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SINAMICS G130
Basic Operator Panel 20 (BOP20)

Operating Instructions

Answers for industry.

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**SINAMICS G130
Basic Operator Panel 20 (BOP20)**

Operating Instructions

Control version V4.7

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.

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 complied with. 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.

Table of contents

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. Ensure that the correct machine is completely interlocked.
 	
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.
>
> For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.
>
> - 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.
>
> - As a minimum, connect cable shields and the cores of power cables that are not used at one end at 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.
> - 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 cause 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 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 overloaded.

> ⚠ 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 of 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
>
> **Danger of an accident occurring due to missing or illegible warning labels**
>
> Missing or illegible warning labels can result in death or serious injury.
>
> - Check 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 check of the system/machine, disconnect the devices as all converters and motors have been subject to a high-voltage test by the manufacturer, and therefore it is not necessary to perform an additional test within the system/machine.

Note

Use of copper cables for a UL-approved system

For a UL-approved system use 60/75° C copper conductors only.

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 or 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).

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
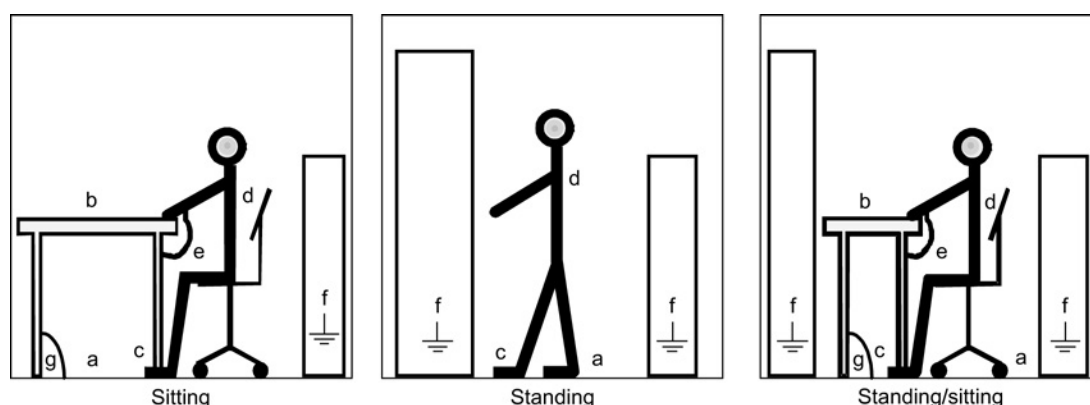- g = contact with conductive flooring

Figure 1-1   ESD protective measures

1.3   Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit Hotspot-Text (http://www.siemens.com/industrialsecurity).

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit Hotspot-Text (http://support.automation.siemens.com).

⚠ **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.

  You will find relevant information and newsletters at this address (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.

  You will find further information at this address (http://www.siemens.com/industrialsecurity).

- Make sure that you include all installed products into the holistic industrial security concept.

General

2

Description

The BOP20 Basic Operator Panel is a basic operator panel with six keys and a backlit display unit.

The BOP20 can be plugged onto the SINAMICS Control Unit and operated.

The BOP20 supports the following functions:

- Entering parameters and activating functions
- Displaying operating modes, parameters, alarms, and faults

Figure 2-1   BOP20

Installation 3

The following photos and captions explain how to assemble the Basic Operator Panel 20 (BOP20) on the Control Unit.

NOTICE
Damage to the interface for the BOP20 at the Control Unit through tilting
If the BOP20 is skewed when inserting or withdrawing it, this can damage the interface for the BOP20. • Make sure that you insert and withdraw the BOP20 straight into/out of the Control Unit and that it is not tilted up or down.

Table 3- 1   Mounting a Basic Operator Panel BOP20 using the CU320-2 DP as an example

1. Press the latching cams together and remove the blanking cover.	2. Insert the memory card in the slot provided.
3. Press the latching cams on the BOP20 together, and push the BOP20 **straight** in until you hear it latch into position.	CU320-2 DP with BOP20 installed

3.1 Removal

Please note the following information when removing the BOP20 from the Control Unit:

