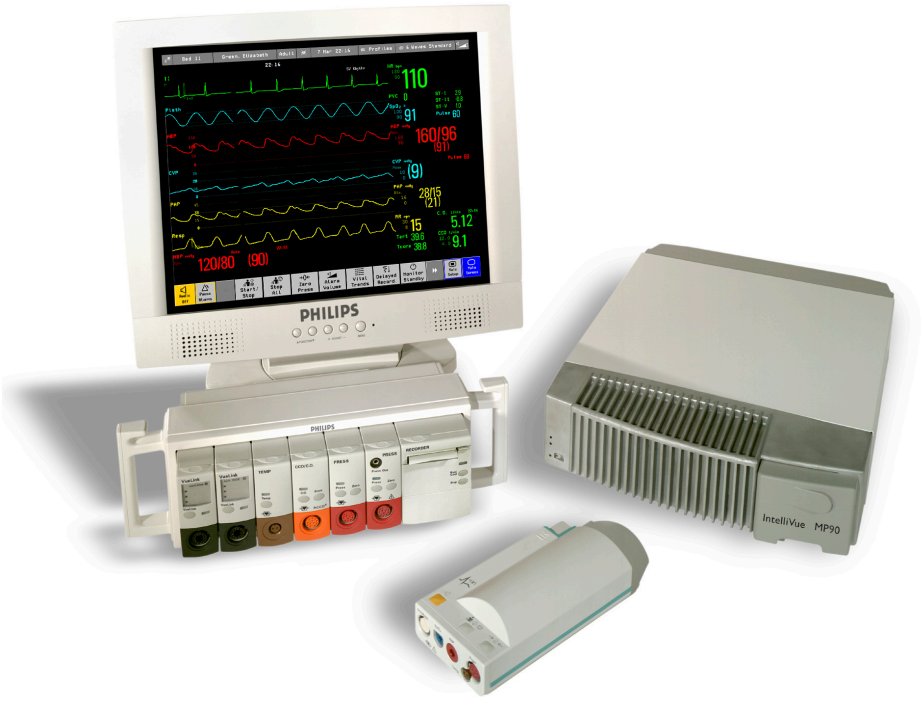


Service Guide

IntelliVue Patient Monitor

MP80/90 & D80

Patient Monitoring

PHILIPS

Part Number M8000-9351K
4535 641 12591

PHILIPS

Table of Contents

1

Introduction

This Service Guide contains technical details for the IntelliVue MP80/90 Patient Monitor, 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 eight 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 MP80/90 Patient Monitor	the monitor
Flexible Module Rack	FMS

Name	Abbreviation
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.

Philips Medizin Systeme Böblingen GmbH

Hewlett-Packard Str. 2

71034 Böblingen, Germany

The information contained in this document is subject to change without notice.

Philips makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties or merchantability and fitness for a particular purpose.

Philips shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

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.

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.

2

Theory of Operation

Monitor Theory of Operation

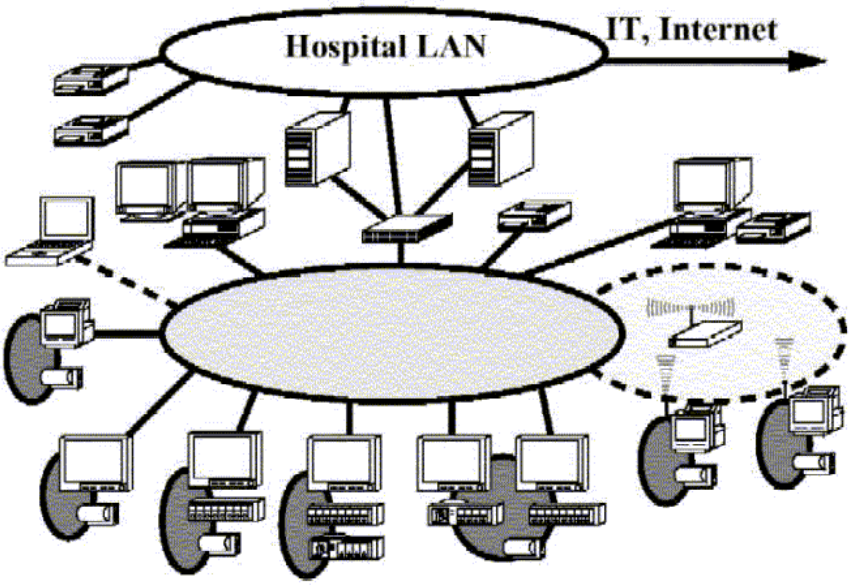
The IntelliVue MP80/MP90 Patient Monitor:

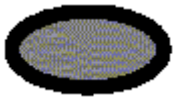
- displays real-time data
- controls the attached measurement servers
- alarms in the case of patient or equipment problems
- offers limited data storage and retrieval (trending)
- interfaces to the Philips Clinical Network and other equipment

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:

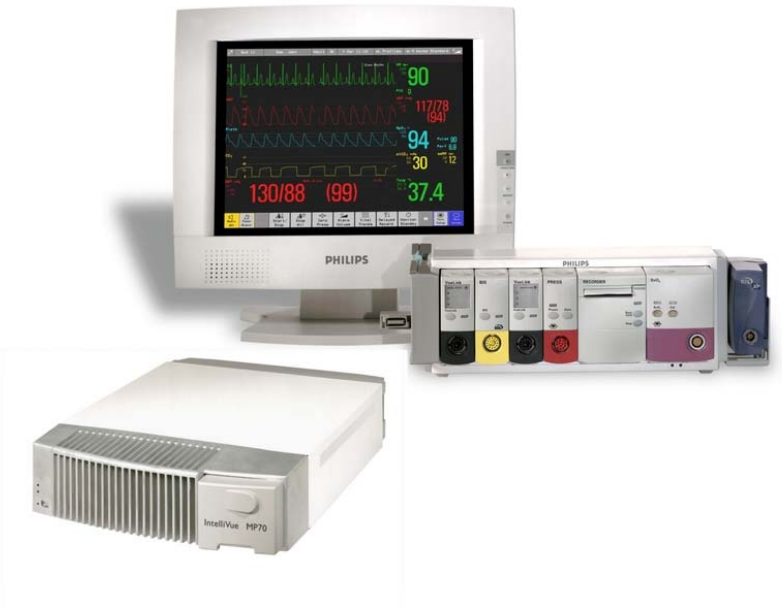


	Measurement LAN combines components of one patient monitor; real time requirements across all interconnected elements
	Philips Clinical Network (wired LAN) connects multiple patient monitors, information centers, application servers; closed system, only Philips qualified products (tested and with regulatory 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:

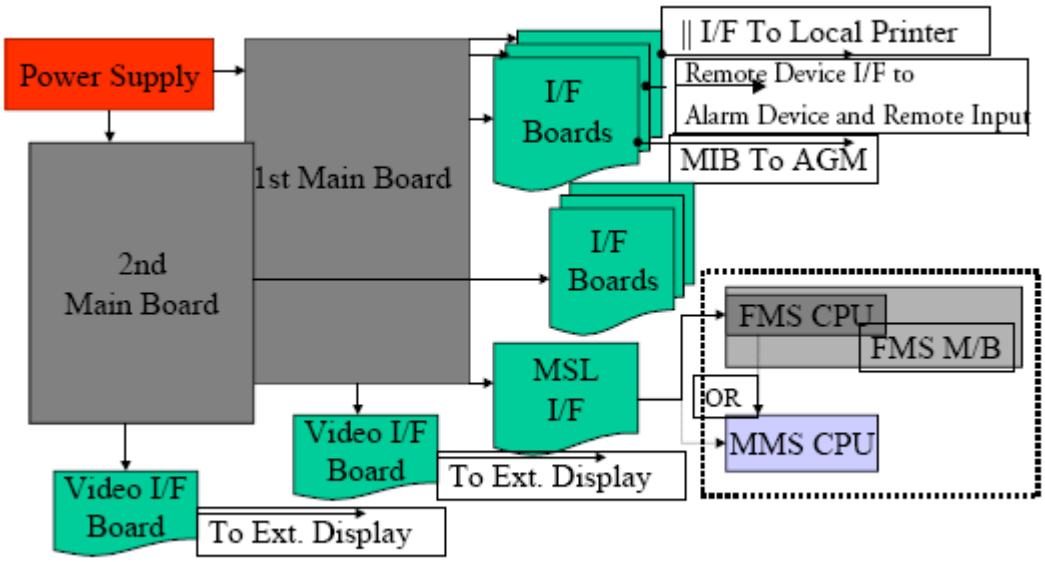
IntelliVue MP80/MP90



The MP80/MP90 monitor:

- can be used with the standalone M8031A 15-inch or the M8033A 17-inch color LCD TFT display with touchscreen operation.
- can also be used with other XGA and SXGA standalone off-the-shelf displays which comply with medical standards such as IEC 60601-1 and IEC 60601-1-2.
- has the central processing unit in a separate module
- uses the Philips SpeedPoint as primary input device whereas the Philips Touchscreen and computer devices such as mice, trackball, and keyboard can be added optionally
- supports the Flexible Module Rack (FMS)

Building Blocks:



Optional Hardware

The M8031A 15-inch color LCD TFT display or the M8033A 17-inch color LCD TFT display (both with touchscreen operation) can be ordered optionally. Additional input devices such as mice, trackball or keyboard can also be added. If the monitor is ordered with the wireless LAN option a wireless transmitter is required. For further details regarding the wireless network please refer to the M3185A Philips Clinical Network documentation.

Compatible Devices

M3001A Multi-Measurement Module (MMS)

M3002A IntelliVue X2

M3012A, M3014A, M3015A, M3016A MMS Extensions

Power Supply

The AC/DC converter transforms the AC power coming from the power plug into 48 V/120W DC source and isolates the monitoring system from the AC power mains.The 48V is distributed via power bus and supplies power to all the components of the system: The 56 V DC power needed for the FMS, MMS and MMS Extension is created by an isolating DC/DC converter. The CPU is supplied with 3.3 V and 5 V DC power. The transformation is performed in two steps: The first DC/DC converter is a power regulator which reduces the variations caused by load changes on the 48V power bus. The second DC/DC converter converts the power to the needed voltage. Interface boards require a power of 10V AC.

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.

I/O Boards

Interfaces to the monitor are implemented via I/O boards. The location of these boards is restricted by general rules. The I/O slot designations diagram and the I/O matrix which outline the I/O board placement rules can be found in the *Installation Instructions* section.

The following is a list of Interface (I/O) boards which may be present in your monitor, depending on your purchased configuration:

- MSL
- Video (analog)
- Philips Clinical Network (LAN wired or wireless)
- Basic Alarm Relay (Nurse Call)

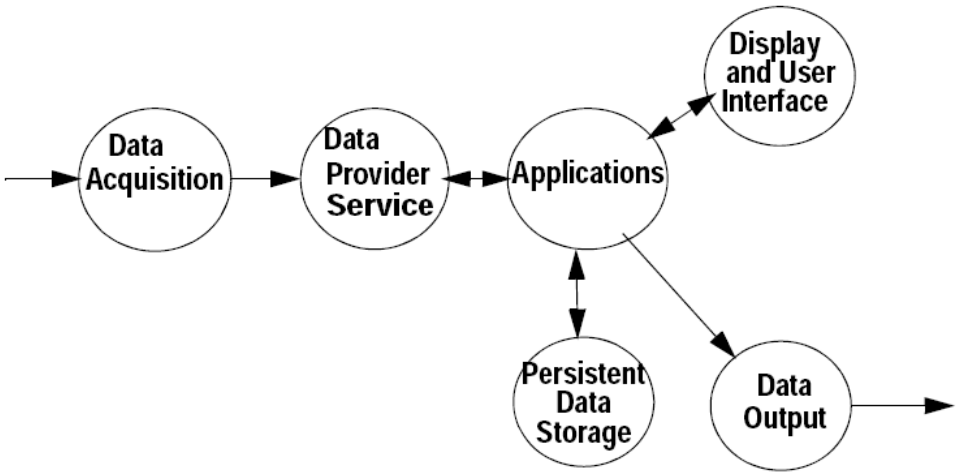
I/O boards:

- PS/2
- MIB/RS232
- USB
- Flexible Nurse Call
- Parallel printer
- Remote devices (Remote Alarm Device, Remote Extension Device)
- IntelliVue 802.11 Bedside Adapter

The specifications for the above listed interfaces can be found in the technical data sheet for the monitor and in the *Installation and Specifications* chapter of the Instructions for Use.

Data Flow

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



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 printers, RS232 based data collection devices, nurse call systems etc.

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 dual 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:

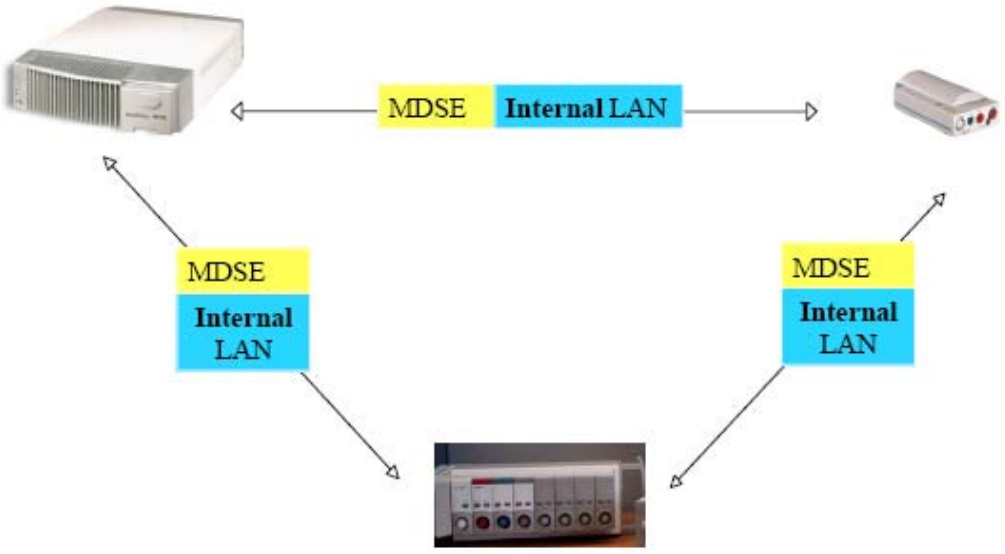
- Digitized patient signals including wave data, numerical data and status information (typically from the measurement server to a display unit)
- Control data representing user interactions (typically from the display unit to a measurement server)
- Shared data structures, for example representing patient 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 external wireless adapter or 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.

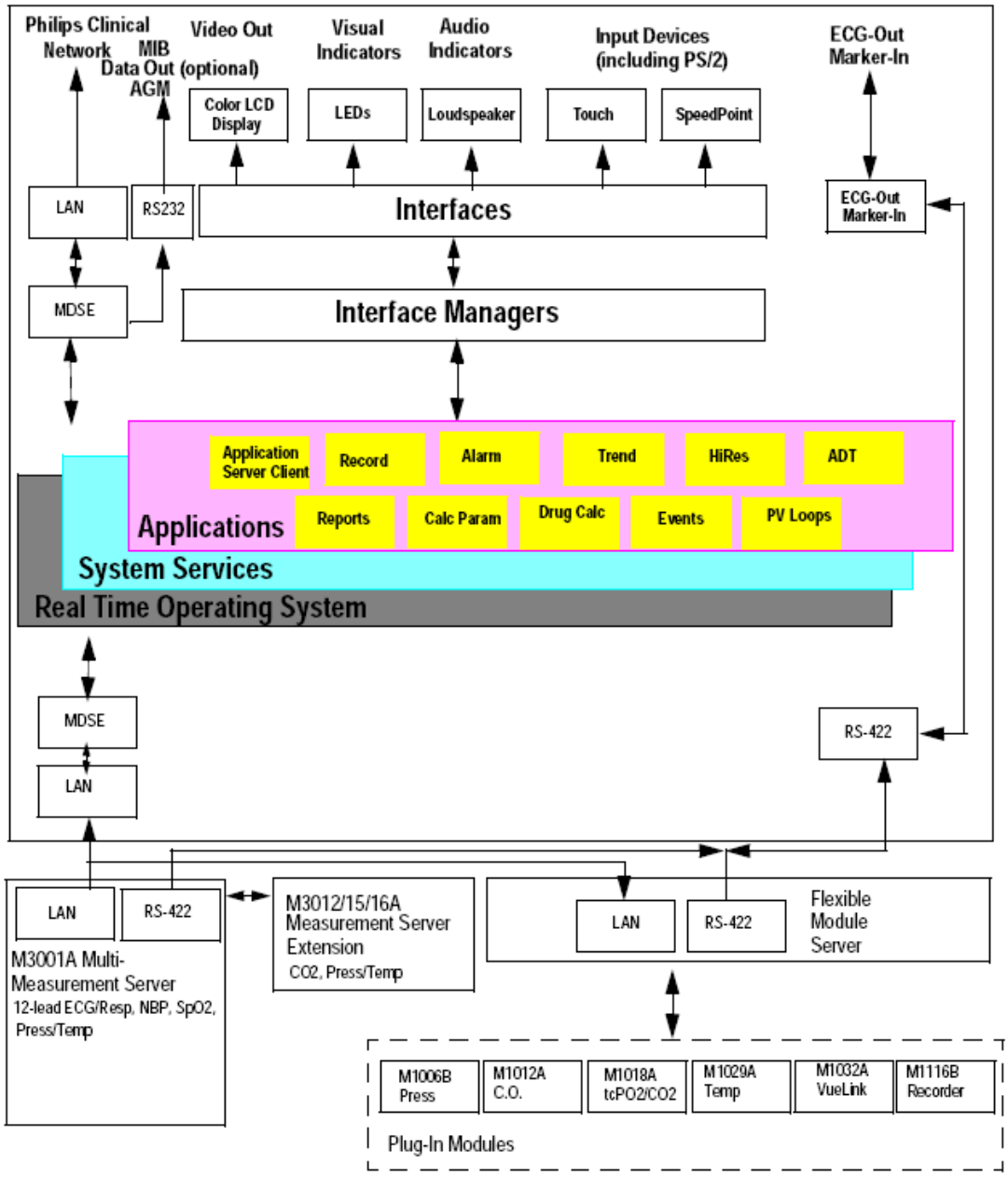
The service protocol developed for this purpose uses a raw access to the devices without the need for IP addresses etc. over a standard customer network installation, so that even defective devices can be upgraded as long as the few kBytes of initial boot code are working. The boot code itself can also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

shows the functional block diagram for the monitoring system. A legend explaining terms and diagram elements follows. The information below varies depending on the purchased monitor options.



IntelliVue Patient Monitoring System Functional 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.

Functional Block	Description
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.
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.

Functional Block	Description
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.
HiRes	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
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.
Drug Calc	The Drug Calc application aids in calculating drug dosages for patients.
PV Loops	The PV Loops application compares graphic representations of airway waves to help detect changes in the patient airway condition.
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.

Functional Block	Description
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)
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.
Centronics	The Centronics interface implements the standard signaling method for bi-directional parallel peripheral devices according to IEEE 1284-I. The interface is used as a parallel interface to a standard printer with electrical isolation and ESD protection.

Functional Block	Description
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, Speed Point, USB and PS/2 devices), formats the collected data and sends it to the display and Operating Interface.
ECG-Out Marker-In	The ECG Out/Marker In 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. In addition, the ECG Out controller receives from a connected device the marker information and forwards this data to the ECG/Resp Arrhythmia ST-Segment physiological algorithm. The converted analog signal is used to synchronize a connected device to the patient's ECG
RS-422	The serial link RS-422 interface communicates the ECG signal to the ECG Output/Marker In of the IntelliVue Patient Monitoring System display unit. The interface is a serial, differential, full-duplex link. The interface is ESD protected.
PS/2	The PS/2 interface supports the serial protocol of standard PS/2 devices (mouse). The PS/2 serial protocol is interpreted by the HIF Control interface.
Nurse Call	The Nurse Call board contains 2 connectors. A phone jack type connector and a multi-port connector. The phone jack type connector has a single close-on-alarm relay. The multi-port connector has 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.
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.

Functional Block	Description
USB Interface	The USB interface allows connection of USB devices (Mouse, Keyboard, Barcode Scanner, Printer) to the monitor.

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 Vicinity:** 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 vicinity 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: 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 Sync Pulse 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	
		VueLink Performance	
		IntelliBridge Performance Test	
		Nurse Call Relay Performance	
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	
		Patient 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, SvO2 and tcGas parameters do not require performance testing. See ***EEG, SvO2 and tcGas Performance Tests*** (on page 103) 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.**

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 **no** display connected to the video output	Perform Visual Inspection and Power On Test
Installation of a monitor with a medical display specified by Philips	Perform Visual Inspection and Power On Test
Installation of a monitor with an off-the-shelf display (non-compliant with IEC 60601-1)	Perform Visual Inspection, Power On and System Test
Installation of a monitor with AGM or IntelliVue G1/G5, connected to separate mains sockets.	Perform Visual Inspection and Power On 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 IT equipment e.g. printer, PC connected via a functional connection e.g. Centronics or USB.	Perform Visual Inspection, Power On and System Tests

Service Event (When performing...	Tests Required ...Complete these 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 networked monitor (LAN)	Perform Visual Inspection and Power On Test
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 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 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
Repairs of IntelliVue 802.11 Bedside Adapter	Perform Visual Inspection, Power On and IntelliVue 802.11 Bedside Adapter 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

Service Event (When performing...	Tests Required ...Complete these tests)
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 parameter module, MMS or X2 has been replaced.	Perform Visual Inspection, Power On and Basic Performance Assurance
Repairs where the printer connected via Centronics or USB I/O 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.
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
Installation of Interfaces or Hardware **Upgrades** where the power supply or parameter boards need to be removed.	Perform Visual Inspection, Power On Test, Basic Performance Tests and all Safety Tests

Service Event (When performing...	Tests Required ...Complete these tests)
Combining or Exchanging System Components	Perform the System Test for the respective system components

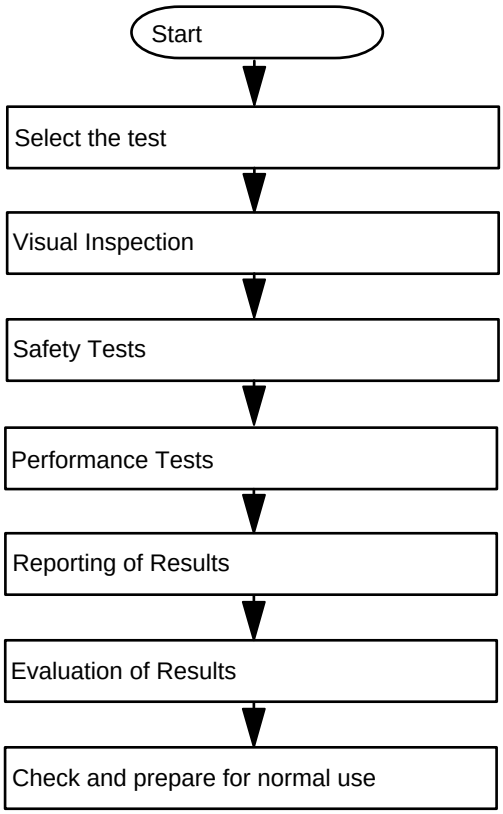
*M3015A with the old hardware Rev. A (i.e. Serial No. DE020xxxxx) also require the pump and scrubber replacement procedures.

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:



See ***When to Perform Tests*** (on page 36)

See ***Visual Test*** (see "Before Each Use" on page 41).

See ***Safety Test Procedures*** (on page 44).

See ***Performance Assurance Tests*** (on page 84).

See ***Reporting of Test Results*** (on page 107)

See ***Evaluation of Test Results*** (on page 111)

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 required)

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 of the monitoring system 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 ***System Test*** (on page 69) procedure.

Accessories of the monitoring system 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

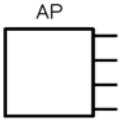
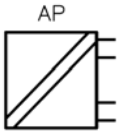
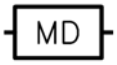
- These tests are well established procedures of detecting abnormalities that, if undetected, could result in danger to either the patient or the operator.
- Disconnect the device under test from the patient before performing safety tests.
- Disconnect the device under test from mains before performing 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:
  IEC60601-1:1988 + A1:1991 + A2:1995 = EN60601-1:1990 +A1:1993 + A2:1995
  IEC60601-1-1:2000
  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 safe installation or service of the product. 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:

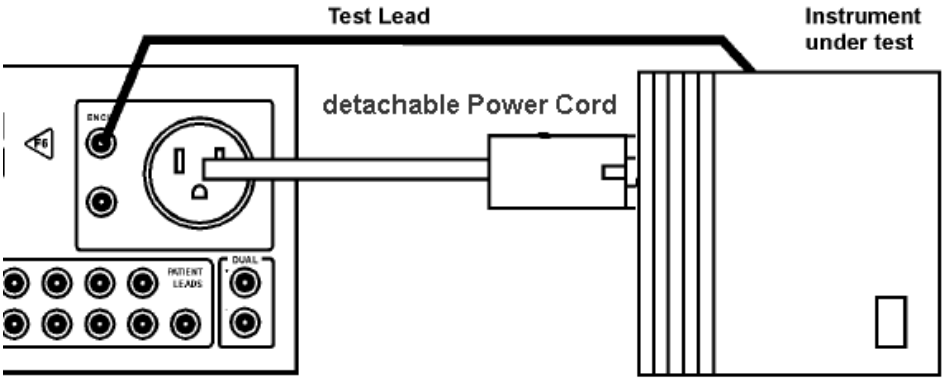
- the integrity of mechanical parts, internally and externally.
- any damage or contamination, internally and externally.
- that no loose parts or foreign bodies remain in the device after servicing or repair.
- the integrity of all relevant accessories.

Hints for Correct Performance of Safety Tests

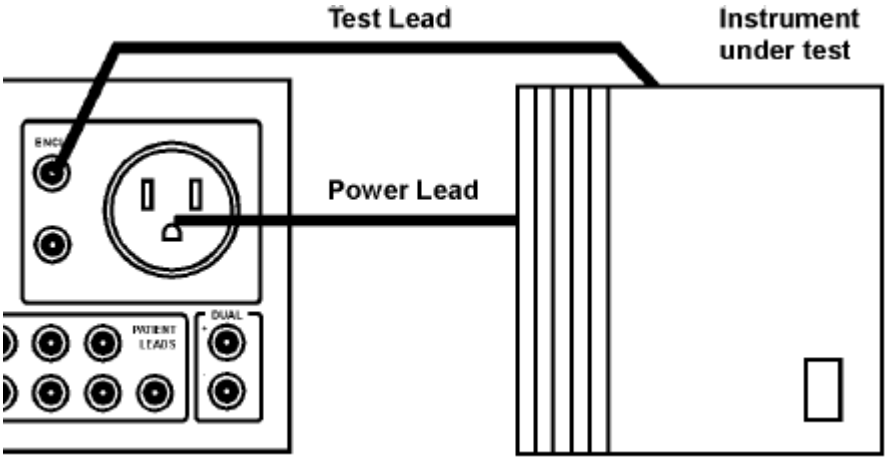
- Perform a visual inspection on all detachable power cords used with the monitoring system and include these in all safety test procedures.
- Connection lines such as data lines or functional earth conductors may appear to act like protective earth connections. These may lead to incorrect measurements and need to be considered during testing. If necessary, unplug these connections.
- Position all cables and cords in such a manner that they do not influence the safety tests.
- Measurement of insulation resistance is not required.

Guideline for Performance of Safety Tests

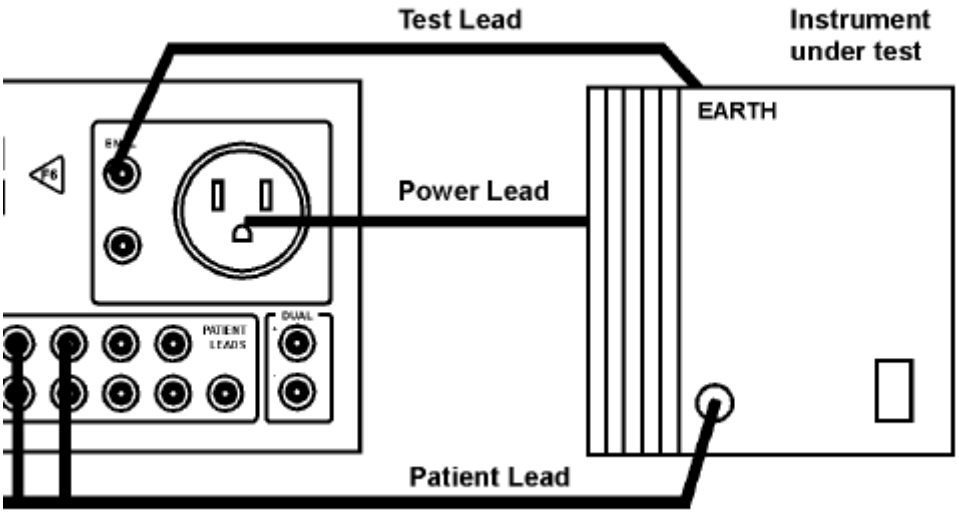
Connect the detachable power cord of the device under test to the safety analyzer's test mains port. Connect the enclosure test lead of the safety analyzer to the enclosure of the device under test, e.g. to the equipotential connector. For testing the applied part leakage current, connect all applied 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



Equipment Leakage Current Test - Setup Example



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).

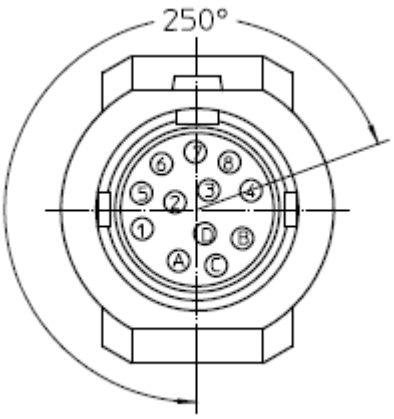
Safety Test Adapter Cable - Schematics

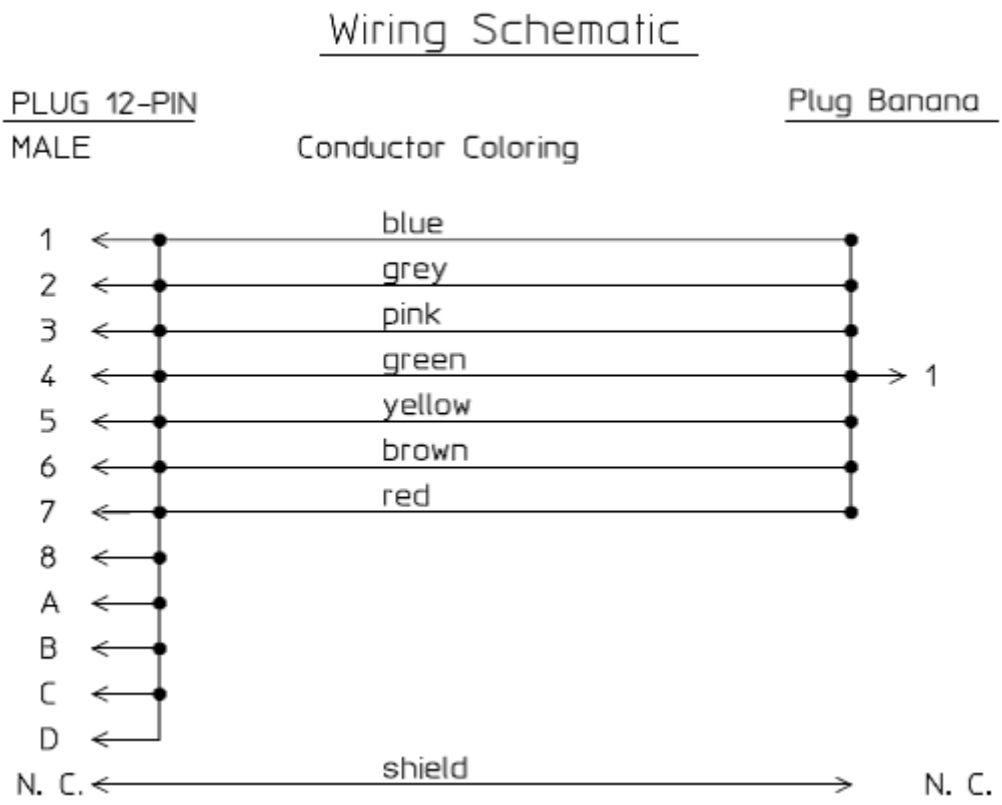
The following graphics provide schematics of safety test (patient lead) adapter cables which can be used for electrical safety testing. These schematics can also be used as a guideline for making your own safety test adapter cables. Alternatively, other methods to make safety test adapter cables can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

NOTE

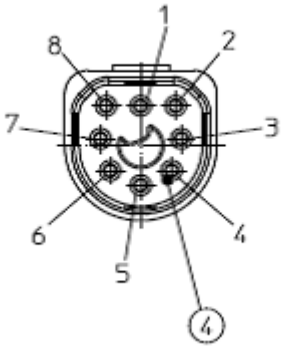
You may not need all of the cables displayed below for electrical safety testing of your respective monitor.

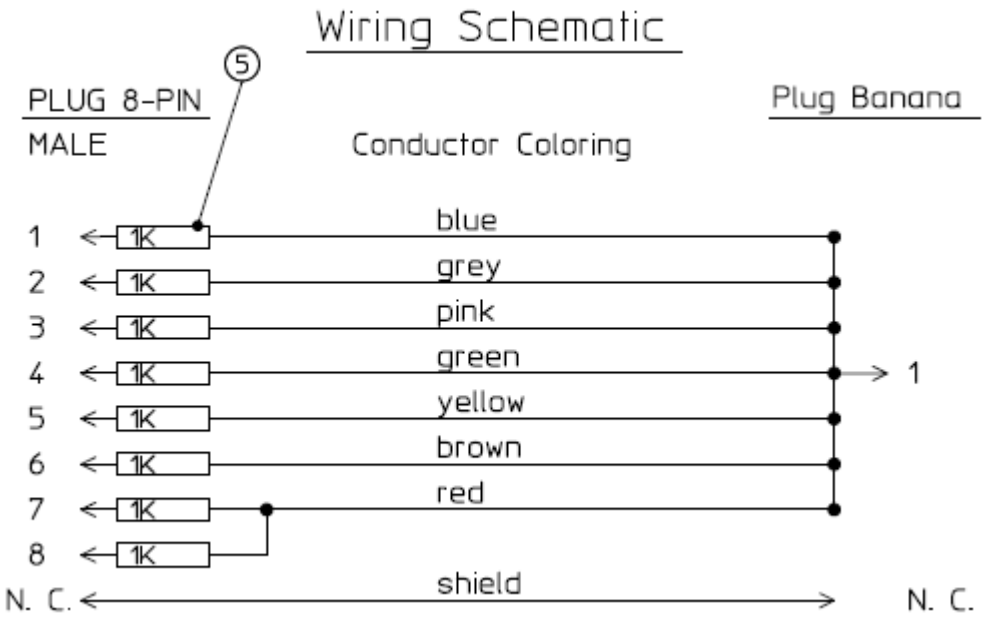
ECG:



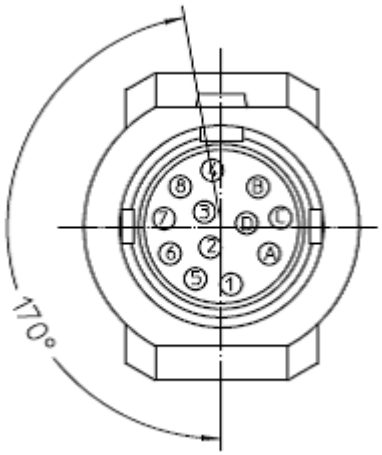


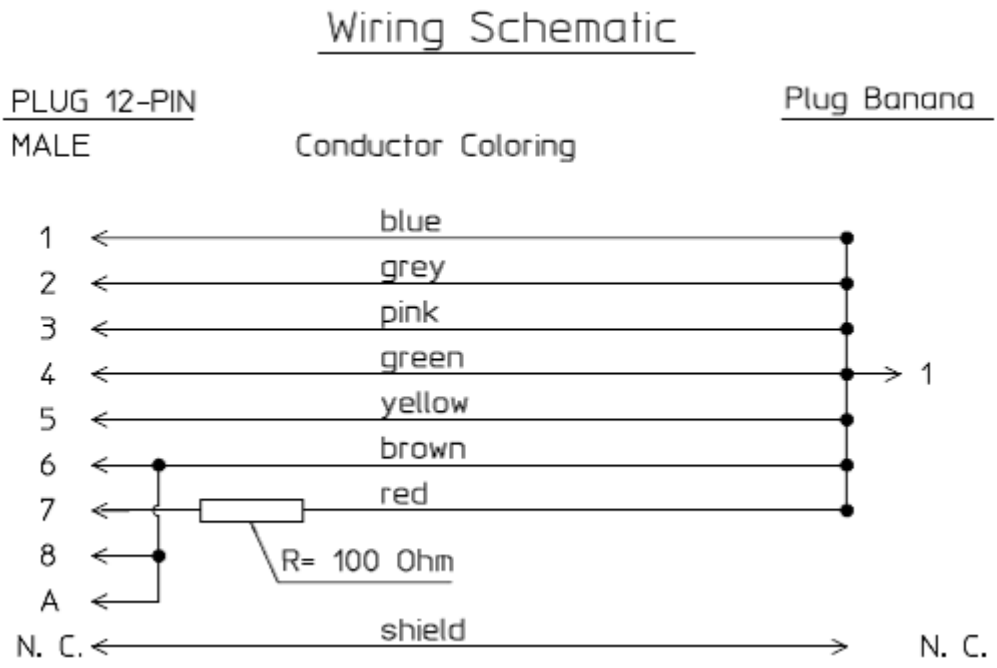
SpO2 (MP2/X2, MP5, M3001A & M1020B #A01, #A02, #A03):



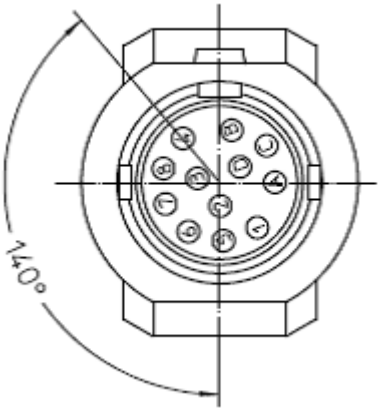


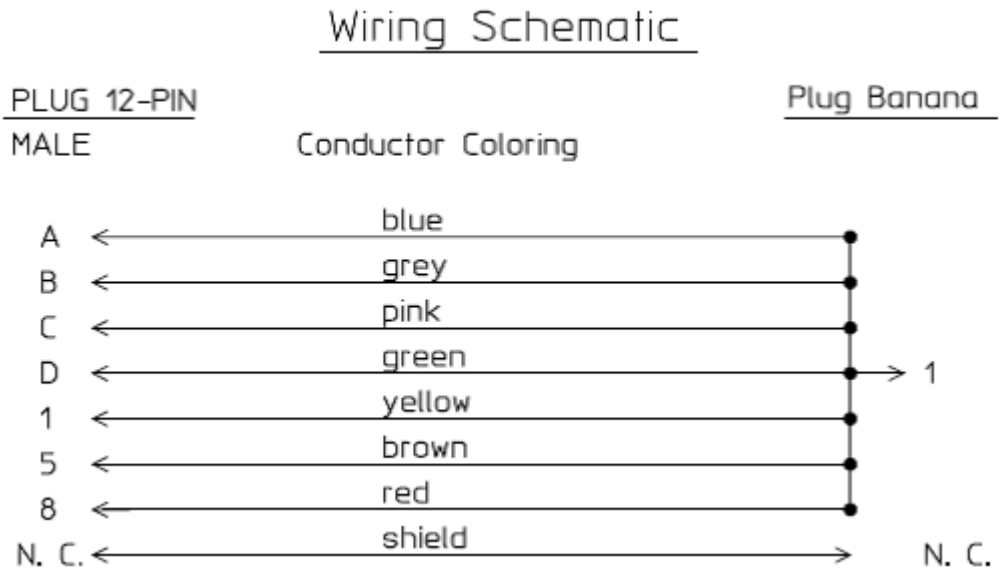
SpO2 (M1020A):


170°

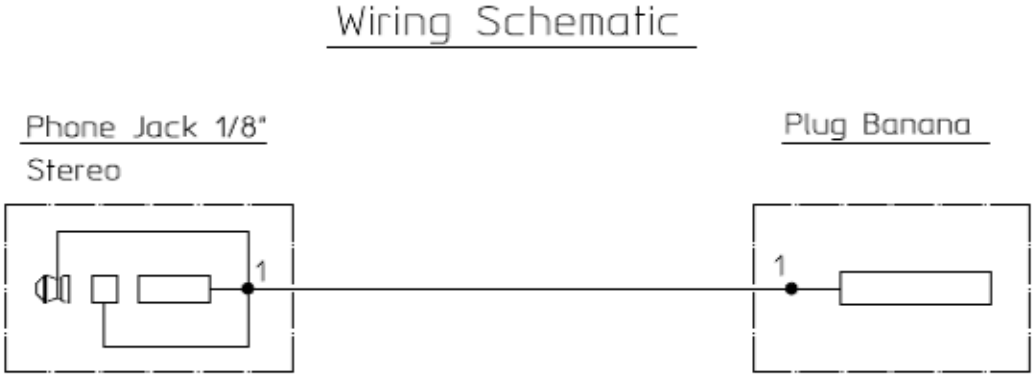

Wiring Schematic
PLUG 12-PIN
MALE
Conductor Coloring
Plug Banana
1
2
3
4
5
6
7
8
A
N. C.
blue
grey
pink
green
yellow
brown
red
R= 100 Ohm
shield
1
N. C.

Invasive Pressure:

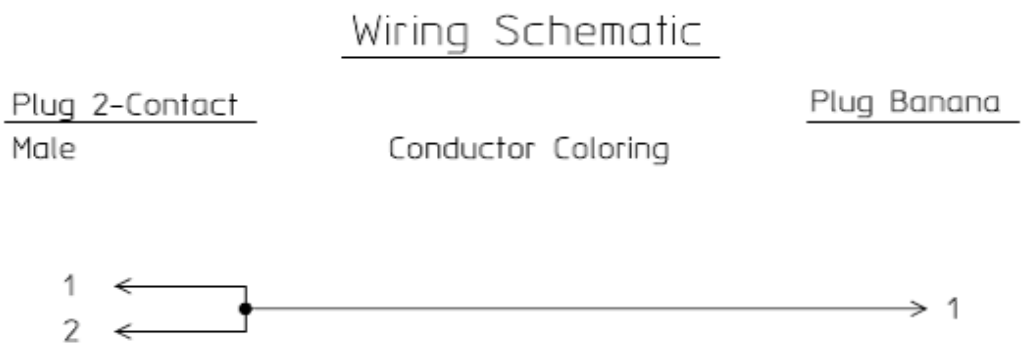




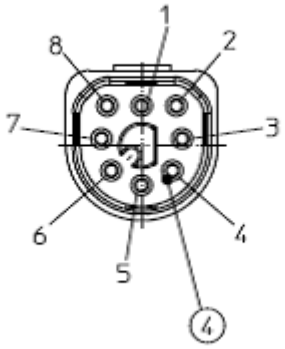
M1006B #C01:

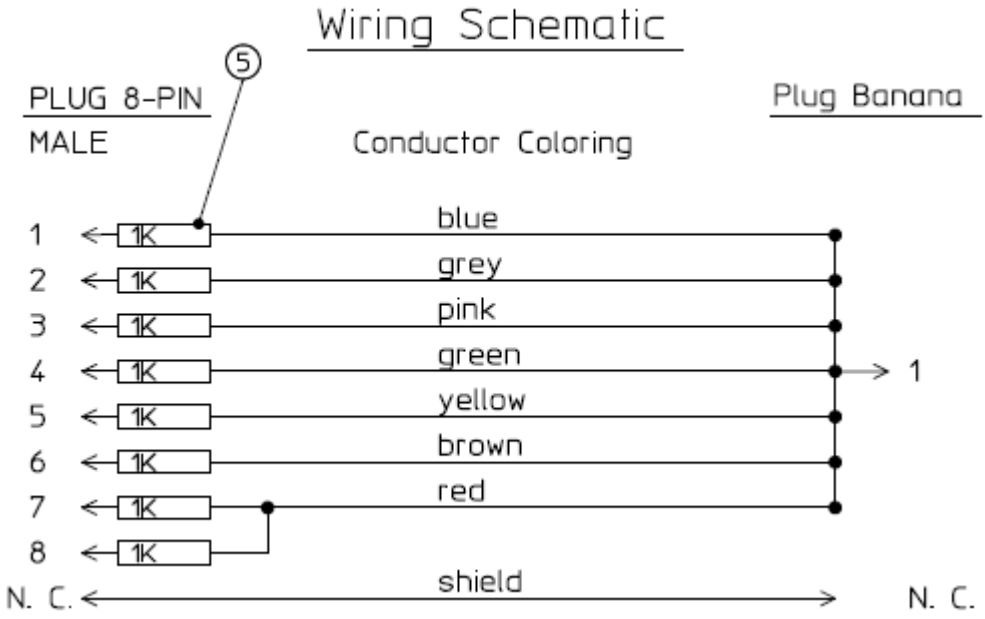


Temperature:

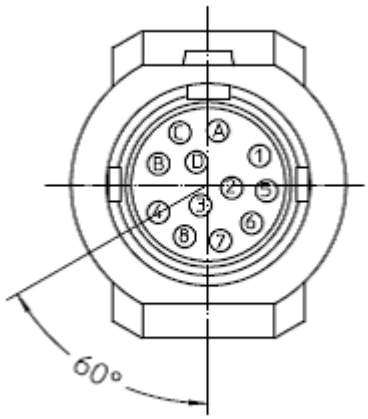


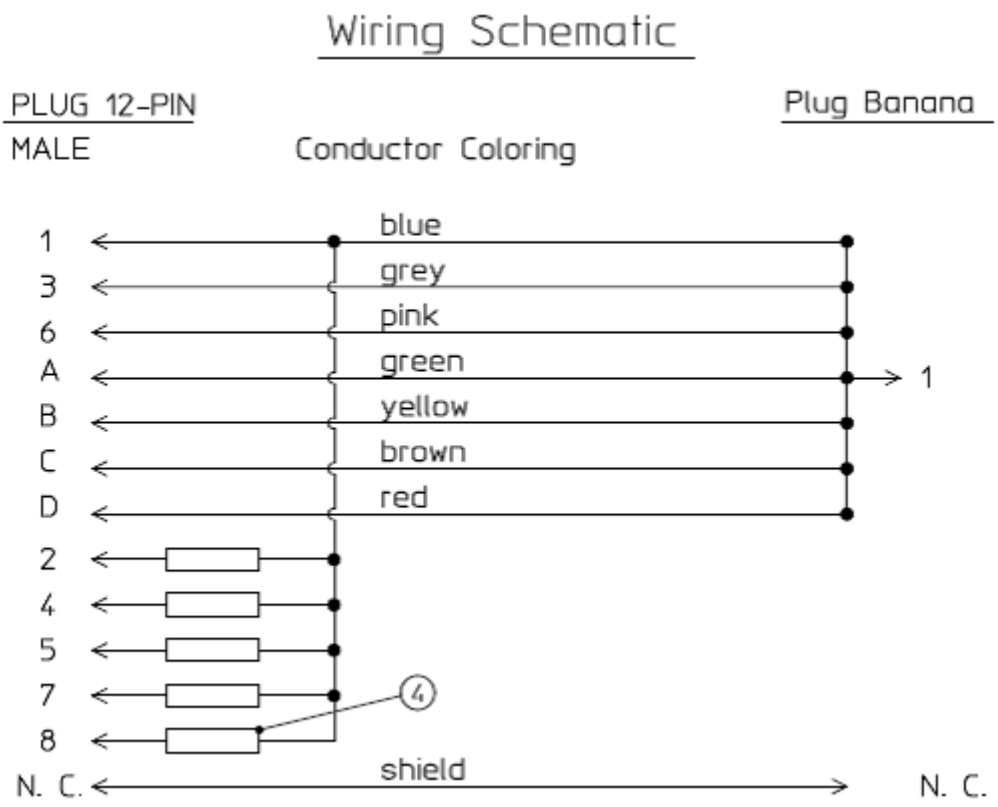
CO2 (MP5, M3014A):





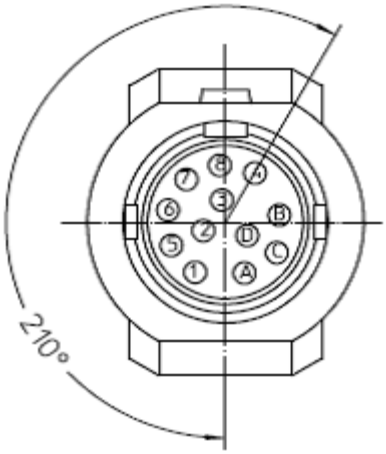
CO2 (M1016A, M3016A):





4 = all resistors 120 KOhm

Cardiac Output:



Wiring Schematic

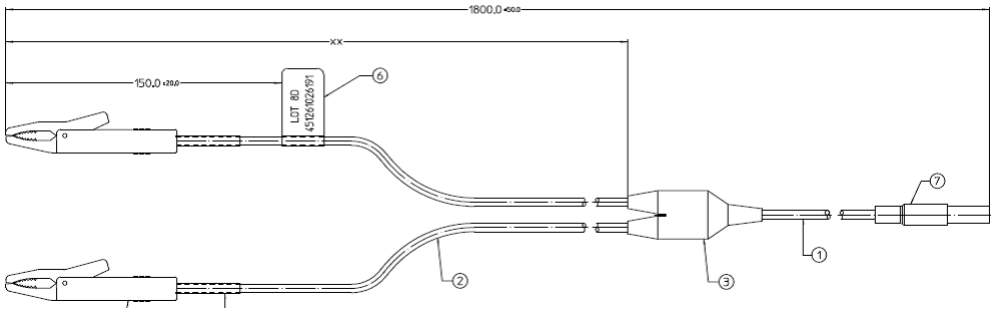
PLUG 12-PIN
MALE

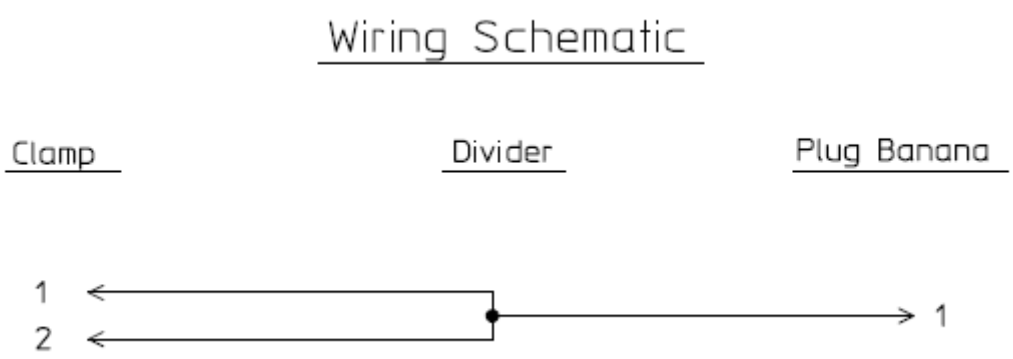
Conductor Coloring

Plug Banana

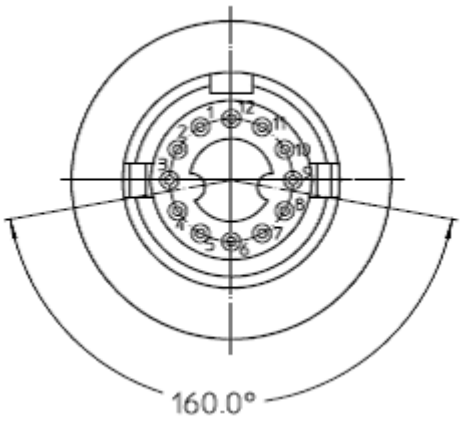
BIS:

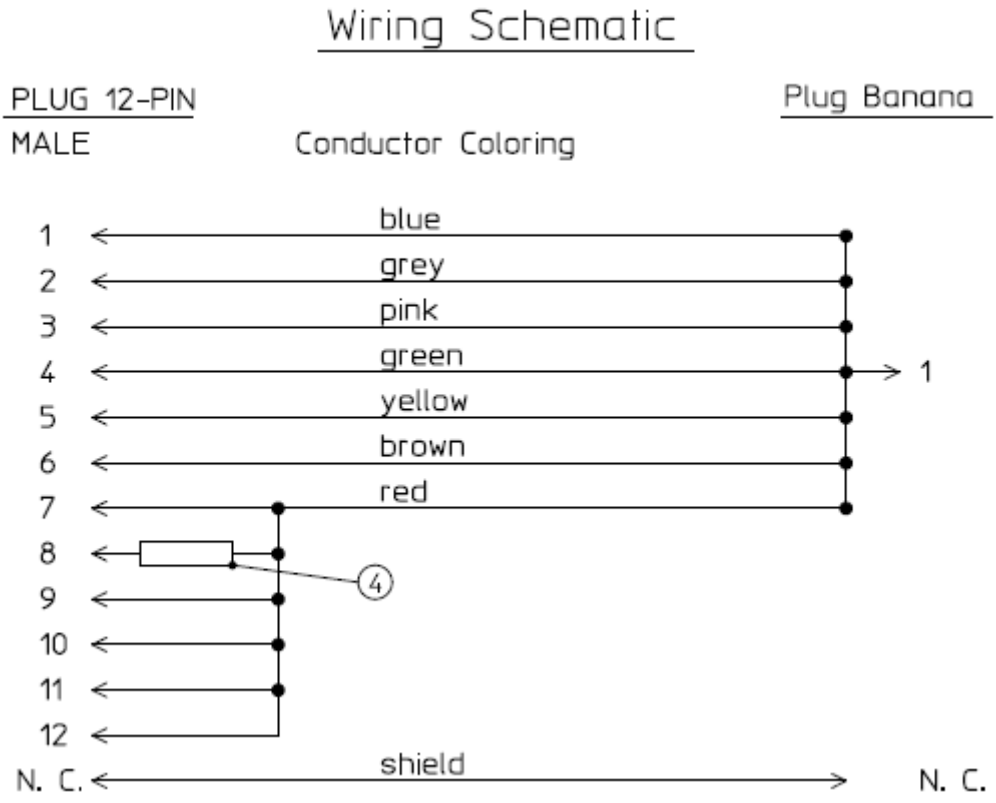
Use Clamp Adapter Cable and M1034-61650 BIS sensor simulator.





