Datex-Ohmeda

S/5™ Extension Frame, F-EXT4 (Rev. 03)
S/5™ Extension Module, M-EXT (Rev. 02)

Technical Reference Manual

All specifications are subject to change without notice.

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Extension Frame, F-EXT4 and Extension Module, M-EXT

INTRODUCTION

The Extension Frame, F-EXT4 is designed for use with S/5 monitors and provides four additional module slots, and enables taking the measuring modules near to the patient. The extension frame, F-EXT4 is connected to the monitor with the extension module, M-EXT, which reserves one module slot.

NOTES:

- Only one F-EXT4 can be connected to the monitor at a time.
- The following modules cannot be used in the F-EXT4
  - Recorder Module, M-REC
  - Memory Module, M-MEM
  - Interface Module, M-INT
  - Compact Airway Modules, M-Cxxxxx
- Do not use identical modules simultaneously in the extension frame and in the host monitor.
- When the extension frame is used with the S/5 Anaesthesia Monitor the F-CU8 must be of rev. 03 or later.

1 SPECIFICATIONS

1.1 General specifications

Frame size, (W × D × H) (w/ module)	160 × 205 × 137 mm 160 × 228 × 137 mm
Frame weight	1.3 kg
Power consumption	35 W (max at input voltage of +32 V) with ESTP and NIBP modules inserted and NIBP pump working.
Module size, (W × D × H)	37 × 180 × 112 mm / 1.5 × 7.1 × 4.4 in

2 FUNCTIONAL DESCRIPTION

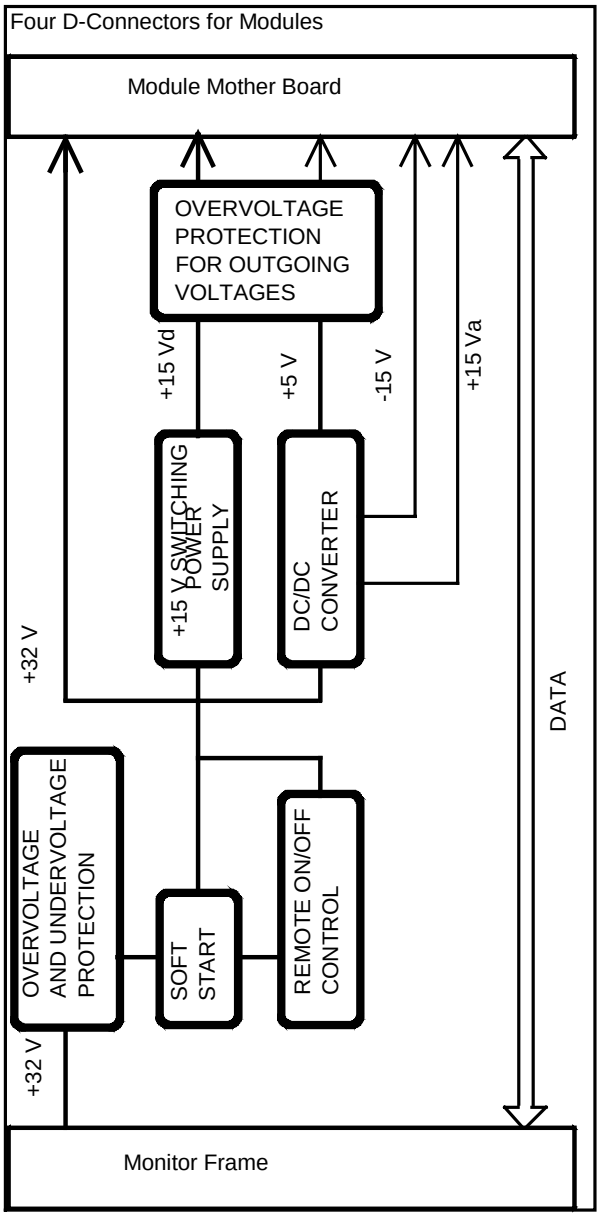


Figure 1 F-EXT electronics unit block diagram

The Extension Frame, F-EXT4, contains the module mother board, power supply board, and space for four single-width or two double-width modules.

