

Frame F5 and Frame F7

Service Manual

Host software version 3, Frame hardware version 01



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Contents

Legal manufacturer information	7
Manufacturer information	7
About this manual	9
Intended use of this manual.....	9
Intended audience of this manual	9
Manual conventions.....	9
Other naming conventions	9
Illustrations and names	10
Related documents.....	10
Revision history.....	10
Product availability	10
Trademarks	10
Third party trademarks.....	10
Manufacturer responsibility.....	10
Introduction	13
F5 and F7 Frames introduction	13
Module frame compatibility.....	13
Controls and connectors.....	14
F5 Frame, 5-module frame.....	14
F7 Frame, 7-module frame.....	14
Frame indicators.....	15
Functional description.....	15
Main components.....	16
EMBC board	16
Power board	16
Mother board	17
PDM flex board	17
Planned and corrective maintenance.....	19
About the maintenance check procedures.....	19
Planned maintenance.....	19
Corrective maintenance.....	19
Performing visual inspection.....	20
Performing electrical safety tests *	20
Performing functional check.....	20
Required tools for module frames functional check.....	20
Making connections for the functional check.....	20

Testing the module communication	21
Completing the functional check	21
Configuration and calibration	23
Configuration.....	23
Software update.....	23
Calibration and adjustments.....	23
Troubleshooting.....	25
Troubleshooting guidelines	25
Performing visual inspection.....	25
Troubleshooting frame functionality	25
LED indicators	26
Viewing device information	26
Service log files	27
Viewing log files.....	27
Downloading log files.....	27
Messages.....	28
Troubleshooting F5 and F7 Frames	28
Disassembly and reassembly	31
Disassembly guidelines.....	31
ESD precautions.....	31
Before disassembly	31
Required tools.....	32
Disassembly procedures	32
Disassembling and reassembling the F7 Frame.....	32
Removing the modules and cables	32
Detaching the EMBC unit.....	33
Detaching the module board	34
Detaching the PSM cable.....	35
Reassembling the F7 Frame	35
Disassembling and reassembling the F5 Frame.....	36
Removing the modules and cables	36
Detaching the EMBC unit.....	36
Detaching the cover and the module mother board	37
Detaching the EMBC unit front cover.....	38
Detaching the PDM dock	39
Reassembling the F5 Frame	41
Service parts	43
Ordering parts.....	43
FRU, Ethernet module bus converter unit, F7 Frame	43
FRU, PSM cable and module Mother board kit, F7 Frame.....	44
FRU, Frame cover and module Mother board kit, F5 Frame	45

FRU, PDM dock, F5 Frame	46
FRU, Ethernet module bus converter unit, F5 Frame	46

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Legal manufacturer information

Manufacturer information

Frame F5-01 and Frame F7-01



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About this manual

Intended use of this manual

This manual contains instructions for the planned and corrective maintenance of the F5 and F7 Frames. This manual must be used in conjunction with the monitor's service manual for important safety and installation information.

Use the manual as a guide for maintenance procedures and repairs considered field repairable. Where necessary the manual identifies additional sources of relevant information and technical assistance.

See the module's service manual for the planned and corrective maintenance of the acquisition module.

See the monitor's service manual for an overview of the patient monitoring system, information needed for system installation and for planned and corrective maintenance of the monitor.

See the monitor's supplemental information provided for the technical specifications, default settings and compatibility information, including electromagnetic compatibility.

See the monitor's user manual for the instructions necessary to operate the device safely in accordance with its function and intended use.

Intended audience of this manual

This manual is intended for service representatives and technical personnel who maintain, troubleshoot, or repair this device.

Manual conventions

This manual uses the following styles to emphasize text or indicate an action. Also note the terminology conventions.

Item	Description
Courier	Indicates hardware keys and connectors.
bold	Indicates menu options, software keys and messages.
<i>italic</i>	Indicates terms for emphasis.
>	Indicates menu options to select consecutively.
select	The word select means choosing and confirming.
supplemental information	In this manual, the phrase supplemental information refers to information that appears in the Supplemental Information Manual or supplements provided.
NOTE	Note statements provide application tips or other useful information.

Other naming conventions

For technical documentation purposes, the abbreviation GE is used for the legal entity names, GE Medical Systems *Information Technologies*, Inc., and GE Healthcare Finland Oy.

Illustrations and names

This manual uses illustrations as examples only. Illustrations in this manual may not necessarily reflect all system settings, features, configurations, or displayed data.

Names of persons, institutions, and places and related information are fictitious; any similarity to actual persons, entities, or places is purely coincidental.

Related documents

- CARESCAPE monitor's service manual
- CARESCAPE monitor's user manual
- CARESCAPE monitor's supplemental information manual
- CARESCAPE Modular Monitors Mounting Solutions
- Monitor Software Compatibility Supplement
- Cleaning and Disinfecting Supplement
- Supplies and Accessories Supplement

Revision history

Revision	Description
1 st edition	Initial release.
2 nd edition	Updated for CARESCAPE Software version 3 (3.2.758) release.

Product availability

NOTE

Due to continual product innovation, design and specifications for these products are subject to change without notice.

Some of the products mentioned in this manual may not be available in all countries. Please consult your local representative for the availability.

Trademarks

GE, GE Monogram, and CARESCAPE are trademarks of General Electric Company.

Third party trademarks

All third party product and company names are the property of their respective owners.

Manufacturer responsibility

GE is responsible for the effects on safety, reliability, and performance of the equipment only if:

- Assembly operations, extensions, readjustments, modifications, servicing, or repairs are carried out by duly trained service personnel.
- The electrical installation of the relevant room complies with the requirements of the appropriate regulations.
- The equipment is used in accordance with the instructions for use.
- The equipment is installed, maintained and serviced in accordance with the instructions provided in the related service manuals.

WARNING

SAFETY HAZARD. To avoid risks to personnel and patient, or damage to the equipment, only perform maintenance procedures described in this manual. Unauthorized modifications can lead to safety hazards.

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Introduction

F5 and F7 Frames introduction

F5 and F7 Frames provide an interface between the monitor and acquisition modules. The F5 Frame is for standalone use. The F5 Frame has five module slots that support E-module acquisition modules. It supports the PDM with a slide mount. The F7 Frame supports seven E-modules.

WARNING

ELECTRIC SHOCK. Do not use the F7 Frame for standalone use. Ventilation holes on the F7 E-module Frame will be covered only if installed within a compatible anesthesia machine.

The technical specifications are described in the supplemental information manual.

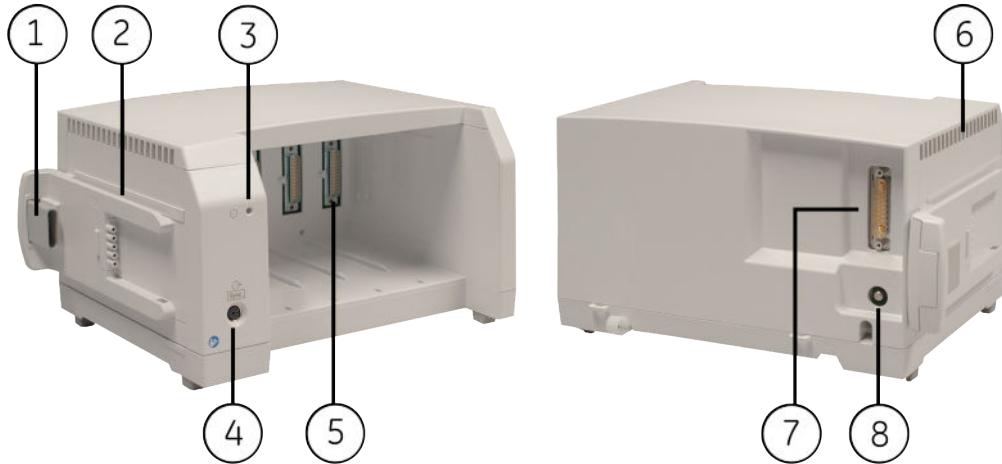


Module frame compatibility

For detailed information regarding module frames, modules, and monitor compatibility, see the supplemental information provided.

