SINAMICS G120
Inverters with the Control Units
CU230P-2
CU240B-2
CU240E-2
Getting Started · 06 2010
Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

**DANGER**
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**WARNING**
indicates that death or severe personal injury **may** result if proper precautions are not taken.

**CAUTION**
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

**CAUTION**
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

**NOTICE**
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
# Table of contents

1 Design and installation...................................................................................................................... 7
   1.1 Inverter ........................................................................................................................................ 7
   1.2 Control Units ............................................................................................................................... 9
   1.3 Interfaces .................................................................................................................................... 10
   1.4 Installation ................................................................................................................................. 14
   1.5 Connection diagram .................................................................................................................. 16
   1.6 IOP Intelligent Operator Panel ................................................................................................. 18
   1.7 Operation .................................................................................................................................. 19
   1.8 Menu structure ............................................................................................................................ 20

2 Commissioning .................................................................................................................................... 21
   2.1 Commissioning procedure ......................................................................................................... 21
   2.2 Basic commissioning .................................................................................................................. 22
   2.3 Voltage boost ............................................................................................................................. 23
   2.4 Inputs and outputs ....................................................................................................................... 24
   2.5 Data backup on the memory card ............................................................................................... 26
   2.6 Important parameters .................................................................................................................. 27
1.1 Inverter

Components and design of the inverter

SINAMICS G120 inverters comprise a *Power Module* (PM) and *Control Unit* (CU). The following tools are available to commission the inverter:

- Intelligent Operator Panel IOP
- Basic Operator Panel BOP 2 (will be available from 05/2010)
- STARTER commissioning tool (PC software)

![Design of the inverter (example)](image)

1. Power Module PM (IP20)
2. Control Unit CU
3. Intelligent Operator Panel IOP
4. Power Module PM230 (IP54 / UL Type 12) with inserted IOP

Figure 1-1  Design of the inverter (example)
Objective of these operating instructions

This Getting Started describes how you commission and operate a SINAMICS G120 inverter using the Application Wizards of the IOP. For special inverter functions, e.g. the automatic restart or flying restart function, please use the operating instructions and the Parameter Manual of the corresponding Control Unit.

The functions and properties of the IOP are described in detail in the "SINAMICS IOP" operating instructions and are only explained here to an extent that is necessary to understand the described functions.

Additional information on SINAMICS G120

All manuals for SINAMICS G120 inverters can be downloaded from the Internet:

and are additionally available on DVD:
SD Manual Collection - all of the manuals on low-voltage motors, geared motors and low-voltage inverters, 5 languages
Order number: 6SL3298-0CA00-0MG0 (supplied once)
Order number: 6SL3298-0CA10-0MG0 (update service for 1 year; supplied 4 times)

Mistakes, questions and improvements

If you find any mistakes when reading this manual or if you have any suggestions for how it can be improved, please contact us as follows:

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E-mail documentation.standard.drives@siemens.com
### 1.2 Control Units

#### Different Control Unit versions

The Control Units differ by the following main factors:

- Fieldbus interface type
- Type and scope of the functions
- e.g. for CU230P-2... through additional specific technology functions for pumps, fans and compressors
- e.g. for CU240E-2... through additional integrated safety functions
- Type and number of available inputs and outputs

This Programming Manual is applicable for the Control Units: CU230P-2..., CU240B-2... and CU240E-2....

