correctly evaluate the signal, this parameter must be adapted to the signal source.

Value	Set value signal
0	0…10 V DC / Ri = 29 kΩ
1	0…20 mADC / Ri = 500 Ω
2	4…20 mADC / Ri = 500 Ω

CP.36 Select 50/60Hz mode

When units or machines are delivered in the area of application of UL an adaption of the factory setting to the valid operating data there can be done with this parameter.

Value	Default value
0	Current values and limts, motor data, frequencies and speed relate to a 50 Hz mains with 400 V rated voltage.
1	Current values and limts, motor data, frequencies and speed relate to a 60 Hz mains with 460 V rated voltage.

6. Error and Status Display

At KEB COMBIVERT error messages are always represented with an "E." and the appropriate error in the display. Error messages cause the immediate deactivation of the modulation. Restart possible only after reset or autoreset.

Malfunction are represented with an „A." and the appropriate message. Reactions to malfunctions can vary. In the following the display and their cause are described. Status is displayed witout any additions.

Display	COMBIVIS display	dec	hex	Meaning
bbL	base block	76	4C	The power modules for motor-de-excitation are locked after opening the control release or after an error.
boFF	open brake	86	56	This message is depending on the adjustment of the brake control mode. It is displayed during open (release) the brake.
bon	close brake	85	55	This message is depending on the adjustment of the brake control mode. It is displayed during close (engage) the brake.
Cdd	calculate drive data	82	52	Measurement of the motor stator resistance.
Cddr	calculate drive data ready	127	7F	Measurement of the motor stator resistance successful completed.
dcb	DC brake	75	4B	Motor is decelerated by a DC-voltage at the output.
dLS	low speed / DC brake	77	4D	Modulation is switched off after DC-braking.
FAcc	forward acceleration	64	40	Acceleration with the adjusted ramps in clockwise direction of rotation (forward).
Fcon	forward constant	66	42	Acceleration / deceleration phase is completed and it is driven with constant speed / frequency in clockwise direction of rotation (forward).
FdEc	forward deceleration	65	41	It is stopped with the adjusted ramp times in clockwise direction of rotation (forward).
HCL	hardware current limit	80	50	The message is output if the output current reaches the hardware current limit.
LAS	LA stop	72	48	This message is displayed if during acceleration the load is limited to the adjusted load level.
LdS	Ld stop	73	49	This message is displayed if during deceleration the load is limited to the adjusted load level or the DC-link current to the adjusted voltage level.
LS	low speed	70	46	No direction of rotation pre-set, modulation is off.
nO_PU	power unit not ready	13	0D	This message is displayed if during deceleration the load is limited to the adjusted load level or the DC-link current to the adjusted voltage level.
noP	no operation	0	0	Control release (terminal ST) is not switched.
PLS	low speed / power off	84	54	No modulation after Power-Off.
POFF	power off function	78	4E	Is displayed during power-off function. Depending on the programming of the function the inverter restarts automatically upon system recovery or after a reset.
				further on next side

Display	COMBIVIS display	dec	hex	Meaning
rAcc	reverse acceleration	67	43	Acceleration with the adjusted ramps in counterclockwise direction of rotation (reverse).
rcon	reverse constant	69	45	Acceleration / deceleration phase is completed and it is driven with constant speed / frequency in counterclockwise direction of rotation (reverse).
rdEc	reverse deceleration	68	44	Stopping with the adjusted ramps in counterclockwise direction of rotation (reverse).
SLL	stall	71	47	This message is displayed if during constant operation the load is limited to the adjusted current limit.
SSF	speed search	74	4A	Speed search function active, that means that the inverter attempts to synchronize onto a running down motor.
STOP	quick stop	79	4F	The message is output if as response to a warning signal the quick-stop function becomes active.
E. EF	Error! external fault	31	1F	An external signal has released an error at a programmable input.
E. Pu	Error! power unit	12	0C	General power circuit fault (e. g. fan)
E.Acc	Error! maximum acceleration	24	18	Acceleration exceeds the limit defined by Pn.79.
E. br	Error! brake	56	38	This error can occur in the case of switched on brake control.
				The absence of a motor phase was detected at brake release.
				The load reaches the hardware current limitation at brake release.
				The load is below the minimum load level at brake release.
E.buS	Error! Watchdog	18	12	Adjusted monitoring time (Watchdog) of communication between operator and PC / operator and inverter has been exceeded. Check wiring and bus master (PC or SPS).
E.Cdd	Error! calc. drive data	60	3C	Error: During the automatic motor stator resistance measurement.
E.dOH	Error! Motor temperature	9	9	Error: Overtemperature of motor PTC. Error can only be reset at E.ndOH, if PTC is again low-resistance.
				No motor overheat connected, but activated in the parameter. Install bridge between T1/t2.
				resistance at the terminals T1/T2 >1650 Ohm
				line breakage to the temperature sensor
				Check motor cooling
				motor overloaded
				further on next side

