COMBIVERT

G6

Start-up **G6 SCL**

Sensorless Closed Loop

Translation of the original manual		
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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

Attention	**Documentation via www.keb.de**
	Prior to performing any work on the unit, it is absolutely necessary to download and read the documentation, especially the safety precautions and instructions for use. Follow these steps to get the documentation:
Step 1	Read the material number (Mat.No.) from nameplate
Step 2	Input the material number at "www.keb.de => Service => Downloads" and click "search". **Downloads** **Suche nach Materialnummern** **Bitte geben Sie eine vollständige (11-stellige) Materialnummer ein.** **Suche nach:** 15G6DCD-3510 suchen

further on next side

Step 3	The entire documentation associated with the device will be displayed, including the instruction manuals in German and English. If available, other translations are also indicated. Make sure that the user understands the provided language.
	**Should you be unable to read or understand the documentation, do not take any further steps. Please inform our support network for further assistance.**

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 KEB authorized personnel. Infringement will annul the liability for resulting consequences.

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

If individual regulations should be futile, not effective or impracticable, then the effectivity of all other regulations or agreements is not affected by this.

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. Inverter are components designed for inclusion in electrical installations or machinery.

Die bei KEB eingesetzten Halbleiter und Bauteile sind für den Einsatz in industriellen Produkten entwickelt und ausgelegt. If the KEB COMBIVERT F5 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

SCL means Sensorless Closed Loop and describes the encoderless operation of three-phase current synchronous motors at the KEB COMBIVERT.The principle is based on a mathematical model of the synchronous motor. With this mathematical model the rotor position can be emulated with known motor data.

SCL is not an operation mode, It is an independent software version, which is ready to run on the hardware of G6-application controls.

This application has the following advantages:

- no encoder system in the motor
- no encoder interface in the KEB COMBIVERT
- automatic measuring function for equivalent circuit data
- mass moment of inertia-dependent default setting of the speed controller

Software restriction:

- no standstill position controller
- no fast setpoint setting, neither speed nor torque

2. Activation of the encoderless operation

Danger  The modulation must not been enabled during the settings!(Control release must be open!)

To activate the encoderless operation the following settings are necessary:

control type(Ud02)

The parameter Ud02 adjusts the "control type".For SCL-mode it must be set >=8.

Ud02: Control type	
Value	control type
0	G6P-G / 400 Hz
1...7	reserved
8	G6P-S / 4000 min^{-1}
9	G6P-S / 8000 min^{-1}
10	G6P-S / 16000 min^{-1}
11	G6P-S / 32000 min^{-1}

Load factory settings with Fr01

With input of value -4 all parameters (except the Security-Parameters) will be set to default.

Following Parameters belong to the Security-Parameters and will not be set to default while loading factory settings with Fr01:

Sy02, Sy03, Sy06, Sy11
ru40, ru41
Ud01, Ud02, Ud06
Fr01
In10...In16, In24...In30

speed control configuration (cS00)

Set control mode to value 4 „speed control“.

Actual source (cS01)

The actual source musst be set to value 2 „calculatedt".

Input of the motor rating plate data

- dr23 DSM rated current
- dr24 DSM rated speed
- dr25 DSM rated frequency
- dr26 DSM EMF voltage constant [Vpk x 1000rpm] *
- dr27 DSM rated torque
- dr28 DSM current for zero speed
- dr30 DSM stator resistance *
- dr31 DSM inductance *

* Parameter dr26 must be programme as peak value of the phase-phase voltage UUV. Parameters dr30 and dr31 must be entered as phase-phase value (R_{UV}, L_{UV}). The equivalent circuit data musst be entered according to the motor data sheet or identificated automatically.

Calculation of motor-dependent data

Set Fr10 to value 1 or 2 to load motor dependent parameters.

The value of following parameters will be changed by triggering Fr10 "load motor dependent parameters".:

cS19
dr33, dr58
dS00, dS01, dS13, dS33
nn01, nn10
Pn61, Pn67

Info After calculating the motor dependent data, the parameters above should be alligned.

Initial setting speed controller

A small KI value is recommended for the initial adjustment of the speed controller, since the drive for the identification must be adjusted non-dynamic but smooth and uncritical.

Set specific data

- set value 1 in dS02 current decoupling.
- set value 0 in uF15 hardware current limitation mode.
- set value 3 "auto ident" in uF18 deadtime comp. mode.
- set max. torque in dr33 (else 5 x dr27 rated torque).

