Welch Allyn
Connex
Spot Monitor

Software version 1.5X

Service manual

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For information about any product, contact Baxter Technical Support: baxter.com/contact-us

This manual applies to # 901058 VITAL SIGNS CORE MONITOR.

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Symbols and definitions

For information on the origin of these symbols, see the Welch Allyn symbols glossary: bax.to/docs-wa-symbols.

Documentation symbols

	WARNING	The warning statements in this manual identify conditions or practice that could lead to illness, injury, or death. Warning statements appear with a gray background in a black and white document.
	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.
		Follow the instructions for use (IFU) -- mandatory action. A copy of the IFU is available on this website. A printed copy of the IFU can be ordered from Baxter for delivery within 7 days.

Power symbols

	Stand-by		Equipotential Ground
	Power plug		Battery absent or faulty
	Alternating Current power present, battery fully charged		Battery charge level
	Alternating Current power present, battery is charging		Battery
	Alternating Current (AC)		Rechargeable battery
	Rated power input, DC		Rated power input, AC
Li-ion	Lithium-ion battery		Direct current (DC)
	Protective Earth (PE)		

Connectivity symbols

	Bluetooth wireless technology		Ethernet

	USB		Nurse call

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

Miscellaneous symbols

	Manufacturer		Defibrillation-proof Type BF applied parts
	Product Identifier		Serial Number
	Reorder Number		China RoHS markings for control of pollution caused by electronic information products. XX indicates Environmentally Friendly Use Period in years.
	Do not reuse, Single use device		Separate collection of Electrical and Electronic Equipment. Do not dispose as unsorted municipal waste.
	Non-ionizing electromagnetic radiation		Call for maintenance
	Task Light		Prescription only or "For Use by or on the order of a licensed medical professional"
	This way up		Fragile
IPX2	IP = International Protection Marking X = No object ingress rating 2 = Protected against vertically falling water drops when enclosure tilted up to 15°		Australian Communications and Media Authority (ACMA) Radio Compliance Mark (RCM).
	Temperature limit		Global Trade Item Number

	Stacking limit by number		Keep dry
	Humidity limitation		Recyclable
	Japan's PSE approval symbol for Category A	MD	Medical device
	Atmospheric pressure limitation		

Mobile stand symbols

	Maximum safe working load limits		Mass in kilograms (kg)
	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.	

Screen symbol

	Process indicator for activities like acquiring measurements and connecting to a laptop

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.

WARNING Defective batteries can damage the monitor. If the battery shows any signs of damage or cracking, it must be replaced immediately and only with a battery approved by Corporate.

CAUTION Before disassembling the device or installing options, disconnect the patient from the monitor, power down the device, and disconnect the AC power cord and any attached accessories (for example, SpO2 sensors, blood pressure hoses and cuffs, and temperature probes) from the device.

CAUTION Do not exceed the maximum weight limits for your mobile stand with basket or bins. See the "Specifications" section of the device's Instructions for use for the basket/bin and mobile stand maximum weight limits.

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.

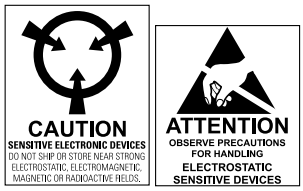
CAUTION Do not operate the monitor in the presence of magnetic resonance imaging (MRI) or hyperbaric chambers.

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 Corporate. (See the accessories list in the Appendix of the Instructions 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.

- Corporate recommends that only Corporate 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 Spot** Monitor. 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.

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.

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

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 Baxter service center.

Related documents

When using this manual, refer to the following:

- *Connex Spot Monitor Instructions for use*
- **Welch Allyn** Service Tool: https://www.hillrom.com/en/services/welch-allyn-service-tool/
- *Welch Allyn Service Tool Installation and configuration guide*: https://www.hillrom.com/en/services/welch-allyn-service-tool/
- *Welch Allyn Braun ThermoScan PRO 6000 Thermometer Instructions for use*
- *Welch Allyn Braun ThermoScan PRO 6000 Charging Station Instructions for use*
- *Welch Allyn 9600 Plus Calibration Tester Directions for use* https://assets.hillrom.com/is/content/hillrom/80020333LITPDFpdf

Technical support services

Baxter 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, go to this site:

https://www.hillrom.com/en/services/.

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 Baxter loaner price list.

Baxter 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.

Service options

SmartCare services for maintenance and repair

While product warranties provide basic assurance of Baxter hardware quality, they may not include the full range of services and support you need. Baxter offers premium service and support through our **SmartCare** program. Whether you service your own devices and require a minimum of support or rely on us to service your device, Baxter provides a program that will meet your needs. A list of available service and support agreements is presented in the "Field replaceable units" section of this manual.

For more information, call your sales representative or visit our website:

https://www.hillrom.com/en/services/ .

SmartCare Remote Management

SmartCare Remote Management is a secure cloud-based portal that offers biomeds access to manage their Baxter connected devices remotely in a centralized portal.

For more Information and a complete list of compatibility information, refer to the **SmartCare** Remote Management Instructions for use.

Warranty service

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

https://www.hillrom.com/en/services/explore-our-self-service-tools/repair-status-request/ .

CAUTION Unauthorized repairs will void the product warranty.

Non-warranty service

Baxter Product Service Centers and Authorized Service Providers support non-warranty repairs. Contact any Baxter regional service center for pricing and service options.

Baxter 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 Baxter for biomedical/clinical engineers. For information, go to this site:

https://www.hillrom.com/en/knowledge/technical-training/ .

Repairs

A Baxter Service Center or Authorized Service Provider must perform all repairs on products under warranty unless you are a properly certified technician that has successfully completed a Baxter Technical Training course. More information on Technical Training can be obtained from your sales representative or by visiting https://www.hillrom.com/en/knowledge/technical-training/.

CAUTION Unauthorized repairs will void the product warranty.

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

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

Baxter *Technical Support*

If you have a problem with the device that you cannot resolve, call the Baxter 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, potentially avoiding an unnecessary return.

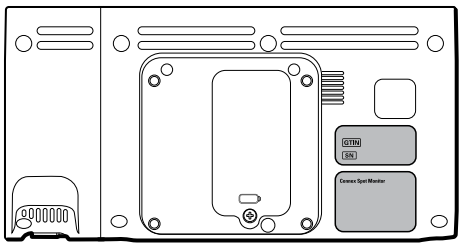
If your product requires warranty, extended warranty, or non-warranty repair service, a Baxter Technical Support representative will record all necessary information to issue an RMA number. The support representative will provide you with the address of the Baxter Service Center to send your device to.

Technical support is available during local business hours.

Returning products

When returning a product to Baxter 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 back housing.



- 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. Obtain an RMA number. Either contact Baxter and request an RMA number or visit us on the web: https://www.hillrom.com/en/services/explore-our-self-service-tools/repair-status-request/.

   NOTE Baxter does not accept returned products without an RMA.

2. Ship the device to Baxter, 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 Lithium-ion batteries

      - 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 Baxter 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 near the device in the original shipping carton.
- 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 about shipping Lithium-ion batteries.

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-ion 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-ion batteries by air or ground. Use 49 CFR 172.102 sections A54 and A101 to find the special provisions for shipping Lithium-ion 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* Baxter. For decontamination and cleaning requirements, see: Decontamination and cleaning requirements for returns in the Cleaning requirements section.

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. Baxter 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 Baxter RMA number with the Baxter 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 as indicated in the following table. Customers who have the Standard unlicensed edition of the **Welch Allyn** Service Tool can perform the basic functional verification and calibration procedures referenced in the table by following the instructions in this manual.

