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SINAMICS S120 Cabinet Modules

AOP30 operator panel (option K08)

Operating Instructions

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Answers for industry.

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S120
Cabinet Modules Operator Panel AOP30

Operating Instructions

Preface

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Control version V4.7

04/2014

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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
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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 product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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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.

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Preface

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. The Purchase Agreement contains the complete and exclusive obligations of Siemens, including the warranty provisions. These contractual warranty provisions are neither extended nor curbed as a result of the statements made in this documentation.

Target group

This documentation is intended for machine manufacturers, commissioning engineers, and service personnel who use the SINAMICS drive system.

Technical support

If you have any questions, please contact our hotline:

Time zone Europe and Africa	
Phone	+49 911 895 7222
Fax	+49 911 895 7223
Internet	http://www.siemens.com/automation/support-request

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

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

Note

Country-specific telephone numbers for technical support can be found on the Internet at the following address:

http://www.automation.siemens.com/partners

Internet addresses

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

Information about SINAMICS S120 Cabinet Modules can be found on the Internet at the following address:
http://www.siemens.com/sinamics-s120-cabinet-modules

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Safety information

1

1.1 General safety instructions



⚠ DANGER

Danger to life due to live parts and other energy sources

Death or serious injury can result when live parts are touched.

- Only work on electrical equipment if you are appropriately qualified.
- Always observe the country-specific safety rules for all work.

Generally, six steps apply when establishing safety:

1. Prepare for shutdown and notify all those who will be affected by the procedure.
2. Disconnect the machine from the supply.
   - Switch off the machine.
   - Wait until the discharge time specified on the warning labels has elapsed.
   - Check that it really is in a zero-voltage state, from phase conductor to phase conductor and phase conductor to protective conductor.
   - Check that every auxiliary circuit is de-energized.
   - Ensure that the motors cannot move.
3. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems or water.
4. Isolate or neutralize all hazardous energy sources by closing switches, grounding or short-circuiting or closing valves, for example.
5. Take measures to prevent reconnection of the energy sources.
6. Make sure that the machine is completely locked ... and that you have the right machine.

After you have completed the work, restore the operational readiness by following the above steps in the reverse order.



⚠ WARNING

Danger to life through a hazardous voltage when connecting an unsuitable power supply

Death or serious injury can result when live parts are touched in the event of a fault.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



⚠WARNING

Danger to life when live parts are touched on damaged devices

Improper handling of devices can cause damage.

Hazardous voltages can be present at the housing or exposed components on damaged devices.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.



⚠WARNING

Danger to life through electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- Connect cable shields and unused conductors of power cables (e.g. brake conductors) at least on one side to the grounded housing potential.



⚠WARNING

Danger to life due to electric shock when not grounded

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.



⚠WARNING

Danger to life due to electric shock when opening plug connections in operation

When opening plug connections in operation, arcs can result in severe injury or death.

- Only open plug connections when the equipment is in a voltage-free state, unless it has been explicitly stated that they can be opened in operation.

⚠WARNING

Danger to life due to fire spreading if the housing is inadequate

Fire and smoke can cause severe injury or material damage.

- Install devices without a protective housing in a metal control cabinet (or protect the device by another equivalent measure) in such a way that contact with fire inside and outside the device is prevented.
- Additionally, select the installation site so that an uncontrolled spreading of smoke can be avoided in the case of a fire.
- Ensure that smoke can escape via designated paths.

⚠WARNING

Danger to life through unexpected movement of machines when using mobile wireless devices or mobile phones

Using mobile radios or mobile phones with a transmit power > 1 W closer than approx. 2 m to the components may cause the devices to malfunction, influence the functional safety of machines therefore putting people at risk or causing material damage.

- When close to components, switch off all wireless devices and mobile phones.

⚠WARNING

Danger to life due to the motor catching fire in the event of insulation overload

There is a greater load on the motor insulation as a result of a ground fault in an IT system. A possible result is the failure of the insulation with a risk for personnel as a result of fire and smoke.

- Use a monitoring device that signals an insulation fault.
- Correct the fault as quickly as possible so the motor insulation is not stressed.

⚠WARNING

Danger to life due to fire if overheating occurs because of insufficient ventilation clearances

Inadequate ventilation clearances can cause overheating with a risk for personnel as a result of fire and smoke. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearances as ventilation clearance for the respective component. They can be found in the dimension drawings or in the "Product-specific safety instructions" at the start of the respective section.

⚠WARNING

Risk of an accident due to missing or illegible warning labels

Missing or illegible warning labels can result in death or serious injury.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, in the national language if necessary.
- Replace illegible warning labels.

NOTICE

Device damage caused by incorrect voltage/insulation tests

Incorrect voltage/insulation tests can damage the device.

- Before carrying out a voltage/insulation test, disconnect the system/machine.

All converters and motors are subject to a high voltage test in the manufacturer's facility. As a consequence, it is not necessary to carry out additional tasks in the system/machine.

⚠WARNING

Danger to life when safety functions are inactive

Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have absolutely guaranteed that the functions relevant to safety are operating correctly.

Note

Important safety notices for safety functions

If you want to use safety functions, you must observe the safety notices in the safety manuals.

1.2 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.3 Industrial security

Note

Industrial security

Siemens provides automation and drive products with industrial security functions that support the secure operation of plants or machines. They are an important component in a holistic industrial security concept. With this in mind, our products undergo continuous development. We therefore recommend that you keep yourself informed with the latest information and updates of our products.

Information and newsletters can be found at:

http://support.automation.siemens.com

To ensure the secure operation of a plant or machine, it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Third-party products that may be in use should also be considered.

Further information can be found at:

http://www.siemens.com/industrialsecurity

⚠WARNING

Danger as a result of unsafe operating states resulting from software manipulation

Software manipulation (e.g. by viruses, Trojan horses, malware, worms) can cause unsafe operating states to develop in your installation which can result in death, severe injuries and/or material damage.

- Keep the software up to date.
  Information and newsletters can be found at:
  http://support.automation.siemens.com
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
  Further information can be found at:
  http://www.siemens.com/industrialsecurity
- Make sure that you include all installed products into the integrated industrial security concept.

General

2

Availability of option K08

Option K08 is available for the following S120 Cabinet Modules:

- Basic Line Modules
- Smart Line Modules
- Active Line Modules
- Booksize Cabinet Kits
- Motor Modules in chassis format

Note

Option K08 is only available in conjunction with the CU320-2 Control Unit (option K90/K95).

Description



Figure 2-1 AOP30 Advanced Operator Panel (option K08)

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

The AOP30 communicates with the CU320-2 Control Unit via an RS232 serial interface using the PPI protocol.

Characteristics

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

Commissioning

3

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 motor identification
- Parameter reset to factory settings

3.2 First commissioning

Start screen

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

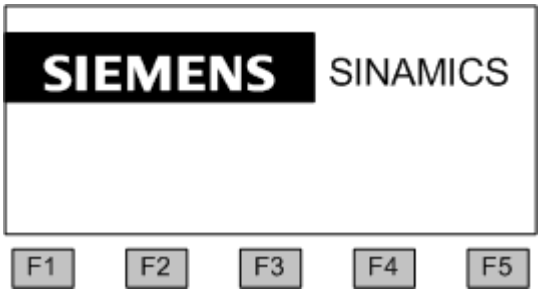


Figure 3-1 Initial screen

While the system is powering up, the parameter descriptions are loaded into the operator panel from the memory card.

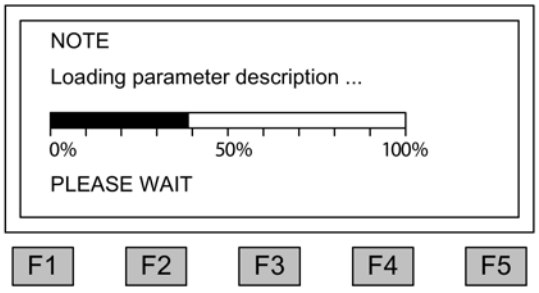
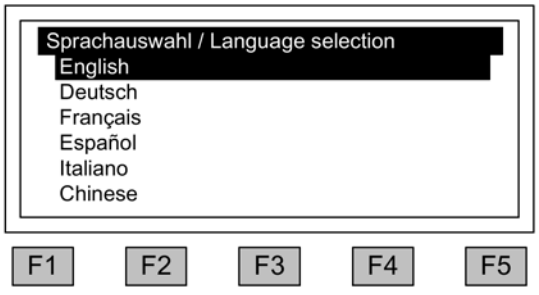


Figure 3-2 Load the parameter descriptions while booting up the system

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.

