The IntelliVue MX450 patient monitor offers a flexible and modular monitoring solution, designed to suit a broad spectrum of needs. The monitor can be connected to the Philips Multi-Measurement Module family with its extensions, and the IntelliVue gas analyzers to extend its functionality with plug-and-play convenience. Dedicated configurations are available for the anesthesia, intensive, cardiac, neonatal and general care environments.

Features

• Intuitive user interface.
• Easy-to-read, easy-to-use touch screen.
• Simple menu hierarchy gives fast access to all basic monitoring tasks.
• Screen layouts are easily adjustable, allowing flexible display of measurement information.
• Previous Screen function provides access to the most recently used screens including the last three modified screens.
• Temperature, height, and weight can be configured either in metric or imperial units. Pressure measurements can be displayed in kPa or mmHg. Gases can be displayed in kPa or mmHg.
• Patient data management with tabular and graphic trends, and high-resolution trends to track changes with beat-to-beat resolution.
• Drug, ventilation, hemodynamic, and oxygenation calculations.
• User or case-specific profiles enable rapid case turnover.
• Patented automatic alarm limits help clinicians provide care more efficiently.
• Alarm Advisor provides feedback on recurring and continuous alarm limit violations, helping clinicians to adapt alarm limits more specifically for individual patients.
• Event Surveillance including Neonatal Event Review for automatic detection of patient status deterioration.
• Guardian Early Warning Scoring (EWS) calculates a score based on vital signs to help recognize early signs of deterioration in patients.
• Tympatic Temperature measurement\(^1\). In ear SpotCheck thermometer, delivers accurate temperature readings in less than two seconds.
• Bed-to-bed overview provides clinicians with an overview of all the patient beds in their care.
• Choice of input devices: Touchscreen, remote control, trackball, mouse, keyboard, or barcode reader.
• Capable of functioning in a wireless infrastructure.
• Built-in Recorder.
• Electronic Strip Recording.
• Graphical measurement window shows which measurements are being measured by which device, making it easier to resolve measurement label conflicts.
• Timers application allows you to set timers to notify you when a specific time period has expired.
• Additional independent display capability using IntelliVue XDS Remote Display.
• Bedside information access using the IntelliVue XDS Clinical Workstation.
• XDS Database (option X40), enables the collection and storage of vital signs information (numeric data only - no waves), for example, heart rate, pressure, ... on an external SQL database.
• The monitor can be configured to automatically adapt the screen brightness to the ambient light conditions. The range within which this adaption is made is determined by the setting made with the brightness SmartKey.
• Support for pre-configured remote applications hosted on Citrix®\(^2\) XenApp®, standard IT web servers.
• Integrated carrying handle.

**Indications for Use**

The monitor is indicated for use by health care professionals whenever there is a need for monitoring the physiological parameters of patients. The monitor is intended to be used for monitoring and recording of, and to generate alarms for, multiple physiological parameters of adults, pediatrics, and neonates. The monitor is intended for use by trained healthcare professionals in a hospital environment.

The monitor is additionally intended for use in transport situations within hospital environments.

The monitor is only for use on one patient at a time. It is not intended for home use. Not a therapeutic device. The monitor is for prescription use only.

Rx only: U.S. Federal Law restricts this device to sale by or on the order of a physician.

The ECG measurement is intended to be used for diagnostic recording of rhythm and detailed morphology of complex cardiac complexes (according to AAMI EC 11).

ST segment monitoring is intended for use with adult patients only and is not clinically validated for use with neonatal and pediatric patients.

The SSC Sepsis Protocol, in the ProtocolWatch clinical decision support tool, is intended for use with adult patients only.

The Integrated Pulmonary Index (IPI) is intended for use with adult and pediatric (1 to 12 years) patients only. The IPI is an adjunct to and not intended to replace vital sign monitoring.

The derived measurement Pulse Pressure Variation (PPV) is intended for use with sedated patients receiving controlled mechanical ventilation and mainly free from arrhythmia. The PPV measurement has been validated only for adult patients.

**Modularity**

The monitor’s functionality can be extended by connecting Philips Multi-Measurement Module family (with extensions), and gas analyzers, with plug-and-play convenience.

The monitors are available as standalone or networked solutions. The monitor’s modular design allows new capabilities to be added in the future as monitoring requirements change. This upgradability gives the security of knowing that the monitor can be enhanced and updated as practices and technologies advance, protecting long-term investments.

**Main Components**

**Display**

The monitor has a color 12 inch LCD TFT display, providing high resolution waveform and data presentation.

The monitor integrates the display and the processing unit into one device. One external display\(^3\) - providing an adaptive duplicate-image of the primary display - can be connected to a built-in DVI-I port.

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\(^1\) Requires Option J13 - MIB/RS232 (2 ports) interface.

\(^2\) Citrix®, Citrix Receiver™, XenApp®, and ICA® (Independent Computing Architecture) are trademarks of Citrix Systems, Inc. and/or one or more of its subsidiaries, and may be registered in the United States Patent and Trademark Office and in other countries.

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Remote Display
IntelliVue XDS Remote Display allows the remote display of an IntelliVue Patient Monitor 1 on a PC which is connected to the same network. It can be configured to allow remote operation of the patient monitor. It is intended to be used as an additional independent display for viewing and operation by clinicians and nurses.

User Interface
The color Graphical-User-Interface is designed for fast and intuitive operation, and ensures that clinicians quickly feel at ease using the monitor. Configurable SmartKeys with intuitive icons allow monitoring tasks to be performed quickly and easily, directly on the monitor screen. Waves and numerics are color-coded. The monitor displays up to six waves simultaneously. For 12-lead ECG monitoring it can display 12 real-time ECG waves, with a rhythm strip and all ST values. Flexible screen layout allows optimal use of the available display space, for example, waves can be overlapped or wave size can adjust dynamically depending on the number of waves configured for the space. The Basic Help provides on-screen operating help, explaining INOP and alarm messages.

Touchscreen Operation
The monitor is supplied as standard with a resistive touchscreen display.

Remote Control
The IntelliVue Remote Control 865244 provides direct access to five hardkeys, a navigation knob, and a numeric keypad which can also be used for alphanumeric entry. The hardkeys include “Silence”, “Alarms Off / Pause Alarms”, “Back Key”, “MainScreen”, and a “SmartKeys” key that displays a block of configurable smart keys. The remote control is connected to the monitor via USB interface or SRR interface (wireless) and is used for the remote operation of the monitor.

Remote Alarm Device 2
The Remote Alarm Device 866406 provides, when connected to a patient monitor audible and visual indicators of alarms, in addition to the indicators at the monitor.

Input Devices
Supported input devices include USB-compatible off-the-shelf computer accessories such as a mouse, keyboard, trackball, or barcode reader. All input devices can be used individually or in combination.

Mouse
Any specified USB mouse or trackball may be used for data entry.

Computer Keyboard
A USB-compatible off-the-shelf keyboard can be connected to the monitor for data entry.

Barcode Reader
A USB barcode reader in "keyboard emulation mode" can be used via a USB connection.

Simulated Keyboard
If alpha or numeric data entry is required, for example to enter patient demographics, a pop-up keyboard will automatically appear on the screen.

