SINAMICS G130

AOP30 operator panel

Operating Instructions · 05/2010

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SINAMICS G130
The AOP30 operator panel

Operating Instructions

Control version V4.3 SP2

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 product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, 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.

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

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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.

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Safety information 1

1.1 Warnings

⚠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 the warnings 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" defined in EN 50110 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

This equipment is used in industrial high-voltage installations. During operation, this equipment contains rotating and live, bare parts. For this reason, they could cause severe injury or significant material damage if the required covers are removed, if they are used or operated incorrectly, or have 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

Those responsible for protecting the plant must ensure the following:

- 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 experts responsible.

- The operating manual and machine documentation are always available.

- The technical specifications regarding the applicable installation, connection, environmental, and operating conditions are always observed.

- The plant-specific assembly and safety guidelines are observed and personal protection equipment is used.

- Unqualified personnel are forbidden from using these machines and working near them.

This operating manual is intended for qualified personnel and only contain information and notes relating to the intended purpose of the machines.

The operating manual and machine documentation are written in different languages as specified in the delivery 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 Components that can be destroyed by electrostatic discharge (ESD)

> ⚠ **CAUTION**
>
> The board contains components that can be destroyed by electrostatic discharge. These components can be easily destroyed if not handled properly. If you do have to use electronic boards, however, please observe the following:
>
> - You should only touch electronic boards if absolutely necessary.
> - When you touch boards, however, your body must be electrically discharged beforehand.
> - Boards must not come into contact with highly insulating materials (such as plastic parts, insulated desktops, articles of clothing manufactured from man-made fibers).
> - Boards must only be placed 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 material is not conductive, the boards must be wrapped with a conductive packaging material (such as conductive foam rubber or household aluminum foil).

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 = contact with conductive flooring
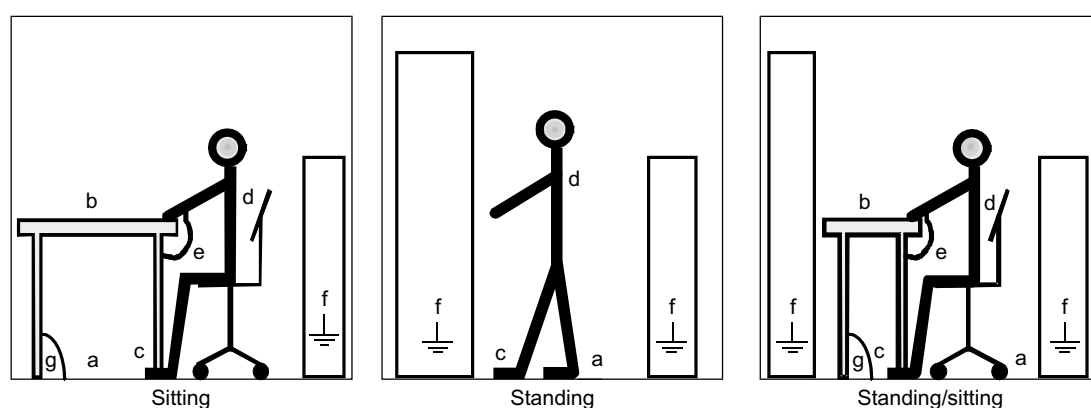
Figure 1-1   ESD protective measures

General

2

Description

The user-friendly AOP30 operator panel is an optional input/output device for SINAMICS G130 converters. The operator panel can be used for commissioning, operation, and diagnostic purposes.

The AOP30 communicates with the SINAMICS drive via a serial interface (RS232) using the PPI protocol. The interface is a point-to-point connection. During communication, the AOP30 is the master and the connected drive is the slave.

Structure

The AOP30 is an operator panel with a graphical display and a touch-sensitive keypad. An RS232 interface is used as the interface to the drive unit. The device can be installed in a cabinet door (thickness: between 2 mm and 4 mm).

Features

- Display with green backlighting (resolution: 240 x 64 pixels)
- 26-key touch-sensitive keypad
- Connection for a 24 V DC power supply
- RS232 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

