

# Compact Installation Instructions



## SINAMICS G120X

### Scope of delivery

- The delivery comprises at least the following components:
- A ready to run converter with loaded firmware. Each converter comprises a Power Module and a Control Unit.
  - One set of connectors for connecting the I/O control terminals
  - One set of shield connection kit for the Power Module (available for FSA to FSG only)
  - One set of shield connection kit for the Control Unit (available for FSD to FSJ only)
  - Compact Installation Instructions in English and German
  - A printed full-size drill pattern (available for FSD to FSJ only), which allows easy drilling of the necessary mounting holes.
  - The converter contains open-source software (OSS). The OSS license terms are saved in the converter.

Options for upgrading and downgrading the firmware can be found on the Internet:  
<https://support.industry.siemens.com/cs/us/en/view/67364620>

**WARNING**

**Danger to life if the safety instructions and installation instructions are not observed**

The compact installation instructions only contain the most important information for installing the converter. If the safety instructions and installation instructions in the associated documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions and installation instructions given in the associated documentation.

QR code and text: SINAMICS G120X Operating Instructions  
<https://support.industry.siemens.com/cs/us/en/ps/25454/man>  
 Language versions: [Flags for UK, DE, FR, ES, IT, CN]

### Rating plate example

**SIEMENS**

Article number: IP 6S13220-2YE26-0AF0  
 Product serial number: S XAM521-020653 FS-02 02  
 FS code: [Barcode]

400V AC Class 480V AC Class  
 Motor Rating 11kW 15hp  
 Voltage 3AC 380-480V 3AC 440-480V  
 Input Freq. 47-63Hz  
 Current 24.5A 21.3A  
 Voltage 3AC 0-INP/UT V  
 Output Freq. 0-500Hz  
 Current 26.0A 21.0A

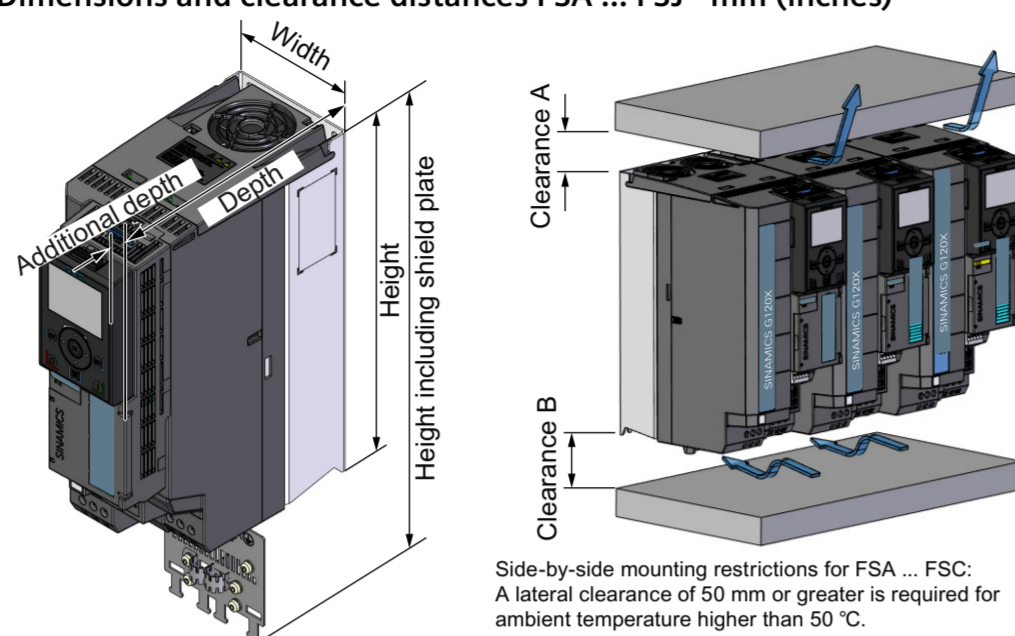
Use 75°C Copper Conductors only  
 Use in PD2 and DVCIII env. only  
 SCCR 100kA

Input: 3AC 380-480V +10%/-20%  
 Motor: IEC 11kW  
 Net weight 7.8kg IP 20  
 Degree of protection

Year of Manufacture: 2021  
 Standby Loss: 17.3W 0.1%  
 Efficiency Class: IE2

REFER TO USER MANUAL  
<http://siemens.automation.siemens.com>  
 Siemens AG, Fraunhofer Str. 10, DE-91050 Erlangen  
 UK Importer: Siemens plc, Manchester M20 2UR  
 Made in United Kingdom

### Dimensions and clearance distances FSA ... FSJ - mm (inches)



Side-by-side mounting restrictions for FSA ... FSC:  
 A lateral clearance of 50 mm or greater is required for ambient temperature higher than 50 °C.