Controls and connectors

F5 Frame, 5-module frame



1. Connector for PDM module.
2. Connector for PSM module (not in use).
3. On/off LED.
4. Synchronization connector (not in use).
5. Module connector.
6. Communication LED and Link LED.
7. ePort connector for the CARESCAPE monitor connection cable.
8. Equipotential connector.

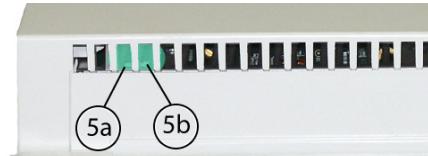
F7 Frame, 7-module frame



1. On/off LED.
2. Connector not in use.

3. Module connector.
4. Connector for PSM module (not in use).
5. ePort connector for the CARESCAPE monitor connection cable.
6. Communication LED and Link LED.
7. Equipotential connector.

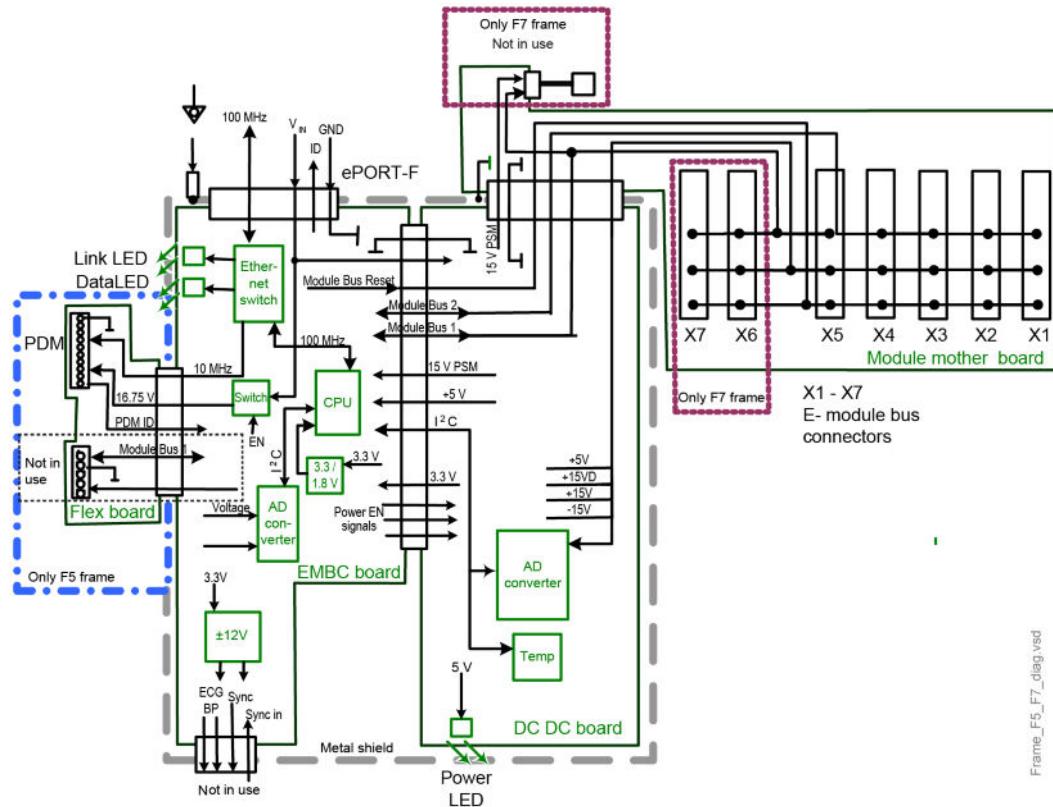
Frame indicators



Ref	Indicators	Normal status
1	On/Standy LED, green	lit
5a	Communication LED, green	lit
5b	Link LED, green	blinking

Functional description

The following illustrates the functional block diagram of the F5 and F7 Frames:



Free air convection is used for cooling the frames. Set up the frame in a location with sufficient ventilation. The ventilation openings of the device must not be obstructed (by equipment, walls, or blankets, for example).

Main components

The following are the main components of the F5 and F7 Frames:

- Ethernet module bus converter (EMBC) board
- Mother board
- Power board
- PDM flex board (F5 Frame only)

EMBC board

The EMBC board provides module bus communication for E-modules and Ethernet connection for PDM.

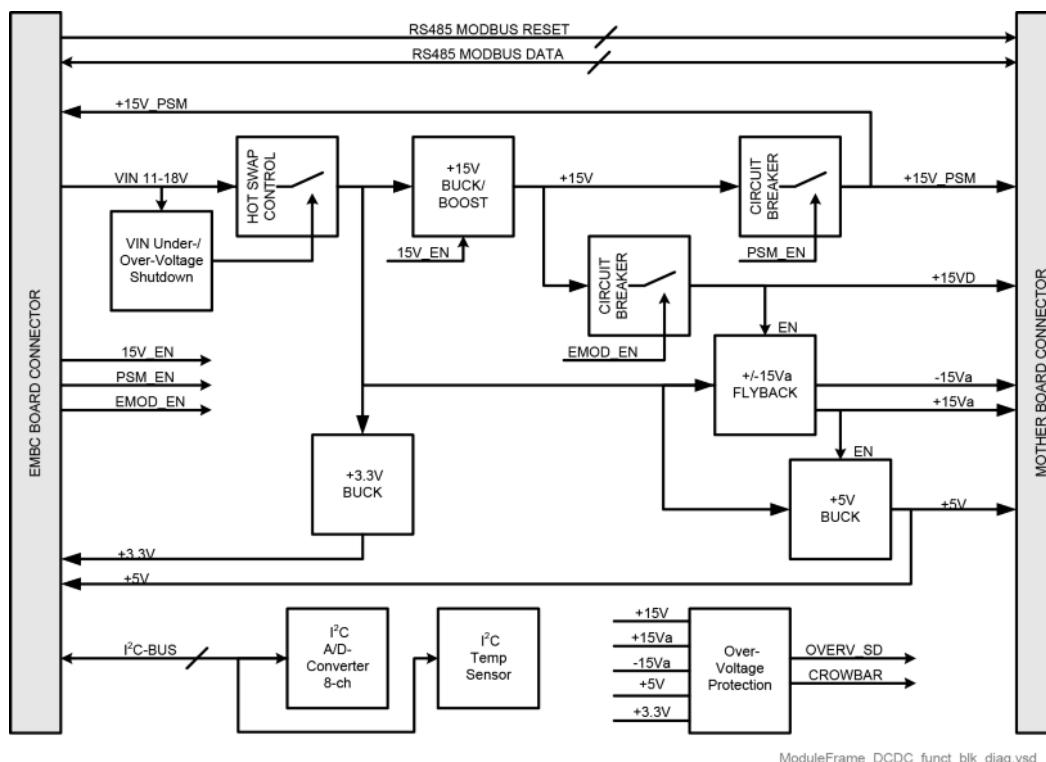
Power board

The power board:

- forms an electrical interface between the EMBC board and the mother board. The power board routes the RS-485 communication and reset lines from the EMBC to the mother board and then to the connected E-modules.
- generates supply voltages for the EMBC board and E-modules. The power board generates the supply voltages from the input voltage coming from the host through the EMBC board. A hot swap control circuit in the DCDC board limits the inrush current if the host cable is hot plugged to the EMBC board.

The power board works properly within the supply voltage range 14 V to 18 V from the CPU unit.

The following block diagram illustrates the operation principle of the power board:



ModuleFrame_DCDC_funct_blk_diag.vsd

Mother board

The Mother board provides connection between modules and the EMBC board. It has protection circuits for signals.

PDM flex board

The PDM flex board connects the PDM to the EMBC board.