X1 Multi-Measurement Module (M3001A/M3001AL)
The X1 Multi-Measurement Module can be connected directly to the rear of the monitor. It can also be placed in patient vicinity connecting it to the monitor via cable. It sends measurement waves and numerics to the monitor and generates alarms and INOPs. The X1 simultaneously provides measurement data for 3-, 5-, 6-, or 10-lead ECG (including multi-lead arrhythmia and ST monitoring), respiration, oxygen saturation of arterial blood (SpO₂), noninvasive blood pressure (NBP), and invasive pressure or temperature. Diagnostic 12-lead capability is optionally available. The X1 stores trend data, patient demographics information and measurement settings and transfers it to a connected IntelliVue patient monitor.

3 Requires Option J15 - Adaptive Secondary Display.
1 Requires Option X00 - XDS Connectivity.
2 Requires Option J23 - Remote Device Interface.
3 Choice of Philips FAST SpO₂, Masimo SET SpO₂, Nellcor OxiMax SpO₂ or Masimo rainbow SET SpO₂ (including certain Masimo rainbow Parameters).
**X2 Multi-Measurement Module (M3002A)**

The X2 Multi-Measurement Module can be used:
- As a stand-alone patient monitor.
- As a Multi-Measurement Module for the IntelliVue family of patient monitors.

The X2 Multi-Measurement Module can be connected directly to the rear of the monitor. It can also be placed in patient vicinity connecting it to the monitor via cable. It sends measurement waves and numerics to the monitor and generates alarms and INOPs.

The X2 can simultaneously monitor 3-, 5-, 6-, or 10-lead ECG, including arrhythmia and ST monitoring, respiration, oxygen saturation of arterial blood (SpO₂¹), noninvasive blood pressure (NBP), and invasive pressures and temperature, or CO₂. The X2 stores trend data, patient demographic information and measurement settings.

Combining its role as a Multi-Measurement Module with that of stand-alone monitor, the X2 is particularly suited to transport situations. When the X2 is disconnected from the host monitor, it continues to monitor the patient as a stand-alone monitor running on battery power, eliminating the need for a separate transport monitor. When the X2 is reconnected to a host monitor, it resumes its role as a Multi-Measurement Module, uploading trend data, patient demographic information and measurement settings, and allowing fully continuous monitoring. The X2 can operate using battery power for over three hours with basic monitoring configuration to let you safely and easily monitor patients during in-hospital transfer.

**X3 Patient Monitor/Multi-Measurement Module (867030)**

The X3 can be used:
- As a stand-alone patient monitor.
- As a Multi-Measurement Module for the IntelliVue family of patient monitors.

The X3 can be connected directly to the rear of the monitor. It can also be placed in patient vicinity connecting it to the monitor via cable. It sends measurement waves and numerics to the monitor and generates alarms and INOPs.

The X3 can simultaneously monitor 3-, 5-, 6-, or 10-lead ECG, including arrhythmia and ST monitoring, respiration, oxygen saturation of arterial blood (SpO₂¹), noninvasive blood pressure (NBP), two invasive pressures, temperature, and CO₂. The X3 stores trend data, patient demographic information and measurement settings.

Combining its role as Multi-Measurement Module with that of stand-alone monitor, the X3 is particularly suited to transport situations. When the X3 is disconnected from the host monitor, it continues to monitor the patient as a stand-alone monitor running on battery power, eliminating the need for a separate transport monitor. When the X3 is reconnected to a host monitor, it resumes its role as a Multi-Measurement Module, uploading trend data, patient demographic information and measurement settings, and allowing fully continuous monitoring. The X3 can operate using battery power for over five hours with basic monitoring configuration to let you safely and easily monitor patients during in-hospital transfer. During in-hospital transport the X3 can power the Measurement Extensions (867039, 867040, and 867041) without requiring the use of the IntelliVue Battery Extension (865279).

**Measurement Extensions**

The following Measurement Extensions can be slotted onto an X1, X2, or X3 to add:
- The 867039 Hemodynamic extension: adds temperature, two pressures, and optionally cardiac output/PiCCO.
- The 867040 Capnography extension: adds mainstream/sidestream capnography, and optionally temperature, two pressures, and cardiac output/PiCCO².
- The 867041 Microstream® CO₂³ extension: adds Microstream capnography, and optionally temperature, two pressures, and cardiac output/PiCCO⁴.
- The M3012A Hemodynamic extension: adds temperature, pressure, an additional pressure or a temperature and optionally cardiac output/PiCCO.
- The M3014A Capnography extension: adds mainstream and sidestream capnography, and optionally one pressure plus either a pressure or a temperature and cardiac output/PiCCO.
- The M3015A Microstream CO₂ extension: adds Microstream capnography, and optionally either pressure or temperature.
- The M3015B Microstream CO₂ extension: adds Microstream capnography, and optionally two pressures and a temperature.

¹ Choice of Philips FAST SpO₂, Masimo SET SpO₂, Nellcor OxiMax SpO₂ or Masimo rainbow SET SpO₂ (including certain Masimo rainbow Parameters).
² PiCCO is not available for the 867040 Capnography extension in the USA and territories relying on FDA market clearance.
³ Microstream is a registered trademark of Oridion Systems Ltd.
⁴ Cardiac Output/PiCCO is not available for the 867041 Microstream CO₂ extension in the USA and territories relying on FDA market clearance.
IntelliVue Gas Analyzers

The versatile IntelliVue G1 and G5 gas analyzers measure the five most commonly used anesthetic gases, as well as N₂O and CO₂. They all provide inspiration and expiration values for display on IntelliVue Patient Monitors and the values required for MAC calculation in the IntelliVue Patient Monitors. The IntelliVue G1 gas analyzer measures the single agent chosen by the clinician. The IntelliVue G5 features automatic agent identification and mixed-agent measurement capability. Advanced O₂ technology based on paramagnetic measurements is optional with the G1 and included as standard with the G5.

The TcGas² measures the transcutaneous O₂ and CO₂ partial pressure in neonates, pediatrics and adults.

Mounting

The standard mounting options enable flexible, space saving placement of the monitors for an ergonomic work space.

Applications for Specific Care Settings

Anesthesia Features

- The IntelliVue G1 and G5 measure the five most commonly used anesthetic gases, as well as N₂O and CO₂.
- Screens provide flexible viewing of patient information during different procedures or phases of an anesthesia case.
- The IntelliBridge EC10 I/O Board provides external device interface capability to external devices at the bedside which have a serial RS232 and/or LAN output.

Critical and Cardiac Care Features

- The monitor performs multi-lead arrhythmia detection analysis on the patient’s ECG waveform at the bedside. It analyzes for ventricular arrhythmias, calculates the heart rate, and generates alarms, including asystole, bradycardia, and ventricular fibrillation.
- Up to 12 leads of ST segment analysis can be performed on adult patients at the bedside, measuring ST segment elevation and depression and generating alarms and events. The user can trend ST changes, set high and low alarm limits, and set both ST and isoelectric measurement points. ST points can be set either relative to the J-point or directly by selecting a numeric value.
- QT/QTc interval monitoring provides the measured QT interval, the calculated heart-rate corrected QTc value and a ΔQTc value, which tracks variation in the QT interval in relation to a baseline value.
- The Parameter Histogram View of the Vital Signs Trend allows the clinician to see, at a glance, the stability of the patient’s condition for a selected time period.

ST Map application shows ST changes over time in two multi-axis spider diagrams.

STE Map adds gender-specific STE limits to ST Map. ST values violating these limits are indicated in red.

12-lead ECG data can be measured in diagnostic quality, using conventional electrode placement with 10 electrodes. Alternatively it can be measured using the EASI lead system with 5 electrodes in EASI placement, or the Hexad lead system with 6 electrodes².