Component	Service interval	Service procedure
NIBP module	Annually	Basic functional verification
SpO2 module	Annually	Basic functional verification
SureTemp Plus	Annually	Basic functional verification
Braun ThermoScan®PRO 6000	Annually[1]	Basic functional verification
Battery	Annually[2]	Replace the battery

[1] In addition to this annual service interval, Baxter recommends cleaning the contacts of the Braun thermometer and dock every 4 months because debris that accumulates in the contacts can interfere with data transmission. See "Clean the **Braun ThermoScan**®PRO 6000 contacts" later in this manual.

Component	Service interval	Service procedure
[2] Battery performance is a function of clinical use and charge/discharge patterns. Baxter recommends replacing the battery after 1 year or when its remaining capacity no longer meets workflow requirements.		

If you have the Gold edition of the service tool, use the tool to perform a complete functional verification and calibration of the device in lieu of performing the basic tests. Perform a complete functional verification and calibration of the device whenever any of the following conditions exist:

- The device does not meet specifications (based on the basic functional verification)
- The device has been dropped or otherwise damaged
- The device is malfunctioning
- The case has been opened
- An internal part has been replaced (battery excluded)

NOTE For instructions on using the Gold edition, see the Service Tool help files.

Maintenance

For device maintenance information, see "Maintenance and service" in the device's Instructions for use. This section covers the following topics:

- Perform periodic checks
- Replace the monitor battery
- Replace the APM work surface battery
- Cleaning requirements

NOTE Service-related cleaning is addressed in the service manual as well.

The **Welch Allyn** Service Tool

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

- *Standard unlicensed*: 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 Baxter.

NOTE To qualify for the Gold license, you must attend the Baxter 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 Baxter 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 Baxter products. Through the remote service function, the service tool can connect to Baxter 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.

NOTE For the Baxter to support updates and upgrades, adjust your firewall settings to permit access for IP address 169.254.10.10 (the local feed server for the software upgrade process).

- *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 and calibration*. The service tool can check any device requiring calibration and, if necessary, calibrate the device to match the design specifications. 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 Baxter Technical Support to reinstall the firmware.
- *Extensible*. The service tool software accepts new plug-ins to support future Baxter products.

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

Battery performance

About the batteries

Follow best practices to extend the life of the battery

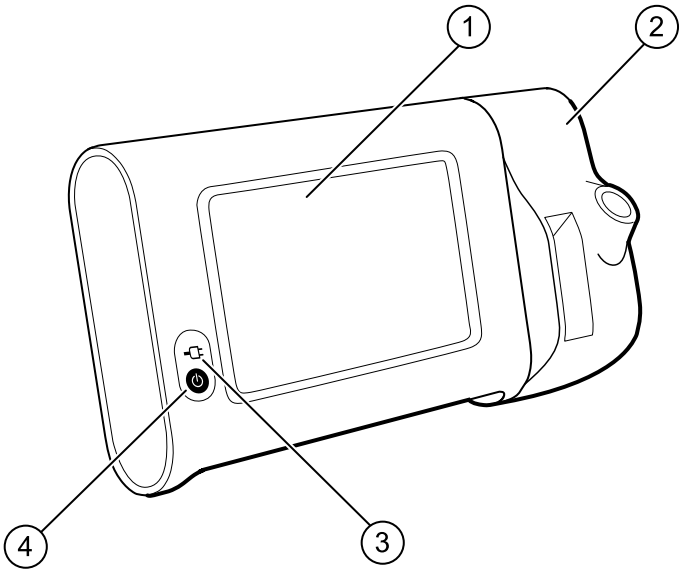
Factors affecting battery operating time

The following table presents settings and conditions that affect the battery operating time and recommendations to maximize battery life.

Setting / Condition	Recommended setting
Display brightness setting	5
Sleep mode setting	1 minute
Automatic power-down setting	15 minutes

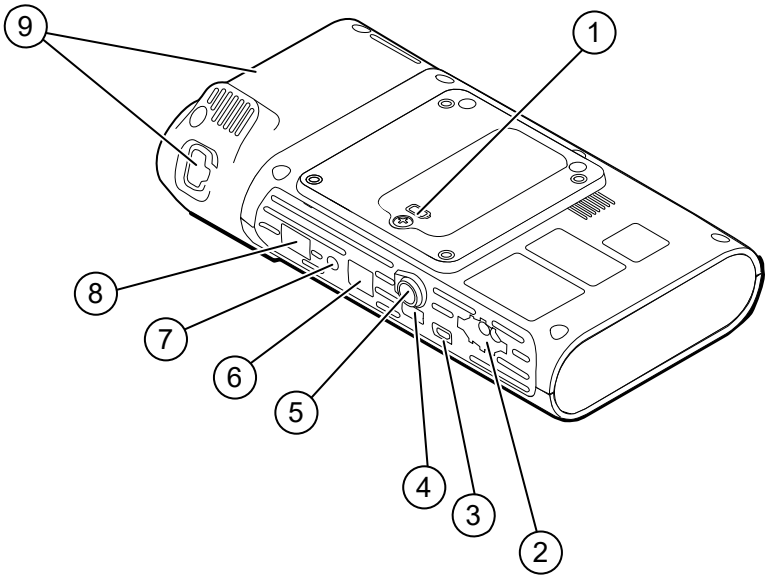
Controls, indicators, and connectors

NOTE Your model might not contain all of these features.



Front-Top-Left view

No.	Feature	Description
1	LCD screen	7" color touchscreen provides a graphical user interface
2	Thermometry	Secures the **SureTemp** unit to the monitor
3	Battery charge and power-up status indicator	The LED indicates the charging and power-up status when connected to AC power: • Green: The battery is charged • Amber: The battery is charging • Flashing: The monitor is powering up
4	Power button	Blue button on lower-left corner of the monitor: • Powers on the monitor • Places the monitor into Sleep mode, except when an alarm condition is active (brief press) • Wakes up the monitor from Sleep mode

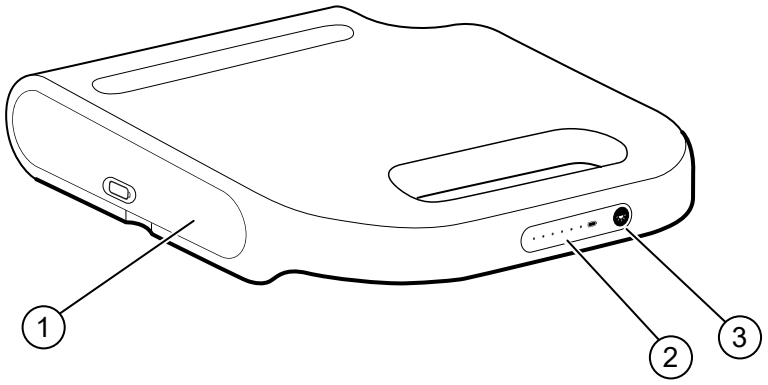


Back-Bottom-Right view

No.	Feature	Description
1	Battery compartment (behind cover)	Houses the battery (captive screw secures cover to monitor)
2	NIBP	Connects NIBP cable to monitor
3	USB client port	Provides a connection to an external computer for testing and software upgrades
4	USB port	Connects APM work surface to monitor
5	Power connection	Connects APM work surface or any accessory to the monitor
6	Ethernet RJ-45	Provides a hardwired connection to the computer network
7	Nurse call	Provides a connection to a hospital nurse call system
8	SpO2	Connects chosen SpO2 system to monitor
9	Thermometry	Configuration shown features **SureTemp** module and probe connection port