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Planned and corrective maintenance

About the maintenance check procedures

This chapter describes the planned and corrective maintenance check procedures for the product. To help ensure the equipment remains in proper operational and functional order and maintains its essential performance and basic safety, follow the corrective and planned maintenance recommendations. The tests that are related to the essential performance and basic safety are marked with the *.

The cleaning precautions, cleaning requirements, cleaning procedures, and recommended cleaning solutions are described in the monitor's user manual or supplemental information provided.

For details about cleaning, disinfecting and sterilizing the accessories, see the instructions for use in the accessory package.

Record the results of the planned and the corrective maintenance check procedures to the eCheckforms delivered in the electronic manual media.

WARNING

SAFETY HAZARD. To avoid risks to personnel and patient, or damage to the equipment, only perform maintenance procedures described in this manual. Unauthorized modifications can lead to safety hazards.

Planned maintenance

WARNING

PATIENT SAFETY. Planned maintenance must be carried out at the specified interval. Failure to implement the maintenance schedule may cause equipment failure and possible health hazards.

Perform the planned maintenance procedure completely every 2 years after installation. Perform the procedure in the following order:

1. Visual inspection
2. Electrical safety tests *
3. Functional check

Corrective maintenance

Perform the following check procedure after any corrective maintenance, before taking the product back into clinical use:

Performed service activity	Required checkout procedure		
	Visual inspection	Electrical safety test	Functional check
Product casing opened either for troubleshooting purpose or for replacing any of the internal parts.	All steps	All steps	All steps
Front cover, or an other external part, replaced.	All steps	Not applicable	Not applicable

Performing visual inspection

Check that:

1. The frame and the applied parts are clean and intact.
2. The module motherboard connectors and PDM connector (F5 Frame only) are clean and intact.
3. The E-modules go in smoothly and lock up properly in all module slots.
4. The cable between the module frame and the CPU unit is connected and the block screws are tightened properly.
5. All four rubber pads are in place and the screws on the bottom are tightened properly. Turn the frame onto one of its sides to check the pads.
6. All product labeling, markings and symbols are intact and readable.

Performing electrical safety tests *

Perform the electrical safety tests described in the monitor's service manual, Checkout procedures chapter. Perform the following tests:

- Ground (Earth) integrity test

Performing functional check

Required tools for module frames functional check

- Any E-module
- PDM

NOTE

Using the PDM in the functional check is optional. Only use the PDM with the F5 Frame, if it is used in the installed monitor.

Making connections for the functional check

1. Connect the F5/F7 Frame to the monitor with an ePort to the host interface cable.
2. Connect the PDM module and the selected E-module to the F5/F7 Frame.

Testing the module communication

1. Turn on the monitor and wait until the normal screen appears.
2. Log in to the service interface.
3. Select **Information**.
4. Select each of the following: **Acquisition Information - Acquisition Module**, **Acquisition Information - E-Module**, and **Acquisition Information - E-Module Frame**. Check that the connected frame and module(s) are identified, and related software and hardware information is provided.
5. Select .

Completing the functional check

1. Select **Data&Pages > Admin/Discharge** or **Start/End case > Discharge Patient** or **Reset Case** to discard any changes made to the monitor configuration during the functional check.
2. Disconnect the test setup.

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Configuration and calibration

Configuration

There are no configurations for the F5 and F7 Frames.

Software update

The EMBC software of the F5 and F7 Frames can be updated in two ways:

- using the software installation kit and the service interface
- using InSite RSvP

To update the software from the software installation kit, connect a service laptop to the host monitor and transfer the new software to the monitor.

When the transfer is complete, activate the software through the service interface.

For more detailed information on updating the software, see the host monitor's service manual.

Calibration and adjustments

No calibration or adjustments are needed for the F5 and F7 Frames.

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Troubleshooting

Troubleshooting guidelines

This chapter focuses on troubleshooting technical problems. Refer to the user manual for troubleshooting monitoring problems and clinical configuration issues.

If a problem remains, contact technical support for service. To ensure accurate problem solving, please be prepared to provide the following information:

- Product name and serial number or UDI
- Hardware and software versions
- Detailed problem description
- Error messages, if any
- Configuration information (or settings file)
- Service Logs
- The troubleshooting you have done so far

Perform the specified corrective maintenance check after any corrective maintenance to the product.

Performing visual inspection

Before beginning any detailed troubleshooting, complete a thorough visual inspection:

1. Check that the cover and the module rails are intact.
2. Check that all connectors are intact and clean.
3. Check that all cables are intact and attached properly.
4. Check that the connected modules are properly attached and locked to the frame.

If you suspect that there are any loose parts or cable connections inside the module frame, detach the frame cover by removing 2 screws (T20) from the bottom and 1 screw from the back of the module frame and check that:

- a. You have tightened the screws properly.
- b. You have connected the cables properly.

Troubleshooting frame functionality

Follow these instructions to identify the unit causing the functional problem.

Before you begin, ensure that the monitor is turned on, and all the modules are connected.

1. Check if there are any error messages shown in the message field.

For a list of possible causes and solutions, see the Messages section.

2. Check the compatibility of each system component.
For a list of the compatible monitors, frames, modules, and accessories, see the supplemental information provided.
3. Check that there are no duplicate modules connected to the monitor.
For a list of identical modules, see the host monitor's manuals.
4. Try each slot in the module frame. Connect a compatible acquisition module to each module slot. Check from the service interface that the module is identified after it is connected. Repeat until all module slots are checked.
5. Visually check the accessories in use. Replace them, if necessary.
For a list of compatible accessories, see the supplemental information provided.

LED indicators

For more information on the location of the LED indicators, see the Controls and connectors section.

LED	Status	Cause
On/Standby LED	On	DC/DC board functioning (+15 V and +5 V exist)
	Off	Monitor switched off Faulty DC/DC board (if monitor on) Disconnected cable
Communication LED (Ethernet Activity LED) green	Blinking	EMBC (Frame) and host or PDM module and host are communicating.
	Off	EMBC (Frame) faulty and not communicating with host. PDM module faulty and not communicating with host.
Ethernet Link LED, green	On	Connection between EMBC (Frame) and host is OK.
	Blinking	EMBC software update in progress.
	Off	Connection between EMBC (Frame) and host fails because of: <ul style="list-style-type: none">• faulty cable• broken connector in frame or in host• faulty EMBC board.

Viewing device information

To view the hardware, software and configuration information of the monitor, modules and/or connected devices:

1. Log in to the service interface.
2. Select **Information**.
3. Select an item on the side navigation menu or scroll down the page to view the information.

The following sections are displayed if the corresponding devices are connected:

- **Acquisition Information - E-Module Frame:** serial number, EMBC serial number, EMBC software number, EMBC software version, EMBC IP address

Service log files

The monitor collects information about different system events, errors and alarms to log files to help troubleshoot equipment problems. The following service logs may contain related useful information:

- **System Logs** records different system events, messages, clinical alarms, user interactions and internal communication events.
- **EMBC Logs** records module communication events and errors for E-series acquisition modules.

Viewing log files

1. Log in to the service interface.
2. Select **Diagnostics > View Logs**.
3. Select the log you want to view. The contents of the selected log file are shown on the screen.

Downloading log files

For security reasons, the contents of the log file(s) will be encrypted with a user-selectable password before the download. Provide the password in a secure way only for the authorized receiver of the log file. Use 7-Zip open-source file archiver (<http://7-zip.org/>) and the password to decrypt the downloaded log file.

1. Log in to the service interface.
2. Select **Diagnostics > Download Logs**.
3. Select the log(s) you want to download.
4. Provide a password to encrypt the contents of the log file. This password is user-selectable.
5. Depending on your access to the service interface:
 - a. If you are using a service PC, you can save the log file to any storage device connected to the service PC.
 - i. Select **Download**.
 - ii. Save the log file according to the instructions provided by the web browser.

The steps to download the log file to a service PC depend on the web browser used. The web browser may also notify you about security issues. Refer to the web browser documentation for details.