<table>
<thead>
<tr>
<th>CU230P-2...</th>
<th>Fieldbus</th>
<th>Technology functions</th>
<th>Digital outputs</th>
<th>Analog inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>Functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU230P-2 HVAC</td>
<td>USS or Modbus RTU or BACnet MS/TP</td>
<td>For instance: Hibernation, motor staging, emergency operation, multi-zone controller, bypass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU230P-2 CAN</td>
<td>CANopen</td>
<td></td>
<td></td>
<td>AI0 and AI1: Voltage or current; AI2: Current or temperature sensor (Ni1000/PT1000); AI3: Temperature sensor (Ni1000/PT1000);</td>
</tr>
<tr>
<td>CU230P-2 DP</td>
<td>PROFIBUS DP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CU240B/E-2...</th>
<th>Fieldbus</th>
<th>Integrated safety functions</th>
<th>Digital inputs</th>
<th>Fail-safe digital inputs*</th>
<th>Analog inputs</th>
<th>Digital outputs</th>
<th>Analog outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>Functions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU240B-2</td>
<td>USS or Modbus RTU</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU240B-2 DP</td>
<td>PROFIBUS DP</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU240E-2</td>
<td>USS or Modbus RTU</td>
<td>STO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU240E-2 F</td>
<td>USS or Modbus RTU</td>
<td>STO, SS1, SLS</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU240E-2 DP</td>
<td>PROFIBUS DP</td>
<td>STO</td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CU240E-2 DP-F</td>
<td>PROFIBUS DP with PROFIsafe</td>
<td>STO, SS1, SLS</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*) A fail-safe digital input is created by combining two “standard” digital inputs
1.3 Interfaces

Process and user interfaces

You will find the following interfaces and operator controls on the Control Unit:

- Terminals for the digital and analog input and output signals.
- DIP switch to set analog inputs as either current input or voltage input.
- Fieldbus interface for signal exchange, e.g. with a higher-level control. (The type of fieldbus interface depends on the specific CU.)
- DIP switch to connect a bus terminating resistor.
- DIP switch to set the fieldbus address.
- Memory card slot to save and transfer inverter settings.
- Interface, to insert the operator device (e.g. IOP or BOP-2).
- USB interface, to connect the inverter with PC / STARTER.
- LED for diagnostics and to display operating states.
1.3 Interfaces

CU230P-2 HVAC

RS485 connector for communicating via fieldbus systems

Switch for bus terminating resistor

Figure 1-2 Communication interfaces, CU230P-2

CU230P-2 CAN

SUB D socket for communicating via CAN

Figure 1-2 Communication interfaces, CU230P-2

CU230P-2 DP

SUB D socket for communicating via PROFIBUS DP

Table 1-2 Assignment of the RS-485 connector

<table>
<thead>
<tr>
<th>Contact</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>0 V</td>
<td>Reference potential</td>
</tr>
<tr>
<td>Pin 2</td>
<td>RS485P</td>
<td>Receive and send signal (+)</td>
</tr>
<tr>
<td>Pin 3</td>
<td>RS485N</td>
<td>Receive and send signal (-)</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Shield</td>
<td>Cable shield</td>
</tr>
<tr>
<td>Pin 5</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Figure 1-3 Communication interfaces, CU240B-/E-2

CU240B-2, CU240E-2, CU240E-2 F

CU240B-2 DP, CU240E-2 DP, CU240E-2 DP-F

RS485 connector for communicating via fieldbus systems

Switch for bus terminating resistor

SUB D socket for communicating via PROFIBUS DP
1.3 Interfaces

Figure 1-4 Process and user interfaces CU230P-2

- Memory card slot
- IOP/IOP handheld interface
- USB interface for STARTER
- RDY
- BF
- Status LED
- DIP switch for bus address
- NI1000 DIP switch AI2 (terminals 50/51)
- DIP switch for AI0 and AI1 (terminals 3/4 and 10/11)
- Digital Outputs
- Terminal strip
- Terminal designation
1.3 Interfaces

Figure 1-5  Process and user interfaces, CU240B-/E-2

1. Memory card slot
2. IOP-/IOP handheld interface
3. USB interface for STARTER
4. DIY
   BF
   SAFE  Status LED
5. DIP switch for bus address
   Bit 6 (64)
   Bit 5 (32)
   Bit 4 (16)
   Bit 3 (8)
   Bit 2 (4)
   Bit 1 (2)
   Bit 0 (1)
   On
   Off
6. DIP switch for A0 and A11 (terminals 3/4 and 10/11)
   A11
   A10
   Current  Voltage
7. Terminal block
8. Terminal marking
9. Bus terminator

CU230P-2; CU240B-2; CU240E-2 Control Units
Getting Started, 06/2010, A5E02792536B AB 13
1.4 Installation

Procedure to install the inverter

1. Mount the Power Module according to the mounting regulations.
2. Connect the motor in either the star or delta circuit configuration (observe the data on the motor rating plate).
3. Connect the Power Module to the motor and power supply.
4. Plug the Control Unit onto the Power Module.
5. Connect the terminals of the CU according to the connection diagram for open-loop controlled or closed-loop controlled applications.
6. Plug the IOP onto the Control Unit.
7. Switch on the inverter power supply.
8. Start the basic commissioning using an Application Wizard.