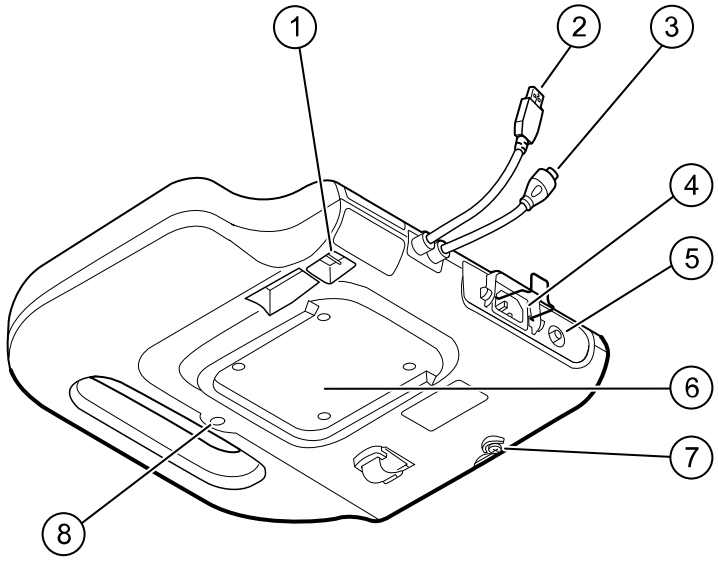
APM

This section applies only to devices with an Accessory Power Management (APM) stand. The APM is an accessory stand with work surface, power supply for enhanced device run time, and organizational bins to arrange sensors and cables for available parameters.



Front-Top-Left view

No.	Feature	Description
1	Battery compartment (behind cover)	Houses the battery
2	Battery charge status indicator	Indicates charge level of battery
3	Light power switch	Powers light under APM work surface



Back-Bottom-Right view

No.	Feature	Description
1	USB ports (2)	Connect optional accessories
2	USB cable	Connects APM work surface to monitor
3	APM power cable	Connects APM work surface to monitor
4	Power connection	Provides an external AC power connection
5	Ground lug (equipotential terminal)	Provided for electrical safety testing and for connecting a potential-equalization conductor

No.	Feature	Description
6	Recess for mounting	Secures the APM work surface when it is mounted on the APM stand (with 4 screws)
7	Battery cover screw	Secures APM work surface battery cover
8	APM light	Illuminates accessory bins and path for APM stand

Advanced settings

Advanced settings provide access to device settings and service menu information with an access code. This section covers the following primary tabs:

- General. Settings for system language as well as date and time, plus open source software disclosure.
- Parameters. Settings for physiological parameters, averaging, and intervals.
- Network. Settings for the internal Ethernet and security, as well as **Wi-Fi**® radio and **Bluetooth**® subsystems.
- Service. Settings and features that support installation and on-device troubleshooting.

NOTE Changes made in Advanced settings take effect immediately, but they do not change the configuration file and cannot be used to clone settings from one device to another. Follow the instructions in "Device configuration and setup" to create, edit, download, and install any settings you want available on multiple devices.

Access Advanced settings

NOTE You cannot access Advanced settings if sensors or physiological alarms are active or if vital sign measurements are displayed.

NOTE Create or change your advanced settings passcode using the Configuration Tool per the device configuration and setup instructions in this manual.

1. From the Home tab, touch the **Settings** tab.
2. Touch the **Advanced** vertical tab.
3. Enter your advanced settings password as the access code and touch OK.

   NOTE This access code is configurable and could be different at your location. Baxter recommends changing the default password.

   The General tab appears.
4. Perform service tasks by making selections or touching other tabs.

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

   The Home tab appears.

General tab

Specify the language

When you first access Advanced settings, the General tab appears, displaying the Language tab.

1. Select a language.
2. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify profile settings

Profiles support multiple clinical workflows.

CAUTION Switching from the Office profile drops the **Bluetooth** connection. Switching to the Office profile clears both patient information and current readings. Switching to another profile retains patient information, but current readings are cleared.

1. In Advanced settings, touch the **General** > **Profiles** tabs.
2. Specify settings.

Setting	Action/Description
Profile types	Select the profile types to display: Intervals, Office, and Spot.
Primary profile	Select the primary profile.
Custom profile name	If desired, modify the profile names.

3. Touch **Apply**.
4. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify date and time settings

1. In Advanced settings, touch the **General** > **Date / Time** tabs.
2. Specify settings.

Setting	Action/Description
Date format	Select a date format for display.
Time zone	Displays UTC time zone (read only)
Enable NTP (Network Time Protocol)	Enable the monitor to query the correct date and time from a trusted time server. When enabled, manual date and time entry on the Settings tab is disabled. Touch the keyboard in the Domain field and enter up to 20 characters and then touch **OK.**

3. Touch Test network connection.

   Test results appear for the Time sync test, IP address, and DNS query status.
4. Touch **OK**.
5. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Review the open source software disclosure

1. In Advanced settings, touch the **General** > **Open Source** tabs.
2. Read Baxter's disclosure about its use of "free" or "open source" software.
3. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Parameters tab

Specify advanced NIBP settings

1. In Advanced settings, touch the **Parameter** > **NIBP** tabs.
2. Specify settings.

Setting	Action/Description
Default view	Select default primary and secondary views. • SYS/DIA as primary • MAP as primary • SYS/DIA only
Unit of measure	Select the NIBP unit of measure for display. • kPa • mmHg
Tube type	Select the number of tubes that are connected to the NIBP cuff that is used with this monitor. If you select **Single**, the device sets the algorithm to **Step**, disabling other options. • Single • Double
Algorithm default	Select the default algorithm used to determine NIBP measurements. • **SureBP** • StepBP If **SureBP** is selected, the device inflates the cuff to the appropriate level, measuring the blood pressure as the cuff is inflating. The systolic display shows the pressure in the cuff as the blood pressure determination is in process. If StepBP is selected, the device will inflate the cuff, then measure the blood pressure while deflating the cuff. If the device is unable to determine a blood pressure while the cuff is inflating due to patient movement, excessive noise, or an arrhythmia, the device will use the StepBP algorithm to inflate the cuff to a higher pressure, then attempt to measure the blood pressure while deflating the cuff. The default NIBP algorithm is **SureBP**.

3. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify advanced temperature settings

1. In Advanced settings, touch the **Parameter** > **Temperature** tabs.
2. Specify settings.

Setting	Action/Description
Unit of measure	Select primary units of measure for the temperature display on the Home tab • °F • °C

Setting	Action/Description
Display temperature conversion	Enable to display primary units of measure and secondary units of measure for the temperature display on the Home tab.

3. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify advanced averaging interval settings

Averaging intervals are available in the Office profile.

1. In Advanced settings, touch the **Parameter** > **Averaging** tabs.
2. Specify settings.

Setting	Action/Description
NIBP averaging program	Select the averaging program to view or modify. You can change the name of the averaging program.
Readings to average	Select which readings in a series to use for averaging (and the number of readings to average as a result).
Delay to start (minutes)	Enter the number of minutes to wait before the averaging program starts (after touching "Start intervals") and the start of the first reading.
Time between (minutes)	Enter the number of minutes to wait between readings.
Keep if + or – (mmHg)	Enter the range that the program uses as criteria to accept or reject readings and establish the baseline reading.
Summary display box	Displays currently selected settings.

3. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify advanced program interval settings

1. In Advanced settings, touch the **Parameter** > **Program** tabs.
2. Specify settings.

Setting	Action/Description
Program	Select the program to view or modify. You can change the name of the program.
Intervals	Specify up to five sets of interval readings for this program. For each set, specify the number of minutes between interval readings and the number of times that each interval should run (repetitions) before proceeding to the next set.

3. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Network tab

Specify radio settings

This task is applicable only to monitors that have a wireless radio installed. Devices can be configured with a wireless or a **Bluetooth** radio.

1. **Bluetooth**
2. In Advanced settings, touch the **Network** > **Radio** tabs.
3. Specify settings.

   Select from the following radio settings:

Setting	Action/Description
Enable radio	Enable the radio for **Wi-Fi** communications. When disabled, the radio is not available.
ESSID	Enter the service set identifier (SSID) for the enterprise. Enter a maximum of 16 characters.
Radio mode	Select the radio band.
Dynamic Frequency Selection	Enable to allow the site to transmit data on changing frequencies for added security. This option applies most frequently to military or government enterprises.
Enable radio network alarms	Activate radio network alarms when an wireless dropout alarm condition occurs. When disabled, radio network alarms are not available.
Roaming	Select the type of roaming (only available with WPA/WPA2 Enterprise).
Regulatory	Display the **Wi-Fi** regulatory certification information.
Update radio	Touch Update radio to activate all new radio settings not selected previously. Touch OK in the confirmation popup. **NOTE** None of the changed radio settings take effect until you touch **Update radio**.

4. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify security settings

1. In Advanced settings, touch the **Network** > **Security** tabs.
2. Select the encryption method to secure data transfer from the device.

   NOTE Network server certificates are required for all EAP security options. Use the **Welch Allyn** Service Tool to load these certificates.
3. Select the preferred encryption option. Then specify any additional settings that appear. The default is WPA2-Personal.

Setting	Action/Description
Authentication type	Select the preferred encryption option. Then specify any additional settings that appear. The default is WPA2-Personal.

Setting	Action/Description
WPA-Personal and WPA2-Personal	Enter a Passphrase (8 to 63 characters). The characters you enter appear as asterisks. Then click **Update radio**.
WPA-Enterprise and WPA2-Enterprise	Specify the following settings and then click **Update radio**.
Anonymous identity	Enable this option to disable the User name field.
User name	Enter the EAP identity (maximum of 32 characters). This is disabled EAP type TTLS.
Password	Enter the EAP password (maximum of 32 characters). This is disabled EAP type TLS.
Enable server validation	Enable or disable server validation. This is disabled EAP type PEAP-TLS.
EAP type	Select the authentication protocol (TLS, TTLS, PEAP-MSCHAPv2, PEAP-GTC, PEAP-TLS, EAP-FAST).
Option	Select more specific EAP settings (Inner EAP Setting: Auto or PAP, PAC Provisioning: Auto or Manual).
Update radio	Touch **Update radio** to activate all new radio settings not selected previously. Touch OK in the confirmation popup. **NOTE** None of the changed radio settings take effect until you touch **Update radio**.
Enable FIPS mode	Select Enable FIPS mode if you are connecting to a FIPS environment. Check the Enable FIPS mode box, and then touch **Update radio**.

4. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify server settings

NOTE If the IP address and the TCP/IP port are not set up correctly, new downloads, new configurations and new firmware will fail to load. When this failure occurs, there is no alert or error message and the system will appear to be connected and synchronizing, but your connection and download will not complete. If this happens, go into your IP port configuration settings and ensure that your IP address is correct and that it is connected to the correct TCP/IP service host port 281.

1. In Advanced settings, touch the **Network** > **Server** tabs.
2. Select the method used to identify the IP address of the server with which the device will communicate.
3. Specify settings.

Setting	Action/Description
Network connectivity method	Select the preferred method to connect to the server.
Data encryption	Turn the security data encryption on or off, and enable or disable the server authentication.
Server authentication	Turn the server authentication on or off.

Setting	Action/Description
Host IP	Enable the device to connect to a host or other server at a fixed IP address. In the IP address entry field, enter the IP address. In the Port entry field and enter the port number. The range of entry is 0 to 65535. Select either a Baxter host or a direct EMR connection.
NRS	Enable the device to connect to a Network Rendezvous Service (NRS) at a fixed IP address. In the IP address entry field, enter the IP address. In the Port entry field and enter the port number. The range of entry is 0 to 65535.
DNS hostname	Enable the device to connect to a Network Rendezvous Service (NRS) by entering a hostname to be sent to a Domain Name Server (DNS) to retrieve the NRS IP address. In the Hostname field, enter the DNS name. In the NRS Service Port entry field, enter the port number. The range of entry is 0 to 65535.
	NOTE The DNS option is only available in the following conditions: • The radio is disabled • No radio is installed
DHCP	Enable the device to connect to a Network Rendezvous Service (NRS) by entering a port number and then connecting at a provided IP address. In the NRS Port entry field, enter the port number. The range of entry is 0 to 65535. After successfully connecting to the server, the NRS IP addresses and the Vendor class identifier appear onscreen.
Server connectivity	Select the preferred server connection: • Baxter host • Direct EMR connection

4. Touch **Test network connection**.

   The status of the server connections appears.
5. Touch **OK**.
6. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify **Bluetooth** settings

This task is applicable only to monitors that have a **Bluetooth** radio installed. Devices can be configured with a wireless or a **Bluetooth** radio. A configuration must be loaded to view regulatory information.

1. In Advanced settings, touch the **Network** > **BLUETOOTH** tabs.
2. Specify settings.

Setting	Action/Description
Allow Bluetooth configuration	Enable the device to connect to a host or other server with the Bluetooth radio. • **Bluetooth** • If enabled, **Bluetooth** Low Energy
Device name	Enter the 8-character device name.
Regulatory	Displays the **Wi-Fi** regulatory certification information.

3. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify device IP settings

A radio card must be installed and operational to specify the device IP settings.

1. In Advanced settings, touch the **Network** > **Device IP** tabs.
2. Specify settings.

Setting	Action/Description
Ethernet	Select **Use DHCP** or **Static ID**.
IP address	If Static ID is selected, specify these settings.
Subnet mask	
Gateway	
DNS IP address	Enter the IP address of the DNS server.

3. Touch **Apply**.
4. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Specify **Active Directory** settings

Use the **Active Directory** settings to manage the device communication address and access settings.

NOTE See "Connex Direct" for further information.

1. In Advanced settings, touch the **Network** > **Active Directory** tabs.
2. Select **Enable Active Directory**.
3. Specify settings.

Setting	Action/Description
Domain name	Enter the domain name.
Group	Enter the domain name group.
Clinician ID type	Select the clinician ID type (User name, Account name, or Employee ID.
Authentication user name	Enter the user name.
Authentication password	Enter the password.
Search subtree	Enter the subtree alpha-numeric characters.

4. Touch **Test network connection**.
   The device displays the Active Directory test status.
5. Click **OK**.
6. Do one of the following:
   - To continue in Advanced settings, touch another tab.
   - To exit Advanced settings and return to the Home tab, touch **Exit**.

Service tab

Ethernet status

In Advanced settings, touch the **Service** > **Ethernet status** tabs. This Ethernet status vertical tab displays read-only data about the Ethernet connection:

Network

- MAC address
- IP address
- Subnet mask
- Gateway
- DHCP server
- DHCP lease time

Network statistics

- Rx bytes
- Tx bytes
- Rx packets
- Tx packets
- Rx multicast packets

Errors

- Rx errors
- Tx errors
- Rx packets dropped
- Tx packets dropped

Radio status

In Advanced settings, touch the **Service** > **Radio status** tabs. This Radio status vertical tab displays the following read-only data about the **Wi-Fi** or **Bluetooth** radio connection:

Network

- MAC address
- IP address
- Subnet mask
- Gateway
- DHCP server
- DHCP lease time

Network statistics

- Rx bytes
- Tx bytes
- Rx packets
- Tx packets
- Rx multicast packets

Errors

- Rx errors
- Tx errors

- Rx packets dropped
- Tx packets dropped

Radio settings

- Version
- Radio status string
- SSID
- Access point MAC
- Authentication type
- RSSI
- Radio band
- Channel
- Power mode
- FIPS mode

If the device cannot communicate with the radio through the internal radio IP address, the radio error 35002c appears. A Mac address text field appears on the Radio status tab approximately three to four minutes after the error message. Contact Baxter for assistance in entering the correct Mac address in this field.