The electronic unit receives +32 V from the monitor frame and generates from it necessary operational voltages for the inserted modules. The received +32 V is passed through fuse (F1) and filtered and led to power supply components.

There is overvoltage and undervoltage protection for input voltage, the input voltage is set so that it can vary between +18.5 V and +36.0 V.

The purpose of the soft start is to raise input voltage +32 V slowly (about 1 second) to the maximum value so that capacitors in power supply components' circuits have time to get charged. This enables extension frame to be connected to monitor frame during operation.

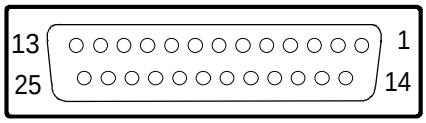
There is also overvoltage protection for outgoing supply voltages. The overvoltage limits are +5.95 V (+5 V) and +17.50 V (+15 Vd).

Signal Routes

There are two connectors which are used for data communications (RS485), for supply voltages (+32 V, +15 Vd, +15 Va, and +5 V), for grounds connections (GNDD, GND&SHIELD) between the power supply board and module mother board.

2.1 Connectors and signals

2.1.1 Module bus connector



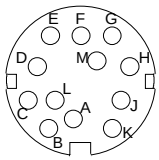
Module bus connector (X1)

Pin No	I/O	Signal
1	I	RESET_RS485*
2	I	-15 VDC*
3	I	+15 VDIRTY*
4	I	+15 VDC*
5	I/O	-DATA_RS485*
6	I/O	DATA_RS485*
7		Ground & Shield*
8	I	-RESET_RS485*
9	I	CTSB
10	O	RTSB
11	I	RXDB
12	O	TXDB
13		Ground & Shield*
14	I	+32 VDIRTY*
15	I	GroundDIRTY*
16	I	CTSC
17	O	RTSC
18	I	RXDC
19	O	TXDC
20		ON/STANDBY*
21		BITOIN*
22		RXDD_RS232
23		TXDD_RS232
24	I	+5 VDC*
25	I	+5 VDC*

* Used in the Extension Frame and in the Extension Module

2.1.2 Other connectors

Extension Frame Rear panel connector (X1)



Pin No	I / O	Signal
A	I	RESET_RS485
B	I/O	-DATA_RS485
C	I/O	DATA_RS485
D	I	-RESET_RS485
E	O	Direct ECG
F	-	N/C
G	I	+32 VDC
H	I	Gnd and Shield (for data transmission)
J	-	N/C
K	-	N/C
L	I	+32 VDC
M	I	GndD (dirty) for power supply

3 SERVICE PROCEDURES

Field service of the Extension Frame, F-EXT4, is limited to replacing faulty circuit boards or mechanical parts. The circuit boards should be returned to Datex-Ohmeda for repair.

Datex-Ohmeda is always available for service advice. Please provide the unit serial number, full type designation, and a detailed description of the fault.

CAUTION Only trained personnel with the appropriate tools and equipment should perform the tests and repairs outlined in this section. Unauthorized service may void warranty of the unit.

3.1 Service check

These instructions include complete procedures for a service check. The service check is recommended to be performed after any service repair. However, the service check procedures can also be used for determining possible failures.

The procedures should be performed in ascending order.

The instructions include a check form (*Appendix A*) which should be filled in when performing the procedures.

The mark ✍ in the instructions means that the check form should be signed after performing the procedure.

The procedures are designed for monitors with S/5 monitor software of revision 01. However, most of the procedures also apply to monitors, which contain some other monitor software type/revision.

