Compact Operating Manual Issue 04/04

sinamics

G110

SIEMENS

SINAMICS G110

Warnings, Cautions and Notes

The following Warnings, Cautions and Notes are provided for your safety and as a means of preventing damage to the product or components in the machines connected.

Specific Warnings, Cautions and Notes that apply to particular activities are listed at the beginning of the relevant chapters and are repeated or supplemented at critical points throughout these chapters.

Please read the information carefully, since it is provided for your personal safety and will also help prolong the service life of your SINAMICS G110 Inverter and the equipment you connect to it.

WARNING

- This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts. Non-compliance with Warnings or failure to follow the instructions contained in this manual can result in loss of life, severe personal injury or serious damage to property.
- Only suitable qualified personnel should work on this equipment, and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this manual. The successful and safe operation of this equipment is dependent upon its proper handling, installation, operation and maintenance.
- The DC link of all SINAMICS G110 modules remains at a hazardous voltage level for 5 minutes after all voltages have been disconnected. Therefore always wait for 5 minutes after disconnecting the inverter from the power supply before carrying out work on any modules. The drive unit discharges itself during this time.
- The mains input, DC and motor terminals carry dangerous voltages even if the inverter is inoperative, wait 5 minutes to allow the unit to discharge after switching off before carrying out any installation work.
- Motor parameters must be accurately configured for motor overload protection to operate correctly above 5 Hz.

NOTES

- This equipment is capable of providing internal motor overload protection in accordance with UL508C section 42 (refer to P0610 and P0335). I^2t monitoring is ON by default.
  Motor overload protection can also be provided using an external PTC via a digital input.
- This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 230 V when protected by an H or K type fuse, a circuit breaker or self-protected combination motor controller.
- Use Class 1 75 °C copper wire only with the cross-sections as specified in the Operating Instructions.
- The maximum permissible ambient temperature is, depending on the equipment, 40 °C or 50 °C (refer to Section 2.1).
- Before installing and commissioning, please read these safety instructions and warnings carefully and all the warning labels attached to the equipment.
- Make sure that the warning labels are kept in a legible condition and replace missing or damaged labels.

Contents

1 Installation

1.1 Clearance distances for mounting

The inverters can be mounted adjacent to each other. If they are mounted on top of each other, however, a clearance of 100 mm has to be observed.

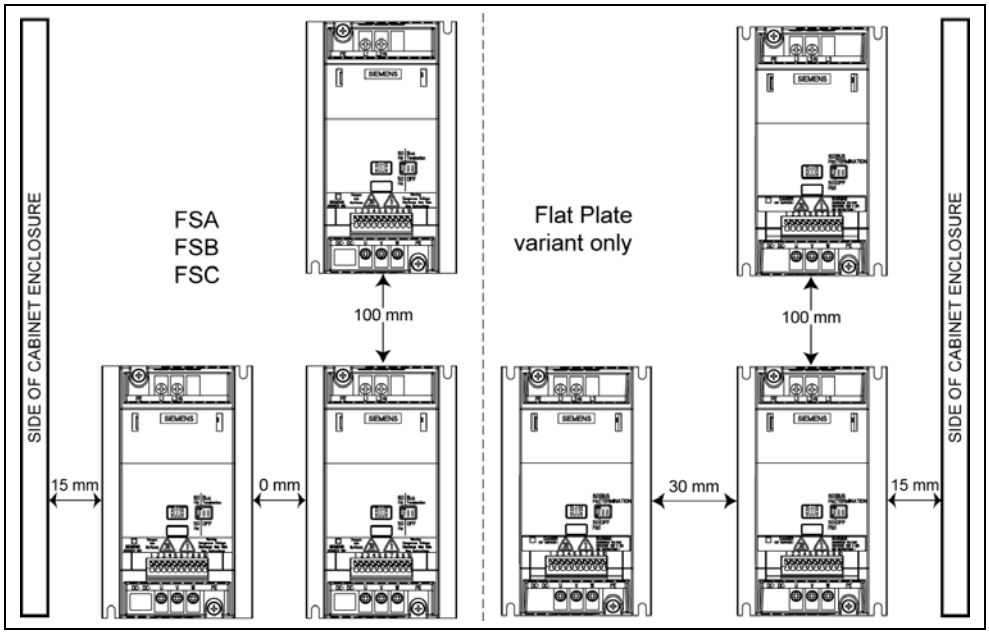
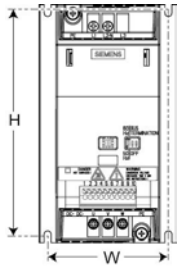


Fig. 1-1 Clearance distances for mounting

1.2 Mounting dimensions



Frame Size	Drilling Dimensions H mm (Inch)	Drilling Dimensions W mm (Inch)	Tightening Torque Bolts	Tightening Torque Nm (ibf.in)
A	140 (5.51)	79 (3.11)	2xM4	2,5 (22.12)
B	135 (5.31)	127 (5.00)	4xM4	
C	140 (5.51)	170 (6.70)	4xM5	4,0 (35.40)

Fig. 1-2 Mounting dimensions

2 Electrical Installation

2.1 Technical specifications

1 AC 200 - 240 V ± 10 %, 47 - 63 Hz

Order No. 6SL3211-		0AB	11-2xy0*	12-5xy0*	13xy0*	15xy0*	17xy0*	21-1xy0*	21-5xy0*	22-2xy0*	23-0xy0*
		0KB	11-2xy0*	12-5xy0*	13xy0*	15xy0*	17xy0*	-	-	-	-
Frame Size			A					B		C	
Inverter Output Rating	kW		0,12	0,25	0,37	0,55	0,75	1,1	1,5	2,2	3,0
	hp		0,16	0,33	0,5	0,75	1,0	1,5	2,0	3,0	4,0
Output Current (perm. ambient temp.)	A		0.9 (50 °C)	1.7 (50 °C)	2.3 (50 °C)	3.2 (50 °C)	3.9 (40 °C)	6.0 (50 °C)	7.8 (40 °C)	11.0 (50 °C)	13.6 (40 °C)
Input Current (230 V)	A		2.3	4.5	6.2	7.7	10.0	14.7	19.7	27.2	32.0
Recommended Fuse	A		10	10	10	10	16	20	25	35	50
	3NA		3803	3803	3803	3803	3805	3807	3810	3814	3820
Input Cable	mm^2		1,0 - 2,5	1,0 - 2,5	1,0 - 2,5	1,0 - 2,5	1,5 - 2,5	2,5 - 6,0	2,5 - 6,0	4,0 - 10	6,0 - 10
	AWG		16 - 12	16 - 12	16 - 12	16 - 12	14 - 12	12 - 10	12 - 10	11 - 8	10 - 8
Output Cable	mm^2		1,0 - 2,5	1,0 - 2,5	1,0 - 2,5	1,0 - 2,5	1,0 - 2,5	1,5 - 6,0	1,5 - 6,0	2,5 - 10	2,5 - 10
	AWG		16 - 12	16 - 12	16 - 12	16 - 12	16 - 12	14 - 10	14 - 10	12 - 8	12 - 8
Tightening Torque	Nm (lbf.in)		0.96 (8.50)					1.50 (13.30)		2.25 (19.91)	

