Service Guide

IntelliVue Patient Monitor

MX600/MX700

Release J.x

Patient Monitoring

PHILIPS

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Introduction

This Service Guide contains technical details for the IntelliVue MX600/700 Patient Monitor, the measurement modules, the Multi-Measurement Module (MMS), the IntelliVue X2, the Flexible Module Rack (FMS) and the Measurement Server Extensions.

This guide provides a technical foundation to support effective troubleshooting and repair. It is not a comprehensive, in-depth explanation of the product architecture or technical implementation. It offers enough information on the functions and operations of the monitoring systems so that engineers who repair them are better able to understand how they work.

It covers the physiological measurements that the products provide, the Measurement Server that acquires those measurements, and the monitoring system that displays them.

Who Should Use This Guide

This guide is for biomedical engineers or technicians responsible for troubleshooting, repairing, and maintaining Philips' patient monitoring systems.

How to Use This Guide

This guide is divided into ten sections. Navigate through the table of contents at the left of the screen to select the desired topic. Links to other relevant sections are also provided within the individual topics. In addition, scrolling through the topics with the page up and page down keys is also possible.

Abbreviations

Abbreviations used throughout this guide are:

Name	Abbreviation
IntelliVue MX600/700 Patient Monitor	the monitor
Flexible Module Rack	FMS
Multi-Measurement Module	MMS
Measurement Link	MSL
Medical Information Bus	MIB
Anesthetic Gas Module	AGM

Responsibility of the Manufacturer

Philips only considers itself responsible for any effects on safety, EMC, reliability and performance of the equipment if:

- assembly operations, extensions, re-adjustments, modifications or repairs are carried out by persons authorized by Philips, and
- the electrical installation of the relevant room complies with national standards, and
- the instrument is used in accordance with the instructions for use.

To ensure safety and EMC, use only those Philips parts and accessories specified for use with the monitor. If non-Philips parts are used, Philips is not liable for any damage that these parts may cause to the equipment.

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Passwords

In order to access different modes within the monitor a password may be required. The passwords are listed below.

Monitoring Mode: No password required

Configuration Mode: 71034

Demo Mode: 14432

Service Mode: 1345

Consult the configuration guide before making any changes to the monitor configuration.

iPC Passwords:

The passwords for the pre-installed user accounts should be changed to ensure appropriate security.

The default passwords and settings are shown in the following table.

User Name	**ClinicalUser**	**ServiceUser**
Long Name	Clinical User	Service User
Password	BedPC	Supp0rtuzr (0 *is zero*)
Password expires	Never	Never
Group	Users	Administrators
Comment	For normal operation	For service purposes

Warnings and Cautions

In this guide:

- A **warning** alerts you to a potential serious outcome, adverse event or safety hazard. Failure to observe a warning may result in death or serious injury to the user or patient.
- A **caution** alerts you where special care is necessary for the safe and effective use of the product. Failure to observe a caution may result in minor or moderate personal injury or damage to the product or other property, and possibly in a remote risk of more serious injury.

1 Introduction

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Theory of Operation

Integrated Monitor Theory of Operation

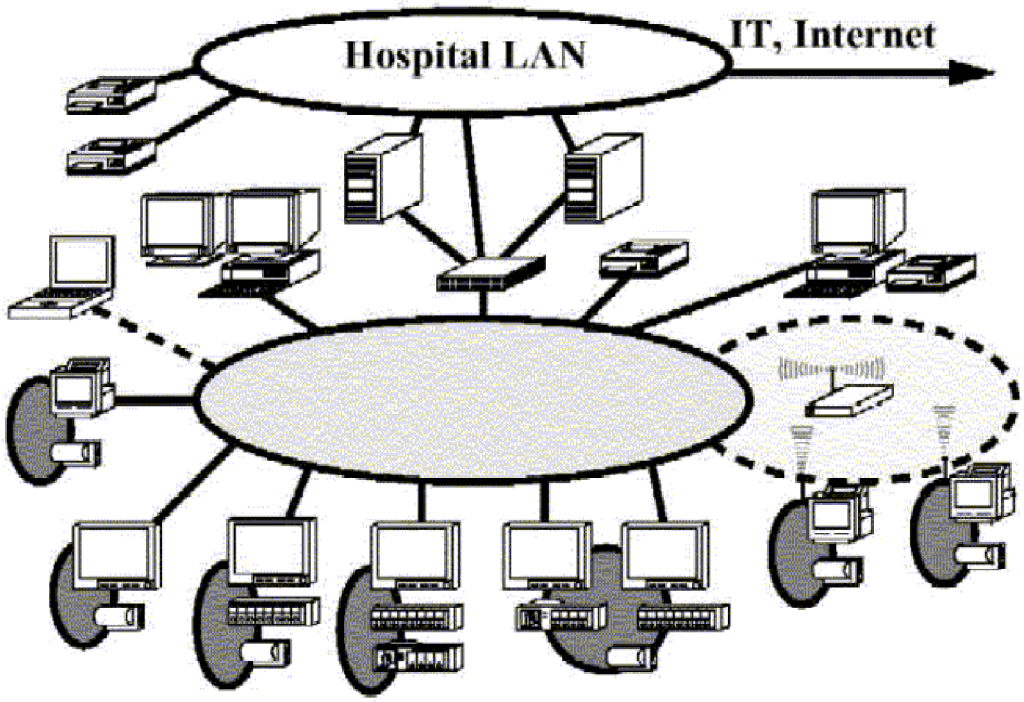
The IntelliVue MX600/700 Patient Monitor:

- displays real-time data
- controls the attached measurement servers
- alarms in the case of patient or equipment problems
- offers limited data storage and retrieval (trending)
- interfaces to the Philips Clinical Network and other equipment

A monitor with just a single integrated measurement server can be connected to additional building blocks to form a monitoring system with a large number of measurements, additional interface capabilities and multiple slave displays. These elements cooperate as one single integrated real-time measurement system.

System Boundaries

The following diagram discusses specific boundaries within the overall system with respect to their openness and real-time requirements:



System Boundaries

	Measurement connections Built-in measurement block
	Philips Clinical Network (wired LAN) connects multiple patient monitors, information centers, application servers; closed system, only Philips qualified products (tested and with regulatory approval) are connected, Philips is responsible for guaranteed real-time functionality and performance
	Philips Clinical Network (wireless) like Philips Clinical Network (wired) LAN, however due to current wireless technologies available it has reduced bandwidth, longer latencies, reduced functionality
	Hospital LAN, Internet Standard Network, not under Philips control, no guaranteed service, no real-time requirements

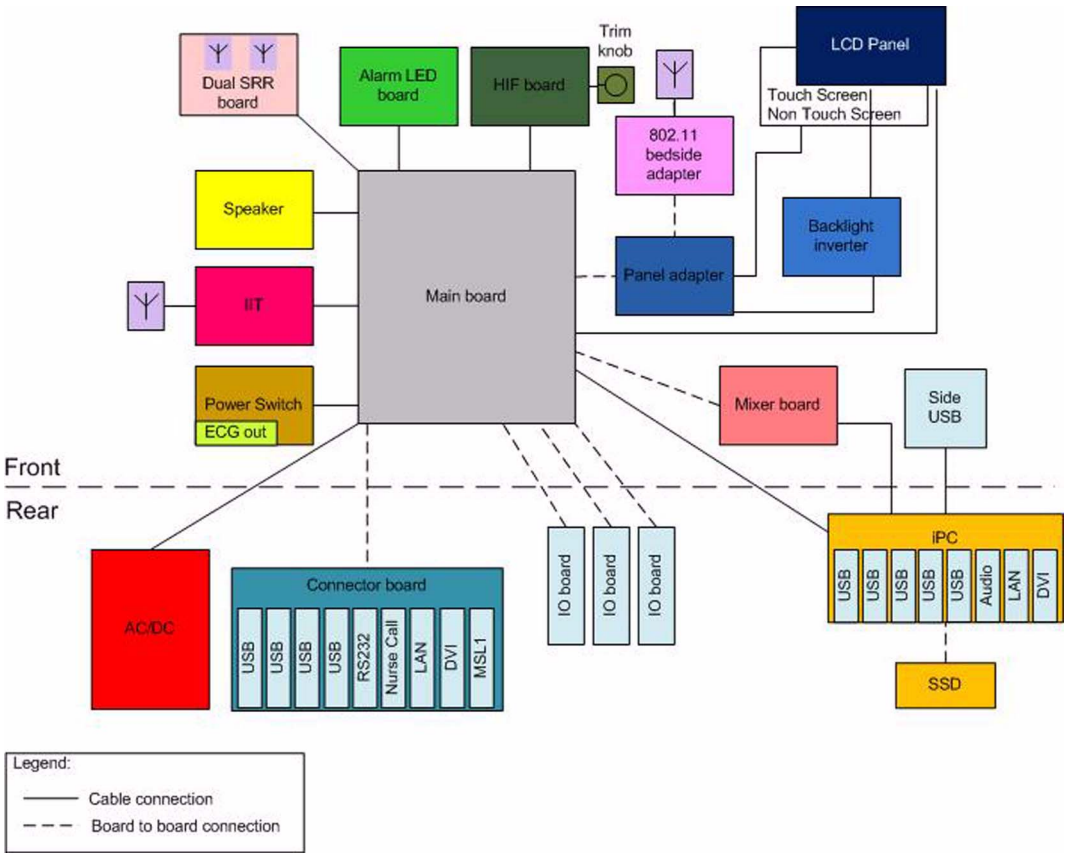
Hardware Building Blocks

The following hardware building blocks make up the monitoring system:

IntelliVue MX600/700

The IntelliVue MX600/700 Monitor:

- integrates the display and processing unit into a single package
- uses a 15" TFT WSXGA+ Color display
- The MX700 uses the touch screen as primary input device; a remote control and computer devices such as mice, trackball, and keyboard can be added optionally. The MX600 uses the trimknob as primary input device. It does not have a touch screen; a remote control and computer devices such as mice, trackball, and keyboard can be added optionally.
- supports the Flexible Module Rack (FMS)



NOTE

The 802.11 Bedside Adapter (WLAN) and IIT are mutually exclusive.

Compatible Devices

M8048A 8-Slot Flexible Module Rack (FMS-8)

865243 4-Slot Flexible Module Rack (FMS-4) (without and with MMS Mount)

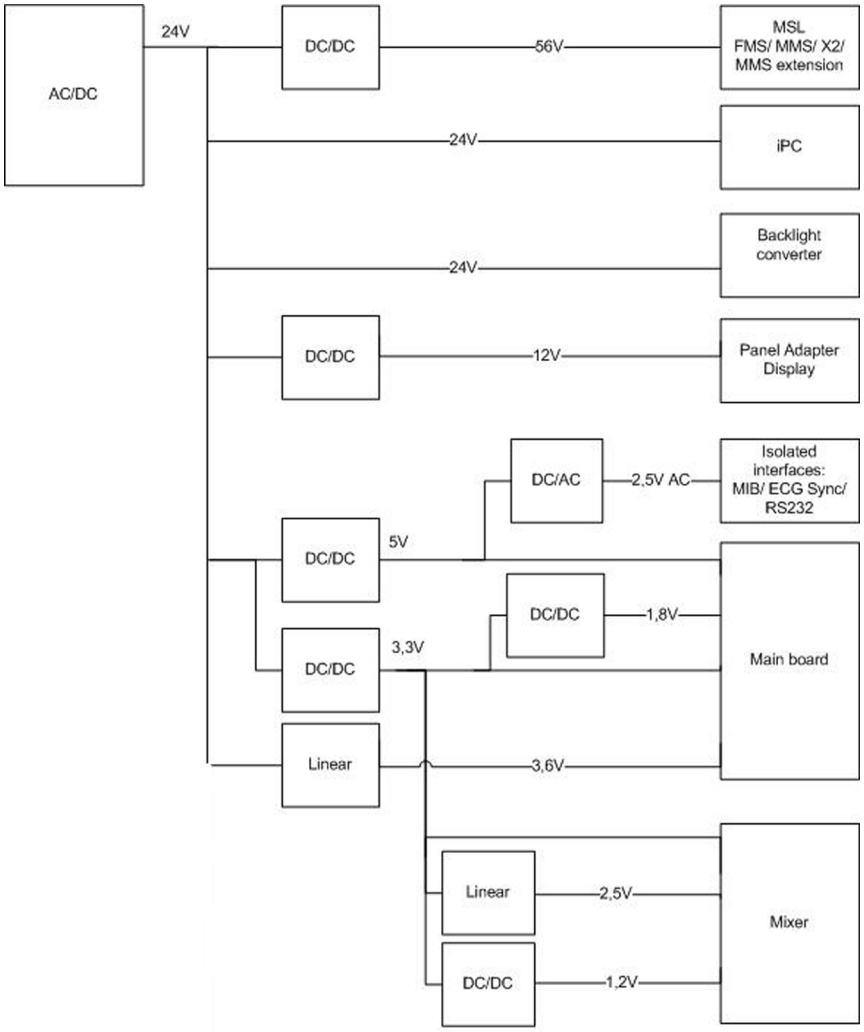
M3001A Multi-Measurement Module (MMS)

M3002A IntelliVue X2

M3012A, M3014A, M3015A, M3016A MMS Extensions

865244 Remote Control

Power Supply



The AC/DC converter transforms the AC power coming from the plug into 24V/ 150W DC source and isolates the monitoring system from the AC power mains. The 24V is distributed via power bus either directly or over additional converters to all components of the system:

The 56V DC power needed for the MSL is created by an isolating DC/DC converter.

The iPC and the backlights converter are supplied with 24V. The power needed for the panel is converted to 12V by the panel adapter DC/DC converter.

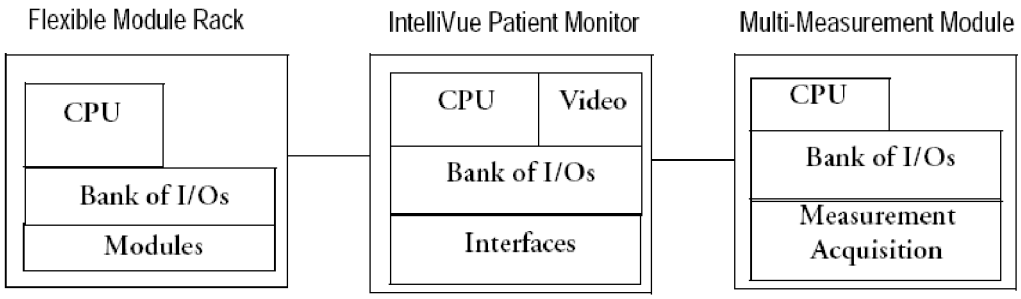
The isolated interfaces are supplied with 2.5V AC. The main board is supplied with 5V, 3.3V and 1.8V.

Additionally, for some infrastructural functions 3.6V is provided to the main board

The mixer board requires a power of 3.3V, 2.5V and 1.2V.

CPU Boards

The CPU boards have an MPC860 50 MHz or MPC86x 100 MHz processor that provides a number of on-chip, configurable interfaces. An array of 12 fast UARTS with configurable protocol options are implemented in an ASIC (along with other system functions such as independent watchdogs etc.), providing interfacing capabilities to measurement modules and I/O boards. The serial interfaces can easily be electrically isolated. The main board contains additional video hardware.



The CPUs provide two LAN interfaces to interconnect CPUs (via the MSL) and to connect to the Philips Clinical Network.

The CPU capabilities are identical. Different loading options are coded on serial EEPROMs to support the automatic configuration of the operating system at boot time.

iPC

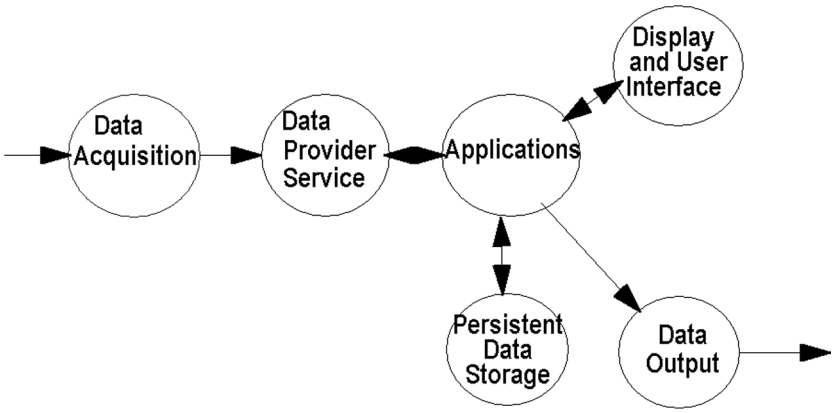
The iPC is a full standard PC that is built into the MX600/700 patient monitors as a hardware option

I/O Boards

A single MIB/RS232 or Flexible Nurse Call Relay board can be added optionally.

Data Flow

The following diagram shows how data is passed through the monitoring system. The individual stages of data flow are explained below.



Data Flow

Data Acquisition

Monitoring data (for example patient measurement data in the form of waves, numerics and alerts) is acquired from a variety of sources:

- Measurement Servers

  The Measurement Servers connected to the internal LAN convert patient signals to digital data and apply measurement algorithms to analyze the signals.

- External measurement devices

  Data can be also acquired from devices connected to interface boards of the monitor. Software modules dedicated to such specific devices convert the data received from an external device to the format used internally. This applies to parameter modules and the Anesthetic Gas Module.

- Server systems on the Philips Clinical Network

  To enable networked applications such as the other bed overview, data can be acquired from server systems attached to the Philips Clinical Network, for example a Philips Information Center

Data Provider System Service

All data that is acquired from measurement servers or external measurement devices is temporarily stored by a dedicated data provider system service. All monitor applications use this central service to access the data in a consistent and synchronized way rather than talking to the interfaces directly.

This service makes the applications independent of the actual type of data acquisition device.

The amount of data stored in the data provider system service varies for the different data types. For example several seconds of wave forms and the full set of current numerical values are temorarily stored in RAM.

Persistent Data Storage System Service

Some applications require storage of data over longer periods of time. They can use the persistent data storage system service. Dependent on the application requirements, this service can store data either in battery backed-up (buffered) memory or in flash memory. The buffered memory will lose its contents if the monitor is without power (not connected to mains) for an extended period of time. The flash memory does not lose its contents.

The trend application for example stores vital signs data in a combination of flash memory and buffered memory, while the system configuration information (profiles) is kept purely in flash memory.

Display and User Interface Service

Applications can use high level commands to display monitoring data or status and command windows on the internal LCD panel. These commands are interpreted by the display manager application. This application controls the dedicated video hardware which includes video memory and a special ASIC.

User input is acquired from a variety of input devices, for example the SpeedPoint, the touchscreen or other standard input devices (keyboard, mouse) which may be attached to I/O boards. The system software makes sure that the user input is directed to the application which has the operating focus.

Data Output

The monitoring system is very flexible and customizable regarding its data output devices. Built-in devices (for example LAN, alarm lamps, speaker, video) provide the basic output capabilities.

These capabilities can be enhanced by adding additional I/O boards, as required in the specific end-user setup. The additional I/O boards typically provide data to externally attached devices, for example to RS232 based data collection devices.

The monitor can identify I/O boards by means of a serial EEPROM device that stores type and version information. The operating system detects the I/O boards and automatically connects them with the associated (interface driver) application. For some multi-purpose cards it is necessary to configure the card for a particular purpose first (for example the MIB/RS232 card can support external touch display , data import, data export).

Monitor Applications

The monitor applications provide additional system functionality over the basic measurement and monitoring capabilities. This includes for example trending, report generating, event storage or derived measurements.

In general, the monitor applications use the data provider system service to access the measurement data. Application interfaces to the other system services allow the application to visualize data, to store data over extended periods of time or to output data to other devices.

Internal LAN (Measurement Link)

All components of the monitoring system (including measurement servers and CPUs in the monitor) communicate using an IEEE802.3/ Ethernet LAN in the Measurement Link (MSL). This network is used to distribute data between the components, for example:

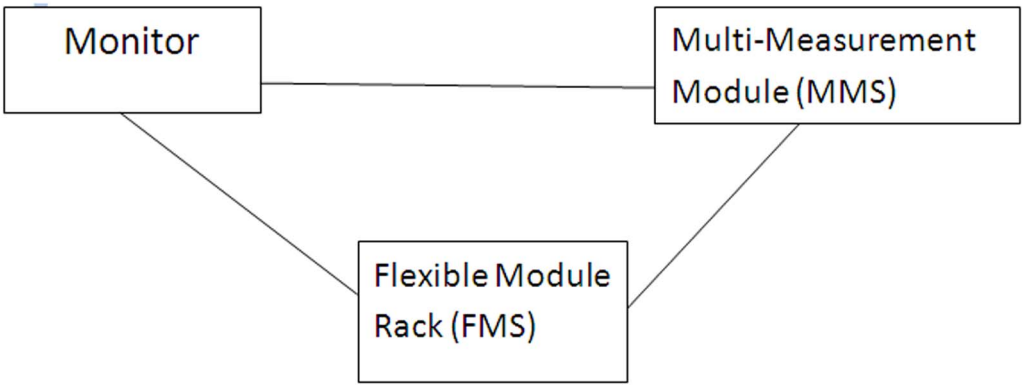
- Digitized patient signals including wave data, numerical data and status information (typically from the measurement server to a display unit)
- Control data representing user interactions (typically from the display unit to a measurement server)
- Shared data structures, for example representing patient demographical data and global configuration items

The internal LAN allows plug and play configuration of the monitoring system. The system automatically detects plugging or unplugging of measurement servers and configures the system accordingly.

The components on the internal LAN are time-synchronized to keep signal data consistent in the system. Dedicated hardware support for synchronization eliminates any latency of the network driver software.

The integrated LAN provides deterministic bandwidth allocation/reservation mechanisms so that the real-time characteristic of signal data and control data exchange is guaranteed. This applies to the data flow from the measurement server to the monitor (for example measurement signal data) and the data flow from the monitor to a measurement server (for example to feed data to a recorder module).

Integrated communication hubs in the monitor and the FMS allow flexible cabling options (star topology, daisy chaining of servers).



Philips Clinical Network

The monitoring system may be connected to the Philips Clinical Network, for example to provide central monitoring capabilities or other network services. This connection may be through a normal wired connection or through a wireless connection.

The monitor supports the connection of an internal wireless adapter (#J35). Switching between wired and wireless networks is automatically triggered by the plugging or unplugging of the network cable.

The Philips Clinical Network protocols function very similarly to the protocols used on the internal LAN.

After configuration, the monitoring system sends the digitized patient signals including wave data, numerical data and status information onto the network. Control data representing user interactions can be exchanged between the monitoring system and a central station bi-directionally.

Additional protocols are supported for networked applications, for example for the other bed overview function, which allows viewing of monitoring data from other patients on the network.

For plug and play operation, the monitoring system uses the standard BootP protocol to automatically acquire a network address.

How does the Support Tool Work with the Monitor

The support tool is a Windows application typically installed on the laptop of a customer engineer or a biomedical engineer working in the customer's own service department.

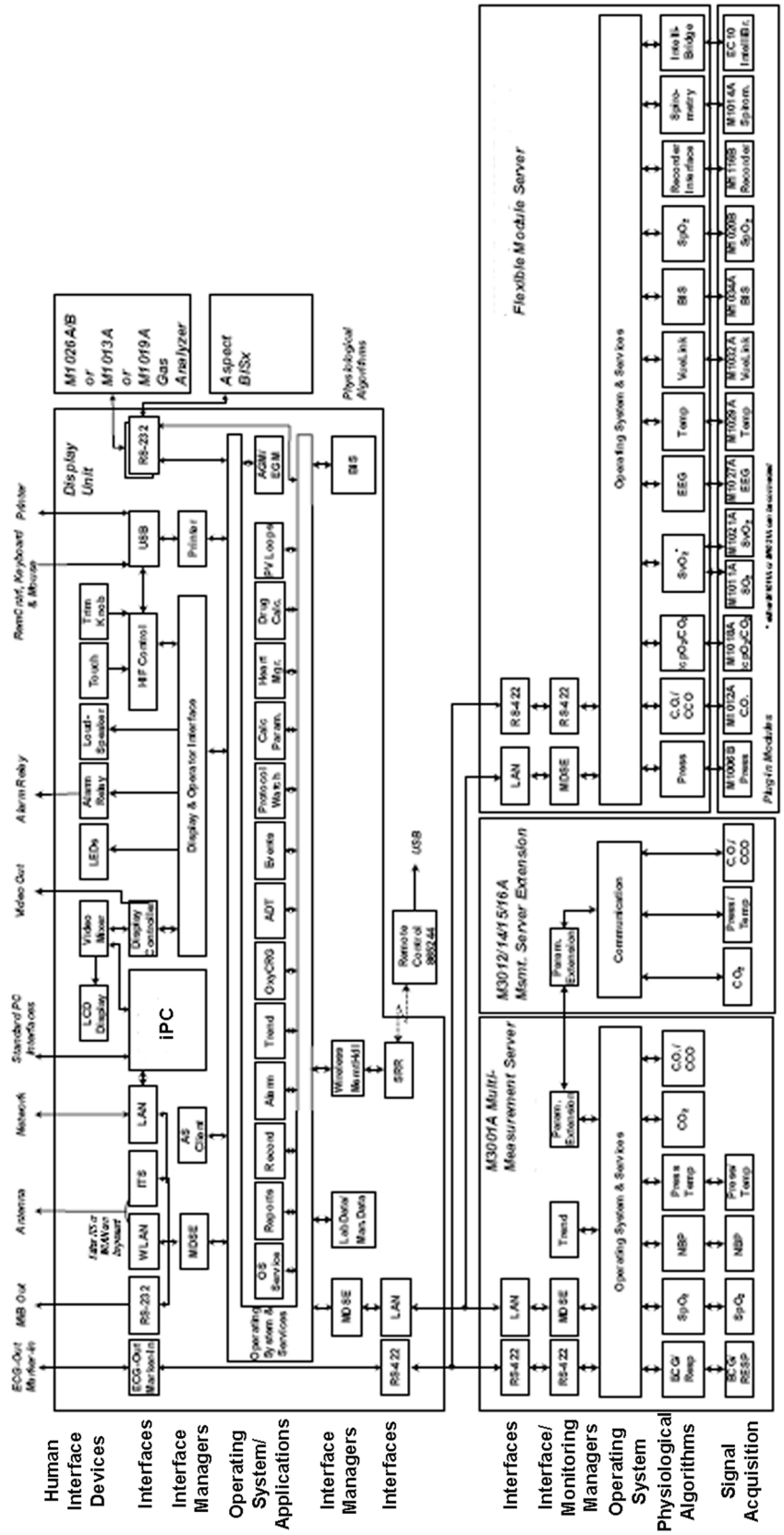
The purpose of the support tool is to upgrade, configure and diagnose all monitoring components (modules, measurement servers, and monitors) in the system over the network.

The service protocol developed for this purpose uses a raw access to the devices without the need for IP addresses etc. over a standard customer network installation, so that even defective devices can be upgraded as long as the few kBytes of initial boot code are working. The boot code itself can also be upgraded using the same protocol.

The tool allows access to internal service information and to serial numbers. It can be remote-controlled, for example via a dial-up connection from a response center, provided the proper infrastructure is in place.

For details see the Instructions for Use for the Support Tool.

Monitor Software Block Diagram



Block Diagram Legend

Functional Block	Description
Services	
Operating System	The Operating System (OS) provides a layer of isolation between the specific hardware implementation and the application software. The OS performs system checks and allocates resources to ensure safe operation when the system is first started. This includes internal self-tests on several hardware modules and configuration checks for validity of configuration with the operating software. During normal operation, the OS continues to run checks on system integrity. If error conditions are detected the OS will halt monitoring operations and inform the operator about the error condition.
System Services	The System Services provide generic common system services. In particular: They use a real-time clock component to track time. They synchronize to network time sources and verify the accuracy of the system time information. They are also responsible for managing persistent user configuration data for all Measurement Servers, Flexible Module Racks and IntelliVue Patient Monitoring System software modules. User configuration data is stored in a non-volatile read/write storage device
Applications	
Application Server Client	The Application Server Client provides the Citrix1 thin client functionality.
Reports	The Reports Service retrieves current and stored physiological data and status data to format reports for printing paper documentation. The following reports are supported: • Vital Signs Report • Graphical Trend Report • Event Review Report • Event Episode Report • ECG Report (12 Lead/Multi-Lead) • Cardiac Output Report • Calculations Report (Hemodynamic/Oxygenation/ Ventilation) • Calculations Review Report • Wedge Report • Test Report • Other reports (e.g. Loops, Review Applications, Drug report) The Reports service generates report data which can be printed on a local or a central printer.

Functional Block	Description
Record	The Record Service retrieves current and stored physiological data and status data to format a continuous strip recording. A recording can be triggered manually by the operator or automatically by an alarm condition. The Record Service uses the services of the Recorder Interface to control an M1116B Recorder in the FMS. The Record Service can also send data to a central recorder.
Alarm	The Alarm Service contains logic that prioritizes alarm conditions that are generated either by the Measurement Servers, Flexible Module Rack, or by IntelliVue Patient Monitoring System software modules. Visual alarm signals (messages) are displayed at the top of the IntelliVue Patient Monitoring System display and alarm sounds are generated by a loudspeaker. Alarm conditions may be generated when a physiological parameter exceeds preselected alarm limits or when a physiological parameter or any other software module reports an inoperative status (technical alarm, for example, the ECG leads may have fallen off the patient). The Alarm service manages the alarm inactivation states, for example suspension of alarms, silencing of alarms, and alarm reminder. Alarm signals may also be configured as latching (alarm signals are issued until they are acknowledged by the operator, even when the alarm condition is no longer true). The Alarm service controls the visual alarm signals (alarm lamps).
Trend	The Trend service stores the sample values of physiological data and status data with a resolution of 12 seconds, 1 minute or 5 minutes for a period of up to 48 hours. The data is kept in battery buffered read/write storage and flash memory devices to be preserved across power failures. The stored data is protected via consistency checks and checksums. When a new patient is admitted, the trend database erases all data of the previous patient.
OxyCRG	The OxyCRG (Oxygen CardioRespiroGram) service derives a high-resolution trend graph from the Beat-to-Beat Heart Rate, SpO2 or tcpO2, and Respiration physiological data. The OxyCRG is specialized for neonatal applications, allowing the operator to identify sudden drops in Heart Rate (Bradycardia) and SpO2 or tcpO2 (Desaturations), and supporting the operator in visualizing Apnea situations.
ADT	The ADT (Admit/Discharge/Transmit) service maintains the patient demographics information. The operator may admit a new patient, discharge the old patient and enter or modify the patient demographics. The ADT service also supports the transport of a patient (trend database) with the M3001A Multi-Measurement Module. The ADT service controls the deletion of old patient data, the upload of trend data from the M3001A and the switching back of all settings to user defaults. It also synchronizes patient information with a central station on the network.

Functional Block	Description
Events	The Events Application captures physiological data from episodes for later review and documentation purposes. Events can be triggered automatically by an alarm condition, by user-defined conditions or manually by the operator.
Protocol Watch	ProtocolWatch allows the execution of pre-defined clinical protocols in the IntelliVue patient monitor by combining events such as automatically triggered events, time and manually triggered events with textbook knowledge thus aiding the operator to follow clinical guidelines. ProtocolWatch notifies the operator when certain combinations of clinical conditions occur and it documents the developments and clinician actions in a log which can be reviewed on the monitor and documented on a printer.
Calc Param	The Calc Param (Calculated Parameters) service accesses current, stored and manually entered physiological data as input to calculation formulas. With these formulas, derived hemodynamic, oxygenation and ventilation variables are computed. The calculation results, including the input parameters, are stored for later review using the Trend service.
Heart Mgr.	The Heart Manager Application allows the selection of the alarming source to be either heart rate (from ECG) or the system pulse rate. The system pulse rate can be chosen from any of the possible pulse rate sources (e.g., SpO2 and invasive pres-sures). The module implements automatic fall-backs when selected signal sources are not available.
Drug Calc	The Drug Calc application aids in calculating drug dosages for patients.
AGM/EGM	AGM (Anesthesia Gas Module) and EGM (extensible Gas Module) interface ane-asthesia gas measurement devices. The AGM/EGM Module (Anesthesia Gas Module) interfaces the M1013A, M1019A or M1026A/B Gas Analyzer devices. The AGM Module retrieves the measurement data and controls the external device. It provides numerical data, wave form data and alarm data for the gas parameters measured by the attached analyzers.
PV Loops	The PV Loops application compares graphic representations of airway waves to help detect changes in the patient airway condition.

Functional Block	Description
Interface Managers	
MDSE	The MDSE (Medical Data Service Element) Interface Manager is responsible for the exchange of real-time data between the IntelliVue Patient Monitoring System display unit and the Measurement Servers and Flexible Module Rack as well as between the IntelliVue Patient Monitoring System display unit and other devices attached to the network. MDSE establishes and maintains a data communication link between the devices. It provides configuration information about the remote device to applications in the local device and it allows the exchange of measurement data and status information between the devices.
Printer	The Printer Interface Manager provides a high level interface to a printer. It provides means to: • establish a connection to the printer • transfer data to the printer • get status of the printer • close connection to the printer The Printer Interface Manager also supervises the connection to the printer and whether the printer accepts data (for example paper out). The Printer Interface Manager notifies the operator in such cases.
Display & Operator Interface	The Display and Operator Interface Manager performs the following tasks: • Screen presentation of real-time and stored physiological measurement data, alarm condition data and status information received from the MDSE interface manager, the Alarm service or other IntelliVue Patient Monitoring System modules • Screen presentation of operating controls (control windows) • Processing of operating control commands received from HIF Control interface. The module verifies and interprets the received commands and forwards them to other software modules of the IntelliVue Patient Monitoring System display unit, Measurement Servers or Flexible Module Rack • Sound generation (issues audible alarm signals and generates audible information signals, for example QRS and SpO2 tones, operator audible feedback)
LabData/Manual Data	The Laboratory Data/ Manual Data Entry Interface Manager allows acquisition of laboratory data (e.g. acquired by the central station from a laboratory information system). It also allows to manually enter measurement data to make additional, manually acquired measurements available to internal applications and to the system.

Functional Block	Description
Wireless Measurement Manager (WMM)	The WMM Interface Manager provides connectivity to the SRR interface. It establishes communication between SRR enabled devices and the ASW module that manages the data provided by the device
Interfaces	
LAN	The LAN interface implements the physical layer of IEEE 802.3. The LAN interface performs Manchester encoding/decoding, receive clock recovery, transmit pulse shaping, jabber, link integrity testing, reverse polarity detection/correction, electrical isolation, and ESD protection. Electronically separated interfaces are used for communication to the Measurement Servers or Flexible Module Rack and to the network.
WLAN	The WLAN Interface is a network interface that provides access to an IEEE 802.11 wireless Local Area Network. The configuration of this interface is done by an OS Service.
Display Controller	The Display Controller Interface consists of a video controller chip, video RAM and the controlling software. The Display Controller interface processes the high level display commands (character and graphic generation, wave drawing) and translates them into pixels, which are written into the video RAM where the video controller chip generates the video synchronization signals and the pixel stream for the Color LCD Display.
HIF Control	The HIF (Human Interface Control) interface scans the Human Interface devices for operator controls (Touch Screen, and USB devices), formats the collected data and sends it to the display and Operating Interface.
ECG-Out	The ECG Out interface receives the ECG waveform directly from the ECG/Resp Arrhythmia ST-Segment physiological algorithm via an RS-422 serial interface and converts the digital ECG signal to an analog ECG signal.
Sync Out (ECG)	A pulse signal is provided on the Sync Out connector to allow synchronization with other medical devices.
RS-232	The RS-232 component represents a generic serial communication interface to connect external devices as shown in the diagram, also providing power in some cases.
RS-422	The serial link RS-422 interface communicates the ECG signal to the ECG Output of the IntelliVue Patient Monitoring System display unit. The interface is a serial, differential, full-duplex link. The interface is ESD protected.
Nurse Call	The Nurse Call board has a modular jack 6P6C connector. The connector has an open and close contact on alarm.
Flexible Nurse Call	The Flexible Nurse Call board has a multi-port connector with three alarm relays which are configurable to be open or closed on alarm. In addition, this interface has an audible alert capability for loss of AC power.

Functional Block	Description
MIB	The MIB interface allows full-duplex, short-haul asynchronous binary communication between the monitor and an arbitrary (medical/non-medical) device using an eight-pin RJ45 modular connector. Switching between MIB and RS232 protocol is possible.
IIT Interface	The IIT interface allows operation of the monitors with IntelliVue Instrument Telemetry.
SRR	The built-in SRR interface allows wireless communication of the monitor with an IntelliVue Instrument Telemetry Transceiver.
USB Interface	The USB interface allows connection of USB devices (Mouse, Keyboard, Barcode Scanner, Printer) to the monitor.
iPC	The iPC is a full standard PC that is built into the MX600/700 patient monitors as a hardware option.
Remote Control	The remote control allows remote operation of the monitor either wireless or via a USB cable connection.

2 Theory of Operation

3

Testing and Maintenance

Introduction

This chapter provides a checklist of the testing and maintenance procedures to ensure the performance and safety of the monitor, the Multi-Measurement Module (MMS),the MMS Extensions and the Flexible Module Rack (FMS) associated modules.

These tests must be performed only by qualified personnel certified by the responsible organization. Qualifications required are: training on the subject, knowledge, experience and acquaintance with the relevant technologies, standards and local regulations. The personnel assessing safety must be able to recognize possible consequences and risks arising from non-conforming equipment.

All recurring safety and performance assurance tests must be performed under equal environmental conditions to be comparable.

Preventive Maintenance refers specifically to the series of tests required to make sure the measurement results are accurate. The accuracy and performance procedures are designed to be completed as specified in the following sections or when readings are in question.

For detailed instructions on the maintenance and cleaning of the monitor and its accessories, see *Care and Cleaning, Using Batteries* and *Maintenance and Troubleshooting* in the monitor's *Instructions for Use.*

Terminology and Definitions

The following terms and definitions are used throughout this chapter and taken from the international standards IEC 60601-1, IEC 60601-1-1 and IEC 62353.

- **Medical System**: a medical electrical system is a combination of at least one medical electrical device and other electrical equipment, interconnected by functional connection or use of a multiple portable socket-outlet.
- **Patient Environment:** any area in which intentional or unintentional contact can occur between the patient and parts of the medical system or between the patient and other persons who have had contact with parts of the medical system. The patient environment is defined anywhere within 1.5m (5 feet) of the perimeter of the patient's bed and 2.5m (8.2 feet) from the floor.
- **Separation Device/Transformer:** a component or arrangement of components with input parts and output parts that, for safety reasons, prevent a transfer of unwanted voltage or current between parts of a medical system.
- **Multiple Portable Socket-Outlet:** a combination of two or more socket-outlets intended to be connected to or integrated with flexible cables or cords, which can easily be moved from one place to another while connected to the power mains.

- **Functional Connection:** an electrical connection for transfer of signals and/or power.
- **Tests:** Safety or Performance Assurance test procedures which may consist of several steps.

Recommended Frequency

Perform the procedures as indicated in the suggested testing timetable. These timetable recommendations do not supersede local requirements.

Table 1 Table 1: Suggested Testing Timetable

Tests		Frequency
Preventive Maintenance*	NBP Performance	Once every two years, or more often if specified by local laws.
	Microstream CO_2 Calibration	**Once a year** or after **4000 hours** of continuous use and following any instrument repairs or the replacement of any instrument parts.
Other Regular Tests	Visual Inspection	Before each use.
	Power On Test	
Performance Assurance Tests	ECG/Resp Performance	Once every two years, or if you suspect the measurement is incorrect, except Mainstream CO2 Accuracy Check, Sidestream CO2 Accuracy Check and Flow Check - required once a year.
	ECG Out Performance	
	SpO2 Performance	
	NBP Performance	
	Invasive Pressure Performance	
	Temperature Accuracy	
	M3014A Capnography Extension Performance Tests	
	Microstream CO_2 Performance Test	
	Spirometry Accuracy Test	
	C.O. Performance	
	BIS Performance	
	NMT Performance	
	VueLink Performance	
	IntelliBridge Performance Test	
	Nurse Call Relay Performance	
	MSL Assurance Test	
	Power Loss Alarm Buzzer Performance Test	
	Mounting Integrity Test	

Tests			Frequency
Safety Tests	**Visual**	Visual Inspection	After each service event
	Electrical	Protective Earth	Once every two years and after repairs where the power supply has been removed or replaced or the monitor has been damaged by impact.
		Equipment Leakage Current	
		Applied Part Leakage Current	
		System Test	Once every two years

*M3015A with the old hardware Rev. A (i.e. Serial No. DE020xxxxx) also require the CO_2 pump/CO_2 scrubber replacement procedure. This is required every three years or after 15000 operating hours.

NOTE

The EEG, SvO_2 (SO_2) and tcGas parameters do not require performance testing. See "EEG, SvO2 (SO2) and tcGas Performance Tests" on page 91 for details.

When to Perform Tests

This table tells you when to perform specific tests.The corresponding test procedures are described in the following sections **All tests listed below must be performed on the monitor itself, any attached MMS/X2 and FMS incl. parameter modules.**

Table 2 When to perform tests

Service Event (When performing...	Tests Required ...Complete these tests)
Installation	
Installation of a monitor in combination with a medical or non-medical device connected to the same multiple socket outlet.	Perform Visual Inspection, Power On and System Tests
Installation of a monitor (with or without iPC) with **no** display connected to the video output	Perform Visual Inspection and Power On Test
Installation of a monitor (with or without iPC) with a medical display specified by Philips	Perform Visual Inspection and Power On Test
Installation of a monitor **without iPC** with an off-the-shelf display (non-compliant with IEC 60601-1)	Perform Visual Inspection, Power On and System Test (per each affected video port)
Installation of a monitor **with iPC** with off-the-shelf displays (non-compliant with IEC 60601-1) connected to both the monitor and the iPC	Perform Visual Inspection, Power On and System Test for both the monitor-display connection and the iPC-display connection
Installation of a monitor with AGM or IntelliVue G1/G5, connected to separate mains sockets.	Perform Visual Inspection and Power On Tests

Service Event (When performing...	Tests Required ...Complete these tests)
Installation of a monitor with a Vuelink connection to another medical device (compliant with IEC 60601-1), connected to separate mains sockets.	Perform Visual Inspection and Power On Tests
Installation of a monitor with an IntelliBridge connection to another medical device (compliant with IEC 60601-1), connected to separate mains sockets.	Perform Visual Inspection and Power On Tests
Installation of a monitor (with or without iPC) with IT equipment e.g. printer, PC connected via a functional connection USB.	Perform Visual Inspection, Power On and System Tests
Installation of monitor with IntelliVue 802.11 Bedside Adapter	Perform Visual Inspection, Power On and IntelliVue 802.11 Bedside Adapter Communication Test
Installation of monitor with IntelliVue Instrument Telemetry	Perform Visual Inspection, Power On and IIT Communication Test
Installation of monitor with Short Range Radio (SRR)	Perform Visual Inspection, Power On and SRR Communication Test
Installation of networked monitor (LAN) without iPC	Perform Visual Inspection and Power On Test
Installation of networked monitor (LAN) with iPC (iPC LAN connected to non-Philips network)	Perform Visual Inspection, Power On Test and System Tests for the iPC LAN connected to non-Philips network
Preventive Maintenance	
Preventive Maintenance*	Perform preventive maintenance tests and procedures: NBP calibration Microstream CO2 calibration
Other Regular Tests and Tasks	
Visual Inspection	Perform Visual Inspection
Power On Test	Perform Power On test
Repairs	
Repairs where the monitor, FMS, parameter modules, MMS or X2 or iPC have been damaged by impact, liquid ingression, fire, short circuit or electrical surge.	Perform Visual Inspection, Power On, all Safety Tests and Full Performance Assurance Tests
Repairs where the power supply, the mains socket or an interface board of the monitor or iPC is removed or replaced or the protective earth ground connection is disrupted.	Perform Visual Inspection, Power On, all Safety Tests and Basic Performance Assurance Test

Service Event (When performing...	Tests Required ...Complete these tests)
Repairs of IntelliVue 802.11 Bedside Adapter	Perform Visual Inspection, Power On and IntelliVue 802.11 Bedside Adapter Communication Test
Repairs of IntelliVue Instrument Telemtery (IIT) Module	Perform Visual Inspection, Power On and IIT Communication Test
Repairs of Short Range Radio (SRR) Interface	Perform Visual Inspection, Power On and SRR Communication Test
Repairs of the parameter modules, FMS, MMS or X2 (all service events where the parameter modules, FMS, MMS or X2 have been opened)	Perform Visual Inspection, Power On, all Safety Tests and Basic Performance Assurance Test. If a certain parameter seems suspicious, perform Full Performance Assurance Test for this parameter.
Repairs where the NBP pump of the MMS or X2 has been replaced	Perform Visual Inspection, Power On, all Safety Tests, Basic Performance Assurance Test and NBP Performance Test and Calibration
Repairs where the parameter module, MMS or X2 has been replaced.	Perform Visual Inspection, Power On and Basic Performance Assurance
Repairs of the AGM or IntelliVue G1/G5	Perform Basic Performance Assurance Test. For further testing requirements, see AGM or IntelliVue G1/G5 Service Guide
Repairs where the printer connected to the monitor or iPC via connector board has been replaced.	Perform Visual Inspection, Power On, System Test and Printer Test.
All other IntelliVue Monitoring System repairs (except when power supply is removed)	Perform Visual Inspection, Power On Test and Basic Performance Assurance Test
Performance Assurance	
Basic Performance Assurance	Perform basic performance assurance tests for the respective monitoring system component.
Full Performance Assurance	Perform all accuracy and performance test procedures listed in the following sections. If a particular measurement is in question, perform the measurement performance test only.
Upgrades	
Software **Upgrades**	Perform Visual Inspection, Power On Test and Basic Performance Assurance Test unless otherwise specified in the Upgrade Installation Notes shipped with the upgrade.
Hardware **Upgrades**	Perform Visual Inspection, Power On Test and Basic Performance Assurance Test unless otherwise specified in the Upgrade Installation Notes shipped with the upgrade.

Service Event (When performing...	Tests Required ...Complete these tests)
Hardware **Upgrades** where IntelliVue 802.11 Bedside Adapter is installed	Perform Visual Inspection, Power On Test, Basic Performance Assurance Test and IntelliVue 802.11 Bedside Adapter Communication Test
Hardware **Upgrades** where IntelliVue Instrument Telemetry (IIT) is installed	Perform Visual Inspection, Power On Test, Basic Performance Assurance Test and IIT Communication Test
Hardware **Upgrades** where Short Range Radio (SRR) is installed	Perform Visual Inspection, Power On Test, Basic Performance Assurance Test and SRR Communication Test
Installation of Interfaces or Hardware **Upgrades** where the power supply of the monitor or iPC or interface boards of the monitor need to be removed.	Perform Visual Inspection, Power On Test, Basic Performance Tests and all Safety Tests
Combining or Exchanging System Components (non-medical equipment connected to an IntelliVue monitor or medical system equipment operated on a multiple socket outlet)	Perform the System Test for the respective system components

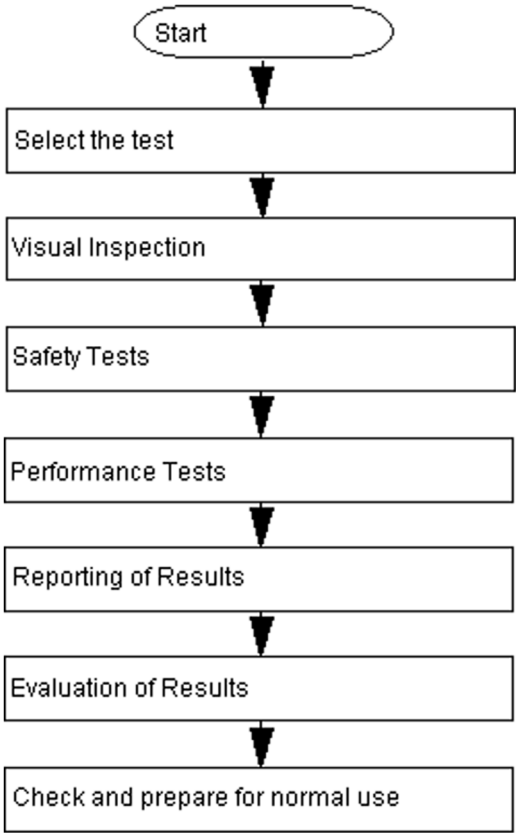
*M3015A with the old hardware Rev. A (i.e. Serial No. DE020xxxxx) also require the pump and scrubber replacement procedures.

NOTE

It is the responsibility of the facility operator or their designee to obtain reference values for recurring safety and system tests. These reference values are the results of the first test cycles after an installation. You may also purchase this service from Philips.

Testing Sequence

Summary of the recommended sequence of testing:



NOTE

If any single test fails, testing must be discontinued immediately and the device under test must be repaired or labeled as defective.

Visual Inspection

Before Each Use

Check all exterior housings for cracks and damage. Check the condition of all external cables, especially for splits or cracks and signs of twisting. If serious damage is evident, the cable should be replaced immediately. Check that all mountings are correctly installed and secure. Refer to the instructions that accompany the relevant mounting solution.

After Each Service, Maintenance or Repair Event

Ensure all fuses accessible from the outside comply with the manufacturer's specification.

Check:

- the integrity of mechanical parts, internally and externally.
- any damage or contamination, internally and externally

- that no loose parts or foreign bodies remain in the device after servicing or repair.
- the integrity of all relevant accessories.

Power On Test

1 Connect the monitoring system to mains and switch it on. This includes connected displays, MMS, MMS Extensions, X2, FMS and FMS associated modules, gas analyzers and Vuelink devices.

2 Make sure that all steps listed in the table *Initial Instrument Boot Phase* in the Troubleshooting section are completed successfully and that an ECG wave appears on the screen.

The expected test result is pass: the monitor boots up and displays an ECG wave. The wave might be a flat line if no simulator is attached.

Safety Tests

Safety tests are comprised of the following tests performed on the monitoring system:

- protective earth resistance
- equipment leakage current
- applied part leakage current
- system test (if applicable)

Safety test requirements are set according to international standards, their national deviations and specific local requirements. The safety tests detailed in this Service Guide are derived from international standards but may not be sufficient to meet local requirements. We recommend that you file the results of safety tests. This may help to identify a problem early particularly if the test results deteriorate over a period of time.

Each individual piece of equipment which has its own connection to mains or which can be connected or disconnected from mains without the use of a tool must be tested individually. The monitoring system as a whole must be tested according to the procedure described in “System Test” on page 57.

Accessories which can affect the safety of the equipment under test or the results of the safety test must be included in the tests and documented.

Warnings, Cautions, and Safety Precautions

- These tests are well established procedures of detecting abnormalities that, if undetected, could result in danger to either the patient or the operator.
- Disconnect the device under test from the patient before performing safety tests.
- Disconnect the device under test from mains before performing safety tests. If this is not possible, ensure that the performance of these tests does not result in danger to the safety analyzer operator, patients or other individuals.
- Test equipment (for example, a *Safety Analyzer*) is required to perform the safety tests. Please refer to Annex C of IEC/EN 62353 for exact requirements for the measurement equipment and for measurement circuits for protective earth resistance and leakage currents. Refer to the documentation that accompanies the test equipment. Only certified technicians should perform safety testing.
- The consistent use of a *Safety Analyzer* as a routine step in closing a repair or upgrade is emphasized as a mandatory step to maintain user and patient safety. You can also use the *Safety*

Analyzer as a troubleshooting tool to detect abnormalities of line voltage and grounding plus total current loads.

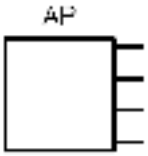
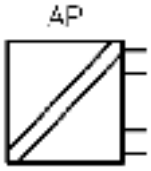
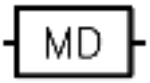
- During safety testing, mains voltage and electrical currents are applied to the device under test. Ensure that there are no open electrical conductive parts during the performance of these tests. Avoid that users, patients or other individuals come into contact with touch voltage.
- For Europe and Asia/Pacific, the monitor complies with:
  IEC 60601-1:1988 + A1:1991 + A2:1995; EN60601-1:1990 + A1:1993 + A2:1995; IEC 60601-1-1:2001; EN 60601-1-1:2001; IEC 60601-1-2:2001; EN 60601-1-2:2001.
  For USA, the monitor complies with:
  UL60601-1
  For Canada, CAN/CSA C22.2#601.1-M90
- Local regulations supersede the testing requirements listed in this chapter.
- If a non-medical electrical device is connected to a medical electrical device, the resulting medical electrical system must comply with IEC/EN 60601-1-1.
- Perform safety tests as described on the following pages.

Safety Test Procedures

Use the test procedures outlined here **only** for verifying and recording the initial values prior to or at installation, safe installation or service of the product, and for periodic recurrent testing. The setups used for these tests and the acceptable ranges of values are derived from local and international standards but may not be equivalent. These tests are not a substitute for local safety testing where it is required for an installation or a service event. If using an approved safety tester, perform the tests in accordance with the information provided by the manufacturer of the tester and in accordance with your local regulations, for example IEC/EN 60601-1, UL60601-1 (US), IEC/EN 62353, and IEC/EN 60601-1-1. The safety tester should print results as detailed in this chapter, together with other data.

Please refer to Annex C of IEC/EN 62353 for requirements for the measurement equipment and for measurement circuits for protective earth resistance and leakage currents.

The following symbols are used in the diagrams illustrating the safety tests:

	Supply mains		Protective earth
L, N	Supply mains terminals	PE	Protective earth terminal
	Mains part		Applied part
	F-type applied part		Measuring device
	Resistance measuring device		Connection to accessible conductive parts
.....	Optional connection		

CAUTION

After each service, maintenance or repair event:

Ensure all fuses accessible from the outside comply with the manufacturer's specification.

Check:

- the integrity of mechanical parts, internally and externally.
- any damage or contamination, internally and externally.
- that no loose parts or foreign bodies remain in the device after servicing or repair.
- the integrity of all relevant accessories.

Hints for Correct Performance of Safety Tests

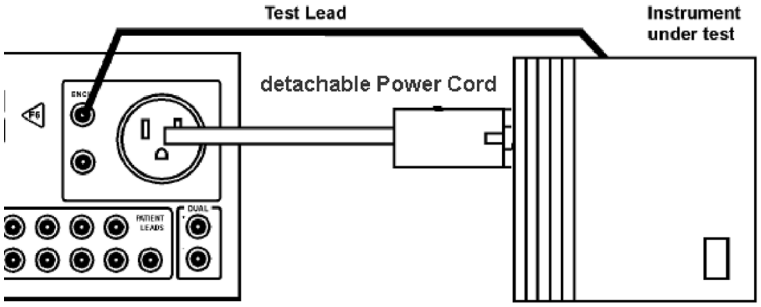
- Perform a visual inspection on all detachable power cords used with the monitoring system and include these in all safety test procedures.

- Connection lines such as data lines or functional earth conductors may appear to act like protective earth connections. These may lead to incorrect measurements and need to be considered during testing. If necessary, unplug these connections.
- During measurements, the device under test shall be isolated from earth (e.g. test on an insulated work bench), except the protective earth conductor in the power supply cord.
- Position all cables and cords in such a manner that they do not influence the safety tests.
- Measurement of insulation resistance is not required.
- When testing a medical electrical system, where possible, test it such that potential ground voltage variations are present as they may be during actual use.

Guideline for Performance of Safety Tests

This section introduces the general principle of performing recurrent safety tests. Product specific test descriptions are described in the following sections.

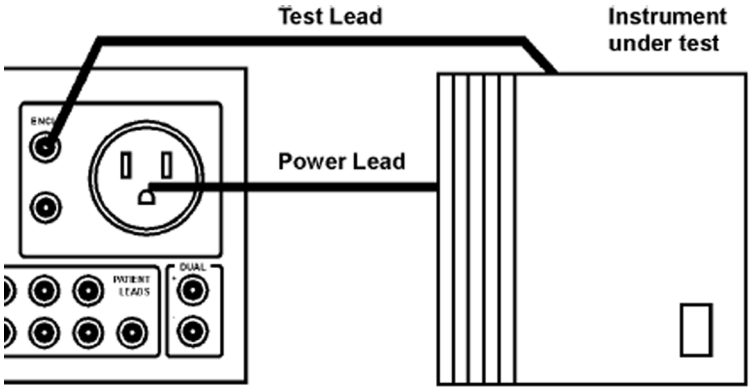
Connect the detachable power cord of the device under test to the safety analyzer's test mains port. Connect the enclosure test lead of the safety analyzer to the enclosure of the device under test, e.g. to the equipotential connector or unearthed conductive accessible parts where applicable during Equipment Leakage Current Tests and Applied Part Leakage Current Tests. For testing the applied part leakage current, connect all applied parts to the safety analyzer using the appropriate patient lead or adapter cable. For the ECG parameter all ten ECG-leads need to be connected to the safety analyzer. If necessary, use an adapter cable to connect all ten ECG-leads. If necessary, repeat the safety test procedure until all available applied parts have been tested. Refer to the documentation that accompanies the safety analyzer for further details on how to set up and perform the test.



Protective Earth Resistance Test - Setup Example

NOTE

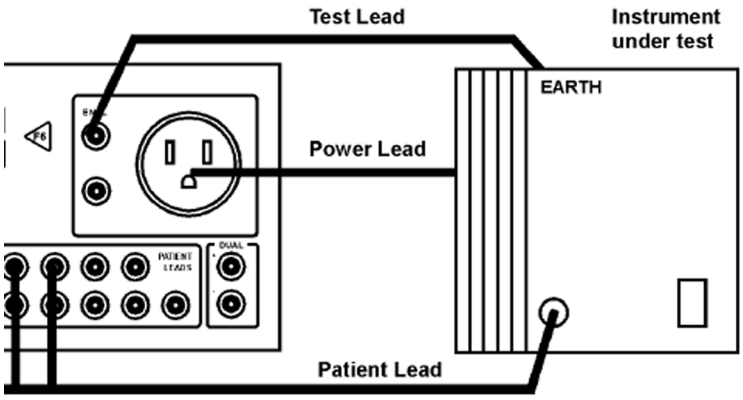
The test lead needs to go to parts that require protective earthing. This may be a single connection or several tested after each other



Equipment Leakage Current Test - Setup Example

NOTE

The test lead needs to go to the grounded enclosure parts, the ungrounded enclosure parts and all of the applied parts connected together.



Applied Part Current Test - Setup Example

NOTE

The above graphics resemble the Metron QA-90 setup and are protected by copyright. Copyright owned by Fluke (Metron).

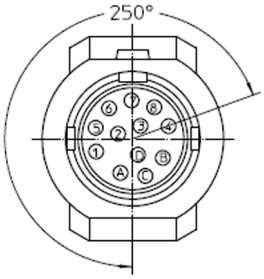
Safety Test Adapter Cable - Schematics

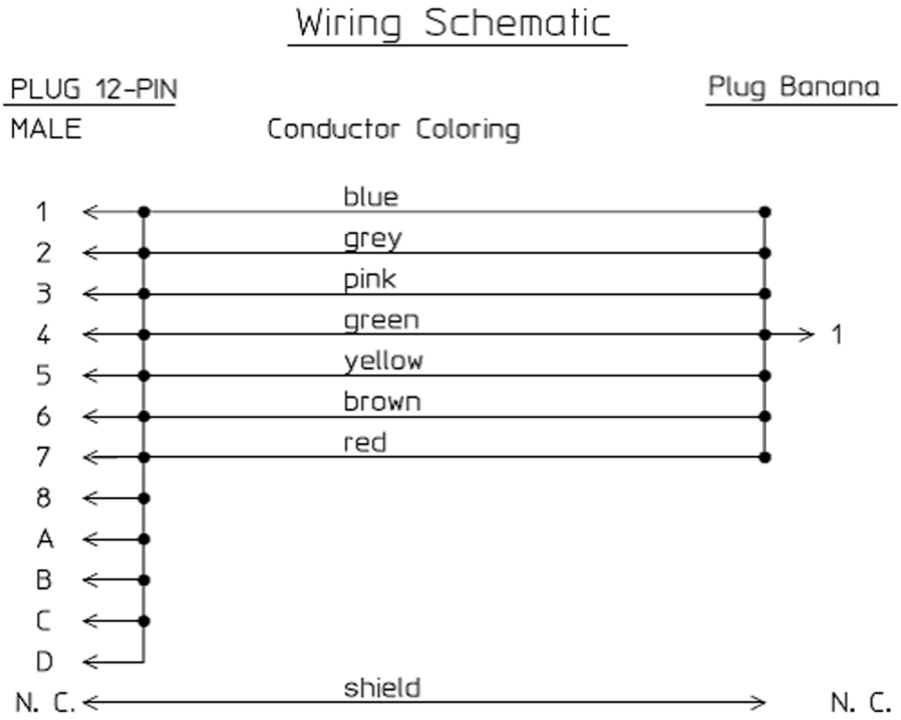
The following graphics provide schematics of safety test (patient lead) adapter cables which can be used for electrical safety testing. These schematics can also be used as a guideline for making your own safety test adapter cables. Alternatively, other methods to make safety test adapter cables can be used, e.g. using a modified accessory cable.

NOTE

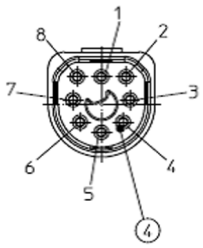
You may not need all of the cables displayed below for electrical safety testing of your respective monitor.

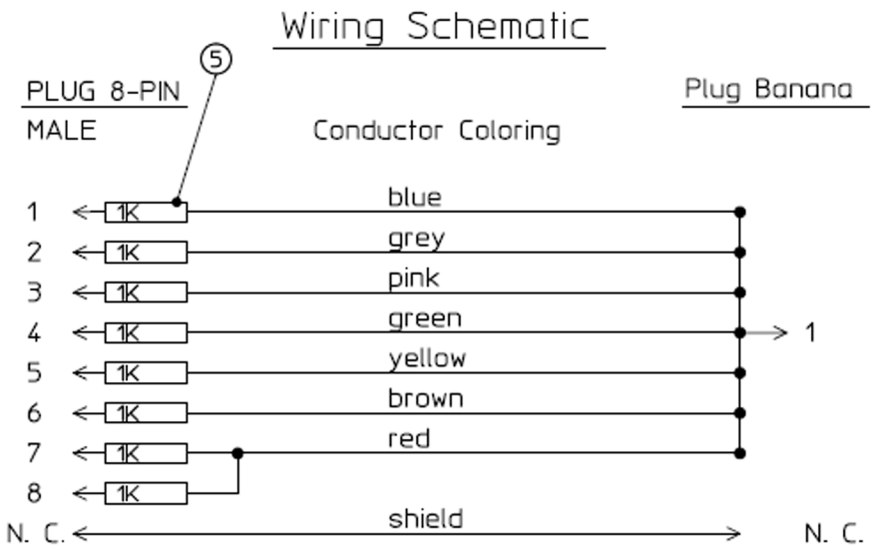
ECG



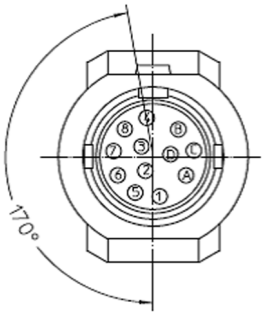


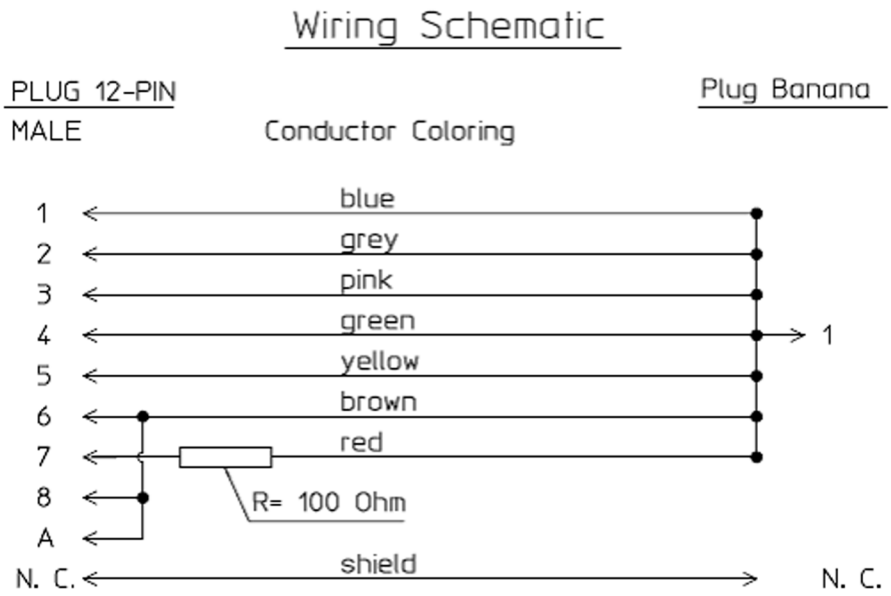
SpO2 (MP2/X2, MP5, M3001A & M1020B #A01, #A02, #A03, #A04)



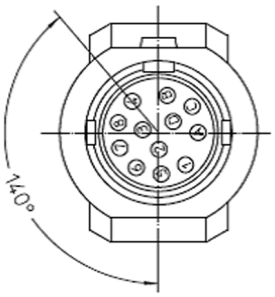


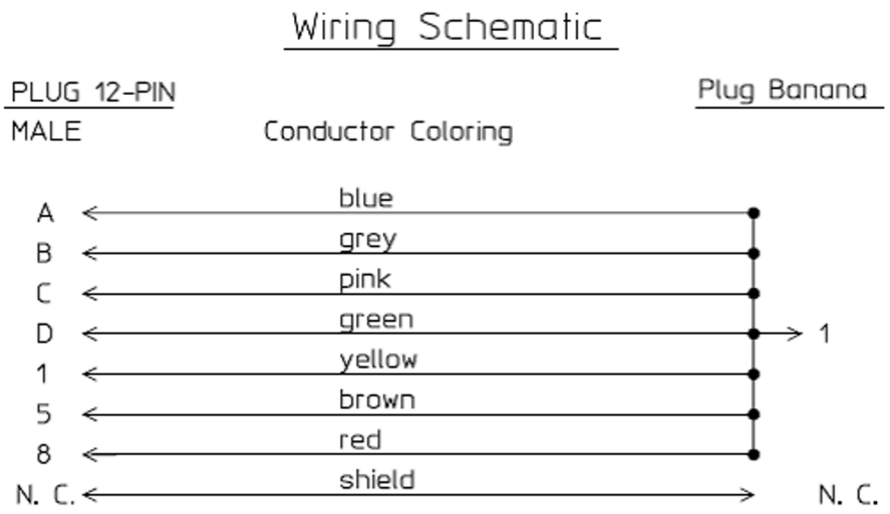
SpO2 (M1020A)



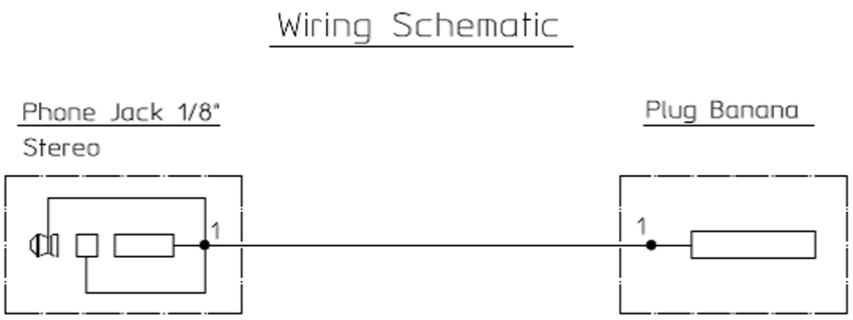


Invasive Pressure

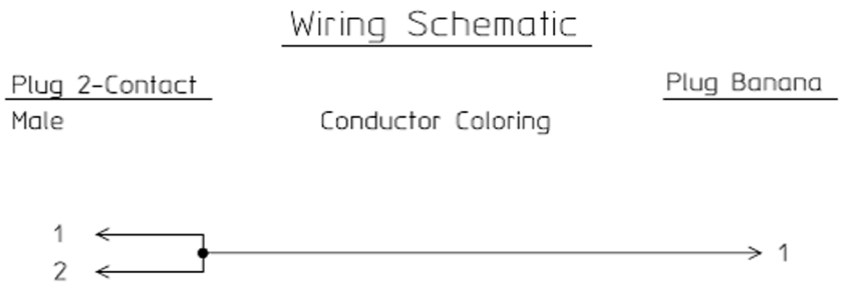




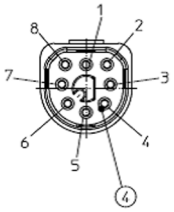
Invasive Pressure (M1006B #C01)

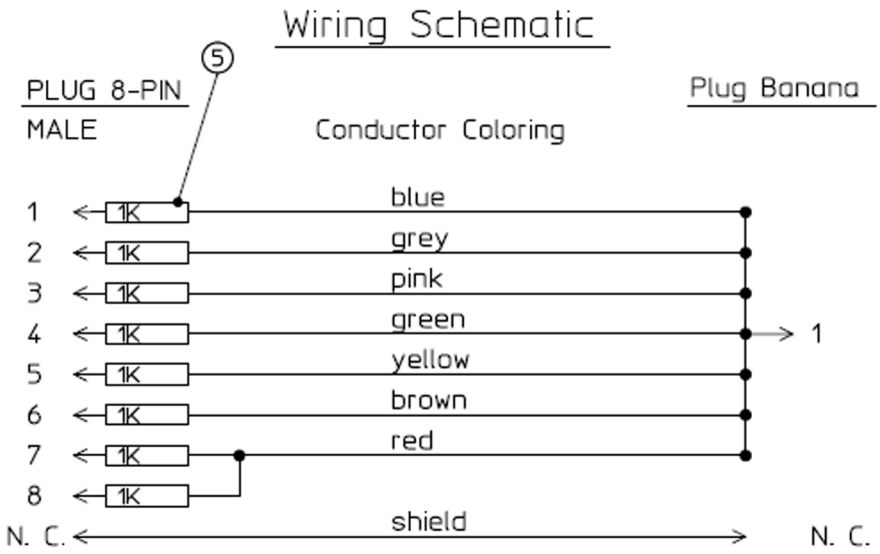


Temperature

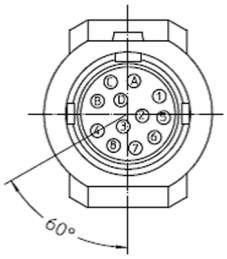


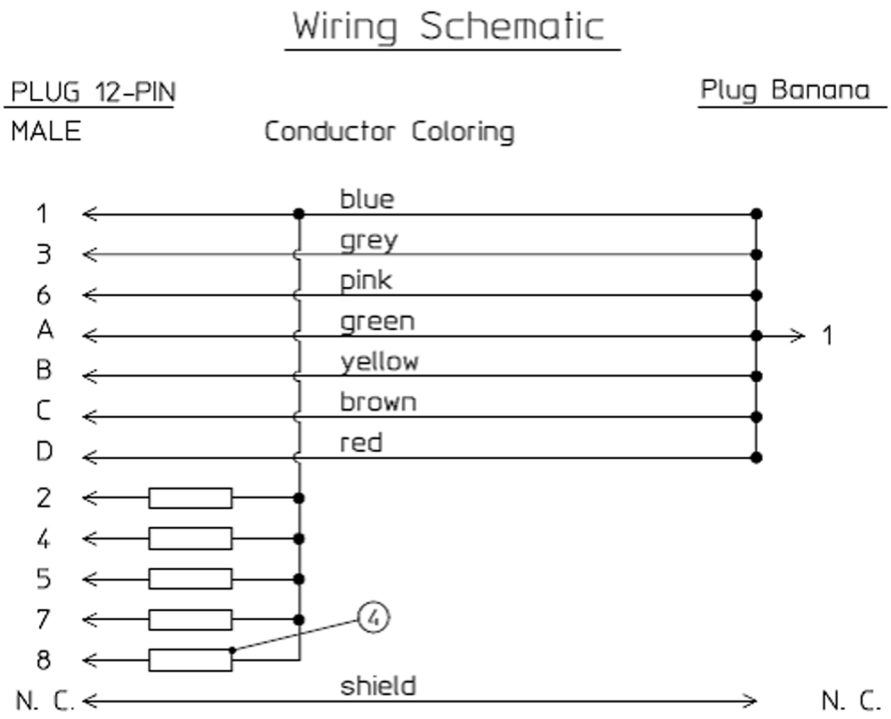
CO2 (MP5, M3014A)





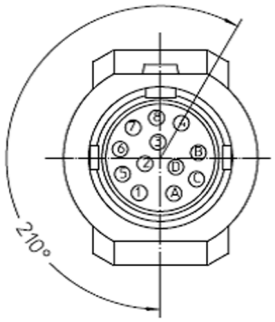
CO2 (M1016A, M3016A)

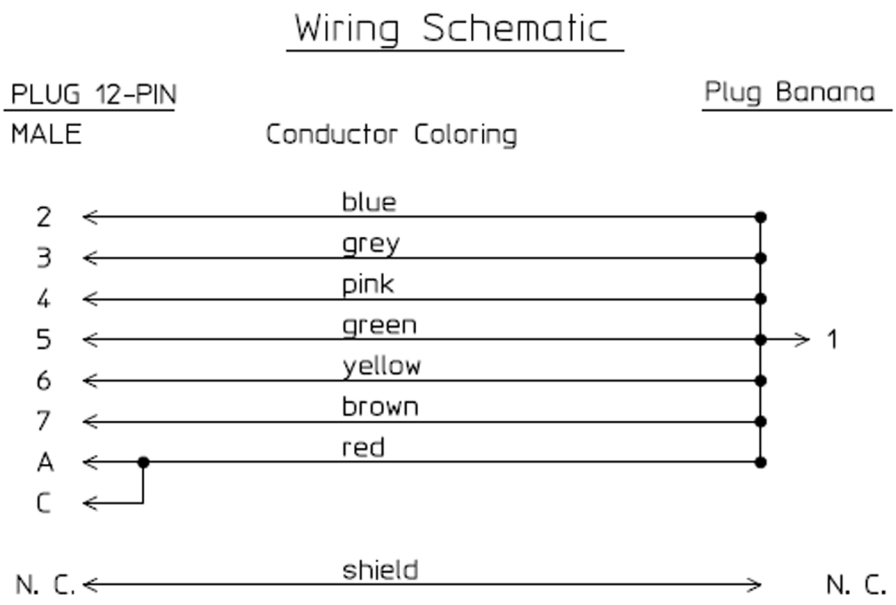




4 = all resistors 120 KOhm

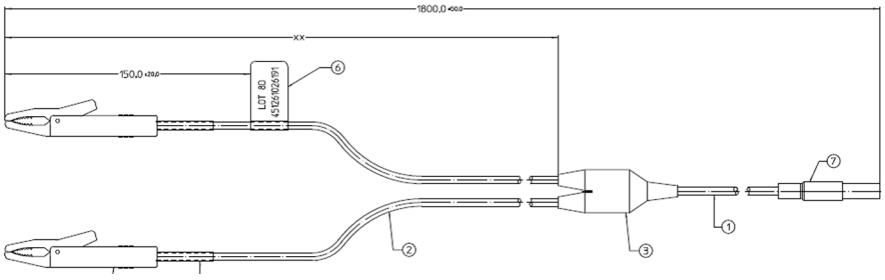
Cardiac Output

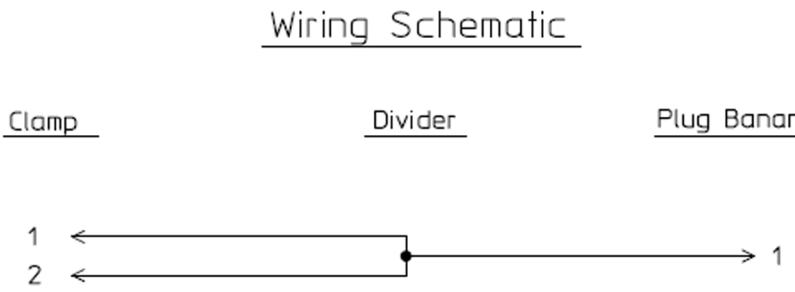




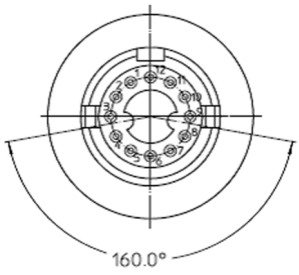
BIS

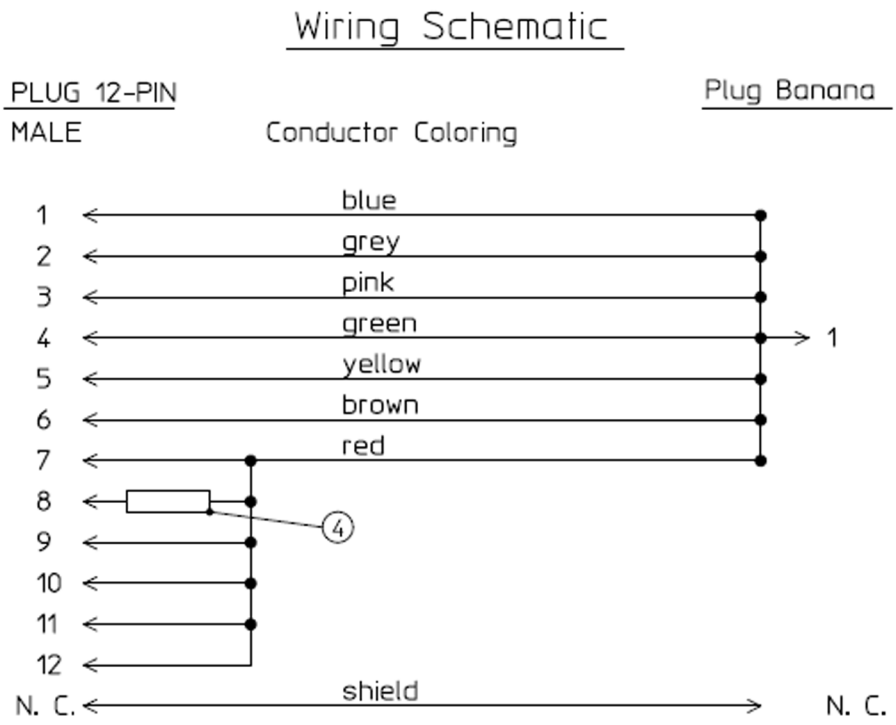
Use Clamp Adapter Cable and BIS sensor simulator (P/N: M1034-61650, 453563233731).