Frame size	Height	Height including shield plate	Width	Depth	Clearance A	Clearance B	Additional depth		
							With Operator Panel	With SINAMICS G120 Smart Access	With I/O Extension Module <sup>1)</sup>
FSA	232 (9.1)	330 (12.9)	73 (2.8)	209 (8.2)	80 (3.1)	100 (3.9)	9 (0.4)	7 (0.3)	27 (1.1)
FSB	275 (10.8)	383 (15.1)	100 (3.9)	209 (8.2)	80 (3.1)	100 (3.9)			
FSC	295 (11.6)	423 (16.7)	140 (5.5)	209 (8.2)	80 (3.1)	100 (3.9)			
FSD	472 (18.6)	625 (24.6)	200 (7.9)	239 (9.4)	300 (11.8)	350 (13.8)			
FSE	551 (21.7)	729 (28.7)	275 (10.8)	239 (9.4)	300 (11.8)	350 (13.8)			
FSF	709 (27.9)	969 (38.1)	305 (12)	360 (14.2)	300 (11.8)	350 (13.8)			
FSG	999 (39.3)	1255 (49.4)	305 (12)	360 (14.2)	300 (11.8)	350 (13.8)			
FSH <sup>2)</sup>	1696 (66.7)	/	548 (21.6)	393 (15.4)	0	250 (9.8)	/	/	/
FSJ <sup>2)</sup>	1621 (63.8)	/	801 (31.5)	393 (15.4)	0	250 (9.8)	/	/	/

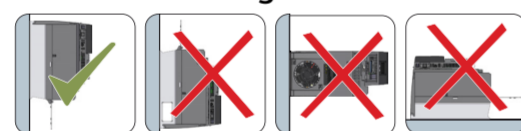
<sup>1)</sup> Additional depth of 11.8 mm/9.8 mm is required with an operator panel/SINAMICS G120 Smart Access mounted onto the I/O Extension Module.  
<sup>2)</sup> For FSH and FSJ, a clearance distance of 100 mm is required at the front of the converter; a clearance distance of 30 mm is required between individual converters.

### Drill patterns FSH/FSJ <sup>1)</sup>

Frame size	Fixing Dimensions - mm (inches)								
	A1	A2	A3	A4	A5	B	G1	G2	Ø
FSH	160 (6.3)	150 (5.9)	160 (6.3)	225 (8.9)	225 (8.9)	1419 (55.9)	39 (1.5)	49 (1.9)	8.5 (0.3)
FSJ	200 (7.9)	290 (11.4)	200 (7.9)	345 (13.6)	345 (13.6)	1399 (55.1)	60.5 (2.4)	60.5 (2.4)	8.5 (0.3)

<sup>1)</sup> Fixings (bolts, washers, nuts): 7 × M8; tightening torque: 25 Nm (221.26 lbf.in)