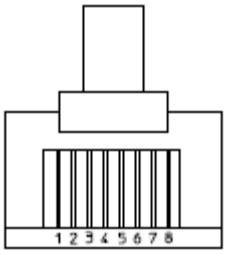
VueLink:

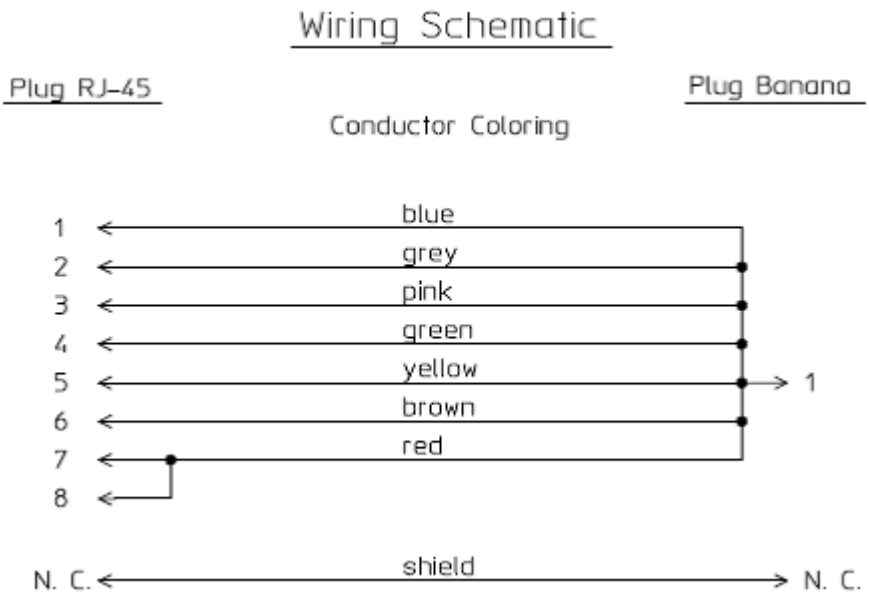




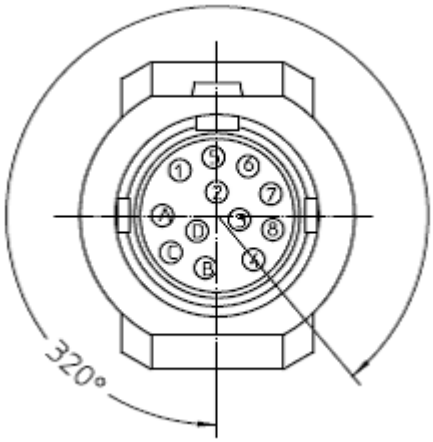
4 = 220 Ohm

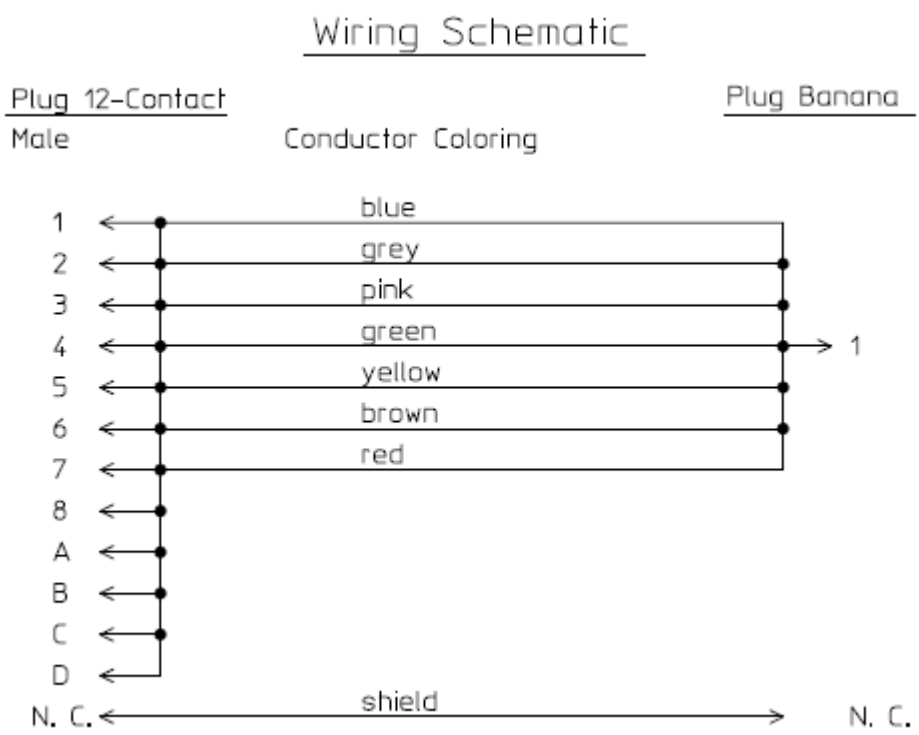
IntelliBridge:



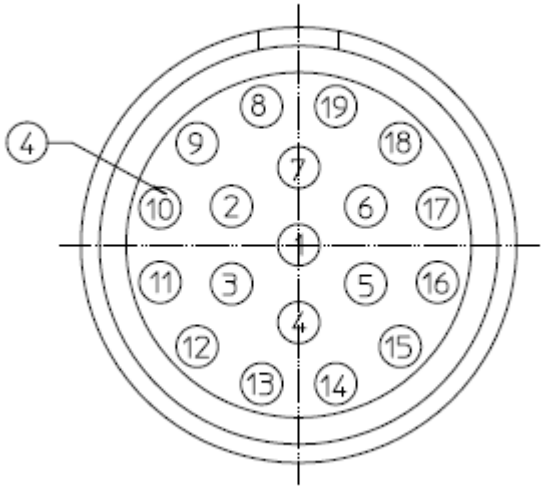


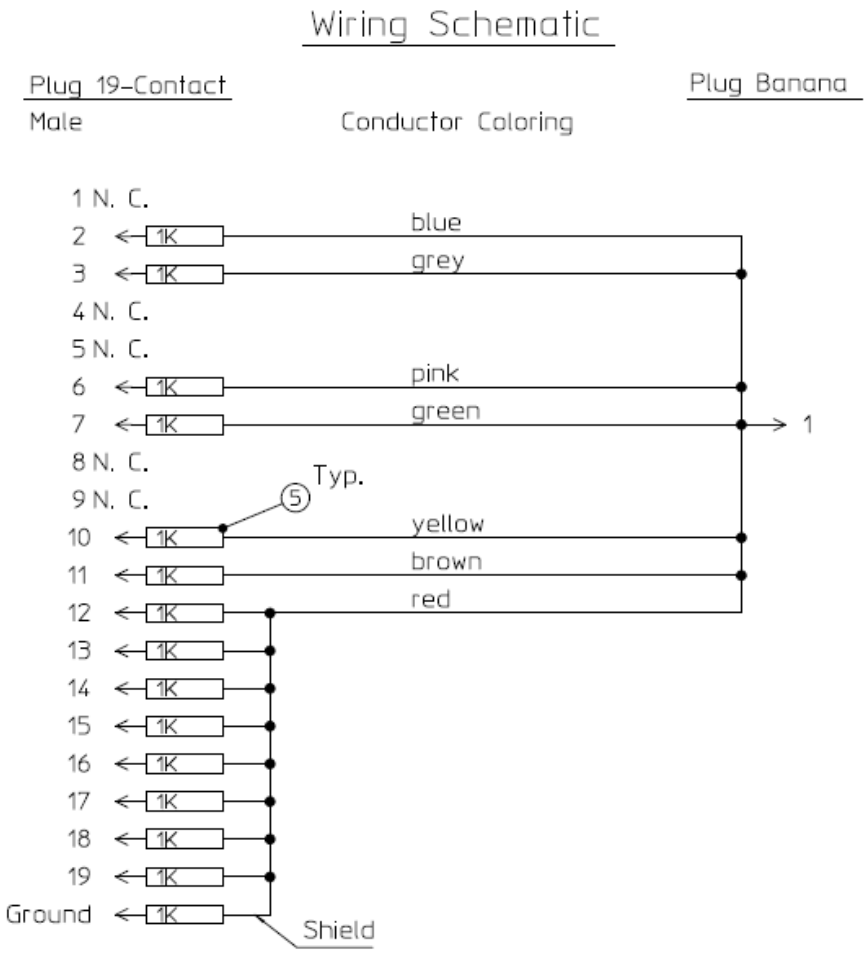
EEG:


320°

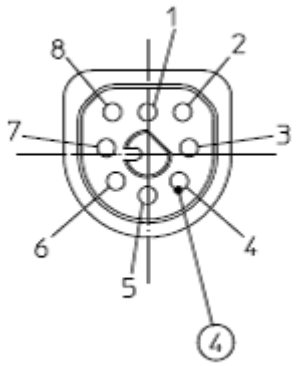

Wiring Schematic
Plug 12-Contact
Male
Conductor Coloring
Plug Banana
1
2
3
4
5
6
7
8
A
B
C
D
N. C.
blue
grey
pink
green
yellow
brown
red
shield
1
N. C.

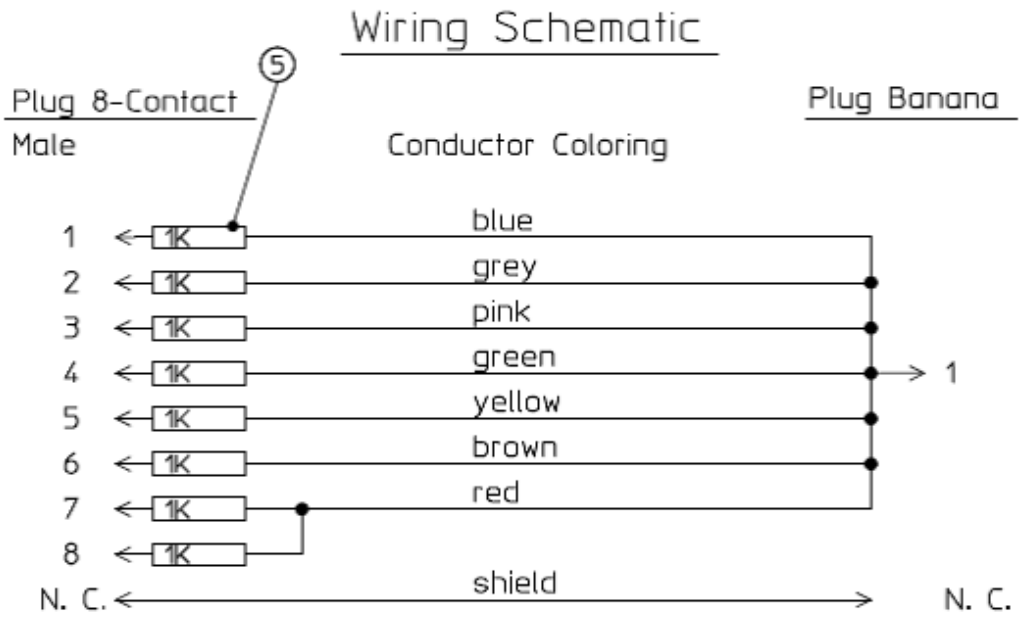
SvO2 (M1021A):


4
8
19
9
18
7
10
2
6
17
1
11
3
5
16
4
12
15
13
14

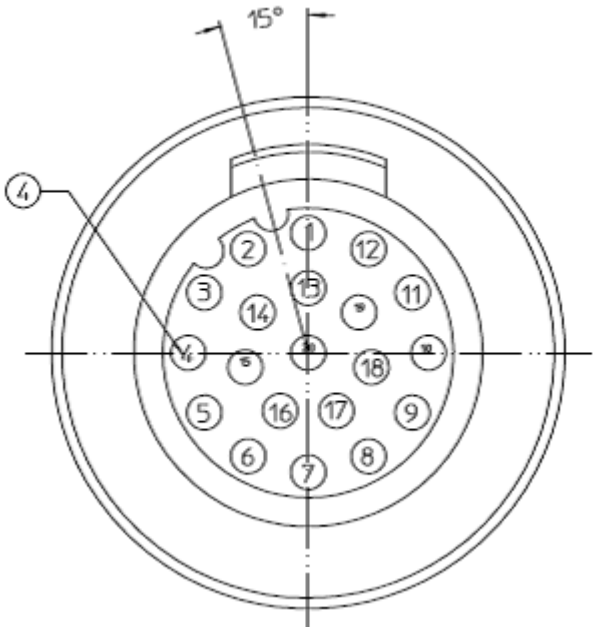

Wiring Schematic
Plug 19-Contact
Male
Conductor Coloring
Plug Banana
1 N. C.
2
3
4 N. C.
5 N. C.
6
7
8 N. C.
9 N. C.
10
11
12
13
14
15
16
17
18
19
Ground
1K
blue
grey
pink
green
yellow
brown
red
Typ.
5
1
Shield

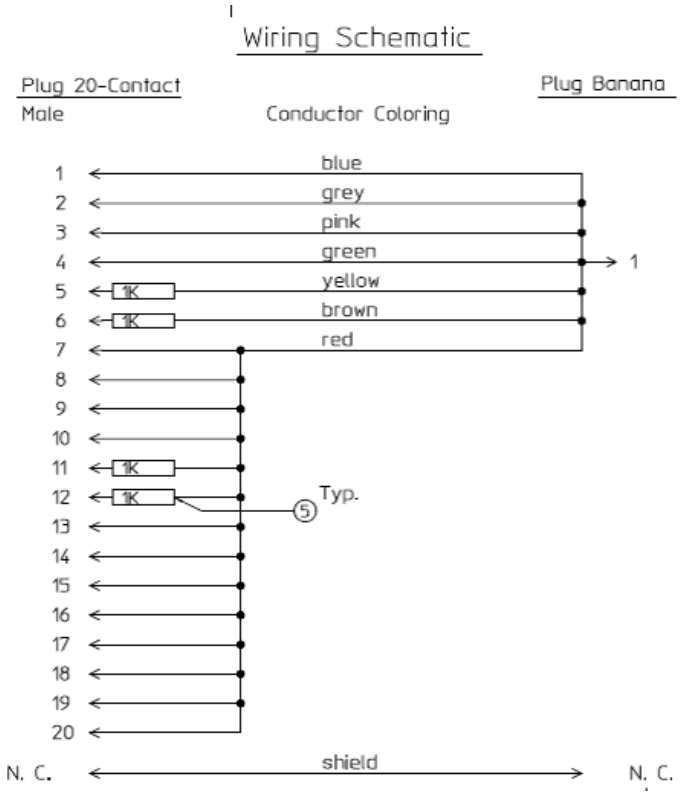
ScvO2 (M1011A):



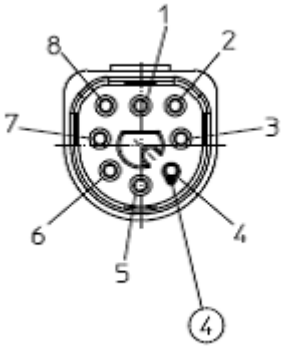


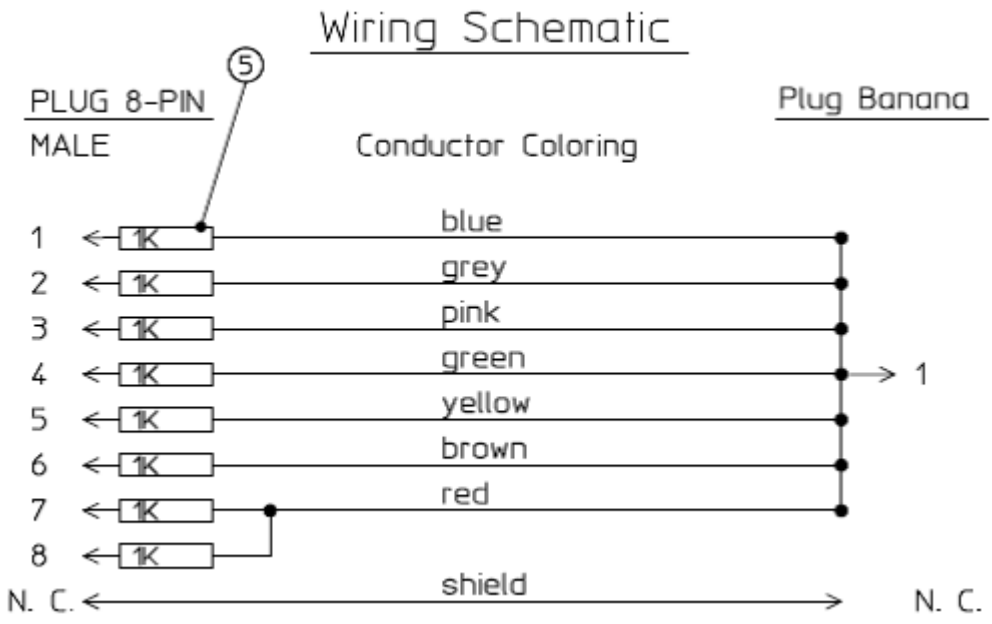
tcpO2/tcpCO2:



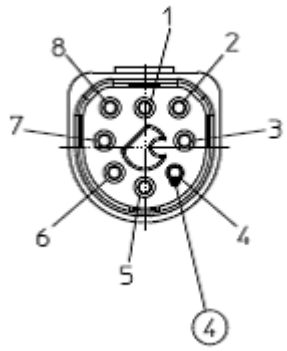


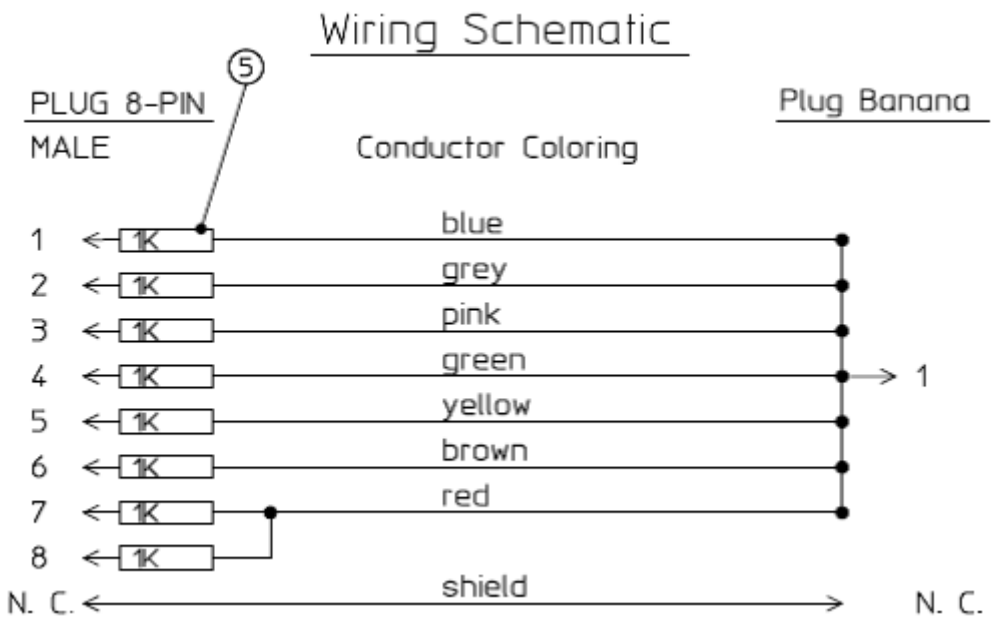
MP5 predicitive Temperature:





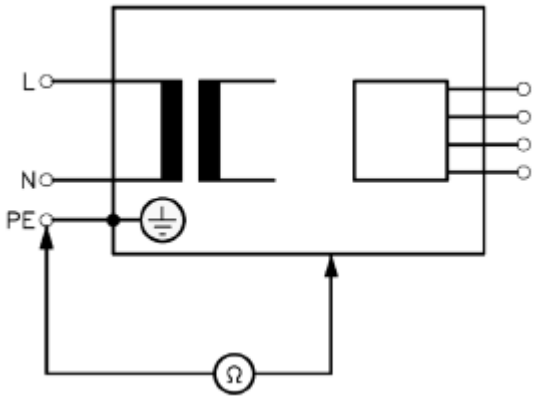
MP5 TAAP:


1
2
3
4
5
6
7
8
4


Wiring Schematic
5
PLUG 8-PIN
MALE
Conductor Coloring
Plug Banana
1
2
3
4
5
6
7
8
1K
blue
grey
pink
green
yellow
brown
red
1
N. C.
shield
N. C.

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 Instrument under Test (IUT), which are for safety reasons connected to the Protective Earth (PE).

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

This safety test is based on IEC/EN 60601-1, IEC/EN 62353, *UL2601-1 Ed. 2/UL60601-1:2003 and CSA 601.1-M90.*

For measurement limits, refer to Safety (1) test, Test and Inspection Matrix.

Report the highest value (X1).

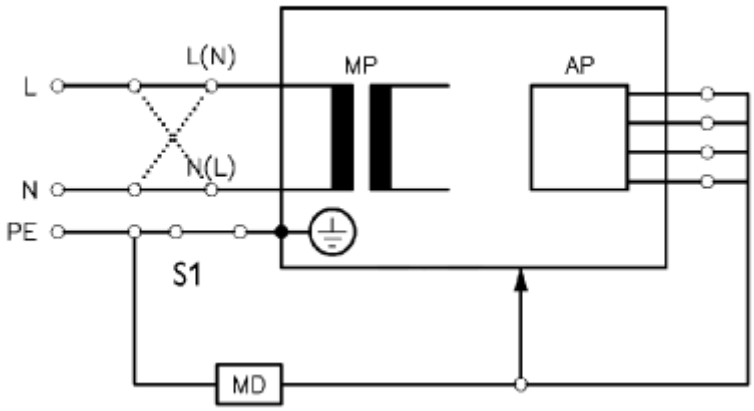
Test	Expected test results
Protective Earth Resistance Test (with mains cable)	X1 <= 300mOhms

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.

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 exposed 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.

This safety test is based on IEC/EN 60601-1, IEC/EN 62353, *UL2601-1 Ed. 2/UL60601-1:2003 and CSA 601.1-M90.*

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

Report the highest value (X1).

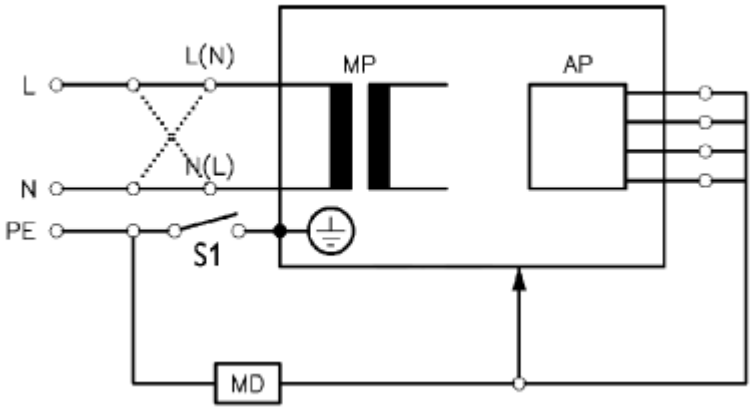
Test	Expected test results
Equipment Leakage Current Test (Normal Condition - with mains cable)	X1 <= 100µA

NOTE

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

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 exposed 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.

This safety test is based on IEC/EN 60601-1, IEC/EN 62353, *UL2601-1 Ed. 2/UL60601-1:2003 and CSA 601.1-M90.*

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.

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).

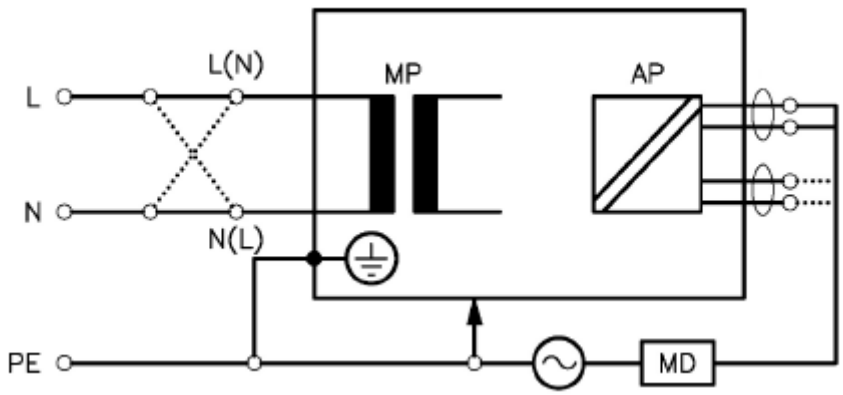
This can occur when the safety tester is connected to the invasive blood pressure and temperature connectors at the same time during the applied leakage current measurement.

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 for ECG measurement inputs.

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

This safety test is based on IEC/EN 60601-1, IEC/EN 62353, *UL2601-1 Ed. 2/UL60601-1:2003 and CSA 601.1-M90.*

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

NOTE

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

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 with IEC/EN 60601-1-1.
- Any electrical device such as IT equipment that is connected to the medical electrical equipment must comply with IEC/EN 60601-1-1 and be tested accordingly.

General Requirements for a System

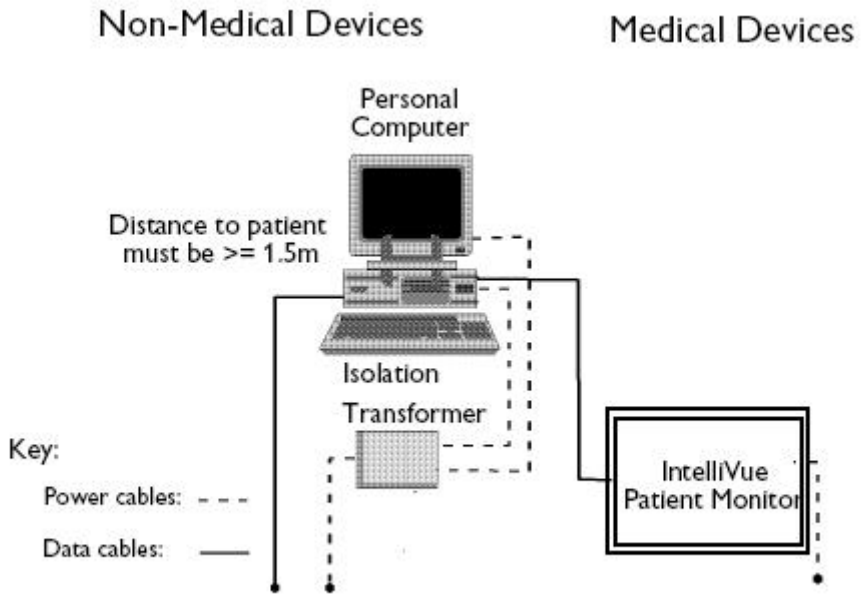
After installation or subsequent modification, a system must comply with the requirements of the system standard IEC/EN 60601-1-1. Compliance is checked by inspection, testing or analysis, as specified in the IEC/EN 60601-1-1 or in this book.

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. These higher limits are acceptable only outside the patient environment. It is essential to reduce equipment leakage currents to values specified in IEC 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

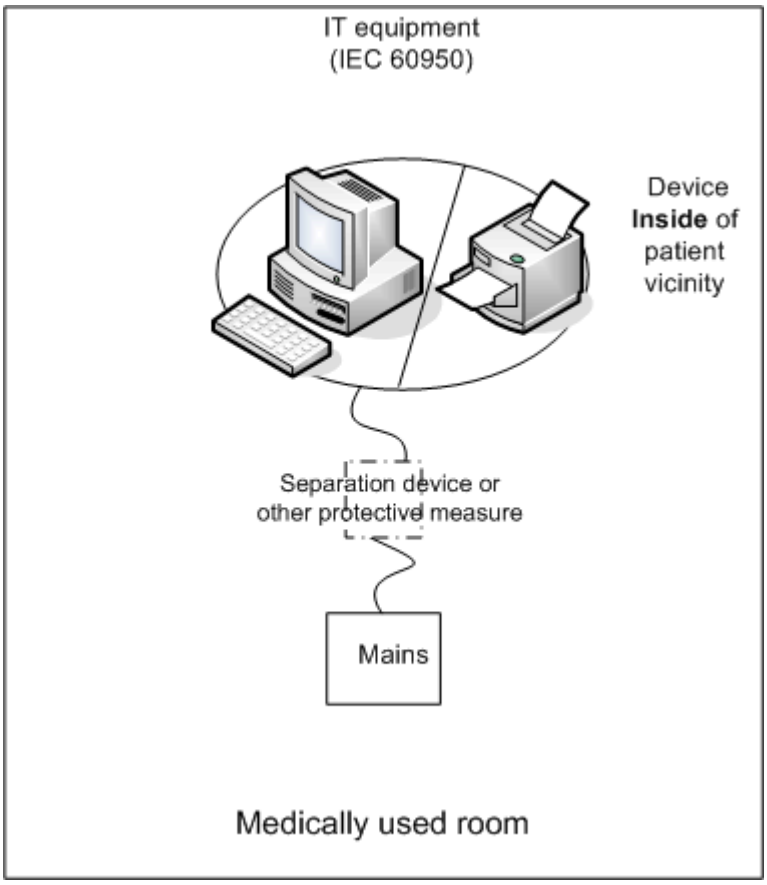
- Do not use additional AC mains extension cords or multiple portable socket-outlets. If a multiple portable socket-outlet is used, the resulting system must be compliant with IEC/EN 60601-1-1. Do not place multiple socket-outlets on the floor. Do not exceed the maximum permitted load for multiple socket-outlets 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. The whole installation, including devices outside of the patient vicinity, must comply with IEC/EN 60601-1-1. 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) that ensures mechanical fixing of the power cords and covering of any unused power outlets.

System Installation Requirements

- Ensure that the 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.
- 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 to limit increased equipment leakage currents caused by current flow through the signal connections. This only works if the equipment leakage current of the respective medical electrical system parts is not exceeded under normal conditions.
- Avoid increase of equipment leakage currents when non-medical electrical equipment within the medical electrical system is used. This only works if the equipment leakage current of the respective medical electrical system parts is not exceeded under normal conditions. Use additional protective earth connection, separation device or additional non-conductive enclosures.
- 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.

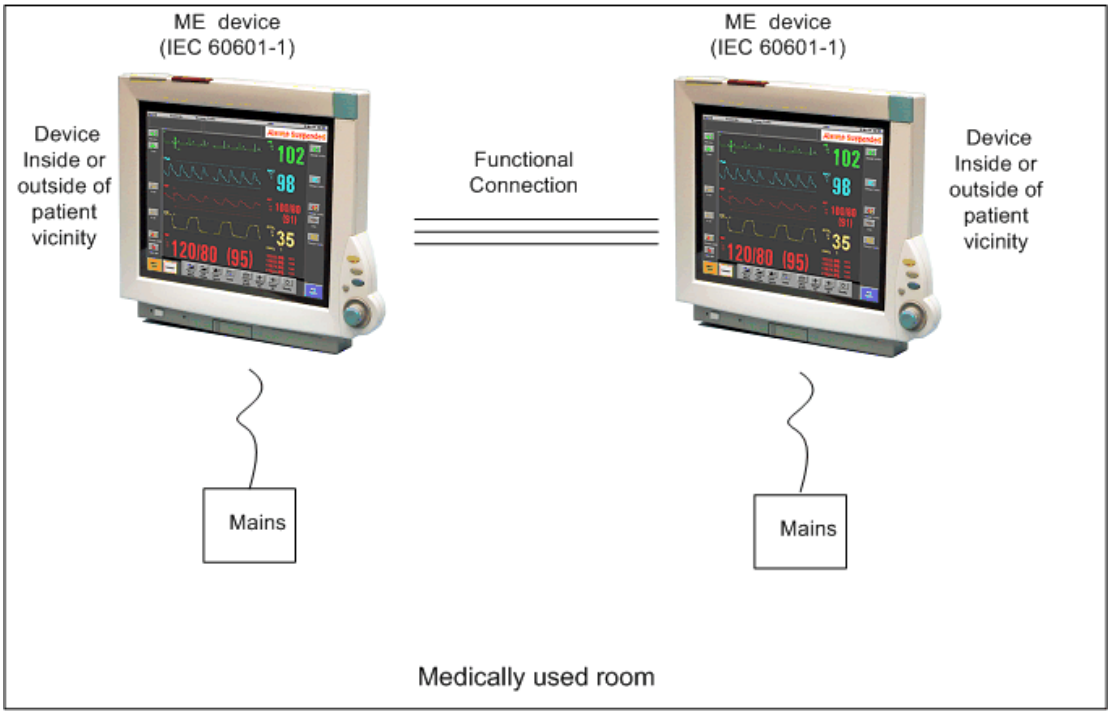
Required Protective Measures at System Installation

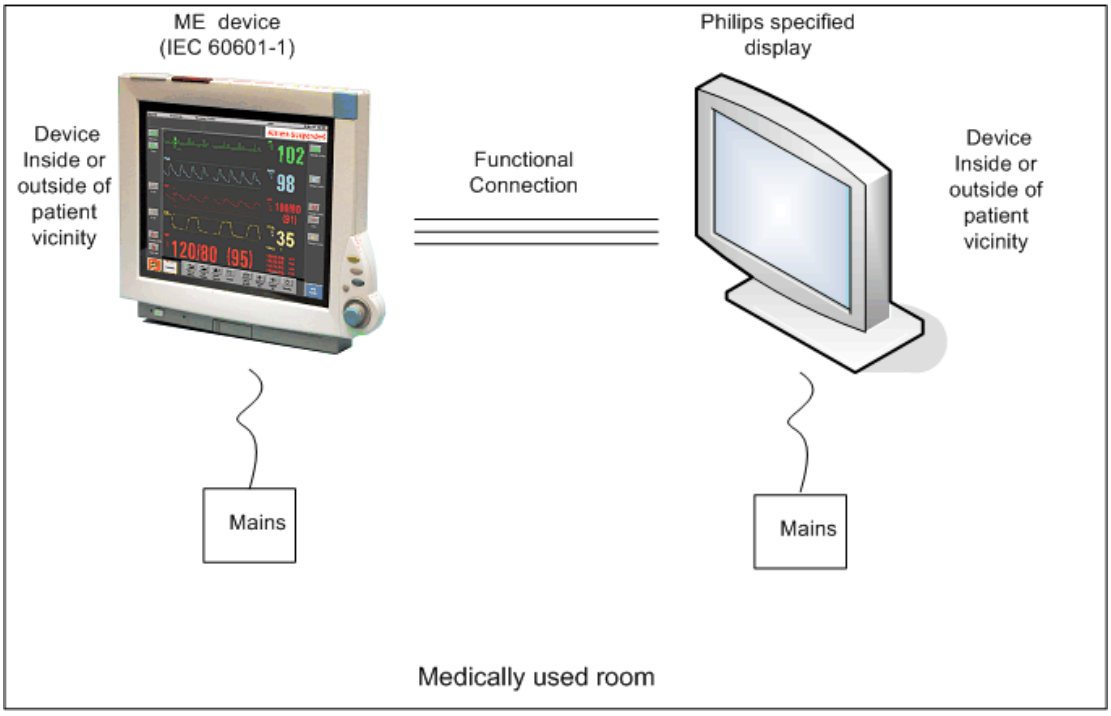
For any IT equipment (IEC60950) operated in patient vicinity ensure that the equipment leakage current does not exceed the limits described in IEC 60601-1. Use a separation device to ensure compliance. After installation of IT equipment in patient vicinity, an enclosure leakage current test is required.



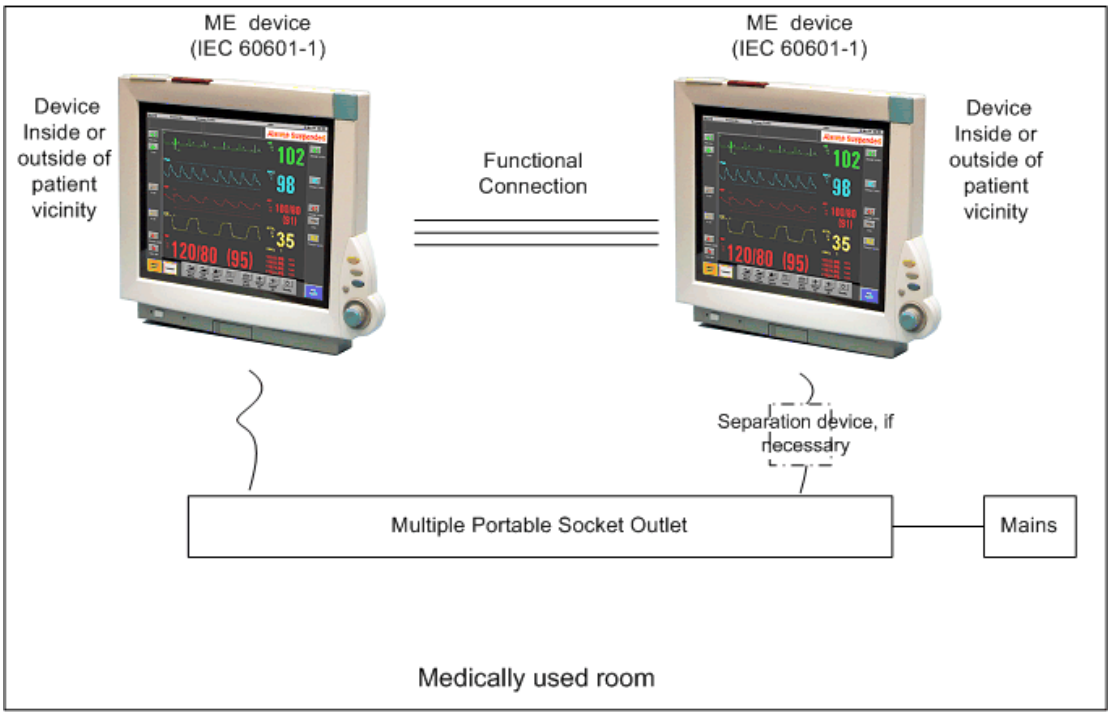
Case 1: Medical Device Combined with Medical Device

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, 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.



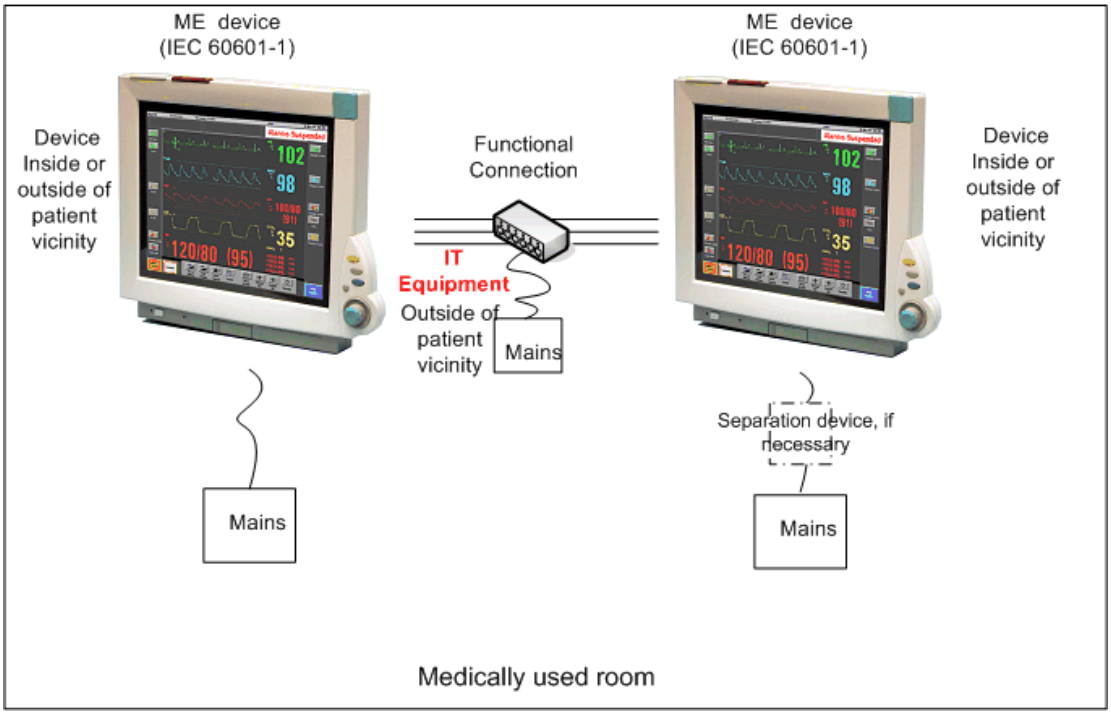


If the combined medical devices are connected to the same multiple portable socket outlet an enclosure leakage current test of the entire device combination on the multiple portable socket outlet is required to ensure that the resulting protective earth leakage current and equipment leakage current does not exceed the limits of IEC 60601-1-1. 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.

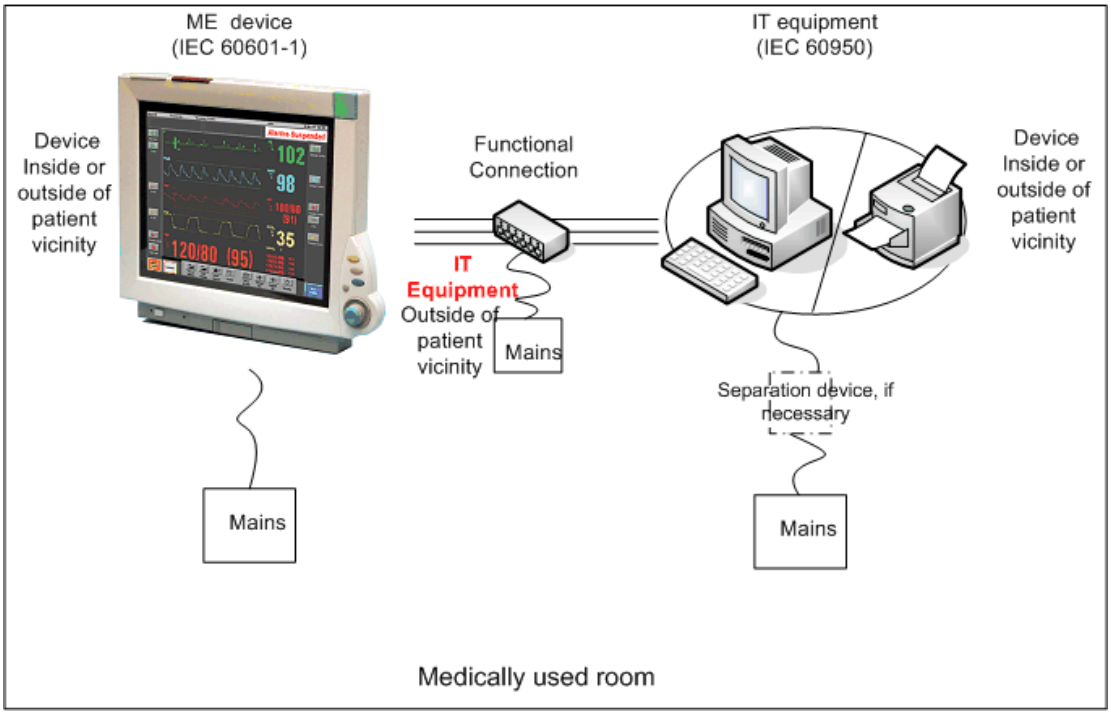


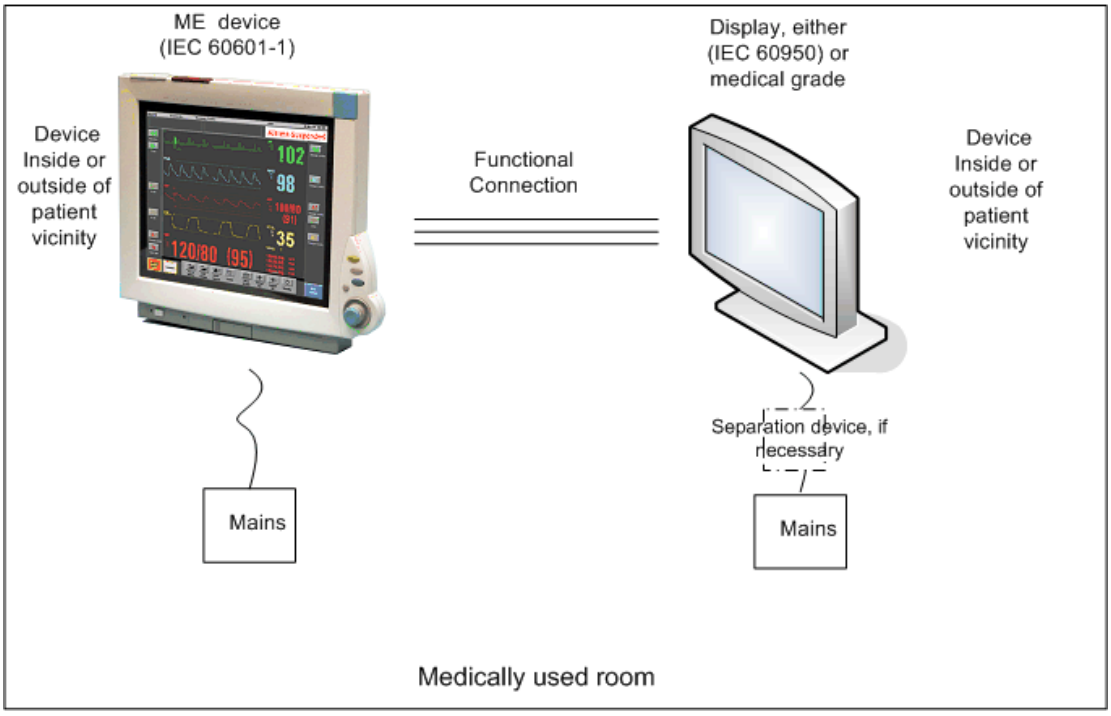
Case 2: Medical Device Combined with a Non-Medical Device

If you combine a medical device with a non-medical device to form a medical electrical system according to IEC60601-1-1, 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.