Mechanical installation

3

The following diagrams and descriptions explain the conditions and procedures involved in the mechanical installation of the AOP30 operator panel.
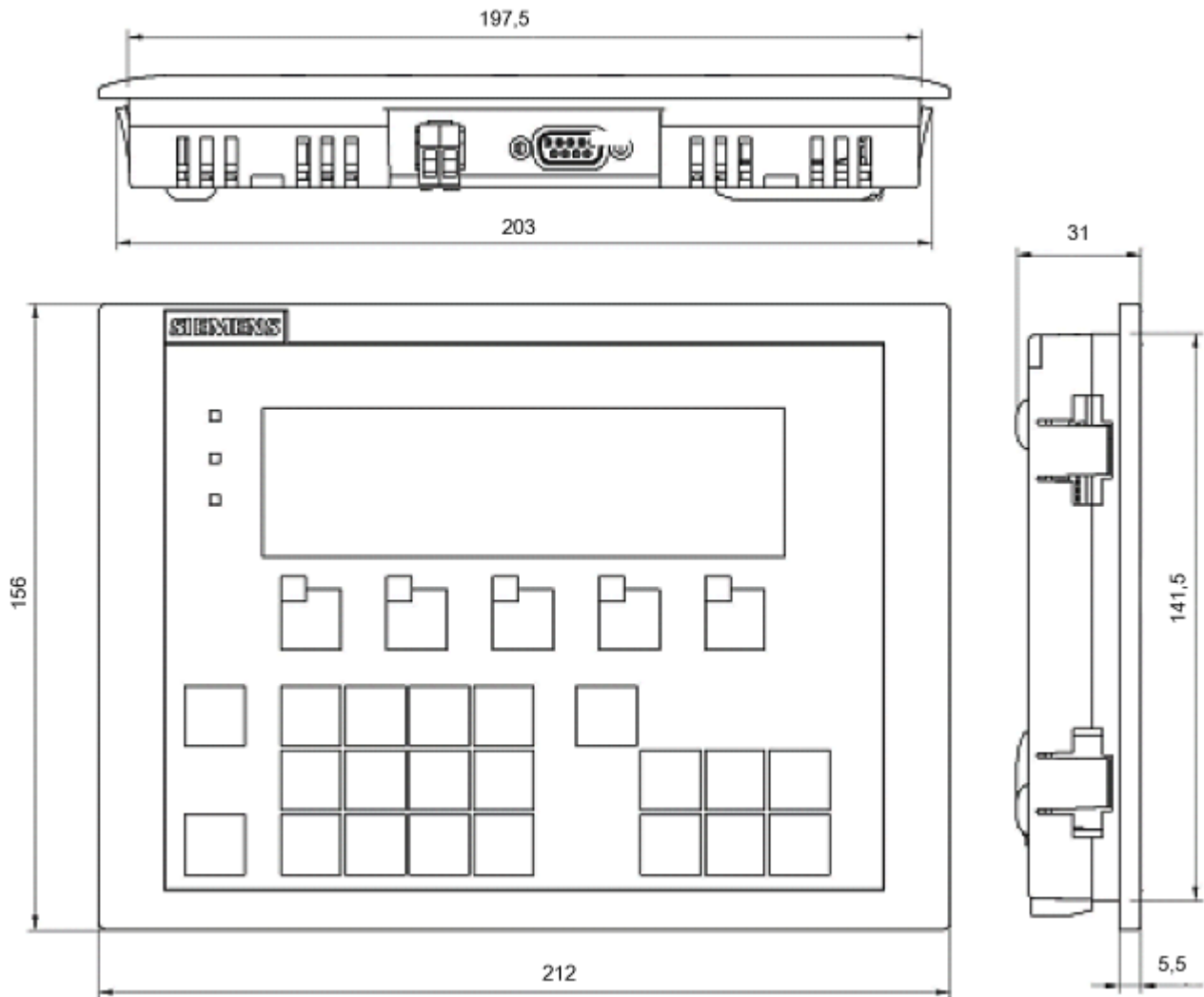
Figure 3-1   Dimension drawing of the AOP30 operator panel

Installing the operator panel (cabinet door thickness: 2 mm)

1. Cut out a 141.5 mm x 197.5 mm section in the cabinet door.

2. Fit the AOP30 operator panel in this cutout section from the outside.

3. Apply pressure to the four corners until the snap-in lugs lock into position.

Installing the operator panel (cabinet door thickness: 2 mm to 4 mm)

The following images show the tensioning elements for the AOP30 operator panel for installation in cabinet doors (thickness: 2 mm to 4mm).
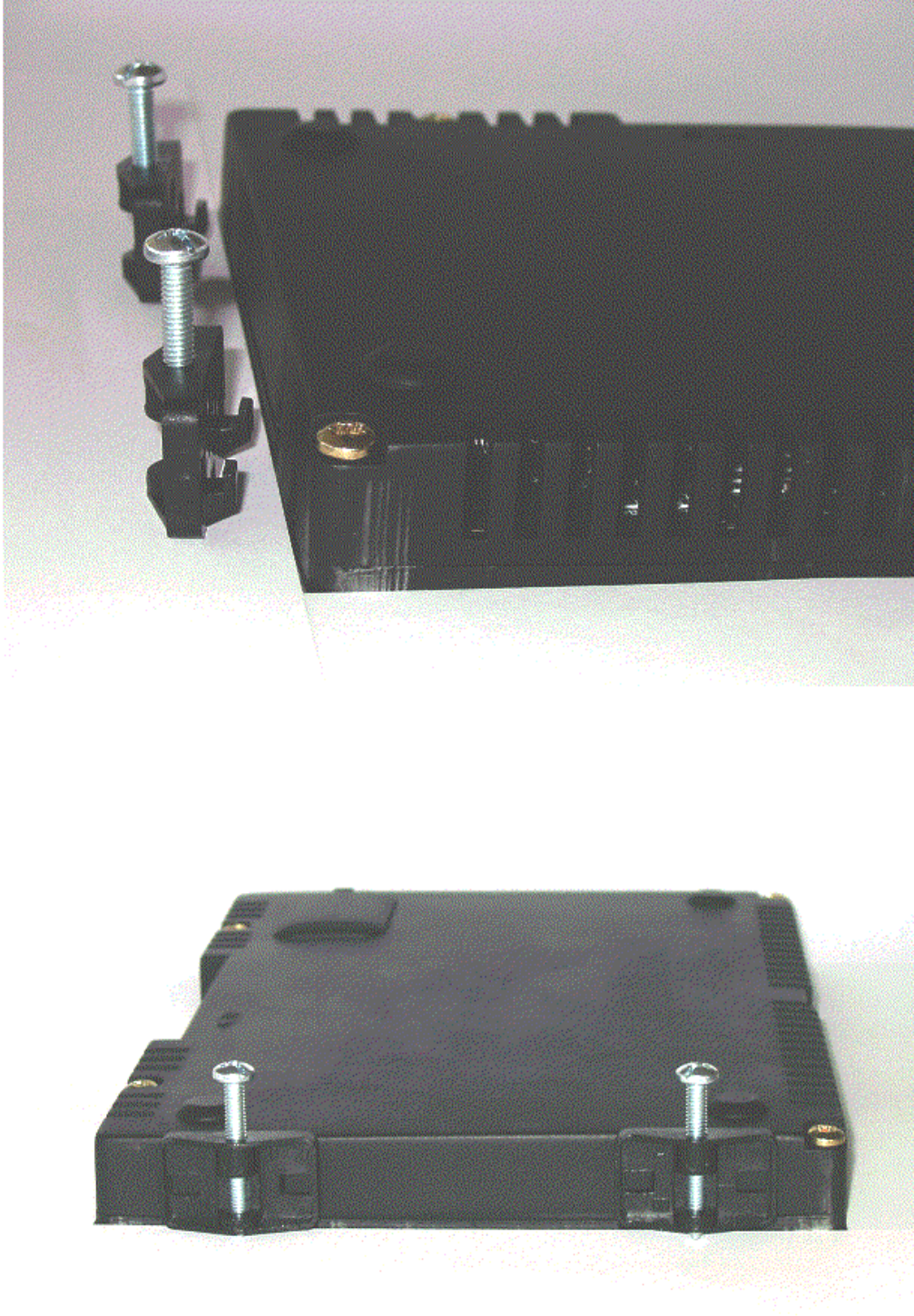
Figure 3-2   Tensioning elements for the AOP30 operator panel for installation in cabinet doors (thickness: 2 mm to 4 mm)