1. Simultaneously press the latching cams on the BOP20.

2. Always withdraw the BOP20 straight out (without skewing it). Never withdraw the BOP20 by pulling it at its lower edge, as this could damage the interface at the rear.
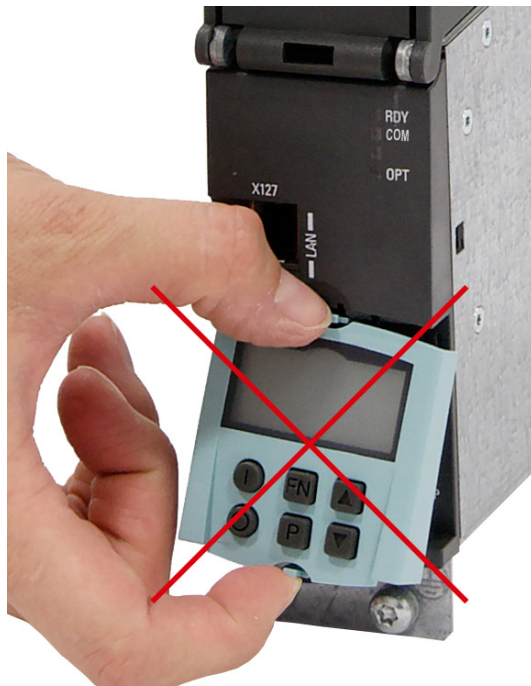

Figure 3-1   Incorrect removal of the BOP20 from a CU320-2 DP (example)

Setting parameters with the BOP20

<div align="right">

4

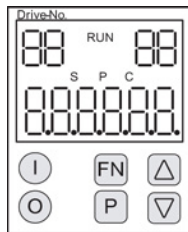</div>

4.1 BOP20 overview

Overview of displays and keys

Figure 4-1   Overview of displays and keys

Information on the displays

Table 4- 1   Displays/indicators

Display	Meaning
Top left, 2 chars.	The active drive object of the BOP is displayed here.
	The displays and key operations always refer to this drive object.
RUN	Lit if at least one drive in the drive line-up is in the RUN state (in operation).
	RUN is also displayed via bit r0899.2 of the drive.
Top right, 2 chars.	The following is displayed in this field:
	• More than 6 digits: Characters that are present but cannot be seen (e.g. "r2" —> 2 characters to the right are invisible, "L1" —> 1 character to the left is invisible)
	• Faults: Selects/displays other drives with faults
	• Designation of BICO inputs (bi, ci)
	• Designation of BICO outputs (bo, co)
	• Source object of a BICO interconnection to a drive object other than the active one.
S	Lit if at least one parameter was changed and the value was not transferred to the non-volatile memory.
P	Lit if the parameter value does not become effective until the P key is pressed.
C	Lit if at least one parameter was changed and the calculation for consistent data management has still not been initiated.
Bottom, 6 chars.	Displays parameters, indices, faults, and alarms.

Information on the keys

Table 4- 2   Keys

Key	Name	Meaning
ON (I)	ON	Switches on the drives for which the command "ON/OFF1" is to be issued from the BOP.
		Binector output r0019.0 is set using this key.
OFF (O)	OFF	Switches off the drives for which the commands "ON/OFF1", "OFF2", and "OFF3" are to be issued from the BOP.
		The binector outputs r0019.0, .1 and .2 are reset simultaneously when this key is pressed. After the key has been released, binector outputs r0019.0, .1 and .2 are again set to a "1" signal.
		Note:
		The effectiveness of these keys can be defined by parameterizing the BICO (e.g. these keys can be used to control all of the existing drives simultaneously).
FN	Functions	The significance of this key depends on the current display.
		Note: The effectiveness of this key for acknowledging faults can be defined by parameterizing the BiCo accordingly.
P	Parameters	The significance of this key depends on the current display.
		If this key is pressed for 3 s, the "Copy RAM to ROM" function is executed. The "S" displayed on the BOP disappears.
△	Raise	The keys depend on the current display and are used to either raise or lower values.
▽	Lower	

