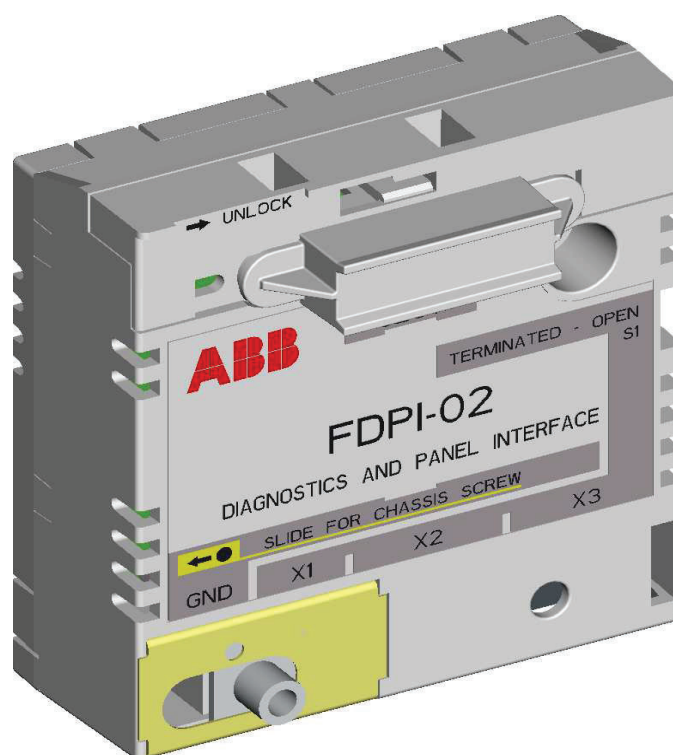


OPTIONS FOR ABB DRIVES AND CONVERTERS

# FDPI-02 diagnostics and panel interface unit

## User's manual



# FDPI-02 diagnostics and panel interface unit

User's manual

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# 1

## Introduction to the manual

---

### Contents of this chapter

This chapter introduces this manual.

### Applicability

This manual applies to the FDPI-02 diagnostics and panel interface unit.

### Compatibility

The interface unit is compatible with the following devices:

- ZCU-..., BCU-... and UCU-... control units
- ACS-AP-I/ACS-AP-W assistant control panel
- PC tool Drive composer
- Small F-type options.

### Target audience

This manual is intended for people who plan the installation, install, start up, use and service the interface unit. Before you do work on the module, read this manual and the applicable drive manual that contains the hardware and safety information for the product in question. You are expected to know the fundamentals of electricity, wiring, electrical components, and electrical schematic symbols.

### Purpose of the manual

The manual provides information on installing, commissioning and using the FDPI-02 diagnostics and panel interface unit.

---

## Terms and abbreviations

| Term  | Description                                   |
|-------|---|
| Drive | Frequency converter for controlling AC motors |
| EMC   | Electromagnetic compatibility                 |
| PCB   | Printed circuit board                         |
| UL    | Underwriters laboratories                     |

## Related manuals

|  |
|--|
| Appropriate drive firmware manual  |
| Appropriate drive hardware manual  |
| <a href="#">ACS-AP-... Assistant control panels user's manual [3AUA0000085685 (English)]</a> . |

## Safety



**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur.



# Hardware description and operation principal

---

## Contents of this chapter

This chapter briefly describes the operation principle and layout of the interface unit.

## Product overview

FDPI-02 diagnostics and panel interface is used for branching the RS-485 panel bus and chaining a control panel or PC tool to several drives.

The interface unit provides a feed-through connection between a control unit and an F-type option module. It is compatible with the ZCU-..., BCU-... and UCU-... control units. The interface unit is installed in an option slot of the control unit. A small F-type option module can then be installed on top of the interface unit.

The interface unit has one RJ-11 and two RJ-45 connectors. The RJ-11 connector is used for connecting the control unit. The RJ-45 connectors support a daisy chain bus for connecting a PC or a control panel (simultaneous control panel and PC communication is not allowed).

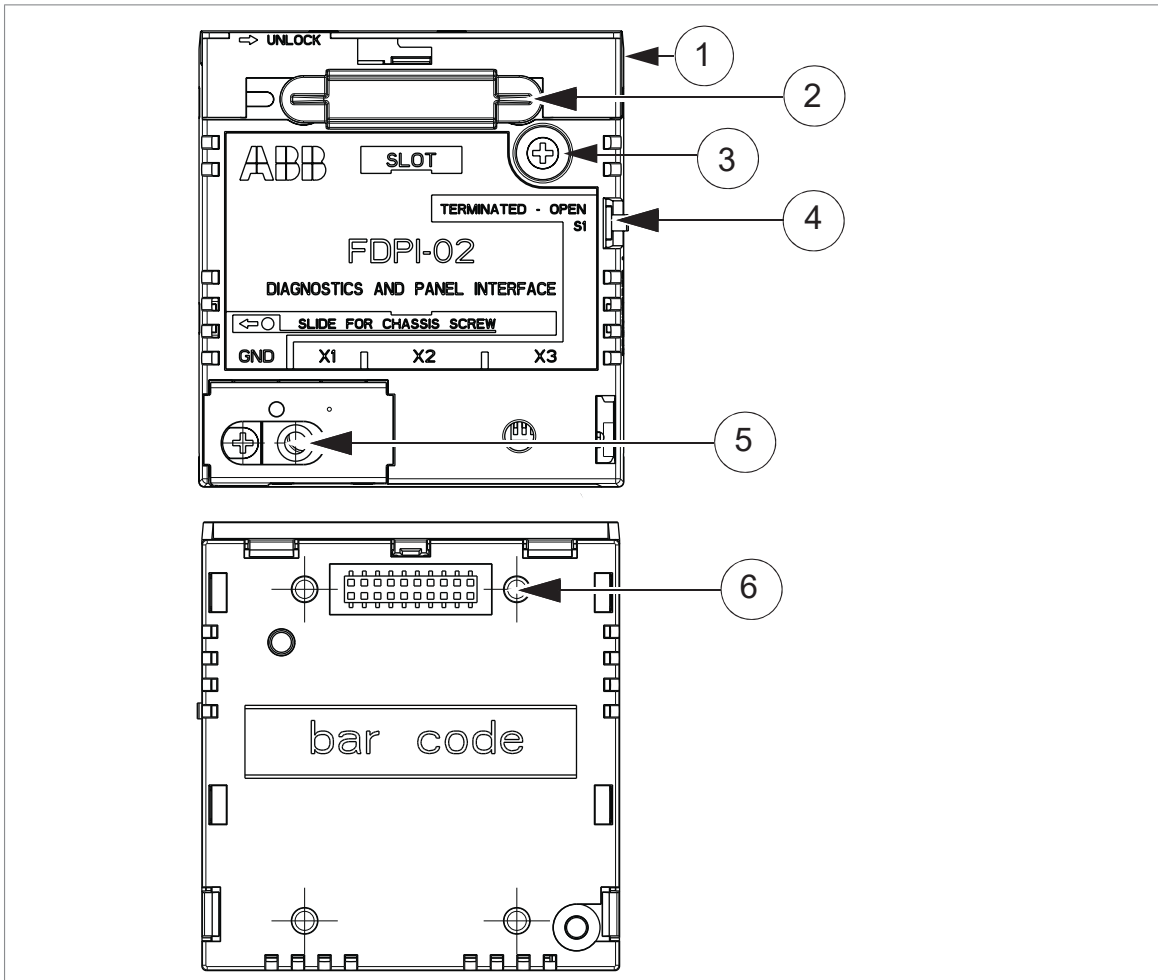
Bus termination is required to prevent signal reflections from the bus cable ends. The interface unit has a bus termination switch for the panel/PC cable. If the unit is the first or the last unit of the bus, the termination switch must be in the TERMINATED position. If a control panel is connected to the bus end, it terminates the bus and only the other end must be terminated by termination switch S1. For a termination example, see section [Panel bus termination and chaining examples \(page 28\)](#).

## Layout

The following figures show the layout of the interface unit.