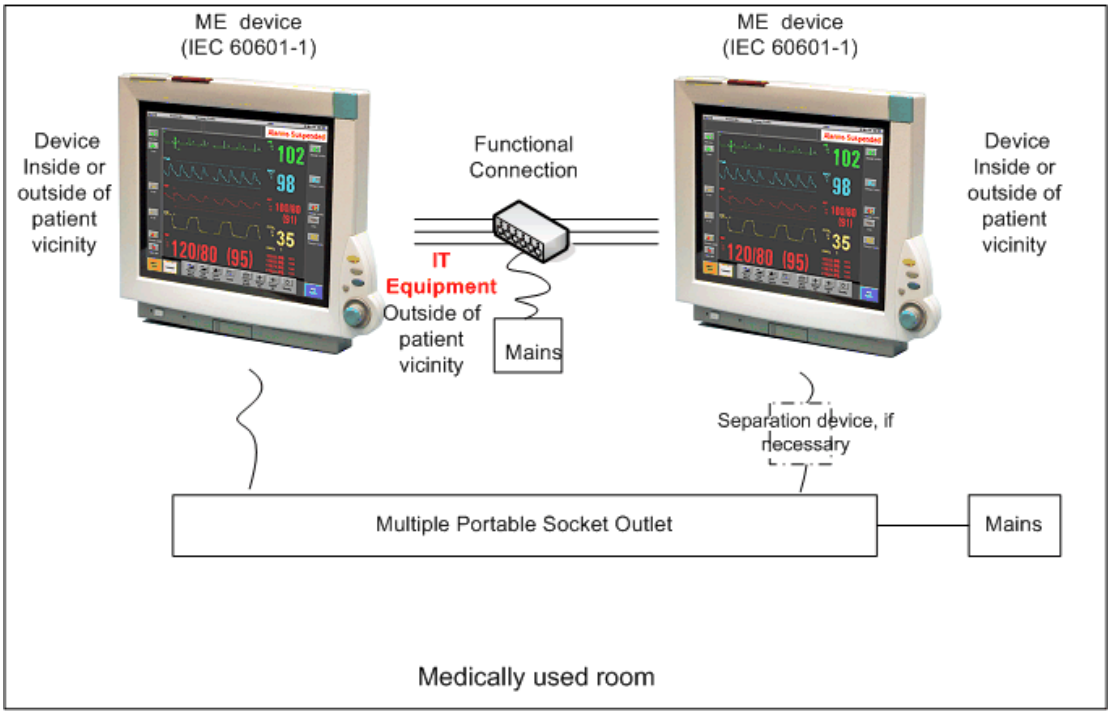


For any IT equipment (IEC60950) operated in patient vicinity ensure that the equipment leakage current does not exceed the limits described in IEC 60601-1. Use a separation device to ensure compliance. After installation of IT equipment in patient vicinity, an enclosure leakage current test is required.

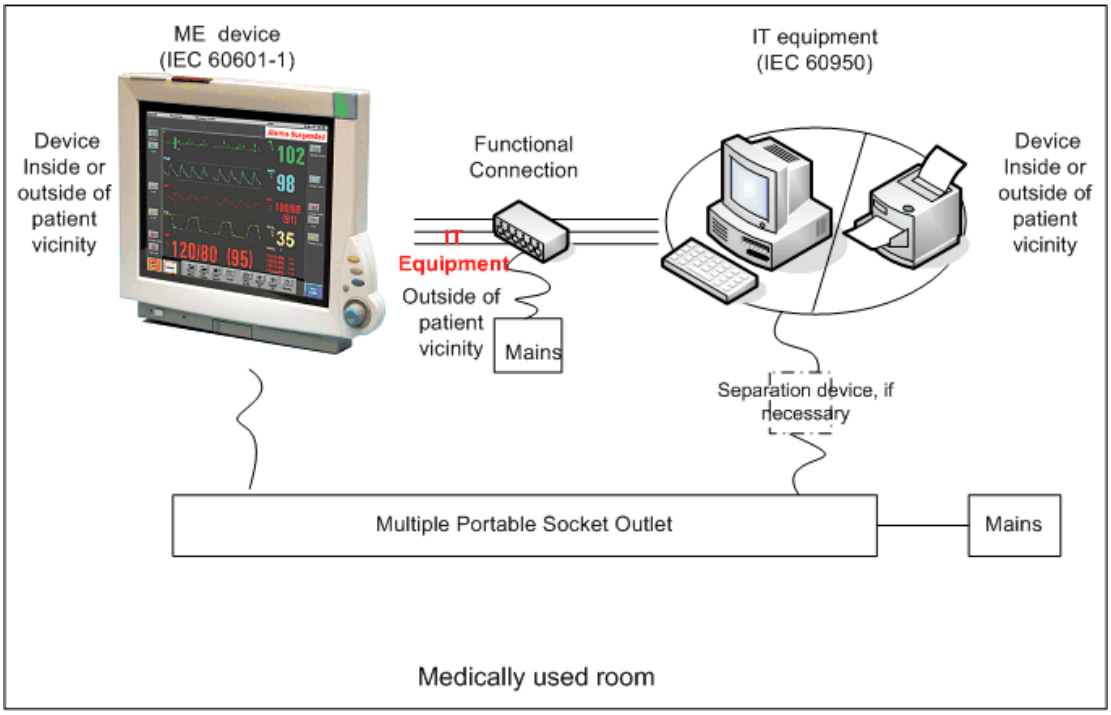




If the combined devices forming the medical electrical system are connected to the same multiple portable socket outlet, ensure that the resulting protective earth leakage current **and** equipment leakage current do not exceed the limits of IEC 60601-1-1. The medical electrical devices or IT equipment 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 are exceeded, additional protective measures are required, e.g. a separation device or the connection of each device to separate mains.

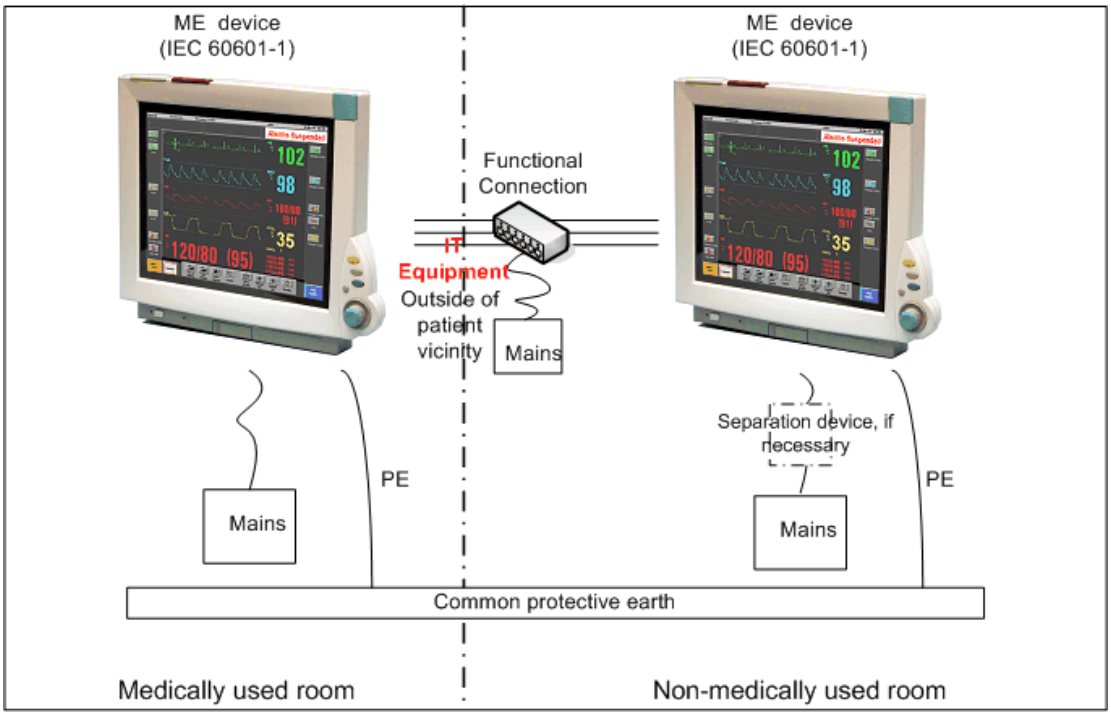


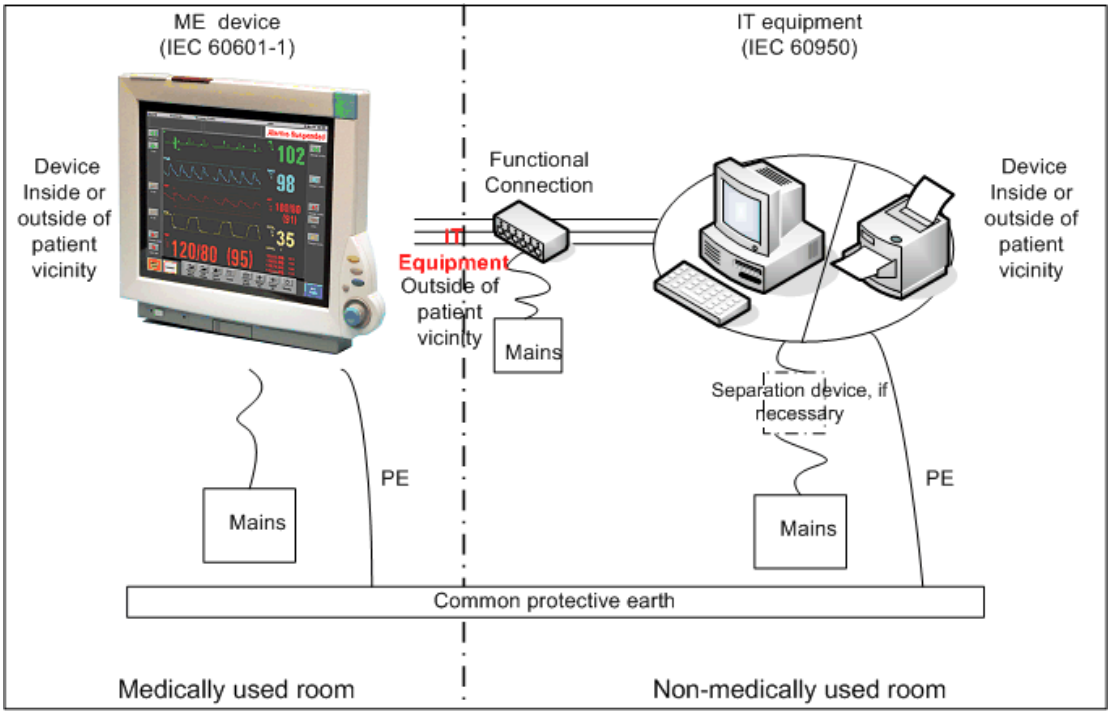
For any IT equipment (IEC60950) operated in patient vicinity ensure that the equipment leakage current does not exceed the limits described in IEC 60601-1. Use a separation device to ensure compliance. After installation of IT equipment in patient vicinity, an enclosure leakage current test is required.



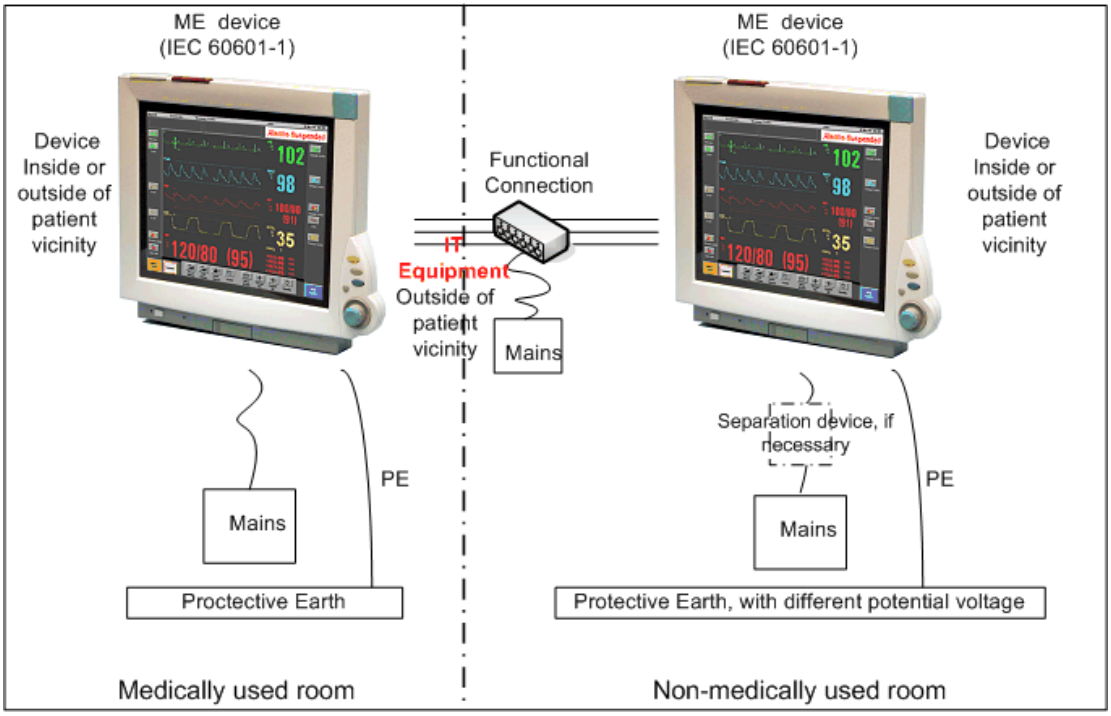
Case 3: Medical Device Combined with a Medical or Non-Medical Device with one Device in a Non-Medically-Used Room

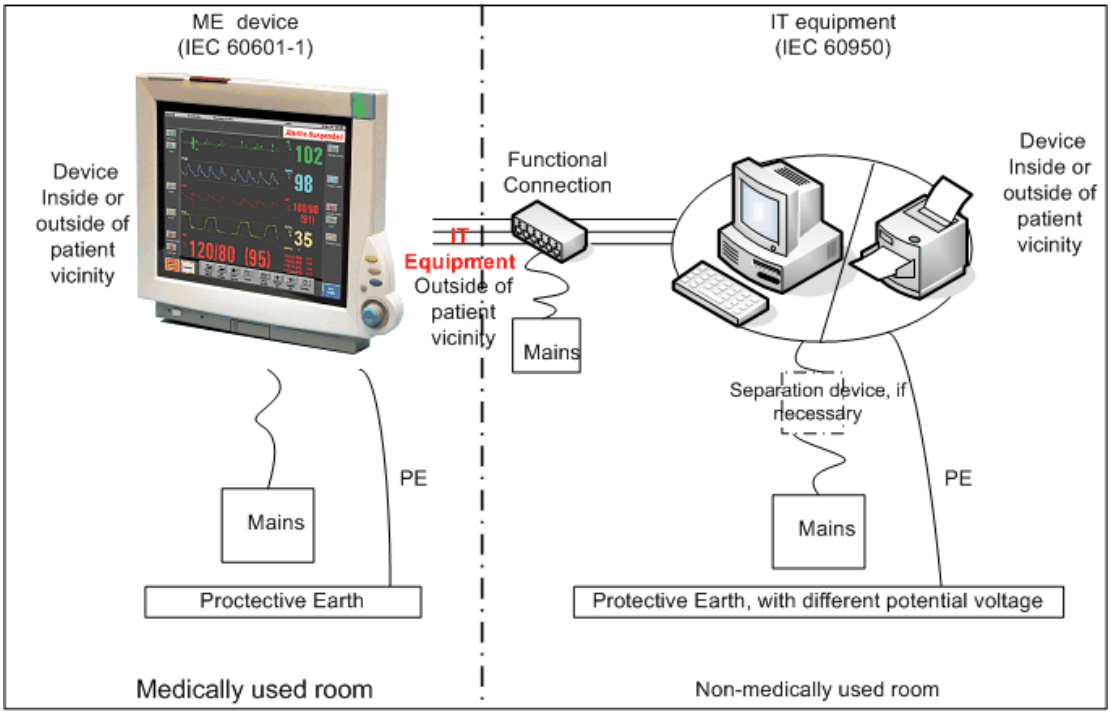
If you combine a medical device with a medical or non-medical device to form a medical electrical system according to IEC60601-1-1 using a common protective earth connection and one of the devices is located in a non-medically used room, additional protective measures are required, e.g. usage of a separation 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.




ME device
(IEC 60601-1)
IT equipment
(IEC 60950)
Device
Inside or
outside of
patient
vicinity
Functional
Connection
IT
Equipment
Outside of
patient
vicinity
Mains
Device
Inside or
outside of
patient
vicinity
Separation device, if
necessary
PE
Mains
PE
Mains
Common protective earth
Medically used room
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 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.





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 the LAN network. 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, e.g. to the equipotential connector. 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).

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 ***When to Perform Tests*** (on page 36) 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 (integrated, 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 ***When to perform Tests*** (on page 36) 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.
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	100bpm +/- 2bpm or 120bpm +/- 2bpm
Respiration Performance Test	40 rpm +/- 2 rpm or 45 rpm +/- 2 rpm

ECG Sync Performance Test

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 Sync and Marker Output.
- Patient simulator.

1. Connect the patient simulator to the ECG connector and the defibrillator to the ECG Sync Output on the monitor.
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 marker pulse is displayed before the T-wave begins.

Test	Expected test results
ECG Sync Performance Test	Marker pulse is displayed before the T-wave begins

SpO2 Performance Test

This test checks the performance of the SpO2 measurement.

Tools required: none

1. Connect an adult SpO2 transducer to the SpO2 connector.
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: 18 to 45
- skin tone: from light to black

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.

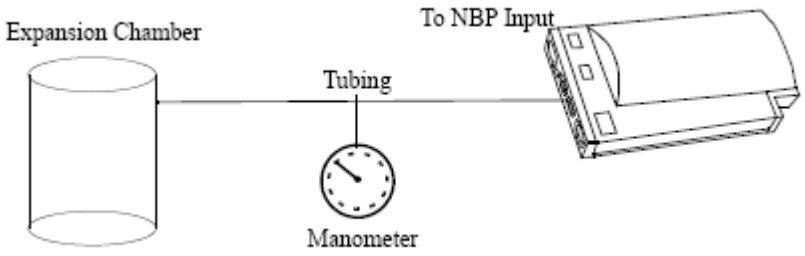
NBP PerformanceTest

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 monitor 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 (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).

Expected Test Results for NBP Accuracy Test, Leakage Test, Linearity Test & Valve Test

Test	Expected test results
Accuracy test	x1 = value displayed by monitor Difference ≤ 3mmHg
Leakage test	x2 = leakage test value x2 < 6 mmHg
Linearity test	x3 = value displayed by monitor 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.

Table 4:

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.

Table 2:

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:

Table 6:

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.

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 MMS Extension. The Microstream CO2 performance test is required once per year 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
- 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

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
- 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 using 2nd cal gas

Perform all checks in the same session.

Leakage Check

The leakage check consists of checking the tubing between:

- the pump outlet and the mCO_2 outlet and
- the pump inlet and FilterLine 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 FilterLine 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.
4. Connect the flowmeter outlet to the FilterLine 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 Filterline connected to the M3015A inlet or the MP5 mCO_2 inlet..
3. Block the inlet of the FilterLine 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 FilterLine inlet and the pump inlet.
5. Check the FilterLine 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 FilterLine 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.

Barometric Pressure Check and Calibration

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

1. Go into service mode and select **Setup CO_2** menu.
2. Connect a FilterLine to the Microstream CO_2 input. This activates the pump in the M3015A 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.

Pump Check

1. Connect the flowmeter inlet to the mCO_2 gas outlet.
2. Connect the FilterLine to the mCO_2 inlet.
3. Block the inlet of the FilterLine 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.

Flow Rate Check and Calibration

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

1. Connect the flowmeter to the CO_2 FilterLine.
2. Check on the flowmeter the flow that the M3015A MMS Extension or MP5 mCO2 pump draws (**x5**). It should be 50 ml/min ± 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.
3. 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.
4. 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.

5. 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

Noise Check

1. With the monitor in service mode, select **Setup CO_2** menu.
2. Disconnect the flowmeter and connect the 5% calibration gas and flow regulator in its place.
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.

CO2 Gas Measurement Calibration Check

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. Check that the 5% calibration gas and flow regulator are connected.
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 in this procedure onwards.
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.
9. If not already connected, connect the 5% calibration gas.
10. Select **Cal. CO_2**.
11. Select the value for the calibration gas. (The default value is 5.0%.)

12. 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.
13. The extension calibrates and prompts when calibration is successful.

Calibration Verification

1. Reopen the 5% gas valve and allow the value to stabilize.
2. Check that the value displayed on the monitor is correct within the tolerance (see step above).
3. Disconnect the 5% calibration gas and connect the 10% calibration gas.
4. Open the valve on the flow regulator to allow 10% CO2 gas to flow into the extension. Allow the value to stabilize.
5. 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 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)
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**<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})

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 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.

PowerLink 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

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 (-USR_ProductName-)" 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 Installation Instructions 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.

EEG, SvO2 and tcGas Performance Tests

The EEG and SvO2 parameters do not require performance tests because the modules perform internal self-tests regularly. These tests suffice for performance testing of these two 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 either at the phone jack type connector (this only tests one relay) or at the multi-port nurse call connector (to test all three relays).

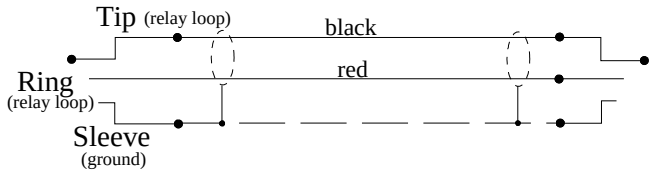
Phone Jack Type Connector Test (Traditional Nurse Call)

This test checks the operation of the traditional 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—Relay open.
- Alarm Condition—Relay closed.

Tools required: Ohmmeter.

1. Plug a phono connector into the Nurse Call Relay connector.
2. Connect the ohmmeter.
3. If no alarm occurs, the relay contacts are open. When an alarm occurs, the relay contacts close.

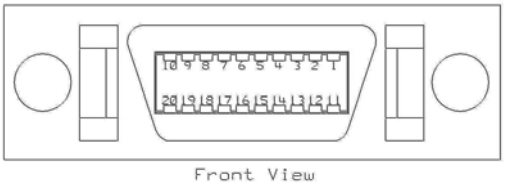


4. The expected test result is: Alarm condition - Relay closed.

Test	Expected test results
Nurse Call Relay Performance Test	Alarm Condition—Relay closed

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

Pin	Cable Color Coding	Relay
5	yellow	R3-middle
6	green	R3-opener
7	blue	n/a
8	purple	n/a
9	gray	n/a
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.

Power Loss Alarm Buzzer Performance Test (only if Multi-Port Nurse Call Connector Board is installed)

1. Switch on the monitor.
2. Remove the battery and 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, connect the monitor to AC power or insert a battery

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

IntelliVue 802.11 Bedside Adapter Communication Test

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 **WPA(PSK)** and enter the **WPA password** (string between 8 and 63 characters).
3. Select **Main Setup** -> **WLAN Diagnostic** to access the service 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 Auth*enticatd (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 wil 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

Reporting of Test Results

Philips recommends all test results are documented in accordance with local laws. Authorized Philips personnel report test result back to Philips to add to the product development database. 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 Table 16.

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:	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.):	
Functional Test (parameters tested):	

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	

Test	Test or Inspection to be Performed	Expected Test Results	Record the Results (mandatory for Philips Personnel only) What to record Actual Results	
	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	
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): Patient Leakage Current - Single Fault Condition, mains on applied part.	Maximum leakage current (X1): <=50 µA	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, 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	

Test	Test or Inspection to be Performed	Expected Test Results	Record the Results (mandatory for Philips Personnel only) What to record Actual Results	
System (Sys 3)	Perform the system test according to subclause 19.201 of IEC/EN 60601-1-1, 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				

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**

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**.

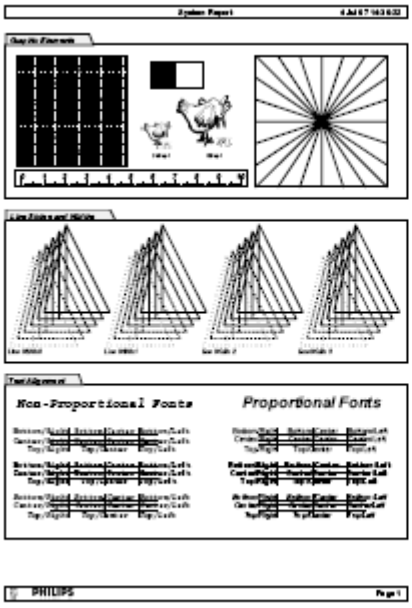
To re-enable touchscreen functionality change the **Touch Enable** selection to **yes**.

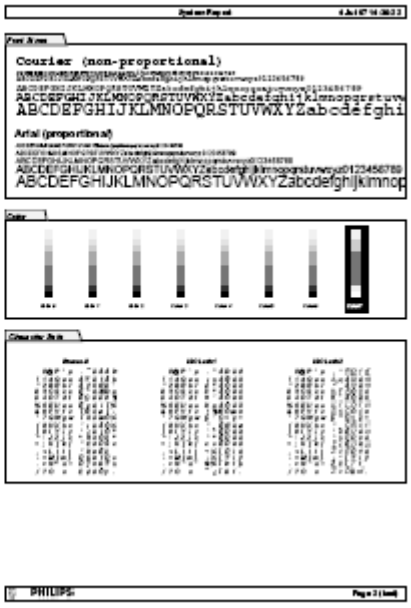
Printer Test Report

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.

Hardware Revision Check

Some troubleshooting tasks may require that you identify the hardware revision of your IntelliVue main board. To check your hardware revision:

1. Enter the Main Setup menu and select **`Revision`**.
2. Select **`Product`**.
3. Select **`Hardware Revision`**.
4. Select the pop-up key for the monitor you want to check (e.g. M8005A, M8007A, M8010A)

The following table shows which part number corresponds to which hardware revision:

Hardware Revision	Board Number	Description
A.00.01 A.00.02	M8050-68401	Main Board 860/50 MHz
B.00.04 B.00.05	M8050-68421	Main Board 86x/100 MHz, 4MB Data Flash
B.00.18	M8050-68422	Main Board 86x/100 MHz, 8MB Data Flash
B.00.22	M8050-68423	Main Board 86x/100 MHz, 8MB Data Flash, 2MB SRAM
B.00.23	M8050-68424	Main Board 86x/100 MHz, 8MB Data Flash, 2MB SRAM

NOTE

Always use two identical main boards in a dual CPU MP90 monitor.

Hardware/Software Compatibility Matrix

Compatibility Matrix for MP60/70/80/90 & D80

Serial No. Prefix	**< DE350**	**DE350**			**DE549**	**DE731**
CPU	**50 MHz, 4 MB Data Flash**	**100 MHz, 4 MB Data Flash**			**100 MHz, 8 MB Data Flash**	**100 MHz, 8 MB Data Flash 2MB SRAM**
Hardware Revision	**A.00.01 A.00.02 A.00.03**	**B.00.03**	**B.00.04**	**B.00.05 B.00.06**	**B.00.18**	**B.00.22 B.00.23**
Part No. / Software Version	**M8050-68401***	**M8050-68421***			**M8050-68422**	**M8050-68423 M8050-68424**
A.0x.xx	Yes[1]	No	No	No	No	No
A.10.xx	Yes[1]	No	No	No	No	No
A.20.46	Yes	No	No	No	No	No
A.25.13	No	Yes	Yes	Yes	No	No
B.00.02	Yes[1]	No	No	No	No	No
B.00.05	Yes[1]	No	No	No	No	No
B.00.06	Yes[1]	No	No	No	No	No
B.05.67	No	Yes	Yes	No[2]	No	No
B.05.71	No	Yes	Yes	Yes	Yes*	Yes*
B.10.80	No	No[3]	No[3]	No[3]	No	No
B.10.82	No	Yes	Yes	No[2]	No	No
B.10.84	No	Yes	Yes	Yes	No	No
B.10.85	No	Yes	Yes	Yes	Yes*	Yes*
B.10.86	No	Yes	Yes	Yes	Yes*	Yes*
C.00.82	No	Yes	Yes	Yes	Yes*	Yes*
C.00.89	No	Yes	Yes	Yes	Yes*	Yes*
C.00.90	No	Yes	Yes	Yes	Yes*	Yes*

Serial No. Prefix	< DE350	DE350			DE549	DE731
CPU	50 MHz, 4 MB Data Flash	100 MHz, 4 MB Data Flash			100 MHz, 8 MB Data Flash	100 MHz, 8 MB Data Flash 2MB SRAM
Hardware Revision	A.00.01 A.00.02 A.00.03	B.00.03	B.00.04	B.00.05 B.00.06	B.00.18	B.00.22 B.00.23
Part No. / Software Version	M8050-68401*	M8050-68421*			M8050-68422	M8050-68423 M8050-68424
D.00.58	No	Yes	Yes	Yes	Yes	Yes
D.00.59	No	Yes	Yes	Yes	Yes	Yes
E.01.24	No	Yes	Yes	Yes	Yes	Yes
E.01.28*[1]	No	Yes	Yes	Yes	Yes	Yes
E.01.31	No	Yes	Yes	Yes	Yes	Yes
F01.40	No	Yes	Yes	Yes	Yes	Yes
F.01.42	No	Yes	Yes	Yes	Yes	Yes
G.0x.xx	No	No	Yes	Yes	Yes	Yes

*Not compatible with D80
1 Not compatible with MP90 with two CPUs
2 Only compatible with MP90
3 Software has been replaced by version B.10.85

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.

Compatibilty 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
A.2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B.1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
C.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
D.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
E.0	No	No	No	Yes	Yes	Yes	Yes	Yes
F.0	No	No	No	Yes	Yes	Yes	Yes	Yes
G.0	No	No	No	No	Yes	Yes	Yes	Yes

Compatibilty with FMS

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

Monitor Software	FMS Software							
	A.2	B.0	B.1	C.0	D.0	E.0	F.0	G.0
A.2	Yes	Yes	Yes	Yes	Yes	Yes	No	No
B.0	Yes	Yes	Yes	Yes	Yes	Yes	No	No
B.1	Yes	Yes	Yes	Yes	Yes	Yes	No	No
C.0	Yes	Yes	Yes	Yes	Yes	Yes	No	No
D.0	Yes	Yes	Yes	Yes	Yes	Yes	No	No
E.0	No	No	No	Yes	Yes	Yes	Yes	No
F.0	No	No	No	Yes	Yes	Yes	Yes	No
G.0	No	No	No	No	No	No	No	Yes

NOTE

Any M8048A FMS connected to a Rel. D.0 or higher MP90 system must have software revision C.0 or higher.

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
A.2	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
B.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
B.1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
C.0	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
D.0	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
E.0	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
F.0	No	No	No	No	Yes	Yes	Yes	Yes	Yes
G.0	No	No	No	No	Yes	Yes	Yes	Yes	Yes

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

Compatibility of MP2/X2/MP5 with the IntelliVue Information Center (pure monitor/measurement use model)

MP5/ MP2/X2 Software	Information Center Software								
	D.01	E.0	E.01	F.0	G.0	H.0	J.0	K.0	L.0
E.0	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
F.0	No	No	No	No	Yes	Yes	Yes	Yes	Yes
G.0	No	No	No	No	Yes	Yes	Yes	Yes	Yes

Compatibility of MP2/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
F.0	No	No	No	No	No	No	No	Yes	Yes
G.0	No	No	No	No	No	No	No	Yes	Yes

Number of Supported Parameter Modules

Module Number	Module Description	Number of Supported Modules MP40/50	Number of Supported Modules MP60/70/80/90	Comments
M1006B	Pressure	2	6	MP60/70: For usage in internal Slot SW >= B.05.67 required.
M1006B #C01	Pressure w/ Analog Out	2	6	MP60/70: For usage in internal Slot SW >= B.05.67 required.
M1011A	ScvO2	1	1	SW Rev>= G.0 required
M1012A	Cardiac Output	1	1	MP60/70: For usage in internal Slot SW >= B.05.67 required.

Module Number	Module Description	Number of Supported Modules MP40/50	Number of Supported Modules MP60/70/80/90	Comments
M1012A #C10	Cardiac Output with PiCCO	1	1	MP60/70: For usage in internal Slot SW >= B.05.67 required. For SW Rev >= E.0 PiCCO plus available
M1014A	Spirometry	1	1	SW Rev >= D.0 required. MP60/70: not supported in internal Slot.
M1018A	tcpO2	1	1	MP60/70: not supported in internal Slot.
M1020B #A01	SpO2 Philips FAST for IntelliVue	1	1	MP60/70: For usage in internal Slot SW >= B.1 required.
M1020B #A02	SpO2 Nellcor OxiMax compatible	1	1	MP60/70: For usage in internal Slot SW >= B.1 required.
Masimo SET IVM Module distributed by Philips (internal Order No. M1020B #A03)	SpO2 Masimo SET	1	1	MP60/70: For usage in internal Slot SW >= B.1 required.
M1021A	SvO2	0	1	MP60/70: not supported in internal Slot.
M1027A	EEG	1	1	MP60/70: not supported in internal Slot.
M1029A	Temp	2	4	MP60/70: For usage in internal Slot SW >= B.05.67 required.
M1032A #A01	VueLink Auxiliary	2	4	MP60/70: For usage in internal Slot SW >= B.1 required.
M1032A #A02	VueLink Ventilator	2	4	MP60/70: For usage in internal Slot SW >= B.1 required.

Module Number	Module Description	Number of Supported Modules MP40/50	Number of Supported Modules MP60/70/80/90	Comments
M1032A #A03	VueLink Gas Analyzer	2	4	MP60/70: For usage in internal Slot SW >= B.1 required.
M1032A #A04	VueLink Anesthesia	2	4	MP60/70: For usage in internal Slot SW >= B.1 required.
M1032A #A05	VueLink Auxiliary+	2	4	MP60/70: For usage in internal Slot SW >= B.1 required.
M1034A	BIS	1	1	MP60/70: For usage in internal Slot SW >= E.0 required
M1116B	Recorder	1	1	
865115	EC10 IntelliBridge	2	4	SW Rev >= G.0 required

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*** (on page 126).

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 instrument, 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. Are the MMS and, if present, the MMS Extension inserted correctly?
4. Are the cables connected properly to the FMS?
5. 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.

NOTE

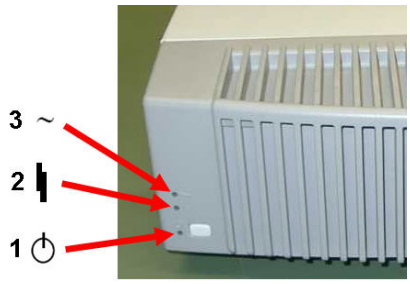
It takes several seconds for the AC Power LED to switch on / off after the mains power cord has been connected / disconnected.

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 LED, the Error LED, the AC Power LED light up momentarily. The location of the front-panel LEDs is shown in the following photograph:



No.	Description
1	Power On LED (Green)
2	Error LED (Red)
3	AC Power LED (Green)

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 ***Boot Phase Failures*** (on page 127) for Troubleshooting information.

Monitor Boot Phase:

For these steps it is assumed that the Monitor is powered correctly and the +3,3 V System Board supply voltage is okay. This is indicated by the green Power On LED.

Time (sec.) after Power On	Event
0	When the Power On/Off button is pressed, the green Power On LED and the red error LED switch on immediately.
1	The alarm LEDs are switched on with low intensity. Colors: Left LED:cyan; Middle LED:red; Alarm Suspend LED (right): red
3	Red Error LED is switched off.
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 Mouse, Touch, SpeedPoint) 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. Click on the links below to view a particular table.

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 (on page 127)

External Display not functioning (on page 131)

External Touch Display not functioning (on page 131)

D80 Intelligent Display Problems (on page 133)

Remote Alarm Device (on page 134)

Remote Extension Device (on page 284)

Network related problems (on page 137)

Wireless Ethernet Adapter (Proxim) (on page 138)

Multi-Measurement Module (on page 141)

MSL-related problems (on page 142)

Alarm Lamps (on page 145)

Alarm Tones (on page 145)

Individual Parameter INOPS (on page 146)

Flexible Module Rack (on page 146)

Printer (on page 147)

MIB / RS232 (on page 149)

Flexible Nurse Call Relay (on page 151)

Troubleshooting the ECG OUT (on page 152)

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 (47V - 49V). Measure on multi-colored wired connection between red and black wires Exchange power supply if defective
	Secondary main board defective	Disconnect cable from the backplane top to backplane bottom. If failure persists continue with 'Primary Video Board defective" Otherwise: Reconnect cable, remove secondary video board and check again. Exchange main board and check again. Replace backplane top.
	Primary Video Board defective	Remove primary Video Board and check again
	Backplane Bottom defective	Remove Backplane Bottom and check again
	Primary Main Board defective	Exchange primary 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 on power supply	Remote Devices	Disconnect all connections to the remote devices and try to switch on the monitor again
	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 primary 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
	Primary Video Board defective	Remove primary video board and try again
	Primary Main Board defective	Exchange primary main board. Add boards in reverse order and try again with each board.
Green Power On LED **and** Red Error LED remain off after pressing power on button on remote extension device or remote alarm device.	Cable to remote device	Check if cable to remote device is connected correctly to the remote device interface board and the remote device.
	Remote device	Use another remote device on this port of the remote device interface board and try to switch on the monitor again.
	Power switch board not connected to the main board	Check if power switch board cable is connected to the primary and secondary main board (opt.#E30)
	Remote device interface board	Check if monitor can be switched on by the power switch on the power supply. If this is possible replace the remote device interface board. Otherwise proceed as described in “Green Power On LED and Red Error LED remain off after pressing power on button on power supply” above.

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Green On/Standby LED **or** Red Error LED remain off after pressing Power on button:	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
	Main board defective	exchange main 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.
	Backplane top defective or secondary main board defective (opt. #E30)	Disconnect cable from the backplane top to the backplane bottom.
	Primary Video Board defective	Remove primary video board and switch on again
	Backplane Bottom defective	Remove Backplane Bottom and check again.
	Primary Main board defective	Exchange primary Main board
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”.
No Test Sound issued	Speaker defective	check for INOPs and follow instructions exchange speaker
	Main board defective	exchange main board

External Display not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
External 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
	Video board defective	Replace video baord
	Main board defective	Replace main board
Indep. Dsp. Malfunc. INOP is issued	Video cable to external display not connected	Check video cable connection to second main display
	External display has no power	Check electricity supply of second main display
	External display is defective	Check second main display and video cable on another monitor or PC
	Video board defective	Replace video baord
	Main board defective	Replace main board
	Second main display defective	Exchange Display
Indep DSP. NotSupp. INOP is issued	The monitor does not support a second main display. The monitor software is incompatible.	Second main display is only supported on MP90 monitors with dual CPU.

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 MIB board
	External Touch driver configuration	Check RS232/MIB 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
	MIB Board defective	Replace MIB 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

D80 Intelligent Display Problems

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Third main display not functioning properly. One of the following INOPS is issued:		
INTELL DSP MALF or INTELL DSP MISSING	D80 not connected properly or defective or The monitor has lost contact with the connected Intelligent Display	Check that the MSL Coupling cable is not defective and connected correctly. If problem persists, refer to the troubleshooting table ***Boot Phase Failures*** (on page 127)
INTELL DSP UNSUPP	The monitor does not support the connected Intelligent Display. The monitor software is incompatible.	Monitor software must be D.00.xx or higher. The D80 can only be connected to an MP90 with dual CPU.
CHECK MCC	The monitor cannot communicate with the D80 Intelligent Display.	Make sure that the gray connector of the MSL coupling cable (MCC) is connected to the Intelligent Display. If problem persists, exchange MSL Coupling cable.
MCC REVERSED	The MSL Coupling cable is reversed.	Connect the end with the gray connector to the Intelligent Display and the blue connector to the MP90.
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.

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 and put them back in 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
	Video board defective	Replace Video 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 Alarm Device

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Alarm LEDs illuminate, but no alarm sound is issued	wrong I/O slot	check I/O matrix in the Theory of Operation section of this manual
	speaker defective	replace remote alarm device

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
	remote device I/F defective	replace I/O board
Alarm occurs on screen, but no LED or alarm sound on the alarm device	cabling not connected	check cabling
	cabling defetive	replace cable
	I/O board defective	replace I/O board
	Remote Alarm Device defective	replace Remote Alarm Device
Alarm sound is isued, but no LEDs light up	LED failure	Replace Alarm Device

Remote Extension Device

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Remote input device (for example mouse/keyboard) attached to the Remote Extension Device does not function	See table for your input device	See table for your input device
Buttons on the Remote Extension Device do not function but input device attached is functioning	Remote Extension Device defective	replace Remote Extension Device
Speed Point attached to Remote Extension Device not functioning	Remote Extension Device is not connected to the monitor.	Check cabling and connections
	SpeedPoint not connected properly	Check cabling to SpeedPoint in the Remote Extension Device
	SpeedPoint defective	Replace SpeedPoint
	Remote Extension Device defective	Replace Remote Extension Device
	Remote Device I/O board in the wrong slot	Check I/O Matrix in *Installation Instructions*
	Remote Device I/O board defective	Replace I/O board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Speed Point Knob Rotation, Joystick Control or Selection control not functioning	SpeedPoint defective	Replace Speed Point
INOP Message CHECK INPUT DEVICES is issued	SpeedPoint or other input device defective	Perform a visual and functional check of all the monitor input devices. Replace input devices if necessary.

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
	PS/2 or USB I/O board in wrong slot	Check I/O Matrix in “Installation Instructions"
	PS/2 or USB I/O Board defective	replace I/O board
Keyboard/Mouse attached to Remote Extension Box not functioning	Remote Extension Box is not connected to the monitor or Input Device is not connected to Remote Extension Box	Check cabling and connections
	Keyboard/Mouse defective	Replace Keyboard/Mouse
	Remote Extension Device defective	Replace Remote Extension Device
	Remote Device I/O board in wrong slot	Check I/O Matrix in "Installation Instructions"
	Remote Device I/O board defective	Replace I/O board

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 ha 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"
		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

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
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
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
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 wireless beds	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)

Wireless Ethernet Adapter (Proxim)

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
No central monitoring possible (see also Network related problems)	Monitor is out of range of the access point (in this case the yellow sync LED on the wireless adapter on the bottom of the device next to the power connector is not on steady)	Move monitor back into coverage area
		Verify size of coverage with the site survey tool
	Wireless Adapter has no power (LEDs on adapter are all off)	Check splitter cable and replace if necessary
		Check network adapter board in monitor and replace if necessary
		Check adapter itself. Replace if necessary
	(Only after first install) Firmware revision in adapter is wrong	Update adapter frimware with wireless support tool
	Wireless adapter defective (the red status LED on the adapter's top panel is on)	Replace wireless adapter
	Wrong configuration in wireless adapter or in access point	Check configuration with wireless support tool
No connectivity (coverage area consists of multiple access points and in some parts of the area there is no connectivity)	Configuration problem	Verify the channel, domain and security ID settings of the access points in the coverage area
Frequent dropouts and network disconnects	Excessive interference by other radio equipment or by microwave ovens	Check statistics that can be read from the wireless adapter via RS232 or via logging application in the PIC. Remove interfering equipment.
	System capacity exceeded in coverage area	Check configuration guidelines for number of monitors per access point.

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
	Configuration problem	Check access point configuration with wireless support tool, in particular the multicast filters
Overview, Printing does not work	Some functions are not available on a wireless network	Connect to cabled network

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 the cable connection between the IntelliVue 802.11 Bedside Adapter and the system interface board. Replace cable, antenna or IntelliVue 802.11 Bedside Adapter if necessary.
	Configuration problem.	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
LEDs on IntelliVue 802.11 Bedside Adapter are off and remain off	Communication problem	Check that the cable connection from the IntelliVue 802.11 Bedside Adapter to the system interface board is correct. Disconnect and reconnect the cable and try again. If problem persists, switch monitor off and on again. If problem persists, exchange cable and or IntelliVue 802.11 Bedside Adapter. If the new adapter does not function either, exchange system interface board. When functioning correctly, The LEDs on the bedside adapter should both light up for about 3 seconds after the monitor is switched on or the bedisde adapter is first connected via the network cable. If the wireless LAN functionality has been disabled permanently both LEDs will remain off during monitor operation. In this case, to check the electrical connection, power-cycle the monitor and observe the LEDs on the adapter.

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

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
INOP Message “MsmtSrv not Supp” is issued	Wrong Software Revison	Upgrade monitor and/or measurement server to a matching software version. Refer to ***Software Compatibility Matrix*** (on page 119) 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 on a M800xA monitor) connected.	Disconnect the unsupported measurement server. Refer to ***Software Compatibility Matrix*** (on page 119) 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	Disconnect the measurement server and cycle power.

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
		Check MSL connector board incl. internal cable to main board and replace if necessary
Measurement Server does not start but LEDs are normal	Communication lines in MSL cable or MSL connector broken	Check MSL cable and MSL connectors
	MSL connector board defective	Check MSL connector board incl. internal cable to main board and replace if necessary

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 1 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 MMS from the monitor Cycle power to restore power to the MSL devices. If the message disappears, reconnect MMS one at a time, waiting 15 minutes between each device to see if message reoccurs. If yes, the respective MMS is faulty. See ***Multi-Measurement Module*** (on page 141) or ***Printer*** (on page 147) 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 including Measurement Server Mount, 2nd MSL interface, 1st and MSL interface and reconnect devices one at a time. If message persists, replace main board.
INOP BAD SERVER LINK is issued	Unexpected data detected on MSL	Check cable and power cycle the monitor

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
	An MMS with an incompatible software revision is connected to the monitor.	Connect FMS MMS with compatible software revsion
	Communication between the components not functioning	Check software versions and model number of devices for compatibility
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 MSL I/O board. Replace if necessary
		Check FMS or MMS 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/ Marker In function does not funcion	Hardware problem	Check MSL cable
		Check ECG Out Hardware in the monitor
		Check the MSL connector in the measurement server

Alarm Issues

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
- SpO_2 EQUIP MALF
- SpO_2 TRANSDUC MALF
- SvO_2 EQUIP MALF
- $tcpO_2$ (or $tcpCO_2$) EQUIP MALF
- <Temp Label> EQUIP MALF
- VueLnk EQU. MALFI

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

Symptoms	Cause of Failure	Failure Isolation and Remedy
	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	Enable the correct printer in the Setup Printers menu
	Paper size of printer does not match paper size of report	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	Switch on printer power
	Printer paper tray empty	fill printer paper tray
	Cabling not connected correctly	Check cabling
	PS/2 or USB I/O board defective	replace I/O board

Symptoms	Cause of Failure	Failure Isolation and Remedy
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.)

Symptom	Possible Cause	Corrective Action
	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 is defective	Check board and replace if necessary
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

Symptoms	Cause of Failure	Failure Isolation and Remedy
	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 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
One LED next to a port with a connected USB device is off	The device connected to the port with the switched off LED is not supported.	Unplug the unsupported device.
	A printer connected to the port is not switched on	Switch on the printer.
	Short-Circuit	Unplug the device in the respective port and try again.

Symptoms	Cause of Failure	Failure Isolation and Remedy
All LEDs on the USB board are off, even though devices are connected	The connected devices are drawing too much electricity.	Unplug the connected devices one by one until the LEDs come back on.
	Unsupported combination of devices.	Unplug the connected devices one by one until the LEDs come back on. See ***Connection of USB Devices*** (on page 260) for details on supported combinations.
None of the connected devices are functioning.	Connected devices or USB board defective.	Unplug all devices and reboot the monitor. The LEDs on the USB board should switch on briefly and then turn off. If they remain on, the USB board is defective and needs to be exchanged.

Flexible Nurse Call Relay

Symptoms	Cause of Failure	Failure Isolation and Remedy
INOP message CHECK NURSE CALL RELAY is issued	Nurse Call Relay board defective	Replace 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
	Nurse Call Relay board is in the wrong slot.	Verify correct placement of the I/O boards
	The Nurse Call Relay board is defective	Replace 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 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 there is no device connected to the first MSL port (slot 1), but there is a device connected to the second MSL port, remove the device from the second MSL port and connect it to the first MSL port. If the problem persists, replace the ECG OUT board.
No ECG-OUT signal to the Defib		Disconnect the MMS and Defib cable. Switch the Monitor off then on again. Observe the red LED in the ECG OUT section. (Note that the LED can only be observed if the housing bottom is removed).

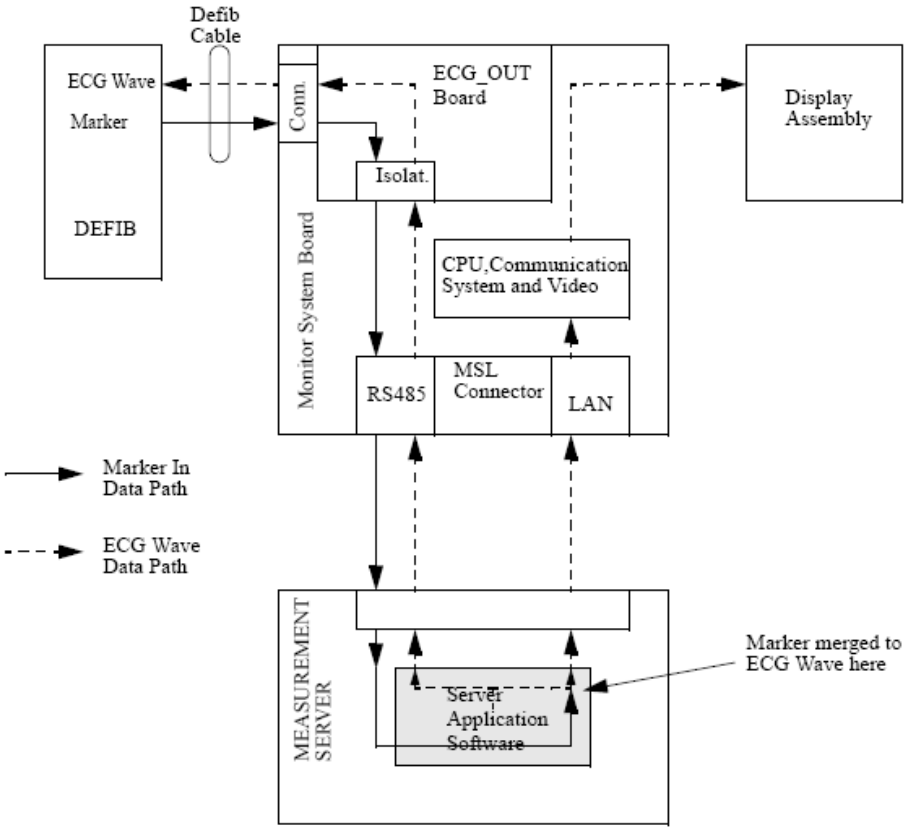
Symptoms	Cause of Failure	Failure Isolation and Remedy
Internal Electronic Defects: The red LED does not switch on for about 1 second at power on:	Cabling not connected	Check cabling
	ECG OUT board defective	Replace ECG OUT board
The red LED switches on and remains on for more than 20 seconds:	ECG OUT Board defective	Replace ECG OUT Board
	Main Board defective	Replace Main Board
External Electronic Defects	ECG OUT board defective	Connect Known good Defib, Defib cable MMS and MMS cable. Check Marker pulse and ECG OUT signal at defib again. **If there is still no signal:** Replace ECG OUT board
	Main Board defective	Replace main board
No marker pulse is displayed on the monitor	Defib does not send marker	Check whether defib is able to send marker or check for internal electronic defects.
The ECG Out/Marker In function does not function	Hardware Problem	Check MSL cable
		Check ECG Out hardware in the monitor
		Check the MSL connector in the measurement server

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.