Motor identifikation (dr48)

Inverter must be in status „LS“ (ru00 = LS) and enter dr48 = 8, in order to identify the equivalent circuit data of the motor automatically. The brake control must be activated in Parameter Pn34.

Info For this point the control release must be given. Chapter "Identification of motor data" must read before.

The following adjustments must be done after successful identification:

- Optimisation of the current controller (dS00, dS01, dS05 and dS06)
- - optimization of the speed controller
- - application-specific adaptions

Attention Special adjustments, which shall not be described here, must be made for the operation with special motors or Hf motors. Please contact KEB for this case.

3. Identification of the motor data

3.1 General

The required equivalent circuit data for the motor model can be determined by the KEB COMBIVERT itself.

Measurement of the motor data is generally started from status "Low Speed". Parameter dr48 cannot be written in other operating conditions. The measured values can be invalid in case of strong overdimensioning of the inverter. The rated current of the motor should be at least 1/3 of the maximum short time current limit (= In18 = hardware current).

Caution  The direction of rotation during identification of the main inductance is always "forward"!

Value 82 „calculate drive data“ is output in inverter state ru00 during the measurement.

After completion of the measurement ru00 = 127 „drive data completely calculated is displayed.

If the measurement is interrupted with an error, ru00 = 60 "Error! drive data" is displayed.

The control release must be switched off in order to leave the identification mode.

During measuring the respective motor data and the dead time characteristic are overwritten with the measured values. These values can be changed during running identification. The defined motor data are adjusted in the corresponding parameters after successful conclusion.

Some adjustments can be incomplete or incorrect if the identification is interrupted e.g. by switching off the control release or by error release. In this case the identification must be executed again.

If the inverter internal brake handling is used in the application, then it must be deactivated for the identification. For safety reasons the output signal "brake release" is not set during measurement, since the motor cannot generate a defined torque in this time.

Stator resistance, rotor resistance and leakage inductance can be measured also at engaged brake.

The drive must be decoupled from the load for identification of the main inductance and the output switching condition, which is assigned to the brake control must be set to value 1 (= always active). Thus the brake is permanently released.

Overview dr48: motor identification

dr48: motor identification			
Bit	Description	Value	Function
0...4	Measurement	0: off	
		1: calc head-ind. Lh / EMF*	Calculation of the EMF from motor data
		2: winding inductance*	Measurement of the winding inductiance
		3: stator resistance Rs*	Measurement of the stator resistance
		5: init model/curr.reg.*	Calculation of the current controller from equivalent circuit data
		6: EMF move!*	ATTENTION: requires motor rotation! EMF measurement
		7: EMF !without move	Start of the automatic measurement without EMF
		8: complete AutoIdentification !with rotation!	ATTENTION: requires motor rotation! Start of the automatic measurement with EMF
		9: reserved	Measurement of dead time compensation characteristics for different switching frequencies
		10: Dead time detection 4kHz *	
		11: Dead time detection 8kHz *	
		12: reserved	
		13: reserved	
		14: reserved	
		15: Torque detection 4 kHz	Detection of the no-load torque at different switching frequencies. During operation this torque is subtracted from torque display ru12.
		16: Torque detection 8 kHz	
		17: reserved	
		18: reserved	
		19: Current offset detection	Detection of the current offset in phase U and V
		20: Voltage pulse	Energizes the motor with 4 pulses
		21: EMF (SM) P-Balance with rotation	As value 6, unless the magnetizing current is not static but it is calculated adaptively
		22: autoident w.m. f. adpt. !with rotation!	As value 8, unless the magnetizing current is not static but it is calculated adaptively.

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dr48: motor identification			
Bit	Descrip-tion	Value	Function
5...7	Frequen-cy	0: 1000 Hz	The measuring frequency is changed independently during measurement. Therefore, leave the value at 0: keep 1000 Hz!
		32: 500 Hz	
		64: 250 Hz	
		96: 125 Hz	
		128: 62.5 Hz	
		160: 31.25 Hz	
		192: 15.625 Hz	
		224: 7.8125 Hz	

* at dr48 = 8 auto identification

3.2 Automatic mode

Since the identification in the automatic mode is very reliably and for the user the simplest method it is recommended to use it generally.