- High performance pulse oximetry technologies perform accurately even in cases with low perfusion.
- Choice of Microstream, sidestream, and mainstream CO₂ monitoring for high quality measurements with intubated and non-intubated patients.
- Continuous cardiac output and advanced hemodynamic assessment are provided using the PiCCO³ method without a pulmonary catheter.
- Integrated Pulmonary Index (IPI)⁴ enables clinicians to quickly and easily assess a patient’s ventilatory status and monitor changes in a patient’s condition, facilitating more timely interventions.
- Pulse Pressure Variation (PPV) is calculated from beat-to-beat arterial pressure values. Pulse pressure is the difference between the systolic and the diastolic pressure values for a single beat. Pulse pressure variation is defined as the maximal pressure less the minimum pressure, divided by the average of these two pressures.
- Clinical calculations enable stored and manually entered data to be used to perform hemodynamic, ventilation and oxygenation calculations. Calculated data is displayed in both indexed and non-indexed format.

Neonatal Monitoring Features

- Transcutaneous gas (TcGas) monitoring helps to optimize respiratory therapy in neonates.
- The Oxygen CardioRespiroGram (oxyCRG) screens provide a simultaneous presentation of up to three High-Resolution Trends:
  - beat-to-beat heart rate (bHbHR)
  - an oxygenation measurement trend (SpO₂)
  - compressed respiration wave (Resp)

This customized display gives clinicians a convenient overview of the neonatal patient’s most important vital signs, helping them to identify significant events.

- Continuous oxyCRG recordings can be made at the bedside on the integrated recorder, and reports can be printed on locally or centrally connected printers.

¹ May not be available in all countries.

² EASI/Hexad-derived 12-lead ECGs and their measurements are approximations to conventional 12-lead ECGs. As the 12-lead ECG derived with EASI/Hexad is not exactly identical to the 12-lead conventional ECG obtained from an electrocardiograph, it should not be used for diagnostic purposes.
³ PiCCO³ is a trademark of Pulsion Medical Systems AG.
⁴ Microstream CO₂ only.
• Trended values can also be viewed in the form of a histogram. The SpO₂ histograms can be trend histograms or real-time histograms with 1-second samples.

• Car Seat Assessment Record (CAR). This is a special period of event surveillance for neonates during a car seat test. During the CAR period, a real-time SpO₂ histogram is also generated with 1-second samples.

• Neonatal Event Review (NER), for automatic detection of patient status deterioration. NER is optimized for monitoring neonatal patients. For each event, an episode of four minutes of data sampled four times a second is stored, to help you keep a record of rapid changes in the condition of neonatal patients. Combi-events correlate apnea events with bradycardia and/or desaturations.

IntelliVue Applications

Advanced Clinical Solutions
Clinicians are continuously drawing mental images from their observations of patients’ vital signs. The IntelliVue’s clinical decision support applications offer this dynamic “minds eye view” directly on the monitoring screen display.

ProtocolWatch
ProtocolWatch allows clinicians to run clinical protocols that can monitor developments in the patient’s condition. The SSC Sepsis Protocol runs on the ProtocolWatch application and is used in screening for severe sepsis.

Guardian Early Warning Scoring (Guardian EWS)
The early warning scoring application provides fast, automated early warning scoring. Guardian EWS is fully customizable to match your hospital’s clinical protocols:

• Configurable scoring parameters and thresholds.
• Up to 20 parameters per EWS protocol.
• Configurable MEWS thresholds.
• Configurable Action List.
• Up to five EWS protocols per monitor.

Guardian EWS provides three basic types of scoring:

• Single Parameter Scoring (SPS).
• Multiple Parameter Scoring, for example:
  – Modified Early Warning Scoring (MEWS)
  – UK National Early Warning Scoring (NEWS)
• Body System Structural Scoring, for example:
  – Pediatric Early Warning Scores (Tucker Schema)
  – Adult Body System Scores

Vital signs and clinical observations can be configured for early warning scoring.

• Vital signs, for example; pulse, temperature.
• Clinical observations, for example; AVPU, Concern.

• Using customized labels, clinical observations can be labeled and defined according to a hospital’s particular requirements at the time of installation.

• ADT data, for example; weight, age.

• Lab data.

• Documentation.

Escalating Monitoring - If a patient’s condition is deteriorating or a closer observation is indicated in a particular situation, the monitor can be left with the patient and switched to a monitor profile that allows more frequent checking of vital signs.

The monitor comes with the following additional Profile:

• **Frequent Vitals**: Can be used if some vital signs need to be checked more frequently.

ST Map
ST Map provides a graphical display that can help clinicians to recognize ST changes and their location in the heart more easily. ST Map collects ST values created from the frontal (limb leads) and horizontal (chest leads) plane into an integrated display. The maps are multi-axis portraits of the patient’s ST segments as measured with the ST/AR arrhythmia algorithm.

Advanced Event Surveillance
Events are electronic records of episodes in the patient’s condition. They can be used to drive alert notification to assist compliance to any protocol that is being used by the clinician.

Horizon Display
Horizon trends provide clinicians with a graphical visualization tool that allows the end user to detect at a glance the patients’ current clinical status. By combining parameters together on the display, the clinician is assisted in their cognitive process of pattern recognition.

Loops
Up to six loops of each type can be stored and compared to detect respiratory changes more easily.

Screen Display Flexibility
Up to 20 different screens can be created per monitor, which means that the clinician has the ability to have a screen created to match a specific clinical scenario on which the data that matters is displayed. This streamlines the information that needs to be processed and interpreted to make the right decision at the right time.
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Trends

- **A standard** trends database configuration is provided, designed to suit specific application areas. Patient data from up to 50 measurement numerics can be sampled every 12 seconds, 1 minute, or 5 minutes, and stored for a period ranging from 4 to 48 hours.

- **Tabular Trends** (Vital Signs) show data for all measurement numerics in tabular form. Tabular Trends can either be viewed in a separate window or permanently displayed on specially designed screens.

- Each NBP measurement generates a column in the Vital Signs trend table. The values for the other measurements are added to provide a complete vital signs set for the NBP measurement time.

- With **Graphic Trends**, up to three rows of measurement trends can be displayed in graphic form, each combining up to four measurements. Graphical Trends can either be viewed in a separate window or permanently displayed on specially designed screens.

- **Screen Trends** permanently display trend data for periodic and aperiodic parameters in graphical format on special screens. The displayed time period can be set to 30 min, 1 h, 2 h, 4 h, 8 h or 12 h.

- **High Resolution Trends** allow the user to track fast-changing measurement trends with beat-to-beat resolution (four samples/second). The number of High Resolution Trends available for display depends on the wave option purchased.

- **Horizon Trends** show the deviation from a stored baseline.

- Trended values can be viewed in the form of a histogram. The SpO₂ histograms can be **Trend Histograms** with 1-second samples.

- Navigation arrows provide easy access to the stored trends. Trend data can be documented on a locally or remotely connected printer.

- With **Event Surveillance**, changes in patients’ condition are automatically detected and an electronic record of data called an Episode is stored. The Episode can store:
  - 15 seconds of high-resolution wave trace
  - 4 minutes of data sampled 4 times a second, or
  - 20 minutes of data sampled every 12 seconds

Event triggers can use the preset alarm limits or they can be user-defined. With user-defined triggers, event episodes are stored even when alarms are paused. A Manual Event SmartKey enables manual episode storage.