Data Flow Marker In and ECG Wave

The following illustration of the data flow for Marker In and ECG Wave may assist in troubleshooting.



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**		**M8010A**	**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

M8010A

This key switches to the Monitor Revision Window

M8048A

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

M3001A

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

Device ID	Error Code	Known Symptoms	Corrective Action
M800xA IntelliVue Monitor - Software Revisions up to A.06.07			
16505	20005	Loss of configuration after system reboot - monitor runs in a default safe profile	Clone configuration to the M800xA IntelliVue Monitor using the support tool
M80xxA IntelliVue Monitor - Software Revisions up to A.10.15			
16400 16400 16505 17218 17303	495 500 20212 16030 30049	Monitor spontaneously reboots without user interaction.	Upgrade M80xxA IntelliVue Monitor to software revisioon A.20.46 or higher. For details see FCO86200287
M8048A and M3001A IntelliVue Servers - Software revisions up to A.10.14			
32750	21002	For M8048: - Modules not recognized - Monitor reboots upon removal of modules	Upgrade M8048A and M3001A to software revision A.10.16 or higher. For details see FCO86200175 and FCO86200176
		For M3001: Monitor reboots after Temp or Pressure unused	
M3001A Multi-Measurement Modules - Software revisions up to B.10.81			
17345	21400	MMS reboots unexpectedly without user interaction - the IntelliVue monitor does not show any waves or numerics coming from the MMS or the MMS extension.	Upgrade M3001A to software revision B.10.81 or higher. For details see FCO86200463

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.

Tools Required

- Torx screwdriver (size 10)
- Torx screwdriver (size 20)
- ESD mat and wrist strap
- 2 small flat blade screwdrivers

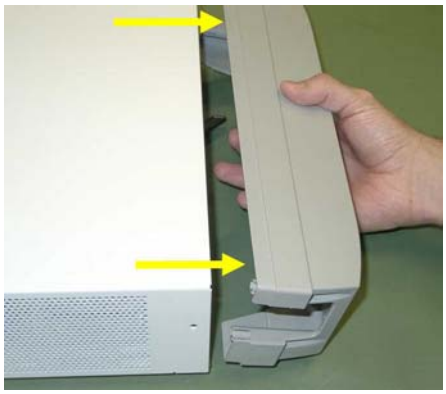
MP80/D80/MP90 CMU Disassembly

NOTE

All screws for the MP80/D80/MP90 are the same size Torx. We recommend that you keep them separated and counted as you disassemble and reassemble the device.

Removing I/O Boards

1. Pull off the cable management cover at the rear of the Computer Module Unit (CMU).



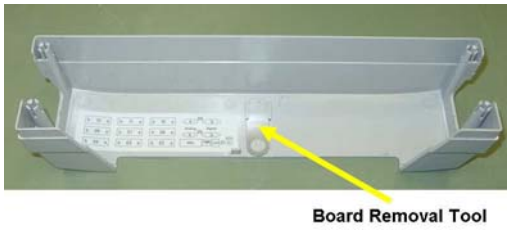
2. Pull off the Power Cord Cover at the front of the CMU and make sure the power cord is unplugged.

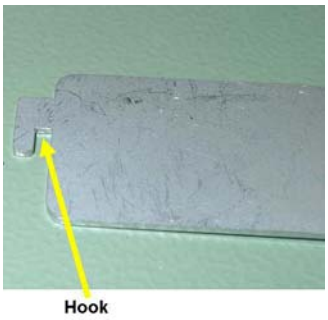
CAUTION

Make sure to unplug the AC power cord before removing the I/O boards. Failure to remove the power cord could cause damage to the CMU as it is still under power.

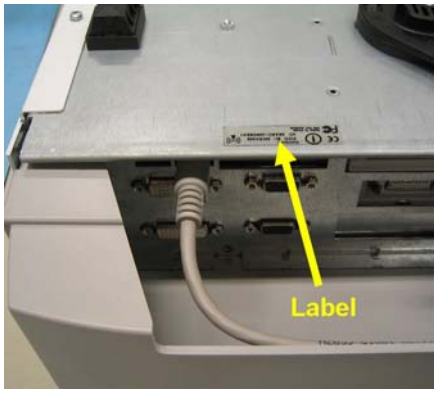
3. Unscrew the four screws at the rear of the CMU and remove the metal I/O board cover.

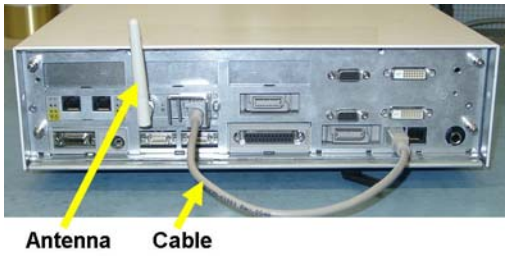
4. Use the board removal tool located inside the cable management cover to remove the I/O boards. Make sure to insert the end with the hook underneath the I/O board.





Reassembly Note: If you have installed #J35 (-USR_ProductName- 802.11 Bedside Adapter) please attach the approval label or the WLAN label for Japan (country specific) and the antenna and plug in the cable as shown below.





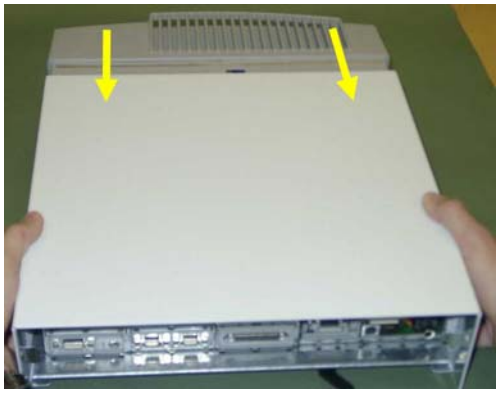
NOTE

After replacing the MSL LAN, ECG OUT I/F on a D80 Intelligent Display CMU, make sure to cover the ECG OUT connector with the “Cover ECG OUT for D80”. This part is available as part of the MP80/MP90 Small Parts Kit.

Removing the Top Cover

1. Flip over the CMU so the bottom faces upwards. With single CPU units it may be helpful to reinsert the I/O board cover without screws before flipping over the CMU in order to have a more stable platform.
2. Remove the four screws next to the plastic feet.

3. Flip the CMU back over, remove the I/O board cover if still present, and slide off the top cover towards the rear.

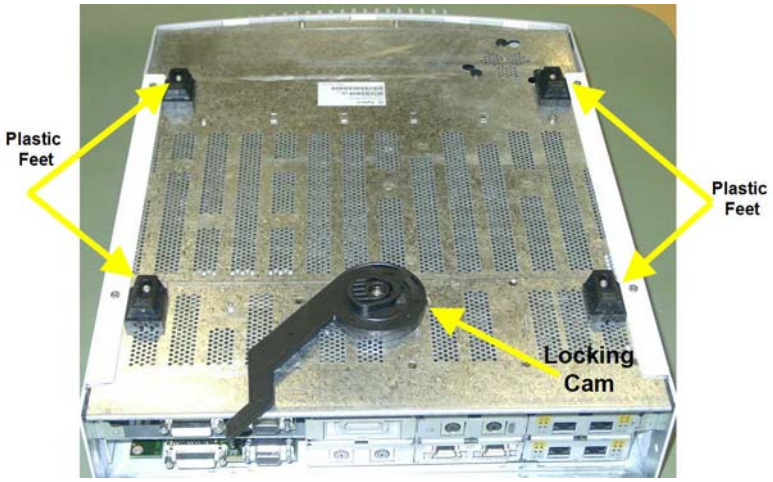


Reassembly Note: Insert the I/O board cover before flipping over the CMU to aid with reinserting screws.

Removing the Plastic Feet and/or the Locking Cam

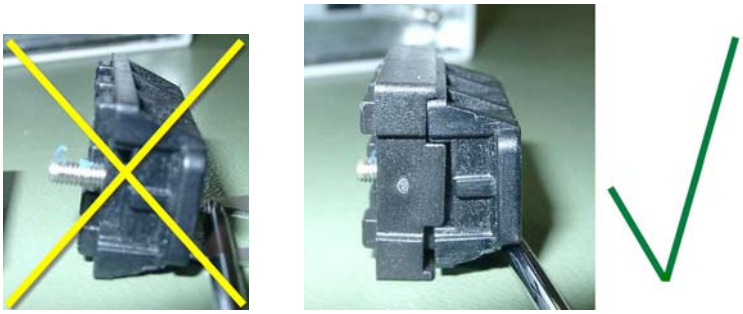
Some mounting options may require the removal of the plastic feet or the locking cam.

1. Place the CMU upside down and remove the screws securing each of the feet and the locking cam.



CAUTION

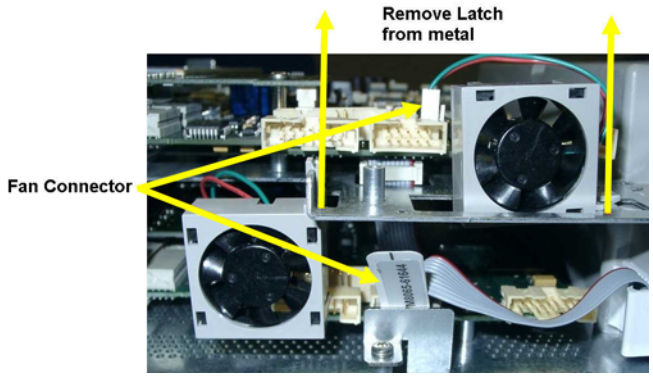
When you remove the feet and/or the locking cam you may find there are standoffs to increase the height under the CMU. You must refit these standoffs with the plastic feet and the locking cam or use shorter screws to refit the feet and the locking cam alone. Screws cannot go more than 5 mm inside the CMU (measured from the exterior of the metal chassis). Inserting screws which are too long into the CMU will damage the main board.



Removing the optional Fans (MP90 Dual CPU Versions only)*

1. Remove the top cover.

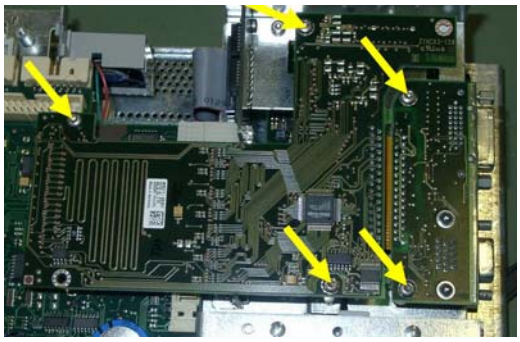
2. Disconnect the fans and pull them out from the sheet metal.

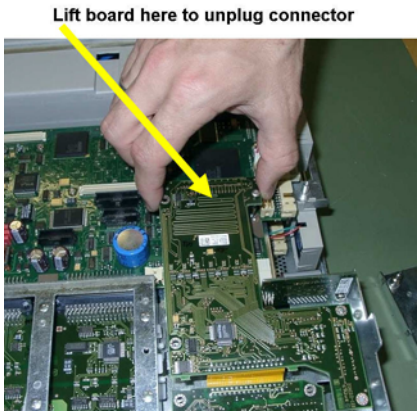


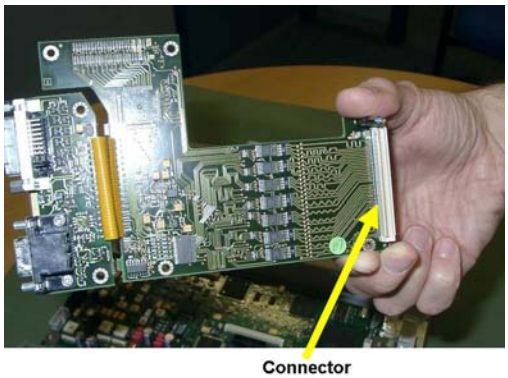
* The MP90 dual CPU version may have fans added during installation. The fans are not mandatory and do not ship with the product. If a dual CPU MP90 is installed with minmal space around it, we recommend the installation of the fans.

Replacing the Second (Independent) Video Board(MP90 Dual CPU Versions only)

1. Remove the 5 screws and take out the video board, unplugging it from its connector.

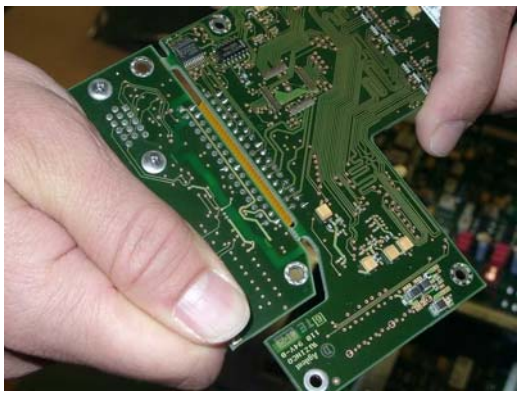






NOTE

If not already separated, you may need to break apart the two pieces of the repaired/exchange board.

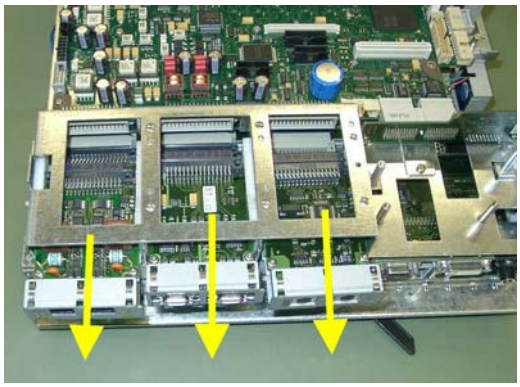


Removing the Second CPU/Main Board (MP90 Dual CPU Versions only)

WARNING

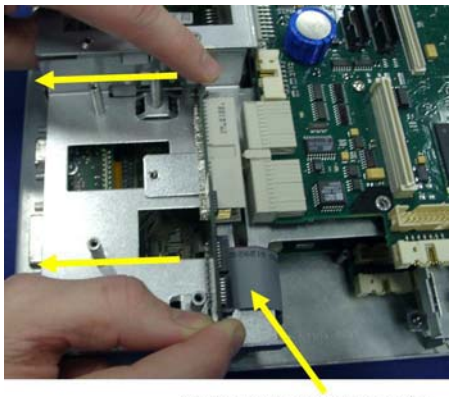
Always use two identical main boards in a dual CPU MP90 monitor. Do not mix two different types of main board.

1. Remove the second independent videoboard as described in ***Replacing the Second (Independent) Video Board (MP90 Dual CPU Versions only)*** *(see "*Replacing the Second (Independent) Video Board(MP90 Dual CPU Versions only)*" on page 164)*.
2. Remove the top three I/O boards.



3. Remove the screw securing the main CPU interconnection board.

4. Pull off the main CPU interconnection board in the direction shown.

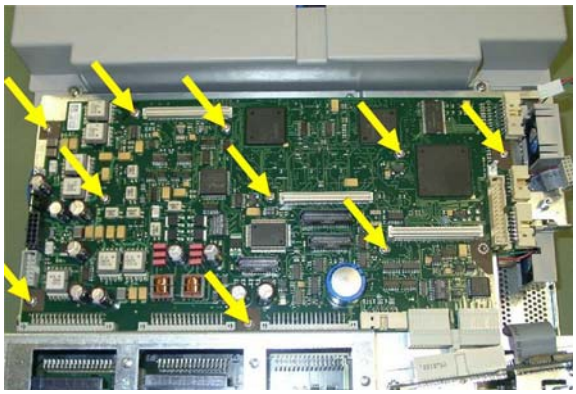


Interconnection Board Connector

NOTE

If you wish to remove the interconnection board entirely, you must also disconnect the interconnection board connector.

5. Remove the 10 screws and pull the mainboard straight up to remove it. Please note that there are sensitve components near the screws on the bottom of the main board.



Accessing the Main CPU or Primary Video Board (MP90 Dual CPU Versions)

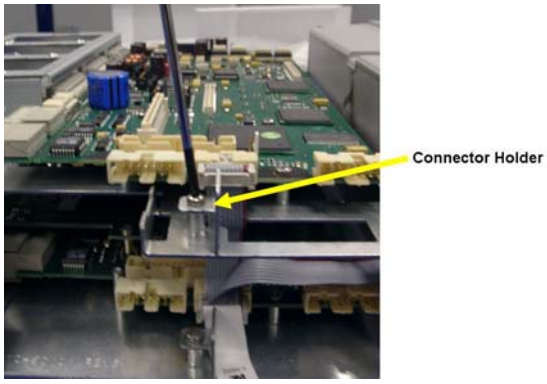
NOTE

If the second independent video board or the second CPU board do not require replacement, you do not need to remove them to access the first CPU and primary video boards.

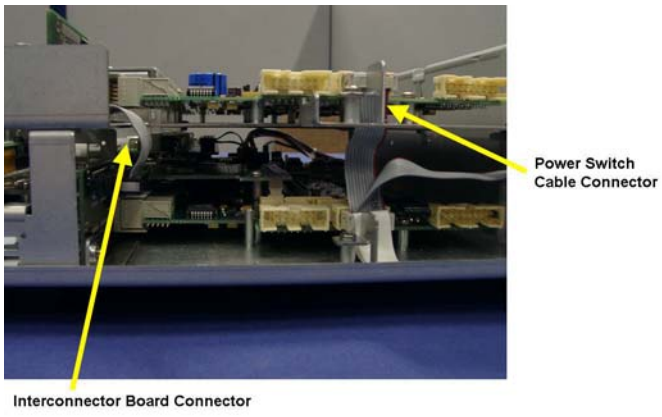
WARNING

Always use two identical main boards in a dual CPU MP90 monitor. Do not mix two different types of main board.

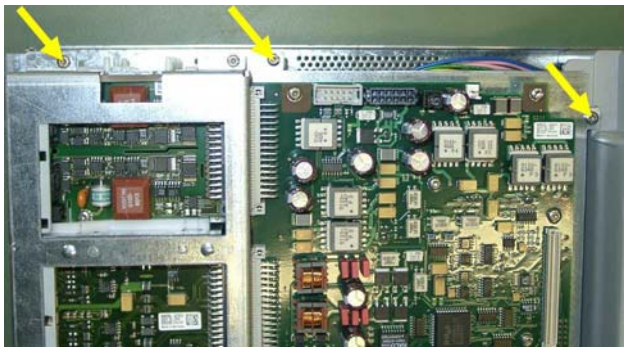
1. Unscrew and remove the Power Switch connector holder.



2. Unplug the interconnector board connector and the power switch cable connector.

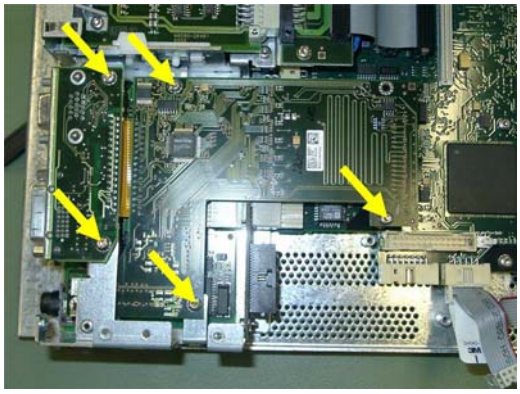


3. Remove the six screws and take off the upper sheet metal plate. (The top three I/O boards do NOT have to be removed).

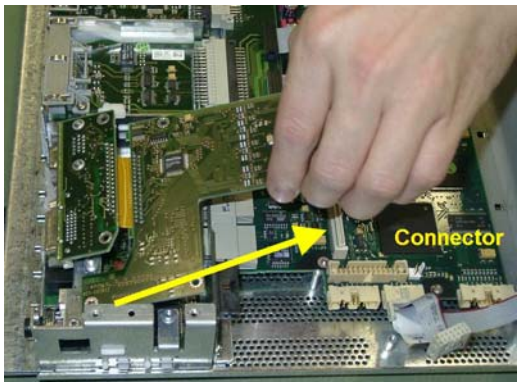


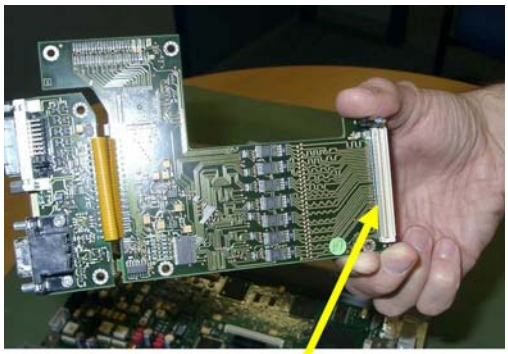
Replacing the Primary Video Board

1. Remove the five screws securing the primary video board.

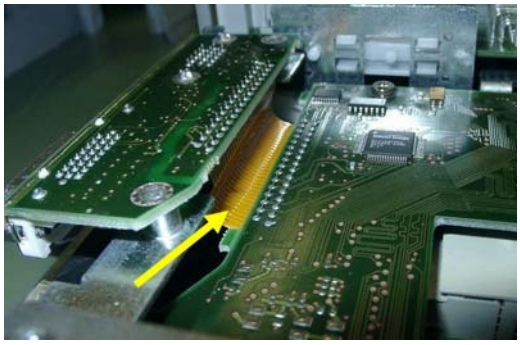


2. Lift up the video board at the back to unplug the connector. Then slide the board backwards to remove it.

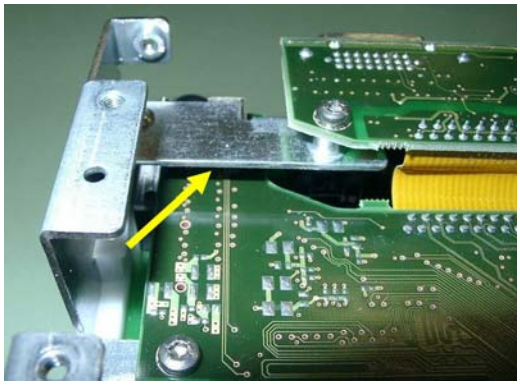




Reassembly Note: The flex cable on the primary video board must go up.

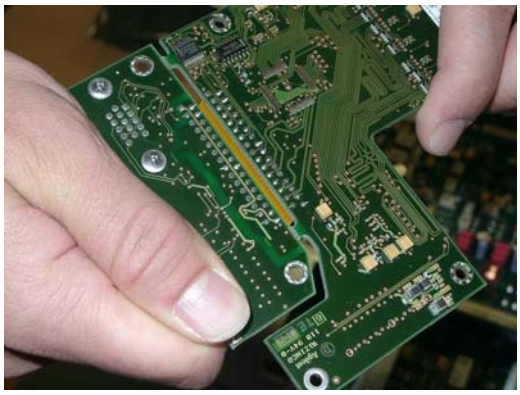


Reassembly Note: When replacing the primary video board, the board must slide under the sheet metal.



NOTE

If not already separated, you may need to break apart the two pieces of the repaired/exchange board.



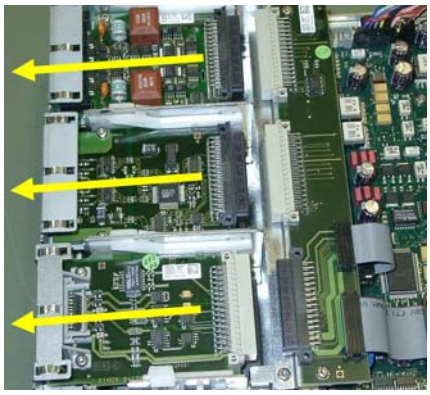
Removing the Main Board

When replacing the main board, the monitor must be reloaded with the software, purchased options and settings. A support tool is required to perform these tasks. Please see the Support Tool Instructions for Use document for details on how to load software, options and settings.

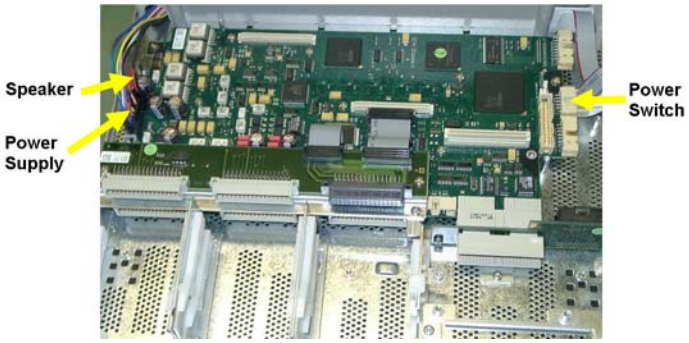
Before exchanging the main board, retrieve the status log from the monitor with the support tool. Please include a status log printout when returning the defective main board.

1. Remove the video board as described in ***Replacing the Primary Video Board*** (on page 168).

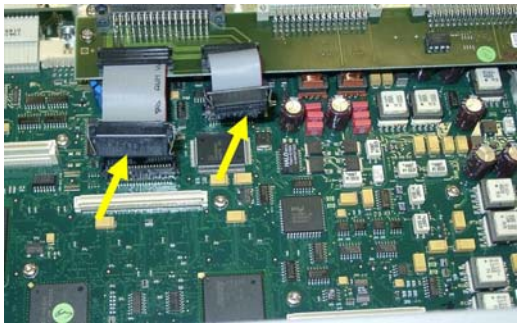
2. Remove all I/O boards



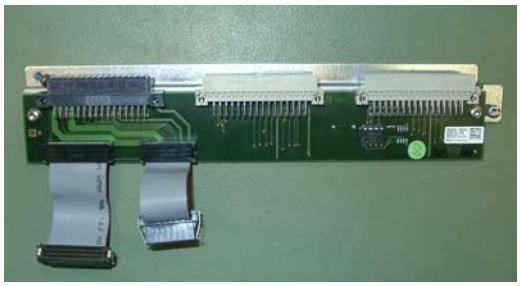
3. Remove power supply and power switch connectors and the speaker connector.



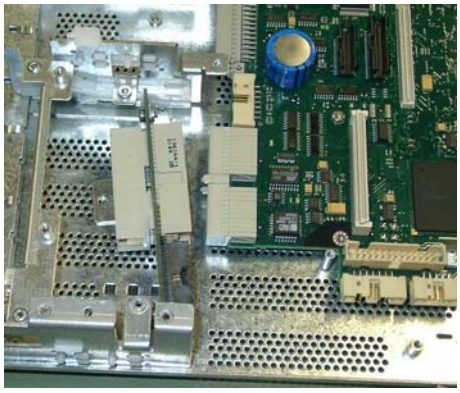
4. Disconnect the I/O board backplane connectors.



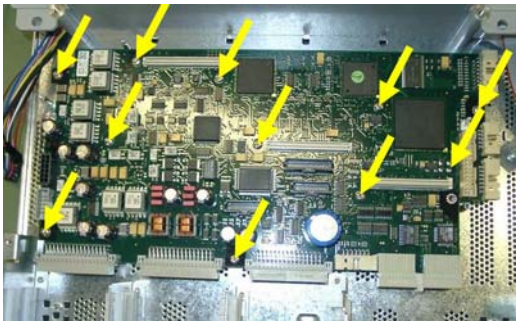
5. Remove the two screws securing the backplane (on the metal, NOT the board) and take out the backplane.



6. Remove the CPU interconnection board.



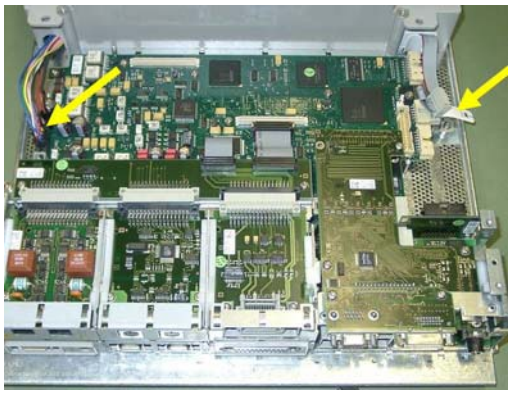
7. Remove the remaining ten screws and pull the main board straight up to remove it. Please note that there are sensitive components near the screws on the bottom of the main board.



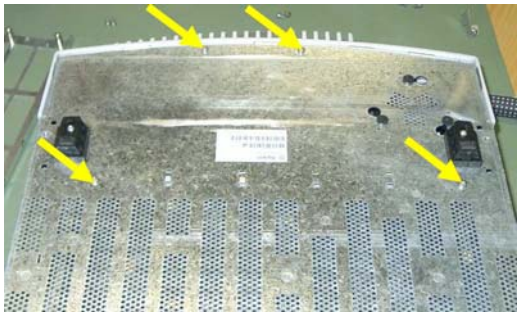
Removing the Power Supply

1. Remove the second CPU sheet metal assembly, if present. (*See Accessing the Main CPU or Primary Video Board (MP90 Dual CPU Versions)* (on page 167)

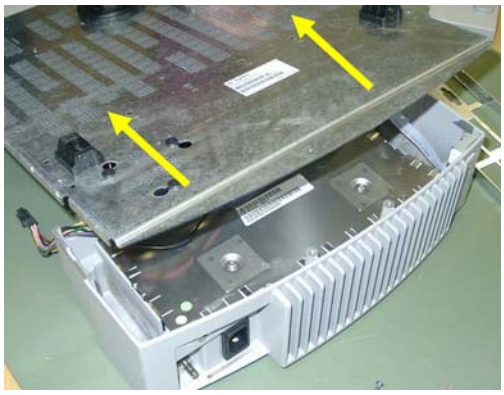
2. Pull out the power supply and power switch connectors.



3. Flip over the CMU, support it with the cable management cover and take off the four screws.



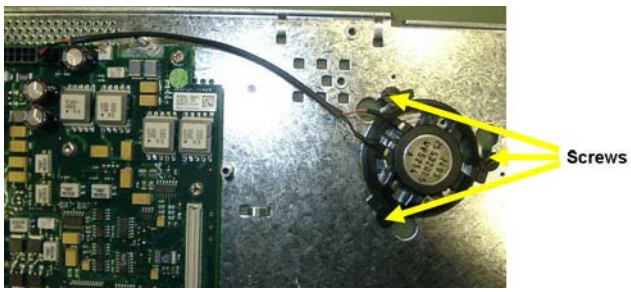
4. Pull the CMU base off of the power supply.



Reassembly Note: When reassembling, ensure that all cables are led through the dedicated holes and not pinched underneath the metal.
After reassembly, set the exchange part data as described in the support tool Instructions for Use

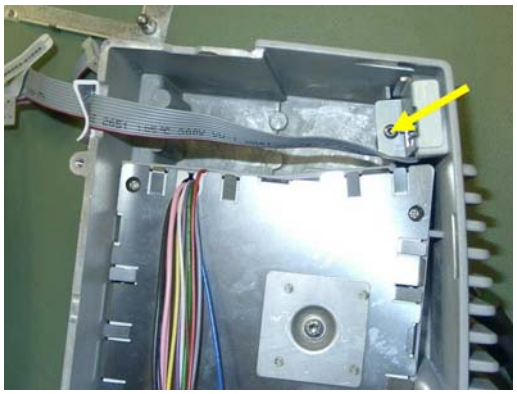
Removing the Speaker (MP80/MP90 only)

1. Remove the power supply.
2. Disconnect the speaker cable, unscrew the three black screws using a flat blade screwdriver, and then turn and pull out the speaker.



Removing the Power On/Off Switch

1. Remove the power supply.
2. Remove the screw securing the power switch and remove the switch.

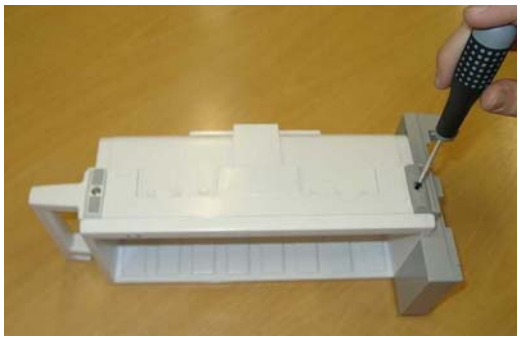


Flexible Module Rack (FMS) Disassembly

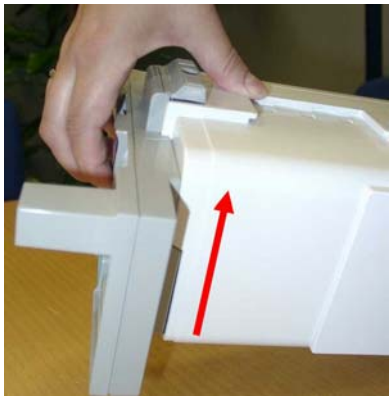
Removing the Handle and the Measurement Server Mount

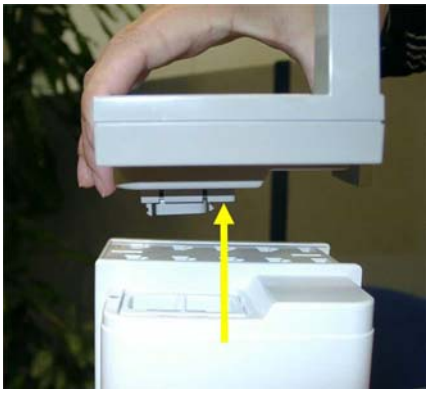
Please note that any combination of handles and mounts is possible.

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



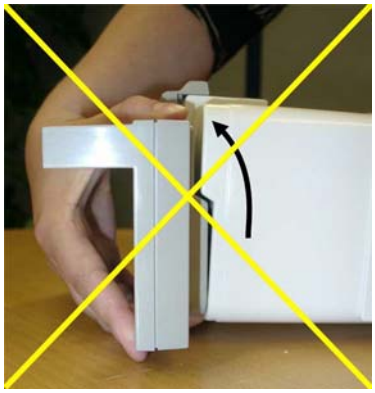
2. Slide the handle up and pull it out.
3. Remove the MMS if connected. Slide the MMS mount up and remove it by pulling directly perpendicular to the FMS.





NOTE

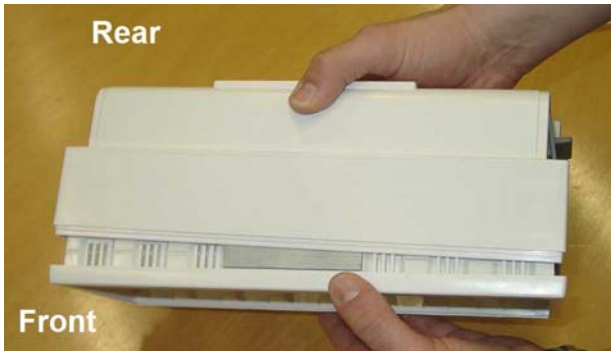
There is a connector located on the MMS mount. If you tilt the MMS mount as you remove it, you may damage the connector.

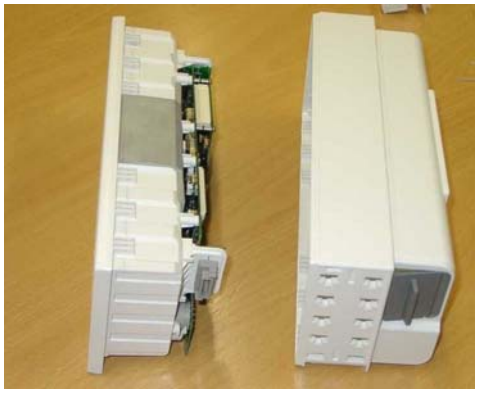


4. Remove the connector housings on each side of the FMS by compressing the cover slightly using two screwdrivers.

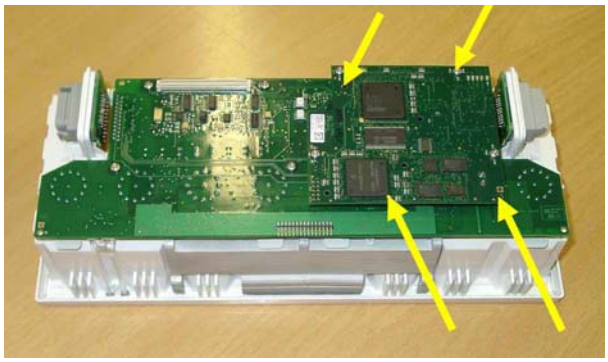
5. Remove the two white pins on each side with a small screwdriver.

6. Take off the rear housing.

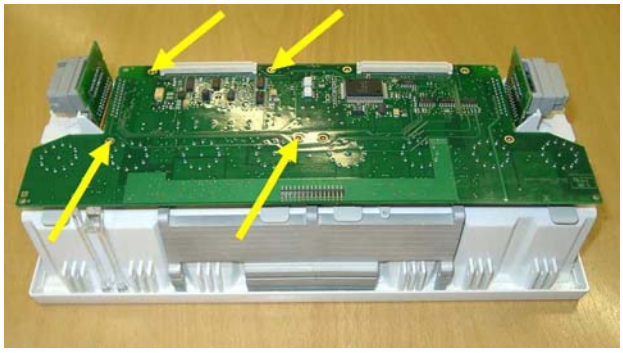




7. Remove the four screws on the CPU board, pull it gently off the mother board, unplugging the connector at the same time.



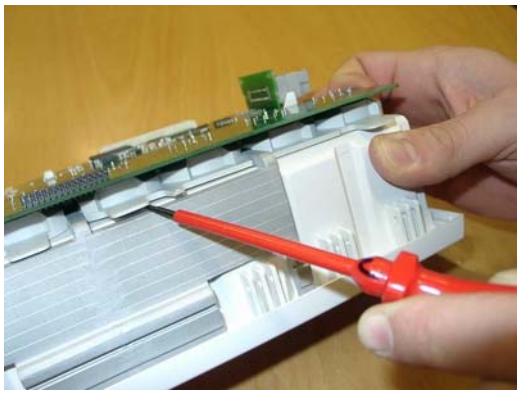
8. Remove the four remaining screws on the mainboard.

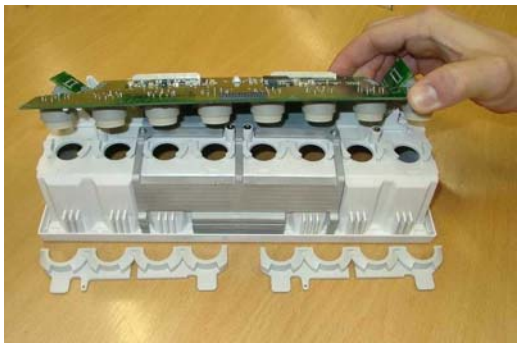


9. Pull off side connector brackets by pulling them gently away from the housing on each side and lifting carefully.

10. Lift up and pull on the tabs to remove the connector holders.

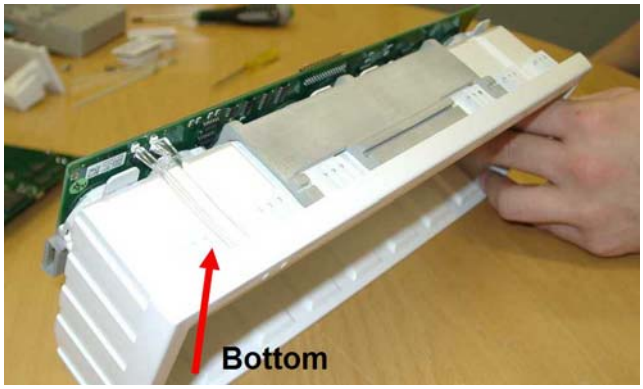
Reassembly Note: The connector holders are side specific.

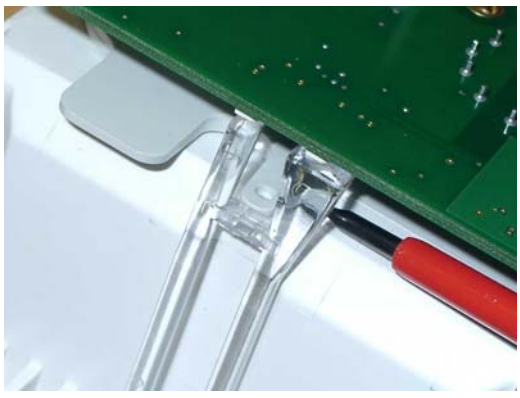




11. Unsnap the lightpipe.

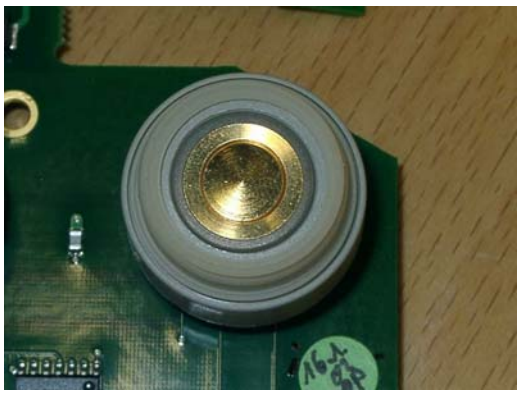
Reassembly Note: You must snap the lightpipe bottom into place before inserting the top into the tab.





12. Pull off the main board.

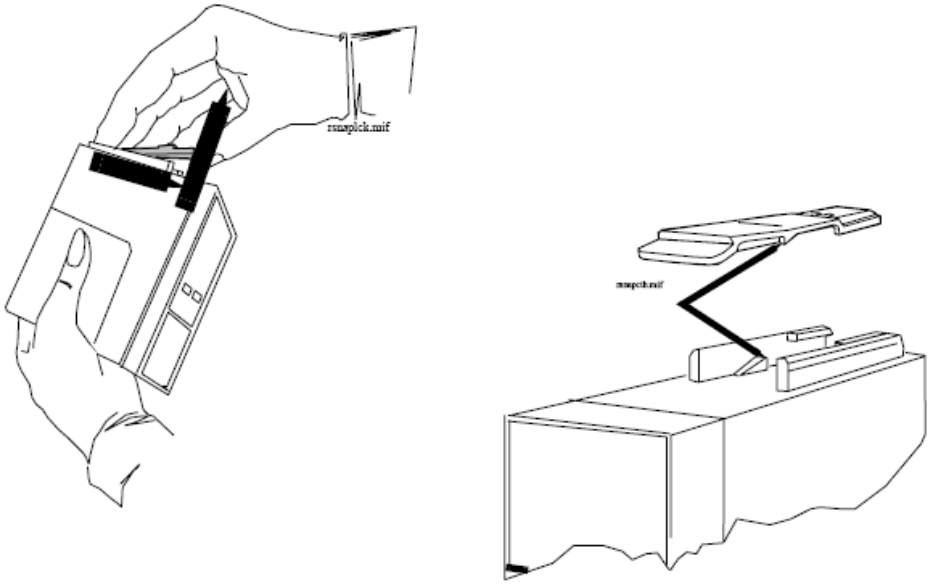
Reassembly Note: Make sure that the rubber seal around the module connectors is inserted properly into the front housing.



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.

Plug-in Modules

The snap lock holds the plug-in module in the FMS.



To remove the snap lock:

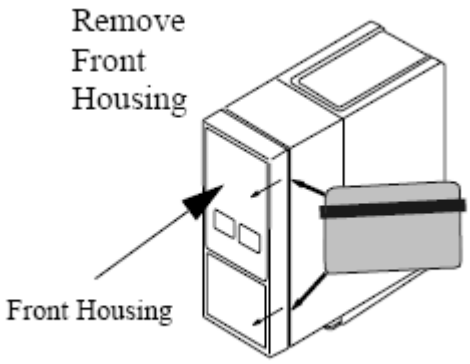
1. Grip the module firmly in one hand and using your thumb, pull the front edge of the snap lock away from the plug-in module so that the lug on the snap lock clears the retaining edge of the module.
2. Push on the rear edge of the snap lock to move the snap lock through the slot toward the front of 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 a patient leakage current test must be performed before it is used again for monitoring.

To disassemble a plug-in module:

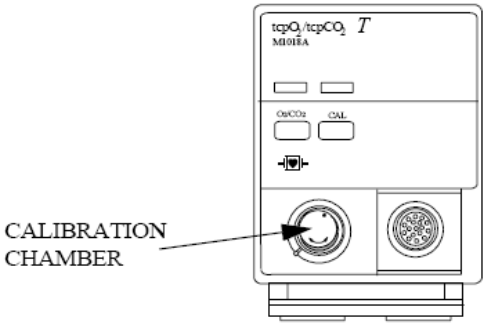
Remove the front housing.

- 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

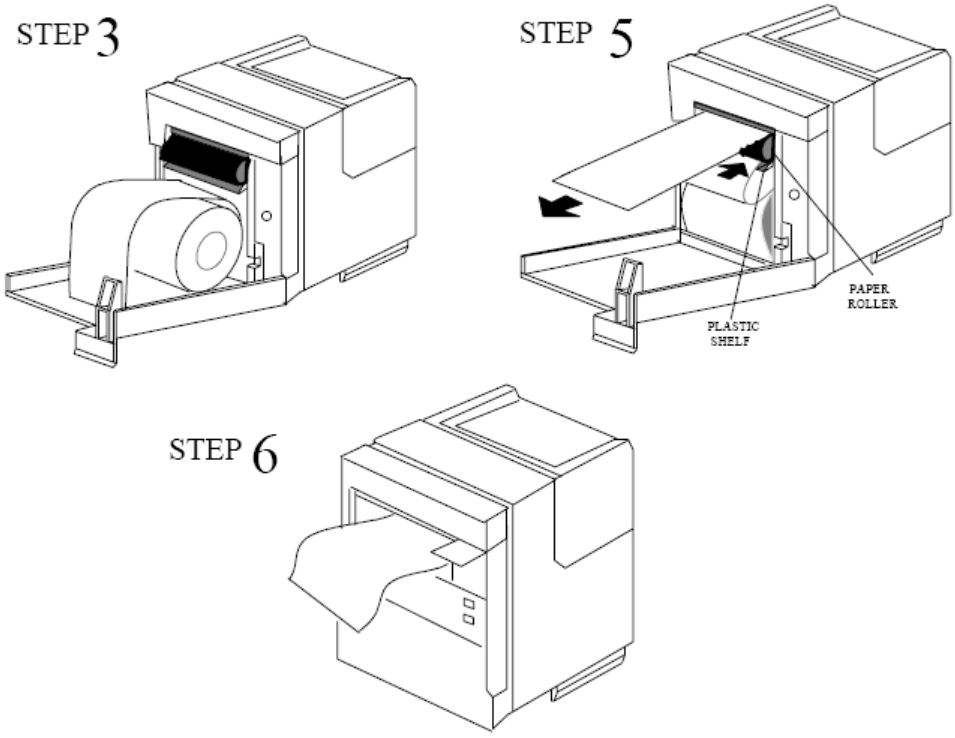
1. Using a flat-tipped screwdriver, remove the screw holding the calibration chamber in place on the front of the plug-in module.
2. Lift the chamber off the plug-in module. Ensure that the white plastic switch tip located in the module is not lost.

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.

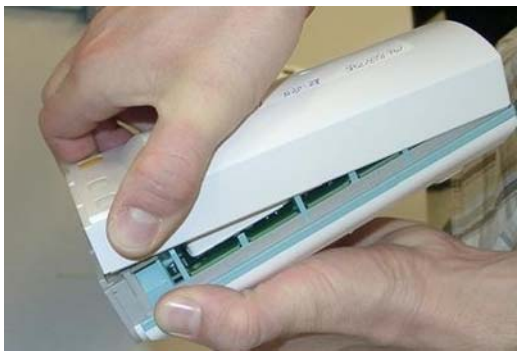
3. Remove the two pins and set them aside for refitting.

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.



Removing the DC/DC Board

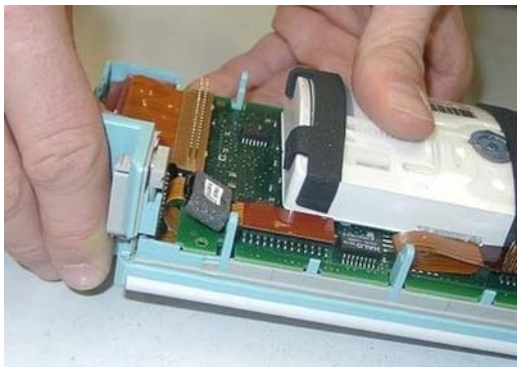
NOTE

The HW Rev C MMS (S/N prefix DE610xxxxx) does not have a separate DC/DC board anymore.

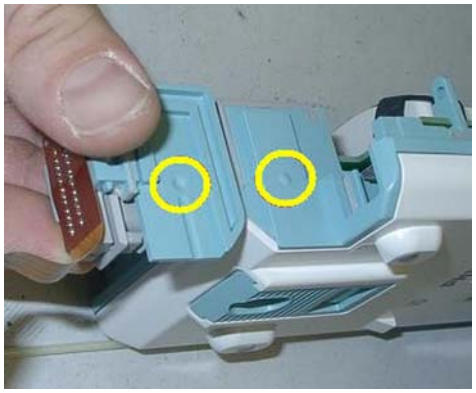
The DC/DC board is connected to the main board. Loosen the pin connection to the main board and remove the DC/DC board by gently lifting it up. Avoid touching the surface of the board. Set it aside where it is ESD protected.

Removing the MSL Flex Assembly

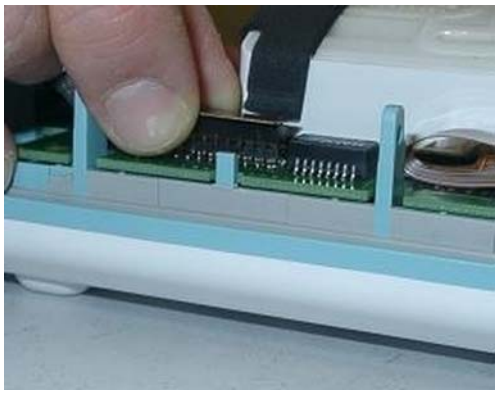
1. After the DC/DC board is removed, lift up the MSL frame connector to which the MSL Flex is attached.



