SINAMICS G120 Overview

The versatile single-motor drive for pumps, fans and compressors

Drive technology + Safety technology = Integrated Safety

Design

The SINAMICS G120 is a modular drive solution using innovative functions and comprising of a Power Module (PM) and Control Unit (CU). This drive is designed to provide precise and cost effective speed/torque control of AC motors in a wide range of industrial applications.

Power Modules - three versions are available:

PM240 - 0.37 kW - 250 kW, 380 V-480 V 3 AC ±10%
The PM240 has an integrated braking chopper so loads can be dynamically braked through an optional external resistor.

PM250 - 5.5 kW - 90 kW, 380 V-480 V 3 AC ±10%
The PM250 has 'Efficient Infeed Technology' (P47), which regenerates braking energy back into the mains supply. This technolgy also reduces the line harmonics so input reactors are not necessary.

PM260 - 7.5 kW - 55 kW, 500 V-690 V 3 AC ±10%
The PM260 also includes Efficient Infeed technology but adds an additional sinewave filter to ensure sinusoidal output currents.

Control Units (CU)

A wide range of Control Units (CU) are available – please see selection chart opposite.

Operator Panels

Basic Operator Panel (BOP), Basic Operator Panel 2 (BOP-2), Intelligent Operator Panel (IOP) and Handheld IOP. Door Mounting Kits are available.

Safety Integrated Functions

When used with the appropriate Control Unit will provide integrated safety functions certified to EN954-1 Cat.3, EN ISO 13849-1 PLd and IEC61508 SIL2.

Energy Efficiency: PM250 / PM260

Energy saving using innovative functions and energy recovery in regenerative operation

	Standard Technology	Efficient Infeed Technology
Line reactor	Required	Not required
Braking resistor	Required	Not required
Configuration overhead	Standard	Low
Generated harmonics	Standard	Minimal
Heat generated when braking	Yes	No
Power infeed	Standard	Approx. 22% less
Power consumption	Standard	Approx. 22% less
Energy efficiency	Standard	Good
Reactive power compensation	No	Yes
Installation outlay	Standard	Low