---

## 10 Hardware description and operation principal



|   |  |
|---|--|
| 1 | Lock   |
| 2 | X101 (under the dust seal)                       |
| 3 | Mounting screw                                   |
| 4 | Termination switch S1                            |
| 5 | Slide for chassis/grounding screw, and the screw |
| 6 | X100   |

| Connector or switch | Description   |
|---------------------|---|
| X1                  | RJ-11 female control unit connector   |
| X2                  | Daisy chain bus terminal 1, RJ-45 shielded female connector for connecting a control panel.<br>The connector feeds the panel supply voltage and LED signals. Chaining the panel to the next drive is done by using terminal 2 (X3). For a chaining example, see <a href="#">Panel bus termination and chaining examples on page 25</a> .<br><b>Note:</b> To avoid damage caused by the panel voltage or LED signals, do not connect the PC to connector X2. The PC does not support the RS-485 bus. |

| Connector or switch     | Description   |
|-------------------------|---|
| X3                      | <p>Daisy chain bus terminal 2, RJ-45 shielded female connector for connecting a PC through a commercial USB - RS-485 converter or Ethernet - RS-485 converter.</p> <p>Chaining the PC to next the drive is done by using terminal 1 (X2). For a chaining example, see <a href="#">Panel bus termination and chaining examples (page 28)</a>.</p> <p><b>Note:</b> To avoid damage caused by the panel voltage or LED signals, do not connect the PC to connector X2.</p> |
| Termination switch S1   | <p>Switch S1 connects 120 ohm termination resistors to the bus.</p> <p>If the unit is the first or the last unit of the bus, the termination switch must be in the TERMINATED position. Otherwise it must be in the OPEN position.</p> <p><b>Note:</b> If a control panel is connected to the bus end, it terminates the bus and only the other end must be terminated by termination switch S1.</p>  |
| X100                    | <p>Option slot interface, female connector on the bottom of the FDPI-02 for connecting the interface unit to the control unit and providing a feed-through connection between the control unit and the F-type option.</p>   |
| X101                    | <p>Option slot interface, male connector on the top of the FDPI-02 for connecting a small F-type option to the interface unit and providing a feed-through connection between the control unit and the F-type option.</p>   |
| Slide for chassis screw | <p>When installing the FDPI-02 onto the control unit, move the slide for the chassis screw to the right. When installing an F-option onto the interface unit, move the slide for the chassis screw to the left.</p>   |
| Lock                    | <p>Lock for fixing the F-option onto the FDPI-02</p>  |

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## Mechanical installation

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### Contents of this chapter

This chapter contains instructions on installing the interface unit and installing an F-option module onto the interface unit.

---

## Installing the FDPI-02 onto the control unit

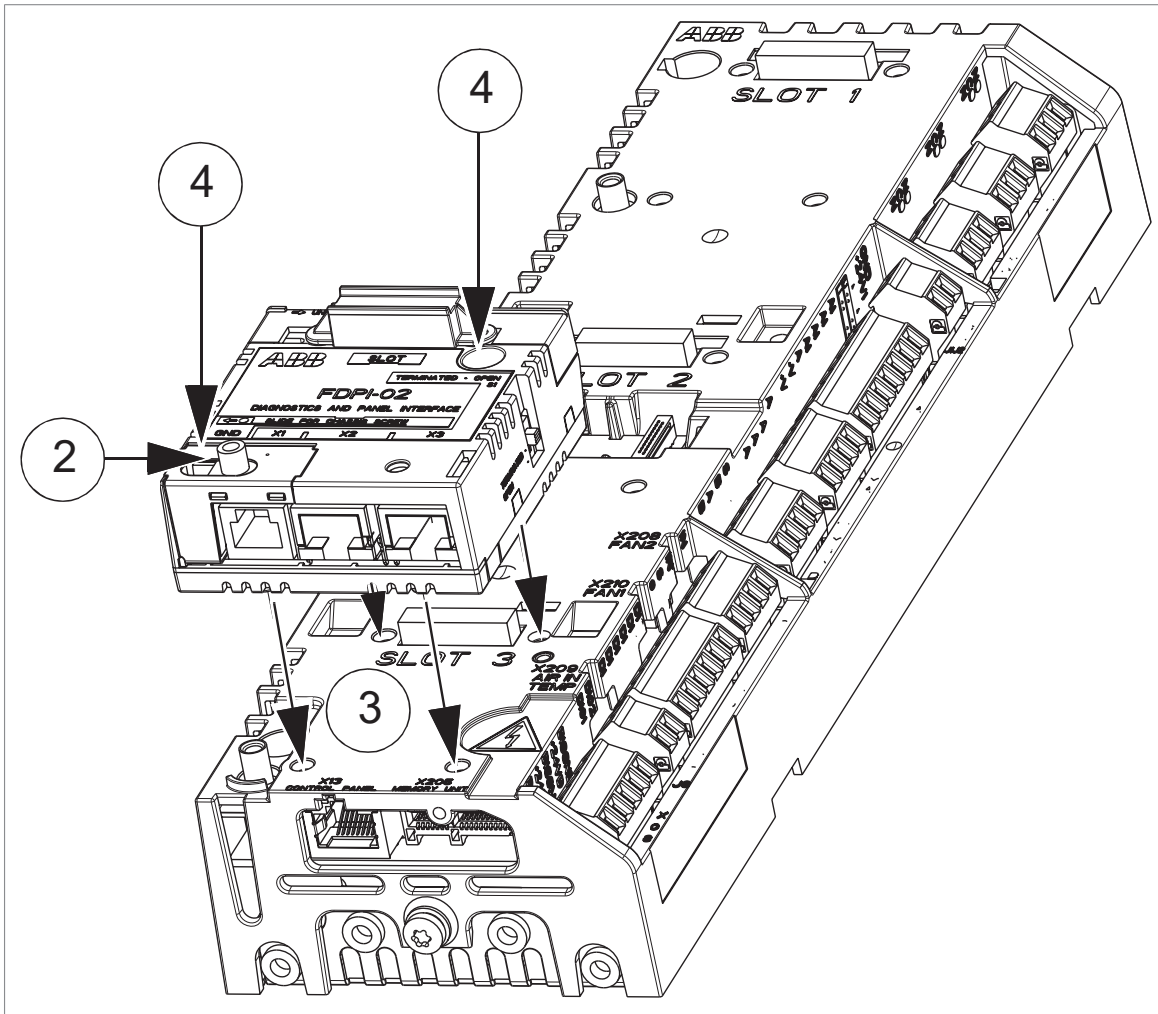


### WARNING!

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

1. Stop the drive and do the Electrical safety precautions in the drive safety instructions before you start the work.
2. On the FDPI-02 interface unit, move the slide for the chassis screw to the right.
3. Insert the interface unit into its designated option slot on the control unit (usually the option slot nearest to the panel bus connector of the control unit).
4. Fasten the unit with two screws to a torque of 0.8 N·m (7 lbf·in).

**Note:** Tighten the grounding screw tight enough to ensure proper grounding. For its location, see the following figures.



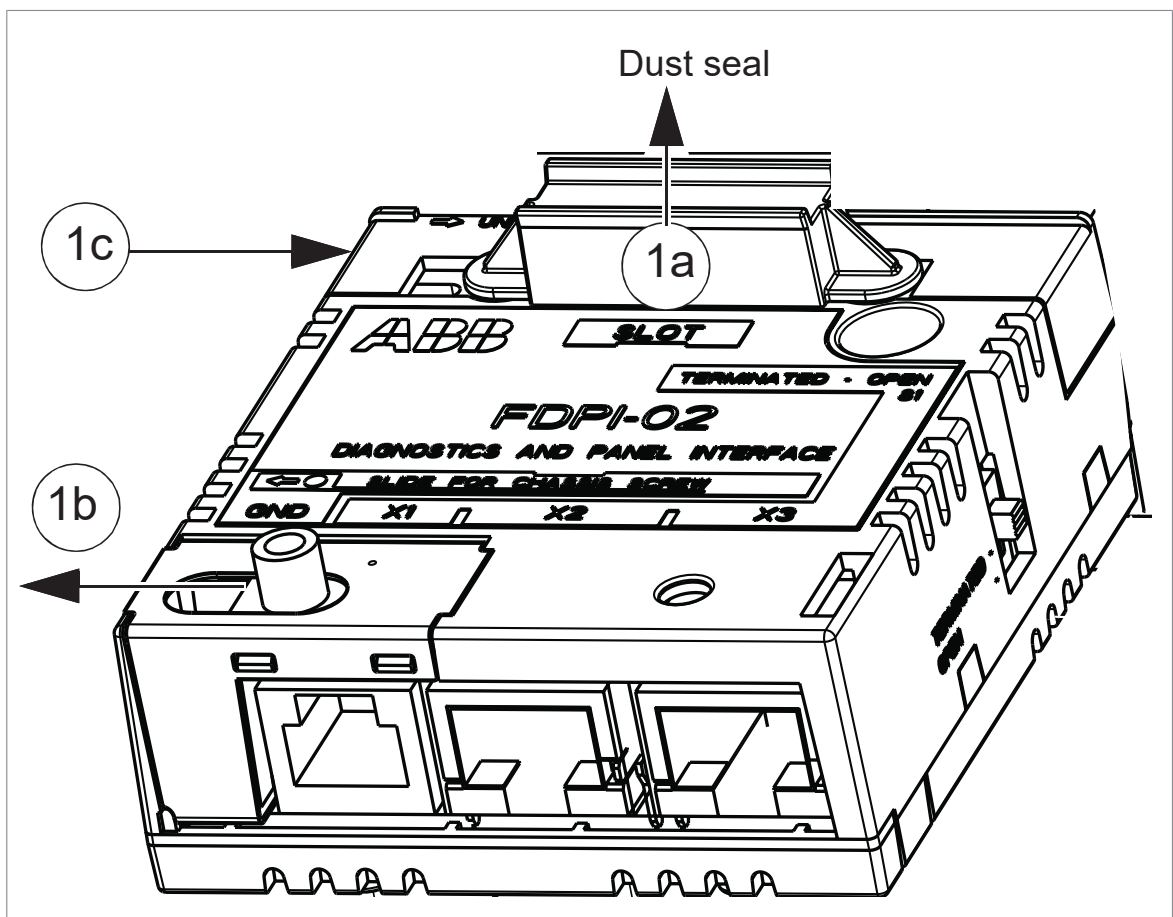
The screw on the lower left corner provides grounding of the bus cable shield connected to the unit.