1. Cut out a 141.5 mm x 197.5 mm section in the cabinet door.
2. Fit the AOP30 operator panel in this cutout section from the outside.
3. Hook the tensioning elements into the openings provided.
4. Tighten the screws by hand to secure the tensioning elements.

CAUTION
Make sure that the screws for the tensioning elements are not too tight otherwise the operator panel housing may be damaged.

Connection

<div style="text-align: right">

4

</div>

Interfaces
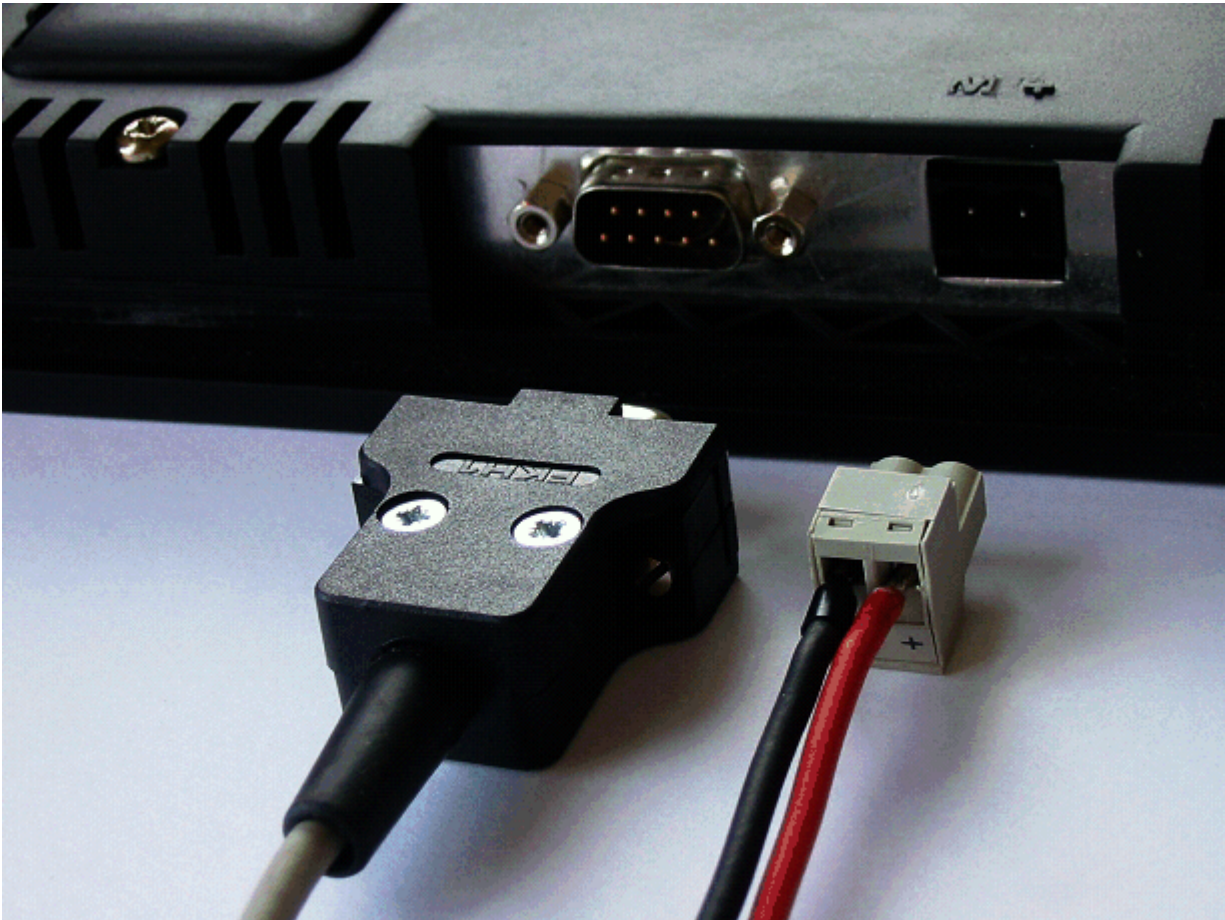
Figure 4-1   AOP30 interfaces

X524: Power supply

Table 4- 1   Power supply terminals

Terminal	Designation	Technical specifications
+	P24	24 V DC power supply
M	M	Ground

Max. connectable cross-section: 2.5 mm²

X540: serial interface (RS232)

Table 4- 2   Serial interface (RS232) X540

Pin	Designation	Technical specifications
2	RxD	Receive data
3	TxD	Transmit data
5	Ground	Ground reference
Connector type: 9-pin SUB D socket		

Note

The maximum cable length is 10 m.

