

SIEMENS



# SINAMICS G120P

The specialist for pumps, fans and compressors

Inverters

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The modular inverter for pumps, fans and compressors

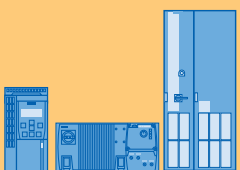
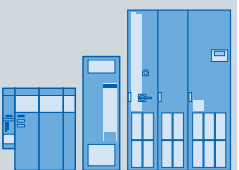
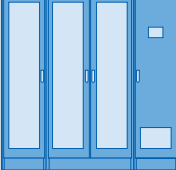
SINAMICS G120P has been specifically tailored to address pump, fan and compressor applications. The modular inverter comprises a Power Module and the optimum Control Unit coordinated to the particular application. Our range of Power Modules covers a power range extending from 0.37 up to 90 kW. Versions in IP20 and IP55 degrees of protection are available. SINAMICS G120P is used for simple speed adaptation as well as complex control tasks in building technology, the water industry and process industry.




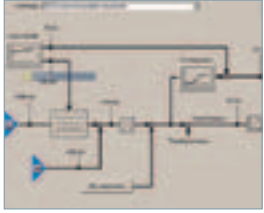



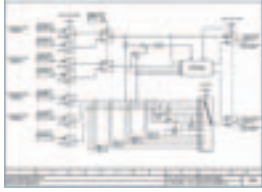


**SINAMICS G120P is a member of the SINAMICS family, which stands for innovative drive solutions that are fit for the future**

- Wide range of power ratings from 0.12 kW up to 120 MW
- Low-voltage and medium-voltage versions available
- Standard functionality using a common hardware and software platform
- All of the drives are engineered in the same way
  - SIZER for engineering
  - STARTER for parameterizing and commissioning
- All of the drives are engineered in the same way
- High degree of flexibility and combinability

SINAMICS offers the optimum drive for every application. A real highlight: All of the drives can be engineered, parameterized, commissioned and operated in the same standard way.

| Low voltage  |   | Medium voltage  |
|--|---|---|
|  |  |  |
| <b>SINAMICS G</b><br>0.12–2,700 kW   | <b>SINAMICS S</b><br>0.12–4,500 kW  | <b>SINAMICS GM/SM/GL</b><br>0.8–120 MW  |