*→ the last digit of the Order No. depends on hardware and software changes

x = B → with integrated filter
x = U → without filter

y = A → analog version
y = B → USS version

2.2 Power terminals

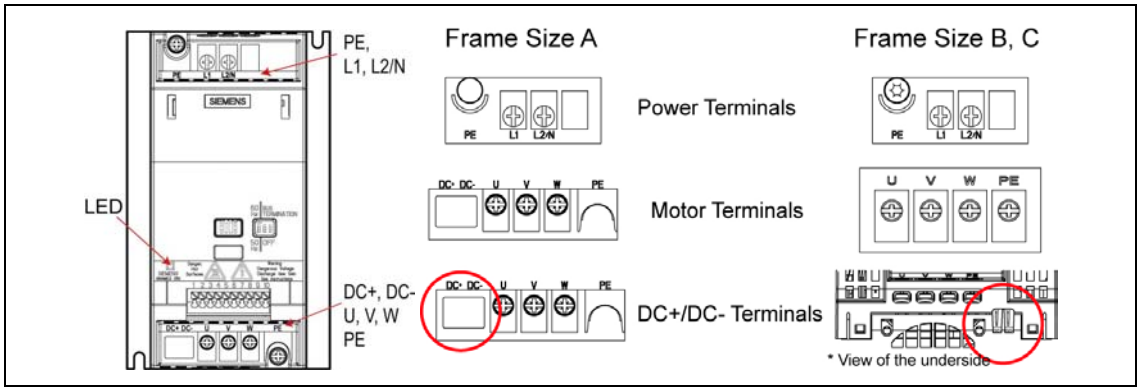


Fig. 2-1 Power Terminals

2.3 Control terminals

Term.	Designation	Function	
1	DOUT-	Digital output (-)	
2	DOUT+	Digital output (+)	
3	DIN0	Digital input 0	
4	DIN1	Digital input 1	
5	DIN2	Digital input 2	
6	-	Isolated output +24 V / 50 mA	
7	-	Output 0 V	
Variant		**Analog**	**USS**
8	-	Output +10 V	RS485 P+
9	ADC	Analog input	RS485 N-
10	-	Output 0 V	

2.4 Block diagram

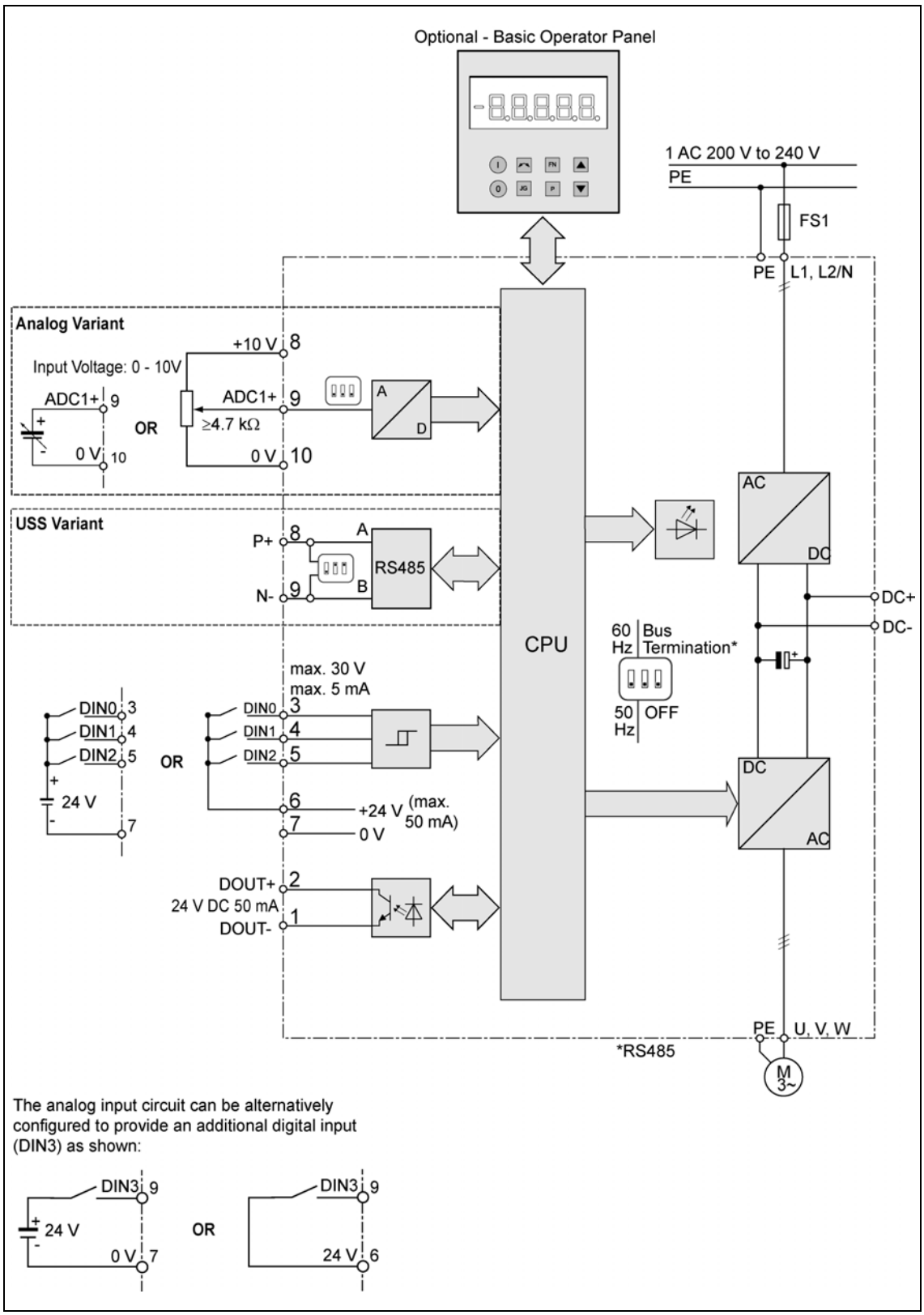


Fig. 2-2 Inverter block diagram

3 Factory setting

The SINAMICS G110 frequency inverter is set in the factory so that it can be operated without any additional parameterization. To do this, the motor parameters set in the factory (P0304, P0305, P0307, P0310), that correspond to a 4-pole 1LA7 Siemens motor, must match the rated data of the connected motor (refer to the rating plate).