To ensure noise-free communication, you are advised to use a shielded cable and connect the cable shield to both connector housings.

CAUTION

In the operator panel electronic circuitry, a connected cable shield may possibly be connected to the signal and P24 ground. If the power supply is connected with incorrect polarity, the P24 supply via the shield and signal ground will short-circuit.

Connection

The AOP30 is connected as follows:

1. Connect the power supply cable to the interface for the electronic power supply (X524).

2. Connect the standard cable to the serial RS232 interface (X540) of the Control Unit.
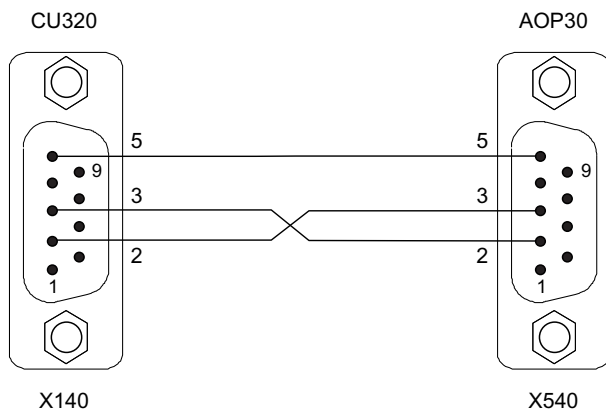
Signal cable between the Control Unit and AOP30

CAUTION
The connection cable to AOP30 may only contain the three contacts which are shown in the drawing; a completely allocated cable may not be used.

Control via the operator panel

<div align="right">5</div>

5.1 Operator panel (AOP30) overview and menu structure

Description

The operator panel can be used for the following activities:

- Parameterization (commissioning)
- Monitoring status variables
- Controlling the drive
- Diagnosing faults 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:

```
MAIN MENU
Operation screen
Parameterization
Fault/alarm memory
Commissioning/service
Sprachauswahl/Language selection
 Help       ▲        ▼            OK
 [F1]      [F2]     [F3]    [F4]    [F5]
```
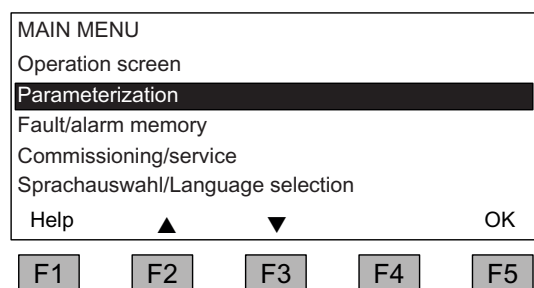
Dialog screen for the main menu:
It can be accessed at any time with the "MENU" key.

Press "F2" or "F3" to navigate through the menu options in the main menu.

Note
AOP reset

If the AOP no longer reacts, you can trigger an AOP reset by simultaneously pressing the key and OFF buttons (longer than two seconds) and then releasing the OFF button.

Menu structure of the operator panel

MENU — Main menu

- Operation screen
  - Current faults *) — Old list of faults
  - Current alarms *)
- Parameterization
  - Individ DO
  - All DO
  - Data set selection
  - Permanent parameter transfer
- Fault memory *)
  Alarm memory *)
  - Faults — Fault history
  - Alarms — Alarm history
- Commissioning / Service
  - Drive commissioning
    - Basic commissioning
    - Complete commissioning
    - Motor identification
    - Reset fan operating time
  - Device commissioning
  - AOP settings
    - Control settings
    - Display settings
    - Define operation screen
    - Set date/time
    - Date format
    - DO name display mode
    - Reset AOP settings
  - AOP30 diagnostics
    - Software / database version
    - Battery status
    - Keyboard test
    - LED test
- Language selection

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

Safety locks
- Operator input inhibit
- Parameters disable
- Access level

Figure 5-1   Menu structure of the operator panel

5.2   Menu: Operation screen

Description

The operation screen displays the most important status variables for the drive unit:

In the delivery condition, it displays the operating state 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".
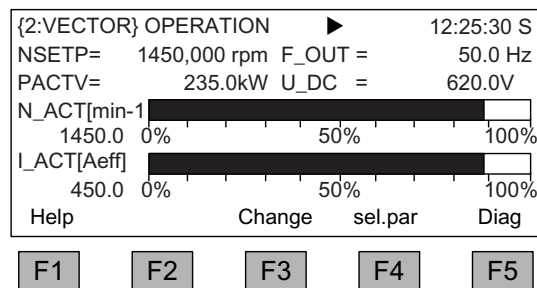
Figure 5-2   Operation screen

If a fault occurs, the system automatically displays the fault screen (see "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.

Settings

When you choose Commissioning / service –> AOP settings –> Define operation screen, you can adjust the display type and the values displayed as required (see "Operation / AOP30 settings").

5.3 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").

The following DOs are available in the SINAMICS G130:

- CU: General parameters for the Control Unit
- VECTOR: Drive control
- TM31 (optional): Terminal Module TM31

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

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".

This drive determines the following:

- Operation screen
- Fault and alarm displays
- The controller (ON, OFF, …) of a drive

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

1. 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.