Operation can be directly assumed when subsequently starting.

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.

With some commissioning steps, the entire commissioning can be interrupted by selecting "Interrupt COMM."

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 memory card.

Adapting the AOP functionality to the version on the memory card

If, once the drive has powered up, the memory 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 memory card to the AOP30.

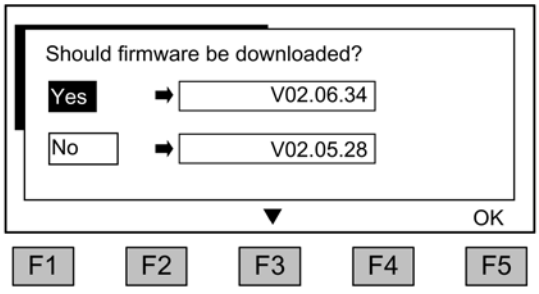


Figure 3-3 Selection of firmware version (version on the memory card is more recent than the AOP version)

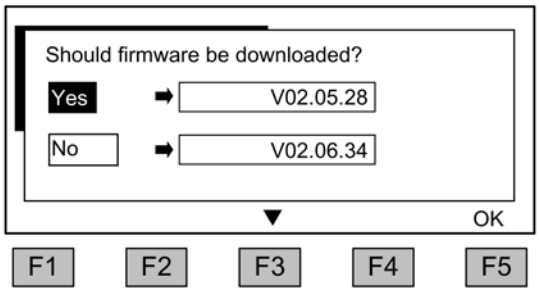


Figure 3-4 Selection of firmware version (version on the memory card is older than the AOP version)

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

The firmware will then be downloaded automatically to the operator panel. The message box below is displayed to indicate the download process.

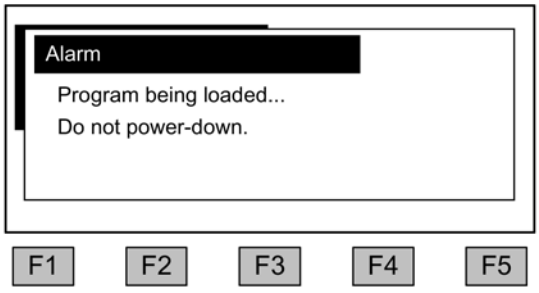


Figure 3-5 Firmware being loaded

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

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

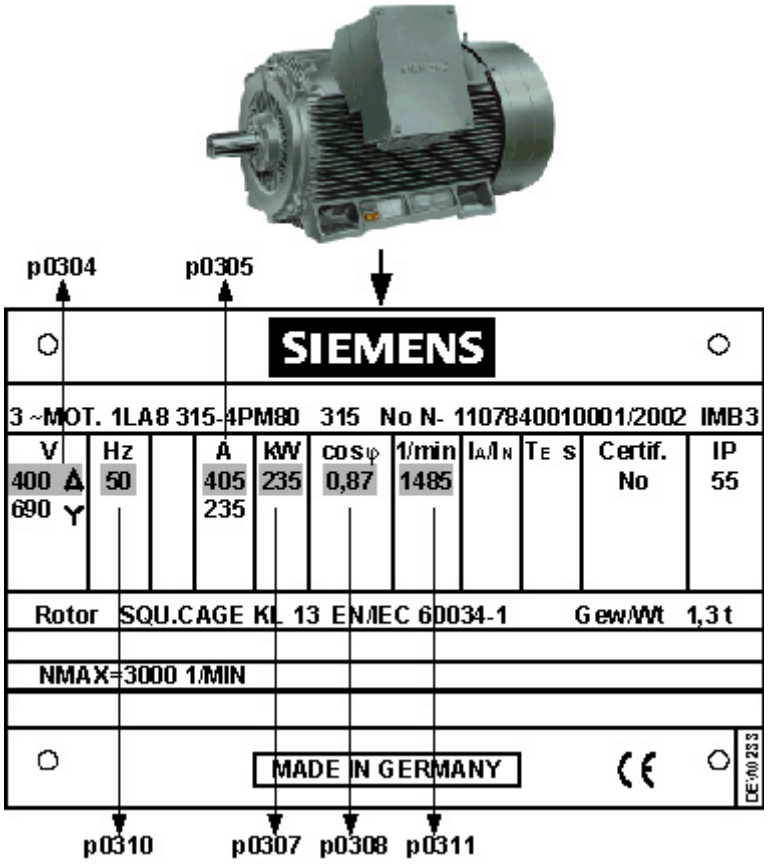


Figure 3-6 Entering the motor data - type plate

Table 3- 1 Motor Data

	Parameter no.	values	Unit
System of units for entering line frequency and motor data	p0100	0 1	IEC [50 Hz/kW] NEMA [60 Hz/HP]
Motor: Rated voltage Rated current Rated power Rated power factor cos ϕ (only for p0100 = 0) Rated efficiency η (only for p0100 = 1) Rated frequency Rated speed	 p0304 p0305 p0307 p0308 p0309 p0310 p0311		 [V] [A] [kW]/[HP] [%] [Hz] [min-1]/[rpm]

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.

Note

p0840 - setting the signal source for the "ON/OFF (OFF1)" command

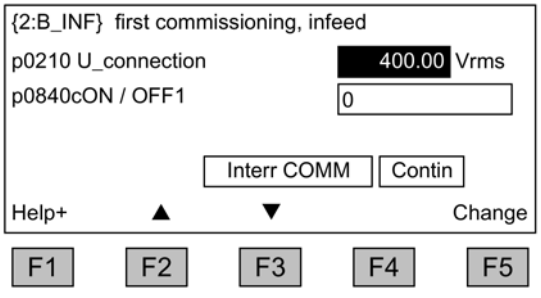
Parameter p0840 must be supplied, e.g. through the following interconnections:

- set constant to 1
- from {VECTOR} p0863 bit 1 (close contactor)
- from the higher-level control

3.4.2.1 Basic Line Module

First commissioning: infeed

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



- 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>.

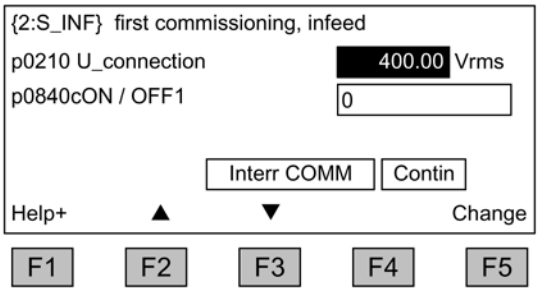
Activate your selection with <F5>.

Once you have entered the final value, choose "Continue" to exit the screen.

3.4.2.2 Smart Line Module

First commissioning: infeed

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



- 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>.

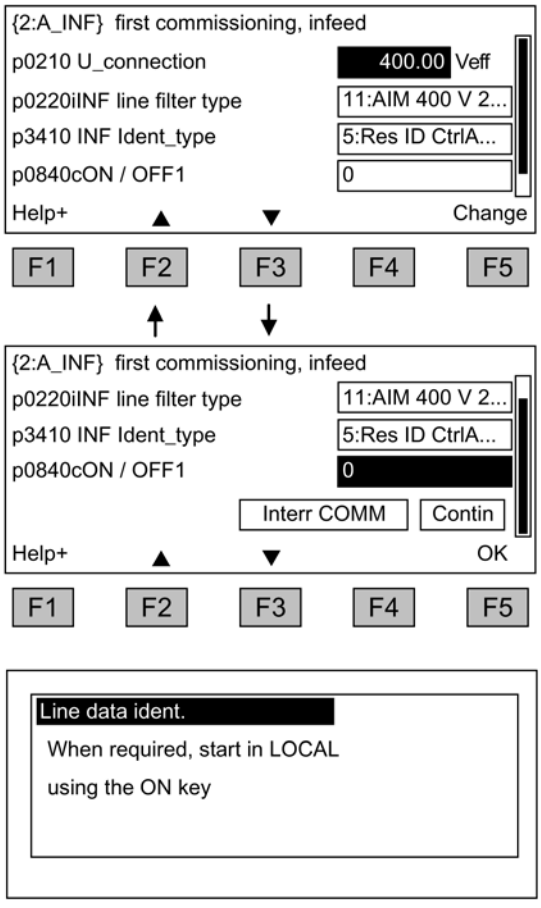
Activate your selection with <F5>.

