COMBIVERT

G6

Customers Parameter

Sensorless Closed Loop for Synchronous Motors

Translation of original manual			
Document	Part	version	Date
20096185	GBR	00	1114

KEB

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1. Preface

The described hard- and software are developments of the Karl E. Brinkmann GmbH. The enclosed documents correspond to conditions valid at printing. Misprint, mistakes and technical changes reserved.

1.1 Information on special measures

The used pictograms have following significance:

Danger	Is used, when death or serious bodily injury may be the consequence of non-observance of the measure.
Warning	Is used, when bodily injury and/or substantial property damage may be the consequence of non-observance of the measure.
Caution	Is used, when property damage may be the consequence of non-observance of the measure.
Attention	Is used, when noise sensitive or unrequested operation may be the consequence of non-observance of the measure.
Info	Is used, when a better or simpler result can be the consequence of the measure.

For a special case the instructions can be supplemented by additional pictograms and text.

1.2 Documentation

Before working with the unit the user must become familiar with it. This includes especially the knowledge and observance of the safety and operating instructions.

Attention	**Observe safety and operating instructions**
	Precondition for all further steps is the knowledge and observance of the safety and operating instructions. This is provided accompanied by the device or by the download site of www.keb.de.

Non-observance of the safety and operating instructions leads to the loss of any liability claims. The warnings and safety instructions in this manual work only supplementary. This list is not exhaustive.

1.3 Validity and liability

The use of our units in the target products is beyond of our control and therefore exclusively the responsibility of the machine manufacturer, system integrator or customer.

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.

Selection of our units in view of their suitability for the intended use must be done generally by the user.

Tests can only be done within the application by the machine manufacturer. They must be repeated, even if only parts of hardware, software or the unit adjustment are modified.

Danger  **by tamper from unauthorized personnel**	
	Unauthorised opening and tampering may lead to death, bodily injury, property damage and malfunctions. Modification or repair is permitted only by authorized personnel by KEB. Infringement will annul the liability for resulting consequences.

The suspension of liability is especially valid also for operation interruption loss, loss of profit, data loss or other damages. Disclaimer of warranty will cause void the guarantee. This is also valid, if we referred first to the possibility of such damages.

If single regulations should be or become void, invalid or impracticable, the effectivity of all other regulations or agreements is not affected.

Through multitude applications not each possible case of installation, operation or maintenance can be considered. If you require further information or if special problems occur which are not treated detailed in the documentation, you can request the necessary information via the local Karl E.Brinkmann GmbH agency.

1.4 Copyright

The customer may use the instruction manual as well as further documents or parts from it for internal purposes. Copyrights are with KEB and remain valid in its entirety.

KEB®, COMBIVERT®, COMBICONTROL® and COMBIVIS® are registered trademarks of Karl E. Brinkmann GmbH.

Other wordmarks or/and logos are trademarks (™) or registered trademarks (®) of their respective owners and are listed in the footnote on the first occurrence.

When creating our documents we pay attention with the utmost care to the rights of third parties. Should we have not marked a trademark or breach a copyright, please inform us in order to have the possibility of remedy.

1.5 Specified application

The COMBIVERT G6 serves exclusively for the control and regulation of three-phase motors. The operation of other electric consumers is prohibited and can lead to the destruction of the unit. Frequency inverters are components which are intended for the installation in electric systems or machines.

The used semiconductors and components of the Karl E.Brinkmann GmbH are developed and dimensioned for the use in industrial products. If the KEB COMBIVERT is used in machines, which work under exceptional conditions or if essential functions, life-supporting measures or an extraordinary safety step must be fulfilled, the necessary reliability and security must be ensured by the machine builder.

The operation of our products outside the indicated limit values of the technical data leads to the loss of any liability claims.

1.6 Product description

These manual contains the description of the customers parameter of the COMBIVERT G6.

Attention	The described parameter are only valid at SCL operation and factory settings.

1.6.1 Corresponding documentation

Attention	**Further documentation via www.keb.de**
	• EMC and safety instructions • Installation power unit • Programming manual

2. Parameter Description

On delivery the KEB COMBIVERT G6 is assigned with an user menu, the customer parameters (CP-Parameters). These represent a selection of important parameters for the operation.

Up to a maximum of 48 customer parameters can be defined from over 500 parameters. Only parameter CP00 password input is predefined and can not be modified or deleted.

The customer parameter menu described in this manual is valid for SCL systems. That can be indentified by parameter CP48 (see below).

