ROBOTICS

Product manual

FlexPendant

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Product manual

FlexPendant

OmniCore, FlexPendant

Document ID: 3HAC093167-001

Revision: A

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Original instructions.

Table of contents

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Overview of this manual

About this manual

This manual contains instructions for operation of the FlexPendant for OmniCore controller based robots. The instructions for the robot controller are found in the respective product manual for the controllers, see *References on page 8*.

Note

It is the responsibility of the integrator to conduct a risk assessment of the final application.

It is the responsibility of the integrator to provide safety and user guides for the robot system.

Note

Screenshots in this manual are generally intended to show a language version corresponding to the language of the manual. In some cases, a translated manual still uses English screenshots if the localized user interface was not available at the time of publishing the manual.

Usage

This manual should be used during:

- installation and commissioning
- maintenance work
- repair work
- decommissioning work

Note

Before any work on or with the robot is performed, the safety information in the product manual for the controller and manipulator must be read.

Who should read this manual?

This manual is intended for:

- installation personnel
- maintenance personnel
- repair personnel.

Prerequisites

A maintenance/repair/installation craftsman working with an ABB robot must:

- be trained by ABB and have the required knowledge of mechanical and electrical installation/repair/maintenance work.
- be trained to respond to emergencies or abnormal situations.

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Continued

Product manual scope

The manual covers all variants and designs of the FlexPendant. Some variants and designs may have been removed from the business offer and are no longer available for purchase.

References

Documentation referred to in the manual, is listed in the table below.

Document name	Document ID
Product manual - OmniCore E10	*3HAC079399-001*
Circuit diagram - OmniCore E10	*3HAC076810-008*
Product manual - OmniCore C30	*3HAC060860-001*
Circuit diagram - OmniCore C30	*3HAC059896-009*
Circuit diagram - OmniCore C30 for IRB 14050	*3HAC063898-009*
Circuit diagram - OmniCore C30 for CRB 15000	*3HAC072448-009*
Product manual - OmniCore C30 Type A	*3HAC089064-001*
Circuit diagram - OmniCore C30 Type A	*3HAC086302-010*
Circuit diagram - OmniCore C30 Type A for CRB 15000	*3HAC089111-009*
Product manual - OmniCore C90XT Type A	*3HAC089065-001*
Circuit diagram - OmniCore C90XT Type A	*3HAC086305-010*
Product manual - OmniCore V250XT Type B	*3HAC087112-001*
Circuit diagram - OmniCore V250XT	*3HAC074000-008*
Product manual - OmniCore V400XT	*3HAC081697-001*
Circuit diagram - OmniCore V400XT	*3HAC082020-008*
Operating manual - Integrator's guide OmniCore	*3HAC065037-001*

Tip

All documents can be found via myABB Business Portal, *www.abb.com/myABB*.

Revisions

Revision	Description
A	First edition.

1 Safety

1.1 Safety information

1.1.1 Limitation of liability

Limitation of liability

Any information given in this manual regarding safety must not be construed as a warranty by ABB that the industrial robot will not cause injury or damage even if all safety instructions are complied with.

The information does not cover how to design, install and operate a robot system, nor does it cover all peripheral equipment that can influence the safety of the robot system.

In particular, liability cannot be accepted if injury or damage has been caused for any of the following reasons:

- Use of the robot in other ways than intended.
- Incorrect operation or maintenance.
- Operation of the robot when the safety devices are defective, not in their intended location or in any other way not working.
- When instructions for operation and maintenance are not followed as intended.
- Non-authorized design modifications of the robot.
- Repairs on the robot and its spare parts carried out by in-experienced or non-qualified personnel.
- Foreign objects.
- Force majeure.

Spare parts and equipment

ABB supplies original spare parts and equipment which have been tested and approved for their intended use. The installation and/or use of non-original spare parts and equipment can negatively affect the safety, function, performance, and structural properties of the robot. ABB is not liable for damages caused by the use of non-original spare parts and equipment.

1.1.2 Requirements on personnel

General

Only personnel with appropriate training are allowed to install, maintain, service, repair, and use the robot. This includes electrical, mechanical, hydraulics, pneumatics, and other hazards identified in the risk assessment.

Persons who are under the influence of alcohol, drugs or any other intoxicating substances are not allowed to install, maintain, service, repair, or use the robot.

The plant liable must make sure that the personnel is trained on the robot, and on responding to emergency or abnormal situations.

Personal protective equipment

Use personal protective equipment, as stated in the instructions.

1.2 Safety signals and symbols

1.2.1 Safety signals in the manual

Introduction to safety signals

This section specifies all safety signals used in the user manuals. Each signal consists of:

- A caption specifying the hazard level (DANGER, WARNING, or CAUTION) and the type of hazard.
- Instruction about how to reduce the hazard to an acceptable level.
- A brief description of remaining hazards, if not adequately reduced.

Hazard levels

The table below defines the captions specifying the hazard levels used throughout this manual.

Symbol	Designation	Significance
	DANGER	Signal word used to indicate an imminently hazardous situation which, if not avoided, will result in serious injury.
	WARNING	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in serious injury.
	ELECTRICAL SHOCK	Signal word used to indicate a potentially hazardous situation related to electrical hazards which, if not avoided, could result in serious injury.
	CAUTION	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in slight injury.
	NOTE	Signal word used to indicate important facts and conditions.
	TIP	Signal word used to indicate where to find additional information or how to do an operation in an easier way.

1.2.2 Safety symbols on controller labels

Introduction to safety symbols

Both the manipulator and the controller are marked with labels containing safety symbols and important information about the product. The purpose of the labels is to ensure personal safety for all personnel handling the robot, for example during installation, service, or operation.

The safety symbols are language independent, they only use graphics. The information labels contain information in text. See *Symbols and information on labels on page 12*.

Note

The safety and information labels on the product must be observed.

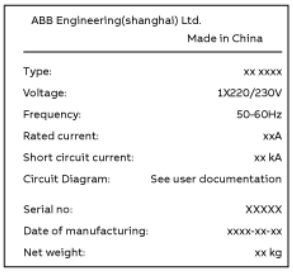
Symbols and information on labels

Note

The descriptions in this section are generic, the labels can contain additional information such as values.

Label	Description
 xx1400001152	Read the user manual before use.
 xx2100000104	The robot is delivered to start in automatic mode
 xx1800000835	CE label

Continues on next page

Label	Description
 xx2400001685	UL Recognized
 xx1700000355	SafeMove label (for *SafeMove Basic* and *SafeMove Pro* software).
 xx1900001805	Rating label (example)
 xx1400001151	Electrical shock
 xx1800000836	Warning & caution label
 xx1400001156	High voltage inside the module even if the main switch is in the OFF position.

Continues on next page

1.2.2 Safety symbols on controller labels

Continued

Label	Description
 xx1400001162	ESD sensitive components inside the controller.

1.3 Robot stopping functions

1.3.1 Protective stop and emergency stop

Robot stopping functions

The robot has protective and emergency stop functions (stop category 0 or 1, in accordance with IEC 60204-1).

Stop category 0	As defined in IEC 60204-1, stopping by immediate removal of power to the machine actuators.
Stop category 1	As defined in IEC 60204-1, a controlled stop with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved.

A stop function, protective or emergency stop, has a default setting for the stop category, see *Inputs to initiate a protective stop or an emergency stop on page 15*.

The default stop category for a protective or emergency stop can be re-configured.

Activation of external safety rated devices, connected to the robot controller through dedicated discrete safety inputs or safety protocols, will initiate these stop functions.

Inputs to initiate a protective stop or an emergency stop

Inputs to initiate a stop function	Description	Default stop category[i]	Stop category reconfigurable
Emergency Stop (ES)	Input to initiate the emergency stop function. The *Emergency Stop* function is initiated in both automatic and manual mode.	Stop category 0 For deviations, see the product manual for the manipulator.	Yes
Automatic Stop and General Stop (AS/GS)	Input to initiate the protective stop function, which can be configured to be either *Automatic Stop* or *General Stop*. When configured as *Automatic Stop*, the protective stop function is only initiated in automatic mode. When configured as *General Stop*, the protective stop function is initiated in both manual mode and automatic mode.	Stop category 1	Yes
Automatic Stop (AS)	Input to initiate the protective stop function. *Automatic Stop* is only initiated in automatic mode.	Stop category 1 For deviations, see the product manual for the manipulator.	Yes
General Stop (GS)	Input to initiate the protective stop function. *General Stop* is initiated in both manual mode and automatic mode.	Stop category 1 For deviations, see the product manual for the manipulator.	Yes

i Stop category 1 is deactivated by responsive jogging in manual reduced speed mode by default. Stop category 1 can be deactivated by changing the parameter Jog Mode from *Responsive* to *Standard*.

For more information about Responsive jogging, see *AM Functional safety and SafeMove 3HAC066559-001*.

Continues on next page

1.3.1 Protective stop and emergency stop
Continued

For example, a safety rated output from a presence sensing device, connected to AS / GS, a dedicated discrete protective stop input on the robot controller, will when the protective stop function is configured as Automatic Stop (AS) initiate the protective stop function in automatic mode only.

The emergency stop function is a complementary protective measure and shall not be applied as a substitute for safeguarding measures or safety functions.

Note

For OmniCore, a safety input used to initiate a protective stop must remain active for at least 100 ms.

Stop category configuration for OmniCore

The stop category configuration is done in RobotStudio, in the tool **Visual SafeMove**.

1.3.2 About emergency stop

The emergency stop

The purpose of the emergency stop function is to avert actual or impending emergency situations arising from the behavior of persons or from an unexpected hazardous event.

The emergency stop function is to be initiated by a single human action.

The emergency stop function is a complementary protective measure and shall not be applied as a substitute for safeguarding measures and other functions or safety functions.

The effect of an activated emergency stop device is sustained until the actuator of the emergency stop device has been disengaged. This disengagement is only possible by an intentional human action on the device where the command has been initiated. The disengagement of the emergency stop device shall not restart the machinery but only permit restarting.

Note

The emergency stop device on the FlexPendant is operational when the robot is powered. Indicators to be used to verify that the robot is powered are the main switch on the cabinet or the LED indicator on the cabinet when robot is in Motors On Mode.

Recover from emergency stop

1. Inspect the machinery in order to detect the reason for the emergency stop device actuation.
2. Locate and disengage the emergency stop device or devices that initiated the emergency stop function.

1.3.3 Enabling device and hold-to-run functionality

Three-position enabling device

CAUTION

The person using the three-position enabling device is responsible to observe the safeguarded space for hazards due to robot motion and any other hazards related to the robot.

The three-position enabling device is located on the FlexPendant. When continuously held in center-enabled position, the three-position enabling device will permit robot motion and any hazards controlled by the robot. Release of or compression past the center-enabled position will stop the robot motion.

CAUTION

For safe use of the three-position enabling device, the following must be implemented:

- The three-position enabling device must never be rendered inoperational in any way.
- If there is a need to enter safeguarded space, always bring the FlexPendant. This is to enforce single point of control.

CAUTION

On the IRB 14050, the three-position enabling device is not active unless a valid SafeMove configuration is active in the controller.

Hold-to-run function in manual high speed mode

The hold-to-run function for manual high speed allows movement in conjunction with the three-position enabling device when the button connected to the function is actuated manually. This hold-to-run function can only be used in manual high speed mode. In case of hazard, release or compress the three-position enabling device.

How to use the hold-to-run function for manual high speed mode is described in the operating manual for the controller.

The hold-to-run function for manual high speed mode is by default not available for YuMi with OmniCore C30. If this function is required, contact your local ABB for support.

2 Product description

2.1 The FlexPendant

Introduction to the FlexPendant

The FlexPendant is a hand held operator unit that is used for many of the tasks when operating a robot: running programs, jogging the manipulator, modifying programs, and so on.