|   | Function   | Benefit  |
|---|--|--|
| <b>Ruggedness – flexible, modular system for demanding ambient conditions</b>               |  |  |
|            | <ul style="list-style-type: none"> <li>Used for ambient temperatures from 0° up to 60°C</li> <li>IP20 degree of protection</li> <li>IP55 degree of protection</li> <li>Coated modules</li> </ul>   | <ul style="list-style-type: none"> <li>Also used where there are high climatic loads</li> <li>Space-saving mechanical design in the control cabinet, power loss is dissipated to the outside</li> <li>Used without a control cabinet, i.e. wall or panel mounting</li> <li>Increased ruggedness in harsh environments (humidity/dust)</li> </ul> |
|   | <ul style="list-style-type: none"> <li>Certified according to SEMI F 47</li> </ul>   | <ul style="list-style-type: none"> <li>Restart after a defined power failure</li> </ul>  |
| <b>Energy saving using innovative technology</b>  |  |  |
|            | <ul style="list-style-type: none"> <li>Lower line harmonics as a result of the power unit with smaller DC link</li> <li>Low apparent current consumption as a result of a high power factor <math>\lambda = 0.94 =  P /S</math></li> </ul> | <ul style="list-style-type: none"> <li>Complies with standard IEC 61000-3-12 for an RSCE &gt;250 without supplementary measures</li> <li>Smaller cable cross-sections as a result of the lower current drawn</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Flux reduction in the partial load range</li> </ul>   | <ul style="list-style-type: none"> <li>Power is saved in the partial load range by reducing the magnetic flux in the motor</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Hibernation mode</li> </ul>   | <ul style="list-style-type: none"> <li>The inverter is shut down if it is not required in the process</li> </ul>   |
| <b>User-friendly handling/simple application-specific commissioning</b>                     |  |  |
|          | <ul style="list-style-type: none"> <li>Pluggable operator panels</li> </ul>  | <ul style="list-style-type: none"> <li>Fast commissioning without expert knowledge</li> <li>Display with user-friendly plain text (IOP) or two channels (BOP-2)</li> <li>Minimized maintenance work</li> </ul>   |
|   | <ul style="list-style-type: none"> <li>Application support using wizards in the IOP and macros in STARTER</li> </ul>   | <ul style="list-style-type: none"> <li>Prompted commissioning for applications in building technology and the water and process industries</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Integrated USB port (plug &amp; play)</li> </ul>  | <ul style="list-style-type: none"> <li>Simple commissioning/diagnostic routines using PC tools</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>MMC memory card</li> </ul>  | <ul style="list-style-type: none"> <li>Data backup by simply replacing</li> </ul>  |
| <b>Requirement-optimized operating behavior</b>   |  |  |
|          | <ul style="list-style-type: none"> <li>Voltage/frequency characteristic for constant and square-law torque</li> </ul>  | <ul style="list-style-type: none"> <li>Basic open-loop control technique for centrifugal pumps, fans and radial compressors with low requirements on the dynamic performance</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Encoderless vector control</li> </ul>   | <ul style="list-style-type: none"> <li>Field-oriented control technique for reciprocating pumps/compressors with high requirements on the dynamic performance</li> </ul>   |
| <b>Extended number of inputs/outputs – for flexible use in a wide range of applications</b> |  |  |
|          | <ul style="list-style-type: none"> <li>Electrically isolated digital inputs (own potential group)</li> <li>Isolated analog inputs</li> </ul>   | <ul style="list-style-type: none"> <li>Avoidance of parasitic voltages</li> <li>EMC-compliant installation without additional components corresponding to the requirements of the process industry</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Direct connection of two resistance thermometers NI1000 / PT1000</li> </ul>   | <ul style="list-style-type: none"> <li>Connection of temperature sensors without separate evaluation</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Motor temperature monitoring</li> </ul>   | <ul style="list-style-type: none"> <li>Motor protection by directly connecting thermistors or bimetallic sensors</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Digital outputs with 230 V relay</li> </ul>   | <ul style="list-style-type: none"> <li>Direct control of auxiliary equipment, e.g. actuator drives for flaps or valves</li> </ul>  |