Event Annotation allows immediate or retrospective annotation of events using a user-defined list of event markers such as “ventilated”. Events can be stored in a database for retrospective review, and episode data including graphic event reviews can be documented on a local or central printer. In addition, episode data without graphic elements can be documented on the integrated recorder¹. Events are also marked on the Event Line of an Information Center.

The **Basic Event Surveillance** package includes one Event Group plus the oxyCRG Group. Up to 50 event episodes can be stored over a 24 hour period.

The **Advanced Event Surveillance** package offers increased storage capability, enabling the monitor to store data from up to 50 events over an eight or 24 hour period. Up to six user-defined Event Groups can be configured, each made up of up to four measurements. All six groups can be active at the same time. Advanced user-configurable trigger mechanisms allow the clinician to define event triggers combining information from up to four measurements. Either alarm limits or user-defined thresholds or deviations can be configured as event triggers. The user can set event notifications in order to be notified when an event is detected.

Transport Features

- The monitors’ portable design with integrated ergonomic handle and (optional) compact bedhanger means they can be used for in-hospital transport.

- The monitor can operate using battery² power for 3–5 hours, depending on the monitor configuration, to let you safely and easily monitor patients during procedures or in-hospital transfer.

- The transition from bedside monitoring to transport is smooth and easy, with no need to disconnect patient cables or adjust any measurement or monitor settings.

- The monitor’s network capability means that it is ready for use as an integrated part of the hospital system.

- Specially-designed mounting solutions let you quickly disconnect the monitor for transport and reconnect to the mount after transport.

Patient Management

- Universal admission/discharge/transfer (ADT): ADT information is shared between the networked monitor and the Philips Information Center. Information need only be entered once.

- **Stat Admit**: allows you to admit a patient with a temporary patient identification. It can be used in cases when the patient ID is unknown or when the data is not yet available.

- **Quick Admit**: allows you to quickly admit a patient using only a limited set of demographic data. You can enter the data with the keyboard or a barcode scanner.

- Patients can be transferred by disconnecting the Multi-Measurement Module, X2, or X3 from a monitor, and then reconnecting it at a new monitor. Patient demographics are stored in the Multi-Measurement Module, X2, or X3, so they do not have to be re-entered at the new monitor.

¹ Integrated recorder is optional, see: “Hardware Options”.

² Battery required, see; “Hardware Options”.

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An extensive range of Patient Reports can be printed:  
- Event Review and Episode Reports  
- 12-lead ECG Reports  
- Vital Signs  
- Graphic Trends  
- Cardiac Output Reports  
- Wedge Procedure Reports  
- Calculations Reports  
- Histogram Reports  
- Loops Report  
- QT Reports  
- Alarm Limit Reports  
- Drug Calculator Reports  
- Real-time Wave Reports  
- Oxy CRG Reports

Report templates can be defined in advance, enabling print-outs tailored to each hospital’s specific requirements to be started quickly. Reports can be printed on locally or centrally-connected printers, and they can be initiated manually or automatically at user-defined intervals.

The integrated recorder records numerics for all active measurements and up to three waveforms. Electronic strip recording (option C10) allows alarm-triggered and manually started electronic strips to be captured in the monitor print database. They can then be reviewed on the monitor, and printed in the form of reports when a printer is available.

The alarm system can be configured to present either the traditional HP/Agilent/Philips alarm sounds or sounds compliant with the IEC 60601-1-8 Standard. Alarm limits are permanently visible on the main screen. When an alarm limit is exceeded, it is signaled by the monitor in the following ways:
- An alarm tone sounds, graded according to severity.
- An alarm message is shown on the screen, color-coded according to severity.
- The numeric of the alarming measurement flashes on the screen.
- Alarm lamps flash for red and yellow alarms and are illuminated for technical INOPs.

The alarm limit review page offers an overview of alarm limit settings and the possibility to modify these settings for all parameters. A “Smart Alarm Delay” feature helps to reduce the number of pulse oximetry nuisance alarms.2

If the monitor is connected via a network to a central monitoring station, alarming is simultaneous at the monitor and at the Information Center.

The nurse call relay has active open and closed contacts and a user-definable delay time.
- Alarms are graded and prioritized according to severity:
  - **Red Alarms*** identify a potentially life threatening situation for a patient.
  - **Yellow Alarms** indicate conditions violating preset vital signs limits.
  - **Yellow Alarms*** indicate arrhythmia alarms.
  - Technical Alarms (INOPs) are triggered by signal quality problems, equipment malfunction, or equipment disconnect.
- The Audio off/Pause Alarms function allows the user to switch off alarm tones with one touch or click while retaining visual alarm messages.

All alarms can be paused indefinitely or for one, two, three, five, or 10 minutes depending on their configuration.

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Alarms are graded and prioritized according to severity:

1 Integrated recorder is optional, see: “Hardware Options”.
2 Not available in the USA and territories relying on FDA Market clearance. The Smart Alarm Delay functionality is currently not available in China or in clinical environments under SFDA control.
Profiles
Profiles are predefined configuration settings for Screens, measurement settings, and monitor properties. Each Profile can be designed for a specific application area and patient category, for example OR adult, or ICU neonatal. Profiles enable a quick reaction to patient and care location changes: activating a Profile with a particular patient category (Adult, Pediatric or Neonatal) automatically applies suitable alarm and safety limits and saves time usually spent carrying out a complete set-up procedure.

A selection of Profiles for common monitoring situations is provided with the monitor.

New Profiles can be created directly on the monitor or remotely on a personal computer and transferred to the monitor using the IntelliVue Support Tool, these created profiles can be changed, added to, renamed, or deleted. A selection of Profiles for common monitoring situations is provided with the monitor.

Networking Capabilities
The monitor can operate as part of a networked system (wired/wireless) using the Philips IntelliVue Clinical Network interface. This includes:
- DHCP/BootP
- QoS Tagging
- 802.11 WLAN or Smart Hopping Interface (1.4 or 2.4 GHz)

Other Bed Overview Capability
The Other Bed window lets you view a subset of the waveform and numeric information from another bed in the same Care Group on the hospital network. Other Bed information can either be viewed in a separate window or permanently displayed on specially designed screens. The alarm status of a care group or unit can be displayed on the monitor’s screen. The Other Bed window can be configured to pop-up automatically when an alarm occurs at another bed.

Clinical Calculation Set
The clinical calculation set consists of: Hemodynamic, Oxygenation, and Ventilation calculations.

Hemodynamic Calculations:
- Cardiac Index (C.I.)
- Stroke Volume (SV)
- Stroke Index (SI)
- Systemic Vascular Resistance (SVR)
- Systemic Vascular Resistance Index (SVRI)
- Pulmonary Vascular Resistance (PVR)
- Pulmonary Vascular Resistance Index (PVRI)
- Left Cardiac Work (LCW)
- Left Cardiac Work Index (LCWI)
- Left Ventricular Stroke Work (LVSW)
- Left Ventricular Stroke Work Index (LVSWI)
- Right Cardiac Work (RCW)
- Right Cardiac Work Index (RCWI)
- Right Ventricular Stroke Work (RVSW)
- Right Ventricular Stroke Work Index (RVSWI)
- Extra Vascular Lung Water Index (EVLWI)
- Intrathoracic Blood Volume Index (ITBVI)
- Global End Diastolic Volume Index (GEDVI)

Oxygenation Calculations:
- Arterial Oxygen Content (CaO2)
- Venous Oxygen Content (CvO2)
- Arteriovenous Oxygen Content (CavO2)
- Oxygen Availability (DO2)
- Oxygen Availability Index (DO2I)
- Oxygen Consumption (VO2)
- Oxygen Consumption Index (VO2I)
- Oxygen Extraction Ratio (O2ER)
- Alveolar-Arterial Oxygen Difference (AaDO2)
- Percent Arteriovenous Shunt (Qs/Qt)

Ventilation Calculations:
- Minute Volume (MINVOL)
- Compliance (COMP)
- Dead Space (Vd)
- Dead Space/Tidal Volume Ratio (Vd/TV)
- Alveolar Ventilation (ALVENT)

Drug Calculator
The drug calculator allows you to calculate the fourth value when three of the following values are entered: dose, amount, volume, rate of infusion.