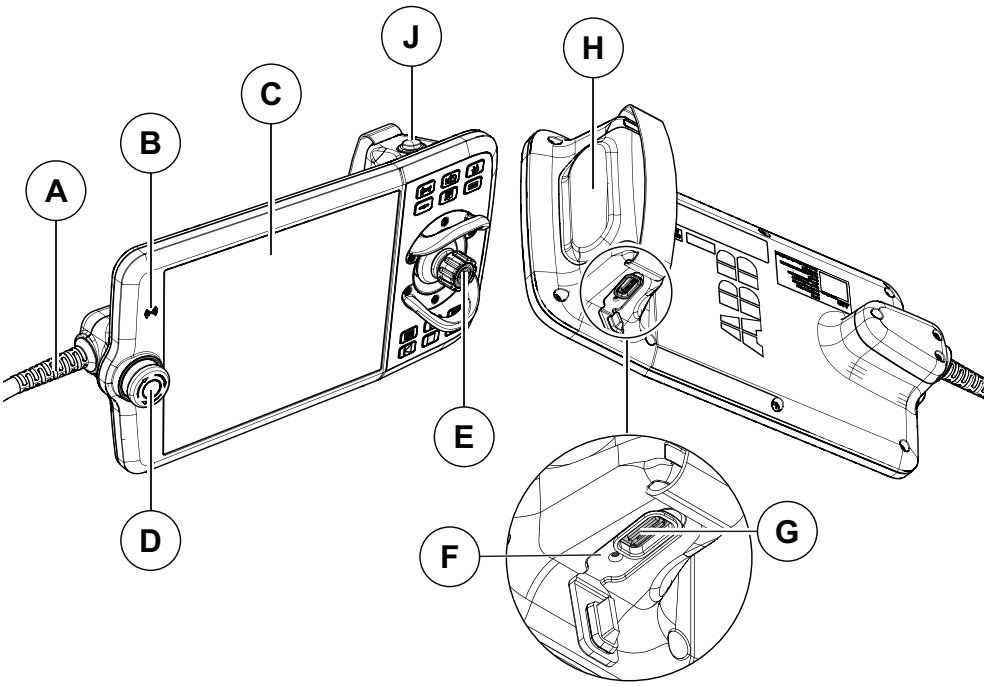
The FlexPendant is designed for continuous operation in harsh industrial environment. Its touchscreen is easy to clean and resistant to water, oil, and accidental welding splashes.

The FlexPendant consists of both hardware and software and is a complete computer in itself. It is connected to the robot controller by an integrated cable and connector.

> **Note**
>
> If protective gloves are used, these must be compatible with touchscreens when using the FlexPendant.

Main parts

These are the main parts of the FlexPendant.



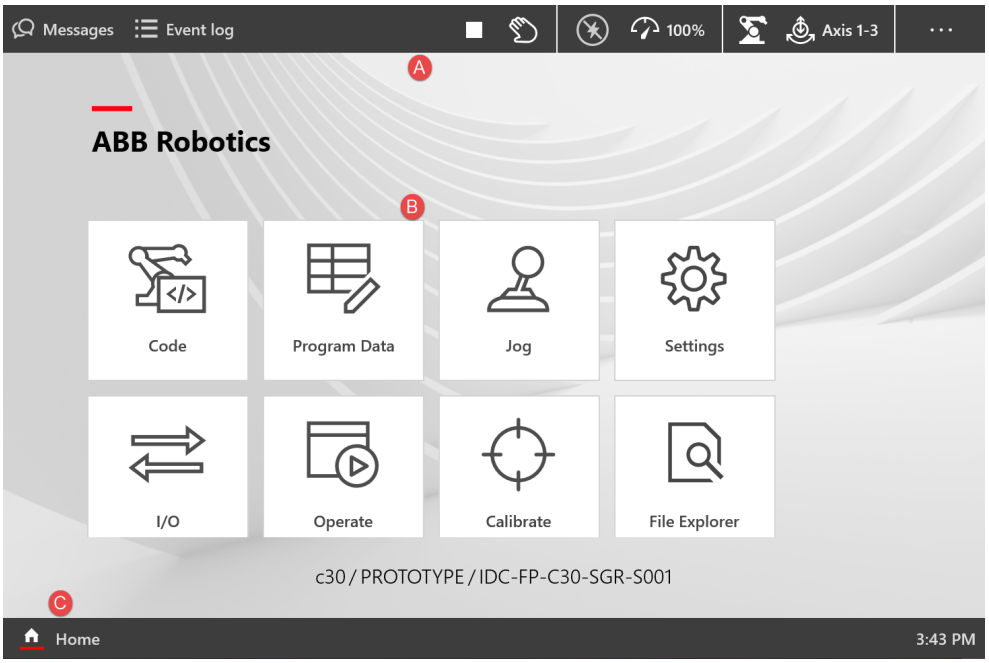
xx1700001891

A	Connector
B	RFID reader (functionality not yet implemented)
C	Touchscreen

Continues on next page

D	Emergency stop device
E	Joystick
F	Reset button
G	USB port
H	Three-position enabling device. For details, see *Three-position enabling device on page 22*
J	Thumb button. For details, see *Thumb button on page 23*.

Touchscreen



xx1800001181

A	Status bar buttons	Allows you to navigate to operator messages, event logs, and QuickSet window.
B	Applications	The applications that are required for operating a robot system are available in the Home Screen. By default, the Home screen displays all the applications available to you.
C	Home button	From any window tap the Home button to navigate to the Home screen of FlexPendant. The Home screen view is also the default view of the FlexPendant during startup.

Emergency stop device

On delivery, the emergency stop device on the FlexPendant is able to initiate the emergency stop function affecting the manipulator(s) and additional axis only.

Joystick

Use the joystick to move the manipulator. This is called jogging the robot. There are several settings for how the joystick will move the manipulator.

Reset button

If the FlexPendant freezes during operation, press the reset button to restart the FlexPendant.

Continues on next page

The reset button resets the FlexPendant, not the system on the controller.

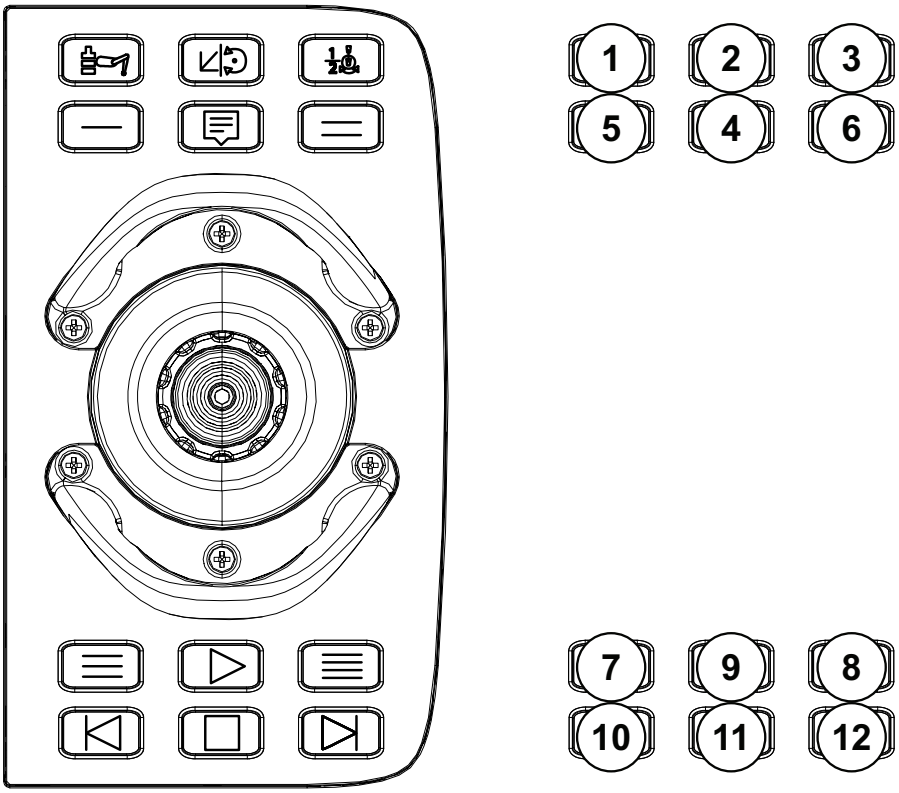
USB port

Connect a USB memory to the USB port to read or save files. For example, to load and save programs and modules, save and restore backups, and so on. The USB memory name and drive letter *(X:)* is displayed in dialogs.

> **Note**
>
> Close the protective cap on the USB port when not used.

Hard buttons

The following hard buttons are available on the FlexPendant.



xx1700001892

Label	Description
1	Mechanical unit button. Allows you to select a mechanical unit.
2	Motion mode button 1. Allows you to toggle the motion mode between reorient and linear.
3	Motion mode button 2. Allows you to toggle the motion mode between axis 1-3 and axis 4-6.
4	Messages button. Allows you to open the QuickSet window. **Note** Press the Messages button for a longer duration to capture a screenshot of the current screen. For more details, see *Operating manual - OmniCore*.

Continues on next page

Label	Description
5, 6, 7, 8	Programmable keys, 1 to 4. Programmable keys are hardware buttons on the FlexPendant that can be used for dedicated, specific functions set by the user.
9	**START** button. Starts the program execution.
10	**Step BACKWARD** button. Executes one instruction backward.
11	**STOP** button. Stops the program execution.
12	**Step FORWARD** button. Executes one instruction forward.

Note

The user interface of the panel in Virtual FlexPendant is slightly different. For more details, see *Operating manual - OmniCore*.

Three-position enabling device

CAUTION

The person using the three-position enabling device is responsible to observe the safeguarded space for hazards due to robot motion and any other hazards related to the robot.

The three-position enabling device is located on the FlexPendant. When continuously held in center-enabled position, the three-position enabling device will permit robot motion and any hazards controlled by the robot. Release of or compression past the center-enabled position will stop the robot motion.

CAUTION

For safe use of the three-position enabling device, the following must be implemented:

- The three-position enabling device must never be rendered inoperational in any way.
- If there is a need to enter safeguarded space, always bring the FlexPendant. This is to enforce single point of control.

CAUTION

On the IRB 14050, the three-position enabling device is not active unless a valid SafeMove configuration is active in the controller.

Note

To enforce single-point of control from the FlexPendant, press and release the three-position enabling device twice.

Continues on next page

Note

YuMi robots with SafeMove requires using the enabling device.

On YuMi robots without SafeMove the enabling device is disabled, hence, not used.

