Welch Allyn Connex® Vital Signs Monitor 6000 Series™

Service manual

WelchAllyn®

Advancing Frontline Care™

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Masimo SET

NELLCOR OxiMAX WORKS HERE™

BRAUN

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Contents

Symbols

Documentation symbols

	**WARNING** The warning statements in this manual identify conditions or practices that could lead to illness, injury, or death.
	**WARNING** Hot surface. Do not touch.
	**Caution** The caution statements in this manual identify conditions or practices that could result in damage to the equipment or other property, or loss of data. This definition applies to both yellow and black and white symbols.
	Consult operating instructions.

Power symbols

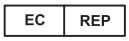
	Power on/standby		Equipotential terminal
	(on display) Monitor is plugged into Alternating Current power		Battery absent or faulty
	(on the monitor, green indicator) Alternating Current power present, battery fully charged		Battery charge level
	(on the monitor, amber indicator) Alternating Current power present, battery is charging		Battery cover
	Alternating Current (AC)		Rechargeable battery

	Li-ion battery		AC input power

Connectivity symbols

	USB		Ethernet (RJ45)
	Wireless signal strength • Best (4 bars) • Good (3 bars) • Fair (2 bars) • Weak (1 bar) • No signal (no bars) • No connection (blank)		Nurse call

Miscellaneous symbols

	Meets essential requirements of European Medical Device Directive 93/42/EEC		European Community Representative
	Manufacturer		Defibrillation-proof Type BF applied parts
	Reorder number		Serial number
	Do not reuse		China RoHS markings for control of pollution caused by electronic information products. XX indicates Environmentally Friendly Use Period in years.
	Nonionizing electromagnetic radiation		Recycle the product separate from other disposables
	Restrictions for use of wireless device in Europe. European communities class 2 radio equipment.		Call for maintenance

Safety

All users of the monitor must read and understand all safety information presented in this manual before using or repairing the monitor.

United States federal law restricts this device to sale, distribution, or use by or on the order of a licensed medical practitioner.

Warnings and cautions

WARNING Safety risk. Make frequent electrical and visual checks on cables, sensors, and electrode wires. All cables, sensors, and electrode wires must be inspected and properly maintained and in proper working order to allow the equipment to function properly and to protect patients.

WARNING Safety risk. Place the monitor and accessories in locations where they cannot harm the patient should they fall from a shelf or mount.

WARNING Fire and explosion hazard. Do not operate the monitor in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide; in oxygen-enriched environments; or in any other potentially explosive environment.

WARNING Inaccurate measurement risk. Dust and particle ingress can affect the accuracy of blood pressure measurements. Use the monitor in clean environments to ensure measurement accuracy. If you notice dust or lint build-up on the monitor's vent openings, have the monitor inspected and cleaned by a qualified service technician.

Caution To ensure that the monitor meets its performance specifications, store and use the monitor in an environment that maintains the specified temperature and humidity ranges.

Caution The monitor may not function properly if dropped or damaged. Protect it from severe impact and shock. Do not use the monitor if you notice any signs of damage.

Caution Do not connect more than one patient to a monitor or connect more than one monitor to a patient.

Caution Do not operate the monitor in the presence of magnetic resonance imaging (MRI) or hyperbaric chambers.

Caution Do not autoclave the monitor. Autoclave accessories only if the manufacturer's instructions clearly approve it.

General safety considerations

- If the monitor detects an unrecoverable problem, it displays an error message. For more information see “Troubleshooting.”
- To ensure patient safety, use only accessories recommended or supplied by Welch Allyn. (See the accessories list in the device’s directions for use). Always use accessories according to your facility’s standards and according to the manufacturer’s recommendations and instructions. Always follow the manufacturer’s directions for use.
- Welch Allyn recommends that only Welch Allyn service personnel or an authorized repair center perform warranty service. Performing unauthorized service on a device that is within warranty may void the warranty.

Electrostatic discharge (ESD)

Caution Electrostatic discharge (ESD) can damage or destroy electronic components. Handle static-sensitive components only at static-safe workstation.

Caution Assume that all electrical and electronic components of the monitor are static-sensitive.

Electrostatic discharge is a sudden current flowing from a charged object to another object or to ground. Electrostatic charges can accumulate on common items such as foam drinking cups, cellophane tape, synthetic clothing, untreated foam packaging material, and untreated plastic bags and work folders, to name only a few.

Electronic components and assemblies, if not properly protected against ESD, can be permanently damaged or destroyed when near or in contact with electrostatically charged objects. When you handle components or assemblies that are not in protective bags and you are not sure whether they are static-sensitive, assume that they are static-sensitive and handle them accordingly.

- Perform all service procedures in a static-protected environment. Always use techniques and equipment designed to protect personnel and equipment from electrostatic discharge.
- Remove static-sensitive components and assemblies from their static-shielding bags only at static-safe workstations—a properly grounded table and grounded floor mat—and only when you are wearing a grounded wrist strap (with a resistor of at least 1 megohm in series) or other grounding device.
- Use only grounded tools when inserting, adjusting, or removing static-sensitive components and assemblies.
- Remove or insert static-sensitive components and assemblies only with monitor power turned off.
- Insert and seal static-sensitive components and assemblies into their original static-shielding bags before removing them from static-protected areas.
- Always test your ground strap, bench mat, conductive work surface, and ground cord before removing components and assemblies from their protective bags and before beginning any disassembly or assembly procedures.

Overview

Purpose and scope

This service manual is a reference for periodic preventive maintenance and corrective service procedures for the Welch Allyn Connex Vital Signs Monitor 6000 Series. It is intended for use only by trained and qualified service personnel.

Corrective service is supported to the level of field-replaceable units. These include circuit-board assemblies and some subassemblies, case parts, and other parts.

Caution No component-level repair of circuit boards and subassemblies is supported. Use only the repair procedures described in this manual.

WARNING When performing a service procedure, follow the instructions exactly as presented in this manual. Failure to do so could damage the monitor, invalidate the product warranty, and lead to serious personal injury.

Find instructions for functional testing and performance verification in the Welch Allyn Service Tool help files.

This manual applies only to this device. For servicing of any other vital signs monitor, see the service manual for the specific device.

Service work not described in this manual must be performed by qualified service personnel at the factory or at an authorized Welch Allyn service center.

Related documents

When using this manual, refer to the following:

- *Welch Allyn Connex Vital Signs Monitor 6000 Series Directions for use* (part number 103501)
- Welch Allyn Service Tool CD (part number 103521)
- *Welch Allyn Service Tool Install guide* (part number 103820)
- *Welch Allyn Braun PRO 4000 Service Manual* (part number 701627)
- *Welch Allyn 9600 Plus Calibration Tester Directions for use* (part number 701754)
- Welch Allyn website: www.welchallyn.com

Technical support services

Welch Allyn offers the following technical support services:

- Telephone support

- Loaner equipment
- Service agreements
- Service training
- Replacement service parts
- Product service

For information on any of these services, call the Welch Allyn Service Center nearest you.

Service loaners

For warranty or non-warranty repairs not covered under a support agreement, loaners are available for a nominal charge, subject to availability. Payment is required prior to shipment for all loaners not covered under a support agreement. The loaner fee can be found on the Welch Allyn loaner price list.

Welch Allyn Service Centers that provide repair service for this product can, on request, loan a device for use while the device is being repaired. Loaned devices are provided free of charge for products repaired while under a support agreement that includes a free loaner provision.

Loaner equipment for the individual component modules is not available.

Service options

Partners in Care service agreements

While product warranties provide basic assurance of Welch Allyn hardware quality, they may not include the full range of services and support you need. Welch Allyn offers premium service and support through our *Partners in Care* program. Whether you service your own devices and require a minimum of support or rely on us to service your device, Welch Allyn provides a program that will meet your needs. For more information visit our web site at www.welchallyn.com or call your sales representative.

Warranty service

All repairs on products under warranty must be performed or approved by Welch Allyn. Refer all warranty service to Welch Allyn Product Service or another authorized Welch Allyn Service Center. Obtain a Return Material Authorization (RMA) number for all returns to Welch Allyn Product Service.

Caution Unauthorized repairs will void the product warranty.

Non-warranty service

Welch Allyn product service and authorized service centers support non-warranty repairs. Contact any Welch Allyn regional service center for pricing and service options.

Welch Allyn offers modular repair parts for sale to support non-warranty service. This service must be performed only by qualified end-user biomedical/clinical engineers using this service manual.

Service training is available from Welch Allyn for biomedical/clinical engineers. For information, go to www.welchallyn.com/support/technical/monitoring_suppt_training.htm.

Repairs

A Welch Allyn Service Center must perform all repairs on products under warranty, unless you have purchased a Welch Allyn support agreement allowing you to service the device while under warranty.

Caution Unauthorized repairs will void the product warranty.

Qualified service personnel or a Welch Allyn Service Center should repair products out of warranty.

If you are advised to return a product to Welch Allyn for repair or routine maintenance, schedule the repair with the service center nearest you.

Welch Allyn Technical Support

If you have a problem with the device that you cannot resolve, call the Welch Allyn Technical Support Center nearest you for assistance. A representative will assist you in troubleshooting the problem and will make every effort to solve the problem over the phone, avoiding a potential unnecessary return.

If your product requires warranty, extended warranty, or non-warranty repair service, a Welch Allyn Technical Support representative will record all necessary information to issue an RMA number. The support representative will provide you with the address of the Welch Allyn Service Center to send your device to.

An RMA number must be obtained prior to any return. Be sure to note this number on the outside of your shipping box and include a copy of the RMA in the box.

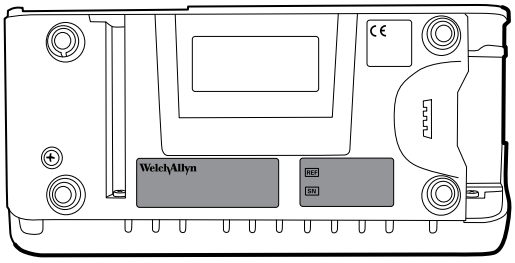
Returns without an RMA number will not be accepted for delivery.

Technical support is available during local business hours.

Returning products

When returning a product to Welch Allyn for service, ensure that you have the following information:

- Product name, model number, and serial number. This information may be found on the product and serial number labels on the bottom of the device.



- A complete return shipping address.
- A contact name and phone number.
- Any special shipping instructions.
- A purchase-order number or credit-card number if the product is not covered by a warranty.
- A full description of the problem or service request.

1. Contact Welch Allyn and request an RMA number.

Note Welch Allyn does not accept returned products without an RMA.

2. Ship the device to Welch Allyn, observing these packing guidelines:
   a. Remove from the package the battery, all hoses, connectors, cables, sensors, power cords, and other ancillary products and equipment, except those items that might be associated with the problem.

      Recommendations for returning the Lithium Ion battery

      - Use ground transportation to return batteries.
      - If returning multiple batteries, package each battery individually.
      - Do not consolidate multiple batteries in a single package.
      - Use packaging provided by Welch Allyn or the battery manufacturer.
      - Do not pack a defective battery in checked or carry-on baggage if traveling by air.

      Packaging

      - If you return the battery with the device, remove the battery, seal the battery in an antistatic plastic bag, and place the battery in the position reserved for the battery in the original shipping carton near the device.
      - If you return the battery separately, package the battery in the replacement battery's plastic bag and shipping box.

      If the original shipping carton or replacement battery shipping box is unavailable, consult the manufacturer website for information regarding shipping lithium ion batteries:

      www.nexergy.com/lithium-shipping.htm

      WARNING Safety risk. Do not ship any battery that has been physically damaged or shows signs of leakage unless you receive specific instructions which meet the requirements for the shipment of Lithium batteries. Dispose of damaged or leaking batteries in an environmentally safe manner consistent with local regulations.

      Note In the United States, the applicable regulations can be found in the Code of Federal Regulations (CFR). Refer to 49 CFR 173.185 for shipping lithium batteries by air or ground. Use 49 CFR 172.102 sections 29, 188, 189, A54, A55, A100, A101, A103, and A104 to find the special provisions for shipping lithium batteries.

   b. Clean the device.

      Note To ensure safe receipt of your device by the service center and to expedite processing and return of the device to you, **thoroughly clean all residues from the device before you ship it to Welch Allyn**. For decontamination and cleaning requirements, see "Decontamination and cleaning" in the appendices.
      If a returned device is found to be contaminated with bodily fluids, it will be returned at the owner's expense. United States federal regulations prohibit the processing of any device contaminated with blood-borne pathogens. Welch Allyn thoroughly cleans all returned devices on receipt, but any device that cannot be adequately cleaned cannot be repaired.

c. Put the device, enclosed in a plastic bag **with a packing list**, into the original shipping carton with the original packing materials or into another appropriate shipping carton.

d. Write the Welch Allyn RMA number with the Welch Allyn address on the outside of the shipping carton.

Recommended service intervals

To confirm that the device is functioning within the design specifications, perform periodic service using the Welch Allyn Service Tool, Gold edition, as indicated in the following table.

Component	Service interval	Service procedure
Monitor	Annually	Functional verification
NIBP module	Annually	Functional verification and calibration if necessary
SpO2 module	Annually	Functional verification
SpHb parameter	Annually	Functional verification
SureTemp Plus	Semi-annually	Functional verification
Braun ThermoScan PRO 4000	Annually	Functional verification
Printer module	Annually	Functional verification
Battery	300 charge cycles	Replace battery

Perform a complete functional verification of the device whenever any of the following conditions exist:

- The device has been dropped or otherwise damaged
- The device is malfunctioning
- The case has been opened
- A part has been replaced

For details on performing the functional verification, see the section on functional verification.

Maintenance

For device maintenance information, see “Maintenance and service” in the device’s directions for use. Covered topics include the following:

- Replacing the printer paper
- Inspecting and cleaning the device and accessories
- Changing the battery

The Welch Allyn Service Tool

The Welch Allyn Service Tool is available in the following editions:

- **Silver**: Accompanies your device.

- **Gold**: Required to perform complete functional verification and calibration. This edition requires an additional license. For more information about acquiring this license, contact Welch Allyn.

  Note To qualify for the Gold license, you must attend the Welch Allyn technical training course or complete online training for the device.

Clinicians and technical service personnel can use the service tool to manage and maintain supported Welch Allyn products. You can use the service tool to do the following:

- **Review device information**. When connected to the device, the service tool lists installed modules, installed firmware and hardware versions, warranty and repair information, status, and usage history.
- **Receive notifications when periodic maintenance is needed**. The service tool can help you manage and maintain your entire inventory of supported Welch Allyn products. Through the remote service function, the service tool can connect to Welch Allyn Customer Service. With this functionality you can automatically receive firmware updates and feature upgrades for your supported products, including software upgrades for the service tool.
- **Install updates and upgrades**. The service tool can read the firmware version for each module and check for available updates or upgrades.
- **Create a work list**. The work list provides information about service actions—referred to as work orders—that are waiting for you to perform on your maintained devices. Work orders may include periodic calibrations, upgrades, or license installations.
- **Schedule periodic maintenance**. You can use the service tool to set the service interval for each maintained device.
- **View and save logs**. You can download and save log files from the device for analysis to help diagnose and identify reported issues.
- **Create user accounts**. Administrators can create user accounts and set permission levels to control access to the features, allowing one group to perform administrative tasks and another to perform service tasks. Restricting access prevents the service tool from being used to make unauthorized changes on a connected device.
- **Perform functional verification**. You can use the service tool to test each component of the system to ensure that its performance meets design specifications. Functional verification is required to meet the periodic maintenance requirements. This feature is not supported for all products and requires the service tool Gold edition for each supported product.
- **Perform calibration verification**. The service tool can check any system requiring calibration and, if necessary, calibrate the device to match the design specifications. Calibration verification is required to meet the periodic maintenance requirements. This feature is not supported for all products and requires the service tool, Gold edition, for each supported product.
- **Recover devices**. In the rare case where a device can no longer boot because of corrupted firmware, the service tool can connect the device to Welch Allyn Technical Support to reinstall the firmware.
- **Extensible**. The device accepts new plug-ins to support future Welch Allyn products.

Some of these features are enabled for any user (Silver edition). Others require special user account privileges or a Welch Allyn service contract (Gold edition). If you require gold-level support for a Welch Allyn product, please contact Welch Allyn technical support.

Battery performance

About the battery

The device uses a rechargeable lithium ion smart battery. Internal circuitry enables the battery to report its condition to the device. The device displays the battery status via the LED power indicator, icons on the screen, and status messages appearing in the Device Status area of the display. Battery information may be collected using the service tool.

New batteries are shipped from the manufacturer with a 30 percent charge to extend shelf life. When installing a new battery in the device, you must plug the device into AC power to wake up the battery. If the AC power is not applied to the device, the new battery will appear discharged.

The Device Status area displays a low-battery status message when 30 minutes of power remain and again when 5 minutes remain.

You can expect new, fully charged batteries to have enough power for the following:

- Six-cell batteries provide approximately 26 patient exams.
- Nine-cell batteries provide approximately 47 patient exams.

Note A patient exam includes NIBP, temperature, and SpO2 measurements at the rate of one patient every 10 minutes with a 2 minute display timeout setting with a new battery, conducted at room temperature (72.5 °F ±4.5 °F; 22.5 °C ±2.5 °C).

The number of exams per charge decrease with the battery age.

Depending on the age of the battery, a 6-cell battery takes 3 hours and a 9-cell battery takes 4 hours to fully charge at room temperature.

Both batteries have a lifetime of 300 charge cycles or more, where a charge cycle is equal to fully charged to discharged to fully charged at room temperature.

Battery charging is provided by the device's internal power supply.

For a complete list of battery specifications, see the device's directions for use.

Best practices

The following practices help to extend the life of the battery and the device.

WARNING Safety risk. When handling and storing Lithium batteries: Avoid mechanical or electrical abuse. Batteries may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures. Do not short or install with incorrect polarity.

- Remove the battery when storing the device.
- Replace batteries that trigger a low battery status message when fully charged.
- Do not use damaged or leaking batteries.
- Store batteries with a 30 to 50 percent charge.
- Store batteries within the temperature range indicated for each period:
  - For storage less than 30 days: Maintain temperature at –4 °F and 122 °F (–20 °C and 50 °C).
  - For storage between 30 days and 90 days: Maintain temperature at –4 °F and 104 °F (–20 °C and 40 °C).

    - For storage more than 90 days up to 2 years: Maintain temperature at –4 °F and 95 °F (–20 °C and 35 °C).
- Recycle batteries where ever possible. In the United States call 1-800-8-BATTERY for information about recycling your Lithium Ion battery or go to the RBRC website at www.rbrc.org for additional information.
- When recycling is not an option dispose of batteries in an environmentally safe manner consistent with local regulations.

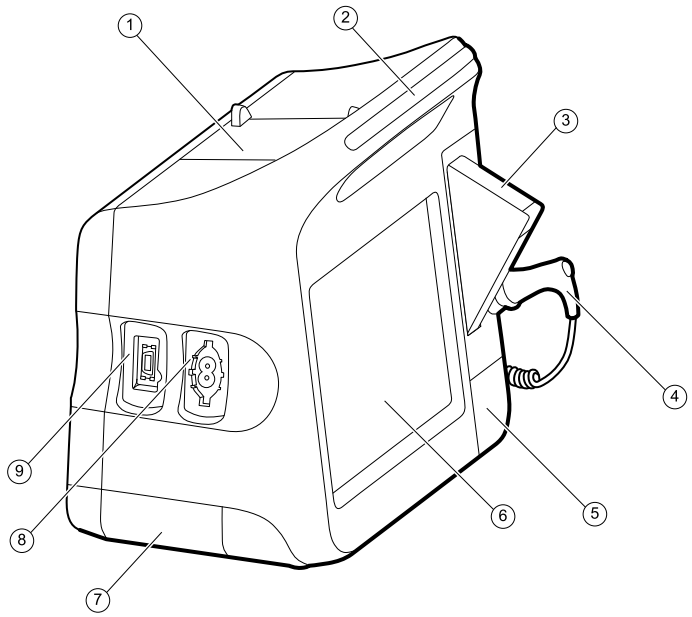
Factors affecting battery operating time

The following settings and conditions affect the battery operating time.

- The display brightness setting
- The display power-saver setting
- The device power-down setting
- Frequency and duration of alarms and alerts
- Amount of motion artifact during NIBP measurements
- Radio searching for an access point

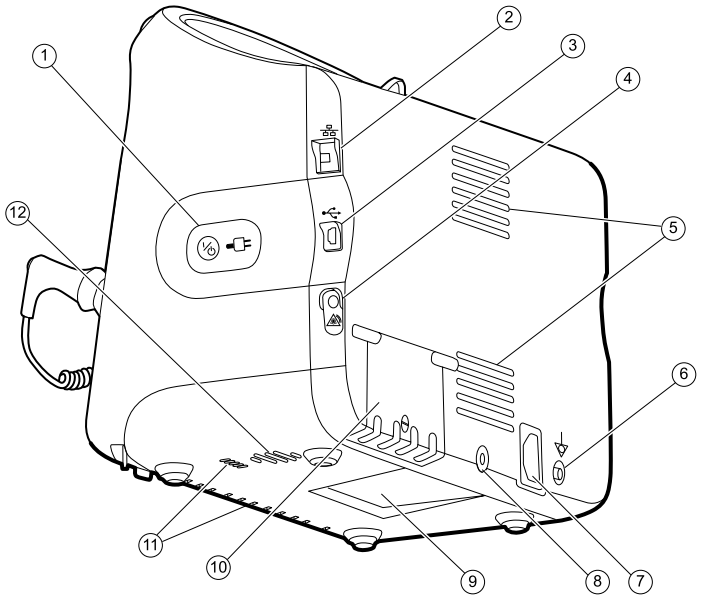
Controls, indicators, and connectors

Note Your model might not contain all of these features.



No.	Feature	Description
1	Printer	Optional. Printer provides a printout of patient and device information.
2	Light bar	Provides a visual alarm with red and amber LEDs.
3	Thermometry	Optional. Temperature probe cover box.
4	Thermometry	Optional. Temperature probe.
5	Thermometry (connector behind cover)	Secures the probe connection to the device.
6	LCD screen	1024 x 600 pixels color touchscreen provides a graphical user interface.
7	Battery compartment (behind cover)	Houses the Li-ion battery.

No.	Feature	Description
8	Blood pressure	Self-contained module for easy replacement. Supports dual-lumen or single-lumen hoses.
9	Pulse oximetry	Optional Nellcor (SpO2) or Masimo Rainbow SET (SpO2 or combined SpO2/SpHb) in a self-contained module for easy replacement.



No.	Feature	Description
1	Power switch and LED	Power-on/Standby switch. The LED indicates the charging status when connected to AC power: • Green: The battery is charged. • Amber: The battery is charging.
2	Ethernet RJ45	Provides a hardwired connection to the computer network.
3	USB client	Provides a connection to an external computer for testing and software upgrades.
4	Nurse call	Optional. Provides a connection to the hospital nurse call system. (Not available on the 6300 model.)
5	Fan exhaust	
6	Ground lug (equipotential terminal)	Provided for electrical safety testing and as a means for connection of a potential equalization conductor.
7	Power connection	Provides an external AC power connection.
8	Mobile stand mounting hardware	Secures the mounting plate to the device.

No.	Feature	Description
9	Recess for mounting plate	Secures the device when mounted on the mobile stand or wall.
10	USB connector door	Provides access to host USB connections for optional accessories.
11	Fan intake	
12	Speaker	Provides tones. A piezo beeper inside the device provides backup.

Service menu

Access the Service screens

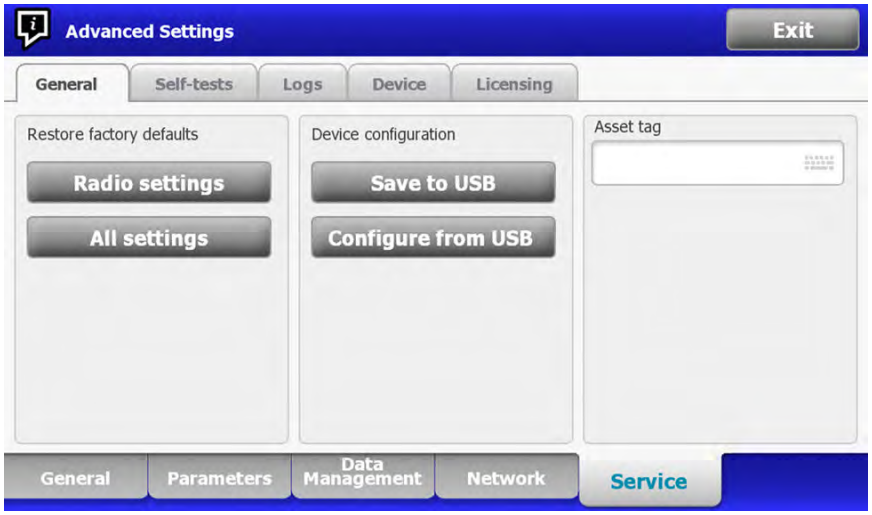
1. From the **Home** tab, touch the **Settings** tab.
2. Touch the **Advanced** tab.
3. Enter **6345** as the access code and touch **OK**.
4. Touch the **Service** tab.

   The **General** screen appears.
5. Perform service tasks by making selections or touching other tabs.

   Note Service tasks and how to do them are detailed in this section.
6. When you are done, touch **Exit**.

   The **Home** tab appears.

General tab



Restore factory default settings

1. Go to the Service screens as described in “Access the Service screens.”
2. Touch the **General** tab.

3. Restore factory default settings:
   - To restore radio settings to factory default values, touch **Radio settings**.
   - To restore all current settings to factory default values, touch **All settings**.

   A confirmation dialog appears and the device reboots.
4. Touch **OK**.

   The factory default settings are restored.

Save the device configuration to a drive

You can save the device configuration to a USB flash drive. You can use the saved configuration to restore this device's configuration or to copy this device's configuration to other devices.

Note Not all flash drives are supported.

1. Connect a flash drive to the USB port.
2. Go to the Service screens as described in "Access the Service screens."
3. Touch the **General** tab.
4. Touch **Save to USB**.

   A confirmation dialog displays.
5. Touch **OK**.

   The device configuration is saved to the USB flash drive and the device reboots.

Load a monitor configuration

You can load a configuration from a USB flash drive to the monitor.

Note Not all flash drives are supported.

Note If your configuration includes radio parameters, make sure the radio is enabled. The radio must be enabled before you can import radio parameters.