Error and Status Display

Display	COMBIVIS display	dec	hex	Meaning
E.dri	Error! driver relay	51	33	Error: Driver relay. Relay for driver voltage on power circuit has not picked up even though control release was given.
E.EEP	Error! EEPROM defective t	21	15	After reset the operation is again possible (without storage in the EEPROM)
E.iEd	Error! input error detect	53	35	Hardware failure at the NPN/PNP change-over or at the start/stop measurement.
E.InI	Error! initialisation MFC	57	39	MFC not booted.
E.LSF	Error! load shunt fault	15	0F	Load-shunt relay has not picked up. occurs for a short time during the switch-on phase, but must automatically be reset immediately.
				High losses in the supply cable
				braking resistor wrongly connected or damaged
				Control of line contactor and input fuses.
				braking module defective
				load-shunt defective
				input voltage wrong or too low
E.ndOH	no ERROR drive overheat	11	0B	Motor temperature switch or PTC at the terminals T1/T2 is again in the normal operating range. Message E.ndOH is displayed. The error can be reset now.
E.nOH	no E. over heat pow. mod.	36	24	Temperature of the heat sink is again in the permissible operating range. The error E.OH can be reset.
E.nOHI	no ERROR overheat int.	7	7	No longer overheating in the interior E.OHI, interior tempereature has fallen by at least 3°C.
E.nOL	no ERROR overload	17	11	After the error E.OL a cooling phase must be elapsed. OL- counter has reached 0 %; message E.nOL is displayed and the error can be reset.
E.nOL2	no ERROR overload 2	20	14	The cooling time has elapsed. The error can be reset.
				further on next side

KEB

Display	COMBIVIS display	dec	hex	Meaning
E. OC	Error! overcurrent	4	4	Occurs, if the specified peak current is exceeded.
				Short cicuit at the output
				Ground fault
				motor cable too long
				Phase error
				EMC
				The load is too big at turned off constant current limit.
				DC brake at high ratings active
				Deceleration ramp or stopping jerk is adjusted too short.
				Braking transistor defective or missing
				Acceleration ramp or stopping jerk is adjusted too short.
				The load is too big at turned off acceleration stop.
E. OH	Error! heat sink temperature	8	8	Error: Overtemperature of power module. Error can only be reset at E.nOH.
				Installation position and minimum distances wrong
				ambient temperature too high
				Fan clogged or defective
				insufficient air flow at the heat sink (soiled)
E.OH2	Error! motor protection	30	1E	Electronic motor protective relay has tripped (see motor protection function of the inverter).
E.OHI	Error! overheat internal	6	6	Error: Overheating in the interior: If the interior temperature has dropped by at least 3 °C, E.nOHI is displayed. Then the error can be reset.
E. OL	Error! overload (Ixt)	16	10	An overload exceeded the permissible time (dependent on short time current limit and overload characteristic). Overload error can only be reset if OL-counter reaches 0% again and E.nOL is displayed.
				motor wrongly wired motor wrongly wired
				inverter not correctly dimensioned
				encoder damaged
				poor control adjustment (overshooting)
				Mechanical error (moved too hard, blockade) or overload in the application

Error and Status Display

Display	COMBIVIS display	dec	hex	Meaning
E.OL2	Error! overload 2	19	13	The standstill constant current has been exceeded (see technical data and overload characteristics). The error can only be reset if the cooling time has elapsed and the message E.nOL2 is displayed.
				inverter not correctly dimensioned
				Mechanical error (moved too hard or blockade) or overload in the application
E. OP	Error! Overvoltage	1	1	The DC-link circuit voltage exceeds the permissible value.
				Braking resistor required
				Interference voltages at the input (use mains filter).
				the input voltage being too high
				The adjusted deceleration ramp is too short
				braking resistor defective or too small
				Deceleration jerk too short
				Worse alignment of the speed controller (overshoot of the actual speed after the acceleration phase)
E.OS	Error! over speed	58	3A	Real speed is bigger than the max. output speed.
E.Puch	Error! power unit changed	50	32	Power circuit identification was changed. With a valid power circuit this error can be reset by writing to SY.03. If the value displayed in SY.3 is written, only the power-circuit dependent parameters are reinitialized. If any other value is written, then the default set is loaded.
E.Puci	Error! Unknown power unit	49	31	Error: During the initialization the power circuit could not be recognized or was identified as invalid.
E.PUCO	Error! Power unit communication	22	16	Error: Parameter value could not be written to the power circuit. No positive acknowledgement of the power unit.
E.SbuS	Error! bus synchron	23	17	Sychronization over sercos-bus not possible. Programmed response „Error, restart after reset".
E.SEt	Error! set	39	27	It has been attempted to select a locked parameter set. Programmed response „Error, restart after reset".
				further on next side