Motor connection type (star or delta)

A delta connection is required if you wish to operate your application with an 87 Hz characteristic (instead of 50 Hz).
Connecting the Power Module to the motor and power supply.

Figure 1-6  Connection diagrams for PM230, PM240, PM250 - line filter and sine-wave filter are already integrated in the PM260 Power Module. Otherwise, the wiring of the PM260 corresponds to that of the PM250.
Plug the Control Unit onto the Power Module and the operator device onto the Control Unit

1.5 Connection diagram

Connection diagram to use Application Wizards

Commissioning using Application Wizards is the simplest way of commissioning pump, fan and compressor applications as well as conveyor systems. Application Wizards guide you step-by-step, in the form of questions, through the commissioning of various standard applications. To do this, your application must be connected up as shown on the following connection diagram.
"Controlled" operation: Application using a technology controller

"Open-loop controlled" operation - i.e. application without technology controller - differs in so much that the second analog input (AI1 = gray background) is not used.

Figure 1-7 Application with technology controller
1.6 IOP Intelligent Operator Panel

The IOP

The IOP is an operator device with which you can commission the inverter locally, enter parameters and monitor operation.

Selection menus and status displays are shown on the text and graphics display. The central panel is structured in three display areas:

1. Status and diagnostics display
2. Status message, here: Output voltage
3. Status message, here: Output frequency
4. Menu: Wizard / Control / Menu

The IOP Intelligent Operator Panel
## 1.7 Operation

### Operation with the IOP

The IOP is operated using the 5 buttons and a navigation wheel.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>You can select the required menu by turning the navigation wheel, e.g. WIZARD. You confirm your selection by pressing on the navigation wheel (OK).</td>
</tr>
<tr>
<td>HAND AUTO</td>
<td>By pressing, you can toggle between external command sources and the IOP as command source. - MANUAL means: Manual control using the IOP buttons - AUTO means: The inverter responds to the external control commands (e.g. fieldbus or terminals)</td>
</tr>
<tr>
<td>I</td>
<td>In the AUTO mode: without function. In the MANUAL mode: Pressing starts the inverter</td>
</tr>
<tr>
<td>O</td>
<td>In the AUTO mode: without function. In the MANUAL mode: - Press briefly: OFF1 - the motor comes to a standstill with the selected down ramp (P1121) - Pressing longer than 3 seconds: OFF2 - the motor coasts down to standstill</td>
</tr>
<tr>
<td>INFO</td>
<td>Pressing supplies information about the actual display. You return to the display by pressing again</td>
</tr>
<tr>
<td>ESC</td>
<td>Press briefly: Return to the previous display. Pressing longer than 3 seconds: The IOP returns to the status screen</td>
</tr>
</tbody>
</table>
1.8 Menu structure

Menu structure

The menu structure shows you where you can find the application Wizards and additional setting functions. Instead of using the application Wizards, you can also use individual parameters to change all of the settings.

- Wizards
  - Boost
  - Open Loop Fan
  - Basic Commissioning
  - PID Wizard
  - Open Loop Pump
  - Open Loop Compressor
  - Closed Loop Pump
  - Closed Loop Fan
  - Roller Conveyor
  - Closed Loop Compressor