1. Connect a flash drive to the USB port.
2. Go to the Service screens as described in "Access the Service screens."
3. Touch the **General** tab.
4. Touch **Configure from USB**.

   A confirmation dialog displays.
5. Touch **OK**.

   The configuration from the USB flash drive overwrites the configuration on the monitor.

Enter an asset tag

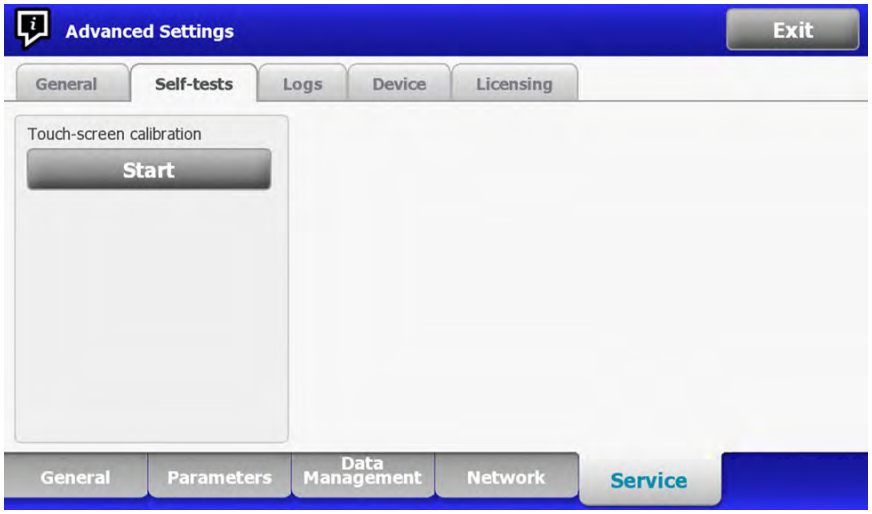
You can enter an alpha-numeric identifier in the data field to serve as an asset tag for device identification.

1. Go to the Service screens as described in "Access the Service screens."
2. Touch the **General** tab.

3. Touch  and enter up to 20 characters.
4. Touch **OK**.

Note If the device language changes, the asset tag remains unchanged.

Self-tests tab

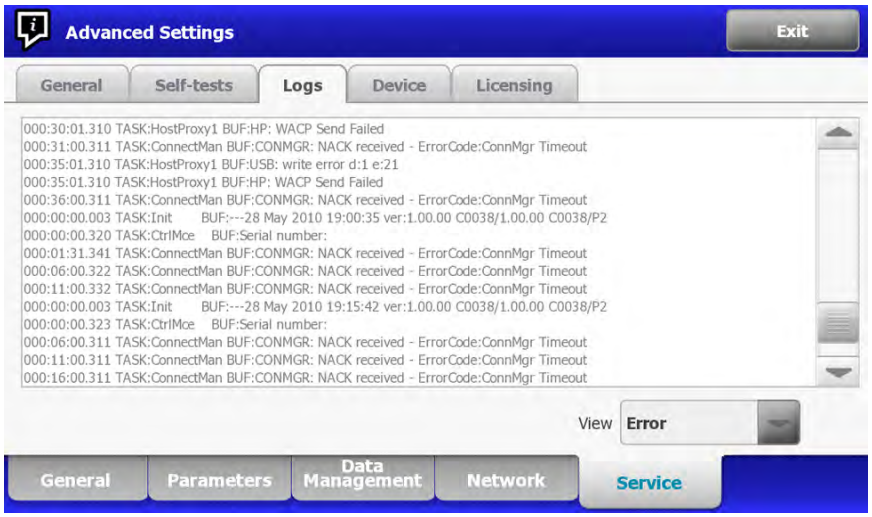


Perform a self-test

This tab calibrates the touchscreen, if needed.

1. Go to the Service screens as described in “Access the Service screens.”
2. Touch the **Self-tests** tab.
3. Touch **Start**.
   a. Touch the location indicated by the device. The device checks the current calibration. If the location coordinates and touched location match, a Calibration Confirmation dialog displays. Touch **OK** to finish.
   b. If the locations do not match, a calibration failure dialog displays. Touch **Calibrate**, and then touch the screen as indicated. When calibration is complete, a Calibration Confirmation dialog displays. Touch **OK** to finish.

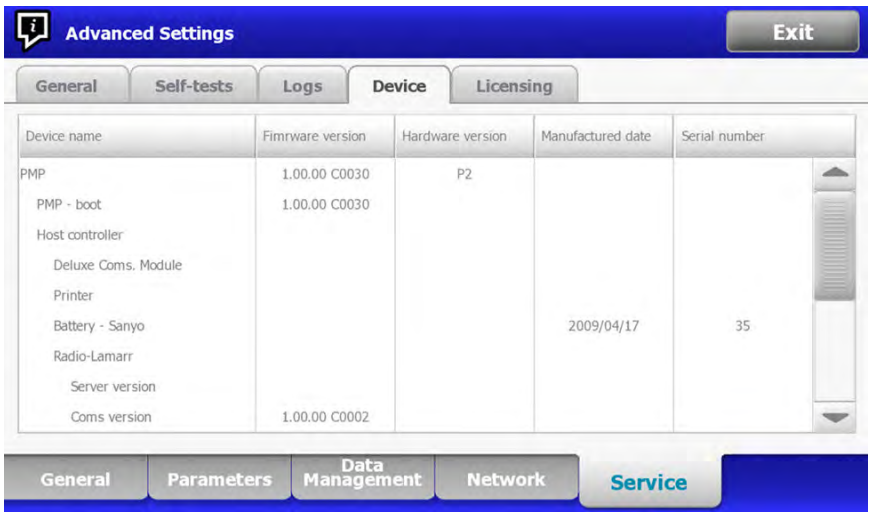
Logs tab



View an error or event log

1. Go to the Service screens as described in “Access the Service screens.”
2. Touch the **Logs** tab.
3. View a log report.
   - To view an error log, select **Error.**
   - To view an event log, select **Event.**

Device tab

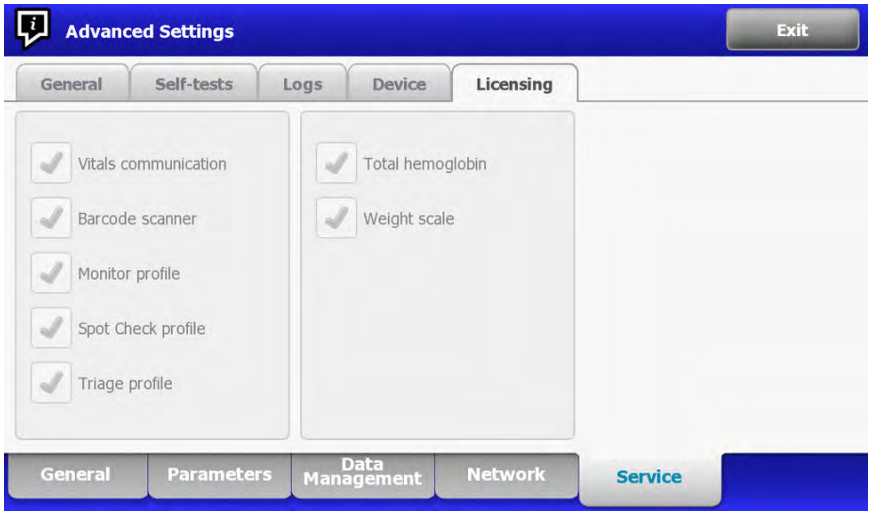


View device and module information

1. Go to the Service screens as described in “Access the Service screens.”
2. Touch the **Device** tab.

Device and module information appears for you to view.

Licensing tab



View device licenses

1. Go to the Service screens as described in “Access the Service screens.”
2. Touch the **Licensing** tab.

   A list of available licenses appears. Checks indicate installed licenses.

Power-up sequence

The system performs a power-on self test (POST) each time the device is powered on. During power up, the system performs a comprehensive self test of the software. If software testing is successful, the system then tests internal hardware. If all tests are successful, the system completes power up and the Home screen appears.

To perform the POST:

1. Disconnect any patient cables connected to the system.
2. Insert a fully charged battery into the system.
3. Upon each power up, confirm the following:
   a. The light bar flashes red then amber.
   b. The Welch Allyn startup screen appears.
   c. A beep sounds, followed by two chimes.

      Note If no chimes sound, replace the speaker as specified in "Remove the speaker."

   d. The product line logo appears at the bottom of the screen.
   e. If a printer is installed, the paper advances slightly.
   f. The Home screen appears.

WARNING Equipment failure risk. The system includes a fan that circulates air through the device. If the fan does not run when you power up the device, remove it from use and inform qualified service personnel immediately. Do not use the system until the problem is corrected.

If the internal self-check is successful, the system shows its normal functions with all values blank and the system is ready for operation. If the self-check fails, an error message appears in the system status area at the top of the screen. If a fault that could adversely affect the product is detected, the system enters a safe mode and stops monitoring patients. The system remains in safe mode until it is turned off by pressing the **Power** button or until it shuts down automatically after a period of inactivity.

If a system error is detected, the system becomes inactive until you press  or until the system shuts down automatically. The system displays a system fault message that contains a wrench icon( ) and a system fault code to aid service and engineers in diagnosing the problem.

While in safe mode, the red LED bar and the piezo buzzer cycle on and off.

Troubleshooting

This section provides the following tables to help troubleshoot the device.

- **Symptoms and solutions**: These tables list symptoms you might observe, list possible causes, and suggest actions that may eliminate the problem.
- **Technical alarm messages**: These tables list messages generated by the device software when a problem is detected. The tables explain possible causes and suggest actions that can resolve the problem.

These tables can help you diagnose and fix a problem. They do not replace basic troubleshooting skills. You must still trace the source of the problem to the board or module level to decide the best course of action. Welch Allyn does not support component-level repair to the board or module. For available replacement parts, see “Field Replaceable Units.”

WARNING Do not perform troubleshooting on a device that is emitting smoke or exhibits other signs of excessive overheating. Disconnect the device from AC power and call Welch Allyn Technical Support immediately.

Caution Replace parts, components, or accessories only with parts supplied or approved by Welch Allyn. The use of any other parts can lead to inferior device performance and will void the product warranty.

Symptoms and solutions

Power

Symptom	Possible cause	Suggested action
The device does not power up	A new battery was installed	Connect AC power to wake up the battery.
	The AC power is disconnected	Connect AC power.
	The power cord is defective	Replace the power cord.
	The battery is discharged	Charge the battery.
	The power button is defective	Replace the right side panel and power button.

Symptom	Possible cause	Suggested action
	An internal connection is faulty	Check the power-flex cable connection at J6 on the main board.
		Check the AC power harness connections from the IEC connector to the power supply.
		Check the power harness from the power supply J2 to J30 on the main board.
		Check the battery power harness from J2 on the battery connector board to J29 on the main board.
	The power supply is defective	Check the output voltage on the power supply. The voltage should be 15 V ± 0.45V DC. If it is not, replace the power supply.
	The battery is defective	Charge the battery for 5 hours. If the battery icon on the display still shows an empty battery symbol, replace the battery.
	The main board is defective	Replace the main board.
The battery doesn't charge or run time is low	The battery is defective	Charge the battery for 5 hours. If the battery icon on the display still shows an empty battery symbol, replace the battery.
	The battery connector board is defective	Check the battery connector board for an open short or broken connector and replace if necessary.
	The battery has reached the end of its useful life	Use the service tool to check cycle count. If the cycle count exceeds 300, replace the battery.

Display

Symptom	Possible cause	Suggested action
The touchscreen does not respond	Software error	Reboot the device. Press and hold the power button until the device shuts down.

Symptom	Possible cause	Suggested action
		Note Any configuration settings not saved as default will be lost. Press the power button to restart.
	The touchscreen is out of calibration	Recalibrate the screen. In Advanced Settings, touch the **Service** tab and then touch the **Self Tests** tab.
	The touchscreen lock is activated	Slide the lock bar to unlock. Touch the **Settings** tab, touch the **Device** tab, and then touch **Start**. Uncheck **Allow display lock timeout**.
	An internal connection is faulty	Check the connection at J48 on the main board with display flex cable.
	A display flex cable is broken	Replace the touchscreen and display assembly.
	The main board has a faulty touchscreen controller	Replace the main board.
The display is blank when the power is on	The device is in Power-Saver mode	Wake the display by touching the screen or the **Power** button.
	The device powered down after a period of inactivity	Turn on the device by pressing the **Power** button. In Advanced Settings, touch the **General** tab and then touch the **Display** tab. Set **Device powers down after** to the desired interval.
	An internal connection is faulty	Check the display harness connections at the display and J19 on the main board. Replace the cable if damaged.
	A cable is damaged	Replace the cable.
The LCD display is dim	The brightness setting is too low	Increase the brightness setting. Touch the **Settings** tab and then touch the **Device** tab. Set **Display**

Symptom	Possible cause	Suggested action
		brightness to the desired level.
	The LCD display has reached the end of its useful life	Replace the LCD display.

User interface

Symptom	Possible cause	Suggested action
Unable to access advanced settings or enter the advanced settings code	Patient monitoring is active or being simulated	Discontinue patient monitoring or stop the simulation.
	The parameter alarm is on	Dismiss the alarm.
	Intervals are turned on	Stop intervals.

Communication

Symptom	Possible cause	Suggested action
Cannot communicate through the USB client connection	The communications board does not receive power	Check the voltage from J49 on the main board for +5.0, ±0.5V DC. Replace the main board if necessary.
	The USB client is defective	Test the connection by connecting a PC running the service tool. Verify that the service tool is configured properly on the PC to communicate with the device. See the service tool help files.
		Replace the power cable to the communications board.
USB accessories do not communicate with the monitor	The accessory is defective	Replace with a known good accessory.
	The communications board is not receiving power	Check the voltage from J49 on the main board for +5.0, ±0.5V DC. Replace the main board if necessary.
	One or more USB host connections are defective	Test the connection with a USB thumb drive. If no power or enumeration is present, such as an LED on a thumb drive, replace the communications board.

Symptom	Possible cause	Suggested action
	A USB connection from the communications board to the main board is faulty	Verify that the USB cables are connected correctly.
		Replace the USB cables.
The device does not communicate via Ethernet with the computer network	The device is not configured properly	Check the settings with your network administrator.
	The communications board is not receiving power	Check the voltage from J49 on the main board for +5.0, ±0.5V DC. Replace the main board if necessary.
	The Ethernet connection from the main board is faulty	Test the internal Ethernet cable. Replace if necessary.
The radio does not connect to the network	The device is out of range of the access point	Check the network status screen's RSSI value.
	The device is not configured properly	Check the settings with your network administrator.
	The antenna is defective	Check the antenna cable and antenna connection. Replace the cable and antenna if necessary.
	The communications board is not receiving power	Check the voltage from J49 on the main board for +5.0, ±0.5V DC. Replace the main board if necessary.

Alarm

Symptom	Possible cause	Suggested action
The light bar does not turn on	No alarm was triggered	Verify that the light bar flashes when the monitor starts.
		Verify that the alarm is triggered by a visual indicator in the message status area and an audio alarm occurs.
	There is a faulty connection	Check the light-bar harness and connections at the light bar and J46 on the main board. Replace the defective cable if necessary.
	The light-bar board is defective	Apply +3.3V to pin 1 of the harness and ground to pin 2. Verify that the amber LEDs illuminate. Connect the ground to pin 3. Verify that the

Symptom	Possible cause	Suggested action
		red LEDs illuminate. If one or both do not illuminate, replace the LED light bar.
	The main board is defective	Verify that there are +3.3V at pin 1 of J46 on the main board.
No audible alarm occurs	No alarm was triggered	Verify that the alarm is triggered by visual indicator in message status area, and light bar. Listen for audible sounds on start up.
	The alarm audio is set to off	Touch the **Alarms** tab and then touch the **General** tab. Select **Alarm Audio on**.
		In the Advanced menu, touch the **General** tab and then touch the **Alarms** tab. Uncheck **Allow user to turn off general audio**.
	The alarm audio is set too low	Touch the **Alarms** tab and then touch the **General** tab. Set **Volume** to the desired level.
		In the Advanced menu, touch the **General** tab and then touch the **Alarms** tab. Set **Minimum alarm volume** to the desired level.
	There is a faulty connection	Check the speaker harness and connections at the speaker and J12 on the main board. Replace the defective cable if needed.
	The speaker is defective	Replace the speaker.
	The main board is defective	Test speaker output using an oscilloscope on J12.

NIBP

Symptom	Possible cause	Suggested action
The NIBP frame on the display is blank	The USB cable is defective	Replace the USB cable.
	The NIBP module is not connected	Check the internal USB connection.
	The NIBP module is not functional	Replace the NIBP module.

Symptom	Possible cause	Suggested action
	If no NIBP error is logged, the main board may be defective	Check the error logs for NIBP errors. Replace the main board if necessary.

SpO2

Symptom	Possible cause	Suggested action
The SpO2 frame on the display is blank	The USB cable is defective	Replace the USB cable.
	The SpO2 module is not connected	Check the internal USB connection.
	The SpO2 module is not functional	Replace the SpO2 module.
	If no SpO2 error is logged, the main board may be defective	Check the error logs for SpO2 errors. Replace the main board if necessary.

SpHb

Symptom	Possible cause	Suggested action
The SpHb frame on the display is blank	The UI license is not installed	Purchase a license and install the license using the service tool.
	The Monitor profile is not selected	Change the profile to Monitor.
	The wrong sensor is connected	Use a sensor that supports the SpHb parameter.
	The sensor and/or cable expired	Replace sensor and/or cable.
	The Masimo SpO2 module does not have the SpHb parameter enabled	Purchase the parameter and install using the service tool.

Weight scale

Symptom	Possible cause	Suggested action
Weight does not appear in manual parameter frame.	The weight was not selected in advanced settings	Select weight in the Advanced settings (**Settings**> **Advanced**; enter **6345** and touch **OK**>**Parameters**>**Manual**.) **Note**: You can select only four manual parameters.

Symptom	Possible cause	Suggested action
	The weight scale is not licensed	Purchase a license and install the license using the service tool.
	The weight scale is not connected	Check cables and connections. Use the service tool to test connectivity. Replace cables.
	The weight scale is not configured	Consult the scale directions for use.

Temperature

Symptom	Possible cause	Suggested action
The temperature frame on the display is blank	The USB cable is defective	Replace the USB cable.
	The temperature module is not connected	Check the internal USB connection.
	The temperature module is not functional	Replace the temperature module.
	If no temperature error is logged, the main board may be defective	Check the error logs for temperature errors. Replace the main board if necessary.

Braun ThermoScan PRO 4000 thermometer

Symptom	Possible cause	Suggested action
The thermometer batteries don't charge	The rechargeable battery pack no longer takes a charge	Replace the rechargeable battery pack.
	Primary AA batteries are installed in the thermometer	Replace the batteries with a rechargeable battery pack.
The dock LED is green, but the battery is low or depleted	Primary AA batteries are installed in the thermometer	Replace the batteries with a rechargeable battery pack.
	The dock is defective	Replace the dock.

Note For additional troubleshooting tips for the thermometer, see the manufacturer's product documentation.

Manual parameters

Symptom	Possible cause	Suggested action
The manual parameter frame does not appear on the Home tab, or the Patients manual tab is blank.	No manual parameters are selected in Advanced settings	Select the desired manual parameters in Advanced settings (**Settings**> **Advanced**; enter **6345** and touch **OK**>**Parameters**> **Manual**). **Note**: You can select only four manual parameters.
BMI is not displayed.	The BMI parameter is not selected	Select the BMI parameter parameters in the advanced settings.
	Height or weight was changed	Adjusting the height or weight clears BMI.
	Weight scale not connected	BMI is available only from a weight scale with height.

Printer

Symptom	Possible cause	Suggested action
The printer does not print	The reactive side of the thermal paper does not face the print head	Reverse the printer paper.
	The thermal paper is wet	Clean and dry the inside of the printer housing and replace the printer paper.
	The USB cable is defective	Replace the USB cable.
	The printer module is not connected	Check the internal USB and power harness connection.
	The printer does not have power	Check J17 on the main board. For more information, see “Interconnect diagram.”
	The printer module does not function	Replace the printer module.
	The power harness is defective	Test the power harness. Replace if necessary.
	If no printer error is logged, the main board may be defective	Check the error logs for printer errors. Replace the main board if necessary.

Bar code reader

Symptom	Possible cause	Suggested action
The bar code reader powers on but does not transfer data	No license is installed	Purchase a license and install the license using the service tool.
	The bar-code reader is not programmed to use USB Com Port Emulation mode	Refer to the manufacturer's documentation to program the bar code reader to USB COM Port Emulation mode.

Errors

Symptom	Possible cause	Suggested action
#000000001	An internal software error	Power down and restart. If the error persists, call Welch Allyn Technical Support for service.
#000000002	An unclassified hardware error	
#000000003	Graphics RAM POST	
#000000004	System RAM POST	
#000000005	Watchdog POST	
#000000006	FLASH initiation failed	
#000000007	A display system error	
#000000008	A real-time clock error	
#000000009	An audio system error	
#000000010	An Ethernet system error	
#000000011	The touchscreen controller failed	
#000000012	Five or more SMBUS errors over a 1-minute period occurred	
#000000013	The communications module or main board failed	
#000000014	Main board USB hub failure	

Technical alarm messages

This section presents tables of technical alarm and information messages to help you troubleshoot issues on the device. For information about physiological, dialog, or informational messages, see the device's directions for use.

When the device detects certain events, a message appears in the Device Status area at the top of the screen. Message types include the following:

- **Information messages** appear on a blue background.
- **Low- or medium-priority alarms** appear on an amber background.
- **High-priority alarms** appear on a red background.

Technical alarm messages are low priority unless noted in the Message column.

You can dismiss a message by touching the message on the screen, or, for some messages, you can wait for the message to time out.

To use these tables, locate the message that displays on the device in the left column of the table. The remainder of the row explains possible causes and suggests actions that can resolve the issue.

If you cannot resolve the issue, use the service tool to read the error log files or use the service tool to perform a functional test[1] on the module reporting the message.

NIBP messages

Message	Possible cause	Suggested action
Alarm		
NIBP air leak; check cuff and tubing connections.	The NIBP module has an air leak	Check the cuff and tubing connections. If no external leaks are found, replace the NIBP module.
NIBP not functional. Call for service.	A calibration error occurred	Review the error log to determine the specific error. Calibrate the NIBP system using the service tool.
	Internal errors or messaging errors occurred	Review the error log.
	The ambient temperature is out of range	Use the monitor in the specified temperature range.
Unable to determine NIBP; check connections; limit patient movement.	Pressure exceeded the maximum limit for this patient mode	Check connections; limit patient movement. Clear the alarm and retry NIBP.
Unable to determine NIBP; check connections and tubing.	The NIBP tubing has a kink	Check the connections and tubing for kinks. Clear the alarm and retry NIBP.
Incorrect NIBP cuff size; check patient type.	A neonate cuff is in use with the monitor in adult or pediatric mode	Check the patient type. Clear the alarm and retry NIBP.

[1] Requires the service tool, Gold edition.

Message	Possible cause	Suggested action
Inflation too quick; check NIBP cuff and tubing connections.	NIBP inflation was too quick	Check the connections and tubing for kinks. Clear the alarm and retry NIBP.
Unable to determine NIBP; check inflation settings.	Target pressure was too low	Check inflation settings and change as necessary. Clear the alarm and retry NIBP.
		Change the inflation setting.
	Too many attempts	Change the inflation setting.
Information		
User cancelled NIBP reading.	Blood pressure reading cancelled by user	Touch **OK** to dismiss. Touch NIBP Start button to dismiss and restart the NIBP reading.
Tube type does not match device configuration. (NIBP measurement is available)	The tube type connected to the monitor does not match the NIBP configuration.	Touch **OK** to dismiss. Configure the NIBP advanced settings to match the tube type, patient type, and algorithm.
	The single lumen switch on the NIBP connection is stuck	Use a small screw driver to press the switch in and release until the spring returns the switch to the dual-lumen position.
Excessive patient movement	The NIBP reading was deemed not precise	Touch **OK** to dismiss. Limit patient movement and restart the NIBP measurement.

SpO2 and SpHb messages

Message	Possible cause	Suggested action
Alarm		
SpO2 not functional. Call for service.	A sensor is defective	Replace the SpO2 sensor with a known good sensor.
	An internal error occurred	Update host software to 1.50.02 or later
		Review the error log. Replace the SpO2 module if necessary.

Message	Possible cause	Suggested action
Attach SpO2 sensor to monitor.	The sensor was not detected	Check the sensor connection.
		Replace the sensor.
Replace the SpO2 sensor.	The SpO2 sensor is faulty or expired	Replace the SpO2 sensor.
	No SpO2 sensor is connected	Connect the SpO2 sensor.
	The cable is faulty or expired	Replace the cable.
Searching for pulse signal. (High-priority alarm)	The SpO2 sensor is not attached to the patient's finger	Touch the alarm icon or the SpO2 frame to dismiss the alarm.
		Set the SpO2 Alarm limits to off.
		Reattach the SpO2 sensor to the patients finger.
Low SpO2 signal quality. Check sensor.	Poor sensor placement on the patient.	Remove the sensor from the patient and reapply.
Low SpHb signal quality. Check sensor.	Poor sensor placement on the patient	Remove the sensor from the patient and reapply.
Low perfusion. Check sensor.	Poor sensor placement on the patient	Remove the sensor from the patient and reapply.
SpO2 mode only. Check sensor or cable.	The sensor is operating as an SpO2-only sensor because it failed to calibrate properly	Reattach the cable to the monitor.
		Remove the sensor from the patient and reapply.
SpO2 sensor expires in...	The SpO2 sensor will expire soon	Replace the SpO2 sensor.
Replace the SpO2 cable.	The SpO2 cable is not functioning properly or is expired	Replace the SpO2 cable.
Expired sensor.	The sensor is expired	Replace the sensor.
Expired cable.	The cable is expired	Replace the cable.
Information		
Excessive patient movement.	The SpO2 reading was deemed not precise	Touch **OK** to dismiss. Limit patient movement and continue the SpO2 measurement.

