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
indicates that death or severe personal injury will result if proper precautions are not taken.

⚠️ 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.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by qualified personnel. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Proper use of Siemens products

Note the following:

⚠️ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

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.
Preface

Information on the SINAMICS S120 documentation

The SINAMICS S120 documentation is subdivided into the following levels:

- General documentation/catalogs
- Manufacturer/service documentation
- Electronic documentation

This documentation is part of the manufacturer/service documentation for SINAMICS. All of the documents are available individually.

Please contact your local Siemens office for further information about other available SINAMICS publications.

For the sake of simplicity, this documentation does not contain comprehensive detailed information about all types of the product and cannot cover every conceivable case of installation, operation, or maintenance.

The contents of this documentation are not part of an earlier or existing agreement, a promise, or a legal agreement, nor do they change this. Any obligations on the part of Siemens arise from the respective Purchase Agreement, which also contains the solely valid warranty conditions in full. These contractual warranty provisions are neither extended nor curbed as a result of the statements made in this documentation.

Target group

This documentation is aimed at machine manufacturers, plant engineers, commissioning engineers, and service personnel who use SINAMICS.
Technical support

If you have any questions, please contact our hotline:

**Time zone Europe and Africa**
Phone: +49 (0) 180 5050 - 222
Fax: +49 (0) 180 5050 - 223
Internet: http://www.siemens.com/automation/support-request

**Time zone Asia/Pacific**
Phone: +86 1064 757 575
Fax: +86 1064 747 474
E-mail: support.asia.automation@siemens.com

**Time zone Americas**
Phone: +1 423 262 2522
Fax: +1 423 262 2200
E-mail: techsupport.sea@siemens.com

---

Note
Country-specific telephone numbers for technical support are provided under the following Internet address:
http://www.automation.siemens.com/partners
"Calls are subject to charge (e.g. € 0.14/min from fixed lines within Germany). Tariffs of other telephone providers may differ."

---

Internet address
Up-to-date information about our products can be found on the Internet at:
http://www.siemens.com

For information about SINAMICS S120 Cabinet Modules, go to:
http://www.siemens.com/sinamics-s120-cabinet-modules
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Safety information

1.1 Warning notices

⚠️ WARNING
Hazardous voltages are present when electrical equipment is in operation. Severe personal injury or substantial material damage may result if these warnings are not observed. Only qualified personnel are permitted to work on or around the equipment. This personnel must be thoroughly familiar with all warning and maintenance procedures described in these operating instructions. The successful and safe operation of this device is dependent on correct transport, proper storage and installation, as well as careful operation and maintenance. National safety guidelines must be observed.

⚠️ DANGER
Five safety rules
When carrying out any kind of work on electrical devices, the "five safety rules" must always be observed:
1. Disconnect the system.
2. Protect against reconnection.
3. Make sure that the equipment is de-energized.
4. Ground and short-circuit.
5. Cover or enclose adjacent components that are still live.

 NOTICE
For a UL-approved system use 60/75°C copper conductors only.
1.2 Safety and operating instructions

DANGER
These electrical machines are designed for use in industrial high-voltage installations. During operation, this equipment contains rotating and live, bare parts. For this reason, it could cause severe injury or significant material damage if the required covers are removed without authorization, if the equipment is used or operated incorrectly, or if it has not been properly maintained.

When the machines are used in non-industrial areas, the installation location must be protected against unauthorized access (protective fencing, appropriate signs).

Prerequisites
The persons responsible for the safety of the system are under an obligation to ensure that:

- The basic planning work for the plant and the transport, assembly, installation, commissioning, maintenance, and repair work is carried out by qualified personnel and/or checked by the experts responsible.
- The operating instructions and machine documentation are always available.
- The technical specifications regarding the valid installation, connection, environmental, and operating conditions are always observed.
- The plant-specific installation and safety regulations are observed and personal protection equipment is used.
- Work on these machines, or in the vicinity of these machines, by unqualified persons is prohibited.

These operating instructions are intended for qualified personnel and only contain information and notes relating to the intended purpose of the machines.

The operating instructions and the machine documentation are available in the languages specified in the supply contracts.

Note
We recommend engaging the support and services of your local Siemens service center for all planning, installation, commissioning, and maintenance work.
1.3 Electrostatic sensitive devices (ESD)

**CAUTION**

This module contains electrostatic sensitive components. These components can be easily destroyed if not handled properly. Observe the following notes if you nevertheless have to work with electronic boards:

- You should only touch electronic boards if absolutely necessary.
- If you do have to touch modules, your body must be electrically discharged first.
- Modules must not come into contact with highly insulating materials, such as plastic parts, insulated desktops, articles of clothing manufactured from man-made fibers.
- Modules must only be set down on conductive surfaces.
- Boards and components should only be stored and transported in conductive packaging (such as metalized plastic boxes or metal containers).
- If the packaging is not conductive, the modules must be wrapped with a conductive packaging material (such as conductive foam rubber or household aluminum foil), prior to placing them in the packaging.

The necessary ESD protective measures are clearly illustrated in the following diagram:

- a = conductive floor surface
- b = ESD table
- c = ESD shoes
- d = ESD overall
- e = ESD wristband
- f = cabinet ground connection
- g = connection to conductive floor

![Figure 1-1 ESD protective measures](image)

**Figure 1-1** ESD protective measures
1.3 Electrostatic sensitive devices (ESD)
Availability of option K08

Option K08 is available for the following S120 Cabinet Modules:

- Basic Line Module
- Smart Line Module
- Active Line Module
- Motor Module in chassis format
- Booksize Cabinet Kit

Note

Option K08 is only available in conjunction with the CU320 Control Unit (option K90/K91).

Description

The user-friendly AOP30 advanced operator panel is an optional input/output device used for commissioning, operation and diagnostic purposes.

The AOP30 communicates with the CU320 Control Unit via an RS 232 serial interface using the PPI protocol.
Features

- Display with green backlighting (resolution: 240 x 64 pixels)
- 26-key keypad
- RS-232 interface
- Time and date memory powered by internal battery backup
- 4 LEDs indicate the operating status of the drive unit:
  - RUN: green
  - ALARM: yellow
  - FAULT: red
  - LOCAL/REMOTE: green
Commissioning

3.1 Chapter content

This chapter provides information on the following:

- First commissioning
- Loading the firmware
- First commissioning of the drive system (initialization)
  - Entering the infeed data (first commissioning: infeed)
  - Entering the motor data (drive commissioning)
  - Entering the most important parameters (basic commissioning) concluding with the motor ID
- Parameter reset to factory settings
3.2  First commissioning

Start screen

When the system is switched on for the first time, the Control Unit (CU320) is initialized automatically. The following screen is displayed:

![Initial screen](image)

Figure 3-1  Initial screen

When the system boots up, the parameter descriptions are loaded into the operating field from the CompactFlash card.

![Loading parameter description](image)

Figure 3-2  Load the parameter descriptions while booting up the system
Selecting the language

When the system is first booted up, a screen for selecting the language appears.

You can select the language in the dialog screen.

To change the language, choose <F2> or <F3>.
To select the language, choose <F5>.

Once the language has been selected, the booting up process continues.

Once the system has successfully ramped up, initial commissioning must be performed when the system is switched on for the first time after it has been delivered. The converter can then be switched on.

When the system is then ramped up again, it can be operated immediately.

Navigation within the interactive screens

Within an interactive screen, the selection boxes can usually be selected using the <F2> and/or <F3> keys. Selection fields are generally texts surrounded by a frame. When they are selected, they are highlighted with a white text on a black background.