- Control
  - Setpoint
  - Reverse
  - Jog

- Menu
  - Diagnostics
    - Active faults/alarms
    - History
    - Identification/Maintenance
    - I/O-Status
    - Communication status
    - E/A-Simulation
    - Drive enables
  - Parameters
    - Parameter groups
    - All parameters
    - Search by number
    - My parameters
    - Changed parameters
    - Parameter filter
    - Default dataset
    - Drive factor reset
  - Wizards (shortcut to wizards menu)
  - Up-/Download
    - Download: Panel to drive
    - Upload: Drive to panel
  - Extras
    - Status-screen wizard
    - Language
    - Time and Date
    - Drive identity
    - Operator panel restart
    - Operator panel Factory reset
    - Display backlight
    - Display contrast
    - Lighting duration
    - Panel identity
2.1 Commissioning procedure

General commissioning procedure using the menu-assisted IOP Wizards

The BASIC COMMISSIONING Wizard has been developed so that either the terminals or
the fieldbus are used as command source. You can select the IOP as command source
using the MANUAL / AUTO button.

- You generally start with the BASIC COMMISSIONING or an Application Wizard, e.g.
  CONTROLLED PUMP.
  - You will find an example for the basic commissioning on the following page.
  - In order to optionally commission e.g. using the Application Wizard CONTROLLED
    PUMP, your application must be connected up as shown in the connection diagram for
    ‘Application with technology controller’.

- The first step in each Wizard is to RESTORE FACTORY SETTINGS. This ensures that
  the inverter is in a defined basic setting.

- As you proceed, among other things, enter the motor data: To do this, read off the data
  from the motor rating plate.

- You must check and confirm your commissioning data before it is accepted in the
  inverter. You do this using the last but one menu item OVERVIEW OF THE SETTINGS.
  In this screen, scroll down to CONTINUE and acknowledge it with OK.

Motor data on the rating plate

1. Motor voltage = P0304
2. Motor frequency = P0310
3. Motor current = P0305
4. Motor power = P0307
5. Motor power factor = P0308
6. Rated motor speed = P0311
2.2 Basic commissioning

The last step is the prompt SAVE or INTERRUPT WIZARD? Select SAVE! Your commissioning data are then loaded into the inverter. Commissioning has now been completed.

You can then make additional settings if required: e.g. a voltage boost to optimize starting behavior using the BOOST Wizard.

Start the menu: WIZARD / BASIC COMMISSIONING

<table>
<thead>
<tr>
<th>No.</th>
<th>Input screen of the IOP</th>
<th>Selected setting on the IOP</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/23</td>
<td>Restore factory settings</td>
<td>[1] yes</td>
<td>P0970 =</td>
<td>1</td>
</tr>
<tr>
<td>02/23</td>
<td>Control mode</td>
<td>[0] V/f with linear characteristic</td>
<td>P1300 =</td>
<td>0</td>
</tr>
<tr>
<td>03/23</td>
<td>Encoder type</td>
<td>[0] Not activated</td>
<td>P0400 =</td>
<td>0</td>
</tr>
<tr>
<td>04/23</td>
<td>Encoder pulses</td>
<td>Encoder type not activated</td>
<td>P0408 is set as default</td>
<td>Confirm with OK</td>
</tr>
<tr>
<td>05/23</td>
<td>Motor data</td>
<td>[0] Europe 50 Hz, kW</td>
<td>P0100 =</td>
<td>0</td>
</tr>
<tr>
<td>06/23</td>
<td>Characteristic</td>
<td>50 Hz / 87 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07/23</td>
<td>Motor connections</td>
<td>Observe the motor connection (star / delta)!</td>
<td>Confirm with OK</td>
<td></td>
</tr>
<tr>
<td>08/23</td>
<td>Motor data</td>
<td>Enter motor data for 50 Hz (refer to 06/23)</td>
<td>Confirm with OK</td>
<td></td>
</tr>
<tr>
<td>09/23</td>
<td>Rated power</td>
<td>Enter [kW] (or [hp]) according to the motor rating plate</td>
<td>P0307 =</td>
<td>0.37</td>
</tr>
<tr>
<td>10/23</td>
<td>Motor speed</td>
<td>Enter [rpm] according to the motor rating plate</td>
<td>P0311 =</td>
<td>1395</td>
</tr>
<tr>
<td>11/23</td>
<td>Motor current</td>
<td>Enter [A] according to the motor rating plate</td>
<td>P0305 =</td>
<td>1.00</td>
</tr>
<tr>
<td>12/23</td>
<td>Motor voltage</td>
<td>Enter [V] according to the motor rating plate</td>
<td>P0304 =</td>
<td>400</td>
</tr>
<tr>
<td>13/23</td>
<td>Motor data ID</td>
<td>[1] Stationary and rotating measurement(^1) If the motor cannot freely rotate, e.g. if travel is mechanically limited, select the setting [2] &quot;MotID only stationary&quot;.</td>
<td>P1900 =</td>
<td>1</td>
</tr>
<tr>
<td>16/23</td>
<td>Additional setpoint source</td>
<td>No additional setpoint</td>
<td>P1075 =</td>
<td>0</td>
</tr>
<tr>
<td>17/23</td>
<td>Minimum speed</td>
<td>Enter the minimum speed [rpm] down to which the motor should operate.</td>
<td>P1080 =</td>
<td>0.00</td>
</tr>
<tr>
<td>18/23</td>
<td>Ramp-up</td>
<td>Time [s] in which the motor should accelerated from standstill up to the maximum speed (P1082).</td>
<td>P1120 =</td>
<td>50.00</td>
</tr>
<tr>
<td>19/23</td>
<td>Ramp-down</td>
<td>Time [s] in which the motor should be decelerated from the maximum speed (P1082) down to standstill.</td>
<td>P1121 =</td>
<td>10.00</td>
</tr>
<tr>
<td>20/23</td>
<td>Overview of the settings</td>
<td>Check list + Select &lt; Continue&gt; + OK</td>
<td>P3900 =</td>
<td>3</td>
</tr>
<tr>
<td>21/23</td>
<td>Save settings</td>
<td>Save</td>
<td>Confirm with OK</td>
<td></td>
</tr>
</tbody>
</table>
Identifying motor data