BOP20 functions

Name	Meaning
Backlighting	The backlighting can be set using p0007 in such a way that it switches itself off automatically after the set time if no actions are carried out.
Changeover active drive	From the point of view of the BOP, the active drive is defined using p0008 or using the "Fn" keys and "Arrow up".
Units	The units are not displayed on the BOP.
Access level	The access level for the BOP is defined using p0003. The higher the access level, the more parameters can be selected via the BOP.
Parameter filter	The parameter filter in p0004 can be used to filter the available parameters in accordance with their particular function.
Selecting the status display	Actual values and setpoints are displayed on the status display. The status display can be set using p0006.
User parameter list	The user parameter list in p0013 can be used to select access parameters.
Unplug while voltage is present	The BOP can be unplugged and plugged in again while the device is live. • The ON and OFF buttons have a function. Unplugging the BOP causes the drives to coast to a standstill. When the BOP is plugged in again, the drives must be switched on again. • The ON and OFF buttons have no function. Unplugging and plugging the BOP in again has no effect on the drives.
Actuating keys	The following applies to the "P" and "Fn" keys: When used in a combination with another key, "P" or "Fn" must be pressed first and then the other key.

Parameters

All drive objects
- p0005   BOP status display selection
- p0006   BOP status display mode
- p0013   BOP user-defined list
- p0971   Save drive object parameters

Drive object, Control Unit
- r0000   BOP status display
- p0003   BOP access level
- p0004   BOP parameter menu
- p0007   Backlighting display delay time
- p0008   BOP drive object selection
- p0009   Device commissioning parameter filter
- p0011   BOP password input (p0013)
- p0012   BOP password confirmation (p0013)
- r0019   CO/BO: Control word, BOP
- p0977   Save all parameters

Other drive objects (e.g. VECTOR, TM31, …)
- p0010   Commissioning parameter filter

4.2 Displays/indicators and using the BOP20

Status display

The status display for each drive object can be set using p0005 and p0006. Using the status display, you can switch to the parameter display or to a different drive object. The following functions are supported:

- Changing the active drive object

    – Press the "Fn" key and "Arrow up" -> the drive object number at the top left flashes.

    – Select the required drive object using the arrow keys.

    – Confirm with the "P" key.

- Parameter display

    – Press the "P" key.

    – The required parameter can be selected using the arrow keys.

    – Press the "Fn" key -> parameter r0000 is displayed.

    – Press the "P" key -> returns to the status display.

Parameter display

The parameters are selected in the BOP20 using the number. To call up the parameter display from the status display, press the "P" key. You can search for the parameters you require using the arrow keys. To display the parameter value, press the "P" key again. You can toggle between the drive objects by pressing the "Fn" keys and the arrow keys simultaneously. You can toggle between r0000 and the parameter that was last displayed by pressing the "Fn" key in the parameter display.
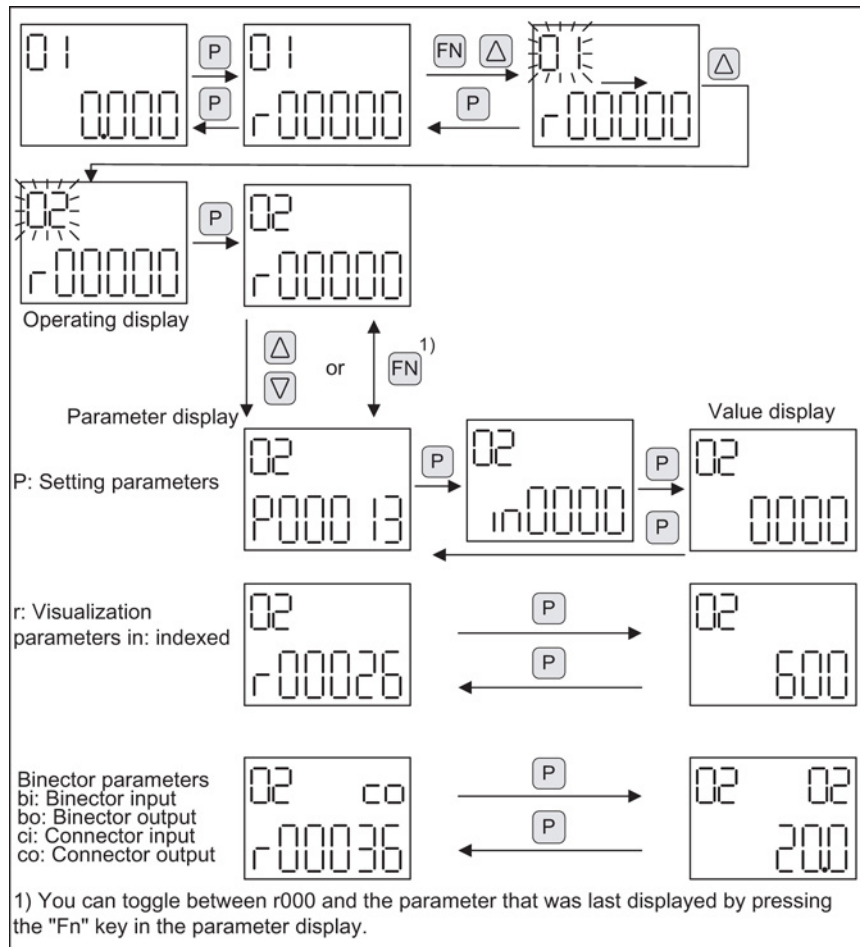

