SIEMENS

14.10.2017

Customer:
Plant:

Customer No.:
Last saved:
Project: Project4
Author:
Comment:

1. Parts list

Pos.	Quantity	Order designation	Product
• Controller, SIMATIC S7-1500 based			
10	1	6EP1334-3BA10	SITOP modular 10.00 A
• Compact drive systems, S120 AC/AC			
20	1	6SL3040-1MA01-0AA0	Control Unit CU320-2 PN
30	1	6SL3054-0EJ00-1BA0	Basic
40	2	6SL3040-0PA00-0AA1	Control Unit Adapter (CUA31)
50	1	6EP1334-3BA10	SITOP modular 10.00 A
• Drive system / Supply system			
60	1	6SL3210-1SE11-3UA0	PM340 power unit; 0.37 kW; 1.30 A; -
70	1	6FX5002-5CG10-1BA0	Motor supply cable; MOTION-CONNECT 500 without brake cable, quick connection (fixed mounting); 10.0 m
80	1	1FK7032-2AK71-1QG0	Synchronous servo motor (feed motor) 1FT/1FK; 0.50 kW; Shaft height 36 mm
• Drive system / Supply system (1)			
90	1	6SL3210-1PE11-8UL1	PM240-2 power unit; 0.55 kW; 1.70 A; -
100	1	6FX5002-5CG10-1BA0	Motor supply cable; MOTION-CONNECT 500 without brake cable, quick connection (fixed mounting); 10.0 m
110	1	1FK7034-2AK71-1QG0	Synchronous servo motor (feed motor) 1FT/1FK; 0.63 kW; Shaft height 36 mm

Legend

► **Please note:**

With full control performance, the rated motor current for the SINAMICS S120 may not be less than:
- 1/12 * rated converter current - V/f or FCC
- 1/4 * rated converter current - vector
- 1/4 * rated converter current - servo

During cyclic operation with limitations with regard to the torque accuracy and smooth running characteristics, the rated motor current of the SINAMICS S120 should not be less than:
- 1/8 * rated converter current - vector
- 1/8 * rated converter current - servo

The overload capability for dimensioning according to load characteristic (e.g. load cycle with constant ON duration) refers to a temporarily required overload on the motor. With longer or cyclic overloads, a configuration via the application is required.

With "Simple motor selection without load configuration", the rated data based on 400/460 V will not be attained depending on the selected drive and version (DC link, control method and control factor). Please take this into account when selecting/using the motor.

The configuration of the SIMATIC S7-1500 CPUs is based on TIA Portal V14 SP1. The firmware of the CPUs is based on FW version V2.1.
The configuration of the CU320-2 is based on FW version V4.8.

Please check the correct DRIVE-CLiQ topology for the configured SINAMICS S120 drive systems.

2. Technical data

• Supply system

- Line data

Voltage	400 V
Frequency	50 Hz
Number of phases	3
Allowance for differing supply voltage	No
Allowance for short term supply fluctuations	Yes
Maximum temporary undervoltage to the rated voltage	15 %
Undervoltage	340 V

• Drive system / Supply system

- SINAMICS S120 AC/AC - servo

- Power unit

Order designation	6SL3210-1SE11-3UA0
Drive-based Safety Integrated	No Safety Integrated functionality
Cooling method	Internal air cooling
Ambient conditions	
Installation altitude	1000 m
Ambient temperature	40 °C
Power unit / catalog data	
Type rating	0.37 kW
Rated current	1.30 A
Frame size	A
Pulse frequency factory setting	4.00 kHz
Energy efficiency class	-
Internal filter	None
Power unit / load-specific data	
Available base-load current	1.30 A

- Motor supply cable

Cable type	MOTION-CONNECT 500 without brake cable, quick connection (fixed mounting)
Laying method	DIN EN 60204-1
Cable cross-section	1 * 4x1.5 mm²
Order designation	6FX5002-5CG10-1BA0
Cable length	10.0 m

- Motor

Order designation	1FK7032-2AK71-1QG0
Motor / ambient conditions	
Installation altitude	1000 m
Ambient temperature	40 °C
Temperature rise class	F/100K
Dimensioning with field weakening operation	Yes
Motor / catalog data (100K values)	
Motor type	1FK7
Version	Compact (generation 2)
Calculated power	0.69 kW
Static torque	1.10 Nm
Rated torque	0.80 Nm
Stall current	1.70 A
Rated current	1.40 A
Rated speed	6000.00 rpm
Shaft height	36 mm
Efficiency	0.870
Encoder	AS20DQI - absolute encoder singleturn 20-bit
Encoder evaluation	Motor integrated
Cooling method	Self-cooling
Holding brake	Without holding brake