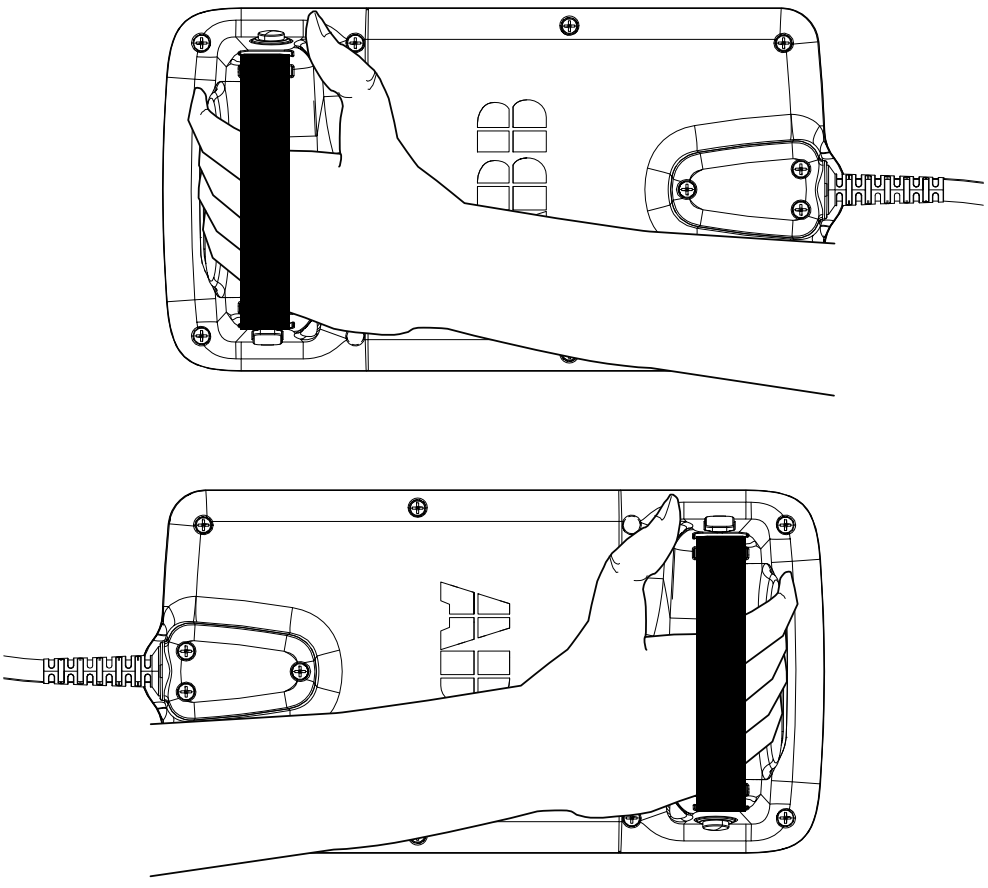
Thumb button

For robots used in collaborative application, the thumb button is used to enable the lead-through functionality.

For robots supporting the mode manual full speed, the button is used as hold-to-run.

How to hold the FlexPendant

FlexPendant is typically operated while being held in the hand. The right-handed users use their left-hand to support the FlexPendant while their right-hand performs the operations on the touch screen. However, the left-handed users can easily adapt FlexPendant for their use.



xx1800000045

2.2 Handling of FlexPendant

Detached FlexPendant

A FlexPendant that is not connected to the robot must be stored out of sight so that it cannot be mistaken for being in use.

Handling and cleaning

- The FlexPendant may only be used for the purposes mentioned in this manual.
- Always use the hand-strap while holding the FlexPendant.
- Handle with care. Do not drop, throw, or give the FlexPendant strong shock. It can cause breakage or failure.
- If the FlexPendant is subjected to shock, always verify that the safety functions (three-position enabling device and emergency stop) work and are not damaged.
- Always use and store the FlexPendant in such a way that the cable does not become a tripping hazard.
- When not using the device, place it in its holder.
- Never use sharp objects (such as screwdriver or pen) for operating the touch screen. This could damage the touch screen. Instead use your finger or a stylus.
- Never clean the FlexPendant with solvents, scouring agent, or scrubbing sponges.

  See the product manual for the robot controller, section *Cleaning the FlexPendant*.
- Always close the protective cap on the USB port when no USB device is connected. The port can break or malfunction if exposed to dirt or dust.
- Do not squeeze and thus damage the cable.
- Do not lay the cable over sharp edges.

CAUTION

The FlexPendant touch screen is made of glass. If the device is dropped on a hard surface or receives a significant impact the glass could break. To reduce the risk of cuts if the glass chips or cracks, do not touch or attempt to remove the broken glass.

FCC statement

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

Continues on next page

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Operation is subject to the following conditions:

- (1) This device may not cause harmful interference,
- (2) this device must accept any interference received, including interference that may cause undesired operation.

The product contains RFID function:

- FCC ID: 2BE510UC20

For radio regulation compliance in other regions, please contact your domestic sales agency.

ABB legal contacts for FCC:

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Ed Marchese, ABB Robotics, 1250 Brown Road, Auburn Hills, MI 48326 USA, ed.marchese@us.abb.com

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3 Installation

3.1 Detaching and attaching a FlexPendant

Introduction

With the option *Hot swappable FlexPendant [3018-1]* it is possible to detach and attach the FlexPendant from an OmniCore controller in automatic mode, without interrupting the ongoing process.

Detaching the FlexPendant in manual mode will always result in an emergency stop.

Note

Detaching the FlexPendant is possible only if the logged in user has the **Detach the FlexPendant** grant.

CAUTION

Before detaching the FlexPendant, another emergency stop shall be available.

CAUTION

When FlexPendant is detached, the status of other actuating controls shall be indicated clearly, for example, power on, fault detected, automatic operation.

CAUTION

A FlexPendant that is not connected to the robot must be stored out of sight so that it cannot be mistaken for being in use.

CAUTION

The FlexPendant connector shall only be used to connect the FlexPendant.

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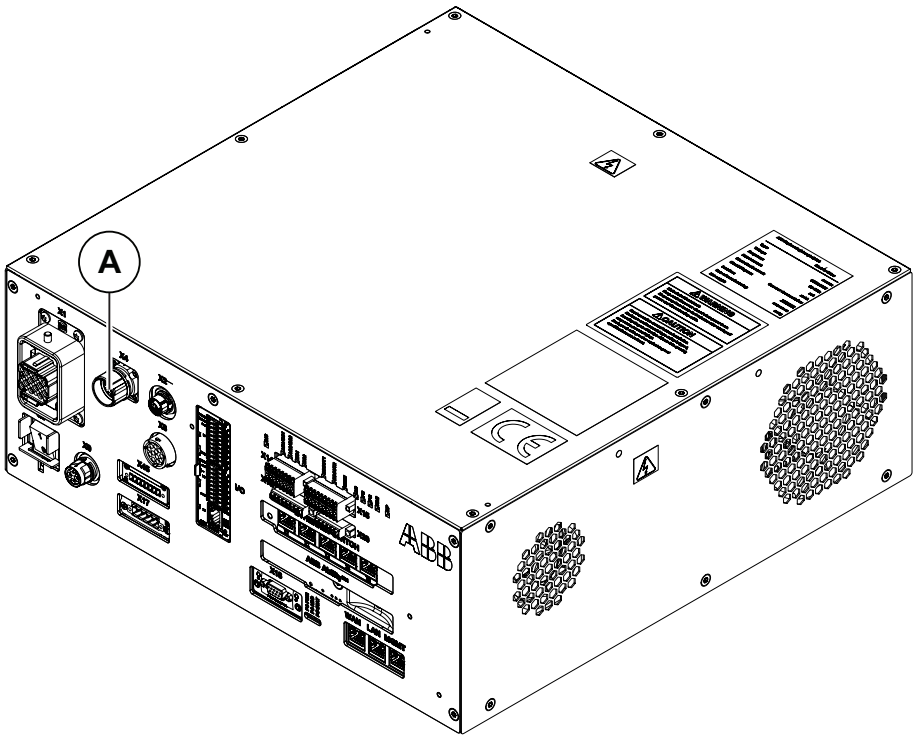
Location of FlexPendant connector

The FlexPendant connector is located on the front panel on the controller.

OmniCore C30



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A	FlexPendant connector

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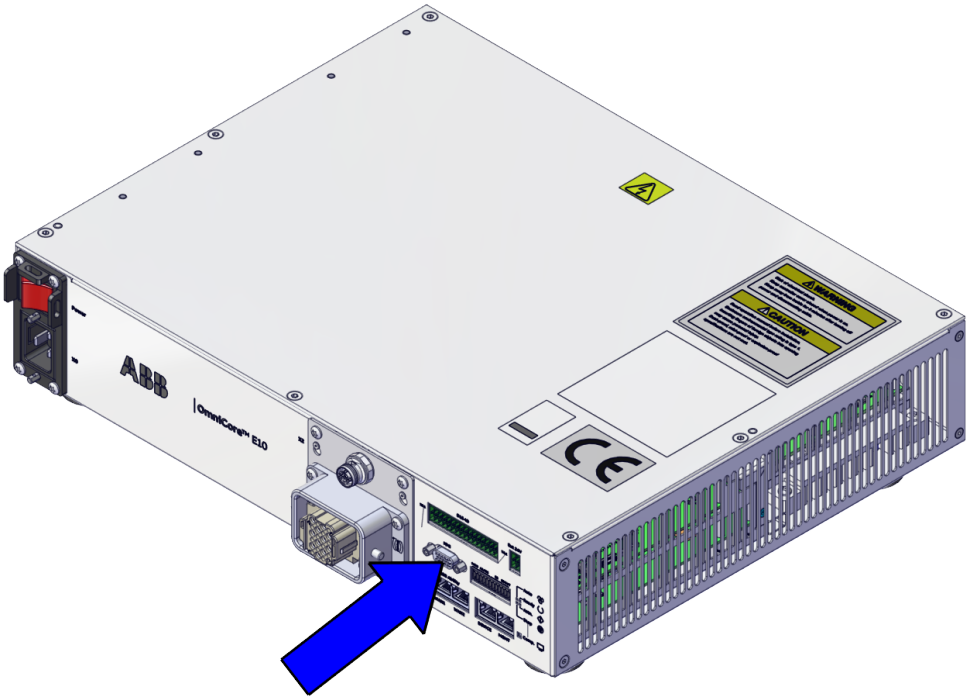
OmniCore C30 Type A

xx2400000022

OmniCore E10



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The FlexPendant connector is located on the cabinet door.

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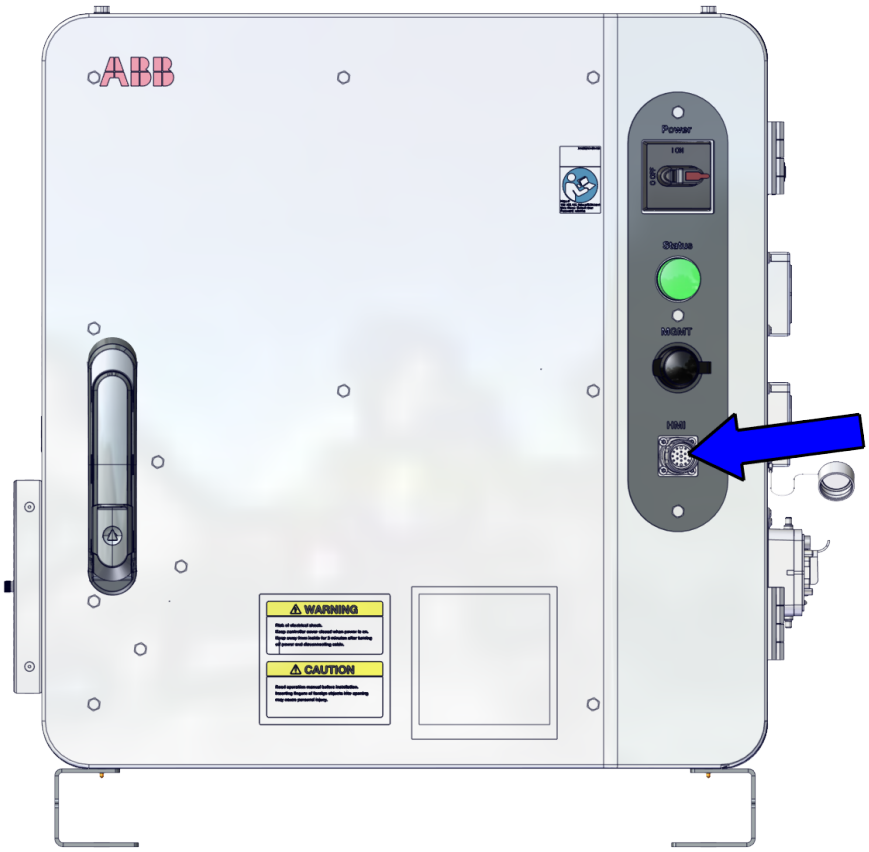
OmniCore C90XT Type A