Temperature messages

Message	Possible cause	Suggested action
Alarm		
Connect temperature probe.	No probe is connected	Connect a temperature probe and retry.
	The probe is faulty	Replace the temperature probe.
	The temperature module returned a connect probe message	Connect a temperature probe and try again. If a probe is already connected, replace the probe. If the problem persists, replace the temperature module
Insert correct color-coded probe well.	The probe well is missing	Insert a temperature probe well.
Replace temperature probe.	The probe is faulty	Replace the temperature probe.
Temperature not functional. Call for service.	An internal error occurred	Review the error log. Replace the temperature module.
	The USB cable is disconnected	Check the USB cable.
	The battery is depleted or missing (Braun ThermoScan PRO 4000 thermometer only)	Replace the batteries.
Retry temperature measurement. **Note** This message often accompanies other temperature messages.	A probe heater or data error occurred	Retry the temperature measurement. If the problem persists, replace the probe.
	User settings require adjustment	Adjust the user settings and retry.
Temperature time limit exceeded.	The direct mode timed out	Return the temperature probe to the probe well and retry measurement.
Information		
Tissue contact lost.	Lost tissue contact while attempting to acquire temperature reading or acquired reading was performed with limited tissue contact	Touch **OK** to dismiss the message. Start a new temperature reading.

Weight scale messages

Message	Possible cause	Suggested action
Weight scale not functional. Call for service.	The weight scale is not operating properly	Check the scale.
		Use the service tool to check connectivity with adapter.
		Replace cables.
		Replace adapter.

Printer messages

Message	Possible cause	Suggested action
Alarm		
Low battery; plug into outlet.	The monitor's battery voltage is too low to support printing	Connect the monitor to AC power to recharge the battery.
Printer door is open; close to continue	The printer door is open	Close the printer door.
Out of paper.	The paper is not properly loaded	Align the paper with the print head.
	The paper sensor does not detect paper	Replace the paper.
		Check the paper sensor.
Printer too hot; wait to retry printing.	The print head overheated	Wait for the print head to cool down.
Printer not functional. Call for service.	The printer motor is broken	Replace the printer.
	The detection switch malfunctioned	Replace the printer.
	A hardware failure occurred in the power supply	Check printer voltage.
	The printer does not identify itself correctly	Check the jumper setting at J8 on the printer board. Replace the printer if necessary.
	The printer does not enumerate	Replace the printer.
	The printer door is ajar	Close the printer door.
Information		
Printing records.	Printing records	Allows the user to cancel printing if desired.

Message		Possible cause	Suggested action
Note	The number of records requested appears in the message and counts down during printing.		
Printing report; please wait.		The **Automatic print on interval** control is enabled	Wait for printing to complete. Change the interval configuration to disable **Automatic print on interval**.

Communications module messages

Message	Possible cause	Suggested action
Communications module did not power on properly. Power down the device. (High-priority alarm)	The communications board is not connected properly to the main board	Check the USB connection at J4. Check the Power connection at J50. Check the voltage from J49 on the main board for +5.0 ±0.5V DC. Replace the main board if necessary.
	The communications board malfunctioned	Replace the communications board.

Radio messages

Message	Possible cause	Suggested action
Alarm		
Radio not functional. Call for service.	A hardware failure occurred	Replace the radio.
	The radio has the wrong software	Update the radio software.
Radio error. Power down and restart.	The monitor and the radio failed to establish communication with each other	Power down and restart the monitor. If the problem persists, check the following: • The USB and power connections from the main board to the communications board. • The connection from the radio board to the communications board.

Message	Possible cause	Suggested action
		• Monitor and radio software compatibility. Replace the radio if necessary.
Unable to establish network communications. Radio out of network range.	The radio is no longer communicating with the access point	Verify that the monitor is within the radio coverage area. Verify that the radio is correctly configured to the network. If this message appears intermittently, check the RSSI value.
Unable to establish network communications. Call for service.	Unable to get an IP address from the DHCP server	Verify that a DHCP sever is available on the network. The monitor requires an IP address from a DHCP server.
Radio Software upgrade failed.	The connection with the host was broken	Re-establish the connection and try again.
	The radio was not provisioned correctly	Reset radio to factory defaults and try again.
	Hardware error	Replace the radio.
Information		
Radio software upgrade in progress. Do not shut down.	Radio software is being written to radio	Do not interrupt the upgrade until complete.
Radio card rebooting; please wait.	The radio is restarting as part of the software upgrade	Do not interrupt the upgrade until complete.

Ethernet messages

Message	Possible cause	Suggested action
Alarm		
Network not found; check network cable connection.	A network cable is unplugged	Check the network cable connection.
	A network connection is broken elsewhere	Check network wiring.

USB messages

Message	Possible cause	Suggested action
Alarm		

Message	Possible cause	Suggested action
External device not recognized.	An unrecognized external device is connected	Reconfigure the external device.
		Replace the external device.
		Disconnect the unsupported device.
USB Communication failure. Call for service	An internal or external device is connected but failed enumeration	Power down and restart.
		Check the external device.
		Check external and internal USB connections.
Information		
External device not licensed for use.	A device requiring a license has been connected to the USB connection	Obtain an authorization code from Welch Allyn to activate the license.
Unable to save configuration to USB.	There was a problem writing the configuration file to the USB flash drive	Use a Welch Allyn approved flash drive.
		Verify that the flash drive is not locked.
		Verify that there is space available on the flash drive.
Unable to read configuration from USB.	There was a problem reading the configuration file to the USB flash drive	Restart and try again.
USB accessory disconnected.	The USB cable between an external device and the monitor is disconnected	Confirm that the USB cable is connected to the device and the monitor.

System messages

Message	Possible cause	Suggested action
Alarm		
Set date and time.	The date or time is not set	Set the date and time.
	The date or time is not set properly	Reset the date or time.
Incompatible Welch Allyn device.	A known USB device enumerates, but fails	The device may be faulty. Test a known good device.
Unexpected restart occurred. Call for service.	A system error caused the monitor to restart	Check Event and Error logs. Run service tool verification test.

Message	Possible cause	Suggested action
Information		
Device shutdown is not available at this time.	The device cannot perform an immediate shutdown	Touch **OK** to dismiss message. If any process is active, wait for it to complete before attempting shutdown.
		If the device is unresponsive, hold down the power button until device shuts down. **Note** Any configuration changes not saved as default are lost.

Battery power manager messages

Message	Possible cause	Suggested action
Alarm		
Low battery 5 minutes or less remaining. (High-priority alarm)	Battery power is extremely low	Plug the monitor into AC power. If not plugged in, the monitor automatically powers off.
Powering down. Call for service.	The battery experienced an internal error	Replace the battery.
Battery is absent or faulty.	There is no battery in the monitor	Insert a battery.
	The battery is faulty	Replace the battery.
Low battery 30 minutes or less remaining.	The battery power is low	Touch the alarm icon to dismiss or plug the monitor to AC power.
Information		
Device is operating in battery mode.	The AC power cord has been disconnected	Touch the alarm icon to dismiss or plug the monitor to AC power.

Configuration Manager messages

Message	Possible cause	Suggested action
Alarm		

Message	Possible cause	Suggested action
Unable to load configuration; using factory defaults.	A configuration load error occurred	Restore factory defaults. If the error persists, call for service.
Functional error. Call for service.	A critical configuration load error occurred	Call for service.
Data did not transfer.	The monitor is configured to send data on save without being networked	Change advanced setting to disable **Automatically send on manual save**.
Information		
No connection for send.	The monitor is not configured to the network	Change advanced setting to disable **Automatically send on manual save** control. Configure the monitor to the network.

Patient data management messages

Status message	Possible cause	Suggested action
Alarm		
Maximum number of patient records saved. Oldest record overwritten.	The maximum number of patient records has been exceeded	Go to the Review tab and delete old records to prevent the alarm from appearing when new records are saved.
Unable to access patient information.	An error occurred when reading the patient list or patient record during startup	Power down and restart. If the error persists, call for service.
Information		
No data to save.	No patient data is available	Take or enter vital signs before saving.
Patient ID required to save data.	The configuration requires a patient ID to save data	Disable **Require patient ID to save readings** on the **Patient IDs** tab, available from the **Data management tab** in Advanced settings.
Clinician ID required to save data.	The configuration requires a clinician ID to save data	Disable **Require clinician ID to save readings** on the **Clinician IDs** tab, available from the **Data management** tab in Advanced settings.
Patient ID required to send data.	The configuration requires a patient ID to send data	Add a patient ID.

Status message	Possible cause	Suggested action
Patient list is full. Delete some patients to add more.	The maximum number of patients was exceeded	Delete a patient from the list to add a new patient.
Stop intervals to select new patient.	The device is set to take interval readings	Stop intervals before changing the patient.
No connection for send.	No connectivity is available to support sending data manually or automatically sending data on manual save	Check network connection.
		Check Radio Configuration settings.
Unable to identify clinician.	The clinician ID or password is incorrect	Confirm the clinician ID and password (if applicable), and retry.
Unable to load language.	Chinese did not load	Power down and restart the device.
Unable to retrieve list.	The device is unable to retrieve a patient list from the network	Check the network connection.
		Check the Radio Configuration settings.
		Verify that the server is available.

Disassembly and repair

These procedures provide instructions for device disassembly and board removal. Except where otherwise noted, the assembly procedure is the reverse of the disassembly procedure.

An exploded view of the assembly precedes disassembly instructions with callouts referencing the parts. In the instructions, numbers in parenthesis refer to callouts in the exploded drawings.

Each part's disassembly instructions may include one or both of the following:

- **Reassembly notes**: This contains information specific to reassembly not addressed in the disassembly instructions.
- **When replacing the *component***: This contains information specific to installing a new option or replacement part.

For information about screws or connectors used in the device, see "Screws" and "Connectors" in the appendices.

Note After performing any of these procedures and prior to returning the device to service, you must use the service tool, Gold edition, to complete the full suite of functional tests to ensure that all systems are operating within the design specifications. For more information about these tests and the service tool, see "Functional verification and calibration."
If you do not have the service tool, contact Welch Allyn Technical Support.

WARNING Electrical shock hazard. Disconnect AC power before opening the device. Disconnect and remove the battery before proceeding with disassembly. Failure to do this can cause serious personal injury and damage to the device.

WARNING Risk of fire, explosion and burns. Do not short-circuit, crush, incinerate, or disassemble the battery pack.

WARNING Safety risk. Do not attempt to service the device when the device is connected to a patient.

Caution Before disassembling the device, disconnect the AC power cord and any attached accessories (SpO2 sensors, blood pressure hoses and cuffs, temperature probes, and accessories) before disassembly.

Caution Remove the probe well in the temperature module prior to disassembly.

Caution Perform all repair procedures at a static-protected station.

Caution When the device case is opened, regard all parts as extremely fragile. Execute all procedure steps with care and precision.

Caution Observe screw torque specifications, especially with screws that secure directly into plastic standoffs.

Caution To avoid mismatching screws and holes, keep the screws for each piece with that piece as you remove modules and circuit assemblies.

Required tools and equipment

- #1 Phillips bit
- #2 Phillips bit
- #10 Torx bit
- Torque driver calibrated for 6.0 in-lb ±1.0 in-lb
- Torque driver calibrated for 7.5 in-lb ±0.5 in-lb
- Slotted screwdriver
- Tweezers
- Needle-nose pliers
- Spudger
- Tie-wrap tool calibrated for torque specification 5 INT
- Tie-wrap cutter
- Soft lens wipes
- Scissors or other cutting device
- Canned air
- A coin to open the battery door. Select a size that comfortably fits the slot.

Note For a list of the equipment required to perform functional verification and calibration, see “Required equipment” in “Functional verification tests.”

Power down the monitor

1. Touch the **Settings** tab.
2. Touch the **Device** tab.
3. Touch **Power down**.

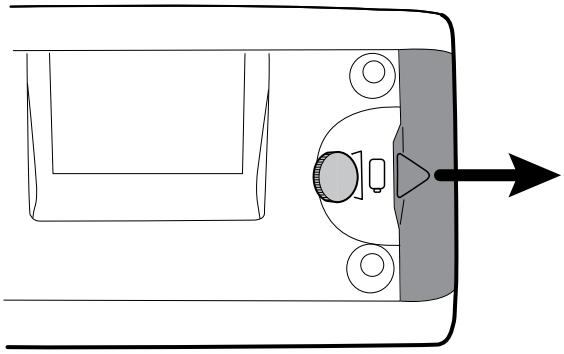
   This power-down method, which places the monitor into Standby mode, ensures that patient measurements are retained in the monitor memory for a maximum of 24 hours. (These saved measurements are available for recall, printing, or to send electronically to the network.) This method also ensures that any configuration settings you have changed and saved will be maintained at the next startup.

Note Because power is still available to charge the battery and power the monitor, the monitor is in Standby mode.

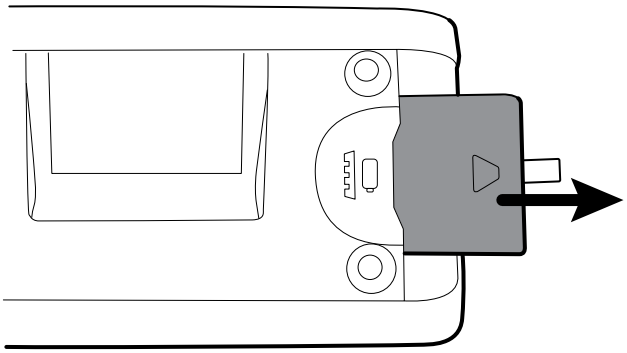
Remove the battery

Before removing the battery, power down the monitor as described in "Power down the monitor."

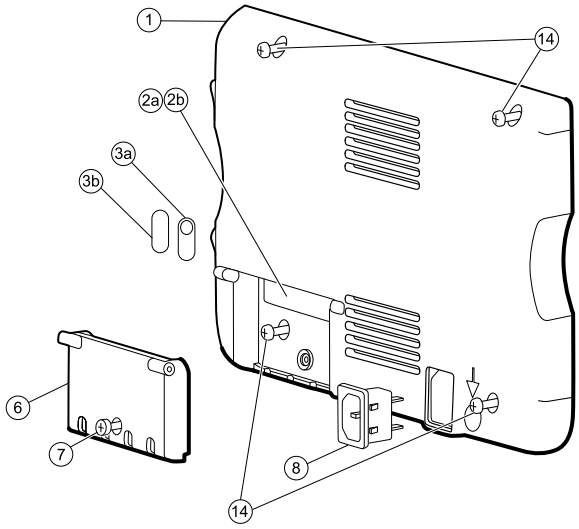
1. Turn the monitor upside down to access the battery cover.
2. Locate the battery cover, indicated by  .
3. Insert a coin into the slot and push to open. Choose a coin that fits comfortably into the slot.



4. Pull the battery out by pulling the battery label, which is visible when you open the battery cover.



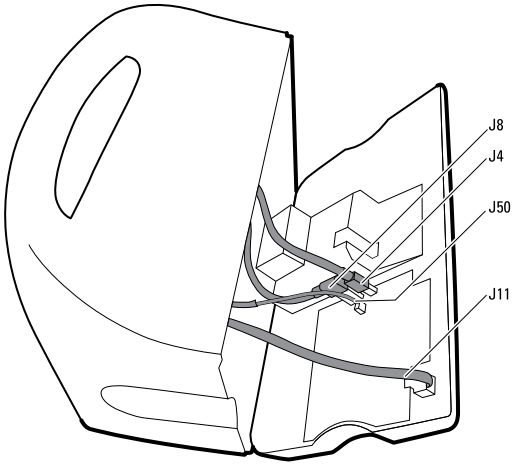
Remove the rear housing



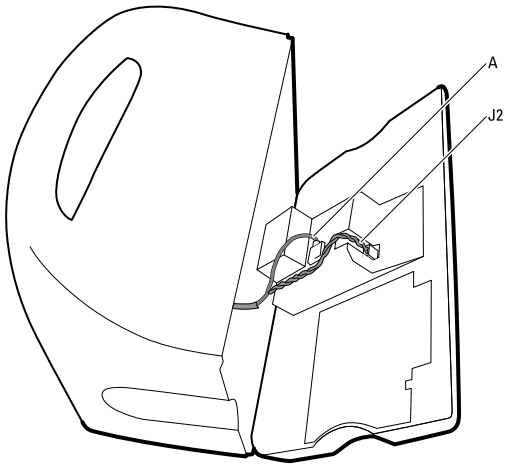
No.	Item	No.	Item
1	Rear housing	6	Rear housing communications door
2a	USB label 4 USB host	7	Communications door captive screw
2b	USB label 1 USB host	8	IEC connector

No.	Item	No.	Item
3a	Nurse call label	14	Screws, M4 X 10 pan head with NYLOC
3b	No nurse call label		

1. Remove the battery as described in “Remove the battery.”
2. Lay the monitor face down on the antistatic mat.
3. Loosen the screw (7) to open the communications door (6).
4. Open the communications door (6) to access the rear housing screw.
5. Remove the four rear housing screws (14).
6. Stand the monitor on its feet with the display facing away from you.
7. Pull the top of the rear housing away from the monitor to access the rear housing cable connections.
8. While supporting the rear housing, disconnect the following from the communications module:



   a. The Ethernet cable (J11).
   b. The small USB connector from J4.
   c. The large USB connector from J8.
   d. The communications power cable from J50.
9. Continuing to support the rear housing, do the following at the power-supply cover:
   a. Free the power supply and fan cable from the wire guide on the side of the power-supply cover.
   b. Disconnect the power supply cable from the power supply board at J2.



c. Disconnect the fan cable (A) from the main harness.

d. Separate the rear housing (1) from the monitor.

Once the rear housing is removed, choose which part of the monitor to work on:

- Rear housing components. For details, see “Disassemble the rear housing.”
- Main chassis. For details, see “Disassemble the main chassis.”

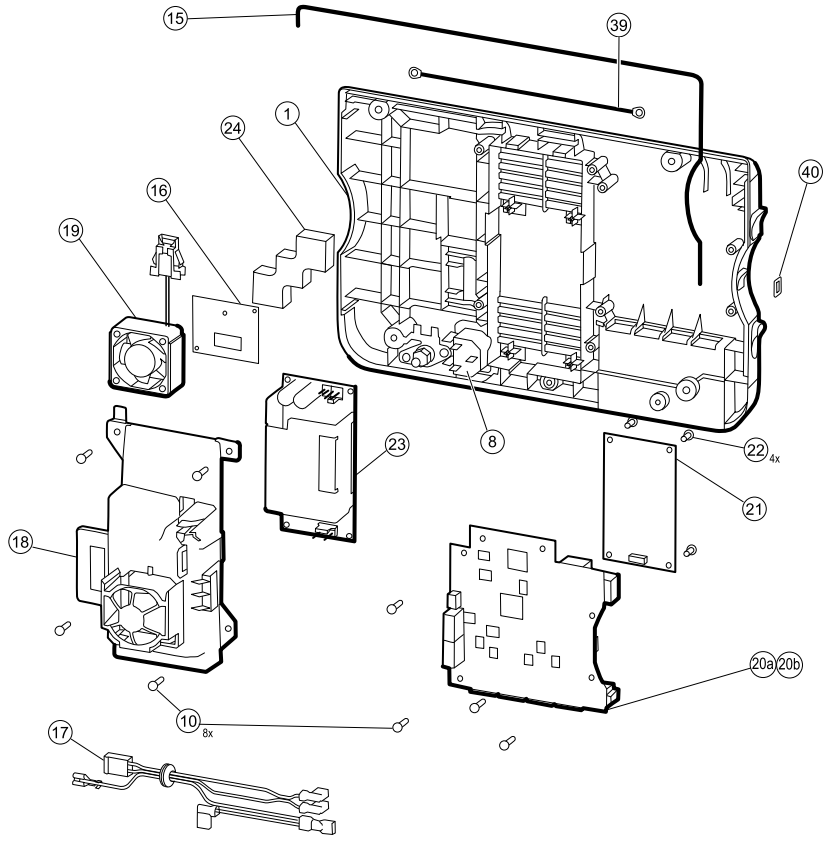
Reassembly notes

- Route the power cable and fan harness cables in the channel on the side of the power-supply cover.
- When closing the case, verify that no wires are crushed or pinched before securing with screws. After tightening the screws, examine the seam between the rear housing and the main chassis to verify that there is no bowing. Bowing indicates that something is preventing the mating surfaces from seating properly.

When replacing the rear housing

1. Follow the procedures to disassemble the rear housing and remove any components that you intend to transfer to the replacement housing.
2. Connect the AC power harness to the IEC AC power connector (8).
3. Install the rear housing gasket (15), included in the rear housing service kit, into the slot in the outer edge of the back housing. To ease installation, use a small flat-blade screwdriver to assist in pushing the seal into the channel.
4. Install any components removed from the old rear housing in the reverse order of the disassembly instructions.
5. After reassembling the rear housing install the USB Client Cover (40) as follows:
   a. Place the USB Client cover on a USB mini B cable with the tape facing out.
   b. Peel the tape off to expose the adhesive.
   c. Insert the USB cable into the client USB connection, press and remove the cable, the cover should adhere to the rear housing.
6. Install these labels:
   - USB label (2a model 6400 and 6500; 2b model 6300) in the communications door opening.
   - Nurse call label (3a model 6400 and 6500; 3b model 6300) over the nurse call connection, located on the right side of the unit.

Disassemble the rear housing



No.	Item	No.	Item
1	Rear housing	20a	Communications board (Model 6300)
8	IEC connector	20b	Communications board (Models 6400 and 6500)
10	Screw, plastite #4-20 X 0.500 pan head	21	Radio board, 802.11a/b/g
15	Rear housing gasket (Norprene tubing)	22	Screw, M3 X 0.5, Phillips pan head
16	Antenna board	23	Power supply board
17	AC power harness	24	Antenna mounting foam block
18	Power supply cover	39	Antenna cable
19	VSM 6000 fan assembly	40	USB client cover

Remove the communications board

1. Remove the rear housing as described in “Remove the rear housing.”
2. Lay the rear housing on its back on the antistatic mat.

3. Remove the four Torx-head screws (10) that secure the communications board (20a or 20b) to the rear housing.
4. Remove the communications board by doing the following:
   a. Lift the inside edge of the board until the USB connector clears the wire channel on the power-supply cover.
   b. Slide the board slightly towards the power supply and lift until the board contacts the wire channel on the power-supply cover.
   c. Lift the outside edge of the board until the side connectors clear the rear housing.
   d. For monitors with a radio: rotate the board (without pulling on the antenna cable) slightly counter clockwise, pivoting on the upper left-hand corner. Turn the board over and set it down outside the top of the case.
5. If replacing the communications board, remove the radio board (21) as described in "Remove the radio board and antenna."

Reassembly notes

- If the radio board was removed, reinstall it before reinstalling the communications board.
- To install the communications board, do the following:
  1. Position the board over the standoffs with the inside edge of the board under the wire channel on the power-supply cover until the outer edge drops into the rear housing.
  2. Align the mini-USB external connector with the opening in the side of the rear housing.
  3. Slide the mini-USB connector into the opening until the board rests on the standoffs.

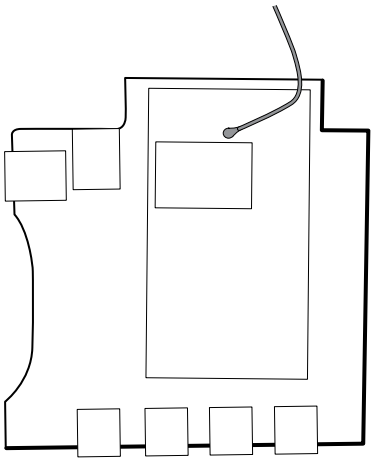
When replacing the communications board

Install the radio board on the new communications board before installing the communications board on the rear housing.

Remove the radio board and antenna

Caution Do not remove the radio antenna from the rear housing unless replacing the radio and antenna or the rear housing.

1. Remove the following:
   - Rear housing. For details, see "Remove the rear housing."
   - Communications board. For details, see "Remove the communications board."
2. If the monitor has the radio option:
   a. Turn the communications board over to access the radio board, taking care to avoid straining the antenna cable.

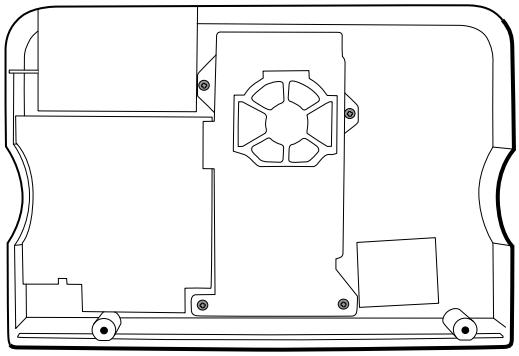


b. Remove the four screws (22) securing the radio board to the communications board.

Caution Do not disconnect the antenna cable from the radio board unless replacing the antenna cable. The female connection on the antenna cable is easily damaged.

c. Hold the communications board with one hand while grasping the radio board at the opposite end from the antenna connection and pull the radio board away from the communications board.

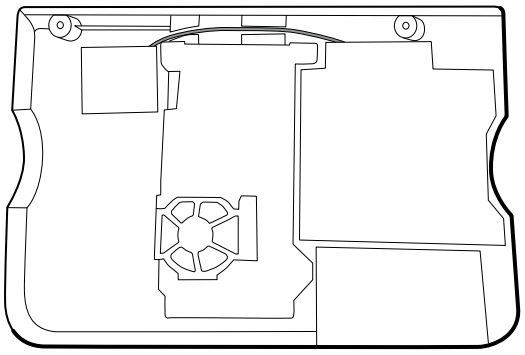
3. (Perform this step only if you are replacing the radio or antenna.) Disconnect the radio antenna cable from the radio board.
4. Remove the four Torx screws (10) securing the power-supply cover.



5. Remove the power-supply cover (18).
6. Use a soft tool such as a spudger to separate the adhesive foam block (24) from the inside of the rear housing.

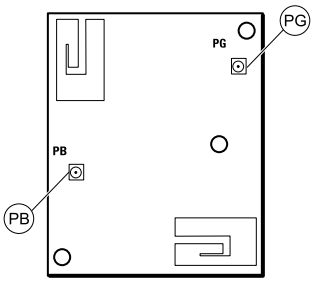
Reassembly notes

Route the antenna cable in the channel located at the top of the rear housing.