Enter general device information

1. In Advanced settings, touch the **Service** > **General** tabs.
2. Touch and enter up to 20 characters in the following data fields to support device identification:
   - Asset tag
   - Device location
   - Device location ID
3. If desired, select **Allow Display Lock**.

   The display lock prevents clinician input, which may be useful when cleaning the display.
4. If desired, select **Disable USB ports**.
5. Touch **OK** and repeat for each data field.

   The General vertical tab appears.

   NOTE You can enter general device information in the **Welch Allyn** Service Tool as well.
6. To calibrate your touchscreen, touch **Start** in the right pane and follow the onscreen prompts.

   The Home tab appears.
7. To synchronize with the Service Monitor, touch **Sync now**.

   If the software version is 1.30 or greater, the screen displays information about the connection and whether a new configuration or firmware is available.
8. Touch **Close**.
9. To verify the NIBP pressure valve accuracy, touch **Close Valve**.

   The pressure displays in the NIBP Pressure Verification field. If the software version is 1.33 or greater, you can check the functionality of NIBP accuracy on the device without use of the **Welch Allyn** Service Tool.
10. To stop the accuracy test, touch **Open Value** or navigate away from the screen.

Review and update configuration information

1. In Advanced settings, touch the **Service** > **Config file** tabs.

   NOTE Loading the Config file sets the initial configuration. However, manually changing settings on the device, overrides the configuration file settings.

2. In the left pane, review the following configuration information:

   - Configuration file
   - Active Config file name
   - Date of generation
   - Date loaded to device
   - Supported features (examples include: **RRp**, **Bluetooth** Low Energy)
   - Licensed features (examples include: **Bluetooth** Low Energy, **RRp**)

3. To load a new configuration from the network, touch Load in the right pane and follow the onscreen prompts.
4. To save the current configuration to a USB drive, connect a compatible flash drive to the USB port, touch Save to USB in the right pane, and follow the onscreen prompts.

   NOTE Not all flash drives are supported. See "USB flash drive requirements" in the Appendix for details.

Save service logs to a USB flash drive

This procedure enables you to save the last 14 active log files to a USB flash drive.

NOTE The **Welch Allyn** Service Tool enables you to save only the 2 most recent log files.

1. In Advanced settings, touch the **Service** > **Log file** tabs.
2. Connect a flash drive to the USB port.

   NOTE Not all flash drives are supported. See "USB flash drive requirements" in the Appendix for details.

3. Touch **Save to USB** and follow the onscreen prompts.

   Copies of the service log files are saved to the drive.

Restore factory default settings

NOTE This process does not restore the monitor to a custom configuration provided at delivery. Instead, it deletes all custom configuration data and restores factory default settings.

1. In Advanced settings, touch the **Service** > **System** tabs.
2. Reset to defaults:

   - To restore radio settings to factory default values, select **Radio settings only**.
   - To restore all current settings to factory default values, select **All settings**.

3. Touch **Reset** and follow the onscreen prompts.

   The factory default settings are restored.

   If you selected Radio settings only, the radio reboots, and the device remains powered on.

   If you selected All settings, the device reboots.

Review firmware status and load firmware from the network

1. In Advanced settings, touch the **Service** > **System** tabs.
2. In the right pane, review the firmware status information.

   NOTE If the firmware is up-to-date, take no further action.

3. To update the firmware, touch **Load** and follow the onscreen prompts.

NOTE You can also load new firmware by rebooting the device.

Power-up sequence

Overview

The system performs a power-on self test (POST) of the software and internal hardware each time the device is powered on. Specific tests performed include the following:

- CVC-PIC tests
- LED power tests
- eMMC (memory) tests
- EEPROM tests

If all tests are successful, the system completes power up and the user interface screen for the default configuration appears (either the Home tab or a login/profile selection screen), and the system is ready for operation.

If the self-check fails, an error message and an error code appear in the system status area at the top of the screen to aid service personnel and engineers in diagnosing the problem. If a fault that could adversely affect the product is detected, the system enters a safe mode and stops all monitoring functions. The system remains in safe mode until it is turned off by pressing ⏻ or until the device shuts down automatically after a period of inactivity.

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 buzzer generates a sound.
   b. A startup screen appears briefly and then disappears.
   c. The power button flashes until the UI is ready.
   d. A beep sounds, followed by one chime.

      NOTE If no chimes sound, replace the speaker as specified in "Separate the speaker nest from the NIBP pump tray" and “When reinstalling the speaker.”
   e. The Home tab or the login/profile selection screen appears.

Bluetooth wireless technology

NOTE Your model might not contain all of these features.

Bluetooth wireless technology is available in the Office profile.

Bluetooth

A monitor with **Bluetooth** wireless technology displays the status between the monitor and the device in the Status area.

Image	Description
No image	**Bluetooth** radio is OFF
Bluetooth icon appears in Status area	**Bluetooth** radio is ON
Bluetooth icon is blinking on / off slowly	The monitor is pairing with the device
Bluetooth icon is blinking on / off quickly	The monitor is connecting with the device
Bluetooth icon appears with a border around the icon in the Status area	The monitor and the device are connected and the monitor is ready to transmit data

In order to transmit data, you must first pair and then connect the monitor and the device.

Enable **Bluetooth** pairing

You can pair a device and a PC configured with **Bluetooth** wireless technology.

1. In Advanced settings, touch the **Network** > **BLUETOOTH** tabs.
2. Touch Allow **BLUETOOTH** configuration to enable pairing.

Pair a device with **Bluetooth** wireless technology

When a monitor with **Bluetooth** wireless technology powers on and there are devices already paired with the monitor, a pop-up screen appears showing the devices available for connection with the monitor. Follow the instructions below to pair an additional device with the monitor.

1. Touch .
2. Touch Add new device.
3. For a laptop, select the monitor from the list of available devices in your **Bluetooth** program manager on your laptop task bar.

   NOTE For a tablet, select the monitor (WACSM device) from the list of available devices in your **Bluetooth** program manager on your tablet. A message appears on the monitor that indicating that "This device is now discoverable" and a confirmation number displays on both the device and monitor screens. Touch **Pair** in the tablet device.

4. Confirm that the numbers match on the device and on the monitor, and then touch **Accept** in the laptop device.

   A message appears indicating that the monitor and device are paired.
5. Touch **OK** on the monitor screen.

   Touch the keyboard icon in the Name this connection: field and begin to type the name to a preferred name of the device.
6. After preferred name is entered, touch **Save**.

   The new name appears in the **Bluetooth** device list of paired devices.

Connect devices with **Bluetooth** wireless technology and download data

1. In the **Bluetooth** connection screen, select a laptop from the list of paired devices.

   The **Bluetooth** icon in the Device Status area quickly blinks on and off as the monitor and laptop are connecting.

   When the monitor and the laptop connect, an information message briefly appears that names the connected laptop. When the message disappears, the name of the connected laptop appears on the top left of the screen, and the **Bluetooth** connected icon appears in the connection area.
2. As the laptop downloads data, the progress indicator spins in the connection area.