3.1.1 Recommended tools

Tool	Order No.	Notes
M-ESTPR/M-ESTP		
M-NIBP		
Adult NIBP cuff & hose		
Gas interface cable	884299	
Multimeter		
Screwdriver		

General

- Disconnect the Extension Module, M-EXT from the host monitor, if connected.
- Disconnect the extension module cable from the Extension Frame, F-EXT4 rear panel.

Extension Module, M-EXT

- Detach the module box by removing the two screws from the back of the module. Be careful with loose latch and spring pin for locking.

1. Check internal parts:
   - all screws are tightened properly
   - there are no loose objects inside the module

✍

2. Check external parts:
   - the front cover and the front panel sticker are intact
   - the module bus connector is intact
   - the module box, the latch and the spring pin are intact
   - the extension module cable and its connector are intact
   - the screw on the cable connector is tightened properly

- Reattach the module box and check that the latch is moving properly.

Extension Frame

3. Check that the plastic frame is intact.

4. Check that the extension frame mount is tightened properly to the plastic frame.

5. Check that the big fastening screw at the back of the mount is intact.

6. Check that all four rubber pads are in place at the bottom.

7. If the extension frame contains a fan (Rev. 02->), clean or replace the fan filter.

8. Check that the cable connector on the rear panel is clean and intact.

9. Check that the module motherboard connectors are clean and intact. Check also that the screws that connect the module motherboard to the frame are tightened properly.

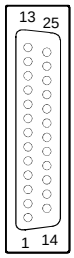
10. Check that the M-NIBP fits in smoothly and locks up properly in the slots in the extension frame.

    Leave the module disconnected.

General

11. Measure resistance from the following module motherboard (F-EXT4) connector pins against the ground:

Pin 1	+Reset RS485
Pin 5	-Data RS485
Pin 6	+Data RS485
Pin 8	-Reset RS485
Pin 13	Ground



Module motherboard connector

Check that the resistance on each of the pins is higher than 10 kΩ. If not, exchange the module motherboard.

12. Connect and lock the extension module cable to the extension frame rear panel connector.

Make sure that the monitor used in checking is switched to STBY, then install the extension module into the monitor. Check that the module goes in smoothly and locks up properly.

13. Connect the gas interface cable (the grounding plates of the cable should be removed) to one of the extension frame module bus connectors.

Switch the monitor on and measure the module bus voltages from the loose gas interface cable connector (see the pin order from the previous figure). The output voltages should meet the following ranges:

Pin 2	-15V	-14.50...-15.50V
Pin 3	+15VD	14.50...15.50V
Pin 4	+15V	14.50...15.50V
Pin 14	+32V	31.0...33.0V
Pin 24	+5V	4.80...5.30V
Pin 25	+5V	4.80...5.30V

If any of the voltages is not within the given tolerance, exchange the extension frame Power supply board.
Disconnect the gas interface cable carefully.

14. If the extension frame contains a fan, check that the fan is running.

15. Install the ESTPR/ESTP and NIBP modules into the extension frame. Make sure that similar modules are not installed into the monitor already. Check that the modules are recognized, i.e. the needed parameter information is shown on the monitor screen.

    NOTE: If nothing happens, make sure the screen configuration is appropriate.

    Swap the modules in the extension frame and check that the modules are still recognized.

16. Detach the extension module, M-EXT from the monitor, then install it again. Check that the modules in the extension frame are still recognized.

17. Disconnect the monitor's power cord shortly during the monitor is on. Check that the monitor recovers and the modules in the extension frame are still recognized.

    NOTE: The monitor may give an audible alarm during the power loss.

18. Connect an adult NIBP cuff to the NIBP module and place the cuff onto your arm. Perform one NIBP measurement and check that the monitor gives a reasonable NIBP reading.

19. Perform electrical safety check and leakage current test.

20. Check that the extension frame functions normally after the performed electrical safety check.

21. Clean the extension frame and module with suitable detergent.

    Fill in all necessary documents.

3.2 Disassembly and reassembly

Disassemble the Extension Frame, F-EXT4 in the following way. See the exploded view of the frame.