Shaft extension	Plain
Radial eccentricity tolerance	N
Vibration severity grade	A
Degree of protection	IP 64
Type of construction	IM B5 (IM V1, IM V3)
Direction of connection	270 degree rotatable
Paint finish	Anthracite (similar to RAL7016)
Motor / calculated data	
Load current	0.95 A
Load data on the motor shaft	
Load characteristic	Constant torque
Load power (effective power, at S3/S6 peak power)	0.39 kW
Max. load speed	7000.00 rpm

• Supply system (1)

- Line data

Voltage	400 V
Frequency	50 Hz
Number of phases	3
Allowance for differing supply voltage	No
Allowance for short term supply fluctuations	Yes
Maximum temporary undervoltage to the rated voltage	15 %
Undervoltage	340 V

• Drive system / Supply system (1)

- SINAMICS S120 AC/AC - servo

- Power unit

Order designation	6SL3210-1PE11-8UL1
Drive-based Safety Integrated	No Safety Integrated functionality
Cooling method	Internal air cooling
Ambient conditions	
Installation altitude	1000 m
Ambient temperature	40 °C
Power unit / catalog data	
Type rating	0.55 kW
Rated current	1.70 A
Frame size	A
Pulse frequency factory setting	4.00 kHz
Energy efficiency class	-
Internal filter	None
Power unit / load-specific data	
Available base-load current	1.70 A

- Motor supply cable

Cable type	MOTION-CONNECT 500 without brake cable, quick connection (fixed mounting)
Laying method	DIN EN 60204-1
Cable cross-section	1 * 4x1.5 mm²
Order designation	6FX5002-5CG10-1BA0
Cable length	10.0 m

- Motor

Order designation	1FK7034-2AK71-1QG0
Motor / ambient conditions	
Installation altitude	1000 m
Ambient temperature	40 °C
Temperature rise class	F/100K
Dimensioning with field weakening operation	Yes
Motor / catalog data (100K values)	
Motor type	1FK7
Version	Compact (generation 2)
Calculated power	1.01 kW
Static torque	1.60 Nm

Rated torque	1.00 Nm
Stall current	1.90 A
Rated current	1.30 A
Rated speed	6000.00 rpm
Shaft height	36 mm
Efficiency	0.860
Encoder	AS20DQI - absolute encoder singleturn 20-bit
Encoder evaluation	Motor integrated
Cooling method	Self-cooling
Holding brake	Without holding brake
Shaft extension	Plain
Radial eccentricity tolerance	N
Vibration severity grade	A
Degree of protection	IP 64
Type of construction	IM B5 (IM V1, IM V3)
Direction of connection	270 degree rotatable
Paint finish	Anthracite (similar to RAL7016)
Motor / calculated data	
Load current	1.44 A
Load data on the motor shaft	
Load characteristic	Constant torque
Load power (effective power, at S3/S6 peak power)	0.62 kW
Max. load speed	6000.00 rpm

• Controller, SIMATIC S7-1500 based

- SIMATIC CPU 1511-1 PN

Order designation	6ES7511-1AK01-0AB0
Note	The dimensioning results (e.g. with regard to installation, power supply and power loss) do not take into account components that have been taken from the TIA Selection Tool or created as additional components.
Total utilization	25 %
Servo cycle clock	2.00 ms
IPO cycle clock	2.00 ms

- 24 V supply

SITOP modular 10.00 A	6EP1334-3BA10
Quantity	1
Total current requirement	0.00 A

• Compact drive systems, S120 AC/AC

(1) - Control Unit CU320-2 PN	
Order designation	6SL3040-1MA01-0AA0
Specified max. total utilization	100.0 %
Total utilization	45 %
CompactFlash Card	6SL3054-0EJ00-1BA0
CFC type	Basic
Externally via DRIVE-CLiQ / Drive system / Supply system	
Closed-loop control	SINAMICS S120 AC/AC - servo
Performance	Medium
Control Unit Adapter (CUA31)	6SL3040-0PA00-0AA1
Externally via DRIVE-CLiQ / Drive system / Supply system (1)	
Closed-loop control	SINAMICS S120 AC/AC - servo
Performance	Medium
Control Unit Adapter (CUA31)	6SL3040-0PA00-0AA1

- 24 V supply

SITOP modular 10.00 A	6EP1334-3BA10
Quantity	1
Total current requirement	1.00 A

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Legend

The overload capability for dimensioning according to load characteristic (e.g. load cycle with constant ON duration) refers to a temporarily required overload on the motor. With longer or cyclic overloads, a configuration via the application is required.
With "Simple motor selection without load configuration", the rated data based on 400/460 V will not be attained depending on the selected drive and version (DC link, control method and control factor). Please take this into account when selecting/using the motor.