Alarm A07791 is output for as long as the inverter has still not identified the motor data. You must switch on the motor (e.g. from the IOP) to identify the motor data. The inverter switches-off the motor after the motor data identification has been completed.

CAUTION

Motor data identification for dangerous loads
Secure dangerous plant and system parts before starting the motor data identification, e.g. by fencing off the dangerous location or lowering a suspended load to the floor.

2.3 Voltage boost

Voltage boost for a high breakaway torque or overload

Using the voltage boost, you can optimize the starting behavior of the V/f control for a high breakaway torque and overload.

- Start the menu: WIZARD / BOOST

<table>
<thead>
<tr>
<th>No.</th>
<th>Input screen of the IOP</th>
<th>Selected setting on the IOP</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/6</td>
<td>Continuous boost</td>
<td>Input in [V]</td>
<td>P1311</td>
<td>...</td>
</tr>
<tr>
<td>2/6</td>
<td>Acceleration voltage boost</td>
<td></td>
<td>P1310</td>
<td>...</td>
</tr>
<tr>
<td>3/6</td>
<td>Starting boost</td>
<td></td>
<td>P1312</td>
<td>...</td>
</tr>
</tbody>
</table>
2.4 Inputs and outputs

Adaptation of the inputs and outputs for special applications

The inverter inputs and outputs are pre-assigned certain functions with the factory default settings or those functions pre-assigned during commissioning with the Application Wizards. However, these can be changed.

Assigning specific control commands to digital inputs

You can precisely assign one control command from a list of selectable control commands (functions) to each digital input. The following control commands are pre-selected in the factory for digital inputs DI0, DI1 and DI2:

- DI0 = ON / OFF1
- DI1 = reversing
- DI2 = fault acknowledgement

Changing the pre-assignment

To change the pre-assignment, assign the required function to the input from a list of control commands.

- Start the menu: MENU / PARAMETERS / PARAMETER GROUPS / INPUTS-OUTPUTS / DIGITAL INPUTS
- FUNCTION of DiX (select the required digital input, e.g. DI1)
  - acknowledged with <OK>
  - select the required function from the list, e.g. 'JOG right'
  - acknowledged with <OK>
Evaluating various inverter operating states via digital outputs

Using the digital outputs, you can display the various inverter states, e.g. inverter alarms or faults. The following messages are pre-selected in the factory for the digital outputs DO0 and DO1:

- DO0 = signal for drive fault (inverter fault)
- DO1 = signal for drive alarm (inverter ready)

Changing the pre-assignment

In order to change the pre-assignment, assign the required status message to the output from a list of messages.