2. 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)

In both cases, the set access level governs which parameters are displayed. You can set the access level in the menu for inhibit functions, which can be 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.

```
┌──────────────────────────────────────────┐
│ Data block selection                    ▓ │
│ Type                  Max   Drive   AOP   │
│ Command DB       c:   [ 1 ] [ 0 ]  [█0█]  │
│ Drive DB         d:   [ 0 ] [ 0 ]  [ 0 ]  │
│ Motor DB         m:   [ 0 ] [ 0 ]  [ 0 ]  │
│                                           │
│  Help     ▲       ▼       Back     OK     │
└──────────────────────────────────────────┘
   [ F1 ]   [ F2 ]   [ F3 ]   [ F4 ]   [ F5 ]
```

Figure 5-3   Data set selection
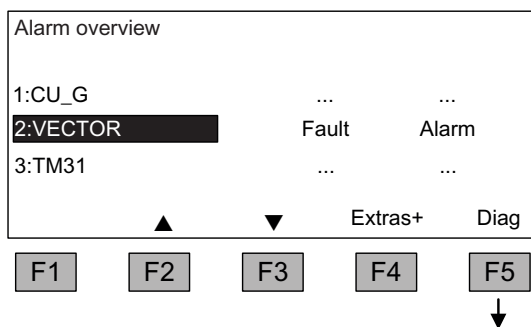
Explanation of the operator control dialog

- "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 in the operator panel.

5.4   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.

```
Alarm overview

1:CU_G                      ...          ...
2:VECTOR                  Fault        Alarm
3:TM31                      ...          ...

              ▲       ▼      Extras+    Diag
      [ F1 ]  [ F2 ]  [ F3 ] [ F4 ]   [ F5 ]
```

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.

```
{2:VECTOR} Display diagnostics
 Current faults
 Current alarms
 Old faults
 Old alarms

              ▲       ▼       Back      OK
      [ F1 ]  [ F2 ]  [ F3 ] [ F4 ]   [ F5 ]
```
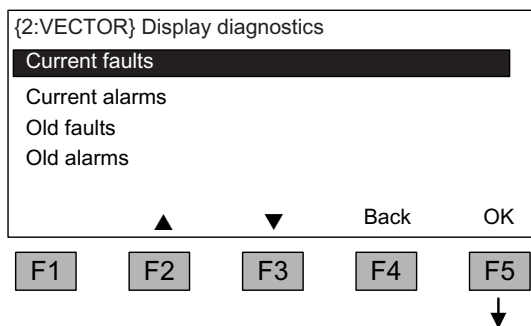
Display diagnosis

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.

```
{2:VECTOR} Faults          0067:21:11:07
 F07860  External fault 1



 Help     ▲       ▼       Back      Ack
      [ F1 ]  [ F2 ]  [ F3 ] [ F4 ]   [ F5 ]
```
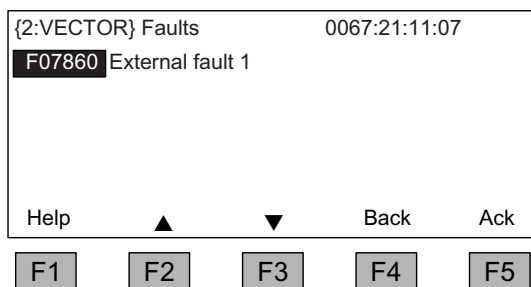
Display of current faults

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.

5.5 Menu commissioning / service

5.5.1 Drive commissioning

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

Basic Commissioning

Only the basic commissioning parameters are queried 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.

Resetting the fan runtime

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

5.5.2 Device commissioning

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.

5.5.3 AOP settings

Control settings

This defines the settings for the control keys in LOCAL mode (see "Operation / Control via the operator panel / Operation via the operator panel").

Display settings

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

Defining the operation screen

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

Define operation screen		
Screen2	not_active	◄►
Oper. screen type	4 values/2 bar	◄►
Operation screen values		
Screen2 type	8 values/1 bar	◄►
Help	▲ ▼	Back Change

F1   F2   F3   F4   F5

F5 →

Operation screen		
01: (02)r01114.00	Setpt after limit	
02: (02)r00024.00	Drv U_outp smooth	
03: (02)r00032.00	Power factor smth	
04: (02)r00026.00	Vdc smooth	
Help	▲ ▼	Back Change

F1   F2   F3   F4   F5

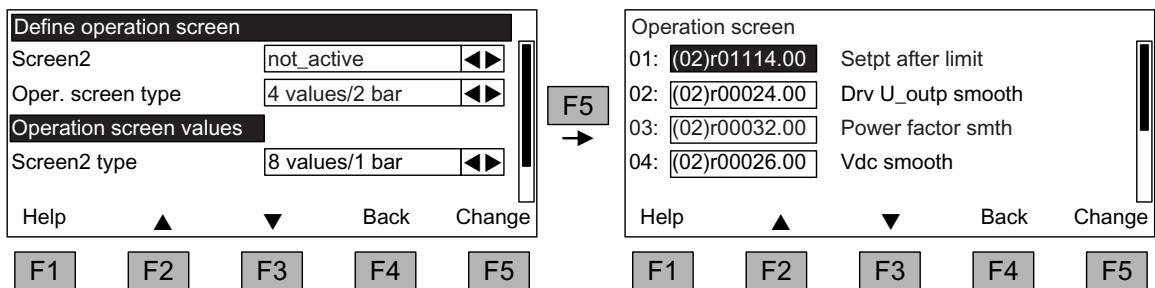Figure 5-4   Defining the operation screen