A titration table and drip table can be displayed and printed. Measurement units can be converted (for example, lbs to kg).

The drug calculator can also be configured to include a list of commonly used drugs using the IntelliVue Support Tool.

Service Features
The IntelliVue Support Tool helps technical personnel to:
- carry out configuration, upgrades, and troubleshooting via the network, or on an individual monitor
- share configuration settings between monitors
- back up the monitor settings
- document configuration settings

A password-protected service mode ensures that only trained staff can access service tests and tasks.

A password-protected configuration mode allows trained users to customize the monitor configuration.

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Device Connections

The monitor can be connected to the following Multi-Measurement Modules:

- X1 (M3001A/M3001AL)
- X2 (M3002A)
- X3 (687030)

The following Measurement Extensions can be connected to the Multi-Measurement Modules:

- 867039 Hemodynamic extension
- 867040 Capnography extension
- 867041 Microstream CO2 extension
- M3012A Hemodynamic extension
- M3014A Capnography extension
- M3015A Microstream CO2 extension
- M3015B Microstream CO2 extension

The monitor can also be connected to:

- A PC running the IntelliVue XDS Solution
- External devices via an IntelliBridge EC10 Interface Board
- Gas Analyzers
- A Philips Information Center (for example, PIC iX)

Standard Interface Connections

Adaptive Secondary Display

The Adaptive Secondary Display, (Option J15), activates the DVI video interface. The output of this interface mirrors the content of the monitor display. The output supports VESA display timings allowing off-the-shelf displays to be used with the DVI output.

Network Interface

The network interface provides the system with networking capability via a wired network connection.

Device Interface (USB Interface)

This interface allows connection of USB devices to the monitor, for example: Mouse, Keyboard, Barcode Scanner, Remote Control 865244, PCL5-supported Printer.

Further Optional Connection Interfaces

Wireless Infrastructure

- Option J35 enables the monitor to function within a WLAN. The WLAN infrastructure is an IEEE 802.11 a/b/g/n network in the 2.4 GHz or 5 GHz bands.
- Smart Hopping Interface options, J45 (1.4 GHz [USA only]) and J47 (2.4 GHz) enable communication with a Philips IntelliVue Information Center (PIIC) or a Philips Information Center iX (PIC iX), using the Philips Cellular Telemetry System (CTS), cellular infrastructure.
- The Short-Range Radio option (J46) provides wireless connectivity to the IntelliVue Remote Control.

Additional components are required to complete the system. Refer to the IntelliVue Clinical Network documentation for further information.

Remote Device Interface

Option J23 (Remote Device Interface) provides a connector on the patient monitor for connection to the Remote Alarm Device.

Advanced System Interface

The Advanced System Interface, option J40, supports an isolated RS232/5 V interface, a basic Nurse Call connector and two additional USB Connectors.

Device Interface (USB Interface)

Option J25 adds a USB port on the right-hand-side of the monitor.

Flexible Nurse Call Interface

Option J30, the Flexible Nurse Call Interface provides a means for alarms generated on the monitor to be signaled on an external device such as a nurse call system, a beeper or a light. It provides three general alarm relays and one power fail alarm. The external device is connected to the alarm relay and alarms are triggered by criteria defined by the user. It has active open and closed contacts and a user-definable delay time.

MIB/RS232 (two port) Interface Board

Additional dual MIB/RS232 I/O boards (Option J13) can be installed. The MIB ports can be independently configured to be used for:

- Input for connection to a touchscreen.
- Numeric, wave, and alarm data export using a computer interface, to an automated anesthesia record keeper or a personal computer (not available in all countries).
- Data export can be configured for up to two MIB ports on the monitor. However only the first configured port provides wave export.
- Connection to a gas analyzer.
- Connection to iTemp (Philips Tympanic Temperature Module).

IntelliBridge EC10 IF Board

Option J32, the IntelliBridge external device connection implements the physical layer of the ISO/IEEE 11073-30200 standard. Driver software is available to support connectivity with a wide range of external medical devices.

In case the IntelliBridge EC5 ID Module is used to provide device identification, it also acts as a hardware adapter to the device-specific connector.

\(^1\) Requires the relevant IntelliVue XDS options to be installed on either the patient monitor, or on a PC running the XDS Solution with an activated license. Refer to the IntelliVue XDS Solution Technical Data Sheet for details.
Remote Applications

With the appropriate connections you can access pre-configured applications made available by your hospital. The applications are hosted remotely on either a Citrix® XenApp® server or a standard IT Web server and can be displayed and operated on the bedside monitor screen.

Monitor Specifications

See the individual Data Sheets for IntelliVue X1, IntelliVue X2, and IntelliVue X3, Measurement Extensions, and plug-in module specifications.

Safety Specifications

The monitor, together with the X1 Multi-Measurement Module (M3001A/M3001AL), the X2 Multi-Measurement Module (M3002A), X3 Patient Monitor/Multi-Measurement Module (867030), and all Measurement Extensions, comply with the Medical Device Directive 93/42/EEC and, among other standards, with:

- IEC 60601-1, Ed.3:1:2012-08 (cons.)
- ANSI/AAMI ES60601-1:2005/(R)2012, Ed.3 (cons.)
- CAN/CSA-C22.2 No. 60601-1-14, Ed.3 (cons.)
- IEC 60601-1-2:2007, Ed.3
- EN 60601-1-6:2010
- EN 60601-2-49:2015

All applied parts are Type CF unless otherwise specified. They are protected against damage from defibrillation and electrosurgery. The possibility of hazards arising from software errors was minimized in compliance with:

- ISO 14971:2007
- EN ISO 14971:2012
- ANSI/AAMI ISO 14971:2010
- IEC 62304:2006

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Physical Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>Max. Weight</th>
<th>W x H x D</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX450 Monitor</td>
<td>6.6 kg (14.6 lb)</td>
<td>327 x 288 x 190 mm (12.9 x 11.3 x 7.5 in)</td>
</tr>
</tbody>
</table>

Environmental Specifications

<table>
<thead>
<tr>
<th>MX450 Monitors</th>
<th>Condition</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Operating</td>
<td>0–40°C (32–104°F)</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>Operating</td>
<td>15–95% Relative Humidity (RH)</td>
</tr>
<tr>
<td>Range</td>
<td>Storage</td>
<td>5–95% (RH)</td>
</tr>
<tr>
<td>Altitude</td>
<td>Operating</td>
<td>-500–3000 m (10000 ft)</td>
</tr>
<tr>
<td>Range</td>
<td>Storage</td>
<td>-500–4600 m (15000 ft)</td>
</tr>
<tr>
<td>Ingress</td>
<td></td>
<td>IP21</td>
</tr>
</tbody>
</table>