- Start the menu: MENU / PARAMETERS / PARAMETER GROUPS/ INPUTS-OUTPUTS / DIGITAL OUTPUTS
- BI: FUNCTION of DOx (select the required digital output, e.g. DO1)
- acknowledgewith <OK>
- select the required function (e.g. function 'in operation')
  - 52: Act. STATUS WORD 1 + <OK>
  - select IN OPERATION + <OK>
- Acknowledgewith <OK>
- Press <ESC> for longer than 3 seconds to return to the standard screen.

Defining analog inputs for setpoints

Analog setpoints are read-in via the analog inputs. The analog inputs are pre-selected in the factory as bipolar voltage inputs (-10 V … +10 V)

(-10V corresponds to -100% of 1500 [rpm]; +10 V corresponds to +100 % of 1500 [rpm])

Changing the default setting

To change the default setting, proceed as follows:

- Set the DIP switch (e.g. A10 to ON for a unipolar current input 0 mA … 20 mA)
- Start the menu: MENU / PARAMETERS / PARAMETER GROUPS / INPUTS-OUTPUTS / ANALOG INPUTS
  - TYPE of the AIx (select the required analog input, e.g. A10) + <OK>
  - INDEX 0 = analog input 0 + <OK>
- Acknowledgewith <OK>
- Select the required analog input type, e.g. 'Unipolar current input' (0 mA … 20 mA)
- acknowledgewith <OK>
Output of various inverter signals via the analog outputs

Using the analog outputs, you can output a wide range of variables; e.g. the actual speed, the actual output voltage or the actual output current. The analog outputs are locked when supplied from the factory.

Changing the default setting

To change the default setting, proceed as follows:

- Start the menu: MENU / PARAMETERS / PARAMETER GROUPS / INPUTS-OUTPUTS / ANALOG OUTPUTS
- AOx (select the required analog output, e.g. AO0)
- Acknowledgewith <OK>
- Select what is required (e.g. unipolar current output 0 mA …20 mA)
- Acknowledgewith <OK>

2.5 Data backup on the memory card

Memory card for data backup and data transfer

You can save a parameter set on the memory card and transfer it to other inverters, e.g. to transfer settings after a device has been replaced.

Order No. of the memory card: 6SL3254-0AM00-0AA0

Backup the parameters on the memory card (upload)

Proceed as follows to save the inverter data.

- Insert the memory card into the card slot in the Control Unit
- Start the menu: MENU / PARAMETERS / SEARCH FOR NUMBERS
- Enter the parameter number, here: 00971
- 'p0971SAVE PAR' acknowledgewith <OK>
- select a function from the list, here: 'SAVE DRV_OBJ'
- Acknowledgewith <OK>
- Display: 'P0971 Save Par (1 Save drv_obj.)'
- Wait until the save operation has been completed
- Display: 'P0971 Save Par (0 inactive)'
- Save operation successfully completed
2.6 Important parameters

The most important parameters at a glance

Table 2-1 Command and setpoint sources

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Possible settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P0700</strong></td>
<td><strong>Select the command source</strong></td>
</tr>
<tr>
<td></td>
<td>2: Digital inputs / terminals: Factory setting for inverters without PROFIBUS interface</td>
</tr>
<tr>
<td></td>
<td>CU230P-2: P0701 … P0706</td>
</tr>
<tr>
<td></td>
<td>CU240B-2: P0701 … P0704</td>
</tr>
<tr>
<td></td>
<td>CU240E-2: P0701 … P0706</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>P1000</strong></th>
<th><strong>Select the setpoint source</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0: No master setpoint</td>
</tr>
<tr>
<td></td>
<td>1: MOP setpoint / motorized potentiometer (P1031 … P1040)</td>
</tr>
<tr>
<td></td>
<td>2: Analog setpoint (P0756 … P0762): Factory setting for inverters without PROFIBUS interface</td>
</tr>
<tr>
<td></td>
<td>3: Fixed setpoint (P1001 … P1023)</td>
</tr>
<tr>
<td></td>
<td>6: Fieldbus (P2050 … P2091): Factory setting for inverters with PROFIBUS interface</td>
</tr>
<tr>
<td></td>
<td>7: Analog setpoint 2</td>
</tr>
</tbody>
</table>