## Installing an F-option module onto the installed FDPI-02

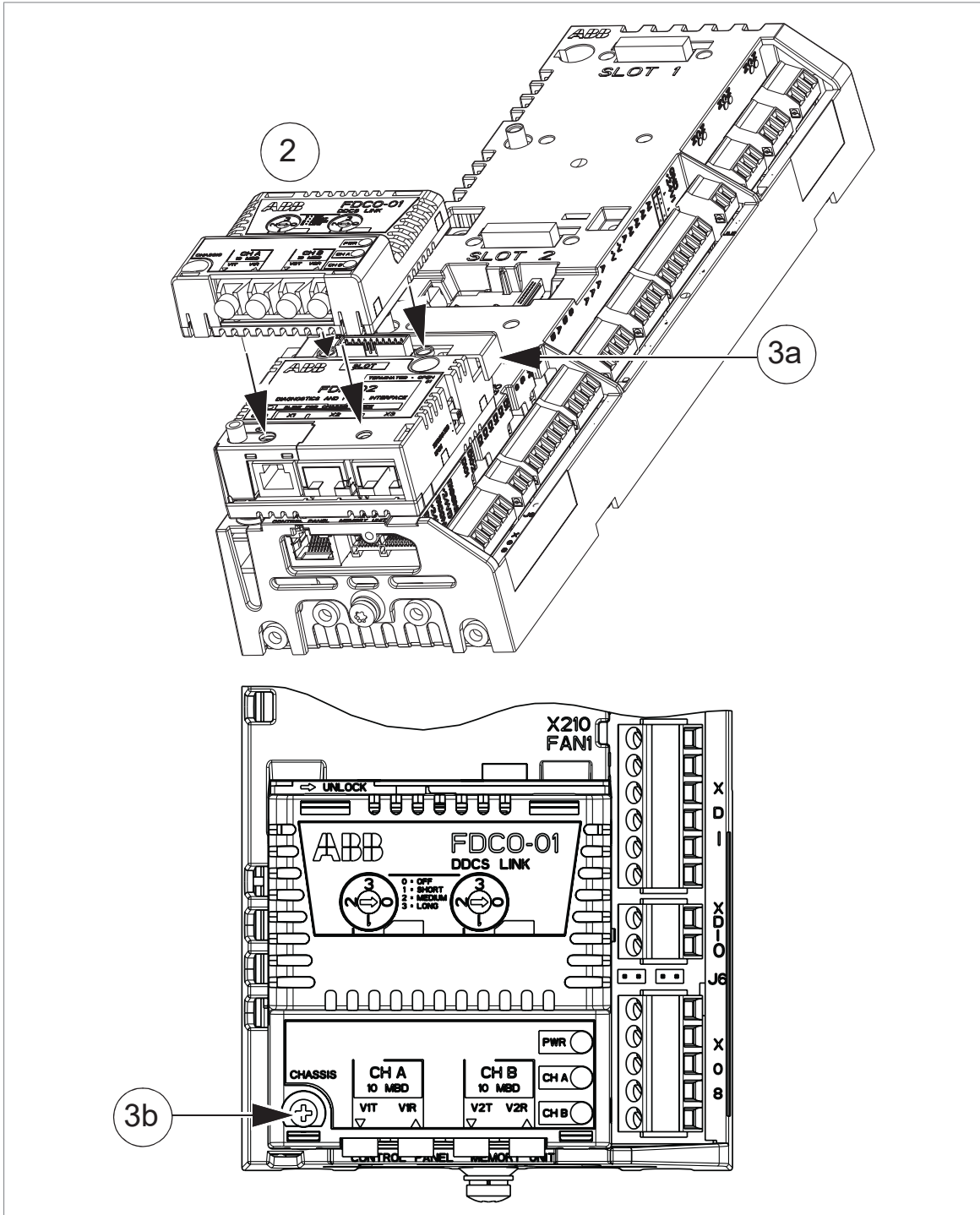
**WARNING!**

Obey the safety instructions of the drive. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrical professional, do not do installation, commissioning or maintenance work.

1. Stop the drive and do the Electrical safety precautions in the drive safety instructions before you start the work.
2. On the interface unit, remove the dust seal (1a), move the slide for the chassis screw to the left (1b) and open the connector lock (1c) by sliding it to the right.
3. Install the option module onto the interface unit.
4. Close the connector lock (3a) by sliding it back to the left and fasten the module with the chassis screw (3b).



## 16 Mechanical installation



A large, bold, black number '4' is centered within a light grey rounded square. The square has a subtle gradient and rounded corners.

# Electrical installation

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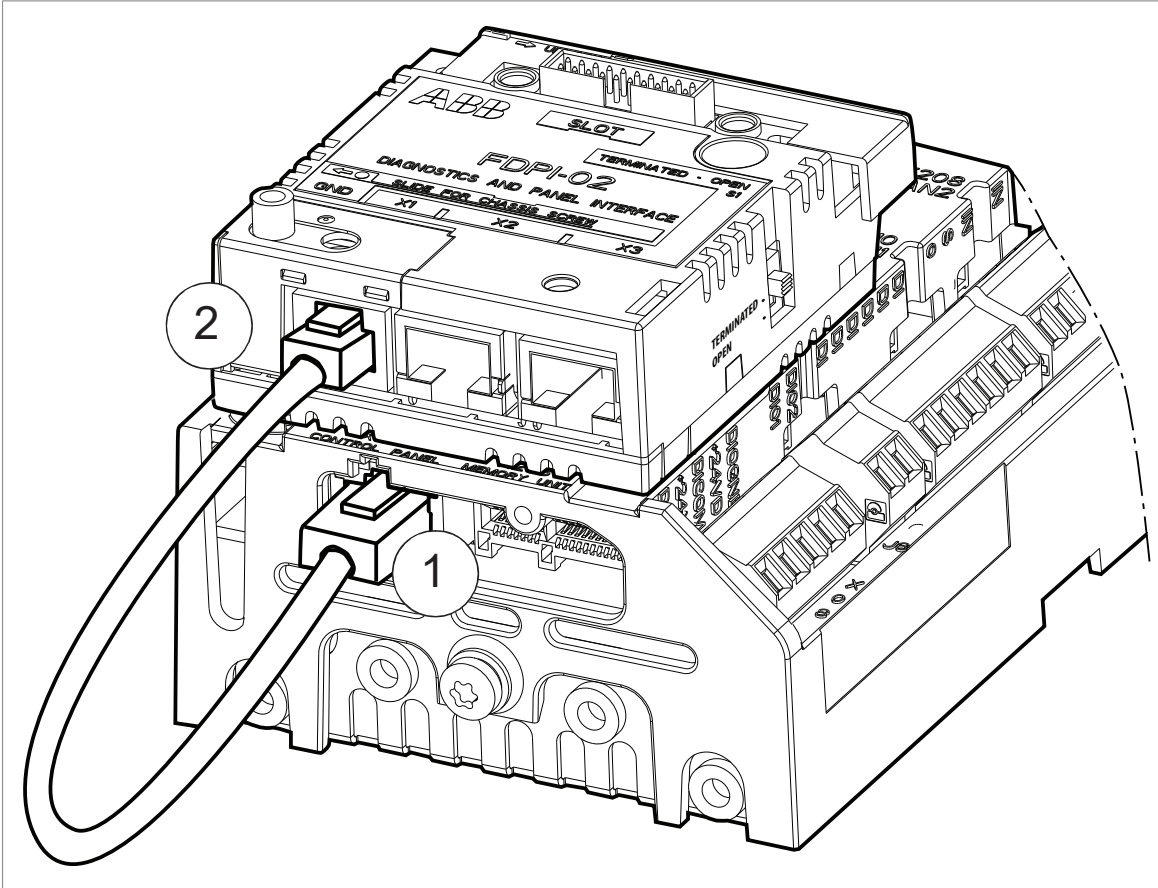
## Contents of this chapter

This chapter contains instructions on connections, bus chaining and bus termination associated with the interface unit.

---

## Connecting the FDPI-02 to the control unit

1. Connect the RJ-45 end of the connection cable to the panel bus connector of the control unit. The cable is included in the delivery.
2. Connect the RJ-11 end of the cable to connector X1 of the FDPI-02 unit.