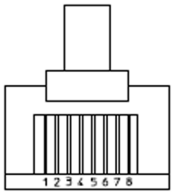
VueLink

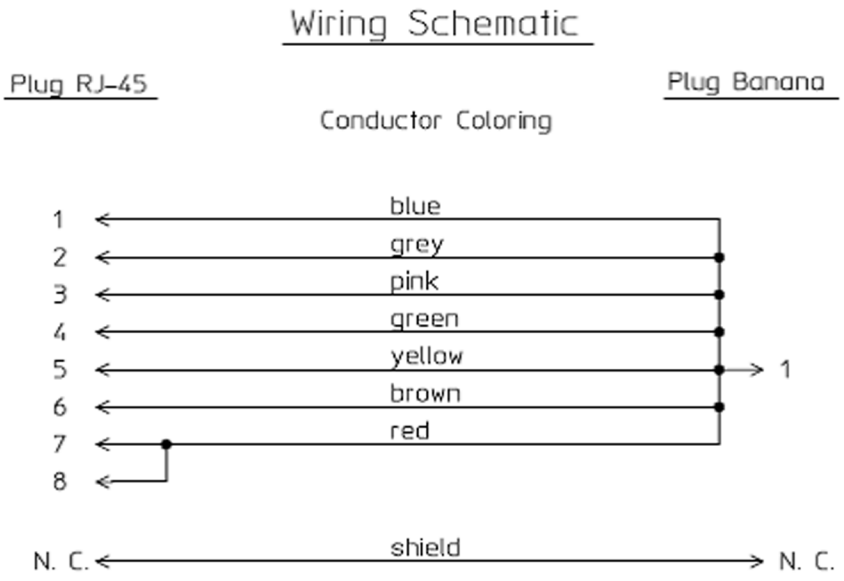




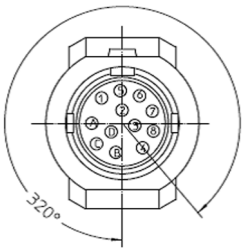
4 = 220 Ohm

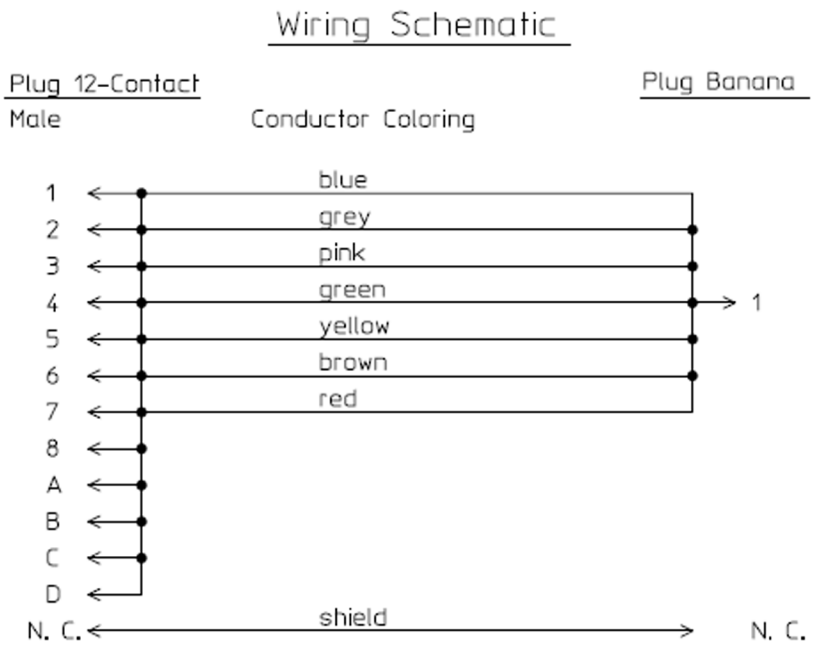
IntelliBridge



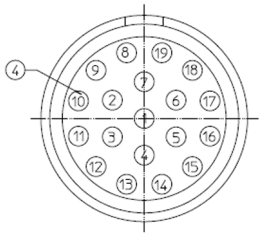


EEG





SvO2 (M1021A)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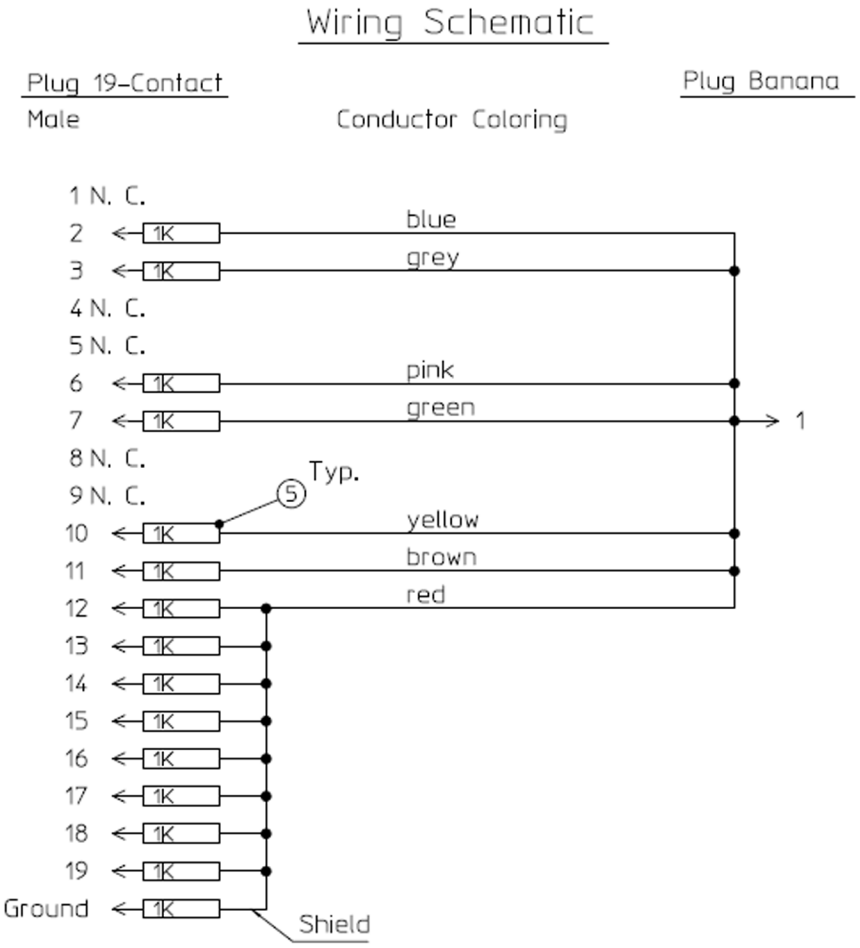
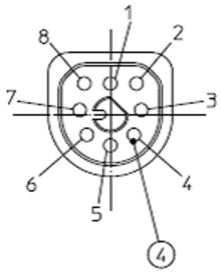
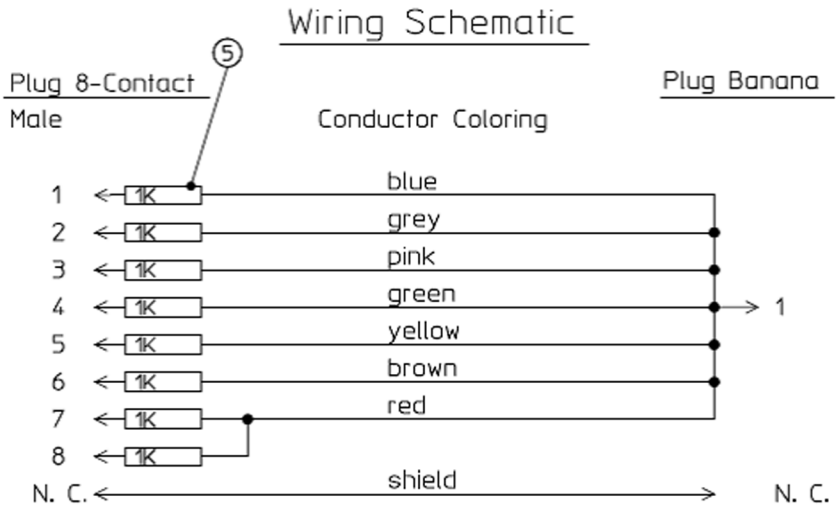
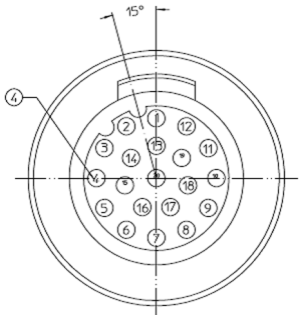

Wiring Schematic
Plug 19-Contact
Male
Conductor Coloring
Plug Banana
1 N. C.
2
3
4 N. C.
5 N. C.
6
7
8 N. C.
9 N. C.
10
11
12
13
14
15
16
17
18
19
Ground
1K
blue
grey
pink
green
yellow
brown
red
1
Typ.
5
Shield

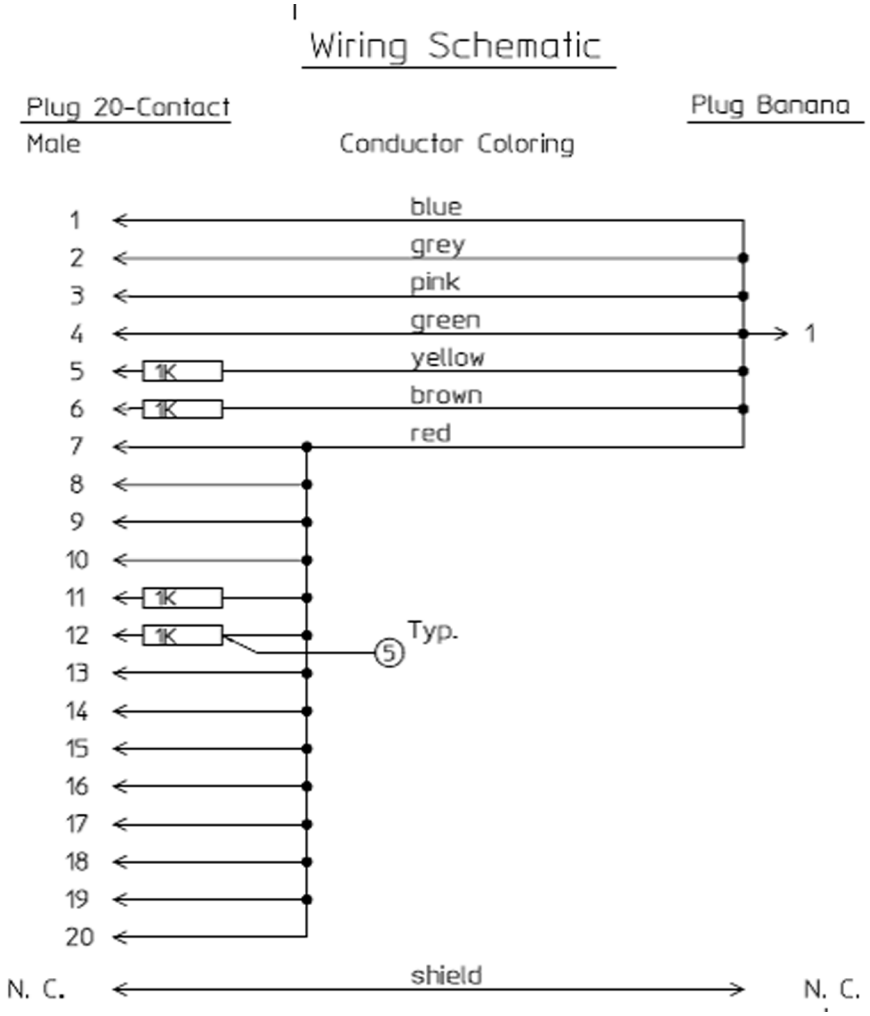
ScVO2 (M1011A)



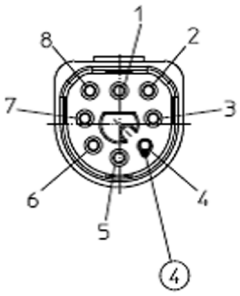


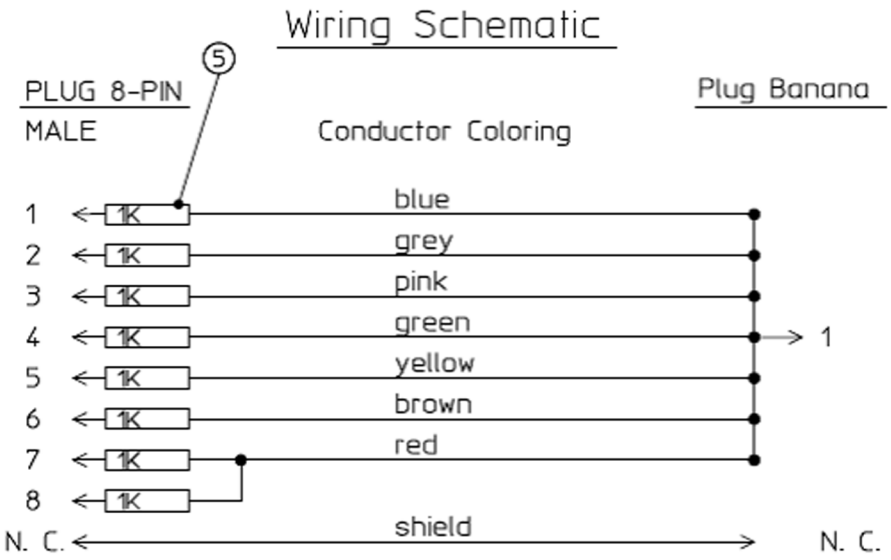
tcpO2/tcpCO2



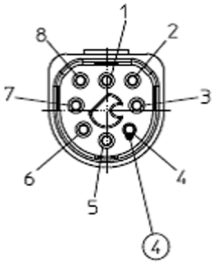


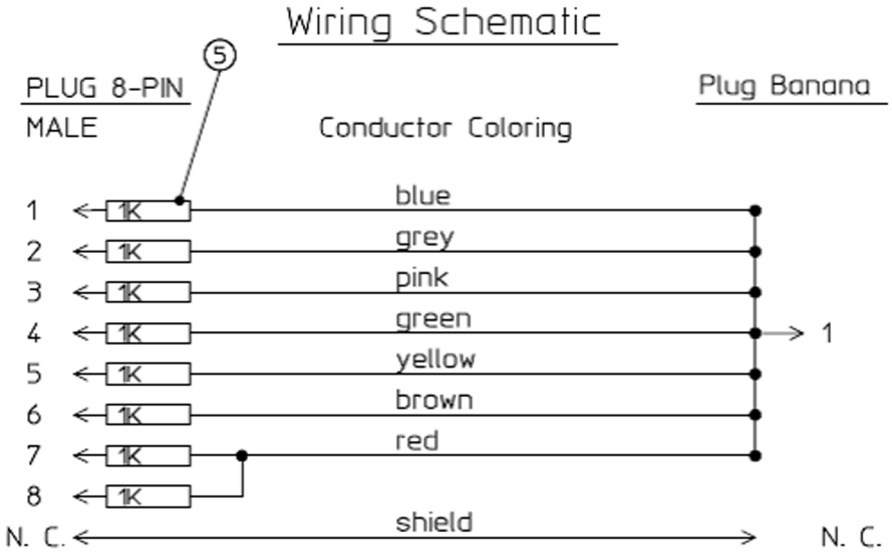
MP5 Predictive Temperature



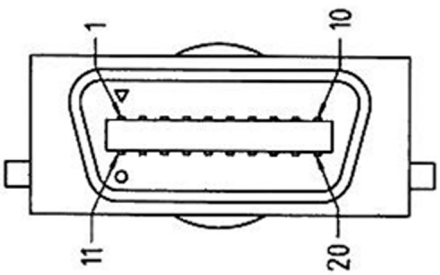


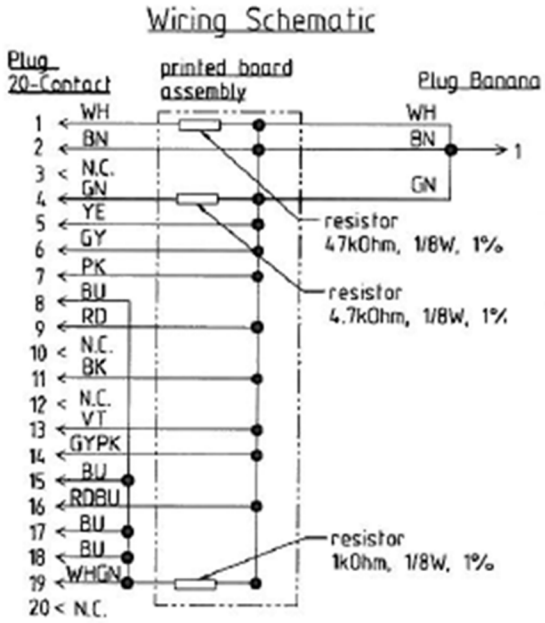
MP5 TAAP





TcG10

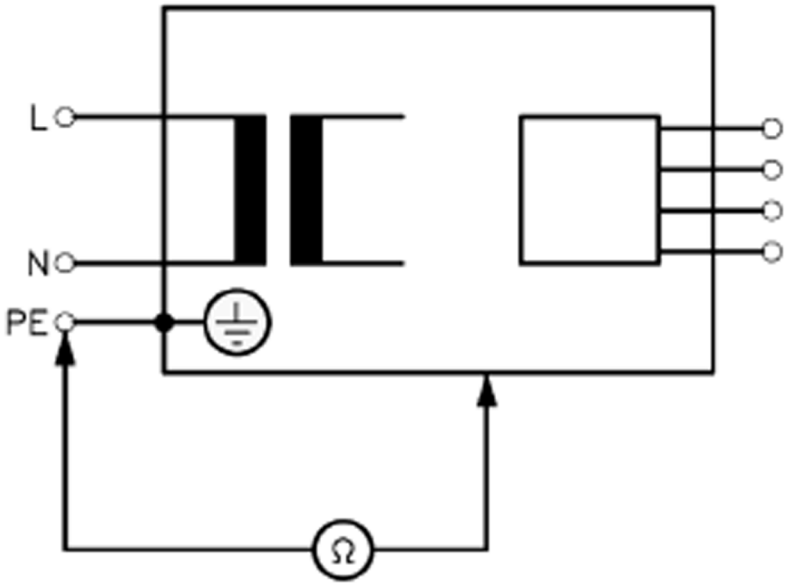




Electrical Safety Testing

S(1): Protective Earth Resistance Test

Test to perform:



Measuring circuit for the measurement of Protective Earth Resistance in medical electrical equipment that is disconnected from the supply mains.

This measures the impedance of the Protective Earth (PE) terminal to all exposed metal parts of the Device under Test (DUT), which are for safety reasons connected to the Protective Earth (PE).

You can find metal parts of the device at the equipotential connector.

Measurements shall be performed using a measuring device capable to deliver a current of at least 200 mA into 500 mOhms with maximum open circuit voltage of 24V

This safety test is based on IEC/EN 62353.

Report the highest value (X1).

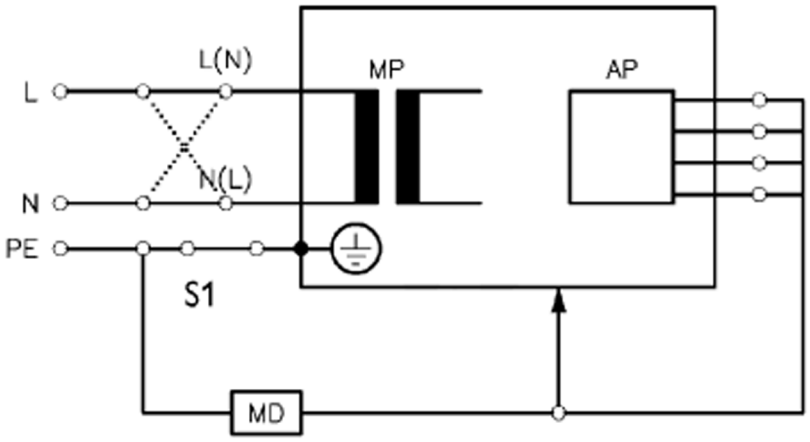
Test	Expected test results
Protective Earth Resistance Test (with mains cable)	X1 <= 300mOhms

NOTE

- If the protective earth resistance test fails, testing must be discontinued immediately and the device under test must be repaired or labeled as defective.
- All values for current and voltage are the root mean square (r.m.s.) values, unless otherwise stated.
- Flex the power cord during the protective earth resistance test to evaluate its integrity. If it does not pass the test, exchange the power cord. Then repeat the test. If it still does not pass, follow the instructions in the first bullet point of this note above.

S(2): Equipment Leakage Current Test - Normal Condition

Test to perform:



Measuring circuit for the measurement of Equipment Leakage Current - *Direct method* **according to IEC/EN 62353.**

This test measures leakage current of accessible conductive and non-conductive metal parts of the monitor and the functional earth leakage current. It tests normal and reversed polarity. Perform the test with S1 closed (Normal Condition).

There are no parts of the equipment that are not protectively earthed. Disconnect any data cables and any connections that may provide an extraneous earth path. Test the device under test (DUT) on an insulated surface. Do not touch the DUT during testing.

This safety test is based on IEC/EN 62353.

For measurement limits, refer to Safety (2) test,Test and Inspection Matrix.

Report the highest value (X1).

Test	Expected test results
Equipment Leakage Current Test (Normal Condition - with mains cable)	X1 <= 100µA

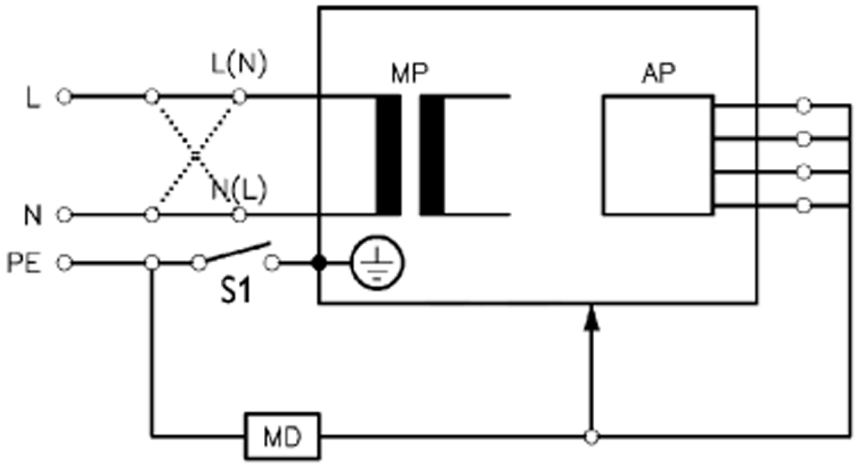
NOTE

All values for current and voltage are the root mean square (r.m.s.) values, unless otherwise stated.

In case of an IT-power system, this safety test measurement requires a special measuring circuit, for example with its own integrated TN-system or use of an external isolation transformer attached to the safety test device.

S(3): Equipment Leakage Current Test - Single Fault Condition

Test to perform:



Measuring circuit for the measurement of Equipment Leakage Current - *Direct method* **according to IEC/EN 62353.**

This test measures leakage current of accessible conductive and non-conductive metal parts of the monitor and the functional earth leakage current. It tests normal and reversed polarity. Perform the test with S1 open (Single Fault Condition).

There are no parts of the equipment that are not protectively earthed. Disconnect any data cables and any connections that may provide an extraneous earth path. Test the device under test (DUT) on an insulated surface. Do not touch the DUT during testing.

This safety test is based on IEC/EN 62353.

For measurement limits, refer to Safety (3) test, Test and Inspection Matrix.

Report the highest value (X2).

Test	Expected test results
Equipment Leakage Current Test (Single Fault Condition - with mains cable)	X2 <= 300µA

NOTE

All values for current and voltage are the root mean square (r.m.s.) values, unless otherwise stated.

In case of an IT-power system, this safety test measurement requires a special measuring circuit, for example with its own integrated TN-system or use of an external isolation transformer attached to the safety test device.

S(4): Applied Part Leakage Current - Mains on Applied Part

NOTE

During measurement of the Applied Part Leakage Current it is possible that the measured current can exceed the allowed limit (per IEC/EN 60601-1 or IEC/EN 62353).

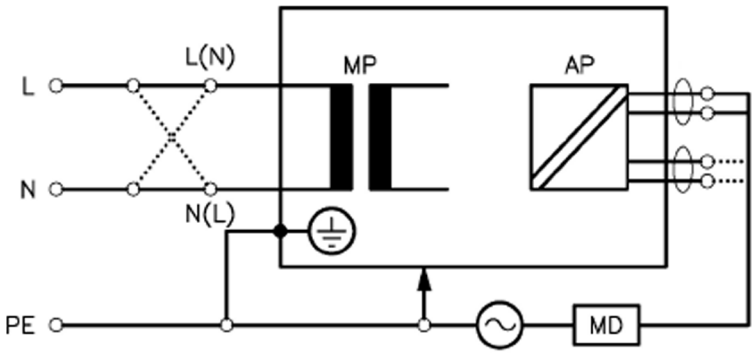
This can occur when the safety tester is connected to the invasive blood pressure and temperature connectors at the same time during the applied leakage current measurement.

The connectors for the invasive blood pressure and temperature are independently functioning connectors.

Although there are individual connectors on the front end, internally those parameters use the same electrical insulation interface and are hardwired to each other. This results in an electrical short of those connectors during measurement if a test current is applied simultaneously. Therefore this should be avoided.

Due to the combined insulation interface, it is sufficient to connect to only one parameter interface (that is, Invasive Blood Pressure or Temperature) of the invasive blood pressure/temperature measurement block. This avoids a short and the potential of exceeding the limit for the current.

Test to perform:



Measuring circuit for the measurement of Applied Part Leakage Current - *Direct method* **according to IEC/EN 62353.**

This test measures applied part leakage current from applied part to earth caused by external main voltage on the applied part. Each polarity combination possible shall be tested. This test is applicable to each Applied Part tested and results recorded in turn with all other Applied Parts left floating. Applied Parts with multiple connections (e.g. ECG) are tested with the connections short-circuited.

There are no parts of the equipment that are not protectively earthed.

This safety test is based on IEC/EN 62353.

For measurement limits and test voltage, refer to Safety (4) test, Test and Inspection Matrix.

Report the highest value. (X1).

Test	Expected test results
Applied Part Leakage Current Test (Single Fault Condition - mains on applied part)	S4 <= 50µA (CF)

NOTE

All values for current and voltage are the root mean square (r.m.s.) values, unless otherwise stated.

In case of an IT-power system, this safety test measurement requires a special measuring circuit, for example with its own integrated TN-system or use of an external isolation transformer attached to the safety test device.

Reference: Allowable Values for IEC 60601-1:1998 and UL 60601-1 Measurements

Protective Earth resistance (between the PROTECTIVE EARTH TERMINAL and any ACCESSIBLE METAL PART which is PROTECTIVELY EARTHED, w/o power cord): 100mOhms

Protective Earth resistance of power cord: 100mOhms

Enclosure leakage current (IEC 60601-1 and UL60601-1): 100 µA (N.C.)

Enclosure leakage current:(IEC 60601-1): 500 µA (S.F.C)

Enclosure leakage current (UL 60601-1): 300 µA (S.F.C)

Patient leakage current: (IEC 60601-1 and UL60601-1): 100 µA (N.C.) for BF

Patient leakage current: (IEC 60601-1 and UL60601-1): 500 µA (S.F.C.) for BF

Patient leakage current: (IEC 60601-1 and UL60601-1): 10 µA (N.C.) for CF

Patient leakage current: (IEC 60601-1 and UL60601-1): 50 µA (S.F.C.) for CF

All values for current and voltage are the root mean square (r.m.s.) values, unless otherwise stated

Insulation Resistance

It is not recommended to perform measurements of the insulation resistance. Refer to IEC 62353 for details about methods of the insulation resistance measurement.

System Test

After mounting and setting up a system, perform system safety tests according to IEC/EN 60601-1-1.

What is a Medical Electrical System?

A medical electrical system is a combination of at least one medical electrical piece of equipment and other electrical equipment, interconnected by functional connection or use of a multiple portable socket-outlet.

- Devices forming a medical electrical system must comply either with IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16.
- Any electrical device such as IT equipment that is connected to the medical electrical equipment must comply either with IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16 and be tested accordingly.
- Non-medical electrical equipment may require connection through a separating device (e.g. an isolation transformer).

General Requirements for a System

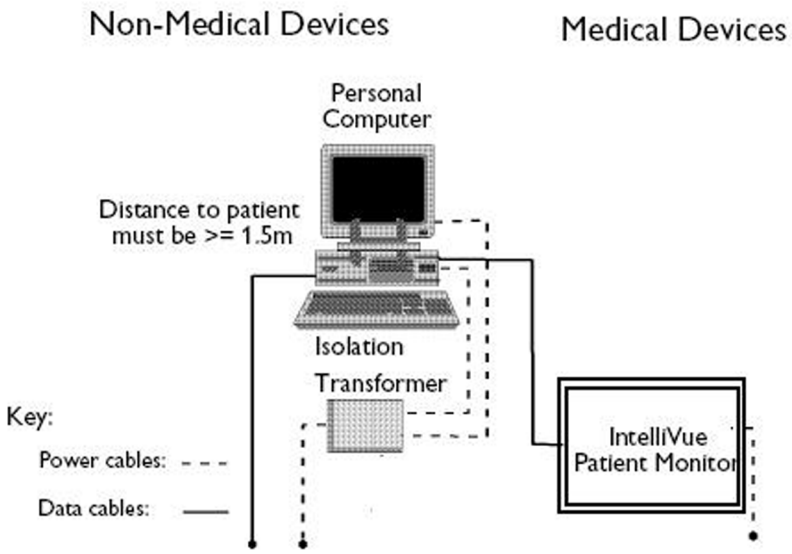
After installation or subsequent modification, a system must comply with the requirements of the system standard IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16. Compliance is checked by inspection, testing or analysis, as specified in the IEC/EN 60601-1-1 or in this book.

Medical electrical equipment must comply with the requirements of the general standard IEC/EN 60601-1, its relevant particular standards and specific national deviations. Non-medical electrical equipment shall comply with IEC safety standards that are relevant to that equipment.

Relevant standards for some non-medical electrical equipment may have limits for equipment leakage currents higher than required by the standard IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16. These higher limits are acceptable only outside the patient environment. It is essential to reduce equipment leakage currents to values specified in IEC/EN 60601-1 when non-medical electrical equipment is to be used within the patient environment.

System Example

This illustration shows a system where both the medical electrical equipment and the non-medical electrical equipment are situated at the patient's bedside.



WARNING

- Do not use additional AC mains extension cords or multiple portable socket-outlets. If a multiple portable socket-outlet is used, the resulting system must be compliant with IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16. Do not place multiple socket-outlets on the floor. Do not exceed the maximum permitted load for multiple socket-outlets used with the system. Do not plug additional multiple socket outlets or extension cords into multiple socket outlets or extension cords used within the medical electrical system.
- Do not connect any devices that are not supported as part of a system.
- Do not use a device in the patient vicinity if it does not comply with IEC/EN 60601-1 or IEC 60601-1 edition 3 clause 16. The whole installation, including devices outside of the patient vicinity, must comply with IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16. Any non-medical device placed and operated in the patient's vicinity must be powered via a separating transformer (compliant with IEC/EN 60601-1-1 or IEC 60601-1 edition 3 clause 16) that ensures mechanical fixing of the power cords and covering of any unused power outlets.

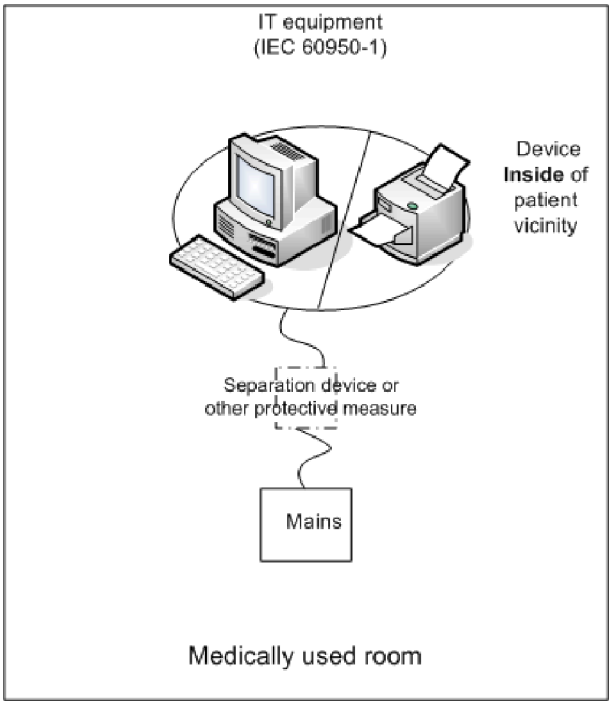
System Installation Requirements

- Ensure that the medical electrical system is installed in a way that the user achieves optimal use.
- Make sure the user is informed about the required cleaning, adjustment, sterilization and disinfection procedures listed in the Instructions for Use.
- The medical electrical system must be installed in such a way that the user is able to carry out the necessary cleaning, adjustment, sterilization and disinfection procedures listed in the Instructions for Use.

- Ensure that the medical electrical system is installed in a way that an interruption and restoration of power to any part of the medical electrical system does not result in a safety hazard.
- We recommend using fixed mains socket outlets to power the medical system or parts thereof. Avoid using multiple portable socket-outlets.
- Any multiple portable socket outlets used must be compliant with IEC 60884-1 and IEC 60601-1-1 or IEC 60601-1 edition 3 clause 16.
- Ensure that any part of the system connected to multiple portable socket-outlets is only removable with a tool, i.e. the multiple portable socket-outlet provides a locking mechanism to prevent power cords from being plugged or unplugged unintentionally. Otherwise, the multiple portable socket-outlet must be connected to a separation device. Multiple Socket Outlets used within the medical electrical system must only be used for powering medical electrical equipment which is part of the system.
- Ensure that any functional connections between parts of the medical electrical system are isolated by a separation device according to IEC 60601-1-1 or IEC 60601-1 edition 3 clause 16 to limit increased equipment leakage currents caused by current flow through the signal connections where necessary (e.g. leakage current coming from non-medical electrical equipment into medical electrical equipment or building ground voltage differences providing leakage current through grounded data cables). This only works if the equipment leakage current of the respective medical electrical system parts is not exceeded under normal conditions. This isolation is especially important where the non-medical electrical equipment leakage currents can pass to the medical electrical equipment in the system or building ground voltage differences can pass to the medical electrical equipment via ground in a data cable connection in the system
- Avoid increase of equipment leakage currents when non-medical electrical equipment within the medical electrical system is used. This only applies when if the equipment leakage current of the respective medical electrical system parts is not exceeded under normal conditions. Use of an additional protective earth connection, separation device or additional non-conductive enclosures are options that can prevent a problem.
- Within the patient environment it is important to limit electrical potential differences between different parts of a system. If necessary, use potential equalization equipment (equipotential cable) or additional protective earth connections.
- Medical electrical equipment used in medical rooms must be connected to potential equalization equipment (equipotential cable) to avoid electrical potential differences. Check your local requirements for details.

Required Protective Measures at System Installation

For any IT equipment (IEC60950-1) operated in the patient environment ensure that the equipment leakage current does not exceed the limits described in IEC 60601-1. Use a separation device to ensure compliance. After installation of IT equipment in the patient environment, an equipment leakage current test is required.

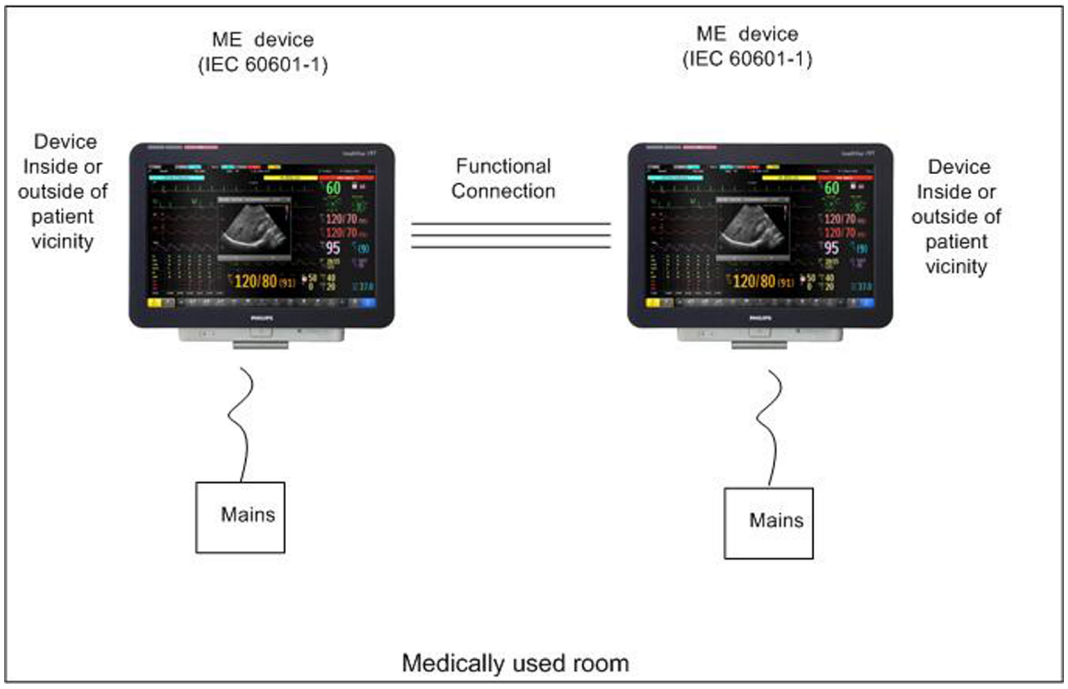


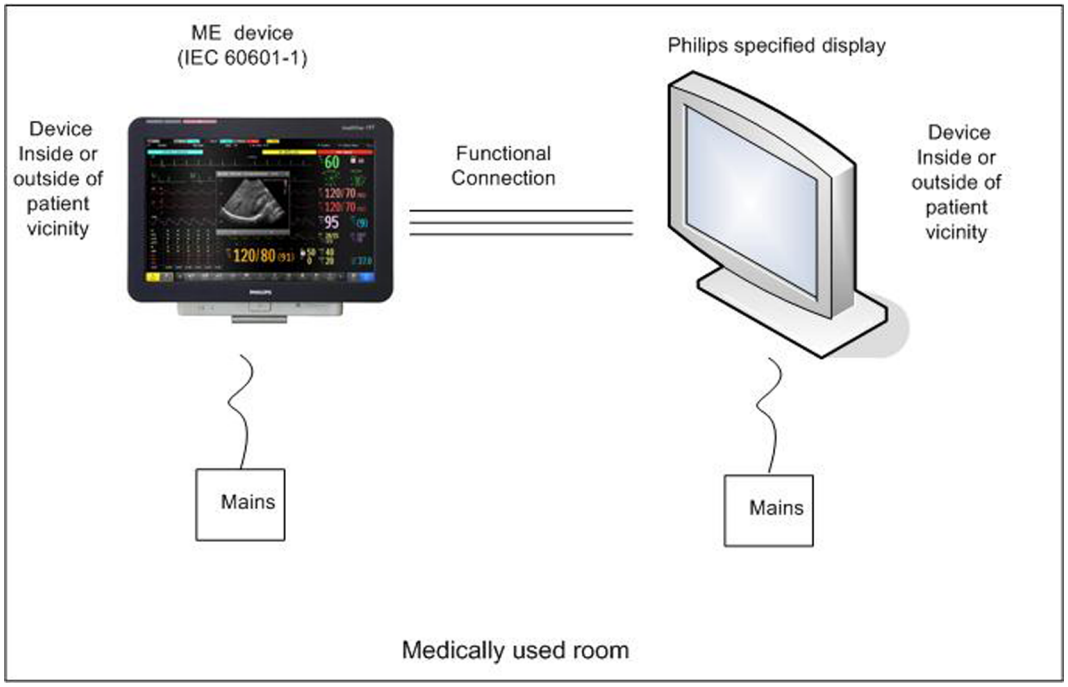
Case 1: Medical Device Combined with Medical Device

If you combine a medical device with another medical device (incl. Philips specified displays) to form a medical electrical system according to IEC60601-1-1 or IEC/EN 60601-1 edition 3 clause 16, no additional protective measures are required. The medical electrical devices may be located in or outside the patient vicinity in a medically used room. This is valid as long as the medical devices are connected to separate mains outlets. No system test is required.

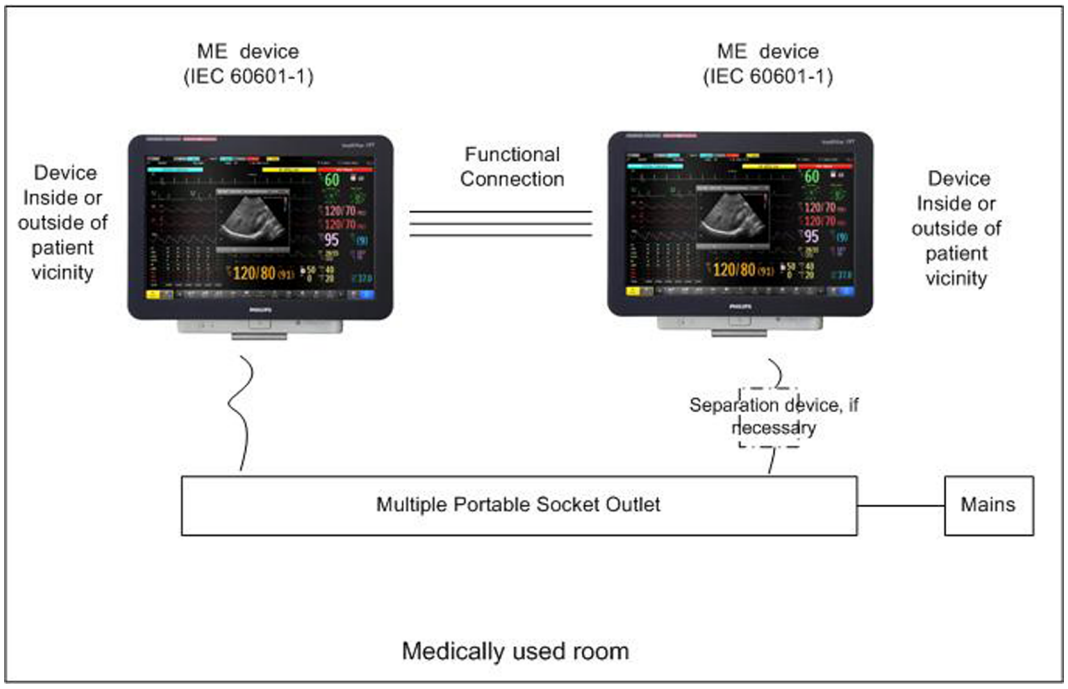
NOTE

The pictures below and in the following chapters show the MX800 as an example. All cases apply to the MX600/700 as well.



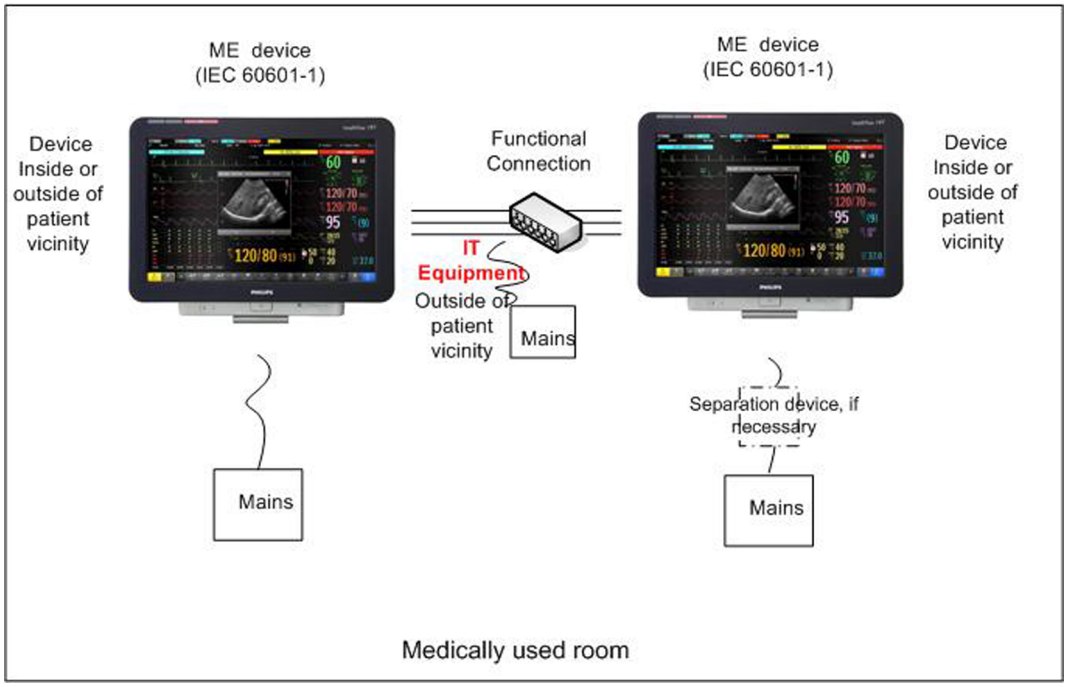


If the combined medical devices are connected to the same multiple portable socket outlet an enclosure leakage current test of the entire device combination on the multiple portable socket outlet is required to ensure that the resulting protective earth leakage current and equipment leakage current does not exceed the limits of IEC 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16. Avoid using multiple portable socket outlets. The medical electrical devices may be located in or outside the patient vicinity in a medically used room. If the limits are exceeded, additional protective measures are required, e.g. a separation device or the connection of each device to separate mains.

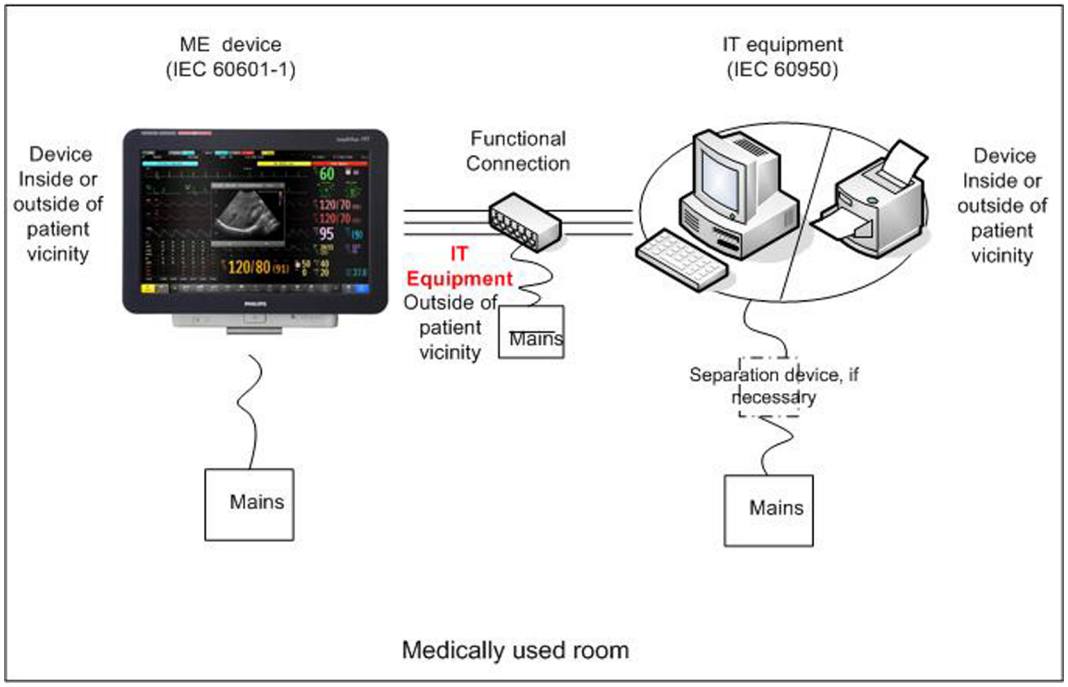


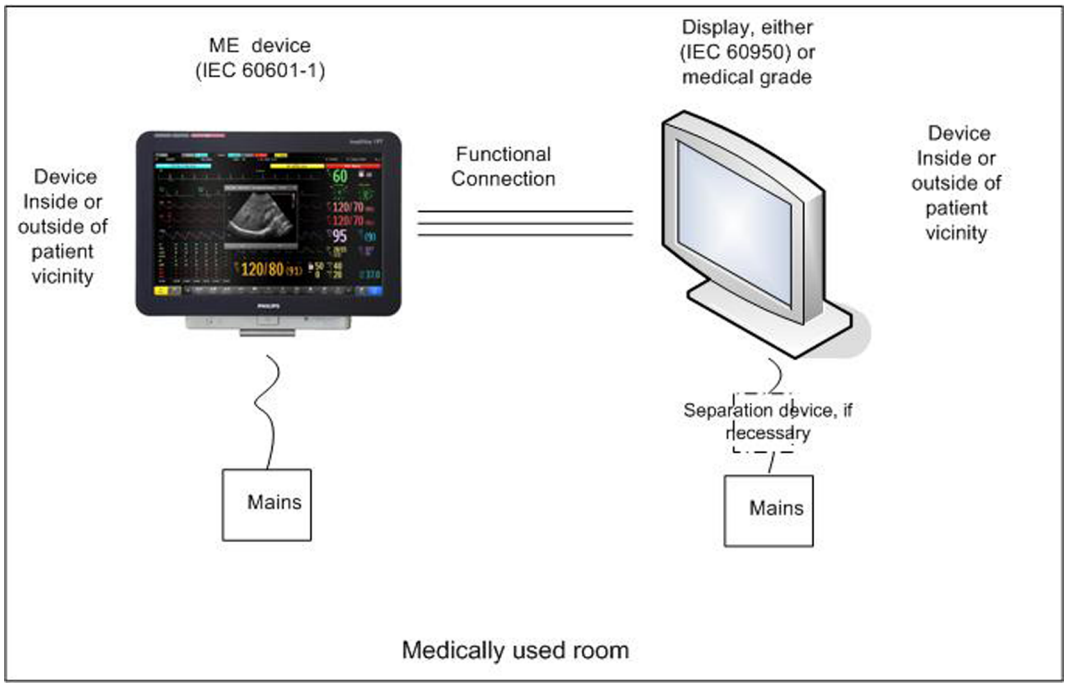
Case 2: Medical Device Combined with a Non-Medical Device

If you combine a medical device with a non-medical device to form a medical electrical system according to IEC60601-1-1 or IEC/EN 60601-1 edition 3 clause 16, additional protective measures are required, e.g. usage of a separation device. The medical electrical devices or the IT equipment may be located in or outside the patient vicinity in a medically used room. After system installation incl. protective measures, a system test is required to ensure that the resulting equipment leakage current and applied part leakage current does not exceed the limits of IEC 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16.

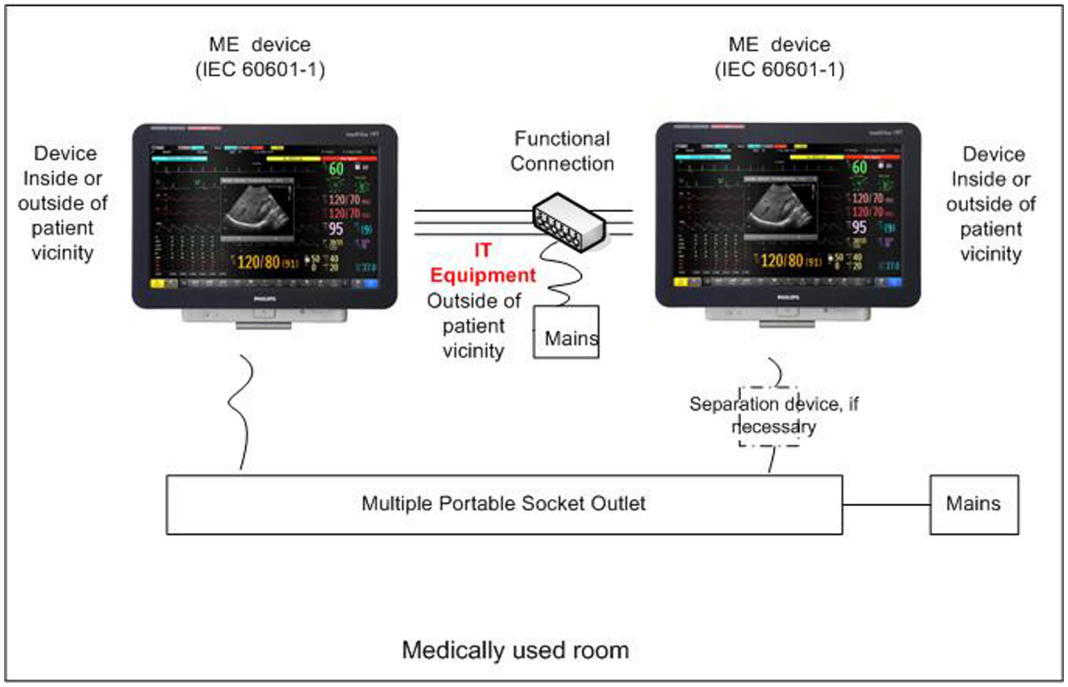


For any IT equipment (IEC60950-1) operated in patient vicinity ensure that the equipment leakage current does not exceed the limits described in IEC 60601-1 or IEC/EN 60601-1 edition 3 clause 16. Use a separation device to ensure compliance. After installation of IT equipment in patient vicinity, an equipment leakage current test is required.

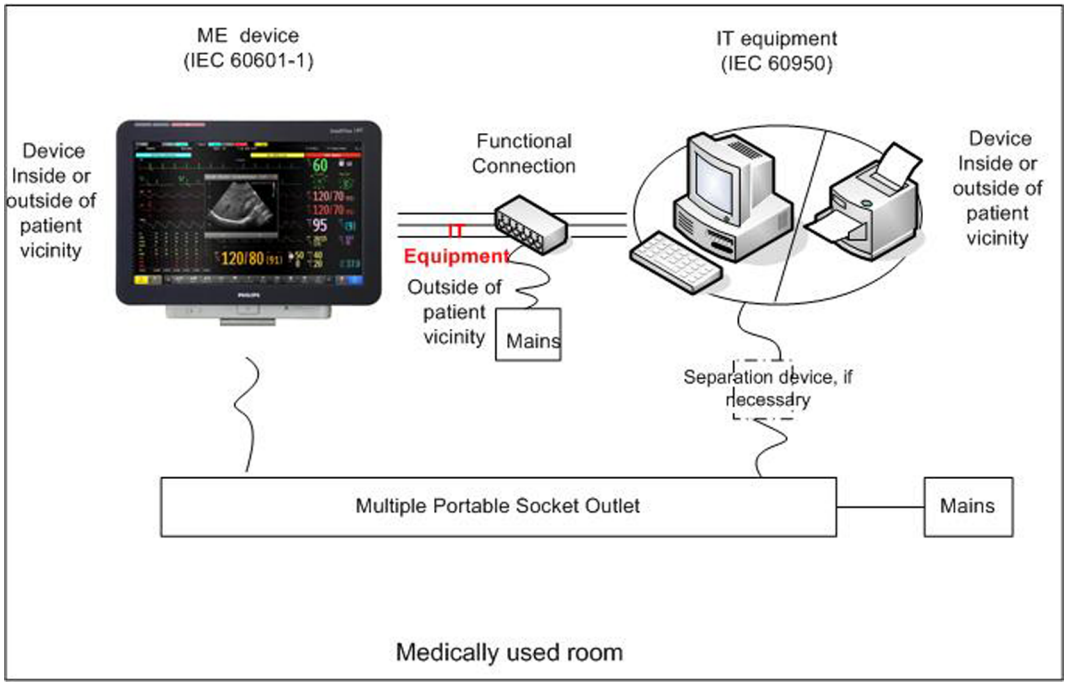




If the combined devices forming the medical electrical system are connected to the same multiple portable socket outlet, ensure that the resulting protective earth leakage current **and** equipment leakage current do not exceed the limits of IEC 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16. The medical electrical devices or IT equipment may be located in or outside the patient vicinity in a medically used room. Avoid using multiple portable socket outlets. If the limits of IEC 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16 are exceeded, additional protective measures are required, e.g. a separation device or the connection of each device to separate mains.

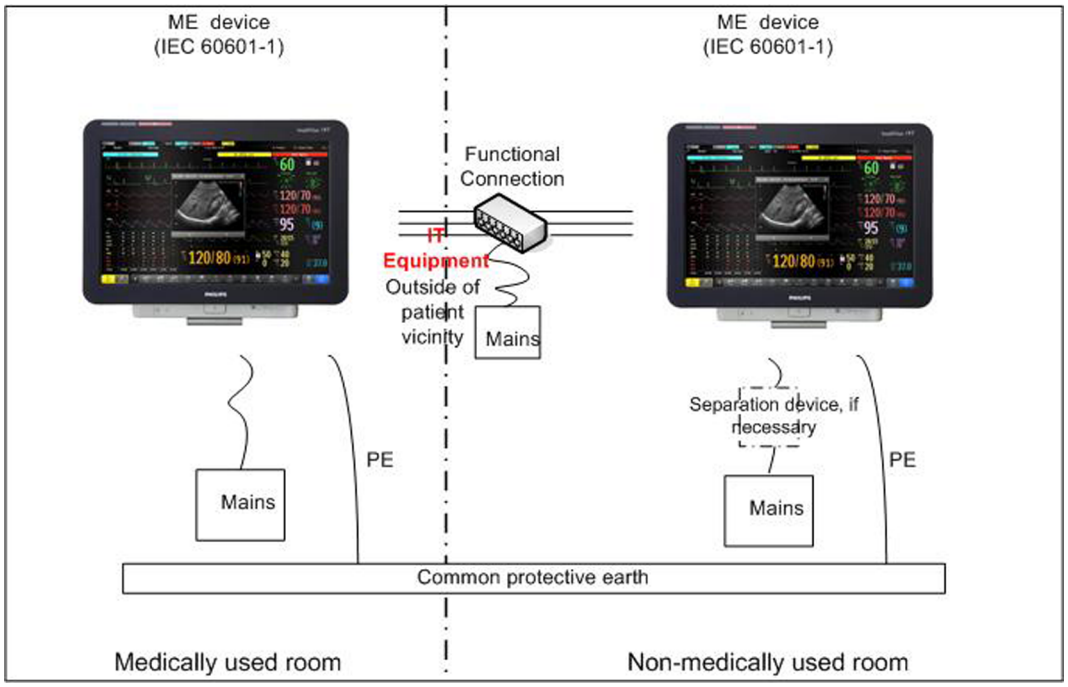


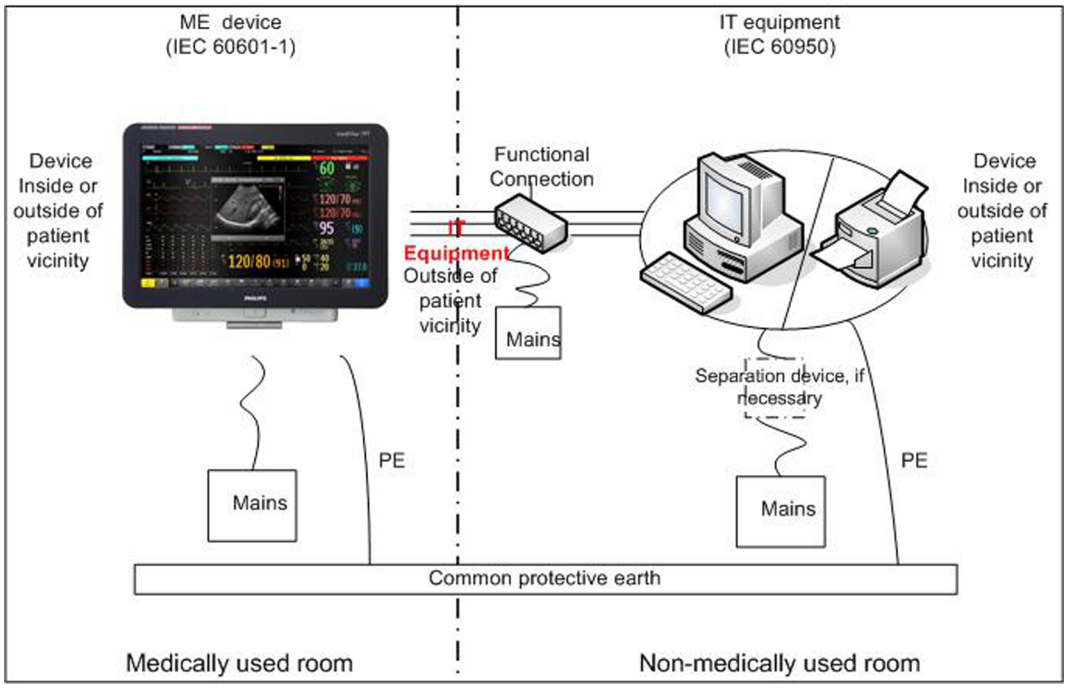
For any IT equipment (IEC60950-1) operated in patient vicinity ensure that the equipment leakage current does not exceed the limits described in IEC 60601-1 or IEC/EN 60601-1 edition 3 clause 16. Use a separation device to ensure compliance. After installation of IT equipment in patient vicinity, an equipment leakage current test is required.



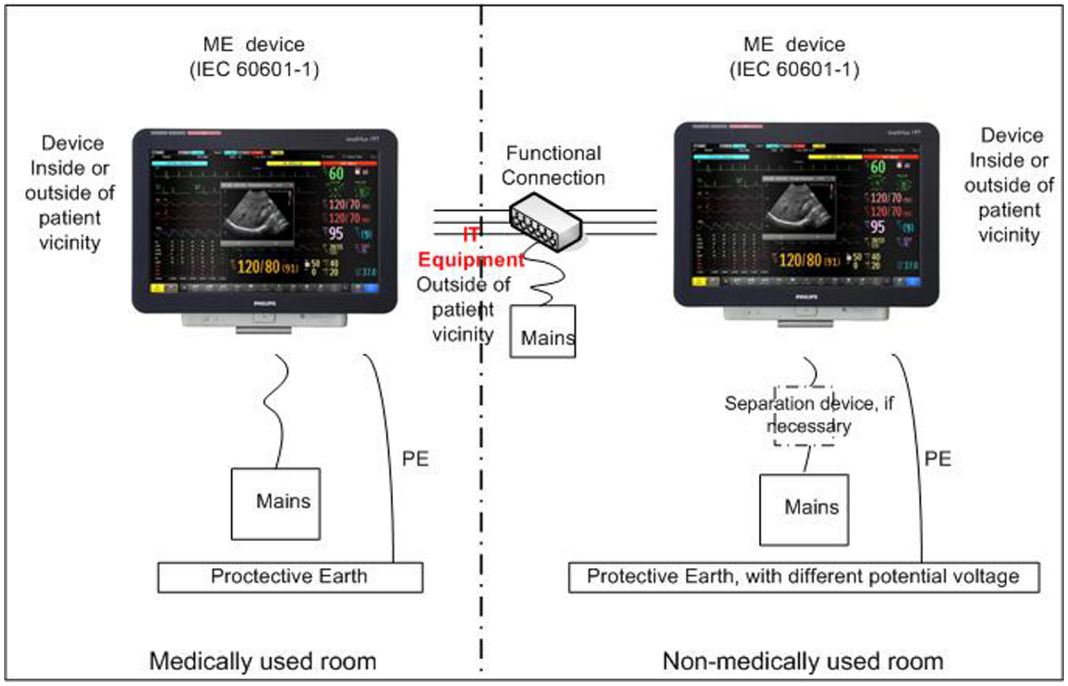
Case 3: Medical Device Combined with a Medical or Non-Medical Device with one Device in a Non-Medically-Used Room

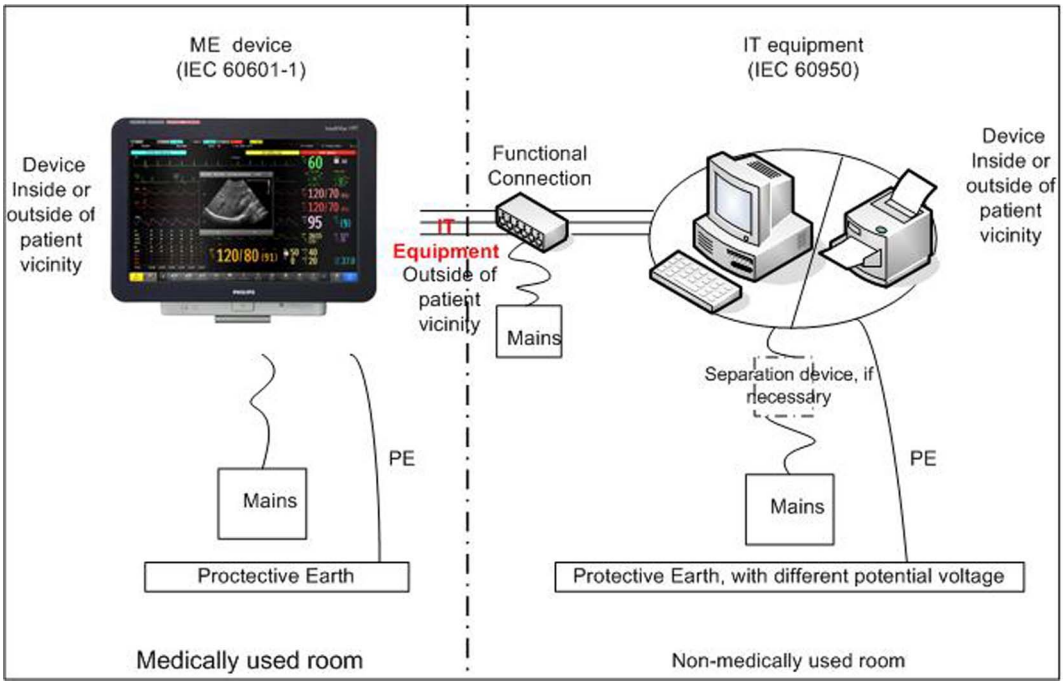
If you combine a medical device with a medical or non-medical device to form a medical electrical system according to IEC60601-1-1 or IEC/EN 60601-1 edition 3 clause 16 using a common protective earth connection and one of the devices is located in a non-medically used room, additional protective measures are required, e.g. usage of a separation device or additional protective earth connection. The medical electrical devices or IT equipment may be located in or outside the patient vicinity. After system installation incl. protective measures, a system test is required to ensure that the resulting equipment leakage current does not exceed the limits of IEC 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16.





If you combine a medical device with a medical or non-medical device to form a medical electrical system according to IEC60601-1-1 or IEC/EN 60601-1 edition 3 clause 16 using two separate protective earth connections and one of the devices is located in a non-medically used room creating a potential voltage difference, additional protective measures are required, e.g. usage of a separation device or additional protective earth connection. The medical electrical devices or IT equipment may be located in or outside the patient vicinity. After system installation incl. protective measures, a system test is required to ensure that the resulting equipment leakage current does not exceed the limits of IEC 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16.





System Test Procedure

If the medical electrical device has already been tested as a standalone device e.g. during factory safety testing, an equipment leakage current test must only be performed once the device is connected to another electrical device/system. If the medical electrical system has not been tested as a standalone device, the device has to be tested as a standalone device (without connection to the system) and as part of the system (with connection to the system).

Connect the detachable power cord of the device under test to the safety analyzer's test mains port. Connect the enclosure test lead of the safety analyzer to the enclosure of the device under test as described in the "Equipment Leakage Test" section . Refer to the documentation that accompanies the safety analyzer for further details on how to set up the test.

Test	Expected test results
Equipment Leakage Current Test (Normal Condition)	Sys1 <= 100µA
Equipment Leakage Current Test (Single Fault Condition)	Sys2 <= 300µA

After the testing of the device as a standalone device and as part of the system, check that the resulting values (without connection and with connection to the system) do not differ by more than +/- 10% from each other.

If the devices in the medical electrical system are connected to a multiple portable socket outlet the resulting protective earth leakage current needs to be determined. All system components must be connected to the multiple portable socket outlet and be switched on during this measurement.

Test	Expected test results
Protective Earth Leakage Current of Multiple Socket Outlets	Sys3 <= 300µA

Refer to the documentation that accompanies the safety analyzer for further details on how to set up the test.

Preventive Maintenance Procedures

Noninvasive Blood Pressure Measurement Calibration

Carry out the noninvasive blood pressure measurement performance tests at least every two years , or as specified by local laws (whichever comes first).

Microstream CO2 Calibration

Carry out the Microstream CO_2 calibration once a year or after 4000 hours of continuous use and following any instrument repairs or the replacement of any instrument parts.

Performance Assurance Tests

Some of the following test procedures must be performed in service mode. To enter service mode select **Operating Modes** in the main menu. Then select **Service Mode** and enter the password.

If required, open the screen menu in the monitor info line at the top of the screen and select **Service** to access the service screen. This is required particularly for Anesthetic Gas Module testing procedures.

Basic Performance Assurance Test

This section describes the basic performance test procedure. Please refer to the section for detailed information on when which test procedure is required.

Procedure:

Power on the monitoring system and go into demo mode. Check that each connected parameter (module, MMS, Gas Analyzer, Vuelink connected device) displays values.

Full Performance Assurance Test

The following sections describe the full performance testing procedures i.e. detailed testing of each parameter with a patient simulator or specified tools. Please refer to the section for information on when which testing procedure is required.

ECG/Resp Performance Test

This test checks the performance of the ECG and respiration measurements.

Tools required: Patient simulator.

ECG Performance

1. Connect the patient simulator to the ECG/Resp connector on the MMS/IntelliVue X2.
2. Configure the patient simulator as follows:
   - ECG sinus rhythm.
   - HR = 100 bpm or 120 bpm (depending on your patient simulator).
3. Check the displayed ECG wave and HR value against the simulator configuration.
4. The value should be 100bpm or 120 bpm+/- 2 bpm.

Respiration Performance

1 Change the Patient Simulator configuration to:
   – Base impedance line 1500 Ohm.
   – Delta impedance 0.5 Ohm.
   – Respiration rate 40 rpm or 45 rpm.

2 The value should be 40 rpm +/- 2 rpm or 45 rpm +/- 2 rpm.

Test	Expected test results
ECG Performance Test	100 bpm +/- 2 bpm or 120 bpm +/- 2 bpm
Respiration Performance Test	40 rpm +/- 2 rpm or 45 rpm +/- 2 rpm

ECG Out Performance Test (not available via SRR)

This test checks the performance of ECG synchronization between the monitor and a defibrillator. It only needs to be performed when this feature is in use as a protocol at the customer site.

Tools required:

- Defibrillator with ECG Input.
- Patient simulator.

1 Connect the patient simulator to the ECG connector of the MMS and the defibrillator to the ECG Output on the monitor with the ECG Sync cable.

2 Set the patient simulator to the following configuration:
   – HR = 100 bpm or 120 bpm (depending on your patient simulator).
   – ECG sinus rhythm.

3 Switch the defibrillator to simulation mode.

4 Check that the ECG signal is displayed.

Test	Expected test results
ECG Out Performance Test	ECG signal is displayed (pass/fail)

SpO2 Performance Test

This test checks the performance of the SpO_2 measurement.

Tools required: none

1 Connect an adult SpO2 transducer to the SpO_2 cradle.

2 Measure the SpO_2 value on your finger (this assumes that you are healthy).

3 The value should be between 95% and 100%.

Test	Expected test results
SpO2 Performance Test	95% and 100%

Measurement Validation

The SpO2 accuracy has been validated in human studies against arterial blood sample reference measured with a CO-oximeter. In a controlled desaturation study, healthy adult volunteers with

saturation levels between 70% and 100% SaO2 were studied. The population characteristics for those studies were:

- about 50% female and 50% male subjects
- age range: 19 to 39
- skin tone: from light to dark brown

NOTE

A functional tester cannot be used to assess the accuracy of a pulse oximeter monitor. However, it can be used to demonstrate that a particular pulse oximeter monitor reproduces a calibration curve that has been independently demonstrated to fulfill a particular accuracy specification.

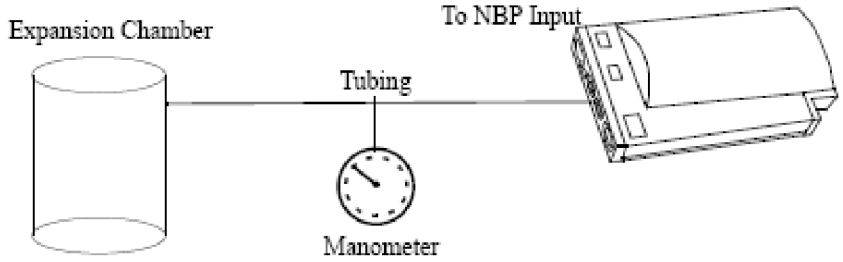
NBP PerformanceTest

This section describes NBP test procedures.The monitor must be in service mode and the screen "Service A" must be selected to perform these tests. The NBP Performance Test consists of:

- NBP Accuracy Test
- NBP Leakage Test
- NBP Linearity Test
- Valve Test

NBP Accuracy Test

This test checks the performance of the non-invasive blood pressure measurement. Connect the equipment as shown:



Tools required:

- Reference manometer (includes hand pump and valve), accuracy 0.2% of reading.
- Expansion chamber (volume 250 ml +/- 10%)
- Appropriate tubing.

In service mode, the systolic and diastolic readings indicate the noise of NBP channels 1 and 2 respectively. When static pressure is applied, the reading in NBP channel 1 should be below 50. The value in parentheses indicates the actual pressure applied to the system.

1 Connect the manometer and the pump with tubing to the NBP connector on the MMS and to the expansion chamber.

2 In service mode, select the **Setup NBP** menu.

3 Select **Close Valves: On**

4 Raise the pressure to 280 mmHg with the manometer pump.

5 Wait 10 seconds for the measurement to stabilize.

6 Compare the manometer values with the displayed values.

7 Document the value displayed by the monitor (**x1**).

8 If the difference between the manometer and displayed values is greater than 3 mmHg, calibrate the MMS. If not, proceed to the leakage test.

9 To calibrate the MMS, select **Close Valves off** then **Calibrate NBP** and wait for the instrument to pump up the expansion chamber.Wait a few seconds after pumping stops until **EnterPrVal** is highlighted and then move the cursor to the value shown on the manometer. If one of the following prompt messages appears during this step, check whether there is leakage in the setup:
   – NBP unable to calibrate–cannot adjust pressure
   – NBP unable to calibrate–unstable signal

10 Press **Confirm**.

If the INOP NBP Equipment Malfunction message occurs in monitoring mode, go back to service mode and repeat the calibration procedure.

NBP Leakage Test

The NBP leakage test checks the integrity of the system and of the valve. It is required once every two years and when you repair the MMS or X2 or replace parts.

1 If you have calibrated, repeat steps 2 to 6 from the accuracy test procedure so that you have 280 mmHg pressure on the expansion chamber.

2 Watch the pressure value for 60 seconds.

3 Calculate and document the leakage test value (**x2**).
x2 = P1 - P2
where P1 is the pressure at the beginning of the leakage test and P2 is the pressure displayed after 60 seconds.
The leakage test value should be less than 6 mmHg.

NBP Linearity Test

1 Reduce the manometer pressure to 150 mmHg.

2 Wait 10 seconds for the measurement to stabilize.

3 After these 10 seconds, compare the manometer value with the displayed value.

4 Document the value displayed by the monitor (**x3**)

5 If the difference is greater than 3 mmHg, calibrate the MMS or X2 (see steps 9 to 10 in the accuracy test procedure).

Valve Test

1 Raise the pressure again to 280 mmHg.

2 Select **Close valves: Off**.

3 Wait five seconds and then document the value displayed. The value should be less than 10 mmHg.

4 Document the value displayed by the monitor (x4).

Test	Expected test results
Accuracy test	x1 = 280 ± 3mmHg Difference ≤ 3mmHg
Leakage test	x2 = leakage test value x2 < 6 mmHg
Linearity test	x3 = 150 ± 3mmHg Difference ≤ 3mmHg
Valve Test	x4 = value < 10 mmHg

Invasive Pressure Performance Test

This test checks the performance of the invasive pressure measurement.

Tools required: Patient simulator.

1 Connect the patient simulator to the pressure connector.

2 Set the patient simulator to 0 pressure.

3 Make a zero calibration.

4 Configure the patient simulator as P(static) = 200 mmHg.

5 Wait for the display.

6 The value should be 200 mmHg ± 5 mmHg. If the value is outside these tolerances, calibrate the Invasive Pressure measurement. If the measurement was calibrated with a dedicated reusable catheter, check the calibration together with this catheter.

Test	Expected test results
Invasive Pressure Performance Test	200 mmHg ± 5 mmHg

Temperature Performance Test

This test checks the performance of the temperature measurement.

Tools required: Patient simulator (with 0.1°C or 0.2°F).

1 Connect the patient simulator to the temperature connector.

2 Configure the patient simulator to 40°C or 100°F.

3 The value should be 40°C ± 0.2°C or 100°F ± 0.4°F.

Test	Expected test results
Temperature Performance Test	40°C ± 0.2°C or 100°F ± 0.4°F

M3014A Capnography Extension Performance Tests

The procedures below describe the mainstream and sidestream CO2 performance tests for the M3014A Capnography Extension.

Mainstream CO2 Accuracy Check

Tools Required:

- three airway adapters
- Verification Gas M2506A
- Gas cylinder regulator M2505A

You also need a local barometric pressure rating received from a reliable local source (airport, regional weather station or hospital weather station) which is located at the same altitude as the hospital.

Procedure:

1. Attach the M2501A CO_2 sensor to the patient monitor. Attach an airway adapter to the sensor. Make sure that the sensor is disconnected from the patient circuit.
2. Switch on the patient monitor.
3. Enter the monitor's Service Mode.
4. Using the sensor status provided in the M2501A Serial protocol, wait for the M2501A sensor to warm up to its operating temperature.
5. The default setting for gas temperature is 22°C. If the gas temperature is significantly above or below this value, correct the gas temperature setting.
6. Zero the sensor on the airway adapter being used in this test. Ensure Zero Gas is set to Room Air
7. Attach a regulated flowing gas mixture of 5% CO2, balance N2 to the airway adapter.
8. Set the gas correction to off.
9. Allow a few seconds for the gas mixture to stabilize and observe the CO2 value. The expected value is 5% of the ambient pressure ±2mmHg

NOTE

Make sure that you follow the above steps correctly. If the sensor fails this check it must be exchanged. The sensor cannot be calibrated.

Example for an expected test result:
The expected test result for an altitude of 0 m (sea level) at approximately 760 mmHg ambient pressure is:

Test	Expected test results (x1)	Acceptance Range
Mainstream CO2 Accuracy Test	5% of 760 mmHg pressure ±2mmHg	36 mmHg - 40 mmHg

NOTE

The expected test results will differ depending on the conditions (i.e. altitude or ambient pressure).

Sidestream CO2 Accuracy Check

Tools Required:

- Cal gas flow regulator M2267A
- Cal tube 13907A
- Verification Gas M2506A
- Straight Sample Line M2776A

You also need a local barometric pressure rating received from a reliable local source (airport, regional weather station or hospital weather station) which is located at the same altitude as the hospital.

Procedure:

1 Attach the M2741A CO2 sensor to the patient monitor. Attach the sample line and the cal tube to the sensor. Make sure that the sensor is disconnected from the patient circuit.

2 Switch on the patient monitor.

3 Enter the monitor's Service Mode.

4 Using the sensor status provided in the M2741A Serial protocol, wait for the M2741A sensor to warm up to its operating temperature.

5 Zero the sensor. Ensure Zero Gas is set to Room Air

6 Attach a regulated flowing gas mixture of 5% CO2, balance N2 to the cal tube.

7 Set the gas correction to off.

8 Allow a few seconds for the gas mixture to stabilize and observe the CO2 value. The expected value is 5% of the ambient pressure ±2mmHg

NOTE

Make sure that you follow the above steps correctly. If the sensor fails this check it must be exchanged. The sensor cannot be calibrated

Example for an expected test result:
The expected test result for an altitude of 0 m (sea level) at approximately 760 mmHg ambient pressure is:

Test	Expected test results (x2)	Acceptance Range
Sidestream CO2 Accuracy Test	5% of 760 mmHg pressure ±2mmHg	36 mmHg - 40 mmHg

NOTE

The expected test results will differ depending on the conditions (i.e. altitude or ambient pressure).

Sidestream CO2 Flow Check

Check the flow rate in the Sidestream CO2 extension as follows:

1 Connect the flowmeter to the sample line

2 Check on the flowmeter the flow that the Sidestream CO_2 extension pump draws. It should be 50 ml/min ± 10 ml/min. If the value is not within tolerance check your setup again and perform another flow check. If it fails again, the sensor must be replaced. The sensor cannot be calibrated.

Example for an expected test result:
The expected test result for an altitude of 0 m (sea level) at approximately 760 mmHg ambient pressure is:

Test	Expected test results (x3)	Acceptance Range
Sidestream CO2 Flow Check	50 ml/min ±10 ml/min	40 ml/min - 60 ml/min

NOTE

The expected test results will differ depending on the conditions (i.e. altitude or ambient pressure).

Microstream CO2 Performance Test

Allow five seconds between individual service procedures to ensure stable equipment conditions. When certain monitor procedures are running, service procedures are not possible and trying to start them will result in a message **Service Operation Failed** in the monitor's status line. Wait until the monitor completes the current operation, then restart the service procedure.

This test checks the performance of the Microstream CO2 measurement. The Microstream CO2 measurement can either be integrated into the IntelliVue MP5 monitor or, for other IntelliVue monitors, into the M3015A/B MMS Extensions. The Microstream CO2 performance test is required once per year or after 4000 hours of continuous use and when the instrument is repaired or when parts are replaced.

This test uses calibration equipment that you can order (see the *Parts* section for the part number). The procedure is summarized in the following steps. Refer to the documentation accompanying the equipment for detailed instructions.

Tools Required:

- Standard tools, such as screwdriver, tweezers
- Electronic flowmeter, M1026-60144 or Mass Flowmeter 453564178121
- Digital Barometer ±2mbar or better
- Gas calibration equipment:
- Cal 1 gas 15210-64010 (5% CO_2)
- Cal 2 gas 15210-64020 (10% CO_2)
- Cal gas flow regulator M2267A
- Cal tube 13907A
- Calibration Line M3015-47301
- Leakage Test Kit M1013-64002 (451261014851) (only required for leakage test without M1026-60144 Flowmeter)
- Flexible Connecting Tube

You also need a local barometric pressure rating received from a reliable local source (airport, regional weather station or hospital weather station) which is located at the same altitude as the hospital.