   The **Bluetooth** connection remains active until the download is complete. After a successful download, the system clears data from the monitor and disconnects the monitor from the laptop.
3. Repeat the process as needed, or touch Cancel to dismiss the **Bluetooth** connection screen.

Rename a device (applies only to standard **Bluetooth**)

You can rename a paired device from a system or generic name to a specific name.

1. Select the arrow button to the right of the device name you want to edit in the **Bluetooth** device list.

   Touch the keyboard icon in the Name this connection: field and begin to type the name to a preferred name of the device.
2. Enter the name, touch **OK** on the keyboard screen, and then touch **Save**.

   The new name appears in the list of paired **Bluetooth** device list.

Bluetooth Low Energy (BLE) workflow

For more information, contact your sales representative.

Use the Product Configuration Tool (version 1.9.0, or later) to allow and enable the **Bluetooth** Low Energy (BLE) connection and update the **Connex Spot** Monitor (monitor) configuration file.

Refer to the “Advanced Settings” instructions on how to allow the **Bluetooth** Low Energy configuration.

1. Power on the **Connex Spot** Monitor.
2. Open the mobile application on the device. A list of Vitals devices appears.
3. If this is the first time connecting the mobile device with the **Connex Spot** Monitor, select the vitals device in the mobile application.
   a. The **Bluetooth** Pairing request prompt appears: "WACSM... would like to pair with your ..."
   b. Pair the device and the **Connex Spot** Monitor by touching OK on the **Connex Spot** Monitor at the prompt, "A **Bluetooth** Low Energy device is attempting to connect."
   c. At the pairing confirmation screen, touch Pair on the mobile application.

      The mobile application home screen appears.

Disassembly and repair

These procedures provide instructions for device disassembly and board removal, as well as component replacement and reassembly.

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

- *Reassembly notes*: This subsection contains information specific to reassembly. At a minimum, these notes indicate whether or not reassembly is the reverse of disassembly. The notes also list service kits of replacement parts where applicable.
- *When replacing the component*: This subsection contains additional instructions related to installing a new option or replacement part.

Each disassembly step includes drawings that illustrate the components to be removed. The reassembly notes could be as short as one or two lines when reassembly is the reverse of disassembly. When reassembly is more complicated, these notes alert you to any special care required to complete the repair or installation and sometimes introduce separate reassembly instructions. Line drawings appear in the reassembly notes only when they differ from the drawings in the disassembly instructions.

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 or installing options, disconnect the patient from the monitor, power down the device, disconnect the AC power cord and any attached accessories (for example, SpO2 sensors, blood pressure hoses and cuffs, and temperature probes) from the device.

CAUTION If your device is configured with a SureTemp module, remove the probe well before 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. It is possible to mistakenly install machine screws in locations intended for plastite screws. Plastite screws have a Torx-pan head.

Required tools and equipment

- Phillips #1 screwdriver
- T-10 **Torx** screwdriver
- 3mm hex key

Torque value table

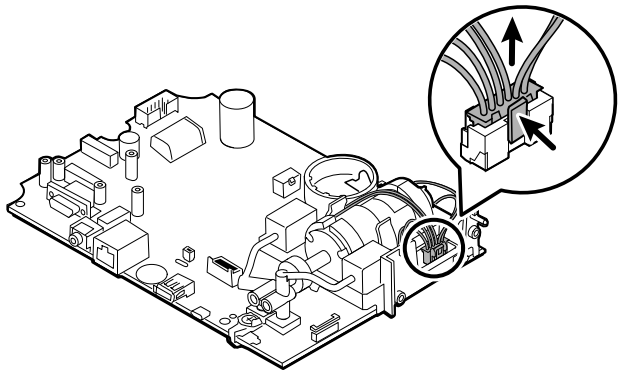
Use this table to determine how much torque to apply to screws by type and location when reassembling the device.

Description	Torque specification	Bit type	Where used
SCR,4-20X.31 PLASTITE PH TORX	4.5 +/-0.5 in-lbs	**Torx**	Chassis and SpO2 Insert to Main CSM PCA. Radio/Bluetooth PCBA to Chassis
SCREW 4-40 .250 PAN PHILLIPS STEEL ZINC	4.5 +/-0.5 in-lbs	Phillips	SpO2 boards
SCREW, M2 X 6 INTERNAL TOOTH SEMS PHP	2.5 +/-0.25 in-lbs	Phillips	Radio PCA to Radio Interface PCA
SCREW, M4 X 10 PAN HEAD W NYLOC	7.5 +/-0.5 in-lbs	Phillips	Front to Back Housing and Temperature Module/Dock
SCR, M4 PAN HD, PHD, SHOULDER	4.5 +/-0.5 in-lbs	Phillips	Battery Door

Connector types

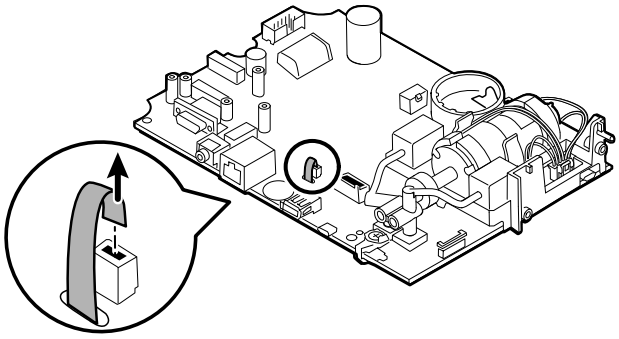
Disassembly and repair procedures require that you disconnect and reconnect the following connector types inside the device:

- *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. Some connectors have multiple latches that require you to press multiple tabs to release.



  To remove a locking connector, squeeze the tab(s) to release the latch(es) and remove the cable.

  To connect a locking connector, push the mating pieces together until the latch(es) lock in place.
- *Friction*: Friction connectors use a spring mechanism to create friction between the contacts.



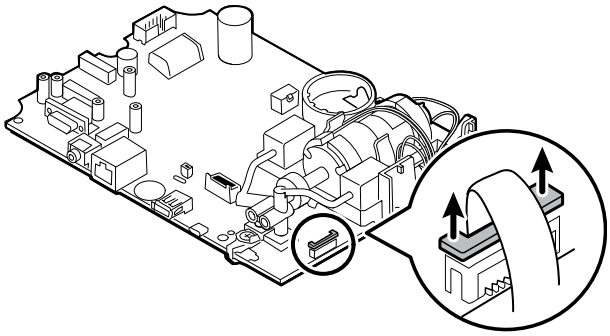
To remove a pressure connector, grasp each connector mating half and pull the halves apart.

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 friction connector, grasp each connector mating half and insert one half into the other.

- *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.

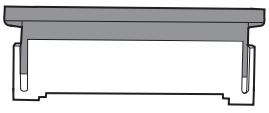


CAUTION Do not use excessive force when releasing pressure on the connector. Excessive force may result in breaking the sliding outer piece.

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.

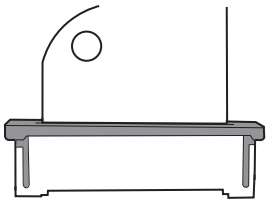


2. Remove the cable.

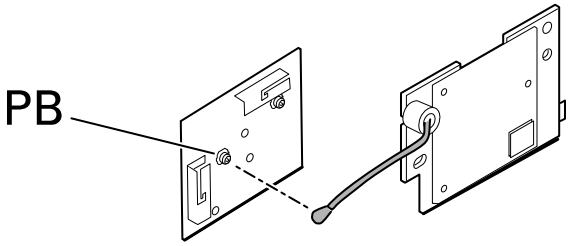
To connect a ZIF connector

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.