Further factory setting

Command sources	P0700 see Section 3.1/3.2
Setpoint source	P1000 see Section 3.1/3.2
Motor cooling	P0335 = 0 (self-cooled)
Motor current limit	P0640 = 150%
Min. frequency	P1080 = 0 Hz
Max. frequency	P1082 = 50 Hz
Ramp-up time	P1120 = 10 s
Ramp-down time	P1121 = 10 s
Control mode V/f	P1300 = 0 (V/f with linear characteristic)

3.1 Specific factory settings for the analog version

Digital input	Terminals	Parameter	Function	Active
Command source	3, 4, 5	P0700 = 2	Digital input	Yes
Setpoint source	9	P1000 = 2	Analog input	Yes
Digital input 0	3	P0701 = 1	ON / OFF1 (I/O)	Yes
Digital input 1	4	P0702 = 12	Reverse (↶↷)	Yes
Digital input 2	5	P0703 = 9	Fault reset (Ack)	Yes

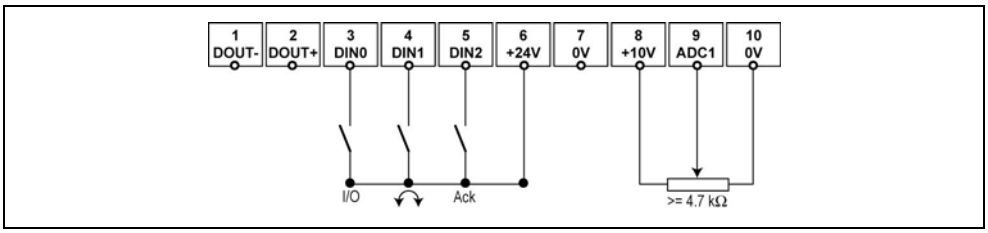


Fig. 3-1 Connections, analog version

3.2 Specific factory settings for the USS version

Inputs	Terminals	Parameter	Function
Command source	8, 9	P0700 = 5	Via the USS protocol
Setpoint source		P1000 = 5	Frequency input via the USS protocol
USS address		P2011 = 0	USS address = 0
USS baud rate		P2010 = 6	USS baud rate = 9600 bps
USS-PZD length		P2012 = 2	Two 16-bit words are in the PZD section of the USS telegram.

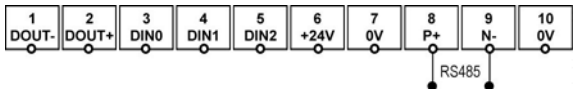


Fig. 3-2 Connections, USS version

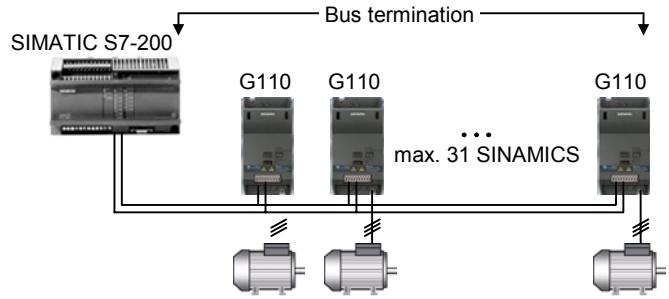


Fig. 3-3 Example, USS bus

3.3 DIP switches

The default motor base frequency of the SINAMICS G110 inverter is 50 Hz. For motors, which are designed for a base frequency of 60 Hz, the inverters can be set to this frequency via a DIP switch.

Bus termination on USS variant

It is necessary to terminate the last inverter on the network bus. This is achieved by setting the Bus Termination DIP switches (DIP switches 2 and 3) on the front of the inverter to the 'Bus Termination' position (ON position). A common 0 V reference (terminal 10) is required between all devices on the USS bus.

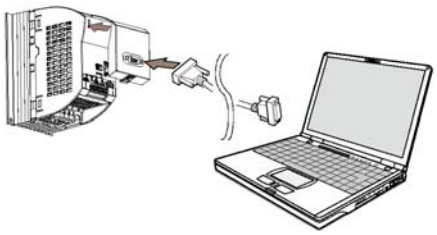
Fig. 3-4 Motor Base Frequency DIP Switch and Bus Termination

4 Communications

4.1 Establishing communications SINAMICS G110 ⇔ STARTER

The following optional components are additionally required in order to establish communications between STARTER and SINAMICS G110:

- PC <-> frequency inverter connecting set
- BOP, sofern die USS-Standardwerte im Umrichter SINAMICS G110 geändert werden sollen.

PC <-> SINAMICS G110 connecting set	SINAMICS G110
	USS settings, refer to Section 6.2.1, Page 15.
	STARTER
	Menu, Options --> Set PG/PC interface --> Select "PC COM-Port (USS)" --> Properties --> Interface "COM1", select a baud rate
	NOTE The USS parameter settings in the SINAMICS G110 frequency inverter and the settings in STARTER must match!

5 BOP (Option)

5.1 Buttons and their Functions

Panel/ Button	Function	Effects
r0000	Indicates Status	The LCD displays the settings currently used by the converter.
I	Start converter	Pressing the button starts the converter. This button is disabled by default. **Activate the button: P0700 = 1 or P0719 = 10 ... 15**
O	Stop converter	OFF1 Pressing the button causes the motor to come to a standstill at the selected ramp down rate. This button is disabled by default. **Activate the button: P0700 = 1 or P0719 = 10 ... 15** OFF2 Pressing the button twice (or once long) causes the motor to coast to a standstill. **This function is always enabled.**
	Change direction	Press this button to change the direction of rotation of the motor. Reverse is indicated by a minus (-) sign or a flashing decimal point. Disabled by default. **Activate the button: P0700 = 1 or P0719 = 10 ... 15.**
JOG	Jog motor	In the "Ready to power-on" state, when this key is pressed, the motor starts and rotates with the pre-set jog frequency. The motor stops when the button is released. Pressing this button when the motor is running has no effect.
Fn	Functions	This button can be used to view additional information. It works by pressing and holding the button. It shows the following, starting from any parameter during operation: 1. DC link voltage (indicated by d – units V) 2. output frequency (Hz) 3. output voltage (indicated by o – units V). 4. The value selected in P0005 (If P0005 is set to show any of the above (1 - 3) then this will not be shown again). Additional presses will toggle around the above displays. **Jump Function** From any parameter (rxxxx or Pxxxx) a short press of the Fn button will immediately jump to r0000, you can then change another parameter, if required. Upon returning to r0000, pressing the Fn button will return you to your starting point. **Acknowledgement** If alarm and fault messages are present, then these can be acknowledged by pressing key Fn.
P	Access parameters	Pressing this button allows access to the parameters.
▲	Increase value	Pressing this button increases the displayed value.
▼	Decrease value	Pressing this button decreases the displayed value.

5.2 Changing parameters using as an example P0003 "Access level"

Step		Result on display
1	Press P to access parameters	r0000
2	Press ▲ until P0003 is displayed	P0003
3	Press P to access the parameter value level	1
4	Press ▲ or ▼ to the required value (example: 3)	3
5	Press P to confirm and store the value	P0003
6	Now access level 3 is set and all level 1 to level 3 parameters are visible to the user.	

5.3 Cloning parameters with the BOP

A single parameter set can be uploaded from an inverter SINAMICS G110 and then downloaded into another SINAMICS G110 inverter. To clone a parameter set from one inverter to another, the following procedure should be performed:

Upload (SINAMICS G110 → BOP)

1. Connect the BOP to the inverter SINAMICS G110 whose parameters you wish to copy.
2. Ensure that it is safe to stop the inverter.
3. Stop the inverter.
4. Set parameter P0003 to 3.
5. Set parameter P0010 to 30 to enter Cloning Mode.
6. Set parameter P0802 to 1 to start the upload from the Inverter to the BOP.
7. During the upload “BUSY” will be displayed.
8. The BOP and the inverter will not react to any commands during upload.
9. If the upload has been completed successfully, the BOP display will return to normal and the inverter will return to a ready state.
10. If the upload has failed:
    Attempt another upload.
11. The BOP can now be removed from the inverter.