### Correct mounting orientation

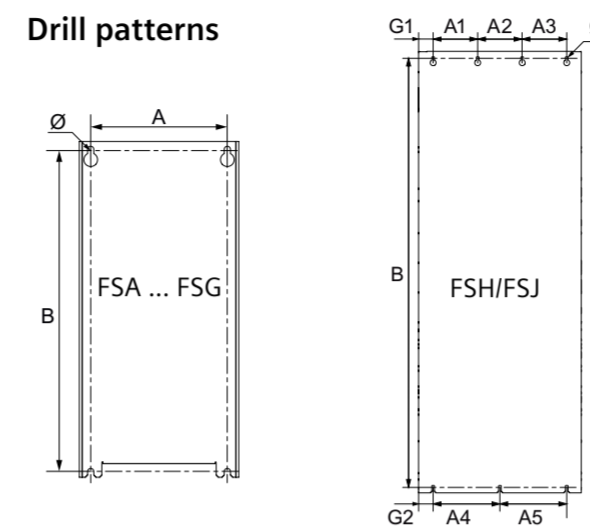


### Cable cross-sections and tightening torques

Frame size	Terminal/connector type/tool		Maximum cable cross-section		Tightening torque		Stripped insulation length mm (in)	
			mm <sup>2</sup>	AWG	Nm	lbf.in		
FSA	Line, motor, PE and DC link	Screw-type terminal	Slot or pozi screw-driver	1.5 ... 2.5	16 ... 14	0.5	4.4	9 ... 10 (0.4)
FSB				1.5 ... 6	16 ... 10	1.3	11.5	12 ... 13 (0.47)
FSC				1.5 ... 16	16 ... 6	1.3	11.5	12 ... 13 (0.47)
FSD	Line, motor and PE DC link	Screw-type terminal	Torque wrench for TX20	10 ... 35	8 ... 2	4.5	39.8	18 (0.7)
FSE				16	6	1.7	15	10 (0.4)
FSE	Line, motor and PE DC link	Screw-type terminal	Torque wrench for TX40	25 ... 70	6 ... 3/0	10	88.5	25 (1)
FSE				26.7 ... 35	3 ... 2	3.7 <sup>1)</sup>	33 <sup>1)</sup>	18 (0.7)
FSF	Line, motor and PE DC link	Cable lug according to SN71322 for M10 bolts	Wrench (size 17 mm)	35 ... 2 × 120	1 ... 2 × 4/0	22 ... 25	194.7 ... 221.3	/
FSF				25 ... 70	6 ... 3/0	8 ... 10	71 ... 88.5	25 (1)
FSG	Line, motor and PE DC link	Cable lug according to SN71322 for M10 bolts	Wrench (size 17 mm)	35 ... 2 × 185	1 ... 2 × 350 MCM	22 ... 25	194.7 ... 221.3	/
FSG				25 ... 70	6 ... 3/0	8 ... 10	71 ... 88.5	25 (1)
FSH	Line, motor, PE and DC link	Cable lug according to DIN46234 for M12 bolts	Wrench (size 18 mm)	4 × 240	4 × 500 MCM	50	442.5	/
FSJ				6 × 240	6 × 500 MCM			

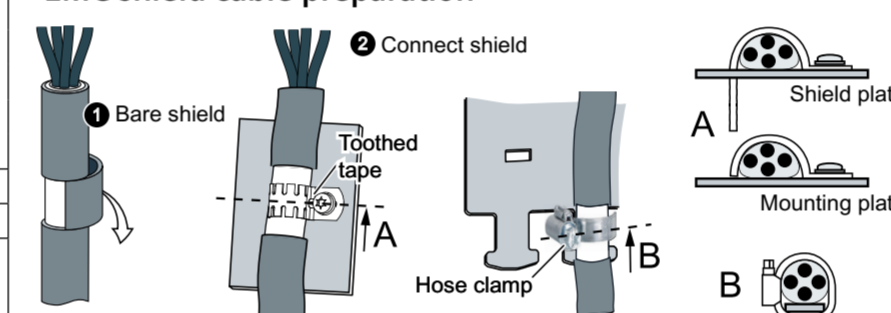
<sup>1)</sup> For converters FSE 690 V, the tightening torque is 4.5 Nm (40 lbf.in).

### Drill patterns



Frame size	Fixing Dimensions - mm (inches)			Fixings	Tightening torque - Nm (lbf.in)
	A	B	Ø		
FSA	55 (2.2)	221.5 (8.7)	5 (0.2)	4 × M4	2.5 (22.1)
FSB	80 (3.2)	265 (10.4)	5 (0.2)	4 × M4	2.5 (22.1)
FSC	118 (4.6)	283 (11.1)	5.5 (0.2)	4 × M5	2.5 (22.1)
FSD	170 (6.7)	430 (16.9)	6.0 (0.2)	4 × M5	6 (53.1)
FSE	230 (9.1)	509 (20.0)	6.5 (0.3)	4 × M6	10 (88.5)
FSF	270 (10.6)	680 (26.8)	8.5 (0.3)	4 × M8	25 (221.3)
FSG	265 (10.4)	970.5 (38.2)	12.0 (0.5)	4 × M10	50 (442.5)

### EMC shield cable preparation

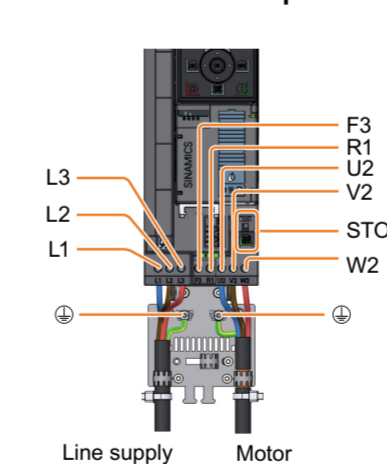


### Wiring example FSB

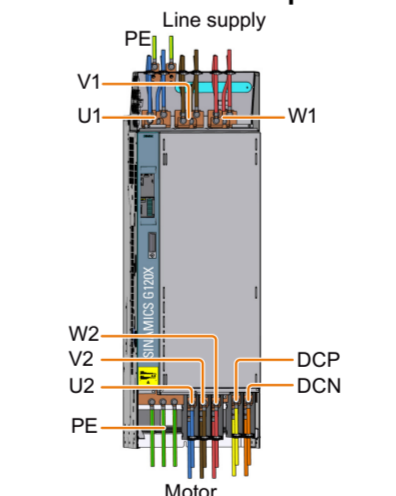
The shield support for converter FSB with PROFINET interface is displayed as an example.