2.1 Selection of the customer parameter menu

CP48 Software version

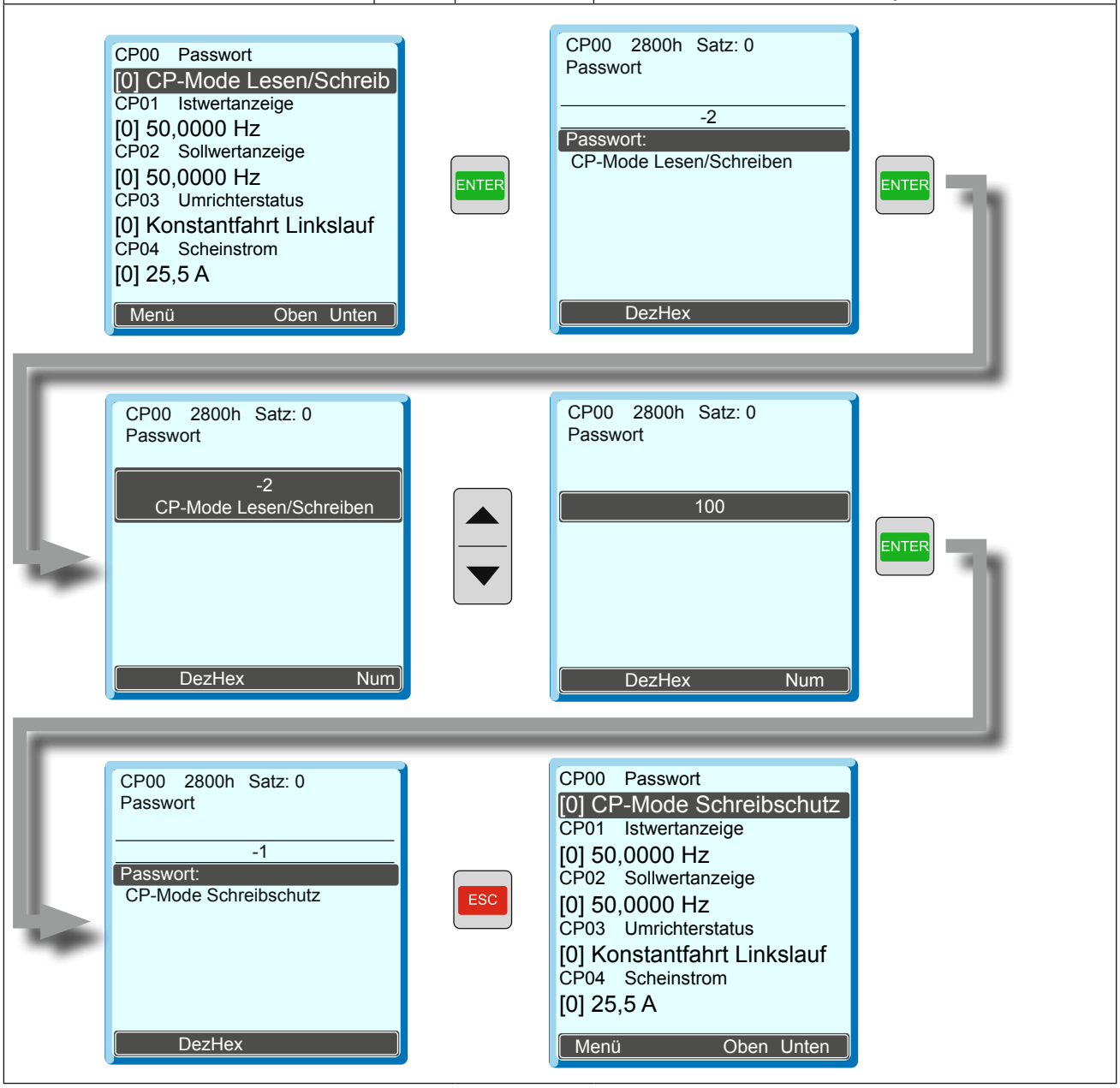
Co-domain	Setting	Description
0.0.0.0 … F.F.F.F	–	Display of the software version
	The first two digits display the major and minor version number (e.g. 1.2.x.x => V1.2)	
	The third digit displays the power unit software	
	x.x.0.x	Power circuit V/f 1. version
	x.x.1.x	Power circuit V/f 2. version
	x.x.2.x	Power unit ASCL
	x.x.3.x	Power circuit SCL => (this manual)
	The fourth digit displays a serial number for the date code.	

2.2 Password input in CP mode

CP00 Password input

Ex works the frequency inverter is supplied without password protection, this means that all changeable parameters can be adjusted. After parameterizing the unit can be barred against unauthorized access. The adjusted mode is stored. Following password levels are possible:

Password level	Val-ue	Password	Explanation
CP mode write protection	-1	100	Only reading of customer parameters
CP mode read/write	-2	200	Read/write of customer parameters



Info A detailed description of the diplay / keyboard can be found in the programming manual "Control circuit analog /digital".

2.3 CP parameters for SCL operation (CP48= „x.x.3.x“)

Parameter		Setting Range	Reso-lution	Default	Unit	Flag	based on
CP00	Password input	0…9999	1	-	-	-	Ud01
CP01	Actual value display	±4000,000	0,125	0	rpm	-	ru07
CP02	Set value display	±4000,000	0,125	0	rpm	-	ru01
CP03	Inverter status	0…255	1	0	-	-	ru00
CP04	Apparent current	0…6553,5	0,1	0	A	-	ru15
CP05	Apparent current peak value	0…6553,5	0,1	0	A	-	ru16
CP06	Actual torque display	±32000	0,01	0	Nm	-	ru12
CP07	Actual DC voltage	0…1500	1	0	V	-	ru18
CP08	DC link voltage peak value	0…1500	1	0	V	-	ru19
CP09	Output voltage	0…1167	1	0	V	-	ru20
CP10	Speed control configuration	0…127	1	4	–	E	cS00
CP11	DSM rated torque	0,1…6553,5	0,1	LTK	Nm	–	dr27
CP12	DSM rated speed	1…64000	1	3000	rpm	–	dr24
CP13	DSM rated frequency	0,0…1600,0	0,1	150,0	Hz	–	dr25
CP14	DSM rated current	0,0…1500,0	0,1	LTK	A	–	dr23
CP15	DSM EMC (Vpk/1000rpm)	0…32000	1	LTK	–	–	dr26
CP16	DSM Inductance	0,01…500,00	0,01	LTK	mH	–	dr31
CP17	DSM stator resistance	0,000…250,000	0,001	2,000	Ω	E	dr30
CP18	DSM current for zero speed	0,0…1490,0	0,1	LTK	A	–	dr28
CP19	Load motor dependent parameter	0…3	1	0	–	E	Fr10
CP22	Maximum speed	0…4000	0,125	2100	rpm	–	oP10
CP23	Step value 1	±4000,000	0,125	100	rpm	–	oP21
CP24	Step value 2	±4000,000	0,125	-100	rpm	–	oP22
CP25	Acceleration time	0…300,00	0,01	5,00	s	–	oP28
CP26	Deceleration time	-1; 0…300,00	0,01	5,00	s	–	oP30
CP27	S-curve time	0…5,00	0,01	off	s	–	oP32
CP28	Torque reference source	0…6	1	2	–	E	cS15
CP29	Absolute torque reference	±32000,00	0,01	LTK	Nm	–	cS19
CP30	KP speed	0…32767	0,01	300	–	–	cS06
CP31	KI speed	0…32767	0,01	100	–	–	cS09
CP32	Switching frequency	4/8/12/16	1	4	kHz	E	uF11
CP33	Relay output 1 / function	0…101	1	4	–	–	do02
CP34	Relay output 2 / function	0…101	1	2	–	–	do03
CP35	Reaction to limit switch	0…6	1	6	–	–	Pn07
CP36	Reaction to external fault	0…6	1	0	–	–	Pn03
CP37	Response to external overtemperature	0…9	1	6	–	–	Pn12
CP38	Inverter address	0…239	1	1	–	E	Sy06
CP39	last error	0…255	1	0	–	E, R	In24
CP40	Parameter set / copy function	-4…7	1	0	–	E	Fr01
CP48	Software version	x.x.x.x	–	LTK	–	R	In06
LTK=depending on power unit; E=ENTER-Parameter; R=read only							