The configuration of the SIMATIC S7-1500 CPUs is based on TIA Portal V14 SP1. The firmware of the CPUs is based on FW version V2.1.
The configuration of the CU320-2 is based on FW version V4.8.

Please check the correct DRIVE-CLiQ topology for the configured SINAMICS S120 drive systems.

3. Characteristics

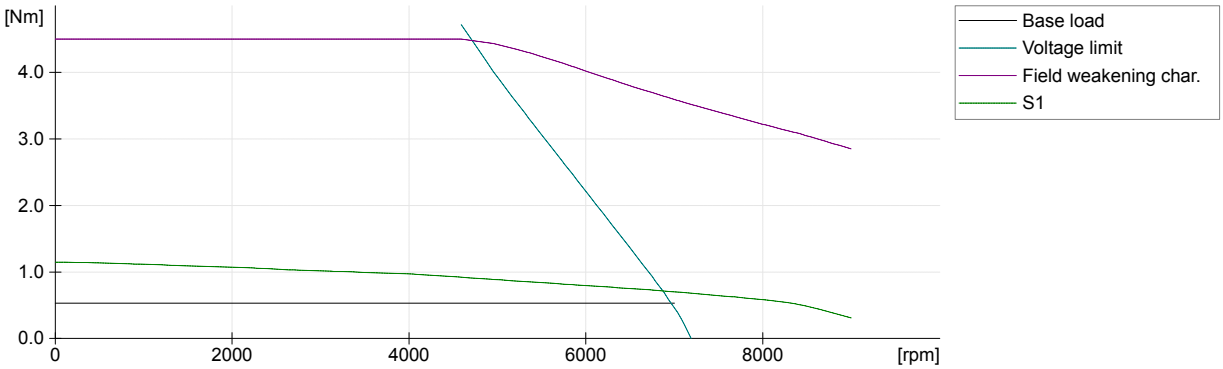

Fig. 3.1: Drive system / Supply system / 1FK7032-2AK71-1QG0 [Load characteristic Constant torque]

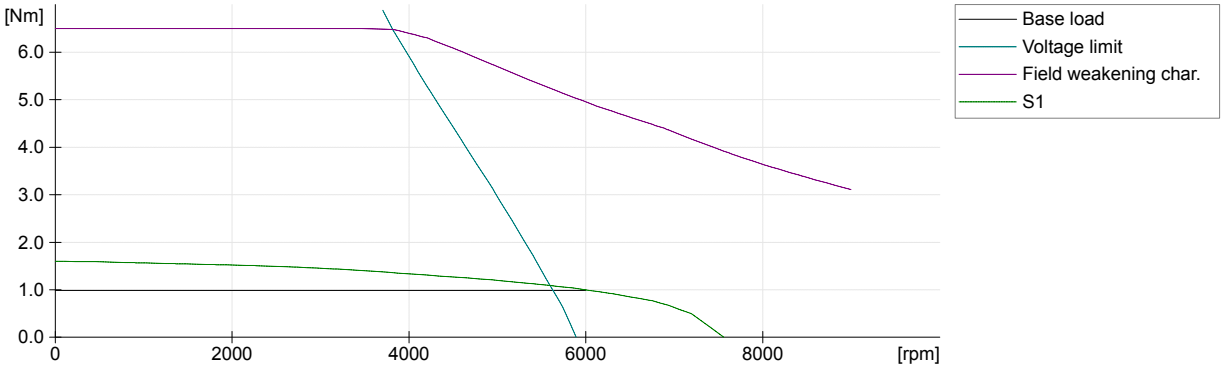

Fig. 3.2: Drive system / Supply system (1) / 1FK7034-2AK71-1QG0 [Load characteristic Constant torque]

4. Installation

4.1. Compact drive systems, S120 AC/AC

The required ventilation distances must be considered.
Depending on the line choke and the associated cable cross-section, a cabling space may be required.
Note that the current carrying capacity of the DC-link busbar is not checked.
The EMC specifications must be taken into account when installing filter and choke.