|   | Function  | Benefit  |
|---|---|--|
| <b>Innovative functions</b>   |   |  |
|                | <ul style="list-style-type: none"> <li>Automatic restart</li> </ul>   | <ul style="list-style-type: none"> <li>Automatic acknowledgment of the fault after a power failure and automatic restart</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Flying restart</li> </ul>  | <ul style="list-style-type: none"> <li>Synchronization of the inverter to a motor that is still rotating</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Skip frequencies</li> </ul>  | <ul style="list-style-type: none"> <li>Resonance points of the mechanical system and piping can be skipped</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Load torque monitoring</li> </ul>  | <ul style="list-style-type: none"> <li>Monitoring of the drive for dry running protection, blocked protection and belt monitoring</li> </ul>   |
|   | <ul style="list-style-type: none"> <li>Real-time clock</li> </ul>   | <ul style="list-style-type: none"> <li>Precise time stamp for fault and alarm logging, buffer time of up to 5 days</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>3 freely programmable digital time switches</li> </ul>   | <ul style="list-style-type: none"> <li>Three selectable events can be controlled as a function of the weekday / hour / minute</li> </ul>   |
|   | <ul style="list-style-type: none"> <li>Display of the energy consumption</li> </ul>   | <ul style="list-style-type: none"> <li>Display of the electrical energy used</li> <li>Display of the energy saved when compared to a control with throttle valve</li> </ul>                      |
|   | <ul style="list-style-type: none"> <li>Free function blocks</li> </ul>  | <ul style="list-style-type: none"> <li>Flexible use of integrated functions for optimum use in building technology, additional, external components can be eliminated</li> </ul>                 |
|   | <ul style="list-style-type: none"> <li>PID controller</li> </ul>  | <ul style="list-style-type: none"> <li>Closed-loop drive speed control as a function of process variables such as temperature, pressure, flow, air quality</li> </ul>                            |
|   | <ul style="list-style-type: none"> <li>Bypass</li> </ul>  | <ul style="list-style-type: none"> <li>Automatic switchover to line operation for faults or when the rated speed is reached</li> </ul>   |
| <ul style="list-style-type: none"> <li>Cascading drives</li> </ul>                              | <ul style="list-style-type: none"> <li>Energy-efficient adaptation of the flow rate by switching in/switching out up to three fixed-speed drives</li> </ul>   |  |
| <b>Communication interfaces – simple and direct integration into the automation environment</b> |   |  |
|              | <ul style="list-style-type: none"> <li>Different communication interfaces <ul style="list-style-type: none"> <li>RS485 with USS protocol</li> <li>Modbus RTU, BACNet MS/TP</li> <li>Siemens FLN P1</li> <li>PROFIBUS DP</li> <li>CANopen</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Simple integration into building management systems, process control systems and automation systems</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>External 24 V power supply</li> </ul>  | <ul style="list-style-type: none"> <li>Bus is not interrupted when the inverter is in the off state</li> </ul>   |
| <b>Special functions for optimum use in building technology</b>                                 |   |  |
|              | <ul style="list-style-type: none"> <li>3 additional, integrated, freely programmable PID controllers</li> </ul>   | <ul style="list-style-type: none"> <li>Distributed control of flaps, heating and cooling valves without any additional control</li> </ul>  |
|   | <ul style="list-style-type: none"> <li>Multi-zone closed-loop control</li> </ul>  | <ul style="list-style-type: none"> <li>Control of pressure, temperature, air quality in up to three zones (average value, minimum, maximum) with a setpoint that can be switched over</li> </ul> |
|   | <ul style="list-style-type: none"> <li>Extended operation in the case of fire (essential service mode)</li> </ul>   | <ul style="list-style-type: none"> <li>Maximum operating time of the drive in case of fire by changing the setpoints, suppressing faults and automatic restart</li> </ul>                        |

|   |   |                     |
|---|---|---------------------|
| <b>Mechanical data</b>  |   |                     |
| <b>Degree of protection</b>                                     | Max. IP55 / UL Type 12  | IP20 / UL Open Type |
| <b>Electrical data</b>  |   |                     |
| <b>Power rating (low overload LO)</b>                           | 0.37 ... 90 kW  | 0.37 ... 75 kW      |
| Rated output current (low overload LO)                          | 1.3 ... 178 A   | 1.3 ... 145 A       |
| <b>Line supply voltage</b>                                      | 3 AC 380 ... 480 V ±10 %  |                     |
| <b>Line frequency</b>   | 47 ... 63 Hz  |                     |
| <b>Overload capability (low overload LO / high overload HO)</b> | Low Overload (LO): 150 % for 3 s plus 110 % for 57 s within a duty cycle of 300 s.<br>High Overload (HO): 200 % for 3 s plus 150 % for 57 s within a duty cycle of 300 s.<br>When using the overload capability, the continuous output current is not reduced.*       |                     |
| <b>Operating temperature</b>                                    | 0 °C to +60 °C (122 °F) for power derating  |                     |
| <b>Relative humidity</b>  | < 95 % RH, condensation not permissible   |                     |
| <b>Output frequency</b>   | 0 ... 650 Hz  |                     |
| <b>Digital/analog inputs and outputs</b>                        | 6DI / 3DO / 4AI / 2AO   |                     |
| <b>Communication</b>  |   |                     |
| <b>Bus interface</b>  | RS485/USS/Modbus RTU, BACnet MS/TP, Siemens FLN P1, PROFIBUS DP, CANopen  |                     |
| <b>Commissioning tools</b>                                      |   |                     |
| <b>Software operator unit</b>                                   | STARTER for the commissioning PC  |                     |
| <b>Functions</b>  |   |                     |
| <b>Open-loop/closed-loop control techniques</b>                 | V/f (linear, square-law, FCC, ECO), sensorless vector control (SLVC)  |                     |
| <b>Protection functions</b>                                     | Motor temperature monitoring with and without temperature sensor (via PTC, KTY and ThermoClick sensor) <ul style="list-style-type: none"> <li>■ Overcurrent protection</li> <li>■ Torque monitoring</li> <li>■ Overvoltage protection (Vdc_max controller)</li> </ul> |                     |
| <b>Brake functions</b>  | DC brake  |                     |
| <b>Motors that can be connected</b>                             | 3-phase induction motors  |                     |
| <b>Standards</b>  |   |                     |
| <b>Conformance with standards</b>                               | UL, CE, c-tick  |                     |
| <b>Electromagnetic compatibility</b>                            | Integrated line filter for installations acc. to EN 61800-3 Category C1 (filter class B) and EN 61800-3 Category C2 (filter class A)  |                     |