At the beginning there might be resistance due to the special fixing mechanism shown in the picture below.

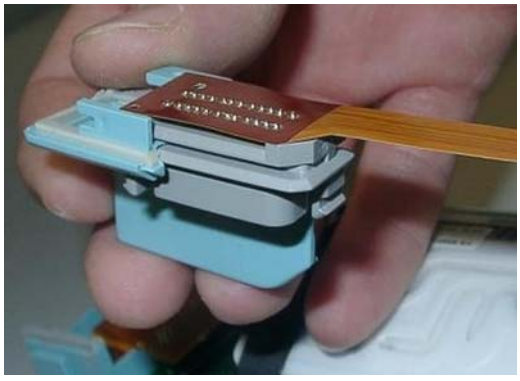


2. Lift up the flex connector carefully. Do not bend the connector pins on the main board.

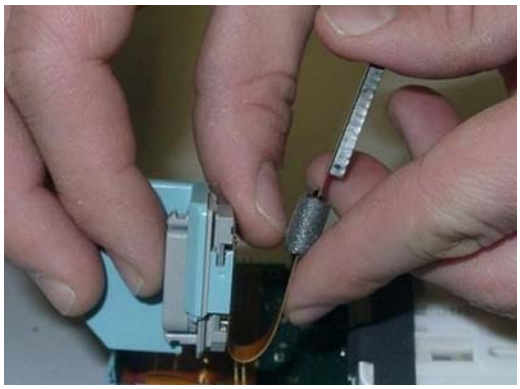


Reassembling the MSL Flex Assembly

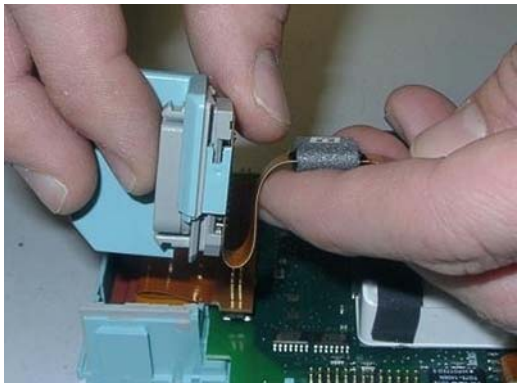
1. Insert the MSL Flex layer into the frame connector as shown below by moving it into the appropriate dove tail.



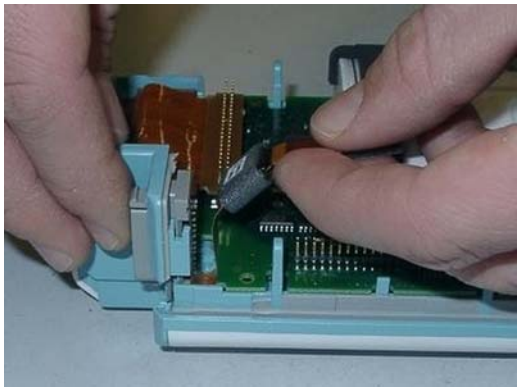
2. To insert the MSL Flex into the MMS, it has to be bent carefully. Bend the MSL Flex in a 180 degree angle as shown below. Do not crease the flex.



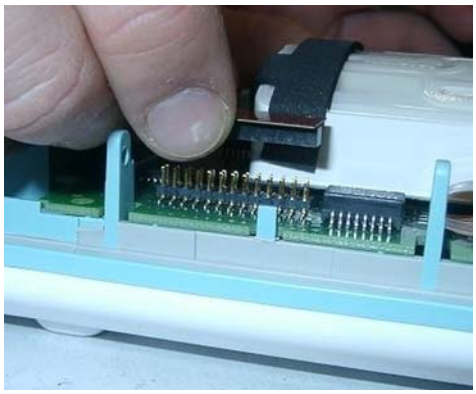
3. The second bend has to be done as shown below. To be able to connect the MSL flex to the main board afterwards, the flex has to be bent in a 90 degree angle as shown in the picture. Do not crease the flex.



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.



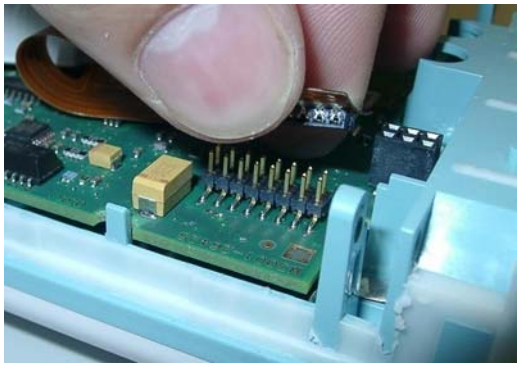
5. Position the connector correctly and push it into place.



Removing the NBP pump

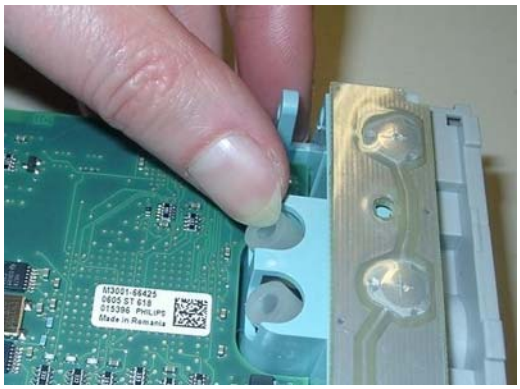
1. Remove the pump by lifting it up. Set the pump aside. Also remove the old silicon tubes.

2. Remove the connector of the NBP pump assembly. The connector may sit tightly. Gently loosen the connector.



Refitting the new NBP Pump

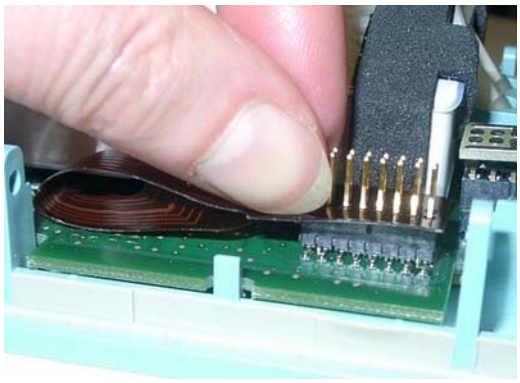
1. Insert new silicon tubes. Make sure they are seated correctly by pressing them into their position.



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.

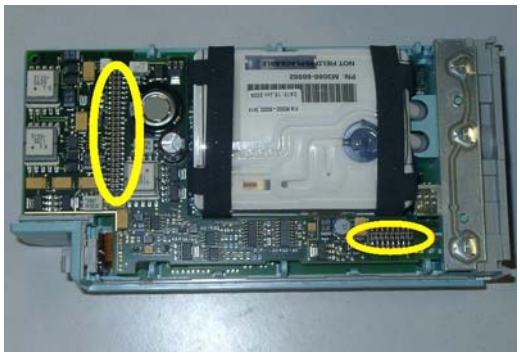


Refitting the DC/DC board

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

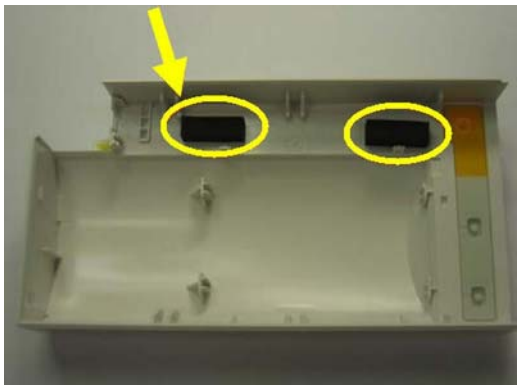
NOTE

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

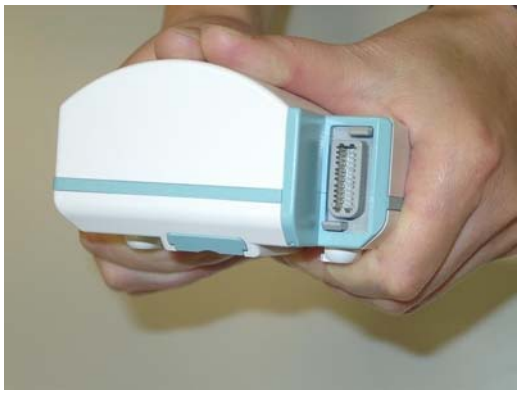
Perform the following two steps only on an MMS HW Rev C

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 sections "Maintaining the Instrument" and "Testing the Instrument".

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 sections "Maintaining the Instrument" and "Testing the Instrument" .

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

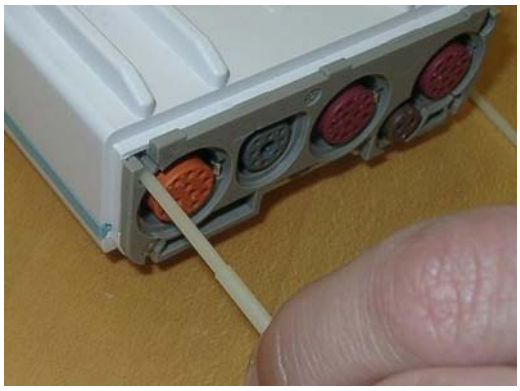
NOTE

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.

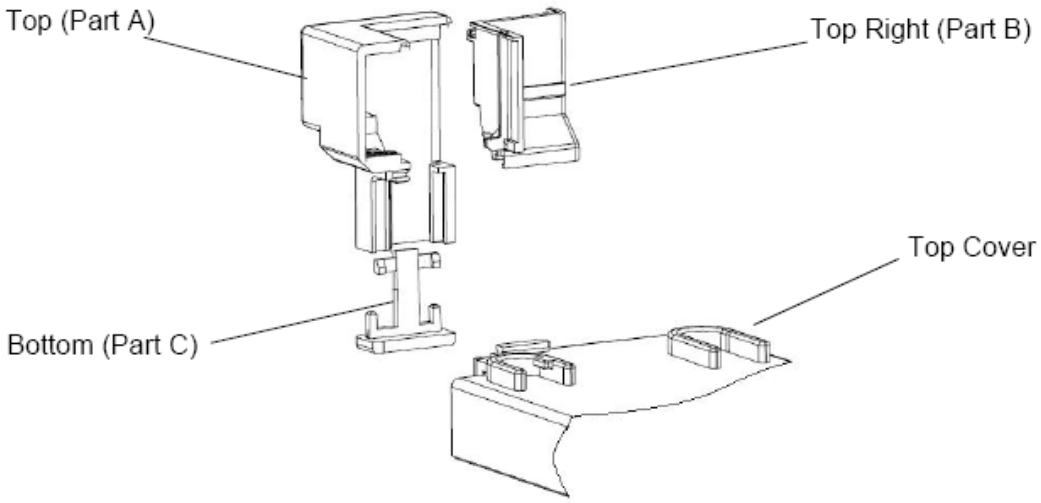


NOTE

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.

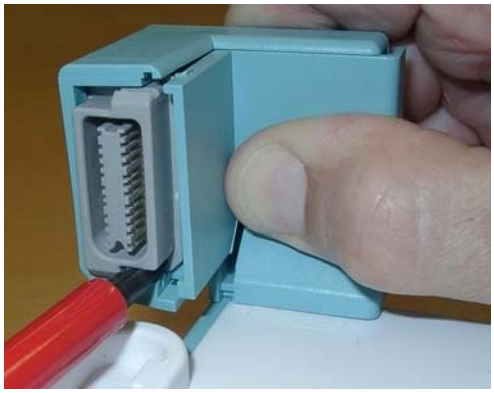


CAUTION

Do not try to remove the link bar with force as this can damage the MSL Flex Cable

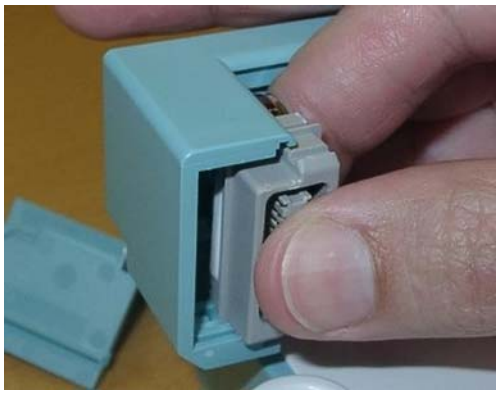
1. Position the MSE with the measurement connector hardware facing towards you.
2. Hold the link bar as shown below. While pressing gently on part B, insert a thick-bladed screwdriver between the MSL connector and part A. Twist the screwdriver to the left and at the same time slide part B to the right, 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.

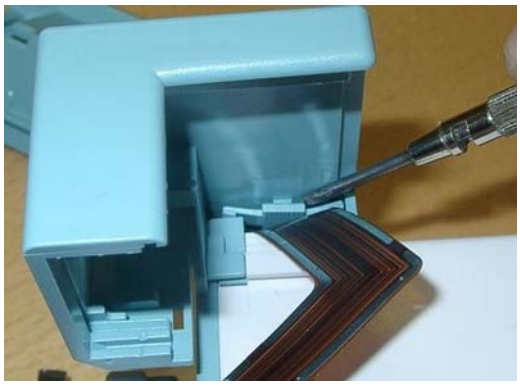
5. Now the MSL Flex connector can be moved to the right.



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

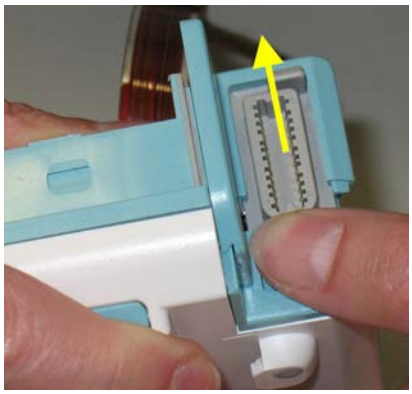
Begin by gently pulling away the top cover from the MSE. The top cover is press-latched at the link bar end. Remove it slowly, without hitting or touching the inside of the MSE.

Replacing the Flex Cable Assembly

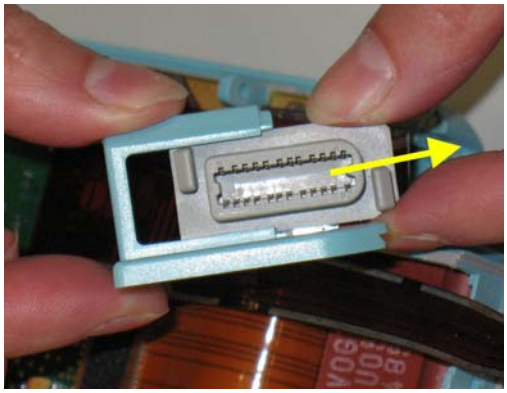
1. Hold the Extension firmly and push upwards against the connector. Then slide connector (together with the connector holder) out of the dovetail connection.

NOTE

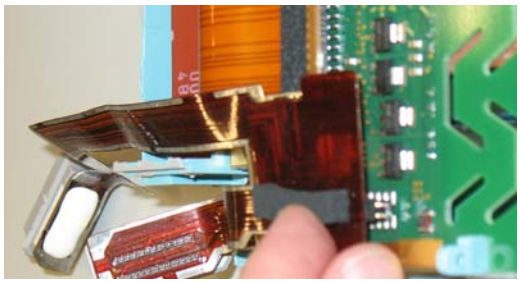
You will probably need to apply some more force at first until the holder slides out of its mechanical lock.



2. Slide the connector out of its holder.

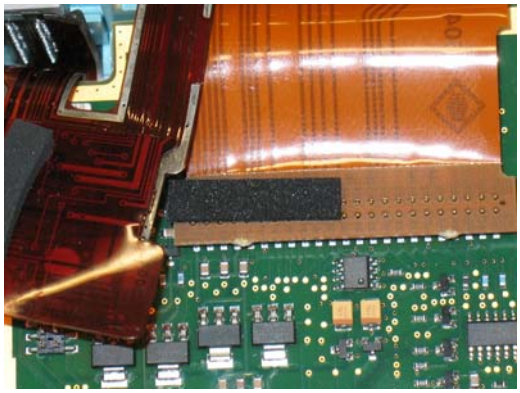


3. Remove the flex cable connector on the MSE board. Be careful not to bend any pins on the female part of the MSE connector.

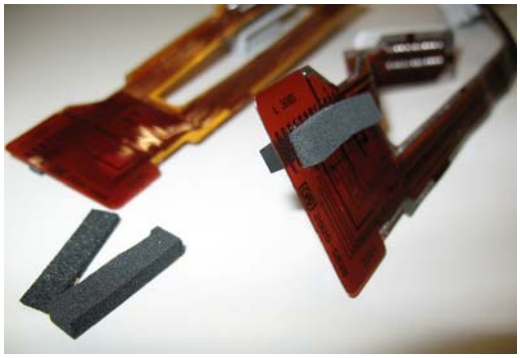


NOTE

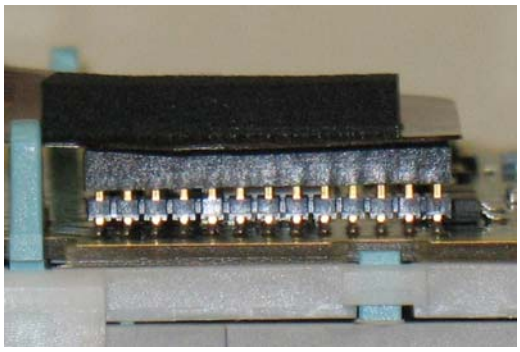
Some units may have a foam pad on the connector of the inner flex cable of the MSEs (as shown below) and some units may not. This has no impact on the functionality of these units.

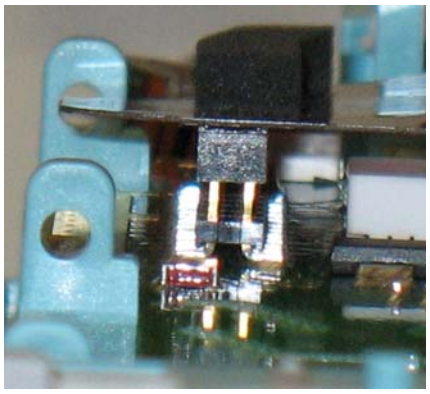


4. Stick the correct foam pad on the rear side of the inner connector. Use the thick pad for : M3012A, M3014A, M3016A. Use the thin pad for: M3015A. You can also check the old flex cable for the correct pad.



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.**

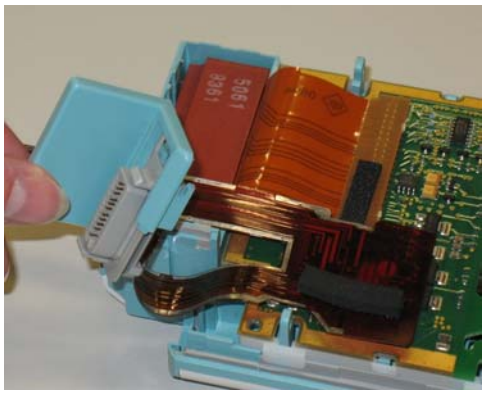




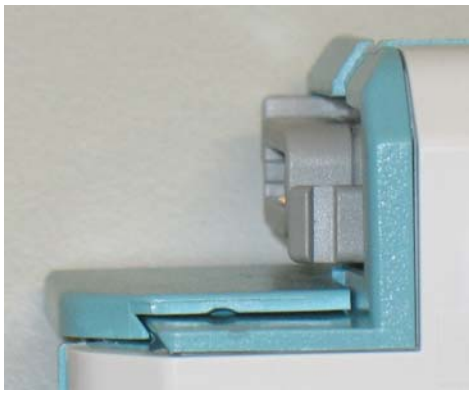
WARNING

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.

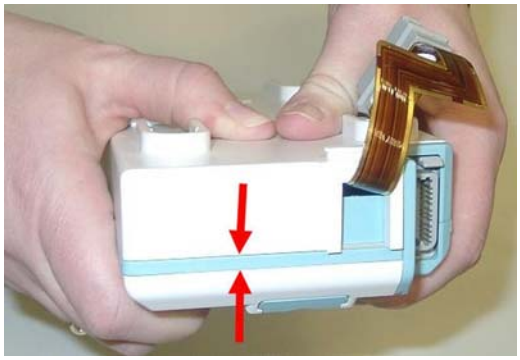


Refitting the Top Cover

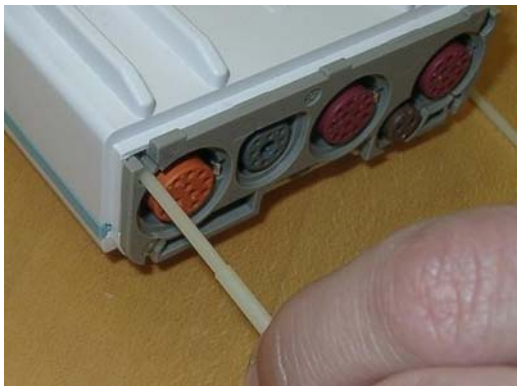
NOTE

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.



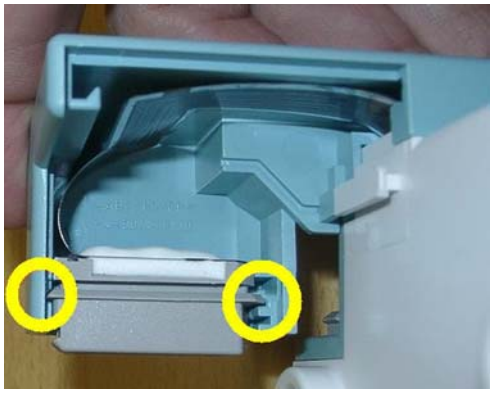
Assembling the dual Link Bar

CAUTION

Do not try to assemble any part of the link bar with force as this can damage the MSL Flex Cable.

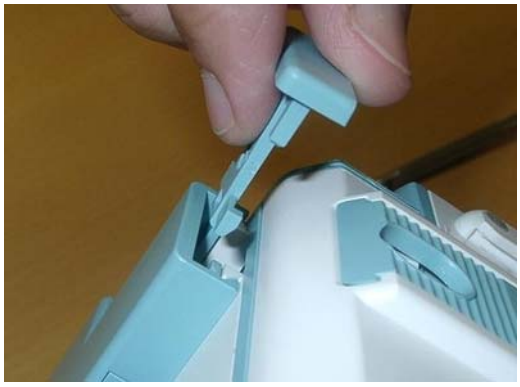
1. Position part A into the dovetail and slide it down.

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 sections "Maintaining the Instrument" and "Testing the Instrument".

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

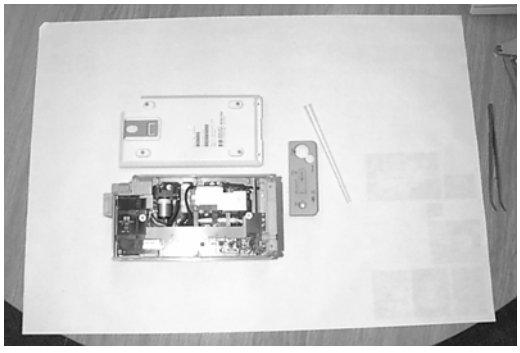
There is high voltage inside the Instrument (800V). Do not connect the MMS Extension to a Monitor while the Extension housing is open.

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

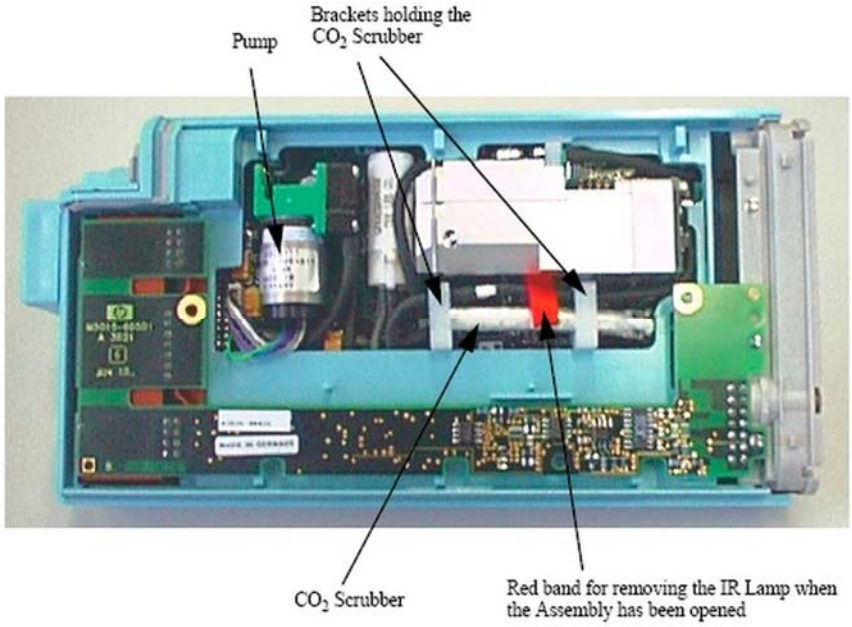
Do not lose these long mounting pins since the Extension will not function unless they are in place.

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.**

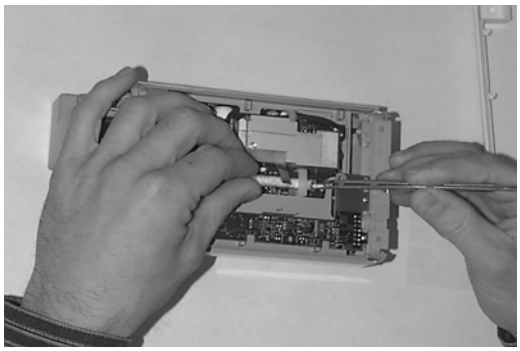
The following illustration shows the location of the replaceable parts in the M3015A Measurement Server Extension.



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.

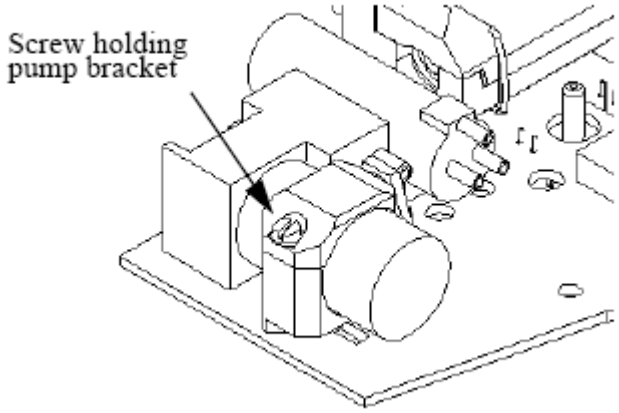
NOTE

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.

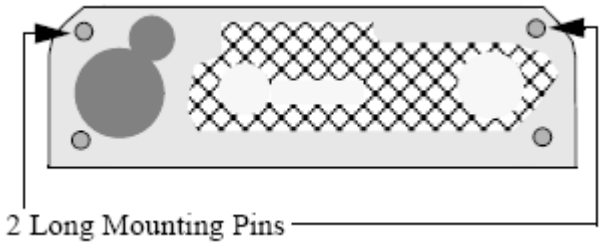
NOTE

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.

Following Reassembly

Once you have reassembled the Instrument, you must perform a safety and performance check on the Instrument. Refer to *Testing and Maintenance*.

6

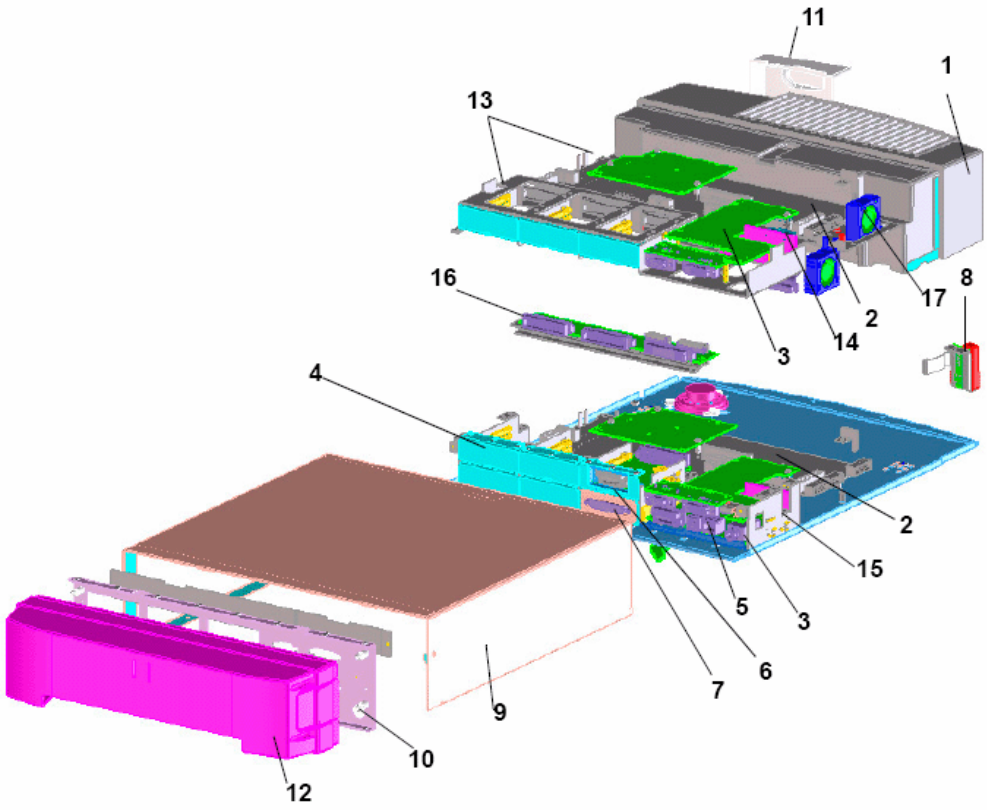
Parts

This section lists the replacement and exchange parts for the following Philips -USR_ProductName- Patient Monitoring System components:

MP80/MP90/D80 Parts

NOTE

- For part numbers of interconnecting cables, please consult the *Site Preparation* and *Installation Instructions* sections. For networkFor -related parts, please see the M3185A Philips Clinical Network documentation.
- The D80 Intelligent Display consists of a CMU (M8016A) and a display. This section contains the CMU parts. For display parts see the ***External Display Part Numbers*** (on page 241) section



Exchange Parts

No. in Diagram	Exchange Part Number 12NC Part No.	Description
1	M4046-68011 453563469401	AC/DC Power Supply
2	M8050-68401* 453563459431	Main Board 860/50 MHz* (ships with A.2 software - not available for D80)
2	M8050-68421*	Main Board 86x/100 MHz

No. in Diagram	Exchange Part Number 12NC Part No.	Description
	451261000701	w/ 4MB Data Flash* (ships with C.0 software; not available for D80)
2	M8050-68422* 451261013461	Main Board 86x/100MHz w/ 8MB Data Flash* (ships with latest software)
2	M8050-68423* 451261024381	Main Board 86x/100MHz 8MB Data Flash, 2MB SRAM*
2	M8050-68424* 453564113621	Main Board 86x/100MHz 8MB Data Flash, 2MB SRAM*

*Please check the Software Compatibility Matrix in the Troubleshooting chapter for details on which main board your monitor requires

Replacement Parts

No. in Diagram	New Part Number	12NC Part No.	Description
3	M8071-66561	453563469531	Video, Analog + DVI
4	M8081-67501	453563469621	I/F; Dual MIB/RS232
4	M8086-67501	453563469651	I/F; HIF, Integral, PS/2
4	M8087-67501	453563469681	I/F; Flexible Nurse Call Relay (not available for D80)
5	M8080-67561	453563480671	I/F; MSL LANWireless-ready, ECG OUT (not available for D80)
5	M8080-67571	453563469581	I/F; MSL LAN, ECG OUT
6	M8080-67581	453563469591	MSL 2nd (not available for D80)
7	M8082-67501	453563469631	I/F; Centronics Printer (not available for D80)
n/	M8089-67501	451261028241	I/F; USB
n/a	M8086-67521	453563469661	Remote I/F
n/a	M8003-47402	451261019561	Knob Speed Point
8	M8065-66561	453563469511	Power On switch
9	M8010-04101	453563469431	Cover Top
10	M8010-64102*	453563469461	Cover Rear I/O boards
11	M8008-44105	451261009141	Cover Front Power Cord for MP80
11	M8010-44105	453563469441	Cover Front Power Cord for MP90
11	M8016-44102	451261013861	Cover Front Power Cord for D80

No. in Diagram	New Part Number	12NC Part No.	Description
12	M8010-64103	453563469471	Blank Cover Rear Cable Mgmt.
13	M8010-60102	453563492771	Metal Frame 2nd CPU (MP90 only)
14	M4046-67521	453563492761	Backplane top (MP90 - Dual CPU only)
15	M4046-67505	453563469381	Backplane bottom
16	M4046-67541	453563469391	Backplane I/O Assembly
17	M8010- 64002	453563485911	Fan Kit
n/a	M8010-64104	453563490611	Holder Wireless Kit
n/a	M4041-22302	451261011861	Mounting Plate Adapter Clamp

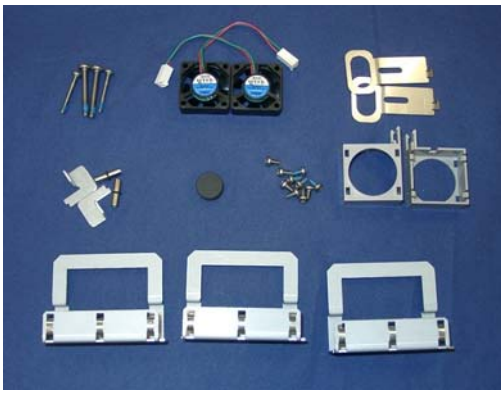
* In order to use the MP80/90 with the IntelliVue 802.11 Bedside Adapter you must install a cover rear I/O Board with revision 0549or higher.

Tools

Part Number 12NC Part No.	Description
M2267A 989803106081	Calibration Regulator
M1026-60144 453563230731	AGM Electronic Mass FlowMeter
15210-64010 989803100841	Gas Cal 1 cylinders for tcpCO2
15210-64020 989803100851	Gas Cal 2 cylinders for tcpCO2
13907A 989803100361	Calibration Tube Assembly
M2505A 989803142701	Gas Cylinder Regulator
M2506A 989803142711	Verification Gas
M2776A 989803144561	Straight Sample Line
M3199-60101 453563337371	3ft UTP crossover cable orange, 0.9m
M3199-60102 453563337381	12ft UTP crossover cable orange, 3.6m

Small Parts Kit MP80/MP90 (M8010-64001 12NC: 453563469451) Contents:

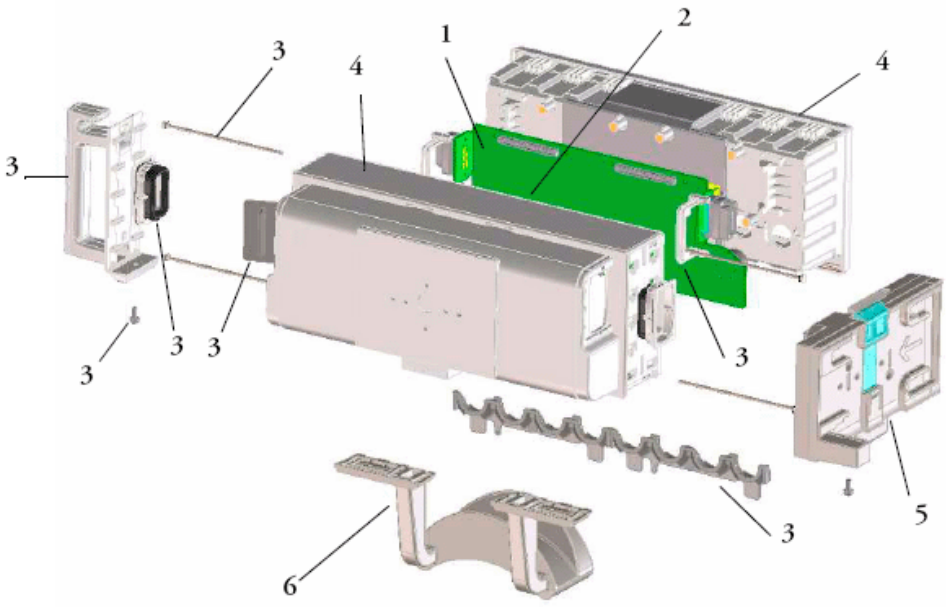
Description	Quantity	Comments
Screw M3x6	10	Used to secure... - the mainboard to the chassis - the bottom backplane - the I/O-Slot backplane - the video board -the On/Off holder to the power supply - the power supply to the chassis - the cable holder to the chassis -the second CPU board to the chassis top - the backplane top to the chassis top - the chassis top to the main chassis - the second video board to the chassis top - the top cover to the chassis - the cover blind to the cover rear - the back metal sheet
Screw M3x25	2	used to secure the video boards to the chassis w/ spacer
Screw M4x30	2	used to attach the Speedpoint to the remote extension device.
Connector holder	2	
Spacer 16mm	2	
Board removal tool	2	
Cover Blank	3	
Cover ECG OUT for D80	1	



Fan Kit (M8010-64002, 12NC: 453563485911) Contents:

Fan	2
Fan Holder	2

Flexible Module Rack (FMS) Parts



Flexible Module Rack (FMS) Parts

Exchange and Replacement Parts

Exchange Part Number 12NC Part No.	Replacement Parts 12NC Part No.	Description	No. in Diagram
M4041-68401 453563459411		Mother board assembly	1
M8055-68401 453563459441		CPU board assembly	2
	M8048-64002 453563456901	Small Parts kit	3
	M8048-64001 453563456891	Housing kit	4
	M4041-60005 453563477961	MMS Mount	5
	M4041-42303 453563494101	Cable Management	6

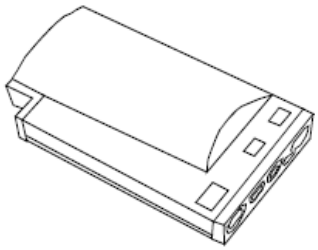
Exchange Part Number 12NC Part No.	Replacement Parts 12NC Part No.	Description	No. in Diagram
	M4041-22302 451261011861	Mounting Plate Adapter clamp (for wall mounting)	n/a

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	

Multi-Measurement Module (MMS) Parts

The primary support strategy for the Multi-Measurement Module is a unit exchange. However, some exchange parts are available: the MMS Top Cover, the MSL Connector Assembly and the front bezel. 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 SpO2
#A02	Nellcor OxiMax compatible
#A03	Masimo SET 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 G.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 G.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 C	D.0 to G.0	DE610 DE632 DE717	>=A.2	A01, A01C06, A01C18, A01C06C12	M3001-68x05
			>=A.2	A02, A02C06, A02C18, A01C06C12	M3001-68x08
		DE632 DE717	>=A.2	A03, A03C06, A03C18, A01C06C12	M3001-68x07

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 Overview

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 -USR_ProductName- patient monitor.

SpO2

Option	Serial Number Prefix	SpO2 FW Rev	Comment
#A01	DE227xxxxx DE441xxxxx	A.01.04	The HW and its interface do not allow a FW upgrade
#A01 #A02	DE441xxxxx DE512xxxxx DE610xxxxx DE632xxxxx	(A.01.41) -> A.01.46	Must be upgraded to A.01.46 - see internal Field Notification
		(A.01.42) -> A.01.46	
#A01 #A02	DE632xxxxx DE717xxxxx	A.01.46	Currently shipped FW
#A03	DE632xxxxx DE717xxxxx	Masimo SET FW	Not upgradeable by Philips

ECG

Option	Serial Number Prefix	ECG FW Rev	Comment
#A01	DE227xxxxx	C.00.13	The HW and its interface do not allow a FW upgrade
#A01	DE441xxxxx	C.01.19	

Option	Serial Number Prefix	ECG FW Rev	Comment
#A01 #A02 #A03	DE441xxxxx DE512xxxxx DE610xxxxx DE632xxxxx DE717xxxxx	D.01.70	Upgradeable - see internal Field Notifications
		D.01.76	
		D.01.77	
		D.01.78	
		D.01.89	
		D.02.02	Currently shipped FW (requires MMS SW Revision F.0)

MMS Part Numbers - Front Bezel for M3001 #A01 & #A03

Part Number	Description	Options
451261024391	MS_X1 Bezel w/o P/T Eng. Text	#C00, #C12
451261024401	MS_X1 Bezel w P/T Eng. Text	#C06 (#C18) #C06C12
451261024411	MS_X1 Bezel w/o P/T Symbols	#C00, #C12
451261024421	MS_X1 Bezel w P/T Symbols	#C06 (#C18) #C06C12

MMS Part Numbers - Front Bezel for M3001 #A02

Part Number	Description	Options
451261024431	MS_X1 Bezel Nellcor w/o P/T Eng. Text	#C00, #C12
451261024441	MS_X1 Bezel Nellcor w P/T Eng. Text	#C06 (#C18) #C06C12
451261024451	MS_X1 Bezel Nellcor w/o P/T Symbols	#C00, #C12
451261024461	MS_X1 Bezel Nellcor w P/T Symbols	#C06 (#C18) #C06C12

MMS Part Numbers - Top Cover and MSL Assembly

Option String	Description	12NC	Orderable Part #
--, A01	MMS Top Cover 5ld w/o P/T Text, FAST	451261016401	M3001-68010
C06, A01C06	MMS Top Cover 5ld w/ P/T Text, FAST	451261016411	M3001-68011
C12, A01C12	MMS Top Cover 12ld w/o P/T Text FAST	451261016421	M3001-68012
C18, A01C18	MMS Top Cover 12ld w/ P/T Text, FAST	451261016431	M3001-68013
--, A01	MMS Top Cover 5ld w/o P/T Symbol, FAST	451261016441	M3001-68014
C06, A01C06	MMS Top Cover 5ld w/ P/T Symbol, FAST	451261016451	M3001-68015
C12, A01C12	MMS Top Cover 12ld w/o P/T Symbol FAST	451261016461	M3001-68016
C18, A01C18	MMS Top Cover 12ld w/ P/T Symbol FAST	451261016471	M3001-68017
A02	MMS Top Cover 5ld w/o P/T Text NELLCOR	451261016481	M3001-68018
A02C06	MMS Top Cover 5ld w/ P/T Text NELLCOR	451261016491	M3001-68019
A02C18	MMS Top Cover 12ld w/ P/T Text NELLCOR	451261016501	M3001-68020
A02	MMS Top Cover 5ld w/o P/T Symbol NELLCOR	451261016511	M3001-68021
A02C06	MMS Top Cover 5ld w/ P/T Symbol NELLCOR	451261016521	M3001-68022
A02C18	MMS Top Cover 12ld w/ P/T Symbol NELLCOR	451261016531	M3001-68023
A03	MMS Top Cover 5ld w/o P/T Text MASIMO	451261016541	M3001-68024
A03C06	MMS Top Cover 5ld w/ P/T Text MASIMO	451261016551	M3001-68025
A03C18	MMS Top Cover 12ld w/o P/T Text MASIMO	451261016561	M3001-68026

Option String	Description	12NC	Orderable Part #
A03	MMS Top Cover 5ld w/o P/T Symbol MASIMO	451261016571	M3001-68027
A03C06	MMS Top Cover 5ld w/P/T Symbol MASIMO	451261016581	M3001-68028
A03C18	MMS Top Cover 12ld w/ P/T Symbol MASIMO	451261016591	M3001-68029
n/a	MMS MSL Connector Assembly	451261016391	M3001-64050
n/a	M3015A Mounting Pin	453563100081	5041-8114

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).

M3001A #A01 Philips FAST SpO2 MMS Exchange Numbers

Language		Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead Option #C12	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English Text	Exchange Part No. 12NC	M3001-68102 453563462911 or M3001-68110 451261017491 or M3001-68114 451261006041 or M3001-68105 451261013041	M3001-68202 453563486921 or M3001-68210 451261017501 or M3001-68204 451261006061 or M3001-68205 451261013061	M3001-68302 453563486931 or M3001-68310 451261017511 or M3001-68304 451261006081	M3001-68402 453563486941 or M3001-68410 451261017521 or M3001-68404 451261006101 or M3001-68405 451261013081

Language		Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead Option #C12	Conventional 12 Lead & Pressure/Temp Extension Option #C18
Symbol (Inter-national)	Exchange Part No. 12NC	M3001-68502 453563486951 or M3001-68510 451261017531 or M3001-68504 451261006121 or M3001-68505 451261013101	M3001-68602 453563486961 or M3001-68610 451261017541 or M3001-68604 451261006141 or M3001-68605 451261013121	M3001-68702 453563486971 or M3001-68710 451261017551 or M3001-68704 451261006161	M3001-68802 453563486981 or M3001-68810 451261017561 or M3001-68804 451261006181 or M3001-68805 451261013141

M3001A #A02 Nellcor OxiMAX-compatible MMS Exchange Numbers

Language		Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English Text	Exchange Part No. 12NC	M3001-68113 451261005361 or M3001-68108 451261015171	M3001-68203 451261005381 or M3001-68208 451261015191	M3001-68403 451261005401 or M3001-68408 451261015211
Symbol (Inter-national)	Exchange Part No. 12NC	M3001-68503 451261005421 or M3001-68508 451261015231	M3001-68603 451261005441 or M3001-68608 451261015251	M3001-68803 451261005461 or M3001-68808 451261015271

M3001A #A03 MMS with Masimo SET SpO2 - Exchange Numbers

Language		Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English Text	Exchange Part No. 12NC	M3001-68107 451261013281	M3001-68207 451261013311	M3001-68407 451261013321
Symbol (Inter-national)	Exchange Part No. 12NC	M3001-68507 451261013341	M3001-68607 451261013371	M3001-68807 451261013381

MMS Part Numbers - Label Kits

Part Number	12NC Part Number	Description
M3001-64003	451261001191	Label Kit Alarm Symbols for MMS

MMS Part Numbers - NBP Assembly

Part Number	12NC Part Number	Description
M3001-64500	451261020561	NBP Assembly for MMS

MMS Extension Parts (M3012A, M3014A, M3015A and M3016A)

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. The item numbers correspond to the illustration which follows.

MMS Extension Part Numbers - Release Mechanisms

Part Number	12NC Part Number	Description
M3014-64200	451261012731	MMS Extension clips and springs (10 each) for MMS extension release mechanism (old version)
M3001-64600	451261012721	MMS Extension lever locks.(packet of 5) for MMS extesnion release mechanism (new version)

MMS Extension Part Numbers - Top Cover, Flex Cable and Link Bar

Part Number	12NC Part Number	Description
M3012-64620	451261016601	MSE Top Cover Assembly
M3012-64621	451261016611	MSE Link Bar Assembly
n/a	453564088851	MSE Flex Cable Connector Assembly

MMS Extension Part Numbers - Front Bezels

12NC Part No.	Description
M3012A #C00 - Pressure, Temp & Press/Temp	
451261024471	M3012A Front Bezel P, T, P/T Eng. Text
451261024481	M3012A Front Bezel P, T, P/T Symbols

12NC Part No.	Description
M3012A #C05 - Cardiac Output, Pressure, Temp & Press/Temp	
451261024491	M3012A Front Bezel C.O.,P, T, P/T Eng. Text
451261024501	M3012A Front Bezel C.O.,P, T, P/T Symbols
M3012A #C10 - Cardiac Output, Continuous Cardiac Output, Pressure, Temp & Press/Temp	
451261024511	M3012A Front Bezel CCO, C.O.,P, T, P/T Eng. Text
451261024521	M3012A Front Bezel CCO, C.O.,P, T, P/T Symbols
M3014A #A01 - Capnography Extension	
451261024531	M3014A Front Bezel CO2 only Eng. Text/Symbols
M3014A #C05 - Cardiac Output, Mainstream CO2, Pressure & Press/Temp	
451261024541	M3014A Front Bezel C.O., CO2, P, P/T Eng. Text
451261024551	M3014A Front Bezel C.O., CO2, P, P/T Symbols
M3014A #C07 - Mainstream CO2, Pressure & Press/Temp	
451261024561	M3014A Front Bezel CO2, P, P/T Eng. Text
451261024571	M3014A Front Bezel CO2, P, P/T Symbols
M3014A #C10 - Cardiac Output, Continuous Cardiac Output, Mainstream CO2, Pressure & Press/Temp	
451261024581	M3014A Front Bezel C.O., CCO, CO2, P, P/T Text
451261024591	M3014A Front Bezel C.O.,CCO, CO2, P, P/T Symb.
M3015A #C06 Sidestream CO2 with Press/Temp	
451261024601	M3015A Front Bezel CO2 w P/T Eng. Text
451261024611	M3015A Front Bezel CO2 w P/T Symbols
M3015A Sidestream CO2 without Press/Temp	
451261024621	M3015A Front Bezel CO2 w/o P/T Eng. Text
451261024631	M3015A Front Bezel CO2 w/o P/T Symbols

12NC Part No.	Description
M3015A Pump Kit And Mounting Pin (only for HW Rev. A)	
453563332261 (M3015-29303)	M3015A Pump Kit (including CO2 scrubber)
453563100081 (5041-8114)	Mounting Pin for M3015A
M3016A (Press/Temp with Mainstream CO2)	
451261024641	M3016A Front Bezel CO2, P/T Eng. Text
451261024651	M3016A Front Bezel CO2, P/T Symbols

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 Part No.	Description
M3012-6801A	451261000201	exchange M3012A MMS Extension with Pressure, Temperature, Press/Temp
M3012-6831A	451261000341	exchange M3012A MMS Extension with Cardiac Output, Pressure, Temperature, Press/Temp
M3012-6861A	451261000491	exchange M3012A MMS Extension with Continuous Cardiac Output, Pressure, Temperature, Press/Temp
M3014-6801A	451261009281	exchange M3014A MMS Extension with CO2
M3014-6831A	451261009311	exchange M3014A MMS Extension with CO2, Cardiac Output, Pressure, Press/Temp
M3014-6891A	451261009461	exchange M3014A MMS Extension with CO2,Pressure, Press/Temp
M3014-6861A	451261009601	exchange M3014A MMS Extension with CO2, Cardiac Output/Continuous Cardiac Output, Pressure, Press/Temp

Part Number	12NC Part No.	Description
M3015-6801A	453563332431	exchange M3015A MMS Extension with Pressure/Temperature, English. (old hardware, S/N prefix: DE**020**xxxxx)*
M3015-6802A	451261005311	exchange M3015A MMS Extension with Pressure/Temperature, English. (new hardware, S/N prefix: DE**435**xxxxx)*
M3015-6831A	453563477871	exchange M3015A MMS Extension without Pressure/Temperature, English. (old hardware, S/N prefix: DE**020**xxxxx)*
M3015-6832A	451261005331	exchange M3015A MMS Extension without Pressure/Temperature, English. (new hardware, S/N prefix: DE**435**xxxxx)*
M3016-6801A	453563332581	exchange M3016A MMS Extension with CO2, English. #A01
M3016-6831A	453563483901	exchange M3016A MMS Extension without CO2, English. #A02

*The new M3015 hardware offers an improved warm up time compared to the old hardware and the gas sample flow rate specification has been changed to 50 ml/min -7,5ml/min/+15 ml/min. Also, the Suppress Auto Zero feature and the capability to turn off the M3015A pump have been added. The new hardware is backwards compatible with all MP20-90 host monitors, but the new features will only be available in combination with a monitor with SW Rev. B.1 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; and battery handling, maintenance, and good practices used to maintain the instrument in good working order, see *Testing and Maintenance*.