Topology (1) - -

#ID	Type component	Version	Name	MLFB	Width [mm]	Height [mm]	Depth [mm]
#1	Closed-loop control	Booksize	(1) - Control Unit CU320-2 PN	6SL3040-1MA01-0AA0	50	300	226
#2	PM	Blocksize	Drive system / Supply system	6SL3210-1SE11-3UA0	73	173	145
#3	PM	Blocksize	Drive system / Supply system (1)	6SL3210-1PE11-8UL1	73	196	165
#4	Group				196	300	226

#ID	I-rated [A]	I-DC link [A]	Max. I-DC link busbar [A]	DC-link adapter (for booksize)	DC link rectifier adapter	I-24 V [A]	24 V supply	24 V terminal adapter
#1	-	-	-			1.00	Terminals	No
#2	1.30	-	-			-		No
#3	1.70	-	-			-		No
#4								

#ID	Continuous motor current [A]	Maximum motor current [A]	Comment
#2	0.95		
#3	1.44		

5. 24 V supply

5.1. Compact drive systems, S120 AC/AC

Topology (1)

SITOP modular 10.00 A, 6EP1334-3BA10

Consumers	Current demand	Infeed type
(1) - Control Unit CU320-2 PN	1.00 A	Terminals
Total	1.00 A	

5.2. Controller

Topology (1)

SITOP modular 10.00 A, 6EP1334-3BA10

Customer:
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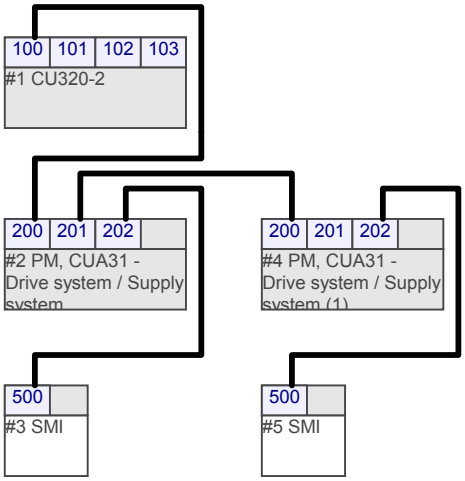
6. DRIVE-CLiQ topology

6.1. Compact drive systems, S120 AC/AC

(1) - Control Unit CU320-2 PN



DRIVE-CLiQ node

No.	Type	Name	Type of construction	Control method	Sampling time	Performance
#1	CU320-2					
#2	PM, CUA31	Drive system / Supply system	LV Blocksize	Servo	125 祉	Medium
#3	SMI	Drive system / Supply system, Motor encoder				
#4	PM, CUA31	Drive system / Supply system (1)	LV Blocksize	Servo	125 祉	Medium
#5	SMI	Drive system / Supply system (1), Motor encoder				

DRIVE-CLiQ cables

From	To	Connection type	Cable type	Length [m]	Order designation
X100, #1 CU320-2	X200, #2 PM, CUA31		No cable selected		
X202, #2 PM, CUA31	X500, #3 SMI	Continuous	No cable selected		
X201, #2 PM, CUA31	X200, #4 PM, CUA31		No cable selected		
X202, #4 PM, CUA31	X500, #5 SMI	Continuous	No cable selected		

6.2. Controller

Customer:
Plant:

7. Application data

7.1. Drive system / Supply system / 1FK7032-2AK71-1QG0 [Load characteristic Constant torque]

Main load

Power	0.39 kW
Max. load speed	7000.00 rpm

7.2. Drive system / Supply system (1) / 1FK7034-2AK71-1QG0 [Load characteristic Constant torque]

Main load

Power	0.62 kW
Max. load speed	6000.00 rpm

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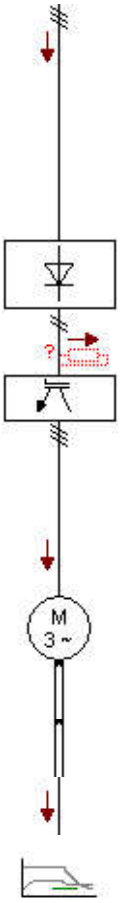
8. Energy requirements of the power electronics

8.1. Drive system / Supply system, SINAMICS S120 AC/AC - servo

Only the energy requirements of the power electronic components are taken into account. Further electronic components are not considered (e.g. Sensor Modules, control electronic components, controllers, 24 V supply).