Factory settings see 2.3.1

Attention 	Due to measuring and calculation inaccuracies tolerances at the current and torque displays as well as at the switching levels and limitations should be taken into account. The given tolerances (see parameter description) refer to the respective maximum values with the dimensioning KEB COMBIVERT: Motor = 1 : 1. **Dependent on the data from the motor manufacturer, higher tolerances at the torque displays are possible due to usual type variations of the motors and temperature drifts.**

CP00 Password input

see chapter 2.2

CP01 Actual value display

Co-domain	Description
±4000.000 rpm	Display of the actual output speed in rpm. The rotation of the inverter is displayed by the sign. Examples:
Display 20.250	Output speed 20.250 rpm, direction of rotation forward
Display -20.250	Output speed -20.250 rpm, direction of rotation reverse

CP02 Set value display

Co-domain	Description
0…±4000 rpm	Display of actually set value. For control reasons the set speed is displayed, even if the control release or direction of rotation are not switched. If no direction of rotation is set, the set speed for clockwise rotation (forward) is displayed.

CP03 Inverter state

The actual operating condition of the inverter (e.g. forward constant run, standstill) is displayed in parameter „inverter state“. In the case of an error the current error message is displayed, even if the display has already been reset with ENTER (status LED is still blinking).

Display	State
no operation	Modulation switched off; output voltage = 0 V; drive is not controlled.
no direction of rotation preset	Modulation switched off; output voltage = 0 V; drive is not controlled.
Acceleration Forward	Drive accelerates with direction of rotation forward.
Deceleration Forward	Drive decelerates with direction of rotation forward.
Acceleration Reverse	Drive accelerates with direction of rotation reverse.
Deceleration Reverse	Drive decelerates with direction of rotation reverse.

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Display	State
Constant run Forward	Drive runs with constant speed and direction of rotation forward.
Constant run Reverse	Drive runs with constant speed and direction of rotation reverse.

Other status messages are described at the parameters, on which they occur (see chapter „Error Diagnosis“).

CP04 Apparent current

Co-domain	Description
0…±6553.5A	Display of the actual apparent current in ampere.

CP05 Apparent current / peak value

Co-domain	Description
0…±6553.5A	CP05 makes is possible to recognize the max. apparent current. For that the highest value of CP04 is stored in CP05. The peak value memory can be cleared by pressing the UP, DOWN or ENTER key or via bus by writing any value you like to the address of CP05. The switch off of the inverter also clears the memory.

CP06 Actual torque

Co-domain	Description
0,0… ±32000.00 Nm	The displayed value corresponds to the actual motor torque in Nm. The value is calculated from the active current. Due to common type variations and temperature drifts of the motor tolerances of up to 30 % are possible in the base speed range. Basic requirement for the torque display is the adjustment of the motor data (CP11…CP18). If the real motor data deviate strongly from the data on the name plate the operating performance can be optimized by entering the real data. The adjustment of the name plate data is sufficient for a start-up.

CP07 Actual DC voltage

Co-domain	Description
0…1000 V	Display of actual DC-link voltage in volt. Typical values:

V-class	Normal operation	Error! overpotential	Error! underpotential
230 V	290…360 V DC	approx. 400 V DC	approx. 216 V DC
400 V	510…620 V DC	approx. 840 V DC	approx. 240 V DC

CP08 DC-link voltage / peak value

Co-domain	Description
0…1000 V	CP08 makes it possible to recognize short-time voltage rises within an operating cycle. For that the highest value of CP07 is stored in CP08. The peak value memory can be cleared by pressing the UP, DOWN or ENTER key or via bus by writing any value you like to the address of CP08. The switch off of the inverter also clears the memory.

CP09 Output voltage

Co-domain	Description
0…778 V	Display of the actual output voltage in volt.

CP10 Speed control configuration

Input	Setting	Function	Description
0		off (open-loop operation)	With this parameter the basic setting of the speed controller is determined.
1		reserved	
2		reserved	
3		off (open-loop operation)	
4	x	Speed control (closed loop operation)	
5		Torque control (closed-loop operation)	
6		Torque-/speed control (closed-loop operation)	
7…127		off (open-loop operation)	

CP11 DSM rated torque

Co-domain	Setting	Description
0.1…6553.5 A	see 2.3.1	Adjustment of the motor rated torque in accordance with the nameplate.

CP12 DSM rated speed

Co-domain	Setting	Description
1…64000 min^{-1}	3000 rpm	Adjustment of the rated speed according to the name plate.

CP13 DSM rated frequency

Co-domain	Setting	Description
0.0…1600.0 Hz	150.0 Hz	Adjustment of the rated motor frequency according to the name plate.

CP14 DSM rated current

Co-domain	Setting	Description
0.0…1500.0 A	see 2.3.1	Adjustment of the rated motor current according to the name plate and the connection (Y / Δ).