No.	Description
1	Unshielded line cable
2	Cable tie
3	Communication cable
4	Cabinet backplane
5	Shielded control cable
6	Toothed tape
7	Shielded motor cable

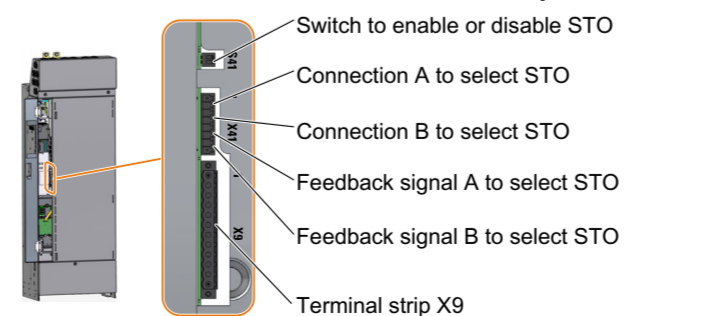
### Connection example FSB



### Connection example FSH



### FSH and FSJ Switch / Terminals S41, X41 and X9



- STO deactivation: move STO switch to OFF position.
- STO activation: move STO switch to ON position and wire STO signals according to Operating Instructions.

### Maximum permissible motor cable lengths - m (ft)

The following values are valid for a pulse frequency set at the factory.

200 V converter	Second environment, C2		No EMC category	
	With external filter	With shielded motor cable	With shielded motor cable	With unshielded motor cable
FSA ... FSC	50 (164.0)	150 (492.1)	300 (984.3)	
FSD ... FSE		200 (656.2)	300 (984.3)	
FSF		300 (984.3)	450 (1476.4)	

400 V converter	First environment, C2 and Second environment, C2		Second environment, C3		No EMC category	
	With integrated C2 filter	With integrated C3 filter	With external filter	With shielded motor cable	With unshielded motor cable	
FSA ... FSC	150 (492.1) <sup>1)</sup>	/	50 (164.0)	150 (492.1)	300 (984.3)	
FSD ... FSE		/	/	200 (656.2)	300 (984.3)	
FSF		150 (492.1)	/	/	300 (984.3)	450 (1476.4)
FSH/FSJ	/	150 (492.1) <sup>2)</sup>	/	150 (492.1)	200 (656.2)	

<sup>1)</sup> 2 kHz pulse frequency for FSF, 75 kW and 90 kW.  
<sup>2)</sup> For motor cable lengths of 100 m (328.1 ft) ... 150 m (492.1 ft), an additional basic interference suppression module shall be provided on the line side (available on request).

690 V converter	Second environment, C3		Second environment, C2		No EMC category	
	With integrated C3 filter	With external filter	With integrated C2 filter	With shielded motor cable	With unshielded motor cable	
FSD ... FSE	/	50 (164.0)	100 (328.1)	200 (656.2)	300 (984.3)	
FSF ... FSJ	150 (492.1)	50 (164.0)	/	300 (984.3)	450 (1476.4)	
FSH ... FSJ	150 (492.1) <sup>1)</sup>	/	/	150 (492.1)	200 (656.2)	

<sup>1)</sup> For motor cable lengths of 100 m (328.1 ft) ... 150 m (492.1 ft), an additional basic interference suppression module shall be provided on the line side (available on request).

### CU Interfaces

1	Terminal strip X134
2	Status LEDs
3	Analog Input selection DIP switch
4	Connection to Operator Panel or SINAMICS G120 Smart Access or I/O Extension Module
5	Memory card slot <sup>1)</sup>
6	Fixing hole for I/O Extension Module
7	Terminal strip X132
8	Terminal strip X133
9	Fieldbus interface

**NOTE**

To reach environment class 3C3, re-fit the protective covers (including dummy SD card, covers for fieldbus connectors) if the corresponding interfaces are not in use.