Measurement of the dead time compensation characteristics, as well as the stator- and rotor resistance and the leakage inductance is done in standstill. A small rotation of the motor caused by the test signals is possible.

It is necessary for the identification of the main inductance, that the motor accelerates to the speed for maximum torque (dr39) and then it operates in no-load operation.

There is a special ramp ‚Lh identification ramp time‘ (dr49) for identification.

This ramp applies for acceleration on dr39 and deceleration at the end of the identification.

The reference value for dr49 is:

1000 rpm in Mode 4000 (Ud02 = 8)

2000 rpm in Mode 8000 (Ud02 = 9)

4000 rpm in Mode 16000 (Ud02 = 10)

8000 rpm in Mode 32000 (Ud02 = 11)

A small Ki value is recommended for parameter setting of the speed controller. The drive may not vibrate during the identification..

Info The identification can take some minutes depending on the respective motor!

Attention After motor identification the parameters which where changed with Fr10 should be optimized (see chapter 2) Nach der Motoridentifikation sollten die mit Fr10 geänderten Parameter optimiert werden (siehe Kapitel 2).

Attention Auto identification cannot be executed if a sine-wave filter is connected!

3.3 Single identification

Single identifications should not be used for the first measurement of the motor adaption, since invalid measuring results can occur in case of a wrong identification sequence or omitting of individual points.

Single identification can always be used if a complete automatic measurement was executed and only individual parameters shall be identified. For example this can be a resistance measurement at rated-load operating temperature.

Default setting of the current controller parameters and EMF (dr48 = 1)

The EMF can be approximately calculated from the entered motor data like rated current and rated torque. dr48 = 1 „calculation of the EMF“ must be written for it.

$$EMC = \frac{M_n \times 90}{I_n}$$

The current controller values are also roughly preset.

Leakage inductance measurement (dr48 = 2)

Measurement of dr31 „winding inductance" occurs with a high-frequency AC current in standstill. The measurement is started with dr48 = 2. Measurement current is DSM rated current dr23. The frequency of the measuring signal is adjustable via bit 5...7 in parameter dr48. If the measurement current cannot be reached with 1kHz, then the identification reduces the measuring frequency automatically. Therefore the frequency value should not be changed. The inductance value is automatically written in dr31 after identification.

Stator resistance (dr48 = 3)

The measurement of the resistance occurs with DC current in the phase U to V. The measurement is started with dr48 = 3. The resistance value is entered in dr30 at successful identification.

Controller parameter (dr48 = 5)

The current controller parameters are calculated from the pre-identified equivalent circuit data with the adjustment of dr48 = 5. Is not identifed in the automatic mode if this calculation should occur before the identification of the EMC.

EMF with rotation (dr48 = 6)

The drive accelerates upto 60% of its rated speed for the identification of the EMF. The ramp of dr49 (ident. acc/dec time) is used for the acceleration. The general speed limits of the oP parameters are valid! This measurement is only possible if the EMF adaptation is activated in parameter nn00 (motor model adjustment) (default setting!)

If the identification is successful executed the value is written in dr26 (DSM EMF peak value) and additionally in dr63 (DSM EMF HR).

Parameter dr63 has a higher resolution and is suitable for applications with high frequencies.

Dead time detection (dr48 = 10, 11)

The deadtime detection works only as single identification if the stator resistance is correct entered/identified. The measured deadtime values can be read out via In39 „deadtime selector“ and In40 „deadtime.

The measured deadtime compensation characteristics are effective during operation, if uF18 "deadtime comp. mode" is adjusted to value 3: "automatic". The characteristics are not cleared by Fr01 „load default set“.

Torque detection (dr48 = 15, 16)

This should be executed only if the application really requires increased torque accuracy. The displayed residual torque in ru12 (actual torque) is subtracted during operation, so that the real shaft torque is displayed. This residual torque is partly caused by switching frequency-dependent losses in the inverter and also by means of friction losses. The torque offset of the complete drive for the different switching frequencies is measured by dr48 = 15, 16. Thereby the drive accelerates in 16 steps with the adjusted ramp in dr49 to maximum 1.3-fold synchronous speed. The general speed limits from the oP parameters are effective. The measured residual torque is stored and interpolated as correction characteristic. The torque offset characteristic can be read out with parameters dr58 „torque offset selector“ and dr59 „torque offset“.

The characteristics are cleared by Fr01 „load default“ with value -4 and also with Fr10 „load mot.dependent para.“.