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



- Input of the supply voltage in V
- Selection of the Active Interface Modules, the default setting should not be changed.
- 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.

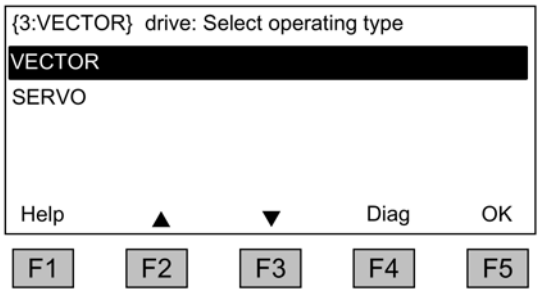
To start the line identification process, press the "ON" key in LOCAL mode.

3.4.3 First commissioning: motor

Note

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

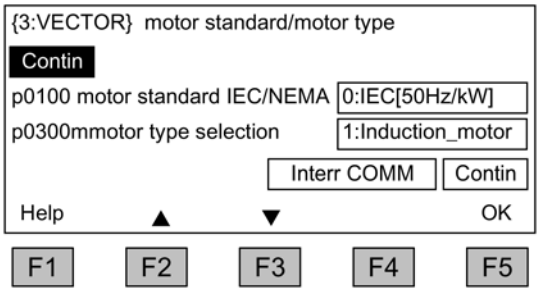
Basic commissioning: Select oper. type



Selecting the operation type for a drive.

To navigate through the selection fields, choose <F2> or <F3>.
To activate a selection, choose <F5>.

Basic commissioning: Selecting the motor type and entering the motor data

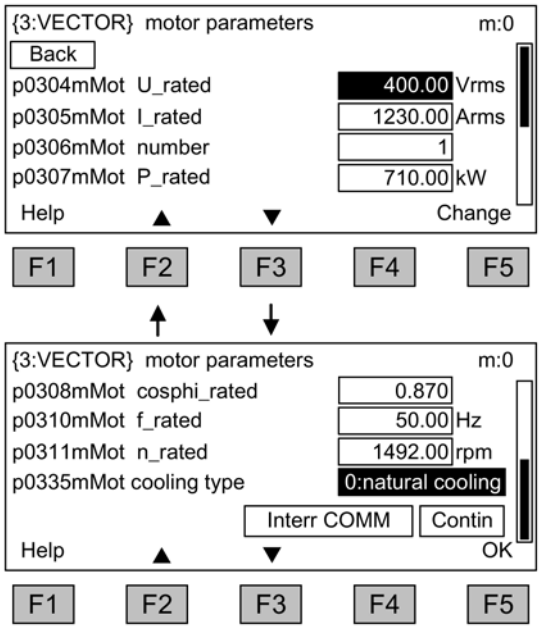


You can select the motor standard and type in the dialog screen.

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:

- Enter the required value directly, or
- Select the value from a list

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

Note

Selecting the motor type

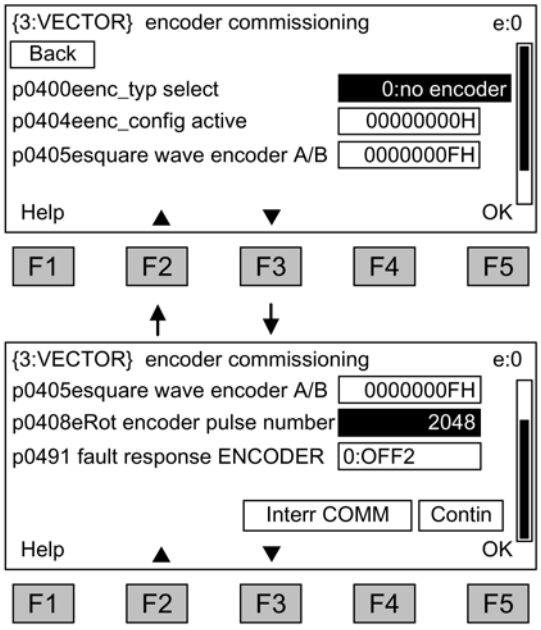
The selection of the motor type pre-assigns specific motor parameters and optimizes the operating characteristics and behavior. Details are described in the List Manual in the p0300 parameter.

Note

Selecting a listed motor (p0300 ≥ 100)

When selecting a motor type ≥ 100, the order number of the associated motor can be selected via drop-down list.

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
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
3109: 2000 nm, TTL, A/B R interval-coded

Note

Pre-defined encoder type

If a predefined encoder type is selected in p0400, then the settings of the following parameters p0404, p0405 and p0408 cannot be changed.

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.

Table 3- 5 Meaning of the bit settings for p0404

Bit	Meaning	Value 0	Value 1
20	Voltage 5 V	No	Yes
21	Voltage 24 V	No	Yes

Table 3- 6 Meaning of the bit settings for p0405

Bit	Meaning	Value 0	Value 1
0	Signal	Unipolar	Bipolar
1	Level	HTL	TTL
2	Track monitoring	None	A/B <> -A/B
3	Zero pulse	24 V unipolar	Same as A/B track

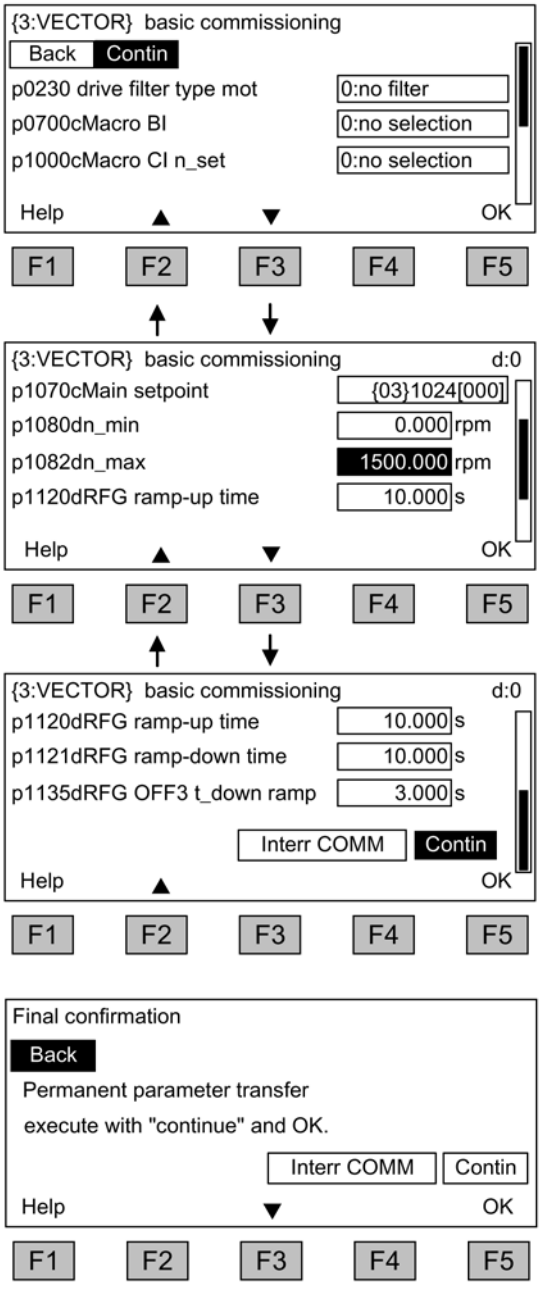
NOTICE

Material damage when selecting the incorrect encoder supply voltage

Once the encoder has been commissioned, the supply voltage (5/24 V) set for the encoder is activated on the SMC30 Module. The encoder may be damaged, if a 5 V encoder is connected and the supply voltage has not been set correctly (bit 20 = "Yes," bit 21 = "No").

- Set the correct supply voltage for the connected encoder.

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.