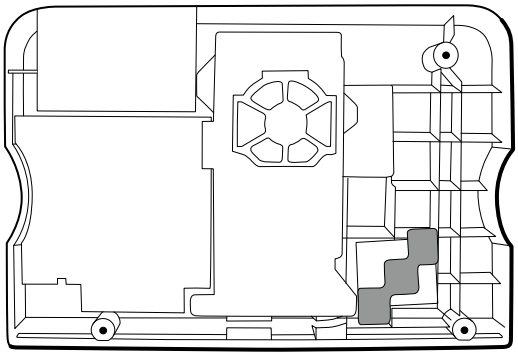


When replacing the radio board and antenna

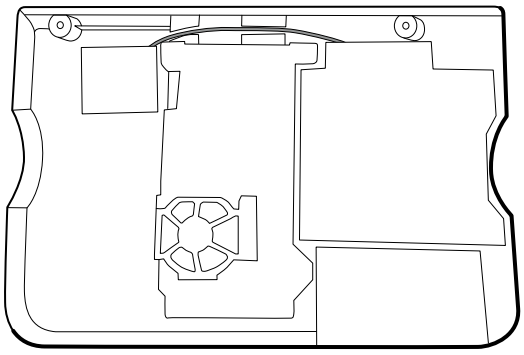
1. If the antenna is removed, clean the rear housing and mounting surface with isopropyl alcohol.
2. Attach the antenna cable to terminal G on the radio board. Attach the other end of the cable to the antenna on terminal PG.



3. Peel the backing off the foam block (24) and affix the foam block to the rear housing.

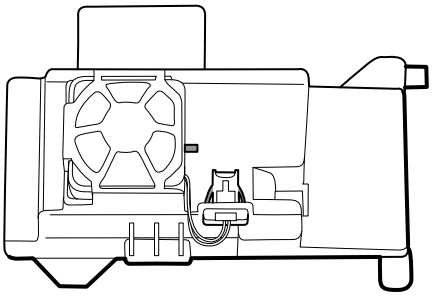


4. Expose the adhesive on the foam block. Mount the antenna (16) on the foam block with the antenna cable (39) oriented under the board and in the wire channel above the power supply.
5. Route the antenna cable in the channel located at the top of the rear housing.



Remove the fan

1. Remove the rear housing as described in “Remove the rear housing.”
2. Press the flanges on the sides of the fan harness connector and separate the fan connector from the power-supply cover (18).

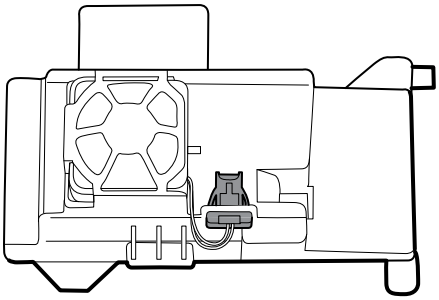


3. Depress the tab on the power-supply cover and slide the fan (19) over the tab and out of the housing.

Reassembly notes

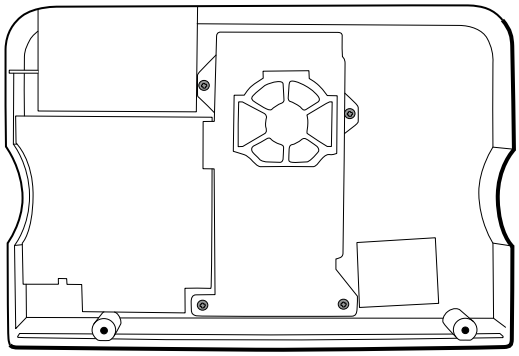
Caution Ensure that the fan is properly oriented. Air must flow toward the power supply.

- With the label facing down, slide the fan into the housing on top of the power-supply cover until the tab on the cover holds it in place.
- Clip the fan harness into the power-supply cover so that the connector is oriented toward the fan, as shown in the following figure.

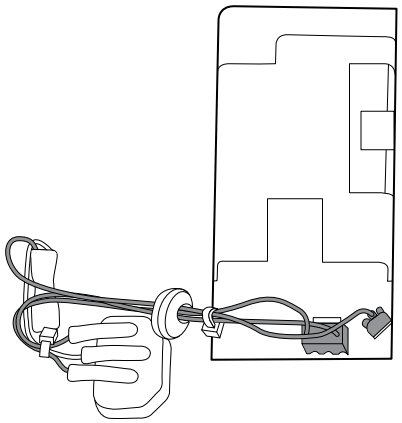


Remove the power supply

1. Remove the rear housing as described in “Remove the rear housing.”
2. Remove the four Torx screws (10) securing the power-supply cover.



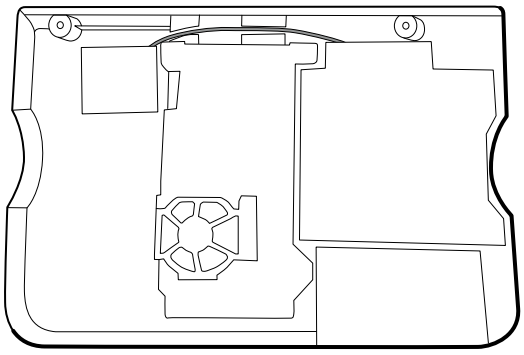
3. Remove the power supply cover (18).
4. Disconnect the following from the power supply:
   - The (green) ground cable
   - The AC power harness (17)



5. Remove the power supply.

Reassembly notes

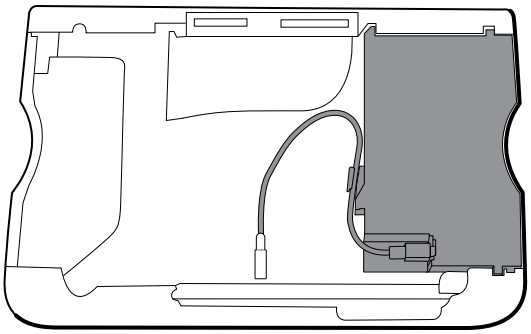
- Ensure that the grommet on the AC power harness is in the slot in the power-supply cover.
- When replacing the power-supply cover, ensure that the antenna cable is routed in the channel located at the top of the rear housing.



Disassemble the main chassis

Remove the SpO2 module

1. Remove the rear housing as described in “Remove the rear housing.”
2. Do one of the following:
   - If no SpO2 module is present, remove the blanking panel by sliding it out of the housing.
   - If an SpO2 module is present:
     a. Disconnect the USB cable from the SpO2 module.



     b. Remove the USB cable from wire clip on the SpO2 module.
     c. Slide the SpO2 module out of the case.

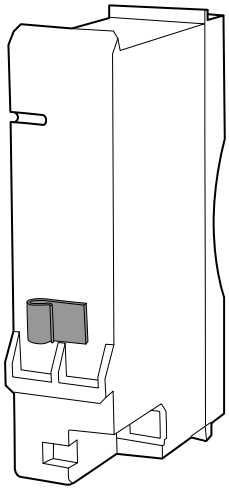
Reassembly notes

Insert the SpO2 module into the housing with the serial number label facing up.

When replacing the SpO2 module or adding a new option

Caution Ensure that your module has the correct option (Masimo or Nellcor).

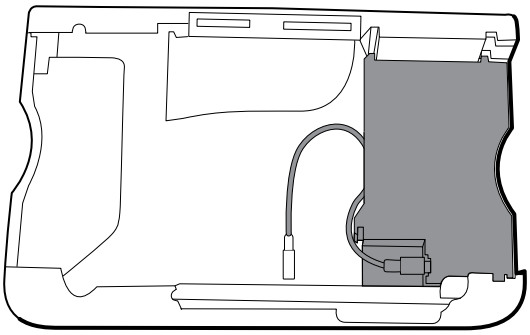
- Install the USB retaining clip onto the back of the SpO2 module.



- Insert the SpO2 module into the housing.

Remove the NIBP module

1. Remove the rear housing as described in “Remove the rear housing”
2. Remove the SpO2 module as described in “Remove the SpO2 module.”
3. Disconnect the USB cable from the NIBP module.

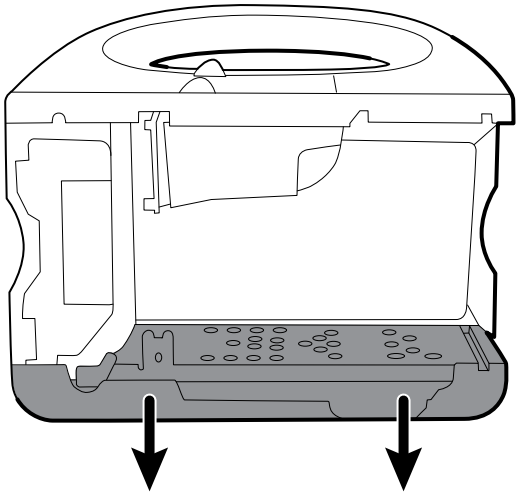


4. Slide the NIBP module out of the case.

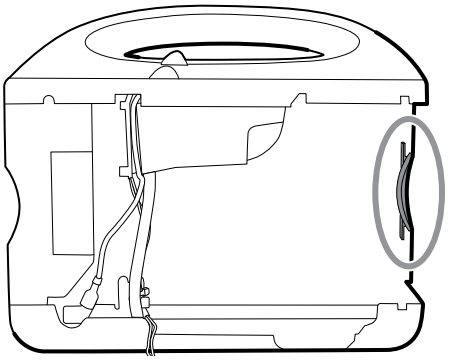
Reassembly notes

- Replace the NIBP module (the module closest to the front of the monitor) *before* replacing the SpO2 module.
- Insert the NIBP module into its housing with the serial number label facing up.

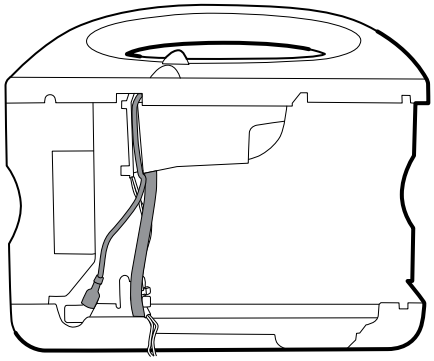
Remove the bottom housing



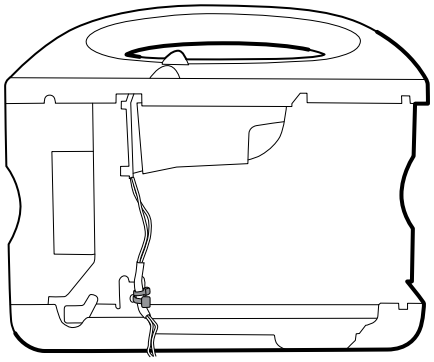
1. Remove the following:
   - Rear housing. For details, see “Remove the rear housing.”
   - SpO2 module. For details, see “Remove the SpO2 module.”
   - NIBP module. For details, see “Remove the NIBP module.”
2. Remove the insert from the left housing.



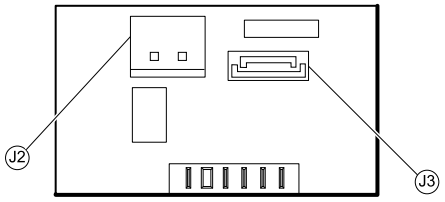
3. If your model has a printer, do the following:
   a. Remove the drain tube located between the printer and the bottom plate.



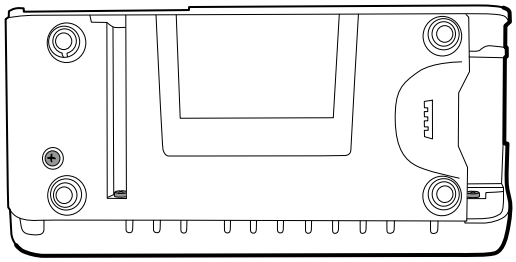
   b. Disconnect the printer ground wire from ground lug on the bottom plate.
4. Cut the tie wrap that secures the main harness to the bottom bracket.



5. Disconnect the speaker cable on the speaker (26) from the main harness.
6. Disconnect the following on the battery connector board:
   a. J2, power from the main board to the battery harness.
   b. J3, the battery harness.



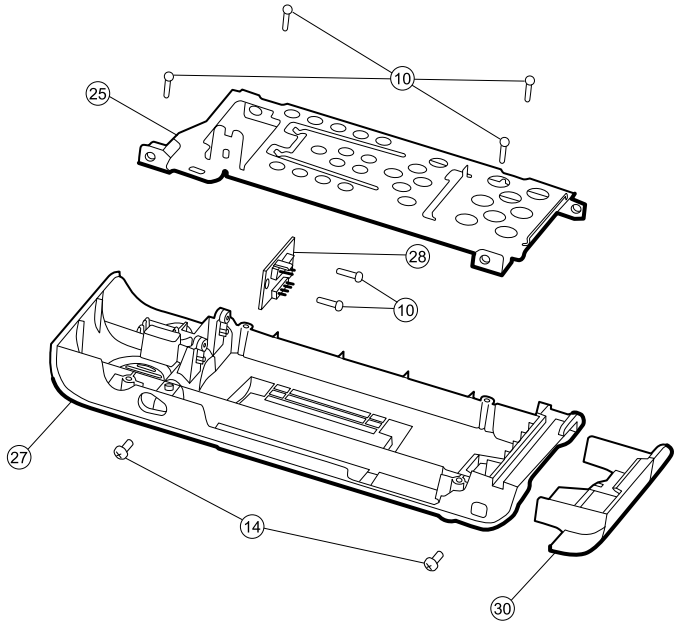
7. Remove the following screws:



   - The bottom housing screw from underneath.
   - The two screws that secure the bottom housing assembly onto the front housing.
8. Remove the bottom housing.
9. Disassemble the bottom housing:

   Note Disassemble the bottom housing only if replacing the battery connector board or installing the battery connector board on a new bottom housing.

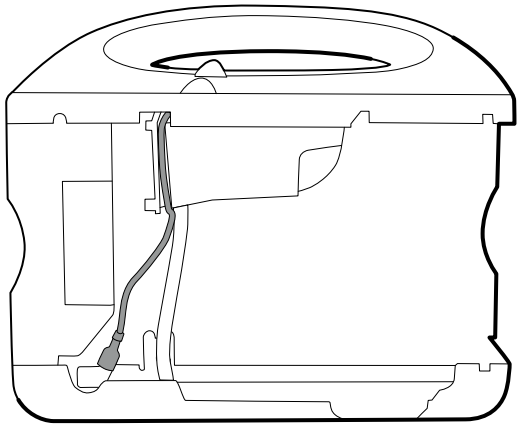
   a. Remove the bottom housing as described in “Remove the bottom housing.”
   b. Remove the two screws that secure the battery connector board to the bottom housing using a no.10 Torx driver.
   c. Remove the four screws that secure the chassis bottom to the housing.



No.	Item	No.	Item
10	Screws, plastite #4-20 X 0.500 pan head	27	Bottom housing
14	Screws, M4 X 10 pan head with NYLOC	28	Battery connector board
25	Bottom housing metal chassis	30	Battery door

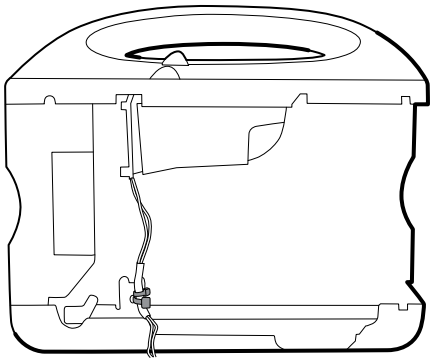
Reassembly notes

- Plug the speaker connection into the main harness in the lower left corner and tuck the cable behind the ground-wire stud. Ensure that the speaker cable is positioned in the channel.
- Route the printer ground wire through the channel on the printer housing.



- Connect the shortest cable (the cable closest to the wire tie) to the fan connector.
- Route the battery harness (J34 on the main board) under the power cable (J29 on the main board) on the main harness and plug into J3 on the battery connector board.
- Route the main board power to the battery harness under the power cable on the main harness and plug into J2 on the battery connector board.

- Secure the main harness to the bracket on the bottom housing using a tie wrap. Position the tie wrap just below the tie wrap on the main harness. Use the tie wrap tool to secure the tie wrap.

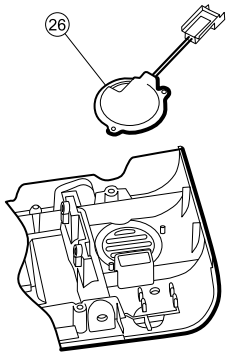


When replacing the bottom housing

Note The bottom housing must be replaced by a Welch Allyn service center to ensure proper labeling.

Remove the speaker

1. Remove the bottom housing as described in “Remove the bottom housing.”
2. Disassemble the bottom housing to more easily access the speaker.
3. Remove the speaker (26) from the bottom housing.

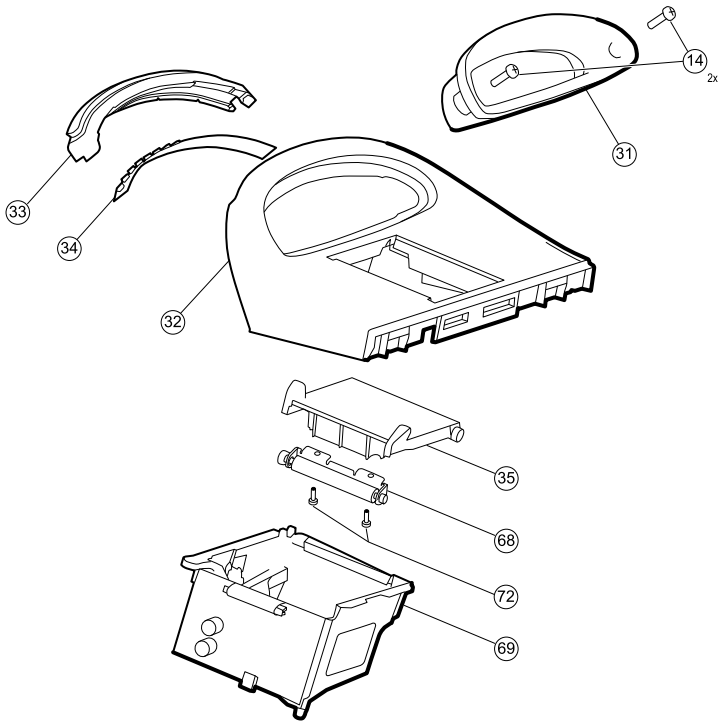


4. Remove any remaining gasket material and clean the surface with 70 percent isopropyl alcohol.

When replacing the speaker

1. Remove the paper to expose the adhesive on the gasket.
2. Align the holes in the speaker assembly with the pins on the bottom housing and press the speaker into place.
3. Apply pressure to the outer radius of the speaker assembly to assure good adhesion with the bottom housing.

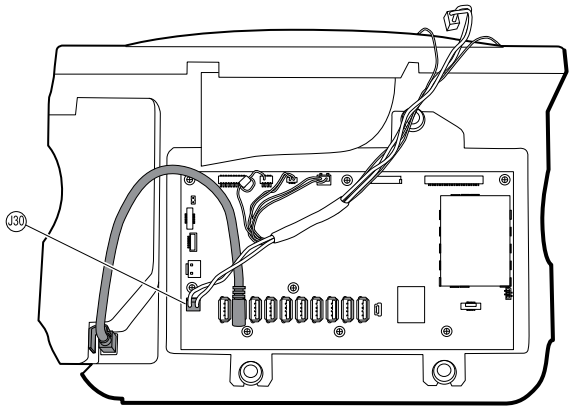
Remove the top housing



No.	Item	No.	Item
14	Screws, M4 X 10 pan head with NYLOC	35	VSM 6000 printer door blank
31	Handle insert	68	Paper feed roller
32	Top housing	69	Printer housing
33	Light bar	72	Screw, M2.2X8, Thrdform, PNH, TRX
34	Light bar LED board		

Note Do not remove the right side panel.

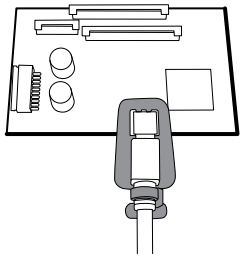
1. Remove the bottom housing as described in “Remove the bottom housing.”
2. Disconnect the power connector on the main harness from J30 on the main board.



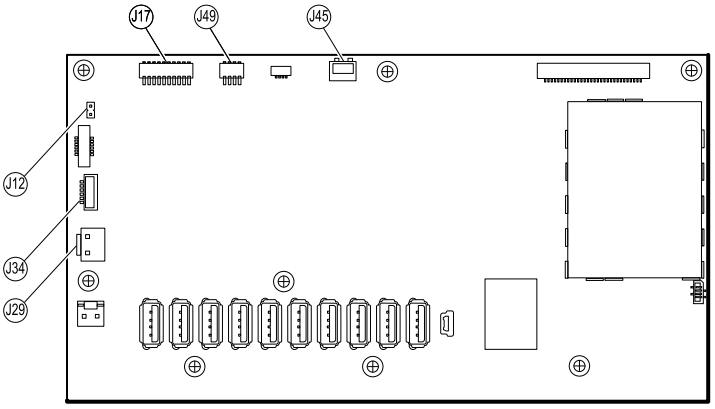
3. Lay the main harness over the top of the unit to clear the USB cables.
4. For models that include the temperature option, disconnect the USB cable connected to the temperature module from J1 on the main board and free the USB cable from the cable separator.

   Note Do not remove the USB cable from the temperature module unless you plan to replace the module. If you disconnect the USB cable, the wire clip must be replaced upon reassembly.

5. For models that include the printer option, unhook the plastic latch to disconnect the USB cable from the printer module.



6. Disconnect the USB cables from the main board.
7. Remove the USB cables and the cable separator.
8. Disconnect and then remove the following:



   a. The fan cable on the main harness from J45 on the main board.
   b. The communications power cable on the main harness from J49 on the main board.
   c. The main board's power to the battery harness from J29 on the main board.

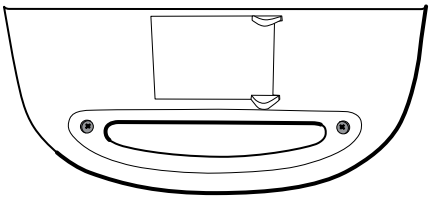
d. The battery harness from J34 on the main board.

e. The printer harness from J17 on the main board.

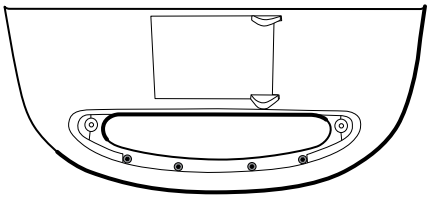
f. The speaker cable on the main harness from J12 on the main board.

Note Use extra care when disconnecting J12 to avoid pulling the connector off the board.

9. Remove the two screws (14) that secure the handle insert and remove the insert.



10. Remove the four screws that secure the handle.

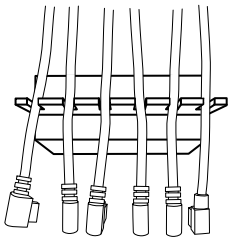
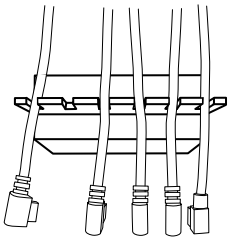


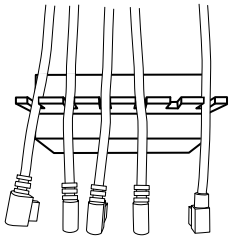
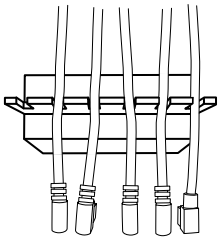
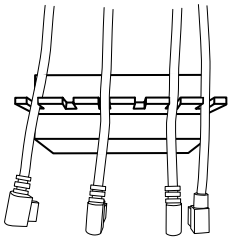
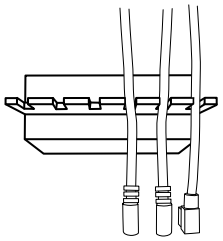
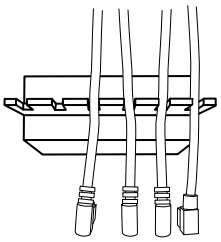
11. Remove the top housing.

Reassembly notes

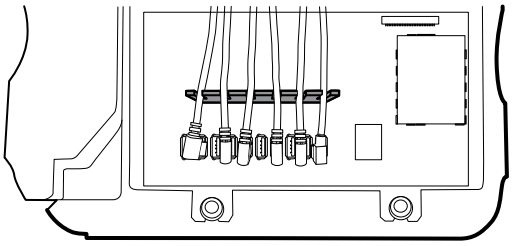
- Ensure that the printer is installed in the top housing. For more information, see "Install the printer."
- When reinstalling the USB cables, position them according to your monitor's configuration: Install the USB cable with right angles at both ends into the rightmost or sixth position from the left. Ensure that the mini-USB connector is nearest the cable separator.

Note If the USB cable was not removed from the temperature module, leave the leftmost position vacant until the cable separator is placed back in the case and the other USB cables have been connected to the main board. When the cable separator is in the case, connect the USB cable from the temperature module to J1 on the main board and snap the cable into the leftmost position in the cable separator.

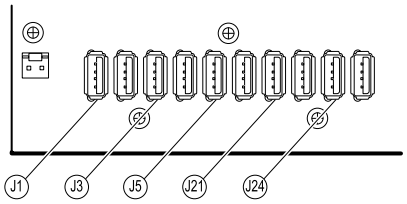
Model options	Cable positions	Model options	Cable positions
All options Install five USB cables into the left five positions of the USB cable separator. Insert the printer cable with the retaining clip in the second position from the left.		**No printer module** Install four USB cables into the left five positions of the USB cable separator, leaving the second position open.	

Model options	Cable positions	Model options	Cable positions
No SpO2 module Install four USB cables into the left five positions of the USB cable separator, leaving the fifth position open. Insert the printer cable with the retaining clip in the second position from the left.		**No temperature option** Install four USB cables into the left five positions of the USB cable separator, leaving the first position open. Insert the printer cable with the retaining clip in the second position from the left.	
No printer or SpO2 modules Install three USB cables into the left five positions of the USB cable separator, leaving the second and fourth positions open.		**No printer, SpO2, or temperature option** Install two USB cables into the left five positions of the USB cable separator, leaving the first, second, and third positions open.	
No printer, no temperature option Install three USB cables into the left five positions of the USB cable separator, leaving the first and second positions open.			