- b. If you are using the local, integrated service interface, you can save the log file to a USB flash drive that is connected to one of the monitor's USB ports:
 - i. Select **Save to USB storage** to save the log file to the USB flash drive.

The log file is saved always to the root directory of the USB flash drive.

NOTE

Do not disconnect the USB flash drive until downloading is complete.

6. Send the log file and the password in a secure way to GE Service for further investigation.

Messages

Message	Location	Possible causes	Suggested actions
• Identical frame detected	• al. area	Two or more identical module frames have been connected to the monitoring system. It is not possible to use more than one F5 or F7 Frame simultaneously in the same monitoring system. F5 and F7 are considered identical module frames.	• Remove the duplicate frame.
• No license for F5/F7 frame	• al. area	The Frame support F5/F7 license is not enabled in your current configuration.	• Contact your GE representative to purchase the license, if needed.
• XXXX measurement(s) removed where XXXX = module	• al. area	The module is not connected properly.	• See section Troubleshooting F5 and F7 Frames.
		The module connector of the frame is defective.	
		The frame is not properly connected to the host.	
		The EMBC board connectors (inside the frame) are loose.	
		The EMBC board is defective.	
		The DC/DC board is defective.	

Troubleshooting F5 and F7 Frames

Problem	Possible causes	Possible solutions
The acquisition module data is not shown on the monitor display.	The acquisition module is not compatible.	Check the compatibility of the module.
	The acquisition module is defective.	See the corresponding module's troubleshooting.
	The module is not connected properly.	Insert the module properly to its rails.
	The monitor is not configured to display the parameter.	Configure the related waveform field and/or parameter window to the monitor screen with adequate priority.
	The cable connecting frame to host is not properly connected or is defective.	Check the cable connections, or replace the cable.
	Some of the frame or EMBC internal connectors are defective or connections loose.	Replace the EMBC module (FRU), or check the connections.
	The module connector is defective.	Replace the module mother board (part of FRU kit).
	The EMBC board is defective.	Replace the EMBC module (FRU).
	The DC/DC board is defective.	Replace the EMBC module (FRU).

Problem	Possible causes	Possible solutions
PDM module works correctly, but E-modules' data is not seen.	The module connector is defective.	Replace the module mother board (part of FRU kit).
The module cannot be placed properly to frame.	The PDM rail or connector is defective.	Replace the PDM dock (FRU).
	The E-module rail or module connector (inside the frame) is defective.	Send the frame or the module to repair.

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Disassembly and reassembly

Disassembly guidelines

Field repair of the device is limited to replacing field replaceable units (FRUs).

NOTE

Only qualified service personnel should perform field replacement procedures.

NOTE

Perform the specified corrective maintenance check after any corrective maintenance to the product.

ESD precautions

All external connectors of the device are designed with protection from ESD damage. However, if the device requires service, exposed components and assemblies inside are susceptible to ESD damage. This includes human hands, non-ESD protected work stations or improperly grounded test equipment. The following guidelines may not guarantee a 100% static-free workstation, but can greatly reduce the potential for failure of any electronic assemblies being serviced:

- Discharge any static charge you may have built up before handling semiconductors or assemblies containing semiconductors.
- Wear a grounded, antistatic wristband or heel strap at all times while handling or repairing assemblies containing semiconductors.
- Use properly grounded test equipment.
- Use a static-free work surface while handling or working on assemblies containing semiconductors.
- Do not remove semiconductors or assemblies containing semiconductors from antistatic containers until absolutely necessary.
- Do not slide semiconductors or electrical/electronic assemblies across any surface.
- Do not touch semiconductor leads unless absolutely necessary.
- Store the semiconductors and electronic assemblies only in antistatic bags or boxes.
- Handle all PCB assemblies by their edges.
- Do not flex or twist a circuit board.

Before disassembly

WARNING

Perform ground integrity measurement whenever service or repair has been done on the device.

- Note the positions of any wires or cables. Mark them if necessary to ensure that they are re-assembled correctly.
- Save and set aside all hardware for reassembly.

Required tools

- Pincers
- Screwdriver, TORX; T10, T20
- Antistatic ESD wristband
- Pozidriv screwdriver
- Thin, long screwdriver, TORX: T10 (for the F5 Frame only)
- Adjustable wrench (for the F5 Frame only)

Disassembly procedures

Disassemble the frame in the order described in this section.

For reference, see the exploded view in Service parts chapter.

Disassembling and reassembling the F7 Frame

Removing the modules and cables

1. Detach the retaining clip with a Pozidriv screwdriver.
2. Remove all modules and cables from the module frame.

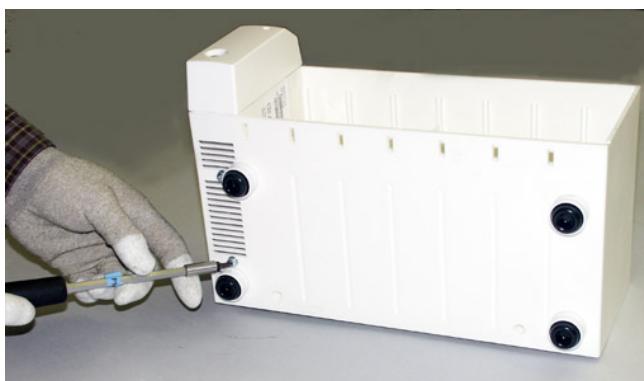


Detaching the EMBC unit

1. Remove one screw (T10) from the back panel.



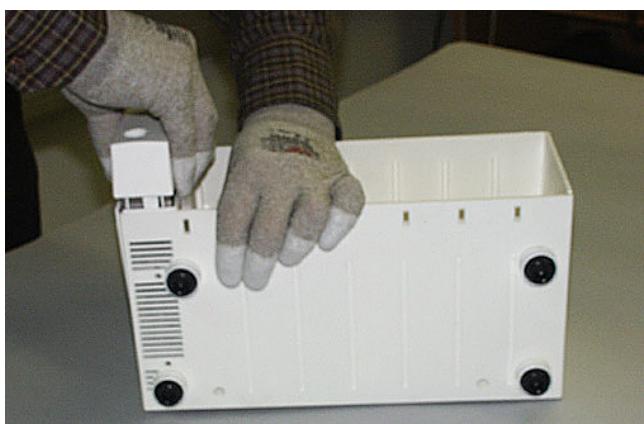
2. Remove the two Pozidriv screws at the bottom of the F7 Frame.



3. Draw carefully the EMBC unit from the frame.

NOTE

When reassembling, ensure that the connector is properly attached.



Detaching the module board

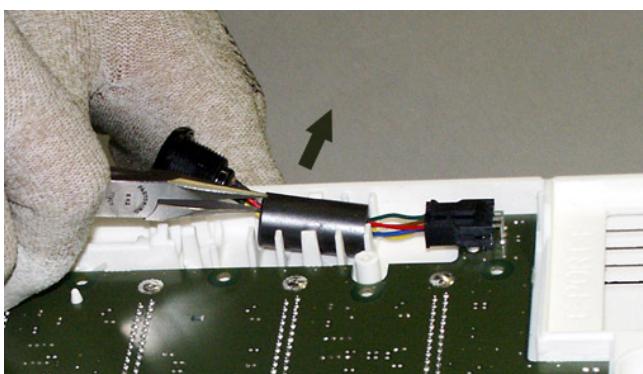
1. Remove four screws (T10) to detach the back plate.



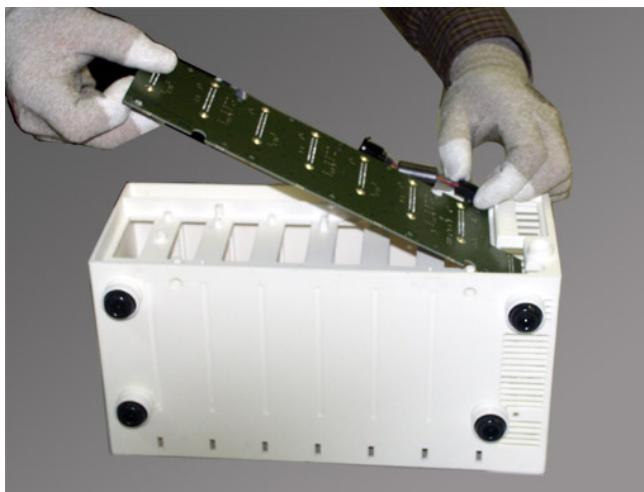
2. Remove the 12 screws (T10) from the module board.