Remote Control 865244

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Operating</td>
<td>0–40°C (32–104°F)</td>
</tr>
<tr>
<td>Range</td>
<td>Storage</td>
<td>-20–60°C (−4–140°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>Operating</td>
<td>15–95% Relative Humidity (RH)</td>
</tr>
<tr>
<td>Range</td>
<td>Storage</td>
<td>5–95% (RH)</td>
</tr>
<tr>
<td>Altitude</td>
<td>Operating</td>
<td>-500–3000 m (10000 ft)</td>
</tr>
<tr>
<td>Range</td>
<td>Storage</td>
<td>-500–4600 m (15000 ft)</td>
</tr>
</tbody>
</table>

Performance Specifications

<table>
<thead>
<tr>
<th>MX450 Performance Specifications</th>
<th>Power Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Power Consumption</td>
</tr>
<tr>
<td>Specifications</td>
<td>Line Voltage 100–240 V</td>
</tr>
<tr>
<td></td>
<td>Current 1.2–0.5 A</td>
</tr>
<tr>
<td></td>
<td>Frequency 50/60 Hz</td>
</tr>
<tr>
<td>WXGA (16:10)</td>
<td>308 mm active matrix color LCD (TFT)</td>
</tr>
<tr>
<td>Display 12 inch</td>
<td></td>
</tr>
</tbody>
</table>

The print quality of this copy is not an accurate representation of the original.
### MX450 Performance Specifications

<table>
<thead>
<tr>
<th>Resolution</th>
<th>1280 x 800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful screen</td>
<td>261.1 x 163.2 mm</td>
</tr>
<tr>
<td>Pixel pitch</td>
<td>0.204 x 0.204</td>
</tr>
</tbody>
</table>

#### Indicators

<table>
<thead>
<tr>
<th>Alarms Off</th>
<th>Red (crossed out alarms symbol) LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarms</td>
<td>Red/yellow/light blue (cyan) LED</td>
</tr>
<tr>
<td>On/Standby/Error</td>
<td>Green/red LED integrated in power switch</td>
</tr>
<tr>
<td>External Power</td>
<td>Green LED</td>
</tr>
<tr>
<td>Battery</td>
<td>Red-green-yellow LED</td>
</tr>
</tbody>
</table>

#### Sounds

- Audible feedback for user input
- Prompt tone
- QRS tone, or SpO2 modulation tone
- Four different alarm sounds
- Remote tone for alarms on other beds in network
- Tone for Timer expired

#### Display Wave Speeds

<table>
<thead>
<tr>
<th>Available for standard waves</th>
<th>6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s with ±5% accuracy (guaranteed only for integrated displays)</th>
</tr>
</thead>
</table>

#### Trends

<table>
<thead>
<tr>
<th>Resolution</th>
<th>50 numerics with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 h @ 12 sec</td>
<td></td>
</tr>
<tr>
<td>24 h @ 1 min</td>
<td></td>
</tr>
<tr>
<td>48 h @ 5 min</td>
<td></td>
</tr>
</tbody>
</table>

#### High Res Trend Waves

<table>
<thead>
<tr>
<th>Measurements available</th>
<th>HR, SpO2, Resp, Pulse, Perf, CO2, ABP, PAP, CVP, ICP, CPP, CCO, Anesthetic Agents, inO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>Measurement samples are taken at a resolution of 4 samples per second</td>
</tr>
<tr>
<td>Update speed</td>
<td>Waves are drawn at a speed of 3 cm/minute</td>
</tr>
</tbody>
</table>

#### Events

<table>
<thead>
<tr>
<th>Information</th>
<th>Trigger condition and time, event classification and associated detailed view of episode data</th>
</tr>
</thead>
</table>

### MX450 Performance Specifications

<table>
<thead>
<tr>
<th>Episode data</th>
<th>Configurable, either:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 minutes of high resolution trend, or</td>
<td></td>
</tr>
<tr>
<td>20 minutes of numerics trend @ 12 sec resolution or</td>
<td></td>
</tr>
<tr>
<td>15 seconds of 4 waves @ 125 samples/sec</td>
<td></td>
</tr>
<tr>
<td>(Snapshot) including all current numerics, alarms and INOPs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity (max.)</th>
<th>25 or 50 events for either 8 or 24 hours</th>
</tr>
</thead>
</table>

#### Alarm Signal

<table>
<thead>
<tr>
<th>System delay</th>
<th>Less than 4 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pause duration</td>
<td>1, 2, 3 minutes or infinite, depending on configuration</td>
</tr>
<tr>
<td>Extended alarm pause</td>
<td>5 or 10 minutes</td>
</tr>
</tbody>
</table>

#### Review Alarms

<table>
<thead>
<tr>
<th>Information</th>
<th>All alarms / INOPs, main alarms on/off, alarm silence and time of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>300 items</td>
</tr>
</tbody>
</table>

#### Real Time Clock

<table>
<thead>
<tr>
<th>Range</th>
<th>From: January 1, 1997, 00:00, to: December 31, 2080, 23:59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Better than 4 seconds per day</td>
</tr>
<tr>
<td>Hold Time</td>
<td>Infinite if powered by AC; otherwise at least 48 hours (typical: &gt;72 hours)</td>
</tr>
</tbody>
</table>

#### Buffered Memory

<table>
<thead>
<tr>
<th>Hold Time</th>
<th>If powered by AC: infinite. Without power: at least 8 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents</td>
<td>Active settings, trends, patient data, realtime reports, events, review alarms</td>
</tr>
</tbody>
</table>
### Interface Specifications

<table>
<thead>
<tr>
<th>Network</th>
<th>Standard</th>
<th>10Base-T and 100Base-TX (IEEE 802.3), auto-negotiation, full- and half-duplex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>RJ45 (8 pin)</td>
<td>Basic insulation (reference voltage: 250 V; test voltage: 1500 V)</td>
</tr>
<tr>
<td>Isolation</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

### USB Interface

<table>
<thead>
<tr>
<th>Standard</th>
<th>USB 2.0 high-speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>USB series “Standard A” receptacle</td>
</tr>
<tr>
<td>Power</td>
<td>Low power port 4.4 V min., max. load for all ports together 500 mA</td>
</tr>
<tr>
<td>Isolation</td>
<td>None</td>
</tr>
</tbody>
</table>

### Video Interface

<table>
<thead>
<tr>
<th>Standard</th>
<th>DVI-I (digital single link)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital video signals</td>
<td>Single link TMDS TTL</td>
</tr>
<tr>
<td>HSYNC/VSYNC signals</td>
<td>Vertical Frequency 59.9 Hz</td>
</tr>
<tr>
<td>Horizontal Frequency 49.3 kHz</td>
<td></td>
</tr>
<tr>
<td>Frequency 71.0 MHz ±0.5%</td>
<td></td>
</tr>
<tr>
<td>Pixel Clock 60 Hz, reduced blanking</td>
<td></td>
</tr>
<tr>
<td>Resolution VESA 1280 x 800</td>
<td></td>
</tr>
</tbody>
</table>

### Dual MIB/RS232 Interface

<table>
<thead>
<tr>
<th>Standard</th>
<th>IEEE 11073-30200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>RJ45 (eight pin)</td>
</tr>
<tr>
<td>Mode</td>
<td>Software-controllable BCC (Rx/D/Tx cross over) or DCC (Rx/D/Tx straight through)</td>
</tr>
<tr>
<td>Power</td>
<td>5 V ±5%, 100 mA (max.)</td>
</tr>
<tr>
<td>Isolation</td>
<td>Basic insulation (reference voltage: 250 V; test voltage: 1500 V)</td>
</tr>
</tbody>
</table>