- *Coaxial*: Coaxial connectors, a type of pressure connector in this case, are components attached to the ends of a coax cable—they make it possible to connect to other devices. The connector has a wire conductor in the center, surrounded by an outer conductor, and an insulation between the two. In this device, the coaxial connector connects the antenna to the wireless radio board.



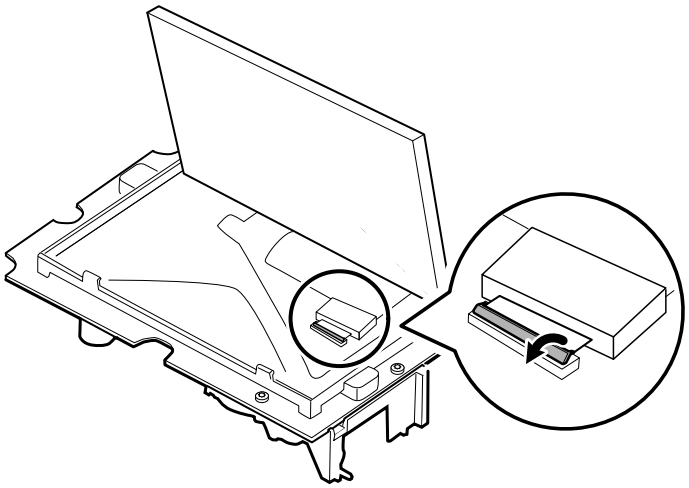
NOTE This connector is labeled PB because of its location on the wireless radio board.

To remove a coaxial connector, lift the connector away from the board.

To connect a coaxial connector, align the connector over the mount on the board and press to snap it into place.

- *FHY connector (Self-Lock mechanism)*: The device uses Self-Lock mechanism cable connectors.

A Self-Lock mechanism enables the cover to close by one-touch operation.



CAUTION Do not use excessive force when releasing pressure on the connector. Excessive force may result in breaking the locking mechnanism.

To remove a Self-Lock mechanism

CAUTION Remove a flex cable only after the FHY connector latch is open.

1. Lift the latching piece of the connector up off the the connector body.

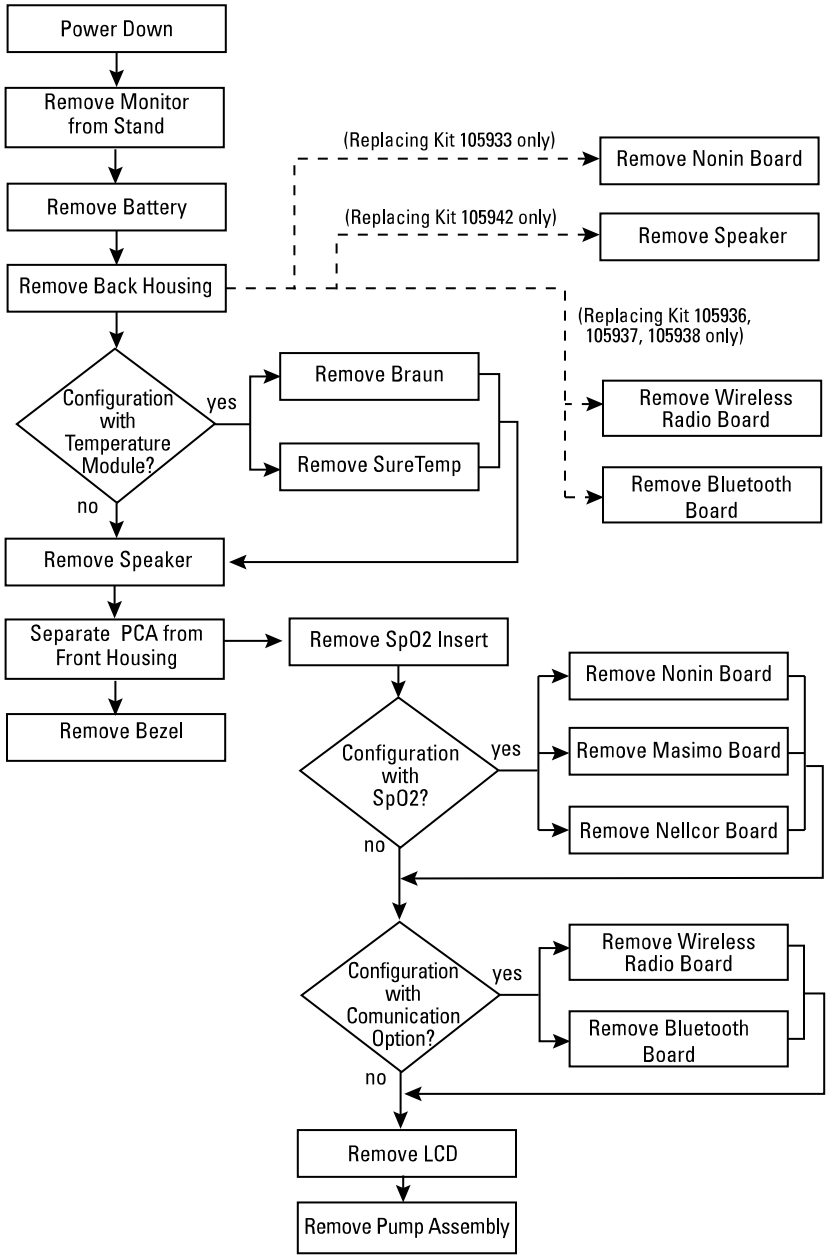
2. Remove the cable.

To connect a Self-Lock mechanism

1. Lift the latching piece of the connector up off from the connector body.
2. Insert the flex cable into the connector.
3. Push down on the latching piece connector until it locks into place.

Disassembly overview

The following flow chart provides an overview of the complete disassembly of the device. Most disassembly activities require that you complete a subset of the steps detailed here. The flow chart indicates the steps which must be completed in sequence to remove a particular component. Because a different sequence of preliminary steps is required to remove certain components, you should use this flow chart as a reference at the start of every disassembly and component replacement procedure.



NOTE After performing any of these procedures and before 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, you can download it from https://www.hillrom.com/en/services/welch-allyn-service-tool/.

Power down the monitor

You can power down the device as follows: 1) by briefly pressing the power button on the housing and then following the onscreen prompts, or 2) by using onscreen controls alone.

Option 1. Press the power button. An onscreen dialog opens with the following options:

- *Power down*. Device behavior is the same for all profiles.

- *Sleep*. The Sleep button clears the display and puts the device into Display power-saving mode.
- *Cancel*. The Cancel button dismisses the dialog.

Touch Power down and complete the power-down procedure as described in Option 2, steps 3 and 4.

Option 2. Use onscreen controls alone to power down the device:

1. Touch the **Settings** tab.
2. Touch the **Device** tab.
3. Touch **Power down**.
4. Select the desired option and then touch Power down.

The Power-down options dialog

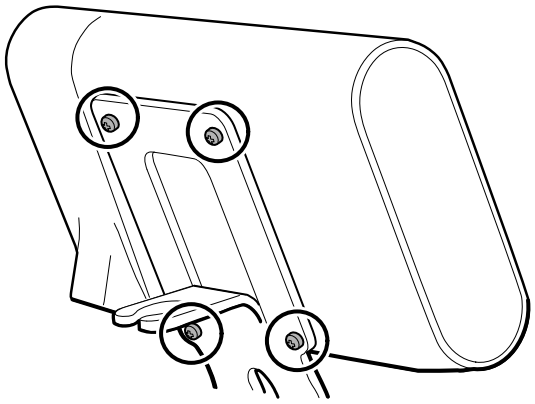
The buttons in this dialog produce varied effects, as noted below:

- *Power down*. The device clears all data onscreen and performs a complete software shutdown.
- *Cancel*. This button dismisses the dialog and returns you to the previous screen.