\*Reduced overload cycle for PM230 IP20 from 22 kW (HO and LO), refer to the documentation for details

## SINAMICS G120P: Configuration in three steps



The SINAMICS G120P inverter comprises the PM230 Power Module, CU230P-2 Control Unit as well as an operator panel (IOP or BOP-2) or a blanking cover. When ordering, an order number is specified for each of the components. The order numbers are listed on the last page.

# Selection and ordering data

| Power Modules PM230 IP55 / IP20 |      |                                       |            |   |   |
|---------------------------------|------|---------------------------------------|------------|---|---|
| Rated power (LO)                |      | Rated output current <sub>IN,LO</sub> | Frame size | PM230 IP55 degree of protection, order number | PM230 IP20 degree of protection *, order number |
| kW                              | hp   | A                                     |            |   |   |
| 0.37                            | 0.5  | 1.3                                   | FSA        | 6SL3223-0DE13-7□A0                            | 6SL3210-1NE11-3□L0                              |
| 0.55                            | 0.75 | 1.7                                   |            | 6SL3223-0DE15-5□A0                            | 6SL3210-1NE11-7□L0                              |
| 0.75                            | 1.0  | 2.2                                   |            | 6SL3223-0DE17-5□A0                            | 6SL3210-1NE12-2□L0                              |
| 1.1                             | 1.5  | 3.1                                   |            | 6SL3223-0DE21-1□A0                            | 6SL3210-1NE13-1□L0                              |
| 1.5                             | 2.0  | 4.1                                   |            | 6SL3223-0DE21-5□A0                            | 6SL3210-1NE14-1□L0                              |
| 2.2                             | 3.0  | 5.9                                   |            | 6SL3223-0DE22-2□A0                            | 6SL3210-1NE15-8□L0                              |
| 3.0                             | 4.0  | 7.7                                   |            | 6SL3223-0DE23-0□A0                            | 6SL3210-1NE17-7□L0                              |
| 4.0                             | 5.0  | 10.2                                  | FSB        | 6SL3223-0DE24-0□A0                            | 6SL3210-1NE21-0□L0                              |
| 5.5                             | 7.5  | 13.2                                  |            | 6SL3223-0DE25-5□A0                            | 6SL3210-1NE21-3□L0                              |
| 7.5                             | 10   | 18                                    |            | 6SL3223-0DE27-5□A0                            | 6SL3210-1NE21-8□L0                              |
| 11.0                            | 15   | 26                                    | FSC        | 6SL3223-0DE31-1□A0                            | 6SL3210-1NE22-6□L0                              |
| 15.0                            | 20   | 32                                    |            | 6SL3223-0DE31-5□A0                            | 6SL3210-1NE23-2□L0                              |
| 18.5                            | 25   | 38                                    |            | 6SL3223-0DE31-8AA0                            | 6SL3210-1NE23-8□L0                              |
| 18.5                            | 25   | 38                                    | FSD        | 6SL3223-0DE31-8BA0                            | –   |
| 22                              | 30   | 45                                    |            | 6SL3223-0DE32-2□A0                            | 6SL3210-1NE24-5□L0                              |
| 30                              | 40   | 60                                    | FSE        | 6SL3223-0DE33-0□A0                            | 6SL3210-1NE26-0□L0                              |
| 37                              | 50   | 75                                    |            | 6SL3223-0DE33-7□A0                            | 6SL3210-1NE27-5□L0                              |
| 45                              | 60   | 90                                    |            | 6SL3223-0DE34-5□A0                            | 6SL3210-1NE28-8□L0                              |
| 55                              | 75   | 110                                   | FSF        | 6SL3223-0DE35-5□A0                            | 6SL3210-1NE31-1□L0                              |
| 75                              | 100  | 145                                   |            | 6SL3223-0DE37-5□A0                            | 6SL3210-1NE31-5□L0                              |
| 90                              | 125  | 178                                   |            | 6SL3223-0DE38-8□A0                            | –   |