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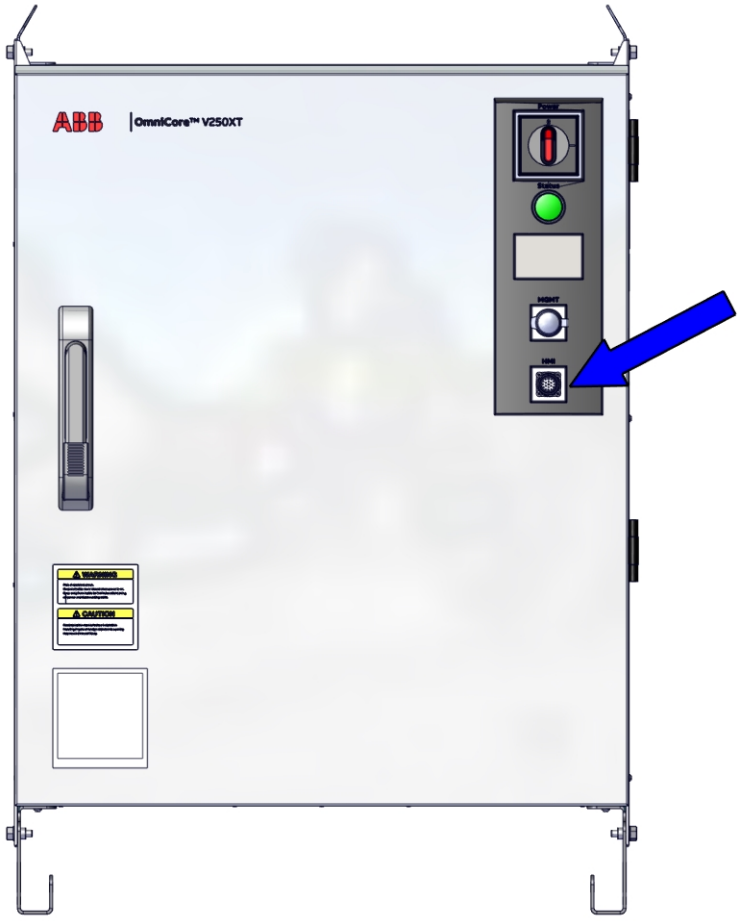
OmniCore V250XT Type B



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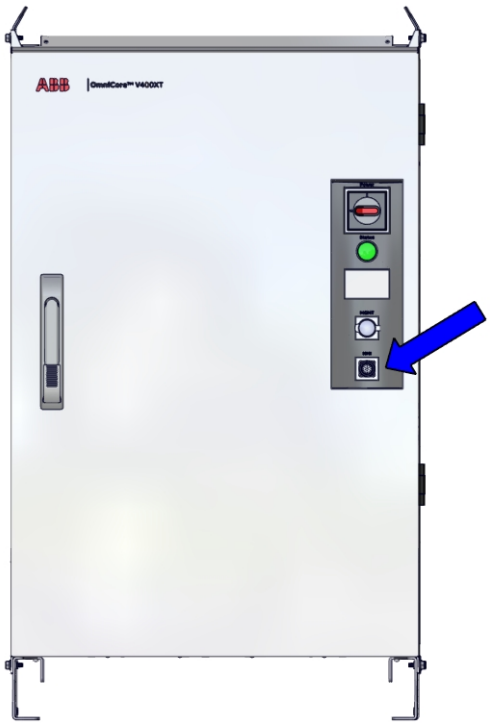
3.1 Detaching and attaching a FlexPendant
Continued

OmniCore V400XT



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Detaching the FlexPendant in automatic mode

Use the following procedure to detach the FlexPendant in automatic mode:

1. On the status bar, tap the **QuickSet** button.
2. Tap the **Logout**/**Restart** tab.
3. In the **FlexPendant** section, tap **Detach FlexPendant**.

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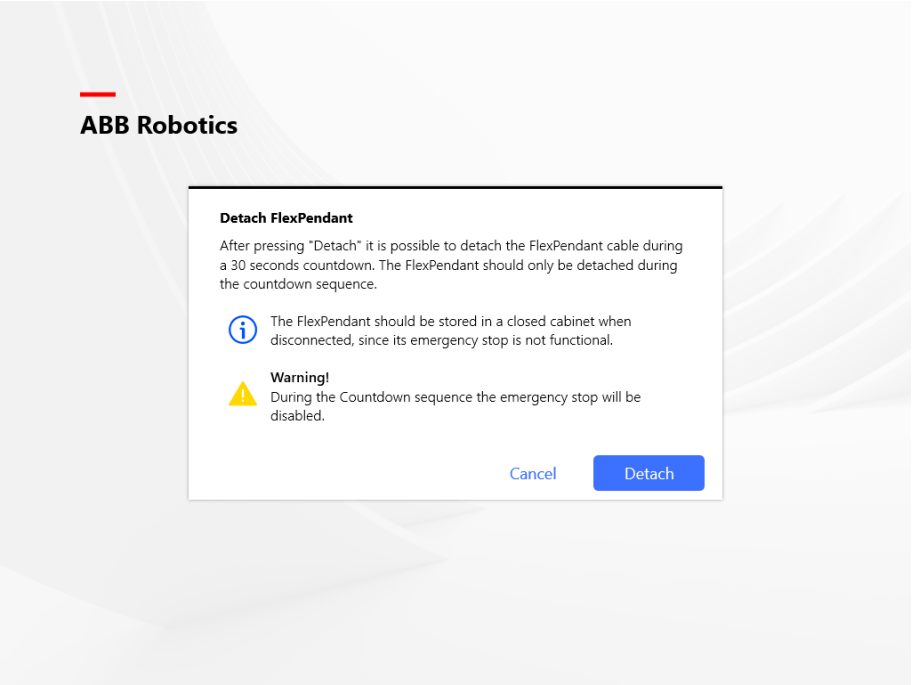
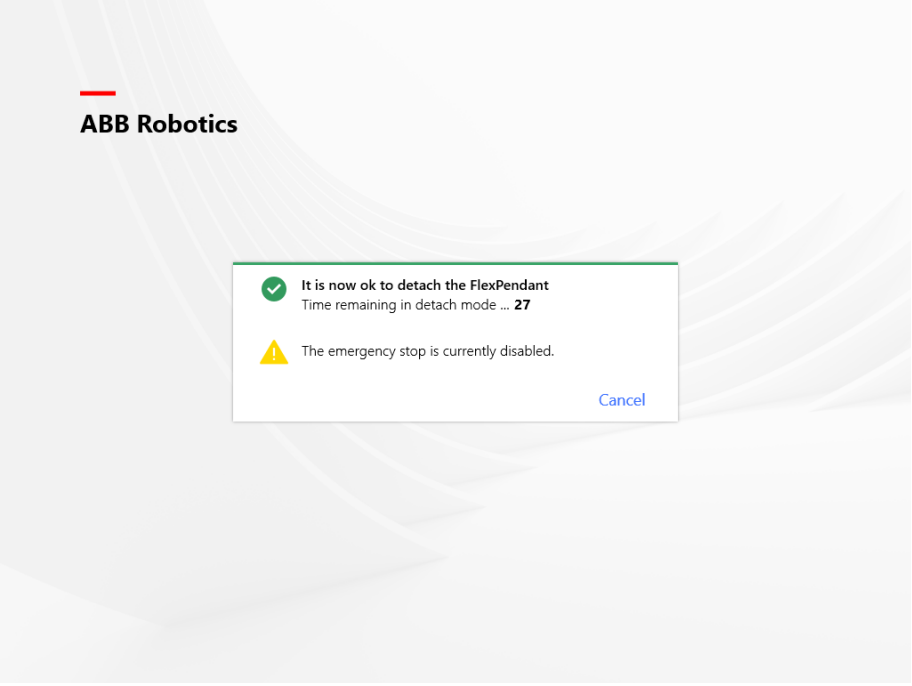
The **Detach FlexPendant** window is displayed.



xx1900000403

4 Tap **Detach**.

A popup window with 30 seconds countdown timer is displayed.



xx1900000404

5 When the countdown is progressing, detach the FlexPendant.

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When detached, the FlexPendant will shut down.

Note

If the FlexPendant is not detached within 30 seconds, the process for detach of the FlexPendant is aborted.

WARNING

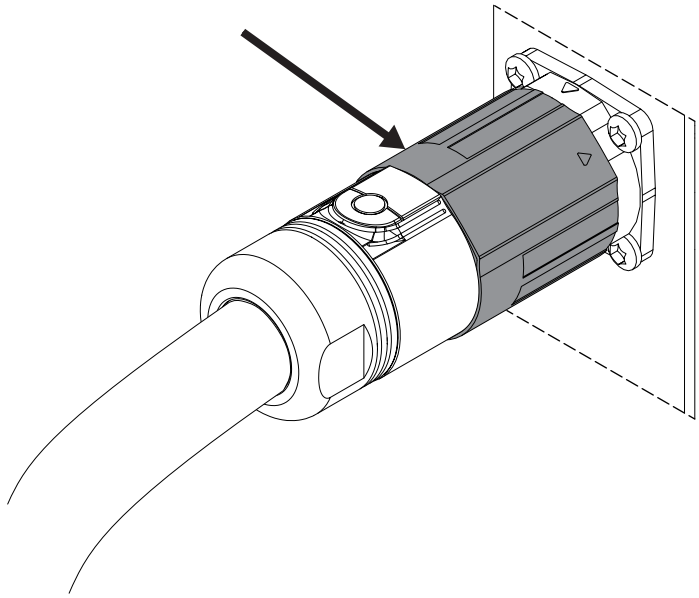
If the FlexPendant is detached after the 30 seconds countdown has passed, the controller will enter emergency stop state.

Attaching the FlexPendant

CAUTION

Always inspect the connector for dirt or damage before attaching. Clean or replace any damaged parts.

Attach the connector to the controller and tighten the locking ring or screws.



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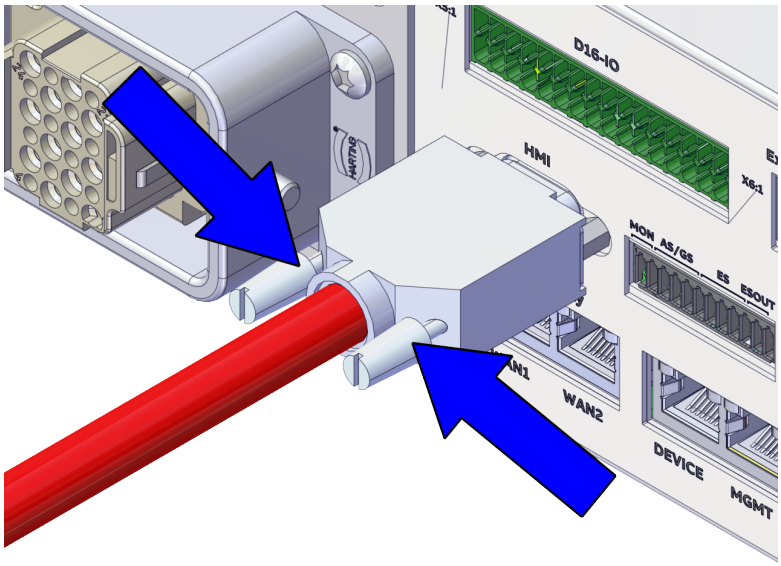
Note

The FlexPendant controller has an adapter cable in between the controller and the FlexPendant.



xx2100001343

CAUTION

Make sure that the emergency stop device is not pressed in before attaching the FlexPendant.

3.2 Mounting the FlexPendant holder

Note

To avoid dropping the FlexPendant from height, the holder should be placed in a comfortable working height.

Always use and store the FlexPendant in such a way that the cable does not become a tripping hazard.

When not using the device, place it so it does not accidentally fall.