Download (BOP → SINAMICS G110)

1. Connect the BOP to the SINAMICS G110 inverter, in which the parameter set is to be downloaded.
2. Ensure power is applied to the inverter.
3. Set parameter P0003 to 3.
4. Set parameter P0010 to 30 to enter Cloning Mode.
5. Set parameter P0803 to 1 to start the download from the BOP to the inverter.
6. During the download “BUSY” will be displayed.
7. During download the BOP and the inverter will not react to any commands during download.
8. If the download has been completed successfully, the BOP display will return to normal and the inverter will return to a ready state.
9. If the download has failed:
    Attempt another download or perform a factory reset.
10. The BOP can now be removed from the inverter.

NOTE

The following important restrictions should be considered when using the Cloning procedure:

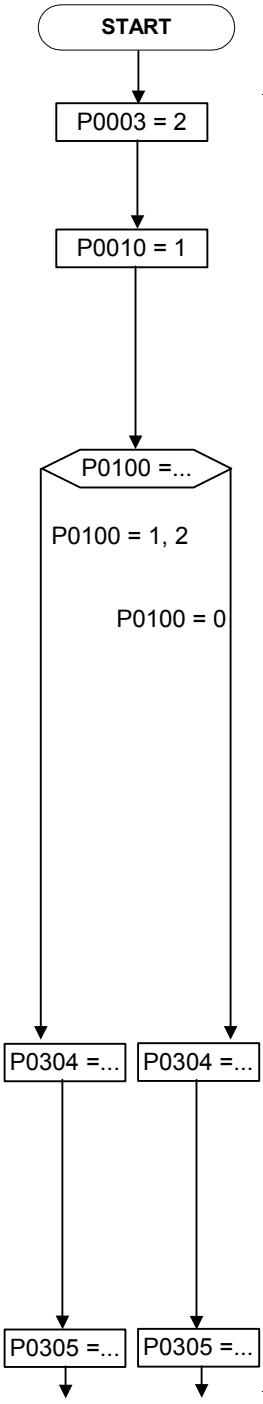
- Only the current dataset is uploaded to the BOP.
- Once the cloning procedure has started, it cannot be interrupted.
- It is possible to copy data from inverters of different power and voltage ratings.
- During download, if the data is not compatible with the inverter, the default values for the parameter will be written to the inverter.
- During the cloning process any data already held by the BOP is overwritten.
- If the download or upload of data fails, the inverter will not function correctly.

6 Commissioning

6.1 Quick commissioning

The frequency inverter is adapted to the motor using the quick commissioning function and important technological parameters are set. The quick commissioning shouldn't be carried-out if the rated motor data saved in the frequency inverter (4-pole 1LA Siemens motor, star circuit configuration ≙ frequency inverter (FU-specific)) match the rating plate data.

Parameters, designated with a * offer more setting possibilities than are actually listed here. Refer to the parameter list for additional setting possibilities.



Factory setting

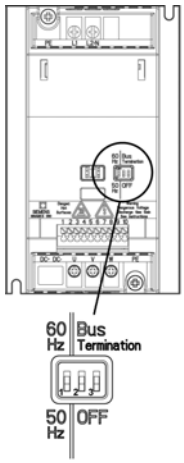
User access level * — 1
1 Standard: Allows access into most frequently used parameters
2 Extended: Allows extended access e.g. to inverter I/O functions
3 Expert (For expert use only)

Commissioning parameter * — 0
0 Ready
1 Quick commissioning
30 Factory setting

NOTE
P0010 should be set to 1 in order to parameterize the data of the motor rating plate.

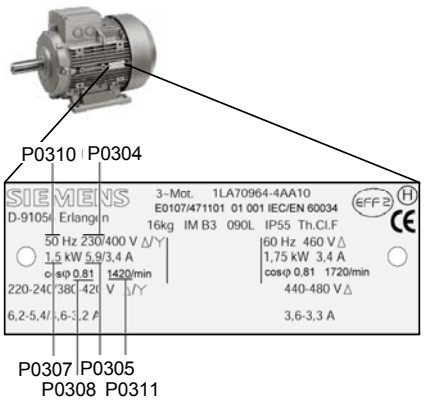
Europe/ North America — 0
(enters the line supply frequency)
0 Europe [kW], frequency default 50 Hz
1 North America [hp], frequency default 60 Hz
2 North America [kW], frequency default 60 Hz

NOTE
For P0100 = 0 or 1, the setting of switch DIP2(2) determines the value of P0100 (refer to the parameter list).

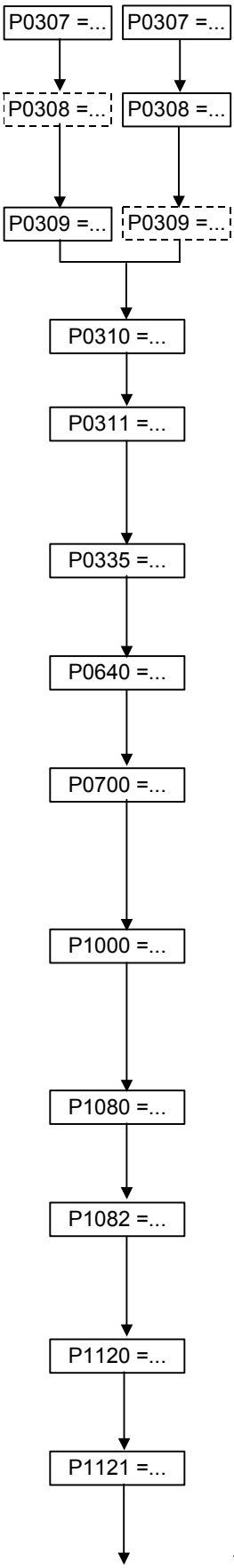


NOTICE
Motor parameters must be accurately configured for motor overload protection to operate correctly above 5 Hz.

Rated motor voltage — 230 V
(Nominal motor voltage [V] from rating plate)
The rated motor voltage on the rating plate must be checked, regarding the star/delta circuit configuration to ensure that it matches with the circuit connection configured at the motor terminal board



Rated motor current — FU-spec.
(Nominal motor current [A] from rating plate)



Rated motor power — FU-spec.
(Nominal motor power [kW/hp] from rating plate)
If P0100 = 0 or 2, value will be in kW. If P0100 = 1, value will be in in hp.

Rated motor cosPhi — FU-spec.
(Nominal motor power factor (cos φ) from rating plate)
If the setting is 0, the value is automatically calculated
P0100 = 1,2: P0308 no significance, no entry required.

Rated motor efficiency — FU-spec.
(Nominal motor efficiency in [%] from rating plate)
Setting 0 causes internal calculation of value.
P0100 = 0: P0309 no significance, no entry required.

Rated motor frequency — 50.00 Hz
(Nominal motor frequency in [Hz] from rating plate)
Pole pair number recalculated automatically if parameter is changed.

Rated motor speed — FU-spec.
(Nominal motor speed in [rpm] from rating plate)
Setting 0 causes internal calculation of value.
NOTE
For slip compensation, the input is absolutely necessary.

Motor cooling — 0
(Selects motor cooling system used)
0 Self-cooled: Using shaft mounted fan attached to motor
1 Force-cooled: Using separately powered cooling fan

Motor overload factor — 150 %
(Motor overload factor in [%] relative to P0305)
This defines the limit of the maximum output current as a % of the rated motor current (P0305).