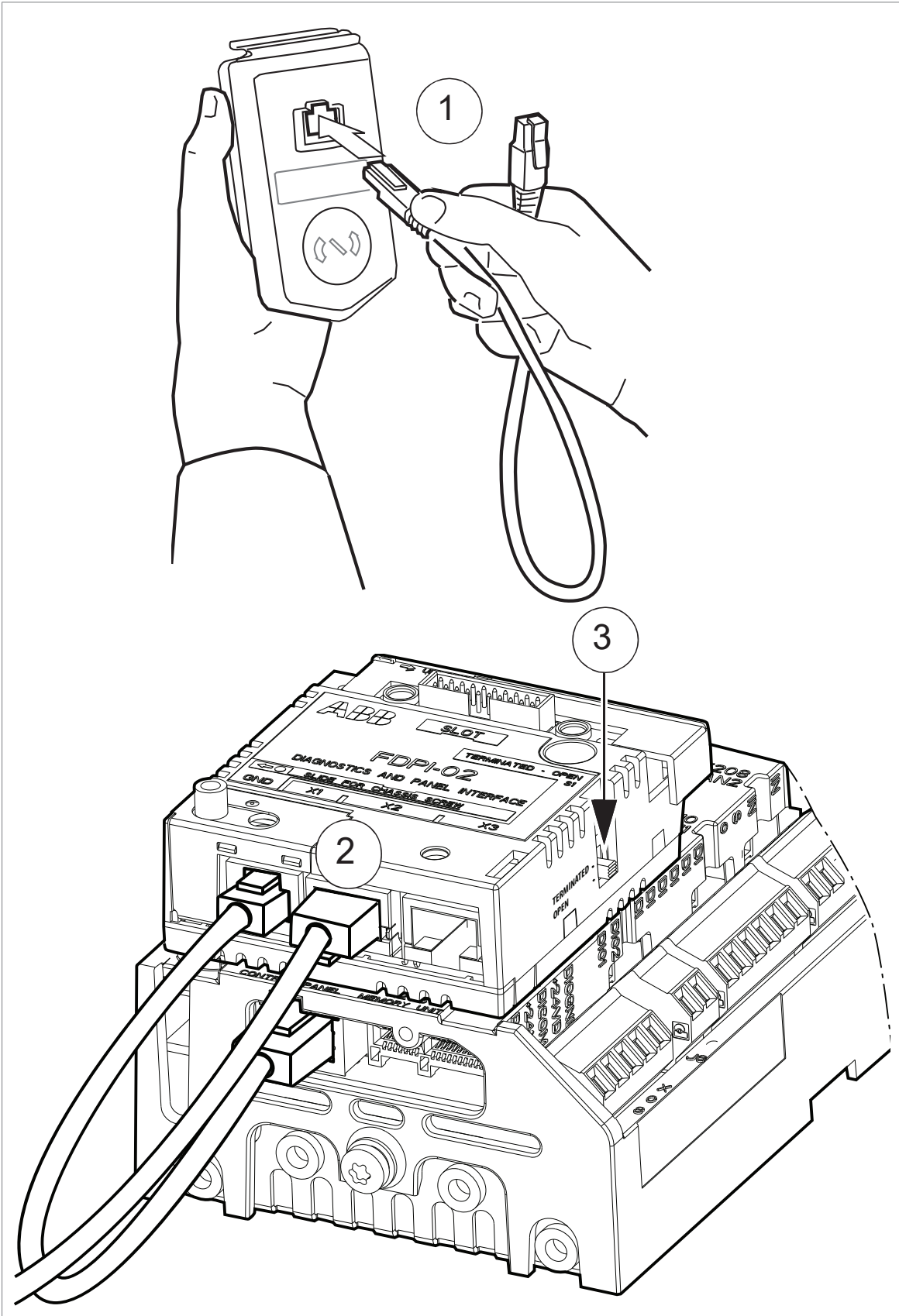
## Connecting a control panel to the FDPI-02

**Note:**

- The FDPI-02 cannot be used for connection to an Ethernet network.
  - To avoid damage caused by the panel voltage or LED signals, do not connect the PC to connector X2.
1. Connect a shielded CAT 5e or better Ethernet cable to the RJ-45 connector of the control panel. For more information on the cable, see [RS-485 bus \(page 34\)](#).
  2. Connect the other end of the cable to connector X2 of the FDPI-02 unit.
  3. Check that termination switch S1 of the FDPI-02 is in the OPEN position.

**Note:** When a control panel is connected to the bus end, it terminates the bus. Only the other end must be terminated by turning termination switch S1 to the TERMINATED position. For starting up the control panel, see [ACS-AP-... Assistant control panels user's manual \[3AUA0000085685 \(English\)\]](#).

---



## Chaining a control panel to several drives

You can use the FDPI-02 interface unit for chaining a control panel to several drives.

After connecting the first interface unit to the drive's control unit and the control panel to the interface unit, continue as follows:

1. Install and connect the second interface unit to the second drive's control unit. For instructions, see sections [Installing the FDPI-02 onto the control unit \(page 14\)](#) and [Connecting the FDPI-02 to the control unit \(page 18\)](#).
2. Before connecting the drive to a network, set the parameters of group 49 Panel port communication of ACS880 primary control program for each drive manually using the control panel.

**Note:**

- All devices connected to the network must have a unique node ID (Parameter 49.01 Node ID number). For networked drives, it is advisable to reserve ID 1 for spare/replacement drives. Start numbering from ID 2.
- The baud rate has to be the same for all nodes on the bus (Parameter 49.03 Baud rate).
- Set parameter 49.05 Communication loss action value as Last speed (2).

For more information on using the control panel, see [ACS-AP-... Assistant control panels user's manual \[3AUA0000085685 \(English\)\]](#).

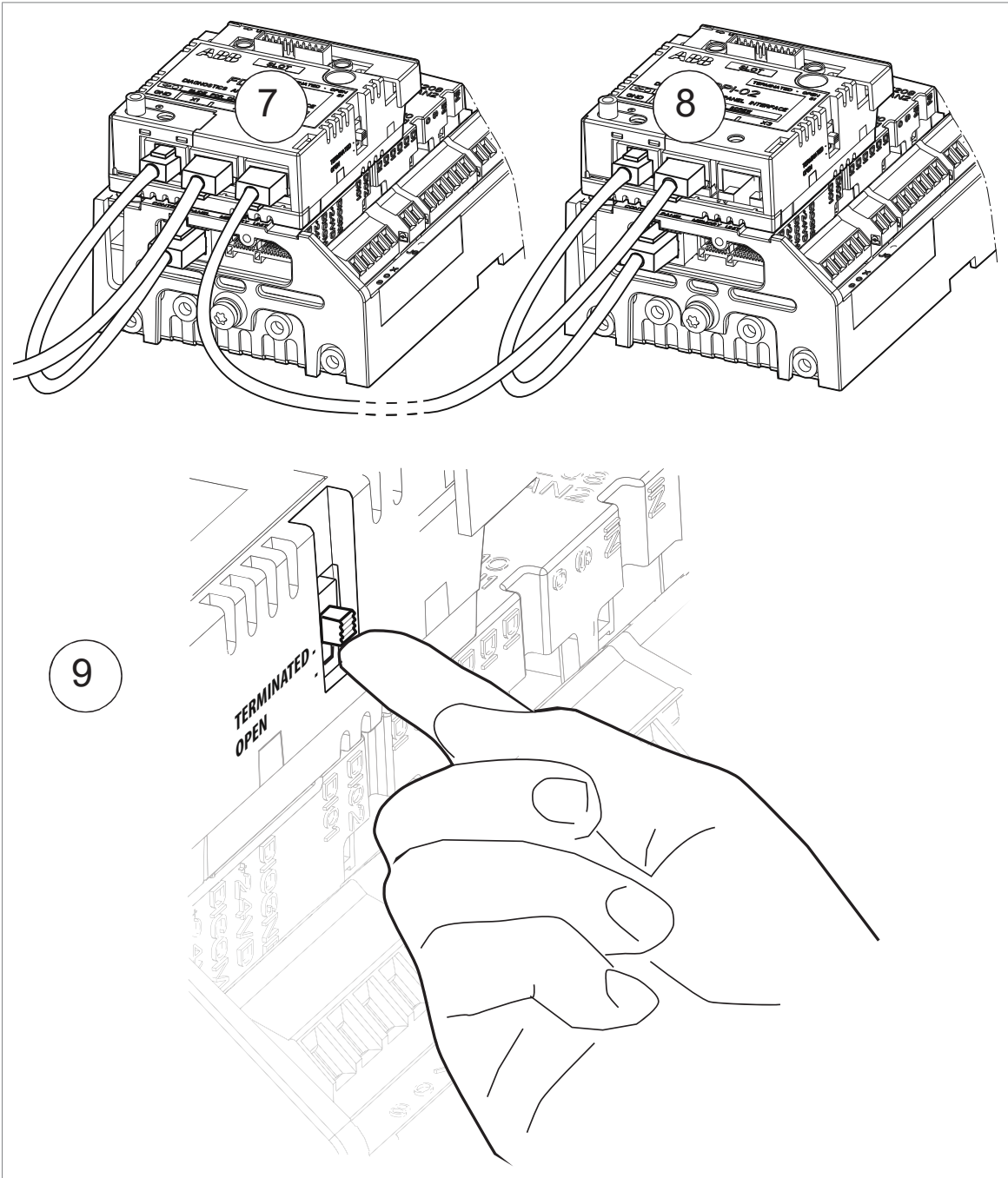
3. Install and connect the third interface unit to the third drive's control unit, set the parameters of group 49 and so on.