The present value of a highlighted selection box can usually be changed by pressing <F5> "OK" and/or "Change". Another entry box then appears and the value you want is entered directly using the numerical keypad or can be selected from a list.

You can change from one interactive screen to the next or previous screen by selecting the "Continue" or "Back" selection boxes and then confirming by pressing <F5> "OK".

If a screen contains particularly important parameters, the selection field "Continue" only appears at the bottom of the screen. This is because every single parameter in this interactive screen has to be checked and/or corrected thoroughly before the next interactive screen can be accessed.
3.3 Loading the firmware

Firmware might need to be loaded to the AOP if the AOP functionality is required to be adapted to the version on the CompactFlash Card.

Adapting the AOP functionality to the version on the CompactFlash card

If, once the drive has powered up, the CompactFlash Card is found to contain a newer or older version of the firmware, a message will appear on the AOP30 asking whether you want to download the firmware from the CompactFlash card to the AOP30.

You should answer this prompt with "YES" in order to match the functionality of the AOP30 to that of the firmware version on the CompactFlash Card.

The firmware will then be downloaded automatically to the operator panel. The message box below is displayed to indicate the download process.
Note
If the firmware download is not successful, you can perform the process manually → see section "Maintenance and Servicing" - "Download new firmware from PC".
3.4 Initial commissioning

3.4.1 Entering the motor data

Entering the motor data

When performing basic commissioning of the Motor Module, the motor data must be entered via the operator panel. These can be taken from the type plate of the motor.

![Type plate of a motor with parameters]

Table 3-1 Motor Data

<table>
<thead>
<tr>
<th>Parameter no.</th>
<th>values</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0100</td>
<td>0</td>
<td>IEC [50 Hz / kW]</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>NEMA [60 Hz / hp]</td>
</tr>
<tr>
<td>p0304</td>
<td></td>
<td>[V]</td>
</tr>
<tr>
<td>p0305</td>
<td></td>
<td>[A]</td>
</tr>
<tr>
<td>p0307</td>
<td></td>
<td>[kW] / [hp]</td>
</tr>
<tr>
<td>p0308</td>
<td></td>
<td>[%]</td>
</tr>
<tr>
<td>p0309</td>
<td></td>
<td>[Hz]</td>
</tr>
<tr>
<td>p0310</td>
<td></td>
<td>[min-1] / [rpm]</td>
</tr>
<tr>
<td>p0311</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4.2 First commissioning: infeed

General

Due to the modular design and the variety of applications for the SINAMICS S120 Cabinet Modules drive system, a variety of Line Modules may be used. Depending on the infeed used, some different parameters will have to be set during first commissioning. First commissioning of the various Line Modules (Basic Line Modules, Smart Line Modules and Active Line Modules) is described in the sections below.

The procedures described below are examples; they may vary depending on the plant constellation.

3.4.2.1 Basic Line Module

First commissioning: infeed

Table 3-2 Data input with infeed via a Basic Line Module

<table>
<thead>
<tr>
<th>Function</th>
<th>Key Presses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help+</td>
<td>F1</td>
</tr>
<tr>
<td>▲</td>
<td>Increase value</td>
</tr>
<tr>
<td>▼</td>
<td>Decrease value</td>
</tr>
<tr>
<td>Change</td>
<td>F2</td>
</tr>
<tr>
<td>F1</td>
<td>p0210 Supply voltage</td>
</tr>
<tr>
<td>F2</td>
<td>p0840cON / OFF1</td>
</tr>
<tr>
<td>F3</td>
<td>400.00 Vrms</td>
</tr>
<tr>
<td>F4</td>
<td>Input of the source of the ON/OFF1 command</td>
</tr>
<tr>
<td>F5</td>
<td>0</td>
</tr>
<tr>
<td>F6</td>
<td>Navigate within the selection fields with &lt;F2&gt; and &lt;F3&gt;.</td>
</tr>
<tr>
<td>F7</td>
<td>Activate your selection with &lt;F5&gt;.</td>
</tr>
<tr>
<td>F8</td>
<td>Continue to exit the screen</td>
</tr>
</tbody>
</table>

- Input of the supply voltage in V.
- Input of the source of the ON/OFF1 command.

Navigate within the selection fields with <F2> and <F3>.
Activate your selection with <F5>.
Once you have entered the final value, choose "Continue" to exit the screen.
3.4 Initial commissioning

3.4.2.2 Smart Line Module

First commissioning: infeed

Table 3-3 Data input with infeed via a Smart Line Module

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0210 Supply voltage</td>
<td>400.00 Vrms</td>
</tr>
<tr>
<td>p0840cON / OFF1</td>
<td>0</td>
</tr>
</tbody>
</table>

- Input of the supply voltage in V.
- Input of the source of the ON/OFF1 command.

Navigate within the selection fields with <F2> and <F3>.
Activate your selection with <F5>.
Once you have entered the final value, choose "Continue" to exit the screen.

3.4.2.3 Active Line Module

First commissioning: infeed

Table 3-4 Entering the infeed data

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0210 Supply voltage</td>
<td>400.00 Vrms</td>
</tr>
<tr>
<td>p3410 INF Ident_type</td>
<td>5:Res ID RegA...</td>
</tr>
<tr>
<td>p0840cON / OFF1</td>
<td>0</td>
</tr>
</tbody>
</table>

- Input of the supply voltage in V
- Select the line identification (do not change the default setting).
- Input of the source of the ON/OFF1 command.

Navigate within the selection fields with <F2> and <F3>.
Activate your selection with <F5>.
Once you have entered the final value, choose "Continue" to exit the screen.
To start the line identification process, press the "ON" key in LOCAL mode.
3.4.3 First commissioning: motor

**Note**
The steps described below also apply to commissioning a drive in the VECTOR type of operation.

### Basic commissioning: Select oper. type

<table>
<thead>
<tr>
<th>(3:VECTOR) Drive: Select oper. type</th>
<th>Selecting the operation type for a drive. To navigate through the selection fields, choose &lt;F2&gt; or &lt;F3&gt;. To activate a selection, choose &lt;F5&gt;.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VECTOR</td>
<td></td>
</tr>
<tr>
<td>SERVO</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Help</th>
<th>▲</th>
<th>▼</th>
<th>Diag</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>F2</td>
<td>F3</td>
<td>F4</td>
<td>F5</td>
</tr>
</tbody>
</table>
Basic commissioning: Selecting the motor type and entering the motor data

You can select the motor standard and type in the dialog screen.

The following is defined for the motor standard:

0: Line frequency 50 Hz, motor data in kW
1: Line frequency 60 Hz, motor data in hp

To navigate through the selection fields, choose <F2> or <F3>.

To activate a selection, choose <F5>.

Entering the motor data specified on the type plate.

To navigate through the selection fields, choose <F2> or <F3>.

To activate a selection, choose <F5>.

To change a parameter value, navigate to the required selection field and activate with <F5>.

The system displays another window in which you can:

- you can enter the value directly, or
- select the value from a list.

When you have finished entering the motor data, choose "Continue" underneath the final parameter value and activate with <F5>. 

---

AOP30 Operator Panel S120 Cabinet Modules
Operating Instructions, 10/2008, A5E02380310A
Basic commissioning: Entering the encoder data (if available)

When the SMC10/SMC20/SMC30 is connected for encoder evaluation (with options K46, K48, and K50), it is recognized by the AOP30 and a screen is displayed in which you can enter the encoder data.

Navigate within the selection fields with <F2> and <F3>.