Selection of command source — 2 / 5
(see Section 6.2.2 "Selection of command source")
0 Factory default setting
1 BOP (keypad)
2 Terminal
5 USS

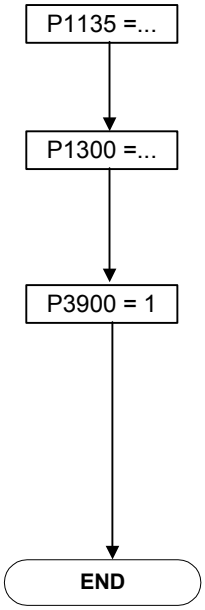
Selection of frequency setpoint — 2 / 5
(see Section 6.2.5 "Selection of frequency setpoint")
1 MOP setpoint
2 Analog setpoint
3 Fixed frequency
5 USS

Min. frequency — 0.00 Hz
(enters the minimum motor frequency in Hz)
Sets minimum motor frequency at which motor will run irrespective of frequency setpoint. The value set here is valid for both clockwise and anticlockwise rotation.

Max. frequency — 50.00 Hz
(enters the maximum motor frequency in Hz)
Sets maximum motor frequency at which motor will run irrespective of the frequency setpoint. The value set here is valid for both clockwise and anticlockwise rotation.

Ramp-up time — 10.00 s
(enters the ramp-up time in s)
Time taken for motor to accelerate from standstill up to maximum motor frequency (P1082) when no rounding is used.

Ramp-down time — 10.00 s
(enters the deceleration time in s)
Time taken for motor to decelerate from maximum motor frequency (P1082) down to standstill when no rounding is used

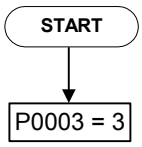


OFF3 ramp-down time (enters the fast stop ramp-down time in s) Defines ramp-down time from maximum frequency to standstill for OFF3 command.	5.00 s
Control mode (enters the required control mode) 0 V/f with linear characteristic 2 V/f with parabolic characteristic 3 V/f with programmable characteristic	0
End of quick commissioning (start of the motor calculation) 0 No quick commissioning (no motor calculations) 1 Start quick commissioning with factory reset 2 Start quick commissioning 3 Start quick commissioning only for motor data **NOTE** For P3900 = 1,2,3 → P0340 is internally set to 1 and the appropriate data calculated (refer to the parameter list P0340).	0
End of quick commissioning/ drive setting If additional functions must be implemented at the drive inverter, use the following Section **"Commissioning the application"**. We recommend this procedure for drives with a high dynamic response.	

6.2 Commissioning the application

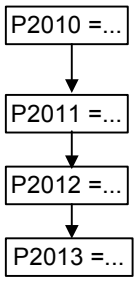
An application is commissioned to adapt/optimize the frequency inverter - motor combination to the particular application. The frequency inverter offers numerous functions - but not all of these are required for the particular application. These functions can be skipped when commissioning the application. A large proportion of the possible functions are described here; refer to the parameter list for additional functions.

Parameters, designated with a * offer more setting possibilities than are actually listed here. Refer to the parameter list for additional setting possibilities.



	Factory setting
User access level * 1 Standard (Allows access into most frequently used parameters) 2 Extended (Allows extended access e.g. to inverter I/O functions) 3 Expert (for expert use only)	1

6.2.1 Serial interface (USS)



USS baud rate Sets baud rate for USS communication.	6	**Possible Settings:** 3 1200 baud 4 2400 baud 5 4800 baud 6 9600 baud 7 19200 baud 8 38400 baud 9 57600 baud
USS address Sets unique address for inverter.	0	
USS PZD length Defines the number of 16-bit words in PZD part of USS telegram.	2	
USS PKW length Defines the number of 16-bit words in PKW part of USS telegram.	127	

6.2.2 Selection of command source

P0700 =...

Selection of command source 2 / 5
Selects digital command source.
0 Factory fault setting
1 BOP (keypad)
2 Terminal
5 USS

P0700	G110 AIN	G110 USS	Settings
0	X	X	–
1	X	X	–
2	X	X	See DIN
5	–	X	See USS

1

6.2.3 Digital inputs (DIN)

P0701=... → P0702 =... → P0703 =... → P0704 = 0 → P0724 =...

Function of digital input 0 1
Terminal 3

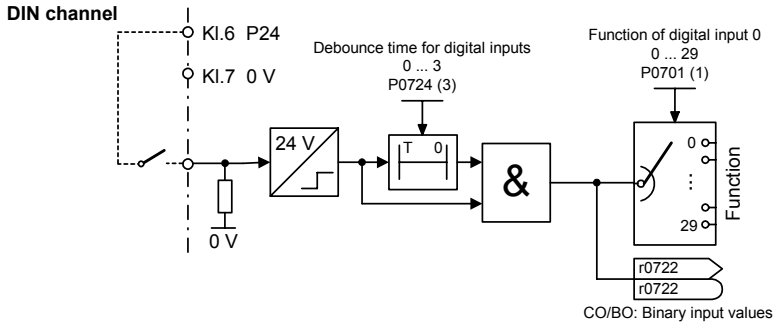
Function digital input 1 12
Terminal 4

Function digital input 2 9
Terminal 5

Function digital input 3 0
Via analog input
Terminals 9, 10
FF selection (15, 16) not possible

Debounce time for digital inputs 3
Defines debounce time (filtering time) used for digital inputs.
0 No debounce time
1 2.5 ms debounce time
2 8.2 ms debounce time
3 12.3 ms debounce time

Possible Settings:
0 Digital input disabled
1 ON / OFF1
2 ON + Reverse / OFF1
3 OFF2 – coast to standstill
4 OFF3 – quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
21 Local/remote
25 DC brake enable
29 External trip



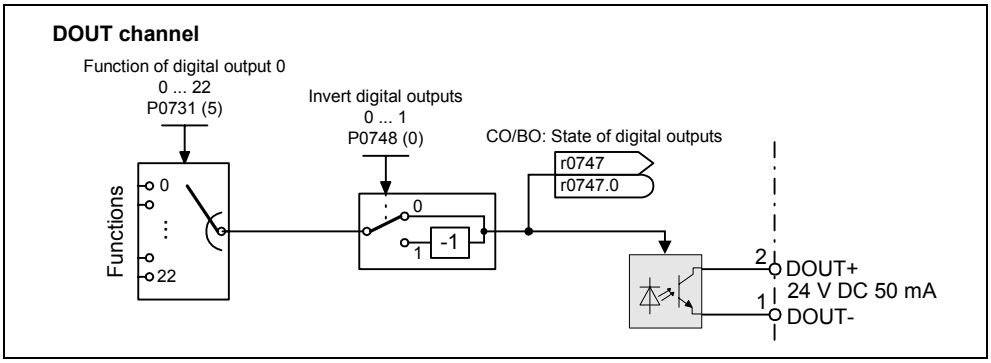
6.2.4 Digital output (DOUT)

P0731 =... → P0748 = 0

Function of digital output 0* 5
Defines source of digital output 0.

Invert digital output 0
Allows the signals to be output to be inverted.

Frequent settings:
0 Not Active
1 Active
2 Drive ready
3 Drive ready to run
4 Drive running
5 Drive fault active
6 OFF2 active
7 OFF3 active
8 Switch on inhibit active
9 Drive warning active
10 Deviation value
11 PZD control
12 Maximum frequency reached
13 Warning: Motor current limit
14 Motor holding brake active
15 Motor overload



6.2.5 Selection of frequency setpoint

P1000 =...