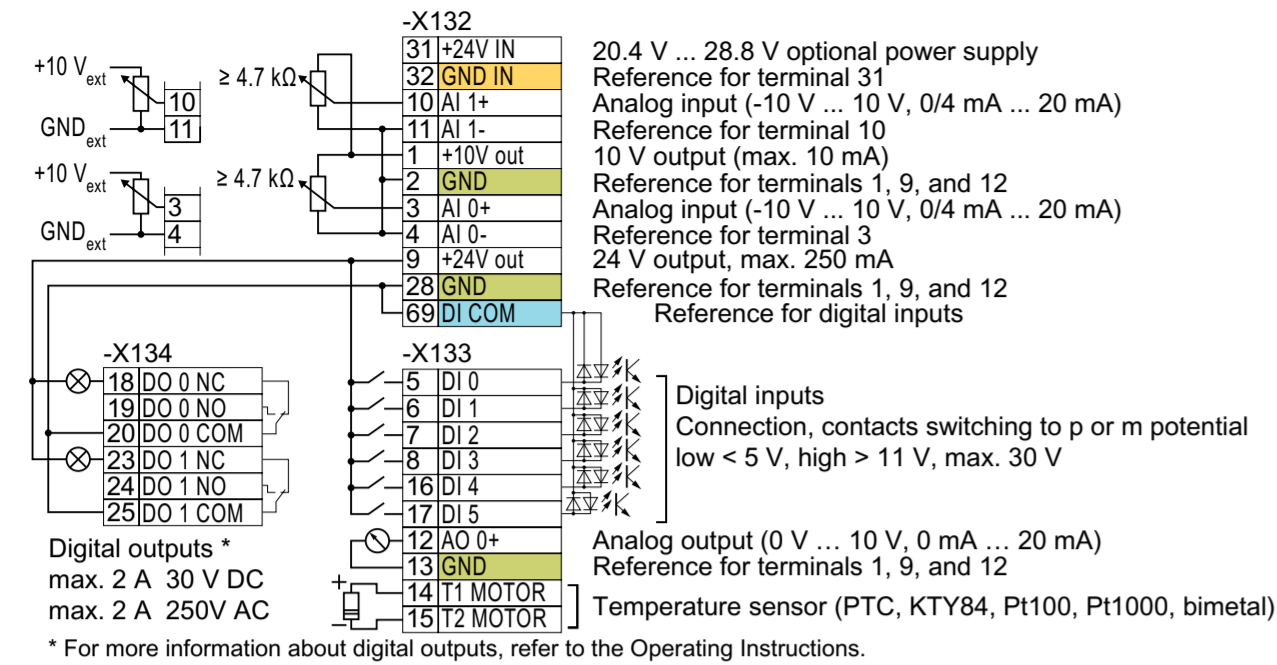
### Fieldbus connections

**PROFINET**  
 X150 X150  
 P1 P2  
 1 RX+, receive data +  
 2 RX-, receive data -  
 3 RxD/TxD-P, receive and transmit (B/B')  
 4 CNTR-P, control signal  
 5 DGND, reference potential for data (C/C')  
 6 VP, supply voltage  
 7 ---  
 8 TX-, transmit data -  
 9 ---

**PROFIBUS DP**  
 X126  
 1 Shield, ground  
 2 ---  
 3 RxD/TxD-P, receive and transmit (B/B')  
 4 CNTR-P, control signal  
 5 DGND, reference potential for data (C/C')  
 6 VP, supply voltage  
 7 ---  
 8 RxD/TxD-N, receive and transmit (A/A')  
 9 ---