**Note:** Maximum 32 nodes can be connected to the RS-485 bus. For a chaining example, see section [Panel bus termination and chaining examples on page 25](#).

4. Connect a shielded CAT 5e or better Ethernet cable to connector X3 of the first interface unit. For more information on the cable, see [RS-485 bus on page 31](#).
5. Connect the other end of the cable to connector X2 of the second interface unit.
6. Connect a similar cable to connector X3 of the second interface unit.
7. Connect the other end of the cable to connector X2 of the third interface unit and so on.
8. In the last interface unit of the bus, terminate the bus by turning termination switch S1 of the interface unit to the TERMINATED position.

For a chaining and termination example, see section [Example: Chaining a control panel \(page 28\)](#).

---



## Connecting a PC to the FDPI-02

You can connect a PC to the FDPI-02 unit either through a control panel or to a commercial USB - RS-485 converter or Ethernet - RS-485 converter.

### Note:

- Never connect the PC to connector X2 of FDPI-02. The panel voltage or LED signals may cause damage to the PC.
- Simultaneous control panel and PC communication is not allowed.
- The FDPI-02 cannot be used for connection to an Ethernet network.

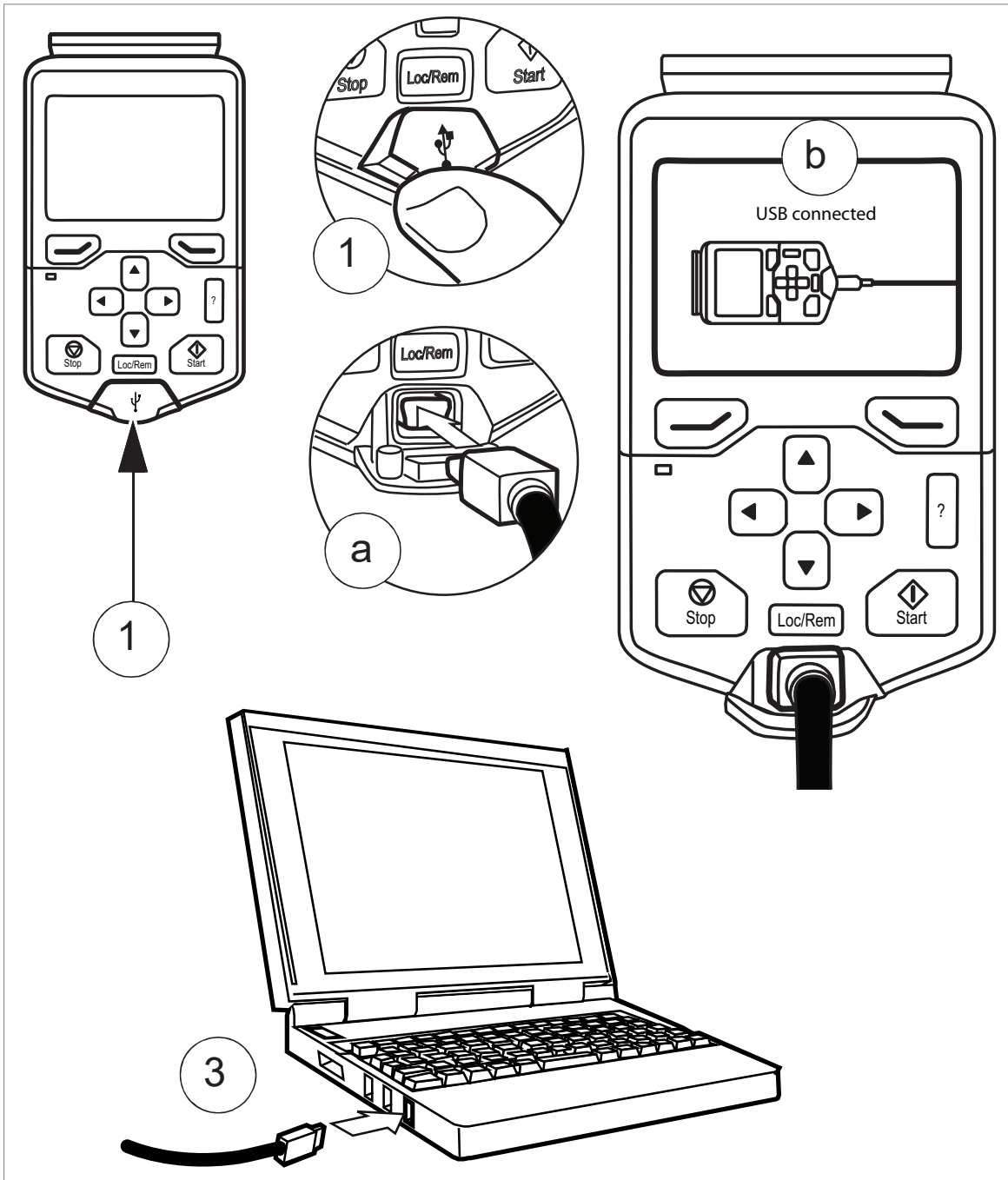
### ■ Connecting a PC through a control panel

For connecting a PC to a control panel (connected to the FDPI-02):

1. Lift the USB connector cover on the control panel from bottom upwards.
2. Insert the USB cable Mini-B plug in the control panel USB connector (a).
3. Insert the USB cable A-plug in the USB connector of the PC. The panel displays: USB connected (b).

For more information on connecting a PC tool to a drive through the control panel, see [ACS-AP-... Assistant control panels user's manual \[3AUA0000085685 \(English\)\]](#).

---



## Connecting a PC through a commercial converter

**Note:**

- Never connect the PC to connector X2 of FDPI-02. The panel voltage or LED signals may cause damage to the PC.
- Simultaneous control panel and PC communication is not allowed.
- The FDPI-02 cannot be used for connection to an Ethernet network.

For connecting a commercial USB - RS-485 converter or Ethernet - RS-485 converter to the FDPI-02:

1. Connect a shielded CAT 5e or better Ethernet cable to the connector of the converter. For information on the converter connectors, see the appropriate converter manual. For more information on the cable, see [RS-485 bus](#).
2. Connect the other end of the cable to connector X3 of the FDPI-02 unit. For the X3 pin information, see section [Pin allocation \(page 32\)](#).
3. Make sure that termination switch S1 of the FDPI-02 is in the OPEN position.

For connecting the PC to the commercial USB - RS-485 converter or Ethernet - RS-485 converter, see the appropriate converter and PC manuals.

---

## Chaining a PC to several drives

### ■ Chaining a PC connected through a control panel

The PC connected to the FDPI-02 interface unit through a control panel is chained to several drives the same way as the control panel.

1. Install and connect the interface units, set the parameters of group 49 for the drives, enable the panel bus networking, connect the chain cables and terminate the bus. For the instructions, see section [Chaining a control panel to several drives \(page 21\)](#).
2. Connect the PC to the control panel. For the instructions, see section [Connecting a PC through a control panel](#).

For a chaining example, see section [Example: Chaining a control panel \(page 28\)](#).

### ■ Connecting chains to the PC's USB port

You can connect chained control panels to more than one USB ports of the same PC. The number of the chains is limited only by the number of the PC's USB ports.

**Note:** For the chaining instructions, see section [Chaining a PC to several drives \(page 26\)](#). For a chaining example, see [Example: Connecting chains to the PC's USB port \(page 30\)](#).

- Each chain can contain maximum 32 drives.
- Each chain must be terminated with the control panel on one end and with termination switch S1 of FDPI-02 on the other end.

### ■ Chaining a PC connected to a commercial converter

You can use the FDPI-02 interface unit for chaining a PC to several drives through a commercial USB - RS-485 converter or Ethernet - RS-485 converter.

After connecting the first FDPI-02 interface unit to the drive's control unit and the commercial converter to the interface unit, continue as follows:

1. Install and connect the second interface unit to the second drive's control unit. For instructions, see sections [Installing the FDPI-02 onto the control unit \(page 14\)](#) and [Connecting the FDPI-02 to the control unit \(page 18\)](#).
2. Before connecting the drive to a network, set the parameters of group 49 Panel port communication for each drive manually using the control panel.

**Note:**

- All devices connected to the network must have a unique node ID (Parameter 49.01 Node ID number). For networked drives, it is advisable to reserve ID 1 for spare/replacement drives. Start numbering from ID 2.
- The baud rate has to be the same for all nodes on the bus (Parameter 49.03 Baud rate).
- Set parameter 49.05 Communication loss action value as Last speed (2).

For more information on using the control panel, see [ACS-AP-... Assistant control panels user's manual \[3AUA0000085685 \(English\)\]](#).

3. Install and connect the third interface unit to the third drive's control unit, set the parameters of group 49 and so on.
-

**Note:** Maximum 32 nodes can be connected to the RS-485 bus. For a chaining example, see section [Example: Chaining a PC through a commercial converter on page 28](#).