Selection of frequency setpoint	2 / 5
0	No main setpoint
1	MOP setpoint
2	Analog setpoint
3	Fixed frequency
5	USS

P1000	G110 AIN	G110 USS	Settings
0	X	X	–
1	X	X	see MOP
2	X	–	see ADC
3	X	X	see FF
5	–	X	see USS

6.2.6 Analog input (ADC)

P0757 =...
P0758 =...
P0759 =...
P0760 =...
P0761 =...

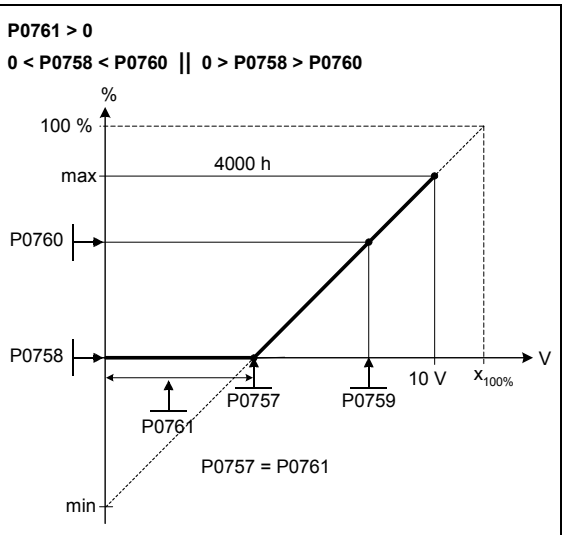
Value x1 of ADC scaling 0 V

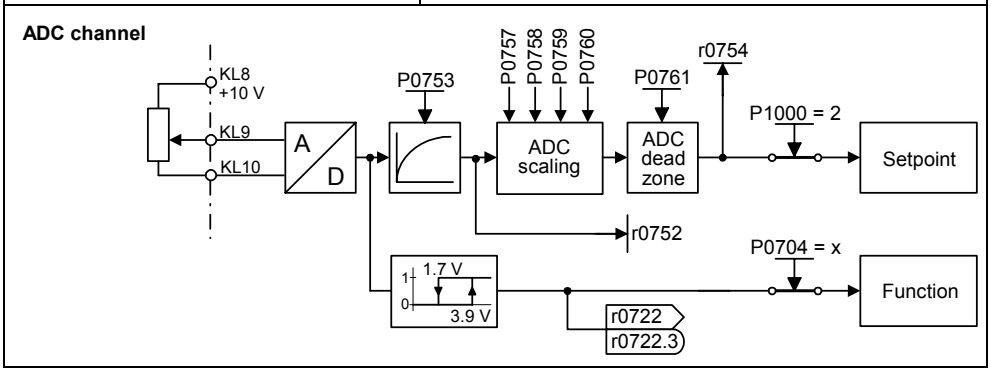
Value y1 of ADC scaling 0.0 %
This parameter represents the value of x1 as a % of P2000 (reference frequency).

Value x2 of ADC scaling 10 V

Value y2 of ADC scaling 100.0 %
This parameter represents the value of x2 as a % of P2000 (reference frequency).

Width of ADC deadband 0 V
Defines width of deadband on analog input.





6.2.7 Motor potentiometer (MOP)

P1031 =...
P1032 =...
P1040 =...

Setpoint memory of the MOP — 0
Saves last motor potentiometer setpoint (MOP) that was active before OFF command or power down.
0 MOP setpoint will not be stored
1 MOP setpoint will be stored (P1040 is updated)

Inhibit negative MOP setpoints — 1
0 Neg. MOP setpoint is allowed
1 Neg. MOP setpoint inhibited

Setpoint of the MOP — 5.00 Hz
Determines setpoint for motor potentiometer control.

MOP ramp-up and ramp-down times are defined by the parameters P1120 and P1121.

Possible parameter settings for the selection of MOP:

	Selection	MOP up	MOP down
DIN	P0719 = 0, P0700 = 2, P1000 = 1 or P0719 = 1, P0700 = 2	P0702 = 13 (DIN1)	P0703 = 14 (DIN2)
BOP	P0719 = 0, P0700 = 1, P1000 = 1 or P0719 = 1, P0700 = 1 or P0719 = 11	UP button	DOWN button
USS *)	P0719 = 0, P0700 = 5, P1000 = 1 or P0719 = 1, P0700 = 5 or P0719 = 51	USS control word r2036 Bit13	USS control word r2036 Bit14

*) SINAMICS G110 CPM110 USS only

6.2.8 Fixed frequency (FF)

P1001 =...
P1002 =...
P1003 =...

Fixed frequency 1 — 0.00 Hz
Defines the setpoint for the fixed frequency 1 (FF1) in Hz.
Hinweis:
Can be directly selected via DIN0 or USS (P0701 = 15, 16).

Fixed frequency 2 — 5.00 Hz
Can be directly selected via DIN1 or USS (P0701 = 15, 16).

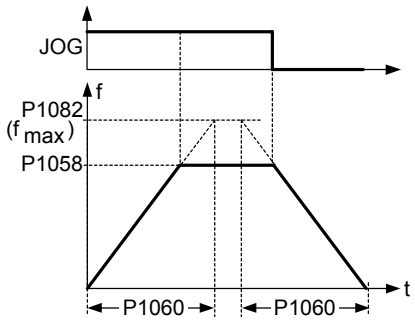
Fixed frequency 3 — 10.00 Hz
Can be directly selected via DIN2 or USS (P0701 = 15, 16).

6.2.9 JOG

P1058 =...
P1060 =...

JOG frequency — 5.00 Hz
Frequency in Hz when the motor is being jogged in the selected direction of rotation.

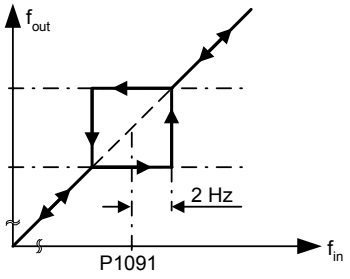
JOG ramp-up/down time — 10.00 s
Ramp-up/down time. The JOG ramp-up is limited by P1058.



6.2.10 Ramp-function generator (HLG)

P1091 =...

Skip frequency (entered in Hz) 0.00 Hz
Defines skip frequency 1 which avoids effects of mechanical resonance and suppresses frequencies within +/- 2 Hz (skip frequency bandwidth).



P1120 =...

Ramp-up time 10.00 s
(enters the accelerating time in s)

P1121 =...

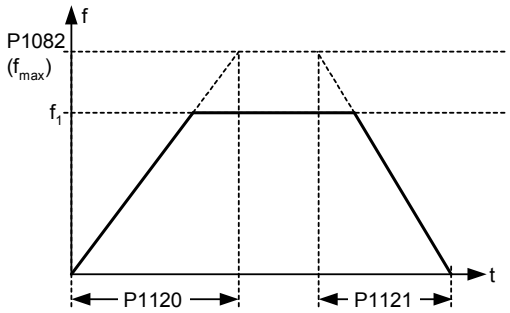
Ramp-down time 10.00 s
(enters the deceleration time in s)

P1130 =...

Rump-up initial rounding time 0.00 s
(entered in s)

P1134 =...