CP15 DSM EMC (Vpk/1000rpm)

Co-domain	Setting	Description
0…32000	see 2.3.1	Adjustment of the electromotive force according to the instruction manual of the motor.

CP16 DSM Inductance

Co-domain	Setting	Description
0,10… 500,00 mH	see 2.3.1	Adjustment of the motor inductance according to the instruction manual of the motor.

CP17 DSM stator resistance

Co-domain	Setting	Description
0,000… 250,000 Ω	see 2.3.1	Adjustment of the motor stator resistance according to the instruction manual of the motor.

CP18 DSM current for zero speed

Co-domain	Setting	Description
0,0… 1490.0 A	see 2.3.1	Adjustment of the current for zero speed according to the instruction manual of the motor.

CP19 Load motor dependent parameter

The servo controller is factory adjusted according to the unit size to a special motor (see 2.3.1 "Factory settings").If the motor data CP11... CP18 are changed, parameter CP19 must be activated once. This re-adjusts the current controller, torque curve and torque limit. The torque limit is set to the value, that is maximal possible in the base speed range (depending on inverter rated current) but not more than 3 x Mn.

Co-domain	Setting	Description
1	x	Default setting of the motor-dependent controller parameters. The voltage class of the inverter is taken as input voltage.
2		Default setting of the motor-dependent controller parameters. The measured DC-link voltage divided by √2 measured at switch on is taken as input voltage. Thus the frequency inverter can be adapted to the actually available mains voltage (e.g. USA with 460 V).

Attention Writing to these parameter is only possible at state 'no operation'!

CP22 Maximum speed

Co-domain	Setting	Description
0…4000 rpm	2100 rpm	A maximum speed must be preset in order to limit the setpoint. This limit value is the basis for further setpoint calculations and for the determination of setpoint characteristics. The maximum speed limits the setpoint speed only. The actual value can exceed this limit due to speed ripples, speed overshoots or hardware defects.

CP23 Step value 1 (input 1)

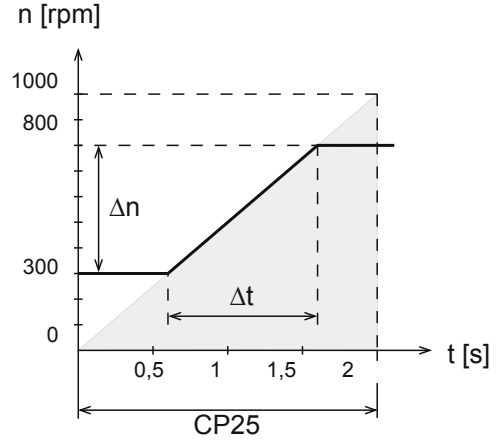
CP24 Step value 2 (input 2)

Co-domain		Setting	Description
CP23	0…±4000 rpm	100 rpm	Two step values can be adjusted. The selection of the step values is made by the inputs I1 and I2. If adjustments are made that are outside the fixed limit of CP22, then the speed is internally limited.
CP24		-100 rpm	

Info Input I1 + input I2 = step value 3 (factory setting = 0 rpm)
Step value 3 cannot be adjusted in the CP-mode.

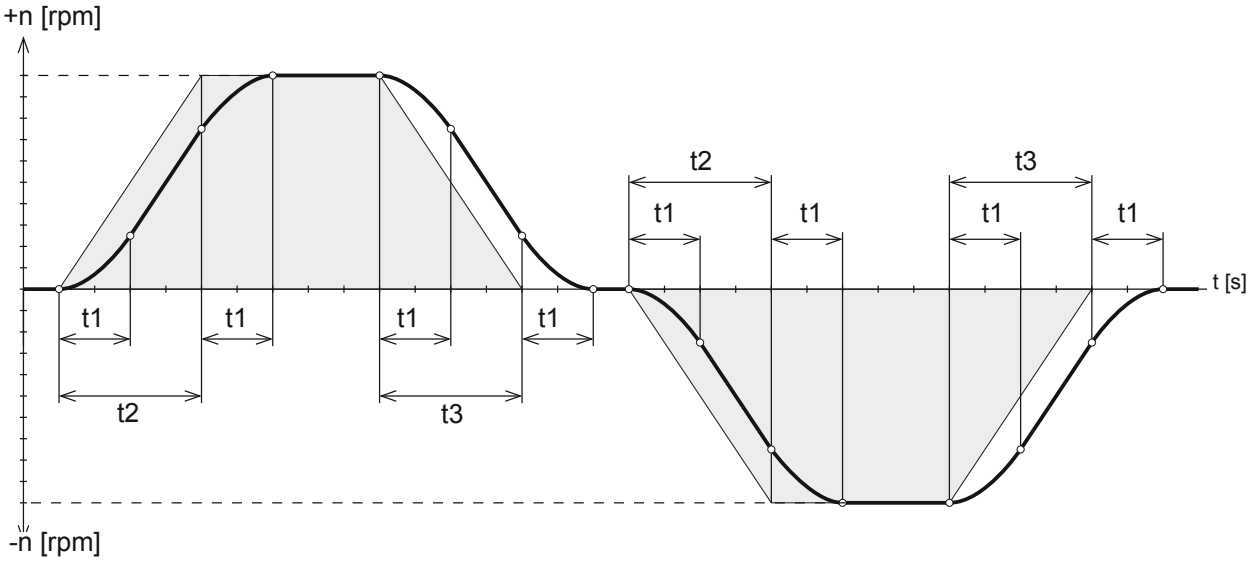
CP25 Acceleration time

CP26 Deceleration time

Co-domain	Setting	Description
0.00…300.00 s	5,00 s	The parameter determines the time needed to accelerate from 0 rpm to 1000 rpm or to decelerate from 1000 rpm to 0 rpm. The actual acceleration-/deceleration time is proportional to the speed change (Δn). If the value -1 is adjusted in CP26, the value from CP25 is accepted (Display „=Acc“)!
Δn Speed change Δt Acceleration-/deceleration time for Δn		
Example		The drive should accelerate from 300 rpm auf 800 rpm in 1 s. Δn = 800 rpm - 300 rpm = 500 rpm Δt = 1 s $CP25 = \frac{\Delta t}{\Delta n} \cdot 1000\,rpm = \frac{1\,s}{500\,rpm} \cdot 1000\,rpm = 2\,s$