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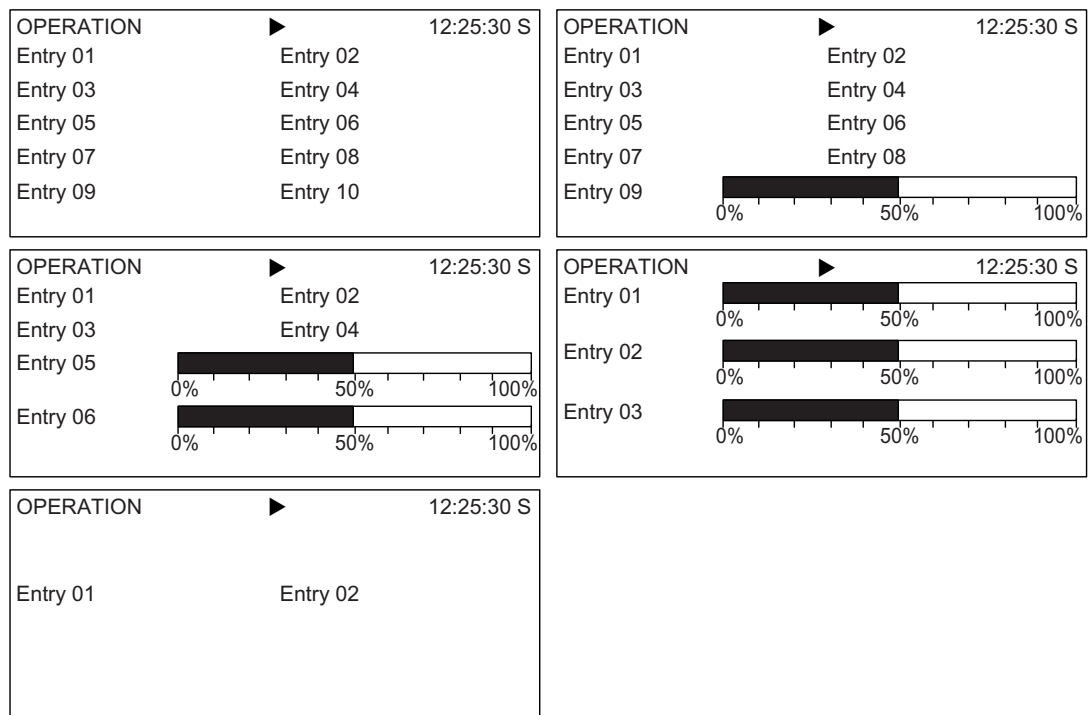

Figure 5-5   Layout of the entries in the operation screen

5.5.4   Lists of signals for the operation screen

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

VECTOR object

Table 5- 1   List of signals for the operation screen - VECTOR object

Signal		Parameters	Short name	Unit	Scaling (100 %=...) See table below
Factory setting (entry no.)					
Speed setpoint upstream of ramp-function generator	(1)	r1114	NSETP	1/min	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 value smoothed	(5)	r0021	N_ACT	1/min	p2000
Absolute actual current smoothed	(6)	r0027	I_IST	A	p2002
Motor temperature	(7)	r0035 [1]	T_MOT	°C	Reference temperature
Converter temperature	(8)	r0037	T_LT	°C	Reference temperature
Actual torque smoothed	(9)	r0031	M_ACT	Nm	p2003
Converter output voltage smoothed	(10)	r0025	C_OUT	V	p2001
For diagnostic purposes					
Speed setpoint smoothed		r0020	NSETP	1/min	p2000
Control factor smoothed		r0028	AUSST	%	Reference modulation depth
Field-producing current component		r0029	IDACT	A	p2002
Torque-producing current component		r0030	IQACT	A	p2002
Converter overload Degree of thermal overload		r0036	LTI2T	%	100 % = Shutdown
Speed actual value motor encoder		r0061	N_ACT	1/min	p2000
Speed setpoint after filter		r0062	NSETP	1/min	p2000
Actual speed smoothed		r0063	N_ACT	1/min	p2000
Control deviation		r0064	NDIFF	1/min	p2000
Slip frequency		r0065	FSCHL	Hz	Reference frequency
Output frequency		r0066	F_OUT	Hz	Reference frequency
Output voltage		r0072	UACT	V	p2001
Control factor		r0074	AUSST	%	Reference modulation depth
Torque-generating actual current		r0078	IQACT	A	p2002
Actual torque value		r0080	M_ACT	Nm	p2003
For further diagnostic purposes					
Fixed speed setpoint effective		r1024		1/min	p2000
Active motorized potentiometer setpoint		r1050		1/min	p2000
Resulting speed setpoint		r1119	NSETP	1/min	p2000
Speed controller output		r1508	NREGY	Nm	p2003
I component of speed controller		r1482	NREGI	Nm	p2003
PROFIBUS setpoint		r2050	PBSOL	1/min	p2000

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

Normalization for VECTOR object

Table 5- 2   Normalization for VECTOR object

Size	Scaling parameter	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	

TM31 object

Table 5- 3   List of signals for the operation screen – TM31 object

Signal	Parameter	Short name	Unit	Scaling (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

Setting the 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

DO name display mode

In this menu, you can switch the display of the DO name between the standard abbreviation (e.g. VECTOR) and a user-defined DO name (e.g. 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.

Resetting 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.

5.5.5 AOP30 diagnosis

Software/database version

You can use this menu to display the firmware and database versions.

The database version must be compatible with the drive software status (you can check this in parameter r0018).

Battery status

In this menu, you can display the battery voltage numerically (in Volts) or as a bar display. 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: "Warning: 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 not available after the system has been switched off for a prolonged period due to the voltage being too low, 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 the 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.

5.6 Language/Sprache/Langue/Idioma/Lingua

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

You can change the language of the operator panel via the "Language/Sprache/Langue/Idioma/Lingua" menu.