4. To enable the panel bus networking, select in the Options menu of the control panel the Select drive menu, then Panel bus and On. Press Save to save the settings. For more information, see [ACS-AP-... Assistant control panels user's manual \[3AUA0000085685 \(English\)\]](#).
5. Connect a shielded CAT 5e or better Ethernet cable to connector X2 of the first interface unit. For more information on the cable, see [RS-485 bus on page 31](#)
6. Connect the other end of the cable to connector X3 of the second interface unit.
7. Connect a similar cable to connector X2 of the second interface unit.
8. Connect the other end of the cable to connector X3 of the third interface unit and so on.
9. In the last interface unit of the bus, terminate the bus by turning termination switch S1 of the interface unit to the TERMINATED position.

For a chaining and termination example, see section [Example: Chaining a PC through a commercial converter \(page 31\)](#).

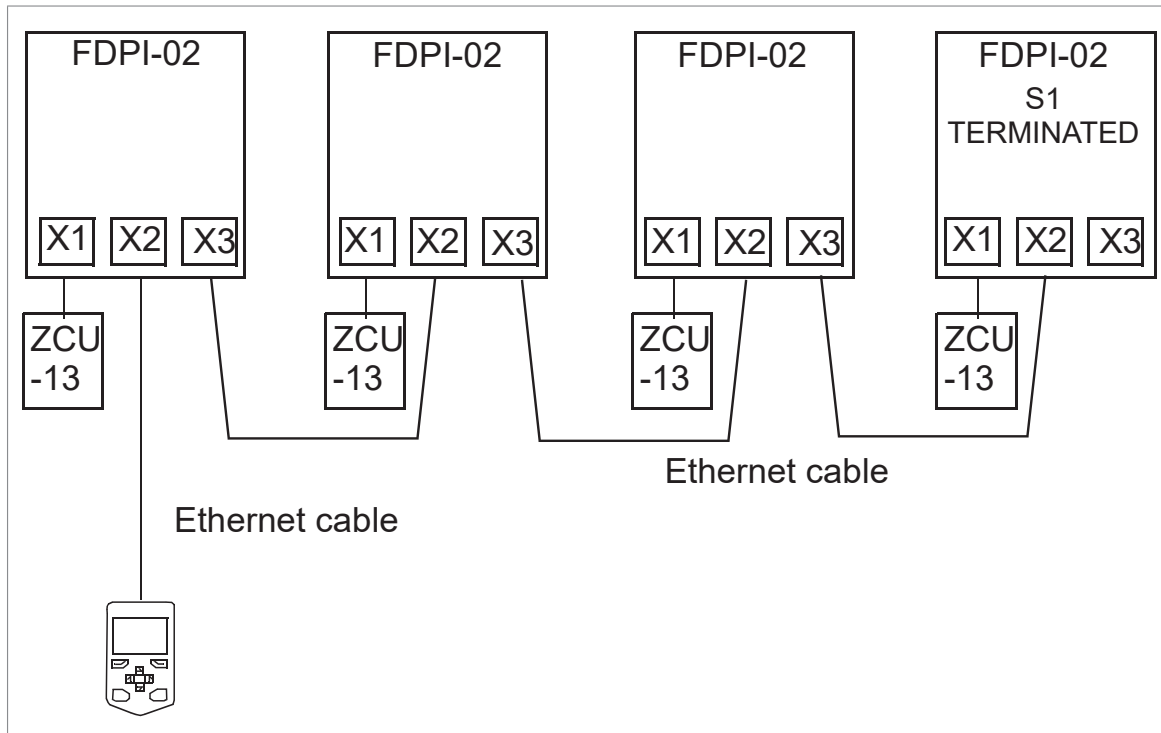
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## Panel bus termination and chaining examples

Bus termination is required to prevent signal reflections from the bus cable ends. If a control panel is connected to the bus end, it terminates the bus and only the other end must be terminated. In the last FDPI-02 interface unit of the bus, termination switch S1 of the interface unit must be turned to the TERMINATED position. In the following examples, ZCU-13 is used as the control unit.

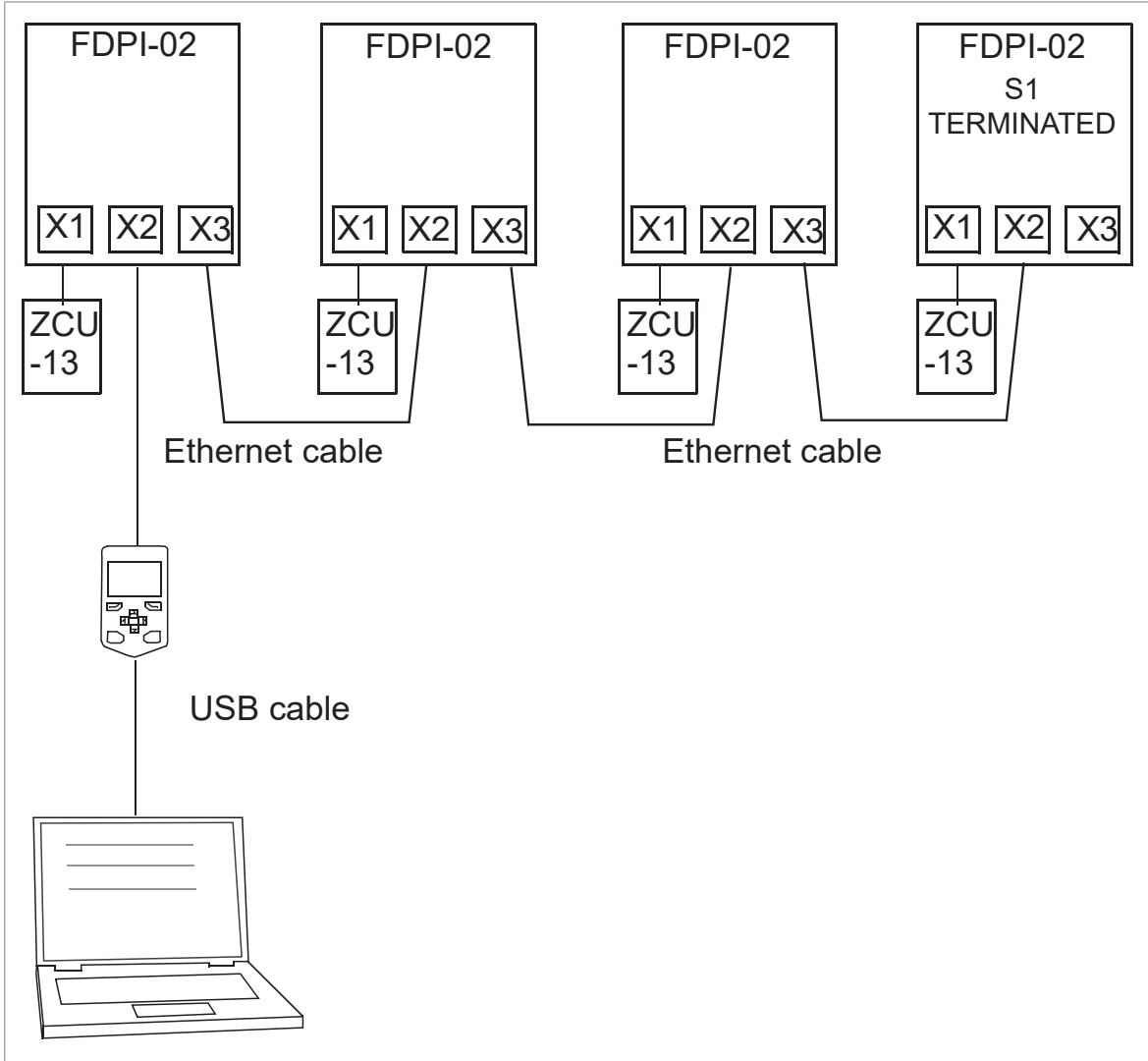
### ■ Example: Chaining a control panel

The following figure shows how a control panel is chained to several drives.