- Space each cable about 1.5 inches from separator to the end.
- Place the separator in the unit in the approximate location shown here:

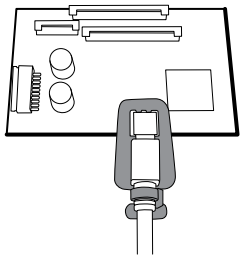


- Plug the USB cables into the main board connectors as follows:

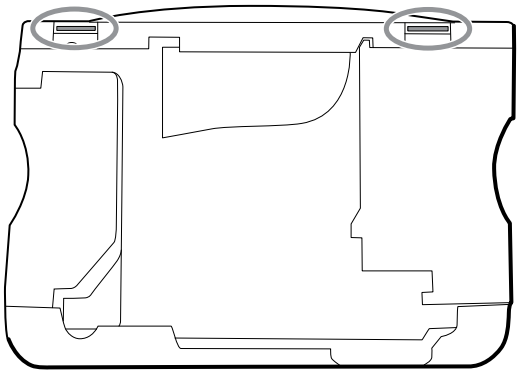


Connector	Connects with	Connector	Connects with
J1	Temperature module	J21	NIBP module
J3	Printer	J24	Communications board
J5	Sp02 module		

- For models with the temperature option, plug the leftmost USB cable into J1 on the main board. Plug the other end into the temperature module. Insert the USB cable into the retaining clip mounted on the temperature housing.
- For models with a printer, plug the second from the left USB connector into J3 on the main board.
  Plug the small end into the USB printer port while pulling the plastic latch away from the connector. Once the connector is seated, push the plastic clip over the connector to secure it.



- Verify that the Ethernet cable passes freely through the space between the temperature housing and the printer board, exiting the case in the space between the top of the temperature housing and beneath the top housing.
- Plug the communications board's power cable from the short end of the main harness into J49 on the main board, with the ferrite bead closest to the main board.
- When replacing the top housing on the chassis, line up the slots with the ends of the horizontal struts in the top housing to ensure proper seating.



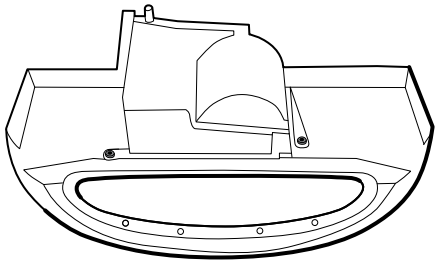
When replacing the top housing

For models without a printer, install a door blank as follows:

1. Remove the paper backing from the gasket on the blanking panel.
2. Install the door blank into the chassis, pressing to secure the blank to the chassis.

Remove the printer module

1. Remove the top housing as described in “Remove the top housing.”
2. Remove the two screws that secure the printer housing to the top housing.



3. Remove the printer from the top housing:
   a. Hold the printer housing while opening the printer door.
   b. Separate the printer and printer door from the top housing.

Reassembly notes

1. Place the printer door into the top housing assembly and hold it in place while performing the next step.
2. Verify that the ground wire exits from the side opposite the printer board in the notched area.
3. Snap the printer door shut to hold the printer in place while securing it into the housing with two screws.

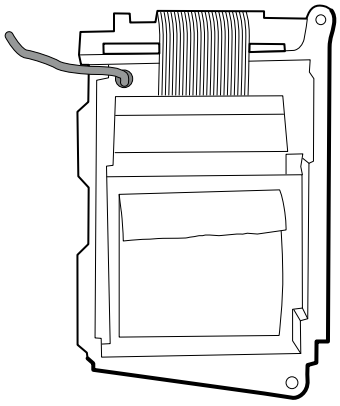
When replacing the printer door

1. Remove the printer platen roller (68) from the existing door and secure it to the replacement door with the two screws (72).

When replacing the printer module or adding a new option

- If adding a printer option, remove the printer blanking door. Remove any remaining gasket material and clean the surface with 70 percent isopropyl alcohol.

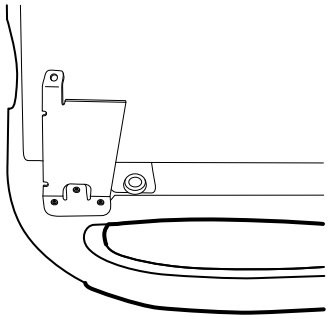
1. Separate the door from the printer assembly.
2. Attach the printer ground harness to the printer ground lug.



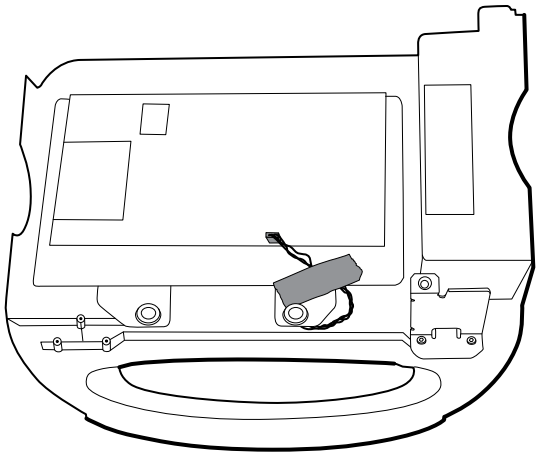
Remove the light bar

1. Remove the top housing as described in “Remove the top housing.”

2. Remove the three screws (10) that secure the horizontal strut (located on the right side when facing from the back) to the front housing.



3. Remove the strut.
4. Remove the tape that secures the light-bar harness to the LCD frame.

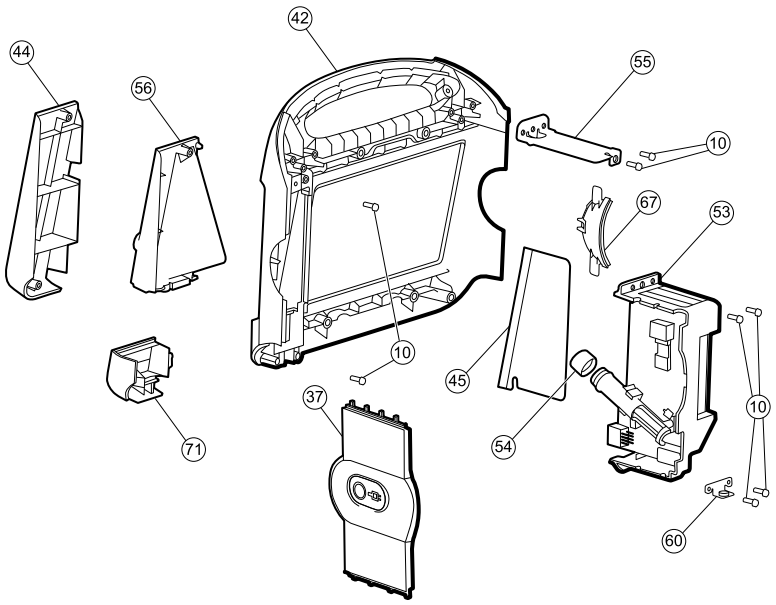


5. Disconnect the light-bar harness from J46 on the main board.
6. Remove the light-bar board (34) and housing (33) from the front housing.
7. Remove the light-bar board from the light bar.
8. Disconnect the light-bar harness from the light-bar board.

Reassembly notes

- Insert the light-bar board by placing the end without the connector into the closed end of the light bar, with the LEDs facing into the light bar.
  Ensure that you slide the non-connector end of the light-bar board to the end of the slot in the light-bar.
- Using the end furthest from the ferrite bead, plug the light-bar harness into the light-bar board.
- Route the light-bar harness as follows:
  - Underneath the horizontal strut.
  - In the channel and between the top of the housing and the LCD frame standoffs.

Remove the temperature module or housing



No.	Item	No.	Item
10	Screw, plastite #4-20 X 0.500 pan head	54	Probe well seal
37	Right side panel	55	Horizontal struts
42	Front housing	56	Temperature mounting cover
44	Temperature blanking panel	60	HSG mounting clamp, bottom housing
45	Thermal shield	67	Left insert
53	Temperature housing (templess)	71	Temperature connection access cover

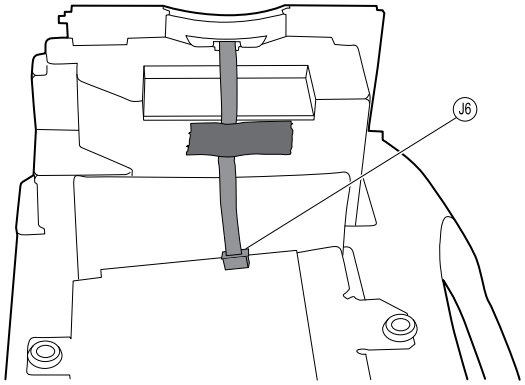
Note These instructions also apply to removing the empty temperature housing for models without the temperature option.

Note Do not disconnect the USB cable from the temperature module unless replacing the module. Disconnect the USB cable at the main board when removing the module.

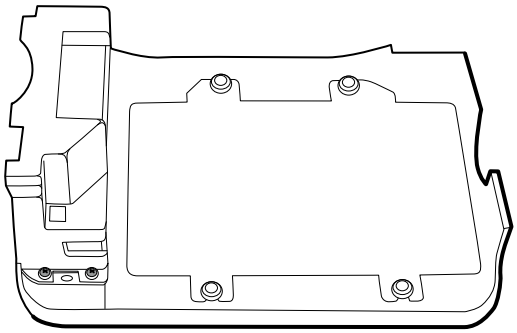
1. Remove the probe well from the temperature module.
2. Remove the top housing as described in “Remove the top housing.”

   Note The temperature module may be removed and replaced without disconnecting the main harness, battery harnesses, USB cables, or light-bar harness from the main board.

3. Disconnect the power button flex cable from J6 on the main board and remove the securing tape.



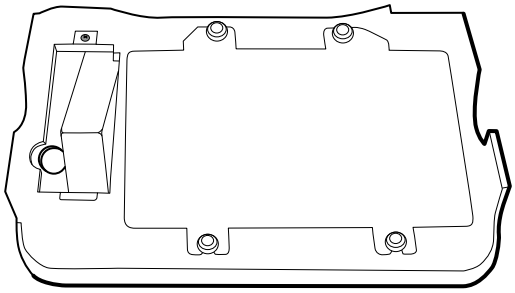
4. Remove the right side panel.
5. Remove the two screws (10) that secure the HSG clamp (60) and the bottom of the temperature module with the temperature mounting cover.



6. Remove the two screws (10) that secure the top of the temperature module.
7. Remove the temperature module.

Note If you are replacing only the temperature module without replacing the front mounting cover, stop here. Install the replacement module in the reverse order of the disassembly procedure.

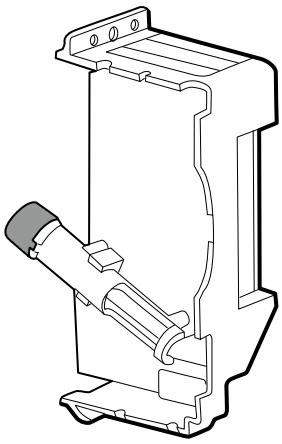
8. Do one of these:
   - If your monitor has a temperature module, remove the temperature mounting cover:
     a. Remove the screw that secures the temperature mounting cover to the front housing.



     b. Remove the temperature mounting cover (56) from the front housing.
   - If your monitor does not have a temperature module, remove the temperature blanking panel:
     a. Remove the two screws that secure the blanking panel to the front housing.
     b. Remove the blanking panel (44).

Reassembly notes

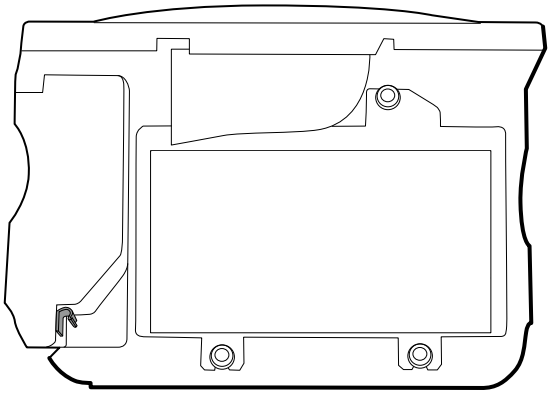
- Before installing the temperature module into the monitor housing, ensure that the probe-well seal is installed with the tab aligned with the slot or notch in the probe-well housing.



- Route the flex cable up and over the temperature module when plugging it into the J6 ZIF connector on the main board.

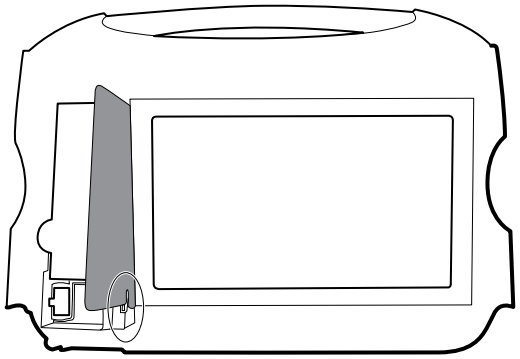
When replacing the temperature module or adding the option

1. When connecting the USB cable, do the following:
   a. Connect the USB cable to the temperature module.
   b. Position the retaining clip on the USB cable against the shoulder of the mini-B connector with the adhesive pad facing away from the temperature module and toward the bottom.
   c. Remove the backing to expose the adhesive on the retaining clip.
   d. Rotate the clip on the USB cable to stick to the temperature module housing.



When adding a new temperature module

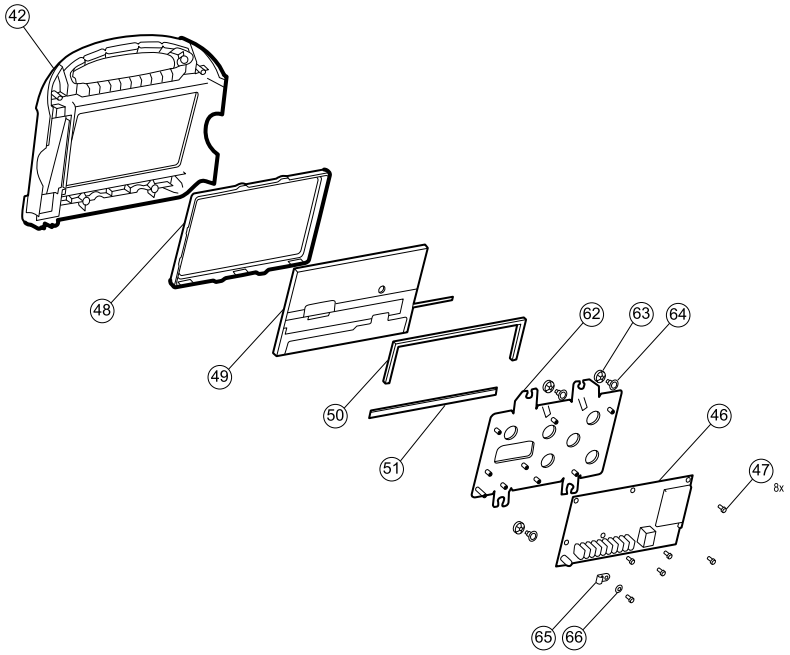
1. Follow the instructions to remove the empty temperature housing, main board, and LCD display.
2. Replace the front temperature blanking panel (44) with the temperature mounting cover (56).
3. Install the thermal shield on the front housing, aligning the notch on the shield with the housing.



4. Reinstall the LCD display in the reverse order of disassembly.
5. Reinstall the main board in the reverse order of disassembly.
6. Install the probe well seal onto the the probe well as described in the reassembly notes for the temperature module.
7. Insert the temperature module into the front housing aligning the probe well with the access hole in the front housing.
8. Secure the top of the temperature module housing to the front housing with two screws included with the kit.
9. Place the HSG clamp on the bottom of the temperature housing and secure with two screws.
10. Reassemble the monitor in the reverse order of disassembly.

Remove the main board

Note If you are replacing this board, you must have the service tool, Gold edition, to re-enter the serial number of the monitor and the main board.



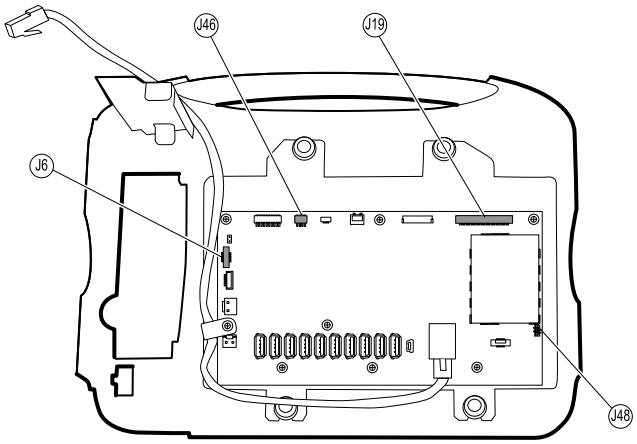
No.	Item	No.	Item
42	Front housing	51	Foam pad, bottom

No.	Item	No.	Item
46	Main board	62	LCD frame
47	Screw, M3 x 5 pan head	63	Grommet, ear - G411-1
48	LCD display bezel	64	Shoulder screw, ear G-411-1 metric
49	LCD display with touchscreen	65	Clamp, cable 3/16 X 3/8 wide X 3/4 long
50	Foam pad, top	66	Washer, M3

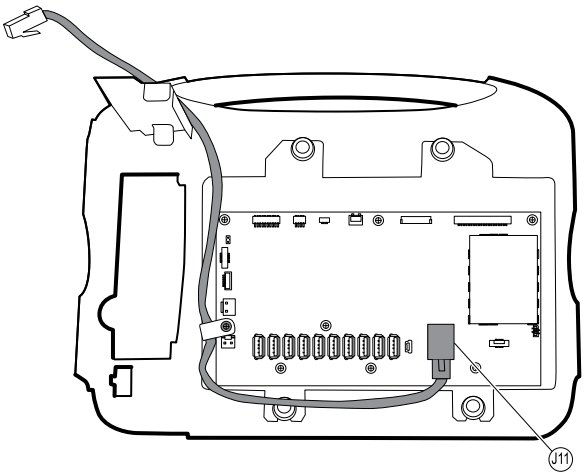
1. Remove the top housing as described in “Remove the top housing.”

   Note It is not necessary to remove the temperature module or light bar to remove the main board or LCD display.

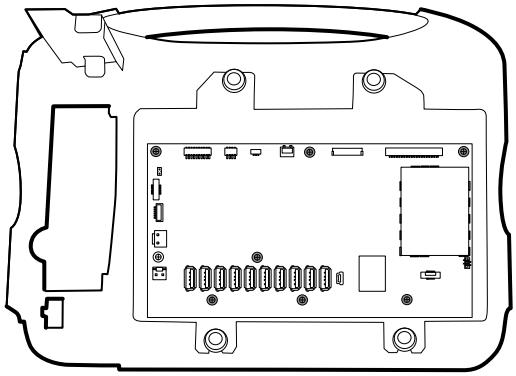
2. Disconnect the following on the main board:
   a. The power button flex cable from J6.
   b. The light-bar harness from J46.
   c. The LCD harness from J19 .
   d. The LCD flex cable from J48.



3. Remove the Ethernet cable:
   a. Disconnect the Ethernet cable from the Ethernet connector (J11) on the main board.
   b. Remove the screw that secures the Ethernet cable P-clamp to the main board.
   c. Remove the Ethernet cable.



4. Remove the seven screws that secure the main board to the LCD frame.



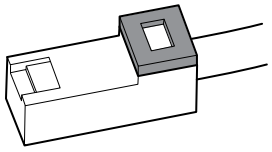
5. Remove the main board.

Reassembly notes

- Ensure that the LCD flex cable is not under the main board.

  Caution The LCD flex cable is extremely fragile and easily damaged. Do not cause creases that may break the connections.

- Route the Ethernet cable outside the PEM stud and not underneath the main board.
- Connect the end of the Ethernet cable with the shim to the main board.



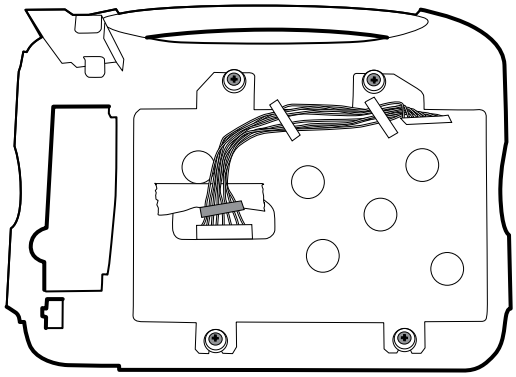
- When securing the main board, do not install a screw near J30 on the lower left side of the board until installing the Ethernet cable.
- If the light bar is not installed, install the light-bar harness into the housing, positioning the ferrite bead near the main board.

When replacing the main board

- When ordering the replacement main board, order the standard license for the model being serviced. You will receive an authorization code to enter in the service tool to reactivate the licenses included with the original configuration.
- After reassembling the monitor, use the service tool to provision the monitor as follows:
  - Enter the monitor's serial number. This can be found on the bottom of the monitor.
  - Restore any previously licensed features by entering the authorization code in the service tool. Use the authorization codes that accompanied the replacement board, along with any additional license authorization codes previously installed. Record the device serial number on the license Authorization Code cards received with the replacement board and retain for future use. If the license is lost, you can reuse the authorization code on the same device.
  - Update the host controller software to the current version. If the current version of the host software is not available after connecting the device to the service tool, contact Welch Allyn Technical Support.

Remove the LCD

1. Remove the main board as described in "Remove the main board."
2. Disconnect the LCD harness from the LCD. For easier access to the connector, you can slide the ferrite bead closest to the connector up the harness.



3. Remove the four shoulder screws that secure the LCD frame.
4. Remove the LCD frame.

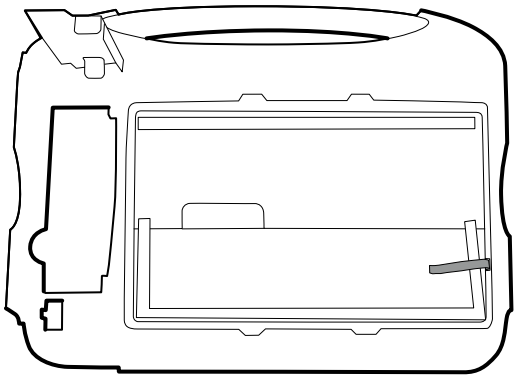
   Note: Be sure to support the LCD display if you are removing it with the frame. The foam strips on the display may cause the display to stick to the LCD frame.
5. Remove the LCD display.

Reassembly notes

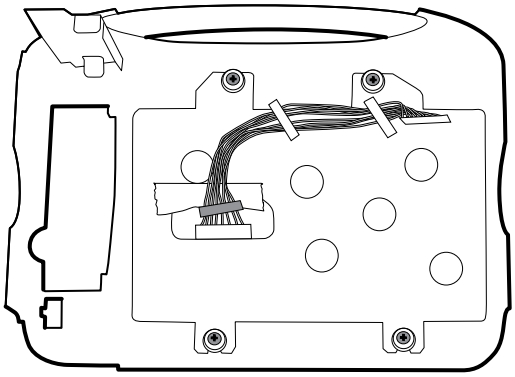
Ensure that the LCD flex cable is not under the LCD frame.

Caution The LCD flex cable is extremely fragile and easily damaged. Do not cause creases that may break the connections.

Insert the display into the bezel in the front housing with the exposed board on the bottom. Verify that the LCD flex cable feeds through the bezel's clearance feature.

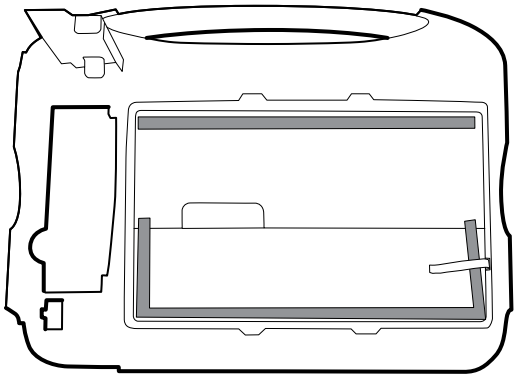


Place the LCD frame over the display. Verify that the LCD frame does not cover the LCD flex cable.



When replacing the LCD

- Peel the protective sheet from the LCD display.
- Add tape to the edge of the LCD frame, where the harness passes through to connect to the LCD display, to prevent abrasion to the LCD harness.
- When adding the ferrite beads, align the beads with the marks on the LCD frame.
- Verify that the foam strips are installed on the back of the display near the top and bottom edges, and extend half way up from the bottom on both sides of the LCD display.



Remove the front housing

Remove the following:

1. Rear housing. For details, see “Remove the rear housing.”

2. Bottom housing. For details, see “Remove the bottom housing.”
3. Top housing. For details, see “Remove the top housing.”
4. Light bar. For details, see “Remove the light bar.”
5. Temperature module and mounting cover. For details, see “Remove the temperature module or housing.”
6. Main board. For details, see “Remove the main board.”
7. LCD display. For details, see “Remove the LCD display.”
8. Remove the remaining strut.

When replacing the front housing

For models with the temperature option, replace the thermal shield (45).

Functional verification and calibration

Functional verification tests

The functional verification tests help to confirm the proper operation of the device and its options. These tests support the requirements of routine preventive maintenance. It is not necessary to disassemble the device to perform these tests.

The tests may also be useful as a diagnostic tool to help isolate a malfunction.

Each time you open the case and prior to returning the device to service, use the service tool, Gold edition, to complete the full suite of tests to ensure that all systems are operating within the design specifications.

Required equipment

Material no.	Description	Service tool	Basic tests	Qty
01802-110	Tester, calibration, 9600 plus	✓	✓	3
DOC-10	Cable, SpO2 extension, Nellcor	✓	✓	1
SRC-MAX	Nellcor portable oximetry tester	✓	✓	1
06138-000	CAL-KEY, assembly, M690/692	✓	✓	1
4500-30	Blood pressure hose, 5 ft.	✓	✓	1
5082-183	BP Y-tube, no fittings 1/8 in tube	✓	✓	1
103507	Masimo Rainbow SET tester (Masimo part #2368)	✓	✓	1
4500-925	USB 2.0/5-pin type A to mini-B cable, gold, 6 ft.	✓	✓	1
407691	Service test box	✓		1
541-USB001	OAE, USB 6' cable	✓		1

Material no.	Description	Service tool	Basic tests	Qty
407022	Assy, MMF Nurse call cable - Service	✓		1
713549	USB 2.0 Dual A to Single Mini B Cable	✓		1
200-2000IN	Pressure meter, NETECH	✓	✓	1
407672	BP Test volume repair fixture 113670	✓	✓	1
Off-the shelf item	NetGear router a/b/g or equivalent	✓		1
660-0138-00	Cable, patch 5' RJ45, T568B	✓		1
6000-30	Single tube blood pressure hose, 5 ft.	✓	✓	1
103521	Welch Allyn Service Tool	✓	✓	1
	PC running Windows XP SP3 or Windows 7	✓	✓	1

About the Welch Allyn Service Tool

Use the service tool, Gold edition, to complete the full suite of functional tests.