Figure 4-2   Parameter display

Value display

To switch from the parameter display to the value display, press the "P" key. In the value display, the values of the setting parameters can be increased and decreased using the arrow keys. The cursor can be selected using the "Fn" key.
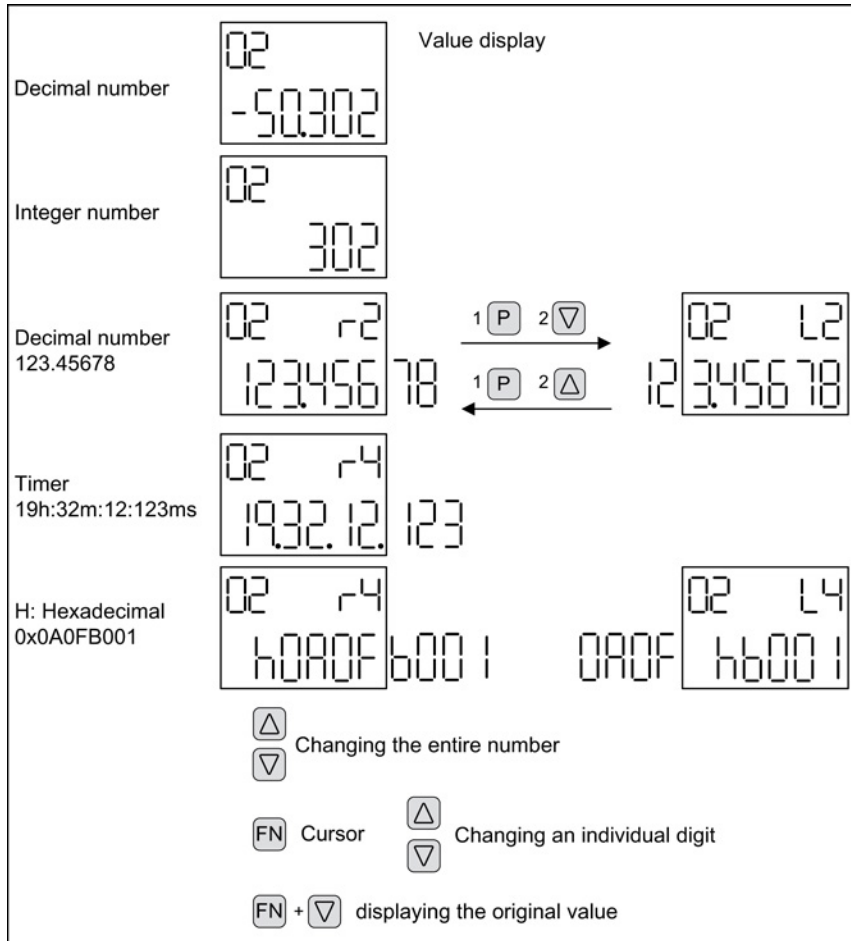

Figure 4-3   Value display

Examples

Example 1: Changing a parameter

Prerequisite: The appropriate access level is set (for this particular example, p0003 = 3).
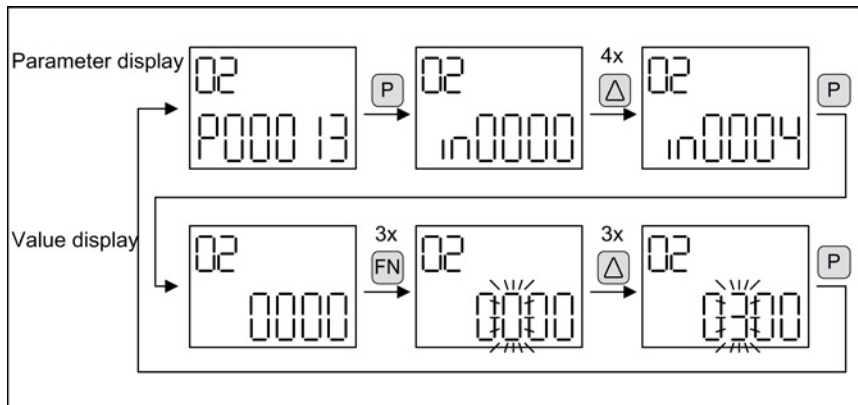

Figure 4-4   Example: Change p0013[4] from "0000" to "0300".