### Flexible Nurse Call Interface

<table>
<thead>
<tr>
<th>Connector</th>
<th>20 pin MDR (Mini D-Ribbon), active open and closed contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>≤100 mA, ≤24 V dc</td>
</tr>
<tr>
<td>Isolation</td>
<td>Basic insulation (reference voltage: 250 V; test voltage: 1500 V)</td>
</tr>
<tr>
<td>Delay</td>
<td>&lt; (Configured Latency +0.5 sec)</td>
</tr>
</tbody>
</table>

### IntelliBridge EC10 IF Board

<table>
<thead>
<tr>
<th>Connector</th>
<th>Modular Jack 8P8C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity</td>
<td>RS232/LAN</td>
</tr>
<tr>
<td>Power</td>
<td>5 V ±5% @ 0–100 mA</td>
</tr>
<tr>
<td>Isolation</td>
<td>Double insulation (reference voltage: 250 V; test voltage: 4000 V)</td>
</tr>
</tbody>
</table>

### Smart Hopping IF

#### 1.4 GHz (USA only)

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal WMTS Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Compatible with Philips Cellular Telemetry System (CTS), cellular infrastructure</td>
</tr>
<tr>
<td>Frequency Band</td>
<td>WMTS, 1395–1400 MHz and 1427–1432 MHz</td>
</tr>
<tr>
<td>Modulation technique</td>
<td>GFSK</td>
</tr>
<tr>
<td>Effective radiated power</td>
<td>Max. 10 dBm ERP (9 mW)</td>
</tr>
</tbody>
</table>

#### 2.4 GHz

<table>
<thead>
<tr>
<th>Type</th>
<th>Internal ISM Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Compatible with Philips Cellular Telemetry System (CTS), cellular infrastructure</td>
</tr>
<tr>
<td>Frequency Band</td>
<td>2.400–2.483 GHz ISM</td>
</tr>
<tr>
<td>Modulation technique</td>
<td>GFSK</td>
</tr>
<tr>
<td>Effective radiated power</td>
<td>Max. 18 dBm ERP (64 mW)</td>
</tr>
</tbody>
</table>
### MX450 Interface Specifications

#### 802.11 Wireless IF<sup>b</sup>

<table>
<thead>
<tr>
<th>Wireless Network Adapter</th>
<th>Type: Internal Wireless Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>IEEE 802.11a/b/g/n</td>
</tr>
<tr>
<td>Frequency Band</td>
<td>2.4 GHz and 5 GHz Band</td>
</tr>
<tr>
<td>USA</td>
<td>2.400–2.483 GHz, 5.15–5.35 GHz, 5.72–5.825 GHz</td>
</tr>
<tr>
<td>Europe</td>
<td>2.400–2.483 GHz, 5.15–5.35 GHz, 5.470–5.725 GHz</td>
</tr>
<tr>
<td>Japan</td>
<td>2.400–2.483 GHz, 5.15–5.25 GHz, 5.25–5.35 GHz, 5.470–5.725 GHz</td>
</tr>
<tr>
<td>China</td>
<td>2.400–2.483 GHz, 5.725–5.85 GHz</td>
</tr>
</tbody>
</table>

#### 802.11b/g/n Modulation technique
- DSSS (CCK, DQPSK, DBPSK)
- OFDM (BPSK, QPSK, 16-QAM, 64-QAM)

#### Bandwidth
20/40 MHz (nominal)

#### Effective Radiated Power (ERP) max.
- 2.400–2.483 GHz: 16 dBm (40 mW)
- 5.150–5.725 GHz: 15 dBm (32 mW)
- 5.745–5.825 GHz: 13 dBm (20 mW)

#### Short-Range Radio Interface<sup>b</sup>

<table>
<thead>
<tr>
<th>Type: Internal SRR interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
</tr>
<tr>
<td>Frequency band</td>
</tr>
<tr>
<td>Modulation technique</td>
</tr>
<tr>
<td>Effective Radiated Power</td>
</tr>
</tbody>
</table>

### MX450 Interface Specifications

#### Measurement Server Link (MSL)

<table>
<thead>
<tr>
<th>Connectors</th>
<th>Voltage: 48 V ±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>12 W</td>
</tr>
<tr>
<td>Power Sync.</td>
<td>5 V CMOS Level, 78.125 kHz (typical)</td>
</tr>
<tr>
<td>LAN signals</td>
<td>IEEE 802.3 10Base-T compliant</td>
</tr>
<tr>
<td>Serial signals</td>
<td>RS-422 compliant</td>
</tr>
</tbody>
</table>

#### ECG Sync Output/Analog ECG Output

**General**
- Connector: (1/4 inch stereo phone jack with tip, ring, sleeve)
- Isolation: None
- Short circuit current: <13 mA
- Gain error: <15%
- Baseline offset Error: <150 mV
- Bandwidth: 1–100 Hz
- Output voltage swing: ±4 V (min.)
- Signal delay: <30 ms

**Analog ECG Output (ring, tip)**
- Output level low: <0.4 V @ I= -1 mA
- Output level high: >2.4 V @ I = 1 mA
- Pulse Width: 100 ms ±10 ms (active high)
- Pulse Rise Time: <1 ms
- Signal delay: <25 ms
- Signal delay with older versions of the M3001A: <35 ms

**Digital Pulse Output (ring)**
- Output level low: 10 ms
- Output level high: 100 ms ±10 ms (active high)
- Signal delay: <1 ms
- Signal delay with older versions of the M3001A: <35 ms

**Advanced System Interface<sup>e</sup>**

<table>
<thead>
<tr>
<th>Standard Connector Mode</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE 11073 30200 RJ45 (eight pin) BCC (RxD/TxD cross over)</td>
<td>5 V ±5%, 100 mA (max.)</td>
</tr>
</tbody>
</table>
Battery Specifications
Philips high-power battery M4605A, 10.8 V 6000 mAh Lithium-Ion.
- Weight: 490 g.
- Status LEDs indicate charge status of batteries.
- Safety: complies with UL1642 (UL recognized).
- Electromagnetic compatibility: complies with the requirements for
  FCC Type B computing Device, and EN 61000-4-2 and EN 61000-4-3.
- Communication Standard: complies with the SMBus specification
  v1.1.

Battery Operating Time
(New and fully charged battery):
- With basic monitoring configuration: 4 hours (brightness set to
  optimum, Multi-Measurement Module connected, NBP measurement
  every 15 minutes).
- With extended monitoring configuration: 3 hours (brightness set to
  optimum, Multi-Measurement Module and Measurement extension
  connected, NBP every 15 minutes, Recorder, 1 alarm event every
  15 minutes).

Battery Charge Time
- When monitor is switched off: three hours.
- When monitor is in use: up to five hours, depending on monitor
  configuration.

Ordering Information
Ordering information for the 866062 (MX450) is given here. See the
individual data sheets for detailed ordering information for the
Multi-Measurement Module family, and Measurement Extensions.