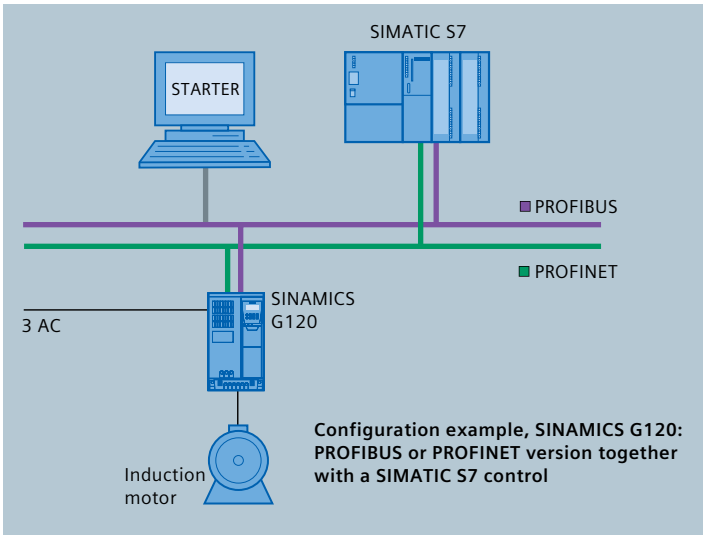
Control Units: Overview of functions

Control Unit	CU240B-2	CU240B-2 DP	CU230P-2 HVAC	CU230P-2 CAN	CU230P-2 DP	CU240E-2	CU240E-2 DP	CU240E-2 F	CU240E-2 DP F	CU240S-DP	CU240S-PN	CU240S-DP F	CU240S PN F
Interfaces													
Digital Inputs (DI)	4	4	6	6	6	6	6	6	6	9	9	6	6
Digital Inputs - Failsafe (F-DI)	-	-	-	-	-	1~	1~	3~	3~	-	-	2	2
Digital Outputs (DO)	1	1	3	3	3	3	3	3	3	3	3	3	3
Analogue Inputs (AI)	1*	1*	4^	4^	4^	2*	2*	2*	2*	2*	2*	2*	2*
Analogue Outputs (AO)	1	1	2	2	2	2	2	2	2	2	2	2	2
Bus Interface													
RS485 / USS	✓	-	✓	-	-	✓	-	✓	-	-	-	-	-
Modbus RTU	-	-	✓	-	-	-	-	-	-	-	-	-	-
BACnet Ms/TP	-	-	✓	-	-	-	-	-	-	-	-	-	-
CANopen	-	-	-	✓	-	-	-	-	-	-	-	-	-
Profibus	-	✓	-	-	✓	-	✓	-	✓	✓	-	✓	-
Profinet	-	-	-	-	-	-	-	-	-	-	✓	-	✓
Encoder Interfaces	-	-	-	-	-	-	-	-	-	1	1	1	1
Operator Panels													
Basic Operator Panel (BOP)	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓
Basic Operator Panel 2 (BOP-2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Intellegent Operator Panel (IOP)	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
IOP Handheld (via PC Connection Kit)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Safety Functions certified to EN954-1 Cat.3, EN ISO 13849-1 PLd and IEC61508 SIL2.													
Safe Stop (SS1)	-	-	-	-	-	-	-	✓	✓	-	-	✓	✓
Safely Limited Speed (SLS)	-	-	-	-	-	-	-	✓	✓	-	-	✓	✓
Safe Brake Control (SBC)	-	-	-	-	-	-	-	-	-	-	-	✓	✓
Safe Torque Off (STO)	-	-	-	-	-	✓	✓	✓	✓	-	-	✓	✓
Brake Relay / Safe Brake Relay	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	✓/ -	- / ✓	- / ✓
Control													
V/f linear/square/selectable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V/f with flux Current Control (FCC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V/f ECO linear/square	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
Vector w/o Encoder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vector with Encoder	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓
Torque Control w/o Encoder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Torque Control with Encoder	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓
Functions													
Fixed Frequencies	16 - programmable												
Operating Functions	Positioning down ramp, automatic restart, flying start, skip compensation, ramp smoothing, jog operation, kinetic buffering (PM240 only), motor and drive temperature monitoring, selectable data sets, technology controller (PID) and many more. The CU230P also has an energy saving function (hibernation), load torque monitoring and three programmable timers.												

* Analogue Inputs can be used as additional Digital Inputs if required.
^ The two differential analogue inputs can be used as additional digital inputs if required.
~ Each "Failsafe" input utilises two digital inputs from the module.

SINAMICS G120 PM240

The versatile single-motor drive for pumps, fans and compressors



Configuration example, SINAMICS G120: PROFIBUS or PROFINET version together with a SIMATIC S7 control

Design

The SINAMICS G120 is a modular drive solution comprising a Power Module (PM) and Control Unit (CU) and is designed to provide precise and cost effective speed/torque control of AC motors in a wide range of industrial applications.

PM 240 Power Modules (0.37 kW to 250 kW)

have an integrated braking chopper to enable loads to be dynamically braked. The energy produced during braking is dissipated through optional externally connected resistors. For frame size GX this is via an optional braking module to connect the braking resistor.

Control Units (CU)

A selection of Control Units (CU) is available dependent on your method of control, application, number of I/O, communication interface and safety features.

Benefits

- Modular - flexible expansion capability
- Compact space saving design
- Simple fast commissioning
- Integrated safety with appropriate CU
- Built in braking chopper module (except for frame size GX)
- Numerous control types
- Innovative cooling concept and coated electronic boards
- Optional MMC Memory Card for backup and transfer of parameter sets

Applications

A Universal Drive for a variety of industrial application e.g. fans, pumps, compressors, extruders, mixers, crushers and high performance conveyors.