3. Carefully detach the cable connector and the ferrite from the brackets.

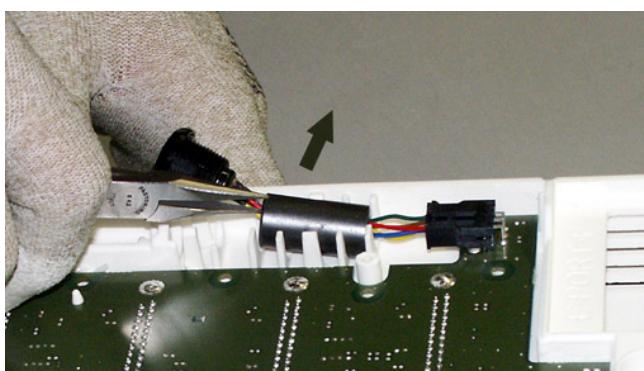


4. Carefully lift the module board from the frame cover.



Detaching the PSM cable

1. Remove five screws (T10) from the back plate.
2. Detach the back plate.
3. Carefully detach the cable connector and the ferrite from the brackets.



4. Detach the connector from the mother board.

Reassembling the F7 Frame

1. Reassemble in reverse order. Make sure the following:
 - Tighten all the screws properly.
 - Connect all the cables properly.
 - EMBC unit is attached properly.
 - There are no loose objects inside the frame.
 - The ferrite of the PSM cable is attached properly.

When reinstalling, make sure the cable connecting the frame to the host is properly connected and secured.

Disassembling and reassembling the F5 Frame

Removing the modules and cables

1. Detach the retaining clip with a Pozidriv screwdriver.
2. Remove all modules and cables from the module frame.



Detaching the EMBC unit

1. Unscrew the two screws (T20) from the bottom and one T10 screw from the back.

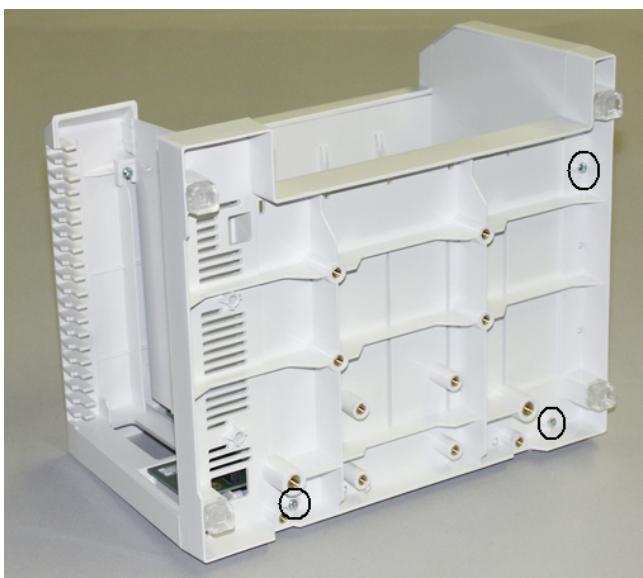


2. Pull out the EMBC unit.

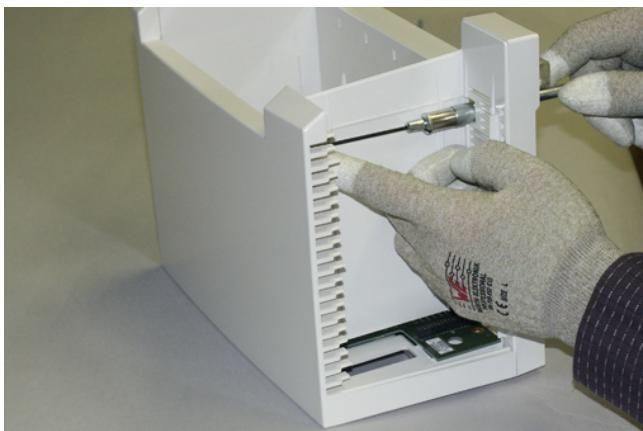


Detaching the cover and the module mother board

1. Unscrew the three T10 screws from the bottom.



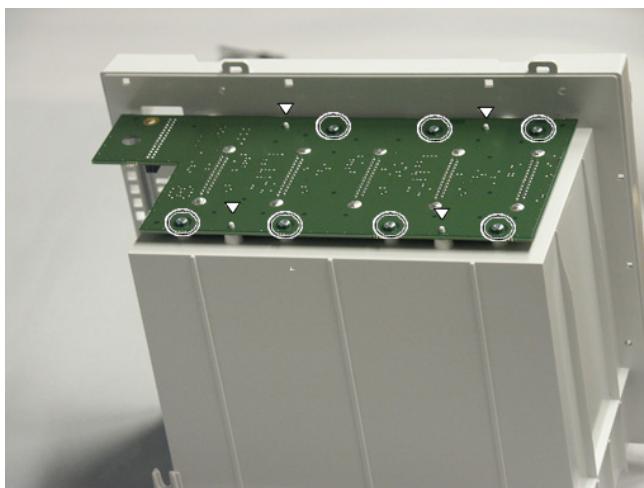
2. Unscrew one T10 screw from the EMBC slot (under the cover).



3. Lift off the cover.



4. Unscrew the seven T10 screws from the module mother board.



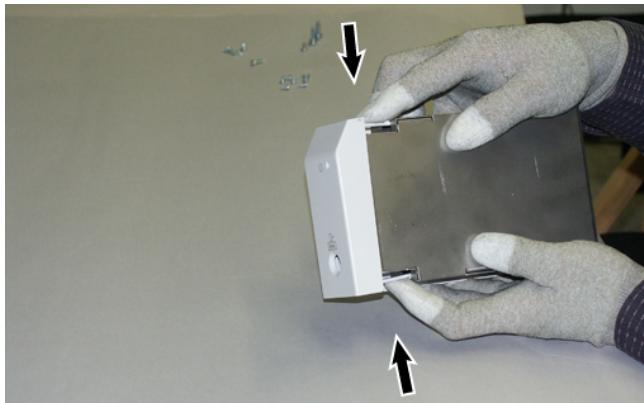
5. Lift off the module mother board.

NOTE

There are four guides to help you in reassembly.

Detaching the EMBC unit front cover

1. Press the top and bottom latches.



2. Lift the two latches attached to the PDM dock.

3. Pull out the cover.

NOTE

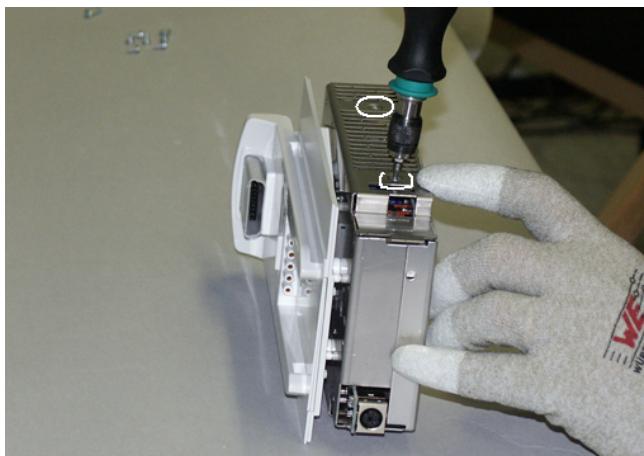
The light guide is loose and comes off easily. Be careful not to drop it.