Example 2: Changing binector and connector input parameters

Binector output r0019.0 of the Control Unit (drive object 1) is connected to binector input p0840[0] (OFF1) of drive object 2.
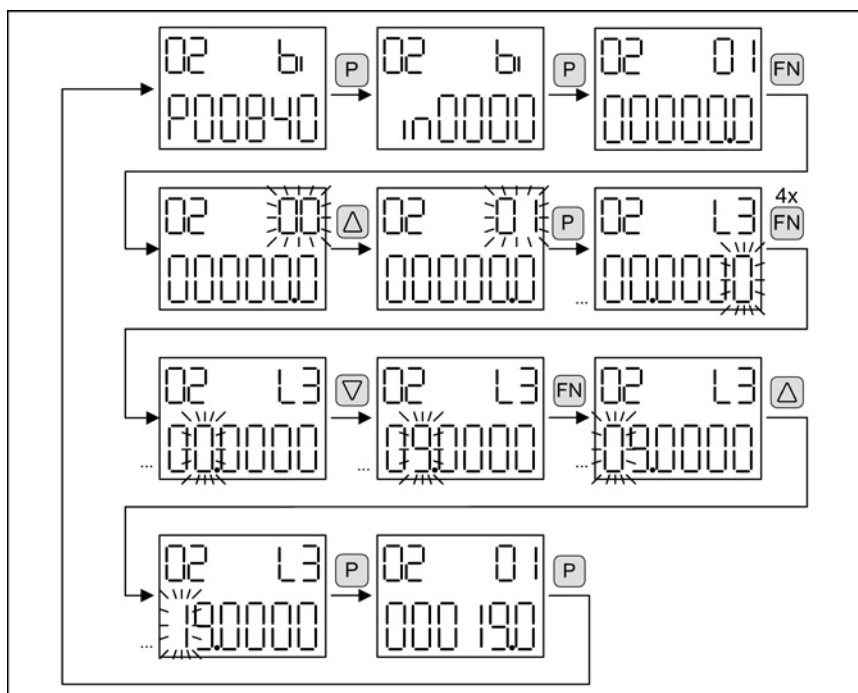

Figure 4-5   Example: Changing the indexed binector parameters
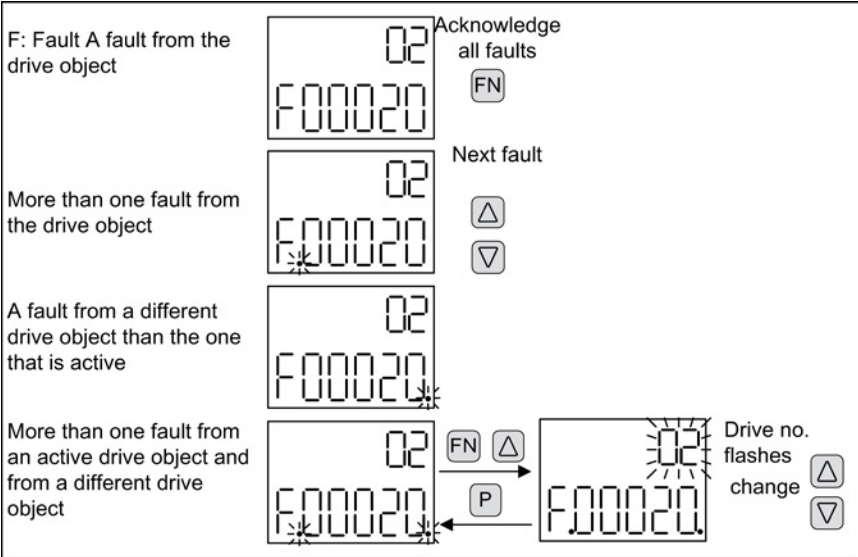
4.3 Fault and alarm displays