Further information: Catalogue D11.1
or on-line: www.siemens.com/sinamics-G120

Technical data	
Electrical data	**SINAMICS G120 PM 240**
Line voltages Power ranges	380 V ... 480 V 3 AC, ±10 % 0.37 kW ... 250 kW
Line supply types	IT, TN, TT
Line frequency	47 ... 63 Hz
Output frequency	0 ... 650 Hz
Open-loop control Closed-loop control	Yes Yes - Control Unit dependent
Fixed frequencies	Control Unit dependent
Digital inputs (DI)	Control Unit dependent
Digital outputs (DO)	Control Unit dependent
Analog inputs (AI)	Control Unit dependent
Analog outputs (AO)	Control Unit dependent
Failsafe digital outputs (F-DI)	Control Unit dependent
Communication interface	Control Unit dependent
Functions	
Software functions	Automatic restart following line failure or fault; selectable ramp-up/ramp-down times, ramp rounding-off set by parameters
Integrated safety functions	STO, SS1, SLS, SBC~ Control Unit dependent
Protection functions	Under voltage, overvoltage, ground fault, short circuit, stall protection, thermal motor protection I2t, converter over temperature, motor over temperature
Motors that can be connected	Induction motors
Mechanical data	
Degree of protection	IP20
Cooling type	≤ 0.75 kW: convection cooling, version with flat heat sink >0.75 kW: internal air cooling (integrated fan)
Standards	
In conformance with the following standards	UL, CE, c-tick, cUL

~ Safe Brake Control on the Power Module via Safe Brake Relay 6SL3252-0BB01-0AA0.

Explanation of safety functions can be found on page 46.

SINAMICS G120 PM240

Part Numbers

Supply Voltage - 380 V ... 480 V 3 AC		Power Modules		
Rating		Frame Size	Industrial	Filtered #
0.37 kW / 1.3 A		A	6SL3224-0BE13-7UA0	6SE6400-2FA00-6AD0*
0.55 kW / 1.7 A		A	6SL3224-0BE15-5UA0	6SE6400-2FA00-6AD0*
0.75 kW / 2.2 A		A	6SL3224-0BE17-5UA0	6SE6400-2FA00-6AD0*
1.1 kW / 3.1 A		A	6SL3224-0BE21-1UA0	6SE6400-2FA00-6AD0*
1.5 kW / 4.1 A		A	6SL3224-0BE21-5UA0	6SE6400-2FA00-6AD0*
2.2 kW / 5.9 A		B	6SL3224-0BE22-2UA0	6SL3224-0BE22-2AA0
3 kW / 7.7 A		B	6SL3224-0BE23-0UA0	6SL3224-0BE23-0AA0
4 kW / 10.2 A		B	6SL3224-0BE24-0UA0	6SL3224-0BE24-0AA0
HO (CT)	LO (VT)			
5.5 kW / 13.2 A	7.5 kW / 18 A	C	6SL3224-0BE25-5UA0	6SL3224-0BE25-5AA0
7.5 kW / 19 A	11 kW / 25 A	C	6SL3224-0BE27-5UA0	6SL3224-0BE27-5AA0
11 kW / 26 A	15 kW / 32A	C	6SL3224-0BE31-1UA0	6SL3224-0BE31-1AA0
15 kW / 32 A	18.5 kW / 38 A	D	6SL3224-0BE31-5UA0	6SL3224-0BE31-5AA0
18.5 kW / 38 A	22 kW / 45 A	D	6SL3224-0BE31-8UA0	6SL3224-0BE31-8AA0
22 kW / 45 A	30 kW / 60 A	D	6SL3224-0BE32-2UA0	6SL3224-0BE32-2AA0
30 kW / 60 A	37 kW / 75 A	E	6SL3224-0BE33-0UA0	6SL3224-0BE33-0AA0
37 kW / 75 A	45 kW / 90 A	E	6SL3224-0BE33-7UA0	6SL3224-0BE33-7AA0
45 kW / 90 A	55 kW / 110 A	F	6SL3224-0BE34-5UA0	6SL3224-0BE34-5AA0
55 kW / 110 A	75 kW / 145 A	F	6SL3224-0BE35-5UA0	6SL3224-0BE35-5AA0
75 kW / 145 A	90 kW / 178 A	F	6SL3224-0BE37-5UA0	6SL3224-0BE37-5AA0
90 kW / 178 A	110 kW / 205 A	F	6SL3224-0BE38-8UA0	6SL3203-0BE32-5AA0*
110 kW / 205 A	132 kW / 250 A	F	6SL3224-0BE41-1UA0	6SL3203-0BE32-5AA0*
132 kW / 250 A	160 kW / 302 A	GX	6SL3224-0XE41-3UA0	6SL3000-0BE34-4AA0*
160 kW / 302 A	200 kW / 370 A	GX	6SL3224-0XE41-6UA0	6SL3000-0BE34-4AA0*
200 kW / 370 A	250 kW / 477 A	GX	6SL3224-0XE42-0UA0	6SL3000-0BE36-0AA0*