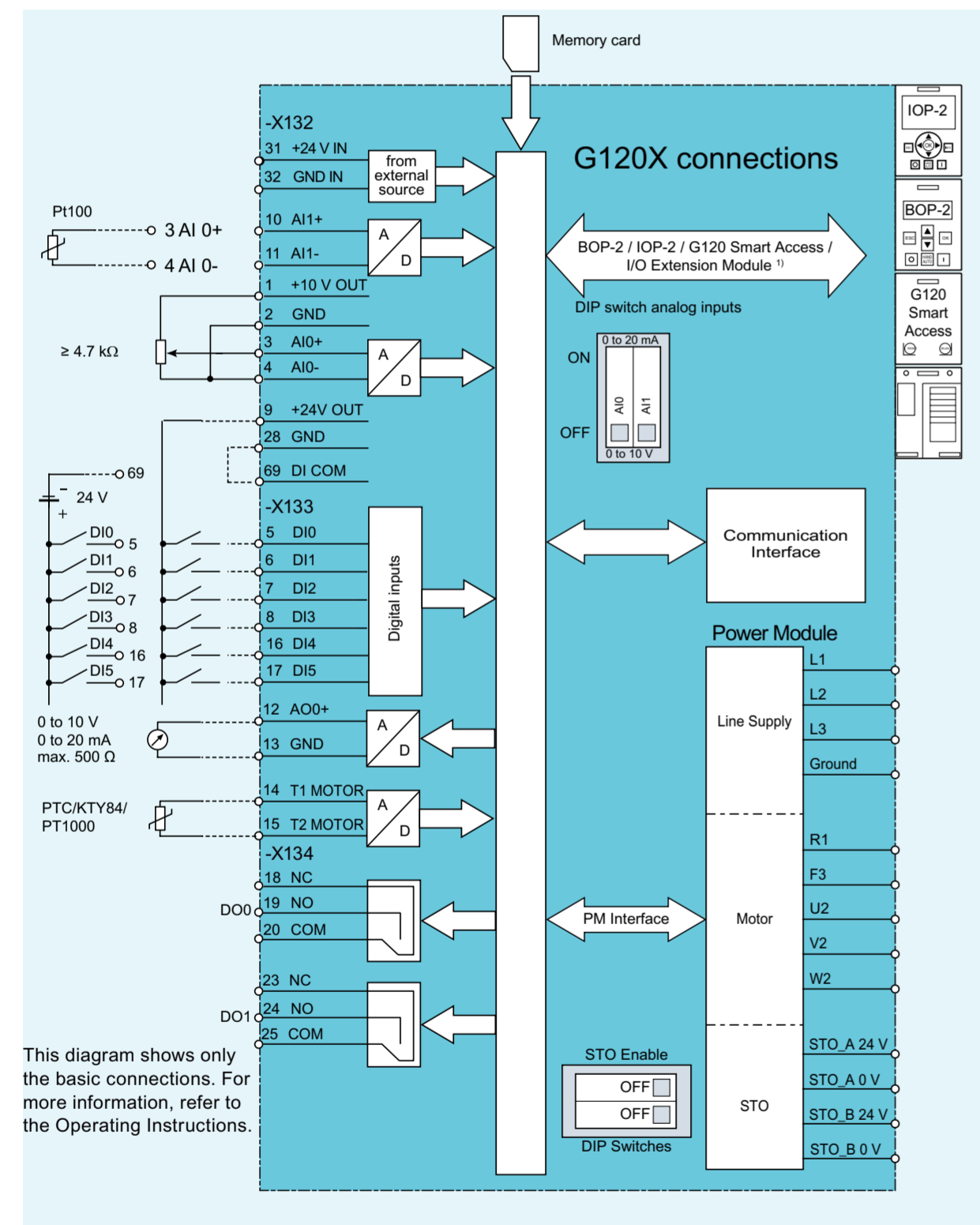
**USS**  
 X128  
 1 0 V, reference potential  
 2 RS 485P, receive and transmit (+)  
 3 RS 485N, receive and transmit (-)  
 4 Shield  
 5 ---

**Terminal strips with wiring example**



**IMPORTANT**  
The numbering sequence in the terminal wiring diagram is sorted into a numerical sequence that does not represent the actual numbering sequence on the Control Unit.