The CO2 calibration for the Microstream extension consists of the following steps:

- Leakage check, **either** with M1026-60144 Flowmeter **or** with 453564178121 Mass Flowmeter*
- Barometric pressure check and calibration, if required.*
- Pump check*

- Flow check and calibration, if required
- Noise check
- CO2 Cal check and calibration, if required
- CO2 Cal verification

Perform all checks in the same session.

* Not applicable for all HW Revisions. See individual test sections for details.

NOTE

The M3015A/B HW Rev C is indicated as HW Rev. Q.xx.xx in the IntelliVue Revision Screen.

Leakage Check with M1026-60144 Flowmeter (only for M3015A with HW Rev. A and B and Firmware Revision < P.01.32)

The leakage check consists of checking the tubing between:

- the pump outlet and the mCO_2 outlet and
- the pump inlet and calibration line inlet.

Check the user's guide of the flowmeter for details on how to make a correct flow reading.

Part 1

1 Go into service mode and select **Setup CO2** menu.

2 Connect a calibration line to the Microstream CO_2 input to start the pump running.

3 Check the ambient pressure and the cell pressure shown in the monitor's status line. The cell pressure should be approximately 20 mmHg lower than ambient pressure. (This test is only to check that the pump starts and is running, which is also indicated by the noise generated by the running pump.)

4 Connect the flowmeter outlet to the calibration line inlet using a flexible connecting tube.

5 Block the mCO_2 outlet using your fingertip and observe the flowmeter display. The value on the flowmeter (**x1**) should decrease to between 0 and 4 ml/min, accompanied by an audible increase in pump noise. If the value is within the tolerance limits, continue with part 2 of the leakage check.

6 If the value is outside the tolerance limits, there is a leakage between the pump outlet and the mCO_2 outlet.

7 Open the MMS Extension or MP5 and check the tubing connections at the pump outlet and the extension gas outlet. If the connections are good, then there is a leakage in the tubing and you must exchange the MMS Extension or the mCO_2 Assembly of the MP5 respectively.

Part 2

1 Disconnect the flowmeter from the Part 1 setup and connect the flowmeter inlet to the M3015A gas outlet or the MP5 mCO_2 gas outlet.

2 Leave the calibration line connected to the M3015A inlet or the MP5 mCO_2 inlet..

3 Block the inlet of the calibration line using your fingertip and observe the flowmeter display. The value on the flowmeter (**x2**) should decrease to between 0 and 4 ml/min, accompanied by an audible increase in pump noise. The cell pressure shown in the status line on the display should decrease to between 300 and 500 mmHg. Do not block the inlet for longer than 25 seconds as this will lead to an "Occlusion" INOP. If the value is within the tolerance limits, there are no leakages and the leakage check is completed; proceed to the pump check.

4 If the value is not within the tolerance limits, there is a leakage between the calibration line inlet and the pump inlet.

5 Check the calibration line connections and open the M3015A or MP5 to check the tubing connections at the pump inlet and the M3015A or MP5 mCO_2 gas inlet. If the connections are good, try replacing the calibration line and repeating the leakage check. If the situation remains, there is a leakage in the tubing and the M3015A or the mCO_2 assembly of the MP5 must be exchanged.

Test	Expected test results
Leakage Check Parts 1 and 2	**x1** = value of part 1 leakage check on flowmeter (**x1**< 4.0 ml/min) **x2** = value of part 2 leakage check on flowmeter (**x2**< 4.0 ml/min)

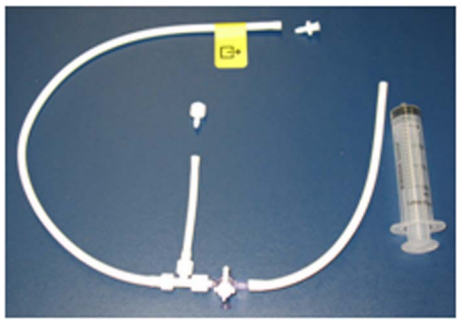
Leakage Check without for M3015B and M3015A with HW Rev C or M3015A with HW Rev. A/B without M1026-60144 Flowmeter

Preparation of Leakage Test Kit:

Remove two Luer connectors from the Leakage Test Kit, as shown in the following picture.

NOTE

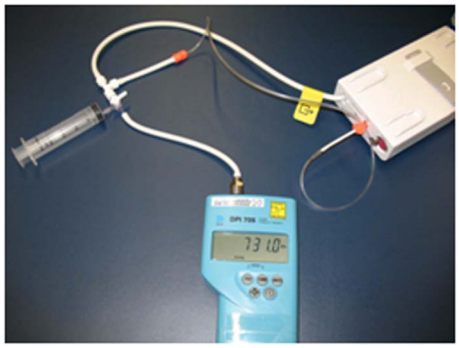
These Luer connectors are not required for the actual Leakage Check. However, you should keep them, as they are required for other tests (e.g. for the kit leak test as documented later in this section).



Test Setup:

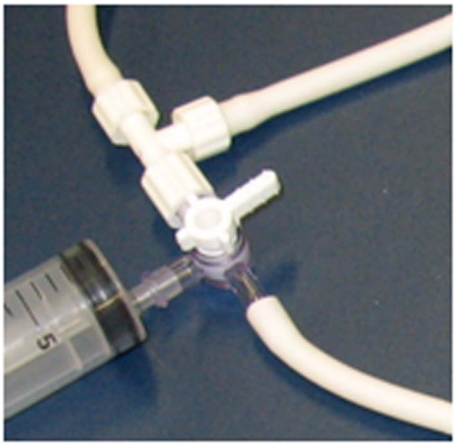
1 Connect the Calibration Line (M3015-47301) to the inlet of the M8105A/M3015A/B (the M8105A/M3015A/B must be switched off, either by disconnecting from the host monitor or by switching off the monitor).

2 Connect the leakage test tubing to the outlet of the M8105A/M3015A/B, to the digital barometer, to the calibration line, and the (empty) syringe as shown below). Make sure all connections have a tight fit!



Test Procedure:

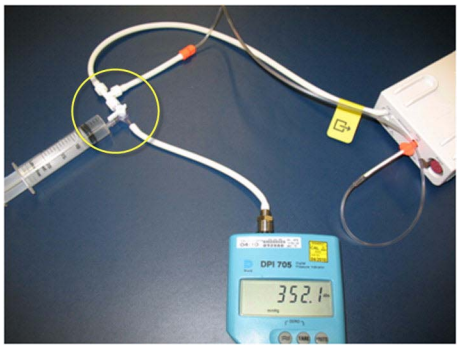
1 Open the 3-way stopcock for all three limbs.



2 Switch on the digital barometer (the digital barometer should now display the actual ambient pressure).

3 Now slowly draw at the syringe, as if filling the syringe, until the pressure (as displayed on the digital barometer) drops to approximately 350 mbar below ambient pressure.Then close the line to the syringe at the 3-way stopcock to syringe (circled in picture below).

4 Let the reading on the digital barometer stabilize for a moment and then perform the leakage check: for 30 seconds the change of the pressure reading should be less than 20 mbar.



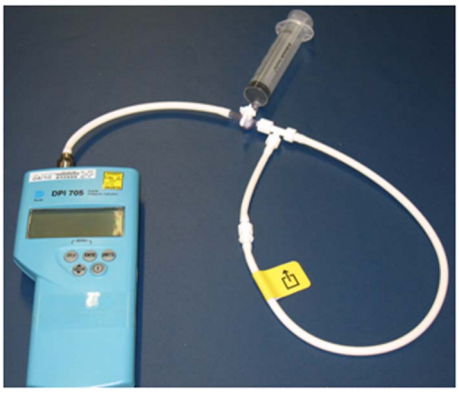
5 If the leakage test is NOT passed, check all connections once more and repeat the test.

Test	Expected test results
Leakage Check	Reading on the digital barometer change is less than 20 mbar for 30 seconds (pass/fail)

NOTE

To ensure the integrity of the Leakage Test Kit (M1013-64002, 451261014851) the following Kit Leak Test Procedure must be performed:

a. Form a loop with the leakage test kit as shown in the picture below.



b. Connect the syringe to the 3-way stopcock and the digital barometer to the open tubing.

c. Draw at the syringe until the digital barometer shows approximately 350 mbar below ambient pressure.

d. Close the 3-way stopcock to the syringe and wait 5 - 10 seconds. In this time, the overall pressure should stabilize.

e. After 1 minute, check the pressure. The pressure should not increase more than 8 mbar in 1 minute for the test to pass.

f. If this test fails, exchange the leakage test kit.

Barometric Pressure Check and Calibration

NOTE

The M3015A with HW Rev C and the M3015B do not require calibration of the barometric pressure. Therefore you will not be able to activate a barometric pressure calibration. If you are using a HW Rev C M3015A or M3015B, perform the barometric pressure check as described below, making sure that only a sample line is connected to the MMS Extension. If the pressure check fails, the M3015A/B needs to be exchanged.

Check the barometric pressure value in the M3015A/B MMS Extension or the MP5 as follows:

1 Go into service mode and select **Setup CO_2**menu.

2 Connect a calibration line to the Microstream CO_2 input. This activates the pump in the M3015A/B MMS Extension or the MP5.

3 The status line at the bottom of the screen displays "CO_2 pressure reading (ambient/cell) xxx/yyy" where xxx is the ambient pressure and yyy is the measured cell pressure. Check whether the ambient pressure value (**x3**) matches (within the acceptable tolerance of ±12mm Hg) the reference value you have received. If so, proceed to the leakage check.

If the value is not correct, calibrate as follows.

a. Select **CO_2** then select **Barom.Press** to activate a table of values.

b. Select the value in the table which matches the reference value received from a reliable local source (airport, regional weather station or hospital weather station). (The values are displayed with a resolution of 2 mmHg up to 500 mmHg and a resolution of 1 mmHg from 500 mmHg to 825 mmHg.) Note: the selected value must be within ±10% of the current measured ambient pressure, otherwise an error message will occur at restarting the monitor.

c. Confirm the barometric pressure setting.

d. Check that the ambient pressure displayed in the status line at the bottom of the screen is the same as the value which you selected from the list in step b.

Test	Expected test results
Barometric Pressure Check	**x3** = difference between the reference pressure and the measured ambient pressure displayed on the monitor (**x3**<12 mmHg)

Pump Check (M3015A HW A only)

1 Connect the flowmeter inlet to the mCO_2 gas outlet using a flexible connecting tube.

2 Connect the calibration line to the mCO_2 inlet.

3 Block the inlet of the calibration line using your fingertip and observe the cell pressure on the monitor display. The cell pressure (**x4**) should be more than 120 mmHg below the ambient pressure shown. If the pressure difference is less than 120 mmHg, the pump is not strong enough and you should replace it, irrespective of the Pump OpTime.

Test	Expected test results
Pump Check	**x4** = difference in pressure between cell pressure and ambient pressure displayed on the monitor during occlusion (**x4** >120 mmHg)

Flow Rate Check and Calibration

Check the flow rate in the M3015A/B MMS Extension or the MP5 as follows:

1 Connect the calibration line to the mCO_2 inlet and the flowmeter outlet to the calibration line.

2 Check on the flowmeter the flow that the M3015A/B MMS Extension or MP5 mCO2 pump draws (**x5**). It should be 50 +15/-7.5 ml/min. If the value is within tolerance, proceed to the CO_2 Gas calibration check.

If the value is not within tolerance, calibrate as follows.

a. Adjust the flow in the instrument by selecting **Increase Flow** or **Decrease Flow** until it is as close as possible to 50 ml per minute as indicated on the flowmeter gauge.

b. When you are satisfied that the flow is set as close as possible to 50 ml per minute, select **Store Flow** and confirm the setting. If you do not store the adjusted flow within 60 seconds of the adjustment, the old flow setting is restored.

c. If you cannot adjust the flow to within tolerance, replace the pump . If you still cannot make the flow adjustment, this indicates a fault in the measurement extension, which must be replaced.

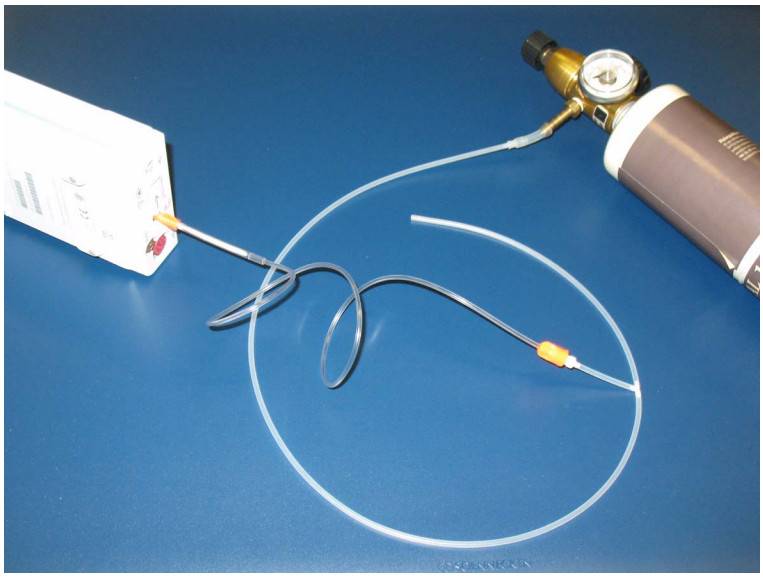
Note that the pump can only be replaced on M3015A with the old hardware Rev. A (i.e. Serial No. DE020xxxxx)

Test	Expected test results
Flow Rate Check	Flow rate is 50 +15/-7.5 ml/min

Noise Check

1 With the monitor in service mode, select **Setup CO_2** menu.

2 Connect the calibration line, the cal tube, the flow regulator and the 5% calibration gas to the mCO_2 inlet.



3 Open the valve to apply the 5% calibration gas and wait until the value is stable.

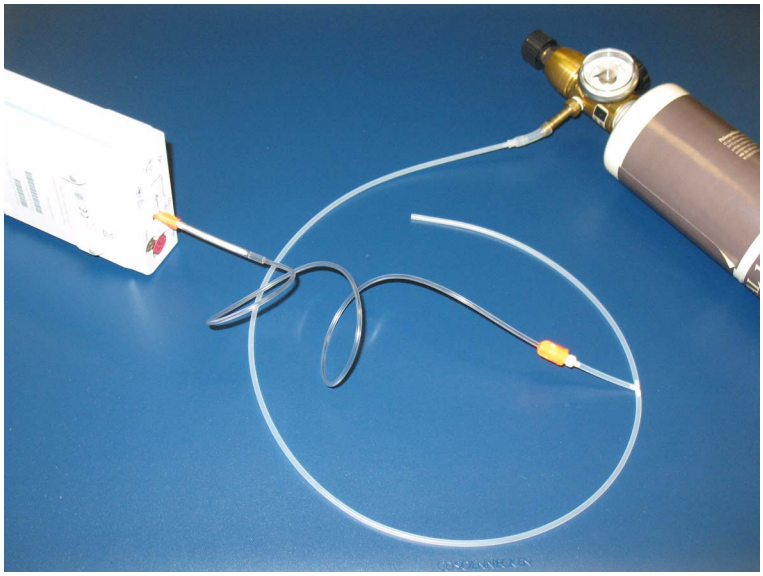
4 Check the noise index (**x6**) displayed next to the CO_2 value on the display (this indicates the level of noise on the CO_2 wave). If the value exceeds 3 mmHg, replace the measurement extension.

Test	Expected test results
Noise Check	**x6** = noise index displayed on monitor (**x6**<3.0)

CO2 Cal Check and Calibration

After switching the measurement extension on, wait at least 20 minutes before checking the calibration. Check the calibration of the CO_2 gas measurement as follows:

1 Connect the calibration line, the cal tube, the flow regulator and the 5% calibration gas to the mCO_2 inlet.



2 Calculate the expected measurement value in mmHg as follows:
0.05 x (ambient pressure) = value mmHg
for example 0.05 x 736 = 36.8 mmHg (with an ambient pressure of 736 mmHg)

3 Open the valve on the flow regulator to allow 5% CO_2 gas to flow into the extension. Allow the value to stabilize.

4 Check that the value on the instrument (measurement value on the main screen, **x7**) matches the calculated mmHg value ± 2.6 mmHg.
If the value is outside the tolerance, calibrate as described in step 8a to 8e below.

5 Disconnect the 5% calibration gas and connect the 10% calibration gas.

6 Calculate the expected measurement value and tolerance in mmHg as follows:
0.1 x (ambient pressure) = value mmHg
±0.07 x (value mmHg) = tolerance
for example 0.1 x 737 mmHg = 73.7 mmHg (with an ambient pressure of 737 mmHg)
±0.07 x 73.7 mmHg = ±5.16 mmHg tolerance

7 Open the valve on the flow regulator to allow 10% CO_2 gas to flow into the extension. Allow the value to stabilize.

8 Check that the value on the instrument (**x8**) matches the calculated mmHg value within the calculated tolerance. If so, the measurement extension is correctly calibrated.
If the value is outside the tolerance, calibrate as follows.

a. Keep the same setup and connect the 5% calibration gas.

b. Select **Cal. CO_2**.

c. Select the value for the calibration gas. (The default value is 5.0%.)

d. Open the valve on the calibration gas to allow CO_2 gas to flow into the extension. Allow the value to stabilize before the start of the calibration. Leave the valve open until the instrument gives a prompt that gas can be removed.

e. The extension calibrates and prompts when calibration is successful.

Test	Expected test results
CO2 Cal Check	x7 = calculated mmHg value ±2.6 mmHg x8 = calculated mmHg value within calculated tolerance

Calibration Verification

1 Keep the same setup as described in "CO2 Cal Check and Calibration" on page 83.

2 Reopen the 5% gas valve and allow the value to stabilize.

3 Check that the value displayed on the monitor is correct within the tolerance (see step above).

4 Disconnect the 5% calibration gas and connect the 10% calibration gas.

5 Open the valve on the flow regulator to allow 10% CO2 gas to flow into the extension. Allow the value to stabilize.

6 Check that the value displayed on the monitor is correct within the tolerance (see step above).

If one or both values are not within tolerances, you must exchange the M3015A/B MMS Extension or the MP5 mCO_2 Assembly.

Test	Expected Test Results
Leakage Check parts 1 and 2*	**x1** = value of part 1 leakage check on flowmeter (**x1**< 4.0 ml/min) **x2** = value of part 2 leakage check on flowmeter (**x2**< 4.0 ml/min)
Leakage Check without Flowmeter	reading on the digital barometer change is less than 20 mbar for 30 seconds
Barometric Pressure Check	**x3** = difference between the reference pressure and the measured ambient pressure displayed on the monitor (**x3**<12 mmHg)
Pump Check**	**x4** = difference in pressure between cell pressure and ambient pressure displayed on the monitor during occlusion (**x4** >120 mmHg)
Flow Check	**x5** = difference between measured value and 50.0 ml/min (**x5** = 50+15/-7.5 ml/min)
Noise Check	**x6** = noise index displayed on monitor (**x6**<3.0)
CO_2 Gas Calibration Check	**x7** = difference between measured CO_2 value and calculated value, based on 5% CO_2 cal. gas. (**x7** < 2.6 mmHg)
CO_2 Cal Verification	**x8** = difference between measured CO_2 value and calculated value, based on 10% CO_2 cal. gas. (**x8** < ± {0.07 x value calculated})

* M3015A HW Rev. A and B and FW Revision < P.01.32 only
** M3015A HW Rev. A only

Reset Time Counters

NOTE

This procedure only applies to M3015A with the old hardware Rev. A (i.e. Serial No. DE020xxxxx

You must check the time counters on the Microstream CO_2 extension before calibrating the instrument. As well, when parts are replaced, the appropriate counters must be reset to zero.

The counters for CO_2 pump, IR Src and Last Cal are displayed in the status line. The values are updated when entering the **Setup CO2** menu.

Observe the following guidelines:

- When calibrating the CO_2 extension, if no parts have been replaced, check the displayed values of **Reset PumpOpTime** and **Reset IRSourceTime** selections to make sure that they are within suggested guidelines for use (15, 000 hours of continuous use). If the counter time is greater than 15, 000 hours, replace the appropriate part. See Repair an*d Disassembly* for details.
- When calibrating the CO_2 extension, if parts have been replaced, reset the appropriate values using the **Reset PumpOpTime** and **Reset IRSourceTime** selections. See *Repair and Disassembly* for details.

Resetting the PumpOpTime generates the INOP: "CO_2 OCCLUSION". To clear this INOP you must perform a flow check and store the flow in service mode (select **Store Flow**).

CO2 Pump / CO2 Scrubber Replacement

NOTE

This procedure only applies to M3015A with the old hardware Rev. A (i.e. Serial No. DE020xxxxx

Refer to the Repair and Disassembly section for the replacement procedures.

Spirometry Performance Tests

These tests verify the performance accuracy of the M1014A Spirometry module.

Equipment Required

- Leak test kit (Part number: M1014-64100)
- calibrated barometer
- M2785A Pediatric/Adult Flow Sensor
- 500ml calibration syringe, Hans Rudolph model 5550 or equivalent

Flow Test

1. Connect the M1014A Spirometry Module to the host monitor and go into service mode.
2. Connect the flow sensor to the module.
3. Connect the 500ml calibration syringe to the flow sensor. Make sure the syringe is set to the "empty" position.
4. Press the **Setup** key on the module and select **Show all Values** in the **Setup Spirometry** menu.

5 Pump the calibration syringe back and forth with a steady motion at a rate of 20 cycles and verify that the readings for TVexp and TVin are 500 ± 25 ml.

If the readings are not within the specified range, try another flow sensor. Ensure that the syringe is calibrated correctly and that the procedure is performed exactly as described above. If the test fails again, replace the module.

Test	Expected test results
Flow Test	TVexp and TVin are 500 ± 25 ml

Leakage Test

1 Connect the M1014A Spirometry Module to the host monitor and go into service mode.

2 Connect the leak test adapter to the module.

3 Press the **Setup** key on the module and then select **Show all Values** in the **Setup Spirometry** menu.

4 Press the Purge key on the module and start a purge cycle. At the end of the purge cycle, the values for Paw and Ppeak should both be above 100 cmH2O.

5 Verify that the pressure difference between Ppeak and Paw remains less than 10 cmH2O after 30 seconds.

If the readings are not within the specified range or if an INOP (e.g. SPIRO PURGE FAILED) is issued, check the leak test adapter for any leaks. Disconnect the adapter from the module and start the test procedure from the beginning. If the test fails again, replace the module.

Test	Expected test results
Leakage Test	Paw and Ppeak >100 cmH2O

Barometer Check

1 Connect the M1014A Spirometry Module to the host monitor and go into service mode.

2 Attach any airway adapter to the module.

3 Press the Setup key on the module and then select **Show all Values** in the **Setup Spirometry** menu.

4 Check that the barometric reading (PB) is within ± 5 mmHg of a reference barometer.

5 If the readings are not within the specified range, check the accuracy of the barometric pressure reference again. If the test fails again, replace the module.

Test	Expected test results
Barometer Check	PB is within ± 5 mmHg of a reference barometer

NOTE

The built-in barometer cannot be recalibrated.

Cardiac Output (C.O.) Performance Test

These tests check the performance of the cardiac output measurement.

1 Connect the patient simulator to the C.O. module using the patient cable.

2 Configure the patient simulator as follows:
Injection temperature: 2 °C
Computation Const: 0.542
(Edward's Catheter)
Flow: 5 l/min

3 Check displayed value against the simulator configuration.

4 Expected test result: C.O. = 5 +/– 1 l/min.

Test	Expected test results
Cardiac Output Performance Test	C.O. = 5 +/– 1 l/min

Service Tool Procedure, Version 1

This procedure applies for Service Tool M1012-61601 in combination with C.O. modules without option C10 and M3012A MMS extensions with option C05.

1 In monitoring mode, connect the C.O. interface cable to the module.

2 Connect one side of the service tool to the injectate receptacle of C.O. interface cable and the other side to catheter cable receptacle.

3 Enter the **C.O. Procedure** window and check the results. The expected test result is:

Tblood = 37.0°C +/- 0.1°C

Test	Expected test results
Cardiac Output Service Tool Procedure Version 1	Tblood = 37.0°C +/- 0.1°C

Service Tool Procedure, Version 2

This procedure applies only for Service Tool M1012-61601 in combination with C.O. modules with option C10 and for the M3012A MMS Extension with option C10.

1 In monitoring mode, connect the C.O. interface cable to the module.

2 Connect one side of the service tool to the injectate receptacle of the C.O. interface cable and the other side to the catheter cable receptacle.

3 Enter **C.O. Procedure** window and check results for:
- Method of measurement
- Arterial Catheter constant
- Tblood

The expected results are:
- Transpulmonary
- 341
- Tblood = 37.0°C +/- 0.1°C

4 Make sure the main alarms are switched on.

5 Disconnect the Catheter cable receptacle from the service tool

6 Enter the Setup C.O Window and change the method of measurement to “Right Heart”

7 Enter the C.O. Procedure window and check the Tinj value. The expected result is:
Tinj = 0.0°C +/- 0.1°C

Test	Expected test results
Cardiac Output Service Tool Procedure Version 2	Tinj = 0.0°C +/- 0.1°C

BIS Performance Test

These tests check the performance of the BIS measurement.

BISx/BIS Engine Test

1 In monitoring mode connect the BIS sensor simulator (P/N: M1034-61650, 453563233731) (for maximum usage please refer to the documentation delivered with the sensor simulator) to the patient interface cable.

2 Enter the BIS menu and select **Show Sensor**.

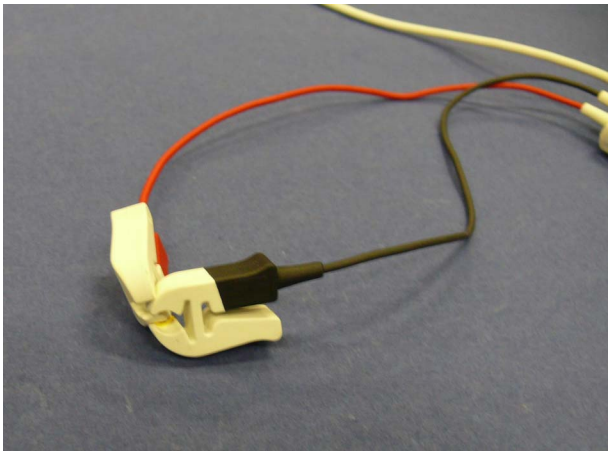
3 Start impedance check by pressing **StartCyclicCheck**. Check the displayed results. Expected results are:

Test	Expected test results
BIS Performance Test	Electrode 1 (+): 4-6 kΩ Electrode 2 (Ref): 8-17 kΩ Electrode 3 (1-): 2-4 kΩ Electrode 4 (2-): 3-5 kΩ

NMT Performance Test

NMT Stimulation Output Test

1 Short circuit the stimulation cables by connecting the two cable clamps to each other as shown below.



2 In service mode, select the **Setup NMT** menu.

3 Select **Start Test**.

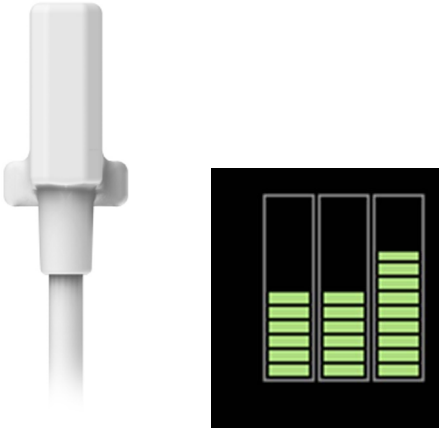
4 Select **Confirm**.

Test	Expected test results
NMT Stimulation Output Test	**NMT Stimulation Output Test passed** is displayed on the monitor.

NMT Transducer Test

1 Go into Service Mode. In Service Mode the NMT Bar Graph only contains three bars instead of four.

2 Place the NMT Transducer on a flat surface with the flat side facing downwards. Two of the three bars in the NMT bar graph should be at the same level and the third one should be higher than the other two.



3 Turn the NMT Transducer 180° and place it on a flat surface with the flat side facing upwards. The bar that was higher than the other two before should now be lower than the other two by approximately the same amount.

Test	Expected test results
NMT Transducer Test	First two bars in the NMT bar graph are at the same level, third bar is higher when the flat side of the transducer is facing downwards and lower by the same amount when the transducer is facing upwards.

Vuelink Performance Test

This test checks the performance of the Vuelink modules.

Tools required: none / external device (i.e. ventilator) and the required Vuelink cable

1 Plug the VueLink module into the Philips patient monitor.

2 Switch to Configuration Mode of your monitor.

3 Depending on your external device, configure the VueLink module as described in the Philips M1032 VueLink Module Handbook "Configuring the VueLink Module (CMS or V24/26)" on page 13 or "Configuring the VueLink Module (IntelliVue Patient Monitor)" on page 45. (Ensure that you have stored the configuration settings before continuing.)

4 Change the operating mode of the monitor to Monitoring Mode.

5 Press the Setup key on the front of the VueLink module.

6 Press the Setup VueLink pop-up key, if setup menu is not already shown.

7 In the Setup VueLink menu select Device, and then select the required Device driver.

8 Select Confirm to store the selection and wait for the message "Switched to new device"

9 Connect the module by plugging one end of the cable connector into the VueLink Module, and the other end into the connector of the external device. Make sure that you use the correct cable option for that device.

10 Select the wave segment on the screen, in which you want the waves to be displayed. In the pop-up menu, select Change Wave, and then select WAVE.

11 Switch on the external device. After communication is established, information from the external device will be available on the Philips patient monitor.

12 We recommend that you confirm with the user that waves and numerics required from the external device are being accurately received.

Test	Expected test results
Vuelink Performance Test	Information from the external device is available at the Philips patient monitor.

IntelliBridge Performance Test

This test checks the performance of the IntelliBridge EC10 & EC5 modules.

Tools required: none / external device (i.e. ventilator) and the required IntelliBridge EC5 Module

1 Plug the IntelliBridge EC10 module into the Philips patient monitor.

2 Connect the Service PC to the IntelliBridge EC10 module and make sure the correct drivers for the external devices are installed. (See the chapter for details).

3 Depending on your external device, connect the appropriate EC5 ID module (indicated on the EC5 label) to the external device.

4 Connect the EC5 to the EC10 module using the supplied cable.

5 Switch the external device on. The connection status LED will flash green until it has correctly identified the external device and started communication. Check that the connection status LED then lights green continuously indicating that communication has been established. Information from the external device should now be available on the Philips patient monitor.

6 Select **Main Setup** -> **Measurements** -> **<External Device Name>** to enter the setup menu for the connected device.

7 Select **Setup Waves** or **Setup Numerics** and make any required changes.

8 Close the setup menu.

9 Select the wave segment on the screen, in which you want the waves to be displayed. In the pop-up menu, select Change Wave, and then select WAVE.

10 We recommend that you confirm with the user that waves and numerics required from the external device are being accurately received. If the external device has a demo mode, use this.

Test	Expected test results
IntelliBridge Performance Test	Numerics are visible on screen (pass/ fail)

EEG, SvO2 (SO2) and tcGas Performance Tests

The EEG and SVO_2 (SO_2) parameters do not require performance tests because the modules perform internal self-tests regularly. These tests suffice for performance testing of these three parameters.

Since the tcGas Module is calibrated regularly it also does not require a separate performance test.

Nurse Call Relay Performance Test

The nurse call relay performance test can be performed at the Modular Jack 6P6C connector.

This test checks the operation of the Nurse Call Relay. The Nurse Call Relay test is recommended for customer sites where the nurse call is in use. The Nurse Call relay functions as follows:

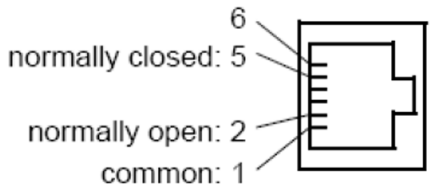
- Standard Operation—connector contact 1-2 open; 1-5 closed.
- Alarm Condition—connector contact 1-2 closed; 1-5 open.

Tools required: Ohmmeter.

1 Plug a 6P6C Modular Plug into the Nurse Call Relay connector.

2 Connect the ohmmeter.

3 When no alarm occurs, connector contacts 1-2 are open and connector contacts 1-5 are closed. When an alarm occurs, connector contacts 1-2 are closed and connector contacts 1-5 are open.



4 The expected test result is: Alarm condition - Connector contacts 1-2 are closed and connector contacts 1-5 are open.

Test	Expected test results
Nurse Call Relay Performance Test	Alarm Condition— Connector contacts 1-2 are closed and Connector contacts 1-5 are open

Multi-Port Nurse Call Connector Test (Flexible Nurse Call)

This test checks the operation of the Flexible Nurse Call Relay. The Nurse Call Relay test is recommended for customer sites where the nurse call is in use. The following diagram and table show the pins and relay identifiers of the connector:

Pin	Cable Color Coding	Relay
1	black	R2-closure
2	brown	R2-middle
3	red	R2-opener
4	orange	R3-closure
5	yellow	R3-middle
6	green	R3-opener
7	blue	n/a
8	purple	n/a
9	gray	n/a

Pin	Cable Color Coding	Relay
10	white	n/a
11	pink	R1-closure
12	light green	R1-middle
13	black/white	R1-opener
14	brown/white	n/a
15	red/white	n/a
16	orange/white	n/a
17	blue/white	R_failure_closure
18	purple/white	R_failure_middle
19	green/white	R_failure_opener
20	red/black	n/a

The Nurse Call relay functions as follows:

- During standard operation R1,R2,R3 _opener are closed; R1,R2,R3_closure are open.
- During alarm condition—R1,R2,R3_opener are open; R1,R2,R3_closure are closed.

Tools required: Ohmmeter.

1 Plug an M8087-61001 cable into the Nurse Call Relay connector.

2 Connect the ohmmeter and measure the pins as indicated in the diagram and table.

3 The relay contacts should behave as described above. The behavior may vary depending on configuration choices. See the Configuration Guide for details on Alarm Relay settings.

4 The expected test results depend on the relay contact used. Please check that the correct relay activity is initiated during alarm condition.

Test	Expected test results
Multi-Port Nurse Call Connector Test	Correct relay activity is initiated during alarm condition (pass/fail)

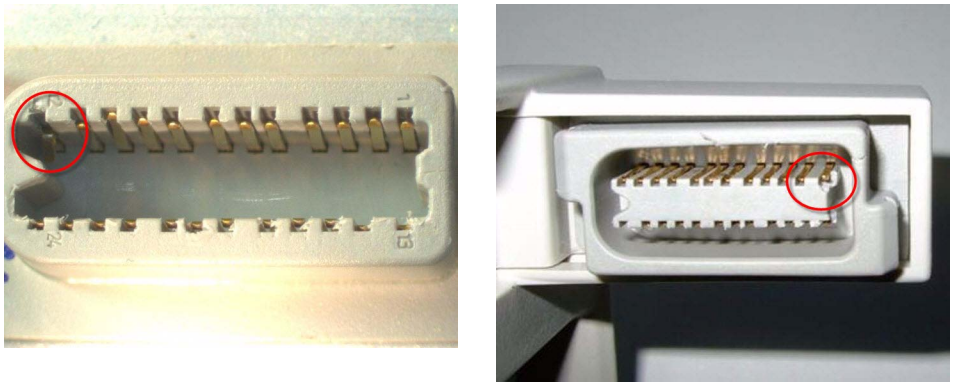
MSL Assurance Test

Visually inspect all MSL connector sockets (cable/monitor/FMS/MMS).

1 Make sure that the pins of the connectors are not jolted.

2 Make sure that no pin is bent inwards or outwards.

3 Exchange connectors that show any evidence of damage or breakage



Examples of damaged connectors

Test	Expected test results
MSL Assurance Test	Pins of connector not jolted/bent (pass/fail)

Power Loss Alarm Buzzer Performance Test

1 Switch on the monitor.

2 Disconnect the monitor from AC power.

3 The Power Loss Alarm Buzzer should beep for about one minute.

4 To switch off the alarm sound, either press the power button or connect the monitor to AC power

Test	Expected test results
Power Loss Alarm Buzzer Performance Test	Beep for one minute

IntelliVue 802.11 Bedside Adapter Communication Test (Rev H.0 or higher)

1 Make sure the LAN cable is disconnected from the rear of the monitor, then switch on the monitor.

2 Go into Service Mode and select **Main Setup -> Network -> Setup WLAN.** In the **Setup WLAN** menu:

- set **Mode** to either **802.11Ah**, **802.11G**, **802.11Bg** (not recommended), **Auto** (not recommended) or **None** (this setting disables the wireless LAN functionality permanently), to match your wireless infrastructure installation.
- set **SSID** to match your installation.

– set the **Country** code to “1000”. Setting the country code to this value will automatically adjust the regulatory domain to match the configuration of the infrastructure. Do not set the country code to values other than “1000” unless otherwise instructed.
– set the **Security Mode** to either **WEP, WPA(PSK)** or **WPA2(PSK)** to match your installation.
– Enter the required keys/passwords for **WEP**, **WPA(PSK)** or **WPA2(PSK)**.

NOTE

WPA2(PSK) was introduced with monitor software revision G.0.(Required WLAN adapter firmware for MP5-90: A.02.24, for MP2/X2: A.00.20)

3 Select **Main Setup** -> **Network** -> **WLAN Diagnostic** to access the WLAN Diagnostic window.

4 Proper installation of the IntelliVue 802.11 Bedside Adapter is assured by connecting to an access point over the wireless link. Place the monitor with the IntelliVue 802.11 Bedside Adapter installed in close proximity to the access point (e.g. if the access point is mounted on the ceiling, place the monitor directly below). Wait until the **Conn.Status** field in the service window shows *Authenticatd (for* Rel. C.0 monitors) or *Connected* (for Rel D.0 or higher). Take the monitor approximately 5 m away from the access point. There should be no walls or other obstacles between the monitor and the access point. The following should apply:
– Observe the **RSSI** (Received Signal Strength Indicator) value for at least 5 - 10 seconds. The **RSSI** value will fluctuate but should stay above 30 in a 5 m distance from the access point used. The wireless link should be active, i.e. the **Conn.Status** field should be *Authenticatd* (for Rel. C.0 monitors) or *Connected* (for Rel D.0 or higher), and the other fields should contain values. If the **RSSI** value is significantly lower, check the distance to the access point and the antenna orientation at the monitor. The antenna orientation should be vertical, but the physical placement of the monitor or other equipment within its vicinity as well as walls or other obstacles may influence the antenna orientation required to receive the best RSSI value.

5 If this test fails, retry in a different physical area with a different access point.

6 Perform the Wireless Switch test blocks as described in the Philips IntelliVue 802.11 a/g Infrastructure Installation and Configuration Guide.

Test	Expected test results
IntelliVue 802.11 Bedside Adapter Performance Test	RSSI value above 30

IIT Communication Test (Rev H.0 or higher)

1 Make sure the LAN cable is disconnected from the rear of the monitor, then switch on the monitor.

2 Go into Service mode and, select **Main Setup** -> **Network** -> **Setup IIT**. In the Setup IIT menu, set the **RF Access Code** in each profile to match your installation.

3 Go into Service Mode. Select **Main Setup** -> **Network** -> **IIT Diagnostic** to access the Instrument Telemetry Diagnostic window.

4 Proper installation of the IIT module is assured by connecting to an access point over the wireless link. Place the monitor with the IIT module installed in close proximity to the access point (e.g. if the access point is mounted on the ceiling, place the monitor directly below). Wait until the **Conn.Status** field in the Instrument Telemetry Service window shows *Active. Take the monitor approximately 5 m away from the access point. There should be no walls or other obstacles between the monitor and the access point. The following should apply:*

– Observe the **RSSI** (Received Signal Strength Indicator) value for at least 5 - 10 seconds. The **RSSI** value should be around -50 ±10 in a 5 m distance from the access point used and the IIT link should be active, i.e. the **Conn.Status** field should be *Active* and the other fields should contain values. If the **RSSI** value is significantly lower, check the distance to the access point and the antenna orientation at both the monitor and the access point (both should be vertical).

– Remove the antenna. The **RSSI** value should be around -90 ±10. The IIT link may be active but the connection could be unreliable. The **Conn. Status** field may toggle between *Inactive* and *Seeking*. If the difference between the **RSSI** values measured with and without antenna is significantly lower, check the antenna and the antenna connector for damage and verify that the cable fom the IIT adapter to the antenna connector plate is connected properly.

5 If this test fails, retry in a different physical area with a different access point.

Error Conditions:

– The field **MAC IIT** should show a value **unequal to** 0000 0000 0000. If it does not, there is a communication problem between the monitor and the IIT adapter.

– With an incorrect RF Access Code or an incorrect or defective antenna installation, the fields **IP Address,Server IP**, **Subnet Mask**, and **RSSI** in the Instrument Telemetry Service window will stay blank. The field **Conn. Status** will slowly toggle between *Inactive* and *Seeking*.

6 Perform the Access Point Controller (APC) test blocks as described in the Philips IntelliVue Wireless Network Installation and Configuration Guide.

Test	Expected test results
IIT Communication Test	IIT Communication without interference

Short Range Radio (SRR) Performance Test

1 Make sure that the short range radio interface is configured as follows: SRR On and appropriate channel selected.

2 Assign a telemetry transceiver or IntelliVue CL Cableless Measurement device to the IntelliVue Monitor according to the procedure described in the Instructions for Use of the patient monitor.

3 Check that the following conditions are fulfilled:

a. Place the telemetry transceiver or CL device close to the monitor.

b. The telemetry transceiver or CL device status is displayed on the monitor in the measurement selection window.

c. Waves or numerics from the telemetry transceiver or CL device are displayed on the monitor. There are no dropouts or gaps in waves or numeric transmission.

d. The battery status of the telemetry transceiver or CL device is displayed in the measurement selection window.

e. The Signal Quality Indicator shows at least 

4 Check that the data from the telemetry transceiver or CL device is transmitted to the monitor within a 1m radius and that there are no dropouts or gaps in waves or numerics.

5 Check whether the connection remains stable within a 5m radius from the monitor.

6 Switch on all telemetry transceivers or CL devices used on the site and check that there are no interferences between the transceivers and their assigned monitors.

7 Check and record the coverage area of the telemetry transceivers or CL devices and inform the customer about this coverage area.

Test	Expected test results
Short Range Radio (SRR) Performance Test	SRR Communication without interference within the coverage

Mounting Integrity Test

Perform the Mounting Integrity Test

- whenever you have removed and reassembled a quick mount
- if one or both of the quick mount screws are loose
- if there is a clearance between the quick mount and the monitor bottom housing
- if the monitor mounting is unstable

Remove the monitor from the mount and disassemble the quick mount. Ensure that the that the threading of the MX600/700 is not damaged or separated from the chassis.

If the quick mount is damaged, exchange the quick mount.

Ensure that all quick mount screws are tight (3.5 Nm). Test the quick mount by pressing the quick release button. If it comes back out gradually and regularly, the quick mount is inserted correctly. If it gets stuck, the quick mount is not centered and must be reinserted correctly.

If you notice any damage to the threading of the MX600/700 chassis, send the MX600/700 in for bench repair.

Test	Expected test results
Mounting Integrity Test	All quick mount screws are tight. No damage to quick mount. No damage to threading of MX600/700. Quick release button comes back out gradually and regularly.

Reporting of Test Results

Philips recommends all test results are documented in accordance with local laws. Authorized Philips personnel report the test result back to Philips. While hospital personnel (biomedical engineers or technicians) do not need to report results to Philips, Philips recommends that they record and store the test results in accordance with local laws.

The following table lists what to record after completing the tests in this chapter. Record the results in the empty column in the Test and Inspection Matrix.

The following is a guide as to what your documentation should include:

- Identification of the testing body (for example, which company or department carried out the tests).
- Name of the person(s) who performed the tests and the concluding evaluation.
- Identification of the device(s) and accessories being tested (serial number, etc.).
- The actual tests (incl. visual inspections, performance tests, safety and system tests) and measurements required
- Date of testing and of the concluding evaluation.

- A record of the actual values of the test results, and whether these values passed or failed the tests.
- Date and confirmation of the person who performed the tests and evaluation.

The device under test should be marked according to the test result: passed or failed.

Carrying Out and Reporting Tests

Test Report

Testing Organization: Name of testing person: Date:	(Check one of the following three options) Test before putting into service (reference value) Recurrent Test Test after Repair
Responsible Organization:	
Device Under Test:	ID-Number
Product Number:	Serial No.:
Accessories:	
Measurement Equipment (Manufacturer, Type, Serial No., Calibration Date):	
Safety Test Method used	
Functional Test (parameters tested):	
Mains voltage and frequency used during safety testing:	

Test and Inspection Matrix

Test	Test or Inspection to be Performed	Expected Test Results	Record the Results (mandatory for Philips Personnel only)	
			What to record	Actual Results
Visual Inspection	Perform Visual Inspection	Pass or Fail	V:P or V:F	
Power On	Power on the unit. Does the self-test complete successfully	If Yes, Power On test is passed	PO:P or PO:F	
Noninvasive Blood Pressure Performance Tests	Perform the Accuracy Test	X1 = value displayed by monitor Difference <= 3mmHg	PN:P/X1 or PN:F/X1	
	Performance Leakage Test	X2 = leakage test value X2 < 6 mmHg	PN:P/X2 or PN:F/X2	
	Performance Linearity Test	X3 = value displayed by monitor Difference <= 3mmHg	PN:P/X3 or PN:F/X3	
	Performance Valve Test	X4 = value < 10 mmHg	PN:P/X4 or PN:F/X4	
Temperature Performance Test	Perform the Temperature Performance Test	X1= 40°C ± 0.2°C or 100°F ± 0.4°F	PT: P/X1 or PT: F/X1	

Test	Test or Inspection to be Performed	Expected Test Results	Record the Results (mandatory for Philips Personnel only)	
			What to record	Actual Results
All other performance tests	Perform the remaining parameter performance tests, if applicable	See expected results in test procedures	P: P or P: F	
Safety (1)	Perform Safety Test (1): Protective Earth Resistance	With mains cable: Maximum impedance (X1): <=300 mOhms	S(1):P/X1 or S(1):F/X1	*
Safety (2)	Perform Safety Test (2): Equipment Leakage Current - Normal Condition.	With mains cable: Maximum leakage current (X1):<= 100 µA	S(2): P/X1 or S(2): F/X1	*
Safety (3)	Perform Safety Test (3): Equipment Leakage Current - Single Fault Condition (Open Earth)	With mains cable: Maximum leakage current (X2):<= 300 µA	S(3): P/X2 or S(3): F/X2	*
Safety (4)	Perform Safety Test (4): Applied Part Leakage Current - Single Fault Condition, mains on applied part.	Maximum leakage current (X1): <=50 µA (CF)	S(4): P/X1 or S(4): F/X1	*
System (Sys 1-2)	Perform the system test according to subclause 19.201 of IEC/EN 60601-1-1 or IEC/EN 60601-1 edition 3, clause 16, if applicable, after forming a system	Equipment Leakage Current: Sys1 <= 100 µA (Normal Condition) Sys2 <= 300µA (Single Fault Condition	Sys: PSys1/PSys2 or Sys: FSys1/Fsys2	*
System (Sys 3)	Perform the system test according to subclause 19.201 of IEC/EN 60601-1-1 or IEC/EN 60601-1 edition 3 clause 16, if applicable, after forming a system	Protective Earth Leakage Current if medical electrical system components are connected to the same Multiple Portable Socket Outlet: Sys3 <= 300 µA	Sys: PSys3 or Sys: FSys3	*
Key: P = Pass, F = Fail, X or Sys = test value to be recorded, * = Record the worst-case results and the associated switch positions (e.g. normal/reverse polarity)				

NOTE

All values for current and voltage are the root mean square (r.m.s.) values, unless otherwise stated.

Evaluation

	Yes	No
Safety and Functional Test passed		
Repair required at a later date, safety and functional test passed		
Device must be taken out of operation until repair and passed tests		
Device failed and must be taken out of operation.		

Notes:		
Next Recurrent Test:		
Name:_____		
Date/Signature:_____		

Evaluation of Test Results

The evaluation of the test results must be performed by appropriately trained personnel with sufficient product, safety testing and application knowledge.

If any test results are between 90% and 100% of the respective expected result, the previously measured reference values must be taken into consideration for the assessment of the electrical safety of the device under test. If no reference values are available, you should consider shorter intervals between upcoming recurrent tests.

NOTE

If any single test fails, testing must be discontinued immediately and the device under test must be repaired or labeled as defective. Be sure to inform the user about the test failure in writing.

Other Regular Tests

The care and cleaning requirements that apply to the monitor and its accessories are described in the Instructions for Use. This section `details periodic maintenance procedures recommended for the monitor and its accessories.

Touchscreen Calibration

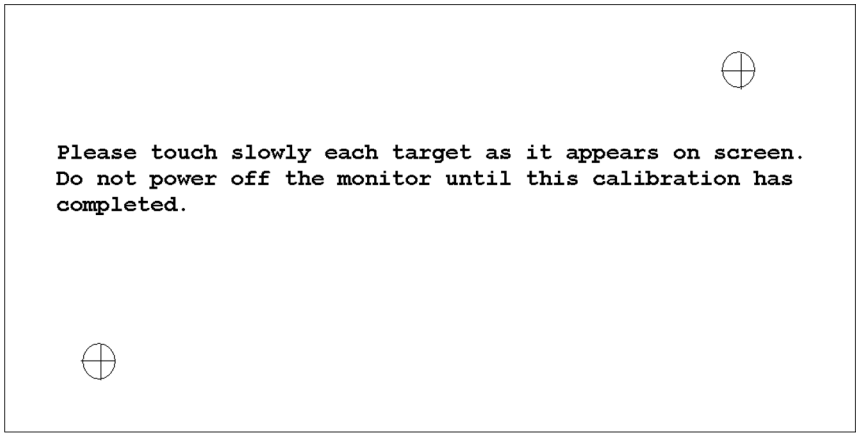
To access the touchscreen calibration screen:

1 Enter service mode

2 Select **Main Setup**

3 Select **Hardware**

4 Select **Touch Calibration**



Touchscreen Calibration Screen

Make sure you complete the calibration procedure without powering off the monitor mid-way. If the monitor is powered off after the first point is touched, the touch panel will be deactivated until the touch calibration is performed again.

If the touchscreen is accidentally mis-calibrated by selecting the wrong spot, you must use another input device to re-enter calibration mode. If you have the support tool, you can select **Reset Touch Calibration to Default** and it will create a rough calibration which will allow you to access the calibration menu again via the touchscreen.

Please refer to the documentation shipped with your selected display for further details on touchscreen calibration procedures.

NOTE

If a touchscreen calibration is started on a multiple display system, the calibration is started for all displays at the same time.

Disabling/Enabling Touch Operation

There are two ways to disable/enable touchscreen operation:

1 To *temporarily* disable touchscreen operation of the monitor, press and hold the **Main Screen** key. A padlock symbol will appear on the key. Press and hold the **Main Screen** key again to re-enable touchscreen operation.

2 To *permanently* disable touchscreen operation:

a. Enter Service Mode.

b. Select **Main Setup**

c. Select **User Interface**

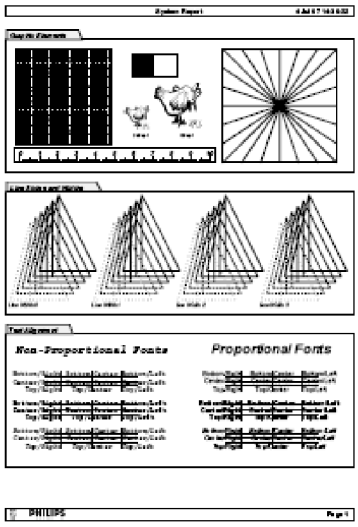
d. Change the **Touch Enable** selection to **no**.
To re-enable touchscreen functionality change the **Touch Enable** selection to **yes**.

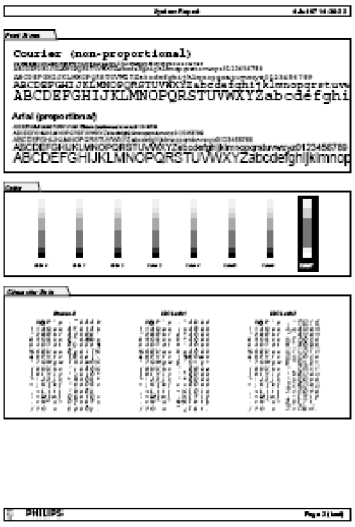
Printer Test Report

To verify your printer configuration you may want to print a test report.

To print a test report select **Main Setup –> Reports –> Setup Printers –> Print Test Rep.**

Your test report should look like this:





After Installation, Testing or Repair

Before handing the patient monitor over to the end-user, make sure it is configured appropriately and that it is in monitoring mode. Ensure that the user receives the current revision of the monitor documentation.

4

Troubleshooting

Introduction

This section explains how to troubleshoot the monitor if problems arise. Links to tables that list possible monitor difficulties are supplied, along with probable causes, and recommended actions to correct the difficulty.

How To Use This Section

Use this section in conjunction with the sections *Testing and Maintenance* and *Parts*. To remove and replace a part you suspect is defective, follow the instructions in the section *Repair and Disassembly*. The *Theory of Operation* section offers information on how the monitor functions.

Who Should Perform Repairs

Only qualified service personnel should open the monitor housing, remove and replace components, or make adjustments. If your medical facility does not have qualified service personnel, contact Philips' Response Center or your local Philips representative.

WARNING

High Voltage - Voltages dangerous to life are present in the instrument when it is connected to the mains power supply. Do not perform any disassembly procedures (other than server and extension removal) with power applied to the instrument. Failure to adhere to this warning could cause serious injury or death.

Replacement Level Supported

The replacement level supported for this product is to the printed circuit board (PCB) and major subassembly level. Once you isolate a suspected PCB, follow the procedures in the Repair and Disassembly section, to replace the PCB with a known good PCB. Check to see if the symptom disappears and that the monitor passes all performance tests. If the symptom persists, swap back the replacement PCB with the suspected malfunctioning PCB (the original PCB that was installed when you started troubleshooting) and continue troubleshooting as directed in this section.

Software Revision Check

Some troubleshooting tasks may require that you identify the Software Revision of your monitor. You can find the software revision along with other information, such as the system serial number, in the monitor revision screen.To access the monitor revision screen:

1 Enter the Main Setup menu and select **Revision**

2 Select **Product**

3 Select **Software Revision**

4 Select the pop-up key for the device you want to check (e.g. **M8004A** or **M3001A)**

NOTE

The part numbers listed in the monitor revision screen do not necessarily reflect the part numbers required for ordering parts. Please refer to the *Parts* section for the ordering numbers.

NOTE

The system serial number can also be found on the lower right corner on the front of the monitor.

Software Compatibility Matrix

For a detailed software compatibility matrix, please refer to the IntelliVue Compatibility Matrix on your Documentation DVD.

For further information on M3001A HW/SW compatibility, please refer to the *Parts* section.

Compatibility with MMS

The following table shows the compatibility between the monitor and MMS software revisions.

Monitor Software	MMS Software										
	A.2	B.0	B.1	C.0	D.0	E.0	F.0	G.0	H.0	H.1x	J.x
H.1x	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
J.x	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

Compatibility with FMS-8

The following table shows the compatibility between the monitor and FMS-8 software revisions.

Monitor Software	FMS-8 Software										
	A.2	B.0	B.1	C.0	D.0	E.0	F.0	G.0	H.0	H.1x	J.x
H.1x	No	No	No	No	No	No	No	No	No	Yes	No
J.x	No	No	No	No	No	No	No	No	No	No	Yes

Compatibility with FMS-4

The following table shows the compatibility between the monitor and FMS-4 software revisions.

Monitor Software	FMS-4 Software	
	H.1x	J.x
H.1x	Yes	No
J.x	No	Yes

Compatibility with Information Center

The following table shows the compatibility between the monitor and Information Center software revisions.

Monitor Software	Information Center Software											
	D.01	E.0	E.01	F.0	G.0	H.0	J.0	K.0	L.0	M.0	N.0	PIIC iX A.0
H.1x	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No
J.x	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

The following table shows the compatibility between the MP2/X2/MP5 and the Information Center software revisions if the X2/MP5 are used in companion mode i.e. as monitor and measurement module.

Table 3 Compatibility of X2/MP5 with the IntelliVue Information Center (companion mode use model)

MP5/X2 Software	Information Center Software											
	D.01	E.0	E.01	F.0	G.0	H.0	J.0	K.0	L.0	M.0	N.0	PIIC iX A.0
H.1x	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No
J.x	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

Number of Supported Parameter Modules

Module Number	Module Description	Number of Supported Modules	Comments
M1006B	Pressure	4	
M1006B #C01	Pressure w/ Analog Out	4	
M1011A	ScvO2	1	
M1012A	Cardiac Output	1	
M1012A #C10	Cardiac Output with PiCCO	1	

Module Number	Module Description	Number of Supported Modules	Comments
M1014A	Spirometry	1	
M1018A	tcpO2	1	
M1020B #A01	SpO2 Philips FAST for IntelliVue	2	
M1020B #A02	SpO2 Nellcor OxiMax compatible	2	
Masimo SET IVM Module distributed by Philips (internal Order No. M1020B #A03)	SpO2 Masimo SET	2	
M1021A	SvO2	1	
M1027A	EEG	1	
M1029A	Temp	4	
M1032A #A01	VueLink Auxiliary	2	
M1032A #A02	VueLink Ventilator	2	
M1032A #A03	VueLink Gas Analyzer	2	
M1032A #A04	VueLink Anesthesia	2	
M1032A #A05	VueLink Auxiliary+	2	
M1034A	BIS	1	
M1116B	Recorder	1	
865115	EC10 IntelliBridge	2	

Obtaining Replacement Parts

See *Parts* section for details on part replacements.

Troubleshooting Guide

Problems with the monitor are separated into the categories indicated in the following sections and tables. Check for obvious problems first. If further troubleshooting instructions are required refer to the Troubleshooting Tables.

Taking the recommended actions discussed in this section will correct the majority of problems you may encounter. However, problems not covered here can be resolved by calling Philips Response Center or your local representative.

Checks for Obvious Problems

When first troubleshooting the monitor, check for obvious problems by answering basic questions such as the following:

1 Is the power switch turned on?

2 Is the AC power cord connected to the instrument and plugged into an AC outlet?

3 Is the MSL cable connected correctly?

4 Are the MMS and, if present, the MMS Extension connected correctly?

5 Are the cables connected properly to the FMS?

6 Are the parameter modules plugged into the FMS correctly?

Checks Before Opening the Instrument

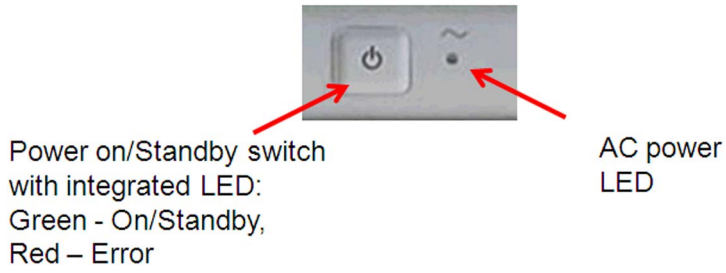
You can isolate many problems by observing indicators on the instrument before it is necessary to open the instrument.

Checks with the Instrument switched Off

- AC connected:
  - AC Power LED is on (green).
- No AC connected:
  - All LEDs are off.

Checks with the Instrument Switched On, AC connected

When the monitor is first switched on, all the front-panel LEDs the Power on/Error LED and the AC Power LED light up momentarily. The location of the front-panel LEDs is shown in the following photograph:



Initial Instrument Boot Phase

The following tables describe the regular initial boot phase of the monitor and its components. If the boot phase does not proceed as described below go to for Troubleshooting information.

Monitor Boot Phase:

For these steps it is assumed that the Monitor is powered correctly. This is indicated by the green Power On LED.

Time (sec.) after Power On	Event
0	AC Power LED is always on when monitor is connected to AC Power. When the Power On/Off button is pressed the red error LED switches on immediately.
3	The alarm LEDs are switched on with low intensity. Colors: Left LED: cyan; Middle LED: red; Alarm Suspend LED (right): red. The red error LED is switched to green On/Standby LED.
4	Boot Screen with the Philips Logo appears on the display. Test Sound is issued.
5	All Alarm LEDs are switched off.
6	Alarm LEDs are tested in the following sequence: Cyan on-off (left LED only) Yellow on-off (left & middle LED) Red on-off (all LEDs)
8	Boot Screen with the Philips Logo disappears
	Fixed screen elements (for example smart keys, alarm fields) appear on the screen.
15-30	First measurement information appears on the screen,user input devices (for example Navigation Point, Mouse, Touch) are functional

Flexible Module Rack Boot Phase

For these steps it is assumed that the Flexible Module Rack is connected via MSL-cable to the monitor.

Time (sec.) after Monitor Power On	Event
0	Red Error LED switches on immediately
1	Green “Ready” LED switches on
3	Red Error LED is switched off
5	Module Power is switched on
5-8	Module Status LEDs blink once or twice (Module dependent)

NOTE

The boot phase times may vary depending on the hardware and software revision of your monitor.

Troubleshooting Tables

The following tables list troubleshooting activities sorted according to symptoms. The possible causes of failure and the remedies listed in the troubleshooting tables should be checked and performed in the order they appear in the tables. Always move on to the next symptom until the problem is solved.

How to use the Troubleshooting tables

The possible causes of failure and the remedies listed in the troubleshooting tables should be checked and performed in the order they appear in the tables. Always move on to the next symptom until the problem is solved.

Boot Phase Failures

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
AC LED does not light up	AC Connection not ok	Check that the AC-Mains are powered and the power cord is ok and connected
	LED defective	Try to switch on the monitor. If it operates normally , the LED is defective => exchange Power Switch board
	Power Switch board not connected to the main board	Check if power switch board is connected correctly to the Main Board
	Power supply defective	Remove power supply and check if output voltage is within the specifications (23.5V - 24.5V).Exchange power supply if defective
	iPC defective	Disconnect Power Cable to iPC and check again
	I/O board defective	Remove I/O board and check again
	Connector board defective	Remove connector board and check again
	Panel adapter board defective	Remove panel adapter board and check again
	Mixer board defective	Remove mixer board and check again
	Main Board defective	Exchange Main Board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Green Power On LED **and** Red Error LED remain off after pressing power on button:	Power Switch Micro Controller hung	Unplug AC Mains and replug after 10 seconds. Try to switch on the monitor again.
	Power switch board not connected to the main board	Check if power switch board is connected correctly to the main board.
	Power Switch Board defective	Exchange Power Switch Board and try to switch the monitor on again.
	I/O Board defective	Remove all I/O boards and try to switch the monitor on again
	Connector board defective	Remove connector board and check again
	Mixer board defective IIT defective WLAN board defective Panel adapter board defective Alarm LED board defective	Disconnect all cables and boards (except Power Cable to the main board and Power Switch cable): - mixer board - IIT - WLAN - panel adapter - Alarm LED then try to switch the monitor on again
	Main board defective	Exchange main board.Add boards in reverse order and try again with each board.
Red Error LED stays on continuously	External connected device defective	disconnect all external cables (except AC) and switch the monitor on again
	I/O Board defective	Remove all I/O boards and switch the monitor on again.
	Connector board defective	Remove connector board and check again.
	Mixer board defective IIT defective WLAN board defective Panel adapter board defective Alarm LED board defective	Disconnect all cables and boards (except Power Cable to the main board and Power Switch cable): - mixer board - IIT - WLAN - panel adapter - Alarm LED then try to switch the monitor on again
	Main board defective	Exchange Main board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Red Error LED blinks (indicating cyclic reboots)	Hardware Failure	connect Support Tool directly to monitor with crossover cable and start “search for defective devices” If no device is detected, proceed as described above in section “Red error LED stays on continuously”
	Software Fault	If the Support Tool can detect the device and it indicates the Operating Mode is ‘Boot’, download and store the status log. Reload software and re-clone the monitor. If this fixes the problem e-mail the status log to your local response center
	Hardware Failure	If this does not rectify the problem follow instructions under “Red Error LED stays on continuously”.
Alarm LEDs remain off:	Alarm LED board is defective	Check for INOPS and follow instructions Exchange Alarm LED board
	Main board defective	Exchange Main board
No Test Sound issued		check for INOPs and follow instructions
	Speaker defective	exchange speaker
	Main board defective	exchange main board

Integrated Display is blank

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Integrated display is blank or brightness is reduced (The information listed in this table is only valid if the boot phase has completed without error. See table for a description of the Boot phase.)	Display brightness is reduced when room temperature, or instruments placed near patient monitor, causes the monitor display to overheat.	Instrument should be placed in an environment that does not exceed 40 degrees C or below 5 degrees C.
		If you have an external display, connect it to the video port. If the external display works, you can eliminate the connector board and the main board as the cause of failure.
	Backlight Inverter Cable not connected	Check cable connection of Panel Adapter Board to Backlight Inverter Board
	Backlight tubes defective	Replace backlight tubes
	Backlight Inverter board defective	If backlight tubes have already been replaced, replace backlight inverter board.
	Panel Adapterboard defective	Replace panel adapter board
	LCD Flat panel defective	Replace LCD Flat panel
	Main board defective	Replace main board

Integrated Touch Screen not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Touch Screen not functioning	Touchscreen functionality has been temporarily disabled	Check if touchscreen functionality has been temporarily disabled (padlock symbol on Main Screen key). If yes, press and hold the Main Screen key to re-enable touchscreen operation.
	Touchscreen functionality has been permanently disabled	In service mode, select Main Setup -> User Interface and change the “Touch Enable” selection to “yes”.
	Touch screen not connected	Check connection from touch screen to panel adapter board
	Panel adapter board defective	Replace panel adapter board
	Touch screen defective	Replace touch screen assembly
	Main board defective	Replace main board
Touch Position invalid	Touch not calibrated	Perform touch calibration: 1. Enter the Main Setup Menu 2. Select Hardware 3. Select Touch Calibration

External Display is blank (Slave Display)

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
External Display is blank		If integrated display is also blank proceed as described under “Integrated Display is blank”
	Video cable to external display not connected	Check video cable connection to external display
	External display has no power	Check electricity supply of external display
	External display is defective	Check external display and video cable on another monitor or PC
	Connector Board defective	Replace Connector board
	Main board defective	Replace main board

External Display Connected to iPC

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
External Display is blank		If integrated display is also blank proceed as described under “Integrated Display is blank”
	Video cable to external display not connected	Check video cable connection to external display
	External display has no power	Check electricity supply of external display
	External display is defective	Check external display and video cable on another monitor or PC
	iPC defective	Replace iPC

External Touch Display not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Touch Screen not functioning	Touchscreen functionality has been temporarily disabled	Check if touchscreen functionality has been temporarily disabled (padlock symbol on Main Screen key). If yes, press and hold the Main Screen key to re-enable touchscreen operation.
	Touchscreen functionality has been permanently disabled	In service mode, select Main Setup -> User Interface and change the “Touch Enable” selection to “yes”.
	External Touch cable not connected	Check cable connection from external touch to connector board
	External Touch driver configuration	Check connector configuration: 1. Enter Main Setup menu 2. Select Monitor 3. Select Hardware 4. Reconfigure RS232/MIB drivers 5. if problem persists, proceed to the next step
	Connector board defective	Replace connector board
	External touch defective	Replace external touch
	Main board defective	Replace Main board
Touch position invalid	Touch not calibrated	Perform touch calibration: 1. Enter Main Setup menu 2. Select Hardware 3. Select Touch Calibration

General Monitor INOP Messages

INOP Message	Possible Causes of Failure	Failure Isolation and Remedy
Checkinternvoltage Check Monitor Func	Problem with too low voltages (5V, 12V) in the monitor. Alarm lamps, display or interfaces may not function correctly.	Remove all I/O boards, connector board, and iPC, and put them back in and reconnect cables one at a time to isolate any defective board. If this does not resolve the problem, replace the main board
Check Monitor Temp	The temperature inside the monitor is too high	Check the environment for possible causes
	Monitor ventilation obstructed	Clean the monitor ventilation internally and then cool monitor down for 8 hours
	Main Board defective	replace Main Board
Settings Malfunction	Problem during cloning process.	Reclone configuration file
	Memory space in which the settings are stored has been corrupted	Reclone configuration file. This will reload the memory space.
	Main board defective	Replace Main board
Internal Comm.Malf.	Problem with the I2C Bus communication in the monitor	Disconnect the external display and try another one
	Connector board defective	Replace connector board
	Main board defective	Replace Main board
MCC Unsupported	An MSL coupling cable has been connected to a device which does not support MSL coupling.	Use the MSL coupling cable only when connecting Dual CPU MP90 monitors to a D80 Intelligent display.

Remote Control (wired)

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Remote Control not recognized by monitor	Connector Board defective	Replace connector board
	Remote Control not plugged according to USB connection rules	See "Connection of USB Devices" in this service guide for the correct connection of USB devices.
	Remote Control defective	Exchange Remote Control

Remote Control (wireless)

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Remote Control not functioning	Low battery	Exchange battery
	Remote Control defective	Exchange Remote Control
Remote Control cannot be assigned to a monitor	Another remote control is assigned to the monitor.	Remove any other remote control before assigning a new remote control to a monitor

Navigation Point

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Navigation Point not functioning	Navigation Point not connected properly	Check cabling
	Navigation Point defective	Replace Navigation Point
Navigation Point Knob Rotation or Selection control not functioning	Navigation Point defective	Replace Navigation Point
INOP Message Check Input Devices is issued	Navigation Point or other input device defective	Perform a visual and functional check of all the monitor input devices. Replace input devices if necessary.

iPC

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
iPC menu not available	iPC is not connected correctly	Check all cable connections to the iPC
Prompt Message "PC HW Malfunction" is issued	Battery empty	Exchange the battery of the iPC
	PC temperature is too high	Let the PC cool off and then try again
	PC defective	Exchange iPC
PC does not start automatically and/or cannot be started manually	HW setting incorrect	Check Global Settings and set to Autostart PC if Auto Start is desired.
	Flat ribbon cable to iPC not connected correctly	Check flat ribbon cable connection to iPC
	iPC defective	Exchange iPC
PC Operating System does not start up	Cable connection to hard disk loose	Check cable connections to hard disk
	Hard disk defective	Exchange hard disk

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Operating System crashes during startup	Windows Installation malfunction	Perform a windows recovery by pressing F8 while the Philips Logo appears on the monitor screen. This will open the boot menu. Use regular windows recovery procedures
No sounds from PC		Verify that the patient monitor sounds are functioning correctly
	PC sounds disabled	Check Global Settings and set to PC Audio On
	Flat ribbon cable to iPC not connected correctly	Check flat ribbon cable connection to iPC
	No sounds issued from PC	Check windows control panel settings. If you are using Windows XP, install the correct Audio drivers. Make sure the PC volume is not set to "0".
Undesired PC sounds from internal speaker	Incorrect HW setting	Set PC Audio to "Off"
DVI, VGA or USB connections not functioning	iPC defective	Exchange iPC
PC is unstable or shows colors incorrectly	RAM faulty	Exchange RAM
LAN connection not functioning	Flat ribbon cable to iPC not connected correctly	Check flat ribbon cable connection to iPC
	iPC defective	Exchange iPC
Date and Time not displaying correctly	Windows settings not synchronized with patient monitor.	Check windows settings
Display Resolution incorrect	Incorrect settings	Change the display resolution settings to match the patient monitor display resolution

Keyboard/Mouse not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Keyboard/Mouse attached directly to the monitor not functioning	Keyboard/Mouse not connected properly	Check cabling
	Keyboard/Mouse defective	Replace Keyboard/Mouse
	Connector board defective	replace connector board
Keyboard/Mouse connected to the iPC not functioning	Keyboard/Mouse not connected properly	Check cabling
	Keyboard/Mouse defective	Replace Keyboard/Mouse
	iPC defective	replace iPC

Bedside Network Status Icons

The following table shows the icons displayed on the monitor when network related issues occur.

Wireless Icon	Wired Icon	Inverse Video	Blinks	Icon Comments	INOP Message	What does it mean?
No Icon	No Icon	-	-	-	-	MONITOR does not have a LAN connection (Wireless Monitor cannot find an access point to talk to, wired Monitor cannot hear anything on its LAN connection)
		Yes	Yes	Central - outline only	"Unsupported LAN" (after 1 minute)	MONITOR has a LAN connection but does not have an IP address assignment (Wireless MONITOR has found an access point to talk to, wired MONITOR hears traffic on the LAN)
		No	No	Central - outline only	"No Central Monitoring"	MONITOR is connected to the LAN and has an IP address assignment, but the bed is not being monitored at the central 1. MONITOR is not assigned to a sector 2. There is another monitor on the network with the same "Equipment Label"

Wireless Icon	Wired Icon	Inverse Video	Blinks	Icon Comments	INOP Message	What does it mean?
		No	No	Central - solid box	-	Normal Operation - MONITOR assigned to a sector and is being monitored by a central
-		No	No	Central - solid box, network line extended	-	Normal Operation MONITOR assigned to a sector and is being monitored by a central. This monitor also has OVERVIEW functionality on other beds.
	-	No	Yes	Central - solid box	"Wireless Out Of Range"	Wireless MONITOR that currently is being monitored by a central is losing contact with the access point and cannot find another to talk to.
		Yes	Yes	Central - outline only, line for broken connection to central	"No Central Monitoring"	Monitor lost connection to the Information Center: 1. LAN cable was disconnected 2. Information Center was disconnected 3. Network infrastructure failure (switch, etc.) 4. Out of range (wireless MONITOR)

Network related problems

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Prompt Message "no central assigned to this bed" is issued	The monitor label is not set in the monitor (if the beds are "monitor labeled" in the Philips Information Center)	Set Monitor Label in Config Mode
	Problem with the Philips Information Center to Switch communication (if the beds are "port mapped" in the Philips Information center	Check PIC to Switch communication, Switch configuration and Firmware status
INOP "Unsupported LAN" is issued	Network failure	Check if switches, Philips Information Center and Database Server are all running and connected to the network
	Monitor connected to wrong network	Check if monitor has been connected for example to a different hospital network instead of the Philips Clinical Network
	IP address conflict after infrastructure re-installation	Reboot Database Server and Philips Information Center
	IIT is enabled but no IIT infrastructure can be found	Move the monitor into the range of the IIT infrastructure or disable IIT in the **Setup IIT** menu if no IIT infrastructure is available.
No connectivity to PIC, no prompt or error message on monitor	Hardware Defect	Check LAN cable connection
		Check NGN Connector board in Monitor
		Check Switch
	Configuration problem	Check switch configuration and firmware revision
Status Message "Incompatible SW Revision versions" is issued	Monitor and PIC software are not compatible	Check Software compatibility and upgrade to compatible software

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Other Bed Overview not available	Configuration Problem	Check configuration in PIC regarding other bed overview (care group assignment)
		Verify configuration of switch (setting of multicast filters)
	This function is not available for IntelliVue Instrument Telemetry and, in combination with earlier IntelliVue Information Center (IIC) revisions, for WLAN (IntelliVue 802.11 Bedside Adapter).	If you are using an IntelliVue 802.11 Bedside Adapter, check the software revision of the IntelliVue Information Center (IIC) to make sure it is compatible. If the software revision of the IIC is incomaptible or you are using IIT, switch to a wired configuration
"Other Bed" Alarms are not appearing	Configuration problem	Verify configuration in PIC, in Monitor (Config Mode) and check that the feature is not temporarily disabled by the user (Bed Info Window)

IntelliVue 802.11 Bedside Adapter Problems

Symptoms	Cause of Failure	Failure Isolation and Remedy
No Network icon or Network icon flashes. No association to central station.	Communication problem between the monitor and the IntelliVue 802.11 Bedside Adapter or RSSI value below 30.	Ensure that the network infrastructure is functioning properly. See Troubleshooting tables in the IntelliVue 802.11 a/g Infrastructure Installation and Configuration Guide for details. Check the antenna cable connection on the IntelliVue 802.11 Bedside Adapter. Check that the IntelliVue 802.11 Bedside Adapter is correctly connected to the panel adapter board. Check that the indicator behind the RSSI value (Main Setup -> Network -> WLAN Diagnostic -> RSSI) is rotating. If it is not, check IntelliVue 802.11 Bedside Adapter hardware. Replace antenna or IntelliVue 802.11 Bedside Adapter if necessary.
	IntelliVue 802.11 Bedside Adapter not yet operational	Check menu line 'Wireless LAN' (Main Setup -> Network -> WLAN Diagnostic -> Wireless LAN). If it shows 'Off', the wireless adapter is not yet operational. This does NOT indicate that WLAN has been disabled by a setting. If problem persists, check for an installed wired LAN cable.
	Configuration problem using WEP, WPA(PSK), WPA2(PSK).	Make sure that the Mode, SSID, Country and Security settings in the Setup WLAN menu match your installation
	Configuration problem using WPA Enterprise or WPA2 Enterprise	1. Check the connection status.(Main Setup -> Network -> WLAN Diagnostics -> Conn.Status) If the state only shows 'Scanning', make sure that the Mode, SSID, Country and Security settings in the Setup WLAN menu match your installation.

Symptoms	Cause of Failure	Failure Isolation and Remedy
		2. Check the connection status. If the device shows the state 'Authenticating', your SSID, Mode, Country and Security settings are correct. You already have a WLAN connection to your Access Point, but the device fails to authenticate, check your authentication server and WLAN controller error log.
		3. As an investigation step, disable the CertificateCheck. (Main Menu -> Network -> WLAN Setup -> CertificateCheck) If authentication is now possible, proceed with step 4. Otherwise double check your authentication server configuration, WLAN controller configuration and the user credentials (User Name, Password, Anonymous Identity). Note: If the previously used credential settings were wrong, the device is perhaps on the exclude list of your WLAN Controller. Resolve this issue on your WLAN controller. Note: **Do not forget to re-enable the certificate check**.

Symptoms	Cause of Failure	Failure Isolation and Remedy
		4. Check the time setting of the device (Main Setup -> Date, Time). If not correctly set, the used certificates are detected as invalid. Adjust to the correct time.
		5. Check the installed CA certificate using the support tool. - Task -> Clone from Medical Device - Open the cloned file using Configuration -> Configuration Editor - In Configuration Editor check Configuration -> Hardware -> Network -> Certificate 1 for validity(Valid from, Valid until)
		6. Make sure that the installed CA certificate is the root certificate of your authentication server certificate chain.

IIT-related Problems

Symptoms	Cause of Failure	Failure Isolation and Remedy
No Network icon or Network icon flashes. No association to central station.	Communication problem between the monitor and the IIT adapter. MAC Instr. Tele. field in Instrument Telemetry Service Window is 0000 0000 0000	Check that RF Access Code is set correctly and the network is correctly set up. Check the cable connection to the IIT module. Check the antenna cable connection between the IIT module and the antenna. Replace cable, antenna or IIT module if necessary.
	Incorrect RF Access Code. No IP Address.	Check that RF Access Code is set correctly. Make sure that network is set up correctly.

Short Range Radio Interface Problems

Symptoms	Cause of Failure	Failure Isolation and Remedy
Measurement selection icon does not change to SRR.	Assignment of SRR device to monitor not possible	Check SRR Configuration Settings. Replace defective SRR interface or cable, if necessary. Make sure SRR interface is installed.
	SRR interface of telemetry transceiver defective or incompatible	Make sure the telemetry transceiver SRR interface is compatible and functional.
Measurement selection icon changes to SRR but Assignment of SRR device to monitor fails. **SRR Interference** INOP is issued	RF Interferences	Check location for RF interferences and free frequencies by performing a site survey (e.g. with air magnet tool).
Communication Dropouts or gaps in parameter waves. **SRR Interference** INOP may be issued	RF Interferences	Check location for RF interferences and free frequencies by performing a site survey (e.g. with air magnet tool).
	Too many SRR devices allocated to one SRR channel	Up to two SRR connections can be established per channel. Check SRR Configuration Settings.
SRR communication aborted. **SRR Interference** or **SRR Invalid Chan** INOP may be issued.	RF Interferences	Check location for RF interferences and free frequencies by performing a site survey (e.g. with air magnet tool).
	Too many SRR devices allocated to one SRR channel	Up to two SRR connections can be established per channel. Check SRR Configuration Settings.
	SRR device out of range (either monitor or Telemetry Transceiver)	Position the SRR devices closer to each other. Check SRR signal quality indicator for signal strength.
Telemetry Device using SRR not recognized by the monitor.	Telemetry Device not supported by the SRR adapter	Make sure you use a telemetry device which is compatible with SRR.