Activate your selection with <F5>.

Predefined encoders can be easily set by selecting parameter p0400 (encoder type selection):

**Encoders for SMC10:**
- 1001: Resolver 1 speed
- 1002: Resolver 2 speed
- 1003: Resolver 3 speed
- 1004: Resolver 4 speed

**Encoders for SMC20:**
- 2001: 2048, 1 Vpp, A/B C/D R
- 2002: 2048, 1 Vpp, A/B R
- 2003: 256, 1 Vpp, A/B R
- 2004: 400, 1 Vpp, A/B R
- 2005: 512, 1 Vpp, A/B R
- 2006: 192, 1 Vpp, A/B R
- 2007: 480, 1 Vpp, A/B R
- 2008: 800, 1 Vpp, A/B R
- 2010: 18000, 1 Vpp, A/B R interval-coded
- 2051: 2048, 1 Vpp, A/B, EnDat, Multiturn 4096
- 2052: 32, 1 Vpp, A/B, EnDat, Multiturn 4096
- 2053: 512, 1 Vpp, A/B, EnDat, Multiturn 4096
- 2054: 16, 1 Vpp, A/B, EnDat, Multiturn 4096
- 2055: 2048, 1 Vpp, A/B, EnDat, Singleturn
3.4 Initial commissioning

AOP30 Operator Panel S120 Cabinet Modules

2081: 2048, 1 Vpp, A/B, SSI, Singleturn
2082: 2048, 1 Vpp, A/B, SSI, Multiturn 4096
2083: 2048, 1 Vpp, A/B, SSI, Singleturn, error bit
2084: 2048, 1 Vpp, A/B, SSI, Multiturn 4096, error bit
2110: 4000 nm, 1 Vpp, A/B R interval-coded
2111: 20000 nm, 1 Vpp, A/B R interval-coded
2112: 40000 nm, 1 Vpp, A/B R interval-coded
2151: 16000 nm, 1 Vpp, A/B, EnDat, resolution 100 nm

**Encoders for SMC30:**

3001: 1024 HTL A/B R at X521/X531
3002: 1024 TTL A/B R at X521/X531
3003: 2048 HTL A/B R at X521/X531
3005: 1024 HTL A/B at X521/X531
3006: 1024 TTL A/B at X521/X531
3007: 2048 HTL A/B at X521/X531
3008: 2048 TTL A/B at X521/X531
3009: 1024 HTL A/B unipolar at X521/X531
3011: 2048 HTL A/B unipolar at X521/X531
3020: 2048 TTL A/B R with sense to X520
3081: SSI, Singleturn, 24 V
3082: SSI, Multiturn 4096, 24 V
3090: 4096, HTL, A/B, SSI, singleturn

**Note**

If the connected encoder does not match any of the encoders predefined in p0400, follow the simple procedure below for entering the encoder data:

- Via p0400, select an encoder type whose data is similar to that of the connected encoder.
- Select "User-defined" (p0400 = 9999). Previously set values are stored here.
- Adjust the bit fields of p0404, p0405, and p0408 to the data for the connected encoder.
3.4 Initial commissioning

Table 3- 5  Meaning of the bit settings for p0404

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
<th>Value 0</th>
<th>Value 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Voltage 5 V</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>21</td>
<td>Voltage 24 V</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 3- 6  Meaning of the bit settings for p0405

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
<th>Value 0</th>
<th>Value 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Signal</td>
<td>Unipolar</td>
<td>Bipolar</td>
</tr>
<tr>
<td>1</td>
<td>Level</td>
<td>HTL</td>
<td>TTL</td>
</tr>
<tr>
<td>2</td>
<td>Track monitoring</td>
<td>None</td>
<td>A/B &lt;&gt; -A/B</td>
</tr>
<tr>
<td>3</td>
<td>Zero pulse</td>
<td>24 V unipolar</td>
<td>Same as A/B track</td>
</tr>
</tbody>
</table>

CAUTION

SMC30 (option K50): Supply voltage for the encoder

Once the encoder has been commissioned, the supply voltage (5/24 V) set for the encoder is activated on the SMC30 Module. If a 5 V encoder is connected and the supply voltage has not been set correctly via p0404 (bit 20 = "Yes", bit 21 = "No"), the encoder may be damaged.
Basic commissioning: Entering the basic parameters

Entering the basic commissioning parameters

To navigate through the selection fields, choose <F2> or <F3>.
To activate a selection, choose <F5>.
To change a parameter value, navigate to the required selection field and activate with <F5>.
Another window appears in which you can
- enter the required value directly, or
- select the value from a list.

Final confirmation

Confirm the basic parameters to save them.
Once you have selected "Continue" and activated your entries with <F5>, the basic parameters you entered are permanently saved and the calculations required for closed-loop control are carried out.
NOTICE
A filter at the motor end must be entered in p0230 (option L08 – motor restrictor: p0230 = 1, option L10 – dV/dt filter with Voltage Peak Limiter: p0230 = 2). Motor control will not otherwise function properly.
When p0230 = 4 "Sinusoidal filter, third-party", a separate sinusoidal filter can be entered. An input screen then appears in which the specific filter can be entered.

Basic commissioning: Motor identification

Selecting motor identification
- Navigate within the selection fields with <F2> and <F3>.
- Activate your selection with <F5>.
Stationary measurements increase control performance as deviations in the electrical characteristic values are minimized on account of deviations in the material properties and manufacturing tolerances.
Rotary measurements determine the data required (e.g. moment of inertia) for setting the speed controller. They also measure the magnetization characteristic and rated magnetization current of the motor.
To activate this function, press the LOCAL key (wait until the LED in the LOCAL key lights up) and then ON.
If motor identification is not carried out, the motor controller is using the motor characteristic values calculated from the type plate data rather than the measured values.
Commissioning

3.4 Initial commissioning

DANGER

**Stationary measurement**
During motor identification, the drive may cause the motor to move.
The emergency OFF functions must be fully operational during commissioning. To protect machines and personnel, the relevant safety regulations must be observed.

DANGER

**Rotating measurement**
When the rotating measurement is selected, the drive triggers movements in the motor that can reach the maximum motor speed.
The emergency OFF functions must be fully operational during commissioning. To protect machines and personnel, the relevant safety regulations must be observed.

**Note**
When motor identification is complete, press the OFF key to cancel the "Switching On Inhibited" status.

**Note**
If a fault is present when the stationary or rotary measurement is selected, motor identification cannot be carried out.
Before rectifying the fault, you have to choose "No identification" and close the screen.
Motor identification can then be selected again via <MENU> - <Commissioning/service> - <Drive commissioning> - <Motor identification>.
3.5 Parameter reset to factory settings

The factory settings represent the defined original status of the device on delivery.
Resetting the parameters to the factory settings means that all the parameter settings made since the system was delivered are reset.

Resetting Parameters via AOP30

Table 3-7 Procedure for resetting parameters to the factory settings with AOP30

1. Setting the "Extended" access level on the operator panel
   <Key button> - <Access level> - Set "Extended"

2. Setting the parameter filter to "Parameter reset"
   <MENU> <Commissioning/Service> <Device commissioning> <OK> <30: Parameter Reset> <OK>

3. Reset all parameters to factory settings
   The factory settings for all the device parameters are restored.

Note
When the parameters have been reset to the factory settings, initial commissioning needs to be carried out.
Commissioning

3.5 Parameter reset to factory settings
4.1 Chapter content

This chapter provides information on the following:

- Image of the main menu
- Menu descriptions
  - Menu: Operation screen
  - Menu: Parameterization
  - Menu: Fault/alarm memory
  - Menu: Commissioning / service
  - Sprachauswahl/Language selection menu
- Operation via the operator panel in LOCAL mode
- Saving the parameters permanently
- Parameterization errors
- Faults and alarms
4.2 Operator panel (AOP30) overview and menu structure

Description

The display can be used for the following activities:

- Parameterization (commissioning)
- Monitoring status variables
- Controlling the drive
- Diagnosing errors and alarms

All the functions can be accessed via a menu.