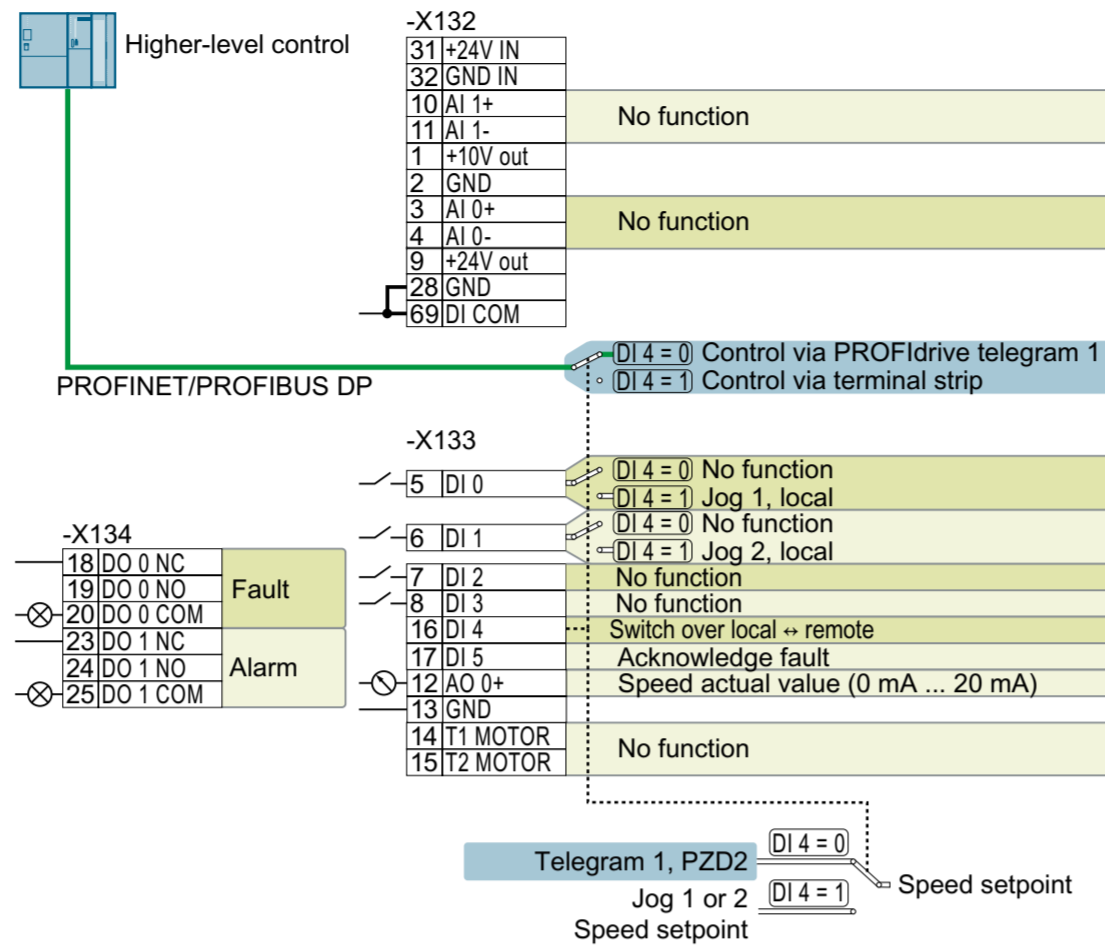
**Block diagram**



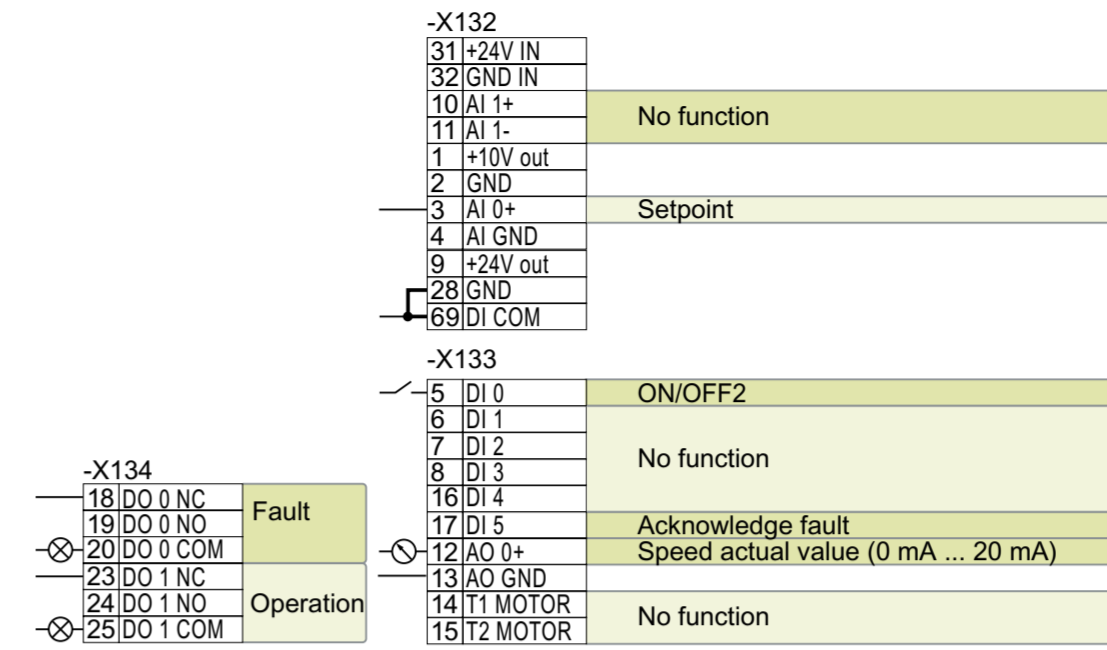
<sup>1)</sup> You can also mount a BOP-2, IOP-2 or SINAMICS G120 Smart Access on the I/O Extension Module.