CP27 S-curve time

Co-domain	Setting	Description
0.00 (off)…5.00 s	(off)	For some applications it is of advantage when the drive starts and stops jerk-free. This is achieved through a straightening of the acceleration and deceleration ramps. The straightening time, also called S-curve time, can be adjusted with CP27.
t1 S-curve time (CP27) t2 Acceleration time (CP25) t3 Deceleration time (CP26)		



Attention In order to drive defined ramps with activated S-curve time, the preset acceleration and deceleration times (CP25 and CP26) must be adjusted higher than the S-curve time (CP27).

CP28 Torque reference source

Value	Source	Adjustment range	Description
0	AN1+ / AN1-	0 %…±100 % = 0…±CP29	The required setpoint source for torque control can be adjusted with this parameter.
1	AN2+ / AN2-	0 %…±100 % = 0…±CP29	
2	digital absolute	CP29	
3…5	only application mode		
6	AN2 direct (±10 V)		
The values must be confirmed with „ENTER“.			

CP29 Absolute torque reference

Co-domain	Setting	Description
±10000.00 Nm	see 2.3.1	The absolute torque reference of the drive is adjusted with parameter CP29 in torque-controlled operation (CP10 = 5) and with digital setpoint setting (CP28 = 2). The sign stands for direction of rotation to be active. In speed-controlled operation (CP10= 4) the parameter works as torque limit in all quadrants. The sign has no effect at that. **This parameter has no function in open-loop operation (CP10).**

Info Due to common type variations and temperature drifts of the motor tolerances of up to 30 % are possible in the base speed range.

CP30 KP speed

Co-domain	Setting	Description
0…32767	300	The proportional factor of the speed controller is adjusted in this parameter.

CP31 KI speed

Co-domain	Setting	Description
0…32767	100	The proportional factor of the speed controller is adjusted in this parameter.

CP32 Switching frequency

Co-domain	Setting	Description	
4/ 8/ 12/ 16 kHz	LTK	The switching frequency with which the power modules are clocked can be changed depending on the application. The maximum possible switching frequency and the factory setting is determined by the power circuit. The values must be confirmed with „ENTER“.	
Refer to following list to learn about influences and effects of the switching frequency.		low switching frequency	high switching frequency
		less inverter heating	less noise development
		less discharge current	improved sine-wave simulation
		less switching losses	less motor losses
		less radio interferences	improved controller characteristics
		improved concentricity with low speed (only open loop!)	

Attention At switching frequencies above 4 kHz pay absolute attention to the max. motor line length in the technical data of the power circuit manual.

CP33 Relay output 1 / function

CP34 Relay output 2 / function

The switching level for relay output 1 is "100.00" for relay output 2 "4.00".

Value	Function
0	No function (generally off)
1	Generally on
2	Run signal; also by DC-braking
3	Ready signal (no error)
4	Error
5	Error (without auto-reset)
6	Warning or error message (also at fast stop)
7	Overload pre-warning (OL) up to 80 %
8	Heat sink temperature pre-warning (OH) up to 70 °C
9	Motor temperature pre-warning (dOH) → CP37
10	Motor protection relay function pre-warning (OH2) → CP27
11	Internal temperature pre-warning
12	Cable breakage 4...20 mA on analog input 1
13	Cable breakage 4...20 mA on analog input 2
14	max. constant current (I>CP25) exceeded
15	max. ramp current (I>CP24) exceeded
16	DC braking active
17	Power off
18	Brake control
19	Speed control difference > switching level
20	Actual value=setpoint (CP03=Fcon; rcon; not at noP, LS, error, SSF)speed search
21	Accelerate (CP03 = FAcc, rAcc, LAS)
22	Decelerate (CP03 = FdEc, rdEc, LdS)
23	Real direction of rotation = set direction of rotation
24	act. utilization (CP06) > switching level
25	Amount actual active current > switching level
26	DC link voltage (CP07) > switching level
27	Actual value (CP01) > switching level
28	Setpoint (CP02) > switching level
30	Actual torque > switching level
31	Absolute value AN1 > switching level
32	Absolute value AN2 > switching level
34	Setpoint AN1 > switching level
35	Setpoint AN2 > switching level
37	Timer 1 > switching level
38	Timer 2 > switching level
40	Hardware current limit activated
41	modulation on
42	ANOUT3 PWM signal
43	ANOUT4 PWM signal
44	Inverter status > switching level
45	Heat sink temperature > switching level
46	Motor temperature > switching level
47	Ramp output value > switching level
48	Apparent current (CP04) > switching level
49	Forward running (not at nOP, LS, abnormal stopping or error)
50	Reverse running (not at nOP, LS, abnormal stopping or error)
51	OL2 warning
52	Current regulator limit reached
53	Speed regulator limit reached
59	Inputs in AND-operation (ru22)

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Value	Function
60	Inputs in OR-operation (ru22)
61	Inputs in NAND-operation (ru22)
62	Inputs in NOR-operation (ru22)
63	Absolute ANOUT1 > switching level
64	Absolute ANOUT2 > switching level
65	ANOUT1 > switching level
66	ANOUT2 > switching level
69	ext. PID system deviation > switching level
70	Driver voltage active
73	Absolute active power > switching level
74	Active power > switching level
80	Active current > switching level
82	Real value channel 2 > switching level
84	Actual value < minimum setpoint oP06/oP07
85	Warning! External fault
86	Warning! bus
89	Actual value < setpoint • switching level
90	Motor temperature correction > switching level
92	Quick stopping
99	Warning! flow control
100	Combination of different conditions
101	Stop after DC braking and when current > switching level (output switches at modulation = OFF and the measured average value of the apparent value of the apparent current during DC braking before switching off the modulation has exceeded the level of CP34)

The switching condition is off for unlisted values.