Part Number Table

The following table shows the part-numbers of the plug-in modules that can be replaced. Find the right number for your language combining the P/N-Prefix with the language-specific suffix for the wanted module. For example, to order a TEMP module for the French language, the correct order number would be M1029-69601.

Exchange Modules, Table 1

Module umber	Module Descriptio n	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1006B	Inv. Press	M1006-69 45356346	601 3061	601 3061	603 2811	604 1711	605 1781	601 3061	607 1791	608 1731		610 1751	601 3061
M1006B #C01	Press with Analog Out	M1006-69 45356346	651 3071	651 3071	653 1241	654 1251	655 1261	651 3071	657 0031	658 0041	659 0051	660 0061	651 3071
M1011A	SO2	45356412	0301	0311	0311	0311	0311	0311	0311	0311	0311	0311	0311
M1012A	C.O.	M1012-69 45356345	601 8801	602 8761	603 8771	601 8801	605 8781	601 8801	601 8801	601 8801	601 8801	610 8791	601 8801
M1012A #C10	C.O. with PiCCO extension	M1012-69 45356346	651 3011	652 0941	653 4731	651 3011	655 0311	651 3011	651 3011	651 3011	651 3011	660 0321	651 3011
M1014A	Spiro-metry	M1014-69 45126101	601 4451	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461
M1018A	tcpO2	M1018-69 4535634	601 59211	602 60491	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	610 58711	601 59211
M1020B #A01	SpO2 (Philips FAST SpO2)	M1020-69 4512610	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061
M1020B #A02	SpO2 (Nellcor Oximax)	M1020-69 4512610	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101
M1020B #A03	Masimo SET Module	M1020-69 4512610	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131
M1021A	SvO2	M1021-69 45356346	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881
M1027A	EEG	M1027-69 45356345	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	610 9161	601 9151

Module umber	Module Description	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1029A	Temp	M1029-69 4535634	601 59291	601 59291	601 59291	601 59291	601 59291	601 59291	601 59291	601 59291	609 60581	610 60561	601 59291
M1032A #A01	VueLink Auxiliary	M1032-69 45356345	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381
M1032A #A02	VueLink Ventilator	M1032-69 45356345	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391
M1032A #A03	VueLink Gas Analyzer	M1032-69 45356345	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401
M1032A #A04	VueLink Anesthesia Machine	M1032-69 45356345	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411
M1032A #A05	VueLink Auxiliary Plus	M1032-69 45356345	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421
865115	IntelliBridge EC10	45356411	6661	6661	6661	6661	6661	6661	6661	6661	6661	6661	6661
M1034A	BIS	M1034-69 45356346	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841
M1116B	Recorder	M1116-68 45356346	603 6701	606 6731	604 6711	603 6701	605 6721	610 6771	603 6701	607 6741	620 6781	609 6761	603 6701

Exchange Modules, Table 2

Module Number	Module Descrip-tion	Part # Prefix 12NC Part No. Prefix	Trad. Chinese	Simpl. Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1006B	Inv. Press	M1006-69 45356346	601 3061	613 1761	601 3061	615 1281	601 3061	601 3061	601 3061	619 1291	620 1301	601 3061	601 3061
M1006B #C01	Press with Analog Out	M1006-69 4535634	651 63071	663 59011	664 58321	665 59021	651 63071	651 63071	651 63071	669 59031	670 59041	651 63071	651 63071

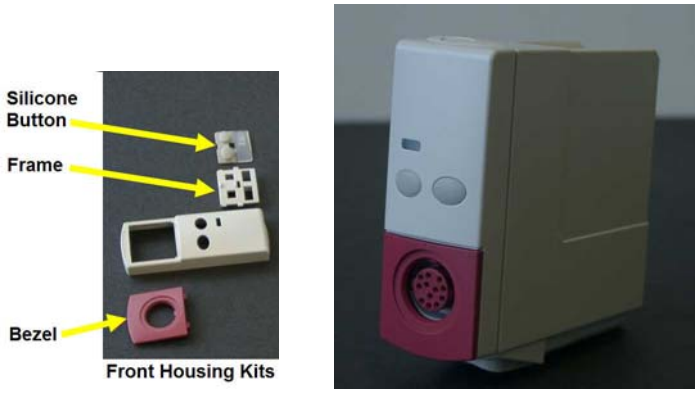
Module Number	Module Descrip-tion	Part # Prefix 12NC Part No. Prefix	Trad. Chinese	Simpl. Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1011A	SO2	45356412	0311	0311	0311	0311	0311	0311	0311	0311	0311	0311	0311
M1012A	C.O.	M1012-69 4535634	601 58801	613 58831	602 58761	615 60931	601 58801	601 58801	601 58801	601 58801	601 58801	601 58801	601 58801
M1012A #C10	C.O. with PiCCO extension	M1012-69 45356346	651 3011	663 0331	652 0941	665 0341	651 3011	651 3011	651 3011	651 3011	651 3011	651 3011	651 3011
M1014A	Spiro metry	M1014-69 45126101	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461
M1018A	tcpO2	M1018-69 4535634	601 59211	613 60541	614 60551	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211
M1020B #A01	SpO2 (Philips FAST SpO2)	M1020-69 4512610	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061
M1020B #A02	SpO2 (Nellcor Oximax)	M1020-69 4512610	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101
M1020B #A03	Masimo SET IntelliVue Module	M1020-69 4512610	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131
M1021A	SvO2	M1021-69 45356346	601 2881	613 0411	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881	601 2881
M1027A	EEG	M1027-69 4535634	601 59151	601 59151	601 59151	615 60481	601 59151	601 59151	601 59151	601 59151	601 59151	601 59151	601 59151
M1029A	Temp	M1029-69 4535634	601 59291	613 60571	601 59291	615 59891	601 59291	601 59291	601 59291	619 59901	601 59291	601 59291	601 59291

Module Number	Module Description	Part # Prefix 12NC Part No. Prefix	Trad. Chinese	Simpl. Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1032A #A01	VueLink Auxiliary	M1032-69 45356345	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381
M1032A #A02	VueLink Ventilator	M1032-69 45356345	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391
M1032A #A03	VueLink Gas Analyzer	M1032-69 45356345	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401
M1032A #A04	VueLink Anesthesia Machine	M1032-69 45356345	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411
M1032A #A05	VueLink Auxiliary Plus	M1032-69 45356345	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421
865115	Intelli-Bridge EC10	45356411	6661	6661	6661	6661	6661	6661	6661	6661	6661	6661	6661
M1034A	BIS	M1034-69 45356346	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841
M1116B	Recorder	M1116-68 45356346	603 6701	608 6751	621 6791	603 6701	603 6701	603 6701	603 6701	603 6701	603 6701	603 6701	603 6701

Plug-In Modules Replaceable Parts

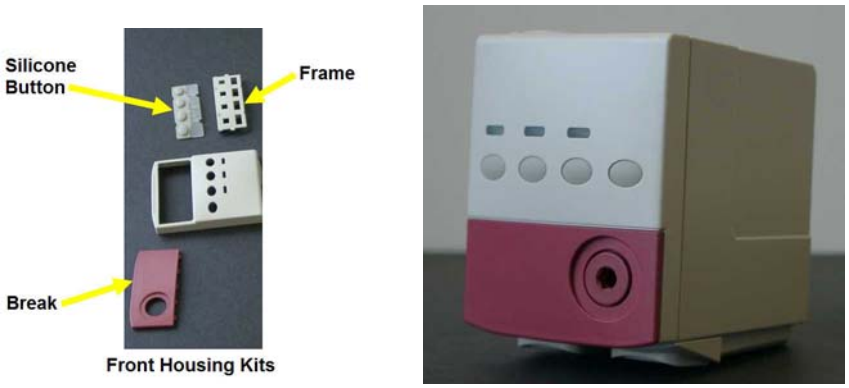
The photographs below are examples of the parts listed in the Replaceable Parts table. Depending on the specific module the language and the color of the connector bezel may vary.

Single-Width Plug-In Module



Single-Width Plug-In Module

Double-Width Plug-In Module



Double-width Plug-in Module

Plug-in Module Replaceable Parts

Part Number	12NC Part No.	Description
M1116-40041	453563243811	TOP HOUSING (FITS M1116 *A* & M1116 *B* MODELS)
M1116-60201	453563243891	M1116B RECORDER CLEANING KIT
M1001-45011	453563490691	SNAP LOCK SINGLE
M1018-60602	453563460501	tcpO2/CO2CALIBRATION CHAMBER KIT - New Type

Plug-In Module Language Specific Front Housing Kits (incl. Silicone Buttons, Frames & Bezels), Table 1

Module#	Module Descrip -tion	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1006B	Inv. Press	M1006-60 45356346	201 2101	201 2101	203 2101	204 1581	205 1591	201 2101	207 1601	208 1611	209 1621	210 1631	201 2101
M1006B #C01	Press with Analog Out	M1006-60 45356346	251 2091	251 2091	253 1691	254 1701	255 1711	251 2091	257 1721	258 1821	259 1831	260 1841	251 2091
M1011A	SO2	45356410	5801	5811	5811	5811	5811	5811	5811	5811	5811	5811	5811
M1012A	C.O.	M1012-60 45356346	201 2021	202 0161	203 0171	201 2021	205 0181	201 2021	201 2021	201 2021	201 2021	210 0191	201 2021
M1012A #C10	CCO/C. O. with PiCCO function ality	M1012-60 4535634	251 2031	252 0221	253 0141	251 2031	255 0151	251 2031	251 2031	251 2031	251 2031	260 2051	251 2031
M1014A	Spiro- metry	M1014-60 45126101	201 4491	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501
M1018A	tcpO2	M1018-60 45356346	201 1441	202 2211	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	210 2221	201 1441
M1020B #A01	SpO2 (Philips FAST SpO2)	M1020-60 4512610	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081
M1020B #A02	SpO2 (Nellcor Oximax)	M1020-60 4512610	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121
M1021A	SvO2	M1021-60 45356346	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461

Module#	Module Descrip -tion	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1027A	EEG	M1027-60 45356346	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	210 2131	201 1471
M1029A	Temp	M1029-60 45356346	201 1451	201 1451	201 1451	201 1451	201 1451	201 1451	201 1451	201 1451	209 2161	210 2171	201 1451
M1032A	VueLink all Types	M1032-60 45356346	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401
865115	Intelli-Bridge EC10	45356411	6931	6931	6931	6931	6931	6931	6931	6931	6931	6931	6931
M1034A	BIS	M1034-60 45356346	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411
M1116B	Recorder	M1116-60 4535634	203 62301	206 62321	204 89221	203 62301	205 62311	210 62351	203 62301	207 89231	220 89241	209 62341	203 62301

Plug-In Module Language Specific Front Housing Kits (incl. Silicone Buttons, Frames & Bezels), Table 2

Module#	Module Descrip- tion	Part # Prefix 12NC Part No. Prefix	Trad. Chinese	Simpl. Chinese	ortuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1006B	Inv. Press	M1006-60 45356346	201 2101	213 1641	214 1651	215 1661	201 2101	201 2101	201 2101	219 1671	220 1681	201 2101	201 2101
M1006B #C01	Press with Analog Out	M1006-60 45356346	251 2091	263 1851	264 1861	265 1871	251 2091	251 2091	251 2091	269 1881	270 1891	251 2091	251 2091
M1011A	SO2	45356410	5811	5811	5811	5811	5811	5811	5811	5811	5811	5811	5811
M1012A	C.O.	M1012-60 45356346	201 2021	213 0201	202 0161	215 0211	201 2021	201 2021	201 2021	201 2021	201 2021	201 2021	201 2021

M1012A #C10	CCO/C.O. with PiCCO functionality	M1012-60 45356346	251 2031	263 2061	252 0221	265 2041	252 0221	252 0221	252 0221	252 0221	252 0221	252 0221	252 0221
M1014A	Spiro-metry	M1014-60 45126101	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501
M1018A	tcpO2	M1018-60 45356346	201 1441	213 2231	214 2241	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441
M1020B #A01	SpO2 (Philips FAST SpO2)	M1020-60 4512610	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081
M1020B #A02	SpO2 (Nellcor Oximax)	M1020-60 4512610	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121
M1021A	SvO2	M1021-60 45356346	201 1461	213 0441	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461	201 1461
M1027A	EEG	M1027-60 45356346	201 1471	201 1471	201 1471	215 2141	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471
M1029A	Temp	M1029-60 45356346	201 1451	213 2181	201 1451	215 2191	201 1451	201 1451	201 1451	219 2201	201 1451	201 1451	201 1451
M1032A	VueLink all Types	M1032-60 45356346	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401
865115	Intelli-Bridge EC10	45356411	6931	6931	6931	6931	6931	6931	6931	6931	6931	6931	6931
M1034A	BIS	M1034-60 45356346	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411
M1116B	Recorder	M1116-60 4535634	203 62301	208 62331	221 89251	203 62301	203 62301	203 62301	203 62301	203 62301	203 62301	203 62301	203 62301

Plug-In Module Specific Bezels

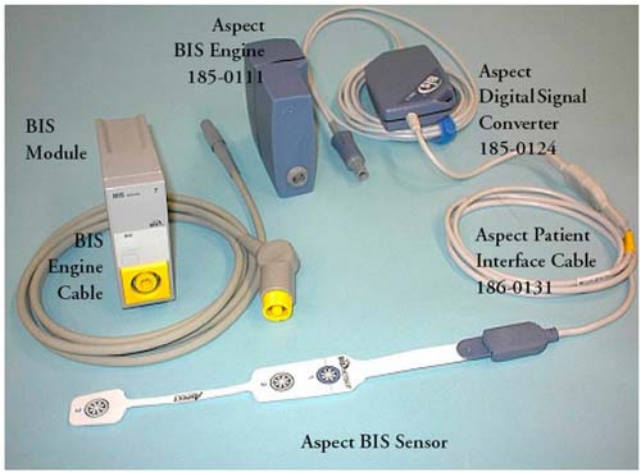
Module#	Module Description	Bezel Part#	12NC Part No.
M1006B	Inv. Press	M1006-42202	453563456611
M1011A	SO2	M1011-42201	453564120341

Module#	Module Description	Bezel Part#	12NC Part No.
M1012A	C.O.	M1012-42201	453563463241
M1014A	Spirometry	M1014-42201	451261014511
M1016A	CO2 Mainstream	M1016-42201	453563463231
M1018A	tcpO2	M1018-42201	453563463651
M1021A	SvO2	M1021-42201	453563463621
M1027A	EEG	M1027-42201	453563463611
M1029A	Temp	M1029-42201	453563456691
M1032A	VueLink	M1032-42201	453563456701
8651115	IntelliBridge EC10	M1031-42201	453564116891
M1034A	BIS	M1034-42201	453563463661

BIS Solution Replaceable Parts

Exchange Part Number	New Part Number	Description	
n/a	M1034-61630 453563233721	BIS PIC (PATIENT INTERFACE CABLE)	14
n/a	M1034-61650 453563233731	BIS SENSOR SIMULATOR	
M1034-68520 453563233761	M1034-60020 453563233661	BIS ENGINE	12
M1034-68102 453563233741	M1034-60102 453563233681	BIS DSC-XP	13
n/a	M1034-61610 453563233701	BIS MODULE CABLE (0.8 m)	11
n/a	M1034-61620 453563233711	BIS MODULE CABLE (2.0 m)	11

BIS Solution Components

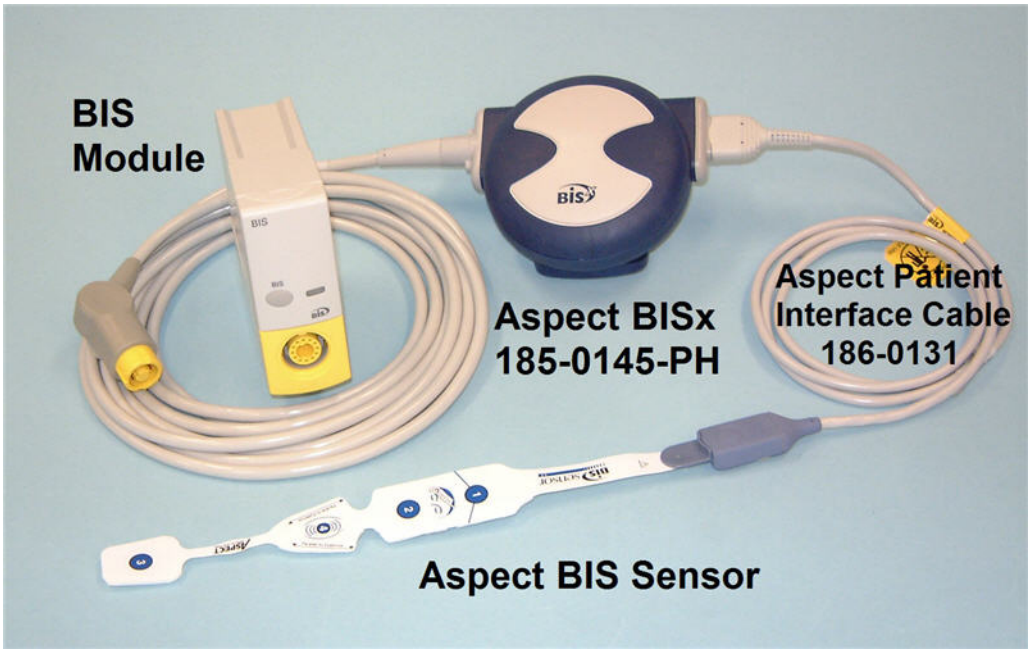


BIS Solution Components with BIS Engine and DSC

BISx Solution Replacable Parts

Exchange Part Number	New Part Number	Description
n/a	M1034-61630 453563233721	BIS PIC (Patient Inetrface Cable)
n/a	M1034-61650 453563233731	BIS Sensor Simulator
M1034-68521 451261003621	n/a	BISx Power Link
n/a	M1034-61660	BISx Host Cable
n/a	M1034-47600	BISx bulkhead connector
M1034-68500 453563233751	n/a	BIS Interface Module

BISx Solution Components



BISx Solution

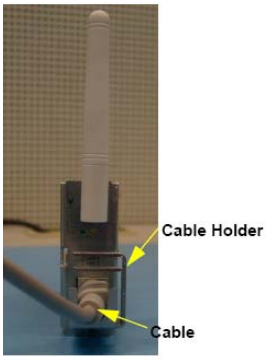
tcpO2/tcpCO2 Module Accessories

The following accessories can be ordered for the tcpO2/tcpCO2 Module:

tcpO2/tcpCO2 Monitoring Accessories

New Part Number	12 NC Part No.	Description
15209-60010	989803100801	Accessory Kit
15210-60010	989803100821	CAL 1 gas (6 bottles - U.S.A. only)
15210-64010	989803100841	CAL 1 gas (6 bottles)
15210-60020	989803100831	CAL 2 gas (6 bottles - U.S.A. only) Contains: 0% O2, 10% CO2
15210-64020	989803100851	CAL 2 gas (6 bottles) Contains: 0% O2, 10% CO2
M1918A	989803105521	tcpO2/CO2 Transducer
M2205A	989803105991	Calibration Tubing (5x)

IntelliVue 802.11 Bedside Adapter Part Numbers*



Part Number (used in Production)	Ordering Part Number	Ordering Part Number 12NC	Description	New or Exchange
M8096-67011	M8096-67511	451261013021	IntelliVue 802.11 Bedside Adapter incl. cable and cable holder	New
M8096-67011	M8096-68011	451261013031	IntelliVue 802.11 Bedside Adapter incl. cable and cable holder	Exchange
M2639-61001	M2639-61001	451261013011	Cable Assembly	New
0955-1495	0955-1495	451261013001	Antenna WLAN Tri-band	New

* In order to use the MP80/90 with the IntelliVue 802.11 Bedside Adapter, you must install a cover rear I/O board with revision 0549 or higher.

External Display Part Numbers

M8031A and M8031B External XGA Displays
External XGA Display Parts

Product Number	Part Number	12NC Part No.	Description
M8031A	M1097-68004	453563241761	Exchange 15” Dual Mode XGA Color Touch Screen Display.
	M1097-64001	453563241731	Power Supply Mounting Clamp for M1097A.
	M1097-01201	453563241611	Mounting Bracket for M1097A.
	M1097-60006	453563282651	Power Supply.
	M1097-61604	453563241721	Adapter Cable.
	M1097-04702	453563241631	Desk Stand for M1097A Display.
	M1097-64100	451261012741	Replacement Kit for M1097A & M8031A
M8031B	M8031-68001	451261001941	Exchange 15” Medical Grade Display with Touch
	M8031-60005	451261001921	Power Supply 12V for M8031B Display
	M8031-64001	451261001931	Power Supply Mounting for M8031B Display
	M8031-04701	451261001901	Monitor Desk Stand for M8031B/M8033C
	2090-0860	453563463201	Backlights for M8031B (old) for displays w/ serial no. < ANxx**0645**xxxxxx
	2090-0985	451261014381	Backlights for M8031B (new) for displays w/ serial no. >ANxx**0649**xxxxxx

M8033A and M8033B External SXGA Displays

M8033C External SXGA Display

External SXGA Display Parts

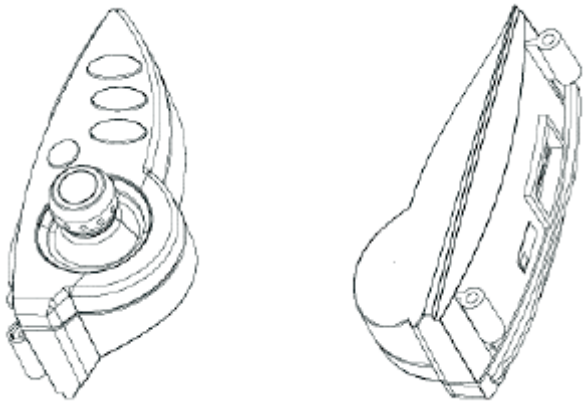
Product Number	Part Number	12NC Part No.	Description
M8033A	M8033-68001	453563480951	Exchange 17” SXGA Color Touch Screen Display.
	M8033-64100	451261014891	M8033A and M8033B Replacement Kit
	M8033-64001	453563480971	Power Supply Bracket Mount
	M8033-60005	453563480961	Power Supply.
	M8033-04701	453563480981	Desk Stand for M8033A and M8033B Display.
M8033B	M8033-60002	451261006271	M8033B New 17” Medical Grade Display with Touch
	M8033-64100	451261014891	M8033A and M8033B Replacement Kit
	M8033-60006	451261006291	Power Supply 12V for M8033B Display
	M8033-64002	451261006301	Power Supply Mounting for M8033B Display
	M8033-04701	453563480981	Monitor Desk Stand for M8033A and M8033B Display

Product Number	Part Number	12NC Part No.	Description
M8033C	M8033-68071	451261009161	M8033C Exchange 17” Medical Grade Monitor with Touch
	M8031-04701	451261001901	Monitor Desk Stand for M8031B/M8033C
	M8033-64603	451920880311	Backlights for M8033C

SpeedPoint Part Numbers

The SpeedPoint Device contains no servicable parts and can only be replaced in its entirety. New part numbers:

- M4046-61401 (12NC:453563456581) (Symbol),
- M4046-61402 (12NC: 453563469761) (Engl. Text).



SpeedPoint Input Device

Remote Alarm Device Part Numbers

The Remote Alarm Device contains no servicable parts and can only be replaced in its entirety (part number M8025-60501 (12NC: 453563469801)). For cable part numbers please see the Site Preparation section.

Remote Alarm Device Front and Rear View

Remote Extension Device Part Numbers

The Remote Extension Device contains no servicable parts and can only be replaced in its entirety (part number: M8026-60504 (12NC: 453563469821)). For cable part numbers, please see the Site Preparation section.

Remote Extension Device Front and Rear View

7

Installation Instructions

The information contained in this chapter should enable the-USR_ProductName- 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 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 contents of this 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 boxes to reveal monitor)
Accessory and 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). 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 M8008A/M8010A/M8016A CMU

NOTE

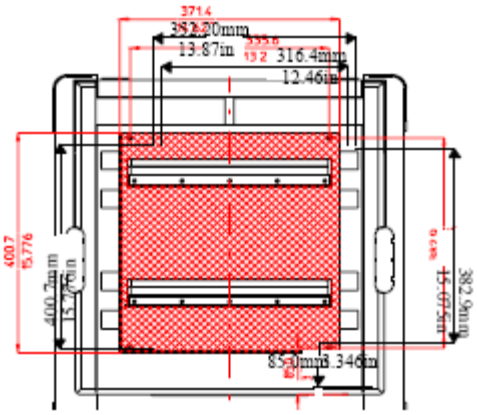
There are different mounting options available for the monitor. This section covers the general concepts of safe mount installations and specific steps for the mounting options sold by Philips. Instructions which ship with a mounting solution should always take precedence over the instructions described in this chapter.

You MUST follow the instructions that ship with the mounting solution, regardless of manufacturer.

Mounting Instructions

Assembling Mounts

The M1180A-96041 Mounting Plate is designed for securing the MP80/MP90/D80 to a flat surface. The plate should be used for **horizontal** applications only. Do not attempt to position the MP80/MP90/D80 vertically.



The monitor is shipped with feet and locking cam. 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.

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.

If mounting requires removal of the feet or the locking cam of the MP80/MP90, please refer to *Removing Feet and Locking Cam* in the *Repair and Disassembly* section.

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%).

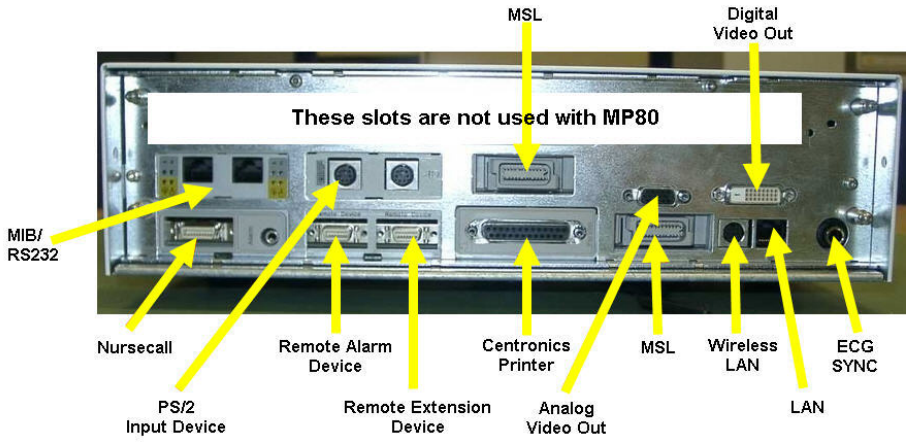
WARNING

- 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 is a rear view of the CMU, and shows the cable and interface board connections.

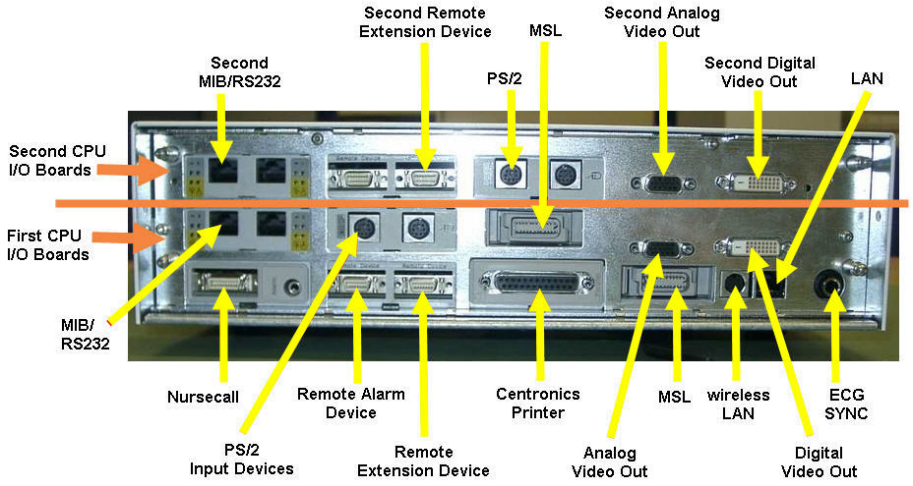
All molded connector cables on the monitor side attach at the location shown in the figure.



MP80 Cable and Interface Board Connections

NOTE

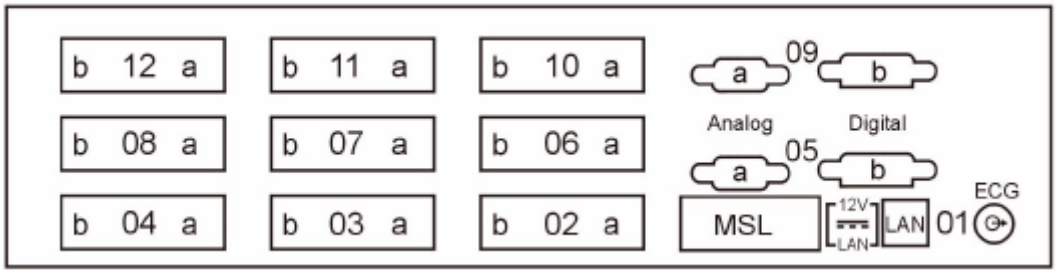
Slots 9-12 are not available in MP80 monitors because dual CPUs are not supported.



MP90 Cable and Interface Board Connections

Installing Interface Boards

The following diagram shows the positions of the I/O slots in the MP80/90.



If you add interface boards to your monitor or move them around, you must insert them into the device according to the combinations in the following tables:

Configuration Table for Single CPU MP80/90 Monitors (slots 10,11,12 not available)

I/O Board		Possible Factory Configurations																
Name	**Compatibility Rules**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Parallel Printer Interface	Slot 02	02	x	02	x	02	x	02	x	02	x	02	x	-	x	-	02	-
Remote Device Interface	Slot 03	03	03	03	03	03	03	03	03	-	-	-	-	03	03	03	03	03
2nd MSL	Slot 06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
IntelliVue 802.11 Bedside Adapter	Slots 07, 08,04,02,03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	07	07
Nurse Call Relays	Slots 04, 03, 02	04	04	04	04	-	-	-	-	04	04	04	04	04	04	04	04	04
USB Interface	Slots 07, 03, 02, 04, 08	x	02	x	02	x	02	x	02	x	02	x	02	x	07	-	x	02
Input Device Interface*	Slots 07, 03, 02, 04, 08	07	x	-	-	07	x	-	-	07	x	-	x	07	x	-	08	x
MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08	x	x
2nd MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	x	x	07	07	04	04	07	07	03	03	07	07	02	02	07	x	x
3rd MIB/ RS232 (2x)	Slots 08, 07, 04, 03, 02	x	x	x	x	x	x	04	04	x	x	03	03	x	x	02	x	x

I/O Board		Possible Factory Configurations															
Name	**Compatibility Rules**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
Parallel Printer Interface	Slot 02	02	x	02	x	02	x	02	x	-	-	-	-	-	-	-	-
Remote Device Interface	Slot 03	03	03	03	03	-	-	-	-	03	03	03	-	-	-	-	-
2nd MSL	Slot 06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
IntelliVue 802.11 Bedside Adapter	Slots 07, 08,04,02,03	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07	07
Nurse Call Relays	Slots 04, 03, 02	04	04	-	-	04	04	04	04	-	-	04	04	04	-	-	-
USB Interface	Slots 07, 03, 02, 04, 08	x	02	x	02	x	02	x	02	x	02	x	x	03	x	03	x
Input Device Interface*	Slots 07, 03, 02, 04, 08	-	x	08	x	03	x	03	x	02	x	-	03	x	03	x	-
MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	08	08	04	04	08	08	08	08	08	08	08	08	08	08	08	08
2nd MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	x	x	x	x	x	x	x	x	04	04	02	02	02	04	04	04
3rd MIB/ RS232 (2x)	Slots 08, 07, 04, 03, 02	x	x	x	x	x	x	x	x	x	x	x	x	x	02	02	03

*For installation of a remote Speedpoint, the Input device interface board must be installed.

Configuration Table for Dual CPU MP90 Monitors

I/O Board		Possible Factory Configurations														
Name	**Compatibility Rules**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Parallel Printer Interface	Slot 02	02	x	-	x	-	x	-	x	02	-	-	x	-	x	02
Remote Device Interface*	Slot 03 and additionally 11	03 (11)	03 (11)	03 (11)	03 (11)	-	-	-	-	03 (11)	03 (11)	03 (11)	03 (11)	-	-	-
2nd MSL	Slot 06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
IntelliVue 802.11 Bedside Adapter	Slots 07, 08,04,02,03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nurse Call Relays	Slots 04, 03, 02	04	04	04	04	04	04	-	-	-	-	-	-	-	-	04
USB Interface	Slots 10, 11, 12 or 07, 03, 02, 04, 08	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x
Input Device Interface**	Slots 10, 11, 12, or 07, 03, 02, 04, 08	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 07
MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08
2nd MIB/RS232 (2x)	Slots 12, 11, 10 or 08, 07, 04, 03, 02	12 x	12 x	12 02	12 02	12 03	12 03	12 04	12 04	12 x	12 x	12 02	12 02	12 03	12 03	12 03
3rd MIB/ RS232 (2x)	Slots 12, 11, 10 or 08, 07, 04, 03, 02	11 x	11 x	11 x	11 x	11 02	11 02	11 03	11 03	11 x	11 x	11 x	11 x	11 02	11 02	11 x

I/O Board		Possible Factory Configurations														
Name	Compatibility Rules	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Parallel Printer Interface	Slot 02	x	02	x	-	x	-	x	02	x	-	x	-	x	-	x
Remote Device Interface*	Slot 03	-	-	-	03 (11)	03 (11)	-	-	03 (11)	03 (11)	03 (11)	03 (11)	-	-	-	-
2nd MSL	Slot 06	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
IntelliVue 802.11 Bedside Adapter	Slots 07, 08,04,02,03	-	-	-	-	-	-	-	07	07	07	07	07	07	07	07
Nurse Call Relays	Slots 04, 03, 02	04	-	-	04	04	04	04	04	04	04	04	04	04	-	-
USB Interface	Slots 10, 11, 12 or 07, 03, 02, 04, 08	10 07	x x	10 07	x x	10 07	x x	10 07	x x	10 x	x x	10 02	x x	10 03	x x	10 03
Input Device Interface**	Slots 10, 11, 12, or 07, 03, 02, 04, 08	x x	10 07	x x	10 07	x x	10 07	x x	10 x	x x	10 02	x x	10 03	x x	10 03	x x
MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	08	08	08	08	08	08	08	08	08	08	08	08	08	08	08
2nd MIB/RS232 (2x)	Slots 12, 11, 10 or 08, 07, 04, 03, 02	12 03	12 04	12 04	12 02	12 02	12 03	12 03	12 x	12 x	12 x	12 x	12 02	12 02	12 04	12 04
3rd MIB/ RS232 (2x)	Slots 12, 11, 10 or 08, 07, 04, 03, 02	11 x	11 03	11 03	11 x	11 x	11 02	11 02	11 x	11 x	11 x	11 x	11 x	11 x	11 02	11 02

* A second remote extension device can be connected to slot 11

**For installation of a remote Speedpoint, the Input device interface board must be installed.

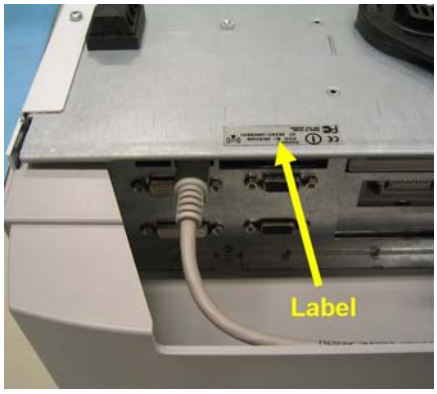
"-" This board is assumed to not be required for the configuration

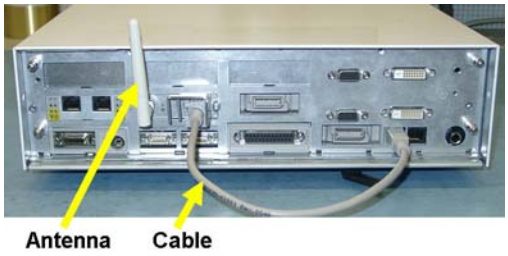
"X" This board cannot be assigned in this configuration

NOTE

- If two MIB/RS232 boards are installed, only one can be configured to Data Out. The other one can then only be configured to GM, Touch1 or Touch2.
- Slots 10 and 12 are only available in dual CPU MP90 monitors. For touch operation of a second main display the 2nd MIB/RS232 Interface board must be inserted into slot 12. Insert PS/2 Interface boards into the corresponding slot to the display you want to use the input devices with - Slot 07 for display 1 , slot 10 for display 2.
  Refer to the Setting Up Multiple Displays section for a configuration table for the D80 Intelligent Display
- When using an USB printer, the USB board to which the printer is connected cannot be inserted into the second CPU (slots 10, 11 or 12.)

- If you have installed #J35 (IntelliVue 802.11 Bedside Adapter) please attach the approval label or the WLAN label for Japan (country specific) and the antenna and plug in the cable as shown below.





Connection of Devices via the MIB/RS232 Interface G.00.xx or higher

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`** once each to the MIB/RS232 ports in any combination. **`Touch 2`** is used for symmetrical operation of a slave display to the primary display. **`Data Out`** can be configured up to two times for each monitor, either on two ports of one MIB/RS232 board or on one port each on two 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. **`Data Out`** and **`GM`** can only be configured **once each** to the MIB/RS232 port.

Connection of Devices via the MIB/RS232 Interface (Rev. D.00.58 to F.01.42)

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 **Data Out**, **GM**, **Touch 1** and **Touch 2** once each to the MIB/RS232 ports in any combination. **Touch 2** is used for symmetrical operation of a slave display to the primary display.

Only one MIB/RS232 board can be configured to **Data Out**, regardless of whether one or two MIB/RS232 boards are installed. The other one can then only be configured to **GM**, **Touch1** or **Touch2**.

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. **Data Out** and **GM** can only be configured **once each** to the MIB/RS232 port.

Connection of Devices via the MIB/RS232 Interface (Rev. A.10.15 to C.00.90)

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 port select **Main Setup** then **Hardware** then **MIB/RS232.** You can configure **Data Out**, **AGM**, **Touch 1** and **Touch 2** once each to the MIB/RS232 ports in any combination. **Touch 2** is used for symmetrical operation of a slave display to the primary display.

Only one MIB/RS232 board can be configured to **Data Out**, regardless of whether one or two MIB/RS232 boards are installed. The other one can then only be configured to **GM**, **Touch1** or **Touch2**.

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. **Data Out** and **AGM** can only be configured **once each** to the MIB/RS232 port.

Connection of MIB Devices (Rev. below A.10.15)

Any time settings are reset, the MIB ports are polled and assigned in the scheme listed below.

- The AGM is assumed to be connected to port ‘a’ on the lowest numbered slot for MIB.
- The second port ‘b’ of the lowest I/O slot for MIB is always data export.
- Both ports ‘a’ and ‘b’ on the MIB I/O board in the next I/O slot in numeric sequence after the AGM will be for touch.
- If there are more than two MIB installed, the MIB with the highest I/O slot number will be for future use and is currently inactive. For example: If using configuration ‘D’ from the table above, AGM is in slot 04a, data export in 04b, touch is in 07a &b, and the MIB in slot 08 is inactive.

If you have only one MIB board it is always port ‘a’ AGM and port ‘b’ data export. If you want to use touch you must have two MIB boards installed.

The configuration of a specific MIB 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 port select **`Main Setup`** then **`Hardware`** then **`MIB/RS232.`**

Only one MIB/RS232 board can be configured to **`Data Out`**, regardless of whether one or two MIB/RS232 boards are installed. The other one can then only be configured to **`GM`**, **`Touch1`** or **`Touch2`**.

NOTE

Be aware that if you change a port assignment this assignment is not reset upon boot up. If the MIB board is removed and replaced with a different type of board the settings are deleted. If the MIB board is then refitted, you must reconfigure the MIB port. The configuration of MIB is not cloned between monitors.

Connection of USB Devices

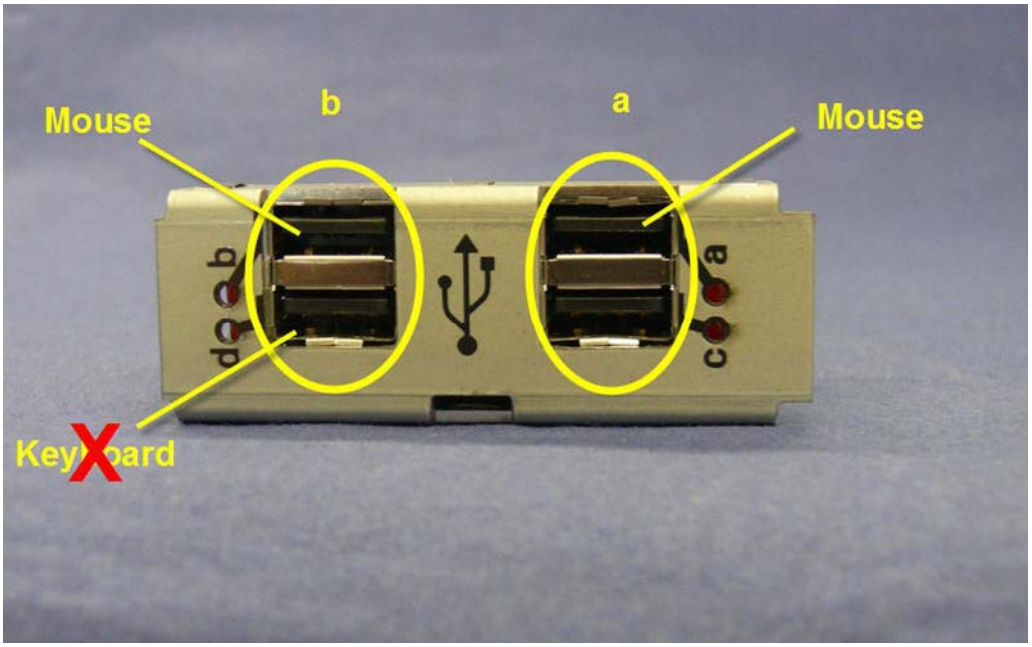
The USB IF board supports the following USB devices:

- printer
- keyboard
- barcode scanner
- computer mouse or trackball

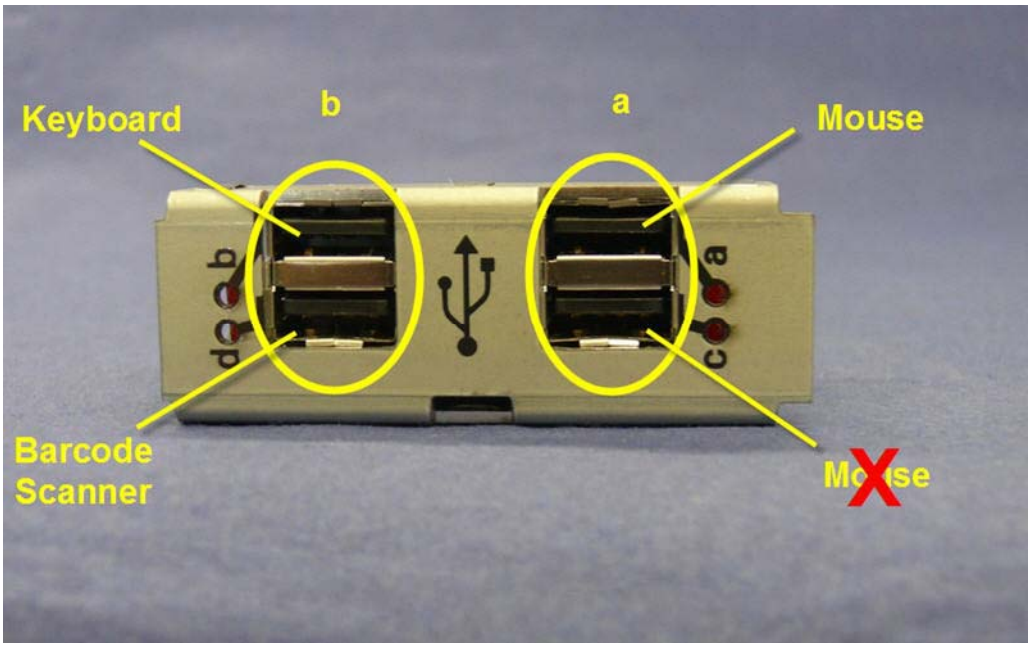
NOTE

Connect only the above mentioned devices to the USB Interface. Other devices are not supported.

As the patient monitor software only supports two input devices, only two input devices can be connected to the USB 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

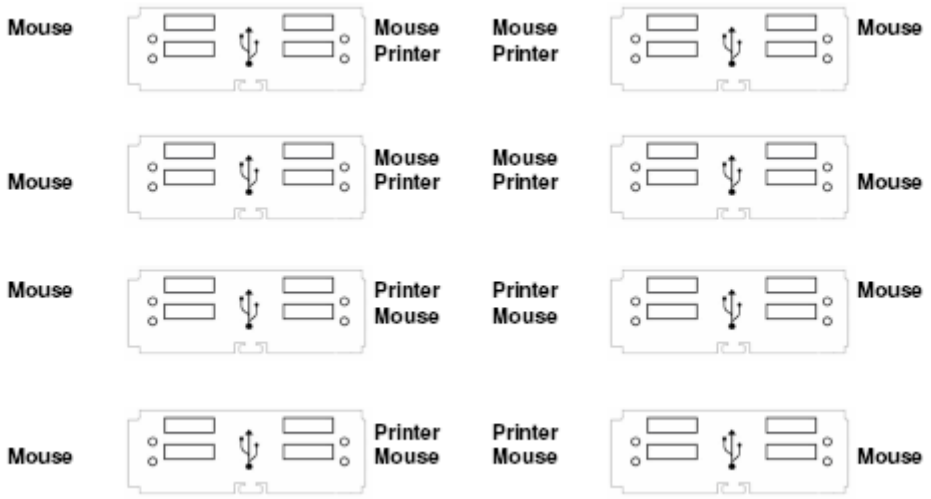
Other USB devices, e.g. USB sticks, iPods etc. are not supported by the USB IF board.**Do not** use USB adapters to connect PS/2 or other devices to the USB board.

Possible USB Device Combinations

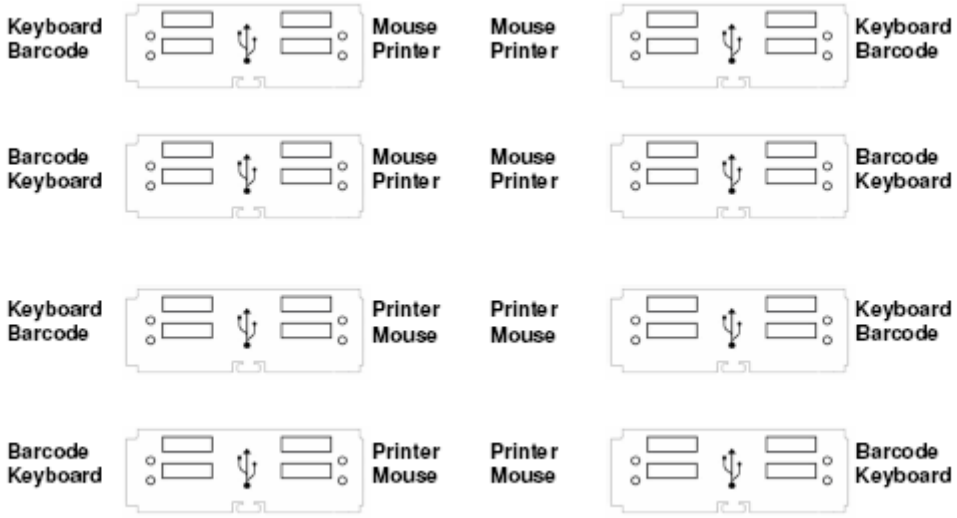
The following three groups of USB device combinations are supported:

- mouse/mouse combination
- keyboard/mouse combination
- keyboard/keyboard combination.

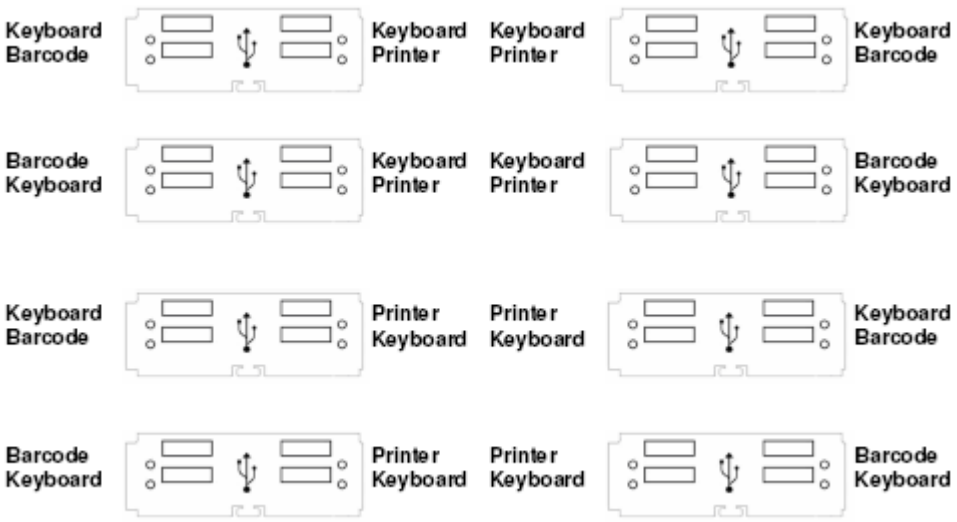
The figures below show the possible device combinations for each of the three groups.