Current offset detection (dr48 = 19)

The current offset is caused by tolerances of the components in the test circuit and as standard automatically synchronized in non-energized state (inverter state "noP"). Caused by current-dependent tolerances in the current detection it is necessary for some applications that the synchronization is done in energized state. For this adjust 19 in parameter dr48 thereby a high-frequency AC current is output by the inverter. The rated current of the motor is injected with a starting frequency of 1kHz. The frequency is automatically reduced if this is not possible.

Furthermore the automatic measurement is deactivated when the modulation is switched off, so the identified offset remains permanently.

Voltage pulse (dr48 = 20)

A preset voltage step by dr31 energizes the motor with 4 pulses with this function. A step response can be recorded with the COMBIVIS scope. The appropriate resonances can be identified from this step response.

EMF (SM) / autoidentification w.m. f. adpt.! (dr48 = 21, 22)

Values 21 and 22 should only be used from a motor size of about 11 kW. Values 21 and 22 are used for the optimisation of the magnetization current for the entered rated motor data.

Deadtime compensation (uF18)

The drive has also measured the dead time compensation characteristic during automatic identification. The calibrated characteristic must be activated for the control with motor model by the setting "dead time compensation mode" (uF18) = 3: „automatic“. Alternatively also value 2 can be selected.

uF18: dead time compensation mode		
Bit	Value	Function
0...1	0: off	Deactivates the dead time compensation
	1: reserved	
	2: e-function	Only required for special applications
	3: automatically	Activation of the identified characteristic. Shall always be used at control of synchronous motors with motor model

The dead time compensation can be switched off via a digital input. The digital input is selected with parameter uF21. This disconnection is only required for special applications with high frequency.

4. Adjustment of the speed controller

4.1 Default setting of the speed controller

The KP cS06 and KI cS09 of the speed controller can be preset by the inverter. For this the mass moment of inertia of the complete system (motor + rigidly coupled load) must be entered in cS25 „inertia“.

Parameter Fr10 „load motor dep. parameter“ = 1 or 2 must be entered once after input of the motor data. Dependent on the adjusted rated power dr23 the mass-moment of inertia was pre-charged for a standard synchronous motor in cS25. The value of cS25 has the right dimension for 50Hz standard motors, because at some applications the ratio of the load inertia is in a range of 0.5...2 x motor inertia.

Better results can be realized if the total moment of inertia is exactly preset. If the value is unknown it can be determined as described in chapter "Determination of the mass moment of inertia".

Parameter cS26 „optimisation" determines the control characteristic which should be achieved by the calculated parameters.

The precharging of the speed controller parameters can be deactivated with setting of value "19 = off" in cS26. The speed control parameters are overwritten when the value for cS26 is changed.

Parameters for a dynamic, hard speed controller adjustment are calculated with cS26 = 20. Interference factors, such as torsion or tolerance of the load coupling can intensify vibrations, so that a higher value must be entered in cS26.

Parameters for a soft and slow speed controller adjustment are calculated with cS26 = 150. Which value between 20 and 150 is most suitable for the application is depending on the oscillation-grade of the total system.

4.2 Determination of the mass moment of inertia

If the moment of inertia of the system is unknown, it is possible to determine it with an acceleration test.

For this the system must be accelerated with defined, constant torque. It must be guaranteed that no significant and acceleration-independent load torque occurs by the application.

The following formula is valid:

$$J_L = M * \frac{\Delta t}{\Delta n}$$

$$cS25\ [kg*cm^2] = M\ [Nm] * \frac{\Delta\ t\ [s]}{\Delta\ n\ [min^{-1}]} * 95493$$