Displaying faults

Figure 4-6   Displaying faults
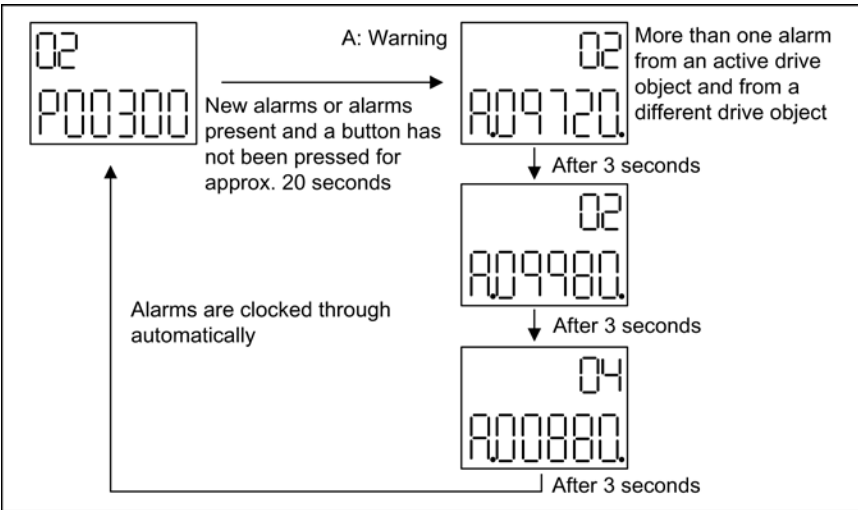
Displaying alarms

Figure 4-7   Displaying alarms

4.4 Controlling the drive using the BOP20

Description

When the drive is commissioned, it can be controlled via the BOP20. A control word is available on the Control Unit drive object (r0019) for this purpose, which can be interconnected with the appropriate binector inputs of the drive.

The interconnections do not function if a standard PROFIdrive telegram was selected as its interconnection cannot be disconnected.

Table 4- 3   BOP20 control word

Bit (r0019)	Signal name	1 signal	0 signal	Example, interconnection parameters
00	ON / OFF (OFF1)	ON	OFF	p0840
01	No coast down/coast down (OFF2)	No coast down	Coast down (OFF2)	p0844
02	No fast stop/fast stop (OFF3)	No fast stop	Fast stop (OFF3)	p0848
07	Acknowledge fault (0 -> 1)	Yes	No	p2102
13	Motorized potentiometer, raise	Yes	No	p1035
14	Motorized potentiometer, lower	Yes	No	p1036

Note

Simple commissioning

For simple commissioning, only bit 0 should be interconnected. When bits 0 ... 2 are interconnected, the system is switched off according to the following priority: OFF2, OFF3, OFF1.

4.5 Important functions via BOP20

Description

The BOP20 can be used to execute the following functions (via parameters) that help you handle your projects more efficiently:

● Restore the factory settings

● Copy from RAM to ROM

● Identification via LED

● Acknowledge error

Restore the factory settings

The factory setting of the complete device can be restored in the CU drive object.

- p0009 = 30
- p0976 = 1

Copy from RAM to ROM

You can initiate the saving of all parameters to the non-volatile memory (memory card) in the drive object CU:

- Press the "P" key for 3 seconds or
- p0977 = 1

Note

Parameter rejection with active identification

This parameter is not accepted if an identification routine (e.g. motor identification routine) has been selected on a drive.

Identification via LED

The main component of a drive object (e.g. power section) can be identified using the index of p0124. The ready LED on the module starts to flash. The index corresponds to the index in p0107; the drive object type can be identified using this parameter.

The drive objects can be identified using the following parameters:

- p0124 Power unit detection via LED
- p0144 Voltage Sensing Module detection via LED
- p0144 Sensor Module detection via LED
- p0154 DRIVE-CLiQ hub identification using LED
- p0154 Terminal Module detection via LED

Acknowledge error

All errors whose cause has been rectified can be acknowledged by pressing the Fn key.

Technical specifications

<div style="text-align: right; font-size: 3em;">5</div>

Table 5- 1   Technical specifications

Basic Operator Panel 20 (BOP20)	
Electronics power supply	3.3 V DC (provided by CU320)
Weight	0.02 kg