Rounding type 0
0 Continuous smoothing
1 Discontinuous smoothing



P1135 =...

OFF3 ramp-down time 5.00 s
Defines ramp-down time from maximum frequency to standstill for OFF3 command.

6.2.11 Reference / limit frequencies

P1080 =...

Min. frequency (entered in Hz) 0.00 Hz
Sets minimum motor frequency [Hz] at which motor will run irrespective of frequency setpoint. If the setpoint falls below the value of P1080, then the output frequency is set to P1080 taking into account the sign.

P1082 =...

Max. frequency (entered in Hz) 50.00 Hz
Sets maximum motor frequency [Hz] at which motor will run irrespective of the frequency setpoint. If the setpoint exceeds the value P1082, then the output frequency is limited. The value set here is valid for both clockwise and anticlockwise rotation.

P2000 =...

Reference frequency (entered in Hz) 50.00 Hz
The reference frequency in Hertz corresponds to a value of 100 %. This setting should be changed if a maximum frequency of higher than 50 Hz is required. It is automatically changed to 60 Hz if the standard 60 Hz frequency was selected using the DIP50/60 switch or P0100.
NOTE
This reference frequency effects the setpoint frequency as both the analog setpoints (100 % ≙ P2000) as well as the frequency setpoints via USS (4000H ≙ P2000) refer to this value.

6.2.12 Closed-loop motor control

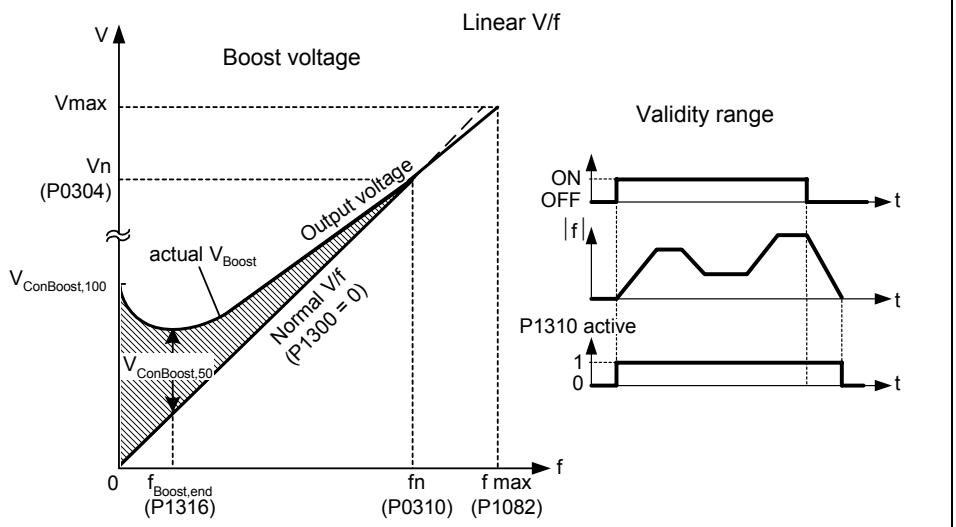
P1300 =...

Control mode 0
The closed-loop control type is selected using this parameter. For the "V/f characteristic" control type, the ratio between the frequency inverter output voltage and the frequency inverter output frequency is defined.
0 V/f with linear
2 V/f with parabolic characteristic
3 V/f with programmable characteristic (→ P1320 – P1325)

P1310 =...

Continuous boost (entered in %) 50.00 %

Voltage boost as a % relative to P0305 (rated motor current) and P0350 (stator resistance). P1310 is valid for all V/f versions (refer to P1300). At low output frequencies, the effective resistance values of the winding can no longer be neglected in order to maintain the motor flux.



P1311 =...

Acceleration boost (entered in %) 0.0 %

Voltage boost for accelerating/braking as a % relative to P0305 and P0350. P1311 only results in a voltage boost when ramping-up/ramp-down and generates an additional torque for accelerating/braking. Contrary to parameter P1312, that is only active for the 1st acceleration operation after the ON command, P1311 is effective each time that the drive accelerates or brakes.

P1312 =...

Starting boost (entered in %) 0.0 %

Voltage boost when starting (after an ON command) when using the linear or square-law V/f characteristic as a % relative to P0305 (rated motor current) or P0350 (stator resistance). The voltage boost remains active until

1) the setpoint is reached for the first time and
2) the setpoint is reduced to a value that is less than the instantaneous ramp-function generator output.

P1320 =...

Programmable V/f freq. coord. 1 0.0 Hz

Sets V/f coordinates (P1320/1321 to P1324/1325) to define V/f characteristic.

P1321 =...

Programmable. V/f volt. coord. 1 0.0 Hz

P1322 =...

Programmable V/f freq. coord. 2 0.0 Hz

P1323 =...

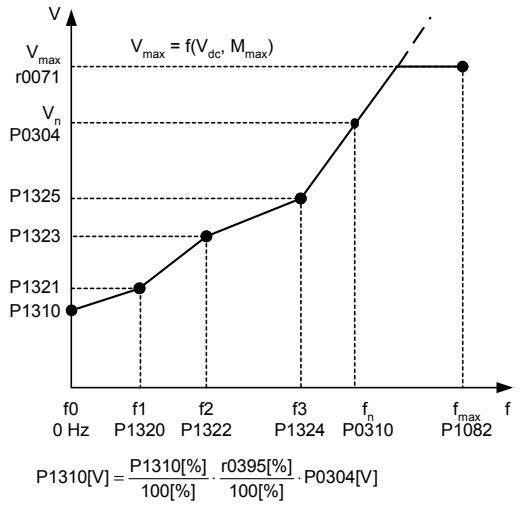
Programmable V/f volt. coord. 2 0.0 Hz

P1324 =...

Programmable U/f Freq. Koord. 3 0.0 Hz

P1325 =...

Programmable V/f volt. coord. 3 0.0 Hz



$$P1310[V] = \frac{P1310[\%]}{100[\%]} \cdot \frac{r0395[\%]}{100[\%]} \cdot P0304[V]$$

P1335 =...

Slip compensation (entered in %) 0.0 %

Dynamically adjusts output frequency of inverter so that motor speed is kept constant independent of motor load.

6.2.13 Inverter/motor protection

P0290 =...

Inverter overload reaction — 0

Legt die Reaktion des Umrichters auf eine interne Übertemperatur fest.

0 Reduce output frequency
1 Trip (F0004 / F0005)

P0335 =...

Motor cooling (enters the motor cooling system) — 0

0 Self-cooled: Using shaft mounted fan attached to motor
1 Force-cooled: Using separately powered cooling fan

P0610 =...

Motor I^2t reaction — 2

Defines reaction when motor I^2t reaches warning threshold.

0 Warning, no reaction, no trip
1 Warning, I_{max} reduction, trip F0011
2 Warning, no reaction, trip (F0011)

P0611 =...