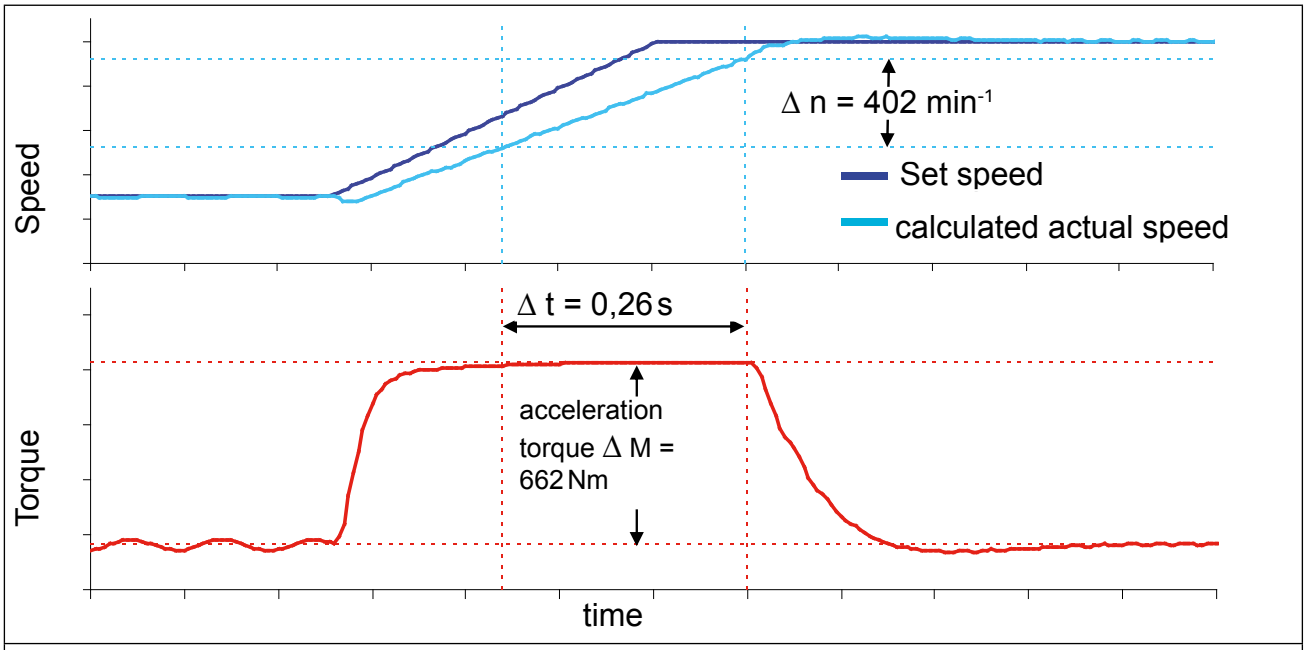

Figure 1: Extending the determination of the mass moment of inertia

$$J = 662\ Nm * \frac{0{,}26\ s}{402\ rpm} * 95493 = 40886\ kg*cm^2$$

In order to eliminate the effect of friction from the calculation, you can determine the mass moment of inertia a second time in similar manner, however by deceleration test. The average value of both inertia, determined at ramp-up or deceleration must be entered in parameter cS25 „inertia (kg cm^2)“.

5. Operation

5.1 Start

It must be secured that the rotor is in a defined position after switching on of the control release ST. Therefore a DC current is injected at standstill. Then the rotor rotates into its origin position.

The standstill current is ½ of the rated current and can be adapted in parameter nn10 in default setting after operation of Fr10. The times (Pn35 and Pn36) of the brake handling are active for standstill operation. In order that the rotor does not vibrate after setting the control release, the current reaches the setpoint value in a half of the time adjusted in Pn35 "premagenetising time“ (see figure „Standstill and starting phase"). The half current-dependent load torque is acceptable as mechanical load (e.g. 0.25 of the rated torque at 0.5 of rated current at standstill).