Possible Mouse/Mouse combinations



Possible Mouse/Keyboard combinations



Possible Keyboard/Keyboard combinations

NOTE

Every time a new device is connected to the USB board, 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 interface does 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.

NOTE

The USB board is not compatible with SW Revisions A.0x.xx. All other available SW Revisions are compatible.

USB Error Indication

The USB ports have a green LED each. If an error occurs, the LED is off. If the LED is on, the connected device is ready for operation.

Setting Up Multiple Displays

The MP90 supports a second and (in combination with the D80 Intelligent Display) a third main display. Most screen elements can be displayed on all displays. Note that a Screen with an embedded Other Bed screen element cannot be displayed on the D80 Intelligent Display.

The main displays support all input devices. Input devices can be assigned to an operator independent of the CPU/display they are connected to. However, we recommend assigning the input devices to the CPU/display to which they are physically connected.

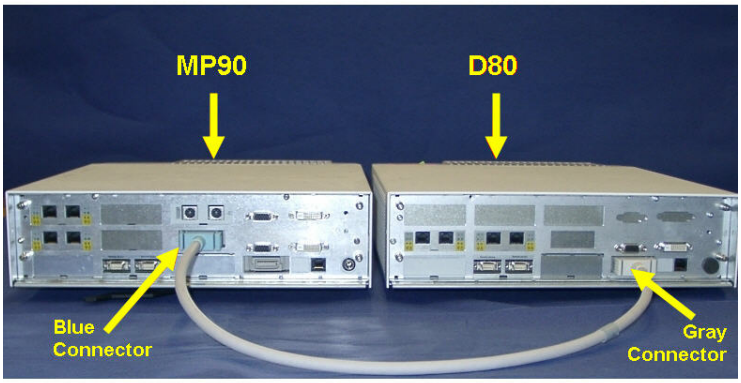
Before setting up multiple displays you must have a clear idea of your intended use model. (E.g. Will the displays be operated by one or two operators? Which display will be operated by which user? Will you be using displays as one wide screen or one tall screen?) Please refer to the examples at the end of this section, which illustrate possible use models.

Installation of Multiple Displays

The MP90 supports two and three display systems. When positioning the individual displays, keep in mind that Display 1 is always the display connected to the first CPU of the MP90, Display 2 is the display connected to the second CPU of the MP90 and Display 3 is the display connected to the D80. Make sure that you position the displays in the correct sequence from left to right or top to bottom to ensure correct cursor movement across the displays.

The MP90 also supports wide screen and tall screen configurations. Note that only Display 1 and Display 2 can be combined to one wide screen or one tall screen. In order to combine two displays to one wide screen or tall screen, the two displays must have the same resolution.

For a two display system, make the appropriate video & touch cable connections as described later in this chapter. For a three display system, the MSL connector of the D80 Intelligent Display must be connected to the MSL2 connector of the MP90 CPU via an adapter cable for MSL coupling. The gray end of the adapter cable for MSL coupling must be connected to the D80 and the blue end to the MP90.



If the cable is too short, it can be extended using an MSL coupling clamp (M3081-64201) and a regular MSL cable. In this case the regular MSL cable is connected to the MP90 and the coupling cable to the D80.

Please make all cable connections before switching on the monitor.

WARNING

The D80 **must** have the same software revision and language as the MP90, otherwise the system may not function or alarms may not be displayed correctly.

The following rules apply to three display systems:

- Only an MP90 with dual CPU and a D80 Intelligent display can be combined to make up a three display system.
- With the D80 Intelligent Display, measurement capabilities of the monitor are not extended compared to an MP90 only.
- Configuration of the whole monitor always resides on the MP90.
- Databases are stored in the MP90.
- Both the MP90 and the D80 must be connected to the network if you want to display Remote Applications on the D80 Intelligent Display.
- The Silence and Pause Alarms/Alarms Off permanent keys and hard keys always affect the monitor as a whole, independent of the display they are selected on.

Installing I/O boards in the D80 Intelligent Display

Install I/O boards into the D80 Intelligent Display according to the following table:

I/O Board		Possible Factory Configurations														
Name	Compatibility Rules	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
USB Interface	Slots 07, 03, 02, 04, 08	x	07	-	x	07	-	x	07	-	x	07	-	x	08	-
Input Device Interface	Slots 07, 03, 02, 04, 08	07	x	-	07	x	-	07	x	-	07	x	-	08	x	-
Remote Extension Device	Slot 03	03	03	03	03	03	03	-	-	-	03	03	03	03	03	03
MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	08	08	08	08	08	08	08	08	x08	08	08	08	-	-	08
2nd MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	-	-	07	04	04	07	03	03	07	02	02	07	-	-	-
3rd MIB/ RS232 (2x)	Slots 08, 07, 04, 03, 02	-	-	-	-	-	04	-	-	03	-	-	02	-	-	-

I/O Board		Possible Factory Configurations											
Name	Compatibility Rules	16	17	18	19	20	21	22	23	24	25	26	27
USB Interface	Slots 07, 03, 02, 04, 08	x	08	x	03	x	02	-	x	03	x	03	-
Input Device Interface	Slots 07, 03, 02, 04, 08	08	x	03	x	02	x	-	03	x	03	x	-
Remote Extension Device	Slot 03	03	03	-	-	03	03	03	-	-	-	-	-
MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	08	08	08	08	08	08	08	08	08	08	08	08
2nd MIB/RS232 (2x)	Slots 08, 07, 04, 03, 02	-	-	-	-	04	04	02	02	02	04	04	04
3rd MIB/ RS232 (2x)	Slots 08, 07, 04, 03, 02	-	-	-	-	-	-	-	-	-	02	02	03

"-" This board is assumed to not be required for the configuration

"X" This board cannot be assigned in this configuration

WARNING

When using an MP90 monitor with a D80 Intelligent Display, always switch power on directly at the MP90 or at a directly connected remote SpeedPoint or remote alarm device.

Configuring Multiple Displays

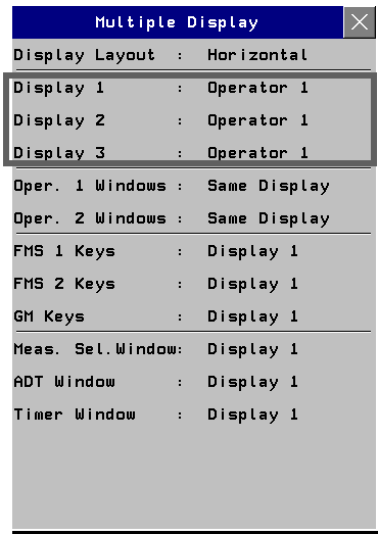
To configure multiple displays correctly you must answer four questions:

1. Who will be operating which display?

Up to two operators can operate up to three displays. Note that operators are not the same as users - although three users can each use (i.e. look at) their individual displays, only two people (operators) can actually independently operate them.

To assign displays to operators:

1. Go into the Multiple Displays menu by selecting **`Main Setup`** -> **`Hardware`** -> **`Multiple Display`**
2. Set **`Display 1`**, **`Display 2`** and **`Display 3`** to either **`Operator 1`** or **`Operator 2`**



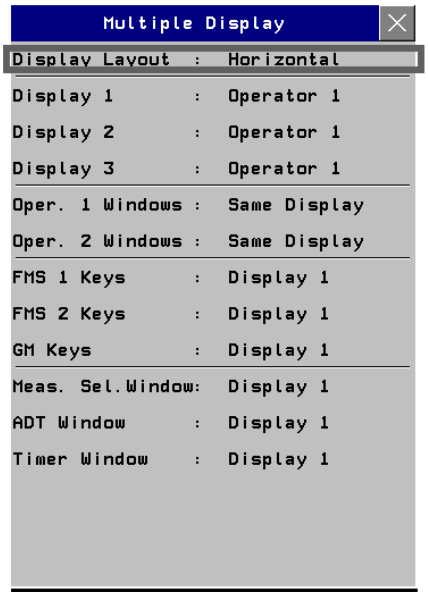
NOTE

If you want to use wide screens or tall screens on display 1 and display 2, you must assign these two displays to the same operator.

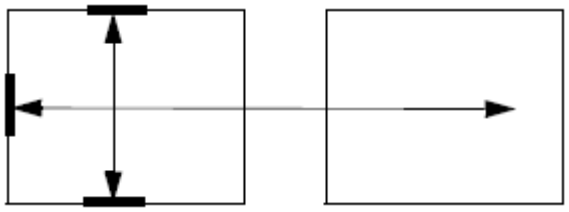
2. How are the displays positioned in relation to each other?

In a scenario where two displays are assigned to one operator, determine how they should be positioned in relation to each other (for example next to each other or above each other). Make sure that you position the displays in the correct sequence from left to right or top to bottom to ensure correct cursor movement across the displays.To configure the correct tracking of the mouse or SpeedPoint:

1. Go into **`Main Setup`** -> **`Hardware`** -> **`Multiple Display`**
2. Set the **`Display Layout`** to **`Horizontal`** or **`Vertical`** depending on the location of the individual displays relative to each other.

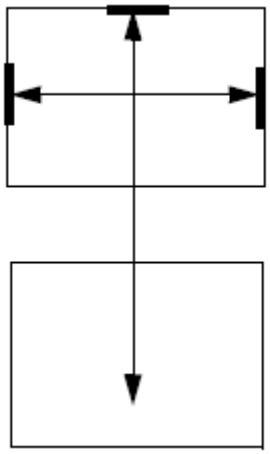


Horizontal - restrains the movement of the mouse cursor or SpeedPoint highlight across two screens to the horizontal borders of the display.



Mouse Cursor or Speedpoint Highlight Movement with Display Layout set to "Horizontal"

Vertical - restrains the movement of the mouse cursor or SpeedPoint highlight across two screens to the vertical borders of the display.



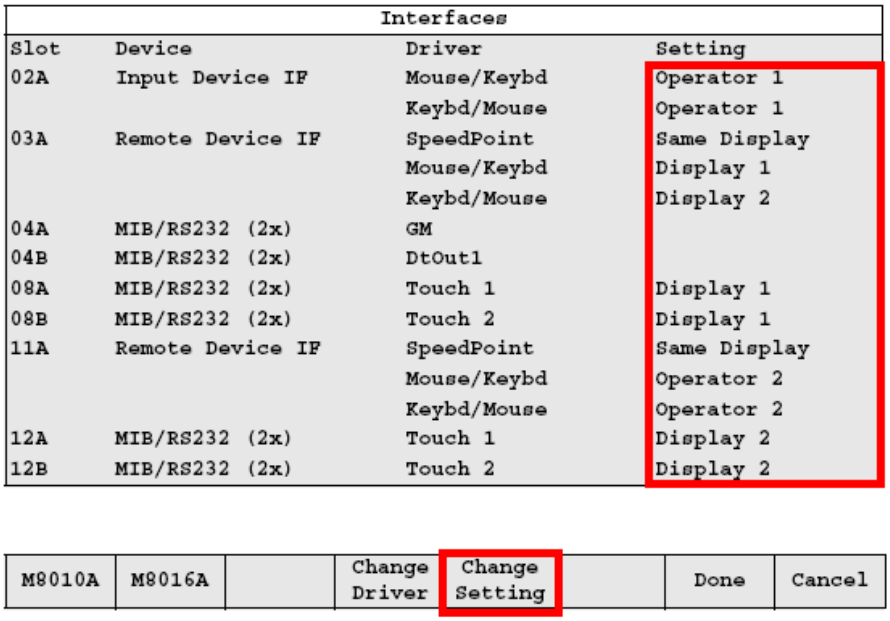
Mouse Cursor or Speedpoint Highlight Movement with Display Layout set to "Vertical"

3. Which Operator (or which display) are the connected input devices assigned to?

To assign the input devices to either an operator or a display, change the individual settings in the **`Interfaces menu:`**

1. Connect all input devices.
2. Go into **`Main Setup`** -> **`Hardware`** -> **`Interfaces`** and select an input device.

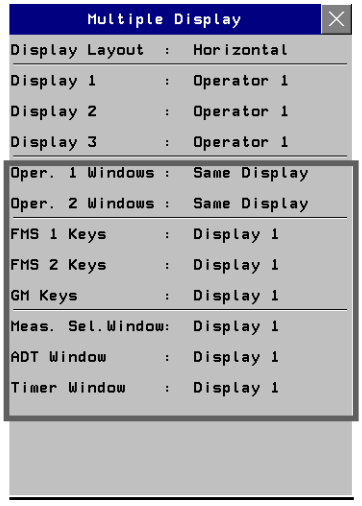
3. Use the **Change Settings** pop-up key to assign input devices either to a specific display or to all displays that were assigned to an operator.



Input devices can be set to either **Operator 1**, **Operator 2**, **Display 1**, **Display 2**, **Display 3** or **Same Display**. **Same Display** means that the input device will function on the display which it is physically connected to via the MP90 or D80 CPU.

4. On which display should an operator's windows appear

To define where menus and windows for an individual operator appear, go into **Main Setup** -> **Hardware** -> **Multiple Display** and set the appropriate settings in the **Multiple Displays** menu.



- **Operator 1 Windows:** If operator 1 is operating more than one display, this setting defines on which display the windows of this operator are placed. Choices are Display 1, **Display 2 or Same**Display. Same Display means the window opens on the display where the window has been selected.

- **Operator 2 Windows**: If operator 2 is operating more than one display, this setting defines on which display the windows of this operator are placed. Choices are Display 1, Display 2 or Same Display. Same Display means the window opens on the display where the window has been selected.
- **FMS1 Keys:** defines on which display a setup menu or application window appears when any of the hard keys on a plug-in module in FMS1 is pressed. If the configured display is not available, the monitor automatically uses Display 1.
- **FMS2 Keys:** defines on which display a setup menu or application window appears when any of the hard keys on a plug-in module in FMS2 is pressed. If the configured display is not available, the monitor automatically uses Display 1.
- **GM Keys**: defines on which display the gas analyzer setup menu appears when the Setup Key on the gas analyzer is pressed. If the configured display is not available, the monitor automatically uses Display 1.
- **Measurement Sel. Window:** defines on which display the Measurement Selection window pops up if **`Meas. Selection`** is configured to **`Window`**, a label conflict occurs, and no other menu/window is open at the same time. If the configured display is not available, the monitor automatically uses Display 1.
- **ADT Window:** defines on which display the Patient Demographics window pops up if a patient identification mismatch occurs and no other menu/window is open at the same time. If the configured display is not available, the monitor automatically uses Display 1.
- **Timer Window:** defines on which display the Timers window pops up when a timer expires, the **`Auto Window`** setting for that timer is set to **`Yes`**, and no other menu/window is open at the same time. If the configured display is not available, the monitor automatically uses Display 1.

NOTE

In order to determine which FMS is FMS1 and which is FMS 2, please go to the measurement selection window. FMS1 is always displayed on top.

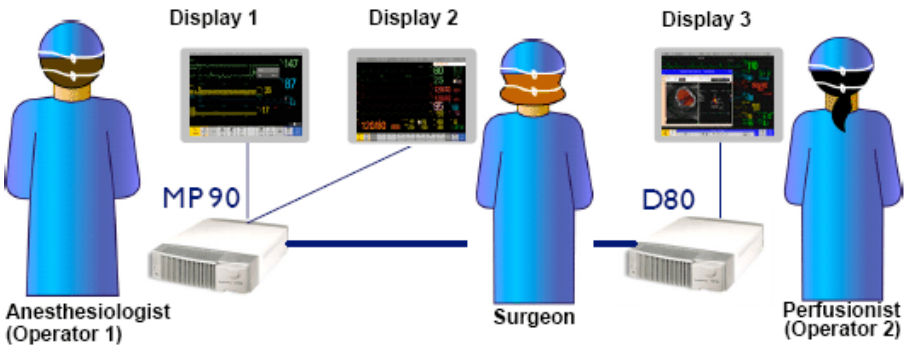
Examples for Multiple Display Use Models

The following examples illustrate possible use models for multiple display scenarios:

Use Model 1: Cardio-thoracic OR

- Anesthesiologist (Operator 1 - Display 1)
  - real-time data, trends, alarming, interaction
- Surgeon (Display 2)
  - real-time data, big waves, no alarming, no interaction

- Perfusionist (Operator 2 - Display 3)
  - real-time data, interaction

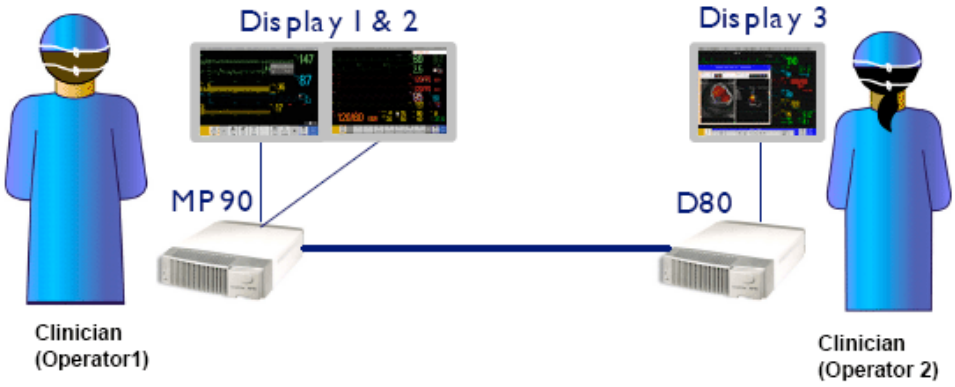


Recommended Settings for this Use Model:	
Display 1/2:	Operator 1
Display 3	Operator 2
Display Layout	Horizontal
All Input Devices connected to MP90	Same Display
All Input Devices connected to D80	Same Display
Operator 1 Windows	Display 1
Operator 2 Windows	Display 3

Use Model 2: Infection Room, Burn Unit/Bone-marrow transplant

- Outside (Display 1 & 2)
  - real-time data, alarming, interaction
  - trends, applications or charting

- Bedside (Display 3)
  - real-time data, alarming, interaction, trending, applications



NOTE

In this use model, the system can only be switched on from the outside (MP90).

Recommended Settings for this Use Model:	
Display 1/2:	Operator 1
Display 3	Operator 2
Display Layout	Horizontal
All Input Devices connected to MP90	Operator 1
All Input Devices connected to D80	Operator 2
Operator 1 Windows	Display 1
Operator 2 Windows	Display 3

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 (M8031A)

The Philips M8031A XGA Color Flatscreen Display is designed for use with the MP80/MP90 monitor as a slave display. A bracket is supplied with the display to connect it to a variety of Philips mounting devices.

A - Removing the desktop stand (if installed):

1. Remove the covers from the screws on the back of the flatscreen display

2. Remove the four screws from the back cover of the display and detach the cover.
3. Remove the four screws from the desktop stand and detach the desktop stand.

B - Attaching the bracket:

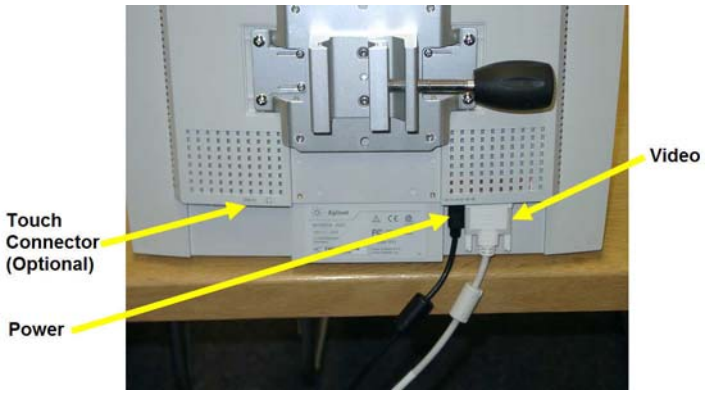
1. Place the bracket on the back of the display with the slits facing upwards.
2. Attach the bracket to the display with four M4x8 screws.
3. Attach the desired mounting device to bracket.

NOTE

Do not mount the display in a position where liquid could spill onto it.

Connections

Connect the cables to the display as shown in the photograph.



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

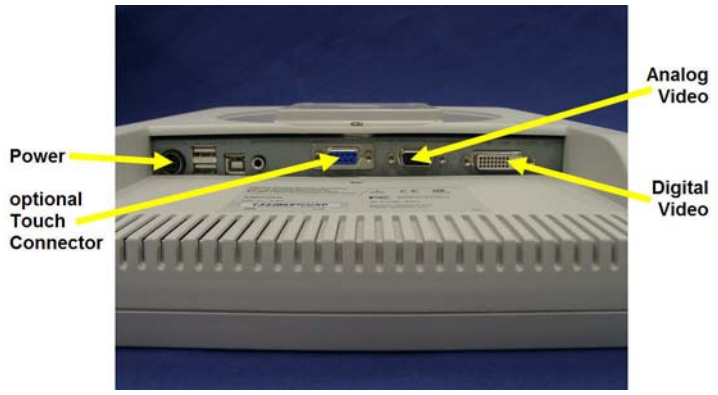
Connect the cables to the display as shown in the photographs below.

Mounting the 17" Remote Display (M8033A/B/C)

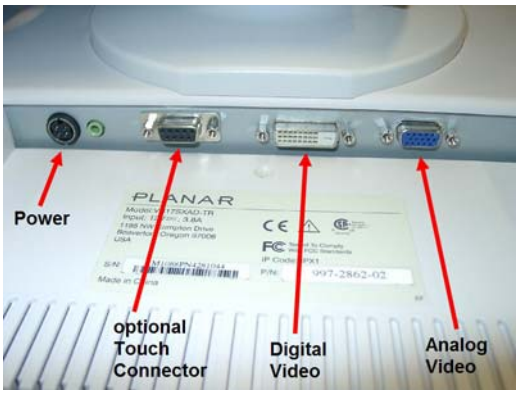
Mounting solutions for the M8033A/B/C must be purchased separately. Please refer to the installation instructions which ship with the mounting solution purchased.

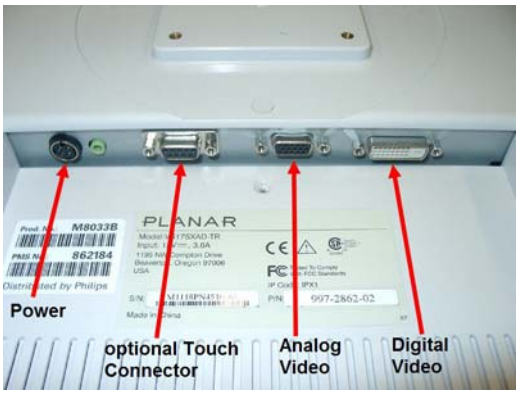
Connections

Connect the cables to the display as shown in the photographs below.

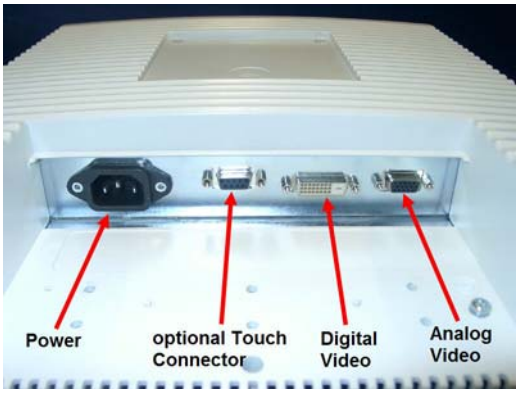


Connections M8033A



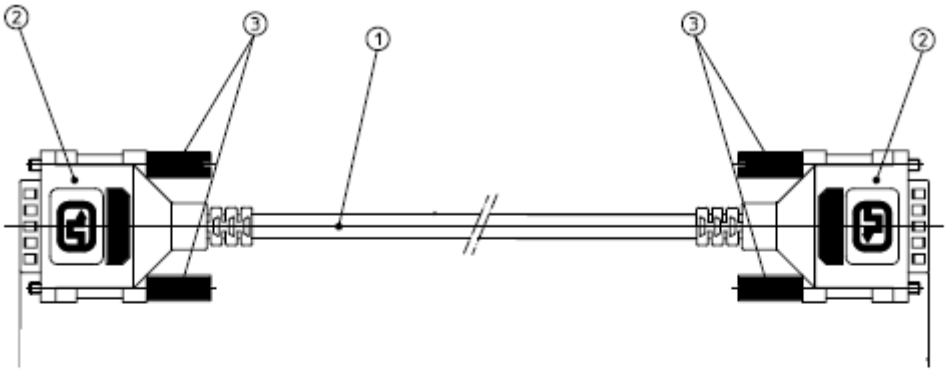


Connections M8033B (old and new version)



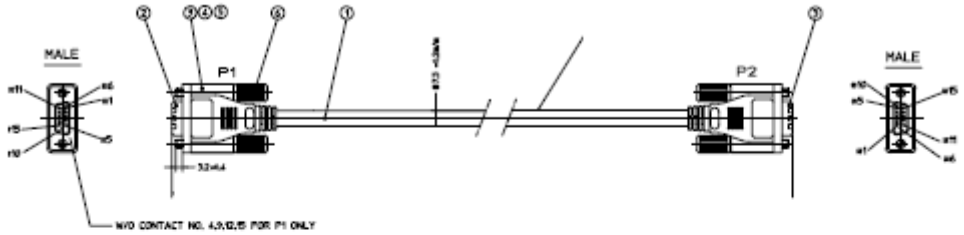
Connections M8033C

Video Cable Wiring Schematics



CN1	Signal Assignment	CN2
1	T.M.D.S. Data2-	1
2	T.M.D.S. Data2+	2
3	T.M.D.S. Data2 Shield	3
4	No Connect	4
5	No Connect	5
6	DDC Clock	6
7	DDC Data	7
8	No Connect	8
9	T.M.D.S. Data1-	9
10	T.M.D.S. Data1+	10
11	T.M.D.S. Data1 Shield	11
12	No Connect	12
13	No Connect	13
14	+5V Power	14
15	Ground for +5V	15
16	Hot Plug Detect	16
17	T.M.D.S. Data0-	17
18	T.M.D.S. Data0+	18
19	T.M.D.S. Data0 Shield	19
20	No Connect	20
21	No Connect	21
22	T.M.D.S. Clock Shield	22
23	T.M.D.S. Clock+	23
24	T.M.D.S. Clock-	24
Shell	FG	Shell

Digital Video Cable Wiring Schematic



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

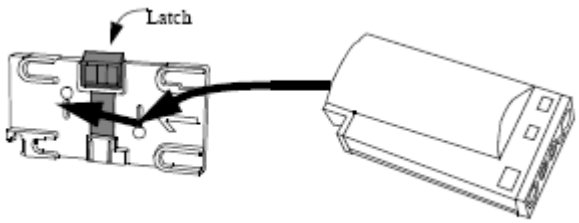
- This section lists settings grouped in the Hardware Settings Block which are available in Service Mode. These settings are set once per monitor and are the same in every profile. Any changes you make to the hardware settings configuration are automatically stored, there is no need to save them in an 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 PS/2.
  See ***PS/2 Keyboard/Mouse*** *(on page 286) section* in this chapterfor 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 Interface (Rev. D.00.xx or higher) 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.



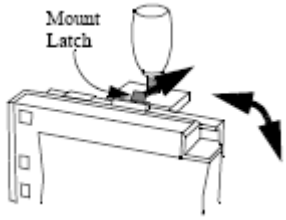
Detaching the Measurement Server from a Mount

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.



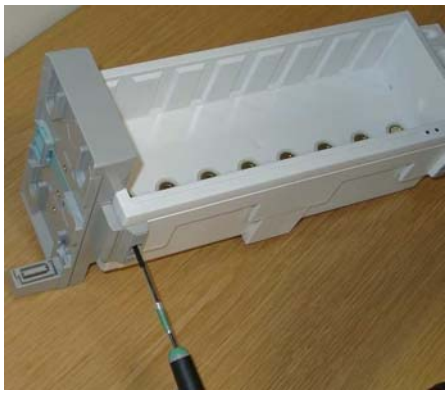
Rotate the Measurement Server and mount until you get it to the position you want.

2. Release the mount latch, and make sure it is clicked into one of the four slots on the back of the mount.

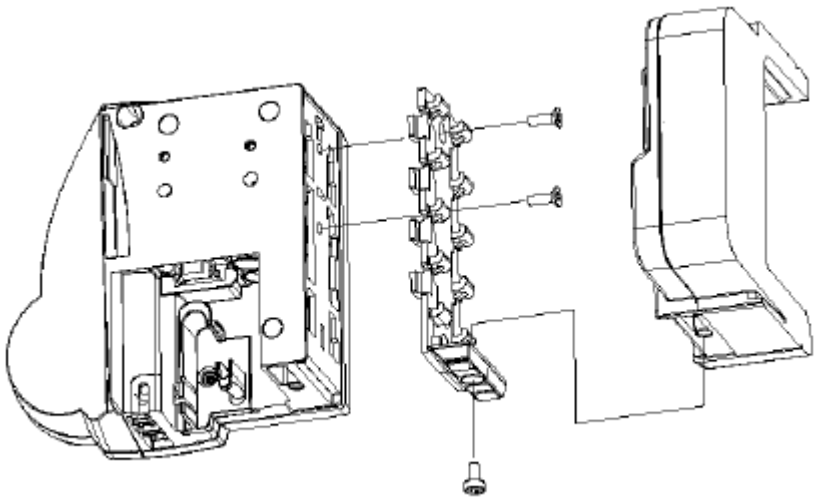
Mounting the MMS Mount to the FMS (M8048A)

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



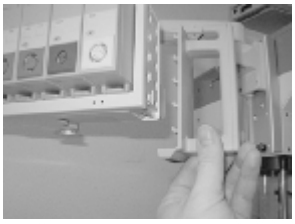
Mounting the Remote Extension Device to the FMS



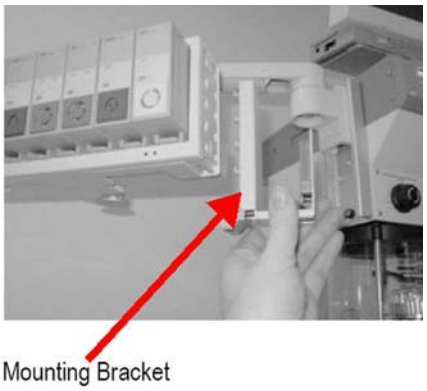
Mounting the Remote Extension Box to M8048A Flexible Module Server

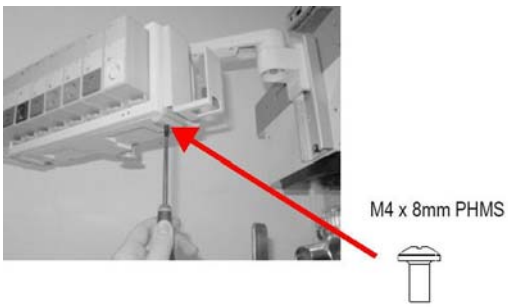
Mounting the BIS Engine to the FMS

1. Remove the existing handle for the FMS

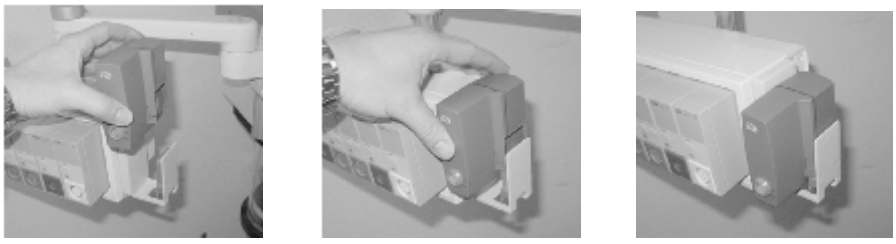


2. Attach the bracket to the FMS using a M4 x 8mm PHMS





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.

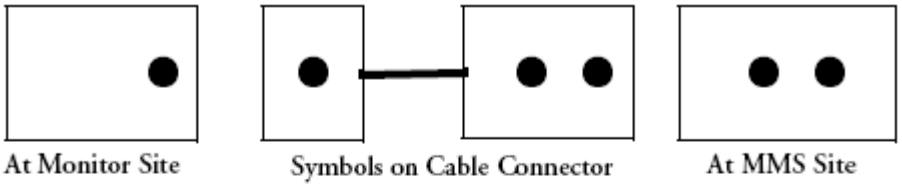
1. Draw the MSL cable through the wall from the site of the monitor to the site of the measurement server.

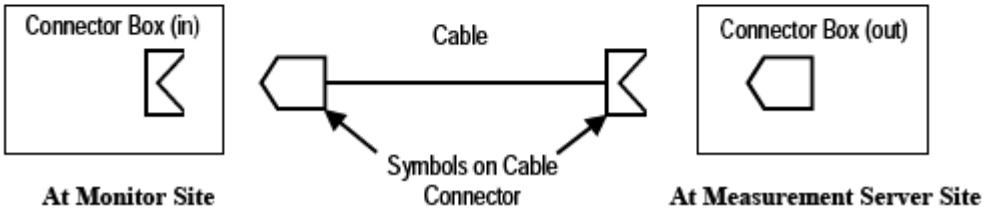
   Each MSL face plate kit contains two connector boxes; one in-going and one out-going. (The US version contains an additional rectangular wall-mounting plate).

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.

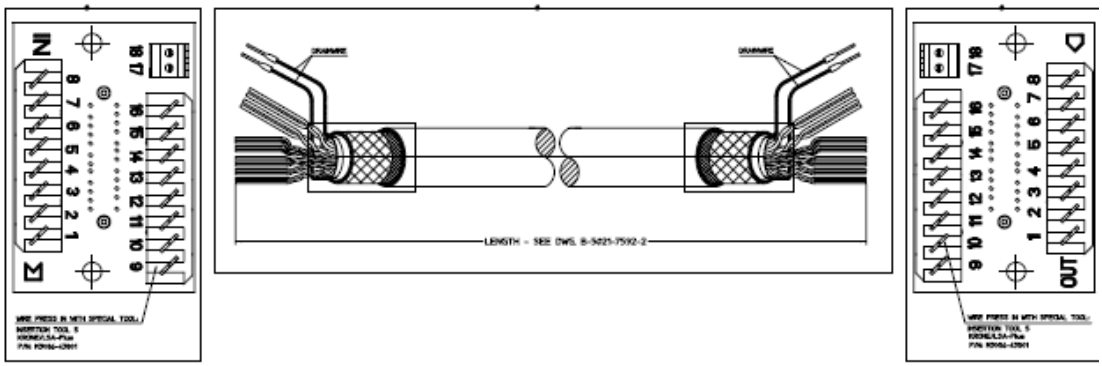
Symbol:  is connector box (out) and must be placed at the measurement server site.

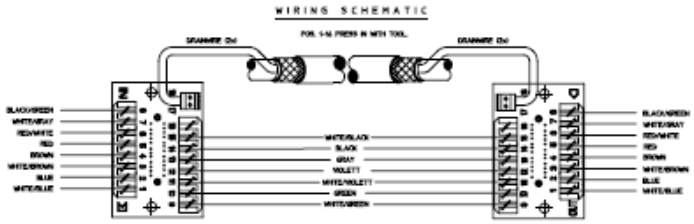
The correct connector cable (M3081-61601, M3081-61602 or M3081-61603) has the opposite symbol:

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

Remote Alarm Devices

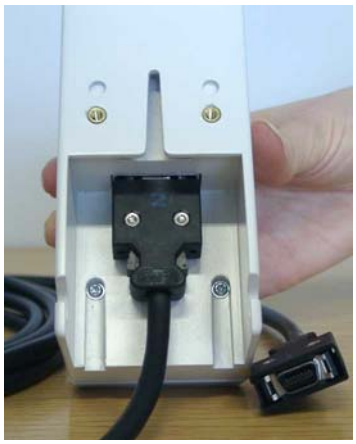
Mounting

The mounting devices for the Remote Alarm Device are the same as for the Remote Extension Device. See ***Remote Extension Device*** (on page 284) for details.

Connections

Remote Alarm Device Rear View

Remote Alarm Device Connector



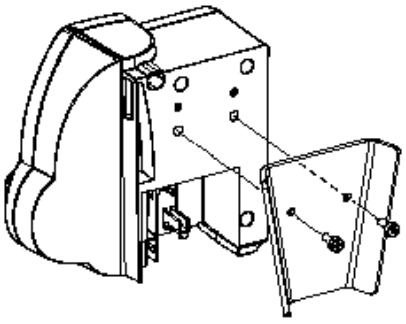
Remote Alarm Device with Cable connected

Remote Extension Device

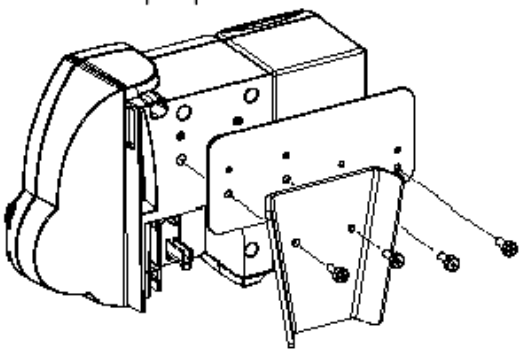
Mounting

Mounting solutions (M8026-64001 Mounting Kit) for the Remote Extension Device are pictured below. Use 3.5 x 35mm screws to attach the mounts to the wall. For part numbers see the Site Preparation section.

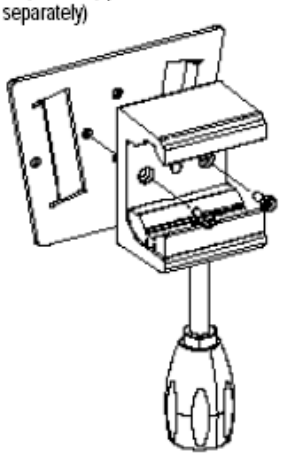
Remote Extension Box plus SpeedPoint



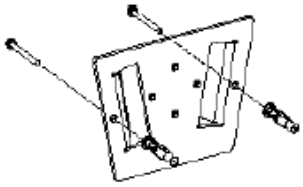
Remote Extension Box plus SpeedPoint Plus Remote Alarm Device



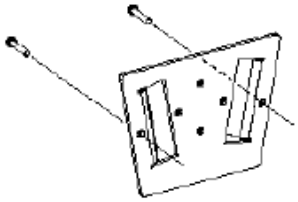
Clamp Wall (included) plus Universal Mounting Clamp (ordered separately)



Clamp Wall plus Universal Fixings (Concrete Wall)



Clamp Wall plus Screws (Plywood Wall)



Connections

Connect the cable to the Remote Extension Device as shown in the photograph. Note that the PS/2 device interface board must be installed in addition to the remote device interface board for use of the remote extension device.

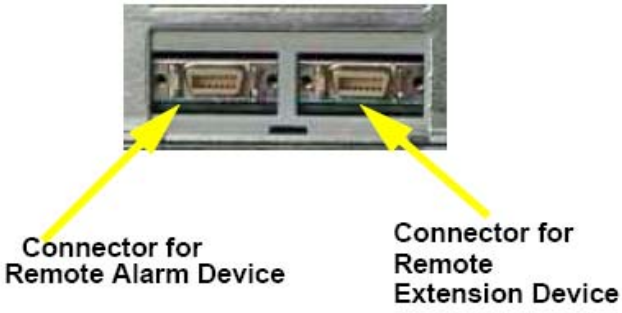
Remote Extension Device Rear View

Remote Extension Device Connectors connected

Remote Extension Device with Cable

Cabling

The connection at the monitor should look like on the photograph . Connect the cable at both the extension device and the monitor.



PS/2 Keyboard/Mouse

Switch off the monitor before connecting any PS/2 compatible device.

Connect the PS/2 connector either to the remote extension device or the PS/2 Interface board in the monitor at the slot indicated by the appropriate symbol.

The default keyboard language setting for all initial configurations is “US”. However, the monitor will not automatically select the best matching language for the keyboard depending on the language of its software. This means that there is no such choice as “Automatic” for the keyboard language.

To configure the keyboard language manually, go to Service Mode, select **`Main Setup`** -> **`Hardware`** -> **`Keyboard`** and then select the proper language. Please note that this setting does not clone.

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.

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.

Nurse Call Relay

Connections

Flexible Nurse Call Relay Connections at Monitor

Nurse Call Relay	Connectors	Contact	Isolation
Basic Nurse Call Relay	3.5 mm phone jack active closed contact only	≤ 100 mA, ≤ 24 VDC	1.5 kV
Flexible Nurse Call Relay	20 pin MDR (Mini D-Ribbon), active open and closed contacts, 3.5 mm phone jack, active closed contact only	≤ 100 mA, ≤ 24 VDC	1.5 kV

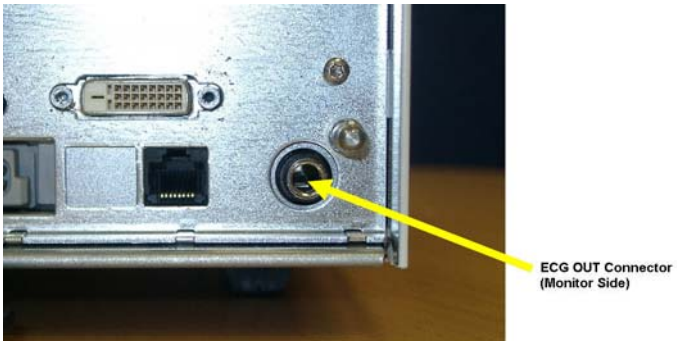
See Multi-Port Nurse Call Connector Test (Flexible Nurse Call) for details on the Nurse Call Relay Connector pin assignment.

ECG Out Functionality

NOTE

The ECG Out in the D80 Intelligent Display is not functional. Please ensure that the ECG Out connector is covered with a “Cover ECG Out for D80” (available as part of the MP80/MP90 Small Parts Kit).

Connections

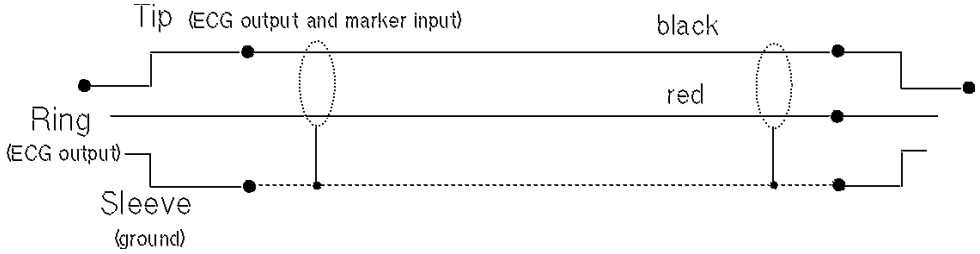


ECG Out Connector

The cable M1181A #A62 has 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 -USR_ProductName- 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.

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).
- IP Address, Subnet Mask and Default Gateway (for manual IP Address Configuration - only in **service mode**)
- ECG cable colors
- Height and Weight units
- IGMP, CI Mode, CI Address, CI TTL (for Customer Supplied Clinical Network (CSCN) Routed Bedside Configurations - only in **service mode**)

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 documentation.

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 the **Bed Label** screen element to call up the **Bed Info** 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.

Configuring IP Address, Subnet Mask and Default Gateway

Typically the automatic configuration via the BOOTP Server of the central station is used. In this case all fields are set to 0.0.0.0. For special requirements, it is possible to switch to a manual/fix IP address configuration.

NOTE

- Only limited checks of the manual values are possible. Therefore, it is mandatory that a manual configuration is only performed by an experienced service person to avoid problems such as duplicate IP addresses, non matching subnet mask, etc.
- The second CPU of an MP90 does not support a manual configuration and therefore will always request the IP configuration via BOOTP.

1. Select the **Bed Label** screen element to call up the **Bed Info** menu.
2. Select **IP Address**. If the IP Address is set to 0.0.0.0, all values are dynamically requested from a BOOTP Server. Otherwise the manually entered address is used.

3. Select **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 the IP Address is provided by a BOOTP Server.
4. Select **Default Gateway**. The IP Address of the Default Gateway can be optionally configured. The configured value is ignored if IP Address and gateway are provided by a BOOTP Server. The configured value must be within the range of the Subnet Mask.

Configuration Settings for CSCN Routed Bedside Monitors (RBM)

The following settings are used for Customer Supplied Clinical Network (CSCN) Routed Bedside monitors. To access these settings, select the **Bed Label** screen element to call up the **Bed Info** menu.

IGMP:Shows status of IGMP Support (On or Off). IGMP (Internet Group Multicast Protocol) is used by many switch manufacturers to limit the number of destinations targeted by a multicast packet.

CI Mode: The mode in which CI messages (Connect Indication messages) are send (Broadcast, Multicast, Manual).

CI Address: IP Address for Connect Indication messages only being used if CI Mode is set to Manual. If CI Mode is Broadcast the CI Address is implicitly the subnet broadcast address. If CI Mode is 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.

Configuring Routed Bedside Monitors Support

An IntelliVue MP2/X2, MP5/MP5T or MP20-90 monitor must be running software revision level G.0 or higher to be used as a routed bedside monitor (RBM).

CAUTION

A Philips Routed Bedside Monitor may temporarily stop displaying its Care Group overview bar for up to 60 seconds if a network link carrying multicast traffic between the Philips IntelliVue Information Center and the network routers is lost. While the multicast traffic is being re-routed, the monitor will not display the Care Group overview bar but will maintain connectivity to its associated Philips IntelliVue Information Center. Primary monitoring/alarms will remain available at the Routed Bedside Monitor and its associated Philips IntelliVue Information Center while the multicast traffic is being re-routed.

To configure an IntelliVue Patient Monitor to function as an RBM:

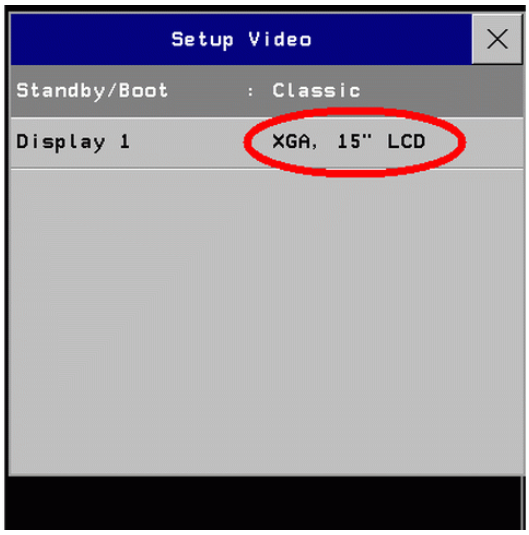
1. Put the monitor into Service Mode
2. Select Main Setup => Bed Information => IGMP and set IGMP to On.
3. Select Main Setup => Bed Information => CI Mode and set CI Mode to Multicast.
4. Select Main Setup => Bed Information => CI TTL, and set CI TTL to a value of 8.
5. Store the settings.

6. The CI Address will change to 224.0.23.63.
7. Return the monitor to its normal operational mode.

For further information regarding CSCN Routed Bedside Monitors refer to the CSCN Specifications (P/N: 4535 640 24951)

Display Settings

Enter the Setup Video window (**Main Setup -> Hardware -> Video -> Display x**) to set the correct display resolution, display size and display type for the external displays.



Resolution

Make sure your resolution setting matches the native resolution of your display to avoid distorted or unclear images on the display. The IntelliVue software also uses resolution information to define the pixel area for touch screens.

Depending on your display, the following resolution settings will be available:

- XGA (1024 x 768 pixels)
- SXGA (1280 x 1024 pixels)
- WXGA (1280 x 768 pixels)
- WXGA+ (1366 x 768 pixels)
- WSXGA (1440 x 900 pixels)

Please note that you must recalibrate the touch screen if the display resolution is reset. To do this:

1. From the **Main Setup** menu select **Setup Hardware**.
2. Select **Calibrate Touch**.

Size

The IntelliVue software uses this information to adjust the wave speed correctly. Make sure you select the correct display size.

Type

Depending on the display you are using, select either **LCD** or **CRT**.