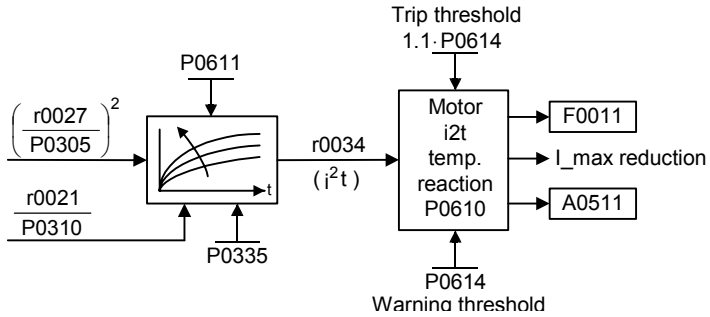
Motor I^2t time constant (entered in s) — 100 s

The time until the thermal limit of a motor is reached, is calculated via the thermal time constant. A higher value increases the time at which the motor thermal limit is reached. The value of P0611 is estimated according to the motor data during quick commissioning or is calculated using P0340 (Calculating of the motor parameters). When the calculation of motor parameters during quick commission is complete the stored value can be replaced by the value given by the motor manufacturer

P0614 =...

Motor I^2t warning level (entered in %) — 110.0 %

Defines the value at which alarm A0511 (motor overtemperature) is generated.



P0640 =...

Motor overload factor [%] — 150.0 %

Defines motor overload current limit in [%] relative to P0305 (rated motor current). Limited to maximum inverter current or to 400 % of rated motor current (P0305), whichever is the lower.

6.2.14 Inverter-specific functions

6.2.14.1 Flying start

P1200 =...

Flying start — 0

Starts inverter onto a spinning motor by rapidly changing the output frequency of the inverter until the actual motor speed has been found.

0 Flying start disabled
1 Flying start is always active, start in direction of setpoint
2 Flying start is active if power on, fault, OFF2, start in direction of setpoint
3 Flying start is active if fault, OFF2, start in direction of setpoint
4 Flying start is always active, only in direction of setpoint
5 Flying start is active if power on, fault, OFF2, only in direction of setpoint
6 Flying start is active if fault, OFF2, only in direction of setpoint

P1202 =...

Motor-current: Flying start (entered in %) — 100 %

Defines search current used for flying start.

P1203 =...

Search rate: Flying start (entered in %) — 100 %

Sets factor by which the output frequency changes during flying start to synchronize with turning motor.

6.2.14.2 Automatic restart

P1210 =...

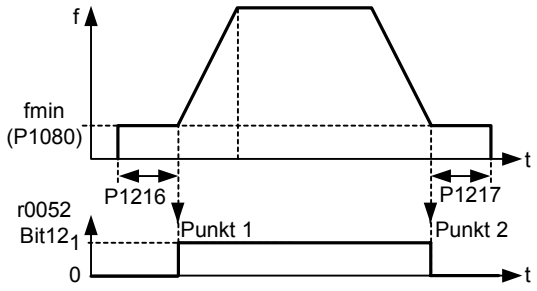
Automatic restart 1
Configures automatic restart function.
0 Disabled
1 Trip reset after power on
2 Restart after mains blackout
3 Restart after mains brownout or fault
4 Restart after mains brownout
5 Restart after mains blackout and fault
6 Restart after mains brown/blackout or fault

6.2.14.3 Holding brake

P1215 =...

Holding brake enable 0
Enables/disables holding brake function (MHB).
0 Motor holding brake disabled
1 Motor holding brake enabled

NOTE
The following must apply when controlling the brake relay via a digital output: P0731 = 14 (refer to Section 6.2.4 "Digital output (DOUT)").



P1216 =...

Holding brake release delay (entered in s) 1.0 s
Defines the time interval during which the frequency inverter runs with the min. frequency P1080 after magnetizing, before the ramp-up starts.

P1217 =...

Holding time after ramp-down (entered in s) 1.0 s
Defines time for which inverter runs at minimum frequency (P1080) after ramping down.

6.2.14.4 DC braking

P1232 =...

DC braking current (entered in %) 100 %
Defines level of DC current in [%] relative to rated motor current (P0305).

P1233 =...

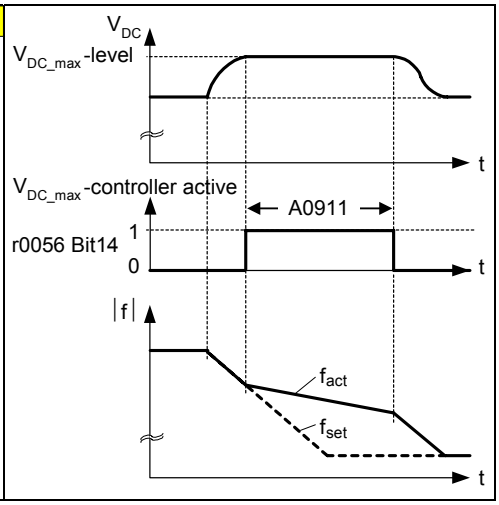
Duration of DC braking (entered in s) 0 s
Defines duration for which DC injection braking is to be active following an OFF1 or OFF3 command.

6.2.14.5 Vdc controller

P1240 =...

Configuration of Vdc controller 1
Enables / disables Vdc controller.
0 Vdc controller disabled
1 Vdc-max controller enabled

NOTE
P1240 = 1 prevents an overvoltage condition of the DC link F0002 in regenerative operation by extending the braking ramp. This can be used for translatory motion.

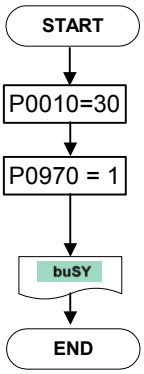


6.3 Series commissioning

An existing parameter set can be transferred to a SINAMICS G110 frequency inverter using STARTER or BOP. Typical applications for series commissioning include:

1. If several drives are to be commissioned that have the same configuration and same functions. A quick / application commissioning (first commissioning) must be carried-out for the first drive. Its parameter values are then transferred to the other drives.
2. When replacing SINAMICS G110 frequency inverters.

6.4 Parameter reset of factory setting



Commissioning parameter 30 Factory setting	0
Factory reset 0 disabled 1 Parameter reset	0
The drive inverter carries-out a parameter reset (duration, approx. 10 s) and then automatically exits the reset menu and sets: P0970 = 0 : disabled P0010 = 0 : ready	

7 Displays and messages

7.1 LED status display

LED	Meaning	Position
LED Off	Inverter Off / No supply	LED 
1000 ms On/1000 ms Off	On / Ready	
LED On steadily	Inverter Running	
500 ms On / 200 ms Off	General Warning	
100 ms On / 100 ms Off	Fault Condition	

7.2 Fault messages and Alarm messages

Fault	Significance
F0001	Overcurrent
F0002	Overvoltage
F0003	Undervoltage
F0004	Inverter Overtemperature
F0005	Inverter I^2t
F0011	Motor Overtemperature I^2t
F0051	Parameter EEPROM Fault
F0052	Powerstack Fault
F0060	Asic Timeout
F0072	No Data from USS (RS485 link) during Telegram Off Time
F0085	External Fault

Alarms	Significance
A0501	Current Limit
A0502	Overvoltage limit
A0503	Undervoltage Limit
A0505	Inverter I^2t
A0511	Motor Overtemperature I^2t
A0910	Vdc-max controller de-activated
A0911	Vdc-max controller active
A0920	ADC parameters not set properly
A0923	Both JOG Left and JOG Right are requested

Information about SINAMICS G110 is also available from:

Regional Contacts

Please get in touch with your contact for Technical Support in your Region for questions about services, prices and conditions of Technical Support.

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The competent consulting service for technical issues with a broad range of requirements-based services around our products and systems.

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