CP35 Reaction to limit switch

This parameter determines the reaction of the drive to terminal X2A.7 (**R**) and/or X2A.8 (**F**). These terminals are programmed as hardware limit switches. The reaction of the drive is shown in the table below.

Val-ue	Setting	Response	Restart
0		Immediate disabling of modulation	Remove fault, reset
1		Quick stopping / disabling of modulation after reaching speed 0	
2		Quick stopping / holding torque at speed 0	
3		Immediate disabling of modulation	Autoreset, if no fault is present
4		Quick stopping / disabling of modulation after reaching speed 0	
5		Quick stopping / holding torque at speed 0	
6	x	No effect to the drive, fault is ignored!	—

CP36 Reaction to external fault

With the external error monitoring external units can take direct influence on the drive. This parameter determines the response of the drive to a signal at terminal X2A.12 (I3) according to the following table.			
Value	Setting	Response	Restart
0	x	Immediate disabling of modulation	Remove fault, reset
1		Quick stopping / disabling of modulation after reaching speed 0	
2		Quick stopping / holding torque at speed 0	
3		Immediate disabling of modulation	Autoreset, if no fault is present
4		Quick stopping / disabling of modulation after reaching speed 0	
5		Quick stopping / holding torque at speed 0	
6		No effect to the drive, fault is ignored!	—

Info A detailed description of the diplay / keyboard can be found in the programming manual "Control circuit analog /digital".

CP37 Response of external overtemperature (only for devices with temperature input)

This parameter determines the response of the drive to the external temperature monitoring. **The function is switched off at factory setting.** The power circuit terminals T1/T2 must be connected to activate the function. Then the response can be adjusted according to the following table. If the overtemperature condition is past, the message „No ERROR drive overheat" (or no ABN.STOP drive overheat") is output. Only then the error can be reset or the automatic restart can be carried out.

CP37	Display	Response	Restart
0	[1]	Immediate disabling of modulation	Remove fault; reset
1*	[2]	Quick stopping / disabling of modulation after reaching speed 0	
2*	[2]	Quick stopping / holding torque at speed 0	
3	[2]	Immediate disabling of modulation	Autoreset, if no fault is present
4*	[2]	Quick stopping / disabling of modulation after reaching speed 0	
5*	[2]	Quick stopping / holding torque at speed 0	
6*	non	No effect on the drive; Switching condition "PTC overtemperature warning" (value 9) is set and can be used with CP31/CP32 to activate an output.	inapplicable
7	non	No effect on the drive; **Malfunction is not present!** Switching condition „External overtemperature“ (value 9) is not set.	
8	[2]	Malfunction is only triggered when the inverter modulates.	Remove fault; reset
9		As value 6, additionally the motor monitoring is also active when the modulation is switched off.	

[1] ERROR drive overheat [2] ABN.STOP drive overheat

*) If the drive is still hot after 10 seconds, error message "ERROR drive overheat" is triggered and the modulation is switched off!

CP38 Inverter address

Co-domain	Setting	Description
0…239	1	Setting of the bus address, whereby the inverter can be addressed by "COMBIVIS" or another control. If several inverters are operated simultaneously at the bus, it is absolutely necessary to assign different bus addresses to them, since otherwise it leads to communication failures.

CP39 last error

Co-domain	Setting	Description
0…255	1	The inverter stores the eight errors that occurred last. Displays the error that occurs last.

CP40 Parameter set / copy function

Co-domain	Setting	Description
-4…7	1	CP40 defines the source parameter set. By default set 0 is adjusted as target set in the CP mode.
0…7	All programmable parameters of the source set are copied into the target set.	
-1	KEBdef/cust.par/sel.sets. Default values are copied in all parameters of set 0 (exception: system and security parameters).If the target set is > 0 only programmable parameters are copied.	
-2	KEBdef/cust.par/all sets. Default values are copied in all parameters of all sets (exception: system and security parameters).	
-3	KEBdef/cust+sys/sel.sets. Default values are copied in all parameters of the target set (exception: security parameters).If the target set is > 0 only programmable parameters are copied.	
-4	KEBdef/cust+sys/all sets. Default values are copied in all parameters of all sets (exception: security parameters).	

Attention  All definitions defined by the machine builder are reset by loading the default values! This can include the terminal assignment, set changeover or operating conditions. Ensure before loading the default set that there are no unwanted operating conditions.

CP48 Software version

Co-domain	Setting	Description
0.0.0.0 … F.F.F.F	x.x.x.x	Display of the software version
	The first two digits display the major and minor version number (e.g. 1.2.x.x => V1.2)	
	The third digit displays the power unit software	
	x.x.0.x	Power circuit V/f 1. version
	x.x.1.x	Power circuit V/f 2. version
	x.x.2.x	Power unit ASCL
	x.x.3.x	Power unit SCL
	The fourth digit displays a serial number for the date code.	

2.3.1 Factory settings SCL

The following table contains the motor data of standard motors.