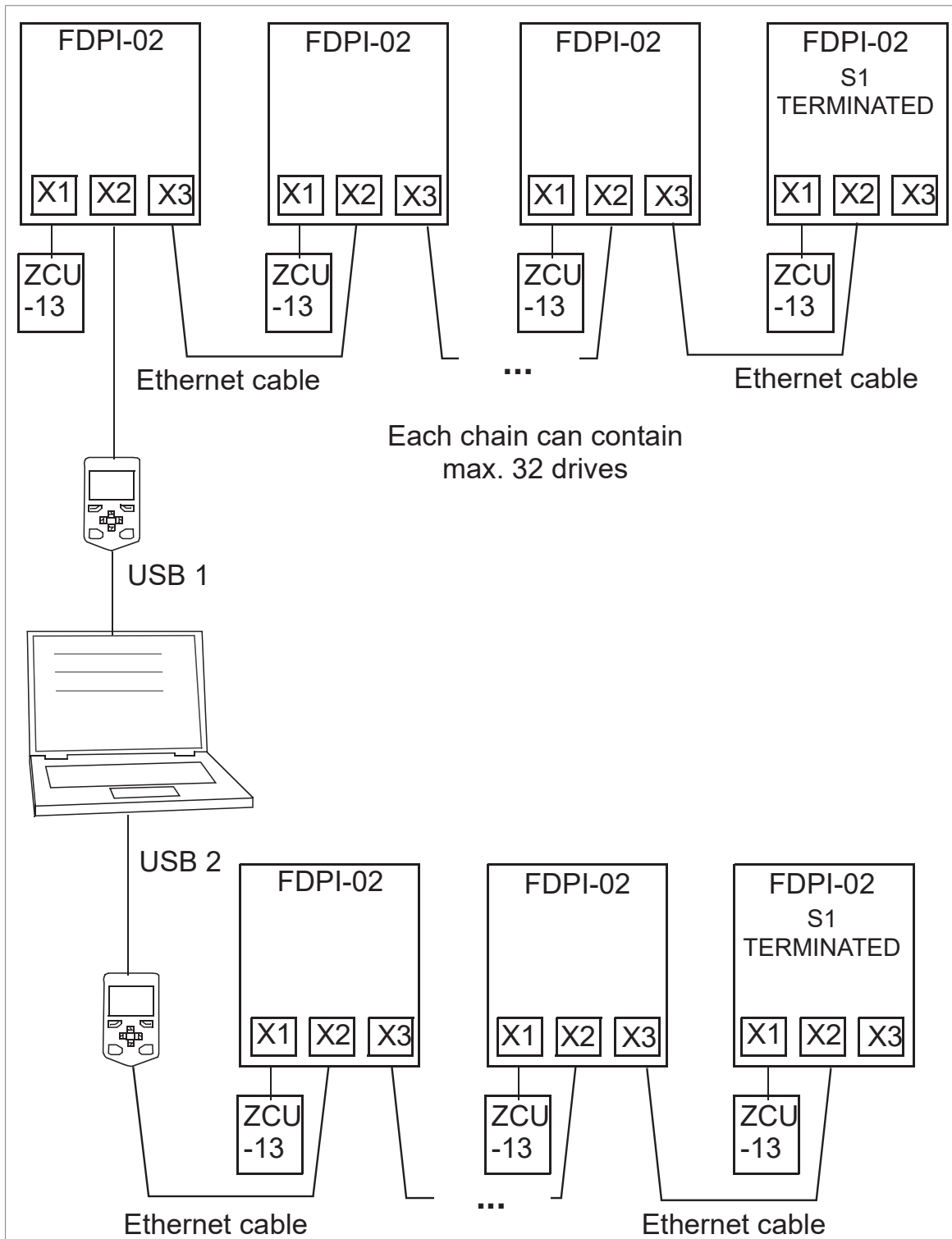
■ **Example: Chaining a PC through a control panel**

The following figure shows how a PC is chained to several drives through a control panel.



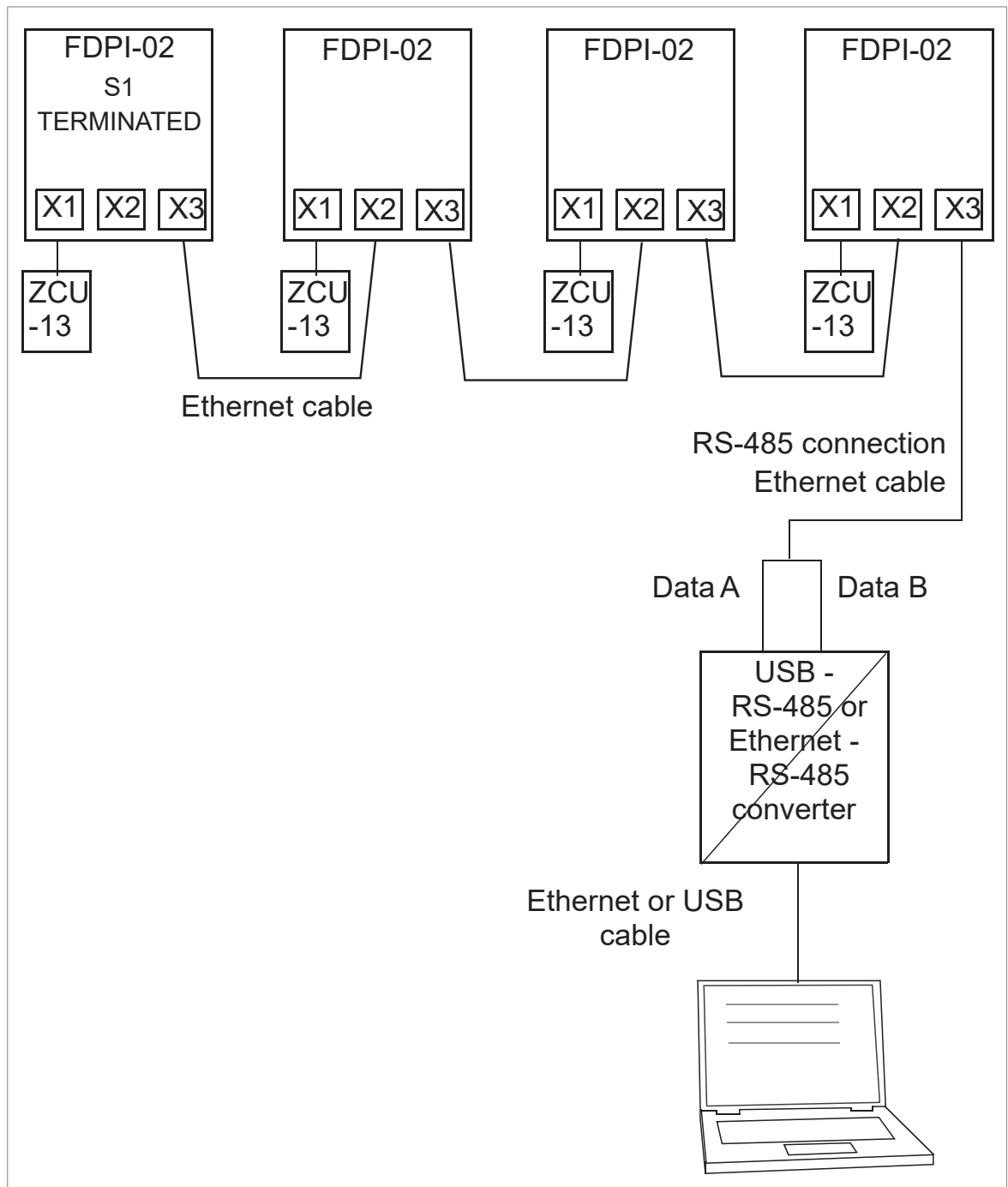
■ **Example: Connecting chains to the PC's USB port**

The following figure shows how you can connect chains to the PC's USB ports.



■ **Example: Chaining a PC through a commercial converter**

The following figure shows how a PC is chained to several drives through a commercial converter.



## Pin allocation

The following tables list the pins of connectors X1, X2 and X3 of FDPI-02.

| <b>X1</b> |     | <b>Dir.</b> | <b>Description</b>                                |
|-----------|-----|-------------|---|
| 1.        | A   | In/Out      | Transmit / receive differential - signal (RS-485) |
| 2.        | B   | In/Out      | Transmit / receive differential + signal (RS-485) |
| 3.        | NC  | In          | LED driver input, open collector                  |
| 4.        | NC  | In          | LED driver input, open collector                  |
| 5.        | GND | -           | Ground  |
| 6.        | VCC | In          | 15 V DC in  |

| <b>X2</b> |      | <b>Dir.</b> | <b>Description</b>                                |
|-----------|------|-------------|---|
| 1.        | A    | In/Out      | Transmit / receive differential - signal (RS-485) |
| 2.        | B    | In/Out      | Transmit / receive differential + signal (RS-485) |
| 3.        | LED1 | Out         | LED driver input, open collector                  |
| 4.        | LED2 | Out         | LED driver input, open collector                  |
| 5.        | GND  | -           | Ground  |
| 6.        | GND  | -           | Ground  |
| 7.        | GND  | -           | Ground  |
| 8.        | VCC  | Out         | 15 V DC out                                       |

| <b>X3</b> |     | <b>Dir.</b> | <b>Description</b>                                |
|-----------|-----|-------------|---|
| 1.        | A   | In/Out      | Transmit / receive differential - signal (RS-485) |
| 2.        | B   | In/Out      | Transmit / receive differential + signal (RS-485) |
| 3.        | NC  | -           | Not connected (reserved for LED1 / /TRANS)        |
| 4.        | NC  | -           | Not connected (reserved for LED1 / /TRANS)        |
| 5.        | GND | -           | Ground  |
| 6.        | GND | -           | Ground  |
| 7.        | GND | -           | Ground  |
| 8.        | NC  | -           | Not connected (reserved for 15 V DC VCC)          |

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# 5

## Technical data

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### Contents of this chapter

This chapter contains the technical specifications of the interface unit and the RS-485 bus.