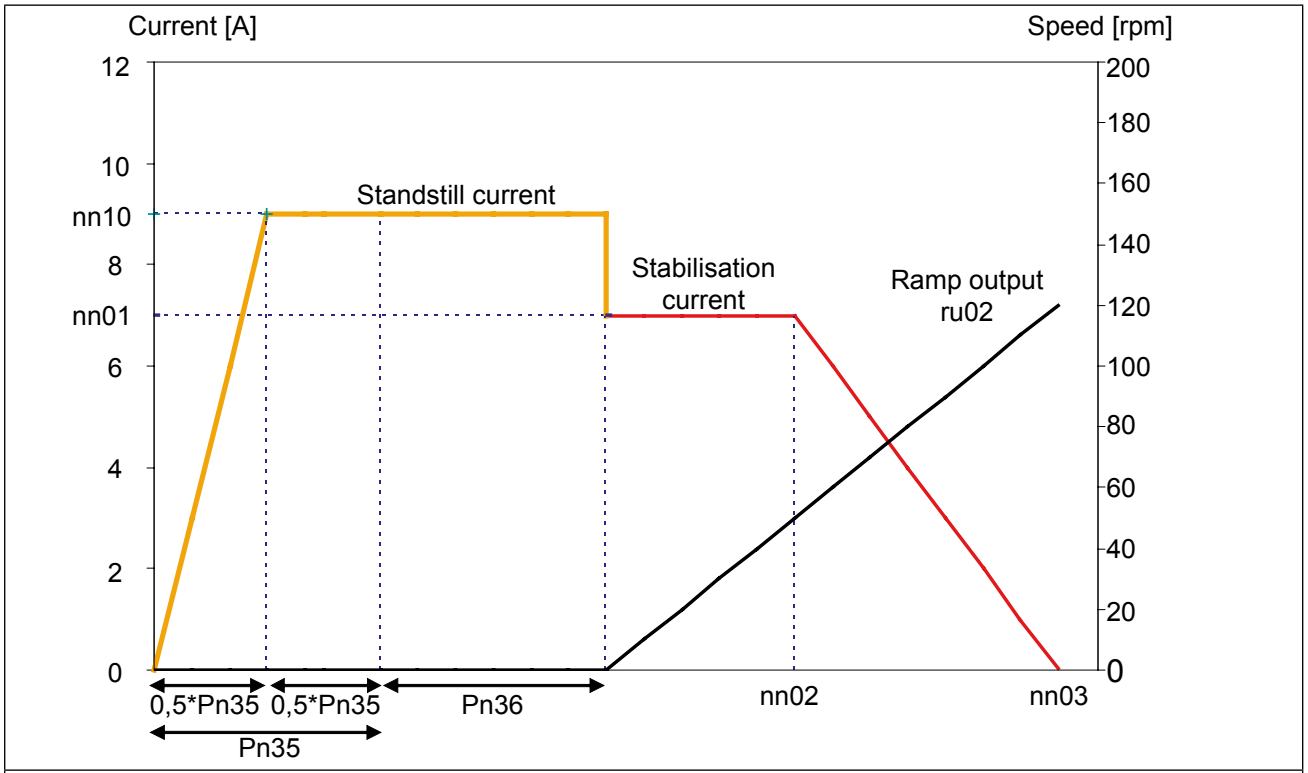

Figure 1: Standstill and starting phase

Following parameters msut be defined:

- nn01 „stabilisation current“
- nn02 „min speed for current“
- nn03 „max speed for current“
- nn10 „standstill current“

5.1.1 Additional start ramp

In order to leave the critical range of small speed at starting and stopping there is an additional ramp for this range.

The ramp is defined by parameter nn08 "startup speed" which indicates the speed range and parameter nn09 „startup time" which indicates the appropriate acceleration-/ deceleration time .