Parameter		CP11	CP12	CP13	CP14	CP15	CP16	CP17	CP18	CP29
Unit size/ Voltage class	Default motor	DASM rated torque	DASM rated speed	DASM rated frequency	DASM rated current	DSM EMK voltage constant	DSM winding inductance	DASM stator resistance	Stand still current	Maximum torque
		[Nm]	[rpm]	[Hz]	[A]	[V/1000rpm]	mH	Ω	[A]	[Nm]
07/400 V	C2SM000-3400	2,4	3000	150	1,8	111	34,4	13,1	1,9	
09/400V	C3SM000-3400	3,9	3000	150	2,4	118	20,6	5,9	2,9	22,47
10/400V	C4SM000-3400	5	3000	150	3,4	113	13,1	3,4	4,2	30,81
12/400V	D2SM000-3400	6,1	3000	150	4,5	119	12,8	3,2	4,8	53,21
13/400V	D4SM000-3400	9,9	3000	150	7,3	121	1,5	1,4	8,5	73,26
14/400V	E2SM000-3400	11	3000	150	7	136	8,2	2	9	80,12
15/400V	E4SM000-3400	15,5	3000	150	9,9	143	3,4	0,81	17,3	118,83
16/400V	F1SM000-3400	20	1465	150	13,8	130	7	0,58	17	165,99
17/400V	F2SM000-3400	31	3000	150	20,6	135	3,6	0,23	32,2	213,37
18/400V	F3SM000-3400	33	3000	150	22,9	131	1,7	0,13	46,2	253,27

3. Troubleshooting

3.1 General

If error messages or malfunctions occur repeatedly during operation, the first thing to do is to pinpoint the exact error. To do that go through the following checklist:

Is the error reproducable?

For that reset the error and try to repeat it under the same conditions. If the error can be reproduced, the next step is to find out during which operating phase the error occurs.

Does the error occur during a certain operating phase (e.g. always during acceleration)?

If so, consult the error messages and remove the causes listed there.

Does the error occur or disappear after a certain time?

That may be an indication for thermal causes. Check, whether the inverter is used in accordance to the ambient conditions and that no moisture condensation takes place.

3.2 Error Messages and their Cause

The status display is divided at COMBIVERT G6 in status, error and warning messages. Status messages display the actual operating condition of the unit.They have no special identification and are used for information only.

Error messages always consist of the word „Error“ and the cause. Error messages cause the immediate deactivation of the modulation. The restart is only possible after reset or autoreset. In case of temperature or overload errors it must be waited until the status message appears that the error has been removed. A reset can be carried out only then.

Warning messages always consist of the word „warning“ and the cause. How the inverter will behave on warning messages can be defined via parameters in the application mode.

The following table lists the status messages, error messages and finally the warning messages each in alphabetic sequence.

Display	Value	Meaning
Status messages		
calculate drive data	82	Measurement of the motor stator resistance
reverse acceleration	67	Acceleration with the adjusted ramp times in anti-clockwise direction of rotation.
forward acceleration	64	Acceleration with the adjusted ramps in clockwise direction of rotation.
LA stop	72	This message is displayed if during acceleration the load is limited to the adjusted load level
		further on next side

Display	Value	Meaning
blockade detected	129	The setpoint must be above the level Pn86. If the actual value is below the level, the counter starts. A blockade is recognized if the counter reaches the adjusted time in Pn86. The output function do00…07 = 96 (blockade active) is set. On exceeding the limit, the value of the counter decreases.
blockade resettable	130	The warning message blockade is no longer available. The message can be reset. The output function do00…07 = 97 "blockade resettable" is set.
close brake	85	Brake control (see chapter "Brake control")
open brake	86	Brake control (see chapter "Brake control")
DC brake	75	Motor is decelerated by DC voltage at the output.
speed search	74	Speed search function active, i.e. the inverter attempts to synchronize onto a running out motor.
no A.STOP overheat int.	92	The temperature in the interior of the inverter is again below the warning threshold.
no A. overheat pow.mod.	88	The heat sink temperature is again below the adjusted warning level.
no A. drive overheat	91	The motor temperature is again below the adjusted warning level. The switch off time is stopped.
no ABN.STOP overload	98	Warning: no more overload, OL counter has reached 0 %, warning „overload" can be reset.
no ABN.STOP overload 2	101	The cooling time after “Warning! Overload during standstill" has elapsed. The warning message can be reset.
hardware current limit	80	The message is output if the output current reaches the hardware current limit.
no ERROR overheat int.	7	No longer overheating in the interior, interior temperature has fallen by at least 3°C, error resettable
low speed	70	No direction of rotation preset, modulation off.
low speed / power off	84	No modulation after power off.
no operation	0	Control release is not set. Terminal ST (for units without safety module) Terminals STO (for units with safety module) Software control release (only in addition with ST or STO)
reverse constant	69	Acceleration / deceleration phase is completed and it is driven with constant speed / frequency in clockwise direction of rotation.
forward constant	66	Acceleration / deceleration phase is completed and it is driven with constant speed / frequency in clockwise direction of rotation.
no E. overheat pow.mod.	36	Temperature of the heat sink is again in the permissible operating range. The error can be reset now.
power unit not ready	13	Power circuit not ready or not identified by the control.
		further on next side

Display	Value	Meaning
low speed / DC brake	77	Modulation is switched off after DC braking (see chapter brake control).
calc. drive data ready	127	Calculation drive data ready
base block	76	Power modules for motor de-excitation locked
no ERROR drive over-heat	11	Motor temperature switch or PTC at the terminals T1/T2 is again in the normal operating range. The error can be reset now.
power off	78	Depending on the programming of the function (see chapter „Power-off function) the inverter restarts auto-matically upon system recovery or after reset.
quick stop	79	The message is output if the quick stop function be-comes active as response to a warning signal.
stall	71	This message is displayed if during constant operation the load is limited to the adjusted current limit.
no ERROR overload	17	No more overload, OL-counter has reached 0%; after "Error! overload" a cooling phase has to be awaited. This message appears upon completion of the cooling phase. The error can be reset now. The inverter must remain switched on during the cooling phase.
no ERROR overload 2	20	The cooling time has elapsed. The error can be reset.
check STO	131	The safety function is checked (100ms).
reverse deceleration	68	It is stopped with the adjusted ramp times in anti-clock-wise direction of rotation.
forward deceleration	65	Forward deceleration with the adjusted ramp times.
Ld stop	73	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.
		further on next side