Required equipment

Equipment	Spare part number	Note
Standard toolkit		See *Standard toolkit for controller on page 73*.
FlexPendant Holder w/t E-stop cover	3HAC064927-001	

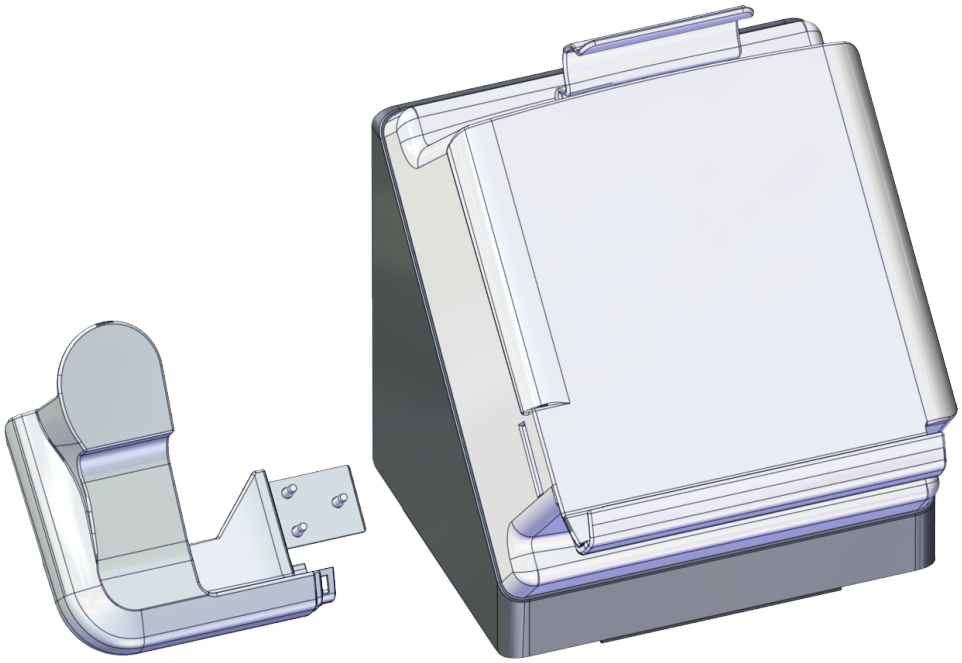
Note

The FlexPendant should always be placed in the holder when it is not used and it is not allowed to use by unauthorized person.

Continues on next page

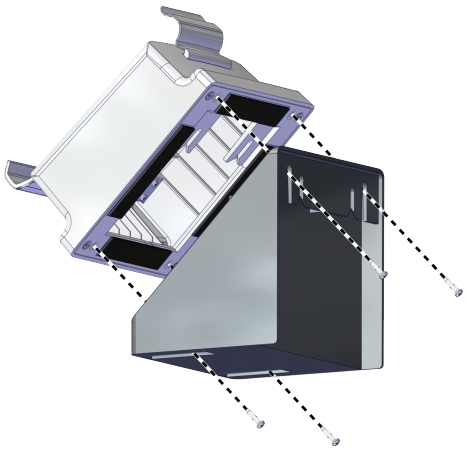
Mounting the bracket for the emergency stop on the FlexPendant holder

The FlexPendant holder is shipped without the bracket for the emergency stop assembled to the holder. They are separated as two parts. To avoid confusion between active and inactive emergency stop devices, this manually-applied covering should be used when the FlexPendant is detached.



xx2100000767

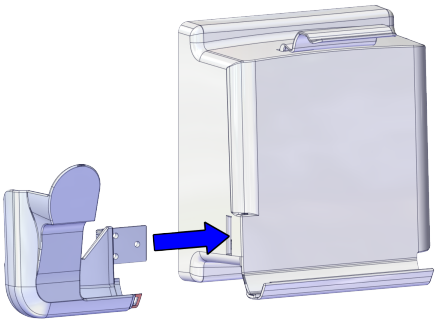
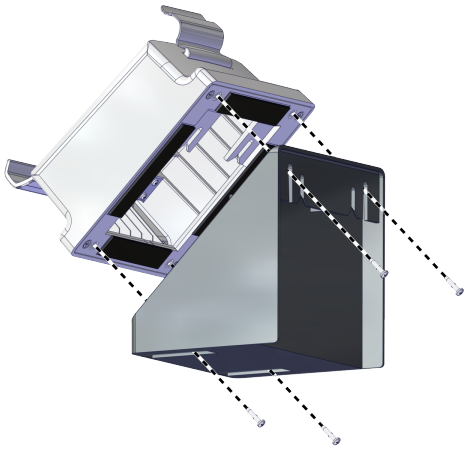
Use this procedure to mount the bracket for the emergency stop to the FlexPendant holder.

	Action	Note/illustration
1	Remove the four screws.	 xx2000002356
2	Separate the rear part from the FlexPendant holder.	

Continues on next page

3.2 Mounting the FlexPendant holder

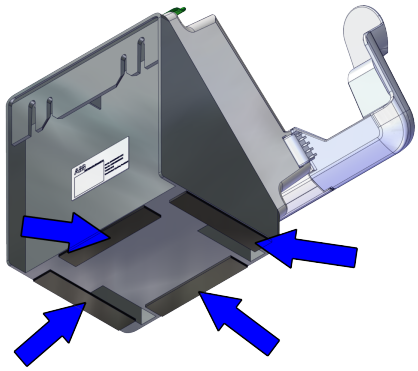
Continued

	Action	Note/illustration
3	Insert the bracket into the FlexPendant holder.	 xx2100000765
4	Secure with the screws.	Screws: BN33 Phillips pan head tapping screw ST2.9x13 (3 pcs) Tightening torque: 6 Nm-7.8 Nm  xx2100000766
5	Refit the rear part and secure with the screws.	Screws: BN33 Phillips pan head tapping screw ST3.5x16 (4 pcs) Tightening torque: 9.4 Nm-12.2 Nm  xx2000002356

Continues on next page

Mounting the FlexPendant holder onto a flat surface (Horizontally)

Use this procedure to mount the FlexPendant holder onto a flat surface, like the top of the controller or a desktop.

	Action	Note/illustration
1	Clean the surface and make sure it is dry.	
2	Remove the protective liner from the tape.	 xx2000002352
3	Press the holder onto the desired place.	 xx2000002353

Hanging the FlexPendant holder with the bracket

Use this procedure to hang the FlexPendant holder on any place that can hold the bracket, like the door of the equipment.

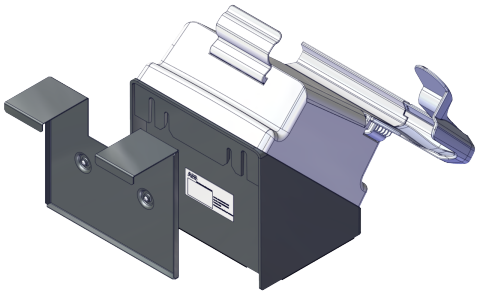
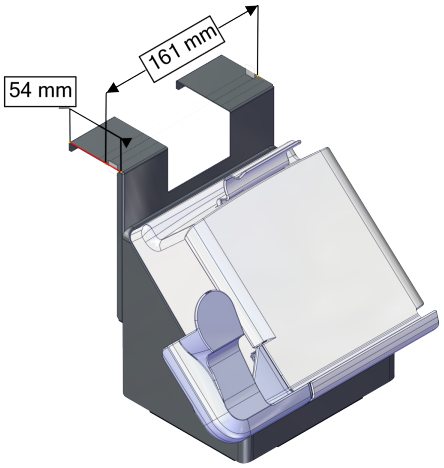
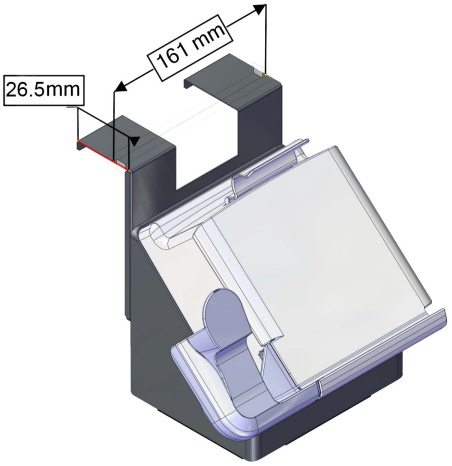
Tip

The bracket is included on delivery.

Continues on next page

3.2 Mounting the FlexPendant holder

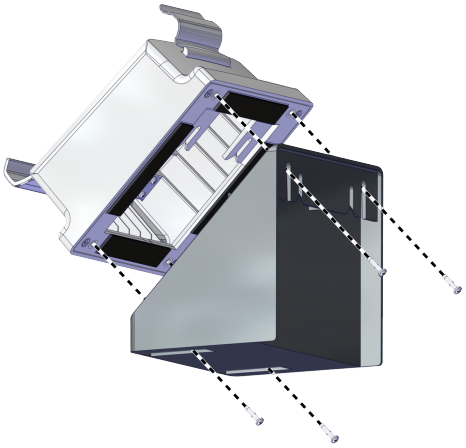
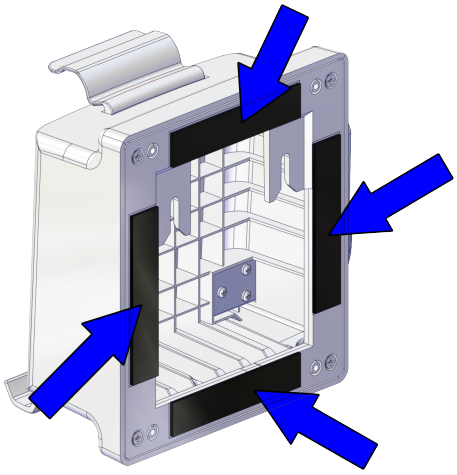
Continued

	Action	Note/illustration
1	Hang the FlexPendant holder to the bracket according to the screws on the bracket.	 xx2000002354
2	Hang the holder with the bracket to the desired place.	 xx2000002355  xx2100002624

Continues on next page

Hanging the front part of the FlexPendant holder with screws (Vertically)

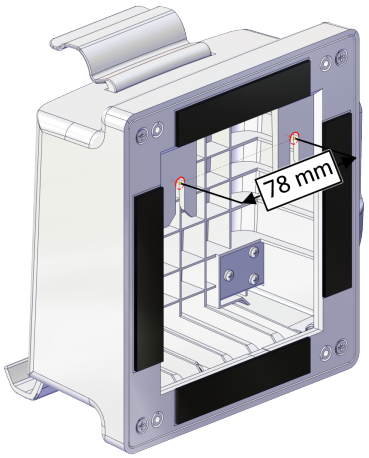
Use this procedure to hang the front part of the FlexPendant holder to the desired place.

	Action	Note/illustration
1	Remove the four screws.	 xx2000002356
2	Separate the rear part from the FlexPendant holder.	
3	Clean the surface and make sure it is dry.	
4	Remove the protective liner from the tape.	 xx2000002357
5	Press the holder onto the desired place.	

Continues on next page

3.2 Mounting the FlexPendant holder

Continued

	Action	Note/illustration
6	Use two M5 screws to secure the holder.	 xx2000002358

3.3 Function tests

3.3.1 Function test of emergency stop

Overview

Validate the function of the FlexPendant emergency stop device.

> **Note**
>
> Also perform the test for any additional emergency stop devices.