Your starting point is the main menu, which you can always call up using the yellow MENU key:

Dialog screen for the main menu:
It can be accessed at any time with the "MENU" key.
Press "F2" or "F3" to navigate through the menu options in the main menu.
If more than one drive (DO) is configured, it is possible to navigate between them by pressing key "F4".
Menu structure of the operator panel

- **Main menu**
  - Operation screen
    - Current faults *
    - Current alarms *
    - Individ. DO
    - All DOs
    - Data set selection
    - Permanent parameter transfer
  - Assigning parameters
    - Fault memory *
    - Alarm memory *
  - Commissioning / Service
    - Faults
    - Alarms
    - Drive commissioning
    - Device commissioning
  - AOP settings
    - Control settings
    - Display settings
    - Define operation screen
    - Set time/date
    - Date format
    - DO name display mode
    - Reset AOP settings
    - Software / database version
    - Battery status
    - Keyboard test
    - LED test
  - AOP30 diagnosis
- **Sprachauswahl/Language selection**
- **Safety inhibits**
  - Operator input inhibit
  - Parameterization inhibit
  - Access level

*) Help texts can be called for all alarms and faults

Figure 4-1 Menu structure of the operator panel
Control via the operator panel

4.3 Menu: Operation screen

Description

The operation screen displays the most important status variables for the drive unit:
In its as-delivered condition, it displays the operating status of the drive, the direction of rotation, the time, as well as four drive variables (parameters) numerically and two in the form of a bar display for continuous monitoring.

You can call up the operation screen in one of two ways:
1. After the power supply has been switched on and the system has ramped up.
2. By pressing the MENU key twice and then F5 "OK"

![Operation screen - example of a drive in vector control mode](image)

![Operation screen - example of infeed via a Basic Line Module](image)

If a fault occurs, the system automatically displays the fault screen (see section "Faults and alarms").

In LOCAL control mode, you can choose to enter the setpoint numerically (F2: setpoint).

The "Define operation screen" menu can be selected directly using F3 "Change".

The individual parameters of the operation screen can be selected using F4 "Sel. par". The corresponding parameter number of the short identifier is displayed using F1 "Help+" and a description of the parameter can be called up.
Selecting the "current drive"

The AOP30 is used for operating devices that comprise more than one drive so that attention is focused on one drive (i.e. the "current drive"). You can switch between the drives either in the operation screen or in the main menu. The corresponding function key is labeled "Drive".

![Figure 4-4 Main menu - drive selection (key "F4")](image)

The following are determined by the current drive:

- the operation screen,
- the display of faults and alarms,
- the control (ON, OFF, ...) of a drive.

Possible settings

When you choose Commissioning / Service" – "AOP settings" – "Define operation screen", you can adjust the display type and the values displayed as required (→ see section "AOP30 settings").
4.4 Menu: Parameterization

You can adjust the device settings in the Parameterization menu. The drive software is modular. The individual modules are called DOs ("drive objects"). Depending on the device configuration, the following DOs may be present more than once in a SINAMICS S120 Cabinet Modules system:

- CU_S  General parameters for the Control Unit (CU320)
- B_INF For infeed via Basic Line Module
- S_INF For infeed via Smart Line Module
- A_INF For infeed via Active Line Module
- VECTOR Drive control in vector control mode
- SERVO Drive control in servo control mode
- TM31 Terminal Module TM31

Note
Parameters with identical functions may exist with the same parameter number in more than one DO (e.g. p0002).

Depending on your requirements, you can choose between two AOP display types:

1. DO selection
   In this display, you can pre-select a DO Only the parameters for this DO are then listed. (The expert list display in STARTER only uses this DO view)

2. All parameters
   All the parameters present in the device are listed here. The DO to which the parameter currently selected belongs (inverted) is displayed in curly brackets in the top left of the screen.

In both cases, the set access level governs which parameters are displayed. You can set the access level in the "Safety inhibits" menu, which is called up using the key button.

The parameters for access levels 1 and 2 are sufficient for simple applications.
At access level 3 "Expert", you can change the structure of the function by interconnecting BICO parameters.
In the data set selection menu, you can choose which of the data sets chosen is currently DISPLAYED.
Data set parameters are indicated by a "c", "d", "m", "e", or "p" between the parameter number and parameter designator.
When a data set parameter is changed, the data set selection dialog appears.
4.4 Menu: Parameterization

Control via the operator panel

Explain of the operation screen:

- "Max" shows the maximum number of data sets parameterized (and thereby available for selection) in the drive.
- "Drive" indicates which data set is currently active in the drive.
- "AOP" indicates which particular data set is currently being displayed on the operator panel.

Note

Permanent parameter transfer

The procedure for "permanent parameter transfer" is described at the end of this chapter, refer to section → "Permanent storage of parameters".
4.5 Menu: Fault/alarm memory

When you select the menu, a screen appears containing an overview of faults and alarms that are present.

For each drive object, the system indicates whether any faults or alarms are present. ("Fault" or "Alarm" appears next to the relevant drive object).

In the graphic below, you can see that at least one active fault/alarm is present for the "VECTOR" drive object. No faults/alarms are indicated for the other drive objects.

Fault / alarm memory

When you navigate to the line with active alarms/faults and then press the F5 <Diag> key, the system displays a screen in which you have to select the current or old alarms/faults.

Display diagnostics

When you navigate to the required line and then press the F5 <OK> key, the corresponding faults/alarms are displayed. The list of current faults is selected here as an example.

Current fault display

A maximum of eight current faults are displayed along with their fault number and name of the fault.

To display additional help regarding the cause of the problem and how to solve it, choose F1 <Help>.

To acknowledge the faults, choose F5 <Ack.>. If a fault cannot be acknowledged, the fault remains.
4.6 Menu commissioning / service

4.6.1 Drive commissioning

Selecting this option enables you to re-commission the drive from the main menu.

- If the operation screen of the "current drive" is focused on an infeed, you will go directly to the screen "First commissioning: infeed".
- If the operation screen is focused on a VECTOR which has not yet been commissioned, you will go directly to the screen for basic motor commissioning.

If commissioning is already finished, the following menu options will be displayed for selection.

Basic commissioning

Only the basic commissioning parameters are interrogated and stored permanently.

Complete commissioning

Complete commissioning with motor and encoder data entry is carried out. Following this, key motor parameters are recalculated from the motor data. The parameter values calculated during previous commissioning are lost.

In a subsequent motor identification procedure, the calculated values are overwritten.

Motor identification

The selection screen for motor identification appears.

Reset fan operating time

After a fan replacement, the time counter for monitoring the fan runtime must be reset.

4.6.2 Device commissioning

In this menu, you can enter the device commissioning status directly. This is the only way that you can reset parameters to the factory setting for example.
4.6 Menu commissioning / service

4.6.3 AOP30 settings

Control settings
Defines the settings for the control keys in LOCAL mode.
(→ see section "Operation via the operator panel (LOCAL mode)").

Display settings
In this menu, you set the lighting, brightness, and contrast for the display.