Display	Value	Meaning
Error messages		
ERROR calc. drive data	60	Error: During the automatic motor stator resistance measurement.
ERROR output phase fail.	5	Phase loss detection at the output
Error blockade	26	A blockade was recognized.Pn85 Bit 4 is at error, no auto-reset.
ERROR brake	56	Error can occur with activated brake control (see chapter brake control) if: • the load during the start is below the min. load level (Pn43) or the missing of a motor phase was detected. • the load is too high and the hardware current limit is reached.
ERROR speed ctrl. lim	25	Speed controller limit reached
ERROR flow control	27	The flow control is activated in Pn91. No input and output for valve control is selected in Pn92 and Pn93.
ERROR input error detect	53	Hardware error at start/stop measurement.
ERROR external fault	31	Is triggered, if a digital input is being programmed as external error input and trips.
ERROR overspeed	58	The speed is outside the defined limits. (can also occur on exceeding of the absolute speed referring to EMF = EMF wrong (servo drives).
ERROR overheat internal	6	Overheating in the interior. Error can only be reset at "no ERROR overheat int." if the interior temperature has dropped by at least 3 °C
ERROR load shunt fault	15	Load-shunt relay has not picked up, occurs for a short time during the switch-on phase, but must automatically be reset immediately. If the error message remains the following causes may be applicable: • load-shunt defective • input voltage wrong or too low • high losses in the supply cable • braking resistor wrongly connected or damaged • braking module defective
ERROR power unit	12	Error: General power circuit fault
ERROR motor protection	30	Electronic motor protective relay has tripped.
ERROR max. acceleration	24	Maximum acceleration exceeded
ERROR drive overheat	9	Error: Overtemperature of motor PTC. Error can only be reset at "no ERROR drive overheat“ if PTC is again low-resistance. Causes: • Resistance at terminals T1/T2 >1650 Ohm • Motor overloaded • Line breakage to the temperature sensor

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Display	Value	Meaning
ERROR set	39	It has been attempted to select a locked parameter set. Programmed response “Error, restart after reset”.
ERROR phase failure	3	One phase of the input voltage is missing (ripple-detection)
ERROR safety	28	Error in a function that is monitored by the optional safety module. See Safety Instructions Mat.No. 00G6N1F-0000.
		 The error „ERROR 28: safety“ can not be reset with a digital input. The error can only be reset by switching off and on of the frequency inverter.
ERROR overfrequency	61	Current frequency is above the permissible range.
ERROR overload	16	Overload error can only be reset at "no ERROR overload" if OL-counter reaches 0% again. Occurs, if the overload is longer than the permissible time (see technical data).
		• mechanical fault or overload in the application • inverter not correctly dimensioned • motor wrongly wired • poor controller adjustment
ERROR overload 2	19	Occurs if the current for zero speed is exceeded (see technical data in the power unit manual). The error can only be reset if the cooling time has elapsed and "no ERROR overload 2" is displayed.
ERROR overpotential	1	Voltage in the DC link circuit too high. Occurs if the DC link voltage exceeds the permissible value. Causes:
		• poor controller adjustment (overshooting) • input voltage too high • interference voltages at the input • deceleration ramp too short • braking resistor defective or too small
ERROR overcurrent	4	Occurs, if the specified peak current is exceeded. Causes:
		• acceleration ramps too short • the load is too big at switched off acceleration stop and switched off constant current limit • short circuit at the output • ground fault • deceleration ramp too short • motor cable too long • EMC • DC brake active at high power (see chapter brake control)
		further on next side

Display	Value	Meaning
ERROR overheat pow. mod.	8	Overtemperature of power module. The error can only be reset at "no E. overheat pow.mod.". Causes: • insufficient air flow at the heat sink (soiled) • ambient temperature too high • ventilator clogged
ERROR underpotential	2	Error: Undervoltage (DC link circuit). Occurs, if DC link voltage falls below the permissible value. Causes: • input voltage too low or unstable • inverter rating too small • voltage losses through wrong cabling • the supply voltage through generator / transformer breaks down at very short ramps • jump factor (Pn56) too small • if a digital input is programmed as external error input with error message "underpotential" (Pn65).
ERROR bus	18	The adjusted monitoring time (watchdog) of the communication between control board and PC (on an optional fieldbus interface) or between control board and power unit has been exceeded.
Warning Messages		
ABN.STOP speed ctrl. lim	107	The speed controller is in limitation. The response to the cause can be programmed with Pn75.
ABN.STOP external fault	90	This warning is triggered via an external input. The response to this warning can be programmed.
ABN.STOP motor protect.	97	Warning: electronic motor protective relay has tripped. The response to this warning can be programmed.
ABN.STOP drive overheat	96	The motor temperature has exceeded an adjustable warning level (Pn13). The switch off time is started. The response to this warning can be programmed.
ABN.STOP set	102	It has been attempted to select a locked parameter set. The response to this warning can be programmed.
ABN.STOP overload	99	A level between 0 and 100 % of the load counter can be adjusted. The warning is output on exceeding this level. The response to this warning can be programmed.
ABN.STOP overload 2	100	The warning is output when the standstill continuous current is exceeded (see technical data and overload characteristics). The response to this warning can be programmed. The warning message can only be reset after the cooling time has elapsed and "no ABN.STOP overload 2" is displayed.
ABN.STOP overheat int.	87	The temperature in the interior of the inverter is above the permissible level. The switch off time was started. The programmed response to this warning message is executed.

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Display	Value	Meaning
A.STOP overheat pow. mod	89	This warning is output when the defined level is exceeded. Furthermore the response to this warning can be programmed.
ABN.STOP bus	93	Watchdog for the communication between control board and PC (on an optional fieldbus interface) or control board and power unit has responded. The response to this warning can be programmed.

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Document	20096185	
Part/Version	GBR	00
Date	2016-10-07	