Performing the function test

	Action	Note
1	Make a visual inspection of the emergency stop device to make sure it is not physically damaged.	If any damage is found on the emergency stop device, it must be replaced.
2	Pull and rotate the emergency stop device clockwise to verify that it is not pressed in.	
3	Power on the robot.	
4	Press the emergency stop device on the FlexPendant. **Note** If the event message **20223 Emergency stop conflict** appears in the event log, or the event message **10013 Emergency stop state** (and **90518 Safety controller Emergency stop triggered** for robots prepared for collaborative applications) does not appear, then the test has failed and the root cause of the failure must be found.	The test is passed if the event message **10013 Emergency stop state** appears in the event log. If either of the following happens, then the test is failed and the root cause must be found: • if the event message **10013 Emergency stop state** does not appear • if the event message **90780 Two-channel fault in Safety Controller** appears **Note** For robots prepared for collaborative applications, the event message **90518 Safety controller Emergency stop triggered** appears by default. The message **10013 Emergency stop state** is also available in the event log.
5	Release the emergency stop device to reset the emergency stop state.	

3.3.2 Function test of manual, auto, and manual full speed mode with FlexPendant

Overview

Perform this function test to change the mode on the FlexPendant using the following operation:

- **Status bar** > **Common Settings** > **Operating Mode (Auto/Manual/Man FS)**.

For more detailed information, see *Operating manual - OmniCore*, *3HAC065036-001*.

Performing the function test

	Action	Note
1	Start the robot system.	
2	Change to **Automatic** operating mode and **Motors ON** state, and then run the robot in auto mode.	This test is passed if it is possible to run the robot program in auto mode. If it is not possible to run the robot program, this test is failed and the root cause of the failure must be found.
3	Change to **Manual** operating mode and **Motors ON** state, and then run the robot in manual mode.	This test is passed if it is possible to run the robot program in manual mode. If it is not possible to run the robot program, this test is failed and the root cause of the failure must be found.
4	Change to **Manual Full Speed** mode and **Motors ON** state, and then run the robot in manual full speed mode. **Note** Manual full speed mode is not available in USA or Canada.	This test is passed if it is possible to run the robot program in manual full speed mode. If it is not possible to run the robot program, this test is failed and the root cause of the failure must be found.

3.3.3 Function test of three-position enabling device

Performing the function test

	Action	Note
1	Start the robot system and turn the mode switch to manual mode.	
2	Press the three-position enabling device to the middle position and then hold the enabling device in this position.	This test is passed if the event message **10011 Motors ON state** appears in the event log. If either of the following happens, then the test is failed and the root cause must be found: • if the event message **10011 Motors ON state** does not appear • if the event message **90780 Two-channel fault in Safety Controller** appears
3	While still holding the three-position enabling device pressed, press the enabling device harder to the enable the device's third position.	This test is passed if the event message **10012 Safety guard stop state** appears in the event log. If either of the following happens, then the test is failed and the root cause must be found: • if the event message **10012 Safety guard stop state** does not appear • if the event message **90780 Two-channel fault in Safety Controller** appears

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4 Maintenance

4.1 Maintenance schedule for the FlexPendant

General

The FlexPendant must be maintained at regular intervals to ensure its function. The activities and intervals are described in this section.

Activities and intervals

Equipment	Maintenance activity	Interval	Detailed in section:
FlexPendant	Cleaning	When needed	*Cleaning the FlexPendant on page 48*
Emergency stop (FlexPendant)	Function test	12 months	*Function test of emergency stop on page 43*
Manual, auto and manual full speed mode with FlexPendant	Function test	12 months	*Function test of manual, auto, and manual full speed mode with FlexPendant on page 44*
Enabling device	Function test	12 months	*Function test of three-position enabling device on page 45*

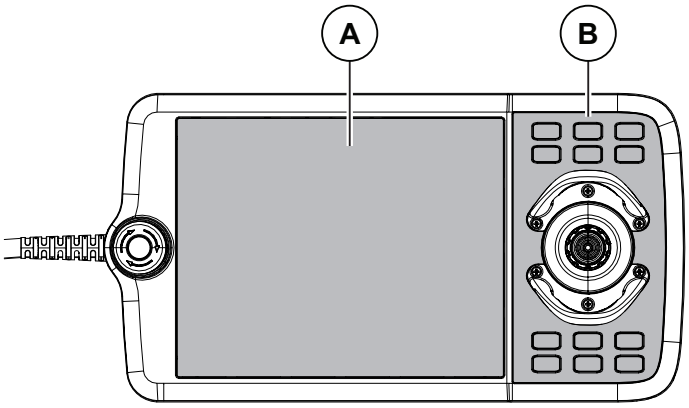
Function test after replacement of component

After replacing a component in the FlexPendant, the function tests should be performed. See *Function tests on page 43*.

4.2 Cleaning the FlexPendant

Location

The surfaces to clean are shown in the illustration below.



xx1800000128

A	Touch screen
B	Hard buttons

Required equipment

Equipment, etc.	Note
Soft cloth	ESD protected
Water/Mild cleaning agent	

Clean the touch screen

This section describes how to clean the touch screen.

	Action	Info/Illustration
1	Lock the screen.	
2	It is safe to clean the FlexPendant when the Lock screen appears.	
3	Clean the touch screen and hardware buttons using a soft cloth and water or a mild cleaning agent.	
4	Unlock the screen, by tapping the buttons.	

Cleaning considerations

The section below specifies some special considerations when cleaning the FlexPendant:

- Use ESD Protection
- Use cleaning equipment as specified above. Any other cleaning equipment may shorten the life time of the touch screen.
- Check that all protective covers are fitted to the device before cleaning.
- Make sure that no foreign objects or liquids can penetrate into the device.

Continues on next page

- Do not remove any covers before cleaning the FlexPendant.
- Do not spray with a high pressure cleaner.
- Do not clean the device, operating panel and operating elements with compressed air, solvents, scouring agent or scrubbing sponges.

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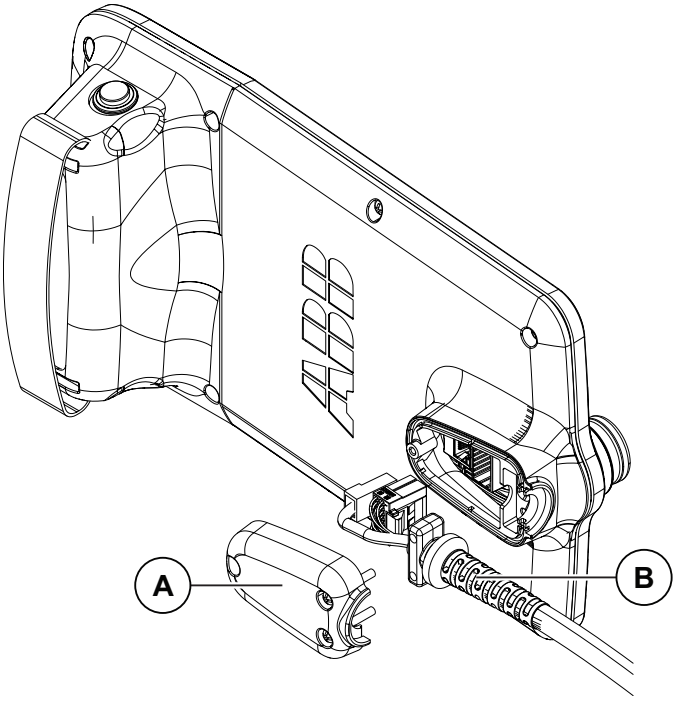
5 Repair

1 Replacing the power cable and power cable cover

Location

The illustration shows the location of the power cable, power cable gasket, and power cable cover in the FlexPendant.



xx1800001154

A	Power cable cover
B	Power cable

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the FlexPendant via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
FlexPendant	3HAC086996-001	DSQC3124
Power cable cover	3HAC065401-001	
FlexPendant power cable 3 m	3HAC064448-002	
FlexPendant power cable 10 m	3HAC064448-001	

Continues on next page

1 Replacing the power cable and power cable cover
Continued

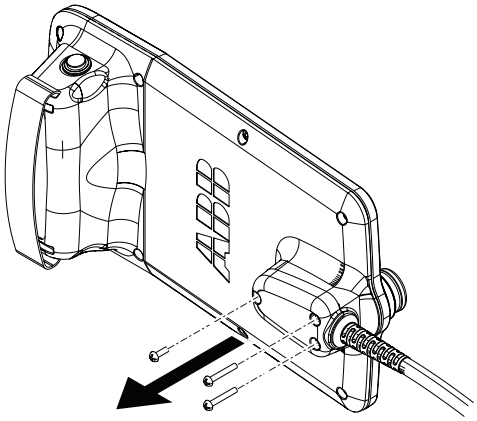
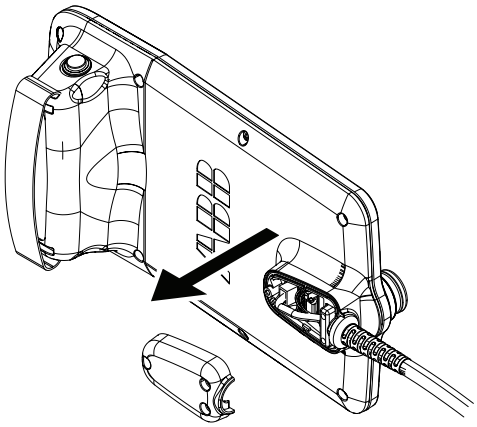
Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit for controller on page 73*.
ESD protective wrist band	-	

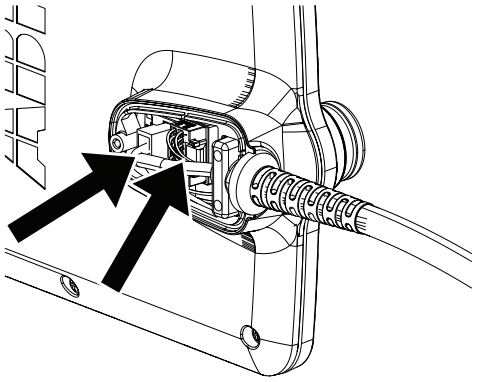
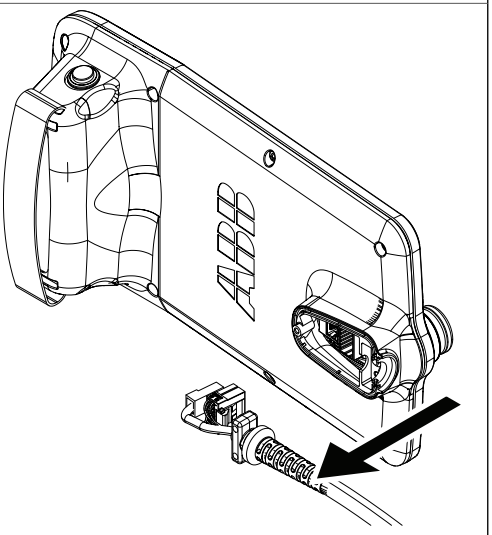
Required documents

Document	Article number	Note
Circuit diagram	See *References*.	