Define operation screen
In this menu, you can switch between five operation screens. You can set the parameters that are to be displayed.

Figure 4-6 Define operation screen
The following image shows how the entries are assigned to the screen positions:

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>12:25:30S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry 01</td>
<td>Entry 02</td>
</tr>
<tr>
<td>Entry 03</td>
<td>Entry 04</td>
</tr>
<tr>
<td>Entry 05</td>
<td>Entry 06</td>
</tr>
<tr>
<td>Entry 07</td>
<td>Entry 08</td>
</tr>
<tr>
<td>Entry 09</td>
<td>Entry 10</td>
</tr>
</tbody>
</table>

![Layout of the entries in the operation screen](image)
4.6 Menu commissioning / service

4.6.3.1 Lists of signals for the operation screen

The following tables list the factory default settings of the signals for the operation screen along with the associated reference variables and default settings for quick commissioning.

Object B_INF

Table 4-1 List of signals for the operation screen - object B_INF

<table>
<thead>
<tr>
<th>Signal</th>
<th>Parameter</th>
<th>Short name</th>
<th>Unit</th>
<th>Normalization (100%=...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC link voltage smoothed</td>
<td>(1) r0026</td>
<td>U_DC</td>
<td>V</td>
<td>p2001</td>
</tr>
<tr>
<td>Temperature of power unit</td>
<td>(2) r0037</td>
<td>T_LT</td>
<td>°C</td>
<td>Reference temperature</td>
</tr>
</tbody>
</table>

Normalization for object B_INF

Table 4-2 Normalization for object B_INF

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normalization parameters</th>
<th>Default for quick commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference voltage</td>
<td>100% = p2001</td>
<td>p2001 = r0206/r0207</td>
</tr>
<tr>
<td>Reference temperature</td>
<td>100% = 100 °C</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4-8 Operation screen - example of infeed via a Basic Line Module
Control via the operator panel

4.6 Menu commissioning / service

Object S_INF

Table 4-3 List of signals for the operation screen - object S_INF

<table>
<thead>
<tr>
<th>Signal</th>
<th>Parameter</th>
<th>Short name</th>
<th>Unit</th>
<th>Normalization (100% = ...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC link voltage smoothed</td>
<td>r0026</td>
<td>U_DC</td>
<td>V</td>
<td>p2001</td>
</tr>
<tr>
<td>Temperature of power unit</td>
<td>r0037</td>
<td>T_LT</td>
<td>°C</td>
<td>Reference temperature</td>
</tr>
<tr>
<td>Active current</td>
<td>r0030</td>
<td>IACTV</td>
<td>A</td>
<td>p2002</td>
</tr>
<tr>
<td>Line frequency</td>
<td>r0024</td>
<td>FLINE</td>
<td>Hz</td>
<td>p2000</td>
</tr>
<tr>
<td>Active power</td>
<td>r0032</td>
<td>PACTV</td>
<td>kW</td>
<td>r2004</td>
</tr>
<tr>
<td>Actual value of current</td>
<td>r0027</td>
<td>I_IST</td>
<td>A</td>
<td>p2002</td>
</tr>
<tr>
<td>Input voltage</td>
<td>r0025</td>
<td>U_IN</td>
<td>V</td>
<td>p2001</td>
</tr>
<tr>
<td>Active power</td>
<td>r0032</td>
<td>PACTV</td>
<td>kW</td>
<td>r2004</td>
</tr>
<tr>
<td>Modulation depth, smoothed</td>
<td>r0028</td>
<td>MODD</td>
<td>%</td>
<td>Reference modulation depth</td>
</tr>
<tr>
<td>Reactive current component</td>
<td>r0029</td>
<td>IREAC</td>
<td>A</td>
<td>p2002</td>
</tr>
</tbody>
</table>

Normalization for object S_INF

Table 4-4 Normalization for object S_INF

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normalization parameters</th>
<th>Default for quick commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference frequency</td>
<td>100% = p2000</td>
<td>p2000 = p0211</td>
</tr>
<tr>
<td>Reference voltage</td>
<td>100% = p2001</td>
<td>p2001 = r0206/r0207</td>
</tr>
<tr>
<td>Reference current</td>
<td>100% = p2002</td>
<td>p2002 = r0207</td>
</tr>
<tr>
<td>Reference power</td>
<td>100% = r2004</td>
<td>r2004 = r0206</td>
</tr>
<tr>
<td>Reference modulation</td>
<td>100% = Maximum output voltage without overload</td>
<td></td>
</tr>
<tr>
<td>depth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference temperature</td>
<td>100% = 100 °C</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4-9 Operation screen - example of infeed via a Smart Line Module
Object A_INF

Table 4- 5  List of signals for the operation screen - object A_INF

<table>
<thead>
<tr>
<th>Signal</th>
<th>Parameter</th>
<th>Short name</th>
<th>Unit</th>
<th>Normalization (100%=...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC link voltage smoothed</td>
<td>(1)</td>
<td>r0026</td>
<td>U_DC</td>
<td>V</td>
</tr>
<tr>
<td>Temperature of power unit</td>
<td>(2)</td>
<td>r0037</td>
<td>T_LT</td>
<td>°C</td>
</tr>
<tr>
<td>Active current</td>
<td>(3)</td>
<td>r0030</td>
<td>IACTV</td>
<td>A</td>
</tr>
<tr>
<td>Line frequency</td>
<td>(4)</td>
<td>r0024</td>
<td>FLINE</td>
<td>Hz</td>
</tr>
<tr>
<td>Active power</td>
<td>(5)</td>
<td>r0032</td>
<td>PACTV</td>
<td>kW</td>
</tr>
<tr>
<td>Actual value of current</td>
<td>(6)</td>
<td>r0027</td>
<td>I_IST</td>
<td>A</td>
</tr>
<tr>
<td>Input voltage</td>
<td>(7)</td>
<td>r0025</td>
<td>U_IN</td>
<td>V</td>
</tr>
<tr>
<td>Active power</td>
<td>(8)</td>
<td>r0032</td>
<td>PACTV</td>
<td>kW</td>
</tr>
<tr>
<td>Modulation depth, smoothed</td>
<td>(9)</td>
<td>r0028</td>
<td>MODD</td>
<td>%</td>
</tr>
<tr>
<td>Reactive current component smoothed</td>
<td>(10)</td>
<td>r0029</td>
<td>IREAC</td>
<td>A</td>
</tr>
</tbody>
</table>

Normalization for object A_INF

Table 4- 6  Normalization for object A_INF

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normalization parameters</th>
<th>Default for quick commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference frequency</td>
<td>100% = p2000</td>
<td>p2000 = p0211</td>
</tr>
<tr>
<td>Reference voltage</td>
<td>100% = p2001</td>
<td>p2001 = r0206/r0207</td>
</tr>
<tr>
<td>Reference current</td>
<td>100% = p2002</td>
<td>p2002 = r0207</td>
</tr>
<tr>
<td>Reference power</td>
<td>100% = r2004</td>
<td>r2004 = r0206</td>
</tr>
<tr>
<td>Reference modulation depth</td>
<td>100% = Maximum output voltage without overload</td>
<td></td>
</tr>
<tr>
<td>Reference temperature</td>
<td>100% = 100 °C</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4-10  Operation screen - example of infeed via an Active Line Module
VECTOR object