### General

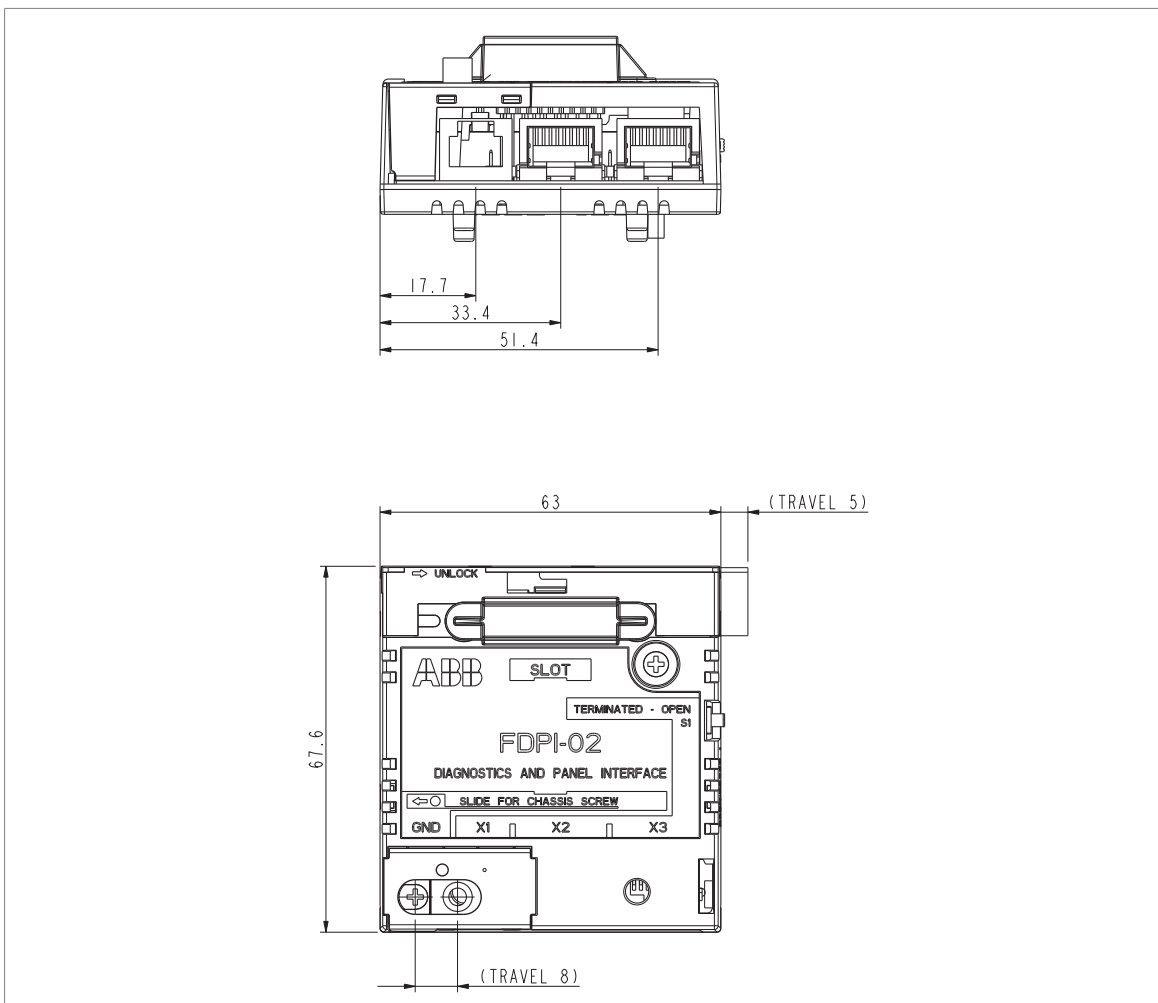
|                      |   |
|----------------------|---|
| Mounting             | Into the designated option slot of the BCU-... or ZCUxx control unit (usually the option slot nearest to the panel bus connector of the control unit)   |
| Degree of protection | IP20  |
| Ambient conditions   | Operating temperature: +0...+70 °C (+32...+158 F)<br>Storage temperature: -40...+70 °C (-104...+158 F)<br>Maximum relative humidity: 95% (non condensing)   |
| Connectors           | 6-pin female connector to the control unit (X1, RJ-11)<br>8-pin shielded female connector to the control panel (X2, RJ-45)<br>8-pin shielded female connector to the PC (X3, RJ-45)<br>20-pin female connector to the control unit for providing a feed-through connection between the control unit and the F-type option (X100)<br>20-pin male connector to a small F-type option for providing a feed-through connection between the control unit and the F-type option (X101). |
| General              | Estimated lifetime 20 years<br>PCB materials UL recognized<br>Complies with EMC standard EN 61800-3:2004<br>Printed circuit board coated  |

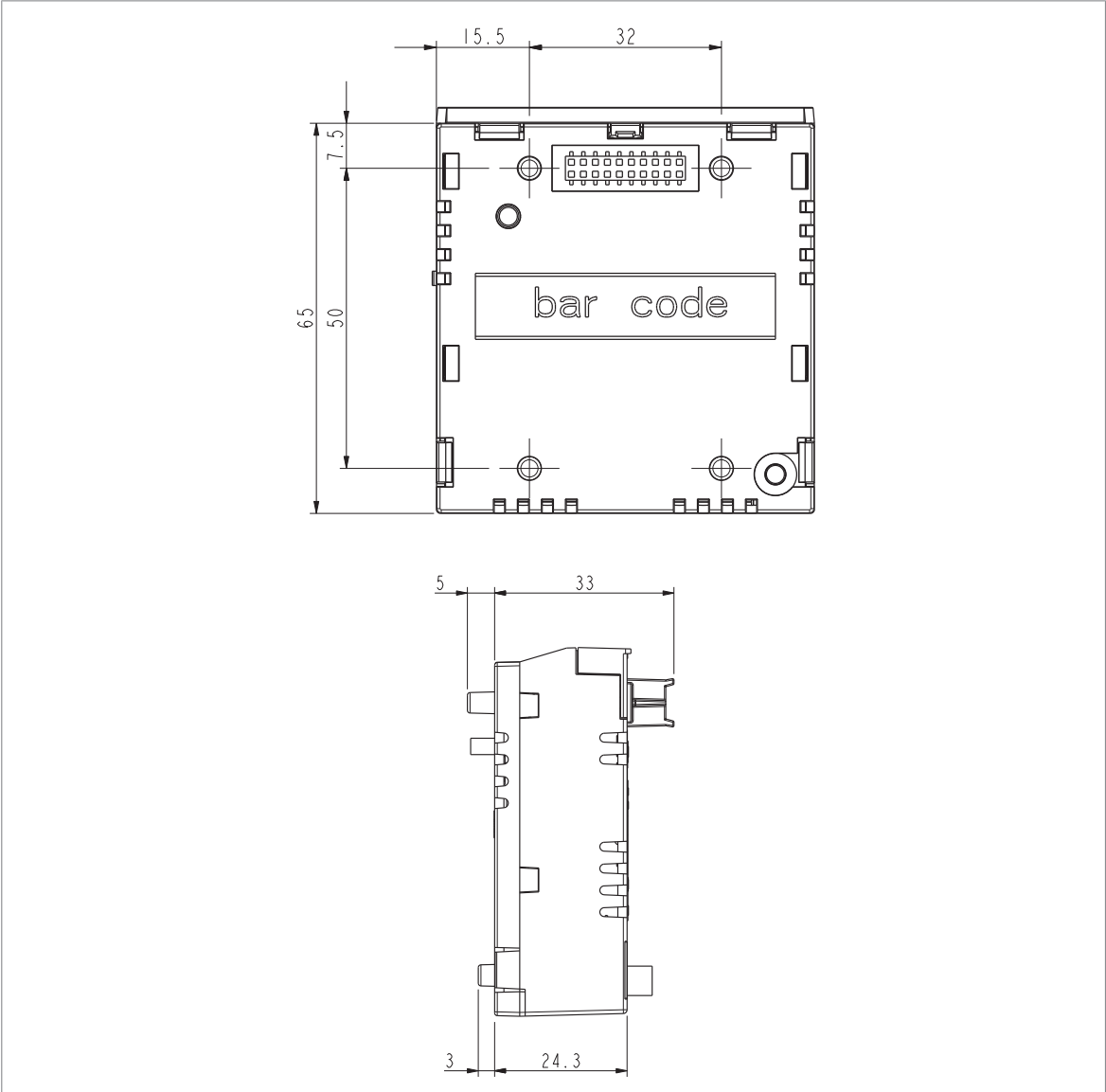
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## RS-485 bus

|                         |   |
|-------------------------|---|
| Purpose                 | Used as a PC bus or control panel bus   |
| Maximum number of nodes | Maximum 32 nodes (panel / PC and drives)  |
| Medium                  | Shielded CAT 5e or better Ethernet cable<br>Termination: 120 ohms (with termination switch S1 built in the interface unit)<br><b>Note:</b> Only the cable connected between the FDPI-02 and the control unit is included in the delivery. |

## Dimension drawings





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# Further information

## Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to [www.abb.com/searchchannels](http://www.abb.com/searchchannels).

## Product training

For information on ABB product training, navigate to [new.abb.com/service/training](http://new.abb.com/service/training).

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