NOTE

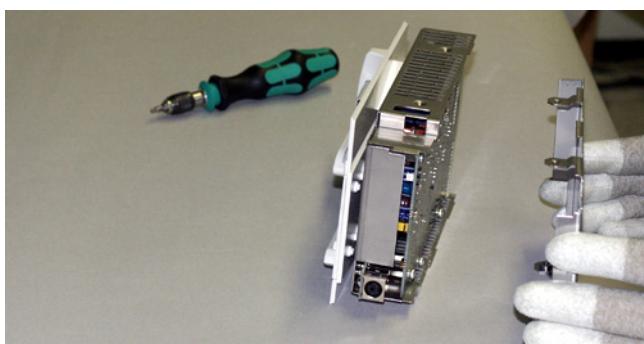
When reassembling, ensure that the latches lock properly.

Detaching the PDM dock

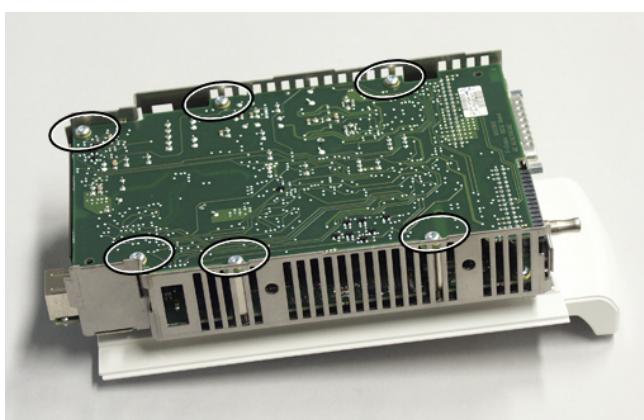
1. Unscrew the two T10 screws from the top.



2. Remove the cover.



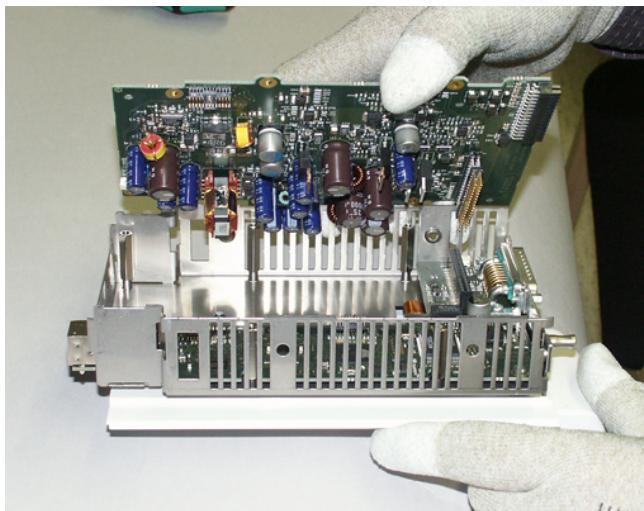
3. Unscrew the six T10 screws from the power board.



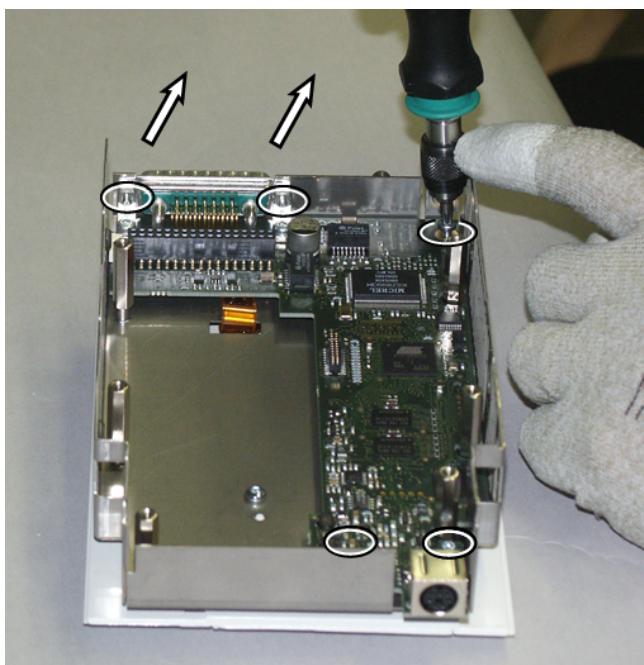
4. Lift off the board.

NOTE

When reassembling, be careful with the EMBC power board. Make sure that the EMBC power board-EMBC board connector is properly aligned and not damaged.



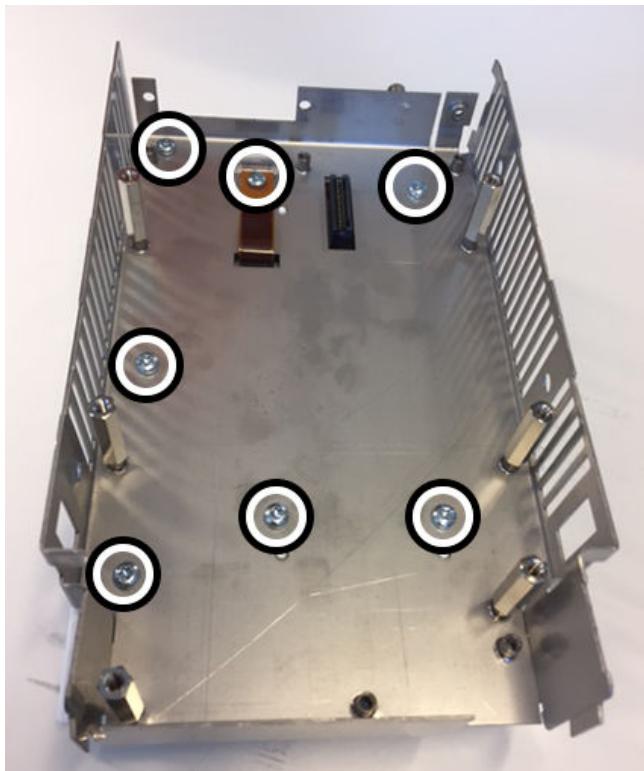
5. Unscrew the three T10 screws from the EMBC board.
6. Unscrew the two hexagon spacers from both sides of the connector at the end of the unit.
7. Unscrew the two T10 screws from the connector holders.



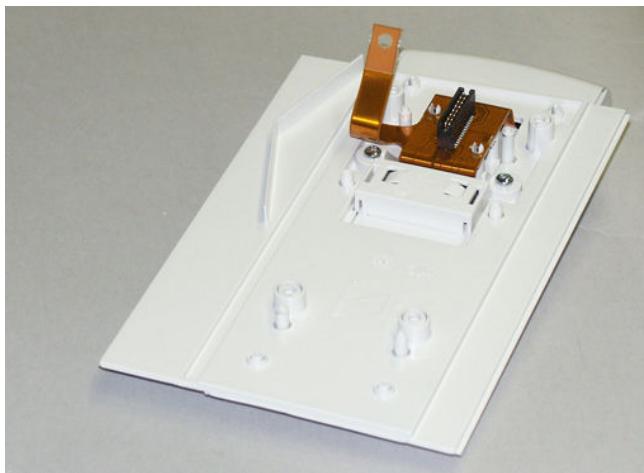
8. Lift off the board.
9. Remove the T10 ground screw and unscrew the six T10 screws.

NOTE

There are four guides to help you in reassembly.



10. Lift off the metal cover to expose the PDM dock.



Reassembling the F5 Frame

1. Reassemble in reverse order. Make sure the following:
 - Tighten all the screws properly.
 - Connect all the cables properly.
 - EMBC unit is attached properly.
 - There are no loose objects inside the frame.

When reinstalling, make sure the cable connecting the frame to the host is properly connected and secured.