Table 2-2 Select the fieldbus protocol

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Possible settings (selection options, depend on the CU type)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P2030</strong></td>
<td>0: No protocol (this means: Control via digital inputs / connecting terminals)</td>
</tr>
<tr>
<td></td>
<td>1: USS</td>
</tr>
<tr>
<td></td>
<td>2: Modbus</td>
</tr>
<tr>
<td></td>
<td>3: PROFIBUS DP</td>
</tr>
<tr>
<td></td>
<td>4: CAN</td>
</tr>
<tr>
<td></td>
<td>5: BACnet</td>
</tr>
</tbody>
</table>

Table 2-3 Ramp settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1080</strong></td>
<td>Minimum speed in [rpm]</td>
</tr>
<tr>
<td><strong>P1082</strong></td>
<td>Maximum speed in [rpm]</td>
</tr>
<tr>
<td><strong>P1120</strong></td>
<td>Ramp-up time in [s]</td>
</tr>
<tr>
<td><strong>P1121</strong></td>
<td>Ramp-down time in [s]</td>
</tr>
</tbody>
</table>
### 2.6 Important parameters

#### Table 2-4  Control types

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Possible settings</th>
</tr>
</thead>
</table>
| P1300 | Setting the open-loop and closed-loop control mode of a drive  
0: V/f control with linear characteristic  
1: Linear V/f characteristic with Flux Current Control (FCC)  
2: V/f control with square-law characteristic  
3: Freely selectable V/f characteristic  
4: Linear V/f characteristic ECO  
5: Linear V/f characteristic for applications requiring a precise frequency in textile systems  
6: Linear V/f characteristic with FCC for applications requiring a precise frequency in textile systems  
7: Square-law V/f characteristic with ECO  
19: V/f control without characteristic  
20: Vector control without speed encoder  
22: Torque control without speed encoder |

#### Table 2-5  Motor data according to the rating plate

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Possible settings</th>
</tr>
</thead>
</table>
| P0100 | Motor standard IEC / NEMA  
0: Europe 50 [Hz] |
| P0300 | Motor type selection  
0: No motor  
1: Induction motor  
2: Synchronous motor |
| P0304 | Motor voltage in [V] |
| P0305 | Motor current in [A] |
| P0307 | Motor frequency in [kW] or [hp] |
| P0310 | Motor frequency in [Hz] |
| P0311 | Motor speed in [rpm] |
| P0625 | Ambient temperature of the motor in [°C] |
| P0640 | Current limit of the motor in [A] |
### 2.6 Important parameters

#### Table 2-6  
**Digital inputs**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Terminal</th>
<th>Signal</th>
<th>Factory setting</th>
<th>Possible settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0701</td>
<td>5</td>
<td>DI0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>P0702</td>
<td>6</td>
<td>DI1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>P0703</td>
<td>7</td>
<td>DI2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>P0704</td>
<td>8</td>
<td>DI3</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>P0705</td>
<td>16</td>
<td>DI4</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>P0706</td>
<td>17</td>
<td>DI5</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Possible settings of the digital inputs:
- 0: No control command
- 1: ON/OFF1
- 3: OFF2
- 4: OFF3
- 9: Acknowledge faults
- 10: Jog mode bit 0
- 11: Jog mode bit 1
- 12: Direction reversal
- 13: Motorized potentiometer setpoint higher
- 14: Motorized potentiometer setpoint lower
- 15: Fixed speed setpoint selection, bit 0
- 16: Fixed speed setpoint selection, bit 1
- 17: Fixed speed setpoint selection, bit 2
- 18: Fixed speed setpoint selection, bit 3
- 25: Activate DC braking
- 26: Activate emergency operation
- 27: Release technology controller
- 29: External fault 1
- 35: Command data set selection CDS bit 0
- 50: Load monitoring failure detection