Table 4-7  List of signals for the operation screen - VECTOR object

<table>
<thead>
<tr>
<th>Signal</th>
<th>Parameter</th>
<th>Short name</th>
<th>Unit</th>
<th>Normalization (100%=...) see table below</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed setpoint upstream of ramp-function generator</td>
<td>(1) r1114</td>
<td>NSETP</td>
<td>rpm</td>
<td>p2000</td>
</tr>
<tr>
<td>Output frequency</td>
<td>(2) r0024</td>
<td>F_OUT</td>
<td>Hz</td>
<td>Reference frequency</td>
</tr>
<tr>
<td>Power smoothed</td>
<td>(3) r0032</td>
<td>PACTV</td>
<td>kW</td>
<td>r2004</td>
</tr>
<tr>
<td>DC link voltage smoothed</td>
<td>(4) r0026</td>
<td>U_DC</td>
<td>V</td>
<td>p2001</td>
</tr>
<tr>
<td>Actual speed smoothed</td>
<td>(5) r0021</td>
<td>N_ACT</td>
<td>rpm</td>
<td>p2000</td>
</tr>
<tr>
<td>Absolute actual current smoothed</td>
<td>(6) r0027</td>
<td>I_IST</td>
<td>O</td>
<td>p2002</td>
</tr>
<tr>
<td>Motor temperature</td>
<td>(7) r0035 1)</td>
<td>T_MOT</td>
<td>°C</td>
<td>Reference temperature</td>
</tr>
<tr>
<td>Converter temperature</td>
<td>(8) r0037 1)</td>
<td>T_LT</td>
<td>°C</td>
<td>Reference temperature</td>
</tr>
<tr>
<td>Actual torque smoothed</td>
<td>(9) r0031</td>
<td>M_ACT</td>
<td>Nm</td>
<td>p2003</td>
</tr>
<tr>
<td>Converter output voltage smoothed</td>
<td>(10) r0025</td>
<td>C_OUT</td>
<td>V</td>
<td>p2001</td>
</tr>
</tbody>
</table>

1) If a temperature sensor has not been installed, a value of –200°C is displayed.

Normalization for VECTOR object

Table 4-8  Normalization for VECTOR object

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normalization parameters</th>
<th>Default for quick commissioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference speed</td>
<td>100% = p2000</td>
<td>p2000 = Maximum speed (p1082)</td>
</tr>
<tr>
<td>Reference voltage</td>
<td>100% = p2001</td>
<td>p2001 = 1000 V</td>
</tr>
<tr>
<td>Reference current</td>
<td>100% = p2002</td>
<td>p2002 = Current limit (p0640)</td>
</tr>
<tr>
<td>Reference torque</td>
<td>100% = p2003</td>
<td>p2003 = 2 x rated motor torque</td>
</tr>
<tr>
<td>Reference power</td>
<td>100% = r2004</td>
<td>r2004 = (p2003 x p2000 x π) / 30</td>
</tr>
<tr>
<td>Reference frequency</td>
<td>100% = p2000 / 60</td>
<td></td>
</tr>
<tr>
<td>Reference modulation depth</td>
<td>100% = Maximum output voltage without overload</td>
<td></td>
</tr>
<tr>
<td>Reference flux</td>
<td>100% = Rated motor flux</td>
<td></td>
</tr>
<tr>
<td>Reference temperature</td>
<td>100% = 100 °C</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4-11  Operation screen - example of a drive with vector control
TM31 object

Table 4-9 List of signals for the operation screen – TM31 object

<table>
<thead>
<tr>
<th>Signal</th>
<th>Parameter</th>
<th>Short name</th>
<th>Unit</th>
<th>Normalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog input 0 [V, mA]</td>
<td>r4052[0]</td>
<td>AI_UI</td>
<td>V, mA</td>
<td>V: 100 V / mA: 100 mA</td>
</tr>
<tr>
<td>Analog input 1 [V, mA]</td>
<td>r4052[1]</td>
<td>AI_UI</td>
<td>V, mA</td>
<td>V: 100 V / mA: 100 mA</td>
</tr>
<tr>
<td>Analog input 0, scaled</td>
<td>r4055[0]</td>
<td>AI_%</td>
<td>%</td>
<td>as set in p200x</td>
</tr>
<tr>
<td>Analog input 1, scaled</td>
<td>r4055[1]</td>
<td>AI_%</td>
<td>%</td>
<td>as set in p200x</td>
</tr>
</tbody>
</table>

4.6.3.2 Set date/time

Set date/time (for date stamping of error messages)

In this menu, you set the date and time.
You can also set whether and/or how the AOP and drive unit are to be synchronized. Synchronization of the AOP with the drive enables error messages to be date- and time-stamped.

- None (factory setting)
  The times for the AOP and drive unit are not synchronized.
- AOP->Drive
  - If you activate this option, the AOP and drive unit are synchronized immediately whereby the current AOP time is transferred to the drive unit.
  - The current AOP time is transferred to the drive unit every time the AOP is started.
  - At 02:00 (AOP time) every day, the current AOP time is transferred to the drive unit.
- Drive->AOP
  - If you activate this option, the AOP and drive unit are synchronized immediately whereby the current drive unit time is transferred to the AOP.
  - The current drive unit time is transferred to the AOP every time the AOP is started.
  - At 02:00 (AOP time) every day, the current drive unit time is transferred to the AOP.

Date format

In this menu, the date format can be set:
- DD.MM.YYYY: European date format
- MM/DD/YYYY: North American data format
4.6.3.3 **DO name display mode**

Using the setting option "User-defined DO name" "No/Yes", you can toggle the display of the DO name between the standard abbreviation (e.g. A_INF, VECTOR; CU_S) and a DO name of your own choice (e.g. Infeed_1, Motor_1).

**User-defined DO name** (factory setting: NO)

- **Yes**: The "User-defined DO name" stored in parameter p0199 is displayed instead of the standard DO abbreviation.
- **No**: The standard DO abbreviation is displayed.

4.6.3.4 **Reset AOP settings**

When you choose this menu option, the AOP factory settings for the following are restored:

- Language
- Display (brightness, contrast)
- Operation screen
- Control settings

---

**NOTICE**

When you reset parameters, all settings that are different to the factory settings are reset immediately. This may cause the cabinet unit to switch to a different, unwanted operational status.

For this reason, you should always take great care when resetting parameters.
4.6 Menu commissioning / service

4.6.4 AOP30 diagnosis

Software/database version

This menu shows the versions of the firmware and database.

The database version must be compatible with the drive software status (refer to parameter r0018).

Battery status

This menu displays the battery voltage (in volts and as a bar chart). The battery ensures that the data in the database and the current time are retained.

When the battery voltage is represented as a percentage, a battery voltage of ≤ 2 V is equal to 0%, and a voltage of ≥ 3 V to 100%.

The data is secure up to a battery voltage of 2 V.

- If the battery voltage is ≤ 2.45 V, the message "Replace battery" is displayed in the status bar.
- If the battery voltage is ≤ 2.30 V, the system displays the following message: "Alarm, weak battery".
- If the battery voltage is ≤ 2 V, the system displays the following message: "Caution: The battery is dead".
- If the time and/or database are unavailable due to lack of voltage after a prolonged system downtime, the loss is established by means of a CRC check when the system is switched on again. This triggers a message instructing the user to replace the battery and then load the database and/or set the time.

For instructions on how to change the battery, see "Maintenance and servicing".

Keyboard test

In this screen, you can check that the keys are functioning properly. Keys that you press are represented on a symbolic keyboard on the display. You can press keys in any order you wish. You cannot exit the screen (F4 – "Back") until you have pressed each key at least once.

Note

You can also exit the key test screen by pressing any key and keeping it pressed.