**Factory settings of the converter**

**Converter with PROFINET or PROFIBUS DP interface**



**Converter with USS interface**



**Macro settings (p0015)**

The available macro settings depend on which fieldbus the converter supports, USS, PROFINET or PROFIBUS DP. You can set the macros from one of the following commissioning dialogues:

- BOP-2 -> Mac Par
- IOP-2 -> I/O Setup
- SINAMICS G120 Smart Access -> I/O configuration

**Prerequisite:** SINAMICS G120X I/O Extension Module is required to expand the I/O terminals.

Terminal	Macro settings								
	41	42	43	44	45	46	47	48	48
5	DI 0	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2	ON/OFF2, local	ON/OFF2	ON/OFF2	ON/OFF2
6	DI 1	-	-	Service pump 1	Service pump 1	Fixed speed 1	ON/OFF2, remote	-	Service pump 1
7	DI 2	-	-	Service pump 2	Service pump 2	Fixed speed 2	-	-	Service pump 2
8	DI 3	-	-	-	Service pump 3	Fixed speed 3	-	-	-
16	DI 4	-	Manual ↔ Auto	Manual ↔ Auto	Manual ↔ Auto	-	Local ↔ Remote	-	Manual ↔ Auto
17	DI 5	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault
18...20	DO 0	Fault	Fault	Fault	Fault	Fault	Fault	Fault	Fault
23...25	DO 1	Operation	Operation	Operation	Pump 1	Operation	Operation	Operation	Operation
97...99	DO 2	Ready for operation	Ready for operation	Pump 1	Pump 2	Ready for operation	Ready for operation	Ready for operation	Pump 1
94...96	DO 3	Alarm	Alarm	Pump 2	Pump 3	Alarm	Alarm	Alarm	Pump 2
3, 4	AI 0	Setpoint	PID setpoint	PID setpoint	PID setpoint	-	Setpoint, local	-	-
10, 11	AI 1	-	PID feedback	PID feedback	PID feedback	-	Setpoint, remote	PID feedback	PID feedback
12	AO 0	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value
85	AO 1	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value
Terminal	Macro settings								
	49	51	52	54	55	57	58	59	59
5	DI 0	ON/OFF2	ON/OFF2	ON/OFF2, local	ON/OFF2	ON/OFF2, local	Jog 1, local	ON/OFF2	ON/OFF2
6	DI 1	Service pump 1	-	ON/OFF2, remote	-	ON/OFF2, remote	Jog 2, local	MOP up	-
7	DI 2	Service pump 2	-	-	-	-	-	MOP down	-
8	DI 3	Service pump 3	-	-	-	-	-	-	-
16	DI 4	Manual ↔ Auto	-	Local ↔ Remote	-	Local ↔ Remote	Local ↔ Remote	-	-
17	DI 5	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	Acknowledge fault	-
18...20	DO 0	Fault	Fault	Fault	Fault	Fault	Fault	Fault	-
23...25	DO 1	Pump 1	Operation	Operation	Operation	Operation	Operation	Operation	-
97...99	DO 2	Pump 2	Ready for operation	Ready for operation	Ready for operation	Ready for operation	Ready for operation	Ready for operation	-
94...96	DO 3	Pump 3	Alarm	Alarm	Alarm	Alarm	Alarm	Alarm	-
3, 4	AI 0	-	-	Setpoint, local	-	Setpoint, local	-	-	-
10, 11	AI 1	PID feedback	-	-	-	-	-	-	-
12	AO 0	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	Speed actual value	-
85	AO 1	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	Current actual value	-

**NOTE**

It is recommended to reset the converter to factory defaults before switching to a new macro setting.

**Operator Panels and commissioning tools**

BOP-2 operating instructions  
<https://support.industry.siemens.com/cs/ww/en/view/109483379>

IOP-2 operating instructions  
<https://support.industry.siemens.com/cs/ww/en/view/109798705>

SINAMICS G120 Smart Access operating instructions  
<https://support.industry.siemens.com/cs/ww/en/view/109801989>

**Commissioning with SINAMICS G120 Smart Access**

The SINAMICS G120 Smart Access enables the wireless connection of mobile devices such as tablets, smartphones or laptops over Wi-Fi to the SINAMICS G120X converter series. The module is set up using a conventional browser and standard operating system. The server functionality eliminates the need to download any additional software.



**Technical support contact**

Online support application  
<https://support.industry.siemens.com/cs/ww/en/sci/2067>

Product registration  
<https://myregistration.siemens.com/>

SINAMICS G120 product information  
<https://www.siemens.com/press/en/pressrelease/?press=en/pressrelease/2018/digitalfactory/pr2018040224dfen.htm>

For more information on the permissible types for the branch circuit protection devices, see the Product Information of Protective Devices for SINAMICS G120X Converter.

SINAMICS G120X product information for Protective Devices  
<https://support.industry.siemens.com/cs/ww/en/view/109762895>

**Data regarding the power loss in accordance with Ecodesign Regulation (EU) 2019/1781 and IEC 61800-9-2**  
You can find data regarding power loss on the Internet:  
<https://support.industry.siemens.com/cs/ww/en/view/94059311>

Siemens AG  
Digital Industries  
Motion Control  
Postfach 3180  
91050 ERLANGEN  
Germany  
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