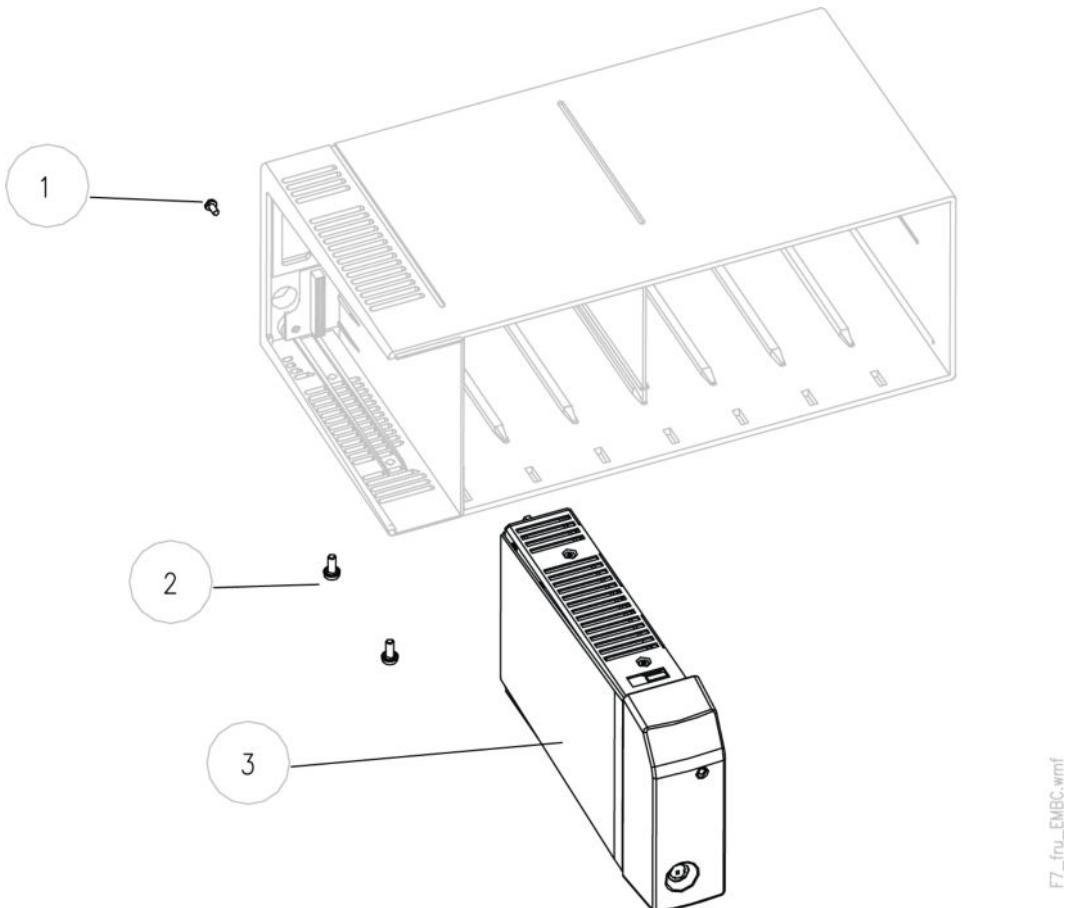
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Service parts

Ordering parts

To order parts, contact your local GE representative. Contact information is available at www.gehealthcare.com. Make sure you have all necessary information at hand.

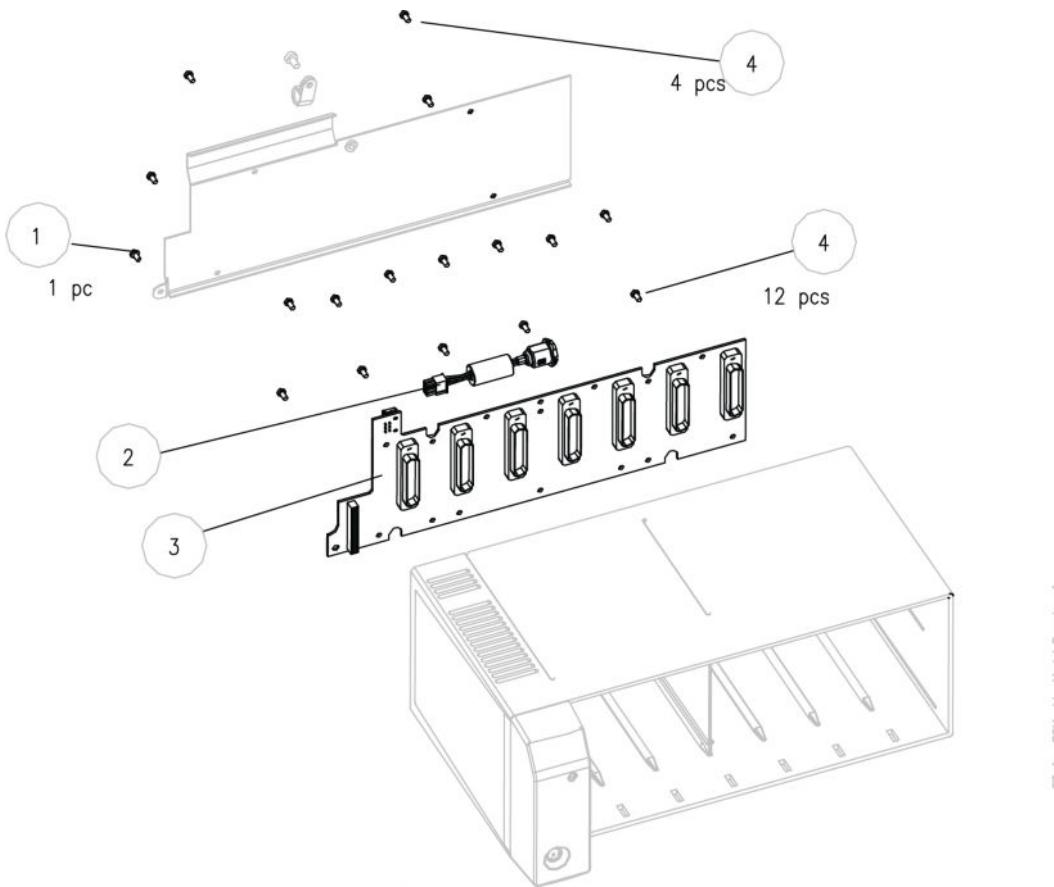
FRU, Ethernet module bus converter unit, F7 Frame



F7_fru_EMBC.wmf

Part Number	Description
2085009-001	FRU, Ethernet Module Bus Converter Unit, F7 Frame <ul style="list-style-type: none">SCREW, M3x6mm, pan head, steel, STZN, TORX/T10 (#1)SCREW, M4x10mm, Pozidrive, pan head, steel, zinc coated, captive serrated lock washer (#2)Ethernet Module Bus Converter Unit, F7 Frame (#3)