1. Remove the four screws from the front of the frame. PC board's block is detached.
2. Remove the four screws from module mother board with which it is attached to the rear frame.
3. Lift carefully module mother board and power supply board attached to it and detach the two connectors under the power supply board.

3.2.1 Changing the fuse

Disassemble the F-EXT4 as described above. The fuse is located on the power supply board. Replace the fuse by the one with the same type and rating.

4 TROUBLESHOOTING

4.1 Troubleshooting chart

Trouble	Cause	Treatment
F-EXT4 does not work.	Connector not connected properly. Cable /Extension module is faulty.	Check connectors. Check cable/module.
F-EXT4 does not work.	Incoming voltage too high or too low.	Check the Central Unit output voltages. Replace the F-EXT4 power supply board, if necessary.
F-EXT4 does not work.	PC board(s) faulty.	Check the fuse on the Power supply board Check the PC boards and their connections. Change Power supply board.
Fuse on power supply board is blown repeatedly.	Short-circuit in output voltages.	Change the fuse. Remove modules and turn power on. If works, some module is faulty. If not, check the PCBs. Change power supply board.

5 SERVICE MENU

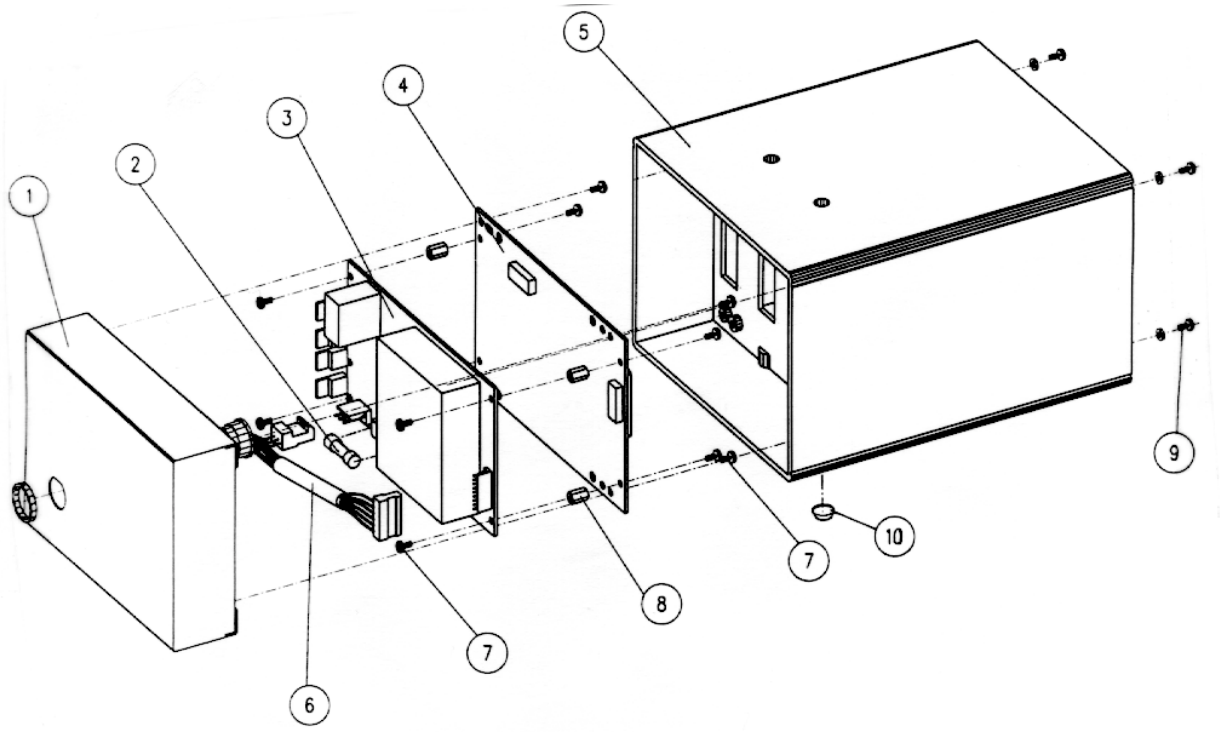
There is no service menu for the extension frame.