Note

Enter the motor-side filter

A filter on the motor side must be entered in p0230:

- Option L07 – dv/dt filter compact plus Voltage Peak Limiter: p0230 = 2
- Option L08 – motor reactor: p0230 = 1
- Option L10 – dv/dt filter plus Voltage Peak Limiter: p0230 = 2

When p0230 = 4 "External sine-wave filter", a separate sine-wave filter can be entered. An input mask for specific filter data then appears.

NOTICE

Damage to the dv/dt filter if it is not activated during commissioning

The dv/dt filter may be damaged if it is not activated during commissioning.

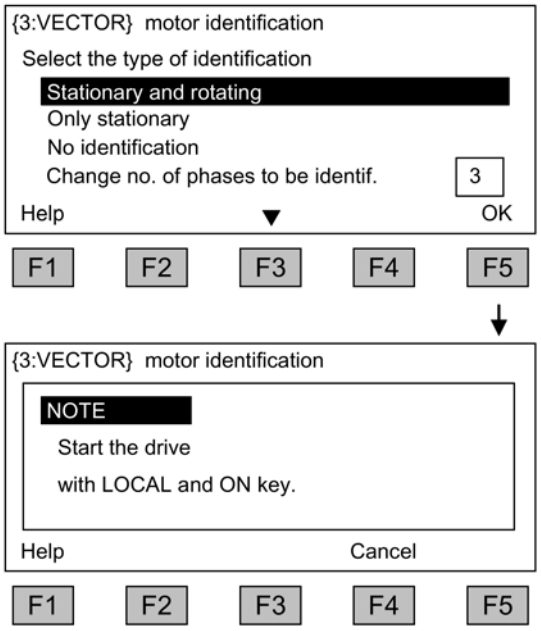
- Activate the dv/dt filter during commissioning.

Note

Motor reactor

If a motor reactor (option L08) is deployed, the option selection must be activated, otherwise the closed-loop motor control will not be able to operate in an optimum fashion.

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.

Changing the number of phases to be identified:

- For identification with one phase, the measurement time is significantly reduced.
- For identification with several phases, the measurement results are averaged.

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.

Note

Complete motor identification

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

⚠WARNING

Danger to life if the motor unexpectedly moves during motor identification in the rotating mode

When selecting motor identification with optimization in the rotating mode, after commissioning, the drive initiates that the motor rotates with speeds that can reach the maximum motor speed.

- Observe the general safety instructions.
- Ensure that the EMERGENCY STOP functions are fully functional when commissioning the drive.

Note

Activate enable signals

Make sure that the necessary enable signals have been assigned; otherwise motor identification cannot be carried out.

Note

Fault with stationary or rotating measurements

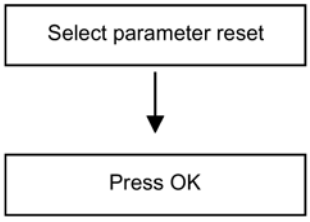
If a fault is present when the stationary or rotary measurement is selected, motor identification cannot be carried out.
Before rectifying the fault, you have to choose "No identification" and close the screen. Motor identification can then be selected again via <MENU> - <Commissioning/service> - <Drive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



Set parameter filter to "Parameter reset":
<MENU> <Commissioning/Service> <Device commissioning> <OK> <30: Parameter Reset> <OK>

Reset all parameters to factory settings:
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.

Control via the operator panel

4

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

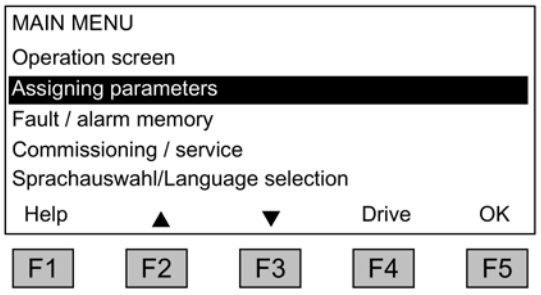
Description

The display can be used for the following activities:

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

All functions can be accessed via a menu.

Your starting point is the main menu which you can always access 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".

Note

AOP reset

If the AOP no longer responds, then the AOP can be reset by simultaneously pressing the key and the OFF button (for longer than 2 seconds) and then releasing the OFF button.

Menu structure of the operator panel

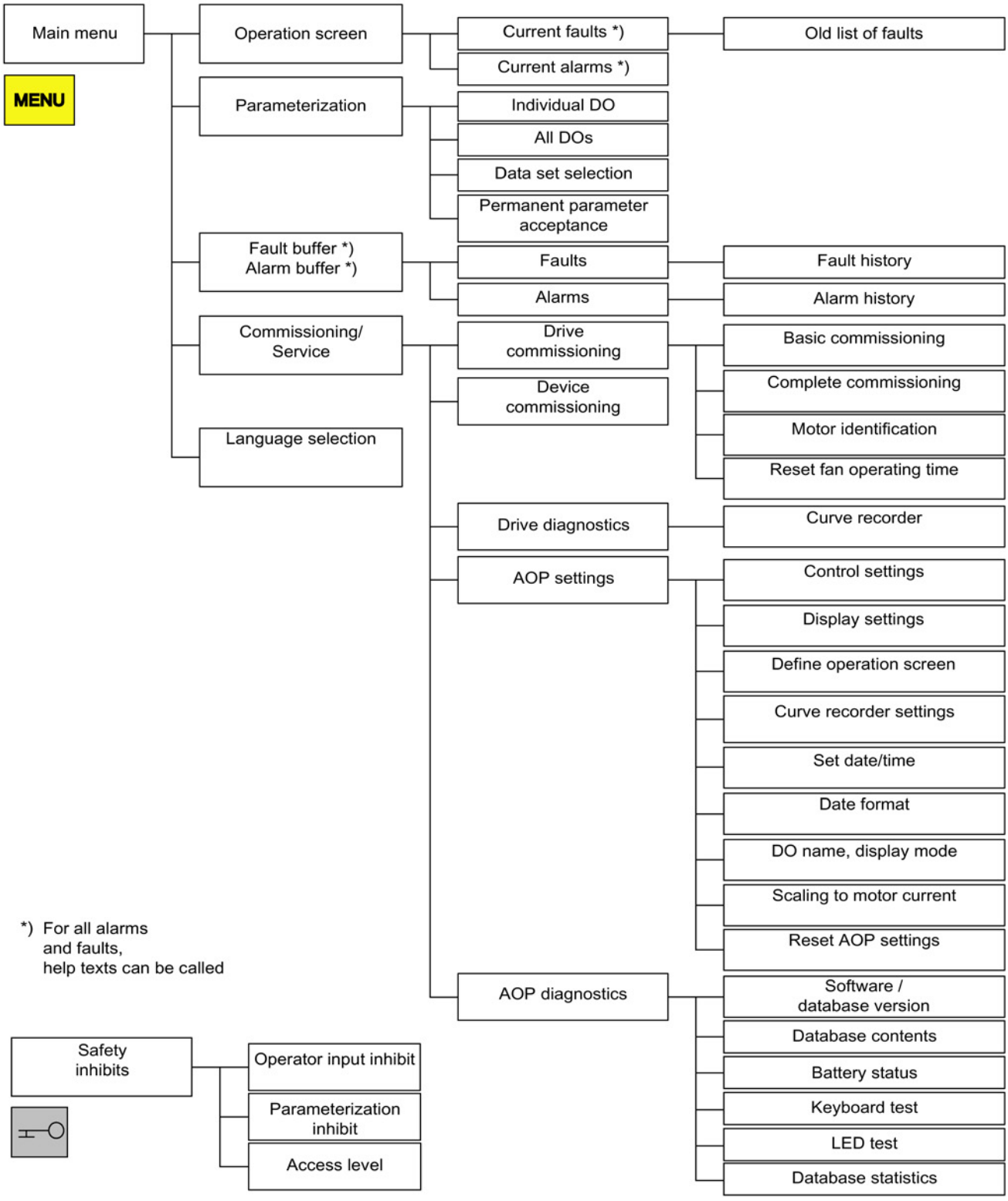


Figure 4-1 Menu structure of the operator panel

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"

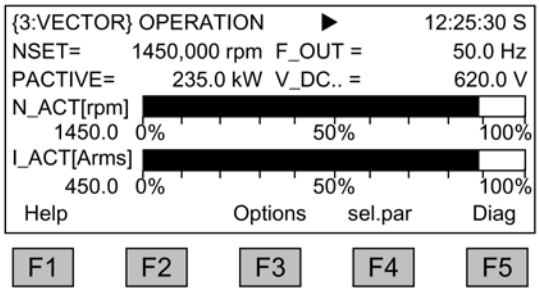


Figure 4-2 Operation screen - example of a drive in vector control mode

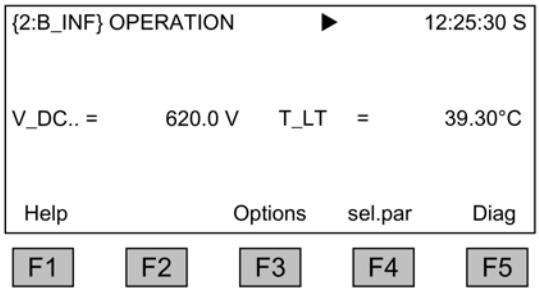


Figure 4-3 Operation screen - example of infeed via a Basic Line Module

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"). The changeover is made in the main menu, the corresponding function key is labeled "Drive".