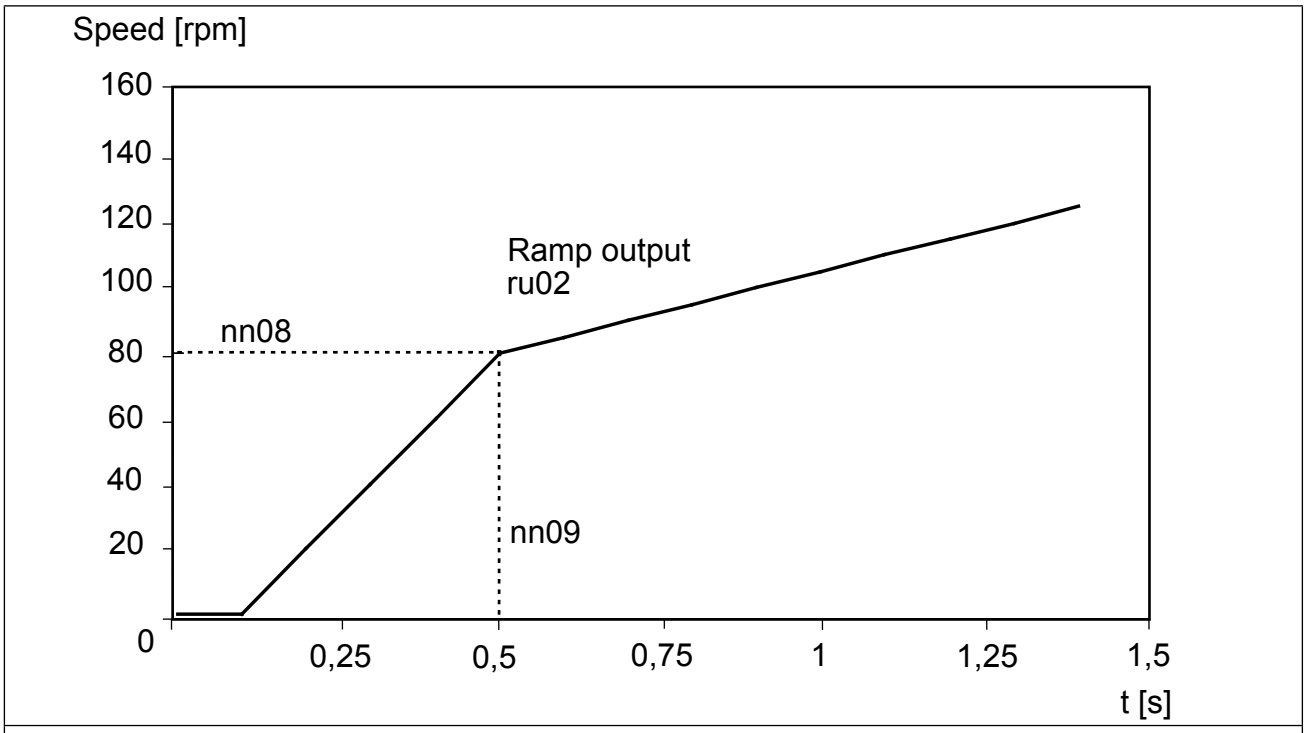

Figure 2: Additional start ramp

Info

In order to leave the lower speed range during starting as fast as possible, a ramp with the parameters nn08 "starting speed" and nn09 "starting time" is installed. which has priority against the ramp generator in the OP parameters.This ramp has priority against the ramp generator in the OP parameters

5.1.2 Start with speed search

If the motor rotates when the modulation is switched on (e.g. "coast down" after malfunction), the actual speed can be determined with the speed search function (SSF). . Next the drive accelerates to the adjusted setpoint speed.

Activation of the speed search

The speed search function can be activated with parameter Pn26. The brake control of Pn34 don´t have to be deactivated.

Pn26: Speed search condition		
Bit	Value	Explanation
0	0: AutoReset	Speed search after auto reset
	1: Speed search after noP	Speed search after status "no control release"
1	2: Speed search after power-on-reset	Speed search after power on
2	4: Speed search after reset	Speed search after execution of a reset
3	8: Speed search after auto reset	Speed search after automatic restart
4	16: Speed search after LS	Speed search after status "standstill (modulation off)"

Attention  It´s not possible to use a sine-wave-filter for speed search. The sine-wave-filter distorts the results.

6. Model-specific parameters

The motor model calculates an estimated speed from the motor data and the actual values of voltage and current. Then this speed is admitted to the speed controller. The calculated model currents can be used also for current control.

nn00: motor model select			
Bit	Description	Value	Explanation
0	Standstill current and stabilisation current	0: off	Activation of nn01 and nn10
		1: On *	
1	Model stabilisation	0: off	Stabilizes the motor model
		2: On *	
2	Stator resistance/ adaption	0: off	Adapts the stator resistance at low speed
		4: On *	
3	Speed source	0: reserved	
		8: Model *	Speed control with spreed estimation
4	High-speed model	0: off	Activates the high-speed model for upper speed
		16: On *	
5	Observer/ motor model	0: off	Becomes noticeable at high speeds
		32: On *	
6	Current control with	0: measured currents*	Current control to model currents
		64: calculated currents	
7	EMF adaption	0: off	Adapts the EMC at upper speed
		128: On *	
8	reserved	0: reserved	
		256: reserved	
9	Controlled operation	0: Off *	Switching off the model during start ramp
		512: an	
10	reserved	0: reserved	
		1024: reserved	
11	Deviation controller	0: Off *	Deviation of model currents to measured currents
		2048: an	
12	reserved	0: reserved	
		4096: reserved	
13	reserved	0: reserved	
		8192: reserved	
14	reserved	0: reserved	
		16348: reserved	

Stabilisation and standstill current (nn01, nn10)

The currents nn01 „stabilisation current“ and nn10 „standstill current“ can be switched off with bit 0 of nn00. The starting phase with activated currents runs more steady so that this adjustment should not be changed! If the rated motor current is higher than the rated inverter current the values are limited (after loading Fr10) to half of the HSR current In18..