\* PM230 IP20 from 22 kW: can be ordered from June 2012 onwards

| Frame size | Filters             | Dimensions, G120P, degree of protection IP55** | Dimensions G120P, degree of protection IP20** |
|------------|---------------------|--|---|
| FSA        | Unfiltered/filtered | 154 x 460 x 264 / 6.06 x 18.11 x 9.8           | 73 x 196 x 248 / 2.87 x 7.72 x 9.37           |
| FSB        | Unfiltered/filtered | 180 x 540 x 264 / 7.08 x 21.25 x 9.8           | 100 x 292 x 248 / 3.94 x 11.5 x 9.37          |
| FSC        | Unfiltered/filtered | 230 x 620 x 264 / 9.05 x 24.40 x 9.8           | 140 x 355 x 248 / 5.51 x 13.98 x 9.37         |
| FSD        | Non-filtered        | 320 x 640 x 344 / 12.59 x 25.18 x 12.94        | 275 x 419 x 287 / 10.83 x 16.5 x 11.30        |
|            | Filtered            |  | 275 x 512 x 287 / 10.83 x 20.16 x 11.30       |
| FSE        | Non-filtered        | 320 x 751 x 344 / 12.59 x 29.55 x 12.94        | 275 x 499 x 287 / 10.83 x 19.65 x 11.30       |
|            | Filtered            |  | 275 x 635 x 287 / 10.83 x 25 x 11.30          |
| FSF        | Non-filtered        | 410 x 915 x 431 / 16.14 x 36.02 x 16.38        | 350 x 634 x 399 / 13.78 x 24.96 x 15.71       |
|            | Filtered            |  | 350 x 934 x 399 / 13.78 x 36.77 x 15.71       |

\*\*Dimensions in mm / inch, max. W x H x D. The depth is specified with Control Unit and IOP.

| Control Units     |  |                    |
|-------------------|--|--------------------|
| Brief designation | Communication  | Order number       |
| CU230P-2 HVAC     | RS485 / USS / Modbus RTU / BACnet MS / TP / Siemens FLN P1 | 6SL3243-0BB30-1HA2 |
| CU230P-2 DP       | PROFIBUS DP  | 6SL3243-0BB30-1PA2 |
| CU230P-2 CAN      | CANopen  | 6SL3243-0BB30-1CA2 |

| Accessories   |                    |
|---|--------------------|
| Designation   | Order number       |
| IOP   | 6SL3255-0AA00-4JA0 |
| BOP-2   | 6SL3255-0AA00-4CA1 |
| Door mounting kit for IOP/BOP-2                           | 6SL3256-0AP00-0JA0 |
| Blanking cover for PM230 IP55 / UL Type 12                | 6SL3256-1BA00-0AA0 |
| PC connection kit 2 for CU230P-2                          | 6SL3255-0AA00-2CA0 |
| Shield connection kit 1 for CU230P-2 IP20 HVAC / DP / CAN | 6SL3264-1EA00-0FA0 |
| MMC memory card 64 MB                                     | 6SL3054-4AG00-0AA0 |
| SINAMICS documentation DVD                                | 6SL30974CA000YGO   |

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