LED test

In this screen, you can check that the 4 LEDs are functioning properly.
4.7 Sprachauswahl/Language selection menu

The operator panel downloads the texts for the different languages from the drive.

You can change the language of the operator panel via the "Sprachauswahl/Language selection" menu.

---

Note

Additional languages for the display

Languages in addition to the current available languages in the display are available on request.

---

4.8 Operation via the operator panel (LOCAL mode)

You activate the control keys by switching to LOCAL mode. If the green LED in the LOCAL/REMOTE key does not light up, the key is not active.

---

Note

If the "OFF in REMOTE" function is activated, the LED in the LOCAL-REMOTE key flashes.

---

All of the supplementary setpoints are deactivated for LOCAL master control.

After the master control has been transferred to the operator panel, the BICO interconnections at bit 0 to bit 10 of the control word of the sequence control are not effective (refer to function diagram 2501).
4.8 Operation via the operator panel (LOCAL mode)

4.8.1 LOCAL/REMOTE key

Activate LOCAL mode: Press the LOCAL/REMOTE key
LOCAL mode: LED lights up
REMOTE mode: LED does not light up: the ON, OFF, JOG, direction reversal, faster, and slower keys are not active.

Settings: Menu – Commissioning / Service – AOP Settings – Control Settings
Save LOCAL mode (factory setting: yes)
- Yes: The "LOCAL" or "REMOTE" operating mode is saved when the power supply is switched off and restored when the power supply is switched back on.
- No: The "LOCAL" or "REMOTE" operating mode is not saved. "REMOTE" is activated when the power supply is switched on.

OFF in REMOTE (factory setting: no)
- Yes: The OFF key functions in REMOTE mode even if the drive is being controlled by external sources (PROFIBUS, customer terminal strip).
  WARNING: This function is not an EMERGENCY STOP function!
- No: The OFF key is only effective in LOCAL mode.

LOCAL/REMOTE also during operation (factory setting: no)
- Yes: You can switch between LOCAL and REMOTE when the drive is switched on (motor is running).
- No: Before switching to LOCAL, a check is carried out to determine whether the drive is in the "Operation" status. If so, the switchover is rejected with the error message "Local not possible". Before the system switches to REMOTE, the drive is switched off and the setpoint is set to 0.
4.8 Operation via the operator panel (LOCAL mode)

4.8.2 ON key / OFF key

**ON key**: always active in LOCAL when the operator input inhibit is deactivated.

**OFF key**: in the factory setting, acts as OFF1 = ramp-down at the deceleration ramp (p1121); when n = 0: voltage disconnection (only if a main contactor is installed)
The OFF key is effective in the LOCAL mode and when the "OFF in REMOTE" function is active.

**Settings**: Menu – Commissioning / Service – AOP Settings – Control Settings

Red OFF key acts as: (factory setting: OFF1)
- OFF1: Ramp-down on the deceleration ramp (p1121)
- OFF2: Immediate pulse inhibit, motor coasts to a standstill
- OFF3: Ramp-down on the quick stop ramp (p1135)

4.8.3 CCW / CW changeover

**Settings**: Menu – Commissioning / Service – AOP Settings – Control Settings

Switching between CCW/CW (factory setting: no)
- Yes: Switching between CW/CCW rotation by means of the CW/CCW key possible in LOCAL mode
- No: The CW/CCW key has no effect in LOCAL mode

For safety reasons, the CW/CCW key is disabled in the factory setting (pumps and fans must normally only be operated in one direction).

In the "Operation" status in LOCAL mode, the current direction of rotation is indicated by an arrow next to the operating status.

**Note**

You have to make additional settings when switching between CW/CCW rotation.
4.8 Operation via the operator panel (LOCAL mode)

4.8.4 Jog

Settings: Menu – Commissioning / Service – AOP Settings – Control Settings

JOG key active (factory setting: no)

- Yes: The jog key is effective in the LOCAL mode in the state "ready to power-up" (not in "operation"). The speed that is set in parameter p1058 is approached.
- No: The JOG key has no effect in LOCAL mode

4.8.5 Increase setpoint / decrease setpoint

You can use the increase and decrease keys to set the setpoint with a resolution of 1 rpm of the maximum speed.

Alternatively, the setpoint can also be entered via the numeric keys. To do so, press F2 in the operation screen. The system displays an inverted edit field for entering the required speed. Enter the required value using the numeric keypad. Press F5 "OK" to confirm the setpoint.

Using the number keys, any speed ranging between the maximum speed (p1080) and minimum speed (p1082) can be entered.

Setpoint entry in LOCAL mode is unipolar. You can change the direction of rotation by pressing the key that allows you to switch between CW/CCW rotation.

- CW rotation and "Increase key" mean:
  The displayed setpoint is positive and the output frequency is increased.
- CCW rotation and "Increase key" mean:
  The displayed setpoint is negative and the output frequency is increased.
4.8.6 AOP setpoint

Settings: Menu – Commissioning / Service – AOP Settings – Control Settings

Save AOP setpoint (factory setting: no)

- **Yes**: In LOCAL mode, the last setpoint (once you have released the INCREASE or DECREASE key or confirmed a numeric entry) is saved.
  The next time you switch the system on in LOCAL mode, the saved value is selected.
  This is also the case if you switched to REMOTE in the meantime or the power supply was switched off.
  When the system is switched from REMOTE to LOCAL mode while the drive is switched on (motor is running), the actual value that was last present is set as the output value for the motorized potentiometer setpoint and saved.
  If the system is switched from REMOTE to LOCAL mode while the drive is switched off, the motorized potentiometer setpoint that was last saved is used.

- **No**: On power-up in LOCAL mode, the speed is always set to the value entered under "AOP starting setpoint". When the system is switched from REMOTE to LOCAL mode while the drive is switched on (motor is running), the actual value that was last present is set as the output value for the AOP setpoint.

AOP setpoint ramp-up time (factory setting: 10 s)

AOP setpoint ramp-down time (factory setting: 10 s)

- **Recommendation**: set as ramp-up/ramp-down time (p1120 / p1121).
  Changing the ramp-up/ramp-down times does not affect the settings for parameters p1120 and p1121 because this is an AOP-specific setting.

AOP starting setpoint (factory setting: 0.000 rpm)

The AOP starting setpoint is the speed setpoint which is active when the drive is switched on (with AOP30 - key "ON"). This setpoint is valid on condition that the system setting "Save setpoint" is set to "NO".
(→ See description of system setting "Save AOP setpoint")

**Note**

The internal drive ramp-function generator is always active.
4.8.7  Inhibit AOP local mode

Settings: Menu – Commissioning / Service – AOP Settings – Control Settings

Inhibit AOP local mode (factory setting: no)

- **Yes:** Deactivates the "Control via operator panel" function, thereby disabling the LOCAL/REMOTE key.
- **No:** Activates the LOCAL/REMOTE key.

**Note**
LOCAL functionality can also be inhibited on the drive by means of the p0806 parameter (BI: Inhibit master control).

4.8.8  Acknowledge error from the AOP

Settings: Menu – Commissioning / Service – AOP Settings – Control Settings

Acknowledge error from the AOP (factory setting: yes)

- **Yes:** Errors can be acknowledged via the AOP.
- **No:** Errors cannot be acknowledged via the AOP.