6 SPARE PARTS

6.1 Spare parts list

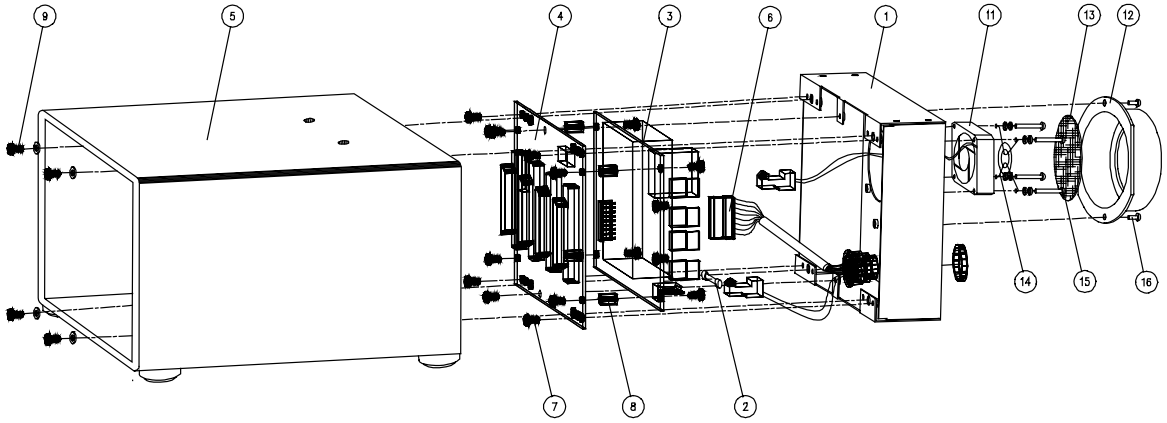
NOTE: Only changed part numbers are listed under later revisions. To find the desired part: check first the list of the revision that corresponds your device. If the part is not listed there, check the previous revision, etc. until you find the right number.

6.1.1 Extension Frame, F-EXT4 Rev. 01



Item	Item description	Order No.
1	Rear frame	881234
2	Fuse T2.5A fast	*51118
3	Power supply board, F-EXT4 (Rev. 01)	*884840
4	Module mother board, F-EXT4 (Rev. 01-02)	884839
5	Frame with rubber pads	(881233) Use 893113
6	Internal connector cable	884838
7	Cross cylinder-head screw M3x6	61721
8	Nut bushing M3x9	640455
9	Cross cylinder-head screw M3x12	61736
10	Pad	65144