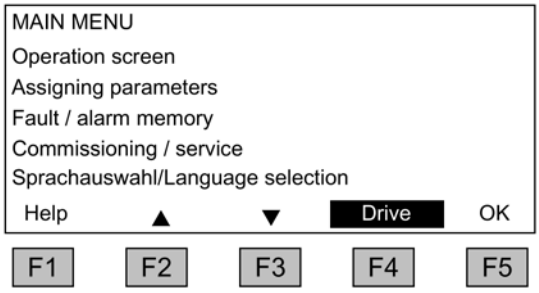


Figure 4-4 Main menu - drive selection (key "F4")

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 "AOP 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 (CU320-2)
- 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
- TM150 The TM150 temperature sensor module
- TM54F The TM54F terminal module

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 designated 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.

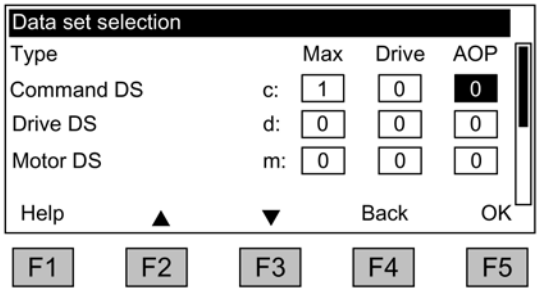


Figure 4-5 Data set selection

Explanation 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

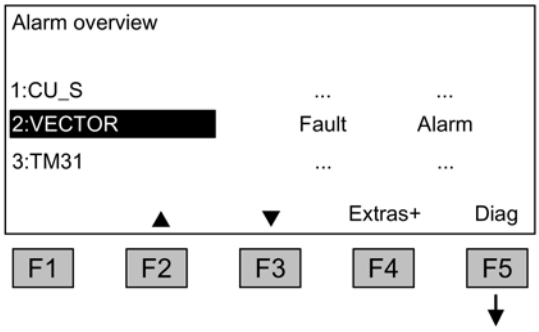
The procedure for "permanent parameter transfer" is described at the end of this chapter, refer to section → "Permanent storage of parameters".

4.5 Menu: Fault/alarm memory

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

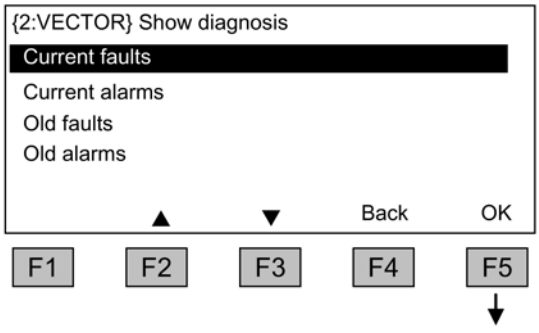
For each drive object, the system indicates whether any faults or alarms are present. ("Fault" or "Alarm" appears next to the relevant drive object).

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

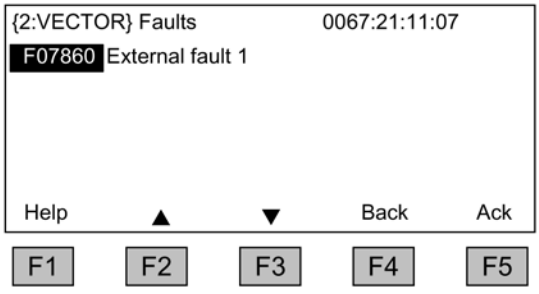
When you navigate to the line with active alarms/faults and then press the F5 <Diag> key, the system displays a screen in which you have to select the current or old alarms/faults.



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

The actual operating hours of the fan in the power unit are displayed.

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.

4.6.3 Drive diagnostics

Curve recorder

The curve recorder provides a slow trace function, which monitors a signal trend.
A signal selected via a parameter is shown in the form of a curve.

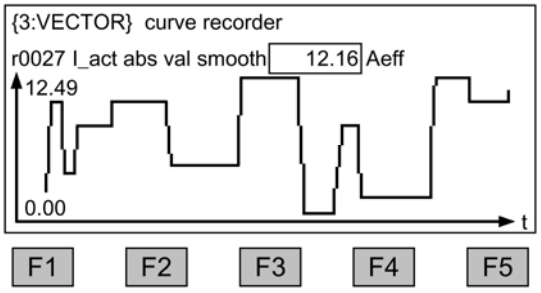


Figure 4-6 Curve recorder

The relevant settings of the curve recorder are changed via the F5 key or via the menu "Commissioning/service – AOP settings - Curve recorder settings".

In addition to the curve, the value of the parameter selected in the curve recorder settings is output on the display and updated every 0.5 ... 24.5 s (adjustable). With a slowly running time basis (as of 20 minutes/figure), the time basis value flashes in the header in the 1 s-cycle alternately with the text "slow X".

Assignment of the function keys F1 to F5 is not normally displayed visibly so that the space can be fully utilized to display the curve. Pressing a function key shows the key assignments. If no additional key is pressed within 5 seconds, the labeling disappears again.

The curve can be scaled automatically or manually. This is selected with key F3 "scale+" - F4 "Auto/Manual" followed by confirmation with F5 "OK."

- Auto

  The scaling of the characteristic curve changes dynamically; it is oriented to the maximum value (for example, 12.49) and minimum value (for example, 0.00) visible in the display up to the actual instant in time. Scaling can be changed step-by-step by pressing buttons F2 and F3.
  If measured value noise is shown with an excessively high resolution as a result of the automatic scaling, then the resolution can be reduced in four steps by pressing button F2. As a result, the automatic scaling is deactivated. However, if the measured value leaves the display range, then this will be extended. The automatic scaling can be reactivated by pressing button F3.

- **Manual**

  After selecting manual scaling and confirmation with "OK," a window opens in which the maximum and minimum limits for scaling can be set.

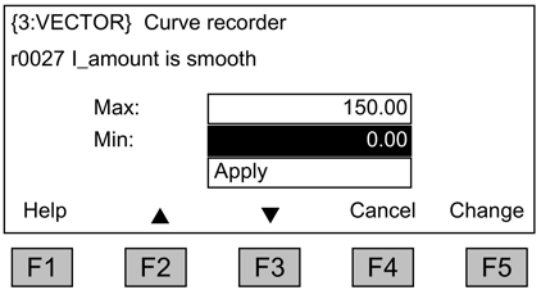


Figure 4-7 Curve recorder - manual scaling

After setting and applying the limits, you switch to the curve recorder and manual scaling is used.

If the current measured values are outside the displayable range, the range will automatically be extended.

Note

Changing the parameter for the curve recorder in manual scaling

When the parameter for the curve recorder is changed the following occurs with manual scaling:

- If the actual parameter has lower values than the currently set scaling, the scaling will be retained.
- If the current parameter has higher values than the currently set scaling, the scaling will be adjusted automatically.

Help for the curve recorder can be opened with key F1.

The curve recorder is exited by pressing the MENU button.