Multi-Measurement Module

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Prompt message "Measurement Server Configuration not supported" is issued	An unsupported MMS Extension has been connected	Disconnect the MMS Extension
	MMS Extension is defective	Replace MMS Extension
	Measurement Server defective	Replace Measurement Server
INOP Message "MsmtSrv not Supp" is issued	Wrong Software Revison	Upgrade monitor and/or measurement server to a matching software version. Refer to for a list of compatible measurement servers.
	Too many measurement servers connected	Disconnect unsupported measurement servers for proper operation.
	Unsupported type of measurement server (for example M3000A) connected.	Disconnect the unsupported measurement server. Refer to for a list of compatible measurement servers.
Prompt message "Measurement Server not supported, unplug device, switch monitor off/on" and INOP "Bad Measurement Server are issued	M3000A Measurement Server Revision A is plugged. This Measurement Server is not compatible with the IntelliVue patient monitors. Parameter board defective.	Disconnect the measurement server and cycle power. Check if all measurements are displayed in the measurement selection window. Exchange MMS/Repair parameter board, if necessary.

MSL-related problems

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Measurement Server does not start up (no LEDs active), no INOP or prompt displayed	No Power	Check MSL cable and replace if necessary
		Replace the Connector Board
Measurement Server does not start but LEDs are normal	Communication lines in MSL cable or MSL connector broken	Check MSL cable and MSL connectors
	Connector board or main board defective	Check connector board and replace if necessary. If problem persists, replace main board.

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
MSL Power High INOP is issued Note: if this condition persists for longer than 15 minutes, the INOP MSL Power Off will appear (see below)	Attached devices drawing too much power from the monitor. Too many FMS and MMS connected to the monitor	Reduce to a limit of 2 FMS and 1 MMS connected to the monitor
MSL Power Off INOP is issued	Attached devices drawing too much power from the monitor. Too many FMS and MMS connected to the monitor	Disconnect all FMS and MMS from the monitor Cycle power to restore power to the MSL devices. If the message disappears, reconnect FMS and MMS one at a time, waiting 15 minutes between each device to see if message reoccurs. If yes, the respective MMS or FMS is faulty. See "Multi-Measurement Module" on page 130 for troubleshooting tasks. If no, add front-end modules one at a time, waiting 15 minutes between each module to see if message reappears, Replace module if faulty. Note: If an individual defective device is connected the MSL Power High or MSL Power Overload INOPs will appear initially. The MSL Power Off INOP will not occur for at least 15 minutes.
MSL Power Overload INOP is issued	Short Circuit within MSL system	Disconnect all MSL connections and reconnect devices one at a time. If message persists, replace connector board.
INOP Bad Server Link is issued	Unexpected data detected on MSL	Check cable and power cycle the monitor
	An FMS or MMS with an incompatible software revision is connected to the monitor.	Connect FMS or MMS with compatible software revsion
	Communication between the components not functioning	Check software versions and model number of devices for compatibility

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
INOP Message Serverlink Malf is displayed, audible indicator: a beep every two seconds	The hardware for communicating with the Multi-Measurement Server is faulty.	Check MSL cable, replace if necessary.
		Check connector board. Replace if necessary
A measurement supported by a server does not come up on the monitor	Label conflict	A parameter label from this measurement is already in use in the monitor. Check the conflict window to select the measurement.
Prompt message “Too many <label> modules connected” is issued	There are more modules of the type <label> connected than supported by the software	Remove the unsupported module or use the lebel manager application in the monitor to disable the module.
The ECG Out function does not funcion	Hardware problem	Check MSL cable
		Check ECG Out Hardware in the monitor (Power Switch Board)
		Check the MSL connector in the measurement server

Alarm Lamps

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
INOP Message Check Alarm Lamps is issued	Alarm LED board cable disconnected	reconnect Alarm LED board to mainboard
	Alarm LED board defective	replace Alarm LED board
	Main board defective	replace Main board
Alarm occurs, but no LED lights up	Environmental lighting too bright	Place monitor in a darker environment
	Alarm LED board cable disconnected	reconnect Alarm LED board to mainboard
	Alarm LED board defective	Replace Alarm LED board
	Main Board defective	Main board

Alarm Tones

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
INOP Message **Speaker Malfunction** is displayed	Speaker cable disconnected	Reconnect speaker cable
	Speaker defective	Replace speaker
	Sound amplifier on main board defective	Replace main board
Alarm occurs but no alarm sound is issued	Audible alarm indicators have been switched off	Switch audible alarm indicators back on
	Volume set to 0	Increase volume
	Speaker defective	Replace speaker
	Sound amplifier on main board defective	Replace main board
Alarm occurs on device connected to VueLink but no alarm sound is issued on the monitor	Configuration of VueLink is incorrect	Check VueLink configuration

Alarm Behavior

If your monitor did not alarm in the way in which the end user expected, please consult the Instructions for Use for possible setup issues or configuration settings which could affect alarm behavior.

Individual Parameter INOPS

If any of the following parameter INOP messages are issued try the respective parameter in another device. If the INOP message persists replace the parameter module, the MMS or other indicated device.

- **CO2 Equip Malf**
- **ECG Equip Malf**
- **NBP Equip Malf**
- **<Pressure Label> Equip Malf**
- **RESP Equip Malf**
- **SpO2 Equip Malf**
- **SpO2 Transduc Malf**
- **SvO2 Equip Malf**
- **tcpO2 (or tcpCO2) Equip Malf**
- **<Temp Label> Equip Malf**
- **VueLnk Equ. Malf**
- **BIS Equip Malfunc**
- **BISx Malfunction**

- **NMT Equip Malfunct**
- **NMT Incompatible**
- **NMT Cal Failed**

Flexible Module Rack

Symptoms	Cause of Failure	Failure Isolation and Remedy
Prompt Message "Unrecognized Measurement Module in slot s" is issued	An unsupported module has been plugged into the Flexible Module Rack	Unplug the unsupported module
Prompt message "Measurement Module in slot n is currently ignored" is issued	Too many modules of the same kind have been plugged into the Flexible Module Rack	Unplug module in slot n
Red Error LED stays on	Unrecoverable hardware selftest error:	Try to attach the MMS directly to the MSL cable. If the measurements show up on the screen, the fault is in the FMS
	MSL cable defective	If the measurements do not show up when the MMS is connected directly to the MSL cable, then replace MSL cable
	Flex connector from main board to MSL defective	Replace connector
	CPU module defective	Replace CPU module
Red Error LED flashes	Hardware selftest error	If system comes up, check status log. Otherwise see above
Flexible Module Rack LEDs ok, Front End Measurement Module not recognized (no prompt or INOP)	Measurement Module or Measurement Module Connector defective	Replace Measurement Module
	No Front-End power because MSL voltage from the monitor is too high or too low	Try a new MSL cable. Replace if failure is rectified.
		Replace mother board
	Mother board or connector on Mother Board defective	If the voltage is in range, or there is obvious damage to a connector, replace mother board

Printer

Symptoms	Cause of Failure	Failure Isolation and Remedy
Prompt message “Print job could not be queued” is issued. No print device is found.	Printer is disabled in the Setup Printers menu Paper size of printer does not match paper size of report	Enable the correct printer in the Setup Printers menu Change paper size of the printer in the Setup Printers menu or change paper size of the report in the Setup Reports menu.
Status message “Print device Local 1 (Local 2) unavailable” is issued. Printer job is stalled.	Printer not switched on Printer paper tray empty Cabling not connected correctly Connector board defective	Switch on printer power fill printer paper tray Check cabling replace connector board
Status message “Print device Remote 1 (Remote 2, Remote 3) unavailable” is issued. Printer job is stalled	Print error on Philips Information Center Network Connection to Philips Information Center not functioning	Print a test report on the Philips Information center. If this fails, refer to Philips Information Center documentation Check that the network connection between the monitor and the Philips Information Center is working
Status message “Printing on device Remote 1... (Remote 2, Remote 3)” is issued but no report is printed	Print queue on Philips Information Center is full. Reasons for this may be: - Printer is not switched on - Printer paper tray is empty	Switch on printer power Fill printer paper tray
Printouts are not as expected	Printer paper size is not correctly configured Printer resolution is not correctly configured Printer color support is configured to “On” although the printer does not support color Printer not compatible	Configure the paper size according to the inserted print media Configure the printer resolution according to the printer capabilities Configure the printer color support to “Off” Check specifications

Recorder

Symptom	Possible Cause	Corrective Action
System thinks that door is open when it is not.	Defective door switch.	Replace door switch. Exchange module.
System thinks that the recorder is out of paper when it is not.	Paper-out sensor dirty.	Clean paper-out sensor.
Recorder not communicating with System.	Poor connection to the front-end FMS.	Unplug the module. Plug it back in and try it again in a few seconds. (Watch for the LED to flash.)
	Only one recorder module may be used with each monitor.	Remove one of the recorder modules.
	System not configured properly.	Check the configuration of the connected monitor.
	Too many modules connected.	Check and remove the extra modules.
Recorder won't run.	Recorder interface not working correctly.	Unplug the module. Plug it back in and try it again in a few seconds. (Watch for the LED to flash.)
Poor print quality.	Printhead dirty.	Clean the Printhead.
	Printhead failure.	Exchange the module.
Paper not feeding properly.	Paper roll off center.	Center paper roll on roller guides.
	Dirty roller.	Clean roller.
Module does not lock into FMS.	Locking plates defective.	Remove and exchange the locking plates.

MIB / RS232

Symptoms	Cause of Failure	Failure Isolation and Remedy
AGM connected to an RS232 port not functioning	The MIB/RS232 port is not configured for AGM	Check configuration of the MIB/RS232 ports in configuration mode
	The cable between AGM and monitor is not connected correctly or defective	Check cable connection, replace cable if necessary
	The MIB/RS232 board is in a wrong slot (slot has been changed after software configuration or an additional board has been plugged in)	Verify correct placement of the I/O boards
	The MIB/RS232 board or the connector board (depending on which RS232 port is used) is defective	Check board and replace if necessary

Symptoms	Cause of Failure	Failure Isolation and Remedy
External device not receiving data	The MIB/RS232 port is not configured for data export	Check configuration of the MIB/RS232 ports in configuration mode
	The wrong data export protocol driver is configured in the monitor	Check the export protocol required by the attached device and configure the monitor accordingly
	The cable between the external device and the monitor is not connected correctly or defective	Check cable and replace if necessary
	The external device does not support the version of the data export protocol used in the monitor	Check if the device supports the version of the data export protocol. Upgrade device or monitor if necessary (if matching versions exist).
	A terminal concentrator is used in between the device and the monitor and a protocol with dynamic speed negotiation is used	Some terminal concentrators do not support changing the transmission speed (baud rate) dynamically. Check if the connection works without the concentrator
	The MIB/RS232 board is in a wrong slot (slot has been changed after software configuration or an additional board has been plugged in)	Verify correct placement of the I/O boards
	The MIB/RS232 board or the connector board (depending on which RS232 port is used) is defective	Check board and replace if necessary
Detailed Protocol Problem		Consult the Data Export Protocol document.

USB

Symptoms	Cause of Failure	Failure Isolation and Remedy
None of the connected devices are functioning.	Invalid combination of connected devices or connected devices defective.	Make sure the combination of connected devices is valid. Replace defective devices if necessary.

Nurse Call Relay

Symptoms	Cause of Failure	Failure Isolation and Remedy
INOP message Check Nurse Call Relay is issued	Connector board defective	Replace connector board
Monitor alarmed, Nurse Call did not activate	Incorrect configuration (Relay latency, Relay trigger)	Check monitor configuration (see configuration guide)
	Connection of cable to monitor or nurse call system not correct	Check cable connection
	Connector board is defective	Replace connector board

Flexible Nurse Call Relay

Symptoms	Cause of Failure	Failure Isolation and Remedy
INOP message Check Nurse Call Relay is issued	Flexible Nurse Call Relay board defective	Replace Flexible Nurse Call Relay I/O board.
Monitor alarmed, Nurse Call did not activate	Incorrect configuration (Relay latency, Relay trigger)	Check monitor configuration (see configuration guide)
	Connection of cable to monitor or nurse call system not correct	Check cable connections
	The Flexible Nurse Call Relay board is defective	Replace Flexible Nurse Call Relay board

Troubleshooting the ECG OUT

Symptoms	Cause of Failure	Failure Isolation and Remedy
INOP EcgOut Equip Malf is issued	Communication Problem or Power Switch/ECG OUT board defective.	Check that the ECG OUT cable is securely connected and that all MSL connections are properly made. Check that the MSL cable and the MSL connectors are not defective. If the problem persists, replace the Power Switch/ECG OUT board.
No ECG-OUT signal to the Defib		Check the Defib cable and the cable connection from the Power Switch/ECG Out board to the main board. Exchange Power Switch/ECG Out Board if necessary. If problem persists exchange main board.

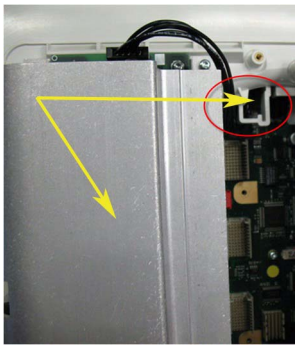
Image Sticking

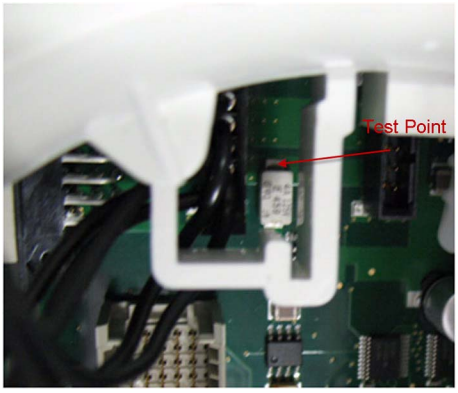
If a static image is displayed for a long time on an LCD display, image sticking, i.e. a temporarily retained image, may occur. To eliminate image sticking, switch off the display and switch it back on again. It is also recommended to use the moving image in standby mode.

Testing the Functionality of the Power Supply

If you are unsure whether the power supply or the main board is defective, perform the following test, to check whether the power supply is faulty.

Place one multimeter probe on the power supply housing and the other at the test point of the fuse (see picture below). If the measured voltage is 24V (±5%) the power supply is functioning correctly.





WARNING

High Voltage - Voltages dangerous to life are present in the instrument when it is connected to the mains power supply.

Status Log

Many events that occur during start-up or regular monitoring are logged in the Status Log. The Status Log can be printed and cleared. Not all entries in the Status Log are errors.

Monitor				
H	1720	20050	1	4 Apr 02 16:37
C	1721	21050	1	4 Apr 02 15:37

The window title is either **Monitor** or **MeasServ**, dependent on which system component's status log is currently displayed.

The Status Log window shows logged events which caused a reboot of the system component (monitor or measurement server).

The first column in the log identifies the event class ("C": caused a cold start, "H": caused a hot start, "N": no retstart, for information only). Column 3 and 4 identify the event source and event code. Column 4 counts the number of occurrences of the event. The last column shows the time and date of the last occurrence of the event.

The following pop-up keys overlay the SmartKeys:

Clear StatLog	Revision		865241	M8048A	M3001A

Clear StatLog

This key clears the currently displayed Status Log

Revision

This key switches to the Revision Screen of the currently displayed system component

865241 (MX700)or **865242** (MX600)

This key switches to the Monitor Revision Window

M8048A (FMS-8) or **865243** (FMS-4)

This key switches to the Flexible Module Rack (FMS) Revision Window

M3001A

NOTE

This key switches to the Multi Measurement Server (MMS) Revision Window

If an event occurs repeatedly, contact your Philips Service Representative.

NOTE

It is possible, using the support tool, to download the status log and send it to your Philips Service Representative as a file (for example via e-mail).

List of Error Codes

There are no error codes at this point.

Troubleshooting with the Support Tool

Using the support tool you can:

- access the full status log which can be saved as a file
- reload software
- identify defective devices
- reset touch screen calibration

For details on how to perform these tasks see the Support Tool User Manual.

Troubleshooting the Individual Measurements or Applications

For problems isolated to an individual parameter or application such as event review, please consult the Instructions for Use and configuration information.

If the instructions for use did not resolve an individual parameter problem, then another module or measurement server should be tried.

If you are getting questionable readings for individual measurements you may want to do the Performance Verification tests in the *Testing and Maintenance* section.

The performance of the individual applications (event review, arrhythmia, trending) are affected by the configuration of the monitor. When contacting Philips support you may be asked about the configuration of the monitor to aid in troubleshooting.

5

Repair and Disassembly

The following section describes the disassembly and reassembly procedures for the monitor and its components to the extent required to remove and replace faulty assemblies. Do not further disassemble the product past the point described in these procedures.

WARNING

High Voltage - Voltages dangerous to life are present in the instrument. Do not perform any disassembly or reassembly procedures (other than MMS, MMS extension or parameter module removal) with power applied to the instrument. Failure to adhere to this warning could cause serious injury or death.

Before doing any disassembly, turn power off, disconnect the Local Distribution Cable, **AC power cable**, MSL cable, Defib sync' cable and RS232 cable (where appropriate), disconnect the MMS and FMS.

Tools Required

- Torx screwdrivers (T10, T20)
- 1 small flat head screwdriver
- Needle Nose Pliers
- ESD mat and wrist strap
- 1 small Pozi or Philips head screwdriver (PH0 x 60)

Monitor Disassembly

NOTE

- The reassembly procedures are the reverse procedures of the disassembly procedures unless otherwise noted.
- Your monitor may look slightly different than on the pictures in this chapter, depending on the options ordered.
- When disassembling, position the monitor such that the weight of the monitor is not on the Navigation Point.

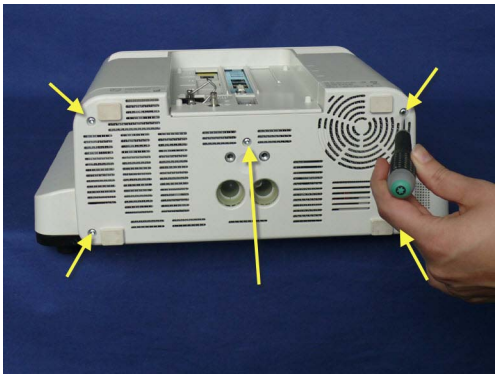
Removing the Cable Cover

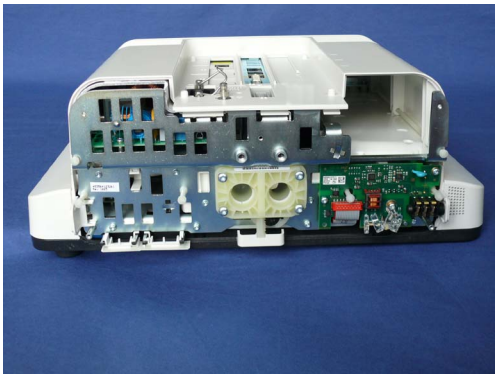
1 Push in the release lever of the cable cover housing and remove the cable cover.

2 Remove the four screws and pull off the cable cover housing.

Removing the Bottom Housing

1 Remove the five screws and pull off the bottom housing.

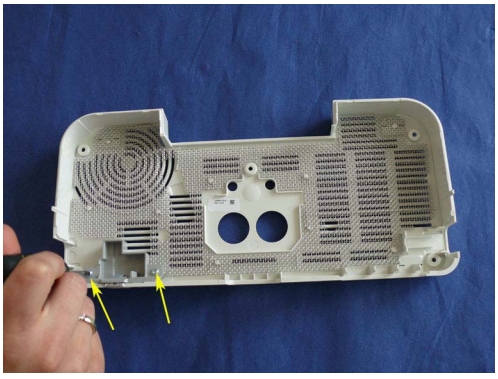


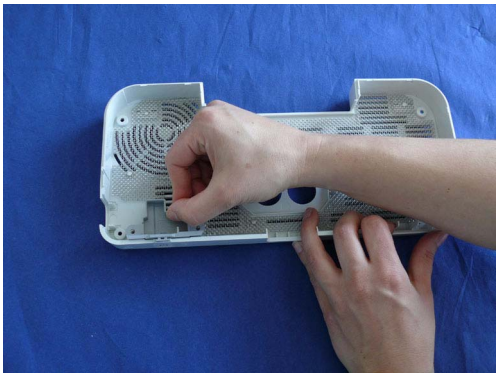


Removing the Power Button

1 Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145

2 Remove the two self-cutting screws inside the bottom housing and pull off the tappet guide.





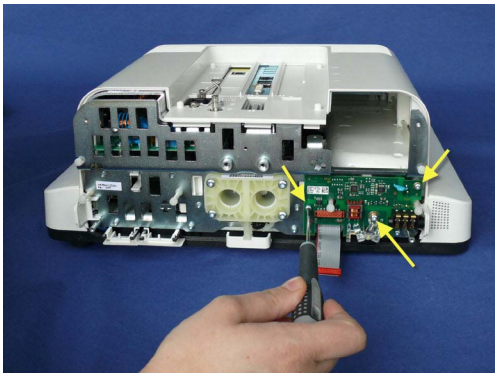
3 Remove the power button.

Removing the Power Switch/ECG Sync Out Board

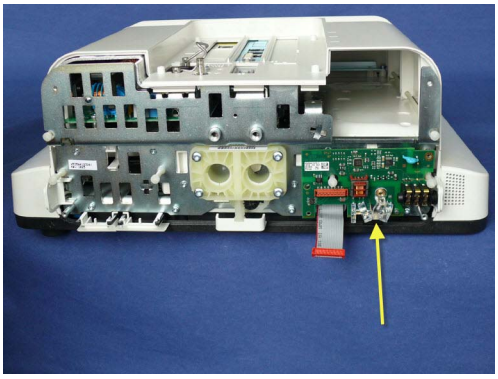
1 Remove the bottom housing as described in “Removing the Bottom Housing” on page 145

2 Unplug the flat ribbon cable from the Power Switch/ECG Sync Out Board.

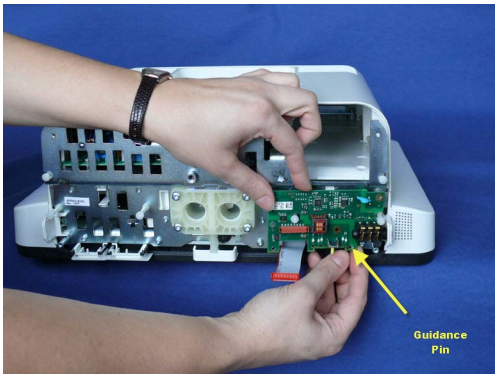
3 Remove the three screws from the Power Switch/ECG Sync Out Board.



4 Remove the light guide from the Power Switch/ECG Sync Out Board.



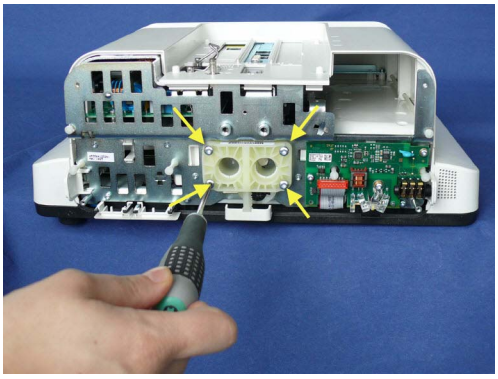
5 Pull the Power Switch/ECG Sync Out board off its guidance pin and remove the board.



Removing the Quick Mount

1 Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.

2 Remove the four screws from the quick mount.

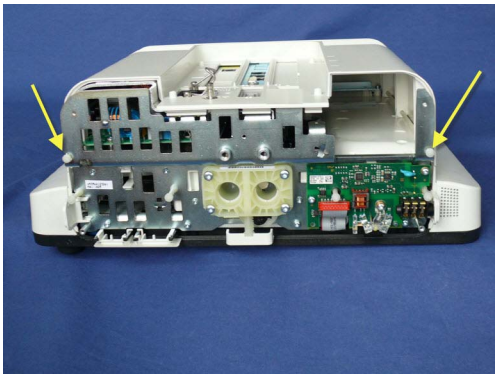


3 Remove the quick mount.

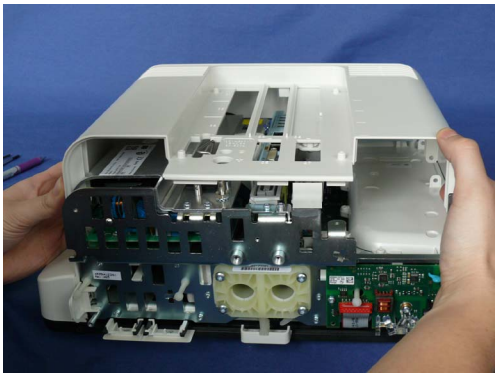
Removing the Housing Rear

1 Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.

2 Pull out the two white plastic pins.



3 Remove the housing rear.

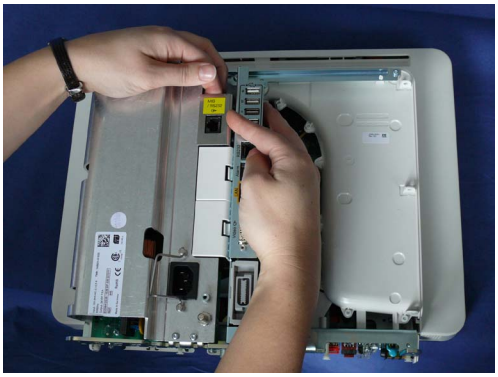


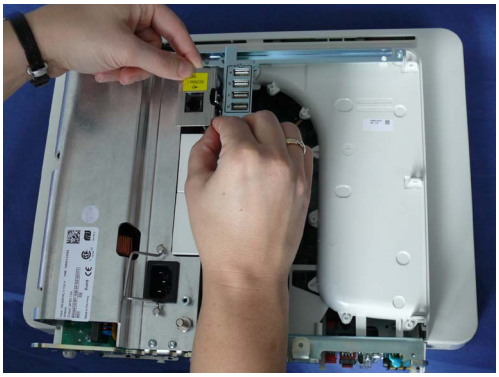
Removing the I/O Cards

1 Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.

2 Remove the housing rear as as described in the section “Removing the Housing Rear” on page 148.

3 Remove all I/O cards and blank I/O slot covers by pushing the release lever and pulling them out at the same time.



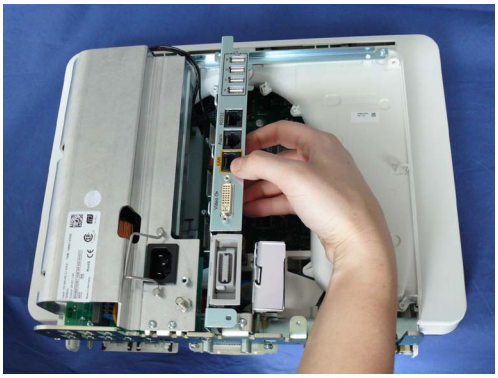


Removing the Connector Board

1. Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.
2. Remove the housing rear as described in the section “Removing the Housing Rear” on page 148.
3. Remove the I/O cards as described in the section “Removing the I/O Cards” on page 148.
4. Loosen the two captive screws on the connector board assembly.

5. Remove the two screws holding the connector board.

6. Remove the connector board.

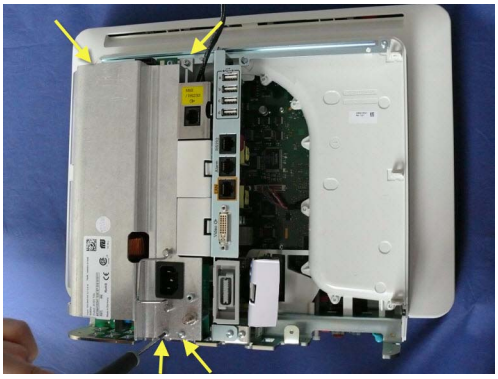


Removing the AC/DC Power Supply

1. Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.
2. Remove the housing rear as described in the section “Removing the Housing Rear” on page 148.

3 Unplug the AC/DC power supply cable by pressing the two latches on the side of the connector.

4 Remove the four screws.



5 Remove the AC/DC power supply.

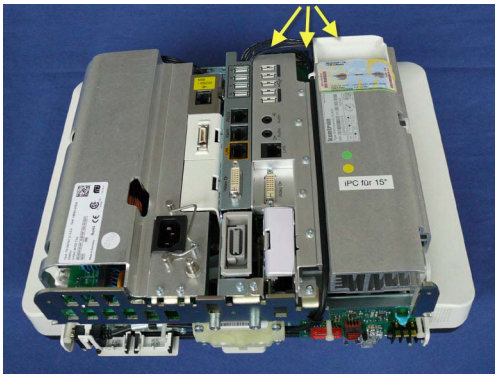
Removing the iPC

This procedure only applies if the iPC is installed.

1 Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.

2 Remove the housing rear as described in the section “Removing the Housing Rear” on page 148.

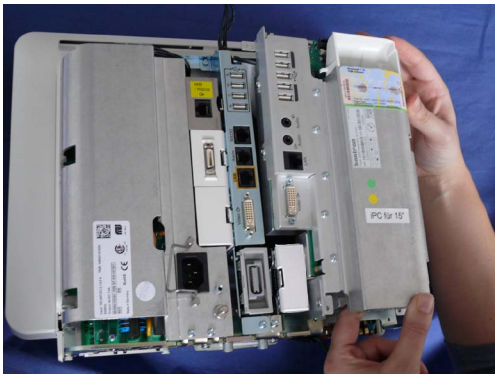
3 Unplug the three iPC cables from the iPC main board (Video, USB, Power).




4 Remove the four screws from the iPC.

5 Remove the side USB cable from the iPC housing.

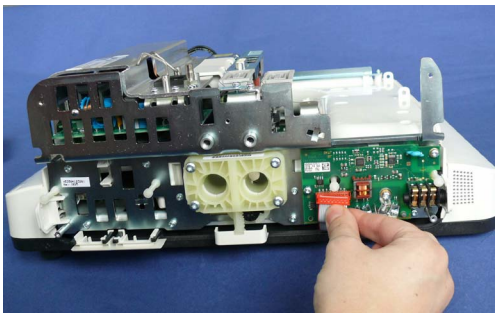
6 Remove the iPC.



Separating the Front and Back Half of the Monitor

1 Remove the bottom housing as described in the section “Removing the Bottom Housing” on page 145.

2 Unplug the flat ribbon cable from the Power Switch/ECG Sync Out board.



3 Remove the housing rear as described in the section “Removing the Housing Rear” on page 148.

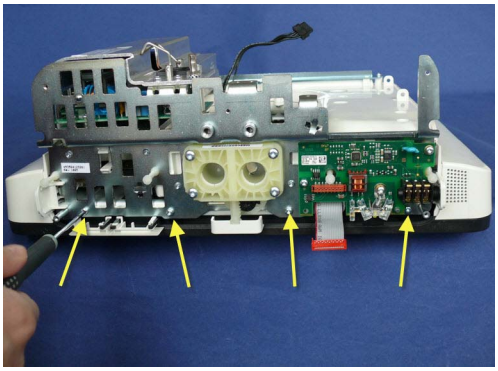
4 Remove the I/O Boards as described in the section “Removing the I/O Cards” on page 148.

5 Remove the connector board as described in the section “Removing the Connector Board” on page 149.

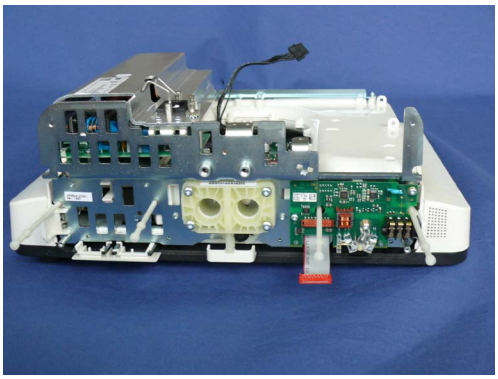
6 Unplug the AC/DC power supply cable.

7 If installed, unplug the three iPC cables as described in the section “Removing the iPC” on page 150.

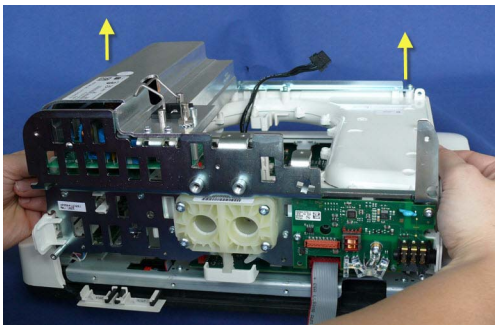
8 With the display facing downwards, remove the bottom row of screws (four screws).



9 Remove the four pins.



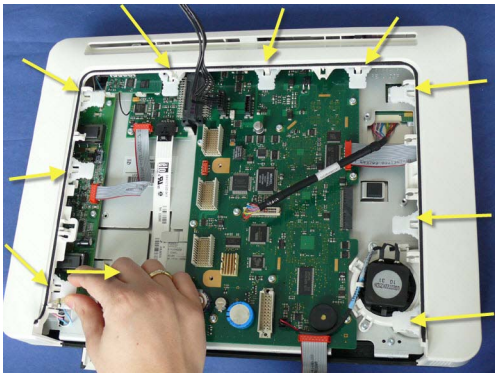
10 Remove the arched element of the housing containing the AC/DC power supply and, if installed, the iPC.



Removing the Rear Display Housing

1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Pull out the nine release clasps until you hear a click and the padlock symbol on the release clasp is visible.



3 Remove the rear display housing.

Reassembling the Rear Display Housing

1 Push the nine release clasps back in before repositioning the rear display housing.

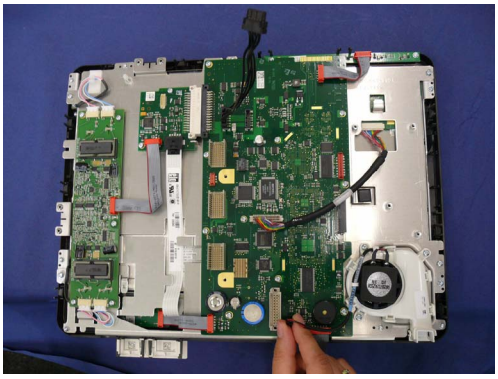
2 Reinsert the rear display housing and press it down carefully.

Removing the Loudspeaker

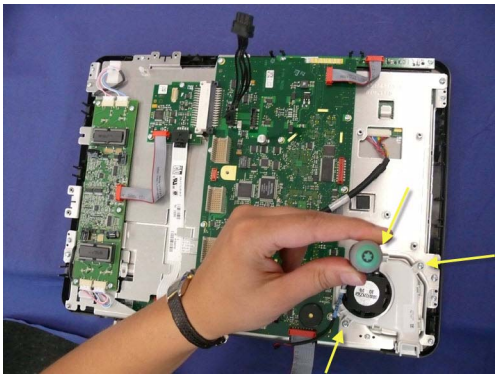
1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 Unplug the loudspeaker cable..



4 Remove the three screws from the loudspeaker.



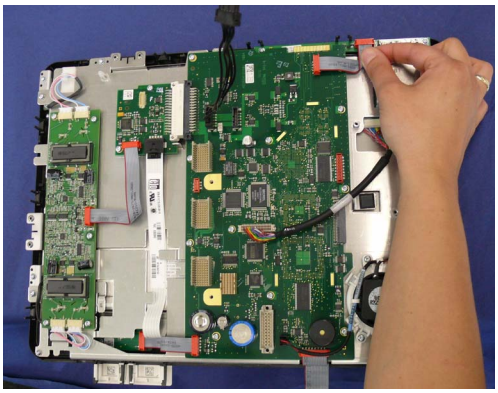
5 Remove the loudspeaker.

Removing the Alarm LED Board

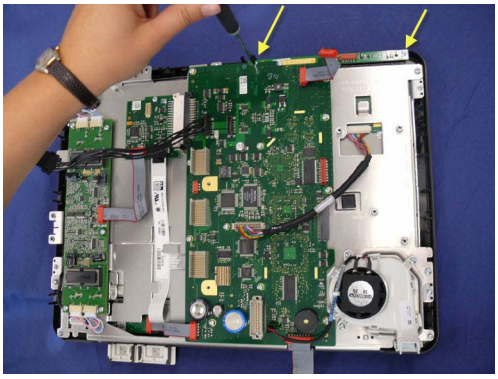
1 Separate the front and back half of the monitor as described in the section “Separating the Front and Back Half of the Monitor” on page 152.

2 Remove the rear display housing as described in the section “Removing the Rear Display Housing” on page 154.

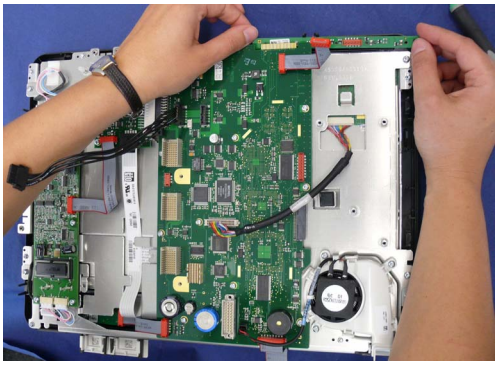
3 Unplug the alarm LED cable.



4 Remove the two self-cutting screws.



5 Remove the alarm LED board.



Removing the Light Pipes

1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 Remove the Alarm LED board as described in the section "Removing the Alarm LED Board" on page 155.

4 Remove the light pipes.

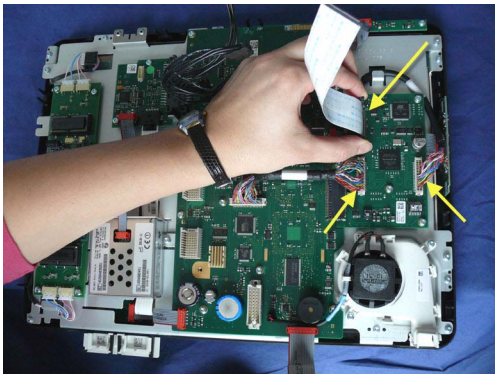
Removing the Video Mixer Board

This procedure only applies if an iPC is installed.

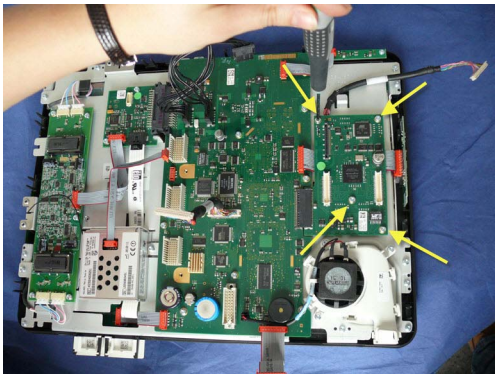
1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Remove the Rear Display Housing as described in the section "Removing the Rear Display Housing" on page 154.

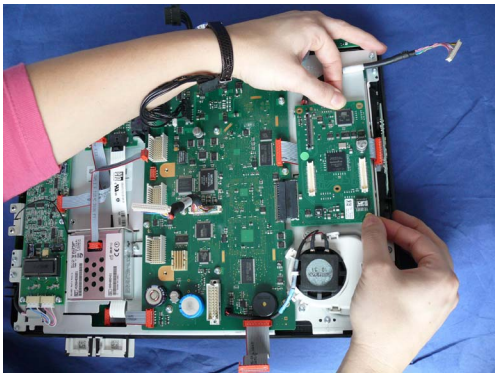
3 Unplug the three cables from the video mixer board.



4 Remove the four screws from the video mixer board.

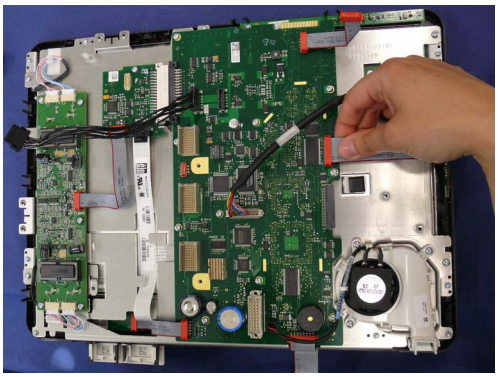


5 Remove the video mixer board.

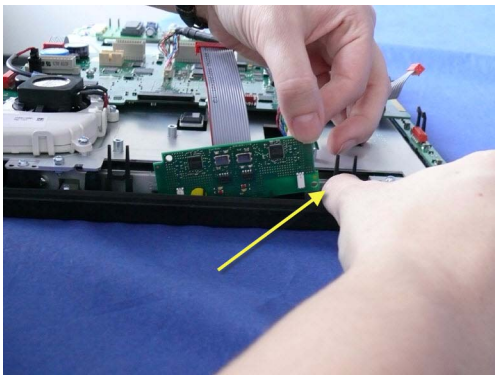


Removing the SRR Board

1. Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.
2. Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.
3. If an iPC is installed, unscrew the screws on the video mixer board, unplug the video mixer board from the main board and lift up the video mixer board from the housing, leaving all other cable connections to the video mixer board plugged. Be careful not to damage the cable connectors on the video mixer board.
4. Unplug the SRR cable from the main board.



5. Release and remove the SRR board by pushing the latch in the monitor housing outwards.

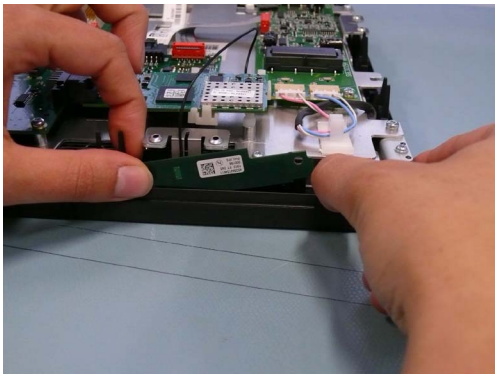


Removing the WLAN/IIT Antenna

This procedure only applies if WLAN or IIT are installed.

1. Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.
2. Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.
3. Unplug the WLAN/IIT antenna from the WLAN board or IIT module.

4 Remove the antenna by pushing the latch in the housing outwards as shown below.



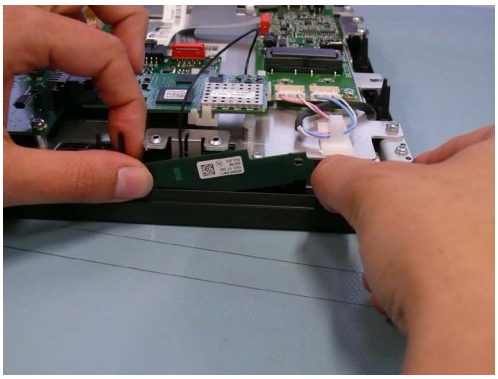
Removing the WLAN board

This procedure only applies if WLAN is installed.

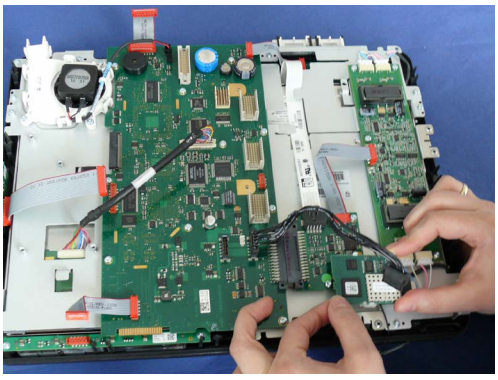
1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

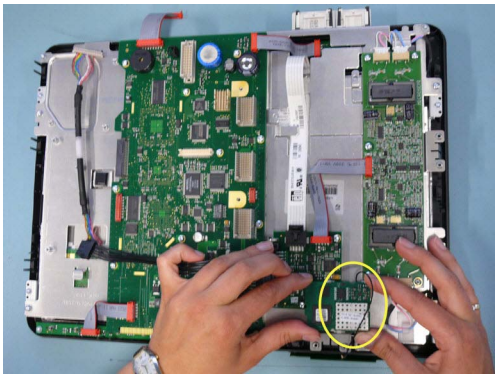
3 Remove the WLAN antenna by pushing the latch in the housing outwards as shown below.



4 Unplug the WLAN board including its holder from the panel adapter board.



5 Reassemble the WLAN Board by performing the above steps in reverse order. When reinserting the WLAN board, make sure to place the WLAN antenna cable above the WLAN board.



Removing the IIT Module

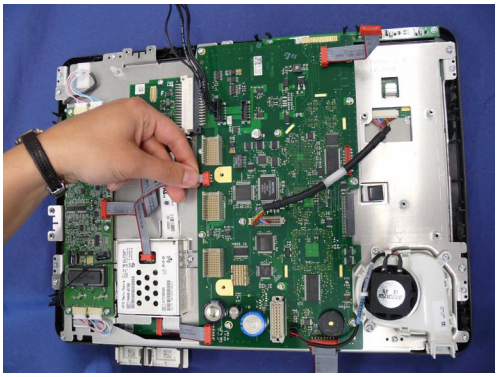
This procedure only applies if IIT is installed.

1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

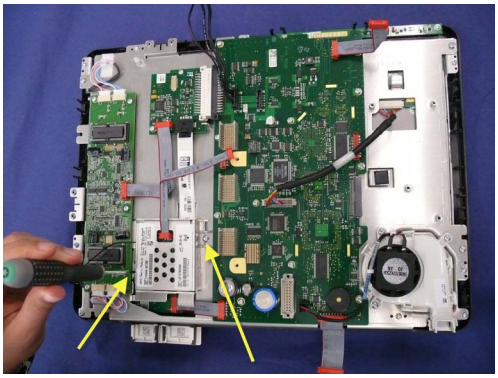
2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 Remove the IIT/WLAN antenna incl. cable as described in the section "Removing the WLAN/ IIT Antenna" on page 158.

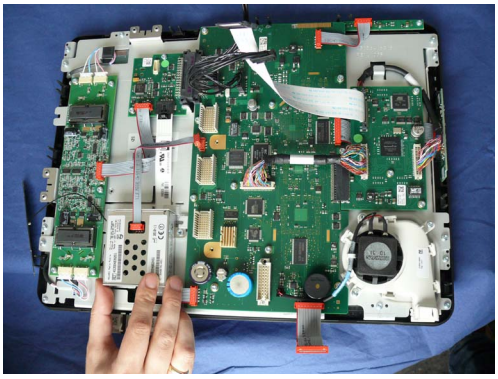
4 Remove the IIT cable from the main board.



5 Remove the two screws from the IIT module.



6 Remove the IIT module by pulling it towards you as shown below.



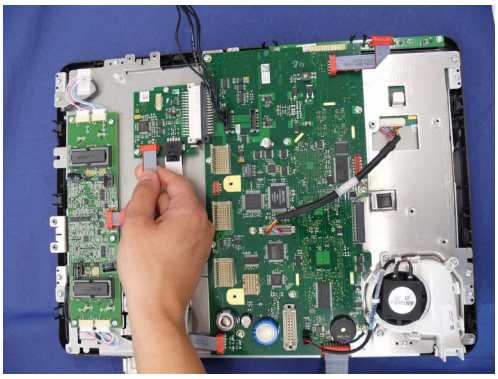
Removing the Panel Adapter Board

1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

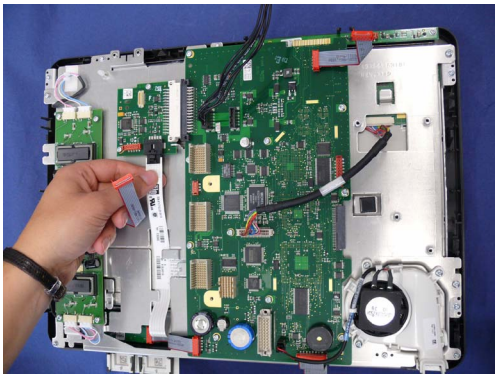
2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 If installed, remove the WLAN board and WLAN board holder as described in the section "Removing the WLAN board" on page 159.

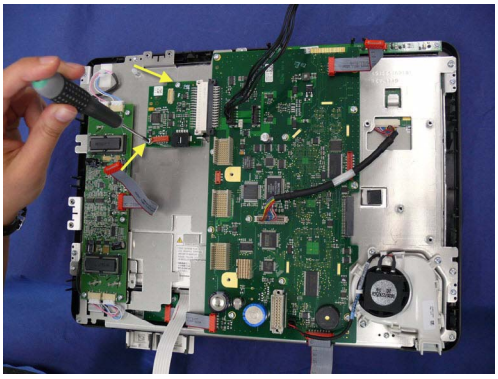
4 Unplug the flat ribbon cable from the panel adapter board.



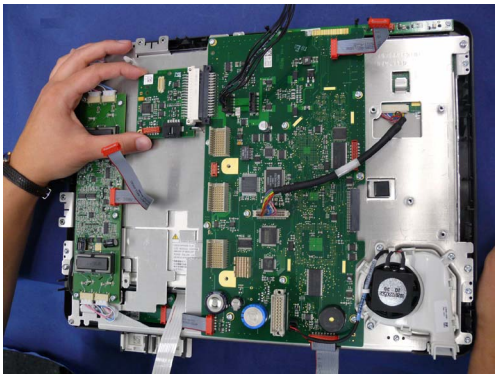
5 Unplug the touch cable from the panel adapter board by pressing the connector latch down and pulling out the cable. Note that non-touch monitors will not have this cable.



6 Remove the two screws from the panel adapter board.



7 Remove the panel adapter board.

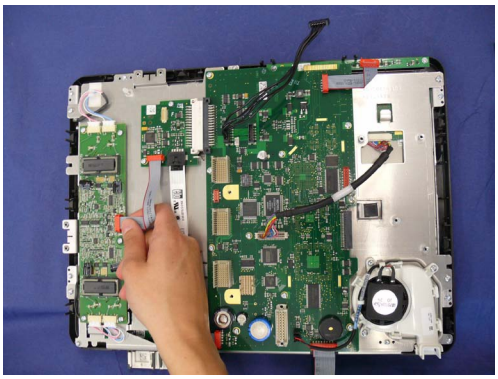


Removing the Backlight Inverter Board

1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

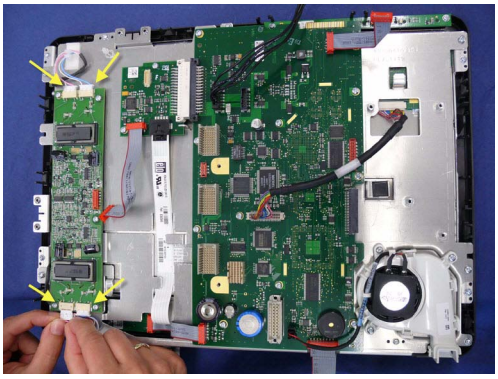
2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 Unplug the cable between the panel adapter board and the backlight inverter board.

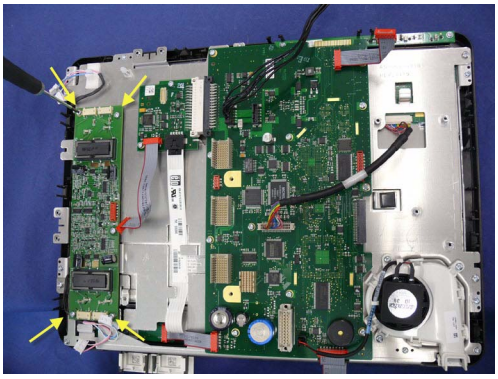


4 If IIT is installed, remove the IIT antenna as described in the section "Removing the WLAN/IIT Antenna" on page 158.

5 Unplug the four backlight cables.

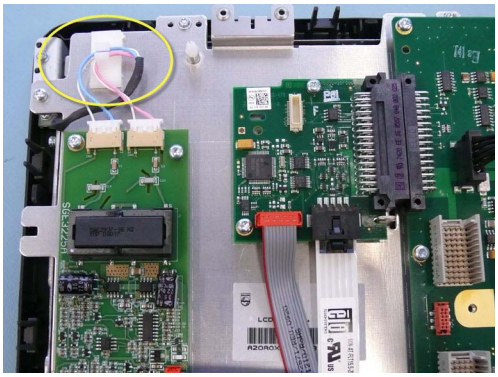


6 Remove the four flat-head screws from the backlight inverter board.



7 Remove the backlight inverter board.

8 Reassemble the backlight inverter board by performing the above steps in reverse order. Make sure that the backlight cables are inserted into the cable holder as shown below.



Removing the Main Board

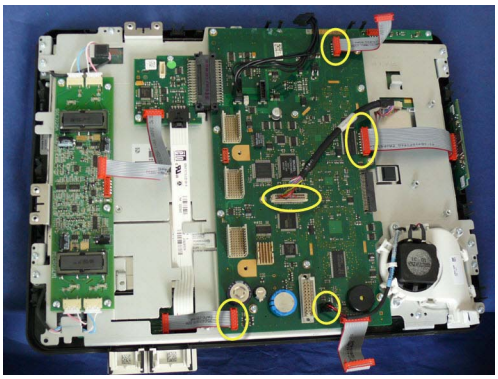
1 Separate the front and back half of the monitor as described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 If an iPC is installed, remove the video mixer board as decribed in the section "Removing the Video Mixer Board" on page 157.

4 If IIT is installed, unplug the IIT cable from the main board.

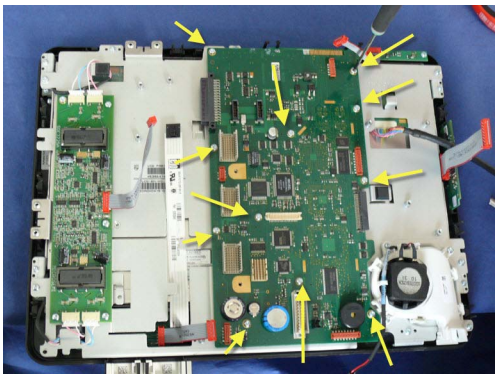
5 Unplug the multi-colored display cable, the loudspeaker cable, the SRR cable, the alarm led board cable and the HIF board cable from the main board.



6 Remove the panel adapter board as described in the section “Removing the Panel Adapter Board” on page 161.

7 If installed, remove the video mixer board incl. cables as described in the section “Removing the Video Mixer Board” on page 157.

8 Remove the 11 screws from the main board.



9 Remove the main board.

Removing the Touch Bezel Assembly

1 Separate the front and back half of the monitor as described in the section “Separating the Front and Back Half of the Monitor” on page 152.

2 Remove the rear display housing as described in the section “Removing the Rear Display Housing” on page 154.

3 If the IIT module is installed, remove the IIT module incl. antenna as described in the section “Removing the IIT Module” on page 160.

4 Unplug the touch cable from the panel adapter board and remove it from the guidance latches in the display chassis assembly.

5 Remove the Alarm LED board as described in the section “Removing the Alarm LED Board” on page 155.

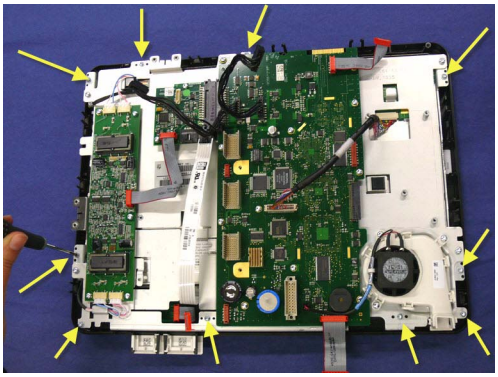
6 Remove the three light pipes as described in the section “Removing the Light Pipes” on page 156.

7 Remove the SRR board as described in the section “Removing the SRR Board” on page 158.

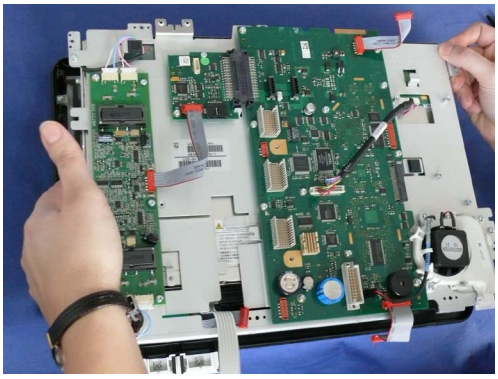
8 If WLAN is installed, remove the WLAN board as described in the section "Removing the WLAN board" on page 159.

9 Unplug the HIF board connector from the main board.

10 Remove the ten self-cutting screws from the touch bezel assembly.



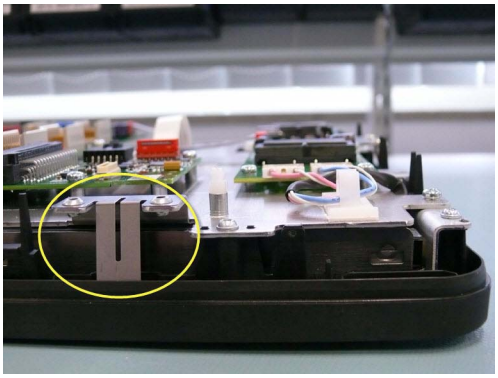
11 Remove the display chassis assembly by pulling it up out of the touch bezel assembly.



NOTE

Place the display chassis assembly on a flat, smooth surface after removal to avoid scratching the LCD panel.

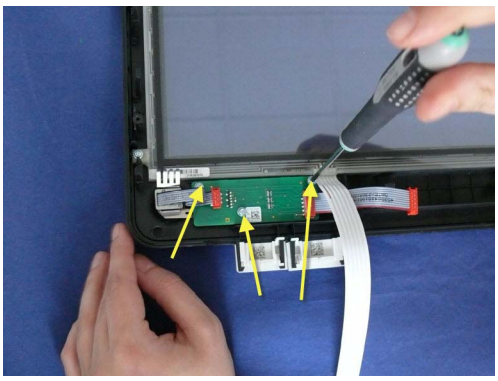
12 Reassemble the touch bezel assembly by performing the above steps in reverse order. When reassembling, make sure that the antenna contact sheet is inside the bezel.



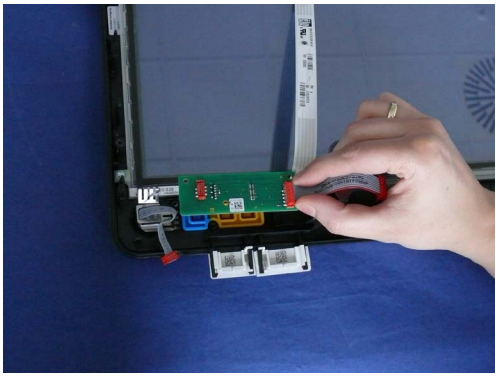
Removing the HIF Board, Navigation Point and Encoder

1 Remove the touch bezel assembly as described in the section “Removing the Touch Bezel Assembly” on page 164.

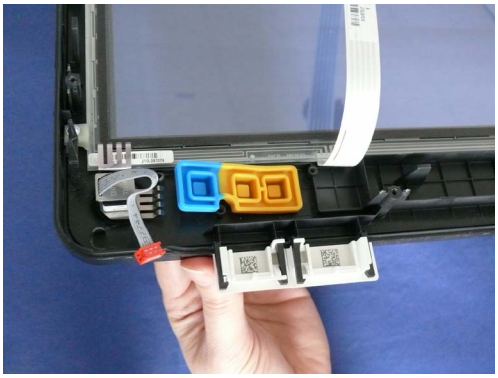
2 Remove the three screws from the HIF board.



3 Unplug both cables from the HIF board.

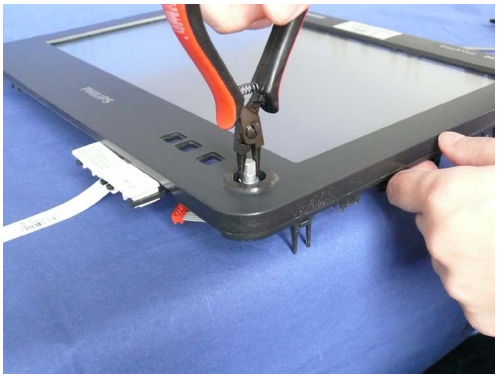


4 Push out the silicone pad from the back.

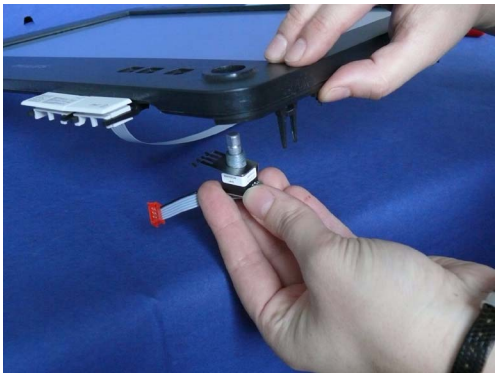


5 Pull off the Navigation Point using a screwdriver.

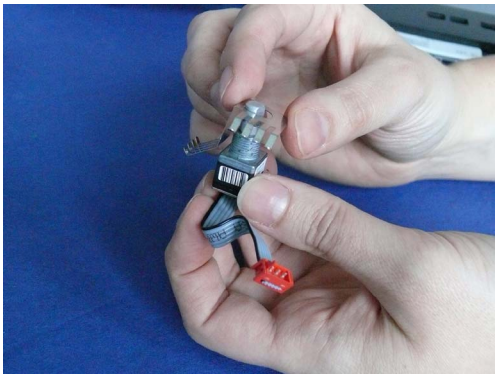

6 Remove the nut from the Navigation Point bolt using pliers.




7 Pull out the Navigation Point bolt from the bottom.



8 Remove the encoder as shown below.



9 Remove the serial number plate and the feature plate.

Removing the LCD Panel

1 Separate the front and back half of the monitors described in the section "Separating the Front and Back Half of the Monitor" on page 152.

2 Remove the rear display housing as described in the section "Removing the Rear Display Housing" on page 154.

3 If the IIT module is installed, remove the IIT module incl. antenna as described in the section "Removing the IIT Module" on page 160.

4 Unplug the touch cable from the panel adapter board.

5 Unplug the alarm LED board cable from the alarm LED board.

6 Unplug the SRR cable and remove the SRR board as described in the section "Removing the SRR Board" on page 158.

7 If WLAN is installed, unplug the WLAN antenna cable.

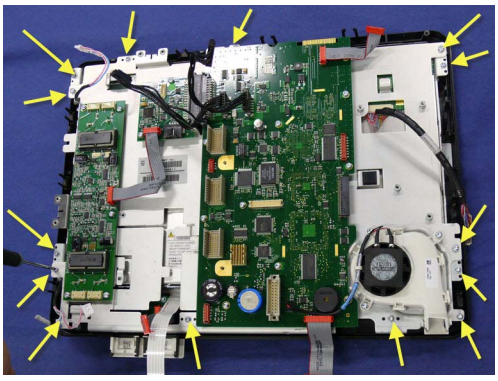
8 Unplug the backlight cables from the backlight inverter board.

9 Unplug the multi-colored display cable from the main board.

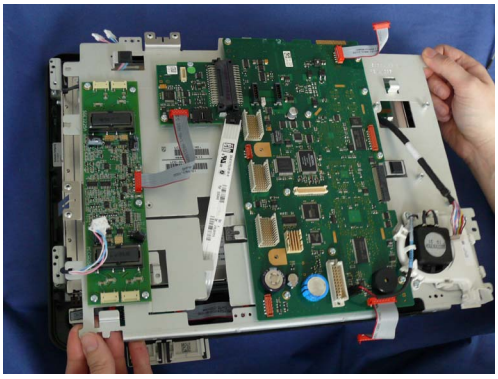
10 Unplug the cable between the backlight inverter board and panel adapter board from the backlight inverter board.

11 If an iPC is installed, remove the video mixer board as described in the section "Removing the Video Mixer Board" on page 157.

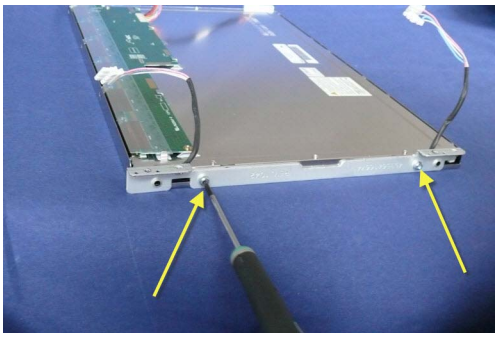
12 Remove the fourteen screws from the display chassis assembly.



13 Remove the display chassis assembly and remove the display.



14 Remove the four screws on the sides of the display chassis assembly (two screws on each side) and remove the angled metal sheets from the sides of the LCD panel.

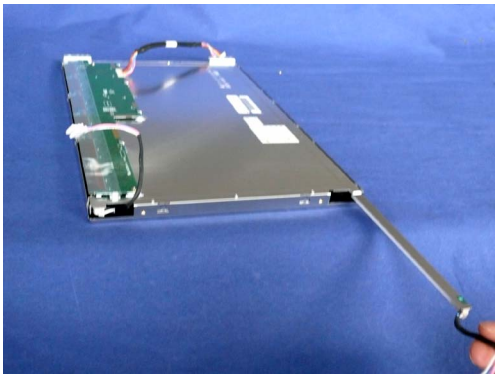


Removing the Backlights

1 Remove the LCD Panel as described in the section "Removing the LCD Panel" on page 168.

2 Remove the screws from the individual backlights (PH0 x 60).

3 Pull out the backlights.



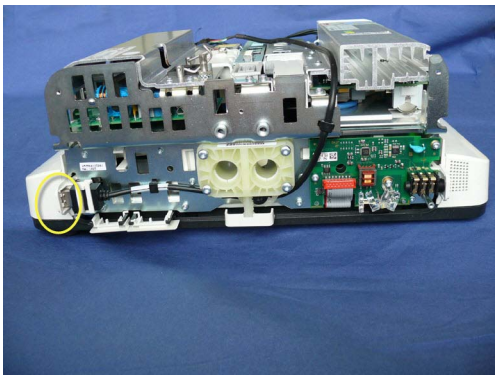
Removing the Blank Side Cover or USB Side Cover

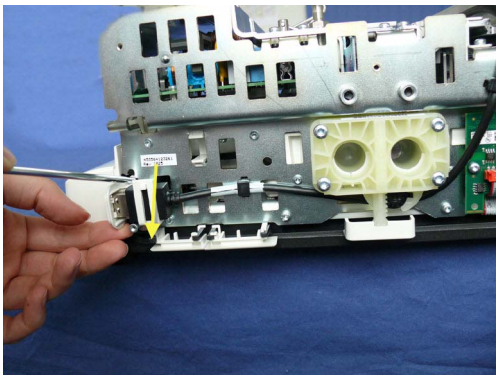
If you have iPC installed you will have a USB side cover. If not, you will have a blank side cover.

1 Remove the bottom housing as described in the section "Removing the Bottom Housing" on page 145.

2 Remove the housing rear as described in the section "Removing the Housing Rear" on page 148.

3 Remove the side cover or the USB side cover from the bottom housing using a screwdriver. The covers are attached to a hook. Press the hook with the screwdriver and pull out the cover.





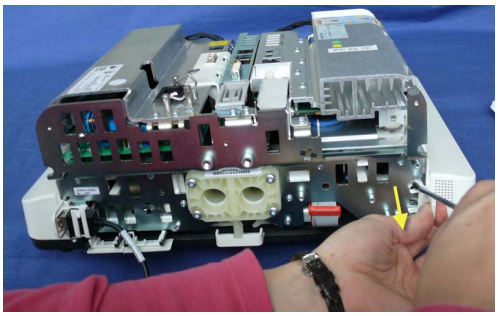
Removing the ECG Sync Side Plate

1 Remove the bottom housing as described in the section "Removing the Bottom Housing" on page 145.

2 Remove the housing rear as described in the section "Removing the Housing Rear" on page 148.

3 Remove the Power Switch/ECG Sync Out Board as described in the section "Removing the Power Switch/ECG Sync Out Board" on page 146.

4 Remove the ECG Sync side plate from the bottom housing using a screwdriver. The ECG Sync side plate is attached to a hook. Press the hook with the screwdriver and pull out the side plate.



Removing the Side USB Cable

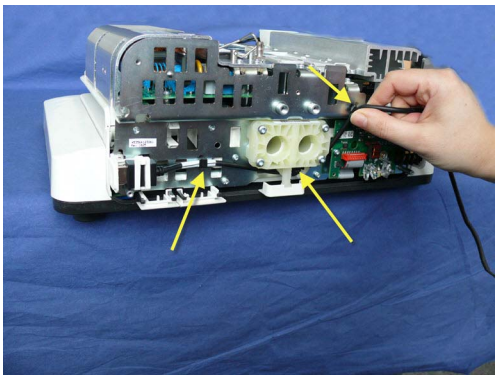
This procedure applies only if iPC is installed.

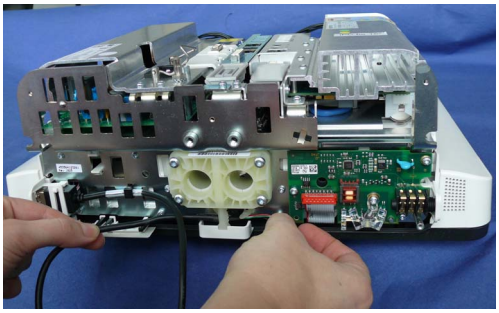
1 Remove the bottom housing as described in the section "Removing the Bottom Housing" on page 145.

2 Remove the housing rear as described in the section "Removing the Housing Rear" on page 148.

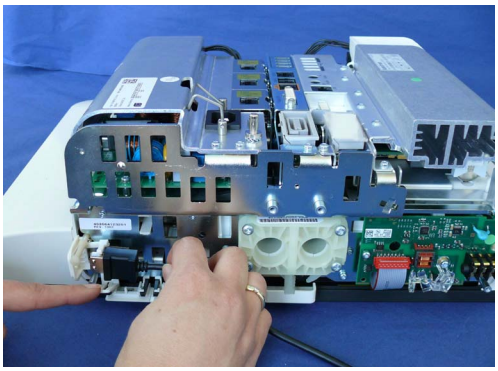
3 Remove the side cover or the USB side cover from the bottom housing as described in the section "Removing the Blank Side Cover or USB Side Cover" on page 170.

4 Remove the two cable holders by pulling on the cable.





5 Unplug the USB Cable.



NOTE

When reinserting the USB cable, make sure it is reassembled in exactly the same way it was before, otherwise the monitor cannot be reassembled.

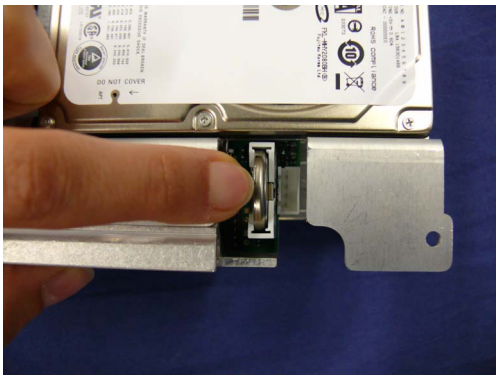
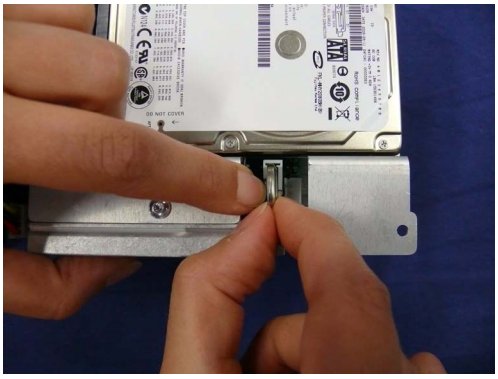
iPC Disassembly

The procedures in this section only apply if an iPC is installed.

Removing the Battery

1 Remove the iPC from the monitor as described in the section .

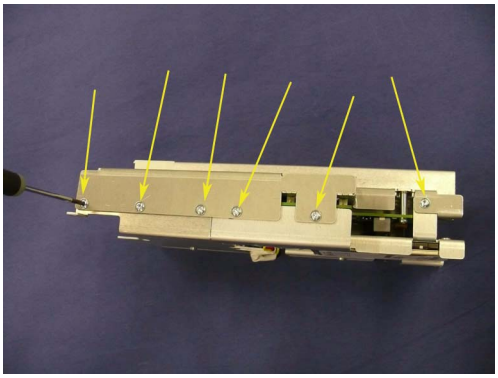
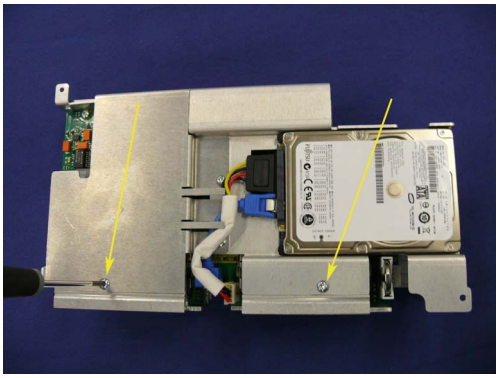
2 Pull back the latch holding the battery and remove the battery.

Removing the iPC Main Board Assembly

1 Remove the iPC from the monitor as described in the section .

2 Remove the eight screws from the iPC (six on the side, two on the back).

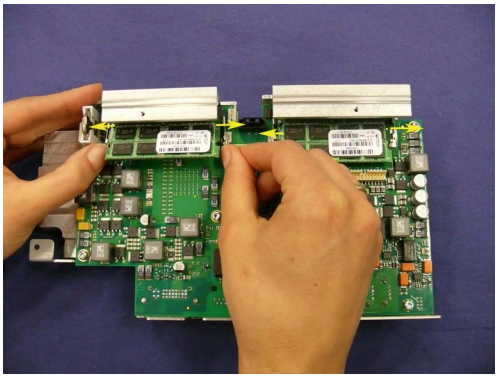



3 Unplug the two cables coming from the hard disk and separate the main board assembly from the hard disk assembly.

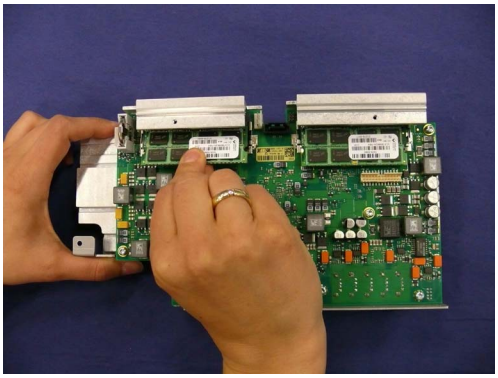
Removing the RAM

1 Remove the iPC main board assembly as described in the section "Removing the iPC Main Board Assembly" on page 172.

2 Press the latches holding the RAM boards to the side.



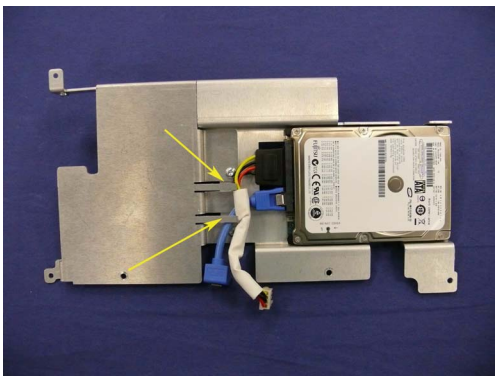
3 Pull out the RAM boards carefully.



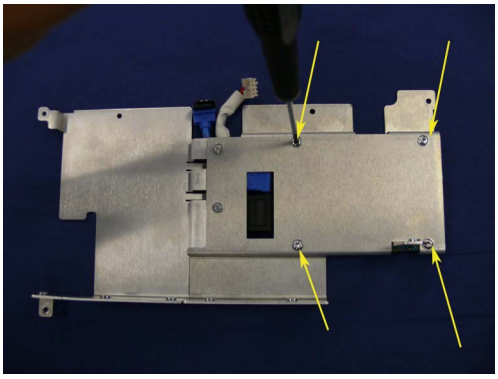
Removing the Hard Drive

1 Remove the iPC main board assembly as described in the section “Removing the iPC Main Board Assembly” on page 172.

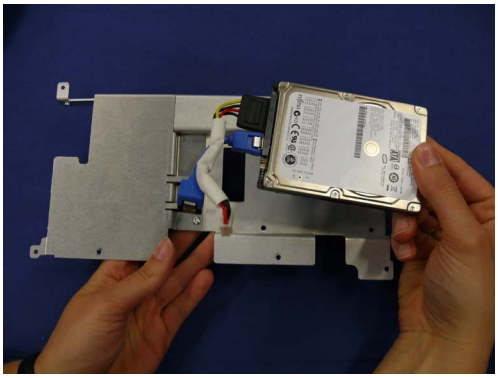
2 Pull the two cables out of the metal latches.



3 Turn the hard drive assembly around so the hard drive is facing downwards. Then remove the four screws from the chassis.



4 Remove the hard drive.

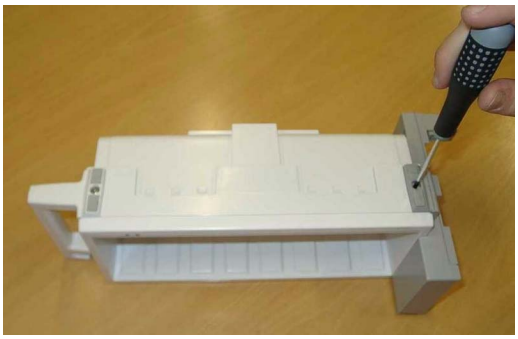


8-Slot Flexible Module Rack (FMS-8) Disassembly

Removing the Handle and the Measurement Server Mount

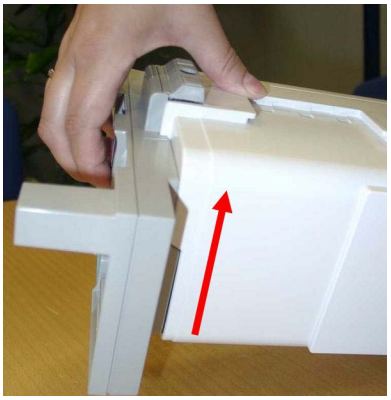
Please note that any combination of handles and mounts is possible.

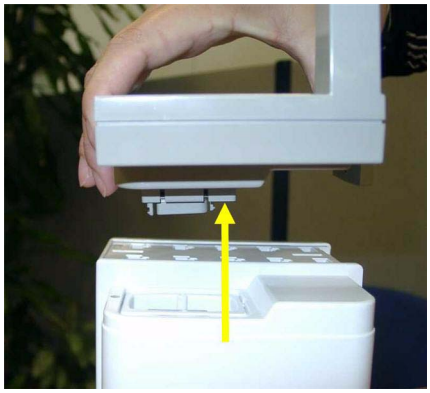
1 Remove the two screws on the bottom with a T20 screwdriver.



2 Slide the handle up and pull it out.

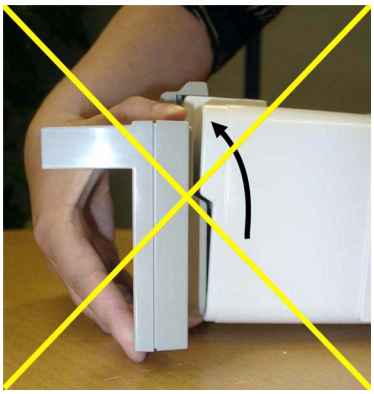
3 Remove the MMS if connected. Slide the MMS mount up and remove it by pulling directly perpendicular to the FMS.





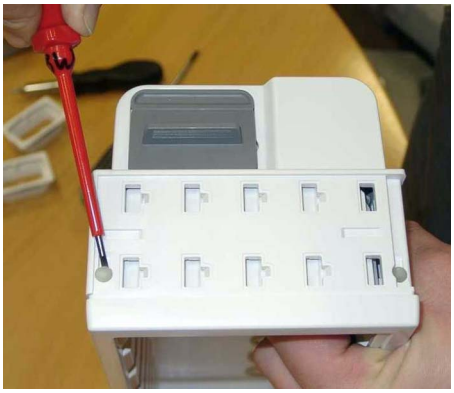
NOTE

There is a connector located on the MMS mount. If you tilt the MMS mount as you remove it, you may damage the connector.

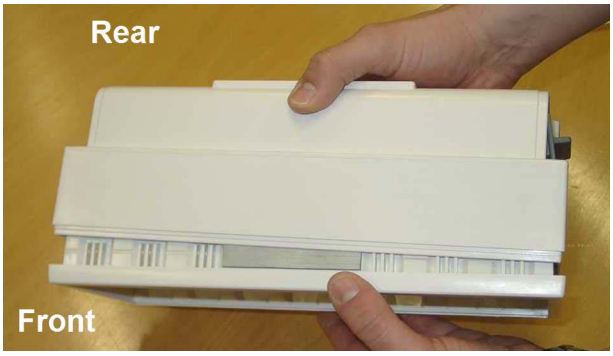


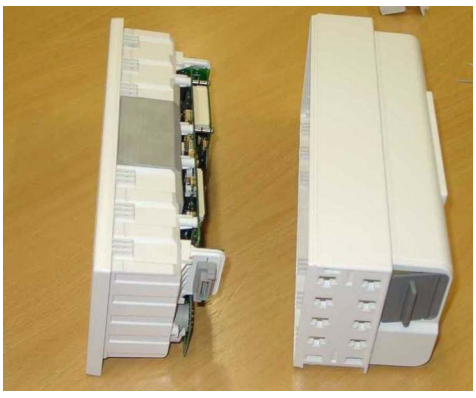
4 Remove the connector housings on each side of the FMS by compressing the cover slightly using two screwdrivers.