For information about the service tool, see the following:

- For instructions on installing and using the service tool, see the "Welch Allyn Service Tool Installation guide."
- For instructions on performing the functional verification, see the service tool's help files installed with the Welch Allyn Service Tool CD.

Tests performed by the service tool

The service tool tests the host device and installed options as listed in the following table.

Test	Description	NIBP	Temperature	SpO2	Host
POST	Performs the power-on self test (POST)[1]	✓	✓	✓	✓
Firmware version	Checks the firmware version	✓	✓	✓	✓
Firmware upgrade	Loads the latest firmware into the module	✓	✓	✓	✓
Leak	Verifies leaks using 100 cc volume	✓			
AD noise	Checks noise on the pressure channel	✓			
Calibration	Calibrates pressure transducers	✓			

Test	Description	NIBP	Temperature	SpO2	Host
Accuracy (NIBP)	Checks the accuracy of transducers across pressure range	✓			
Dump	Checks dump valves	✓			
Inflation	Verifies the pneumatic pump	✓			
Valve control	Verifies control of the system valve	✓			
Inflation linearity	Verifies operation of linear inflation control hardware	✓			
Probe detect	Verifies the operation of the probe detect switch		✓		
Accuracy (Temp)	Verifies the accuracy of the thermometer across range		✓		
Functional check	Verifies module operation with cal-key[2]		✓		
Current draw	Measures the module's current draw	✓	✓	✓[3]	
Printer	Prints the sample patient record and test pattern				✓
LCD display	Generate a test pattern				✓
Back light interface	Operator verifies LED outputs				✓
Touchscreen interface	Verifies touch-screen calibration				✓
LED	Turns the light bar LEDs on and off				✓
Fan interface	Turn the fan on and off				✓
Beeper	Sounds the buzzer				✓
Nurse call relay	Verifies the nurse call relay				✓
Battery operation	Verifies the internal battery				✓
Speaker	Sounds the speaker				✓
USB host port communication	Verifies the USB ports				✓
Ethernet communication	Verifies the Ethernet port				✓

[1] POST testing checks the following:

- **NIBP**: ROM, RAM, A/D channels, calibration, and user configuration.

- **Temperature**: ROM, RAM, calibration, and heater.
- **SpO2**: ROM and RAM, and connection to the SpO2 board.
- **Printer**: ROM and RAM, and connection to the printer.

[2] SureTemp Plus only.

[3] Normal mode.

Basic functional verification tests

These tests verify basic functionality of the NIBP, SpO2 and thermometry parameters for users without the service tool, Gold edition. They are not a substitute for the complete functional test available with the service tool, Gold edition. Welch Allyn recommends using the service tool, Gold edition, to perform preventive maintenance and verification of the device when completing a repair.

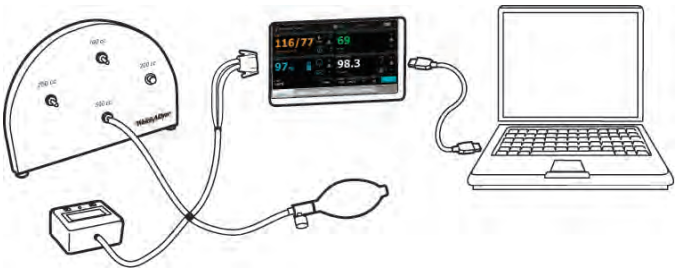
Use this section to perform functional verification tests on the device.

NIBP leak test

The NIBP leak test is performed automatically using the service tool. The leak test pressurizes the system with a start pressure (P_s) of 250 mmHg ± 10 mmHg. After 15 seconds (T_t) the end pressure (P_e) is measured. The leak rate is calculated using the formula $L = (P_s – P_e)/ T_t$. The test fails if the leak rate exceeds 5 mmHg in 15 seconds.

Perform an NIBP leak test

1. Launch the service tool on the PC.
2. If the simplified interface is active, choose the Service option.
3. Log on with User ID: ADMIN without entering a password.
4. Connect the device to the PC using the USB 2.0/5-pin type A to mini-B cable (4500-925).
5. Power on the device.
6. Connect the BP Y-tube (5082-183) to the BP connection.
7. Connect each end of the four-way hose connection.



8. Select the device you want to test from the device list.
9. Click **NIBP Sensor** under the Device Information tab.
10. Click **Leak Test** in the NIBP Sensor pane on the right side of the window
11. Follow the prompts until the test completes.
12. Click **Close**.

To record the results of your test, go to “Service record.”

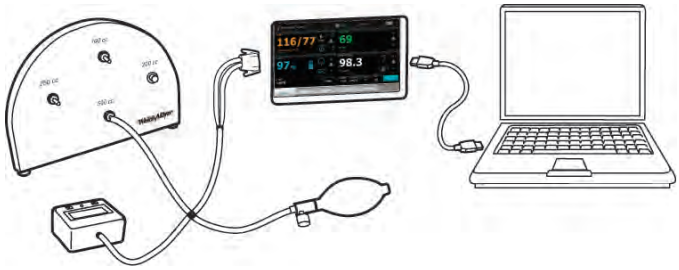
NIBP over pressure test

The NIBP over pressure test is performed automatically using the service tool. The over pressure test verifies that the NIBP system will prevent the pressure from exceeding 329 mmHg in adult mode and 164 mmHg in neonate mode. To pass this test, the device must shut down the pump and open the valves when the pressure is between 280 mmHg and 329 mmHg in adult mode, or 130 mmHg to 164 mmHg in Neonate mode.

Perform an NIBP over pressure test

Note If you are performing this test after performing the NIBP leak test, skip to step 9.

1. Launch the service tool on the PC.
2. If the simplified interface is active, choose the Service option.
3. Log on with User ID: ADMIN without entering a password.
4. Connect the device to the PC using the USB 2.0/5-pin type A to mini-B cable (4500-925).
5. Power on the device.
6. Connect the BP Y-tube (5082-183) to the BP connection.
7. Connect each end of the four-way hose connection.



8. Select the device you want to test from the device list.
9. Click **NIBP Sensor** under the **Device Information** tab.
10. In the NIBP Sensor pane on the right side of the window, click **Over Pressure Test**.
11. Follow the prompts until the test completes.
12. Click **Close**.

To record the results of your test, go to “Service record.”

NIBP accuracy check

The NIBP accuracy check is performed manually using the service tool to close the valves. The accuracy check compares the reading from the primary transducer pressure shown in the service tool window with the reading from an external calibrated digital pressure meter. The results of this check are not recorded in the service tool log file. To record the results for your records, copy the table in the service manual. If a calibration verification is required, run the NIBP calibration included with the Gold edition of the service tool.

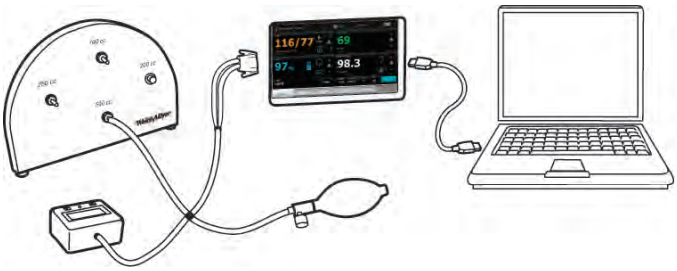
Caution False equipment error can occur. This accuracy check verifies only the accuracy of the primary transducer. If the safety transducer is out of calibration, a false error can occur due to the pressure difference between the primary and safety transducer. To prevent potentially false errors, Welch Allyn recommends a qualified service technician perform a full functional verification and calibration on an annual basis.

WARNING Patient safety risk. If the primary transducer fails, the system might not identify an over pressure condition at the right limit, causing injury when the device is re-connected to a patient. To ensure patient safety, Welch Allyn recommends a qualified service technician perform a full functional verification and calibration on an annual basis.

Perform an NIBP accuracy check

Note If you are performing this test after performing a previous NIBP check, skip to step 9.

1. Launch the service tool on the PC.
2. If the simplified interface is active, choose the Service option.
3. Log on with User ID: ADMIN without entering a password.
4. Connect the device to the PC using the USB 2.0/5-pin type A to mini-B cable (4500-925).
5. Power on the device.
6. Connect the BP Y-tube (5082-183) to the BP connection.
7. Connect each end of the four-way hose connection.



8. Select the device you want to test from the device list.
9. Click **NIBP Sensor** under the **Device Information** tab.
10. Click **Accuracy Check** in the NIBP Sensor pane on the right side of the window.
11. Connect the 500 CC volume.
12. Turn on the pressure meter and zero if necessary.
13. Check the accuracy at 0 mmHg.
14. Record the reading on the pressure meter and the service tool and compare the results.
15. Using the hand bulb, pressurize the NIBP system to 50 mmHg ± 5mmHg and allow 10 seconds for the pressure to stabilize.
16. Record the reading on the pressure meter and the service tool and compare the results.
17. Using the hand bulb, pressurize the NIBP system to 150 mmHg ± 5 mmHg and allow 10 seconds for the pressure to stabilize.
18. Record the reading on the pressure meter and the service tool and compare the results.
19. Using the hand bulb, pressurize the NIBP system to 250 mmHg ± 5 mmHg and allow 10 seconds for the pressure to stabilize.
20. Compare the reading on the pressure meter to the service tool reading and record the results.
21. Click **Done** to open the NIBP valves and complete the check.

To record the results of your test, go to “Service record.”

SpO2 and SpHb tests

Use this procedure to test the device SpO2 function and SpHb function, if included.

Perform a Masimo SpO2 and SpHb test

1. Power on the device.
2. Touch the **Settings** tab.
3. Touch the **Profiles** tab.
4. Select **Monitor**.
5. Return to the Home tab.
6. Connect the Masimo Rainbow SET tester (103507).
7. Give the device up to 30 seconds to stabilize, and then verify a displayed pulse rate of 61 bpm ± 1 bpm and a displayed SpO2 of 81% ± 3%.
8. If the SpHb option is active, verify that the parameter is displayed with a reading of 14g/dl ± 1 g/dl.

Perform a Nellcor SpO2 test

Use this procedure to test only the device SpO2 function.

1. Power on the device.
2. Connect the Nellcor SRC-MAX SpO2 functional tester to the SpO2 input connector through a Nellcor DOC-10 extension cable.

   Note In the following tests, if the SRC-MAX defaults are outside the device alarm limits, readjust the limits or silence the alarms.

3. Verify the following on the SRC-MAX:
   - All of the device LEDs flash: left panel, center panel, and right panel.
   - The SRC-MAX initializes to default condition where the four test parameter LEDs are lit closest to their selector buttons.
   - The default pulse rate is 60 bpm and the default SpO2 is 75%.
4. Give the device up to 30 seconds stabilize, and verify a displayed pulse rate of 60 ± 3 bpm and a displayed SpO2 of 75 ± 2%.
5. Set the SRC-MAX pulse rate to 200 bpm.
6. Give the device up to 30 seconds to stabilize, and verify a displayed pulse rate of 200 ±3 bpm.
7. Set the SRC-MAX SpO2 saturation percentage to 90.
8. Give the device up to 30 seconds to stabilize, and verify a displayed SpO2 saturation level of 90 ± 2%.
9. Disconnect the SRC-MAX

SureTemp temperature system test

The SureTemp temperature system test is performed using a calibration key (06138-000). The calibration key tests the system using a fixed resistance to display a temperature of 97.3 ± 0.2 °F (36.3 ± 0.1 °C).

Perform a SureTemp temperature system test

1. With the system power on and the temperature probe in the well, disconnect the probe cable from the temperature input connector on the front of the device.

2. Connect the temperature test key to the temperature input connector.
3. Remove the probe from the well.
4. Verify that the displayed temperature is 97.3 ± 0.2 °F (36.3 ±0.1 °C).

SureTemp temperature probe and system test

Use this procedure to test the temperature function while verifying the temperature probe. To achieve accurate results, you must perform this test with the device in Direct mode.

Test each probe at the low, medium, and high set points on the tester. Repeat the procedure for each thermometer and temperature to test.

Set up the 9600 Plus calibration tester

Place the tester on a level surface away from sunlight, drafts, and other sources of heat or cold.

The tester takes approximately 20 minutes to heat to the lowest set point.

To expedite testing, Welch Allyn recommends the following practices:

- To eliminate waiting for the tester to heat to the next set point, use three testers, each set to one of three different set points.
- When using only one tester to test several thermometers at all three temperatures, test all thermometers at one set point before proceeding to the next set point.
- To eliminate waiting for the tester to cool down, start at the lowest set point. Because the tester does not have an internal fan, it requires more time to cool down than to heat up.

Change the 9600 Plus set point

To scroll from one set point to the next, press and hold the Temperature Selection button until a beep sounds.

The new set point appears in the upper left corner of the LCD display. The device's current temperature appears, flashes, and continues flashing until the cavity reaches equilibrium at the new set point. The 9600 Plus beeps when the set point is reached.

Perform a SureTemp temperature probe and system test

1. Set the 9600 Plus to the desire set point and wait for the display to stop flashing.
2. Insert the temperature probe, without a probe cover, into the thermistor device port on the tester.
3. When  appears on the display, touch it to switch to Direct mode.
4. Wait for up to two minutes for the temperature reading to stabilize.
5. Record the results in the temperature service record.
6. Return the temperature probe to the probe well on the device.
7. Repeat the procedure as necessary until all thermometers are tested at each temperature.

To record the results of your test, go to "Service record."

Braun ThermoScan PRO 4000 thermometer test

This explains how to perform a functional verification on the Braun ThermoScan PRO 4000 thermometer using the 9600 Plus Calibration Tester.

Note Use this procedure in place of the verification and calibration test for the Braun PRO 4000 dock in the Welch Allyn Service Tool version 1.0.2.0 and earlier.

Caution Before the test, place thermometers and tester in the same room for approximately 30 minutes so that they adjust to the ambient temperature.

For more information, see the *Welch Allyn 9600 Plus Calibration Tester Directions for use*.

Perform a Braun ThermoScan PRO 4000 functional verification test

Test each thermometer at the low, medium, and high set points on the tester. After placing the thermometer in calibration mode, repeat the procedure from step 4 for each thermometer and temperature to be tested.

1. Clean the probe window with a cotton swab slightly moistened with isopropyl alcohol, remove excess alcohol with a clean cotton swab, and let air dry for 5 minutes. Do not use any chemical other than alcohol to clean the probe window.
2. Place the thermometer in calibration mode:
   a. Make sure that the thermometer displays the OFF symbol.
   b. Turn on the thermometer by pushing and releasing **I/O mem**.

      Symbols and functions appear as the thermometer performs an automatic self check.
   c. Wait for two dashes and °C or °F to appear on the display.
   d. Push and hold **I/O mem**.

      After approximately 3 seconds, a short beep sounds, and the OFF symbol flashes on the display. Then a long beep sounds.
   e. Release the button immediately.

      The display flashes and shows the CAL symbol.

   The thermometer is now in calibration check mode.
3. Apply a new probe cover. Place the probe firmly into the Ear Device Port.
4. Wait approximately 3 seconds, and then press the thermometer Start button.

   The ExacTemp light flashes.
5. Leave the thermometer in the tester until a beep sounds.
6. Remove the thermometer from the tester and read the temperature in the thermometer's display. If the temperatures are within ±0.2 °C (±0.4 °F) of the tester's set point, the thermometer is within calibration.
7. Record the results in the thermometer service record.
8. Press the start button once to clear the previous reading.
9. Wait 1 minute, and then take another reading with the same thermometer. Repeated measurements in short sequence might cause higher readings.

   Note If using only one tester, test all available thermometers for calibration verification at the current set point, before raising the set point.

10. Repeat the procedure from step 4 as necessary until all thermometers are tested at each temperature.
11. Exit CAL mode using one of the following methods:
    - Press and hold the I/O mem button until the OFF symbol flashes.
    - Wait for 4 minutes. The thermometer automatically exits CAL mode.

To record the results of your test, go to “Service record.”

Service record

Date:	**Time**:
Device name:	**Serial number**:
Technician:	**Service tool version**:

Leak test

Leak test	Specification	Actual reading	Pass	Fail
LeakTest:	Max: 5			

Over Pressure test

Over Pressure test		Specification	Actual reading
OverPressureTest:	Adult mode:	280 329	
	Neonate mode:	130 164	

NIBP accuracy check

Target pressure ± 5 mmHg	Pressure meter	Service tool	Specification	Pass	Fail
0 mmHg	mmHg	mmHg	± 1 mmHg		
50 mmHg	mmHg	mmHg	± 3 mmHg		
150 mmHg	mmHg	mmHg	± 3 mmHg		
250 mmHg	mmHg	mmHg	± 3 mmHg		

SpO2 test results

Masimo SpO2, SpHb, and heart rate test

Test	Specification	Actual reading	Pass	Fail
SpO2 heart rate 61 bpm	Pulse rate 61 ±1 bpm 60 to 62 bpm	bpm		
SpO2% saturation 81%	Saturation 81% ±3% 78 to 84%	%		
SpHb g/dl 14g/dl	SpHb 14g/dl ±1g/dl 13g/dl to 15g/dl	g/dl		

Nellcor SpO2 and heart rate test

Test	Specification	Actual reading	Pass	Fail
SpO2 heart rate 60 bpm	Pulse rate 61 ±3 bpm 57 to 63 bpm	bpm		
SpO2% saturation 75%	Saturation 81% ±3% 73 to 77%	%		
SpO2 heart rate 200 bpm	Pulse rate 200 ±3 bpm 197 to 203 bpm	bpm		
SpO2% saturation 90%	Saturation 90% ±2% 88 to 92%	%		

Calibration key temperature test for SureTemp Plus

Temperature test	Specification ± 0.2°F (± 0.1°C)		Actual reading	Pass	Fail
97.3 °F (36.3°C)	97.1 to 97.5°F	36.2 to 36.4°C	°F or °C		

SureTemp Plus test

Temperature tested	Specification ± 0.2 °C (± 0.4 °C)		Actual reading	Pass	Fail
96.8 °F (36.0 °C)	96.4 °F to 97.2 °F	35.8 °C to 36.2 °C			
101.3 °F (38.5 °C)	100.9 °F to 101.7 °F	38.3 °C to 38.7 °C			
105.8 °F (41.0 °C)	105.4 °F to 106.2 °F	40.8 °C to 41.2 °C			

Braun ThermoScan PRO 4000 test

Temperature tested	Specification ± 0.2 °C (± 0.4 °C)		Actual reading	Pass	Fail
96.8 °F (36.0 °C)	96.4 °F to 97.2 °F	35.8 °C to 36.2 °C			
101.3 °F (38.5 °C)	100.9 °F to 101.7 °F	38.3 °C to 38.7 °C			
105.8 °F (41.0 °C)	105.4 °F to 106.2 °F	40.8 °C to 41.2 °C			

Electrical safety testing

Welch Allyn recommends performing ground continuity, leakage current, and dielectric strength tests[1] when replacing the power supply or primary wiring according to EN/IEC 60601-1 - Medical Electrical Equipment – Part 1: General Requirements for Basic Safety and Essential Performance or EN/IEC 62353 - Medical Electrical Equipment - Recurrent Test and Test After Repair of Medical Electrical Equipment.

Due to the variability of test equipment in the field, Welch Allyn does not include specific instructions to perform electrical safety tests. When performing electrical safety tests, refer to your test equipment manuals for detailed instruction. The following table provides connections and test limits to assist you in performing these tests.

Test	Limits
Ground continuity	Ground continuity from EP stud* (equipotential terminal) to the Gnd pin of the IEC power connector shall be no greater than 0.1 ohms.
Leakage current	Leakage current shall be less than 300 µA from EP stud* to mains (Line and Neutral pins of the IEC power connector).
Dielectric strength	Dielectric strength shall be 1.8 kVAC EP stud* to IEC mains (Line and Neutral pins of the IEC power connector).

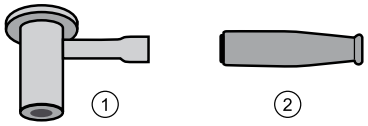
* To locate the equipotential terminal, see “Controls, indicators, and connectors.”

Ground stud connector

Welch Allyn Connex Integrated Wall Systems are equipped with a ground stud (equipotential terminal) for electrical safety testing, and to connect a potential equalization conductor. To ensure use of the proper connector for safety testing, the ground stud is recessed into the system’s housing. Do not use “alligator” style clamps or connectors. The mating electrical connector requires self assembly by crimping it to appropriate connecting leads.

The mating connector (Type POAG-KBT6DIN, order number 15.0010) consists of the right-angled socket and insulator, as shown in the next figure. You can purchase the mating connector and the crimping pliers from the manufacturer, Multi-Contact (http://www.multi-contact.com).

[1] Perform this test only if there is a reason to doubt the integrity of the electrical insulation (e.g. multiple trips of a residual-current device or liquid ingress of a saline solution). If you determine this test should be performed, return the device to Welch Allyn for service.



Item	Description	Type	Order no.
①	The mating electrical connector, a right-angled socket made of nickel-plated brass with Multilam™ made of gold-plated, hard-drawn copper alloy.	POAG-WB6DIN	01.0404
②	Insulator	T-POAG6	15.5004-24
	Crimping pliers with mandrel crimp for 4 mm² and 6mm² flexible conductors.	POAG-PZ-N	14.5009

Options, upgrades, and licenses

Welch Allyn supports option, software, and license upgrades for all models.

Option upgrades for devices still under warranty that require any installation inside the device must be performed by a Welch Allyn service center unless you participate in the Partners in Care Biomed Partnership Program. Option upgrades external to the device such as the Braun docking station can be installed without voiding the warranty. If you want to install the options, we recommend you attend either the classroom or online technical training course for the device. The training is required to be eligible to receive the Welch Allyn Service Tool Gold edition. The Gold edition is required to verify that the device is functioning correctly after it has been serviced. Although all of the option upgrades are calibrated and tested before leaving the factory, Welch Allyn recommends performing a complete functional test whenever the device is serviced.

Software upgrades, when available, can be purchased or provided at no charge if your device is covered by a Welch Allyn Service Agreement. The upgrades can be installed by either a Welch Allyn service center or by using the service tool, Silver or Gold edition.

If you choose to install software upgrades on your own, you will receive the software through the internet. When ordering software, provide the serial number of the device you want to install the software on.

Licenses are available for purchase to turn on additional software features or communication options. If you want to install licenses, you will need the service tool, Silver or Gold edition, and an internet connection. If you purchase a license, you will receive a code to enter in the service tool running on a PC connected to the internet that will contact a server and download the license file. The service tool connects with the device to install the license to turn on the advanced feature. A more detailed description of the license process can be found in the service tool help files.

Note When a license authorization code is used to activate the license, the authorization code is tied to the device's serial number. Save the license authorization code with the serial number for future use. If the main board is replaced, you will need the authorization code to reactivate the license files.

Available options, upgrades, and licenses

The following options, upgrades, and licenses can be added to each model's base configuration.

Options

Model	6300	6400	6500
Masimo	◒	◒	◒
Nellcor	◒	◒	◒
SureTemp Plus	◒	◒	◒
Braun ThermoScan PRO 4000[1]	◒	◒	◒
Masimo with SpHb enabled [2]	○	◒	◒
Printer	◒	◒	◒
Radio	○	◒	●

[1]Requires host software version 1.50.01

[2]Requires host software version 1.70.00

○ Not available for this model. ◒ Available for this model. ● Included with this model.

Supported software upgrades

Software improvements and added features will only be available in the latest versions of software. If your device encounters issues with an older version of software, you may be asked to upgrade the software to the current release. To receive the latest software versions you must install PartnerConnect with the Welch Allyn Service Tool. See the Welch Allyn Service Tool help files to learn how to upgrade your device software.

Software updates and upgrades are supported as shown in the table below. New software upgrades will be pushed out to all devices using PartnerConnect.

Model	6300	6400	6500
VSM 6000 host	●	●	●
NIBP	◒	◒	◒
SpO2	◒	◒	◒
SureTemp Plus	◒	◒	◒

Model	6300	6400	6500
Braun Dock [1]	◒	◒	◒
Radio	○	◒	◒

[1]Requires host software version 1.50.01

○ Not available for this model. ◒ Supported for this model.

Licensed features

Model	6300	6400	6500
Connectivity	●	●	●
Barcode reader	◒	◒	◒
Application framework	◒	◒	◒
Weight scale [1]	◒	◒	◒
Masimo SpHb [2]	○	◒	◒
Profiles	◒	◒	◒
Spot check	◒	●	●
Triage	◒	●	●
Monitor	●	●	●

[1]Requires host software version 1.70.00

[2]Requires host software version 1.70.00

○ Not available for this model. ◒ Available for this model. ● Included with this model.

Install options

All internal option installations entail opening the device case and performing some disassembly. Because this process requires disconnecting internal components, Welch Allyn requires that the device undergo a full functional test after reassembly and before placing the device back in service.

Before installing a new option, read information about removing the option in “Disassembly and repair.” After familiarizing yourself with the process, follow the instructions in the disassembly section to remove the empty housing or, in the case of the printer and radio access, the empty space.

Note The Braun option does not require disassembly because it is external. The Masimo SpHb option does not require disassembly because it is a software upgrade.

Option install procedures

This table lists the procedures required to install all available internal options. For step-by-step instructions, see "Disassembly and repair."

Caution Before installing an option, disconnect patients and power down the monitor.

Option to install				
SpO2	SureTemp Plus	Printer	Radio	Procedure
✓	✓	✓	✓	Remove the battery.
✓	✓	✓	✓	Remove the rear housing.
			✓	Remove the communications board.
			✓	Remove the power supply cover.
✓	✓	✓		Remove the SpO2 module or blanking panel.
	✓	✓		Remove the NIBP module.
	✓	✓		Remove the bottom housing.
	✓	✓		Remove the top housing.
	✓			Remove the empty temperature housing.
	✓			Remove the temperature blanking panel.
		✓		Remove the printer door blank.
	✓			Remove the main board
	✓			Remove the LCD display
			✓	Install the communications board and radio.
			✓	Install the radio antenna.
			✓	Re-install the power-supply cover.
	✓			Install the temperature cover.

Option to install				
SpO2	SureTemp Plus	Printer	Radio	Procedure
	✓			Install the temperature module.
		✓		Install the printer module.
	✓	✓		Install the top housing.
	✓	✓		Install the bottom housing.
	✓	✓		Install the NIBP module.
✓	✓	✓		Install the SpO2 or blanking panel.
✓	✓	✓	✓	Re-install the rear housing.
✓	✓	✓	✓	Insert the battery.