Note

Data is not recorded

The values displayed in the recorder are not recorded and saved, they are only used for display until the screen form is exited.

4.6.4 AOP 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.

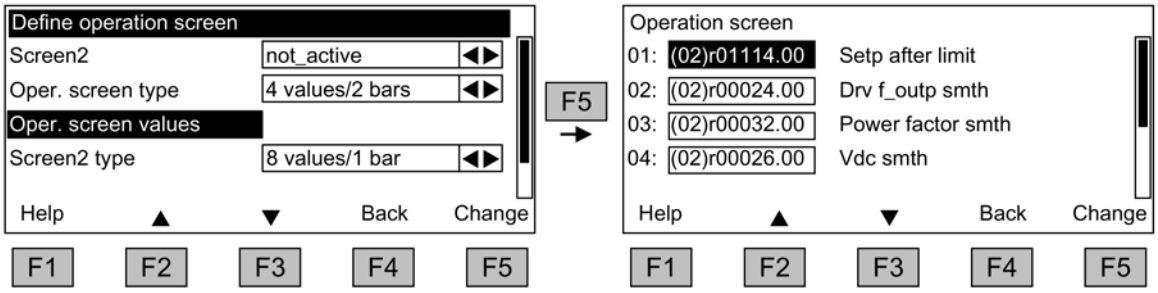


Figure 4-8 Define operation screen

The following image shows how the entries are assigned to the screen positions:

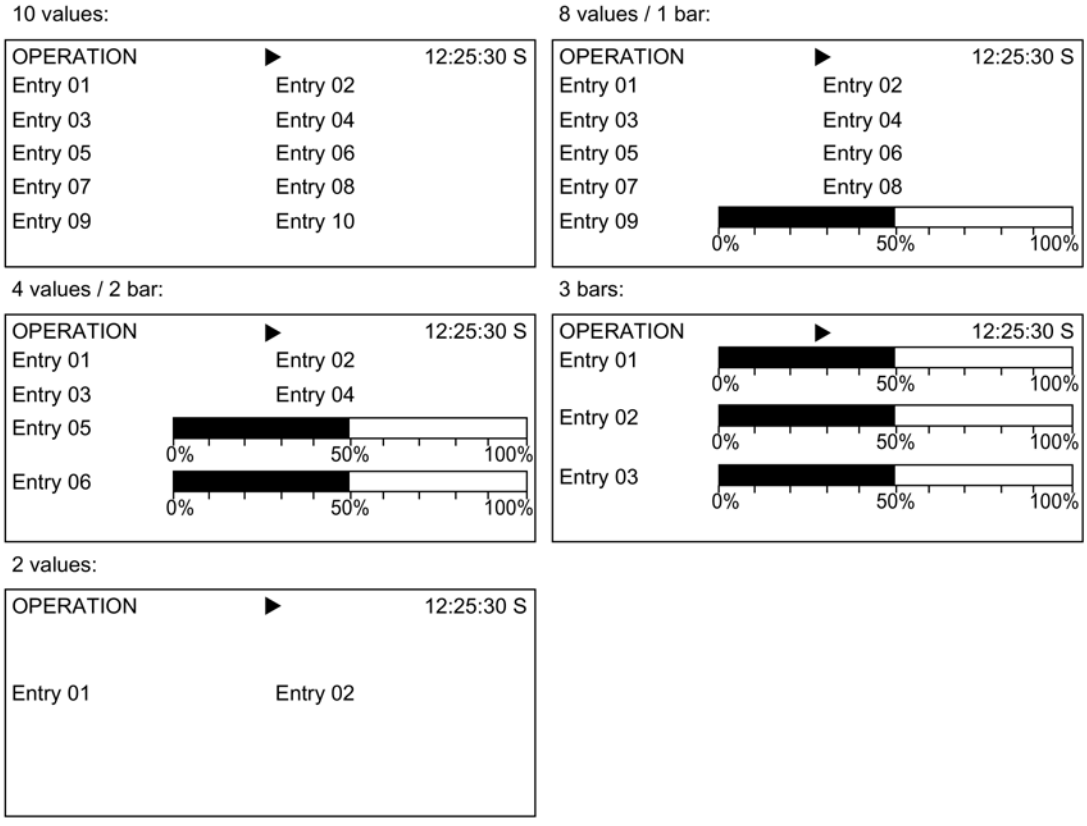


Figure 4-9 Layout of the entries in the operation screen

4.6.4.1 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

Signal		Parameter	Short name	Unit	Normalization (100%=...) see table below
Factory setting (entry no.)					
DC-link voltage smoothed	(1)	r0026	U_DC	V	p2001
Temperature of power unit	(2)	r0037	T_LT	° C	p2006

Normalization for object B_INF

Table 4- 2 Normalization for object B_INF

Variable	Normalization parameters	Default for quick commissioning
Reference voltage	100% = p2001	p2001 = r0206/r0207
Reference temperature	100% = 100 °C	

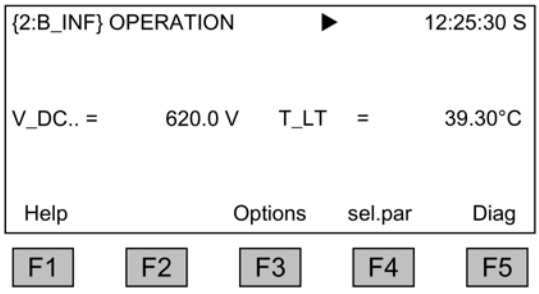


Figure 4-10 Operation screen - example of infeed via a Basic Line Module

Object S_INF

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

Signal		Parameter	Short name	Unit	Normalization (100%=...) see table below
Factory setting (entry no.)					
DC-link voltage smoothed	(1)	r0026	U_DC	V	p2001
Temperature of power unit	(2)	r0037	T_LT	° C	p2006
Active current	(3)	r0030	IACTV	A	p2002
Line frequency	(4)	r0024	FLINE	Hz	p2000
Active power	(5)	r0032	PACTV	kW	r2004
Actual value of current	(6)	r0027	I_IST	A	p2002
Input voltage	(7)	r0025	U_IN	V	p2001
Active power	(8)	r0032	PACTV	kW	r2004
Modulation depth, smoothed	(9)	r0028	MODD	%	Reference modulation depth
Reactive current component smoothed	(10)	r0029	IREAC	A	p2002

Normalization for object S_INF

Table 4- 4 Normalization for object S_INF

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

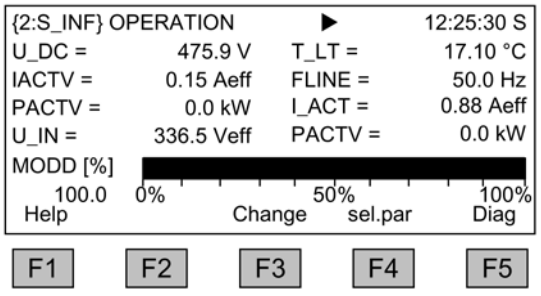


Figure 4-11 Operation screen - example of infeed via a Smart Line Module

Object A_INF

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

Signal		Parameter	Short name	Unit	Normalization (100%=...) see table below
Factory setting (entry no.)					
DC-link voltage smoothed	(1)	r0026	U_DC	V	p2001
Temperature of power unit	(2)	r0037	T_LT	° C	p2006
Active current	(3)	r0030	IACTV	A	p2002
Line frequency	(4)	r0024	FLINE	Hz	p2000
Active power	(5)	r0032	PACTV	kW	r2004
Actual value of current	(6)	r0027	I_IST	A	p2002
Input voltage	(7)	r0025	U_IN	V	p2001
Active power	(8)	r0032	PACTV	kW	r2004
Modulation depth, smoothed	(9)	r0028	MODD	%	Reference modulation depth
Reactive current component smoothed	(10)	r0029	IREAC	A	p2002