Removing the power cable and power cable cover

	Action	Note/Illustration
1		
2	Disconnect the FlexPendant from the controller.	
3	Remove the attachment screws for the power cable cover.	 xx1800001189
4	Remove the power cable cover.	 xx1800001190

Continues on next page

	Action	Note/Illustration
5	Disconnect two connectors to the FlexPendant.	 xx1800001748
6	Remove the power cable.	 xx1800001192

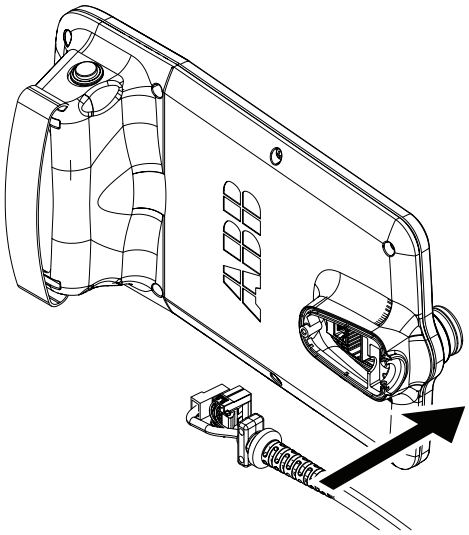
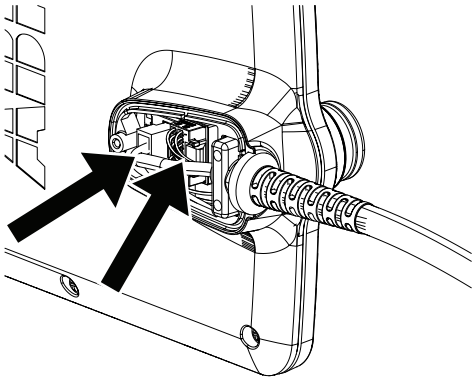
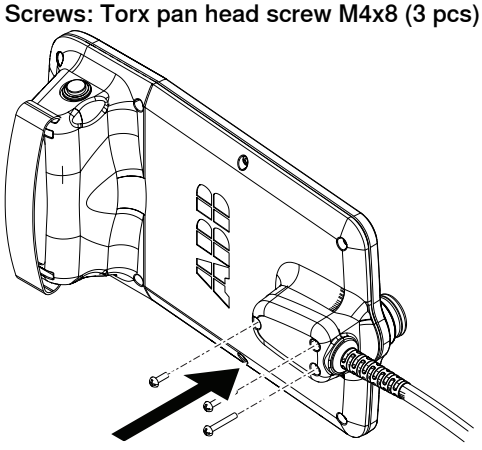
Refitting the power cable and power cable cover

	Action	Note/Illustration
1		

Continues on next page

1 Replacing the power cable and power cable cover

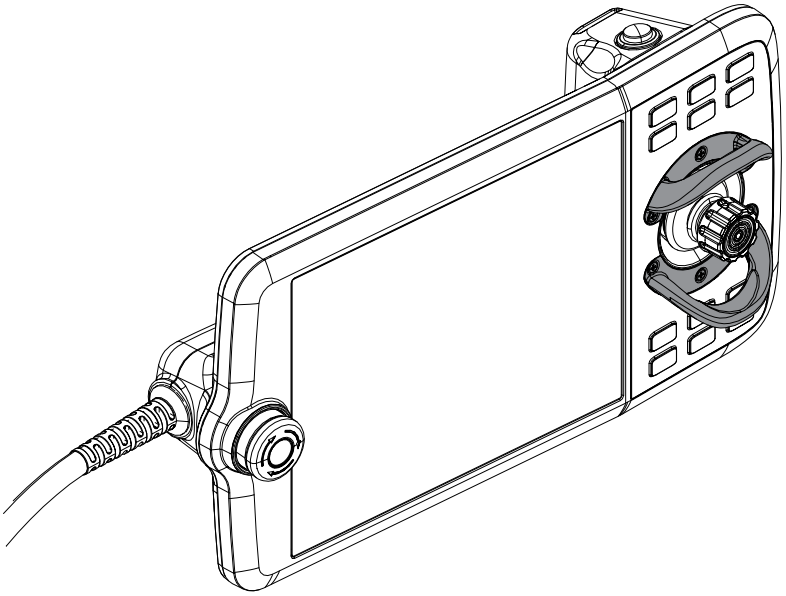
Continued

	Action	Note/Illustration
2	Refit the power cable.	 xx1800001193
3	Reconnect the power cable to the FlexPendant.	 xx1800001748
4	Refit the power cable cover and tighten the screws.	Screws: Torx pan head screw M4x8 (3 pcs)  xx1800001196
5	Perform the function tests to verify that the safety features work properly, see *Function tests on page 43*.	

2 Replacing the joystick protection

Location

The illustration shows the location of the joystick protection on the FlexPendant.



xx1800001197

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the FlexPendant via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Joystick guard	3HAC065408-001	

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit for controller on page 73*.

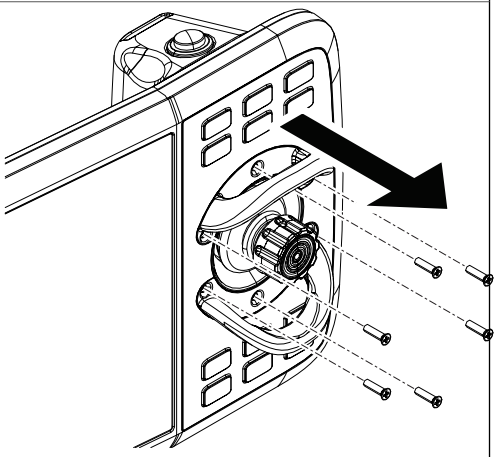
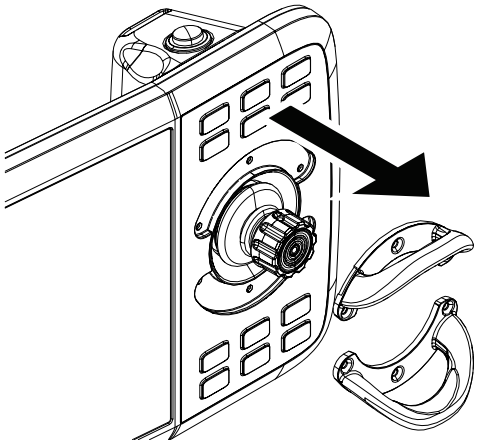
Required documents

Document	Article number	Note
Circuit diagram	See *References*.	

Continues on next page

2 Replacing the joystick protection
Continued

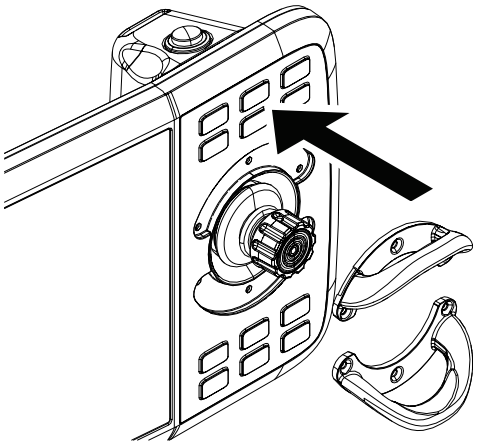
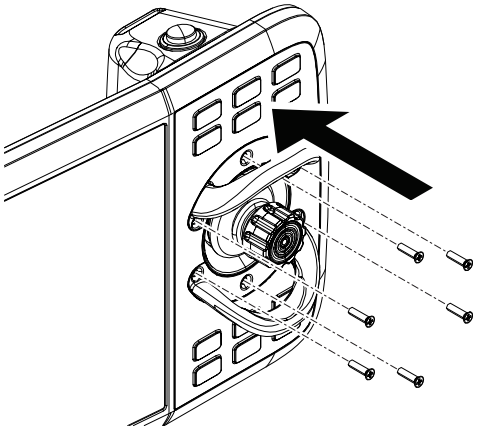
Removing the joystick protection

	Action	Note/Illustration
1		
2	Disconnect the FlexPendant from the controller.	
3	Remove the attachment screws.	 xx1800001198
4	Remove the joystick protection.	 xx1800001199

Refitting the joystick protection

	Action	Note/Illustration
1		

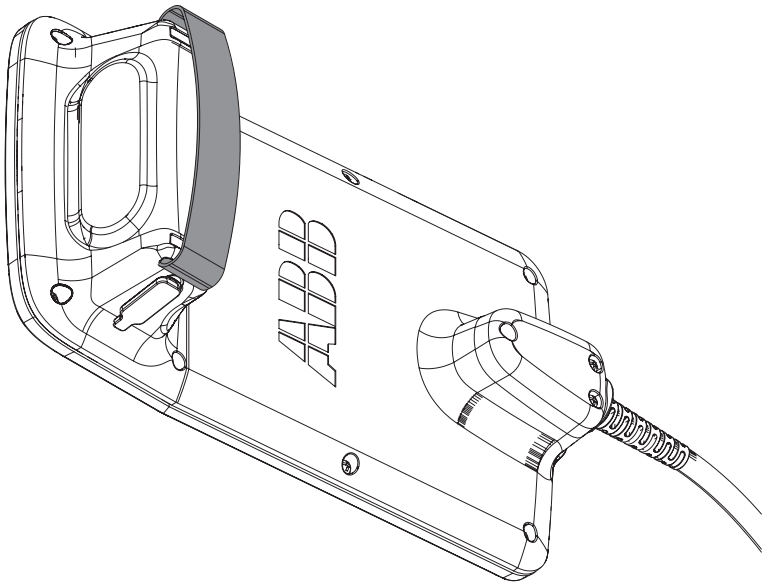
Continues on next page

	Action	Note/Illustration
2	Refit the joystick protection.	 xx1800001200
3	Secure the screws.	 xx1800001206 Countersunk head screw: ST2.9 X 10 (6 pcs)

3 Replacing the fasten strip

Location

The illustration shows the location of the fasten strip on the FlexPendant.



xx1900000771

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the FlexPendant via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Fasten strip	3HAC065419-001	

Replacing the fasten strip

	Action	Note/Illustration
1	Open the velcro on the fasten strip.	
2	Take the fasten strip out from the holes.	
3	Insert the new fasten strip into the holes one by one.	
4	Secure the velcro in a suitable length.	

6 Troubleshooting

6.1 Problem starting or connecting the FlexPendant

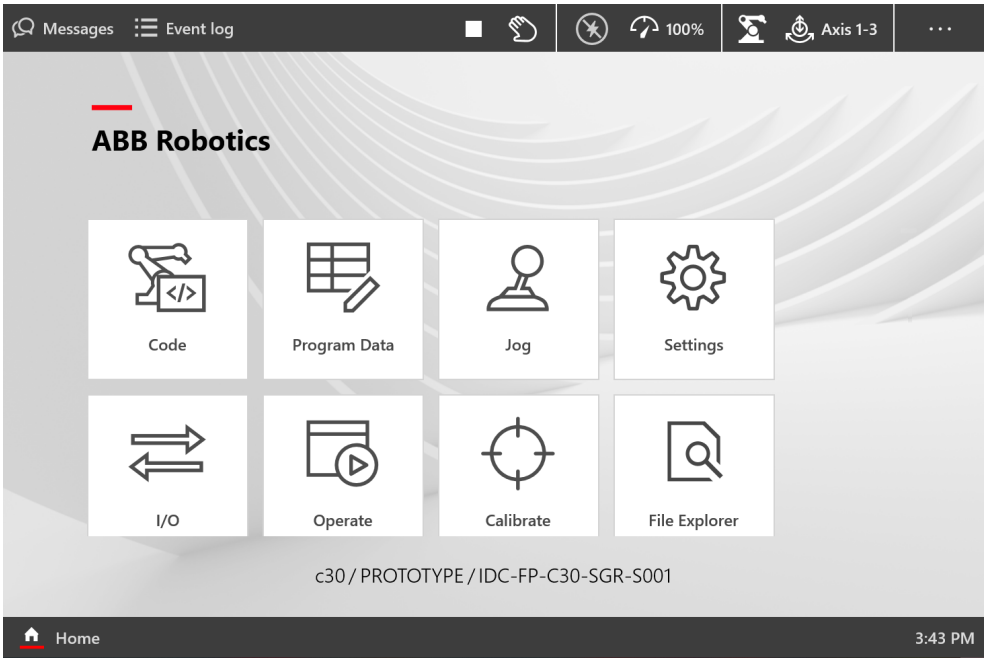
Description

The FlexPendant is not responding, either completely or intermittently.

No entries are possible, and no functions are available.

> **Note**
>
> If protective gloves are used, these must be compatible with touchscreens when using the FlexPendant.

The FlexPendant starts but does not display the main interface.



xx1900000917

Required test equipment

Equipment needed for troubleshooting:

Equipment	Note
Multimeter	
Insulating gloves	
Circuit diagram	See *References*.

Preparations

	Action
1	Make sure that the controller is switched on. Wait 30 s - 1 min to enable start-up sequence.