4.8.9  Timeout monitoring

In "LOCAL" mode or if "OFF in REMOTE" is active, the drive is shut down after 1 s if the data cable between the AOP and drive is disconnected.
4.8.10 Operator input inhibit / Parameterization inhibit

To prevent users from accidentally actuating the control keys and changing parameters, you can activate an operator input / parameterization inhibit using a key-operated pushbutton. Two key icons appear in the top right of the display when these safety inhibits are enabled.

<table>
<thead>
<tr>
<th>Inhibit type</th>
<th>Online operation</th>
<th>Offline mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>No safety inhibit</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Operator input inhibit</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Parameterization inhibit</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Operator input inhibit + parameterization inhibit</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Settings**

The "Operator input inhibit" setting can be changed directly via <F5> "Change" once you have selected the selection field.

When "Parameterization inhibit" is activated, you have to enter a numeric password (repeat this entry). You must also enter this password when deactivating "Parameterization inhibit".
4.8 Operation via the operator panel (LOCAL mode)

**Operator input inhibit** (factory setting: not active)

- **Active:** The parameters can still be viewed, but a parameter value cannot be saved (message: "Note: operator input inhibit active"). The OFF key (red) is enabled. The LOCAL/REMOTE, ON (green), JOG, CW/CCW, HIGHER and LOWER keys are disabled.

**Parameterization inhibit** (factory setting: not active)

- **Active:** Parameters cannot be changed unless a password is entered. The parameterization is the same as in the operator input inhibit state. If you try and change parameters, the message "Note: Parameterization inhibit active" is displayed. All the control keys, however, can still be actuated.

**Access level** (factory setting: Expert):

The different parameters required for this complex application are filtered so that they can be displayed as clearly as possible. You select them according to the access level.

An expert level, which must only be used by expert personnel, is required for certain actions.
4.9 Saving the parameters permanently

Description

If parameters are changed using the operator panel (confirm with OK in the Parameter editor), the new values are initially stored in the volatile memory (RAM) of the converter. An "S" flashes in the top right of the AOP display until they are saved to a permanent memory. This indicates that at least 1 parameter has been changed and not yet stored permanently.

Two methods are available for permanently saving parameters that have been changed:

- To store the parameters permanently, choose <MENU> <Parameterization> <OK> <Permanent parameter transfer>.
- When confirming a parameter setting with OK, press the OK key for > 1 s. The system displays a message asking you whether the setting is to be saved in the EEPROM. If you press "Yes", the system saves the setting in the EEPROM. If you press "No", the setting is not saved permanently and the "S" starts flashing to indicate this fact.

In both cases, all changes that have not yet been saved permanently are stored in the EEPROM.

4.10 Parameterization errors

If a fault occurs when reading or writing parameters, a popup window containing the cause of the problem is displayed.

The system displays

Parameter write error (d)pxxxx.yy:0xnn

and a plain-text explanation of the type of parameterization error.
4.11 Faults and alarms

If a fault occurs, the drive displays the fault and/or alarm on the operator panel. Faults are indicated by the red "FAULT" LED and a fault screen is automatically displayed. You can use the F1 Help function to call up information about the cause of the fault and how to remedy it. You can use F5 Ack. to acknowledge a stored fault.

Alarms are indicated by means of the yellow "ALARM" LED. The system also displays a note in the status bar providing information on the cause.

What is a fault?

A fault is a message from the drive indicating an error or other exceptional (unwanted) status that results in the drive being switched off. This could be caused by a fault within the converter or an external fault triggered, for example, by the winding temperature monitor for the motor. The faults are displayed and can be reported to a higher-level control system via PROFIBUS. In the factory default setting, the message "converter fault" is also sent to a relay output. Once you have rectified the cause of the fault, you have to acknowledge the fault message.

What is an alarm?

An alarm is the response to a fault condition identified by the drive. It does not result in the drive being switched off and does not have to be acknowledged. Alarms are "self acknowledging", that is, they are reset automatically when the cause of the alarm has been eliminated.

Fault and alarm displays

Every fault and alarm is entered in the fault/alarm buffer along with time the error occurred and the time it was rectified. This time stamp appears in the header of the screen for each inversely displayed message selected with "F2/F3". There are two time stamp display formats:

- Format: DDDD: HH:MM:SS
  Number of days, hours, minutes and seconds since the fault or alarm first occurred. This display format is active when "AOP→Drive" time synchronization is not selected.

  System time (year, month, day, hour, minute, second) at which the fault or alarm occurred in systems with a time-of-day master. This display format is active when "AOP→Drive" time synchronization has been selected.

Note

For further information about time synchronization → see chapter "Commissioning / Service menu", section "AOP30 settings", "Set date/time (for date stamping of error messages)"

You can call up an overview screen that displays the current status of faults and/or alarms for every drive object in the system by choosing MENU – Fault memory / alarm memory.

A context menu featuring the "Back" and "Quit" options appears when you press F4 "Others". The function required can be selected using F2 and F3 and executed by pressing F5 "OK".
The "Acknowledge" function sends an acknowledgement signal to each drive object. The red FAULT LED extinguishes once all the faults have been acknowledged.

![Fault screen](image1)

You can use F5 Ack. to acknowledge a stored fault.

![Alarm screen](image2)

Alarms that are no longer active are removed from the alarm memory with F5 Clear.
4.11 Faults and alarms
5.1 Replacing the backup battery

1. Disconnect the 24 V DC power-supply cable.
2. Disconnect the communication cable on the operator panel.
3. Open the cover of the battery compartment.
4. Remove the old battery.
5. Insert the new battery.
6. Carry out any other work by reversing the sequence.
5.1 Replacing the backup battery

Table 5-1  Technical data for the backup battery

<table>
<thead>
<tr>
<th>Type</th>
<th>CR2032 3 V lithium battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Maxell, Sony, Panasonic</td>
</tr>
<tr>
<td>Nominal capacity</td>
<td>220 mAh</td>
</tr>
<tr>
<td>Maximum permissible charging current</td>
<td>10 mA (restricted to &lt; 2 mA in operator panel)</td>
</tr>
<tr>
<td>Self-discharge at 20 °C</td>
<td>1%/year</td>
</tr>
<tr>
<td>Service life (in backup mode)</td>
<td>&gt; 1 year at 70 °C &gt; 1.5 years at 20 °C</td>
</tr>
<tr>
<td>Service life (in operation)</td>
<td>&gt; 2 years</td>
</tr>
</tbody>
</table>

NOTICE

You must replace the battery within one minute; otherwise, the AOP settings may be lost.
5.2 Loading the new operator panel firmware from the PC.

Description

Firmware might need to be loaded to the AOP if the AOP functionality has been updated. If, once the drive has powered up, the CompactFlash Card is found to contain a different version of the firmware, a message will appear on the AOP30 prompting you to load the new firmware. You should click "YES" in response to this prompt. The firmware will then be loaded automatically on the operator panel and the following dialog screen will appear.

![Alarm]

Program being loaded...
Do not power-down.

Figure 5-2 Firmware being loaded

If the firmware cannot be loaded successfully, it can be loaded using the following manual method.

The load program LOAD_AOP30 and the firmware file can be found on the CD.

Loading the firmware

1. Establish the RS232 connection from the PC to the AOP30.
2. Provide the supply voltage (24 V DC).
3. Start the LOAD_AOP30 program on the PC.
4. Choose the PC interface (COM1, COM2).
5. Choose and open the firmware (AOP30.H86).
6. Follow the instructions in the status window of the program and connect the power supply for the AOP30 while pressing the red key (O).
7. The load procedure is started automatically.
8. Switch the power on (switch the power supply off and then back on).
Maintenance and servicing

5.2 Loading the new operator panel firmware from the PC.
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