Normalization for object A_INF

Table 4- 6 Normalization for object A_INF

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

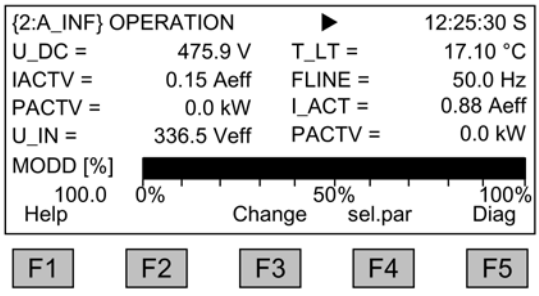


Figure 4-12 Operation screen - example of infeed via an Active Line Module

VECTOR object

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

Signal		Parameter	Short name	Unit	Normalization (100%=...) see table below
Factory setting (entry no.)					
Speed setpoint upstream of ramp-function generator	(1)	r1114	NSETP	rpm	p2000
Output frequency	(2)	r0024	F_OUT	Hz	Reference frequency
Power smoothed	(3)	r0032	PACTV	kW	r2004
DC-link voltage smoothed	(4)	r0026	U_DC	V	p2001
Actual speed smoothed	(5)	r0021	N_ACT	rpm	p2000
Absolute actual current smoothed	(6)	r0027	I_IST	A	p2002
Motor temperature	(7)	r0035 [1)]	T_MOT	° C	p2006
Converter temperature	(8)	r0037 [1)]	T_LT	° C	p2006
Actual torque smoothed	(9)	r0031	M_ACT	Nm	p2003
Converter output voltage smoothed	(10)	r0025	V_OUT	V	p2001

[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

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

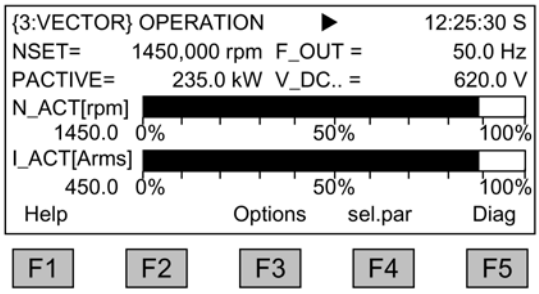


Figure 4-13 Operation screen - example of a drive with vector control

TM31 object

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

Signal	Parameter	Short name	Unit	Normalization (100% = ...)
Analog input 0 [V, mA]	r4052[0]	AI_UI	V, mA	V: 100 V / mA: 100 mA
Analog input 1 [V, mA]	r4052[1]	AI_UI	V, mA	V: 100 V / mA: 100 mA
Analog input 0, scaled	r4055[0]	AI_%	%	as set in p200x
analog input 1, scaled	r4055[1]	AI_%	%	as set in p200x

4.6.4.2 Curve recorder settings

In this menu, the following settings can be made:

Parameter selection

You can select the parameter whose signal is to be displayed in the form of a curve in the curve recorder.

Interpolation (factory setting: No) so that variables that change as a step function can be better displayed.

- **No:** Only the measured values are displayed as points, without a connecting line between the points.
- **1:** The measured values are connected with a vertical line.
- **2:** The measured values are connected with a line, offset at the center.

Time basis (factory setting: 2 min/figure)

The rate of the signal recording in minutes per figure is set. The value can be changed in integer multiples of 2. If odd values are entered, the value is rounded up. After changing the time basis, the recording is started again.

Background recording (factory setting: NO)

- **YES:** The value recording is also continued if the display screen is exited. When the screen is entered again, the recorded prehistory is displayed.
- **NO:** The value recording is stopped when the curve recorder is exited.

Y scale mode (factory setting: Auto), specifies the display of the curve

- **Auto:** The scaling takes place automatically (making the best possible use of the display height).
- **Manual:** The scaling takes place by manually entering the MIN/MAX range limits. If, in this mode, values that are outside the defined window occur, the limit is automatically adapted for the display so that actual measured values can always be recorded.

4.6.4.3 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.

Note

Display format for the time

The drive unit displays the time in parameter r3102 in the UTC format (days/milliseconds since 01/01/1970).

Synchronization settings can be made under "Additional settings":

Synchronization (factory setting: None)

- **None**
  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.
  - Depending on the set synchronization interval, the current AOP time is transferred to the drive unit.

  Note
  Flashing "S"
  If the AOP detects a difference between RAM and ROM during synchronization to the drive unit, this is indicated by a flashing "S" at the top right in the display or, if operator input and/or parameter assignment has been disabled, by a flashing key symbol.
- **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.
  - Depending on the set synchronization interval, the actual drive unit time is transferred to the AOP.

  Note
  Time-of-day master
  The time in the drive must be set by the time-of-day master (e.g. SIMATIC).

Synchronization interval

The interval for time synchronization is set from 1 hour (factory setting) to 99 hours.

For the interval, the time in the AOP from the time of the last change of the interval is decisive.

Daylight-saving time changeover (factory setting: No)

- **No**
  The time does not automatically change over to daylight-saving time.
- **Yes**
  Selection is only possible if synchronization is set to "None" or "AOP -> Drive".
  The time is then automatically set to summer or winter time.
  After the changeover - for synchronization "AOP -> Drive" - synchronization is immediately carried out, irrespective of the synchronization interval set.

Changes to the synchronization must be saved with "Save".

Date format

In this menu, the date format can be set:

- **DD.MM.YYYY**: European date format
- **MM/DD/YYYY**: North American date format

4.6.4.4 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.

4.6.4.5 Normalization to motor current

The reference variable for the bar-type display of parameter r0027 (smoothed absolute current actual value) can be changed over in the operating screen forms in this menu.

Normalization to motor current (factory setting: NO)

- **Yes:**The bar-type display of parameter r0027 in the operating screen form is displayed referred to parameter p0305 (rated motor current).
- **No:**The bar-type display of parameter r0027 in the operating screen form is displayed referred to parameter p2002 (reference current).

4.6.4.6 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

Note

Restoring the factory setting

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.

4.6.5 AOP diagnostics

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).

Database contents

For service purposes, the contents of the database are displayed in the screen form.

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

Exit keyboard test

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 four LEDs are functioning properly.

Database statistics

For service purposes, the database statistics are displayed in the screen form.

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 the 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).

Note

If STARTER has the master control, then when the LOCAL-REMOTE button is pressed, the "Other device has master control" message is output and transfer of master control is rejected.

4.8.1 LOCAL/REMOTE key



Activating the 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 the REMOTE mode even if the drive is being controlled by external sources (fieldbus, customer terminal strip).
  WARNING: This function is not an EMERGENCY STOP function!
- **No**: The OFF key is only effective in the 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 it is, switchover is prevented and the error message "Local mode during operation not possible" is output. Before the system switches to REMOTE, the drive is switched off and the setpoint is set to 0.

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.

4.8.4 Jog

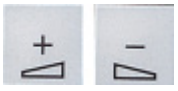


Settings: Menu – Commissioning/Service – AOP Settings – Control Settings

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 the LOCAL mode

4.8.5 Increase setpoint / decrease setpoint



You can use the Raise and Lower keys to enter the setpoint with a resolution of 1% 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 "Raise key" mean:
  The displayed setpoint is positive and the output frequency is increased.
- CCW rotation and "Raise 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 Lock 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

Lock LOCAL

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 CDS setting via AOP

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

CDS changeover via AOP (factory setting: No)

- **Yes**: In the LOCAL mode, the active CDS be changed by one in the operating screen form. This is helpful if operation via the AOP would not be possible due to the fact that a standard telegram has been activated.
  When CDS0 or 2 is active, "CDS+1" switches to CDS1 or CDS3.
  When CDS1 or 3 is active, "CDS-1" switches to CDS0 or CDS2.
- **No**: In the LOCAL mode, the active CDS cannot be changed by one in the operating screen form.

4.8.10 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.

4.8.11 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 4- 10 Display of operator input / parameterization inhibit

Inhibit type	Online operation	Offline mode
No safety inhibit		
Operator input inhibit		
Parameterization inhibit		
Operator input inhibit + parameterization inhibit		

Settings

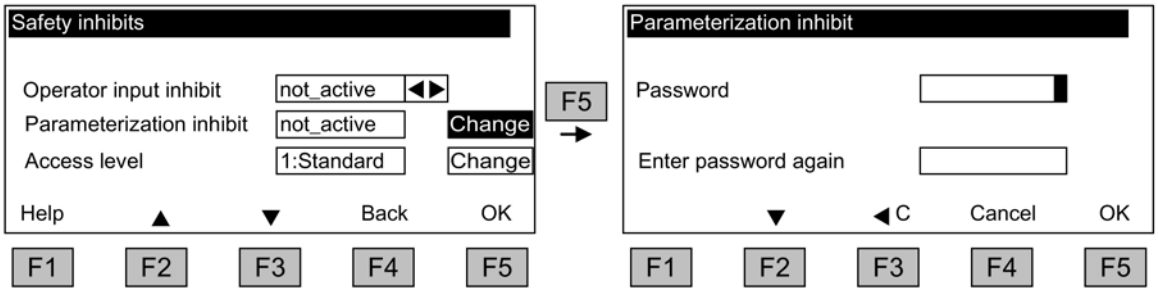


Figure 4-14 Set safety inhibits

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".