Note

Additional languages for the display

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

5.7 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.

For LOCAL master control, all of the supplementary setpoints are de-activated.

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).

5.7.1 LOCAL/REMOTE key

Activate LOCAL mode: Press the LOCAL 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**: "LOCAL" or "REMOTE" operating mode is not saved. "REMOTE" is active when the supply voltage is switched back 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, NAMUR 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 the system switches to LOCAL, a check is carried out to determine whether the drive is in the operational status. If so, the system does not switch to LOCAL and outputs the message "Local not possible". Before the system switches to REMOTE, the drive is switched off and the setpoint is set to 0.

5.7.2 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 block, motor coasts to a standstill

- **OFF3**: Ramp-down on the emergency stop ramp (p1135)

5.7.3 Switching between clockwise and counter-clockwise rotation

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 mode.

Note

You have to make additional settings when switching between CW/CCW rotation.

5.7.4 Jog

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

5.7.5 Increase setpoint / decrease setpoint

You can use the increase and decrease keys to set the setpoint with a resolution of 1min^{-1} of the maximum speed.

You can also enter the setpoint numerically. 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.

When you enter values numerically, you can enter any speed between the minimum speed (p1080) and the maximum speed (p1082).

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.

5.7.6 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)

Note

The internal drive ramp-function generator is always active.

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

Save 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 locked on the drive by means of the p0806 parameter (BI: Lock master control).

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.

5.7.7 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.

5.7.8 Operator input inhibit / parameterization inhibit

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

Table 5- 4   Display of operator input/parameters disable

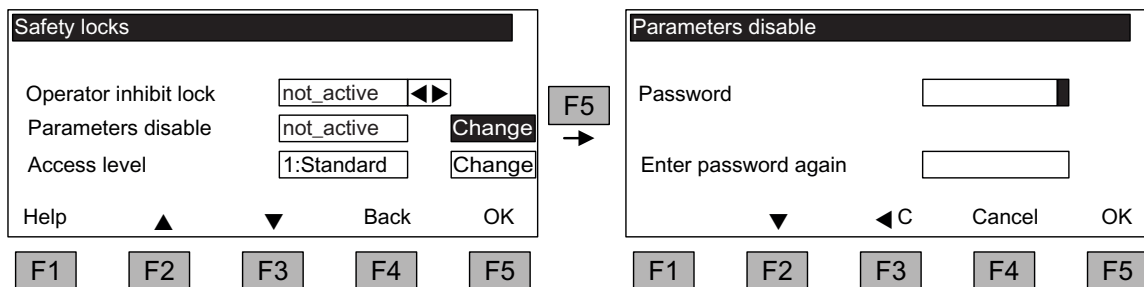| Inhibit type	Online operation	Offline operation
No inhibit		
Operator input inhibit		
Parameters disable		
Operator input inhibit + parameters disable		

Settings

Figure 5-6   Set inhibit functions

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, INCREASE, and DECREASE keys are disabled.

Parameterization inhibit (factory setting: not active)

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

A "Copy RAM to ROM" is carried out automatically if the operator input inhibit or parameterization inhibit are activated; this saves the parameter settings in a non-volatile memory on the memory card.

5.8   Faults and alarms

Indicating 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 causes the drive to shutdown. 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. The time stamp refers to the system time (r2114).

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 "Next". 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.
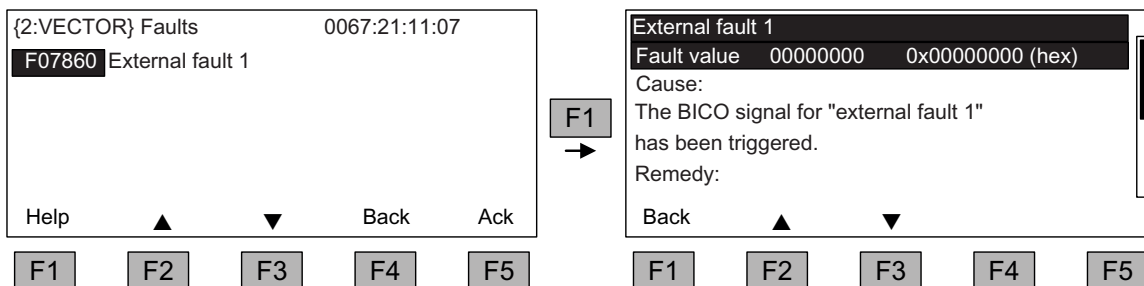
```
{2:VECTOR} Faults           0067:21:11:07
 F07860  External fault 1




 Help      ▲        ▼        Back     Ack
```
 [F1] [F2] [F3] [F4] [F5]

[F1] →

```
External fault 1
 Fault value    00000000      0x00000000 (hex)
Cause:
The BICO signal for "external fault 1"
has been triggered.
Remedy:
 Back      ▲        ▼
```
 [F1] [F2] [F3] [F4] [F5]

Figure 5-7   Fault screen

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

```
{2:VECTOR} Alarms
 A07991  motor data ident             Active
 A07850  External alarm 1             Active




 Help      ▲        ▼        Back     Clear
```
 [F1] [F2] [F3] [F4] [F5]

[F1] →

```
External alarm 1
 Alarm value    00000000      0x00000000 (hex)
Cause:
The BICO signal for "external alarm 1"
has been triggered.
The condition this external
 Back      ▲        ▼
```
 [F1] [F2] [F3] [F4] [F5]

Figure 5-8   Alarm screen

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

5.9 Saving the parameters permanently

Description

If parameters have been 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.

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

5.10 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.