5 Remove the two white pins on each side with a small screwdriver.

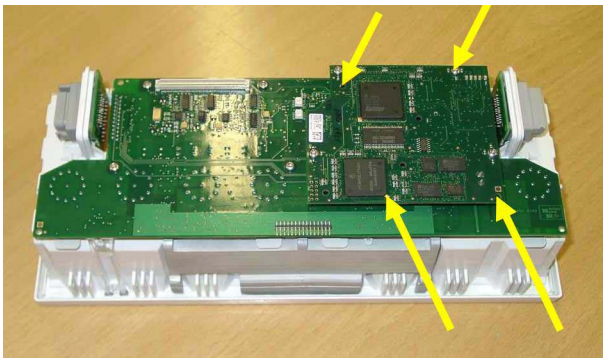


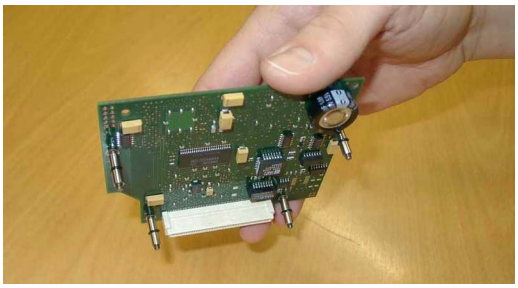
6 Take off the rear housing.



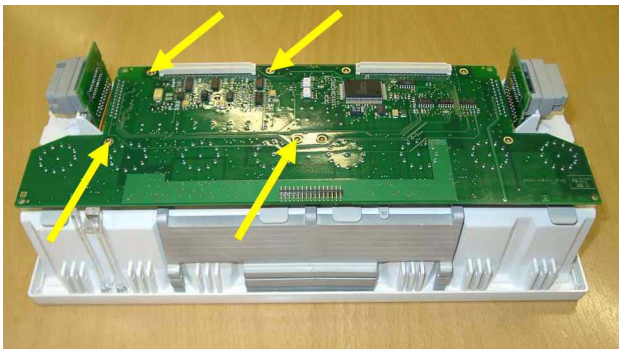


7 Remove the four screws on the CPU board, pull it gently off the mother board, unplugging the connector at the same time.



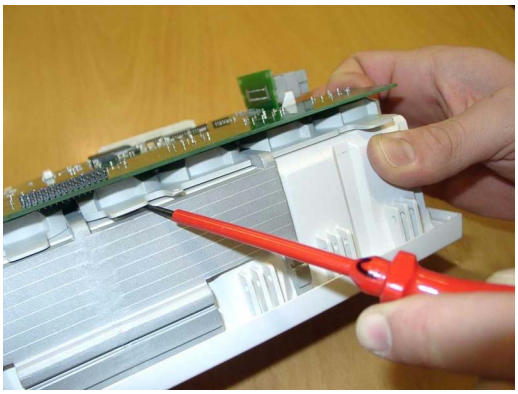


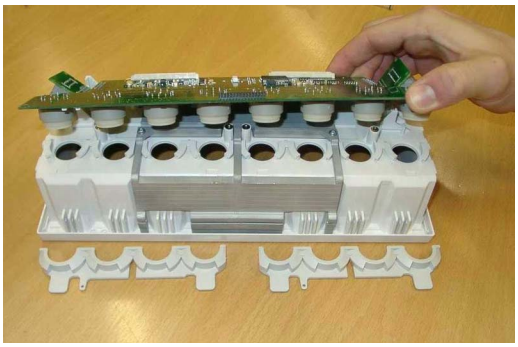
8 Remove the four remaining screws on the mainboard.



9 Pull off side connector brackets by pulling them gently away from the housing on each side and lifting carefully.

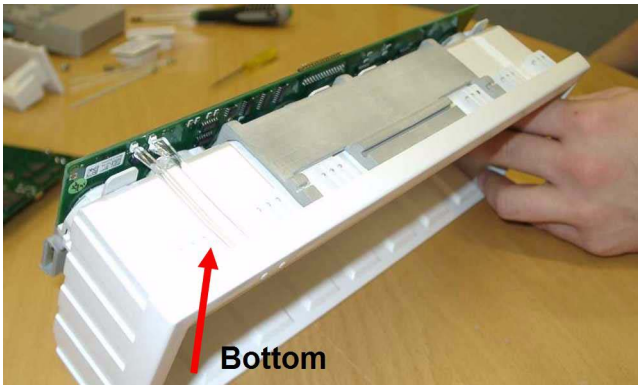
10 Lift up and pull on the tabs to remove the connector holders.
Reassembly Note: The connector holders are side specific.

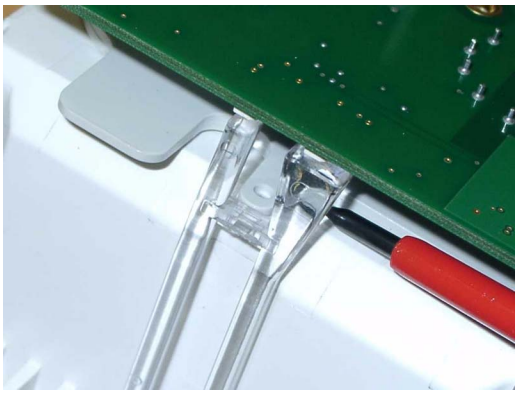




11 Unsnap the lightpipe.

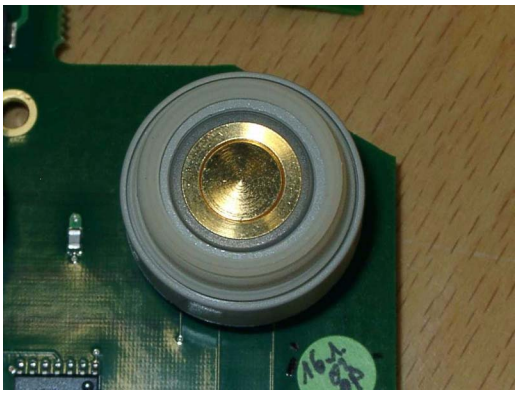
Reassembly Note: You must snap the lightpipe bottom into place before inserting the top into the tab.





12 Pull off the main board.

Reassembly Note: Make sure that the rubber seal around the module connectors is inserted properly into the front housing.

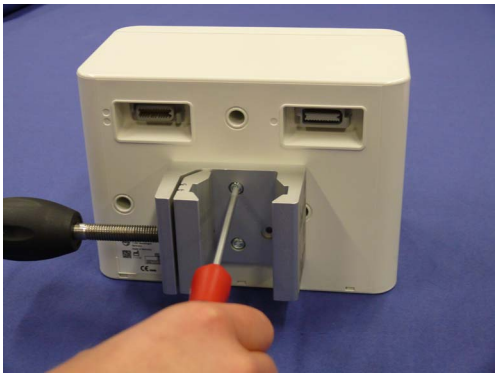


Please make sure to set the exchange part data (serial number) with the support tool after reassembly. For details please refer to the support tool Instructions for Use.

4-Slot Flexible Module Rack (FMS-4) Disassembly (without MMS Mount)

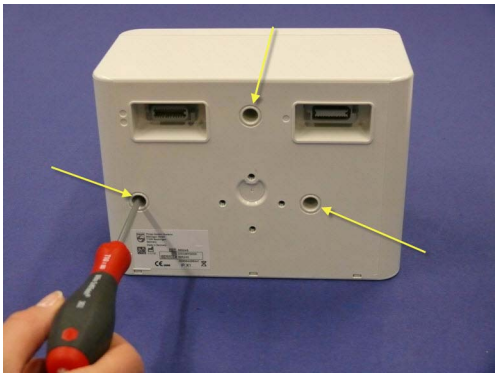
Separating the Front and Back of the 4-Slot FMS

1 If the Universal Mounting Clamp is installed, remove the two screws (T20) from the Universal Mounting Clamp and remove the clamp.

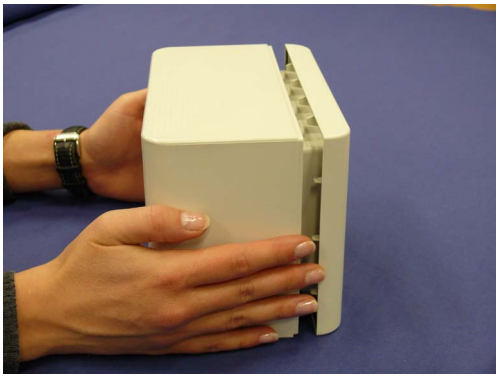


If any other mounting bracket is installed, remove it.

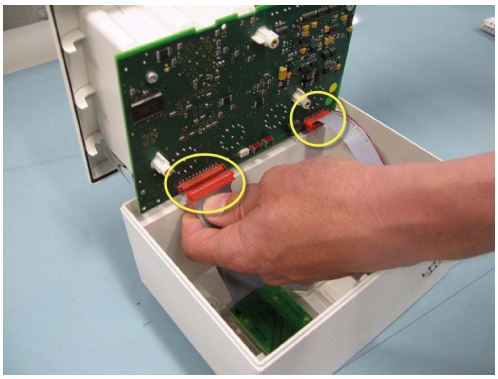
2 Remove the three screws (T10) from the back of the FMS.



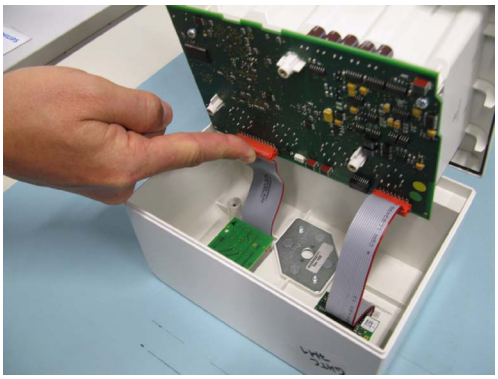
3 Push the front housing off with your hands.



4 Flip the back of the FMS down, resting the front of the FMS on the rear housing as shown below. Then unplug the two cables from the main board.



5 Reassemble the FMS by performing the above steps in reverse order. When reassembling the front and back of the FMS, make sure the cables are inserted into the main board as shown below.



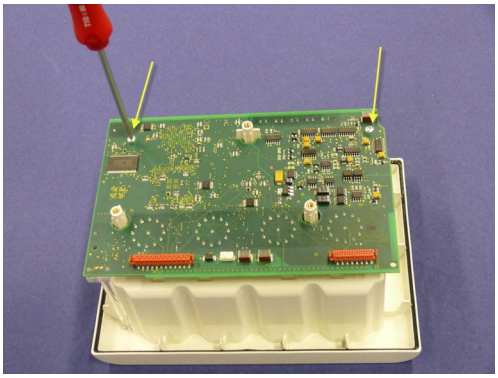
Make sure that the screws in the rear cover of the FMS are tight enough so the FMS is properly sealed.

Removing the Main Board

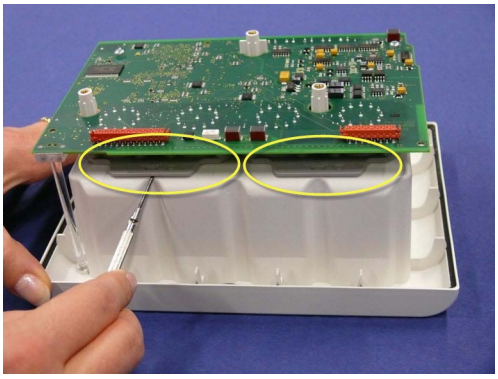
1 If installed, remove the Universal Mounting Clamp.

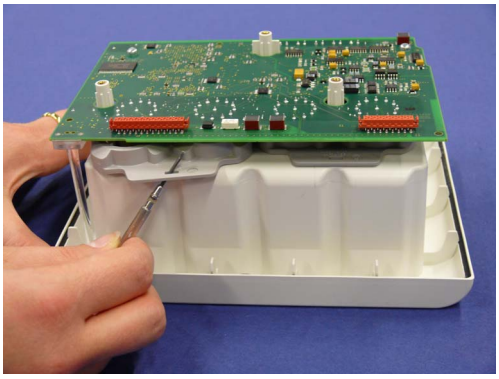
2 Separate the front and back of the FMS as described in “Separating the Front and Back of the 4-Slot FMS” on page 181.

3 Remove the two screws (T10) from the main board.

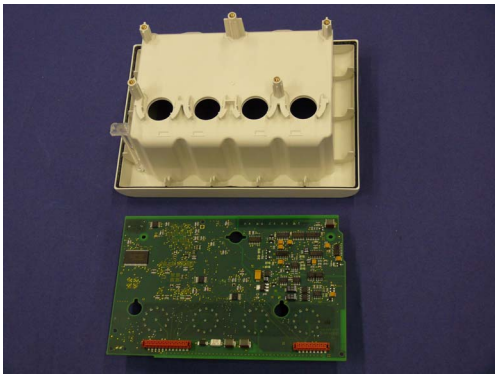


4 Pull out the two connector holders with a flathead screwdriver.

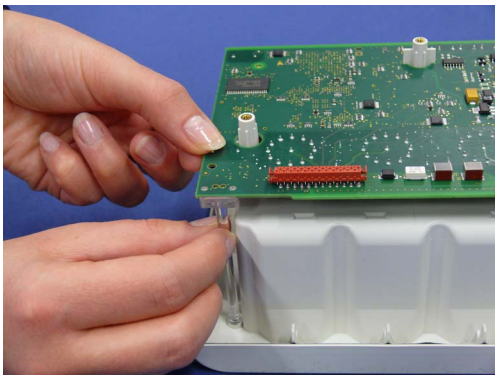




5 Remove the main board.



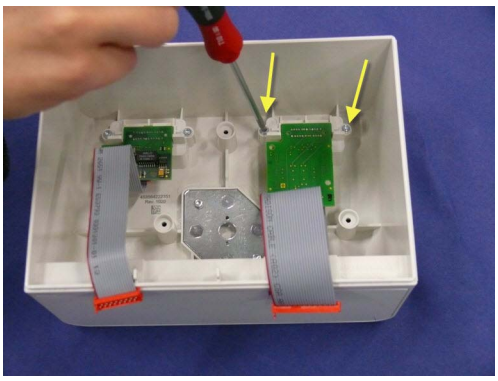
6 Reassemble the FMS by performing the above steps in reverse order. Make sure that the light guide is in its correct position (see picture below) and reinsert the connector holders by pushing them in until you hear a click.



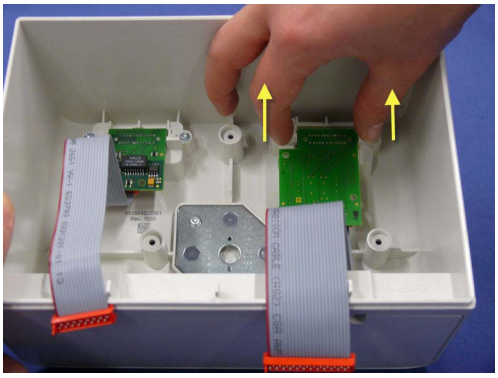
Removing the MSL Boards

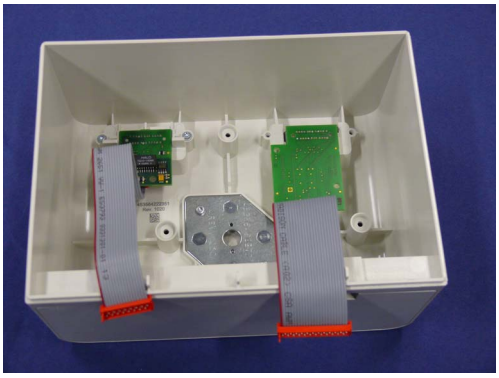
1 Separate the front and back of the FMS as described in “Separating the Front and Back of the 4-Slot FMS” on page 181

2 Remove the two screws from the MSL holder.

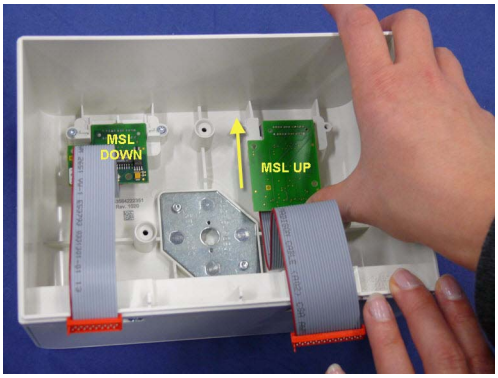


3 Push the MSL Holder forwards to remove it.

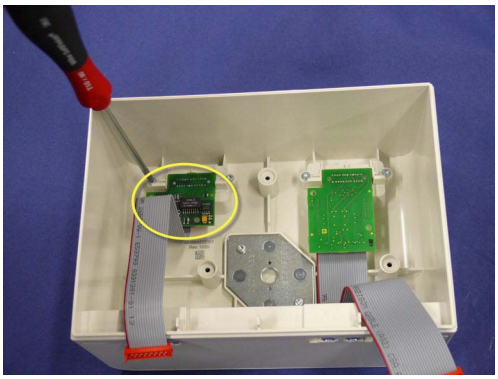




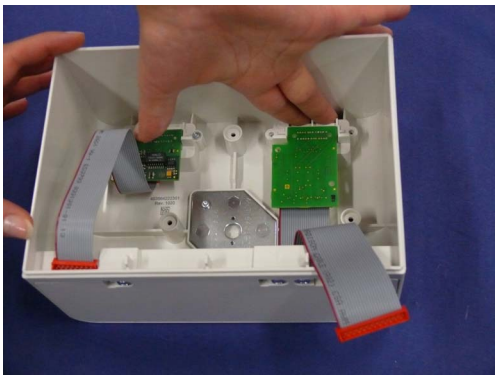
4 Push the MSL UP board forwards to remove it.



5 Remove the MSL DOWN board accordingly by performing the above steps for the other MSL board.



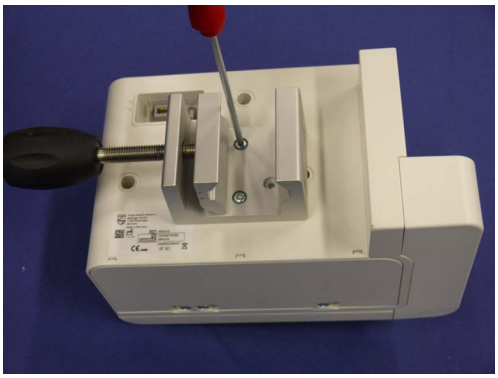
6 Reassemble the MSL boards by performing the above steps in reverse order. When reassembling, push down MSL holder before tightening screws.



4-Slot Flexible Module Rack (FMS-4) Disassembly (with MMS Mount)

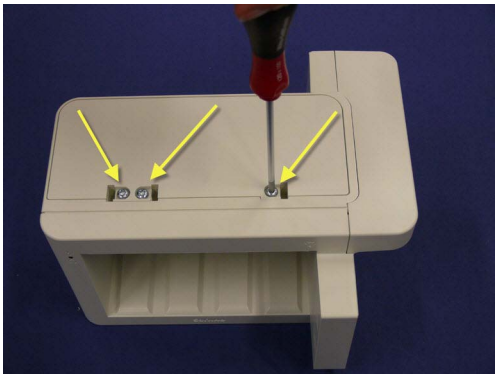
Removing the Universal Mounting Clamp

1 If the Universal Mounting Clamp is installed, remove the two screws (T20) from the Universal Mounting Clamp and remove the clamp. If any other mounting bracket is installed, remove it.



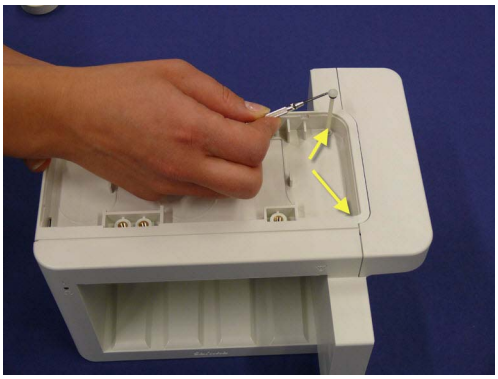
Removing the MSL DOWN board in MMS Mount

1 Remove the three screws (T20) from the bottom cover.



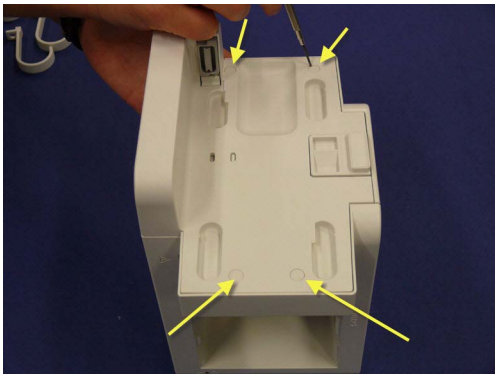
2 Remove the bottom cover. If cable management hooks are installed, remove them.

3 Remove the two pins as shown below.

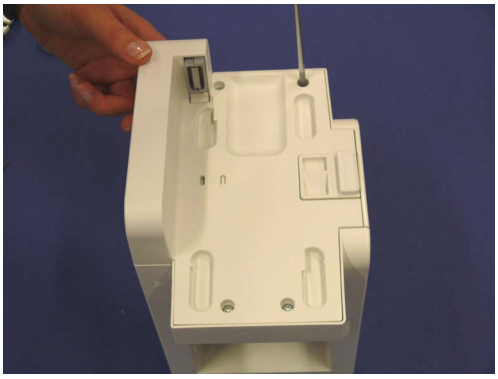


4 Position FMS with the MMS mount pointing upwards.

5 Remove the four silicone screw covers as shown below.

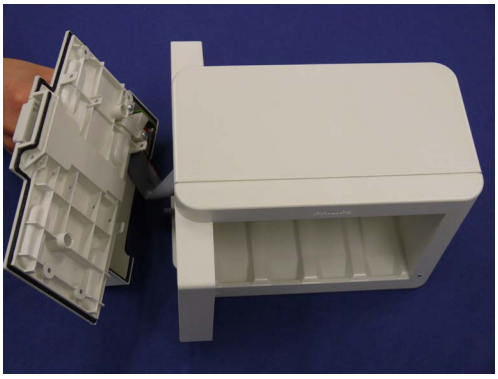


6 Remove the four screws (T10) from the MMS mount.

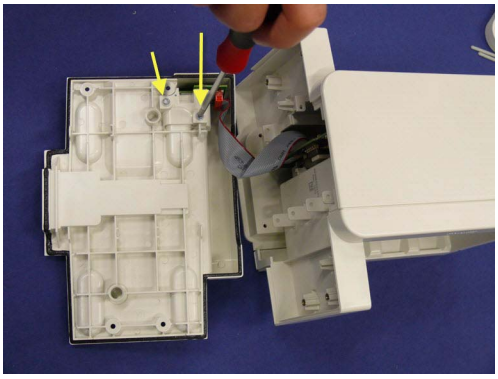


7 Flip FMS so it is positioned right side up.

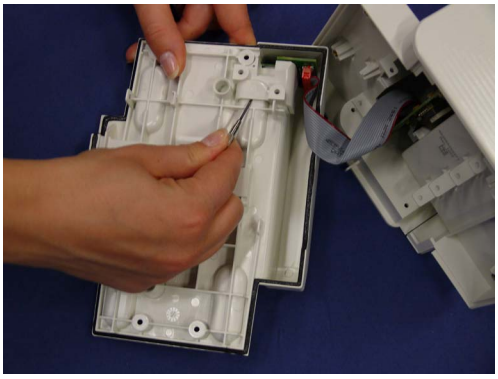
8 Pull off the MMS mount.



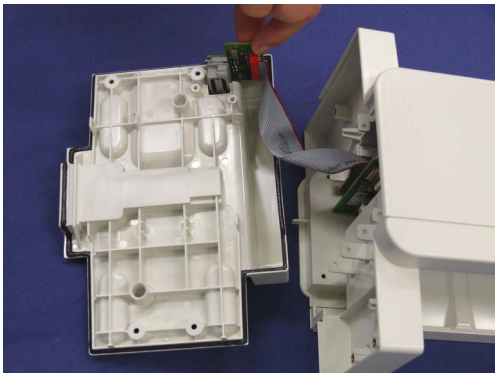
9 Remove the two screws (T10) from the MSL holder.



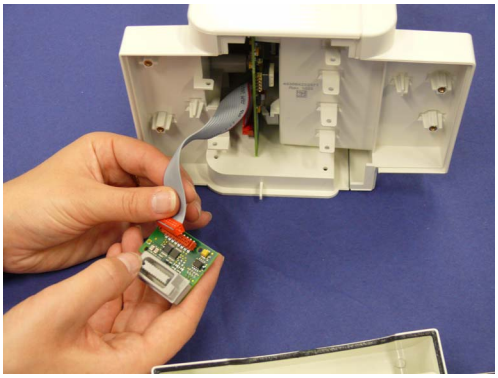
10 Remove MSL holder as shown below.



11 Remove the MSL Down board.



12 Remove the MSL cable from the board.



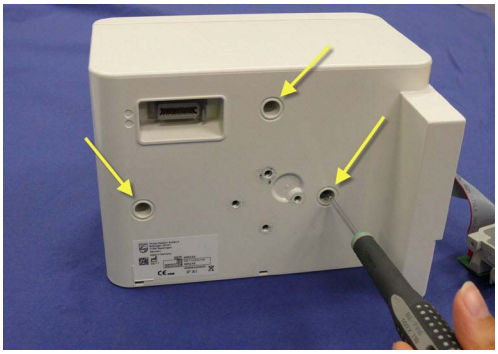
13 Reassemble the FMS by performing the above steps in reverse order. When reassembling insert the silicone screw covers with the holes pointing towards the bottom.

Separating the Front and Back of the 4-Slot FMS with MMS Mount

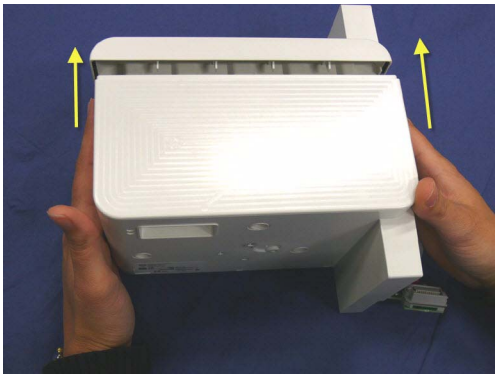
1 Remove the Universal Mounting Clamp or any other mounting bracket as described in “Removing the Universal Mounting Clamp” on page 185.

2 Remove the MMS Mount as described in steps 1 to 11 of the section “Removing the MSL DOWN board in MMS Mount” on page 186

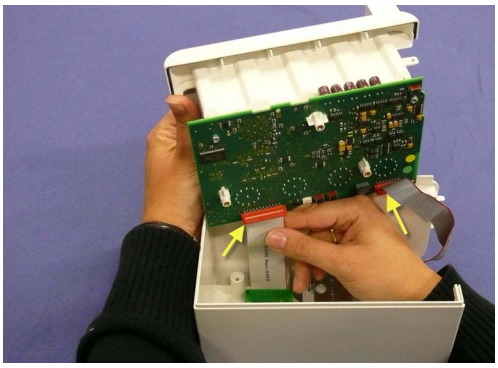
3 Remove the three screws (T10) from the back of the FMS.



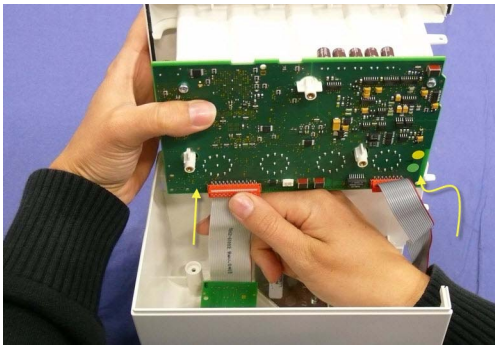
4 Push the front housing off with your hands as shown below.

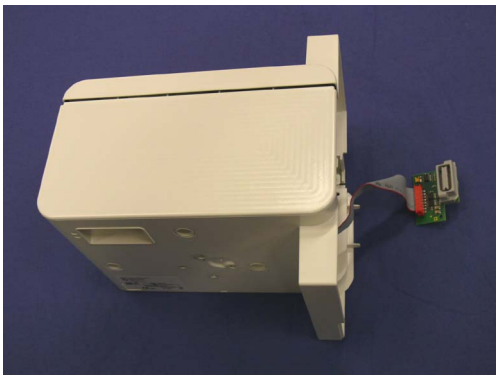


5 Unplug the cables from the main board.



6 Reassemble the FMS by performing the above steps in reverse order. When reassembling the front and back of the FMS, make sure the cables are inserted into the main board as shown below.



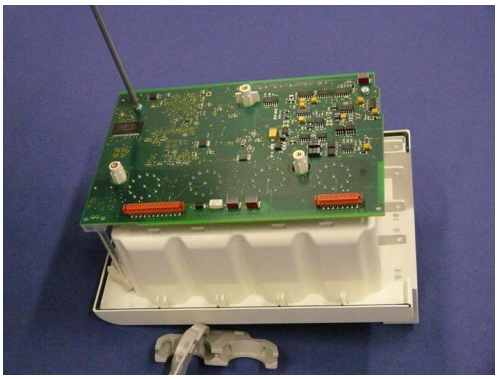


Make sure that the screws in the rear cover are tight enough so that the FMS is properly sealed and that the silicone screw covers in the MMS mount are inserted with the hole facing downwards.

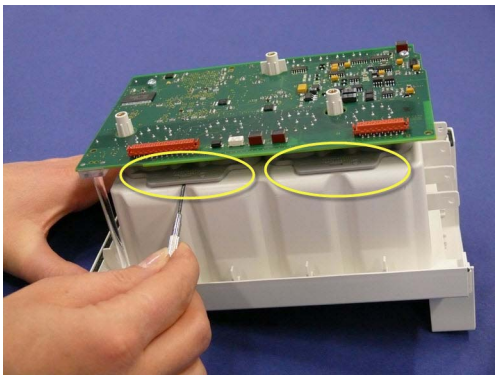
Removing the Main Board

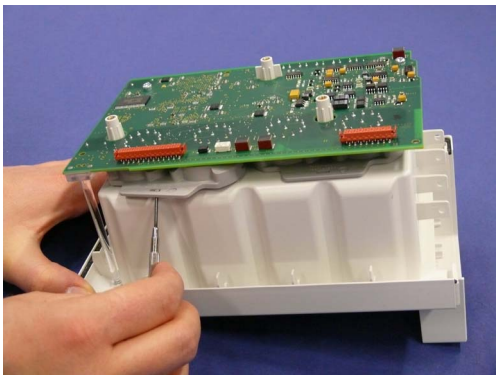
1 Separate the front and back of the FMS-4 as described in “Separating the Front and Back of the 4-Slot FMS with MMS Mount” on page 189.

2 Remove the two screws (T10) from the main board.

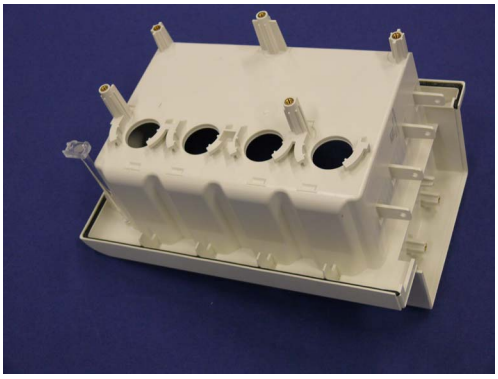


3 Pull out the two connector holders with a flathead screwdriver.

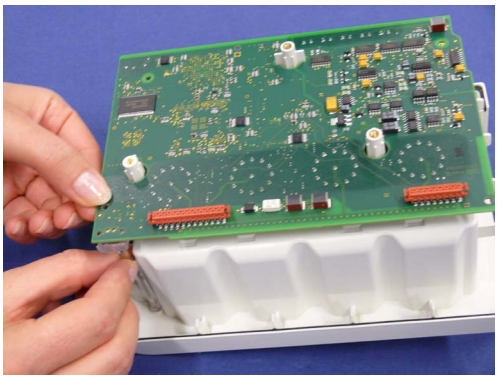




4 Remove the main board.



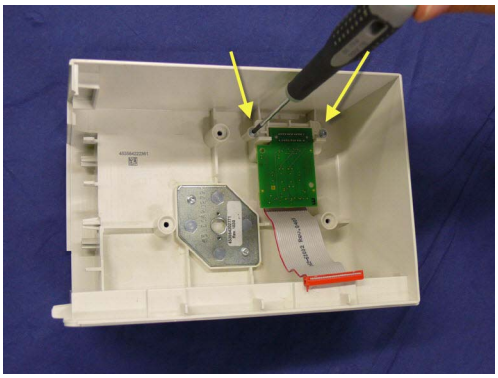
5 Reassemble the FMS by performing the above steps in reverse order. Make sure that the light guide is in its correct position (see picture below) and reinsert the connector holders by pushing them in until you hear a click..



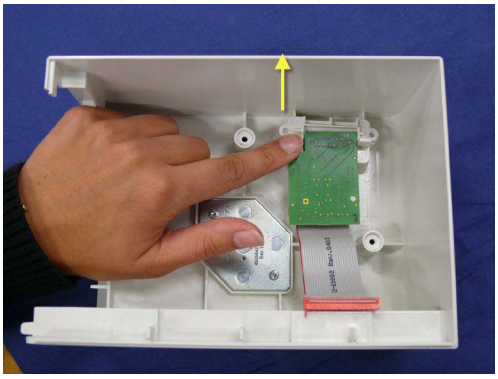
Removing the MSL UP Board

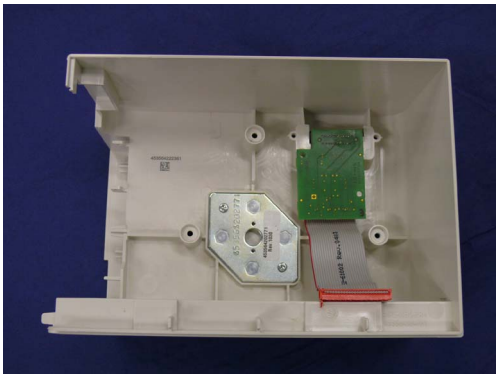
1 Separate the front and back of the FMS as described in “Separating the Front and Back of the 4-Slot FMS with MMS Mount” on page 189.

2 Remove the two screws from the MSL holder.

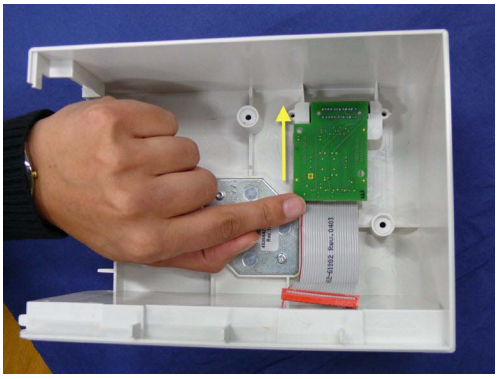


3 Push the MSL Holder forwards to remove it.





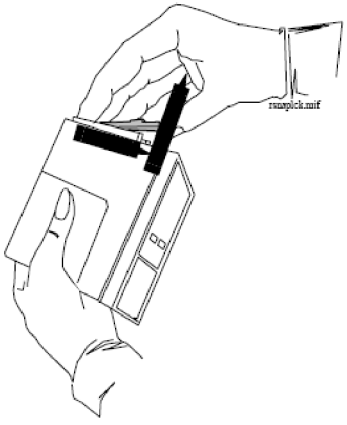
4 Push the MSL board forwards to remove it.

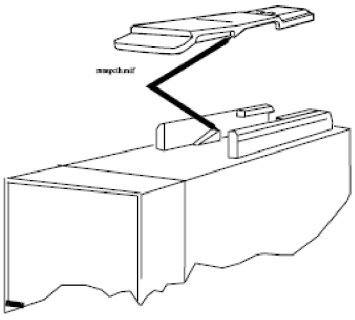


5 Reassemble the MSL UP board by performing the above steps in reverse order. When reassembling, push down MSL holder before tightening screws.

Plug-in Modules

The snap lock holds the plug-in module in the FMS.





To remove the snap lock:

1 Grip the module firmly in one hand and using your thumb, pull the front edge of the snap lock away from the plug-in module so that the lug on the snap lock clears the retaining edge of the module.

2 Push on the rear edge of the snap lock to move the snap lock through the slot toward the front of the module until it is clear.

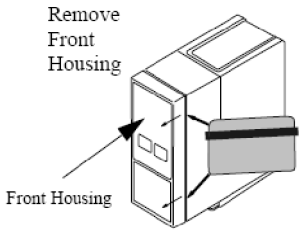
To replace the snap lock:

1 Locate the snap lock into the slot on the bottom of the module.

2 Slide the snap lock toward the rear of the module until the lock snaps into position.

Plug-In Module Disassembly

Disassembly of the parameter module enables replacement of the front assembly.



Removing the Module Front Housing

WARNING

When you disassemble/assemble a plug-in module an applied part leakage current test must be performed before it is used again for monitoring.

To disassemble a plug-in module:

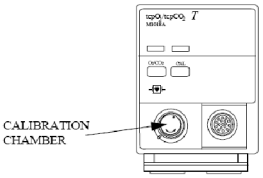
Remove the front housing.

- Place the module on a flat surface and insert a card (similar to a credit or cheque type card) into one side of the module to disengage the 2 tabs securing the front housing to the module housing.
- Pull the edge of the front housing away from the module housing.
- Carefully turn the module over so the free edge does not reengage and repeat the first two steps on the other side of the module. The front housing should now be free of the module housing.

To reassemble a plug-in module:

Snap-fit the front housing onto the front of the module case so the openings in the front housing match the LEDs and keys.

tcpO2/tcpCO2 Calibration Chamber Kit



M1018A Traditional CMS-Style Module

Front Housing

Calibration Chamber

Front Housing with Calibration Chamber

M1018A New Style Module

NOTE

You must order a new front housing AND a new calibration chamber kit when repairing a traditional CMS-Style M1018A module. The calibration chamber must be replaced first for the new style housing to fit properly

To remove the calibration chamber

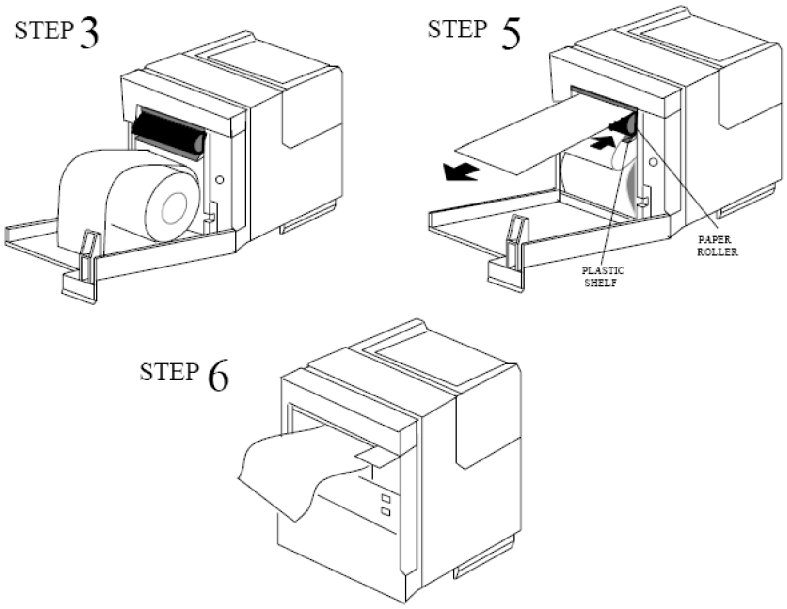
1. Using a flat-tipped screwdriver, remove the screw holding the calibration chamber in place on the front of the plug-in module.
2. Lift the chamber off the plug-in module. Ensure that the white plastic switch tip located in the module is not lost.

To replace the calibration chamber

1. Ensure the white plastic switch tip is in place in the plug-in module.
2. Place the calibration chamber in the allocated position on the plug-in module.
3. Insert and tighten the screw into the calibration chamber, securing it to the plug-in module.

Recorder Module Paper

The recorder will not run when the door is open or when the recorder is out of paper. To prevent damage to the recorder module, use only Philips approved paper (Philips re-order number 40477A/B)



To load paper into the recorder module:

1. Remove the empty core from the previous roll of paper.
2. Cut off and discard the first few inches of paper to eliminate any traces of adhesive.
3. Pull out several inches of paper from the new roll, holding the roll with the loose end hanging over the top toward you.
4. Open the door and push the paper roll into the holders in the recorder.
5. Thread the paper under the roller and over the plastic shelf far enough so it goes around the roller and comes out above it.
6. Drape the paper over the end of the door and close the door. The paper should be visible and draped down in front of the door.

Multi-Measurement Module (MMS) Disassembly

Please follow the disassembly and reassembly steps below closely. Do not disassemble the MMS past the point described in the procedures below.

Tools required

- thin-bladed screwdriver
- ESD mat and wrist strap

WARNING

- Do not open the MMS while it is connected to a monitor.
- Parts inside the instrument may be contaminated with bacteria. Protect yourself from possible infection by wearing examination gloves during this procedure.

Removing the Front Cover

1 Position the thin-bladed screwdriver in the small slot provided for this purpose. Remove the front cover by pulling it away from the MMS until it snaps off. There may be a slight resistance when removing the front cover.

Removing the Mounting Pin

1 Position the MMS with the connectors facing towards you. There are four long mounting pins threaded into the MMS in each of the four corners under the cover. Locate the heads of the two long mounting pins on the top cover and only remove these.

2 Use the thin-bladed screwdriver to lift the pins gently out, far enough that they can be removed manually.

3 Remove the two pins and set them aside for refitting.

NOTE

Without these long mounting pins, the MMS will not function properly

Removing the Top Cover

Begin by gently pulling the top cover away from the MMS. The top cover is press-latched at the MMS connector. There might be a resistance due to the rubber sealing. Remove the cover slowly, without hitting or touching the inside of the MMS.

Exchanging / Removing the DC/DC Board

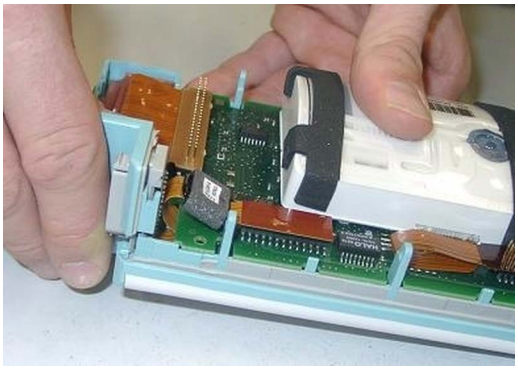
NOTE

The HW Rev C MMS (S/N prefix DE610xxxxx) does not have a separate DC/DC board anymore.

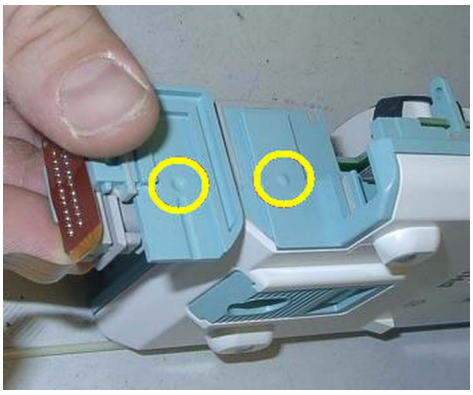
The DC/DC board is connected to the main board. Loosen the pin connection to the main board and remove the DC/DC board by gently lifting it up. Avoid touching the surface of the board. Set it aside where it is ESD protected.

Removing the MSL Flex Assembly

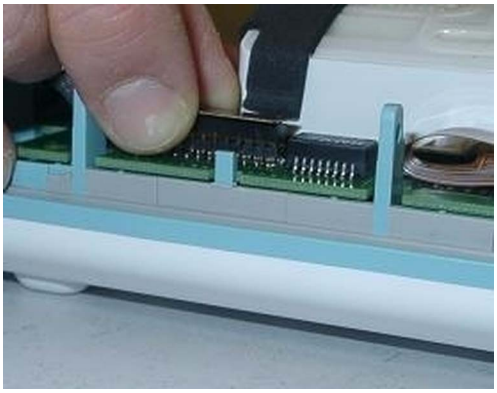
1 After the DC/DC board is removed, lift up the MSL frame connector to which the MSL Flex is attached.



At the beginning there might be resistance due to the special fixing mechanism shown in the picture below.

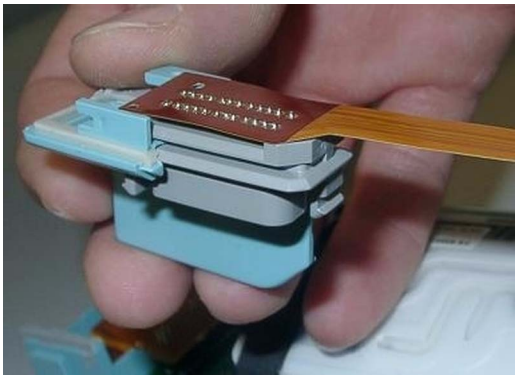


2 Lift up the flex connector carefully. Do not bend the connector pins on the main board.

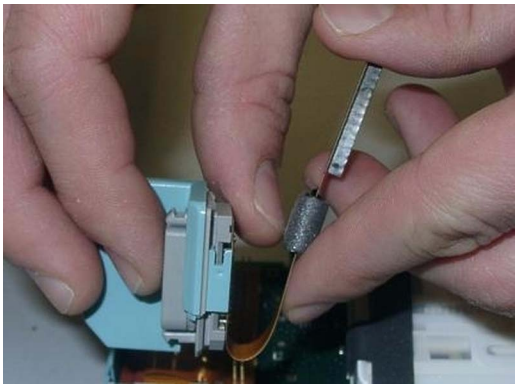


Reassembling the MSL Flex Assembly

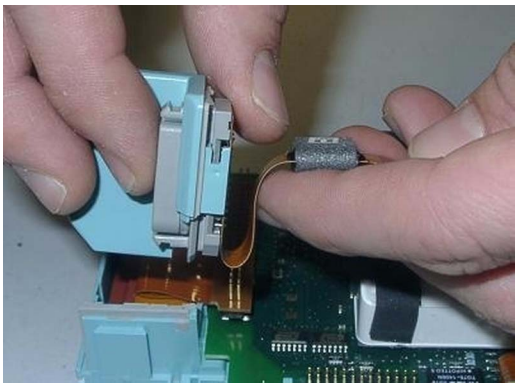
1 Insert the MSL Flex layer into the frame connector as shown below by moving it into the appropriate dove tail.



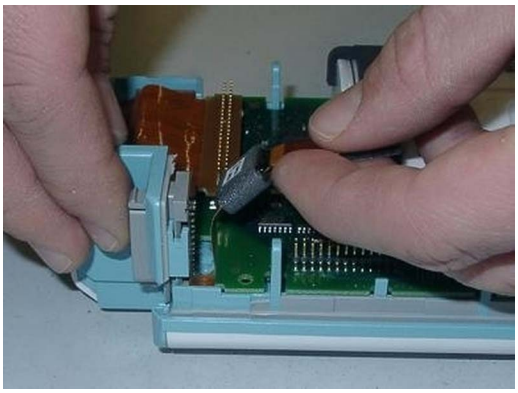
2 To insert the MSL Flex into the MMS, it has to be bent carefully. Bend the MSL Flex in a 180 degree angle as shown below. Do not crease the flex.



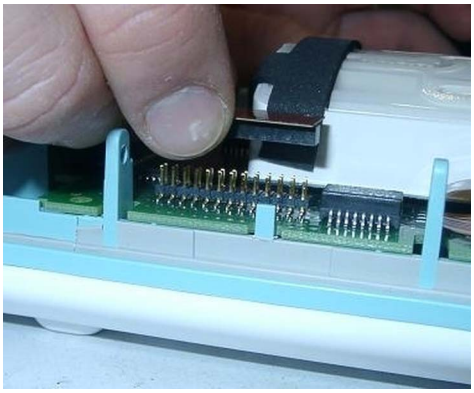
3 The second bend has to be done as shown below. To be able to connect the MSL flex to the main board afterwards, the flex has to be bent in a 90 degree angle as shown in the picture. Do not crease the flex.



4 Insert the frame connector with the attached and bent MSL Flex. Be careful not to damage the MSL flex when pushing the frame connector downwards.



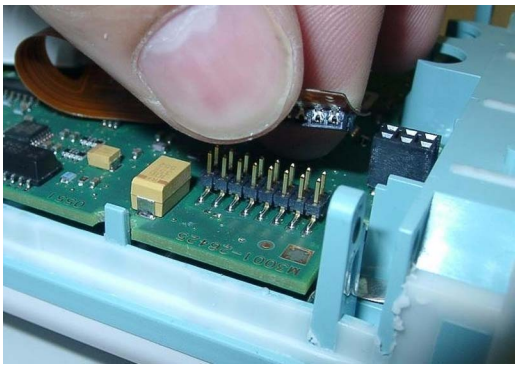
5 Position the connector correctly and push it into place.



Removing the NBP pump

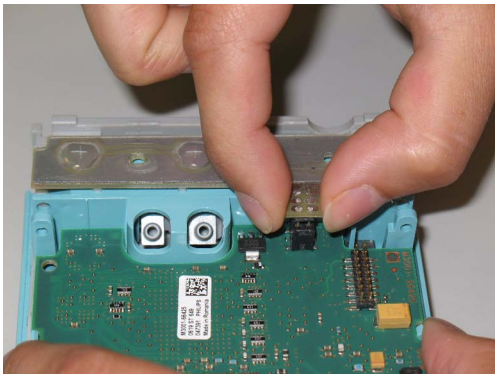
1 Remove the pump by lifting it up. Set the pump aside. Also remove the old silicon tubes.

2 Remove the connector of the NBP pump assembly. The connector may sit tightly. Gently loosen the connector.



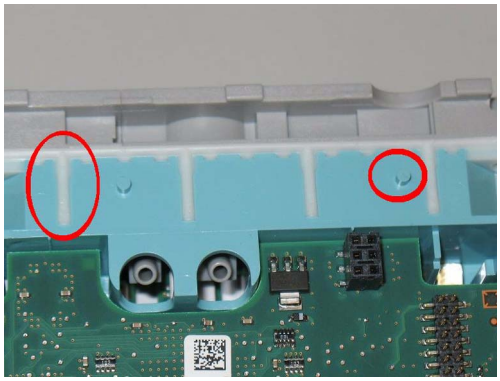
Removing the Keypad

1 Remove the keypad by lifting it straight up.



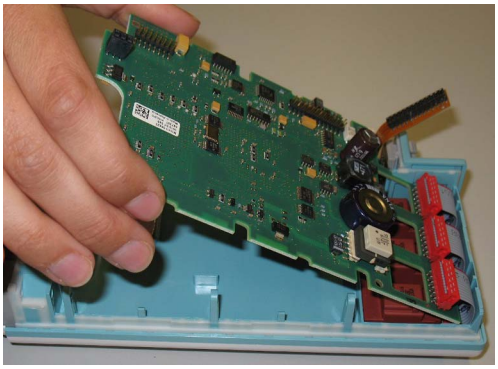
NOTE

The rubber sealing and the guides (marked with red circles) may hold the keypad firmly in place. Therefore it may be necessary to loosen the keypad first. Do this carefully to avoid any damage.

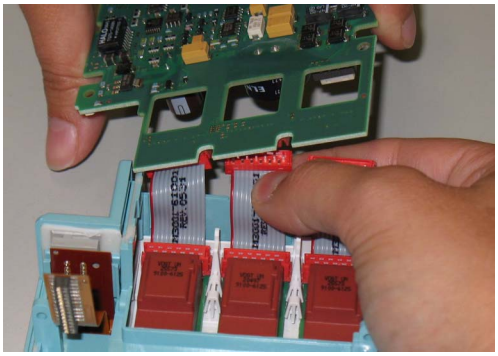


Removing the Main Board

1 Lift up the main board as shown below. Then turn it over and continue with step 2.



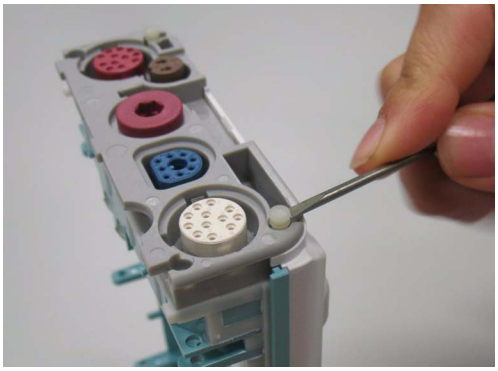
2 Remove the connectors to the main board starting from the right side.



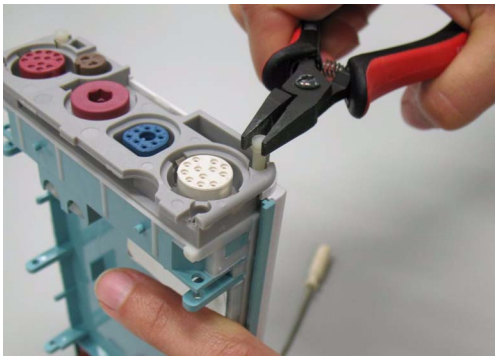
Removing the Measurement Board

1 Position the MMS with the connectors facing towards you. There are four long mounting pins threaded into the MMS in each of the four corners under the cover. Locate the heads of the two long mounting pins on the bottom cover. Only these need to be removed.

2 Use a thin-bladed screwdriver to gently lift the pins out far enough so they can be removed with pliers.



3 Remove the two pins and set them aside for refitting.

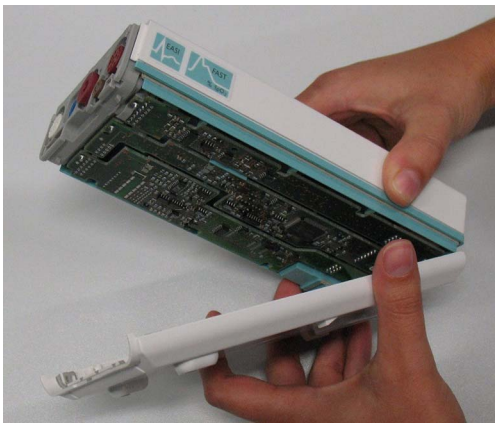


NOTE

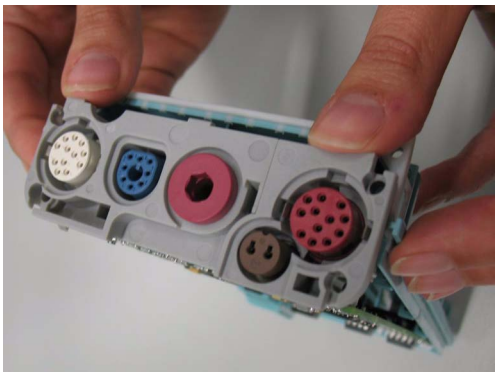
Without these long mounting pins, the MMS will not function properly.

4 Loosen the bottom cover gently. Use the screwdriver and position it in the gap between bottom cover and measurement block, then twist the screwdriver. **Do not push the screwdriver into the device as you may damage electronic components inside.**

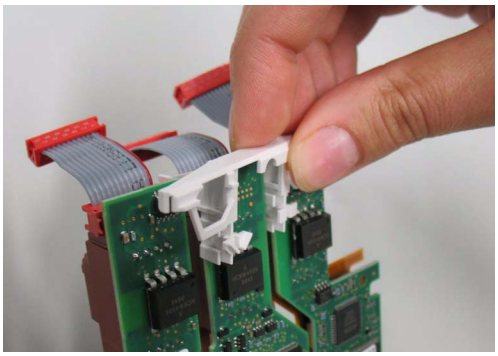
5 Remove the bottom cover. There may be a slight resistance when opening the cover.



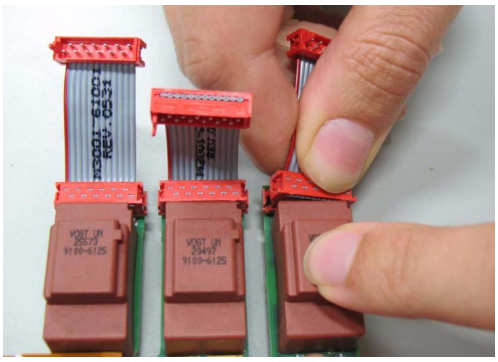
6 Loosen the measurement block by pushing the it block forward while holding plastic chassis. Then remove the measurement block.



7 The spacer keeps the measurement boards in place. Remove the spacer by lifting it up.



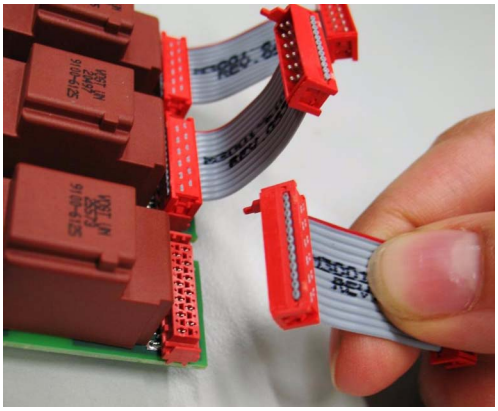
8 Remove the measurement ribbon cable. Twist the cable slightly in order to loosen it.



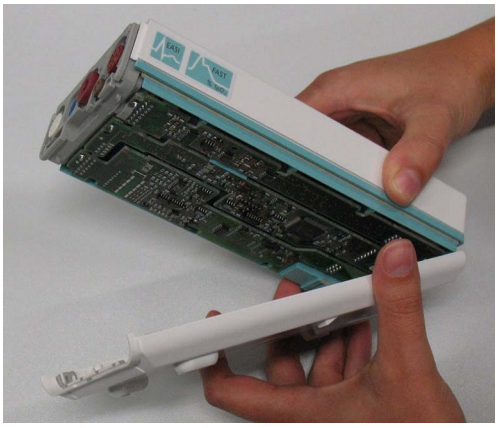
Reassembling the Measurement Block

1 Insert the spacer to keep the measurement block in place.

2 Make sure that you insert the measurement cable correctly. Please refer to the picture below for the appropriate orientation. A cable inserted incorrectly may cause a <Measurement>Malfunction INOP.

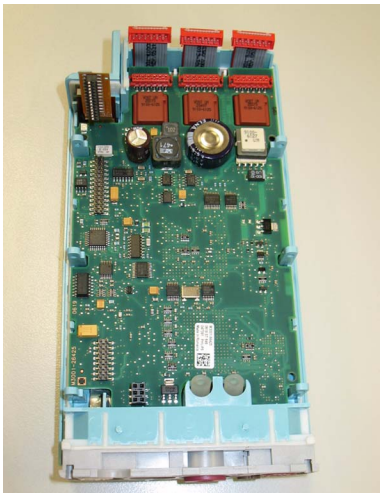


3 Make sure the measurement block is inserted as shown below. Make sure that there is no gap between the chassis and the bottom.

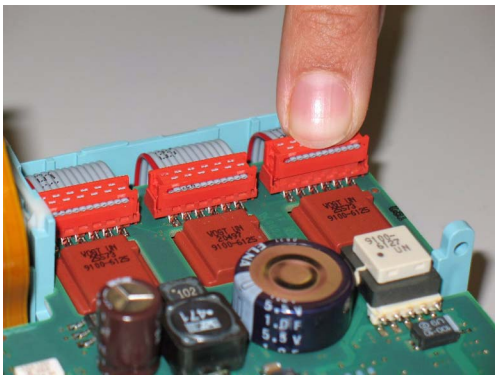


Refitting the Main Board

1 Insert the new main board. Make sure the main board is seated correctly.

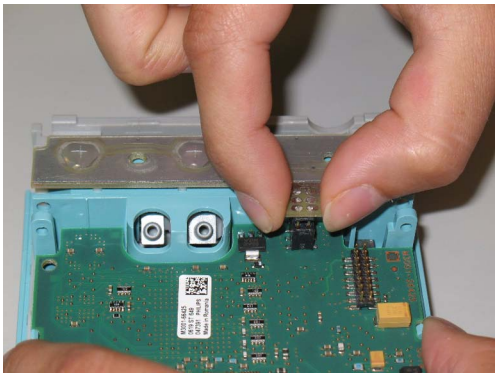


2 Re-establish the connection to the measurements. Make sure the connection is tight. If it is not connected correctly, a corresponding measurement malfunction INOP may occur.



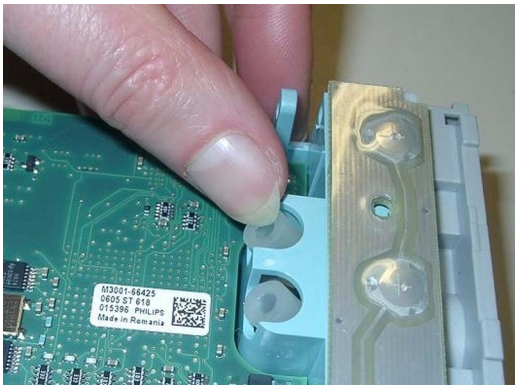
Refitting the Keypad

1 Reinsert the key pad. Make sure it is positioned correctly.

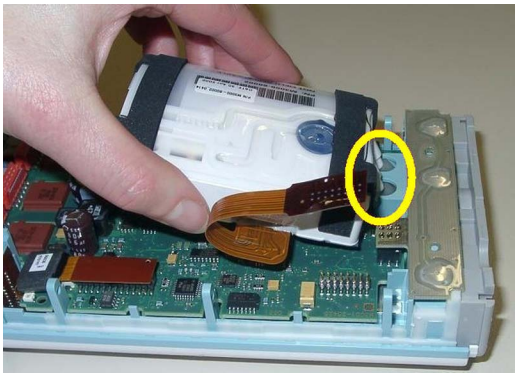


Refitting the new NBP Pump

1 Insert new silicon tubes. Make sure they are seated correctly by pressing them into their position.

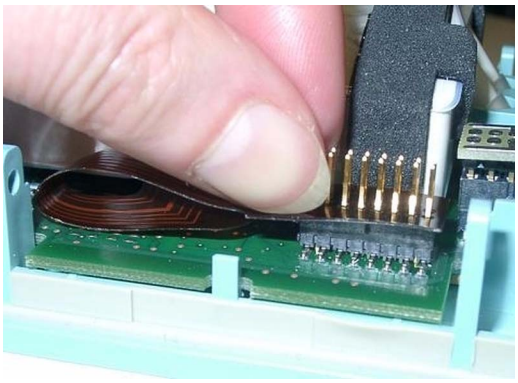


2 Insert the new pump assembly. Lift up the back and press the airways onto the silicon tubes.



3 Make sure the airways have a tight connection to the silicon tubes.

4 Insert the connector of the NBP assembly into the connector on the main board. Do not crease the flex cable. M3001A HW A/B and M3000A have a post connector with long pins. Press down the connector until there is no gap between the connectors.

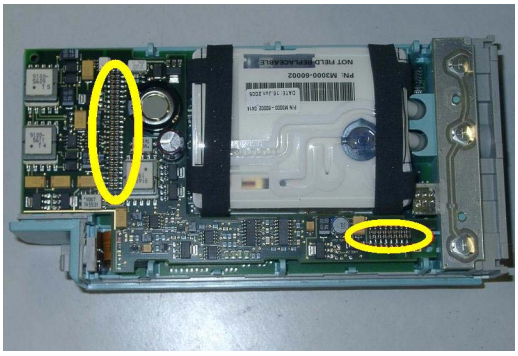


Refitting the DC/DC board

NOTE

This step only has to be done on HW A/B

Position the DC/DC board and press it down gently. Make sure it is connected properly to both connectors indicated in the picture.



Refitting the Cover

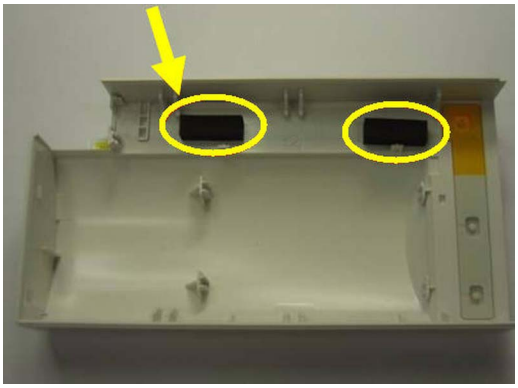
NOTE

To change the top cover of a HW Rev C MMS (S/N prefix DE610xxxxx) you have to attach the two cushions which are part of the Top Cover Assembly. These two cushions secure the connection of the MSL Flex and the NBP Flex.

NOTE

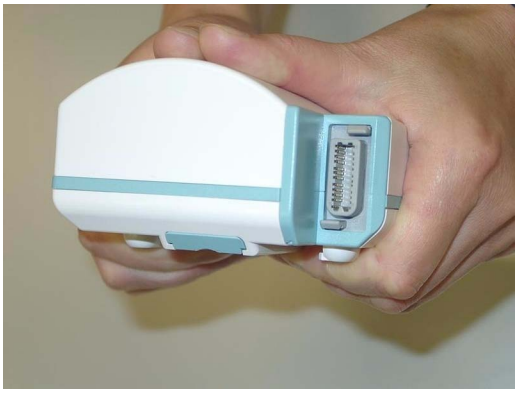
Perform the following two steps only on an MMS HW Rev C

1 Stick the two cushions onto the marked positions inside the top cover.

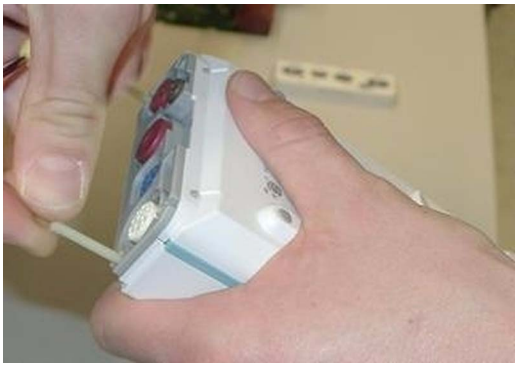


2 Position the top cover, then press it back into place until you hear a click or there is no longer a gap between the two covers.

3 The cover has a rubber seal, press the cover firmly together.



4 Holding the bottom cover firmly in place, slide the two long mounting pins completely back into the MMS. Make sure there is no gap between the top and bottom cover.



Refitting the Front Cover

To refit the front cover, press it back into place over the measurement connector hardware until you hear a click.

Final Inspection

Perform a final inspection to ensure that:

- The MSL connector is positioned correctly
- There are no gaps between the MSL connector and the cover
- there is no gap between the top and bottom cover

Testing

To ensure that the MMS is functioning correctly, you must perform safety tests and a performance check on it. Please refer to the "Testing and Maintenance" chapter of this service guide.

WARNING

When you disassemble/assemble an MMS, an applied part leakage current test must be performed before it is used again for monitoring.

MMS Extensions - Exchanging the Top Cover, MSL Flex Cable and the Dual Link Bar

This section describes the exchange procedures for:

- The Top Cover with new release mechanism
- The Dual Link Bar incl. the MSL Flex Cable.

for all MMS Extension (MSE) types (M3012A, M3014A, M3015A, M3016A).

Exchange Procedures

NOTE

Please follow the disassembly and reassembly steps closely.

Tools Required:

A thin-bladed screwdriver and a thick-bladed screwdriver, ESD mat and wrist strap

WARNING

- Do not open the MSE while it is connected to a monitor.
- Parts inside the instrument may be contaminated with bacteria. Protect yourself from possible infection by wearing examination gloves during this procedure.

NOTE

Once you have reassembled the MSE, you must perform a performance check on it. Please refer to the "Testing and Maintenance" chapter of this service guide .

Removing the Front Cover

1 Position the thin-bladed screwdriver in the small slot provided for this purpose. The front cover (Bezel) then clicks away from the Extension. Remove the front cover

NOTE

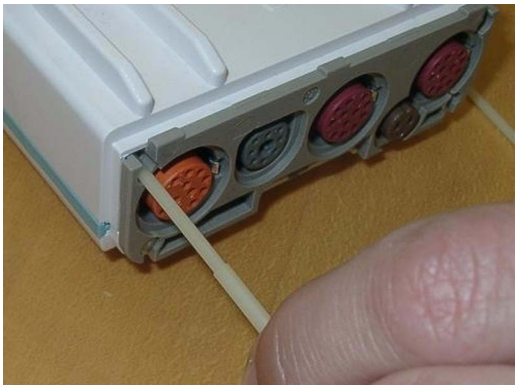
There might be a slight resistance when you remove the front cover.

Removing the Mounting Pin

1 Position the MSE on the dual link bar with the measurement connector hardware facing upwards and the arm of the dual link bar away from you. There are four long mounting pins threaded into the MSE in each of the four corners under the cover. Locate the heads of the two long mounting pins on the top housing and only remove these.

2 Use the thin-bladed screwdriver to lift the pins gently out far enough so they can be removed manually.

3 Remove the two pins and set them aside for refitting.

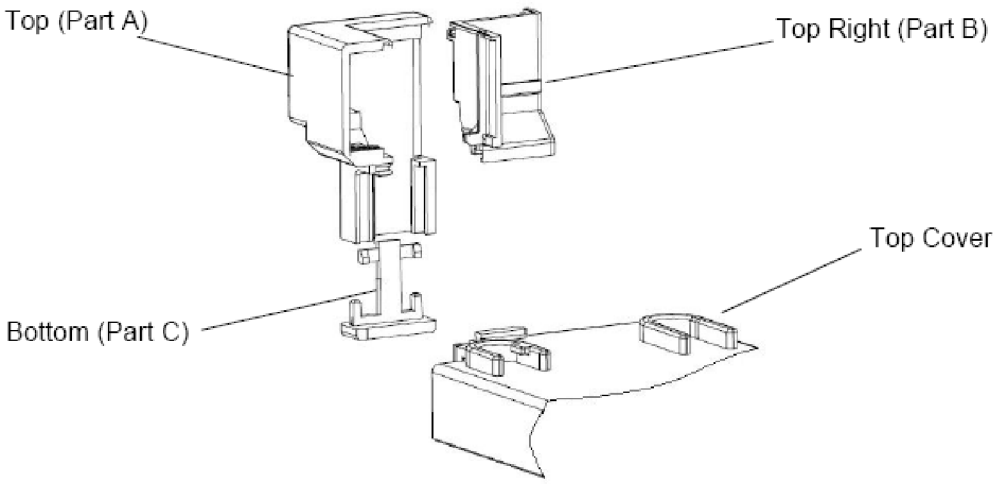


NOTE

Without these long mounting pins the MSE will not function properly.

Removing the Dual Link Bar

The Dual Link Bar consists of three parts as shown below. Follow the specific steps carefully to remove the Link Bar.

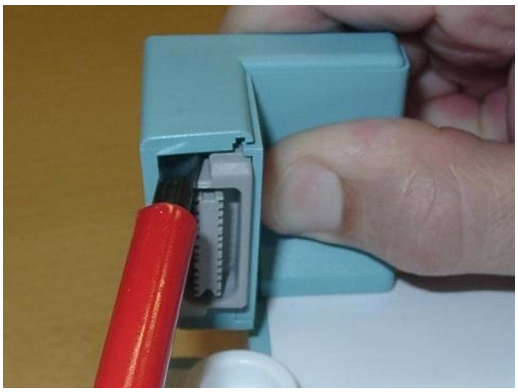


CAUTION

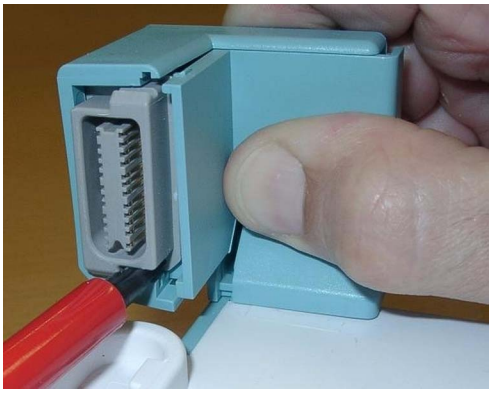
Do not try to remove the link bar with force as this can damage the MSL Flex Cable

1 Position the MSE with the measurement connector hardware facing towards you.

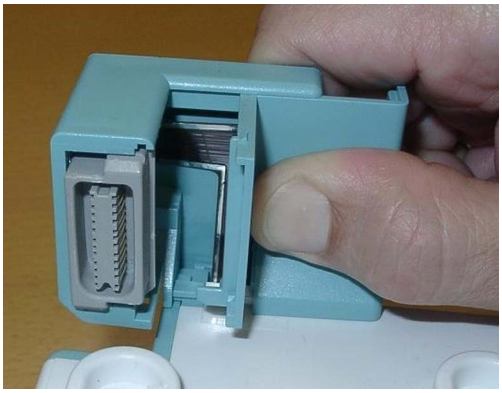
2 Hold the link bar as shown below. While pressing gently on part B, insert a thick-bladed screwdriver between the MSL connector and part A. Twist the screwdriver to the left and at the same time slide part B to the right, so it is released at the top.



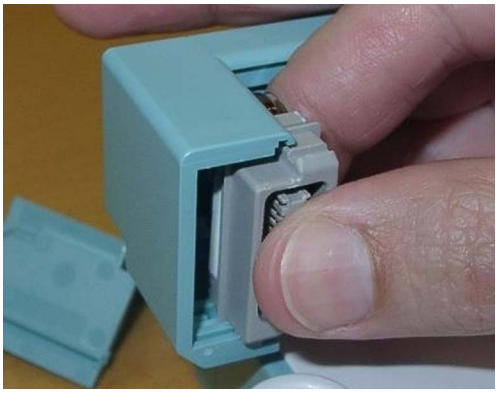
3 Repeat Step 2 at the bottom.



4 Slide part B to the right. If part B fails to move to the side, please repeat steps 2 and 3.



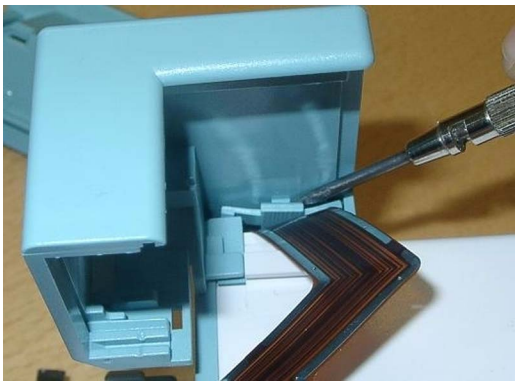
5 Now the MSL Flex connector can be moved to the right.



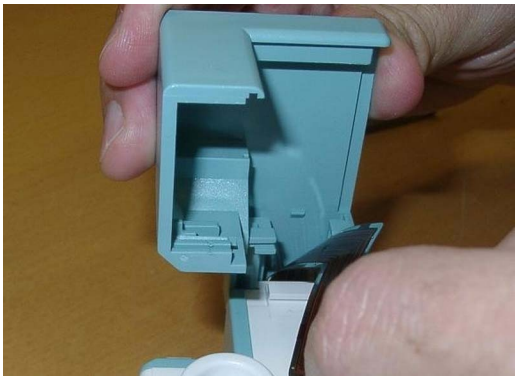
NOTE

Make sure that the movement of the screwdriver does not pinch the MSL flex cable.

6 Insert the thin-blade screwdriver behind the release mechanism of part C. Carefully twist the screwdriver, then press gently so that part C drops down.



7 Lift part A upwards. It is fixed in a dovetail. Be careful with the MSL flex.



Removing the Top Cover

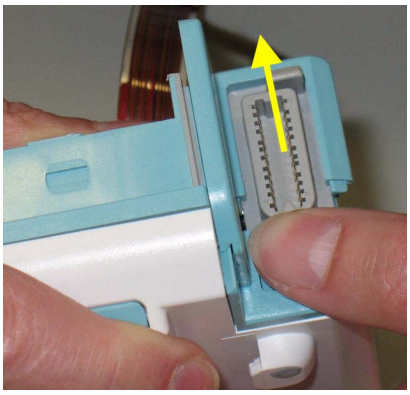
Begin by gently pulling away the top cover from the MSE. The top cover is press-latched at the link bar end. Remove it slowly, without hitting or touching the inside of the MSE.

Replacing the Flex Cable Assembly

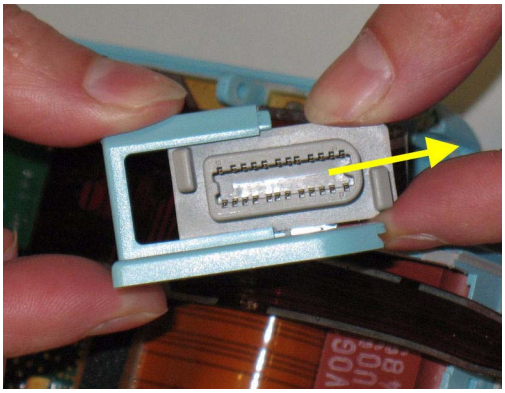
1 Hold the Extension firmly and push upwards against the connector. Then slide connector (together with the connector holder) out of the dovetail connection.

NOTE

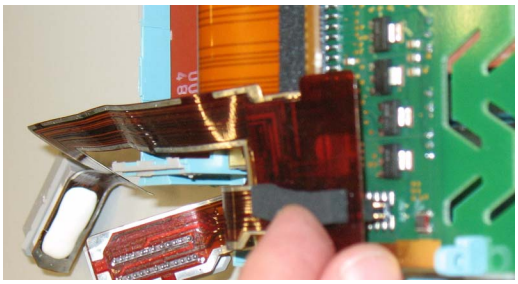
You will probably need to apply some more force at first until the holder slides out of its mechanical lock.



2 Slide the connector out of its holder.

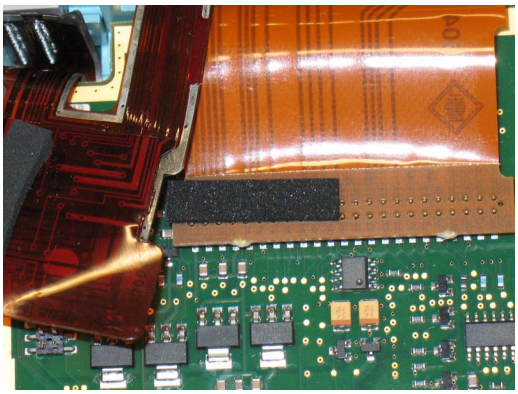


3 Remove the flex cable connector on the MSE board. Be careful not to bend any pins on the female part of the MSE connector.

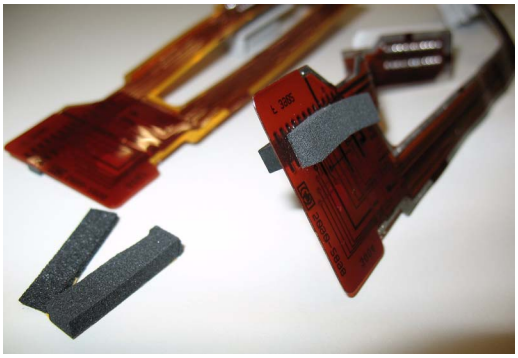


NOTE

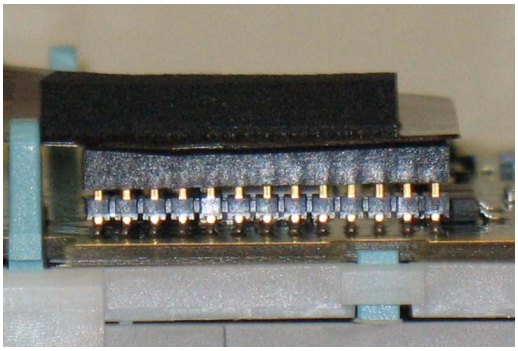
Some units may have a foam pad on the connector of the inner flex cable of the MSEs (as shown below) and some units may not. This has no impact on the functionality of these units.

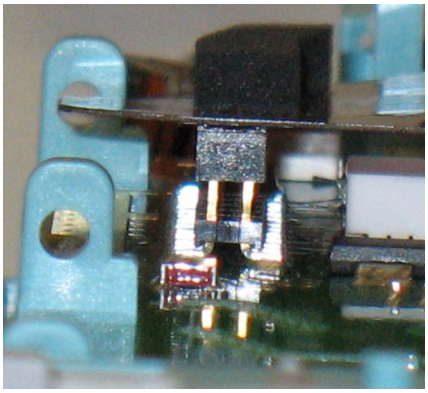


4 Stick the correct foam pad on the rear side of the inner connector. Use the thick pad for : M3012A, M3014A, M3016A. Use the thin pad for: M3015A. You can also check the old flex cable for the correct pad.