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.

Note

Copy RAM to ROM

When the operator input inhibit or parameterization inhibit is activated, a "Copy from RAM to ROM" is automatically executed to back the parameter settings up in non-volatile memory on the memory card.

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.
- Format: YY:MM:DD:HH:MM:SS
  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.

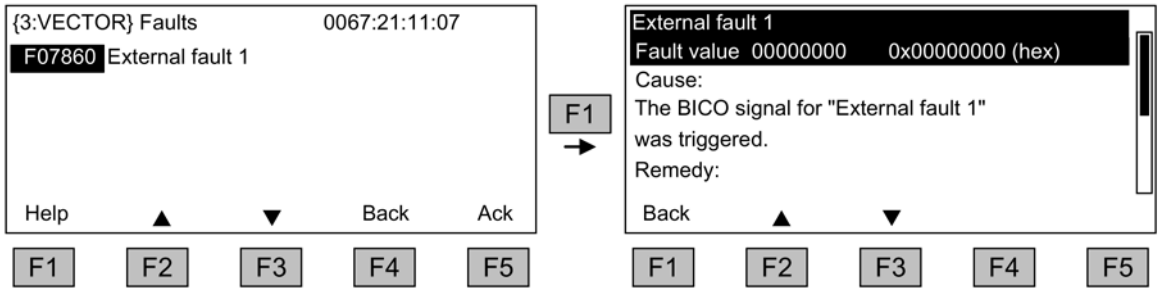


Figure 4-15 Fault screen

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

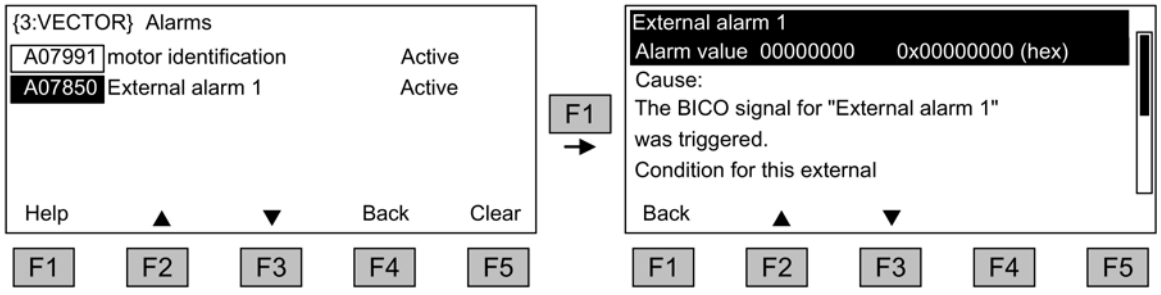


Figure 4-16 Alarm screen

Alarms that are no longer active are removed from the alarm memory with F5 Clear.

Maintenance and servicing

5

5.1 Replacing the backup battery

Replacing the backup battery

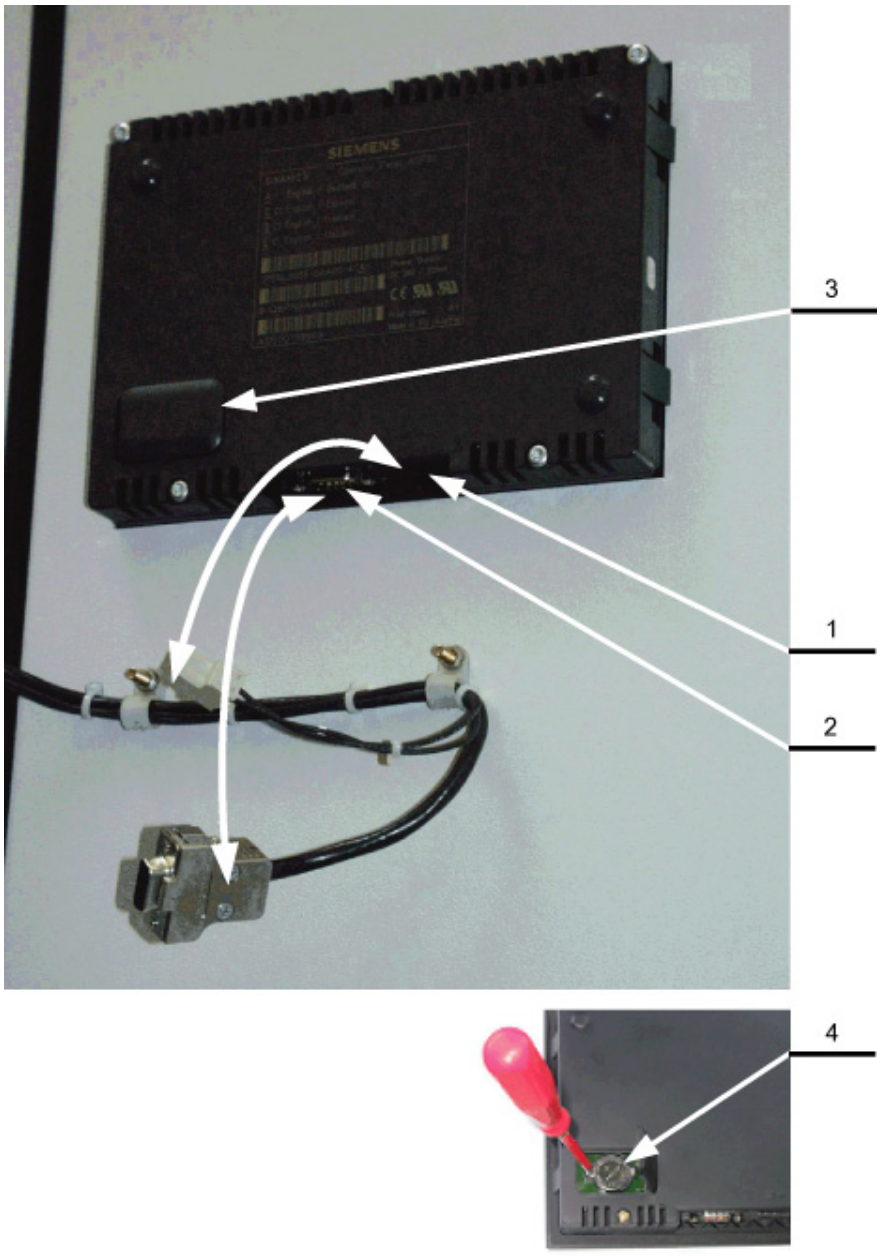


Figure 5-1 Replacing the backup battery

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.

Table 5- 1 Technical data for the backup battery

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

Note

You must replace the battery within one minute; otherwise, the AOP settings may be lost.

Note

The battery must be disposed of in accordance with the applicable country-specific guidelines and regulations.

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 memory card is found to contain a different version of the firmware, a message appears on the AOP30 prompting you as to whether new firmware should be loaded. 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.

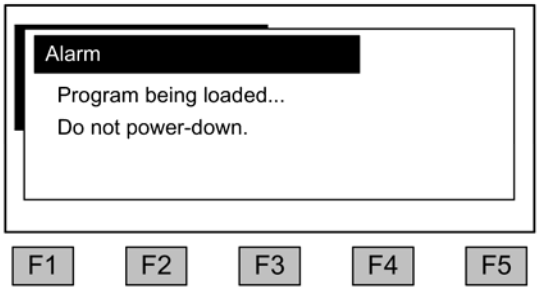


Figure 5-2 Firmware being loaded

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).

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Siemens AG
Industry Sector
Drive Technologies
Large Drives
Postfach 4743
90025 NÜRNBERG
GERMANY

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