Continues on next page

6.1 Problem starting or connecting the FlexPendant

Continued

	Action
2	Check the FlexPendant for errors and warnings.
	DANGER Troubleshooting on the controller while powered on must be performed by personnel trained by ABB or by ABB field engineers.

Recommended working procedure

If the FlexPendant starts but does not display the main interface during the start-up, use this procedure to troubleshoot what might cause the problem.

Look at the following block diagram to understand how power is connected from incoming and forward.

Location of LEDs

Information about LEDs not yet available.

Detailed working procedure

	Action	Note
1	Try resetting the FlexPendant using the reset button located next to the USB port.	See *Operating manual - OmniCore*.
2	Check that the FlexPendant cable is correctly connected to the controller through the HMI signal connector, X4.	If it is not connected, repair the connection and go to step six. Check the pins in the connector. If it is ok, go to the next step.
3	Check that the FlexPendant cable is correctly connected to the extension cable.	If it is not connected, repair the connection and go to step six. Check the pins in the connector. If it is ok, go to the next step.
4	Check the LED PC and LED HMI, they should be green.	For more details about the LEDs, see controller manual for troubleshooting of the robot signal exchange proxy. • If the LEDs are not green, see controller manual for troubleshooting of the robot signal exchange proxy • If they are ok, go to the next step.
5	Check the FlexPendant cable for any damage.	• If damage is found, replace the FlexPendant cable and go to step six. • If it is ok, go to the next step.
6	Check that the connection from the robot signal exchange proxy to the HMI signal connector is ok, K2.X9, 13 - X4.	• If it is not ok, repair the connection and go to step six. • If it is ok, go to the next step.

Continues on next page

	Action	Note
7	Check that the connection from the robot signal exchange proxy to the main computer is ok: • K2.X8 - A2.X6 • K2.X2 - A2.X1 • K2.X12 - A2.K3.X6,7 • K2.X3 - A2.K3.X1	• If any connection fails, repair the connection and go to step six. • If the connections are ok, go to the next step.
8	If possible, test by connecting another FlexPendant. This is to eliminate the FlexPendant and cable as error sources; Test the FlexPendant with a different controller to eliminate the controller as error source.	
9	Check that the FlexPendant works normally. **Tip** This is detailed in section *Troubleshooting the FlexPendant on page 63*.	If it is not ok, contact your local ABB.

6.2 Problem using the joystick

Description

The FlexPendant is started and responds when you push the buttons or tap on the touchscreen. However, the joystick does not work and no warnings or messages show up. It is therefore not possible to jog the robot.

Recommended working procedure

	Action	Information
1	Make sure that the joystick lock is not activated.	See *Operating manual - OmniCore*.
2	Make sure the controller is in manual mode.	
3	Make sure the FlexPendant is connected correctly to the controller.	
4	Press the reset button located next to the USB port on the back of the FlexPendant.  **Note** The reset button only resets the FlexPendant, not the system on the controller.	If the joystick is still not working, then replace the FlexPendant.

6.3 Troubleshooting the FlexPendant

Description

The FlexPendant communicates with the main computer. The FlexPendant is physically connected to the panel board. The cable contains the +24 V supply, two enabling device chains and emergency stop.

Procedure

The procedure below describes what to do if the FlexPendant does not work correctly.

	Action	Note
1	Try resetting the FlexPendant using the reset button located next to the USB port.	See *Operating manual - OmniCore*.
2	If the FlexPendant is not responding or does not operate correctly, see *Problem starting or connecting the FlexPendant on page 59*.	**Note** If protective gloves are used, these must be compatible with touchscreens when using the FlexPendant.
3	Check the cable for connections and integrity.	
4	Check the 24 V power supply.	
5	Read the error event log message and follow any instructions of references.	

For more information on the FlexPendant, see *Operating manual - OmniCore*.

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7 Decommissioning

7.1 Introduction to decommissioning

Introduction

This section contains information to consider when taking a product, robot or controller, out of operation.

It deals with how to handle potentially dangerous components and potentially hazardous materials.

> **Note**
>
> The decommissioning process shall be preceded by a risk assessment.

Disposal of materials used in the robot

All used grease/oils and dead batteries **must** be disposed of in accordance with the current legislation of the country in which the robot and the control unit are installed.

If the robot or the control unit is partially or completely disposed of, the various parts **must** be grouped together according to their nature (which is all iron together and all plastic together), and disposed of accordingly. These parts **must** also be disposed of in accordance with the current legislation of the country in which the robot and control unit are installed.

See also *Environmental information on page 66*.

Disposal of storage media

Before disposal of any storage equipment (anything from an SD card to a complete controller), make sure that all sensitive information has been deleted.

> **Tip**
>
> To remove all data from the OmniCore controller, use the **Delete user data** function (part of **Delete RobotWare system** function) in RobotWare. See *Operating manual - Integrator's guide OmniCore*.

Transportation

Prepare the robot or parts before transport, this to avoid hazards.

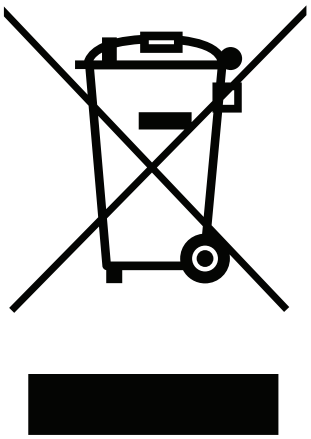
7.2 Environmental information

Introduction

ABB robots contain components in different materials. During decommissioning, all materials shall be dismantled, recycled, or reused responsibly, according to the relevant laws and industrial standards. Robots or parts that can be reused or upcycled helps to reduce the usage of natural resources.

Disposal symbol

The following symbol indicates that the product must not be disposed of as common garbage. Handle each product according to local regulations for the respective content (see table below).



xx1800000058

Materials used in the product

The table specifies some of the materials in the product and their respective use throughout the product.

Dispose components properly according to local regulations to prevent health or environmental hazards.

Material	Example application
Aluminium	Heat sinks on power supplies
Batteries, Lithium	Battery
Brominated flame retardants	Electronics
Copper	Cables
Lead	Electronics
Plastic/rubber	Cables, connectors, etc.
Silicone	Power supply[i]
Steel	Cabinet structure, plates, screws, etc.

[i] The product does not contain silicone by design but there might be a minimal risk of contamination during production.

Continues on next page

China RoHS symbol

The following symbol shows the information to hazardous substances and the environmental protection use period of FlexPendant according to "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (SJ/T 11364-2014) ".

xx1900000804

Orange symbol with a number in it: The product contains certain hazardous substances and can be used safely during its environmental protection use period (as indicated by the number in the center) which should enter into the recycling system after its environmental protection use period.

Note

This form and environmental protection use period label are based on the regulation in China. These are not necessary to be concerned in other countries.

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8 Spare parts

Spare part level

ABB spare parts are categorized into two levels, L1 and L2. Always check the part level before conducting a service work on a spare part.

- L1 spare parts

  The L1 parts can be replaced in the field. The maintenance and replacement instructions given in the related product manuals must be strictly followed. If there are any problems, contact your local ABB for support.

- L2 spare parts

  To replace the L2 parts require specialized training and might need special tools. Only ABB field service personnel or qualified personnel trained by ABB can replace L2 parts.

- L3 spare parts

  L3 spare parts shall only be replaced or repaired by qualified ABB service technician with knowledge of the application due to reduce risk of injury or damage to equipment. Improper installation may void warranty.

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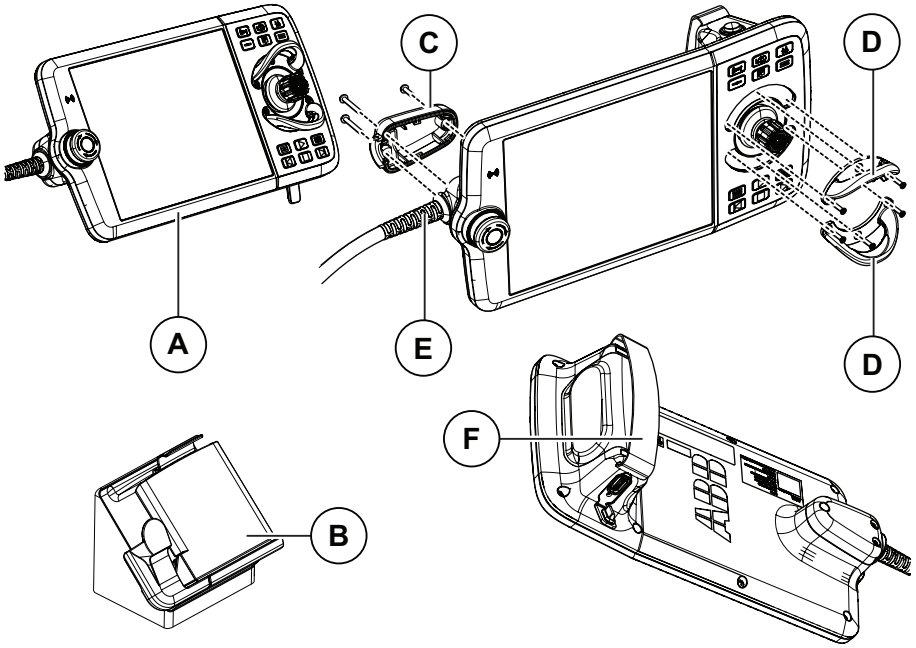
8.1 FlexPendant parts

FlexPendant parts

The illustration below shows the placement of the parts in the recommended spare part list.



xx1800000974

	Spare part number	Description	Type	Spare part level
A	3HAC086996-001	FlexPendant	DSQC3124	L1
B	3HAC064927-001	FlexPendant Holder w/t E-stop cover		L1
C	3HAC065401-001	Power cable cover		L1
D	3HAC065408-001	Joystick guard		L1
E	3HAC064448-002	FlexPendant power cable 3 m		L1
	3HAC064448-001	FlexPendant power cable 10 m		L1
	3HAC064448-003	FlexPendant power cable 30 m		L1
F	3HAC065419-001	Fasten strip		L1
-	3HAC068915-001	FlexPendant extension cable 15 m		L1
-	3HAC068915-002	FlexPendant extension cable 22 m		L1
-	3HAC068915-005	FlexPendant extension cable 30 m		L1

9 Reference information

9.1 Introduction

General

This chapter includes general information, complementing the more specific information in the different procedures in the manual.

9.2 Applicable standards

General

The product is compliant with ISO 10218-1:2011, *Robots for industrial environments - Safety requirements - Part 1 Robots*, and applicable parts in the normative references, as referred to from ISO 10218-1:2011. In case of deviation from ISO 10218-1:2011, these are listed in the declaration of incorporation. The declaration of incorporation is part of the delivery.

Other standards used in design

Standard	Description
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements, normative reference from ISO 10218-1
IEC 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
IEC 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
ISO 13849-1:2006	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design, normative reference from ISO 10218-1

9.3 Standard toolkit for controller

General

All service (repair, maintenance and installation) instructions contain lists of tools required to perform the specified activity. All special tools, that is, all tools that are not considered as standard tools as defined below, are listed in their instructions respectively.

This way, the tools required are the sum of the standard toolkit and any tools listed in the instructions.

Standard toolkit for controller

Tool	Description
Screw driver, Torx	Tx10
Screw driver, Torx	Tx20
Screw driver, Torx	Tx25
Ball tipped screw driver, Torx	Tx25
Screw driver, flat blade	4 mm
Screw driver, flat blade	8 mm
Screw driver, flat blade	12 mm
Screw driver	Phillips-1
Box spanner	8 mm

Toolkit recommended for troubleshooting

Tool	Note
Normal shop tools	Contents as specified above.
Multimeter	-
Camera	To document problems or procedures

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