5 Insert the flex cable connector into the female receptacle on the MSE board. **Check from the side and the front that the connector is inserted correctly (there is no mechanical guidance) and that no pins are bent, otherwise you may damage the MSE when powering it on.**

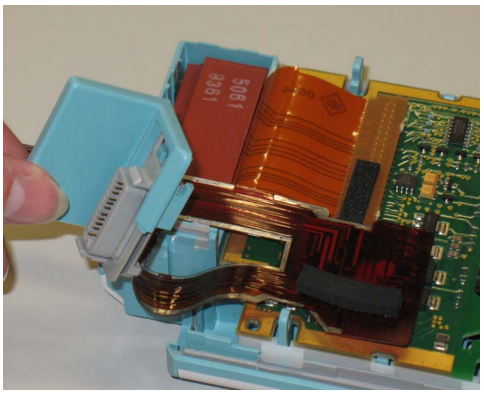




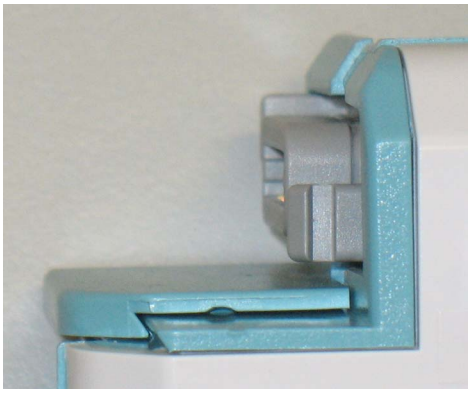
WARNING

A misplaced connector might damage the MSE or the monitor.

6 Slide the connector into the holder as shown below. Arrange the flex cable in the space beside and underneath the board (be careful not to bend the cable) while positioning the holder for insertion.



7 Insert the holder with the connector into the dovetail connection and slide it down until you hear a click.



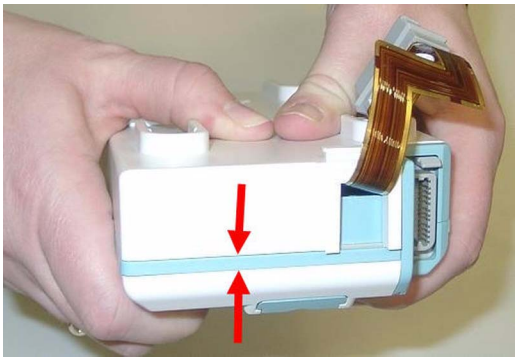
Refitting the Top Cover

NOTE

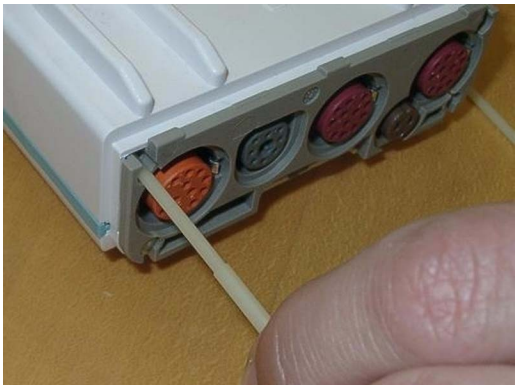
Be careful with the MSL Flex cable. Make sure it does not get stuck between the covers.

1 Position top cover, then press the bottom cover back into place until a click is heard.

2 The cover has a rubber seal. Press the covers firmly together and make sure there is no gap between the top and bottom cover.



3 Holding the bottom cover firmly in place, slide the two long mounting pins completely back into the MSE.

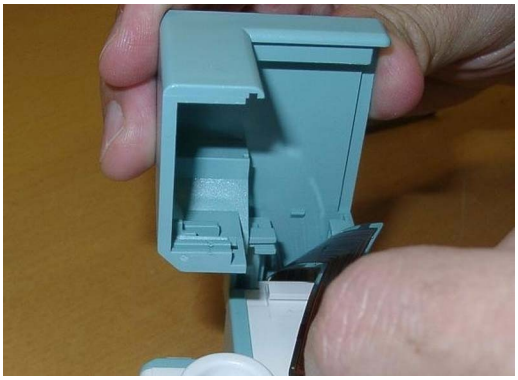


Assembling the dual Link Bar

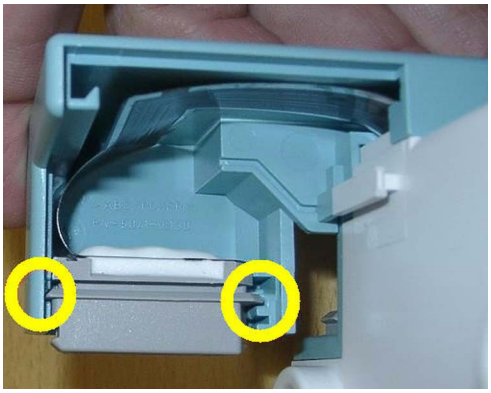
CAUTION

Do not try to assemble any part of the link bar with force as this can damage the MSL Flex Cable.

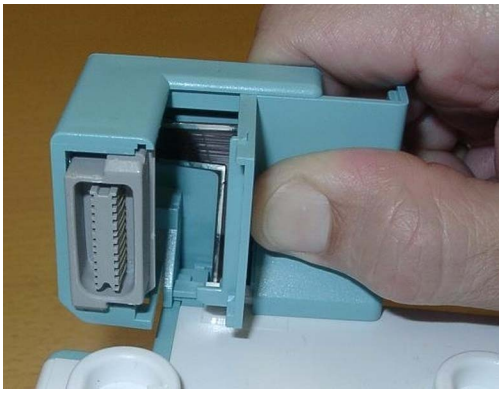
1 Position part A into the dovetail and slide it down.



2 Make sure the MSL Flex connector is positioned in the correct slot (See indicated slots below). Then push it gently into part A.



3 Making sure the MSL flex cable lies flat in part A of the assembly, place part B into the dovetail and close the open link bar.



4 Turn the MSE around and insert part C into the bottom part of the link bar. When you hear a click, part C is correctly inserted.

Refitting the Front Cover

To refit the front cover, press it back into place over the measurement connector hardware until you hear a click.

Final Inspection

Perform a final inspection to ensure that:

- The link bar is positioned correctly
- There are no gaps between the link bar parts
- There is no gap between the top and bottom cover

Testing

To ensure that the MSE is functioning correctly, you must perform a performance check on it. Please refer to the "Testing and Maintenance" chapter of this service guide.

WARNING

When you disassemble/assemble an MMS Extension, an applied part leakage current test must be performed before it is used again for monitoring.

Disassembly Procedures for the M3015A MMS Extension (HW Rev. A)

NOTE

These procedures apply only to M3015A MMS with Serial Numbers DE020xxxxx.

It is recommended that you replace all the replaceable parts in the Extension (CO2 Scrubber and Pump) after 15 000 hours (approximately 3 years) of continuous use.

Tools Required:

- A thin-bladed screwdriver.
- A pair of large tweezers.
- In addition, for removing the pump, you will need a large-bladed screwdriver.

WARNING

There is high voltage inside the Instrument (800V). Do not connect the MMS Extension to a Monitor while the Extension housing is open.

As well, parts inside the Instrument may be contaminated with bacteria. Protect yourself from possible infection by wearing examination gloves during these procedures.

Removing the Front Cover

To remove the front cover, do the following:

1 Remove the server and the monitor from the extension.

2 Use a thin-bladed screwdriver to prise the grey front cover (the console covering the measurement connector hardware) gently from the bottom of the extension. Position the screwdriver in the small slits provided for this purpose. The front cover then clicks away from the extension.

3 Remove the front cover.

Removing the Extension Bottom Cover

To remove the Extension bottom cover, do the following:

1 Position the extension on the dual link bar with the measurement connector hardware facing upwards and the arm of the dual link bar towards you. There are four long mounting pins threaded into the extension in each of the four corners under the cover. Locate the heads of the two long mounting pins on the side away from you

2 Use tweezers to prise the pins gently out enough to be removed by hand.

3 Remove the two pins and set them aside for refitting.

NOTE

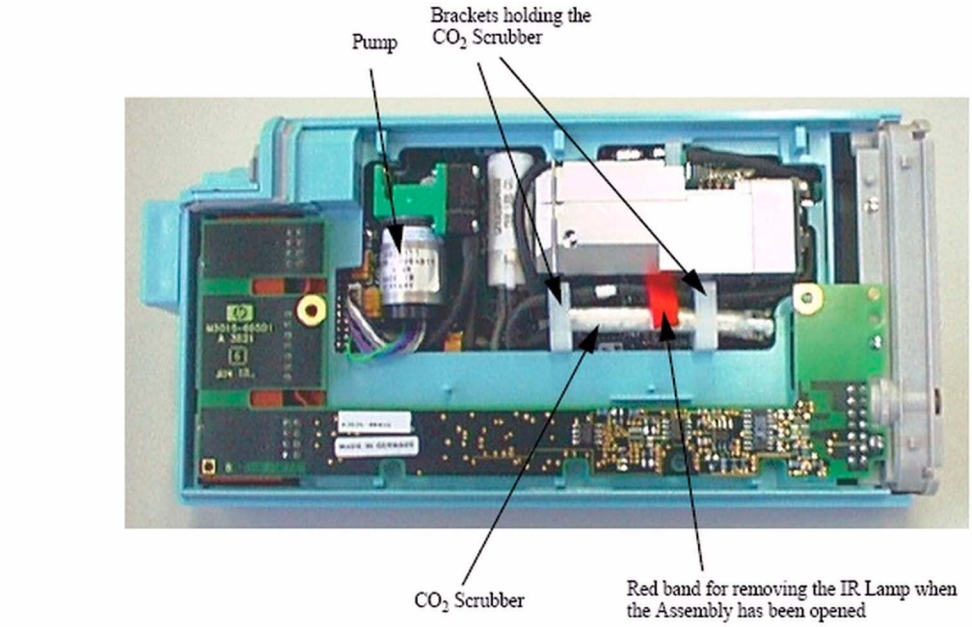
Do not lose these long mounting pins since the Extension will not function unless they are in place.

4 Using your hands, gently pry the bottom cover away from the Extension at the link bar end first. The bottom cover is press-latched at the link bar end. Remove it gently making sure not to bang or touch the inside of the Extension.

NOTE

If you accidentally try to remove the wrong side of the bottom cover, you will notice that it is attached to the inside of the Extension with a ribbon connector and that the dual link bar prevents you from removing it completely. **Do not try to forcibly remove the wrong side of the M3015A cover; you cannot access replaceable parts from this side.**

The following illustration shows the location of the replaceable parts in the M3015A Measurement Server Extension.



Removing the CO2 Scrubber

To remove the CO2 Scrubber, do the following:

1 Locate the CO2 Scrubber in the Extension.

2 Being careful not to touch anything else in the Extension, use tweezers to pull the body of the CO2 Scrubber out of the bracket.

3 Holding the body of the CO2 Scrubber with your fingers, carefully disconnect the Extension intake tube from the scrubber end and remove the CO2 Scrubber from the Extension.

4 Dispose of the CO2 Scrubber according to local legal requirements for low volume chemical waste.

NOTE

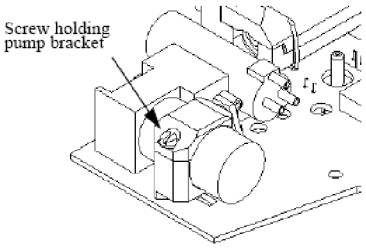
Now that it is exposed, do **NOT** allow anything to fall into the Infrared Lamp assembly.

Removing the Pump

To remove the Pump, do the following:

1 Locate the Pump in the Extension.

2 Being careful not to touch anything else in the Extension, unscrew the screw holding the pump bracket in position. Lift the top part of the bracket away and lift out the pump.



3 Gently disconnect the flow tubing attached to the Extension from the Pump.

NOTE

Be sure to note which tube attaches to the inlet and which tube attaches to the outlet.

4 Gently disconnect the power lead which attaches the Pump to the Extension.

5 Remove the Pump.

NOTE

After replacing the Pump, reset the displayed value displayed using the Reset PumpOpTime selection (Service Mode>CO2 Setup). When the PumpOpTime has been reset an INOP will be generated: "CO_2 OCCLUSION". To clear this INOP you must perform a flow check and store the flow in Service Mode (select "Store Flow")

Refit Procedures for the MMS Extension

Tools Required:

- A thin-bladed screwdriver.
- A pair of large tweezers.
- In addition, for refitting the Pump, you will need a large-bladed screwdriver.

WARNING

There is high voltage inside the Instrument (800V). Do not connect the MMS Extension to a Monitor while the Extension housing is open.

As well, parts inside the instrument may be contaminated with bacteria. protect yourself from possible infection by wearing examination gloves during these procedures.

Refitting the CO2 Scrubber

WARNING

The CO2 Scrubber contains lithium hydroxide monohydrate. This is a strong base. Do not open or damage the CO2 Scrubber. If you come into contact with the CO2 Scrubber material, flush the area immediately with water and consult a doctor.

To refit the CO2 Scrubber, do the following:

1 O2 Scrubber through the bracket to meet the Extension intake tube.

2 Push the intake tube firmly into the scrubber end to connect it.

3 Holding the body of the CO2 Scrubber with tweezers, feed the CO2 Scrubber fresh air intake under the second bracket and position it.

Refitting the Pump

To refit the Pump, do the following:

1 Gently connect the power lead to the Extension.

NOTE

The power lead can only be connected one way.Do not try to force the power lead into position. Instead, align it correctly and connect it gently.

2 Connect the flow tubing to the Pump.

NOTE

Be sure to reconnect the inlet tube to the inlet valve and the outlet tube to the outlet valve.

3 Being careful not to touch anything else in the Extension, insert the pump into the bracket on the PC board. Make sure that the pump is horizontal and does not touch the PC board. (Vibration from the pump in operation will damage the Extension if the pump touches the PC board.)

4 Replace the top part of the bracket and screw firmly into position.

NOTE

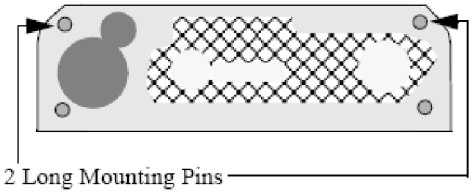
After replacing the Pump, reset the displayed value using the Reset PumpOpTime selection (Service Mode>CO2 Setup). When the PumpOpTime has been reset an INOP will be generated: "CO_2 OCCLUSION". To clear this INOP you must perform a flow check and store the flow in Service Mode (select "Store Flow").

Refitting the Extension Bottom Cover

To refit the Extension bottom cover, do the following:

1 Latch the link bar end into place then press-click the bottom cover back into place covering the interior of the Extension.

2 Holding the bottom cover firmly in place, thread the two long mounting pins back into the Extension making sure to thread them all the way to the end.



Refitting the Front Cover

To refit the front cover, press-click it back into place over the measurement connector hardware.

General Reassembly/Refitting Comments

- Ribbon Connections—Make sure male-female ribbon connections are correctly lined-up.
- Open Component—Do not allow anything to fall into the open component.

Testing

To ensure that the MMS Extension is functioning correctly, you must perform a performance check on it. Please refer to the *Testing and Maintenance* chapter of this service guide.

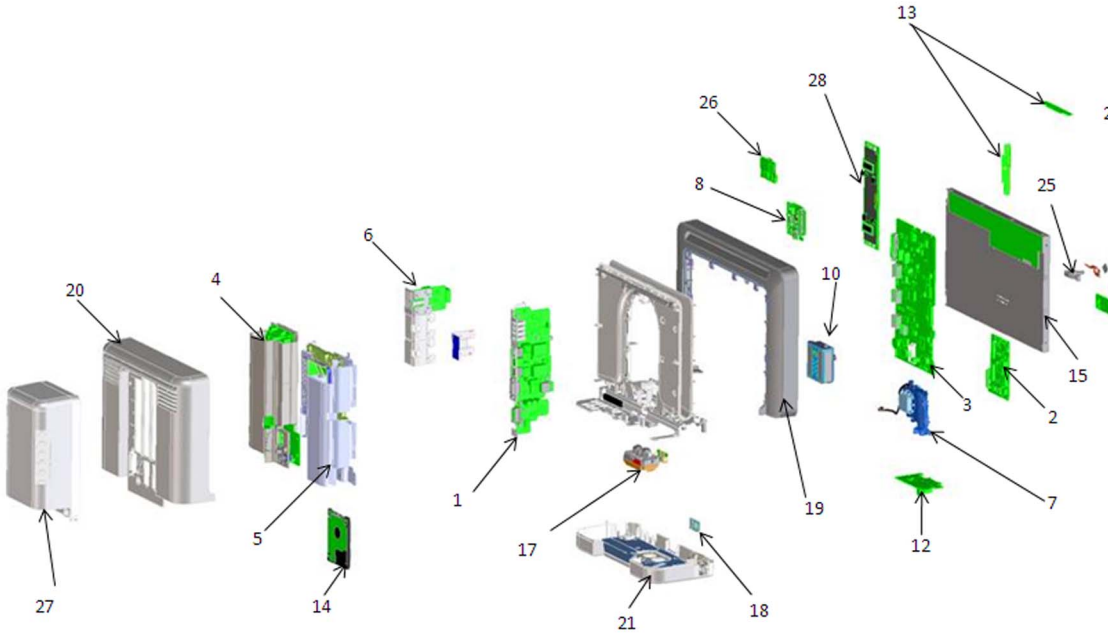
When you disassemble/assemble an MMS Extension, an applied part leakage current test must be performed before it is used again for monitoring.

6

Parts

This section lists the replacement and exchange parts for the following Philips IntelliVue Patient Monitoring System components:

MX600/MX700 Parts



Exchange Parts

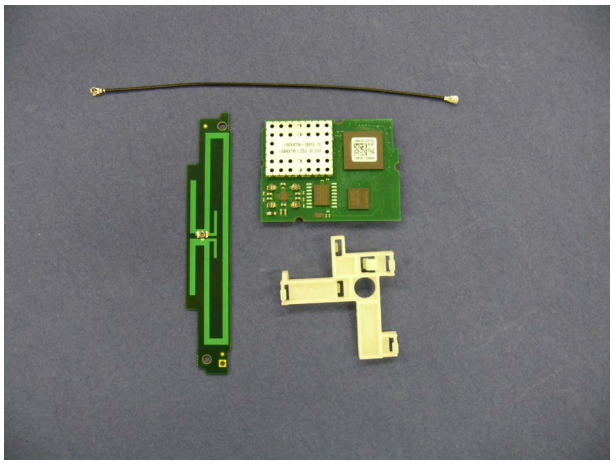
Part number	12NC	Description	No in diagram
453564204481	453564204481	IV2-STAT I/F; Connector Board	1
453564212421	453564212421	IV2-STAT PCA Video Mixer board	2
453564204431	453564204431	IV2-STAT Main board	3
453564172631	453564172631	IV2-STAT ASSY-PWR AC/DC Power Supply	4
453564204591	453564204591	IV2-STAT iPC w/o disk incl. Cable	5

Replacement Parts

Part number	12NC	Description	No in diagram
453564260811	453564260811	IV2-STAT I/F; Flexible Nurse Call	6
453564204361	453564204361	IV2-STAT I/F; Single MIB/ RS232	6
453564204381	453564204381	IV2-STAT Loudspeaker	7
453564260821	453564260821	IV2-STAT Panel adapter board MX700	8
453564260831	453564260831	IV2-STAT Panel adapter board MX600	8
453564204411	453564204411	IV2-STAT Alarm LED board	9

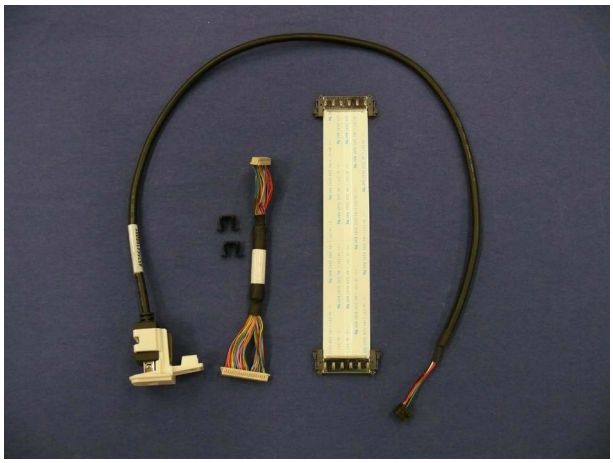
Part number	12NC	Description	No in diagram
453564053561	453564053561	IV IIT Module 2.4 GHz	10
M4840-68708	451261009041	IV IIT Module 1.4 GHz	10
453564258611	453564258611	IV SRR brd ver2 (for MP5/T/SC+MX6/7/800)	11
453564204471	453564204471	IV2-STAT Power switch/ ECG sync out bd	12
453564211691	453564211691	IV2-STAT Triband antenna for IIT/ WLAN	13
453564207391	453564207391	IV2-STAT iPC RAM DDR3 2 GB	n/a
453564207371	453564207371	IV2-STAT iPC SSD with pre-installed OS	14
453563464231	453563464231	BAT 3V Lithium CR2032	n/a
453564260851	453564260851	IV2-STAT DSPL Backlights (2x) MX600/700	n/a
453564260861	453564260861	IV2-STAT DSPL LCD panel MX600/700	15
453564260871	453564260871	IV2-STAT Touch bezel assembly MX700	16
453564260881	453564260881	IV2-STAT Non Touch bezel assembly MX600	16
453564204641	453564204641	IV2-STAT Quick mount	17
453564204651	453564204651	IV2-STAT Power button	18
453564260891	453564260891	IV2-STAT Rear dspl housing MX600/700	19
453564204691	453564204691	IV2-STAT Rear housing	20
453564204701	453564204701	IV2-STAT Bottom housing	21
453564260911	453564260911	IV2-STAT Key Silicone Pad	22
453564260951	453564260951	IV2-STAT Trim Knob	23
453564260991	453564260991	IV2-STAT HIF board	24
453564261021	453564261021	IV2-STAT Encoder	25
453564204491	453564204491	IV2-STAT WLAN Assy	26
453564204511	453564204511	IV2-STAT iPC cable kit	n/a
453564204521	453564204521	IV2-STAT cable management kit	27
453564204541	453564204541	IV2-STAT Small parts kit	n/a
453564261261	453564261261	IV2-STAT Basic cable kit MX600/700	n/a
453564239731	453564239731	IV2 MECHASY Table Top Mount Kit	n/a
453564260841	453564260841	IV2-STAT DSPL Backlt inver. bdMX600/700	28

WLAN Kit (453564204491) Contents:



Item	Quantity
PCA MMS+ WLAN Radio Board	1
IV2-STAT PLAST HOLDER WLAN	1
IV2-STAT PCA Antenna triband	1
CBL ASSY AMC RIGHT ANGL PLG JMPER 14MM	1

iPC Cable Kit (453564204511) Contents:

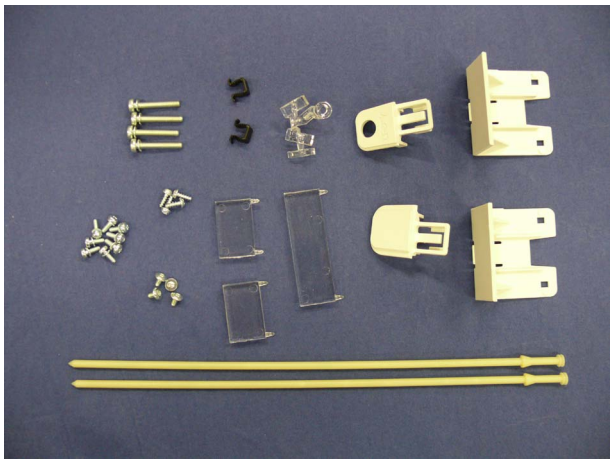


Item	Quantity
IV2-STAT CBL MB-Mixer	1
CBL Ay IV2-STAT SAM-Mixer	1
IV2-STAT MECHASY Assy Holder USB	1
Cable clip	2

Cable Management Kit (453564204521) Contents:

Item	Quantity
SCRW TPG M3.0 X 1.34 8MM-LG WSHR-HD	4
IV2-STAT PLAST Cablehouse	1
IV2-STAT PLAST Cablehouse Lid	1

Small Parts Kit (453564204541) Contents:



Item	Quantity
IV2-STAT PLAST Lightguide P/S	1
IV2-STAT PLAST IO-Slot Cover Blank	2
IV2-STAT PLAST Cover USB Side	1
IV2-STAT PLAST Sync Side Plate	1
IV2-STAT PLAST LIGHTPIPE LARGE	1
IV2-STAT PLAST LIGHTPIPE SMALL	2
IV2-STAT PLAST PIN 265MM	2
Cable clip	2

Item	Quantity
K30x8	4
M3x5	4
M3x8	8
M4x25	4

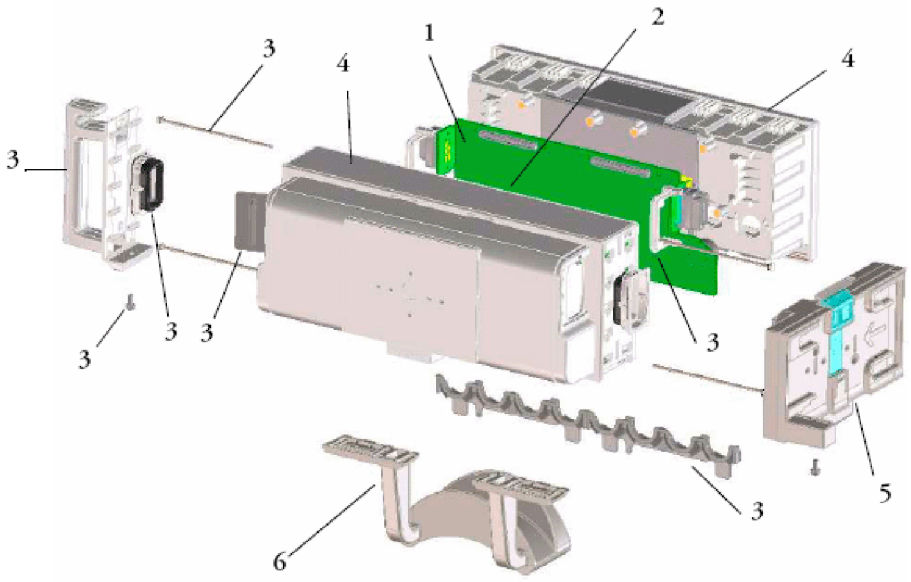
Basic Cable Kit (453564261261) Contents:

Item	Quantity
IV2-STAT CBL MB-ALARM	1
IV2-STAT CBL MB-IIT	1
IV2-STAT CBL MB-SRR	1
IV2-STAT CBL MB-AC/DC	1
IV2-STAT CBL MB-Power Switch	1
IV2-STAT CBL PA-Backlight	1
IV2-STAT CBL MB-19" Display	1
CBL MB-HIF	

Remote Control Parts

Part number	12NC	Description
453564212481	453564212481	IV2-RC Remote Control
453564212401	453564212401	IV2-RC Holder for Remote Control
453564212411	453564212411	IV2-RC USB cable for Remote Control
453564262641	453564262641	IV2-RC CBL Tethering cable

8-Slot Flexible Module Rack (FMS-8) Parts



Flexible Module Rack (FMS-8) Parts

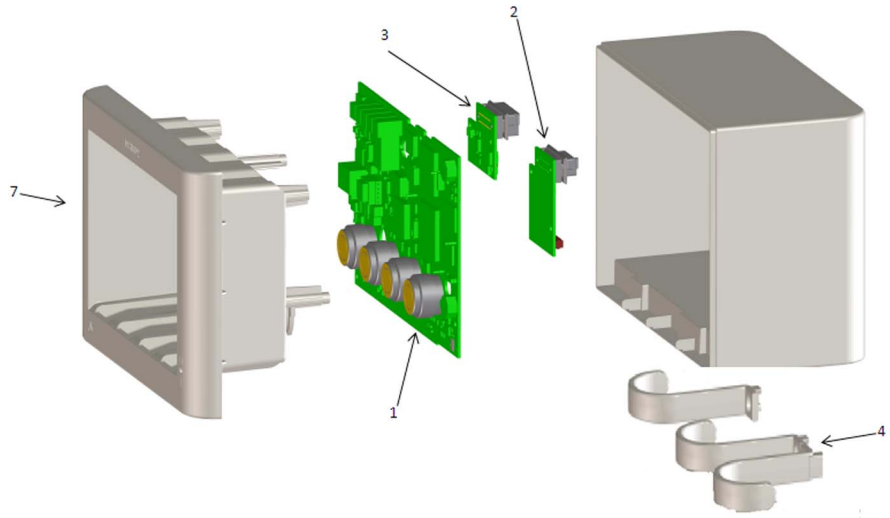
Exchange and Replacement Parts

Part number	12NC	Description	No. in Diagram
M4041-68401	453563459411	IV-FMS Mother board assembly	1
M8055-68401	453563459441	IV CPU board assembly	2
M8048-64002	453563456901	IV-FMS Small Parts kit	3
M8048-64001	453563456891	IV-FMS Housing kit	4
M4041-60005	453563477961	IV-FMS Mounting Plate Assy	5
M4041-42303	453563494101	IV-FMS PLAST Cable Management	6
M4041-22302	451261011861	IV-FMS BRKT Mounting Plate Adapter Clamp	
M8040-60100	451261030081	IV SWITCH Universal Clamp	

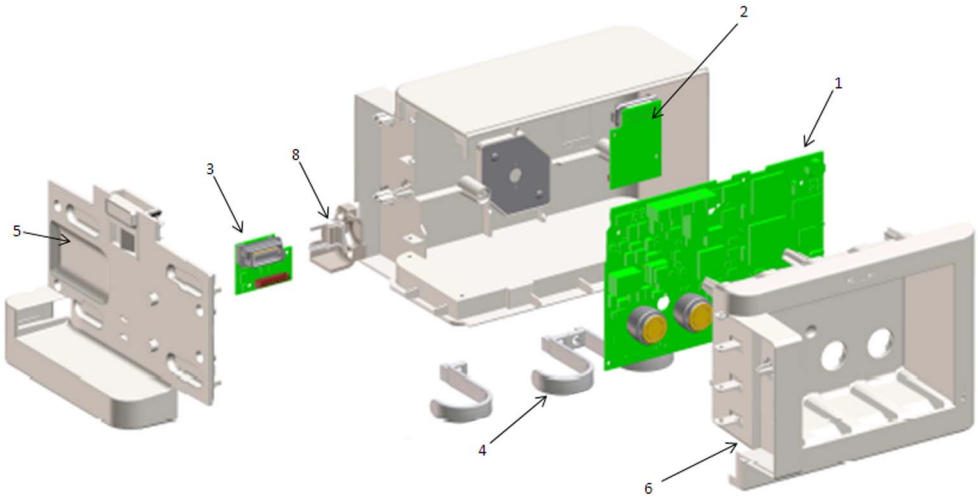
M8048-64002 Small Parts Kit Contents

Description	Quantity	Comments
Torx M3 x 6 mm screws	8	used for securing mainboard to FMS housing
Torx M3 x 20 mm screws	8	used to connect the CPU board w/ spacers to the mainboard
Torx M4 x 8 mm screws	4	used to secure the handle or the MMS mount to the FMS housing
Torx M4 x 12 mm screws	4	used to secure the universal clamp to the FMS housing
Connector Holder (FE)	2	
Connector Holder (SRL)	2	
Lightpipe	1	
Cover Connector SRL	2	
Cover Side	1	
Pin	4	
Cover Seal Connector	2	
Handle Assembly	1	

4-Slot Flexible Module Rack (FMS-4) Parts



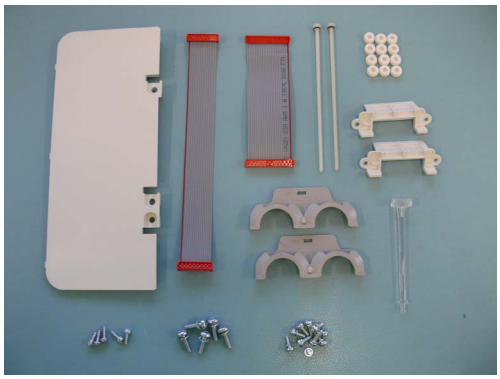
4-Slot Flexible Module Rack (FMS-4) without MMS Mount



4-Slot Flexible Module Rack (FMS-4) with MMS Mount

Exchange and Replacement Parts

Part number	12NC	Description	No in diagram
Exchange Parts			
453564261731	453564261731	IV2-FMS4 Main board	1
Replacement Parts			
453564262101	453564262101	IV2-FMS4 MSL up board	2
453564262111	453564262111	IV2-FMS4 MSL down board	3
453564262121	453564262121	IV2-FMS4 Cable management hooks	4
453564262131	453564262131	IV2-FMS4 MMS mount	5
453564262141	453564262141	IV2-FMS4 Assy Front MMS Option	6
453564262151	453564262151	IV2-FMS4 MECHASY Front w/O MMS Option	7
453564262161	453564262161	IV2-FMS4 MECHASY Rear w/o MMS Option	
453564262171	453564262171	IV2-FMS4 MECHASY Rear MMS Option	
453564262181	453564262181	IV2-FMS4 Side MSL Holder	8
453564262191	453564262191	IV2-FMS4 Small Parts Kit	n/a
M8040-60100	M8040-60100	IV SWITCH Universal Clamp	n/a



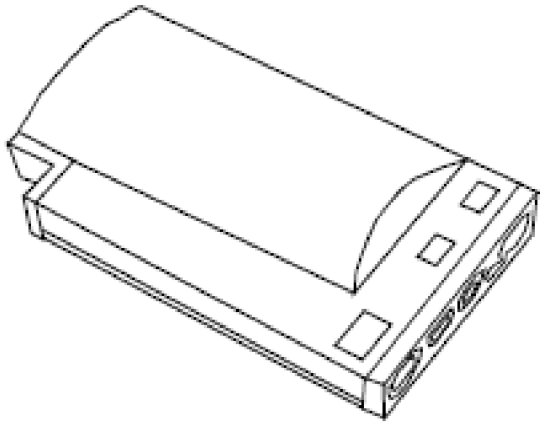
453564262191 Small Parts Kit Contents

Description	Quantity
Light guide	1
Pin	2
M4 x 12 mm screws (T20)	5
K30 x 8 mm screws (T10)	5
M3 x 8 mm screws (T10)	10
Connector Holder	2
MSL Holder	2

Description	Quantity
Cable MSL Up	1
Cable MSL down	1
IV2-FMS4 RUBBER Screw Cover	12
IV2-FMS4 PLAST Cover Bottom	1

Multi-Measurement Module (MMS) Parts

The primary support strategy for the Multi-Measurement Module is a unit exchange. However, some exchange parts are available. In order to determine which exchange parts need to be ordered check the serial number and the option string of the MMS as described below.



M3001A Multi-Measurement Module

MMS Part Number Overview and Identification

Identify the correct MMS part number by checking the serial number prefix and the option string on the label on the rear of the MMS housing. The following picture shows the label of an M3001A. Use the table below to determine the hardware revision and the required exchange part.

Option	M3001A Option Description
#A01	Philips FAST SpO^2
#A02	Nellcor OxiMax compatible
#A03	Masimo SET Technology
#A04	Nellcor OxiMax Technology
(#C00)	Standard
#C06	Add Pressure/Temp
#C12	Add 12 Lead ECG (only older revisions - see table below
(#C18)	(Add Pressure/Temp and 12 Lead ECG) **old**

With Rel. G.0 option #C18 is split into #C06#C12

HW Revision	Possible MMS Software Revision	Serial Number Prefix	SW of monitor the MMS is connected to	Option String	Exchange MMS (for 12NC information please refer to tables in the following sections)
HW A	A.0 to H.0	DE227	A.0, A.1	--, C06, C12, C18, C06C12	M3001-68x10
		DE441	A.0, A.1	A01, A01C06, A01C12, A01C18, A01C06C12	
		DE227	>=A.2	--, C06, C12, C18, A01C06C12	M3001-68x02
		DE441	>=A.2	A01, A01C06, A01C12, A01C18, A01C06C12	
HW B	B.1 to H.0	DE441	>=A.2	A02, A02C06, A02C18, A01C06C12	M3001-68113 M3001-68x03
		DE512	>=A.2	A02, A02C06, A02C18, A01C06C12	
			>=A.2	A01,A01C06, A01C12, A01C18, A01C06C12	M3001-68114 M3001-68x04

HW Revision	Possible MMS Software Revision	Serial Number Prefix	SW of monitor the MMS is connected to	Option String	Exchange MMS (for 12NC information please refer to tables in the following sections)
HW C	D.0 to H.0	>=DE610	>=A.2	A01, A01C06, A01C18, A01C06C12	M3001-68x05
			>=A.2	A02, A02C06, A02C18, A01C06C12	M3001-68x08
		>=DE632	>=A.2	A03, A03C06, A03C18, A01C06C12	M3001-68x07
		>=DE907	>=A.2	A04, A04C06, A04C06C12	M3001-68x06

For further compatibilty information please refer to the Software Compatibilty Matrix in the Troubleshooting section.

Exchange Multi-Measurement Modules are shipped with English front bezels only. If you require a bezel in another language (compare the part numbers of your language to the English ones to check this) the front bezel has to be ordered additionally. Attach the appropriate bezel before putting the MMS into operation.

MMS Firmware

NOTE

Multi-Measurement Modules (MMS) with HW Rev. A have a fixed firmware that cannot be upgraded. HW B and HW C MMSs allow upgrading of the SpO2 and ECG firmware.

To perform a FW upgrade, the MMS must have SW Revision C.0 or higher and be connected to an IntelliVue patient monitor.

SpO2

Option	HW Revision	SpO2 FW Rev	Comment
#A01	HW A	A.01.04	The HW and its interface do not allow a FW upgrade
#A01 #A02	HW B	(A.01.41) -> A.01.46	Must be upgraded to A.01.46 - see internal Field Notification
		(A.01.42) -> A.01.47	
#A01 #A02	HW C	A.01.46	
	HW C (B.00.03)	A.04.12	Currently shipped FW
#A03	HW C	Masimo SET FW	Not upgradeable by Philips
#A04	HW C	Nellcor OxiMax FW	Philips upgradeable

ECG

Option	HW Revision	ECG FW Rev	Comment
#A01	HW A	C.00.13	The HW and its interface do not allow a FW upgrade
#A01	HW A	C.01.19	
#A01 #A02 #A03 #A04	HW B/C	D.01.70	Upgradeable - see internal Field Notifications
		D.01.76	
		D.01.77	
		D.01.78	
		D.01.89	
		D.02.02	
		D.02.05	Currently shipped FW (requires MMS SW Revision F.0)

MMS Part Numbers - Front Bezels

Part number	12NC	Description	Options
451261024391	451261024391	MS_X1 Bezel w/o P/T Eng. Text	#A01, #A03
451261024401	451261024401	MS_X1 Bezel w P/T Eng. Text	#A01, #A03
451261024411	451261024411	MS_X1 Bezel w/o P/T Symbols	#A01, #A03
451261024421	451261024421	MS_X1 Bezel w P/T Symbols	#A01, #A03
451261024431	451261024431	MS_X1 Bezel Nellcor w/o P/T Eng. Text	#A02, #A04
451261024441	451261024441	MS_X1 Bezel Nellcor w P/T Eng. Text	#A02, #A04
451261024451	451261024451	MS_X1 Bezel Nellcor w/o P/T Symbols	#A02, #A04
451261024461	451261024461	MS_X1 Bezel Nellcor w P/T Symbols	#A02, #A04

MMS Support Parts

Part number	12NC	Description	Comments
M3000-66541	453564107971	MS_X1 PCA DC/DC Board for HW A/B	
M3001-64050	451261016391	MS_X1 MMS MSL Connector Assy	
M3001-64500	451261020561	MS_X1 NBP Assembly for X1/X2/MP2	
M3001-68557	451261020751	MS_X1 PCA ECG-5ld/Fast SpO2	HW C only
453564186021	453564186021	MS_X1 PCA ECG-5ld/Fast SpO2/w PressTemp	HW C only
453564186041	453564186041	MS_X1 PCA ECG-5ld/OxiMax comp SpO2	HW C only
453564186031	453564186031	MS_X1 PCA ECG-5ld/OxiMax comp SpO2/w PT	HW C only

Part number	12NC	Description	Comments
M3001-68553	451261020771	MS_X1 PCA ECG-5ld/Masimo SpO2	HW C only
453564186051	453564186051	MS_X1 PCA ECG-5ld/Masimo SpO2/w PT	HW C only
M3001-68555	451261020791	MS_X1 PCA ECG-5ld / Nellcor SpO2	HW C only
453564186081	453564186081	MS_X1 PCA ECG-5ld/Nellcor SpO2/w PT	HW C only
M3001-68425	453564177921	MS_X1 Main board for HW C	HW C only
5041-8114	453563100081	MS_X1 Mounting Pin	

MMS Part Numbers - Top Covers

Part number	12NC	Description
M3001-68010	451261016401	MS_X1 Top Cover 5ld w/o P/T Text FAST
M3001-68011	451261016411	MS_X1 Top Cover 5ld w P/T Text FAST
M3001-68012	451261016421	MS_X1 Top Cover 12ld w/o P/T Text FAST
M3001-68013	451261016431	MS_X1 Top Cover 12ld w P/T Text FAST
M3001-68014	451261016441	MS_X1 Top Cover 5ld w/o P/T Sym FAST
M3001-68015	451261016451	MS_X1 Top Cover 5ld w P/T Sym FAST
M3001-68016	451261016461	MS_X1 Top Cover 12ld w/o P/T Sym FAST
M3001-68017	451261016471	MS_X1 Top Cover 12ld w P/T Sym FAST
M3001-68018	451261016481	MS_X1 Top Cover 5ld w/o P/T Text NELLCOR
M3001-68019	451261016491	MS_X1 Top Cover 5ld w P/T Text NELLCOR
M3001-68020	451261016501	MS_X1 Top Cover 12ld w P/T Text NELLCOR
M3001-68021	451261016511	MS_X1 Top Cover 5ld w/o P/T Sym NELLCOR
M3001-68022	451261016521	MS_X1 Top Cover 5ld w P/T Sym NELLCOR
M3001-68023	451261016531	MS_X1 Top Cover 12ld w P/T Sym NELLCOR
M3001-68030	453564147051	MS_X1 TopCover 12ld w/o P/T Text NELLCOR
M3001-68031	453564147061	MS_X1 Top Cover 12ld w/o P/T Sym NELLCOR
M3001-68024	451261016541	MS_X1 Top Cover 5ld w/o P/T Text MASIMO
M3001-68025	451261016551	MS_X1 Top Cover 5ld w P/T Text MASIMO
M3001-68026	451261016561	MS_X1 Top Cover 12ld w P/T Text MASIMO
M3001-68027	451261016571	MS_X1 Top Cover 5ld w/o P/T Sym MASIMO
M3001-68028	451261016581	MS_X1 Top Cover 5ld w P/T Sym MASIMO
M3001-68029	451261016591	MS_X1 Top Cover 12ld w P/T Sym MASIMO
M3001-68032	453564147071	MS_X1 Top Cover 12ld w/o P/T Text MASIMO
M3001-68033	453564147081	MS_X1 Top Cover 12ld w/o P/T Sym MASIMO

MMS Exchange Part Numbers

NOTE

The MMS always ships with the latest Software Revision. In order to make it compatible with the respective monitor the MMS may need to be upgraded or downgraded. From Support Tool version E.03.01 onwards the MMS can be up- or downgraded with every support tool license key (except general).

Part number	12NC	Description
X1 HW Rev: A; Option: A01; SN Prefix: DE227, DE441; SW Rev: Latest SW		
M3001-68102	453563462911	MS_X1 Exch Std 5ld w/o P/T-Eng latest SW
M3001-68202	453563486921	MS_X1 Std 5ld w P/T #C06-Eng latest SW
M3001-68302	453563486931	MS_X1 12ld w/o P/T #C12-Eng latest SW
M3001-68402	453563486941	MS_X1 Std 12ld w P/T #C18-Eng latest SW
M3001-68502	453563486951	MS_X1 Exch Std 5ld w/o P/T-Sym latest SW
M3001-68602	453563486961	MS_X1 Std 5ld w P/T #C06-Sym latest SW
M3001-68702	453563486971	MS_X1 12ld w/o P/T #C12-Sym latest SW
M3001-68802	453563486981	MS_X1 Std 12ld w P/T #C18-Sym latest SW
X1 HW Rev: B; Option: A02; SN Prefix: DE441, DE512; SW Rev: Latest SW		
M3001-68113	451261005361	MS_X1 5ld w/o P/T-Eng - OxiMax
M3001-68203	451261005381	MS_X1 5ld w P/T-Eng - OxiMax HWB
M3001-68403	451261005401	MS_X1 12ld w P/T-Eng - OxiMax HWB
M3001-68503	451261005421	MS_X1 Std 5ld w/o P/T-Sym - OxiMax HWB
M3001-68603	451261005441	MS_X1 5ld w P/T-Sym - OxiMax HWB
M3001-68803	451261005461	MS_X1 12ld w P/T-Sym - OxiMax HWB
X1 HW Rev: B; Option: A01; SN Prefix: DE512; SW Rev: Latest SW		
M3001-68114	451261006041	MS_X1 Std 5ld w/o P/T-Eng - HW B
M3001-68204	451261006061	MS_X1 5ld w P/T-Eng - HW B
M3001-68304	451261006081	MS_X1 12ld w/o P/T #C12-Eng - HW B
M3001-68404	451261006101	MS_X1 12ld w P/T-Eng - HW B
M3001-68504	451261006121	MS_X1 5ld w/o P/T-Sym - HW B
M3001-68604	451261006141	MS_X1 5ld w P/T-Sym - HW B
M3001-68704	451261006161	MS_X1 12ld w/o P/T #C12-Sym - HW B
M3001-68804	451261006181	MS_X1 12ld w P/T-Sym - HW B
X1 HW Rev: C; Option: A01; SN Prefix: DE610 <= ; SW Rev: Latest SW		
M3001-68105	451261013041	MS_X1 5ld w/o P/T-Eng - HW C
M3001-68205	451261013061	MS_X1 5ld w P/T - Eng - HW C
M3001-68305	453564146221	MS_X1 12ld wo P/T-Eng - HW C
M3001-68405	451261013081	MS_X1 12ld w P/T -Eng - HW C

Part number	12NC	Description
M3001-68505	451261013101	MS_X1 5ld w/o P/T-Sym - HW C
M3001-68605	451261013121	MS_X1 5ld w P/T -Sym - HW C
M3001-68705	453564146241	MS_X1 12ld w/o P/T-Eng - HW C
M3001-68805	451261013141	MS_X1 12ld w P/T - Sym - HW C
X1 HW Rev: C; Option: A04; SN Prefix: DE907 <= ; SW Rev: Latest SW		
M3001-68106	451261013161	MS_X1 5ld w/o P/T-Eng - Nellcor
M3001-68206	451261013181	MS_X1 5ld w P/T -Eng - Nellcor
M3001-68306	453564146171	MS_X1 12ld wo P/T -Eng- Nellcor
M3001-68406	451261013201	MS_X1 12ld w P/T -Eng - Nellcor
M3001-68506	451261013221	MS_X1 5ld w/o P/T-Sym - Nellcor
M3001-68606	451261013241	MS_X1 5ld w P/T -Sym - Nellcor
M3001-68706	453564146181	MS_X1 12ld wo P/T -Sym- Nellcor
M3001-68806	451261013261	MS_X1 12ld w P/T -Sym - Nellcor
X1 HW Rev: C; Option: A03; SN Prefix: DE632 <= ; SW Rev: Latest SW		
M3001-68107	451261013281	MS_X1 5ld w/o P/T-Eng-Masimo-HWC
M3001-68207	451261013301	MS_X1 5ld w P/T-Eng-Masimo-HWC
M3001-68307	453564146301	MS_X1 12ld wo P/T-Eng - Masimo HW C
M3001-68407	451261013321	MS_X1 12ld w P/T -Eng-Masimo-HWC
M3001-68507	451261013341	MS_X1 5ld w/o P/T-Sym-Masimo-HWC
M3001-68607	451261013361	MS_X1 5ld w P/T -Sym-Masimo-HWC
M3001-68707	453564146321	MS_X1 12ld w/o P/T-Eng- Masimo-HWC
M3001-68807	451261013381	MS_X1 12ld w P/T - Sym-Masimo-HWC
X1 HW Rev: C; Option: A02; SN Prefix: DE610 <= ; SW Rev: Latest SW		
M3001-68108	451261015171	MS_X1 5ld w/o P/T Eng-OxiMax-HWC
M3001-68208	451261015191	MS_X1 5ld w P/T-Eng-OxiMax-HWC
M3001-68308	453564146351	MS_X1 12ld wo P/T-Eng- OxiMax HW C
M3001-68408	451261015211	MS_X1 12ld w P/T -Eng-OxiMax-HWC
M3001-68508	451261015231	MS_X1 5ld w/o P/T-Sym-OxiMax-HWC
M3001-68608	451261015251	MS_X1 5ld w P/T -Sym-OxiMax-HWC
M3001-68708	453564146361	MS_X1 12ld w/o P/T Eng-OxiMax-HWC
M3001-68808	451261015271	MS_X1 12ld w P/T-Sym-OxiMax-HWC

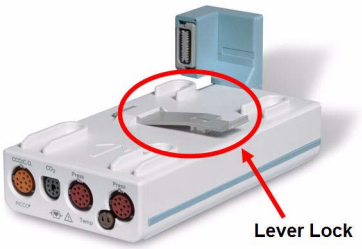
MMS Extension Parts (M3012A, M3014A, M3015A/B)

Exchange MMS Extensions are shipped with English front bezels only. If you require a bezel in another language (compare the part numbers of your language to the English ones to check this) the front bezel has to be ordered additionally. Attach the appropriate bezel before putting the MMS extension into operation.

The part numbers in the following parts table below, are used to order parts from your Philips representative.

MMS Extension General Support Parts

Part number	12NC	Description	Comments
M3014-64200	451261012731	MS_RCO2 MMS Ext Clips+Springs, 10ea	Old top housing
M3012-64600	451261012721	MS_HMS MMS Ext. Lever Locks (5ea)	Grey lever release mechnanism
M3012-64620	451261016601	MS_HMS MSE Top Cover Assy	
M3012-64621	451261016611	MS_HMS MSE Link Bar Assy	Without Flex, must be ordered separately
453564088851	453564088851	MS_MCO2 Flex Cable/Connector Assy	
5041-8114	453563100081	MS_X1 Mounting Pin	



MMS Extension Front Bezels and Accessories

Part number	12NC	Description
M3012A BEZELS		
451261024471	451261024471	MS_HMS Bezel P, T, P/T Eng. Text
451261024481	451261024481	MS_HMS Bezel P, T, P/T Symbols
451261024491	451261024491	MS_HMS Bezel C.O.,P, T, P/T Eng. Text
451261024501	451261024501	MS_HMS Bezel C.O.,P, T, P/T Symbols
451261024511	451261024511	MS_HMS Bezel CCO,C.O.,P,T,P/T Eng Text
451261024521	451261024521	MS_HMS Bezel CCO, C.O.,P,T,P/T Sym
M3012A Misc		
14454A	453563057651	I.V POLE MOUNT
M3014A Bezels		
451261024531	451261024531	MS_RCO2 Bezel CO2 only Eng. Text/Sym
451261024541	451261024541	MS_RCO2 Bezel C.O., CO2,P,P/T Eng. Text
451261024551	451261024551	MS_RCO2 Bezel C.O., CO2, P, P/T Symbols
451261024561	451261024561	MS_RCO2 Bezel CO2, P, P/T Eng. Text
451261024571	451261024571	MS_RCO2 Bezel CO2, P, P/T Symbols
451261024581	451261024581	MS_RCO2 Bezel C.O., CCO,CO2,P,P/T Text
451261024591	451261024591	MS_RCO2 Bezel C.O.,CCO, CO2, P, P/T Sym
Canpnograhpy Sensors		
M2741-68000	451261011291	SNSR M2741A Sidestream Sensor
M2501-68000	451261006391	MS_MCO2 M2501A MainstreamSensor
M2741-60000	451261011731	Mounting Bracket Replacement
M3015A Bezel		
451261024601	451261024601	MS_SCO2 Bezel CO2 w P/T Eng. Text
451261024611	451261024611	MS_SCO2 Bezel CO2 w P/T Symbols
451261024621	451261024621	MS_SCO2 Bezel CO2 w/o P/T Eng. Text
451261024631	451261024631	MS_SCO2 Bezel CO2 w/o P/T Symbols
M3015B Bezel		
453564270051	453564270051	MS_SCO2 Bezel Symbols M3015B CO2. P, P, T
453564270061	453564270061	MS_SCO2 Bezel Text M3015B CO2. P, P, T
Repair Kit M3015A		
M3015-29303	453563332261	MS_SCO2 OEM M3015A pump kit +C02scrb
M3015-29314	453563332281	MS_SCO2 LAMP M3015A Infra Red lamp

Exchange Parts List

Exchange parts are parts that have been returned to Philips and reconditioned for further use. Parts offered as exchange parts are in excellent service order according to rigorous Philips standards but offer you a considerable price advantage.

A front bezel with symbols instead of English text is provided with each exchange MMS Extension.

Part number	12NC	Description
M3012A	**862111**	**Hemodynamic Measurement Server Extension**
M3012-6801A	451261000201	MS_HMS OEM EXCH.UNIT ENGLISH (#C00)
M3012-6831A	451261000341	MS_HMS OEM EXCH.UNIT ENGLISH (#C05)
M3012-6861A	451261000491	MS_HMS OEM EXCH.UNIT ENGLISH (#C10)
M3014A	**862187**	**Capnography extension**
M3014-6801A	451261009281	MS_RCO2 OEM EXCH.UNIT ENGLISH (#C00)
M3014-6831A	451261009311	MS_RCO2 OEM EXCH.UNIT ENGLISH (#C05)
M3014-6861A	451261009601	MS_RCO2 OEM EXCH.UNIT ENGLISH (#C10)
M3014-6891A	451261009461	MS_RCO2 OEM EXCH.UNIT ENGLISH (#C07)
M3015A	**862393**	**Microstream CO2 Extension**
M3015-6801A	453563332431	MS_SCO2 OEM Exch. Unit with P/T (HW Rev. A)
M3015-6831A	453563477871	MS_SCO2 Exch. Unit without P/T (HW Rev. A)
M3015-6802A	451261005311	MS_SCO2 M3015A Unit with P/T (HW Rev. B)
M3015-6832A	451261005331	MS_SCO2 M3015A Unit wo P/T (HW Rev. B)
453564293881	453564293881	MS_SCO2 OEM Exch. Unit with P/T (HW Rev. C)
453564293891	453564293891	MS_SCO2 Exch. Unit without P/T (HW Rev. C)
M3015B*	**865377**	**Microstream CO2 Extension**
453564270041	453564270041	MS_SCO2 M3015B with CO2,P, P and T

* Requires SW Rev. H or higher

IntelliVue X2 Part Numbers

Please refer to the IntelliVue X2 Service Guide for IntelliVue X2 part numbers.

Plug-in Modules Part Numbers

For inspection procedures; preventive maintenance procedures; cleaning procedures; maintenance, and good practices used to maintain the instrument in good working order, see *Testing and Maintenance*.

Part number	12NC	Description
M1001-45011	453563490691	M_ECG PLAST SNAP LOCK SINGLE
5040-4249	453563099411	PLAST Housing Module Rear new color
5040-4250	453563099421	PLAST Housing Module Front new color
5040-4247	453563099401	PLAST Snap Lock (CV color)

M1006B Invasive Blood Pressure Module

Part number	12NC	Description
M1006-69601	453563463061	M_PRS IP Mod multilanguage
M1006-69603	453563462811	M_PRS IP Mod German
M1006-69604	453563461771	M_PRS IP Mod Dutch
M1006-69605	453563461781	M_PRS IP ModSpanish
M1006-69607	453563461791	M_PRS IP Mod Norwegian
M1006-69608	453563461731	M_PRS IP Mod Swedish
M1006-69609	453563461741	M_PRS IP Mod Finnish
M1006-69610	453563461751	M_PRS IP Mod Japanese
M1006-69613	453563461761	M_PRS IP Mod Chinese
M1006-69614	453563461271	M_PRS IP Mod Portugese
M1006-69615	453563461281	M_PRS IP Mod Greek
M1006-69619	453563461291	M_PRS IP Mod Czech
M1006-69620	453563461301	M_PRS IP Mod Polish
Front Housings		
M1006-60201	453563462101	M_PRS Frt Housg Assy Press, ENG
M1006-60203	453563461551	M_PRS Frt Housg Assy Press, GER
M1006-60204	453563461581	M_PRS Frt Housg Assy Press, DUT
M1006-60205	453563461591	M_PRS Frt Housg Assy Press, SPA
M1006-60207	453563461601	M_PRS Frt Housg Assy Press, NOR
M1006-60208	453563461611	M_PRS Frt Housg Assy Press, SWE
M1006-60209	453563461621	M_PRS Frt Housg Assy Press, FIN
M1006-60210	453563461631	M_PRS Frt Housg Assy Press, JAP
M1006-60213	453563461641	M_PRS Frt Housg Assy Press, PRC
M1006-60214	453563461651	M_PRS Frt Housg Assy Press, POR
M1006-60215	453563461661	M_PRS Frt Housg Assy Press, GRK
M1006-60219	453563461671	M_PRS Frt Housg Assy Press, CZE

Part number	12NC	Description
M1006-60220	453563461681	M_PRS Frt Housg Assy Press, POL
Overlay old style modules		
M1006-44501	453563225431	M_PRS KBD M1006B OVERLAY English
M1006-44502	453563225441	M_PRS KBD M1006B OVERLAY French
M1006-44503	453563225451	M_PRS KBD M1006B OVERLAY German
M1006-44504	453563225461	M_PRS KBD M1006B OVERLAY Dutch
M1006-44505	453563225471	M_PRS KBD M1006B OVERLAY Spanish
M1006-44507	453563225481	M_PRS KBD M1006B OVERLAY Swedish
M1006-44508	453563225491	M_PRS KBD M1006B OVERLAY Finnish
M1006-44509	453563225501	M_PRS KBD M1006B OVERLAY Norwegian
M1006-44511	453563225511	M_PRS KBD M1006B OVERLAY Japanese
M1006-44512	453563225521	M_PRS KBD M1006B OVERLAY Chinese
Modules with analog out		
M1006-69651	453563463071	M_PRS IP Mod multi, w. Analog-out
M1006-69653	453563461241	M_PRS IP Mod German, w. Analog-out
M1006-69654	453563461251	M_PRS IP Mod Dutch., w. Analog-out
M1006-69655	453563461261	M_PRS IP Mod Spanish, w. Analog-out
M1006-69657	453563460031	M_PRS IP Mod Norwegian, w. Analog-out
M1006-69658	453563460041	M_PRS IP Mod Swedish, w. Analog-out
M1006-69659	453563460051	M_PRS IP Mod Finnish, w. Analog-out
M1006-69660	453563460061	M_PRS IP Mod Japanese, w. Analog-out
M1006-69663	453563459011	M_PRS IP Mod Simpl. Chin, w. Analog-out
M1006-69664	453563458321	M_PRS IP Mod Portugese, w. Analog-out
M1006-69665	453563459021	M_PRS IP Mod Greek, w. Analog-out
M1006-69669	453563459031	M_PRS IP Mod Czech, w. Analog-out
M1006-69670	453563459041	M_PRS IP Mod Polish, w. Analog-out
Front Housings with analog out		
M1006-60251	453563462091	M_PRS Frt Housg Assy Press C01, ENG
M1006-60253	453563461691	M_PRS Frt Housg Assy Press C01, GER
M1006-60254	453563461701	M_PRS Frt Housg Assy Press C01, DUT
M1006-60255	453563461711	M_PRS Frt Housg Assy Press C01, SPA
M1006-60257	453563461721	M_PRS Frt Housg Assy Press C01, NOR
M1006-60258	453563461821	M_PRS Frt Housg Assy Press C01, SWE
M1006-60259	453563461831	M_PRS Frt Housg Assy Press C01, FIN
M1006-60260	453563461841	M_PRS Frt Housg Assy Press C01, JAP
M1006-60263	453563461851	M_PRS Frt Housg Assy Press C01, PRC
M1006-60264	453563461861	M_PRS Frt Housg Assy Press C01, POR

Part number	12NC	Description
M1006-60265	453563461871	M_PRS Frt Housg Assy Press C01, GRK
M1006-60269	453563461881	M_PRS Frt Housg Assy Press C01, CZE
M1006-60270	453563461891	M_PRS Frt Housg Assy Press C01, POL
Overlay old style modules		
M1006-44521	453563225531	M_PRS KBD M1006B #C01 OVERLAY English
M1006-44522	453563225541	M_PRS KBD M1006B #C01 OVERLAY French
M1006-44523	453563225551	M_PRS KBD M1006B #C01 OVERLAY German
M1006-44524	453563225561	M_PRS KBD M1006B #C01 OVERLAY Dutch
M1006-44525	453563225571	M_PRS KBD M1006B #C01 OVERLAY Spanish
M1006-44526	453563225581	M_PRS KBD M1006B #C01 OVERLAY Italian
M1006-44527	453563225591	M_PRS KBD M1006B #C01 OVERLAY Swedish
M1006-44528	453563225601	M_PRS KBD M1006B #C01 OVERLAY Finnish
M1006-44529	453563225611	M_PRS KBD M1006B #C01 OVERLAY Norwegian
M1006-44531	453563225621	M_PRS KBD M1006B #C01 OVERLAY Japanese
M1006-44532	453563225631	M_PRS KBD M1006B #C01 OVERLAY Chinese
Bezel		
M1006-42202	453563463211	M_PRS PLAST Bezel Press-Round
M1006-42201	453563469771	M_PRS PLAST Bezel Press-Square
Cables		
M1006-61689	453563225911	M_PRS CBL ADPTR M1006B#C01 1/4" phone JK

M1011A Intravascular Oxygen Saturation Module

Part number	12NC	Description
453564120301	453564120301	M_SO2 Module Exchange, ENG
453564120311	453564120311	M_SO2 Module Exchange, SYMBOLS
453564105801	453564105801	M_SO2 Front Housing Assy SO2 ENGLISH
453564105811	453564105811	M_SO2 Front Housing Assy SO2 SYMBOL
M1011-42201	453564120341	M_SO2 Bezel
989803151591	989803151591	SO2 Optical Module
453564097201	453564097201	M_SO2 OEM Exchange SO2 Optical Module

M1012A Cardiac Output Parameter Module

Part number	12NC	Description
M1012-69601	453563458801	M_CO Module C.O., ENG
M1012-69602	453563458761	M_CO Module C.O., FRC
M1012-69603	453563458771	M_CO Module C.O., GER
M1012-69605	453563458781	M_CO Module C.O., SPA
M1012-69610	453563458791	M_CO Module C.O., JAP
M1012-69613	453563458831	M_CO Module C.O., PRC
M1012-69615	453563460931	M_CO Module C.O., GRK
Front housing		
M1012-60201	453563462021	M_CO Frt Housg Assy C.O., ENG
M1012-60202	453563460161	M_CO Frt Housg Assy C.O., FRC
M1012-60203	453563460171	M_CO Frt Housg Assy C.O., GER
M1012-60205	453563460181	M_CO Frt Housg Assy C.O., SPA
M1012-60210	453563460191	M_CO Frt Housg Assy C.O., JAP
M1012-60213	453563460201	M_CO Frt Housg Assy C.O., PRC
M1012-60215	453563460211	M_CO Frt Housg Assy C.O., GRK
Module with Picco		
M1012-69651	453563463011	M_CO Module C10 PiCCO, ENG
M1012-69652	453563460941	M_CO Module C10 PiCCO, FRC
M1012-69653	453563464731	M_CO Module C10 PiCCO, GER
M1012-69655	453563460311	M_CO Module C10 PiCCO, SPA
M1012-69660	453563460321	M_CO Module C10 PiCCO, JAP
M1012-69663	453563460331	M_CO Module C10 PiCCO, PRC
M1012-69665	453563460341	M_CO Module C10 PiCCO, GRK
Front housing		
M1012-60251	453563462031	M_CO Frt Housg Assy C.O. PiCCO, ENG
M1012-60252	453563460221	M_CO Frt Housg Assy C.O. PiCCO, FRC
M1012-60253	453563460141	M_CO Frt Housg Assy C.O. PiCCO, GER
M1012-60255	453563460151	M_CO Frt Housg Assy C.O. PiCCO, SPA
M1012-60260	453563462051	M_CO Frt Housg Assy C.O. PiCCO, JAP
M1012-60263	453563462061	M_CO Frt Housg Assy C.O. PiCCO, PRC
M1012-60265	453563462041	M_CO Frt Housg Assy C.O. PiCCO, GRK
Overlay old style module		
M1012-44471	453563227501	M_CO KBD M1012A Overlay ENG
M1012-44472	453563227511	M_CO KBD M1012A Overlay FRC
M1012-44473	453563227521	M_CO KBD M1012A Overlay GER

Part number	12NC	Description
M1012-44475	453563227531	M_CO KBD M1012A Overlay SPA
M1012-44476	453563227541	M_CO KBD M1012A Overlay ITA
M1012-44481	453563227551	M_CO KBD M1012A Overlay JAP
M1012-44482	453563227561	M_CO KBD M1012A Overlay PRC
Bezel		
M1012-42201	453563463241	M_CO PLAST Bezel CO Module

M1014A Spirometry Module

Part number	12NC	Description
M1014-69601	451261014451	M_SPR Module Spiro, Eng
M1014-69602	451261014461	M_SPR Module Spiro, Symbol
Front housing		
M1014-60201	451261014491	M_SPR Frt Housg Assy Spiro, ENG
M1014-60202	451261014501	M_SPR Frt Housg Assy Spiro, SYMBOL
Bezel		
M1014-42201	451261014511	M_SPR PLAST Bezel Spiro
Misc		
M1014-64100	451261014521	M_SPR TUBING Leak Test Kit Spiro

M1018A Transcutaneous pO2/pCO2 Parameter Module

Part number	12NC	Description
M1018-69601	453563459211	M_TCPO2 M1018A Exch,Eng,Ger,Dut,...
M1018-69602	453563460491	M_TCPO2 M1018A tcpO2/CO2 Exch, Fre
M1018-69610	453563458711	M_TCPO2 M1018A tcpO2/CO2 Exch, Jap
M1018-69613	453563460541	M_TCPO2 M1018A tcpO2/CO2 Exch, CHN
M1018-69614	453563460551	M_TCPO2 M1018A tcpO2/CO2 Exch, Por
Front housing		
M1018-60201	453563461441	M_TCPO2 Frt Housg Assy ENG
M1018-60202	453563462211	M_TCPO2 Frt Housg Assy FRC
M1018-60210	453563462221	M_TCPO2 Frt Housg Assy JAP
M1018-60213	453563462231	M_TCPO2 Frt Housg Assy PRC
M1018-60214	453563462241	M_TCPO2 Frt Housg Assy POR
Bezel		
M1018-42201	453563463651	M_TC PLAST Plast Bezel

Part number	12NC	Description
M1018-60602	453563460501	M_TC PLAST Calibration Chamber Assy
Misc		
M2205A	989803105991	Calibration Tube, 5/pouch
M1918A	989803105521	TCP02/C02 Xducer, solid state design

M1020B Pulse Oximetry Module

Part number	12NC	Description
M1020-69651	451261000061	M_SpO2 M1020B Philips/FAST
M1020-60251	451261000081	M_SpO2 Frt Housg Assy M1020B PhilipsFAST
M1020-66511	453563480451	M_SpO2 SpO2 PCA
M1020-42201	453563463641	M_SpO2 PLAST Bezel SpO2 Type 1 Module
OxiMax Compatible Module		
M1020-69652	451261000101	M_SpO2 M1020B NELLCOR Oxi
M1020-60252	451261000121	M_SpO2 Frt Housg Assy M1020B NELLCOR
Masimo SET Module		
M1020-69653	451261000131	M_SpO2 OEM M1020B Masimo

M1021A Mixed Venous Oxygen Saturation Module

Part number	12NC	Description
M1021-69601	453563462881	M_SvO2 M1021A SVO2 Exch,all Lang ex.sCh
M1021-69613	453563460411	M_SvO2 M1021A SVO2 Exch,CHN Simpl.
Front housing		
M1021-60201	453563461461	M_SvO2 Frt Housg Assy SvO2, ENG
M1021-60213	453563462151	M_SvO2 Frt Housg Assy SvO2, PRC
Bezel		
M1021-42201	453563463621	M_SvO2 PLAST Plast Bezel

M1027A EEG Module

Part number	12NC	Description
M1027-69601	453563459151	M_EEG M1027A Exch, all Lang ex Jap&Gre
M1027-69610	453563459161	M_EEG M1027A EEG Exch, JAP
M1027-69615	453563460481	M_EEG M1027A EEG Exch, Greek
M1027-60201	453563461471	M_EEG Frt Housg Assy EEG, ENG

Part number	12NC	Description
M1027-60210	453563462131	M_EEG Frt Housg Assy EEG, JAP
M1027-60215	453563462141	M_EEG Frt Housg Assy EEG, GRK
M1027-42201	453563463611	M_EEG PLAST Plast Bezel
M1027-61601	453563231141	M_EEG CBL EEG MODULE TEST DEVICE

M1029A Temperature Module

Part number	12NC	Description
M1029-69601	453563459291	M_TMP Temp Module multilanguage
M1029-69609	453563460581	M_TMP Temp Module Finish
M1029-69610	453563460561	M_TMP Temp Module Japanese
M1029-69613	453563460571	M_TMP Temp ModuleChinese Simpl.
M1029-69615	453563459891	M_TMP Temp Module Greek
M1029-69619	453563459901	M_TMP Temp Module Czech
Front housing		
M1029-60201	453563461451	M_TMP Frt Housg Assy Temp, ENG
M1029-60209	453563462161	M_TMP Frt Housg Assy Temp, FIN
M1029-60210	453563462171	M_TMP Frt Housg Assy Temp, JAP
M1029-60213	453563462181	M_TMP Frt Housg Assy Temp, PRC
M1029-60215	453563462191	M_TMP Frt Housg Assy Temp, GRK
M1029-60219	453563462201	M_TMP Frt Housg Assy Temp, CZE
Overlay old style module		
M1029-44471	453563231261	M_TMP KBD M1029A Overlay Multilanguage
M1029-44478	453563231281	M_TMP KBD M1029A Overlay Finnish
M1029-44481	453563231291	M_TMP KBD M1029A Overlay Chinese
M1029-44482	453563231301	M_TMP KBD M1029A Overlay Japanese
Bezel		
M1029-42201	453563463631	M_TMP PLAST Temp Module Bezel

M1032A External Device Interface Module

Part number	12NC	Description
M1032-69801	453563458381	M_LNK A01 Auxiliary exch module
M1032-69802	453563458391	M_LNK A02 Ventilator exch module
M1032-69803	453563458401	M_LNK A03 Gas Module exch module
M1032-69804	453563458411	M_LNK A04 Anesth mach exch module
M1032-69805	453563458421	M_LNK A05 AUX.Plus exch module

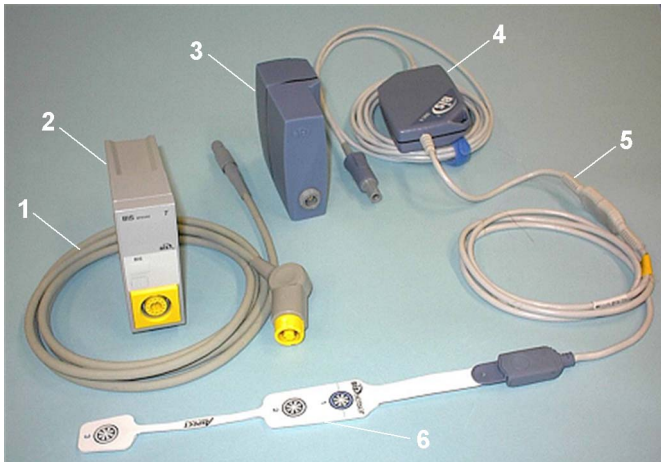
Part number	12NC	Description
M1032-70806	451261002041	M_LNK Tested PHILIPS SPO2 #A06
M1032-60201	453563461401	M_LNK Frt Housg Kit, all Languages
M1032-44401	453563231691	M_LNK KBD Overlay all Languages
M1032-42201	453563463671	M_LNK PLAST Vuelink Module Bezel
Cables		
453564086631	453564086631	M_LNK CBL MAQUET JOSTRA HL-20
M1032-61601	453563231931	M_LNK CBL Draeger Cicero (4m)
M1032-61602	453563231941	M_LNK CBL Draeger Cato (1.4m)
M1032-61603	453563231951	M_LNK CBL Ohmeda Modulus CD (2m)
M1032-61604	453564044241	M_LNK CBL Draeger Graph Scr Savina 4m
M1032-61605	453563231961	M_LNK CBL NAD Narkomed 2B/2C 2m
M1032-61606	453564089711	M_LNK CBL GE DINAMAP PRO 100-400
M1032-61607	453564089701	M_LNK CBL GE Engstroem Carestation
M1032-61611	453563231971	M_LNK CBL Free Analog (2m)
M1032-61612	453563231981	M_LNK CBL Free Analog (4m)
M1032-61613	453563231991	M_LNK CBL Critikon 1846/1846SX (2m)
M1032-61614	453563232001	M_LNK CBL Critikon 1846/1846SX (4m)
M1032-61615	453563232011	M_LNK CBL Nellcor N-100 (2m)
M1032-61616	453563232021	M_LNK CBL Nellcor N-100 (4m)
M1032-61617	453563498811	M_LNK CBL Nellcor N-200 (2m)
M1032-61618	453563232031	M_LNK CBL Nellcor N-200 (4m)
M1032-61619	453563232041	M_LNK CBL ABBOTT OXI 3
M1032-61620	453563232051	M_LNK CBL Abbott Oximetrix 3 (4m)
M1032-61621	453563232061	M_LNK CBL Puritan Bennett 7200A/AE (2m)
M1032-61622	453563232071	M_LNK CBL Puritan Bennett 7200A/AE (4m)
M1032-61623	453563232081	M_LNK CBL Siemens 900 C/D/E (2m)
M1032-61624	453563232091	M_LNK CBL Siemens 900 C/D/E (4m)
M1032-61625	453563498821	M_LNK CBL Siemens SCM 990 (2m)
M1032-61626	453563232101	M_LNK CBL Siemens SCM 990 (4m)
M1032-61629	453563232111	M_LNK CBL Draeger Evita (2m)
M1032-61630	453563232121	M_LNK CBL Draeger Evita (4m)
M1032-61631	453563232131	M_LNK CBL M1025A/B (2m)
M1032-61633	453563232141	M_LNK CBL Datex Cap./Ulti.(1.4m)
M1032-61635	453563232151	M_LNK CBL Ohmeda RGM 5250 (1.4m)
M1032-61636	453563232161	M_LNK CBL Ohmeda RGM 5250 Rev 6 (2m)
M1032-61642	453563232171	M_LNK CBL Siemens Servo 300/300A (4m)
M1032-61643	453563232181	M_LNK CBL Draeger Evita 2 (4m)
M1032-61644	453563232191	M_LNK CBL Draeger Babylog 8000 (4m)

Part number	12NC	Description
M1032-61645	453563232201	M_LNK CBL Infrasonic Infant Star/ISV 4m
M1032-61648	453563232221	M_LNK CBL Braun FM Sys SW rev.<3.0 (4m)
M1032-61649	453564113041	M_LNK CBL BBraun Space System (4m)
M1032-61651	453563232231	M_LNK CBL Baxter Explorer (2m)
M1032-61652	453563232241	M_LNK CBL Baxter Vigilance(rev.< 6.00)2m
M1032-61653	453563232251	M_LNK CBL Mortara ELI 100STM(4m)
M1032-61654	453563232261	M_LNK CBL Open Interface 25-pin (4m)
M1032-61657	453563232271	M_LNK CBL Bear 1000 (4m)
M1032-61658	453563232281	M_LNK CBL Ohmeda 7800 (2m)
M1032-61659	453563232291	M_LNK CBL Ohmeda 7810 (2m)
M1032-61663	453563232311	M_LNK CBL Support Vuelink TO PC (2m)
M1032-61664	453563232321	M_LNK CBL Ohmeda Rascal II (2m)
M1032-61665	453563232331	M_LNK CBL NPB 740/760/840 (4m)
M1032-61666	451261009001	M_LNK CBL Draeger Zeus (4m)
M1032-61667	451261011051	M_LNK CBL I-Stat 1 Analyzer with RIBS 2m
M1032-61673	453563232351	M_LNK CBL Hamilton Amadeus/Veolar 4m
M1032-61674	453563232361	M_LNK CBL Taema Alis (2m)
M1032-61675	453563232371	M_LNK CBL Draeger Cicero EM mono (2m)
M1032-61676	453563232381	M_LNK CBL Draeger PM 8050 (2m)
M1032-61678	453563232391	M_LNK CBL Ohmeda 7900
M1032-61680	453563232401	M_LNK CBL Draeger Evita XL/4/2dura (2m)
M1032-61681	453563232411	M_LNK CBL Draeger Julian (2m)
M1032-61682	453563232421	M_LNK CBL Fresenius Vial (4m)
M1032-61684	453563232431	M_LNK CBL GE Aesp./Aest./Avance/Aisys 2m
M1032-61685	453563232441	M_LNK CBL Draeger Cicero EM Color (2m)
M1032-61687	453563498831	M_LNK CBL Aspect BIS A2000 (4m)
M1032-61688	453563498841	M_LNK CBL Diametrics IRMA SL (4m)
M1032-61689	453563498851	M_LNK CBL Diametrics TrendCare (4m)
M1032-61690	453563498861	M_LNK CBL KIT FOR TOF WATCH (2m)
M1032-61691	453563232451	M_LNK CBL BRAUN FM System SW rev. >= 3.1
M1032-61692	453563498871	M_LNK CBL Edwards Vigilance/2/Vigileo 2m
M1032-61693	453563458271	M_LNK CBL Danm. AAI (SSI)/AEP Monitor 2m
M1032-61694	453563458281	M_LNK CBL DraegerPrimus/Apollo/Pallas 2m
M1032-61699	451261003891	M_LNK CBL Open Interf 9-pin dig. only 4m
M1032-61695	453563458261	M_LNK CBL FOR DRAEGER VAMOS
M1032-61700	451261013521	M_LNK CBL Draeger Fabius GS / Tiro (2m)
M1032-61696	453563498881	M_LNK CBL Maquet (Siemens) Servo-i/-s 4m
M1032-9100L	451261001271	M_LNK LP Inst. Note TOF-Watch SX Mnt-eng

M1034A BIS Module

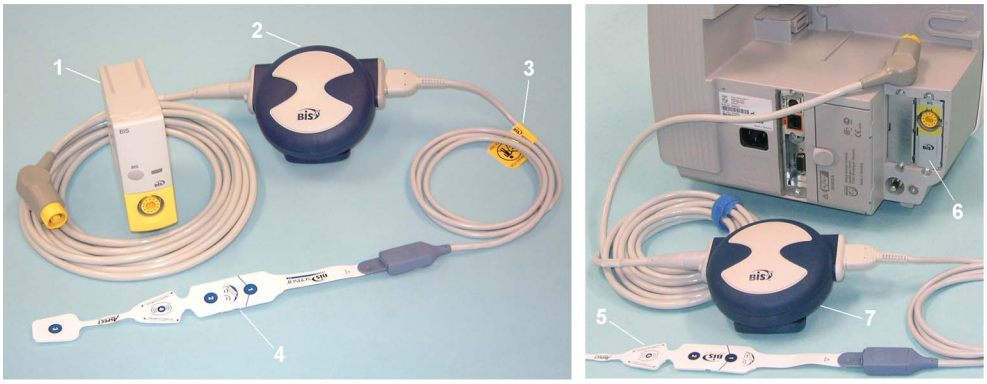
Part number	12NC	Description
M1034-69601	453563462841	M_BIS BIS Interface Module, exchange
M1034-61630	453563233721	M_BIS CBL Patient Interface Cable
M1034-68520	453563233761	M_BIS BIS Engine, exchange
M1034-68102	453563233741	M_BIS BIS DSC-XP, exchange
M1034-61610	453563233701	M_BIS CBL Engine Cable
M1034-61620	453563233711	M_BIS CBL Engine Cable (long)
M1034-68521	451261003621	M_BIS BISx Power Link, exchange
M1034-61660	451261005261	M_BIS CBL BISx Host Cable
M1034-47600	451261005271	M_BIS CBL BISx Bulkhead Connector
M1034-41200	453563233641	M_BIS Rack Mount
M1034-60104	453563490591	M_BIS MECHASY BIS FMS MOUNT
M1034-60201	453563461411	M_BIS Frt Housg Assy BIS, ENG
M1034-61650	453563233731	M_BIS BIS Sensor Simulator
M1034-42201	453563463661	M_BIS PLAST PLAST Bezel
M1034AX	862375	BISx

BIS Solution Components



1 BIS Engine Cable
2 BIS Module
3 BIS Engine
4 Digital Signal Converter (DSC)
5 Patient Interface Cable
6 BIS Sensor

BISx Solution Components



1 BIS Module
2 BISx
3 Patient Interface Cable
4 BIS Sensor
5 BIS Sensor
6 BIS Interface Board (MP20/30 only)
7 BISx

M1116B Thermal Array Recorder Module

Part number	12NC	Description
M1116-68603	453563466701	2" RECDR ECMS EXCH ENGLISH
M1116-68604	453563466711	2" RECDR ECMS EXCH GERMAN
M1116-68605	453563466721	2" RECDR ECMS EXCH SPANISH
M1116-68606	453563466731	2" RECDR ECMS EXCH FRENCH
M1116-68607	453563466741	2" RECDR ECMS EXCH SWEDISH
M1116-68608	453563466751	2" RECDR ECMS EXCH CHINESE
M1116-68609	453563466761	2" RECDR ECMS EXCH JAPANESE
M1116-68610	453563466771	2" RECDR ECMS EXCH ITALIAN
M1116-68620	453563466781	2" RECORDER ECMS EXCH FINNISH
M1116-68621	453563466791	2" RECORDER ECMS EXCH PORT
Front housing		
M1116-60203	453563462301	PLAST Front Housing English
M1116-60204	453563489221	PLAST Front Housing German
M1116-60205	453563462311	PLAST Front Housing Spanish
M1116-60206	453563462321	PLAST Front Housing French
M1116-60207	453563489231	PLAST Front Housing Swedish
M1116-60208	453563462331	PLAST Front Housing Chinese
M1116-60209	453563462341	PLAST Front Housing Japanese
M1116-60210	453563462351	PLAST Front Housing Italian
M1116-60220	453563489241	PLAST Front Housing Finnish
M1116-60221	453563489251	PLAST Front Housing Assembly Portuguese
M1116-60301	453563243911	HSG Rear DBL (CV COLOR
M1116-80040	453563244171	PLAST Left Half Chassis
M1116-80230	453564017111	PLAST Right Half Chassis
5040-4255	453563099431	PLAST Housing Double Module
5040-4256	453563099441	PLAST Housing Double Module
M1116-40041	453563243811	Housing Top (CV color)
M1116-40230	453563243851	PLAST Front Housing English
M1116-40240	453563243861	Front Door (CV color)
1500-0802	453563059491	MECH Flat Belt
1810-1339	453563064911	ASSY Thermal Print Head
M1116-00030	453563243781	MET Spring Leaf
M1116-40060	453563243821	MACH Timing Pulley
M1116-40070	453563243831	MECHASY Drive Roller
M1116-40095	453563243841	SWITCH CAP EXTENDER

Part number	12NC	Description
M1116-41050	453563243871	STAMPING Buff Cam
M1116-60200	453563243881	EMCH Drive Motor
M1116-60201	453563243891	Printhead Cleaning Kit
M1116-83002	453563244191	LBL Inside Door
0515-0890	453563480701	SCRW MACH M3 X 0.5 6MM-LG 90-DEG-FLH-HD
M1001-60620	453563224011	M_ECG PLAST RECORDER FRONT ASSY, BLANK

865115 IntelliBridge EC10 Module

Part number	12NC	Description
453564116661	453564116661	IB-EC10 Module RS232/LAN
453564116931	453564116931	IB-EC10 Frt Housg Assy Module RS232/LAN
M1031-42201	453564116891	IB-EC10 Bezel RJ45

865383 NMT Module

Part number	12NC	Description
453564279141	453564279141	M_NMT Module NMT, US
453564279161	453564279161	M_NMT Module NMT, Intl
453564257851	453564257851	M_NMT PLAST Bezel
453564279181	453564279181	M_NMT Frt Housg Assy NMT, US
453564279191	453564279191	M_NMT Frt Housg Assy NMT, Intl
989803174581	989803174581	CBL NMT Patient Cable*

* Not orderable via SPS. Must be ordered through Supplies.