KEB

| Display	COMBIVIS display	dec	hex	Meaning
E. UP	Error! underpotential	2	2	Occurs, if the DC-link voltage falls below the permissible value.
				Voltage losses through wrong cabling.
				inverter rating too small
				A digital input was programmed as external error input with error message E.UP has released.
				Mains contactor or input fuse defective
				Input voltage is too low or instable
				The supply voltage through generator / transformer breaks down at very short ramps.
E.UPh	Error! Phase failure	3	3	One phase of the input voltage is missing (ripple-detection)
PUIn	Error! Power unit invalid	14	0E	Software version for power circuit and control card are different. Error cannot be reset. Only at F5-G B-housing.
A.Acc	Warning! maximum acceleration	106	6A	Acceleration exceeds the limit defined by Pn.79. The response to this warning can be definied by Pn.81.
A.buS	Warning! Watchdog	93	5D	Adjusted monitoring time (Watchdog) of communication between operator and PC / operator and inverter has been exceeded. Check wiring and bus master (PC or SPS). The response to this warning can be programmed.
A.dOH	Warning! drive overheat	96	60	The motor temperature has exceeded an adjustable warning level. The switch off time is started. The response to this warning can be programmed. This warning can be generated only with a special power circuit.
A.EF	Warning! external fault	90	5A	An external signal has released an error at a programmable input. The response to this warning can be programmed.
A.ndOH	All-clear! drive overheat	91	5B	The motor temperature is again below the adjusted warning level. The switch off time is stopped.
A.nOH	All-clear! overheat pow.mod.	88	58	The heat sink temperature is again below the adjusted warning level.
A.nOHI	All-clear! overheat internal	92	5C	The temperature in the interior of the inverter is again below the warning threshold.
A.nOL	All-clear! overload (Ixt)	98	62	The load counter decreases again under the adjusted warning level. The warning "overload" is reset.
A.OH	Warning! overheat pow.mod.	89	59	A level can be defined, when it is exceeded this warning is output. The response to this warning can be programmed.
A.OH2	Warning! motor protection	97	61	Warning: electronic motor protective relay has tripped. The response to this warning can be programmed.
				further on next side

Error and Status Display

Display	COMBIVIS display	dec	hex	Meaning
A.OHI	Warning! overheat internal	87	57	The temperature in the interior of the inverter lies above the permissible level. The switch off time was started. The programmed response to this warning message is executed.
A.OL	Warning! overload	99	63	A level between 0 and 100 % of the load counter can be adjusted, when it is exceeded this warning is output. The response to this warning can be programmed.
A.SbuS	Warning! synchron	103	67	Sychronization over sercos-bus not possible. The response to this warning can be programmed.
A.SEt	Warning! set	102	66	It has been attempted to select a locked parameter set. The response to this warning can be programmed.

Annex A

A.1   Overload characteristic

Release time [s]
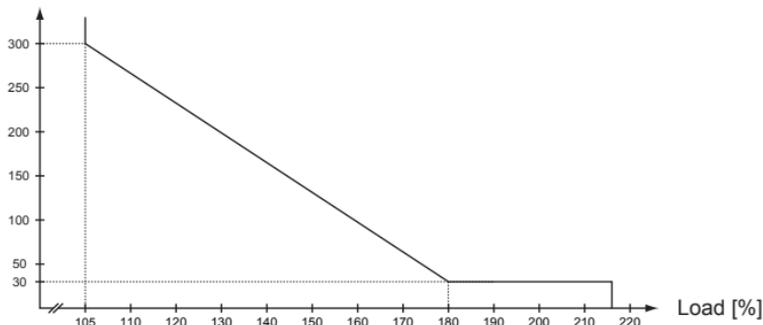
On exceeding a load of 105% the overload integrator starts. When falling below the integrator counts backwards. If the integrator achieves the overload characteristic, the error E.OL is triggered.