6.1.2 Extension Frame, F-EXT4 Rev. 02

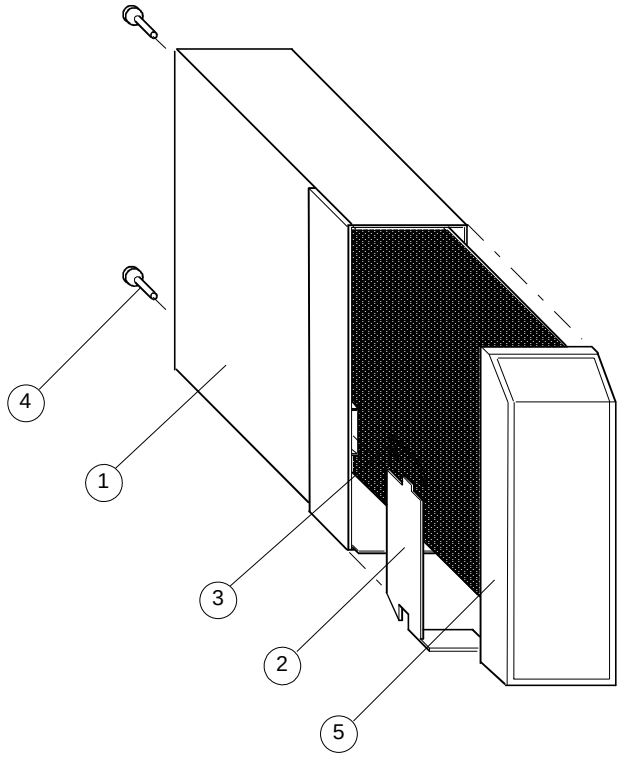


Item	Item description	Order No.
1	Rear frame	892379
3	Power supply board, F-EXT4 (Rev. 02)	*892378
5	Frame with rubber pads	893113
11	Fan, F-EXT4	893141
12	Fan cover	892680
13	Fan filter	*874594
14	Protection mesh	58201
15	Cross cylinder-head screw M3x18	61739
16	Slotted recess screw M3x6	61223

6.1.3 Extension Frame, F-EXT4 Rev. 03

Item	Item description	Order No.
1	Power covering	898316
5	Frame Housing	898317
16	Slotted recess screw M3x6	61620

6.1.4 Extension Module, M-EXT Rev. 01, M-EXT Rev. 02



Item	Item description	Order No.
1	Module box (single width)	886167
2	Latch	879181
3	Spring Pin	879182
4	Cross recess screw M3x8 black	616215
5	Front panel frame	882080

* this part is recommended for stock

6.1.5 Stickers

Front panel sticker for M-EXT

Adaptation	M-EXT (Rev. 01) Order No.	M-EXT (Rev. 02) Order No.
-00-	882085	8000212

7 EARLIER REVISIONS

F-EXT4 Rev. 01 see also service manual p/n 889535.

M-EXT Rev. 00 see also service manual p/n 889535.

APPENDIX A

SERVICE CHECK FORM

Extension Frame, F-EXT4

Customer					
Service		Type		S/N	
Service engineer				Date	

☐ OK = Test OK ☐ N.A. = Test not applicable ☐ Fail = Test Failed

Extension Module

	OK	N.A.	Fail		OK	N.A.	Fail
1. Internal parts	☐	☐	☐	2. External parts	☐	☐	☐

Notes

Extension Frame

3. Plastic frame	☐	☐	☐	4. Mounting plate	☐	☐	☐
5. Fastening screw	☐	☐	☐	6. Pads	☐	☐	☐
7. Fan filter	☐	☐	☐	8. Cable connector	☐	☐	☐
9. Module motherboard connectors	☐	☐	☐	10. Module motherboard position	☐	☐	☐

Notes

General

11. Communication lines

+Reset RS485 (pin 1)		> 10 kΩ
-Data RS485 (pin 5)		> 10 kΩ
+Data RS485 (pin 6)		> 10 kΩ
-Reset RS485 (pin 8)		> 10 kΩ

12. M-EXT installation ☐ ☐ ☐

13. Voltages

- 15 V (pin 2)		-14.50...-15.50V
+ 15 VD (pin 3)		14.50...15.50 V
+ 15 V (pin 4)		14.50...15.50 V
+ 32 V (pin 14)		31.0...33.0 V
+ 5 V (pin 24)		4.80...5.30 V
+ 5 V (pin 25)		4.80...5.30 V

14. Fan ☐ ☐ ☐
15. Module communication ☐ ☐ ☐
16. Restarting 1. ☐ ☐ ☐
17. Restarting 2. ☐ ☐ ☐
18. Test measurement with module ☐ ☐ ☐

Notes _____

19. Electrical safety check ☐ ☐ ☐
20. Functioning after electrical safety check ☐ ☐ ☐
21. Final cleaning ☐ ☐ ☐

Notes _____

_____

Used Spare Parts _____ _____ _____

Signature _____