External Display Part Numbers

Part number	12NC	Description
M8031B	**862137**	**15in TFT Touch XGA Display (FIMI)**
M8031-68001	451261001941	IV DSPL 15" Medical Grade w Touch
M8031-60005	451261001921	IV ASSY-PWR 12V for M8031B Display
M8031-64001	451261001931	IV ASSY Pwr Supply Holder 15”/19” displ
M8033-04701	453563480981	IV DSPL Desk Stand for M8033A/M8033B
2090-0985	451261014381	DSPL Backlights (2x) (Version 2)
2090-0860	453563463201	Backlights (2x) (Version 1)

Part number	12NC	Description
M8033C	**M8033C**	**17 in. TFT Touch (S)XGA Display**
M8033-68071	451261009161	IV DSPL 17" Medical Grade with Touch
M8031-04701	451261001901	IV MECHASY Mon Desk Stand M8031B/M8033C
M8033-64603	451920880311	IV DSPL Backlights for M8033C
453564263911	453564263911	IV MECHASY 17" display replacement kit[1]
865299	**865299**	**19 in. TFT Touch (S)XGA Display**
453564116741	453564116741	ASSY-PWR - E539821 Power Brick - 12V
453564192181	453564192181	IV DSPL 19" Medical Grade w Touch 865299
451261001931	451261001931	IV ASSY Pwr Supply Holder 15”/19” displ

[1] Must be ordered together with 453564192181 IV DSPL 19" Medical Grade w Touch 865299

Test and Service Tools

Table 4 UTP LAN Crossover

Part number	12NC	Description
M3199-60101	453563337371	PIC CBL NI 3FT CROSSOVER UTP
M3199-60102	453563337381	NI CBL UTP Crossover 12ft

Table 5 Grounding

Part number	12NC	Description
8120-4808	453563199211	CMS CBL EXT GND ASSY (gnd lug con)
8120-2961	453563198651	CMS CBL EXT GND ASSY(Crocodile clip)

Table 6 Test Cables

Part number	12NC	Description
451261026081	451261026081	CBL Safety Test ECG
451261026141	451261026141	CBL Safety Test IBP
451261026071	451261026071	CBL Safety Test M1006A/B #C01 Phone Jack
451261026041	451261026041	CBL Safety Test SpO2 (MMS/M1020B)
451261026171	451261026171	CBL Safety Test C.O.
451261026091	451261026091	CBL Safety Test EEG
451261026161	451261026161	CBL Safety Test CO2
451261026131	451261026131	CBL Safety Test Temp
451261026031	451261026031	CBL Safety Test CO2 (M3014A)

Part number	12NC	Description
453564127781	453564127781	CBL Safety Test IntelliBridge
451261026181	451261026181	CBL Safety Test VueLink I
451261026191	451261026191	CBL Safety Test Defi paddles
453564127771	453564127771	CBL Cable AY. ScvO2
M1012-61601	453563227731	M_CO CONN Test Adapter Cardiac Output

Table 7 Capnography - Respironics Mainstream

Part number	12NC	Description
M2506A		GAS Verification Gas
M2505A		GAS CYLINDER REGULATOR

Table 8 Capnography - Respironics Sidestream

Part number	12NC	Description
M2267A	989803106081	Calibration Regulator
13907A	989803100361	Calibration Tube Assembly
M1026-60144	453563230731	M_AGM Electronic Mass FlowMeter
453564178121	453564178121	M_AGM Flowmeter TSI
M2506A		GAS Verification Gas
M2776A		Straight Sample Line

Table 9 Capnography - Microstream Oridion

Part number	12NC	Description
M1026-60144	453563230731	M_AGM Electronic Mass FlowMeter
453564178121	453564178121	M_AGM Flowmeter TSI
15210-64010	989803100841	GAS Cal 1 cylinders for TCPC02, 6/bx.
15210-64020	989803100851	GAS Cal 2 Cylinders for TCPC02, 6/bx.
M2267A	989803106081	Calibration Regulator
M3015-47301	989803143081	MS_SCO2 LBSPLY Calibration Line
13907A	989803100361	Calibration Tube Assembly
M1013-64002	451261014851	M_G1 IV G1/G5 Leakage Test Kit (only required for leakage test without M1026-60144 flowmeter)

6 Parts

7

Installation Instructions

The information contained in this chapter should enable the MX600/MX700 to be installed ready for use (the preparation and planning should be adhered to as specified in the *Site Preparation* section). Configuration of the system is explained in the Configuration Guide.

Installation should be carried out by qualified service personnel, either by the hospital's biomedical department, or by Philips Support.

The monitor is suitable for use in all medically used rooms which fulfill the requirements regarding electrical installation according to IEC60364-7-710 "Requirements for special installations or locations- Medical locations, or corresponding local regulations.

For mechanical and electrical installation, you need technically qualified personnel with a knowledge of english. Additionally, for monitor configuration, you need clinically qualified personnel with a knowledge of the use environment.

As the first step in preparing the monitor for use, follow the installation instructions given in this chapter.

Electromagnetic Emissions

The monitor is suitable for use in the electromagnetic environment specified in the table below. You must ensure that it is used in such an environment.

Emissions test	Compliance	Avoiding Electromagnetic Interference
Radio Frequency (RF) emissions	Group 1	The monitor uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment
RF emissions CISPR 11	Class A	The monitor is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes
Harmonic emissions IEC 61000-3-2	n/a	
Voltage fluctuations IEC 61000-3-3	n/a	

WARNING

The monitor should not be used next to or stacked with other equipment. If you must stack the monitor, you must check that normal operation is possible in the necessary configuration before you start monitoring patients.

Electromagnetic Interference (SRR)

Commercially available Short Range Radio 802.15.4 transceivers operate at very low RF power levels to transmit data and need to have high sensitivity receivers to achieve a good link budget. Due to technological limitations the selectivity of the receiver is limited. Consequently, the SRR link is susceptible to other strong RF transmitters not only in the operating frequency band and 5% around it, but also to non-transient RF disturbances stronger than 1V/m at frequencies close to the operating frequency band (2.0 to 2.3 GHz)

Installation Checklist

Use this checklist to document your installation. Please file this installation record

Step	Task	Check Box when Task Done
1	Perform initial inspection of delivery, unpack and check the shipment	o
2	Mount the monitor as appropriate for your installation	o
3	Connect the monitor to AC mains using the supplied power cord	o
4	Perform Visual, Power On and Functional test blocks	o
5	Perform Safety Tests, if required by local laws and regulations	o
6	Load paper into the recorder, if present	o
7	Check/set the time and date	o
8	Check that the country-specific default settings are appropriate	o
9	Perform System Test as necessary	o

Unpacking the Equipment

Your equipment will arrive in a carton similar to the ones pictured below. All components of the monitoring system are consolidated into a single packing crate. The user documentation is provided in a separate package. The contents of the monitoring system crate depend on the options you have purchased. In addition to the monitor it can contain the following:

- MMS and user manuals
- FMS
- Parameter modules
- MMS Extensions and accessories

Accessory Packaging (Remove upper box to reveal monitor)

Monitor Packaging

In the unlikely event of a defect on arrival, please keep the packing materials until you have completed the initial inspection.

Initial Inspection

Mechanical Inspection

Open the shipping container(s) and examine each part of the instrument for visible damage, such as broken connectors or controls, or scratches on the equipment surfaces. If the shipping carton/ container is undamaged, check the cushioning material and note any signs of severe stress as an indication of rough handling in transit. This may be necessary to support claims for hidden damage that may only become apparent during subsequent testing.

Electrical Inspection

The instrument has undergone extensive testing prior to shipment. Safety testing at installation is not required (except in situations where devices are interconnected forming a system, see *Connecting Non-Medical Devices* in the Site Preparation Chapter of this manual). An extensive self check may be performed. This recommendation does not supersede local requirements.

All tests are described in the *Testing and Maintenance* section of this manual.

Claims for Damage and Repackaging

Claims for Damage

When the equipment is received, if physical damage is evident or if the monitor does not meet the specified operational requirements of the patient safety checks or the extended self check, notify the carrier and the nearest Philips Sales/Support Office at once. Philips will arrange for immediate repair or replacement of the instrument without waiting for the claim settlement by the carrier.

Repackaging for Shipment or Storage

If the instrument is to be shipped to a Philips Sales/Support Office, securely attach a label showing the name and address of the owner, the instrument model and serial numbers, and the repair required (or symptoms of the fault). If available and reusable, the original Philips packaging should be used to provide adequate protection during transit. If the original Philips packaging is not available or reusable please contact the Philips Sales/Support Office who will provide information about adequate packaging materials and methods.

Installing the MX600/700 Monitor

NOTE

There are different mounting options available for the monitor. This section covers the general concepts of safe mount installations and specific steps for the mounting options sold by Philips. Instructions which ship with a mounting solution should always take precedence over the instructions described in this chapter.

You MUST follow the instructions that ship with the mounting solution, regardless of manufacturer.

Mounting Instructions

Assembling Mounts

- The table mount ships with the monitor. Every type of compatible mounting solution is delivered with a complete set of mounting hardware and instructions. Refer to the documentation delivered with the mounting hardware for instructions on assembling mounts. Compatible table mounts are:
  - M8000-64100 (table mount with gray tops and marked with date code 10/31 or higher), or
  - 453564239731 (completely made of stainless steel).

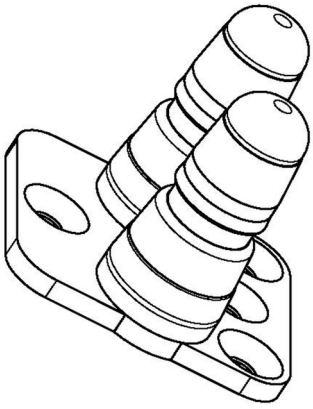
WARNING

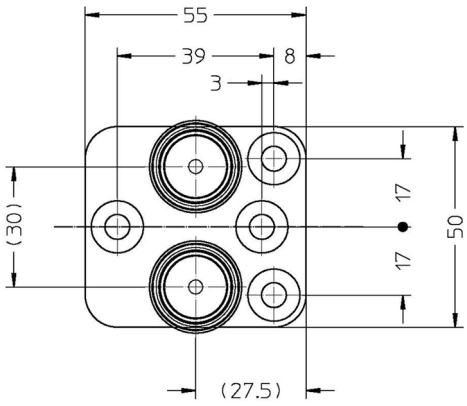
- It is the customer's responsibility to have the attachment of the mounting hardware to the ceiling, wall, or mounting rail and the construction of the ceiling, wall, or mounting rail evaluated for structural integrity and compliance with all local, state and any other required codes by a registered, professional, structural and/or mechanical engineer.
- Ensure that this commitment has been met before assembling mounts.
- Incorrect mounting and use of inappropriate mounting material may lead to injury. It is the customer’s responsibility to ensure that the mounting procedures have been performed correctly and the appropriate mounting devices have been used.

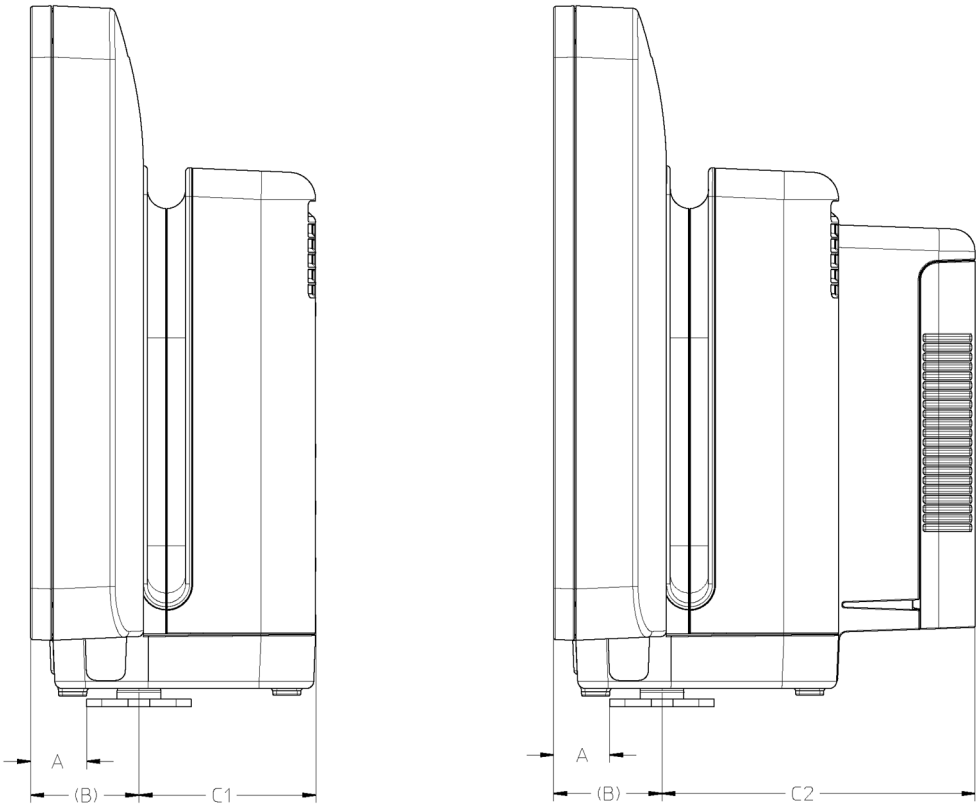
Please mount the monitor using either the Philips Quick Mount or Fix Mount solution or another approved mounting solution. The mounting shall be done in a manner that no patient, operator or other person can be harmed by a monitor removed intentionally or released accidentally from the mount. When using the Quick Mount, be aware of the danger of accidental activation of the Quick Mount release button when lifting or moving items located under the monitor, such as pole mounts, etc. If in doubt, use the Philips Fix Mount solution to avoid such situations.

For instructions on how to mount the monitor using the Quick Mount table mount refer to the Assembly Instructions delivered with the mounting kit M8000-64100 or 453564239731.

An alternative mounting solution is the Fix Mount, which should be used for those installations where the Quick Mount might not be appropriate. The Fix Mount is already integrated into the monitor bottom housing.







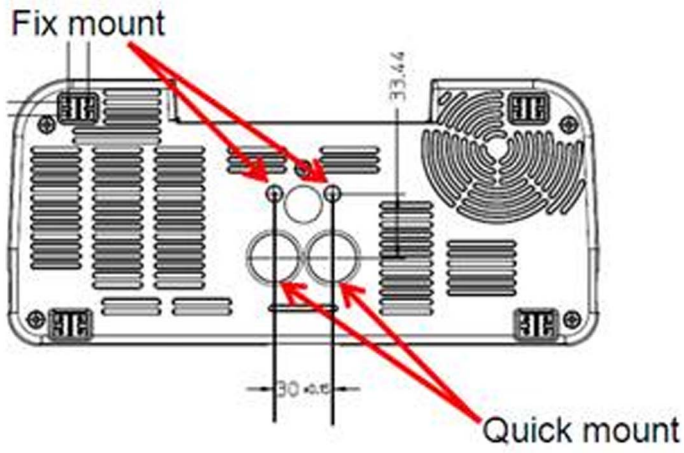
Mx600/700 Mx600/700 with Cable Management

Table Mount (M4046-64100, 12NC: 451261001381)

	A	(B)	C1	C2
MX600/700	29.5mm	57mm	93.1mm	164.7mm

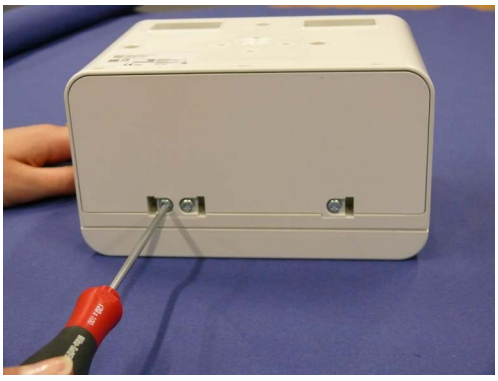
Mounting:

The Quick Mount and Fix Mount solutions are both shipped as standard.



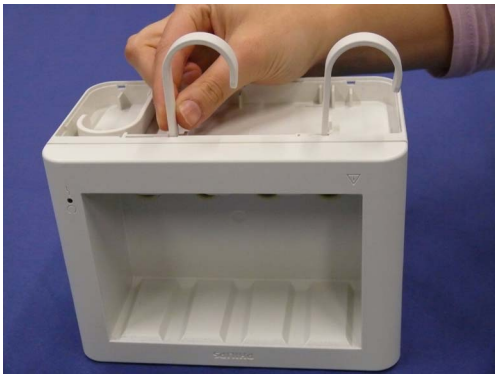
Installing the FMS-4 Cable Management Hooks (without MMS Mount)

1 Remove the three screws (T20) from the bottom of the FMS.



2 Remove the bottom cover.

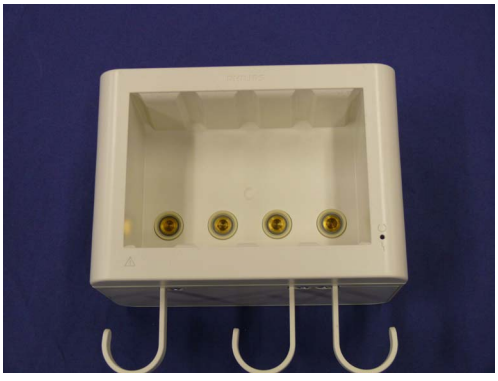
3 Insert the cable management hooks in the desired position



4 Reinsert the bottom cover at the back first and then flip it down.

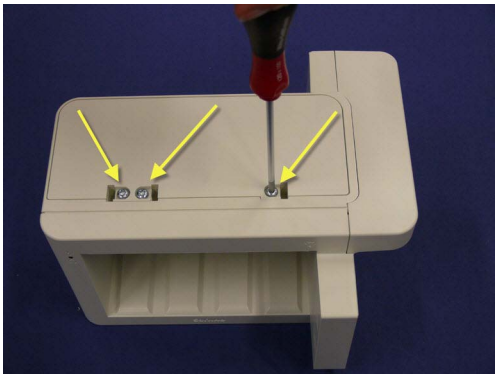
5 Reinsert and tighten the three screws on the bottom cover.

6 You can install up to three cable management hooks.



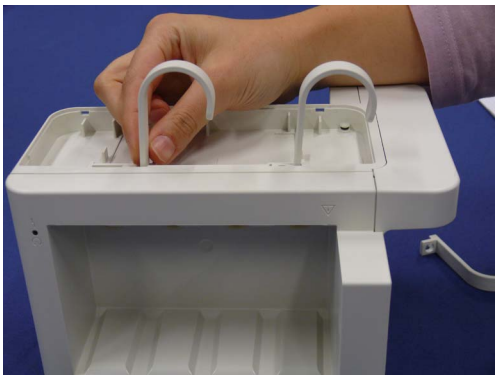
Installing the FMS-4 Cable Management Hooks (with MMS Mount)

1 Remove the three screws (T20) from the bottom cover of the FMS.

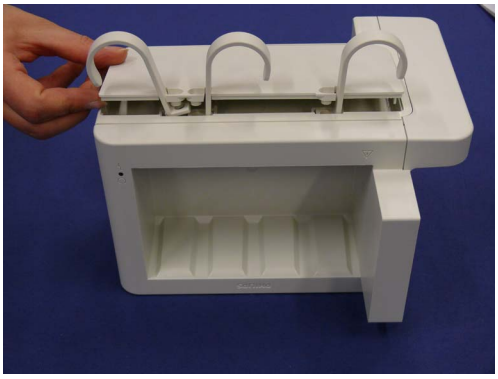


2 Remove the bottom cover.

3 Install the cable management hooks in the desired position.



4 Reinsert the bottom cover at the back first and then flip it down.



5 Reinsert and tighten the three screws in the bottom cover.

6 You can install as many cable management hooks as you wish.

Installing the Wired Remote Control

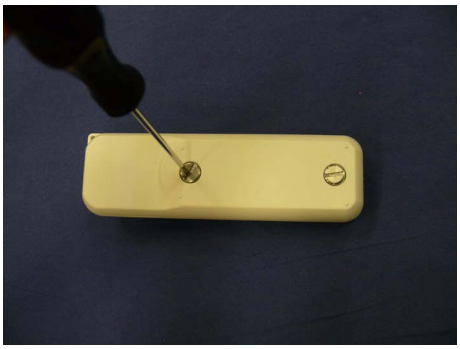
NOTE

Connection of a remote control requires SW Rev H.0 or higher

The remote control comes with a cradle and USB cable.

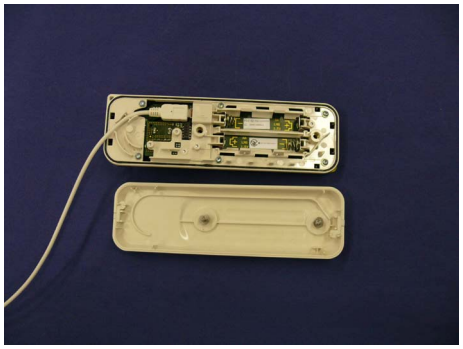
To install the remote control:

1 Remove the two screws on the back of the remote control.

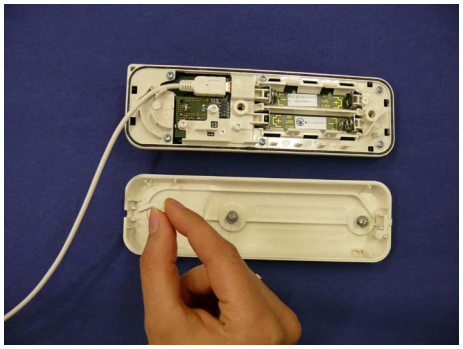
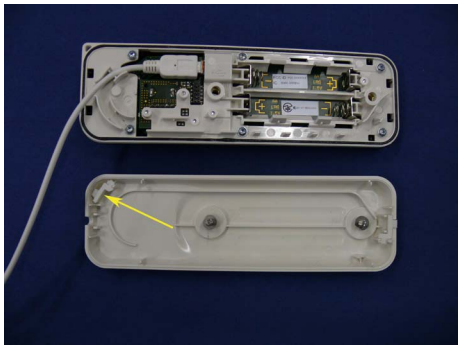


2 There are two ways to install the USB cable - at the top of the remote control or at the bottom. If you want to install the cable at the bottom of the remote control, proceed to step 3. To install the cable at the top of the remote control:

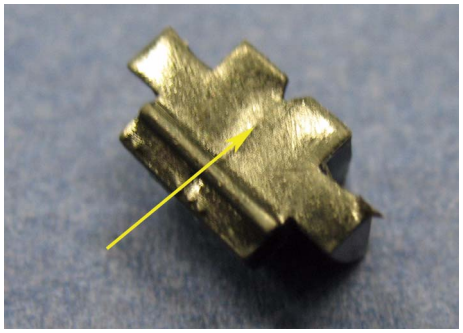
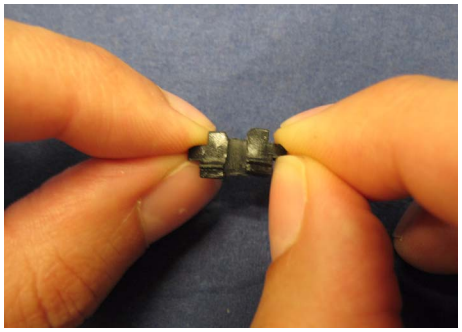
   a. Plug the USB cable and lead it through the remote control housing as shown below.



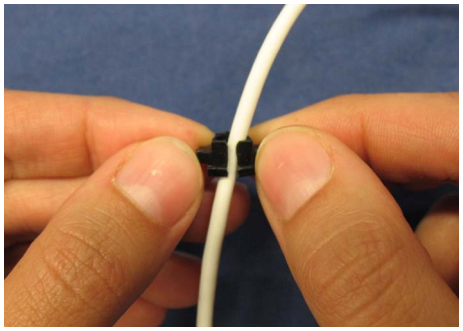
b. Remove the plastic cover from the top of the remote control rear housing and reinsert it in the corner of the housing as shown below.

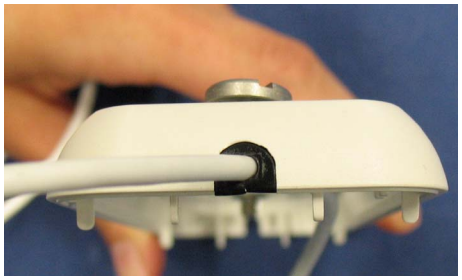
c. Break open the rubber seal for the USB cable at the perforation as shown below.

d. Insert the USB cable into the rubber seal.



e. Insert the rubber seal into the cable slot of the remote control housing.

NOTE

Be sure to always insert the rubber seal when installing the remote control, as it prevents liquid from running into the remote control.

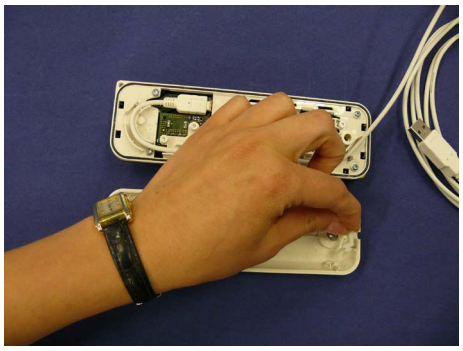
f. Put the housing of the remote control back together and reinsert the screws.

g. Perform a functional test to make sure the remote control is functioning correctly.

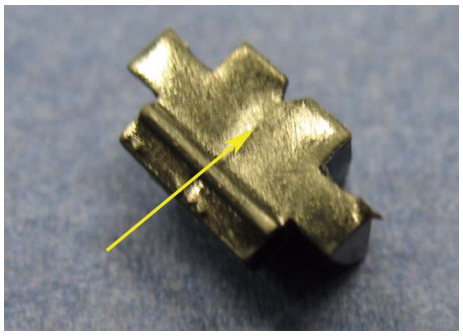
3 To install the cable at the bottom of the remote control:

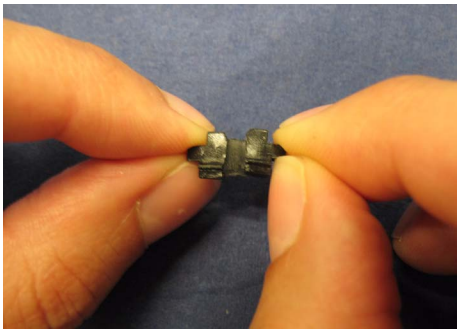
a. Plug the USB cable and lead it through the remote control housing as shown below.

b. Remove the plastic cover from the bottom of the remote control rear housing and reinsert it in the corner of the housing as shown below.

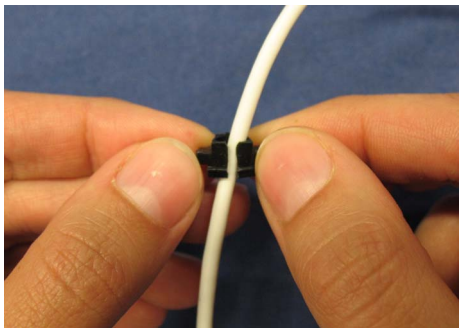


c. Break open the rubber seal for the USB cable at the perforation as shown below.

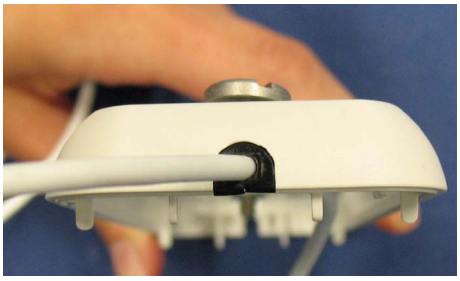




d. Insert the USB cable into the rubber seal.



e. Insert the rubber seal into the cable slot of the remote control housing.



NOTE

Be sure to always insert the rubber seal when installing the remote control, as it prevents liquid from running into the remote control.

f. Put the housing of the remote control back together and reinsert the screws.

g. Perform a functional test to make sure the remote control is functioning correctly.

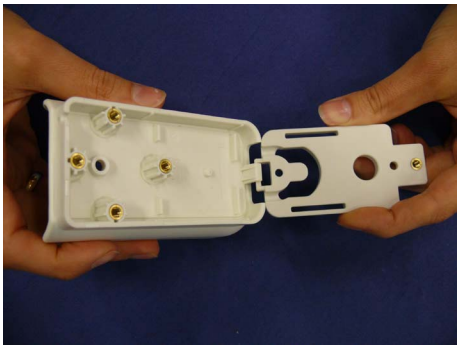
Mounting the Wired Remote Control

The Remote Control can either be mounted to a wall or with the Universal Mounting Clamp.

To mount the remote control to a wall:

1 Remove the screw from the remote control holder.

2 Separate the back plate from the remote control holder.



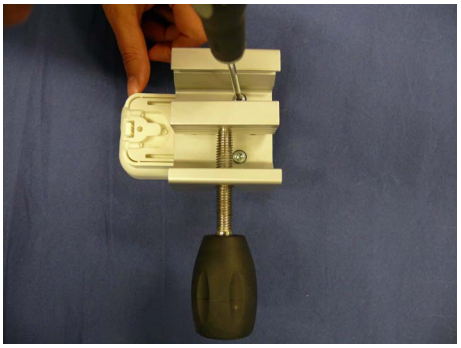
3 Insert the USB cable into the holder on the back plate at the desired length.

4 Screw the holder back plate to a wall and then reattach the holder to the back plate.

To mount the remote control using the Universal Mounting Clamp:

1 Make sure the back plate is attached to the cradle

2 Screw the Universal Mounting Clamp to the back of the cradle in the desired direction.



3 Insert the USB cable into the holder on the back plate at the desired length.

Installing the Wireless Remote Control

In order to use the wireless remote control with the monitor, the remote control must be assigned to the monitor first. To assign a remote control to the monitor:

1 Go into Service Mode or Configuration Mode.

2 Press the back key for more than two seconds. This initiates the remote control discovery procedure.

The **Add Cableless** key appears instead of the measurement selection key. 

3 Select the **Add Cableless** key to open the **Add Cableless** window. The Remote Control is shown in the window with a symbol and its label.

4 Select the remote control in the window. The monitor displays the assignment prompt message: **cl RC added** <clRC serial number>in the Status Line of the monitor.

NOTE

- While the remote control discovery procedure is active, the functionality of the remote control is disabled.
- If there is already a remote control assigned to the monitor, this remote control must be unassigned before a new remote control is assigned.

To remove a remote control:

1 Select **Main Setup-> Hardware -> cl Remote Control**

2 Select **Remove RemCtrl**

3 Select **Confirm** to unassign the remote control

CAUTION

When using a remote control without a cable, it is important that the user knows which remote control is assigned to which monitor. Use the tethering cable delivered with the remote control to attach it to a bed rail or IV pole, or label the remote control with the bed or monitor ID.

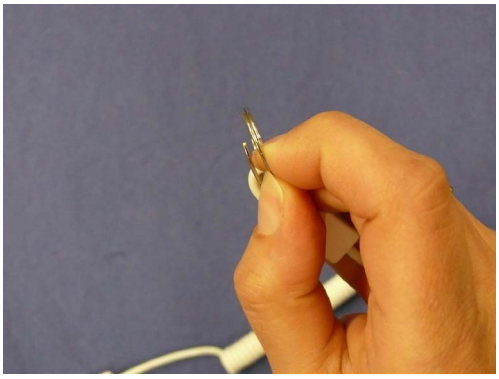
Wireless Remote Control Assignment Rules

- Only one remote control can be assigned to a monitor at a time. If you want to assign another remote control, you must unassign the remote control which is already assigned first.
- If you switch from wireless remote control to USB connected remote control operation with the same remote control, the assignment to the monitor will be lost. If you switch back to wireless remote control operation you will have to reassign the remote control.
- If you assign a wireless remote control to a second monitor without unassigning it from the first monitor and then come back to the monitor it was originally assigned to, press the back key on the remote control to start discovery mode. Once the remote control has been recognized by the monitor you can reassign it immediately. It does not have to be removed first.
- An assignment can only be initiated from the remote control itself.
- An unassignment can only be initiated from the monitor.
- If you exchange the battery of a remote control the assignment to a monitor is kept. You do not need to reassign the remote control

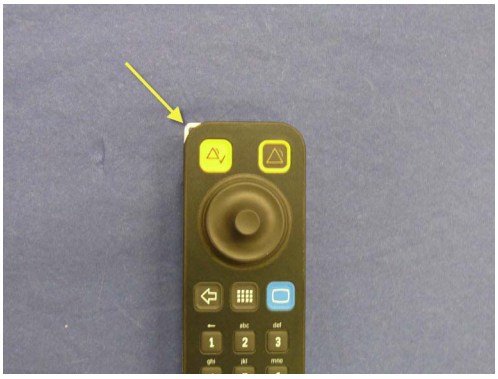
Installing the Tethering Cable

To attach the tethering cable to a remote control:

1 Pull apart the ring on one end of the tethering cable.



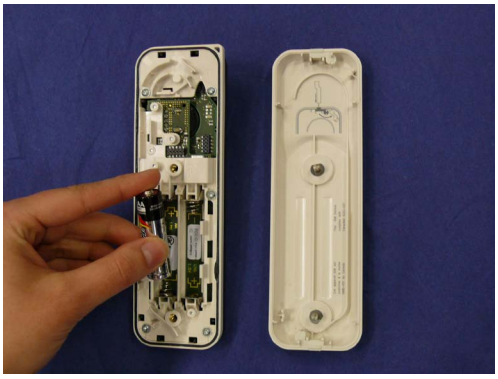
2 Insert the end of the metal ring spiral into the hole at the top left corner of the remote control.

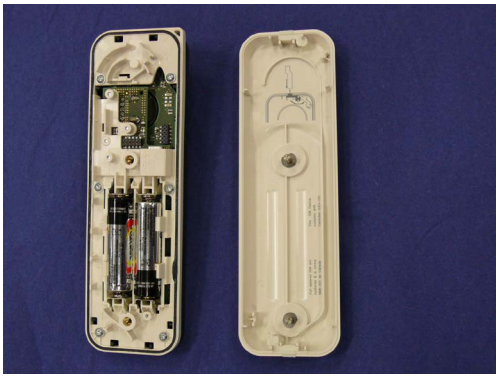


Exchanging the Remote Control Battery

1 Loosen the two screws on the back of the remote control and open the remote control.

2 Remove the old batteries and insert the new batteries as shown below.





3 Close the remote control and tighten the screws on the back cover.

4 Perform a functional test to make sure the remote control is functioning correctly.

Connecting the Monitor to AC Mains

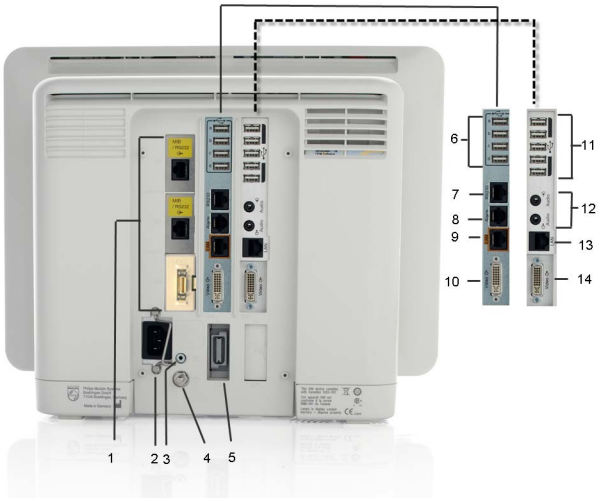
The monitor has a wide-range power supply that allows you to operate the monitor from an AC (alternatin g current) power source of 100 V to 240 V (± 10%) and 50/60 Hz (± 5%).

WARNING

- Always use the supplied power cord with the earthed mains plug to connect the monitor to an earthed AC mains socket. Never adapt the mains plug from the power supply to fit an unearthed AC mains socket.
- Do not use AC mains extension cords or multiple portable socket-outlets. If a multiple portable socket-outlet without an approved isolation transformer is used, the interruption of its protective earthing may result in enclosure leakage currents equal to the sum of the individual earth leakage currents, so exceeding allowable limits.
- Do not connect any devices that are not supported as part of a system.
- Any non-medical device placed and operated in the patient's vicinity must be powered via an approved isolation transformer that ensures mechanical fixing of the power cords and covering of any unused power outlets.

Connections

The following figure shows the cable and interface board connections:



1	Serial/MIB (RS232) connectors, type RJ45, Flexible Nurse Call
2	AC power input
3	Protective earth screw hole
4	Equipotential ground connector
5	Measurement Server Link (MSL)
6	USB rear connectors (for remote control, keyboard, pointing devices, printer)
7	Serial RS232 connector
8	Nurse Call
9	Wired network connector
10	Video out connector (digital/analog)
The following connectors are only present with the iPC	
11	USB rear connectors (for keyboard, pointing devices, printer)
12	Audio in/out
13	Local Area Network
14	Video out connector (digital/analog)

NOTE

For installation of software on the iPC, refer to the documentation provided with the software you want to install.

1 ECG Sync Output/Analog ECG output connector

1 USB side connector (only present with the iPC)

Video Interface on the Connector Board

NOTE

The DVI video interface on the connector board has slave display capability only. Slave displays must have the same resolution as the MX600/700's built-in display. If you connect a slave display with a different resolution, you may see distortion or black bars on the edge of your screen.

VESA-compatible displays can be connected to the DVI video interface on the connector board. In rare cases, a specific VESA-compatible display may not be supported, because the video timing of the DVI video interface differs slightly from the VESA standard. We recommend testing the functionality of any external display before installation.

Audio Interface (for iPC only)

The audio interface does not provide an electrical separation. When connecting an audio device which uses an additional power supply e.g. an active speaker, a separation device according to EN/IEC 606010101 or IEC 60601-1 edition 3 clause 16 is required. After installation, a system test is required

to ensure that the resulting equipment leakage current does not exceed the limits of EN/IEC 60601-1-1 or IEC 60601-1 edition 3 clause 16. For detailed information see the Testing and Maintenance chapter.

Connection of Devices via the RS232 Connector on the Connector Board

The following devices can be connected to the RS232 connector on the connector board:

- IntelliVue G1 Anesthetic Gas Module
- IntelliVue G5 Anesthetic Gas Module
- M1026B Anesthetic Gas Module
- Barcode Reader
- Touchscreen

NOTE

The RS232 connector on the connector board has no data export capability

Connection of Devices via the MIB/RS232 I/O Board

The configuration of a specific MIB/RS232 port can be viewed in config mode and altered in service mode. This is required, for example, when a slave display with touchscreen is installed. To alter the configuration of an MIB/RS232 port select **Main Setup** then **Hardware** then **Interfaces.** You can configure **GM**, **Touch 1** and **Touch 2** to the MIB/RS232 port.

Data Out can be configured up to two times (on two or more MIB/RS232 boards). Note that only the first MIB/RS232 port configured to **Data Out** (i.e. the first one to receive a request) provides wave export. A second MIB/RS232 port configured to **Data Out** will only export numerics.

NOTE

Be aware that if you change a port assignment this assignment is not reset upon boot up. If the MIB/RS232 board is removed and replaced with a different type of board the settings are deleted. If the MIB/RS232 board is then refitted, you must reconfigure the MIB/RS232 port. The configuration of MIB/RS232 is not cloned between monitors. **GM** can only be configured **once** to an MIB/RS232 port.

Connection of USB Devices

The USB ports on the connector board support the following USB devices:

- printer
- keyboard
- barcode scanner
- computer mouse or trackball
- remote control

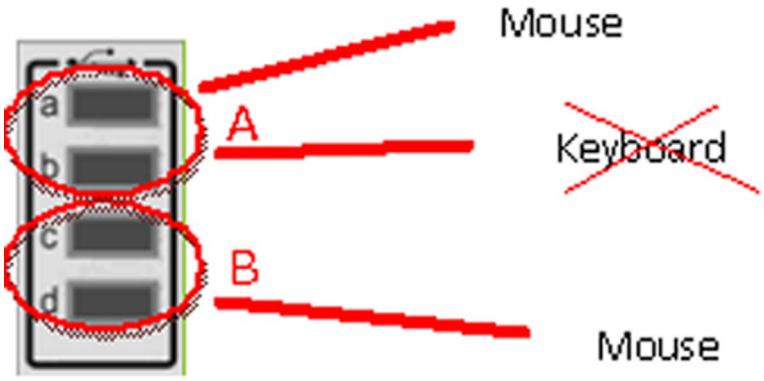
NOTE

- Connect only the above mentioned devices to the USB Interface. Other devices are not supported.
- Connection of a remote control requires SW Rev H.0 or higher
- A remote control is treated as a keyboard. Either a remote control or a keyboard can be connected to one group.

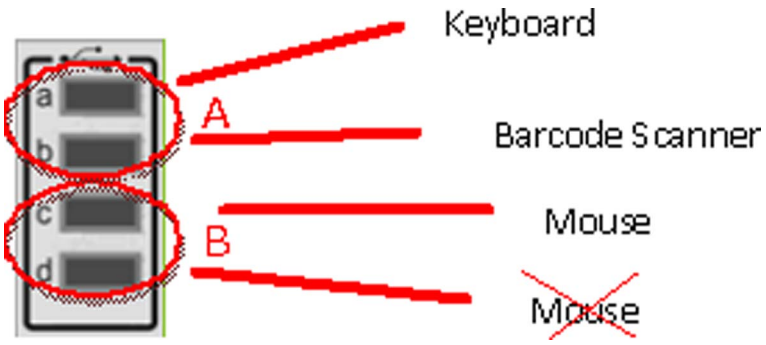
CAUTION

Do NOT connect a remote control to a USB connector on the iPC (including the side USB Connector) as it will not function properly. To make sure you have connected the remote control to the connector board and not the iPC, press the SmartKeys button on the remote control. The Smartkeys window should appear. If it does not, check the USB connection of the remote control.

As the patient monitor software only supports two input devices, only two input devices can be connected to the USB ports on the connector board. For this purpose, the USB ports are divided into two groups, "A" and "B". Only one input device per group is allowed. In the graphic below, a mouse is connected to a port in each group. Therefore the keyboard is not recognized.



It is, however, possible to connect a mouse, a keyboard and a barcode scanner. In this case, the keyboard and barcode scanner are treated as one input device and must be connected to two ports of the same group.



NOTE

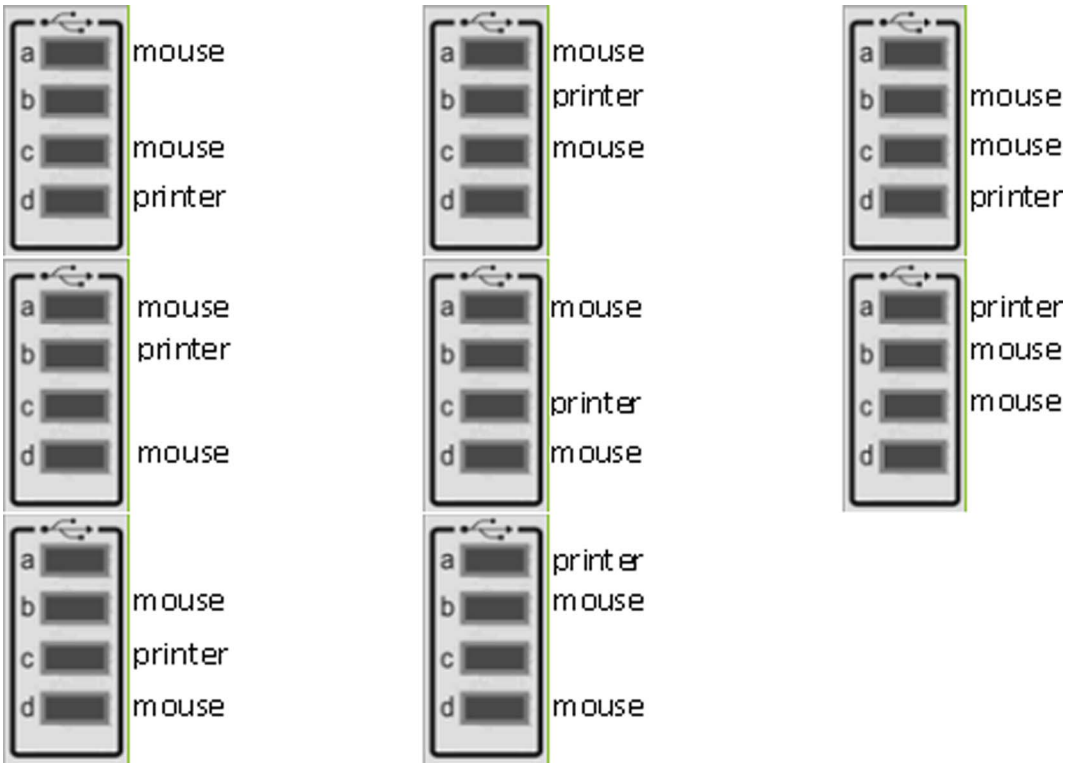
Other USB devices, e.g. USB sticks, iPods etc. are not supported by the USB IF board.**Do not** use USB adapters to connect PS/2 or other devices to the USB board.

Possible USB Device Combinations at the Connector Board

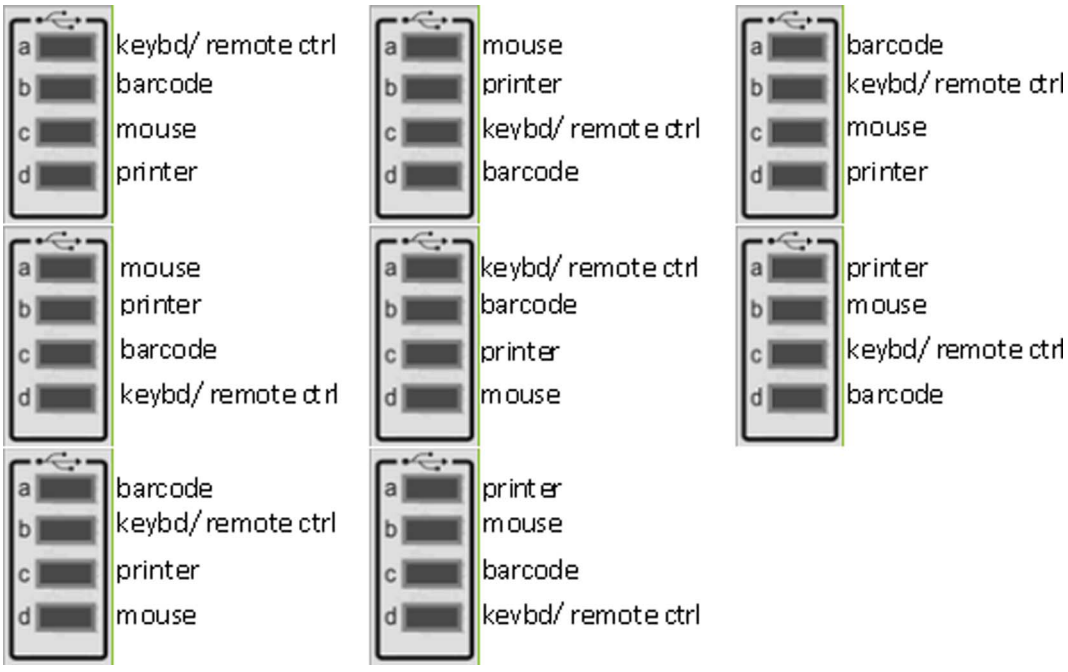
The following three groups of USB device combinations are supported:

- mouse/mouse combination
- keyboard/mouse combination
- keyboard/keyboard combination.

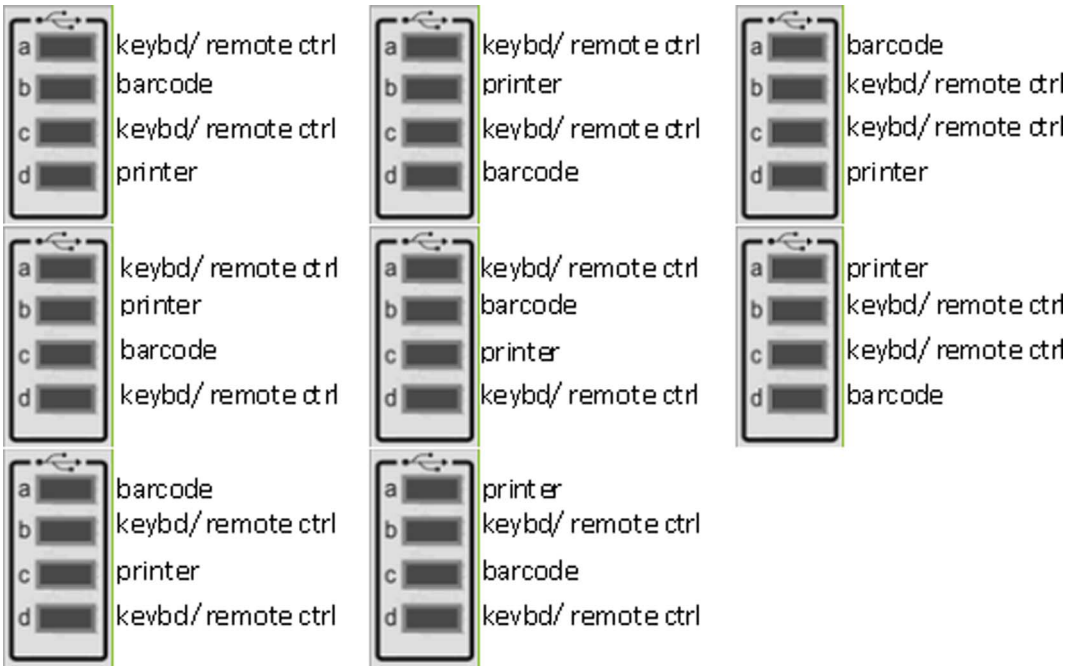
The figures below show the possible device combinations for each of the three groups.



Possible Mouse/Mouse combinations



Possible Mouse/Keyboard combinations



Possible Keyboard/Keyboard combinations

NOTE

Every time a new device is connected to the USB ports, all connected USB devices are stopped and the ports are scanned. Depending on whether the combination is allowed or not, the devices will function again after the scan.

Combined input devices such as a keyboard with an integrated trackball are also supported. However, no additional mouse can be connected in this case. Multiple combined devices are also not allowed.

CAUTION

The USB ports do not provide an electrical separation. When connecting a USB device which uses an additional power supply e.g. printer, a separation device according to EN/IEC 60601-1-1 is required. After installation a system test is required to ensure that the resulting equipment leakage current does not exceed the limits of EN/IEC 60601-1-1. For detailed information see the Testing and Maintenance chapter.

Possible USB Device Combinations at the iPC

The iPC is treated as a regular PC device. There are no specific rules for the connection of USB devices.

You can connect input devices to the rear connectors of the iPC or to the front USB connector and use them for the iPC. Input devices connected to the iPC can also be shared with the patient monitor. Sharing input devices and touchscreen input requires a specific software application; refer to the *IntelliVue XDS Application Instructions for Use* for details.

If the iPC is switched off when input devices are shared, any input devices connected to it will not be available for use with the monitor.

Configuring the USB Interface for Use with a Programmable Barcode Scanner

Requires SW Rev. H.0 or Higher

If you want to use a programmable barcode scanner, the USB Interface group you want to connect the barcode scanner to must be configured to Barcode.

1 Go into Service Mode.

2 Select **Hardware -> Interfaces->USB**

3 Select the **Change Setting** key

4 Change the setting to **Barcode** and select the **Done** key.

NOTE

A programmable barcode scanner must be pre-configured to provide the codes in the correct form to the monitor. Refer to the Installation Note "Installing and Testing the 4600g Barcode Scanner" on the IntelliVue Documentation DVD for details.

Installing Remote Devices

This section provides instructions for Philips products. Installation instructions for devices not sold by Philips must be provided by the device manufacturer.

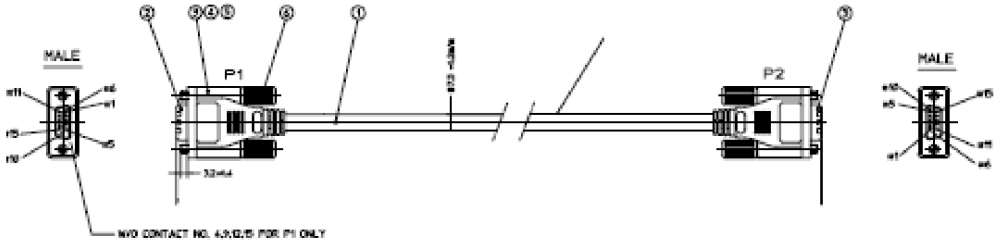
Mounting the 15” Remote Display (M8031B)

Mounting solutions for the M8031B must be purchased separately. Please refer to the installation instructions which ship with the mounting solution purchased.

Connections

Connect the cables to the display as shown in the photographs below.

Video Cable Wiring Schematics

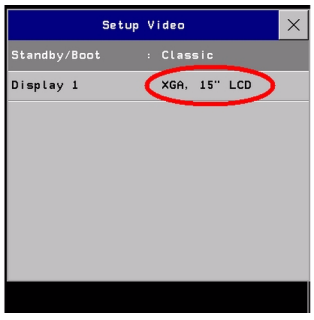


CIRCUIT DIAGRAM		
P1	WIRE	P2
1	RED COAX. CENTER	1
2	GREY COAX. CENTER	2
3	BLUE COAX. CENTER	3
5	BLACK	5
10		10
6	RED COAX. SHIELD	6
7	GREY COAX. SHIELD	7
8	BLUE COAX. SHIELD	8
11	BROWN	11
13	YELLOW	13
14	WHITE	14
SHELL	OVER SHIELD	SHELL

Analog Video Cable Wiring Schematic

Hardware Settings

- This section lists settings grouped in the Hardware Settings Block which are available in Service Mode. These settings are set once per monitor and are the same in every profile. Any changes you make to the hardware settings configuration are automatically stored, there is no need to save them in an extra step. Hardware settings must be entered for each monitor individually, they are stored in the monitor, and they are not cloned. To enter the hardware settings menu, select **Main Setup** -> **Hardware**.
- Keyboard - this setting allows you to select the language of the keyboard connected via USB. See USB Keyboard/Mouse *section* in this chapter for details.
- Setup Video - this setting allows you to set the correct display resolution for the external displays and to choose between the basic (black background) or classic (photo of nurse and child in the background) standby/boot screen.

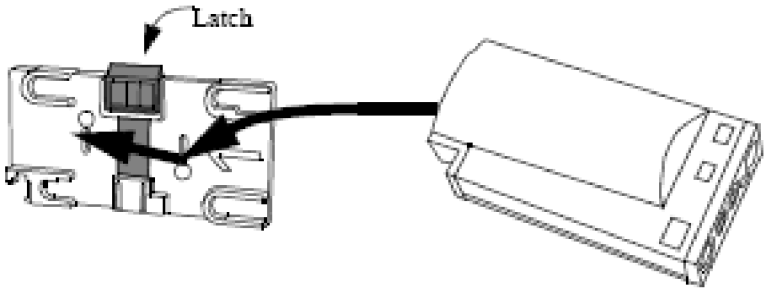


- MIB/RS232 - see “Connection of Devices via the MIB/RS232 I/O Board” on page 285 section in this chapter for details.

Flexible Module Rack and/or Multi-Measurement Module

Attaching the MMS to a Mount

1. Make sure the Measurement Server is oriented correctly relative to the mount (see the picture below).
2. Place the Measurement Server on the back mount. If it is not tight against the mount, slip it in the direction of the measurement connectors until it is.
3. Slip the Measurement Server forward until it clicks into place.



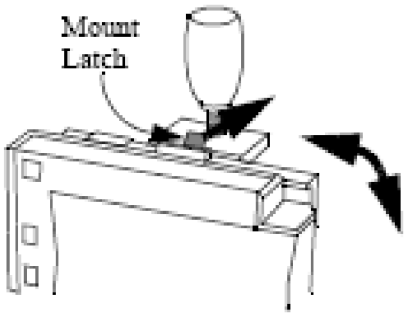
Detaching the Measurement Server from a Mount

1. Press and hold the latch (in the middle at the top of the mount) away from the Measurement Server.
2. Slide the Measurement Server off the mount in the direction of the measurement connectors.

Positioning the Measurement Server on a Clamp Mount

If you have your Measurement Server on the clamp mount, you can have it in one of four positions. You can reposition it as follows:

1. Press and hold the mount latch toward the clamp screw.

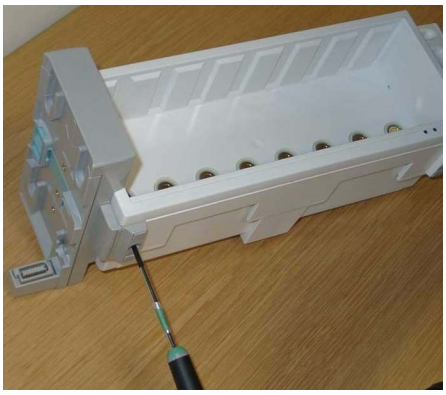


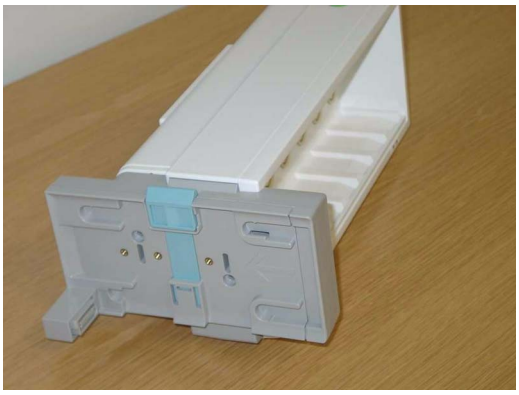
   Rotate the Measurement Server and mount until you get it to the position you want.
2. Release the mount latch, and make sure it is clicked into one of the four slots on the back of the mount.

Mounting the MMS Mount to the FMS (M8048A)

1 Connect the MMS Mount to the FMS and snap it into place.

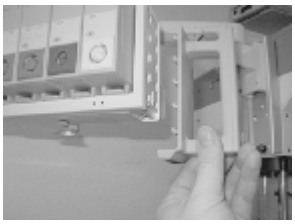
2 Insert and tighten the screw at the bottom of the FMS



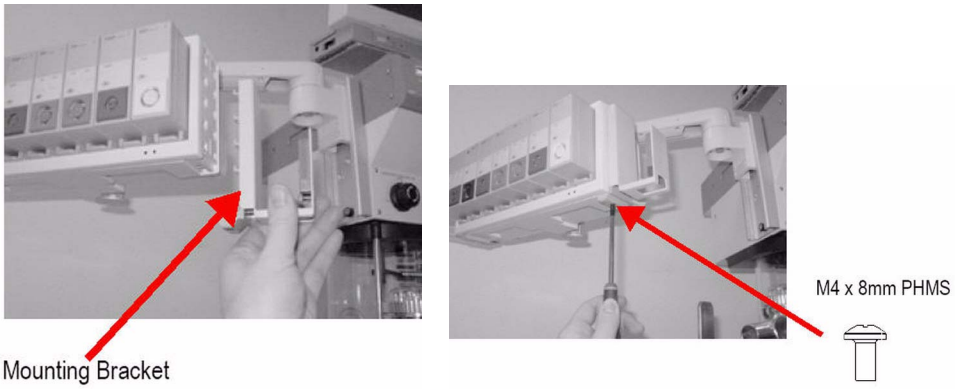


Mounting the BIS Engine to the FMS

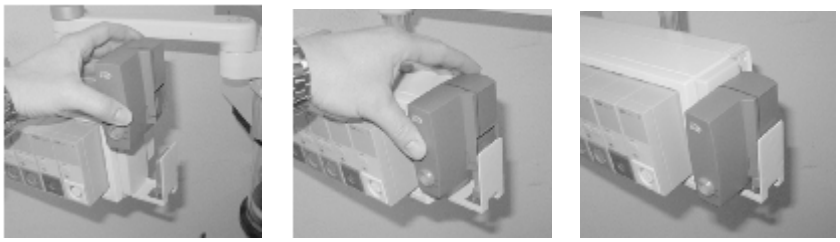
1 Remove the existing handle for the FMS



2 Attach the bracket to the FMS using a M4 x 8mm PHMS



3 Attach the BIS Engine onto the mount



Mounting the FMS

A universal clamp for vertical rail or pole solutions ships with each FMS.

Connections

The cable specifications and part numbers for through wall solutions of the M8048A and M3001A are described in the *Site Preparation* section of this manual.

MSL Cable Termination

The following installation procedure describes how to install the wall installation cable kit when the patient monitor and the measurement server are not located at the same site. The kit consists of two connector boxes and a cable (15m or 25m).

For this procedure you need the insertion tool (M3086-43801) and a small screwdriver.

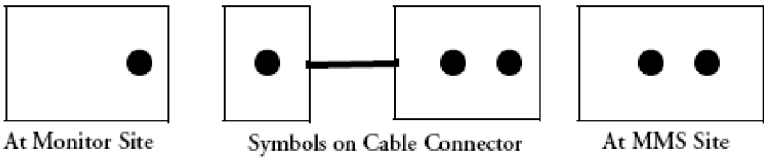
1 Draw the MSL cable through the wall from the site of the monitor to the site of the measurement server.

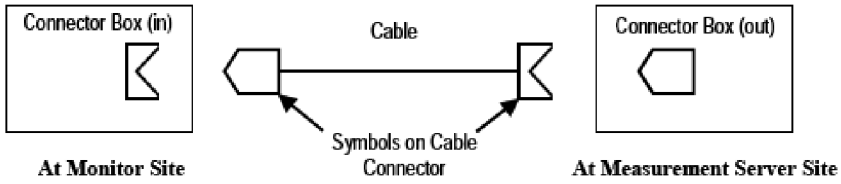
Each MSL face plate kit contains two connector boxes; one in-going and one out-going. (The US version contains an additional rectangular wall-mounting plate).

NOTE

The installation procedure is the same for both connector boxes. This means you must perform steps 3 to 8 of this procedure twice.

The connectors on each box are different, so you must ensure that the correct box is placed at the correct location. The dots on the plastic angled cover indicates at which site you should install the box:





If there are no dots on the cover, symbols are used:

Symbol:  is connector box (in) and must be placed at the monitor site.

Symbol:  is connector box (out) and must be placed at the measurement server site.

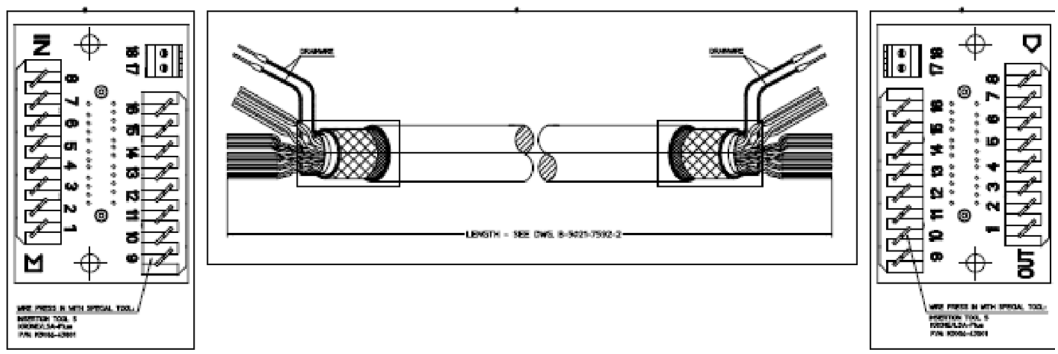
The correct connector cable (M3081-61601, M3081-61602 or M3081-61603) has the opposite symbol:

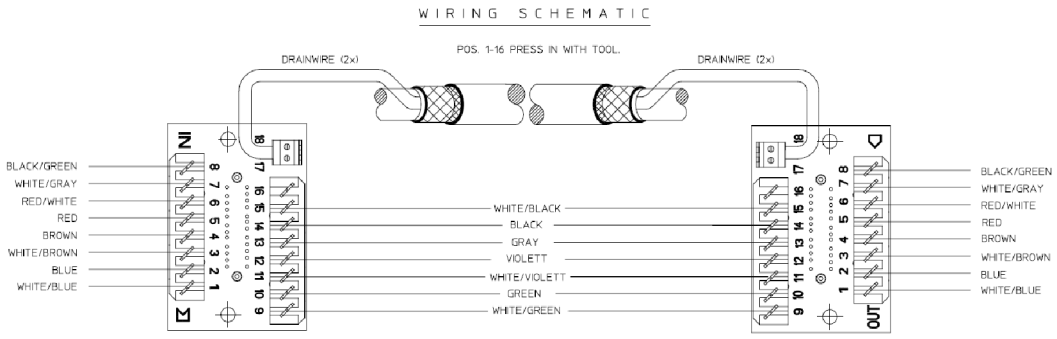
2 Detach the PCB assembly (in/out) from the metallic mounting flange.

3 Use the Insertion Tool (M3086-43801) to position each wire on the PCB according the wiring schematic below, where each color corresponds to a number.

NOTE

The Insertion Tool should be set to cutting mode on.





Wiring Schematic

4 Use a small screwdriver to connect the two drain wires to the PCB, see the wiring schematic in .

5 Slide the PCB back on to the metallic mounting flange.

6 Use screws to fasten the mounting flange to the wall.

NOTE

US version only: Fasten the rectangular wall-mounting plate to the wall. Attach the mounting flange to the wall-mounting plate.

7 Mount the plastic cover. The plastic cover consists of two pieces:

- Frame
- Angled cover

Put the frame over the mounting insert and the PCB. Place the angled cover on top and fasten with two screws.

8 Connect the monitor and the measurement server to the wall installation.

9 Perform the following tests as described in the Test and Maintenance section of this manual:

- Power-on test blocks
- Safety test blocks
- ECG Sync Performance Test

Philips Clinical Network (Wired)

Installation of the Philips Clinical Network should be performed by Philips service personnel. Use unshielded twisted pair (UTP) cables for installation of the clinical network. Refer to the installation instructions in the M3185A Installation Manual for further details.

WARNING

In order to maintain the galvanic isolation of the IntelliVue monitor, it is essential that UTP (Unshielded Twisted Pair) LAN cables is used to connect the IntelliVue monitor to other devices.

Philips Clinical Network (Wireless)

Refer to the installation instructions in the M3185A Philips Clinical Network Installation Manual for network installation instructions when using the wireless ethernet adapter. For instructions on connecting the wireless ethernet adapter, please refer to the instruction sheet shipped with the mounting device for the adapter.

NOTE

The wireless ethernet adapter is not waterproof and therefore should not be installed anywhere where liquid could spill onto it.

Refer to the IntelliVue 802.11 a/g Infrastructure Installation and Configuration Guide for network installation instructions when using the IntelliVue 802.11 Bedside Adapter. For instructions on connecting the IntelliVue 802.11 Bedside Adapter, please refer to the Hardware Upgrade Guide for your bedside monitor.

IntelliVue Instrument Telemetry (IIT)

Frequency Coordination (USA only):

Frequency coordination is a registration and coordination process for wireless medical telemetry devices used in the U.S.A. which operate in the FCC-allocated Wireless Medical Telemetry Service (WMTS) bands (608-614 MHz, 1395-1400 MHz, 1427-1432 MHz). The 865241/865242 #J45 operates in both of the 1395-1400 and 1427-1432 MHz bands.

Under U.S. Federal Communications Commission (FCC) rules, authorized healthcare providers must register their WMTS devices with an authorized Frequency Coordinator designated by the FCC. The American Society for Healthcare Engineering (ASHE) is the current designated Frequency Coordinator.

Registration/Coordination is a two-step process.

Step 1: Registration: Register the healthcare facility on-line, from the ASHE website). Click on the link for Wireless Medical Telemetry Service and come to the registration page. Fill out the details, and pay the associated fee as per the instructions provided. You will receive confirmation of this registration. Confirmation must be received before proceeding to the next step.

Step 2: Frequency Coordination: Along with confirmation of registration, you will receive access information necessary to perform this second step, frequency coordination. This step involves logging the equipment and frequencies used into the FCC's database, so as to identify any existing potential interference and to help prevent potential future interference. Coordination is accomplished via the ASHE website. Click on the links for Wireless Medical Telemetry Service and then Frequency Coordination. The way the coordination process is executed as of today, it will need to be repeated twice for the M4840A system; once for the 1395-1400 MHz band, and then again for the 1427-1432

MHz band, both of which are used concurrently by the Philips product. There is a separate fee for each coordination request, which varies between $250 and $2000, depending upon the number of transmitting devices used and the band/s of operation. Coordination is executed by a company named Comsearch, on behalf of ASHE.

To fill in the frequency coordination forms, you'll need to know the following:

- The county.
- Latitude and longitude that represents the center of the area where the transmitting devices will be deployed. Comsearch can help provide this information; *www.comsearch.com* provides contact information.
- The name/s of the Clinical Unit/s using the devices (e.g. ICU4, CCU-West, ER1, Step-Down North, etc.
- The radius of deployment, expressed in meters. Imagine drawing a circle around the center of the clinical unit, that encloses/encompasses the unit. What is its radius?
- The number of the highest floor on which a transmitting device will operate.
- How many transmitting devices will be used, i.e. the total number of IntelliVue Instrument Telemetry adapter devices combined.
- The Effective Radiating Power: 6.3 mW.
- The Equipment Manufacturer: Philips Medical Systems.
- The Model numbers: 865241/865242 #J45 IntelliVue Instrument Telemetry adapter used with 865241 (MX700) or 865242 (MX600)
- The Frequency Range to be used: Two separate coordinations are required: For the first one, click on the range of 1395.0 through 1400.0 MHz. For the second one, click on all the frequency ranges listed in the range of 1427.0 through 1432.0 MHz.

When both Registration and Frequency Coordination have been successfully completed, the IntelliVue Instrument Telemetry System can be activated. Note that this process is the responsibility of the customer, as the final "operator" of the transmitting equipment.

Philips IntelliVue Information Center

Please refer to the installation instructions and Instructions for Use of the IntelliVue Information Center Rev. System J or higher.

Short Range Radio

Installation of the Short Range Radio interface should be performed by Philips service personnel.

Before installing an SRR infrastructure it might be necessary to perform a site a survey to determine available channels. This should be performed by Philips telemetry installation experts.

Configuring SRR Channels

Hardware Setting: **Main Setup -> Hardware -> SRR Channel**

SRR channel settings only apply for monitors that have a short range radio interface installed. They must be set to match the hospital's wireless infrastructure. SRR channel settings are hardware settings and will typically be set by service personnel at installation.

Refer to your configuration guide for details.

SRR Channel Settings Configuration Implications

ChannelUse this setting to configure the SRR channel the monitor should use. SRR provides a total of 16 channels in the ISM (2.4 GHz) band. The channels are labeled 11 to 26. Up to two SRR connections can be established per channel. The ISM band is not exclusively reserved for SRR applications. It is also used by, for example, Wireless LAN (WLAN) and the IntelliVue Telemetry network (except for the US). For this reason, depending on the hospital's existing wireless infrastructure, a number of SRR channels might already be occupied by other wireless applications.

To achieve the best SRR performance possible, follow these recommendations:

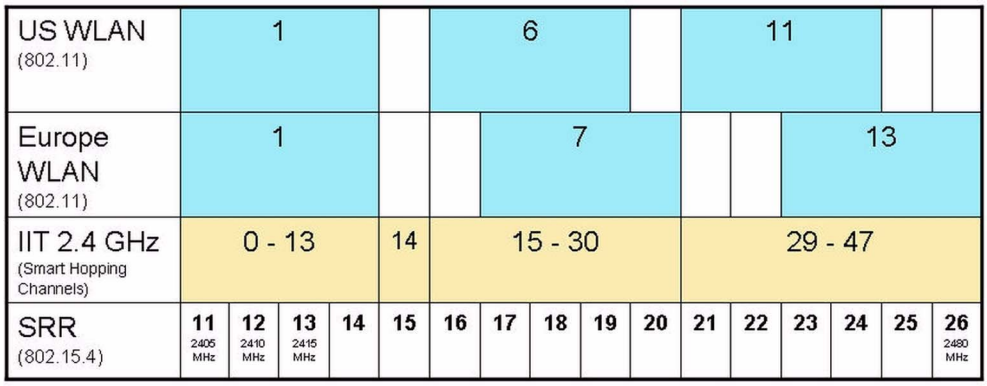
- Usage of WLAN together with SRR may cause interferences. Each WLAN network uses at least four of the 16 SRR channels. If the use of WLAN cannot be avoided, limit the number of channels used for the WLAN infrastructure to a minimum.
- Usage of Bluetooth devices together with SRR may cause interferences. Bluetooth devices automatically change channels regardless of whether a channel is already used by another component of the wireless infrastructure and therefore interfere with SRR connections.
- Usage of cordless phones using the ISM band in the vicinity of SRR devices may cause interferences.
- Usage of wireless PC keyboards or mice using the ISM band in the vicinity of SRR devices may cause interferences.

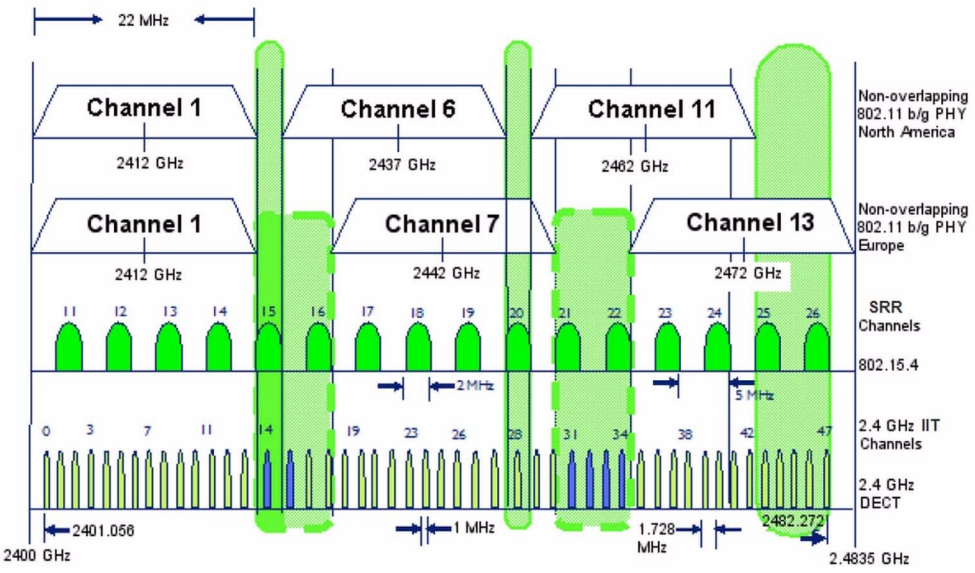
To assign SRR channels to all monitors in a unit that should be used with SRR connections,

1. Identify unused SRR channels. This can be done by using commercially available tools, such as AirMagnet.
2. Obtain a floor plan of the unit and identify where the monitors with SRR interface are located.
3. Determine SRR groups. An SRR group may contain a maximum of two monitors which share the same SRR channel. Monitors belonging to an SRR group should be located close to each other.
4. For each SRR group, assign the same SRR channel to all monitors belonging to a group.

SRR Channel Restrictions with WLAN, IIT, and DECT Devices

The following table and graphic show the restrictions of WLAN, IIT, or DECT Device usage together with SRR.





For a successful SRR deployment, the SRR channels must be located in RF spectra where they are least likely to be interfered with. Choosing appropriate channels after reviewing the Spectrum Analyzer date is critical. In hospitals, 802.11 systems are most the likely source of interference with SRR channels. The figures above show the relationship between 802.11, IIT, and DECT Devices. For example, if the site uses European 802.11 channel 1 for WLAN and has no IIT or DECT devices in the SRR channels 15 or 16, these channels can be used for SRR. Philips telemetry experts will identify available SRR channels by performing a site survey.

When using the Philips IntelliVue 802.11 Bedside Adapter we recommend that you use the 5 GHz band to free the 2.4 GHz band for SRR usage.

NOTE

Short range radio signals are low power signals and therefore have a relatively short range. You can use this fact if the number of unused channels is low, and you run out of channels. Provided the distance between two SRR groups is large enough, i.e. none of the short range radio signals transmitted by the one group can interfere with signals of the other group, you may attempt to assign the same SRR channel to both groups. Take into consideration that portable components (such as Telemetry transceiver, MP5/MP5T or an X2) belonging to one group may be temporarily used within the range of another group.

The range of SRR signals cannot be clearly defined as it depends on external factors such as the components and structure of walls, ceilings, etc.