NOTE: HO = High Overload Rating (0.37 kW ... 75 kW - 1.5 x rated current for 57s in a 300s cycle time, 90 kW ... 200 kW - 1.36 x rated current for 57s in a 300s cycle time)
LO = Low Overload Rating (0.37 kW ... 250 kW - 1.1 x rated current for 57s in 300s cycle time.
# EMC filtering generally suitable for 1st environment; additional filter options available on request - please refer to page 51 for specific categorisations.
* Additional unit to be used with the industrial drive.

Control Units	Designation	Interfaces	DI	DO	AI	AO	F-DI	Safety
6SL3243-0BB30-1HA1	CU230P-2 HVAC	RS485 / USS / Modbus / BACnet	6	3	4	2	-	-
6SL3243-0BB30-1PA1	CU230P-2 DP	Profibus DP	6	3	4	2	-	-
6SL3243-0BB30-1CA1	CU230P-2 CAN	CANopen	6	3	4	2	-	-
6SL3244-0BB00-1BA0	CU240B-2	RS485 / USS	4	1	1	1	-	-
6SL3244-0BB00-1PA0	CU240B-2 DP	Profibus DP	4	1	1	1	-	-
6SL3244-0BB12-1BA0	CU240E-2	RS485 / USS	6	3	2	2	1^	STO
6SL3244-0BB12-1PA0	CU240E-2 DP	Profibus DP	6	3	2	2	1^	STO
6SL3244-0BB13-1BA0	CU240E-2 F	RS485 / USS	6	3	2	2	3^	STO, SS1, SLS
6SL3244-0BB13-1PA0	CU240E-2 DP F	Profibus DP	6	3	2	2	3^	STO, SS1, SLS
6SL3244-0BA20-1PA0	CU240S DP	Profibus DP	9	3	2	2	-	-
6SL3244-0BA20-1FA0	CU240S PN	Profinet	9	3	2	2	-	-
6SL3244-0BA21-1PA0	CU240S DP F	Profibus DP	6	3	2	2	2	STO, SS1, SLS, SBC~
6SL3244-0BA21-1FA0	CU240S PN F	Profinet	6	3	2	2	2	STO, SS1, SLS, SBC~

^ Each 'Failsafe' input utilises two digital inputs from the module.

Options	
6SL3255-0AA00-4BA1	BOP - Basic Operator Panel - **only** for CU240S / CU240E Control units
6SL3255-0AA00-4CA1	BOP-2 - Basic Operator Panel 2 - direct mount onto CU-2 Control units
6SL3255-0AA00-4JA0	IOP - Intelligent Operator Panel - direct mount onto CU-2 Control units
6SL3256-0AP00-0JA0	IOP / BOP-2 Door mounting Kit - only for use with CU-2 Control units
6SL3255-0AA00-4HA0	IOP Hand Held - Requires Connection Kit 6 SL3255-0AA00-2AA1 for CU240E / S
6SL3255-0AA00-2AA1	PC Inverter Connection Kit - only for use with CU240E and CU240S Control units
6SL3255-0AA00-2CA0	PC Inverter Connection Kit 2 - only for use with CU-2 Control units only
6SL3252-0BB00-0AA0	Brake Relay (including cable harness for connection to the power module)
6SL3252-0BB01-0AA0	Safe Brake Relay (including cable harness for connection to the power module)
6SL3254-0AM00-0AA0	Memory Card (MMC)

Shield Connection Kits	
6SL3264-1EA00-0EA0	Shield Connection kit for CU240S
6SL3264-1EA00-0FA0	Shield Connection kit for CU230P-2
6SL3264-1EA00-0HA0	Shield Connection kit for CU240B-2 & CU240E-2
6SL3262-1AA00-0BA0	Frame Size FSA PM240 / PM250
6SL3262-1AB00-0DA0	Frame Size FSB PM240 / PM250
6SL3262-1AC00-0DA0	Frame Size FSC PM240 / PM250
6SL3262-1AD00-0DA0	Frame Size FSD and FSE PM240 / PM250
6SL3262-1AF00-0DA0	Frame Size FSF PM240 / PM250