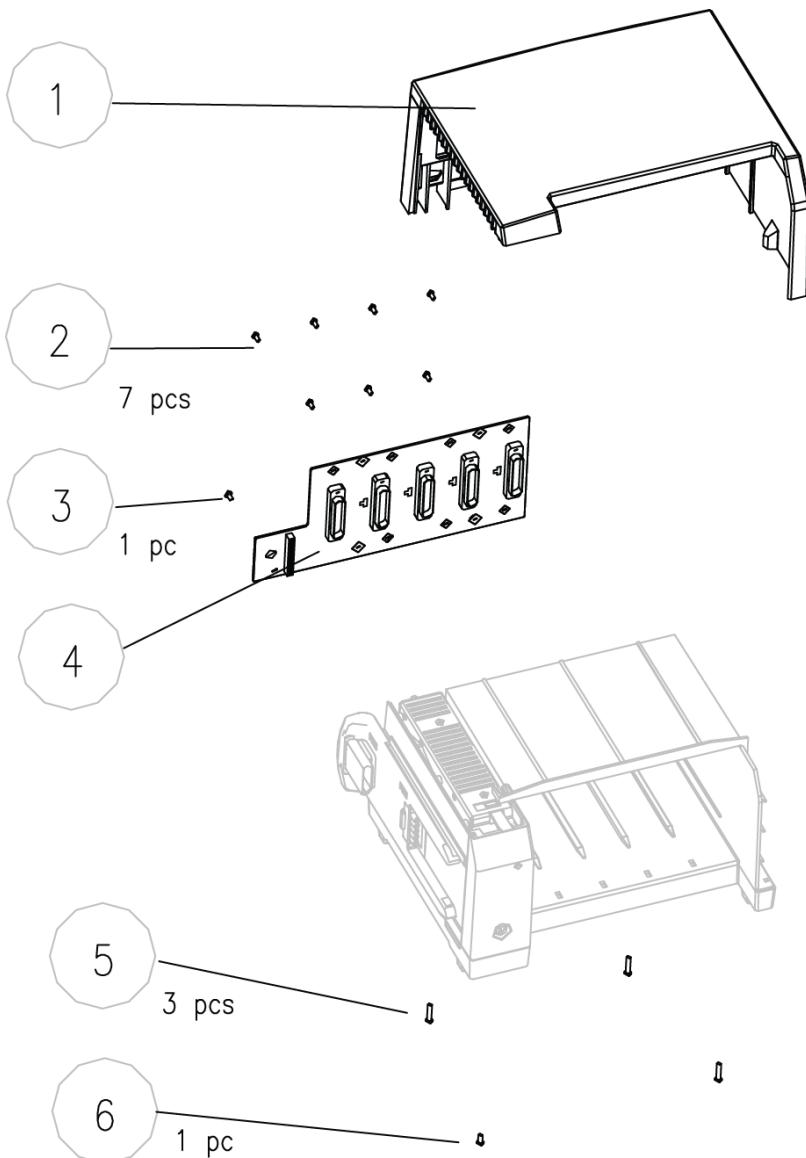
FRU, PSM cable and module Mother board kit, F7 Frame



F7_fru_PSMcable_ModuleBoard.wmf

Part number	Description
M1151855	FRU, PSM Cable and Module Board Kit, F7 Frame <ul style="list-style-type: none">• SCREW, M3x6mm, pan head, steel, STZN, TORX/T10 (#1)• PSM cable (#2)• Module mother board (#3)• SCREW-PT, PAN-HEAD, TORX/T10, 3.0x6mm, ST-ZN (#4)

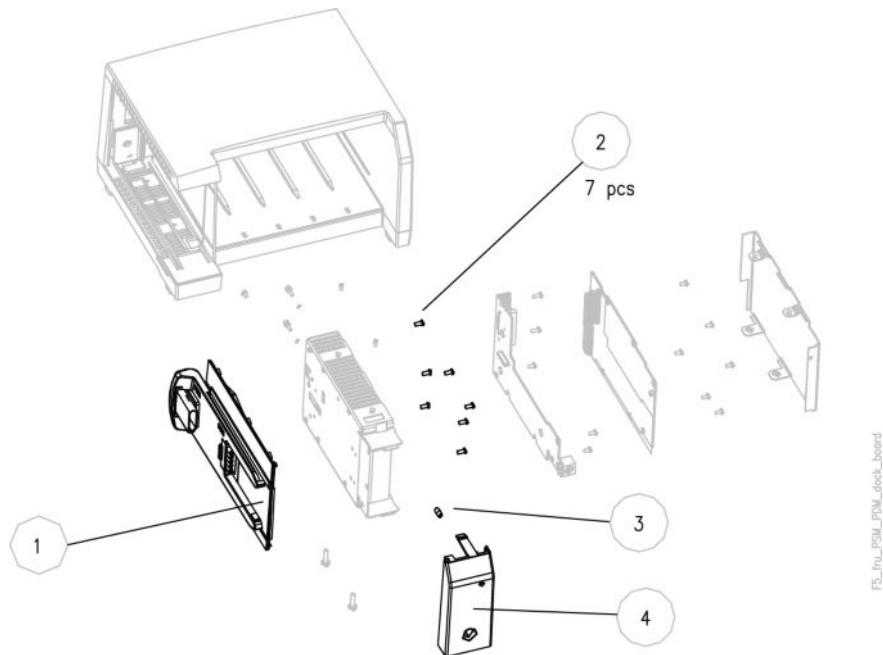
FRU, Frame cover and module Mother board kit, F5 Frame



F5_frame_cover_module_board

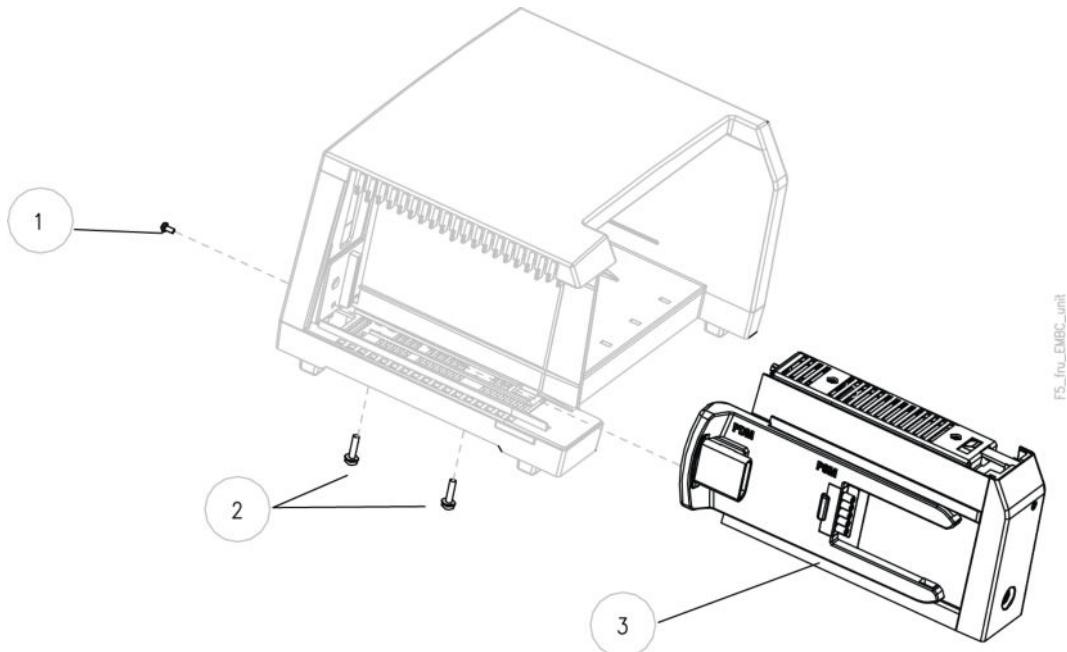
Part number	Description
M1151852	<p>Frame cover and module Mother board kit, F5 Frame</p> <ul style="list-style-type: none"> • Frame Cover, F5 Frame (# 1) • SCREW-PT, PAN-HEAD, TORX/T10, 3.0x6mm, ST-ZN (#2) • SCREW,M3x6mm, pan head, steel, STZN, TORX/T10 (#3) • F5 Frame Mother board (#4) • SCREW, PT3.5x16mm, pan head, steel, STZN, HEAD(ID=5.8mm), TORX/T10 (#5) • SCREW, PT3.5x7.5mm, pan head, steel, STZN, HEAD(ID=5.8mm, TORX/T10 (#6)

FRU, PDM dock, F5 Frame



Part number	Description
2085013-001	FRU, PDM Dock, F5 Frame (#1) <ul style="list-style-type: none"> SCREW, PT3.5x7.5mm, pan head, steel, STZN, TORX/T10 (#2) Light Guide, F5 Frame (#3) Module Front Panel, F5 Frame (#4)

FRU, Ethernet module bus converter unit, F5 Frame



Part number	Description
2085010-001	FRU, Ethernet module bus converter unit, F5 Frame <ul style="list-style-type: none">• SCREW, M3x6mm, pan head, steel, STZN, TORX/T10 (#1)• SCREW, M4x16mm, pan head, steel, zinc coated, TORX/T20 (#2)• Ethernet Module Bus Converter Unit, F5 Frame (#3)

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