IntelliBridge EC10

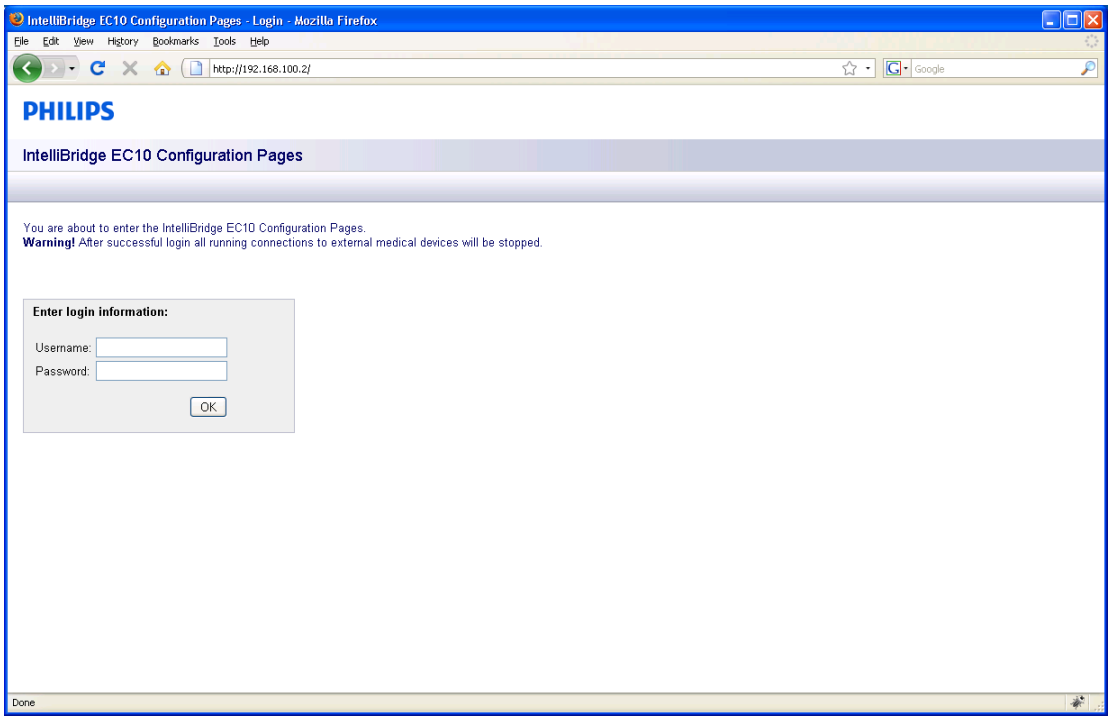
The IntelliBridge EC10 web based service interface allows you to:

- upgrade the EC10 Firmware
- upload or remove device drivers
- generate and upload clone files
- view system information

Accessing the IntelliBridge EC10 Service Interface

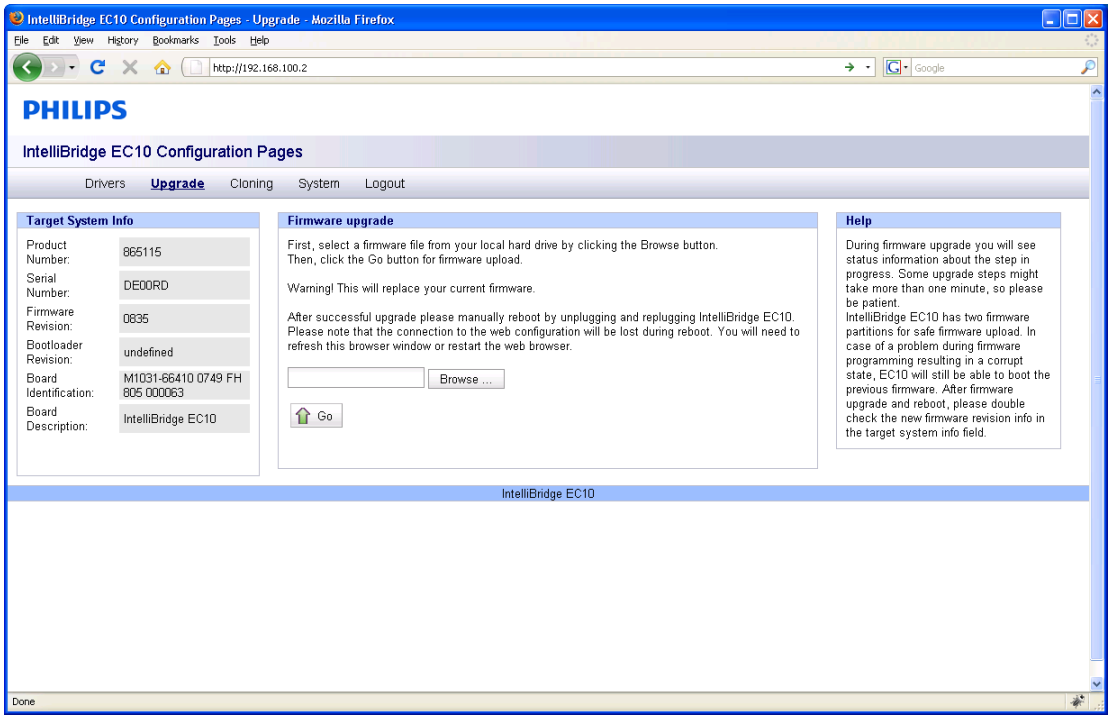
1. Connect the Service PC to the IntelliBridge EC10 module using a standard LAN cable.
2. Make sure that the TCP/IP settings of your Local Area Connection Properties on the Service PC are set to "**obtain IP Address automatically**".
3. Open your Internet Browser. Internet Explorer 7 and Firefox 3.0 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

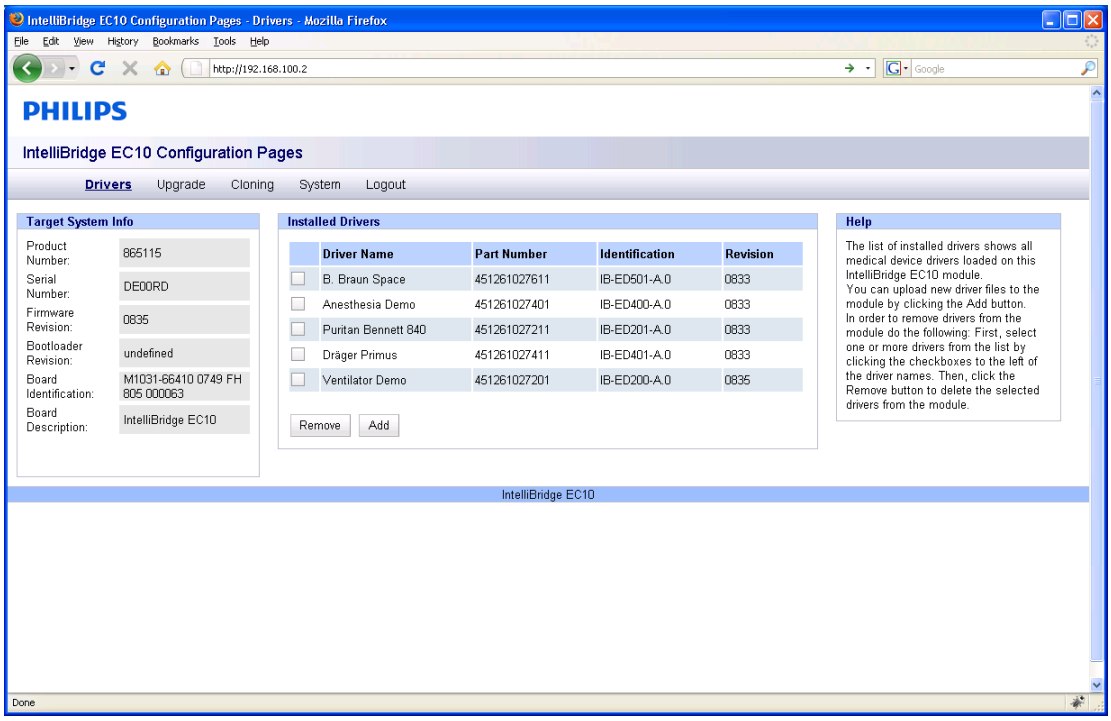
1. In the EC10 Configuration Screen select the tab **`Upgrade`**.
2. The Firmware upgrade window will open up.



3. Click on the **Browse** button and select the correct FW file.
4. Click **Go**.

Uploading and Removing Device Drivers

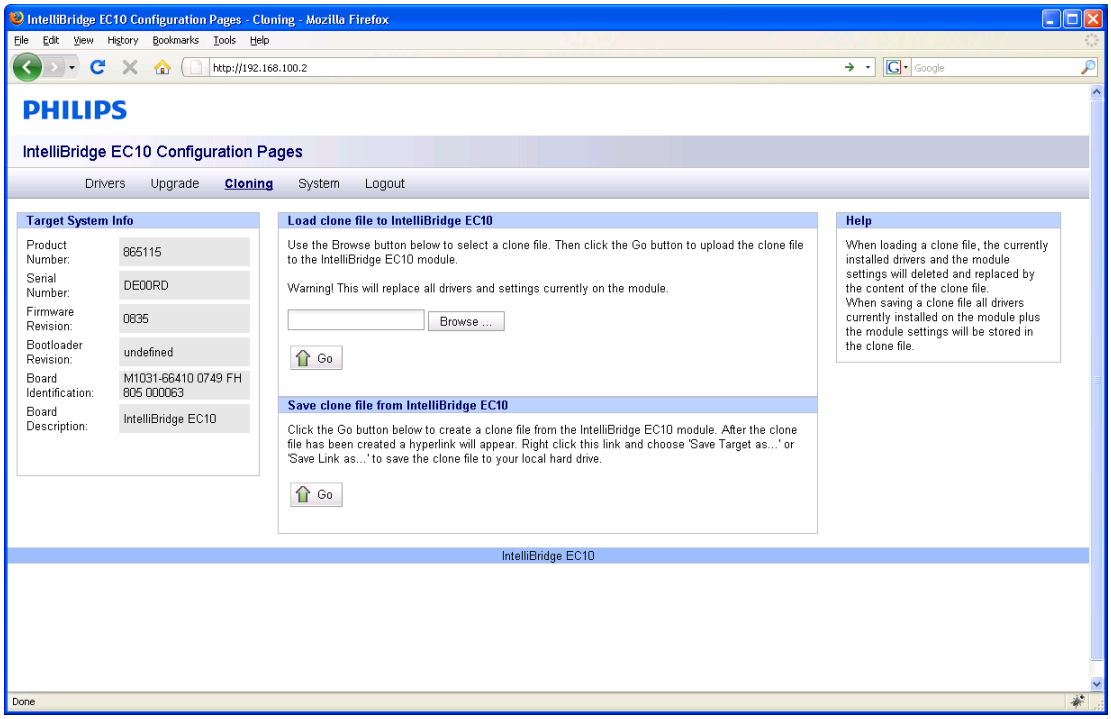
1. In the EC10 Configuration Screen, select the **Drivers** Tab.
2. A list of the available drivers on the EC10 module will appear.
3. To upload a new driver, click the **Add** button, then click the **Browse** button and select the driver file. To remove one or more drivers, select the driver(s) from the list of available drivers and click the **Remove** button.



Generating and Uploading Clone Files

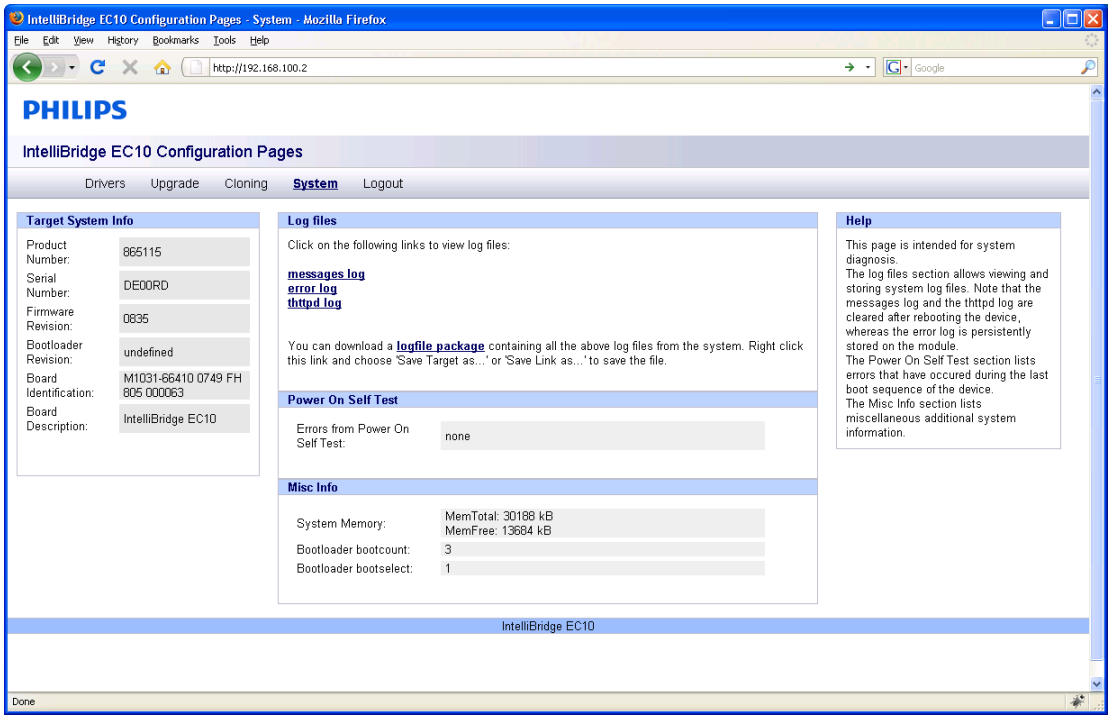
1. In the EC10 Configuration Screen, select the **Cloning** tab.
2. To generate a clone file, click the **Go** button in the *Save clone file from IntelliBridge EC10* window. A hyperlink will appear. Right click this link and select "**Save Target as**..." to save it to the desired location.

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 (M8105-9441x) 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.

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 MP80/MP90 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.

- 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 307) 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.

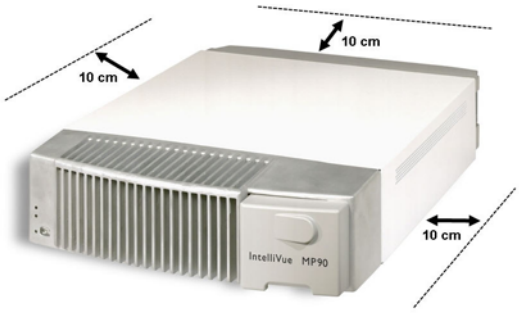
Procedures for Philips Personnel

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."

M8008A/M8010A/M8016A 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. The MP80/D80/MP90 should be placed with sufficient space around it (see diagram below).



Maximum dimensions and weight:

Size (W x H x D)

342mm x 108mm x 505mm (13.47” x 4.25” x 19.88”)

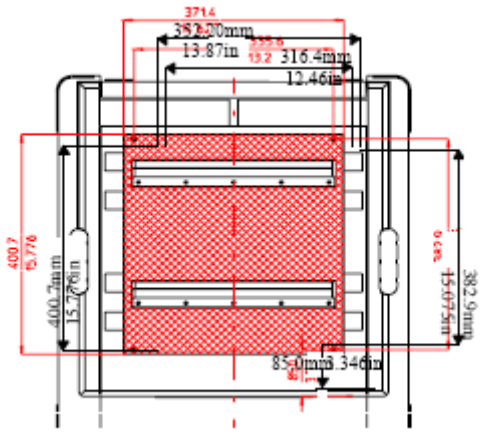
Weight

10kg (22.05lb) without options

NOTE

If a dual CPU MP90 is installed with minmal space around it, we recommend the installation of the optional fan kit.

The following figure shows the dimensions required for the M1180A #A31 table mounting bracket.



Environmental Requirements

The environment where the MP80/D80/MP90 will be used should be reasonably free from vibration, dust and corrosive or explosive gases. The ambient operating and storage conditions for the MP80/D80/MP90 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 35ºC (32 to 95ºF)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 20% to 85% Relative Humidity (RH) (non-condensing)

Storage: 5% to 85% Relative Humidity (RH)

Altitude

Operating: -500m to 4600m (15000 ft.)

Storage: -500m to 15300m (50000 ft.)

Electrical and Safety Requirements (Customer or Philips)

Safety Requirements

If the MP80/D80/MP90 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 MP80/D80/MP90 **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 MP80/D80/MP90.

WARNING

Each component must be individually grounded for safety and interference suppression purposes.

Electrical Requirements

Line Voltage Connection

The MP80/D80/MP90 uses < 145 W (1.6 to 0.7 A).

Line Voltage

The MP80/D80/MP90 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 Server or Multi-Measurement Module

Remote Display

Remote Alarm Device

Remote Extension Device (with or without SpeedPoint)

Where more than one site is used for locating equipment (a remote installation), the following sections should be considered for EACH device:

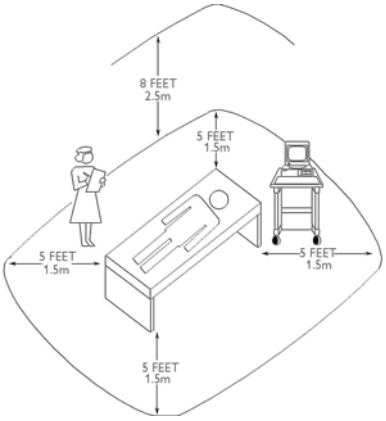
- Space Requirements
- Environmental Requirements
- Mounting
- Electrical and Safety Requirements
- Cabling Options and Conduit Size Requirements

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 or Flexible Module Rack (FMS) M8048A

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 Flexible Module Rack M8048A

Size (W x D x H)

320 mm x 120mm x 35mm (12.6” x 4.72” x 5.3”)

Weight

< 3500g (7.7lb)

Environmental Requirements Multi-Measurement Module M3001A and IntelliVue X2 M3002A

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 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.)

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the FMS and the MMS.

M8048A, M3001A and M3002A Cables

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
Both ends are terminated with straight MSL connectors.					
M8022A #SC1	M3081-61626 453563474781	0.75m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
n/a	M3081-61601 453563402721	1 m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC2	M3081-61602 453563377851	2m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC4	M3081-61603 453563402731	4m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC6	M3081-61627 453563484501	10m Measurement Server to Monitor[a]	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC7	M3081-61628 453563484511	15m Measurement Server to Monitor[a]	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC9	M3081-61629 453563484521	25m Measurement Server to Monitor[a]	72 mm^2	40 mm	40 mm x 17 mm

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
Unterminated Cables					
M3081A #A15	M3081-61615 453563484481	MSL Installation Cable 15m	72 mm^2	40 mm	40 mm x 17 mm
M3081A #A25	M3081-61625 453563484491	MSL Installation Cable 25m	72 mm^2	40 mm	40 mm x 17 mm
Faceplates					
M3081A #C06	M3081-68708 453563484541	MSL Face Plate US version (pair of connector boxes)	n/a	n/a	n/a
M3081A #C07	M3081-68707 453563484531	MSL Face Plate non-US version (pair of connector boxes)	n/a	n/a	n/a
Insertion Tool					
n/a	M3086-43801 453563484771	MSL Insertion Too;l	n/a	n/a	n/a
[a]Built on demand..					

Mounting

M3001A Multi-Measurement Module (MMS) and M3002A IntelliVue X2 Mounts

Product Option Number	Part Number 12NC Part No.	Description
M3080A #A01 M8007A #E20	n/a M4046-62501 453563469731	Wall Mounting Plate Mount for back of MP60/70

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)

Cabling for D80 Intelligent Display

Product Option Number	Part Number	12NC Part No.	Description
M8016A #MC1	M3081-61676	451261013881	Adapter cable MSL coupling (0.75 m) incl. clamp
M8016A #MC2	M3081-61652	451261013891	Adapter cable MSL coupling (2 m) incl. clamp
M8016A #MC4	M3081-61653	451261013901	Adapter cable MSL coupling (4 m) incl. clamp

The adapter cable can be extended using the MSL coupling clamp with an MSL cable (maximum total length. 30 m).

Part Number	12NC Part No.	Description
M3081-64201	451261013871	MSL Coupling Clamp

Remote Displays (M8031A)

Space Requirements

Size (W x D x H)

With mounting bracket: 333mm x 408mm x 85mm (13.1” x 16” x 3.4”)

With desk stand: 387mm x 408mm x 175mm (15.2” x 16” x 6.9”)

Weight

With mounting bracket: 4900g (10.8lb)

With desk stand: 6900g (15.2lb)

Environmental Requirements

Temperature

Operating: 5 to 45ºC (41 to 113ºF

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 95% RH max @ 40ºC (104ºF)

Storage: 85% RH max @ 50ºC (122ºF)

Altitude

Operating: Up to 4600m (15000 ft.)

Storage: Up to 4600m (15000 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V

Voltage selection:

Wide range input, no voltage selection required

Max. Power consumption: 40W

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 - M8033A

Space Requirements

Size (W x Hx D)

Landscape mode: 457mm x 457mm x 216mm (18” x 18” x 8.5”)

Portrait mode: 457mm x 495mm x 216mm (18” x 19.5” x 8.5”)

Weight: 8.9 kg (20 lbs)

Environmental Requirements

Temperature

Operating: 0 to 40ºC (32 to 104ºF)

Storage: -20 to 60ºC (-4 to 140ºF)

Humidity

Operating: 10 to 90% RH (Non-condensing)

Storage: 10 to 90% RH (Non-condensing)

Altitude

Operating: Up to 2400m (8000 ft.)

Storage: Up to 12200m (40000 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V (13.5A fuse)

Voltage selection:

Wide range input, no voltage selection required

Power consumption: 60 watts maximum

Remote Displays - M8033B

Space Requirements

Size (W x Hx D)

404mm x 401mm x 234mm (15.9” x 15.8” x 9.2”)

Weight

Without deskstand: 4.8 kg (10.6 lbs)

With deskstand: 8.8 kg (20 lbs)

Environmental Requirements

Temperature

Operating: 0 to 40ºC (32 to 104ºF)

Storage: -20 to 65ºC (-4 to 140ºF)

Humidity

Operating: 10 to 90% RH (Non-condensing)

Storage: 10 to 90% RH (Non-condensing)

Altitude

Operating: Up to 2438m (8000 ft.)

Storage: Up to 12192m (40000 ft.)

Electrical and Safety Requirements

Voltage ranges:

100V to 240V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: 50 watts maximum

Remote Displays - M8033C

Space Requirements

Size (W x Hx D)

410mm x 362mm x 103mm (16.1” x 14.25” x 4.1”)

Weight

Without deskstand: 7 kg (15.4 lbs)

With deskstand: 10.8 kg (20 lbs)

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 (8000 ft.)

Storage: Up to 12000m (40000 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: 60 watts maximum

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the M8031A/B 15” and the M8033A/B/C 17” TFT Medical Grade Touch Displays.

Analogue Video Cables

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #VA2	M3080-61606 453563484451	1.5m Analogue Video Cable Kit	64 mm^2	40 mm	35 x 16 mm
M8022A #VA3	M3080-61602 453563334661	3m Analogue Video Cable Kit	64 mm^2	40 mm	35 x 16 mm
M8022A #VA6	M3080-61603 453563334671	10m Analogue Video Cable Kit[a]	64 mm^2	40 mm	35 x 16 mm
M8022A #VA7	M3080-61607 453563484461	15m Analogue Video Cable Kit[a]	64 mm^2	40 mm	35 x 16 mm
M8022A #VA9	M3080-61608 453563484471	25m Analogue Video Cable Kit[a]	64 mm^2	40 mm	35 x 16 mm
M1181A #A78	M1181-61695 453563255281	3m XGA Video Cable with right-angled connector. Computer module to display.			
M1181A #A79	M1181-61698 453563255291	10m XGA Video Cable with right-angled connector. Computer module to display.			
Both ends are terminated with HDSUB15 (“VGA”) straight connectors [a]Built on demand					

Digital Video cables

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #VD2	M8071-61001	1.5m Cable Kit	38mm^2	30mm	45 x 18 mm
M8022A #VD3	M8071-61002	3m Cable Kit	38mm^2	30mm	45 x 18 mm
M8022A #VD6	M8071-61003	10m Cable Kit.	38mm^2	30mm	45 x 18 mm

Touch Cable

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #TC2	M8081-61010 451261006551	Touch Cable, 1.5m	30mm^2	25mm	35 x 16 mm

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #TC3	M8081-61011 451261006561	Touch Cable, 3m	30mm^2	25mm	35 x 16 mm
M8022A #TC6	M8081-61012 451261006571	Touch Cable, 10m	30mm^2	25mm	35 x 16 mm
M8022A #TC7	M8081-61013 451261006581	Touch Cable, 15m	30mm^2	25mm	35 x 16 mm
M8022A # TC9	M8081-61014 451261006591	Touch Cable, 25m	30mm^2	25mm	35 x 16 mm

Remote Alarm Devices

Space Requirements

Size (W x D x H)

62mm x 125mm x 63 mm (2.4” x 5” x 2.5”)

Weight

< 300 g (< 0.7 lb)

Mounting

Remote Alarm Device Mounting

Note that the Universal Mounting Clamp (5061-8363) must be ordered separately

Product Option Number	Part Number	Description
n/a	M8026-64001 451261006641	Wall Mount

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the Remote Alarm Device M8025A.

M8025A Remote Alarm Device Cables

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #HF2	M8086-61003 453563484641	1.5m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF3	M8086-61004 453563484651	3m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #HF6	M8086-61005 453563484661	10m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF7	M8086-61006 453563484671	15m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF9	M8086-61007 453563484681	25m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
Both ends are terminated with straight MDR connectors. [a]Built on demand.					

Remote Extension Device

Space Requirements

Size (W x D x H):

103mm x 139mm x 63 mm (4” x 5.5” x 2.5”)

Weight:

< 400 g (< 0.9 lb)

Mounting

Remote Extension Device Mounting

Product Option Number	Part Number	Description
n/a	M8026-64001 451261006641	Wall Mount
n/a	M8026-64002 451261015161	Mount to FMS

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the M8026A Remote Extension Device.

M8026A Remote Input Extension Device Cables

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #HF2	M8086-61003	1.5m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF3	M8086-61004	3m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF6	M8086-61005	10m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF7	M8086-61006	15m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF9	M8086-61007	25m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
Both ends are terminated with straight MDR connectors. [a]Built on demand.					

Input Devices

The following tables describes the input devices which can be connected to the Remote Extension Device M8024A, or directly to the monitor.

M8024A Input Devices

Product Option Number	Part Number	12NC Part Number	Description
M8024A #A02	-	-	Slimline Keyboard/Trackball USB
	-	453564115901	Keyboard French Trackball USB
	-	453564115911	Keyboard Italian Trackball USB
	-	453564115921	Keyboard German Trackball USB
	-	453564115931	Keyboard Danish Trackball USB
	-	453564115941	Keyboard Swedish Trackball USB
	-	453564115951	Keyboard English Trackball USB
	-	453564119161	Keyboard Spanish Trackball USB
M8024A #A03	-	-	Compact Keyboard USB
	-	453564115961	Keyboard French standard USB
	-	453564115971	Keyboard Italian standard USB
	-	453564115981	Keyboard German standard USB
	-	453564115991	Keyboard Danish standard USB

Product Option Number	Part Number	12NC Part Number	Description
	-	453564116001	Keyboard Swedish standard USB
	-	453564116011	Keyboard English standard USB
	-	453564119171	Keyboard Spanish standard USB
M8024A #B01	M4046-60104	451261000661	Optical Mouse USB PS/2
M8024A #C02	M4046-60105	451261000671	Wireless Track Ball USB PS/2
M8024A #C03	M4046-60106	451261000681	Wired Track Ball USB PS/2
M8024A #C04	-	453564119281	Wireless Off Table Mouse

IntelliBridge

Cabling Options

Product Option #	Part Number	Description
865114 #L01	M8081-61001 453563484591	Connection Cable 1.5 m
865114 #L02	M8081-61002 453563484601	Connection Cable 3 m
865114 #L03	M8081-61003 453563484611	Connection Cable 10 m

Local Printer

See printer documentation

Philips Medical LAN

For information refer to the IntelliVue Information Center documentation.

Wireless LAN Adapter Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius
M8022A #WL0	M8080-61001 453563484581	~30cm Y-piece; DC supply plus LAN for Wireless Ethernet Adapter and IIT Adapter	30 mm^2	30 mm

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius
n/a	M2639-61001 451261013011	Cable Assembly Mini Din 8 Pin 1:1r for IntelliVue 802.11 Bedside Adapter		

RS232/MIB/LAN Interface

MIB Cable and Serial Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Max. Bend Angle	Connector Size (L x W)
M8022A #SR2	M8081-61001 453563484591	1.5m cable	30 mm^2	25 mm	15 x 15 mm
M8022A #SR3	M8081-61002 453563484601	3m cable	30 mm^2	25 mm	15 x 15 mm
M8022A #SR6	M8081-61003 453563484611	10m cable	30 mm^2	25 mm	15 x 15 mm
M8022A #SR7	M8081-61004 453563484621	15m cable	30 mm^2	25 mm	15 x 15 mm
M8022A #SR9	M8081-61005 453563484631	25m cable	30 mm^2	25 mm	15 x 15 mm
Both ends are terminated with 8 pin RJ45 connectors. CAT5 cable; straight through wiring.					

Cable and Adapter Set

Nurse Call Relay Interface

Nurse Paging Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size
M8022A #NC3	M1181-61648 453563375601	3m traditional nurse paging relay cable. One end terminated with phone plug, one end without connector.	13 mm^2	20 mm	Diameter 12 mm
M8022A #NC6	M8087-61001 453563484741	10m flexible nurse paging cable. One end terminated with straight MDR connector, one end without connector.	40 mm^2	30 mm	35 x 16 mm

ECG Out Interface

ECG Out Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (Diameter)
M8022A #A62	8120-1022 453563198151	3m cable (Both ends are terminated with .25” phone plugs)	40 mm^2	30 mm	13 mm
n/a	M1181-61625 453563255091	cable kit consisting of: 25 m raw cable, 2 x 1/4” socket, 1 x 1/4” plug			

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.

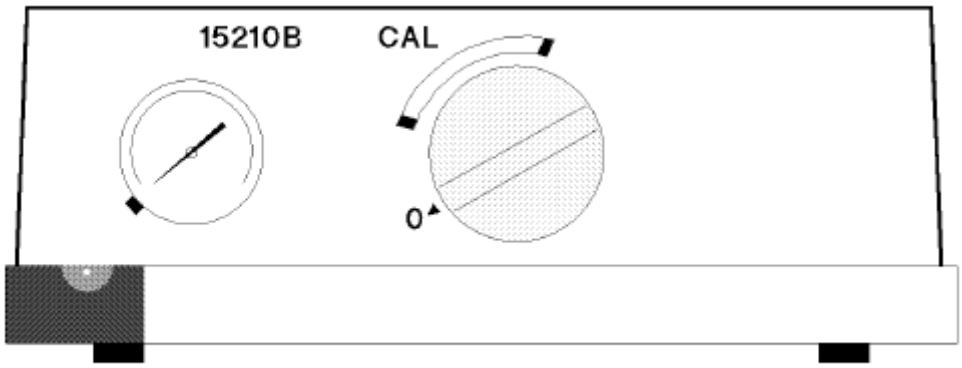
For details on configuring the RS232/MIB port for the gas analyzers, see *Connection of Devices via the MIB/RS232 Interface (Rev. D.00.xx or higher) i*n the Installation Instructions chapter

10

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 Calibration 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*** (see "Routine Maintenance" on page 327)" on page -273, 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

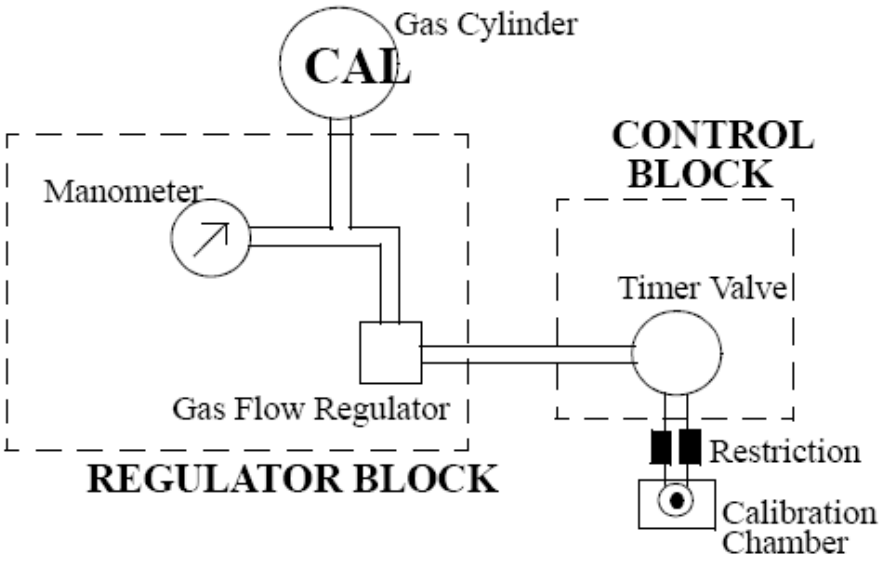
Keep the surfaces of the calibration unit clean and free of dust and dirt. Clean regularly with a lint-free cloth or sponge dampened in soapy water. Avoid using alcohol or ammonia based cleaners which may damage the Calibration Unit. Other strong cleaners such as Povidine RR, Lysol R and Mikroklene R 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.

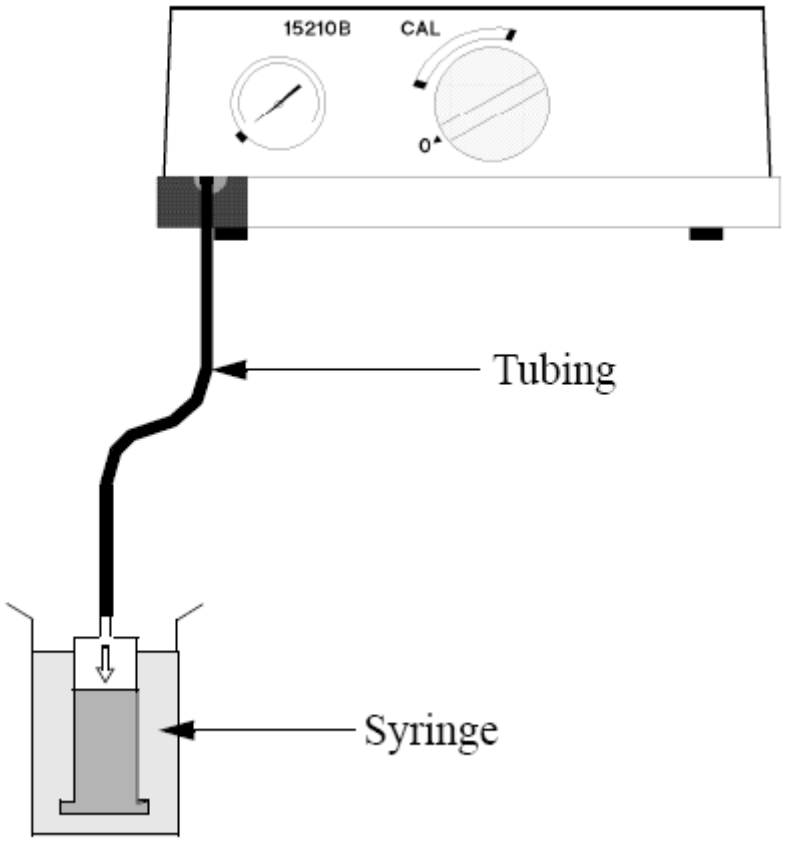
Gas Flow Performance Check

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

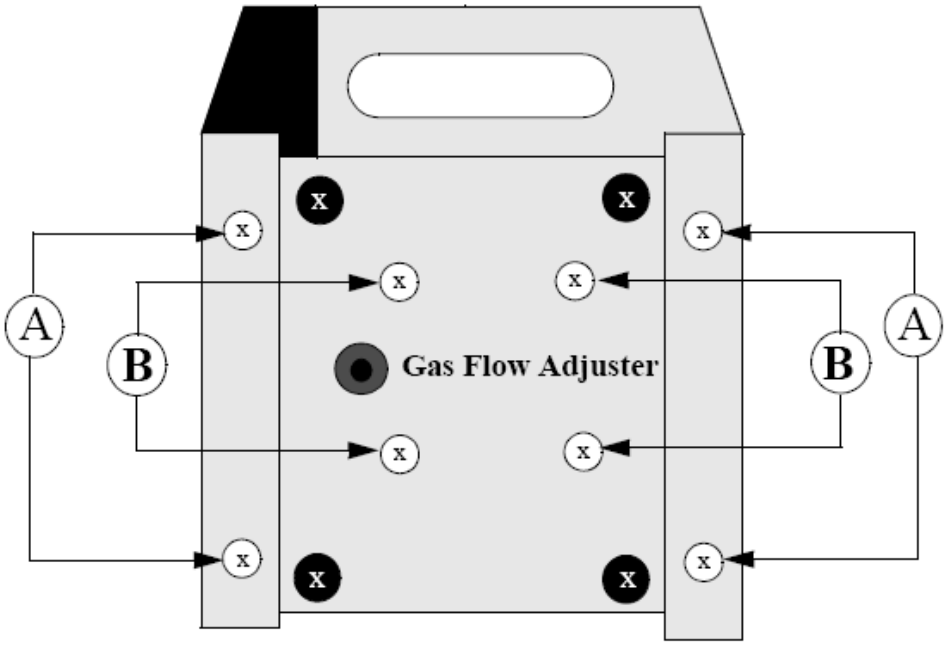
The volume of water displaced in 60 seconds should be 8ml (4/-2ml) for the 15210-64010 gas cylinder or 12ml (+4/-2ml) for the 15210-60010 gas cylinder. If the displacement is within the appropriate one of these ranges, the supply of gas in within specification.

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.

2. 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.

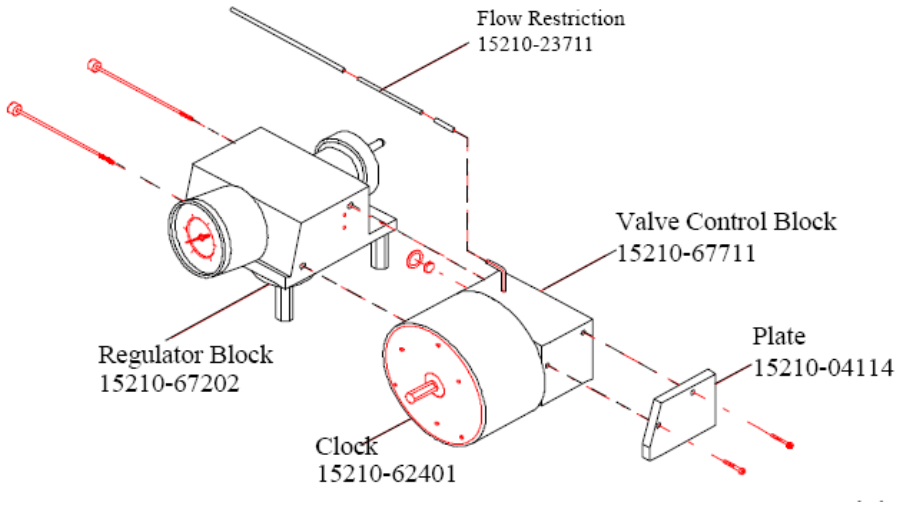
b. Regulator / Control Block Removal

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

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

Part Number	Description
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)

IntelliVue Product Structure

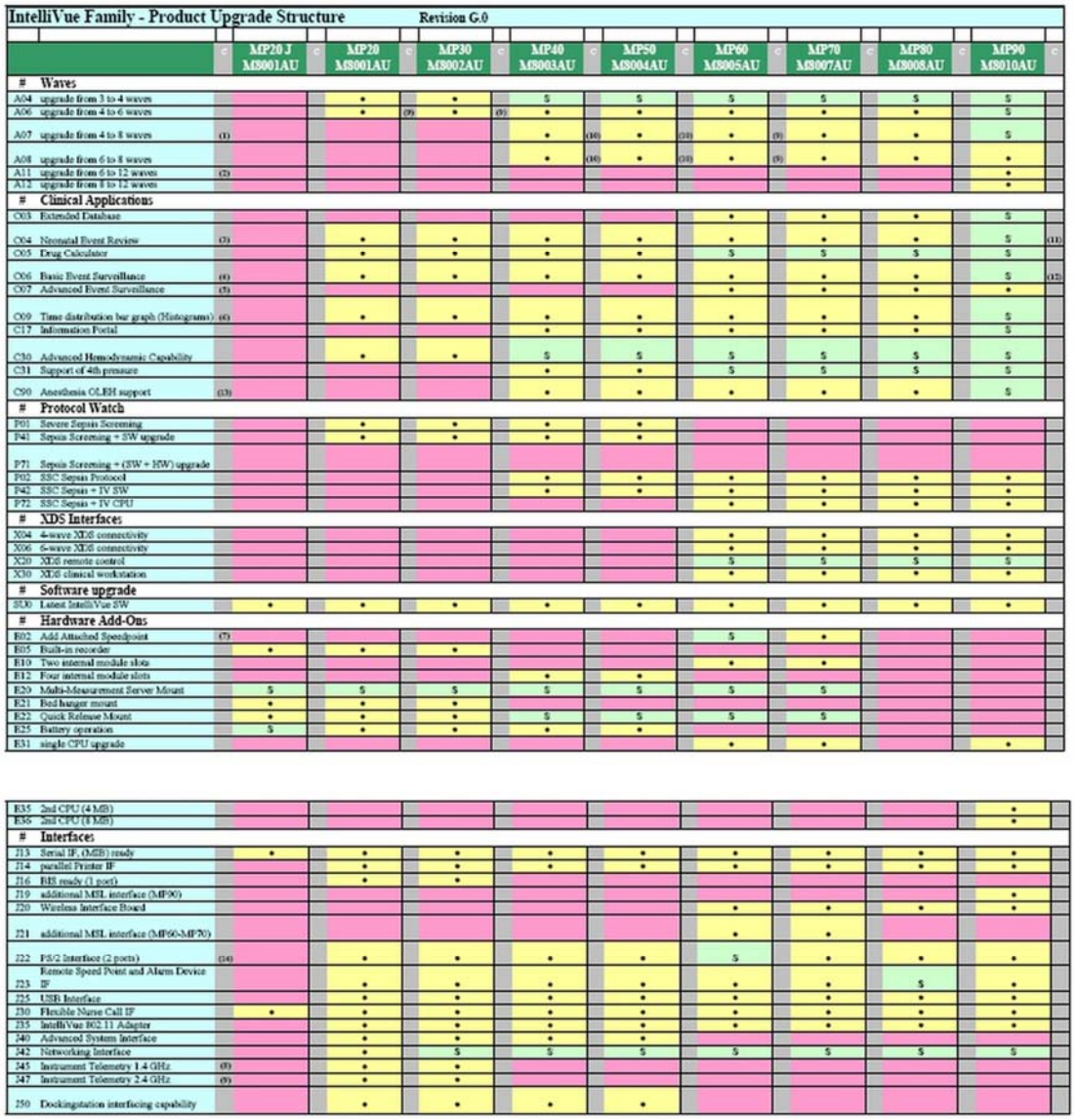
The following tables show the product option structure and available upgrades for the IntelliVue MP20-90 monitors.

		MP20 M8001A	MP30 M8002A	MP40 M8003A	MP50 M8004A	MP60 M8005A	MP70 M8007A	MP80 M8008A	MP90 M8010A
	Required Additional Purchases	(1)							
#	**Waves**								
A03	3 Waves	•	•	S	S	S	S	S	S
A04	4 Waves	•	•	•	•	•	•	•	S
A06	6 Waves	•	• (9)	• (9)	•	•	•	•	•
A08	8 Waves			•	• (11)	• (11)	• (9)	•	•
A12	12 Waves								•
M20	MP20 Junior								
M21	MP30 L								
#	**Application Areas**								
H10	General / Intensive Care Software	•	•	•	•	•	•	•	•
H20	Neonatal Software	•	•	•	•	•	•	•	•
H30	Anesthesia Software	•	•	•	•	•	•	•	•
H40	Cardiac Care Software	•	•	•	•	•	•	•	•
#	**Cables (mandatory)**								
HF2	Remote SpeedPoint Cable Kit - 1.5 m							•	•
HF3	Remote SpeedPoint Cable Kit - 3.0 m							•	•
HF6	Remote SpeedPoint Cable Kit - 10 m							•	•
HF7	Remote SpeedPoint Cable Kit - 15 m							•	•
HF9	Remote SpeedPoint Cable Kit - 25 m							•	•
Add-On Options									
#	**Clinical Applications**								
C01	Full Arrhythmia Capability	S	S	S	S	S	S	S	S
C02	High Resolution Trends	S	S	S	S	S	S	S	S
C03	Extended Database					•	•	•	S
C04	Neonatal Event Review	(2) •	•	•	•	•	•	•	S (17)
C05	Drug Calculator	•	•	•	•	S	S	S	S
C06	Basic Event Surveillance	(3) •	•	•	•	•	•	•	S (18)
C07	Advanced Event Surveillance	(4)				•	•	•	•
C08	Oxy CRG	S	S	S	S	S	S	S	S
C09	Time distribution bar graph (Histograms)	(5) •	•	•	•	•	•	•	S
C15	Networking Software	S	S	S	S	S	S	S	S
C17	Information Portal			•	•	•	•	•	S
C20	Full Customization	S	S	S	S	S	S	S	S
C30	Advanced Hemodynamic Capability	•	•	S	S	S	S	S	S
C31	Support of 4th pressure			•	•	S	S	S	S
C90	Anesthesia OLEH support	(21)		•	•	•	•	•	S

E35	2nd CPU (4 MB)										•
E36	2nd CPU (8 MB)										•
#	Interfaces										
J13	Serial IF, (MIB) ready	•	•	•	•	•	•	•	•	•	•
J14	parallel Printer IF		•	•	•	•	•	•	•	•	•
J16	BE ready (1 port)		•	•							
J19	additional MIL interface (MP90)										•
J20	Wireless Interface Board							•	•	•	•
J21	additional MIL interface (MP60-MP70)							•	•		
J22	PS/2 Interface (2 ports)	(10)	•	•	•	•	5	•	•	•	
J23	Remote Speed Point and Alarm Device IF		•	•	•	•	•	•	$	•	
J25	USB Interface		•	•	•	•	•	•	•	•	•
J30	Flexible Nurse Call IF	•	•	•	•	•	•	•	•	•	•
J35	IntelliVue 802.11 Adapter		•	•	•	•	•	•	•	•	•
J40	Advanced System Interface		•	•	•	•					
J42	Networking Interface		•	$	$	$	$	$	$	$	
J45	Instrument Telemetry 1.4 GHz	(9)	•	•							
J47	Instrument Telemetry 2.4 GHz	(9)	•	•							
J50	Dockingstation interfacing capability		•	•	•	•					

Comments		#
	one and only one out of a category must be chosen	1
	#C04 includes #C09 #C04 and #C09 are exclusive #C04, #C06 and #C07 are exclusiv	2
	#C06 is included in #C07 #C04, #C06 and #C07 are exclusive	3
	#C07 includes #C06 #C04, #C06 and #C07 are exclusive	4
	#C09 is included in #C04 #C04 and #C09 are exclusive	5
	#E02 includes #J22	6
	batteries need to be ordered seperately	7
	US only	8
	not available in the US	9
	mandatory for the US	10
	Greater China and on specific request	11
	one of J13, J14, J23, J25, J30 is free of charge	12
	one #J22 is standard	13
	one of J13, J14, J22, J23, J25, J30 is free of charge	14
	one of J13, J14, J22, J25, J30 is free of charge	15
	one J23 is standard	16
	#C04 comes standard with #H20	17
	#C06 comes standard with #H10, #H30 and #H40	18
	two #J13 are standard, two more can be ordered if #E30 is selected	19
	two PS/2 two interfaces are provided with the Remote SpeedPoint	20
	enables #C17	21

Upgrade Options



IntelliVue Family - Product Upgrade Structure — Revision G.0

		MP20 J M8001AU		MP20 M8001AU		MP30 M8002AU		MP40 M8003AU		MP50 M8004AU		MP60 M8005AU		MP70 M8007AU		MP80 M8008AU		MP90 M8010AU	
#	**Waves**																		
A04	upgrade from 3 to 4 waves			•		•		S		S		S		S		S		S	
A06	upgrade from 4 to 6 waves			•	(9)	•	(9)	•		•		•		•		•		S	
A07	upgrade from 4 to 8 waves	(1)						•	(10)	•	(10)	•	(9)	•		•		S	
A08	upgrade from 6 to 8 waves							•	(10)	•	(10)	•	(9)	•		•		•	
A11	upgrade from 6 to 12 waves	(2)																•	
A12	upgrade from 8 to 12 waves																	•	
#	**Clinical Applications**																		
C03	Extended Database											•		•		•		S	
C04	Neonatal Event Review	(3)		•		•		•		•		•		•		•		S	(11)
C05	Drug Calculator			•		•		•		•		S		S		S		S	
C06	Basic Event Surveillance	(4)		•		•		•		•		•		•		•		S	(12)
C07	Advanced Event Surveillance	(5)										•		•		•		•	
C09	Time distribution bar graph (Histograms)	(6)		•		•		•		•		•		•		•		S	
C17	Information Portal							•		•		•		•		•		S	
C30	Advanced Hemodynamic Capability			•		•		S		S		S		S		S		S	
C31	Support of 4th pressure							•		•		S		S		S		S	
C90	Anesthesia OLEH support	(13)						•		•		•		•		•		S	
#	**Protocol Watch**																		
P01	Severe Sepsis Screening			•		•		•		•									
P41	Sepsis Screening + SW upgrade			•		•		•		•									
P71	Sepsis Screening + (SW + HW) upgrade																		
P02	SIC Sepsis Protocol							•		•		•		•		•		•	
P42	SIC Sepsis + IV SW							•		•		•		•		•		•	
P72	SIC Sepsis + IV CPU											•		•		•		•	
#	**XDS Interfaces**																		
X04	4-wave XDS connectivity											•		•		•		•	
X06	6-wave XDS connectivity											•		•		•		•	
X20	XDS remote control											S		S		S		S	
X30	XDS clinical workstation											•		•		•		•	
#	**Software upgrade**																		
S00	Latest IntelliVue SW		•		•		•		•		•		•		•		•		•
#	**Hardware Add-Ons**																		
E02	Add Attached Speedpoint	(7)										S		•					
E05	Built-in recorder		•		•		•												
E10	Two internal module slots											•		•					
E12	Four internal module slots								•		•								
E20	Multi-Measurement Server Mount		S		S		S		S		S		S		S				
E21	Bed hanger mount		•		•		•												
E22	Quick Release Mount		•		•		•		S		S		S		S				
E25	Battery operation		S		•		•		•		•								
E31	single CPU upgrade											•		•				•	
E35	2nd CPU (4 MB)																	•	
E36	2nd CPU (8 MB)																	•	
#	**Interfaces**																		
J13	Serial IF, (MIB) ready		•		•		•		•		•		•		•		•		•
J14	parallel Printer IF				•		•		•		•		•		•		•		•
J16	BIS ready (1 port)				•		•												
J19	additional MSL interface (MP90)																	•	
J20	Wireless Interface Board											•		•		•		•	
J21	additional MSL interface (MP60-MP70)											•		•					
J22	PS/2 Interface (2 ports)	(14)			•		•		•		•		S		•		•		•
J23	Remote Speed Point and Alarm Device IF				•		•		•		•		•		•		S		•
J25	USB Interface				•		•		•		•		•		•		•		•
J30	Flexible Nurse Call IF		•		•		•		•		•		•		•		•		•
J35	IntelliVue 802.11 Adapter				•		•		•		•		•		•		•		•
J40	Advanced System Interface				•		•		•		•								
J42	Networking Interface				•		S		S		S		S		S		S		S
J45	Instrument Telemetry 1.4 GHz	(8)			•		•												
J47	Instrument Telemetry 2.4 GHz	(8)			•		•												
J50	Dockingstation interfacing capability				•		•		•		•								

Comments		#
	enables #A08	1
	enables #A12	2
	#C04 includes #C09 #C04 and #C09 are exclusive #C04, #C06 and #C07 are exclusiv	3
	#C06 is included in #C07 #C04, #C06 and #C07 are exclusive	4
	#C07 includes #C06 #C04, #C06 and #C07 are exclusive	5
	#C09 is included in #C04 #C04 and #C09 are exclusive	6
	#E02 includes #J22	7
	US only	8
	not available in the US	9
	Greater China and on specific request	10
	#C04 comes standard with #H20	11
	#C06 comes standard with #H10, #H30 and #H40	12
	enables #C17	13
	included in #E02	14

Index

C

D

E

F

G

H

I

K

L

M

N

O

P

R

S

T

U

V

W