After installing an option, be sure to confirm the proper operation of the monitor and its options as described in “Functional verification tests.”

Masimo Hemoglobin (SpHb) upgrade

The Masimo hemoglobin (SpHb) parameter is offered for the device's 6400 and 6500 models. You can upgrade devices configured without Masimo SpO2 by adding Masimo SpO2 or by replacing the Nellcor SpO2 module with a Masimo SpO2 module.

If a Masimo SpO2 module is required, it may only be installed by Welch Allyn, Masimo Corporation, or customers participating in the Partners in Care Biomed program. Customers performing the hardware upgrade without participating in a Partners in Care Biomed program will void the device warranty. Participants in the Biomed program may order the upgrade kit (Material no. 104210) and perform the installation on their own. The upgrade kit contains a Masimo SpHb-enabled SpO2 module, a user interface license authorization code, and instructions for installing and licensing the upgrade. To complete the installation you will also need the tools listed in the “Disassembly and Repair” section of this manual.

The SpHb parameter is enabled on devices configured with Masimo SpO2 through a firmware upgrade. You can install the firmware through PartnerConnect or return the device to a Welch Allyn service center. To receive the firmware upgrade through PartnerConnect, you must have the service tool installed on a PC connected to the internet. For installation instructions, consult the *Welch Allyn Service Tool Installation and Configuration Guide*.

Before updating the device verify that the device firmware meets the minimum requirements needed to support the SpHb parameter. Devices that do not meet the minimum firmware requirements may be upgraded on-line through PartnerConnect.

Masimo SpHb requirements:

- Host Firmware version 1.70.00 or later
- Masimo SpO2 with firmware (consult the instructions included with the upgrade kit)

Required tools:

- Welch Allyn Service Tool version 1.5.0 with PartnerConnect WA Material no. 103521
- Masimo Rainbow Tester (Welch Allyn Material no. 103507).

When you purchase the firmware upgrade (Material no. 104361) to enable the SpHb parameter, you receive upgrade instructions and an authorization code. Follow the instructions to check the host firmware version and Masimo firmware version. If the firmware does not meet the minimum requirements, follow the instructions to upgrade them. When contacting Welch Allyn Technical Support to receive your upgrade package, provide the authorization code and the serial number for each device you plan to upgrade. Technical Support will build the upgrade package and notify you when it is available.

To install the upgrade, do the following:

1. Connect the device you want to upgrade to the PC running the service tool.
2. Power on the device. The service tool lists connected devices.
3. Select the device you want to upgrade.
4. Select the **Upgrade** tab.
5. The upgrade appears in the SpO2 row. Select the row by clicking it.
6. Click **Upgrade**. Follow the prompts to complete the upgrade.
7. Use the power down button on the device tab to turn off the monitor.

To verify the SpHb parameter is functioning, do the following:

1. Power up the device.
2. Go to the **Settings** tab.
3. Go to the Profiles tab and select **Monitor**.
4. Return to the Home tab and verify that the SpHb frame appears.
5. Connect the Masimo Rainbow Tester to the SpO2 connection. Wait for the device to display the SpHb reading.
6. Verify that the displayed readings meet the tester specifications.

Note If you have the Gold edition of the service tool, you can use the verification test for the SpO2 Sensor to verify the SpHb parameter.

The SpHb firmware upgrade is custom-built for a specific device and, once installed it cannot be transferred to another device. Record the serial number of the device on the upgrade instructions with the authorization code and retain them for your records. If you lose the SpHb license, or need to replace the Masimo module, the authorization code is required to restore your license.

Configure options

When connected and powered on, the monitor recognizes all options. When the option successfully passes the POST, all software controls in the monitor's user interface are activated, enabling you to configure option settings.

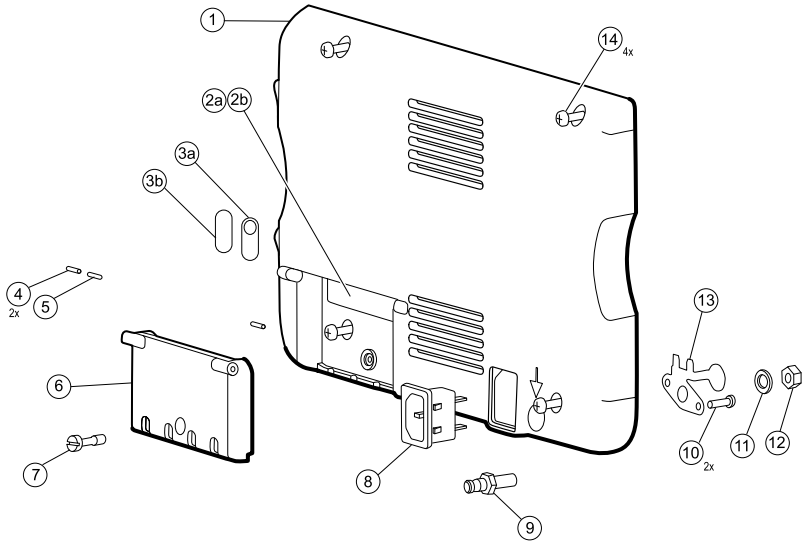
Option parameters are initially set at factory default values. To change these settings go to Advanced Settings. The configuration screens for NIBP, SpO2, SpHb, and temperature modules are on the Parameters tab. The configuration screens for the radio are on the Network tab. For more information about the Advanced Settings menu, see the device's directions for use.

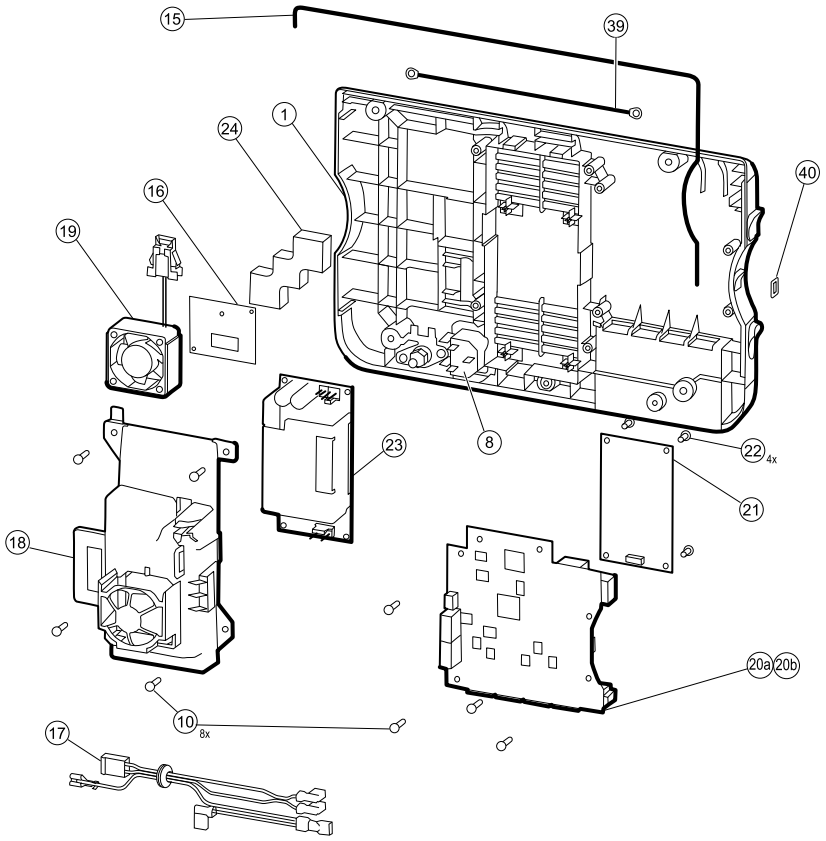
Field replaceable units

This listing includes only field-replaceable service parts. Product accessories—including patient sensors, probes, cables, batteries, probe covers, printer paper and other consumable items—are listed separately in the accessories list in the device's directions for use, which is available from Welch Allyn Customer Service.

Service kits are shown with the contents listed underneath each kit.

Rear housing





Serv Kit, VSM6000, Rear housing (material no. 103375)

No.	Item	Qty
1	Rear housing	1 ea
4	Communications door dowel pin	2 ea
5	Communications door spring	1 ea
6	Rear housing communications door	1 ea
7	Communications door captive screw	1 ea
8	IEC connector	1 ea
9	Ground lug	1 ea
10	Screw, plastite #4-20 X 0.500 pan head	2 ea
11	Flat washer	1 ea
12	Hex nut	1 ea
13	Ground lug plate	1 ea

No.	Item	Qty
15	Rear housing gasket (Norprene tubing)	20 in
17	AC power harness	1 ea

Serv Kit, VSM6000, Basic comms PCBA (material no. 103354)

No.	Item	Qty
20a	Communications board (Model 6300)	1 ea

Serv Kit, PLFM, Standard comms PCBA (material no. 103355)

No.	Item	Qty
20b	Communications board (Models 6400 and 6500)	1 ea

Serv Kit, PLFM, Radio (material no. 103356)

No.	Item	Qty
16	Antenna board	1 ea
21	Radio board, 802.11a/b/g	1 ea
22	Screw, M3 X 0.5, Phillips pan head	4 ea
24	Antenna mounting foam block	1 ea
39	Antenna cable	1 ea
Not shown	Radio label	1 ea

Serv Kit, PLFM, Antenna (material no. 103357)

No.	Item	Qty
16	Antenna board	1 ea
24	Antenna mounting foam block	1 ea
39	Antenna cable	1 ea

Serv Kit, VSM6000, Power supply (material no. 103359)

No.	Item	Qty
17	AC power supply harness	1 ea
18	Power supply cover	1 ea
23	Power supply board	1 ea

Serv Kit, VSM6000, Labels, model 6300 (material no. 103590)

No.	Item	Qty
2b	USB label 1 USB host	2 ea
3b	No nurse call label	2 ea
40	USB client cover	2 ea
Not shown	VSM 6000 product label	2 ea
Not shown	VSM 6000 patent label	2 ea

Serv Kit, VSM6000, Labels, 6400, 6500 (material no. 103592)

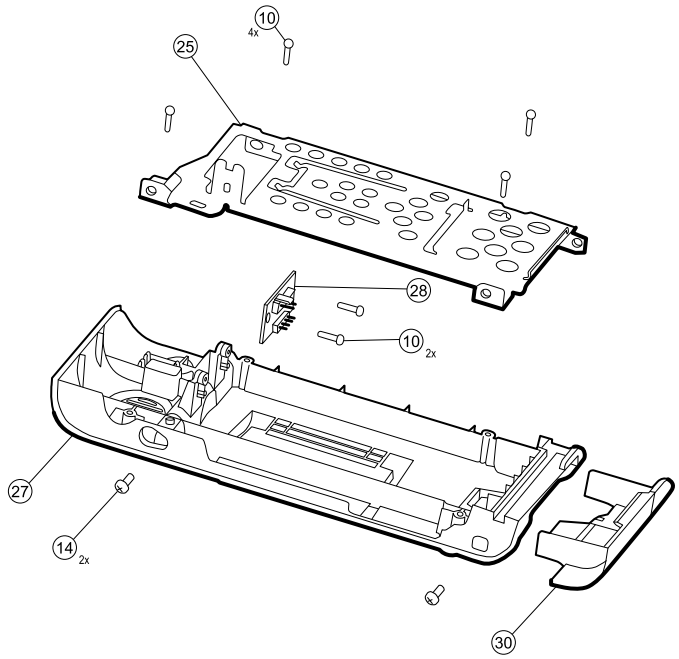
No.	Item	Qty
2a	USB label 4 USB host	2 ea
3a	Nurse call label	2 ea
40	USB client cover	2 ea
Not shown	VSM 6000 product label	2 ea
Not shown	VSM 6000 patent label	2 ea
Not shown	Radio label	2 ea

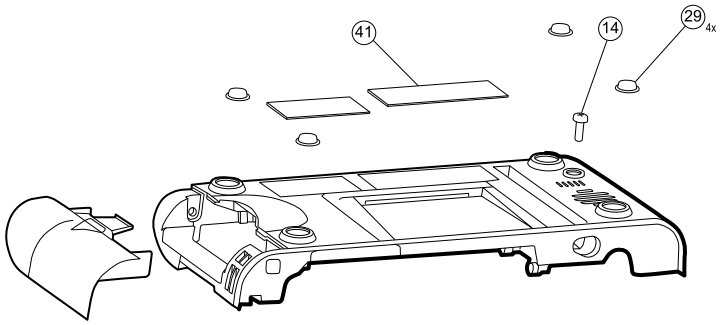
Miscellaneous

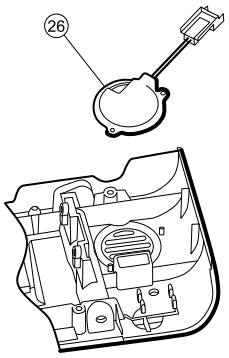
No.	Material no.	Item	Qty
15	103575	VSM 6000 rear housing gasket	20 in
17	103567	VSM 6000 AC power harness	1 ea
19	103552	VSM 6000 fan assembly	1 ea

No.	Material no.	Item	Qty
24	103571	PLFM antenna mounting block	1 ea

Bottom housing







Serv Kit, VSM6000, Bottom housing (Material no. 103379)

No.	Item	Qty
10	Screw, plastite #4-20 X 0.500 pan head	4 ea
25	Bottom housing metal chassis	1 ea
26	Speaker assembly	1 ea
27	Bottom housing	1 ea
30	Battery door	1 ea

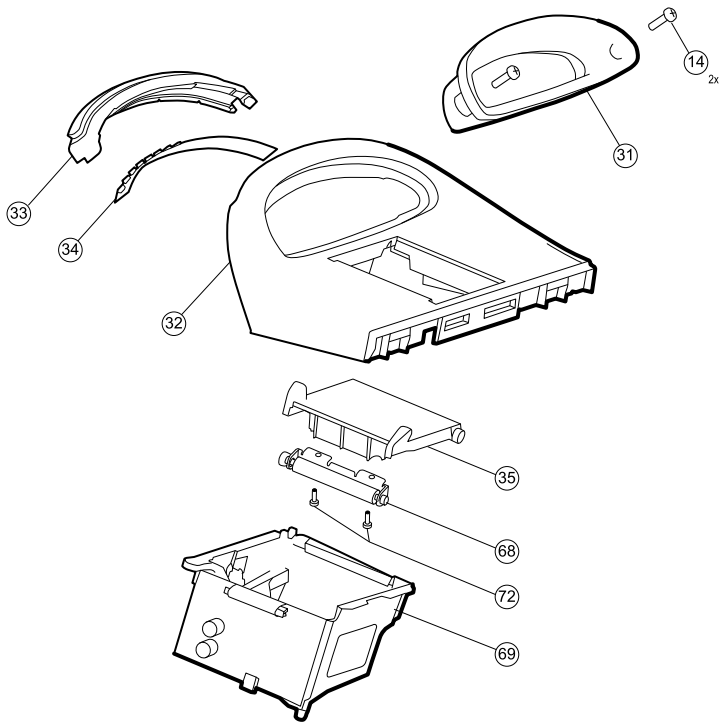
Serv Kit, VSM6000, Battery connector PCA (Material no. 103358)

No.	Item	Qty
28	Battery connector board	1 ea
Not shown	Smart battery harness	1 ea
Not shown	Battery power harness	1 ea

Individual parts

No.	Material no.	Item	Qty
26	103554	PLFM speaker assembly	1 ea
30	103555	VSM 6000 battery door	1 ea
Not shown	103566	VSM 6000 smart battery harness	1 ea
Not shown	103568	VSM 6000 battery power harness	1 ea

Top housing



Serv Kit, VSM6000, Top housing (material no. 103378)

No.	Item	Qty
31	Handle insert	1 ea
32	Top housing	1 ea
Not shown	Printer door blank	1 ea

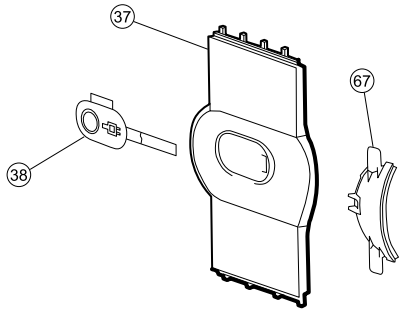
Serv Kit, VSM6000, LED light bar (material no. 103353)

No.	Item	Qty
33	Light bar	1 ea
34	Light bar LED board	1 ea
Not shown	Light bar harness	1 ea

Individual parts

No.	Material no.	Item	Qty
31	103556	VSM 6000 handle insert	1 ea
32	103546	VSM 6000 top housing	1 ea
33	103544	VSM 6000 light bar	1 ea
34	103550	PLFM light bar LED board	1 ea
35b	103551	VSM 6000 printer door blank	1 ea
Not shown	103569	VSM 6000 light bar harness	1 ea
Not shown	103560	VSM 6000 printer drain tube	1 ea
Not shown	103561	VSM 6000 printer harness	1 ea
Not shown	103570	VSM 6000 printer ground cable	1 ea

Side panels



Serv Kit, VSM6000, Right side panel (material no. 103381)

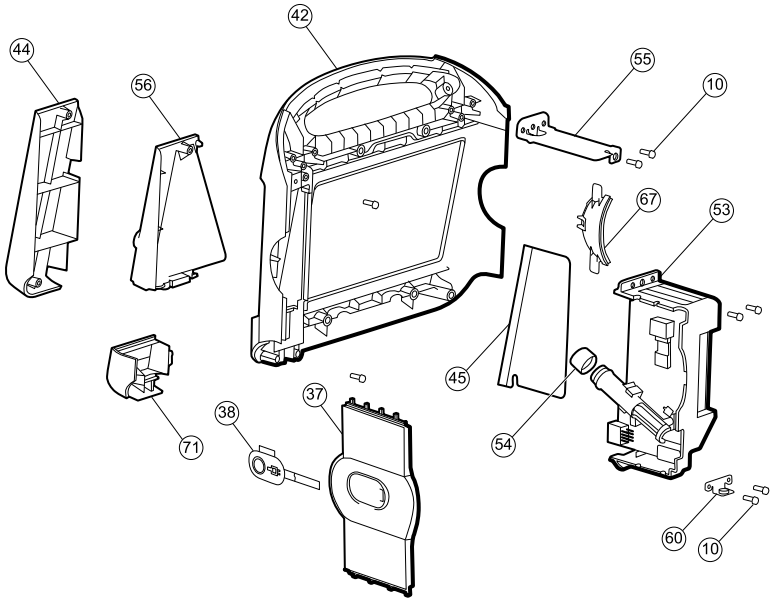
No.	Item	Qty
37	Right side panel	1 ea
38	Power button and flex cable	1 ea

VSM 6000, left insert (material no. 103547)

No.	Material no.	Item	Qty
67		Left insert	1 ea

Front housing and mid section

Note Replacing the main board requires using the service tool, Gold edition, to re-provision the device.

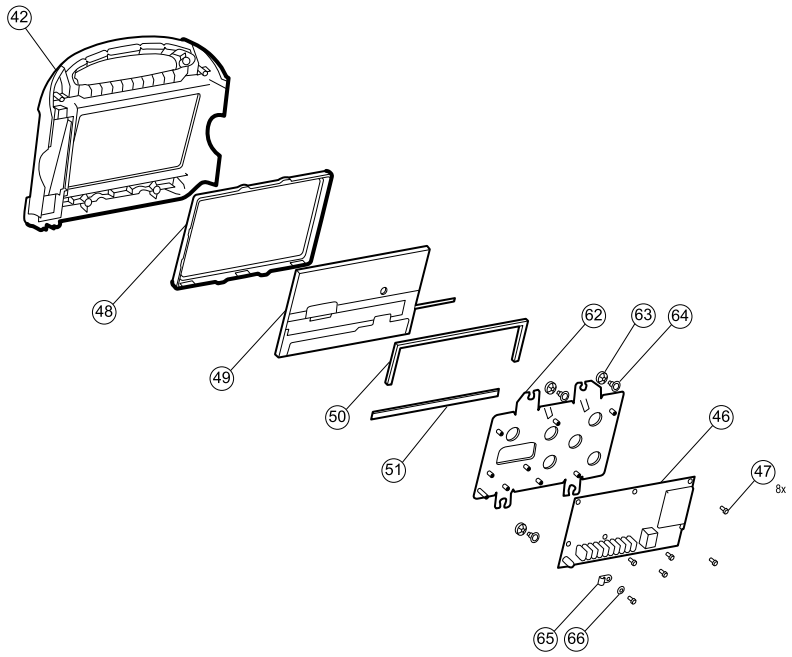


Serv Kit, VSM6000, Front housing, templess (material no. 103376)

No.	Item	Qty
10	Screw, plastite #4-20 X 0.500 pan head	2 ea
67	Left insert	1 ea
42	Front housing	1 ea
44	Temp blank front	1 ea
45	Thermal shield	1 ea

Serv Kit, VSM6000, Front housing, SureTemp (material no. 103377)

No.	Item	Qty
10	Screw, plastite #4-20 X 0.500 pan head	1 ea
67	Left insert	1 ea
42	Front housing	1 ea
45	Thermal shield	1 ea
56	Temperature front housing	1 ea
71	Temperature connection access cover	1 ea



Serv Kit, PLFM, MCE PCBA (material no. 103352)

Note When replacing the main board, all licenses are lost. If you did not retain authorization codes to restore those licenses, you must order replacement licenses.

No.	Item	Qty
46	Main board	1 ea

Serv Kit, PLFM, LCD display (material no. 103351)

No.	Item	Qty
48	LCD display bezel	1 ea
49	LCD display with touchscreen	1 ea
50	Foam pad, top	1 ea
51	Foam pad, bottom	1 ea
Not shown	LCD harness	1 ea

Individual parts

No.	Material no.	Item	Qty
44	103557	VSM 6000 temp blank front	1 ea

No.	Material no.	Item	Qty
45	103562	VSM 6000 thermal shield	1 ea
48	103565	VSM 6000 LCD bezel	1 ea
54	103558	VSM 6000 probe well seal	1 ea
56	103542	VSM 6000 temp front housing	1 ea
55	103543	VSM 6000 horizontal struts	2 ea
53	103545	VSM 6000 temp housing (templess)	1 ea
62	103573	VSM 6000 LCD frame	1 ea
Not shown	103548	VSM 6000 USB mini B to USB A right angle	2 ea
Not shown	103549	VSM 6000 Ethernet cable	1 ea
44	103557	VSM 6000 temp blank front	1 ea
Not shown	103563	PLFM USB cable mini B RT-type A RT	1 ea
Not shown	103564	PLFM SpO2 blank	1 ea
Not shown	103572	VSM 6000 USB cable separator	1 ea
Not shown	103578	PLFM LCD harness	1 ea

Miscellaneous parts

Serv Kit, VSM6000, Screws and fasteners (material no. 103395)

No.	Item	Qty
10	Screw, plastite #4-20 X 0.500 pan head	160 ea
14	Screw, M4 X 10 pan head with NYLOC	45 ea
29	Bumper, 3M-SJ5012	40 ea
47	Screw, M3 x 5 pan head	60 ea
60	Mounting clamp, bottom housing	10 ea
63	Grommet, ear - G411-1	20 ea
64	Shoulder screw, ear G-411-1 metric	20 ea
65	Clamp, cable 3/16 X 3/8 wide X 3/4 long	10 ea
66	Washer, M3	10 ea

No.	Item	Qty
72	Screw, M2.2X8, THRDFORM, PNH, TRX (printer door roller)	45 ea
Not shown	USB cable retaining clip	30 ea

Service tools

Material no.	Item	Qty
103396	Welch Allyn Service Tool Gold license key (VSM6000)	1
103521	Welch Allyn Service Tool DVD	1

Options

Serv Kit, VSM6000, SureTemp module (material no. 103391)

No.	Item	Qty
	SureTemp module assembly	1 ea
	10.5" USB mini B to USB A right angle	1 ea
	USB cable retaining clip	1 ea
45	Thermal shield	1 ea
54	Probe well seal	1 ea
56	Temperature front housing	1 ea
71	Temperature connection access cover	1 ea

Serv Kit, VSM6000, SpO2 module, Nellcor (material no. 103388)

Item	Qty
Module assembly SpO2, Nellcor	1 ea
10.5" USB mini B to USB A right angle	1 ea
USB cable retaining clip	1 ea

Serv Kit, VSM6000, SpO2 module, Masimo-MX (material no. 103389)

Item	Qty
Module assembly SpO2 Masimo	1 ea
10.5" USB mini B to USB A right angle	1 ea
USB cable retaining clip	1 ea

Upgd Kit, Masimo MX with SpO2, SpHb Mod (material no. 104210)

Item	Qty
Module assembly SpO2-SpHb Masimo	1 ea
10.5" USB mini B to USB A right angle	1 ea
USB cable retaining clip	1 ea
Authorization code for SpHb UI license	1 ea
Installation instructions	1 ea

Masimo SpHb SW upgrade - sold by WA (material no. 104361)

Item	Qty
Masimo software license	1 ea
Welch AllynSpHb user interface license	1 ea
Authorization code for online upgrade	1 ea

Serv Kit, Masimo MX SpO2, SpHb repair (replacement only) (material no. 104370)

Item	Qty
Module assembly SpO2-SpHb Masimo	1 ea
10.5" USB mini B to USB A right angle	1 ea
USB cable retaining clip	1 ea

* This service kit can be used only to replace an existing SpHb-enabled module.