A.2   Calculation of the motor voltage
The motor voltage for dimensioning of the drive is depending on the used components. The mains voltage reduces according to the following table:

Mains choke Uk	4 %	Example:
Inverter open loop	4 %	Closed loop inverter with mains- and motor choke at
Inverter closed loop	8 %	non-rigid supply system:
Motor choke Uk	1 %	400 V mains voltage - 15 % = 340 V motor voltage
Non-rigid supply system	2 %	

A.3   Maintenance
All work may only be done by qualified personnel. The security must be ensured as follows:

- Disconnect power supply at MCCB
- Secure against restarting
- Await discharge time of capacitors (if necessary controlling by measurement at „+PA" and „-", respectively "++" and „--")
- Ensure loss of voltage by measurement

In order to avoid premature ageing and avoidable malfunctions, the measures mentioned

below must be carried out in the appropriate cycle.

Cycle	Function
Constant	Pay attention to unusual noises of the motor (e.g. vibrations) as well as of the frequency inverter (e.g. fan).
	Pay attention to unusual smells of the motor or frequency inverter (e.g. eva-poration of capacitor electrolyte, braise of the motor winding)
Monthly	Check unit for loose screws and plugs and if necessary tighten up.
	Clean frequency inverter from dirt and dust deposits. Pay attention especially to cooling fins and protective grid of the fans.
	Examine and clean extracted air filter and cooling air filter of the control cabinet.
	Examine function of the fans of the KEB COMBIVERT. The fans must be replaced in case of audible vibrations or squeak.

A.4 Storage

The DC link of the KEB COMBIVERT is equipped with electrolytic capacitors. If electrolytic capacitors are stored de-energized, the oxide film working as dielectric fluid reacts with the acidic electrolyte and destroy themselves slowly. This affects the dielectric strength and the capacity.

If the capacitor starts running with rated voltage, it is tried to build the oxide film abrupt again. This causes heat and gas and leads to the destruction of the capacitor.

In order to avoid defectives, the KEB COMBIVERT must be started up depending on the storage period in accordance with the following specification:

Storage period < 1 year		
•	Start-up without special measures	
Storage period 1…2 years		
•	Operate frequency inverter one hour without modulation	
Storage period 2…3 years		
•	Remove all cables from the power circuit; especially of braking resistor or module	
•	Open control release	
•	Connect variable transformer to inverter input	
•	Increase variable transformer slowly to indicated input voltage (>1 min) and remain at least on the specified time.	
	Voltage class	Input voltage	Residence time
		0…160 V	15 min
	230 V	160…220 V	15 min
		220…260 V	1 h
			further on next side

	400 V	0…280 V	15 min
		280…400 V	15 min
		400…540 V	1 h

Storage period > 3 years			
•	Input voltages as before, however double the times per year. Eventually change capacitors.		

After expiration of this start-up the KEB COMBIVERT can be operated on nominal rating conditions or delivered to a new storage.

A.5 Activation of the temperature input (only housing B)
The parameter Pn.12 determines the response of the drive when terminals T1, T2 of terminal strip X1B (only housing B) are open. **The function is switched off at factory setting (value "7"), so the terminals must not be bridged.** The following responses can be adjusted:

pn.12	Display	Response	Restart
0	E.dOH	Immediate disabling of modulation	Remove fault; reset
1*	A.dOH	Quick stopping / disabling of modulation after reaching speed 0	
2*	A.dOH	Quick stop / holding torque at speed 0	
3	A.dOH	Immediate disabling of modulation	Autoreset, if no fault is present
4*	A.dOH	Quick stopping / disabling of modulation after reaching speed 0	
5*	A.dOH	Quick stop / holding torque at speed 0	
6*	none	No effect to the drive. An output can be set with CP.32/33 value „11".	inapplicable
7	none	No effect to the drive. **Malfunction is not present!**	

*) If the motor is still too hot after 10 seconds, the error E.dOH is triggered and the modulation is switched off ! If overheat no longer exists, the message E.ndOH (or A.ndOH) is output. Only then the error can be reset or the automatic restart can be carried out.