#### Table 2-7  
**Digital outputs (relay outputs)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Terminal</th>
<th>Signal</th>
<th>Factory setting</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0730</td>
<td>18/19/20</td>
<td>DO0</td>
<td>52.3</td>
<td>Drive fault active (inverter fault)</td>
</tr>
<tr>
<td>P0731</td>
<td>21/22</td>
<td>DO1</td>
<td>52.7</td>
<td>Drive warning active (inverter ready for operation)</td>
</tr>
<tr>
<td>P0732</td>
<td>23/24/25</td>
<td>DO2</td>
<td>52.2</td>
<td>Operation enabled (inverter running)</td>
</tr>
</tbody>
</table>

#### Table 2-8  
**Analog inputs and temperature sensors**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Terminal</th>
<th>Signal</th>
<th>Factory setting</th>
<th>Possible settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CU230P-2; CU240E-2; CU240B-2</td>
<td></td>
<td></td>
<td></td>
<td>Possible settings of the analog inputs</td>
</tr>
<tr>
<td>P0756 [0]</td>
<td>3 / 4</td>
<td>AI0</td>
<td>4: Voltage input, bipolar: Can be switched between current and voltage</td>
<td>0: Unipolar voltage input (0 V … +10 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1: Unipolar voltage input monitored (+2 V…+10 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2: Unipolar current input (0 mA … +20 mA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3: Unipolar current input monitored (+4 mA … +20 mA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4: Bipolar voltage input (-10 V … +10 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6: Ni1000 temperature sensor (-50 … +150°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7: PT1000 temperature sensor (-50 … +250°C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8: No sensor connected</td>
</tr>
<tr>
<td>CU230P-2; CU240E-2</td>
<td></td>
<td></td>
<td></td>
<td>With each switchover between current and voltage, the DIP switch on the housing of the CU must also be set accordingly.</td>
</tr>
<tr>
<td>P0756 [1]</td>
<td>10 / 11</td>
<td>AI1</td>
<td>4: Voltage input bipolar: Can be switched between current and voltage</td>
<td></td>
</tr>
<tr>
<td>CU230P-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0756 [2]</td>
<td>50 / 51</td>
<td>AI2</td>
<td>Input can be switched between current and temperature sensor</td>
<td></td>
</tr>
<tr>
<td>P0756 [3]</td>
<td>52 / 53</td>
<td>AI3</td>
<td>Input for temperature sensor</td>
<td></td>
</tr>
</tbody>
</table>
### 2.6 Important parameters

#### Table 2-9  Analog outputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Terminal</th>
<th>Signal</th>
<th>Factory setting</th>
<th>Possible settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0771[0]</td>
<td>12 / 13</td>
<td>AO0</td>
<td>0: Analog output locked</td>
<td>0: Analog output locked</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Analog output 0 switchable between current and voltage through P0776</td>
<td>21: Speed actual value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24: Output frequency smoothed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25: Output voltage smoothed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26: DC link voltage smoothed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27: Actual current value (smoothed absolute value)</td>
</tr>
<tr>
<td>P0771[1]</td>
<td>26 / 27</td>
<td>AO1</td>
<td>0: Analog output locked</td>
<td>0: Analog output locked</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Analog output 1 is only the current output</td>
<td></td>
</tr>
</tbody>
</table>

#### Table 2-10  Motor temperature sensor interface

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Terminal</th>
<th>Abbreviation</th>
<th>Factory setting</th>
<th>Possible setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0601</td>
<td>14</td>
<td>T1 motor (+)</td>
<td>0: Evaluation of the motor temperature sensor is disabled</td>
<td>0: No sensor (factory setting)</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>T2 motor (-)</td>
<td></td>
<td>1: PTC thermistor (→ P0604)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2: KTY84 (→ P0604)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4: ThermoClick sensor</td>
</tr>
</tbody>
</table>