System view:

(1)		**Drive system / Supply system 943.1 kWh/a**		
(2)		**0.54 kW**		
(3)	**0.54 kW**	-		SINAMICS S120 AC/AC - servo
(4)		**0 kW**		Unregulated DC link
(5)	**0.44 kW**	**0 kW**		1FK7
(6)	**0.39 kW**	**0 kW**		Load characteristic



Operating hours / a: 1760.0

Explanation of the values

		Total energy requirement
(1)	Total energy requirement	The resulting drive power extrapolated from the project settings for the specified number of operating hours per annum.
		Powers on the drive line
(2)	Resulting drive power	Corresponds to the motoring/generating drive power.
(3)	Drive power	This value is calculated from the motoring/generating components of the load specification and is always positive. In regenerative systems, this is the power that can be fed back to the infeed.
(4)	Braking power	When dimensioning with mechanical systems, this is the power that is lost at the braking resistor in the DC link.
(5)	Motor power	This is the required electrical power of the motor. Speed dependencies on the efficiency of the mounted gearbox and additional gearbox are not taken into account.
(6)	Load power	This is the power on the load required/produced by the specification (motor shaft power).

Refer to the online help for details.

Liability for the correctness of the energy requirement data is excluded. The energy consumption of a drive system depends on the operation and ambient conditions and contains physical power losses that cannot be fully determined.

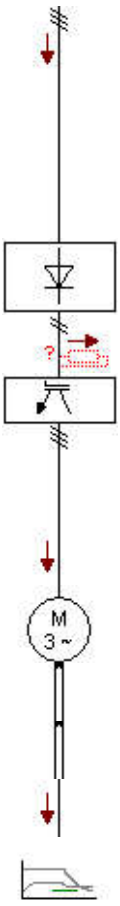
Customer:
Plant:

8.2. Drive system / Supply system (1), SINAMICS S120 AC/AC - servo

Only the energy requirements of the power electronic components are taken into account. Further electronic components are not considered (e.g. Sensor Modules, control electronic components, controllers, 24 V supply).

System view:

(1)	**Drive system / Supply system (1) 1330 kWh/a**			
(2)		**0.76 kW**		
(3)	**0.76 kW**		**-**	SINAMICS S120 AC/AC - servo
(4)			**0 kW**	Unregulated DC link
(5)	**0.73 kW**		**0 kW**	1FK7
(6)	**0.62 kW**		**0 kW**	Load characteristic



Operating hours / a: 1760.0

Explanation of the values

		Total energy requirement
(1)	Total energy requirement	The resulting drive power extrapolated from the project settings for the specified number of operating hours per annum.
		Powers on the drive line
(2)	Resulting drive power	Corresponds to the motoring/generating drive power.
(3)	Drive power	This value is calculated from the motoring/generating components of the load specification and is always positive. In regenerative systems, this is the power that can be fed back to the infeed.
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(6)	Load power	This is the power on the load required/produced by the specification (motor shaft power).

Refer to the online help for details.

Liability for the correctness of the energy requirement data is excluded. The energy consumption of a drive system depends on the operation and ambient conditions and contains physical power losses that cannot be fully determined.

9. Cabinet power loss

9.1. Compact drive systems, S120 AC/AC

Load-dependent power loss of the cabinet components without passive power elements

Open-loop/closed-loop control / 24 V components	
~ Control Units	0.03 kW
~ SITOPs / Control Supply Module incl. additional modules	0.02 kW
Drive system / Supply system (load-related)	
~ Power unit	0.09 kW
Input components	
System components	
Other system components	
Drive system / Supply system (1) (load-related)	
~ Power unit	0.03 kW
Input components	
System components	
Other system components	
Total power loss	**0.18 kW**

Liability for the correctness of the energy requirement data is excluded. The energy consumption of a drive system depends on the operation and ambient conditions and contains physical power losses that cannot be fully determined.

9.2. Controller

Load-dependent power loss of the cabinet components without passive power elements

Open-loop/closed-loop control / 24 V components	
~ SITOPs / Control Supply Module incl. additional modules	0.02 kW
Total power loss	**0.02 kW**

Liability for the correctness of the energy requirement data is excluded. The energy consumption of a drive system depends on the operation and ambient conditions and contains physical power losses that cannot be fully determined.