Electromagnetic Interference (SRR)

Commercially available Short Range Radio 802.15.4 transceivers operate at very low RF power levels to transmit data and need to have high sensitivity receivers to achieve a good link budget. Due to technological limitations the selectivity of the receiver is limited. Consequently, the SRR link is susceptible to other strong RF transmitters not only in the operating frequency band and 5% around it, but also to non-transient RF disturbances stronger than 1V/m at frequencies close to the operating frequency band (2.0 to 2.3 GHz)

ECG Out Functionality

Connections

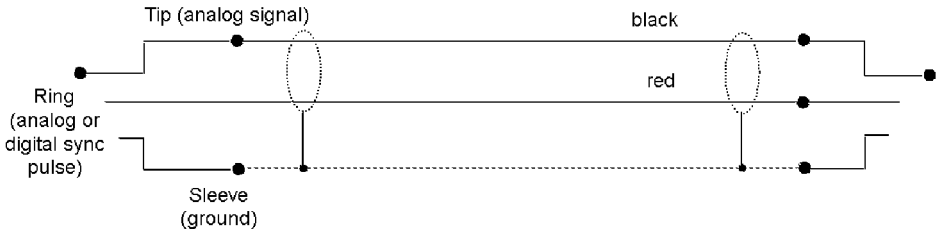
ECG Out Connector

The cables 8120-1022 and M1181-61625 have both ends terminated. The photograph above shows the monitor side connection.

If using a non-terminated cable:

1 Strip 5 mm (3/16") insulation from leads and twist conductor strands tightly.

2 Solder leads to the connector as shown in the following diagram.



WARNING

According to AAMI specifications the peak of the synchronized defibrillator discharge should be delivered within 60 ms of the peak of the R wave. The signal at the ECG output on the IntelliVue patient monitors is delayed by a maximum of 30 ms. Your biomedical engineer should verify that your ECG/Defibrillator combination does not exceed the recommended maximum delay of 60 ms.

Computer Client or Hospital Network connected to MX600/MX700 Internal LAN or iPC LAN Interface

You must use Unshielded Twisted Pair (UTP) LAN cables to connect the IntelliVue monitor to other devices. The Computer Client and network infrastructure devices typically are not classified as medical devices and must be located outside the patient vicinity. The patient vicinity is defined as an area within 6ft (1.85m) of the perimeter of the patient's bed or within 7.5ft (2.3m) of the floor.

If the Computer Client is installed in the patient vicinity and connected to the monitoring device, it must be correctly isolated from the mains power supply by an isolation transformer.

If the Computer Client is installed in the patient vicinity and a network switch or hub is used to connect it to a monitoring device, it must be correctly isolated from the mains power supply by an isolation transformer.

WARNING

All external devices in the patient vincinity must comply with IEC 60601-1:1988/A1:1991A2:1995 or EN 60601-1:1990/A1:1993/A2:1995. This applies also to all signal connections, entering the patient vincinity. Additional safety equipment, e.g. isolation transformers might be used.

The installation procedures e.g. for electrical connections as documented in the Instructions for Use must be strictly followed.

Configuration Tasks

You must configure these settings during installation in configuration mode.

- Line Frequency
- Printer
- Altitude
- Equipment Label (for wireless networked monitors, or when the Information center is in flexible monitoring mode).
- ECG cable colors
- Height and Weight units
- Setup Network
- Setup WLAN
- Setup IIT

Checking Country-Specific Default Settings

Some settings are made in the factory to match the typical requirements in a specific country. Line frequency, units for weight and height, and ECG cable colors (AAMI or IEC) have been set to appropriate values. If you suspect that these settings may not match your institution's requirements, check the settings and change them if necessary as described in the *Configuration Guide*.

WARNING

Before starting monitoring, check that the configuration meets your requirements, especially patient category, alarm limits and paced setting.

If you need to enter configuration mode:

1 In the **Main Setup** menu, select **Operating Modes**.

2 Select **Config** and enter the passcode.
The passcode for configuration mode is given in the monitor's Service Guide.

The monitor displays **Config** at the right hand side of the status line and in the center of the Screen while you are in configuration mode.

Before you leave configuration mode, always be sure to store any changes you made. You must store changes made to each Settings Block and to each Profile, individually. As it may be difficult to remember whether the settings you changed belong to a Monitor Settings block or a Measurement Settings block, we recommend that you store each block before you leave configuration mode.

To leave configuration mode:

- In the **Main Setup** menu, select **Operating Modes** and then select **Monitoring**.

Setting Altitude, Line Frequency, ECG Cable Colors and Height & Weight Units

You require a local barometric pressure rating from a reliable source (such as airport, regional weather station, or hospital weather station) that is located at the same altitude as the institution.

1. From the **Main Setup** menu, select **Global Setting**. Select **Altitude** and enter the altitude.
2. From the **Main Setup** menu, select **Global Setting**. Select **Line Frequency** and choose the Line Frequency.
3. From the **Main Setup** menu, select **Global Setting**. Select **ECG Cable Color** and choose the Cable Color.
4. From the **Main Setup** menu, select **Global Setting**. Select **Height Unit** and choose the Height unit.
5. From the **Main Setup** menu, select **Global Setting**. Select **Weight Unit** and choose the Weight unit.

Setting Altitude and Line Frequency

You require a local barometric pressure rating from a reliable source (such as airport, regional weather station, or hospital weather station) that is located at the same altitude as the institution.

1. From the **Main Setup** menu, select **Global Setting**. Select **Altitude** and enter the altitude.
2. From the **Main Setup** menu, select **Global Setting**. Select **Line Frequency** and choose the Line Frequency.

Configuring the Equipment Label

If the Information Center is in fixed monitoring mode, it controls the equipment label. You do not need to follow this procedure.

However, if you are on a wireless network, or your Information Center is configured for flexible monitoring mode, you must set the equipment label. This associates the monitor with a central monitoring sector. An identical monitor label must also be configured in the Information Center.

1. Select **Main Setup** -> **Bed Information** to call up the **Bed Information** menu.
2. Select **Equipment Label** to call up the onscreen keyboard.
3. Enter the system identifier. This needs to be set up in either the monitor or the Information Center. If the Information Center is in flexible monitoring mode, the monitor must be setup to match the Information Center's monitor label.

Configuring the Printer

1. From the **Main Setup** menu select **Reports**.
2. Select **Printer Settings** and configure **Local** to enabled if the printer is connected directly to the monitor. See configuration guide for further details.

Setup Network

Main Setup => **Network** => **Setup Network**

Network Setup	
IP Config	BOOTP
Dynamic IP	Mandatory
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
IGMP	Off
CI Mode	Broadcast
CI Address	0.0.0.0
CI TTL	1
QoS State	Off
QoS Level	0
Directory Mode	Broadcast
Directory Addr	0.0.0.0

The Setup Network Menu allows you to configure the following items:

IP Config Allows you to change the mode to acquire the IP address. Choices are **BOOTP, DHCP, DHCP restricted** and Manual. In **DHCP restricted** mode any true BOOTP responses are ignored.

Dynamic IP Can be either **Mandatory** (default) or **Optional**. If Mandatory is set the bedside will announce an INOP if an IPv4 address could not be acquired.

IP Address If IP Config is set to Manual, the IP Address should be a valid IP address, e.g. not 0.0.0.0. The configured value is ignored when IP Config is not set to Manual.

Subnet Mask The Subnet Mask must be provided for manual IP addresses. The Subnet Mask must consist of a single consecutive series of "1" bits; e.g. 255.255.248.0. The configured value is ignored when IP Config is not set to **Manual**.

Default Gateway The IP Address of the Default Gateway can be optionally configured. The configured value must be within the range of the Subnet Mask. The configured value is ignored when IP Config is not set to **Manual**.

IGMP Enables or disables IGMP support (On/ Off).

CI Mode The mode in which CI messages (Connect Indication messages) are sent (**Broadcast, Multicast, Manual**).

CI Address Multicast Address for Device Connect Indication (only used if CI Mode is set to **Manual**). If **CI Mode** is set to **Broadcast,** the CI Address is implicitly the subnet broadcast address. If **CI Mode** is set to **Multicast** the CI Address is implicitly 224.0.23.63

CI TTL Sets the TTL (Time To Live) of the CI message. Defaults to **1**.

QoS State QoS (Quality of Service) can be switched **On** or **Off**. Defaults to **Off**.

QoS Level The QoS Level (DSCP CoS value) can be entered between 0 and 7. Defaults to 0.

Directory Mode The mode in which Directory Service requests are received (Broadcast, Multicast)

Directory Addr Mode Multicast address for Directory Service requests (if Directory Mode set to Multicast).

Store The entered values are verified when the "Store" softkey is pressed. A valid configuration is immediately activated and the window closed. If any field is invalid (e.g. invalid subnet mask or gateway not in subnet), an error popup window is shown and the configuration is not applied.

Network Status Window

The network status window provides network status information which can be used for troubleshooting purposes.

Main Setup => **Network** => **Network Status**

Network Status	
Network Type	LAN
MAC Address	0030 D301 376B
MAC IIT	0097 3498 87EC
RF Access Code	2
IP Config	BOOTP
Dynamic IP	Mandatory
IP Address	172.31.10.03
Subnet Mask	255.255.0.0
Default Gateway	172.31.20.10
BOOTP Server	172.31.10.165
Server IP	172.31.10.200
IPv6 Address	FE80::0209:FBFF:FE6E:D163
IGMP	Off
CI Mode	Broadcast
CI Address	172.31.255.255
CI TTL	1
QoS State	Off
QoS Level	0
Directory Mode	Broadcast
Directory Addr.	172.31.255.255

Network Type Displays the current active network type (**LAN, IIT, WLAN**)

IP Config Shows the IP Configuration mode. Choices are **BOOTP, DHCP, DHCP restricted** and **Manual**. In **DHCP restricted** mode any true BOOTP responses are ignored.

Dynamic IP Can be either **Mandatory** (default) or **Optional**. If **Mandatory** the bedside monitor will issue an INOP if an IPv4 address could not be acquired.

The **MAC Address**, current IP address configuration (**IP Address, Subnet Mask, Default Gateway, Server IP address and CI mode/ CI Address/ CI TTL**) and **BOOTP/ DHCP Server** is displayed. The IP address configuration can be changed in Service Mode only. Manually entered IP addresses are marked by the suffix "Manual", invalid fields are marked by the suffix "Invalid".

If the Instrument Telemetry interface is available, its **MAC Address** and **RF Access Code** are displayed. In addition, the bedside monitor's IPv6 link local address is shown.

Setup WLAN

Main Setup => **Network** => **Setup WLAN**

Setup Wireless LAN	
Country	1000
IP Address	172.31.10.04
WMM Mode	disabled
Mode	802.11bg
SSID	Philips
Security Mode	WPA2Enterpr.
WEP Key Size	40 bit
WEP Key	*
WEP Key Index	2
WPA Password	*
Authentication	PEAP
Inner Authentication	MSCHAPv2
PEAP Version	Default
PEAP Label	Default
User Name	username
Password	secret
Anonymous Ident.	anonymous
CertificateCheck	Enabled
CA Certificate	Installed

The Setup Wireless LAN Menu allows you to configure the following items:

Country Country setting for the WLAN card to adapt to the local frequency and transmit power regulations. The default value 1000 should be left to support adapting to country provided by the AP.

IP Address IP Address of the WLAN card. Typically the automatic configuration via the BOOTP/ DHCP Server of the central station is used. In this case the field is set to 0.0.0.0. For special requirements, it is possible to switch to a manual/fix IP address configuration.

Manually entered IP addresses are marked by the suffix "Manual"

NOTE

- The subnet mask and the gateway address of the WLAN card will be taken from the corresponding fields in the **Bed Information** or **Setup Network** menu.
- Only limited checks of the manual values are possible. Therefore it is mandatory that a manual configuration is only performed by experienced service personnel to prevent problems such as duplicate IP addresses, non matching subnet mask, etc.

WMM Mode Changes to WMM (Wireless Multimedia Mode) mode for the WLAN adapter supporting this feature.

Mode Defines the WLAN operating mode/ IEEE 802.11 Standard. Valid values are either 802.11ah, 802.11bg, 802.11g, Auto or None. None indicates that no wireless connection should be estab-lished although a wireless adapter is available and operational.

SSID Set Identifier: Logical WLAN Network Name.

Security Mode **WEP**, **WPA(PSK)** or **WPA2(PSK)**, **WPA-Enterprise** and **WPA2-Enterprise** with either Protected EAP (PEAP) or Tunneled TLS (TTLS) as authentication methods.

WEP Key Size 40 bit or 104 bit.

WEP Key The number of hex chars for the WEP key depends on the WEP key size chosen. For a 40 bit WEP key size the WEP key must be 10 hex chars long, for a 104 bit key the WEP key must be 26 hex chars long. Will be shown as "*" after the user entered the key.

WEP Key Index Defines the transmit WEP Key Index. This entry must match the WEP Key Index configured at the infrastructure device, i.e. on a WLAN Access Point, and ranges from 1 to 4.

WPA Password In WPA(PSK) or WPA2(PSK) mode this entry defines the Pre-Shared-Secret or Password with 8 to 63 alpha-numeric characters. Will be shown as "*" after the password is entered.

In WPA-Enterprise or WPA2-Enterprise mode the following read only fields are available. The configuration can only be performed via the IntelliVue Support Tool:

Authentication Authentication method can be either Protected EAP (PEAP) or Tunneled TLS (TTLS).

Inner Authentication PEAP and TTLS can be used with several different Inner Authentication methods. PEAP with MSCHAPv2 and TTLS with PAP, CHAP, MSCHAP or MSCHAPv2

PEAP Version This setting describes the PEAP protocol version to be used while authenticating against the authentication server. Valid values are either Default, Version 0 and Version 1. If set to Default the decision is up to the wireless adapter. Version 0 or 1 forces the wireless adapter to use the protocol version required for a certain authentication server. This setting is intended for experts only.

PEAP Label The PEAP label setting defines the string to be use to signal EAP-PEAP encryption to the authentication server. Valid values are Default, EAP or PEAP. Default lets the decision up to wireless

adapter. Both EAP and PEAP forces the wireless adapter to use this setting. This setting is intended for experts only.

Username The username used in the encrypted tunnel with 1-63 alpha-numeric characters. It is also used as outer identity as long as the Anonymous Identity is not set.

Password The password used in the encrypted tunnel with 8-63 alpha-numeric characters. Will be shown as four stars "****" after the user entered the password.

Anonymous Identity The identity used for the outer PEAP or TTLS authentication, which may be "unprotected". Thus, the identity should be different to the Username for enhanced security. The Anonymous Identity contains 1-63 characters. It can be set to NotConfigured by clearing it.

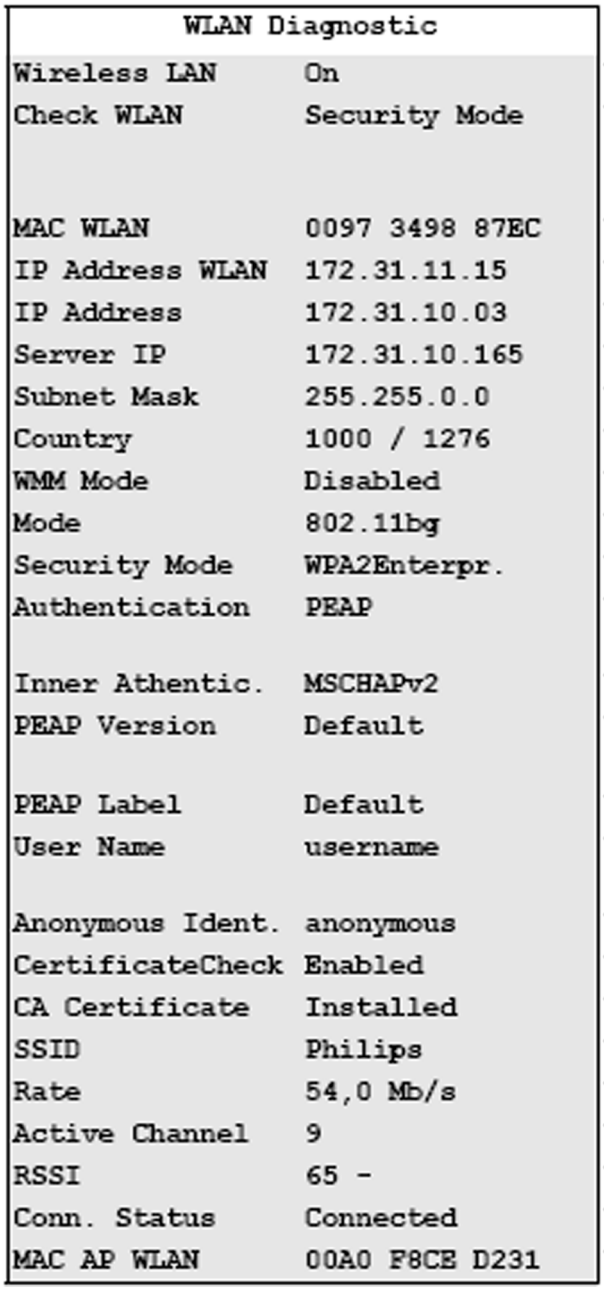
CA Certificate Indicates that the certificate of the Certification Authority (CA) has been installed on the device. The CA certificate is the root certificate of the server delivered certificate chain. The certifcate chain ends with the server certificate, which contains the key material used to build up the encrypted tunnel for PEAP or TTLS. Values are either Installed or NotInstalled. This field is not user configurable. The CA certificate can only be installed with the Intellivue Support Tool.

Certificate Check As long the Certificate Check is set to Enabled, the CA Certificate is used to verify the authenticity of the certificate chain delivered by the authentication server. The verification involves also the system time to check the validity period of every certificate in the chain. This item can only be set to Enabled, if an CA Certificate has been installed. Valid values are Disabled or Enabled.

WLAN Diagnostic Window

The WLAN DIagnostic window provides WLAN status information which can be used for troubleshooting purposes.

Main Setup => **Network** => **WLAN Diagnostic**



WLAN Diagnostic	
Wireless LAN	On
Check WLAN	Security Mode
MAC WLAN	0097 3498 87EC
IP Address WLAN	172.31.11.15
IP Address	172.31.10.03
Server IP	172.31.10.165
Subnet Mask	255.255.0.0
Country	1000 / 1276
WMM Mode	Disabled
Mode	802.11bg
Security Mode	WPA2Enterpr.
Authentication	PEAP
Inner Athentic.	MSCHAPv2
PEAP Version	Default
PEAP Label	Default
User Name	username
Anonymous Ident.	anonymous
CertificateCheck	Enabled
CA Certificate	Installed
SSID	Philips
Rate	54,0 Mb/s
Active Channel	9
RSSI	65 -
Conn. Status	Connected
MAC AP WLAN	00A0 F8CE D231

In the WLAN Diagnostic window, the wireless LAN address information is shown (**MAC address**, **IP addresses** and **Subnet Mask**) as well as the active security settings, WLAN **Mode**, **SSID** as well as **Country** setting, which are all not editable in this window. In addition, the following status information is shown:

Wireless LAN State of the wireless adapter. Off indicates inactive or just starting, On indicates operational. Does not take the wireless state into account.

Check WLAN Indicates that a configuration issue has been detected. The message text depends on the operating mode.

Country The configured country code and the dynamically chosen country code based on access point setting.

WMM Mode The WMM mode being used.

RSSI Received Signal Strength Indicator.

Conn. Status Current wireless LAN connection status (**None, Scanning, Authenticating, Authenticated Shared, Associating, Connected, Link Problem)**.

Active Channel Current radio channel.

Rate Currently selected transmission rate (adapts dynamically based on wireless signal propagation behavior).

MAC AP WLAN The MAC address of the access point to which a connection has been established.

WLAN Configuration Check

Before a wireless connection is established, the configuration is checked for basic issues or incompatibilities. If issues are found during this check, a status message will be shown in the status prompt area of the monitor's resting display. Additionally, the Check WLAN line of the WLAN Diagnostic window will display the status message. In Service Mode, a detailed status message is shown, while a simplified message is shown in all other operating modes.

The table below lists the status messages displayed in service mode, depending on the issue found.

Issue	Status Message
Security Mode	Check WLAN Security Mode
Country Setting	Check WLAN Coutry Setting
IEEE Wireless Mode	Check WLAN IEEE Mode
WMM Mode	Check WLAN WMM Mode
WEP Encryption	Check WLAN WEP Settings
WPA Encryption	Check WLAN WPA/WPA2 Key
Authentication	Check WLAN Authentication Mode
Inner Authentication	Check WLAN Inner Authentication Mode
PEAP settings	Check WLAN PEAP Properties
Certificate Check	Check WLAN Certificate Check Setting
User Name,Password	Check WLAN EAP Credentials

The simplified message in all other operating modes is "Check WLAN Settings"

Setup IIT

Main Setup => **Network** => **Setup IIT**

IIT Setup	
IIT	Enabled
RF Access Code	1

The Setup IIT Menu allows you to configure the following items:

Instr. Telemetry The Instrument Telemetry network interface can be disabled by a Global Setting to suppress network related technical INOPS if the IIT-capable device is operated in a non-IIT environment.

RF Access Code Instrument telemetry specific partitioning of the radio domain. Displays "Disabled" instead of RF Access Code if Instrument Telemetry is disabled by Global Setting.

Instrument Telemetry Diagnostic Window

The Instrument Telemetry Diagnostic window provides IIT status information which can be used for troubleshooting purposes.

Main Setup => **Network** => **IIT Diagnostic**

Instrument Telemetry Diagnostic	
MAC IIT	0097 3498 87EC
RF Access Code	2
IP Address	172.31.10.03
Server IP	172.31.10.165
Subnet Mask	255.255.0.0
RSSI	-50
Conn. Status	Active

Network addresses To support troubleshooting of the network connection, the following fields are displayed: Instrument Telemetry **MAC Address, IP Address, BOOTP/ DHCP Server IP address** and **Subnet Mask**.

RF Access Code Instrument telemetry specific partitioning of the radio domain. Displays "Disabled" instead of RF Access Code if Instrument Telemetry is disabled by Global Setting.

RSSI Received Signal Strength Indicator.

Conn. Status Current connection status of the Instrument Telemetry Subsystem.

IntelliBridge EC10

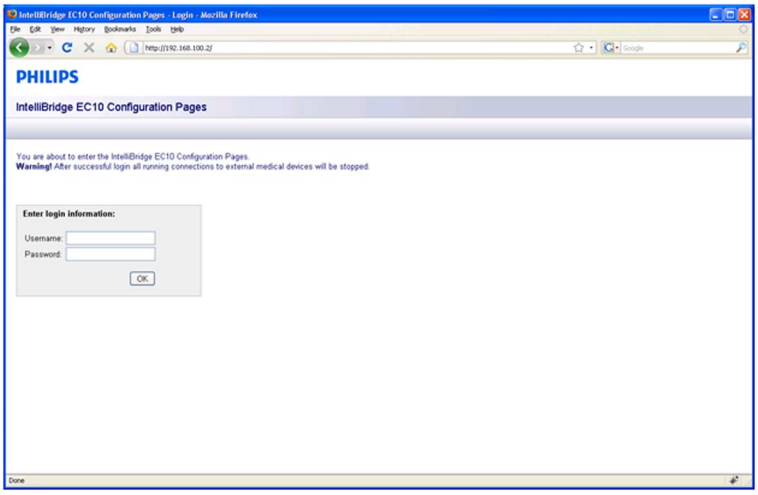
The IntelliBridge EC10 web based service interface allows you to:

- upgrade the EC10 Firmware
- upload or remove device drivers

- generate and upload clone files
- view system information

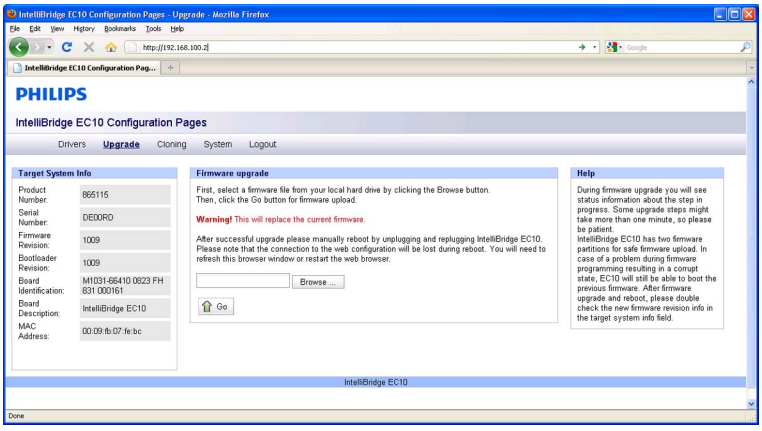
Accessing the IntelliBridge EC10 Service Interface

1. Connect the Service PC to the IntelliBridge EC10 module using a standard LAN cable.
2. Make sure that the TCP/IP settings of your Local Area Connection Properties on the Service PC are set to "**obtain IP Address automatically**".
3. Open your Internet Browser. Internet Explorer 7 and Firefox 3.0 are supported.
4. Enter **192.168.100.2** in the navigation field of the internet browser.
5. The EC10 Configuration screen will open up. Enter the following login information:
   Username: service
   Password: IBEC10



Firmware Upgrade

1. In the EC10 Configuration Screen select the tab **Upgrade**.
2. The Firmware upgrade window will open up.



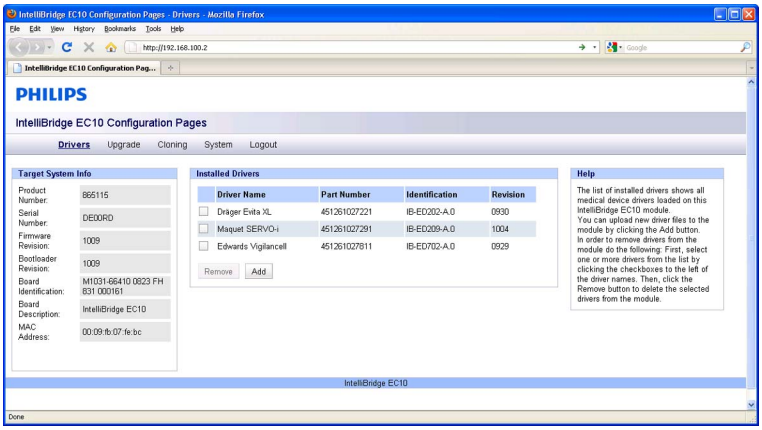
3. Click on the **Browse** button and select the correct FW file.
4. Click **Go**.

Uploading and Removing Device Drivers

1 In the EC10 Configuration Screen, select the **Drivers** Tab.

2 A list of the available drivers on the EC10 module will appear.

3 To upload a new driver, click the **Add** button, then click the **Browse** button and select the driver file. To remove one or more drivers, select the driver(s) from the list of available drivers and click the **Remove** button.

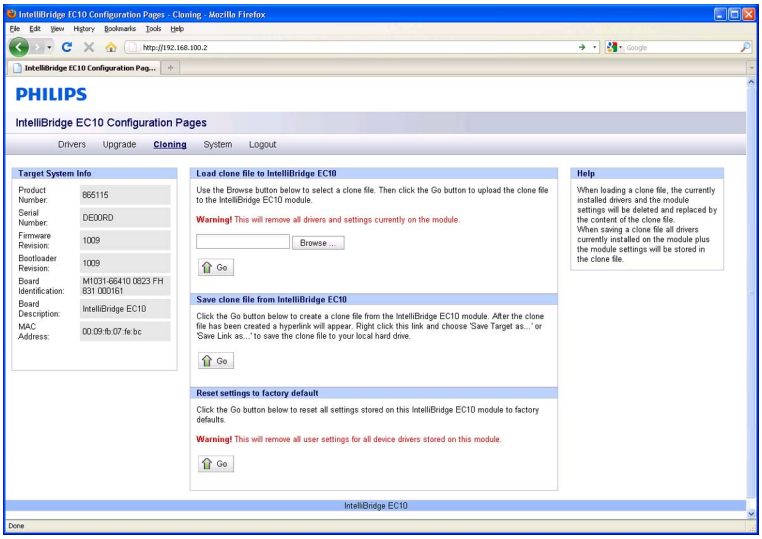


Generating and Uploading Clone Files

1 In the EC10 Configuration Screen, select the **Cloning** tab.

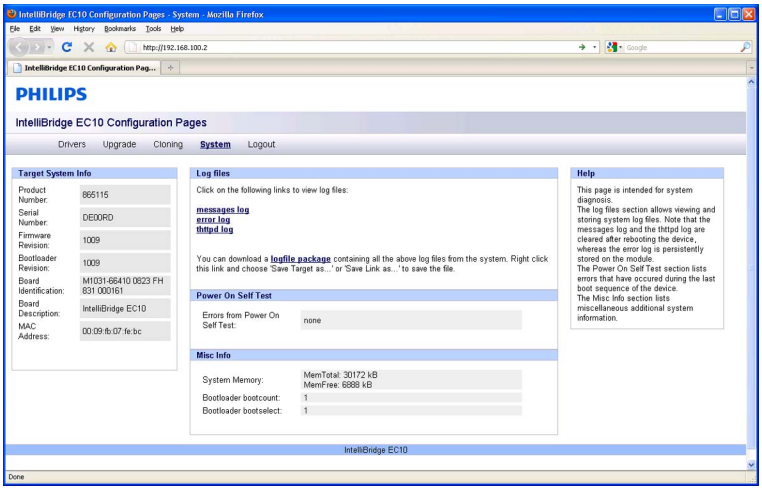
2 To generate a clone file, click the **Go** button in the *Save clone file from IntelliBridge EC10* window. A hyperlink will appear. Right click this link and select "**Save Target as**..." to save it to the desired location.

3 To upload a clone file click the **Browse** button in the *Load Clone File to IntelliBridge EC10* window and select the clone file. Then click **Go**.



Viewing System Information

1 In the EC10 Configuration Screen, select the **System** Tab. This screen allows you to view Log files and other system information.



Handing Over the Monitor

If you are handing over the monitor to the end-users directly after configuration, make sure that it is in Monitoring mode.

Ensure that the users have access to the following documentation delivered with the monitor:

- Training Program - M8000-9461x - for self-training on the monitor before use
- Instructions for Use - M8000-9001x - for more detailed questions during use

WARNING

All users must complete the training program and read the Instructions for Use before working with the monitor.

These training materials (in combination with this service guide) can also be used to train service personnel on how to use and service monitor.

Please refer to the Testing and Maintenance section of this service guide to determine the respective safety and performance tests to be performed before handing over the monitor to the customer.

7 Installation Instructions

8

Site Preparation

Introduction

This section describes the procedures you should follow to plan and prepare a site for an IntelliVue monitor installation. It describes:

- Site planning.
- Roles and responsibilities for local and Philips personnel.
- Remote installation planning.

Site Planning

The careful planning of the site for the IntelliVue monitor is essential for its safe and efficient operation. *A consulting schedule should be established between the Customer and Philips Sales and Support Representatives, to ensure that all preparations are completed when the system is delivered.*

The site planning phases prior to equipment installation are:

Location: Planning the location of the various system components.

Environment: Confirming and correcting, as necessary, the environment of the proposed installation site(s).

System Capabilities: Explaining the possibilities for system expansion.

Mounting: Referencing the mounting hardware information website for the listing of suitable mounting hardware recommended for use with the various system components, and all details on the available mounts and accessories.

Cabling: Identifying the requirements for the cabling, conduiting and faceplates for connecting the various system components.

Roles & Responsibilities

This section describes the procedures necessary to prepare a site for a system installation. The procedures are grouped into two parts: procedures that local staff or contractors are responsible for, and procedures that Philips personnel are responsible for.

Site Preparation Responsibilities

Local Staff

- Ensure that all safety, environmental and power requirements are met.
- Provide power outlets.
- Prepare mounts.
- Pull cables, install conduit, install wallboxes.
- Terminate network cables if a Philips Clinical Network is in use.
- It may be necessary to certify the network cable plant, see Philips Clinical Network Installation Manual for details.

Philips Personnel

- Provide the customer with the safety, environmental and power requirements.
- Assemble mounts.
- Prepare monitor remote cabling.

Procedures for Local Staff

The following tasks must be completed **before** the procedures for Philips personnel may be started.

- Providing Power Outlets

  One power outlet for each display and for any peripheral device (for example, a printer or slave display) is required by the system. Provide a power outlet in the vicinity (1 m or 3 ft) of each component that requires power.

WARNING

Only the power cables provided with the system may be used. For reasons of safety, power (mains) extension cables or adapters shall not be used.

- Preparing Mounts

  Where ceiling, wall, or shelf mounts are required for mounting the equipment, the customer is responsible for the following:
  - Providing and installing all hardware which is required to install the mounting hardware supplied by Philips as detailed in the installation notes.
  - Making sure that all ceilings, walls, and mounting rails that supports mounting hardware are suitable for their proposed load.

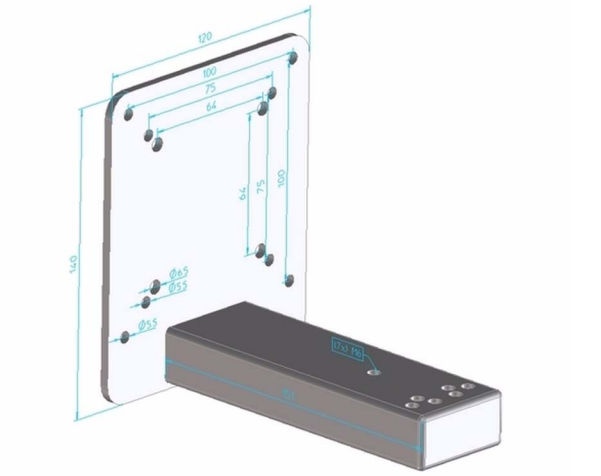
WARNING

It is the customer's responsibility to have the attachment of the mounting hardware to the ceiling, wall, or mounting rail and the construction of the ceiling, wall, or mounting rail evaluated for structural integrity and compliance with all local, state and any other required codes by a registered, professional, structural and/or mechanical engineer.

Although considerable effort has been made to ensure the safety of the ceiling mount installation and or mounting guidelines, it is to be understood that the installation itself is beyond the control of Philips

Medical Systems. Accordingly, Philips Medical Systems will not be responsible for the failure of any such installation.

The following figures show the dimensions required for the M1180A #C53 wall and the table mounting bracket which ships with the monitor.



Wall Mounting Bracket Dimensions

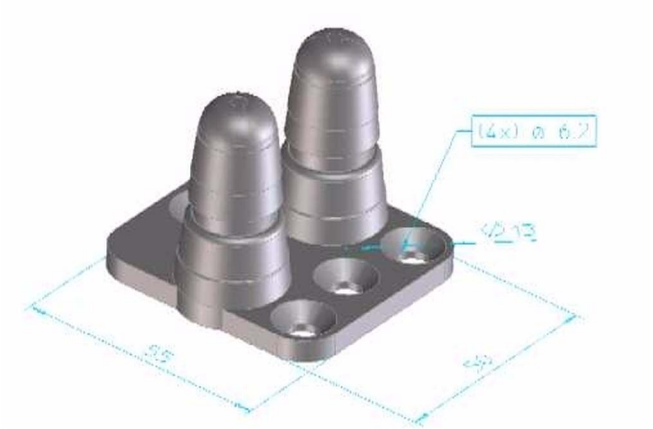


Table Mounting Bracket Dimensions

- Providing Conduit

  Where a remote installation is required, for example the installation of a remote display, the customer is responsible for the following hardware installations:

  – Providing conduit and/or trunking of a sufficient cross-sectional area for the planned cables and possible future expansion (for additional components or systems). See “Cabling Options and Conduit Size Requirements” on page 323 for cable specifications for remote installations.

  – Providing and/or installing suitable wall boxes to accommodate the faceplates.

- Pulling Cables

WARNING

NEVER run power cables through the same conduit or trunking used for system cables.

- Installing Wall Boxes

It is the customer's responsibility to provide and install wallboxes to house faceplates. The customer must notify the Philips installation coordinator of which size is to be used.

Procedures for Philips Personnel

Before you begin the procedures in the installation sections, ensure that the customer has completed all necessary preparations outlined in the previous section, "Procedures for Local Staff."

Monitor MX600/700 Site Requirements

Space Requirements

The situating of the monitor should be planned such that the nursing staff are able to monitor the patient with relative ease, with all patient connectors and controls readily available and the displays clearly visible. The location should also allow access to service personnel without excessive disruption and should have sufficient clearance all round to allow air circulation.

Maximum dimensions and weight:

Size (W x H x D)

392mm x 321mm x 163mm (15.43” x 12.64” x 6.42”) (without cable management)
392mm x 321mm x 235mm (15.43" x 12.64" x 9.25") (with cable management)

Weight

9.5kg (20.94lb) without options

Environmental Requirements

The environment where the MX600/700 monitor will be used should be reasonably free from vibration, dust and corrosive or explosive gases. The ambient operating and storage conditions for the MX600/700 monitor must be observed. If these conditions are not met, the accuracy of the system will be affected and damage can occur.

Temperature

Operating: 0 to 40ºC (32 to 104ºF) without iPC, 0 to 35°C (32 to 95°F) with iPC

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 15% to 95% Relative Humidity (RH) (non-condensing)

Storage: 5% to 95% Relative Humidity (RH)

Altitude

Operating: -500m to 3000m (10000 ft.)

Storage: -500m to 4600m (15000 ft.)

Electrical and Safety Requirements (Customer or Philips)

Safety Requirements

If the monitor is to be used in internal examinations on the heart or brain ensure that the monitor is connected to an equipotential grounding system.

Grounding

The monitor **MUST** be grounded during operation (Class I equipment according to IEC 60601-1). If a three-wire receptacle is not available then the hospital electrician must be consulted to ensure that proper grounding is available on installation. **NEVER** attempt to use a three-wire to two-wire adapter with the monitor.

WARNING

Each component must be individually grounded for safety and interference suppression purposes.

Electrical Requirements

Line Voltage Connection

The MX600/700 monitor uses < 200 W.

Line Voltage

The MX600/700 monitor may be operated on ac line voltage ranges of 100 to 240V (50/60 Hz).

Remote Device Site Requirements

The system can be installed with one or more combinations of the following remote devices.

Flexible Module Rack or Multi-Measurement Module

Remote Display

Remote Control

Where more than one site is used for locating equipment (a remote installation), the following sections should be considered for EACH device:

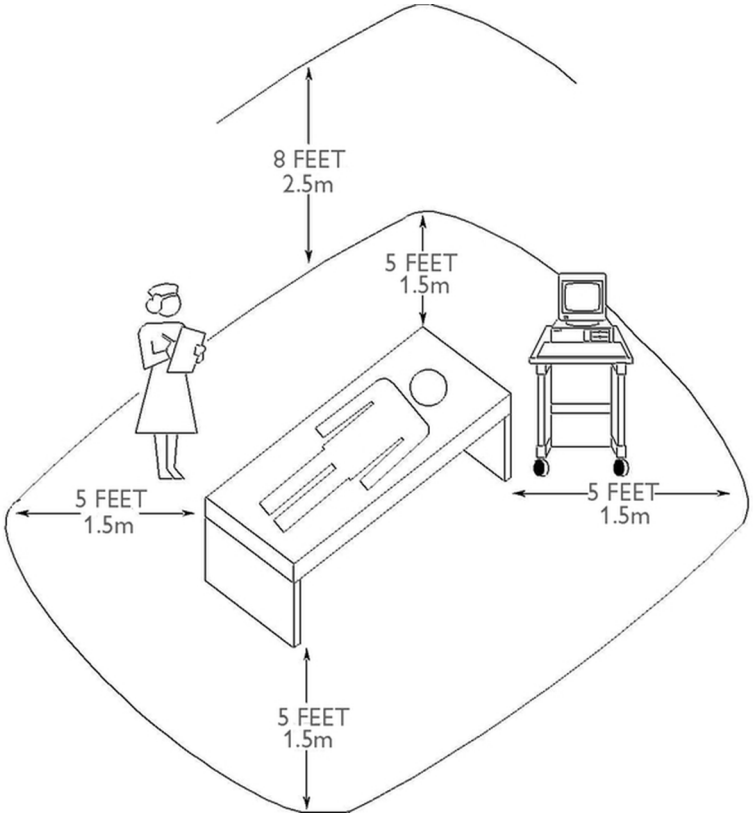
- Space Requirements
- Environmental Requirements
- Mounting
- Electrical and Safety Requirements
- Cabling Options and Conduit Size Requirements

Connecting Non-Medical Devices

The standard IEC-60601-1-1 applies to any combination of medical and non-medical electrical devices, where at least one is a medical electrical device. Therefore IEC-60601-1-1 must still be met after all devices are connected.

WARNING

Do not use a device in the patient vicinity if it does not comply with IEC-60601-1. The whole installation, including devices outside of the patient vicinity, must comply with IEC-60601-1-1; one reasonable solution may be the use of an isolation transformer.



Equipment Location in the Patient Vicinity

NOTE

The site planning requirements, with the exception of the cabling, must be provided by the device manufacturer, if the remote device is not purchased from Philips.

Multi-Measurement Module (MMS) M3001A, IntelliVue X2 M3002A, 8-Slot Flexible Module Rack (FMS-8) M8048A, 4-Slot Flexible Module Rack (FMS-4) 865243 or Remote Control 865244

Space Requirements Multi-Measurement Module M3001A

Size (W x D x H)

188.0mm x 96.5 mm x 51.5 mm

(7.40” x 3.80” x 2.03”)

Weight

650g (1.4 lb)

Space Requirements IntelliVue X2 M3002A

Size (W x D x H)

188.0mm x 99 mm x 86 mm

(7.4” x 3.9” x 3.4”)

Weight

1.5 kg (3.3 lb)

Space Requirements 8-Slot Flexible Module Rack (FMS-8) M8048A

Size (W x D x H)

320 mm x 120mm x 135mm (12.6” x 4.72” x 5.3”)

Weight

< 3500g (7.7lb)

Space Requirements 4-Slot Flexible Module Rack (FMS-4) 865243

Size with MMS Mount (W x H x D)

232 mm x 139mm x 188mm (9.13” x 5.47” x 7.4”)

Size without MMS Mount (W x H x D)

194 mm x 139 mm x 110 mm (7.64" x 5.47" x 4.33")

Weight

< 1.1kg (2.43lb)

Space Requirements Remote Control 865244

Size (W x H x D)

53 mm x 165 mm x 23 mm

(2.1" x 6.5" x 0.9")

Weight

<250 g (0.55 lb)

Environmental Requirements Multi-Measurement Module M3001A

Temperature

Operating: 0 to 45ºC (32 to 113ºF)

Storage: -40 to 70ºC (-40 to 158ºF)

Humidity

Operating: 95% relative humidity (RH) max. @ 40ºC (104ºF)

Storage: 90% relative humidity (RH) max. @ 65ºC (150ºF)

Altitude

Operating: -500m to 4600m (-1600 to 15000 ft.)

Storage: -500m to 15300m (-1600 to 50000 ft.)

Environmental Requirements IntelliVue X2 M3002A

Temperature

Operating: 0 to 40ºC (32 to 100ºF)
0 to 35°C (32 to 95°F) (while charging batteries or when equipped with IIT or IntelliVue 802.11 Bedside Adapter)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 15 to 95% relative humidity (RH) max. @ 40ºC (104ºF)

Storage: 5 to 95% relative humidity (RH) max. @ 65ºC (150ºF)

Altitude

Operating: -500m to 3000m (-1600 to 10000 ft.)

Storage: -500m to 4600m (-1600 to 15000 ft.)

Environmental Requirements 8-Slot Flexible Module Rack M8048A

Temperature

Operating: 0 to 45ºC (32 to 113ºF)

Storage: -40 to 70ºC (-40 to 158ºF)

Humidity

Operating: 95% relative humidity (RH) max. @ 40ºC (104ºF)

Storage: 90% relative humidity (RH) max. @ 65ºC (150ºF)

Altitude

Operating: -500m to 4600m (-1600 to 15000 ft.)

Storage: -500m to 15300m (-1600 to 50000 ft.)

Environmental Requirements 4-Slot Flexible Module Rack 865243

Temperature

Operating: 0 to 40ºC (32 to 100ºF)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 15 to 95% relative humidity (RH)

Storage: 5 to 90% relative humidity (RH)

Altitude

Operating: -500m to 3000m (-1600 to 10000 ft.)

Storage: -500m to 4600m (-1600 to 15000 ft.)

Environmental Requirements Remote Control 865244

Temperature

Operating: 0 to 40ºC (32 to 100ºF)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 15% to 95% relative humidity (RH) (non-condensing)

Storage: 5% to 90% relative humidity (RH)

Altitude

Operating: -500m to 3000m (-1600 to 10000 ft.)

Storage: -500m to 4600m (-1600 to 15000 ft.)

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the FMS and the MMS.

Table 10 M8048A, M3001A and M3002A Cables

Part number	12NC	Description	Conduit sizes	Bend Radius	Connector Size (L x W)
Both ends are terminated with MSL conntectors					
M3081-61626	453563474781	CBL MSL 0.75m	72mm^2	40 mm	40 mm x 17 mm
M3081-61601	453563402721	CBL MSL 1m	72mm^2	40 mm	40 mm x 17 mm
M3081-61602	453563377851	CBL MSL 2m	72mm^2	40 mm	40 mm x 17 mm
M3081-61603	453563402731	CBL MSL 4m	72mm^2	40 mm	40 mm x 17 mm
M3081-61627	453563484501	CBL MSL 10m terminated	72mm^2	40 mm	40 mm x 17 mm
M3081-61628	453563484511	CBL MSL 15m terminated	72mm^2	40 mm	40 mm x 17 mm
M3081-61629	453563484521	CBL 25m MSL Install terminated	72mm^2	40 mm	40 mm x 17 mm

Part number	12NC	Description	Conduit sizes	Bend Radius	Connector Size (L x W)
Both ends are unterminated, use faceplates					
M3081-61615	453563484481	CBL MSL Instal.15m unterminated	72mm^2	40 mm	40 mm x 17 mm
M3081-61625	453563484491	CBL MSL Instal.25m unterminated	72mm^2	40 mm	40 mm x 17 mm
Faceplates					
M3081-68707	453563484531	CBL MSLFace Plate pair of boxes NON US	72mm^2	40 mm	40 mm x 17 mm
M3081-68708	453563484541	CBL MSL Face Plate pair of boxes US	72mm^2	40 mm	40 mm x 17 mm
Insertion Tool					
M3086-43801	453563484771	MSL Insertion Tool for unterminated CBL	72mm^2	40 mm	40 mm x 17 mm

Mounting

Table 11 M3001A Multi-Measurement Module (MMS) and M3002A IntelliVue X2 Mounts

Product Option Number	Part Number 12NC Part No.	Description
M3080A #A01	n/a	Wall Mounting Plate

Table 12 M8048A Flexible Module Rack Mounts

Product Option Number	Part Number	12NC Part No.	Description
M8048A #E15	M4041-42303	453563494101	Cable Management
M8048A #E20	M4041-60005	453563477961	MMS Mount
	M8048-64002	453563456901	Handle (part of small parts kit)
M1180A #C33	M1034-60104	453563490591	BIS Mount
n/a	M4041-22302	451261011861	Mounting Plate Adapter clamp (for wall mounting)

Remote Displays (M8031B)

Space Requirements

Size (W x D x H)

372mm x 308mm x 74.1mm (14.65” x 12.13” x 2.92”)

Weight

Without deskstand: 5200g (11.5lb)

With desk stand: 9000g (19.8lb)

Environmental Requirements

Temperature

Operating: 0 to 40ºC (32 to 104ºF)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 20 to 85% RH (Non-condensing)

Storage: 5 to 85% RH (Non-condensing)

Altitude

Operating: Up to 4000m (13123.36 ft.)

Storage: Up to 12000m (39370,08 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: ~30W

Remote Displays (865299)

Space Requirements

Size (W x H x D)

429mm x 359mm x 61mm (16.89” x 14.13” x 2.4”)

Weight

6.1 kg (13.45 lbs.)

Environmental Requirements

Temperature

Operating: 0 to 40ºC (32 to 104ºF)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 30 to 70% RH (Non-condensing)

Storage: 10 to 90% RH (Non-condensing)

Altitude

Operating: Up to 4000m (13123.36 ft.)

Storage: Up to 12000m (39370,08 ft.)

Electrical and Safety Requirements

Voltage ranges:

100V to 240V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: ~48W

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the M8031A/B 15”, the M8033A/B 17” and the 865299 19" TFT Medical Grade Touch Displays.

Table 13 Digital Video cables

Part number	12NC	Description
M8071-61001	453563484551	IV CBL 1.5m Cable Kit
M8071-61002	453563484561	IV CBL 3m Cable Kit
M8071-61003	453563484571	IV CBL 10m Cable Kit.

Touch Cable

Part number	12NC	Description	Conduit sizes	Bend Radius	Connector Size (L x W)
M8081-61010	451261006551	IV CBL Touch, 1.5m	30mm^2	25 mm	35 x 16 mm
M8081-61011	451261006561	IV CBL Touch, 3m	30mm^2	25 mm	35 x 16 mm
M8081-61012	451261006571	IV CBL Touch, 10m	30mm^2	25 mm	35 x 16 mm
M8081-61013	451261006581	IV CBL Touch, 15m	30mm^2	25 mm	35 x 16 mm
M8081-61014	451261006591	IV CBL Touch, 25m	30mm^2	25 mm	35 x 16 mm

IntelliBridge

Cabling Options

Part number	12NC	Description	Conduit Sizes	Max. Bend Angle	Connector Size (L x W)
M8081-61001	453563484591	IV CBL 1.5m LAN/ RS232 straight	30 mm^2	25 mm	15 x 15 mm
M8081-61002	453563484601	IV CBL 3m LAN/RS232 straight	30 mm^2	25 mm	15 x 15 mm
M8081-61003	453563484611	IV CBL 10m LAN/ RS232 straight	30 mm^2	25 mm	15 x 15 mm

Local Printer

See printer documentation

RS232/MIB/LAN Interface

Table 14 MIB Cable and Serial Cable

Part number	12NC	Description	Conduit Sizes	Max. Bend Angle	Connector Size (L x W)
M8081-61001	453563484591	IV CBL 1.5m LAN/ RS232 straight	30 mm^2	25 mm	15 x 15 mm
M8081-61002	453563484601	IV CBL 3m LAN/RS232 straight	30 mm^2	25 mm	15 x 15 mm
M8081-61003	453563484611	IV CBL 10m LAN/ RS232 straight	30 mm^2	25 mm	15 x 15 mm
M8081-61004	453563484621	IV CBL 15m LAN/ RS232 straight	30 mm^2	25 mm	15 x 15 mm
M8081-61005	453563484631	IV CBL 25m LAN/ RS232 straight	30 mm^2	25 mm	15 x 15 mm

Cable and Adapter Set

Nurse Call Paging Cable

Part number	12NC	Description	Conduit Sizes	Bend Radius	Connector Size
453564214531	453564214531	CBL Nurse paging cable 3m	0.125 mm^2	12 mm	9 x 12 mm One end terminated with 6P6C connector. one end without connector.
453564220531	453564220531	CBL Nurse paging cable 10m	0.125 mm^2	12 mm	9 x 12 mm One end terminated with 6P6C connector. one end without connector.
M8087-61001	453563484741	IV CBL 10m flex nursepaging MDR&open con	40 mm^2	30 mm	35 x 16 mm One end terminated with straight MDR connector, one end without connector

ECG Out Interface

Table 15 ECG Out Cable

Part number	12NC	Description	Conduit Sizes	Bend Radius	Diameter	Comments
8120-1022	453563198151	CBL ECG Out 3m Phone plug terminated	40 mm^2	30 mm	13 mm	3m cable (Both ends are terminated with .25” phone plugs
M1181-61625	453563255091	CMS CBL ECG OUT CABLE KIT 25m				cable kit consisting of: 25 m raw cable, 2 x 1/4” socket, 1 x 1/4” plug
M1783A	989803105251	Sync Cable 12-pin 2.5M. (8ft.)				one end is terminated with ECG 12 pin and one end is terminated with phone plug
M5526A	989803129001	24' Sync Cable				one end is terminated with ECG 12 pin and one end is terminated with phone plug

8 Site Preparation

9

Gas Analyzers

For details on the M1026A/B Anesthetic Gas Module, the M1013A IntelliVue G1 and the M1019A IntelliVue G5, please refer to the respective Service Guides on your documentation CD.

For details on configuring the RS232/MIB port for the gas analyzers, see *Connection of Devices via the MIB/RS232 Interface (Rev. D.00.xx or higher) i*n the Installation Instructions chapter

10

Specifications

Essential Performance

The following tables list the essential performance for IntelliVue Patient Monitors, in combination with Multi-Measurement Modules (MMS), MMS Extensions, the Flexible Module Rack (FMS) and Measurement Modules. The essential performance is maintained under the electromagnetic conditions specified in chapter "Safety and Performance Test" of the Instructions for Use. The essential performance is specified separately for non-transient and for transient electromagnetic interference.

Essential Performance for Non-Transient EMC Phenomena

- Radiated electromagnetic fields
- Conducted disturbances induced by RF fields
- Conducted disturbances induced by magnetic fields
- Voltage dips / voltage variations

Parameter	Essential Performance
General	No interruption or cessation of current operating mode (e.g. no reboot, display ok, …) No spontaneous operation of controls (e.g. no activation of touch screen controls without user interaction)
BIS	Measurement of the bispectral index (BIS).
C.O. / CCO	Measurement of the blood temperature within the specified error limits
	Alarming on blood temperature limit violations.
ECG (Monitoring)	Measurement of the heart rate within the specified error measurement ranges (adult, pediatric and neonatal)
	Alarming on asystolie, or heart rate limit violations as specified in IEC 60601-2-27 :2005.
	Detection of VFIB and alarming.
	ECG-Output Signal delay

Parameter	Essential Performance
ECG (Diagnostic)	Diagnostic bandwidth
	Measurement of the spectral edge frequency, mean dominant frequency, peak power frequency, total power as well as the percentage of power in bands alpha, beta, theta and delta.
Invasive Pressure	Measurement of systolic, diastolic and mean blood pressure and pulse rate within the specified error limits.
	Alarming on systolic, diastolic and mean blood pressure and pulse rate limit violations.
NBP	Measurement of systolic, diastolic and mean blood pressure and pulse rate within the specified error limits.
	Automatic cycling
	Alarming on systolic, diastolic and mean blood pressure limit violations.
Respiration	Measurement of the respiration rate within the specified error limits.
	Alarming on apnea and respiration rate limit violations.
Respiratory Gases CO2, O2, N2O, Anesthetic Agents)	Measurement of the respiratory gases within the error limits of EN ISO 21647:2004 clause 51.101.1
	Measurement of the airway respiration rate within the specified error limits.
	Alarming on apnea, airway respiration rate and respiratory gas limit violations.
Spirometry	Measurement of spirometry values within the specified error limits.
	Alarming on apnea, and PEEP, PIP, MV and respiration rate limit violations.
SpO2	Measurement of oxygen saturation and pulse rate within the specified error limits
	Alarming on oxygen saturation and pulse rate limit violations.
Intravascular Oxygen Saturation	Measurement of intravascular oxygen saturation within the specified error limits.
	Alarming on oxygen saturation limit violations.
tcpO2 / tcpCO2	Measurement of transcutaneous partial pressures O2 and CO2 within the specified error limits.
	Alarming on transcutaneous partial pressure O2 and CO2 limit violations.
Temperature, SureTemp+	Measurement of temperature within the specified error limits.
	Alarming on temperature limit violations.

Essential Performance Transient EMC Phenomena

- Electrostatic Discharge (ESD)
- Electrical Fast Transients / Bursts
- Surges
- Voltage interruptions
- Electrosurgery (ESU)

Parameter	Essential Performance
All	After electrostatic discharge, fast transients / bursts, surges and electro surgery interference the equipment will return to previous operation mode within 10 seconds (SpO2 30 seconds) without loss of any stored data.
	After voltage interruptions the equipment returns to previous state without operator intervention and loss of data

MDD Classification

According to the Council Directive 93/42/EEC (Medical Devices Directive) the device classification is 2B, Rule 10.

Safety and Regulatory Information

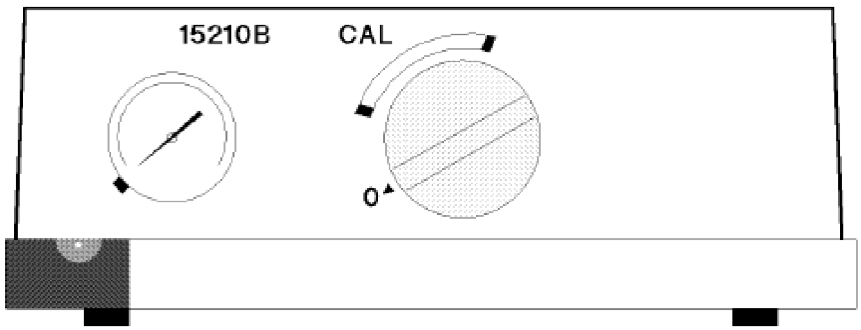
For details about safety and regulatory information refer to the Instruction for Use.

10 Specifications

Appendix - Philips 15210B Calibration Unit

The Philips 15210B Calibration Unit consists of a gas cylinder connected to a gas outlet via a time controlled valve. The valve is normally closed, ensuring that no gas is lost when the unit is not in use. When the unit is set up for use and the timer control knob is turned, gas is directed to the calibration chamber on the tcpO2/tcpCO2 module (Philips M1018A) for a period of up to 20 minutes. After this time the valve automatically closes.

This section provides the necessary information for you to install and service the Philips 15210B.



Unpacking the Instrument

If external damage to the shipping carton is evident, ask the carrier's agent to be present when the unit is unpacked.

Initial Inspection

Check the instrument for any external damage such as dents and scratches on panel surfaces. If the shipping carton is not damaged, check the cushioning material and note any signs of severe stress as an indication of rough handling in transit. Retain the packaging material for possible repacking.

Claims for Damage

If physical damage is evident when the Calibration Unit is received or the unit does not meet the specified operational requirements, please notify the carrier and the nearest Philips Sales/Service office

immediately. The Sales/Service office will arrange for repair or replacement without waiting for settlement of the claim against the carrier.

Repacking for Shipment or Storage

If the Unit is to be shipped to a Philips Sales/Service office, securely attach a tag showing the name and address of the owner, the model and serial number, and the repair required or symptoms of the fault. If available and reusable, the original shipping carton and packaging material should be used to provide adequate protection during shipping. The Philips Sales/Service office will provide information and recommendations on materials to be used if the original material is not available or reusable.

Instrument Identification

Philips uses a nine character sequence for instrument identification. The serial number is located on a plate attached to the rear panel of the instrument.

Specification

Gas Supply:	1 low pressure cylinder.
Gas Flow:	8 ml +4/-2 ml per minute for 15210-64010, 12 ml +4/-2 ml per minute for 15210-60010.
Cylinder Pressure:	Indicated by an integral pressure manometer.
Timer Period:	20 minutes.
Dimensions:	90mm (35.4in) high x 220mm (86.6in) wide x 235mm (92.5in) deep, (without cylinder).
Weight:	2.4 kg (5.3lbs), (without cylinder).

NOTE

The 15210B is intended for use with Philips "CAL 1" gas cylinders (part number 15210-60010 **or** 15210-64010 for Europe and Japan).

Operating Environment

The environment where the Philips 15210B will be used should be reasonably free from vibration, dust, corrosive or explosive gases, extremes of temperature, humidity, etc. The Philips 15210B operates within specifications at ambient temperatures between 0°C and 55°C. The maximum operating relative humidity is 95% at 40°C. Ambient temperatures or humidities which exceed these limits could affect the accuracy of the calibration unit and cause damage to components.

Operating Information

Each Philips 15210B is delivered with a multilanguage collection of stick-on operating labels. Each label summarizes day-to-day operating procedures using the Calibration Unit. It is intended to be stuck to the top surface of the Unit; however, it may be attached to any flat, grease-free surface.

To attach label: Clean the surface where the label is to be placed with soapy water to remove any dirt or grease. Dry the surface thoroughly. Peel off the paper backing and carefully place the label in the required position. Press down firmly with a clean dry cloth, paying particular attention to the edges.

Fitting the Gas Cylinders

When the Calibration Unit is delivered, no gas cylinder is fitted. Before putting the unit into service, screw the cylinder into the opening in the rear panel (See“Routine Maintenance” on page 339” on page , next section).

When new, the calibration unit will contain a small amount of normal air. To expel this air before use and thus prevent inaccurate calibration, turn the timer control fully clockwise after fitting the gas cylinders and allow it to run for the full period. The calibration unit is now ready for use.

Storage of Gas Cylinders

New gas cylinders should be stored in a cool place and not exposed to direct sunlight.

Disposal of Used Gas Cylinders

Do not crush or incinerate used gas cylinders. They may be disposed of as scrap metal.

Routine Maintenance

Changing the Gas Cylinders

1. Before each calibration the gas pressure indicator on the Philips 15210B front panel should be read. If the indicator is in the “black” zone, change the gas cylinder as follows:
2. From the rear of the unit turn the empty gas cylinder anti-clockwise until the cylinder is free (3-6 turns).
3. Withdraw the empty cylinder.
4. Take a full gas cylinder and insert it squarely into the rear of the unit. Turn clockwise until hand tight.
5. Check that the pressure indicator is no longer in the “black” zone.

Care and Cleaning

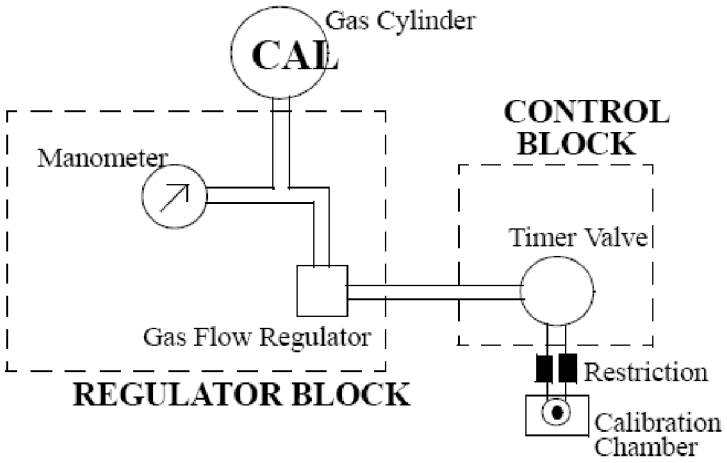
Keep the surfaces of the calibration unit clean and free of dust and dirt. Clean regularly with a lint-free cloth or sponge dampened in soapy water. Avoid using alcohol or ammonia based cleaners which may damage the Calibration Unit. Other strong cleaners such as Povidine RR, Lysol R and Mikroklene R are not recommended since they may stain the unit. Do not pour any liquid on the instrument while cleaning. Never use an abrasive material such a steel wool or metal polish. Cleaning agents and disinfectants should only be used in cases of stubborn dirt. If used, carefully remove any remaining traces of cleaning agent or disinfectant with clean water.

NOTE

Do not allow water to enter the gas outlet.

To clean the gas outlet: Use cotton wool soaked in soapy water to remove any deposits which may collect in the outlet. Dry the outlet thoroughly after cleaning. In the case of severe blockages, a thin length of wire may be used to free the outlet pipe.

Theory of Operation



Block diagram - Internal Components

The gas cylinder is screwed directly into a pressure *regulator block*. This block ensures that, in combination with the *restriction*, the gas flow remains constant as the pressure in the cylinders falls with use. From the regulation block the gas is channelled to the *control block*. The gas passes into the control block via an opening in the side sealed with an "O" ring and filter. The control block acts as a switch.

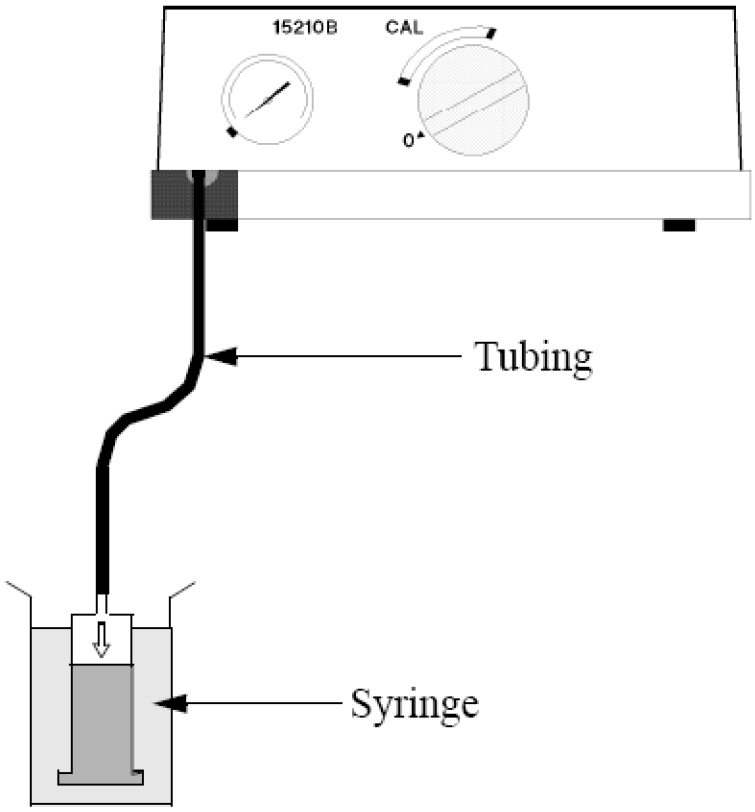
A restriction piece is fitted in the tubing connecting the control block to the gas outlet. The restriction helps to regulate the gas flow.

Gas Flow Performance Check

Philips recommends that the following gas flow check is conducted once a year.

Test Procedure

1. Check that the pressure indicator is not in the black zone (i.e. that there is an adequate supply of gas in the cylinder).
2. Fit gas tubing to the gas outlet, then take the free end and fit it to a water-filled syringe in a glass of water.
3. Turn the timer control fully clockwise and note the volume of water displaced after 60 seconds.



Test Procedure

Action if outside specification

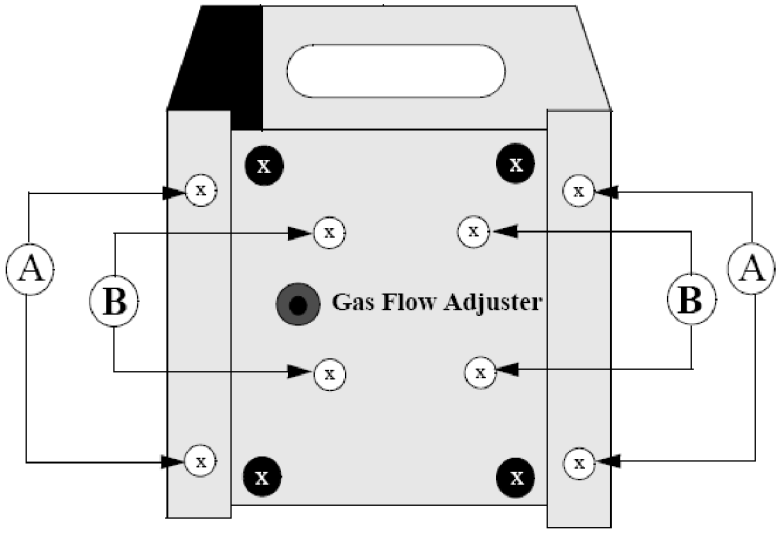
The volume of water displaced in 60 seconds should be 8ml (4/-2ml) for the 15210-64010 gas cylinder or 12ml (+4/-2ml) for the 15210-60010 gas cylinder. If the displacement is within the appropriate one of these ranges, the supply of gas in within specification.

If the gas flow is less that the permitted minimum, remove the Calibration Unit cover (see *Cover Removal* in the next section) and look for an occlusion or leakage.

If the gas flow is greater than the permitted maximum, follow the procedure below:

1 Replace the gas cylinder with a new cylinder.

2 Turn the *Gas flow adjuster screw* on the underside of the unit to reduce the gas flow (see next figure to locate the gas flow adjuster).



Calibration Unit viewed from underneath

3 Repeat the gas flow performance check described above. If the gas flow is still significantly greater than the permitted maximum, remove the cover following the procedure *(Cover Removal)* below.

4 Remove the flow restriction by pulling the tubing off (see Figure 3-4), select a new restriction from the set of restriction pieces (part number 15210-68703) and fit in the unit.

5 Reassemble the unit and repeat the gas flow performance check.

6 Turn the gas flow adjuster screw as necessary.

7 If the gas flow is still greater that the specified rate, repeat the above steps, inserting a longer restriction.

Disassembly

Tools Required: Pozidrive screwdriver, size GN1, Normal screwdriver, size 1/7, Hex-key (Allen-key), size SW 3mm.

1 Cover Removal

a. Remove the gas cylinder from the calibration unit.

b. Remove the four screws on the base of the unit (labeled A – see figure).

c. Slide the cover off towards the rear of the unit.

1 Timer Control Knob

a. The timer control know is secured with a "grub-screw" located in the side of the knob. Loosen this screw approximately 2 turns. The knob can now be pulled off.

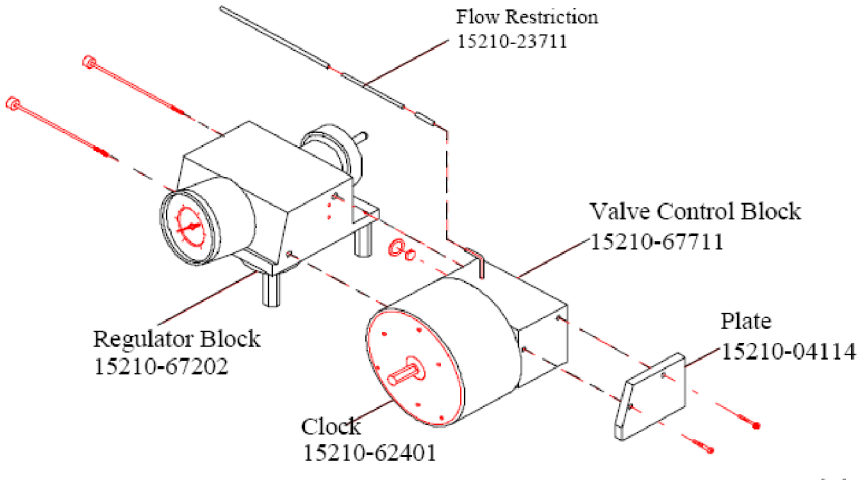
b. Regulator / Control Block Removal

c. Complete operations 1 and 2 above.

d. Remove the connection pipe from the rear of the Calibration Chamber.

e. Unscrew the four remaining screws on the unit base (labeled B in the figure) to release the Regulator / Control Block.

f. The two screws on the regulator block side can now be removed to separate the regulator block from the control block. Be careful not to misplace the "O" ring and filter which are fitted between the two blocks.



Exploded view - Regulator and Control Blocks

Parts List

Table 16 Replaceable Parts for the 15210B

Part Number	Description
15210-47101	Flat sealing ring (to seal gas bottle)
15210-47106	Membrane foil
15210-62401	Clock
15201-67711	Valve control block
15210-67202	Regulator block left
15210-23711	Flow regulator restriction
0905-0678	8mm ring - between valve control block and regulator block
15210-27401	Timer control knob
0515-0777	Screw M6x8 (for timer control knob)
15210-04111	Cover - bottom
15210-04102	Cover - top
15210-24702	Spacer - hexagonal nut for mounting regulator bloc
15210-62302	Gas outlet block
M2205A	Calibration tubing (set of 5)

11 Appendix - Philips 15210B Calibration Unit

12

IntelliVue MX600/700 Product Structure

The following table shows the product option structure for the IntelliVue MX600/700 patient monitors:

IntelliVue MX600/700 Product Structure Rev. H.1	MX600 865242	MX700 865241
User Interface		
Navigation Point	Basic	Basic
Touch	n/a	Basic
Remote Control	Optional	Optional
Multiple Profiles	Basic	Basic
Multiple Screen Layouts	Basic	Basic
Full Customization Capability	Basic	Basic
Patient Data Management and documentation		
Tabular Trends	Basic	Basic
Graphical Trends	Basic	Basic
Short Trends (Split Screen Trends)	Basic	Basic
High Resolution Trends	Basic	Basic
Recorder Support	Basic	Basic
Print Support inc. Reports	Basic	Basic
Clinical Decision Support		
OxyCRG	Basic	Basic
Neonatal Event Review	Optional	Optional
Car Seat Test	Optional	Optional
Basic Event Surveillance	Optional	Optional
Parameter Histograms	Optional	Optional
Horizon Trends	Basic	Basic
PV Loops	Basic	Basic
Information Portal	Basic	Basic

IntelliVue MX600/700 Product Structure Rev. H.1	MX600 865242	MX700 865241
Cardiac Applications		
Arrhythmia	Basic	Basic
Full Arrhythmia	Basic	Basic
ST Segment Analysis	Basic	Basic
ST Map	Basic	Basic
QT/QTc	Basic	Basic
12 Lead Display Application	Basic	Basic
Clinical Applications		
Alarm Review	Basic	Basic
Hemodynamic Calculations	Basic	Basic
Ventilation Calculations	Basic	Basic
Oxygenation Calculations	Basic	Basic
Drug Calculator	Optional	Optional
Mathematic Calculator	Basic	Basic
Interfaces		
Networking (Fast Ethernet)	Basic	Basic
Basic Nurse Call	Basic	Basic
Remote Control Interface	Optional	Optional
Serial Interface ports (RS232) (Standard/Max.)	1/1	1/1
Serial Interface ports (RS232/MIB) for data export (Standard/Max.)	0/1	0/1
USB 2.0 ports Full Speed (Standard/Max.)	4/4	4/4
VGA/DVI Video Out	Basic	Basic
ECG Sync Out	2 ports	2 ports
MSL Interface (Standard/Max.)	1/1	1/1
Measurement Support		
Number of racks supported (Standard/Max.)	1/1	1/1
Number of modules supported (Standard/Max)	4/4	4/4
Number of IBP measurements (Standard/Max.)	2/4	2/4
Number of Temperature Measurements (Standard/Max.)	2/2	2/2
Number of SpO2 Measurements (Standard/Max.)	1/2	1/2
Number of VueLink/IntelliBridge Connections (Standard/Max.)	2/2	2/2
Add-Ons		
Quick Release Mount	Basic	Basic
Required Purchases	**MX600**	**MX700**
Application Areas		

IntelliVue MX600/700 Product Structure Rev. H.1				MX600 865242	MX700 865241
H10	General / ICU Config.		Option H10 - General and Intensive Care software. Adds application-specific functionality and configurations	Optional	Optional
H20	Neonatal Config		Option H20 - Neonatal software. Adds application-specific functionality and configurations	Optional	Optional
H30	OR / Anesthesia Config.		Option H30 - OR/Anesthesia software. Adds application-specific functionality and configurations	Optional	Optional
H40	Cardiac Config		Option H40 - Cardiac software. Adds application-specific functionality and configurations	Optional	Optional
Waves					
A04	4-Wave Capability		Option A04 - The addition of 4-wave capability which can be used for the display of realtime waveforms and/or high resolution trends	Optional	Optional
A06	6-Wave Capability		Option A06 - The addition of 6-wave capability, which can be used for the display of realtime waveforms and/or high resolution trends	Optional	Optional
Add-On Options				**MX600**	**MX700**
Clinical Applications					
C04	Neonatal CDS Package		Option C04 - The Neonatal CDS package consists of Car Seat Testing, Parameter Histograms and Neonatal Event Review which provides automatic detection, display, storage and documentation of up to 50 neonatal events over 24 hours.	Optional	Optional
C05	Drug Calculator		Option C05 - Drug Calculator	Optional	Optional
C06	Basic Event Surveillance		Option C06 - Basic Event Surveillance allows the user to define events based on the behavior of up to three parameters. When the event triggers, it can be programmed to capture either a waveform snippet (15 seconds) or standard trend (20 minute trend, 12 second resolution)	Optional	Optional
C09	Parameter Histograms		Option C09 - Parameter Histograms provide a time-distribution bar graph of the numerical values during a given time period. X-axis represents parameter range, Y-axis represents % of time.	Optional	Optional
Protocol Watch					
P01		Severe Sepsis Screening	Option P01 - The Severe Sepsis Screening option provides sepsis screening capability according to the SSC guidelines.	Optional	Optional

IntelliVue MX600/700 Product Structure Rev. H.1				MX600 865242	MX700 865241
P02		SSC Sepsis Protocol	Option P02 - Includes the Sepsis Screening and SSC Sepsis Bundles (resuscitation and management).	Optional	Optional
XDS external display solution					
X00	XDS Connectivity		Option X00 - Provides connectivity to a PC running the XDS application. Allows the PC to display independent waveforms, up to the number of waves defined by the Axx option of the host monitor. Includes remote control of the monitor.	Optional	Optional
X30	XDS Clinical Workstation		Option X30 - Provides ability to launch external IT applications on a PC running the XDS application. Transfers patient context information from the patient monitor to the IT application.	Optional	Optional
Measurement Support					
M06	Suppor 2 adtl IBPs		Option M06 extends the capability to measure invasive pressure by two additional lines	Optional	Optional
M20	Support 1 adtl. SpO_2		Option M20 provides the capability to measure two SpO_2 values	Optional	Optional
Hardware Add-Ons					
E00	Remote Control		Option E00 - the IntelliVue Remote Control allows single handed control of the IntelliVue patient monitors. It can be connected either wired (USB) or wireless (Short Range Radio). It comes with a cradle, 3.0 meter USB cable, a wall installation kit and a protection for un-intended removal.	Optional	Optional
E04	4-slot rack with MMS mount		Option E04 - The 8-slot rack with the built-in MMS mounting plate provides 4 module slots for use with individual measurement modules and the recorder.	Optional	Optional
iPC Performance Options					
PC0	Integrated PC (iPC)		Option PC0 - the integrated PC with passive cooling system is optimized for use in a clincal environment. Comes with operating system and basic applications software pre-installed	Optional	Optional
Wired Interfaces					
J13		RS232/ MIB interface	Option J13 - Provides Serial/MIB interface (1 port). Allows connectivity to RS232 and MIB-ready devices	Optional	Optional

IntelliVue MX600/700 Product Structure Rev. H.1				MX600 865242	MX700 865241
J30		Flexible Nurse Call IF	Option J30 - Flexible Nurse Call Relay provides three alarm relays and one power-fail alarm. Both polarities are supported	Optional	Optional
Wireless Interfaces					
J35	802.11 Wireless IF		Option J35 - IntelliVue 802.11 Bedside Adapter consists of the internal radio interface board and the connecting cable.	Optional	Optional
J45	Smart Hopping IF 1.4 GHz		Option J45 - The IntelliVue 1.4 GHz Smart Hopping Interface consists of the internal radio interface board and the connecting cable.	Optional	Optional
J46	Short Range Radio		Option J46 - The Short Range Radio interface consisits of the internal radio board and proved connectivity to the remote control (option E00)	Optional	Optional
J47	Smart Hopping IF 2.4 GHz		Option J47 - The IntelliVue 2.4 GHz Smart Hopping Interface consists of the internal radio interface board and the connecting cable.	Optional	Optional
Cables					
SC1	MSL system cable - 0.75 m		Option SC1 - The 0.75 m long MSL cable connects IntelliVue patient monitors with the MMS (M3001A), X2 (M3002A), MP5 (M8105A) and the FMS (M8048A).	Optional	Optional
SC2	MSL system cable - 2.0 m		Option SC2 - The 2.0 m long MSL cable connects IntelliVue patient monitors with the MMS (M3001A), X2 (M3002A), MP5 (M8105A) and the FMS (M8048A).	Optional	Optional
SC4	MSL system cable - 4.0 m		Option SC4 - The 4.0 m long MSL cable connects IntelliVue patient monitors with the MMS (M3001A), X2 (M3002A), MP5 (M8105A) and the FMS (M8048A).	Optional	Optional
SC6	MSL system cable - 10.0 m		Option SC6 - The 10.0 m long MSL cable connects IntelliVue patient monitors with the MMS (M3001A), X2 (M3002A), MP5 (M8105A) and the FMS (M8048A).	Optional	Optional

IntelliVue MX600/700 Upgrade Structure

The following table shows the available upgrade options for the IntelliVue MX600/700 patient monitors:

IntelliVue MX600/700 Upgrade Structure 86305(MX600) /86304 (MX700)	
Waves	
A06	4- to 6-Wave Upgrade
Clinical Applications	
C04	Neonatal CDS Package
C06	Basic Event Surveillance
C09	Parameter Histograms
Protocol Watch	
P01	Severe Sepsis Screening
P02	SSC Sepsis Protocol
XDS external display solution	
X00	XDS Connectivity
X30	XDS Clinical Workstation
Measurement Support	
M06	Support 2 additional IBPs
M20	Support 1 additional SpO2
iPC Performance Options	
PC0	Integrated PC (iPC)
Wired Interfaces	
J13	RS232/MIB interface
J30	Flexible Nurse Call IF
Wireless Interfaces	
J35	802.11 Wireless IF
J45	Smart Hopping IF 1.4 GHz
J46	Short Range Radio
J47	Smart Hopping IF 2.4 GHz
Software	
SU0	Current Software Revision

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