Maintenance and servicing
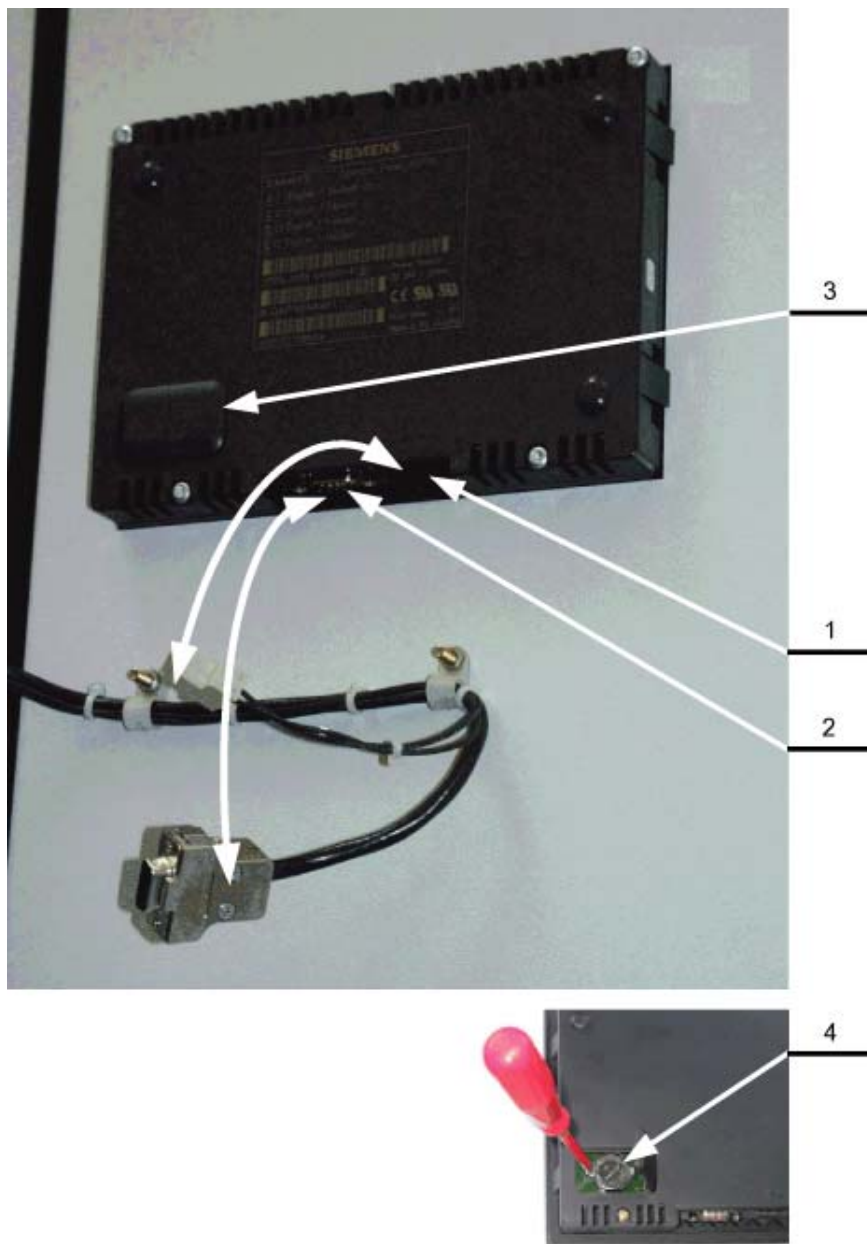
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6.1   Replacing the backup battery

Replacing the backup battery

Figure 6-1   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 6- 1   Technical specifications of the backup battery

Type	CR2032 3 V lithium battery
Manufacturer	Maxell, Sony, Panasonic
Nominal capacity	220 mAh
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

NOTICE
The battery must be replaced within one minute to ensure that no AOP settings are lost.

Note

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

6.2 Downloading new operator panel firmware from the PC

Description

Firmware might need to be loaded to the AOP if the AOP functionality needs to be upgraded.

If, once the drive has powered up, the CompactFlash Card is found to contain a newer 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.

```
SIEMENS SINAMICS
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│ Software being loaded...      │
│ Please do not disconnect the power  │
│ supply!!                      │
│                               │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘


 [ F1 ]   [ F2 ]   [ F3 ]   [ F4 ]   [ F5 ]
```
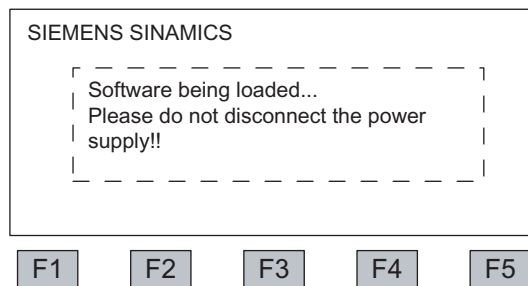
Figure 6-2   Dialog screen: loading firmware

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).

Technical specifications

<div style="text-align: right; font-size: 3em;">7</div>

Table 7- 1   Technical specifications

Power supply	24 V DC (20.4 V to 28.8 V)
Current requirements - Without backlighting - With maximum backlighting	 <100 mA <200 mA
Data interface	RS232 interface, PPI protocol
Back-up battery	3 V lithium CR2032
Operating temperature	0 to 55°C
Storage and transport temperature	-25 to +70°C
Degree of protection	IP20 (inside cabinet) IP55 (outside cabinet)
Certification	cULus CE
Product standard	EN 61800-5-1
Dimensions	Information on this can be found in the "Mechanical installation" section
Weight	0.55 kg

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