Stator resistance/ adaption

The stator resistance changing by temperature influences can affect the behavior at low speed as well as the start. The RS adaptation adjusts the stator resistance and stabilizes the motor model therefore. The I-part of the adaptation can be adjusted with nn06 „rs adaption factor“. The rs adaption becomes active at ru17 „active current“ > nn01.

EMF adaption

The EMF changing by load and temperature influences is adjusted at higher speed . The adaption becomes active at actual speed ru07 > fourth of the rated speed dr24 and improves the accuracy of the actual torque display ru12.

Observer

The observer amplifies the influence of the measured currents in the model. The most effects become noticeable in the upper speed range. The value must be increased if current oscillations occur at e.g. applications with high frequency. The observer factor can be adjusted with nn07 "observer factor".

Speed estimation

The speed estimate controller is calculated by writing on Fr10 and cannot be changed. The speed estimate controller estimates a speed from the currents of the motor model. Parameter nn04 „time speed calculation" determines the scan time of the speed estimate controller. This time should not be changed.

7. Programming example

The start-up steps and the application of SCL are described in the following programming example.

Start-up steps G6P-S on a synchronous motor

- G6P-S parameter configuration with Ud02 = 8 activated.
- Load factory settings with Fr01 = -4 (load default value).
- Speed control configuration cS00 = 4 activated
- Actual source cS01 = 2 activated
- Enter motor data (dr23...dr28).
  An approximate value for EMC can be calculated with dr48 = 4, if the EMC is unknown
- Auto identification with dr48 = 8 execute.
- Optimisation of the current controller (dS00, dS01, dS05 and dS06)
- switch on dead time compensation uF18 = 3
- activate adaption to the motor with Fr10 = 1 or 2
- determine and preset mass moment of inertia if necessary. Activate Fr10 = 1 or 2 again
- determine no-load characteristic and identify EMC if necessary. Activate Fr10 = 1 or 2 again
- Adaption of the remaining parameters to the application
- Test run for a check of the adjustment and wiring

7.1 Used parameters

Parameter	Address	Min. value	Max. value	Default	Step	Unit
cS00	2F00h	4	6	4	1	---
cS01	2F01h	0	6	2	1	---
cS06	2F06h	0	32767	50	1	---
cS09	2F09h	0	32767	100	1	---
cS25	2F19h	0	10737418,23	0	0,01	---
cS26	2F1Ah	19	150	19	1	---
dr23	2617h	0	1500	LTK	0,1	A
dr24	2618h	1	64000	LTK	1	rpm
dr25	2619h	0	16000	LTK	0,1	Hz
dr26	261Ah	0	32000	LTK	1	---
dr27	261Bh	0,1	6553,5	LTK	0,1	Nm
dr28	261Ch	0	1490	LTK	0,1	A
dr30	261Eh	0	250	LTK	0,001	Ohm

further on next side

Parameter	Address	Min. value	Max. value	Default	Step	Unit
dr31	261Fh	0,01	500,00	LTK	0,01	mH
dr33	2621h	0,1	6553,5	LTK	0,1	Nm
dr39	2627h	0	64000	32000	1	rpm
dr48	2630h	0	255	0	1	---
dr49	2631h	0	300	5	0,01	s
dr50	2632h	100	500	150	1	%
dr58	263Ah	0	79	0	1	---
dr59	263Bh	-320	320	0,00	0,01	Nm
dS02	3102h	0	4	0	1	---
Fr01	2901h	-4	7	0	1	---
Fr10	290Ah	0	2	0	1	---
In18	2E12h	LTK	LTK	LTK	0,1	A
nn00	3400h	0	32767	191	1	---
nn01	3401h	0	1500,0	0	0,1	A
nn02	3402h	0	32000	0	1	rpm
nn03	3403h	0	32000	0	1	rpm
nn08	3408h	0	4000	0	0,125	rpm
nn09	3409h	0	300	5	0,01	s
nn10	340Bh	0	1500	0	0,1	A
Pn34	2422h	0	8	2	1	---
Pn35	2423h	0	100	1	0,01	s
Pn36	2424h	0	100	0,25	0,01	s
ru00	2200h	0	255	0	1	---
Ud02	2802h	0	11	8	1	---
uF15	250Fh	0	2	1	1	---
uF18	2510h	0	3	0	1	---

*LTK = power circuit-dependent

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