Serv Kit, VSM6000, NIBP module (material no. 103386)

Item	Qty
Module assembly	1 ea
10.5" USB mini B to USB A right angle	1 ea

Serv Kit, VSM6000, Printer module (material no. 103393)

Item	Qty
Assembly, printer, platform, 2IN	1 ea
Harness, printer ground	1 ea
Screw, plastite #4-20 X 0.500 pan head	2 ea
Harness, MCE to printer	1 ea
10.5" USB mini B to USB A right angle	1 ea
Drain tube - printer	1 ea

Serv Kit, VSM6000, Radio (material no. 103356)

No.	Item	Qty
16	PCA, platform radio, a/b/g antenna	1 ea
21	Plat. radio, Prov. SPI, 802.11 a/b/g	1 ea
22	Screw, M3 X 0.5, pan Phillips	4 ea
24	Foam block	1 ea
39	Antenna, coax, 150mm	1 ea
Not shown	Radio label	1 ea

Service parts for Braun Pro 4000 and dock (material no. 104037)

Item	Qty
Braun PRO 4000 Thermoscan thermometer	1 ea
Braun PRO 4000 dock	1 ea
Braun dock cradle ring	1 ea

Item	Qty
Braun dock base	1 ea
Braun PRO4000 mounting hardware	1 ea
Serv Kit PLFM Braun PRO4000 MN	1 ea
USB cable,mini B TO USB A 410mm	1 ea
Rechargeable battery pack	1 ea

Licenses

Material no.	Item	Notes
103371	Bar code reader	
103372	Spot profile	6300 only
103373	Triage profile	6300 only
103910	CVSM 6300 standard license	6300 only
103911	CVSM 6400/6500 standard license	6400/6500 only
104197	Weight scale	
104196	Application framework	

Partners in Care service and support agreements

Material no.	Item	Material no.	Item
S1-6000	VSM 6000, Comprehensive partnership program 1 year	S1-6000-2	VSM 6000, Comprehensive partnership program 2 years
S2-6000	VSM 6000, Bio-med partnership program 1 year	S2-6000-2	VSM 6000, Bio-med partnership program 2 years
S3-6000	VSM 6000, Investment protection partnership program 1 year	S3-6000-2	VSM 6000, Investment protection partnership program 2 years

Service and repair training

Note Required to be eligible to receive the service tool, Gold edition.

Material no.	Item
VSM6000SERREP-TRN	VSM 6000 series repair training
VSM6000SERREPW-TRN	VSM 6000 series repair web training

Appendices

Decontamination and cleaning requirements

As a general safety precaution, the monitor must undergo decontamination before being returned to Welch Allyn for service, repair, inspection, or disposal.

Note Contaminated items must not be returned without prior, written agreement.

Note Decontaminate the monitor according to your facility's procedures and local regulations.

Cleaning is an essential prerequisite for effective disinfection or decontamination.

Note The following guidelines apply to the monitor only. For cables, sensors, cuffs, and other peripheral items, follow the cleaning instructions in the directions for use that accompany these accessories.

WARNING Electric shock hazard. Before cleaning the monitor, disconnect the AC power cord from the power outlet and the monitor.

WARNING Electric shock hazard. DO NOT autoclave the monitor or accessories. The monitor and the accessories are not heat-resistant.

WARNING Liquids can damage electronics inside the monitor. Take care to prevent water or other liquids from spilling on the monitor.
If liquids are spilled on the monitor:

1. Power down the monitor.
2. Disconnect the power plug.
3. Remove the battery pack from the monitor.
4. Dry off excess liquid from the monitor.

   Note If liquids possibly entered the monitor, remove the monitor from use until it has been properly dried, inspected, and tested by qualified service personnel.

5. Reinstall the battery pack.
6. Power on the monitor and verify that the monitor functions normally before using it.

If liquids enter the printer housing:

1. Power down the monitor.
2. Disconnect the power plug.
3. Remove the battery pack from the monitor.
4. Remove and discard the paper roll.
5. Clean and dry the inside of the printer housing.

   Note The printer housing has a drain tube that directs liquids down and out the bottom of the device. If liquids possibly entered other openings in the monitor, remove the monitor from use until it has been properly dried, inspected, and tested by qualified service personnel.

6. Install a new roll of paper.
7. Power on the monitor and verify that the monitor functions normally before using it.

Caution DO NOT use steam, heat, or gas sterilization on the monitor.

Caution DO NOT use harsh solvents such as acetone on the monitor.

The following agents are compatible with the monitor. Follow the cleaning agent manufacturer's guidelines:

- CaviWipes™
- Sani-Cloth® Plus
- 70 percent isopropyl alcohol
- 10 percent chlorine bleach solution

Note Disinfect according to your facility's protocols and standards or local regulations.

CaviWipes or Sani-Cloth Plus

1. Using CaviWipes or Sani-Cloth Plus, wipe the surface of the monitor to remove all debris.
2. Allow the monitor surface to dry for a minimum of 10 minutes before using the monitor.

70 percent isopropyl alcohol

Wipe the monitor with a clean cloth slightly dampened with 70 percent isopropyl alcohol.

10 percent chlorine bleach solution

1. Wipe the monitor with a clean cloth slightly dampened with a 10 percent bleach and water solution. Follow the cleaning agent manufacturer's guidelines.
2. Rinse with a clean cloth slightly dampened with water that meets EP and USP quality standards.
3. Allow the monitor surface to dry for a minimum of 10 minutes before using the monitor.

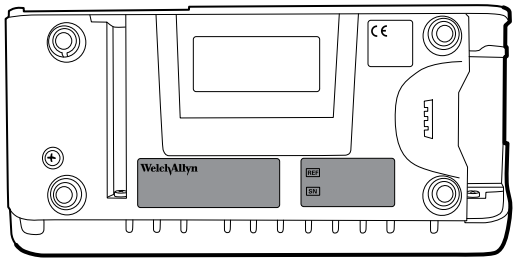
Identifying the monitor and subsystems

This explanation of the monitor labeling is provided to assist you in identifying these particular parts by serial number. The part numbers appearing on the labels are internal part numbers and will not be found in the list of field replaceable units (FRUs) included in this manual.

Future revisions of a part may not always be backward compatible with a legacy part. To determine the correct replacement part for your unit always provide the serial number and model when ordering.

Monitor serial number and model label

The model number and serial number can be found on the label on the bottom of the monitor.



Serial number and format code	
Serial number	MMMMXXXXWWYY
MMMM	Manufacturing plant
XXXX	Sequential number
WW	Week of manufacture
YY	Year of manufacture

Model number format and code

The device is available in multiple configurations. Use the following to determine available configurations:

[Model][Oximeter][SureTemp][Printer][Braun]-[PowerCord]

Note For more configuration options, including approved accessories, see the accessories list in the device's directions for use.

Note If options have been added to the device, the actual configuration will not match the model description.

Position	Description
[Model]	Two numbers that indicate the model: • **63**: The 6300 (basic) model. Does not include nurse call. Includes Ethernet and USB connectivity. • **64**: The 6400 (standard) model. Includes nurse call, Ethernet, and USB connectivity. The radio is optional. • **65**: The 6500 (wireless) model. Includes all Standard features plus an internal 802.11 a/b/g radio.
[Oximeter]	One character that indicates the oximeter type: • **H**: Includes Masimo with SpHb. • **M**: Includes Masimo. • **N**: Includes Nellcor. • **X**: Does not include oximetry.
[SureTemp]	One character that indicates whether a SureTemp Plus thermometer is included: • **T**: Includes SureTemp Plus. • **X**: Does not include SureTemp Plus.
[Printer]	One character that indicates whether a printer is included: • **P**: Includes a printer. • **X**: Does not include a printer.
[Braun]	One character that indicates whether a Braun ThermoScan PRO thermometer and docking station is included: • **E**: Includes a Braun ThermoScan PRO and docking station. • **X**: Does not include a Braun ThermoScan PRO or docking station. **Note** If the device includes both the Braun ThermoScan PRO and SureTemp Plus, the model number on the label does not include an '**E**.' Instead, the Braun ThermoScan PRO is purchased as a separate accessory.
[PowerCord]	The suffix, characters or numbers that follow the hypen, indicates the power cord packaged with the device. Country codes include the following:

Suffix	Description	Suffix	Description
A	Denmark	2	Europe
B	North America	3	Israel
C	China	4	United Kingdom
G	Argentina	5	Switzerland
K	South Korea	6	Australia/New Zealand
N	India/UAE	66	Australia/New Zealand - orange
P	Thailand	7	South Africa
T	Taiwan		

Position	Description
Y	Italy
Z	Brazil

Monitor circuit board and internal options label

Circuit board and internal option labels	
PCBA identifier	**XXXXXX BOM Y DWG Z**
XXXXXX	Welch Allyn material number
Y	Bill of material (BOM) revision
Z	Assembly drawing verison from current version of drawing

Circuit board and internal option labels	
Serial number	**XXXXWWYYID**
XXXX	Sequential number
WW	Week of manufacture
YY	Year of manufacture
ID	Unique vendor identifier

NIBP and SpO2 module labels

Circuit board and internal option labels	
Module identifier	**XXXXXX**
XXXXXX	Welch Allyn material number
Module serial number	**XXXXWWYYID**
XXXX	Sequential number
WW	Week of manufacture
YY	Year of manufacture
ID	Unique vendor identifier

Factory defaults

General alarm

Settings	Default value
Display alarm limits	Enabled
Alarm Audio on	Enabled
Volume	Medium
Advanced	
Allow user to disable alarms	Enabled
Allow user to turn off general audio	Enabled
Minimum alarm volume	Low
Nurse call threshold	Medium
Audio pause time	2 minutes
SpO2 alarm condition delay	10 seconds
SpHb alarm condition delay	10 seconds

NIBP

Settings	Default value
Alarms	
Systolic and Diastolic Alarm Limits On/Off Control	On
Systolic: Upper Limit	Adult: 220 mmHg (29.3 kPa) Ped: 145 mmHg (19.3 kPa) Neo: 100 mmHg (13.3 kPa)
Systolic: Lower Limit	Adult: 75 mmHg (10.0 kPa) Ped: 75 mmHg (10.0 kPa) Neo: 50 mmHg (6.7 kPa)
Diastolic: Upper Limit	Adult: 110 mmHg (14.7 kPa) Ped: 100 mmHg (13.3 kPa) Neo: 70 mmHg (9.3 kPa)

Settings	Default value
Diastolic: Lower Limit	Adult: 35 mmHg (4.7 kPa) Ped: 35 mmHg (4.7 kPa) Neo: 30 mmHg (4.0 kPa)
MAP Alarm Limits On/Off Control	Off
MAP: Upper Limit:	Adult: 120 mmHg (16 kPa) Ped: 110 mmHg (14.7 kPa) Neo: 80 mmHg (10.7 kPa)
MAP: Lower Limit	Adult: 50 mmHg (6. 7 kPa) Ped: 50 mmHg (6.7 kPa) Neo: 35 mmHg (4.7 kPa
Intervals	
Interval	Automatic
Minutes	15 minutes
Program	Disabled
Program 2	
Duration	60 minutes
Interval	0 minutes
Stat	Disabled
Automatic print on interval	Disabled
Advanced	
Display map	Enabled
SYS/DIA as primary	Enabled
Map as primary	Disabled
Default patient type	Adult
Tube type	2 tubes
Unit of measure	mmHg
Algorithm	SureBP
Cuff inflation target (step algorithm)	
Adult	160 mmHg (21.3 kPa)

Settings	Default value
Pediatric	140 mmHg (18.7 kPa)
Neonate	90 mmHg (12.0 kPa)

SpO2

Settings	Default value
Alarms	
Saturation Alarm Limits On/Off Control	On
Saturation: Upper Limit	Adult: 100% Ped: 100% Neo: 100%
Saturation: Lower Limit	Adult: 90% Ped: 90% Neo: 90%
SatSeconds™ (Nellcor only)	0
Advanced	
Default view	% SpO2
Default response	Normal
Sweep speed	25 mm/s

SpHb

Settings	Default value
Alarms	
Upper limit	17.0 g/dl, (11.0 mmol/L)
Lower limit	7.0 g/dl, (4.0 mmol/L)
Advanced	
Mode	Venous
Units	g/dl
Averaging	Medium

Settings	Default value
Trend view time	1 hr

Temperature

Settings	Default value
Alarms	
Temperature Alarm Limits On/Off Control	Off
Temperature: Upper Limit	101 °F (38.3 °C)
Temperature: Lower Limit	94 °F (34.4 °C)
Advanced	
Unit of measure	°F (Fahrenheit)
Display temperature conversion	Enabled
Default SureTemp Plus site	Oral

Pulse rate

Settings	Default value
Alarms	
Pulse Rate Alarm Limits On/Off Control	On
Pulse Rate: Upper Limit	Pulse Rate 120 bpm Ped: 150 bpm Neo: 200 bpm
Pulse Rate: Lower Limit	Adult: 50 bpm Ped: 50 bpm Neo: 100 bpm
Tone volume	Off
Advanced	
Display source	Enabled

Patient manual parameters

Note Defaults appear when you use the up/down arrow keys for entry.

Settings	Default value
Height	70 in (177.8 cm)
Weight	150 lb (68.0 kg)
Pain	0
Respiration	12
Temperature	98.6 °F (37 °C)
Advanced[1]	
Display height	Enabled
Display weight	Enabled
Display pain	Enabled
Display respiration	Enabled
Display temperature [2]	Disabled
Display BMI	Disabled
Height units	in
Weight units	lb

[1]You can enable only four manual parameters.

[2]If a temperature module is available, manual Temperature selection is not available

Device

Settings	Default value
Display brightness	6
Allow display lock timeout	Enabled
Profiles	Monitor
Advanced	
Language	English
Date/time	
Date format	mm/dd/yyyy
Time zone	UTC
Automatically adjust clock for daylight saving time, reported by host	Disabled

Settings	Default value
Allow users to change date/time	Enabled
Display date and time	Enabled
Display	
Display lock	Never
Display power saver	2 minutes
Device power down	20 minutes
Other	
Allow profile change	Enabled
Power line frequency	60 Hz
Demo	
Type	Autoplay

Data management

Settings	Default value
Advanced	
Patient IDs	
Patient Name format	Full name
Patient Primary label	Name
Patient Secondary label	Patient ID
Require patient ID to save readings	Disabled
Search by patient ID	Disabled
Clear patient information on manual save	Enabled
Retrieve list	Disabled
Clinician IDs	
Clinician Label	Clinician ID
Require clinician ID to save readings	Disabled
Clinical data	
Automatically send on manual save	Disabled
Delete readings after successful send	Disabled
Emulate Spot Vital Signs LXi	Enabled
Search by clinician ID	Disabled
Require password	Disabled
Clear clinician information on manual save	Disabled

Network

Settings	Default value
Radio	
SSID	com.welchallyn
Radio band	b/g

Settings	Default value
Authentication type	WPA2-PSK
Authentication method	Network key
Enable radio	Enabled
Enable radio network alarms	Disabled
Server	
Obtain server IP information automatically	Enabled
IP address	127.0.0.1[1]
Port	281[1]
UDP broadcast port	7711

[1] This default is available if **Obtain server IP information automatically** is not enabled.

Disassembly and repair reference

Screws

The following table lists torque specifications for all screws.

Qty	Location	Type	Size/length	Torque	Bit type
1	Communications door	Captive screw	#8-32 X 0.656	6.0 in-lb ±1.0 in-lb	#1 Phillips
8	Main board	Pan head machine	M3 X 8	6.0 in-lb ±1.0 in-lb	#1 Phillips
4	Radio board				
2	Battery connector board	Plastite	#4-20 X 0.500	7.5 in-lb ±0.5 in-lb	Torx T10
4	Communications board				
2	Ground stud assembly				
4	Handle to front housing				
6	Horizontal struts to front housing				
2	HSG clamp/temperature housing				
4	Metal chassis to bottom housing				
4	Power-supply cover				

Qty	Location	Type	Size/length	Torque	Bit type
2	Printer module to top housing				
2	Temperature housing top				
1	Temperature module mounting cover				
4	LCD plate	M4 shoulder	M4	6.0 in-lb ±1.0 in-lb	#2 Phillips
3	Bottom housing	Pan head machine	M4 X 10	7.5 in-lb ±0.5 in-lb	#2 Phillips
2	Handle insert				
4	Rear housing				

Connectors

Connector types

Disassembly and repair procedures require that you disconnect and reconnect the following connector types:

- **Locking (squeeze-release)**: Locking connectors use a latching mechanism to prevent accidental disconnection during assembly and use. The latch is located on one end of a tab so it may flex and lock into place when coupled with its matching connector. The tab provides a lever to release the latch. When disconnecting, squeeze to provide pressure on the tab to unlatch. Some connectors have multiple latches that require you to press multiple tabs to release.
  To remove a locking connector, squeeze the release lever and remove the cable.

  To connect a locking connector, push the mating pieces together until the latch locks in place.
- **Pressure**: Pressure connectors use friction to prevent accidental disconnects.
  To remove a pressure connector, grasp each connector mating half and pull the halves apart.

  Caution Do not use excessive force to disconnect the connector. Excessive force may result in pulling the mounted connector off the circuit board.

  To connect a pressure connector, grasp each connector mating half and insert one half into the other.
- **USB**: USB connectors provide communications and power connectivity between the main board and any sub-systems and external devices. USB connectors use friction to maintain the connection, but rarely require much force to connect or disconnect. The USB cable can safely be removed from the mounted connector by simply pulling it out of the connector. Two types of USB connectors are used: USB A-type and USB mini-B.
  To remove a USB connector, grasp the connector and pull.

  To connect a USB connector, grasp the connector and insert.
- **ZIF (zero insertion force)**: The device uses flex cables and ZIF flex cable connectors. Flex cables and ZIF connectors require special care when handling.

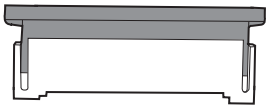
ZIF connectors use a sliding outer piece that latches and unlatches to secure and release the flex cable. ZIF cables cannot be successfully connected or disconnected without properly unlatching and latching the sliding outer piece.

Caution Do not use excessive force when releasing pressure on the connector. Excessive force may result in breaking the sliding outer piece.

To remove a ZIF connector

Caution Remove a flex cable only *after* the ZIF latch is open.

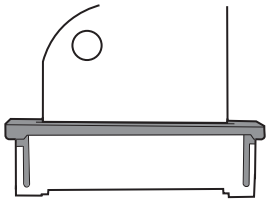
1. Using a suitable tool (for example, a paper clip, small flat-head screwdriver, or needle-nose pliers), slide the latching piece of the connector away from the connector body.



2. Remove the cable.

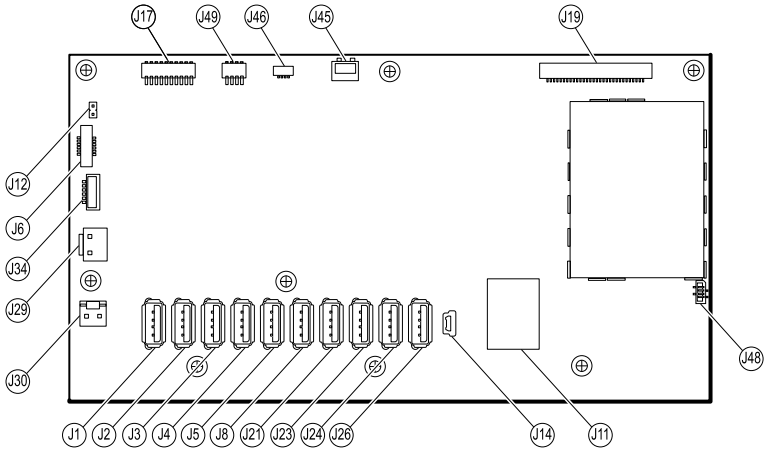
To connect a ZIF connector

1. Slide the latching piece of the connector away from the connector body.
2. Insert the flex cable into the connector. This may require using a suitable tool to keep the latching piece elevated.
3. Slide the latching piece toward the connector body until it locks into place.



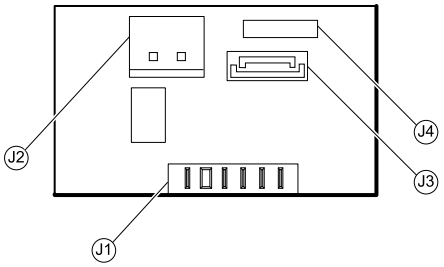
Connectors

Main board connectors



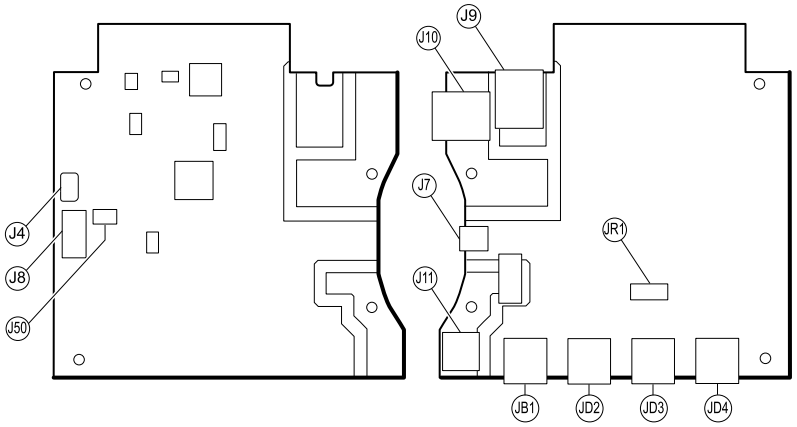
Connector	Wiring harness	Connects with	Connector
J1	USB	Temperature module	USB
J2	USB	Reserved for future use	USB
J3	USB	Printer	USB
J4	USB	Reserved for future use	USB
J5	USB	SpO2 module	USB
J6	Power button	Power button and LED status	ZIF
J8	USB	Reserved for future use	USB
J11	Ethernet	Communications board	Locking
J12	Main harness	Speaker	Pressure
J14	Client USB	Communications board J8	Mini USB
J17	Printer power	Printer board CN1	Pressure
J19	LCD	LCD board	Pressure
J21	USB	NIBP module	USB
J23	USB	Reserved for future use	USB
J24	USB	Communications board J4	USB
J26	USB	Reserved for future use	USB
J29	Battery power	Battery connector board J2	Locking
J30	Main harness	Power supply board J2	Pressure
J34	Battery	Battery connector board J3	Locking
J45	Main harness	Fan connector on the power-supply cover	Locking
J46	Light bar	Light bar board J1	Pressure
J48	LCD flex cable	LCD	Pressure
J49	Main harness	Communications board power	Pressure

Battery connector board connectors



Connector	Wiring harness	Connects with	Connector
J1	N/A	Battery	Pressure
J2	Battery power	Main board J29	Locking
J3	Battery	Main board J34	Locking
J4	N/A	Internal use only	N/A

Communications board connectors

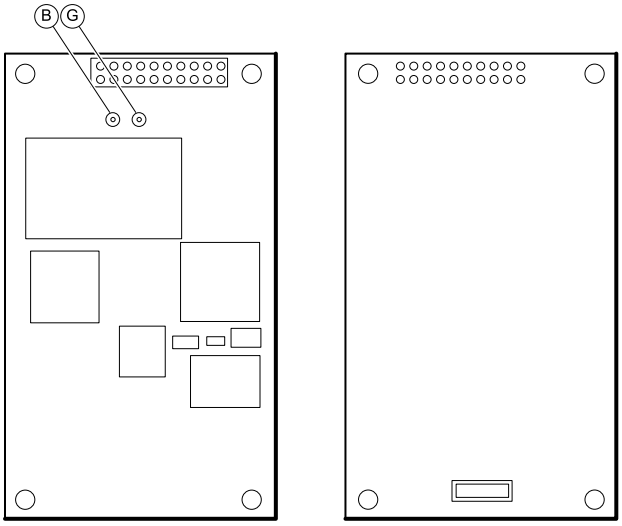


Connector	Wiring harness	Connects with	Connector
J4	USB	Main board J24	Mini USB
J7	USB	External (client)	Mini USB
J8	USB	Main board J14	USB
J9	Ethernet	Main board J11	Locking (RJ45)
J10	Ethernet	External	Locking (RJ45)
J11 *	Nurse call	External	Mini stereo
J50	Main	Main board J49	Pressure

Connector	Wiring harness	Connects with	Connector
JB1	USB	External	USB
JD2 *	USB	External	USB
JD3 *	USB	External	USB
JD4 *	USB	External	USB
JR1 *	N/A	Radio	Pressure

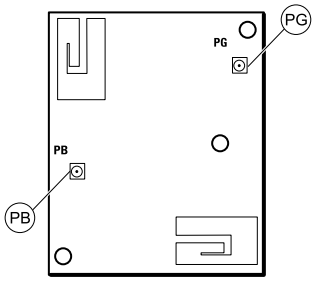
* Not available on the Basic communications board.

Radio board connectors



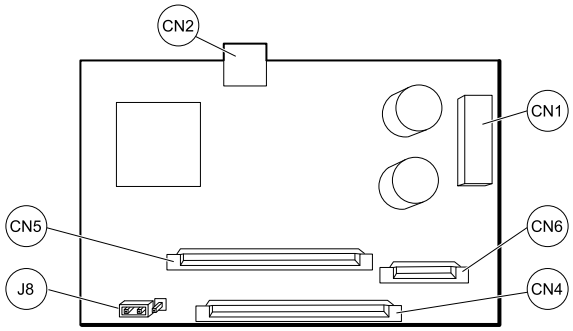
Connector	Wiring harness	Connects with	Connector
B	Not used	Not used	Pressure
G	Antenna cable	Antenna board PG	Pressure
A (not labeled)	N/A	Standard communications board JR1	Pressure

Antenna board connectors



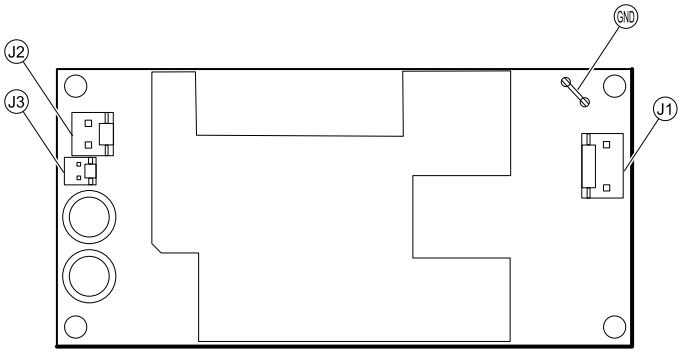
Connector	Wiring harness	Connects with	Connector
PG	Antenna cable	Radio board G	Pressure
PB	Not used	Not used	Pressure

Printer board connectors



Connector	Wiring harness	Connects with	Connector
CN1	Main board to printer	Main board J17	Pressure
CN2	USB	Main board J3	Mini USB
CN4	Printer flex cable	Printer	ZIF
CN5	N/A	Reserved for 4-in printer	ZIF
CN6	N/A	Reserved for 4-in printer	ZIF
J8	Jumper	Pins 2 and 3 for 2-in printer	Pressure

Power supply board connectors



Connector	Wiring harness	Connects with	Connector
J1	AC to power supply	IEC connector (blue: line-in, brown: neutral)	Pressure
J2	Main harness	Main board J30	Pressure
J3	N/A	Internal use only	N/A
GND	AC to power supply	IEC connector (green: ground) via ground stud	Pressure

Interconnect diagram