It is neccessary to change into the application mode to activate the temperature input. There the parameter Pn.12 can be set according to the table above. The following example shows how to change the parameter Pn.12 to value "7".
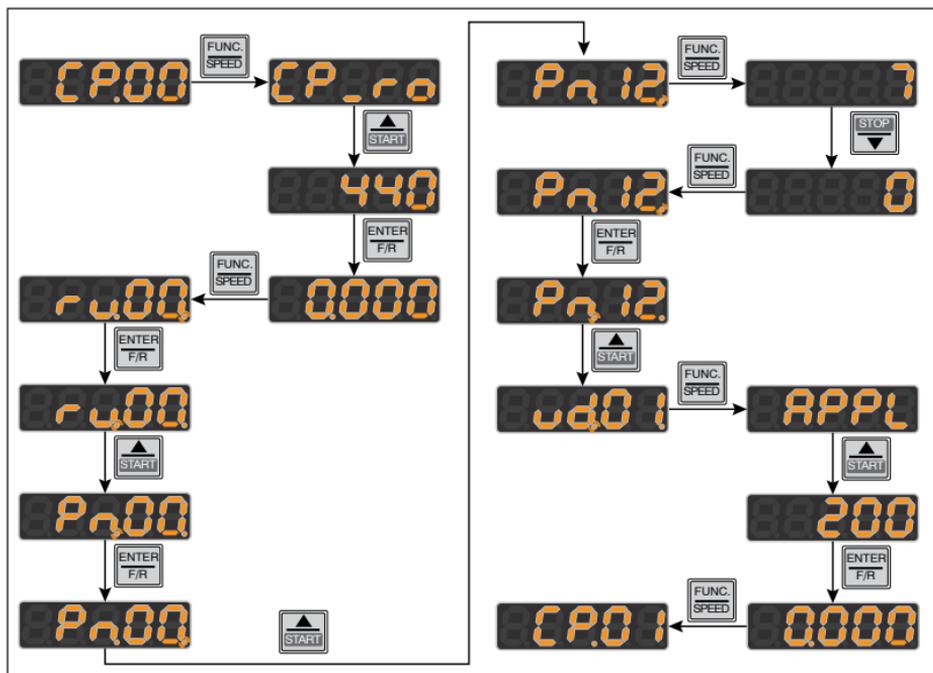
Example to set Pn.12 in application mode

Annex B

B.1   CE-Marking

CE marked frequency inverters and servo drives were developed and manufactured to comply with the regulations of the Low-Voltage Directive 2006/95/EC.

The inverter or servo drive must not be started until it is determined that the installation complies with the directive 2006/42/EC (machine safety directive) as well as the EMC-directive (2004/108/EC)(note EN 60204).

The frequency inverters and servo drives meet the requirements of the Low-Voltage Directive 2006/95/EC. The harmonized standards of the series EN 61800-5-1 in connection with EN 60439-1 and EN 60146 were used.

This is a product of limited availability in accordance with EN 61800-3. This product may cause radio interference in residential areas. In this case the operator may need to take corresponding measures.

B.2   UL marking

To be conform according to UL for the use on the North American Market the following instructions must be observed (original text in accordance with UL) :

- 240V units
  Suitable For Use On A Circuit Capable Of Delivering Not More Than 10000 rms Symmetrical Amperes, 240 Volts Maximum when Protected by Fuses or see Instruction Manual for Alternate BCP.
  480V units
  Suitable For Use On A Circuit Capable Of Delivering Not More Than 10000 rms Symmetrical Amperes, 480 Volts Maximum when Protected by Fuses or see Instruction Manual for Alternate BCP.

- Maximum Surrounding Air Temperature 45 °C (113 °F)

- For control cabinet mounting as „Open Type"

- Use In A Pollution Degree 2 Environment

- Use 60/75°C Copper Conductors Only

- Motor protection by adjustment of current parameters.For adjustement see application manual parameters Pn.14 and Pn.15.

- Not incorporated Overspeed Protection

- Overload protection at 130 % of inverter output rated current (see type plate).

- Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes, or the equivalent.

B.3 Additional Manuals
You find supplementary manuals and instructions for the download under

www.keb.de > Service&Downloads > Downloads

General instructions
• Part 1 EMC-and safety instructions

Service notes
• Up- /Download of parameter lists with KEB COMBIVERT
• Error messages

Instruction and information for construction and development
• Application Manual
• CAN manual
• Electronic accessories->braking resistors
• Preparation of a user-defined parameter menu
• Programming of the digital inputs
• Input fuses in accordance with UL

All documents are also available in printed version, however we have to charge a nominal fee for these.

KEB worldwide…

More and newest addresses at http://www.keb.de

© KEB	
Mat.No.	00B60EM-KB00
Rev.	1G
Date	07/2009