Monitor Capability Options

<table>
<thead>
<tr>
<th>Basic Functionality</th>
<th>866062</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Care Software (Default)a</td>
<td>H02</td>
</tr>
<tr>
<td>Intensive Care Software</td>
<td>H12</td>
</tr>
<tr>
<td>Neonatal Care Software</td>
<td>H22</td>
</tr>
<tr>
<td>Anesthesia Software</td>
<td>H32</td>
</tr>
<tr>
<td>Cardiac Care Software</td>
<td>H42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waveform Capability</th>
<th>866062</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Real-time Wave Segments (Default)</td>
<td>A04</td>
</tr>
<tr>
<td>6 Real-time Wave Segmentsa</td>
<td>A06</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Clinical Packages</th>
<th>866062</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization Toolset</td>
<td>CP0</td>
</tr>
<tr>
<td>Extended ECG Capabilities</td>
<td>CP2</td>
</tr>
<tr>
<td>Clinical Data Visualization</td>
<td>CP3</td>
</tr>
<tr>
<td>Extended Alarming Capabilities</td>
<td>CP4</td>
</tr>
<tr>
<td>Access to Information</td>
<td>CP5</td>
</tr>
</tbody>
</table>

1 One Hxx option and one Axx option must be chosen.
### Clinical Applications 866062
- Neonatal CDS Package: C04
- Drug Calculator: C05
- Basic Event Surveillance: C06
- Advanced Event Surveillance: C07
- Parameter Histograms: C09
- eDocumentation: C10
- Alarm Advisor: C46

### ProtocolWatch 866062
- Severe Sepsis Screening: P01
- IntelliVue Guardian EWS: P05

### Hardware Options

#### Hardware 866406
- Remote Alarm Device: A01

#### Hardware Add-Ons 866062
- Remote Control: E00
- Integrated Recorder: E05
- Bed Hanger Mount: E21
- Quick Release Mount: E22
- One Li-Ion Battery: E24

### Interface Options

#### Wired Interfaces^a
- MIB/RS232 (2 ports) Interface^b: J13
- Remote Device Interface: J23
- USB Interface: J25
- Flexible Nurse Call Interface: J30
- IntelliBridge EC10 Interface Board: J32
- Advanced System Interface: J40

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### Wireless Interfaces^a
- 802.11 Wireless Interface: J35
- Smart Hopping Interface 1.4 GHz^b: J45
- Short-Range Radio: J46
- Smart Hopping Interface 2.4 GHz: J47

---

### Measurement Options

#### Ethernet Interfaces^a
- Ethernet/RS232 (2 ports): J13
- Remote Device Interface: J23
- USB Interface: J25
- Flexible Nurse Call Interface: J30
- IntelliBridge EC10 Interface Board: J32
- Advanced System Interface: J40

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Please note that the availability of options may depend on the choice of Hxx option.

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Related Products

**Measurement Extensions**

**Microstream CO₂ Extension**
- 867041
  - (With Microstream CO₂ measurement)
  - Dual invasive pressure, temperature, and cardiac output
    - B05
  - Dual invasive pressure, temperature
    - B06
  - Dual invasive pressure, temperature, and cardiac output, and PiCCO
    - B10

**Capnography Extension**
- 867040
  - (With mainstream or sidestream CO₂ measurement)
  - Dual invasive pressure, temperature, and cardiac output
    - B05
  - Dual invasive pressure, temperature
    - B06
  - Dual invasive pressure, temperature, and cardiac output, and PiCCO
    - B10

**Hemodynamic Extension**
- 867039
  - Dual invasive pressure, temperature, and cardiac output
    - B05
  - Dual invasive pressure, temperature
    - B06
  - Dual invasive pressure, temperature, and cardiac output, and PiCCO
    - B10

**Microstream CO₂ Extension**
- M3015A

**Add Press/Temp**
- C06

**Microstream CO₂ Extension (with dual Invasive Pressure and Temperature measurements)**
- M3015B

**Hemodynamic Extension (with Press, Temp, Press/Temp)**
- M3012A

**Add C.O.**
- C05

**Cables**

<table>
<thead>
<tr>
<th>Length</th>
<th>Description</th>
<th>Product/Option</th>
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<tbody>
<tr>
<td>0.75 m</td>
<td>Monitor to Multi-Measurement Module</td>
<td>M8022A #SC1</td>
</tr>
<tr>
<td>2 m</td>
<td>Monitor to Multi-Measurement Module</td>
<td>M8022A #SC2</td>
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</tbody>
</table>

**Gas Analyzers**

- IntelliVue G1: M1013A
- IntelliVue G5: M1019A
- IntelliVue TcG10: 865298

**Input Devices**

- M8024A
  - Slimline keyboard with protective cover: M8024A #A01
  - Trackball: Wired: M8024A #B01
  - Trackball: Wireless: M8024A #C01
  - Remote Control: M8024A #C02

**Accessory**

- External Battery Charger: 865432
- IntelliVue Battery Extension (provides additional power to a combination of Measurement Extension and M3002A IntelliVue X2 Multi-Measurement Module for situations when no mains power is available, for example, during transport): 865297

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Mounting Information

For mounting hardware, contact your local Philips sales representative. For more information, see: http://www.usa.philips.com/healthcare/solutions/patient-monitoring/mounting-solutions

Documentation

All documentation is available in .pdf format on a documentation DVD that is shipped with the product. Additionally, a predefined number of printed Instructions for Use ships with each order.

Hardware Upgrade Options - 866372

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
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<tbody>
<tr>
<td>MIB/RS232 Interface (2 ports)</td>
<td>J13</td>
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<tr>
<td>Adaptive Secondary Display⁹</td>
<td>J15</td>
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<tr>
<td>Remote Device Interface</td>
<td>J23</td>
</tr>
<tr>
<td>USB Interface</td>
<td>J25</td>
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<tr>
<td>Flexible Nurse call Interface</td>
<td>J30</td>
</tr>
<tr>
<td>IntelliBridge EC10 Interface Board</td>
<td>J32</td>
</tr>
<tr>
<td>802.11 Wireless Interface</td>
<td>J35</td>
</tr>
<tr>
<td>Advanced System Interface</td>
<td>J40</td>
</tr>
<tr>
<td>Smart Hopping Interface 1.4 GHz⁹</td>
<td>J45</td>
</tr>
<tr>
<td>Short-Range Radio</td>
<td>J46</td>
</tr>
<tr>
<td>Smart Hopping Interface 2.4 GHz</td>
<td>J47</td>
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</table>

Software Upgrade Options - 866362

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
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</thead>
<tbody>
<tr>
<td>Upgrade from 4 to 6 waves⁹</td>
<td>A06</td>
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Clinical Applications

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
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</thead>
<tbody>
<tr>
<td>Drug Calculator</td>
<td>C05</td>
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<tr>
<td>Basic Event Surveillance</td>
<td>C06</td>
</tr>
<tr>
<td>Advanced Event Surveillance</td>
<td>C07</td>
</tr>
<tr>
<td>Parameter Histograms</td>
<td>C09</td>
</tr>
<tr>
<td>eDocumentation</td>
<td>C10</td>
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<tr>
<td>Alarm Advisor</td>
<td>C46</td>
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ProtocolWatch

Severe Sepsis Screening | P01 |

Measurement Capability Options

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
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</thead>
<tbody>
<tr>
<td>Support one additional IBP</td>
<td>M05</td>
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<tr>
<td>Cardiac Output</td>
<td>M12</td>
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XDS Connectivity Options

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
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<tbody>
<tr>
<td>XDS Connectivity</td>
<td>X00</td>
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<tr>
<td>XDS Clinical Workstation</td>
<td>X30</td>
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<tr>
<td>XDS Database</td>
<td>X40</td>
</tr>
</tbody>
</table>

Software

Upgrade to current SW Revision | SUM |


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⁹ USA only.

a One end terminated with 6P6C connector; other end w/o connector.

b Both ends terminated with 1/4 in phone plug.