NOTE If your monitor is configured with a **Braun** thermometer, avoid powering down the monitor between patient measurements to help maintain an adequate charge to the Braun dock.

Remove the monitor from the stand

1. Disconnect the power cord from the wall.
2. If the system has an APM, disconnect the power and communication cables from the monitor. If the system has an external power supply, disconnect the power supply from the monitor.
3. Remove the 4 Phillips screws from the back of the stand mount to remove the monitor from the stand.

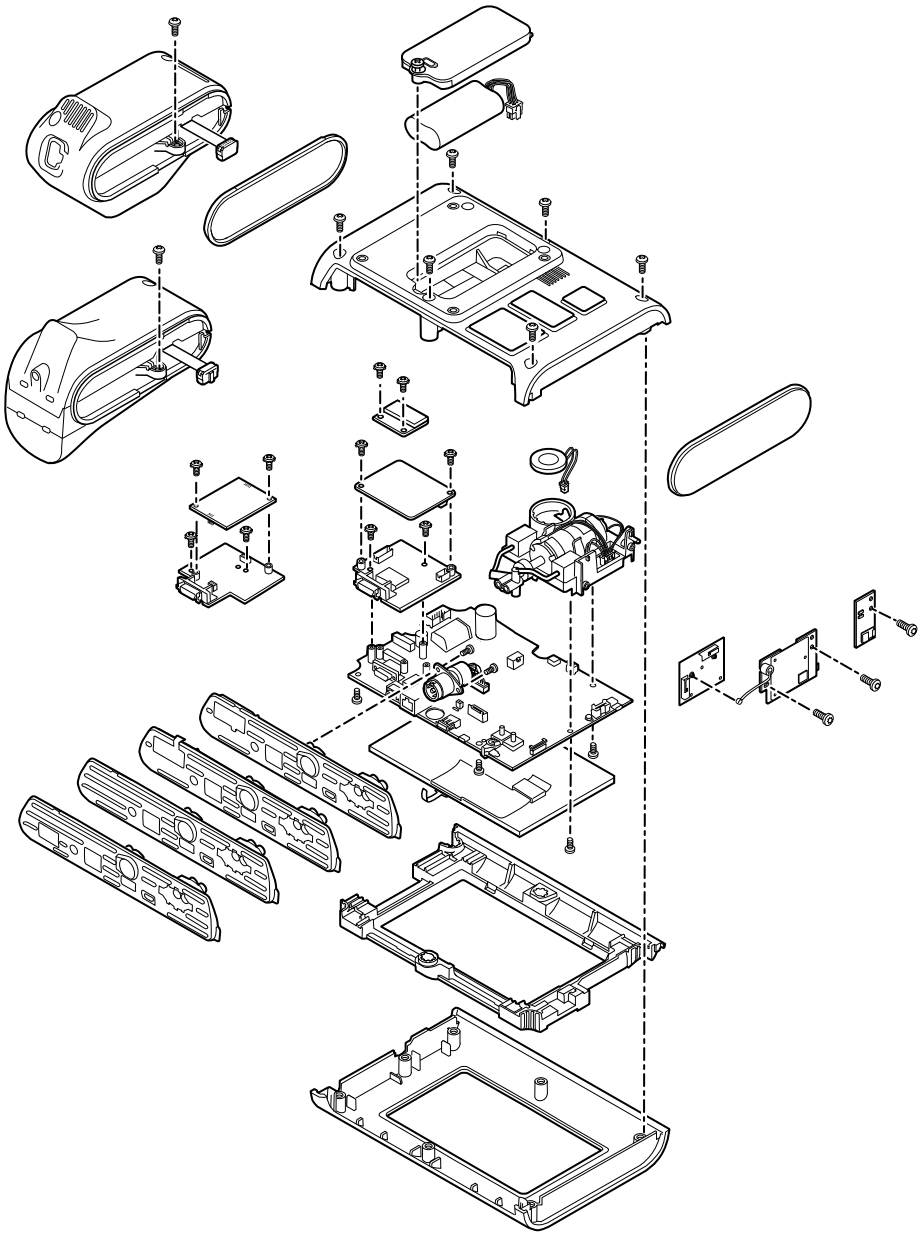


NOTE This artwork features the APM stand. Other stand mounts look slightly different.

Reassembly notes: Reassembly is the reverse of disassembly.

Exploded view diagram

The drawing below shows individual components of the device and their relationships to one another.

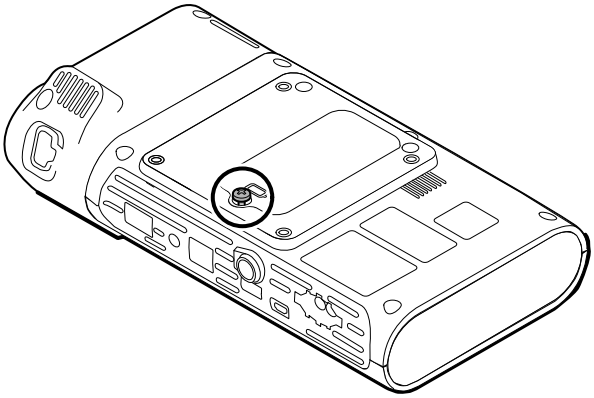


Remove the battery

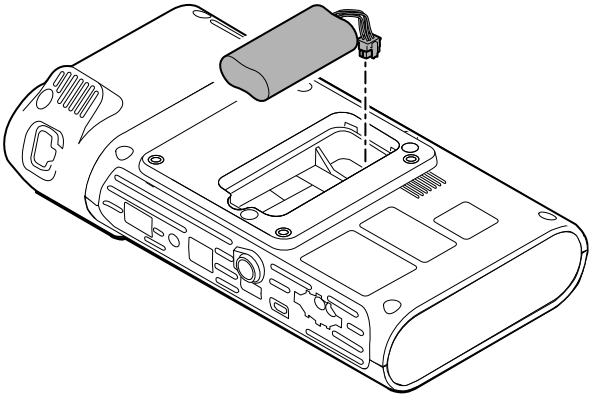
Before removing the battery, power down the monitor as described in this manual.

1. Place the unit face down on the table as shown.

2. Loosen the captive Phillips screw to remove the battery door.



3. Disconnect and remove the battery.



Reassembly notes

Kit item:

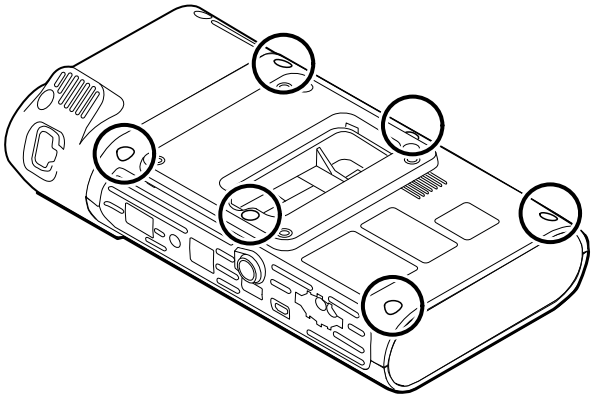
- Batt22, Srv Kit 2 Cell Lithium-ion Battery

NOTE Reassembly is the reverse of disassembly.

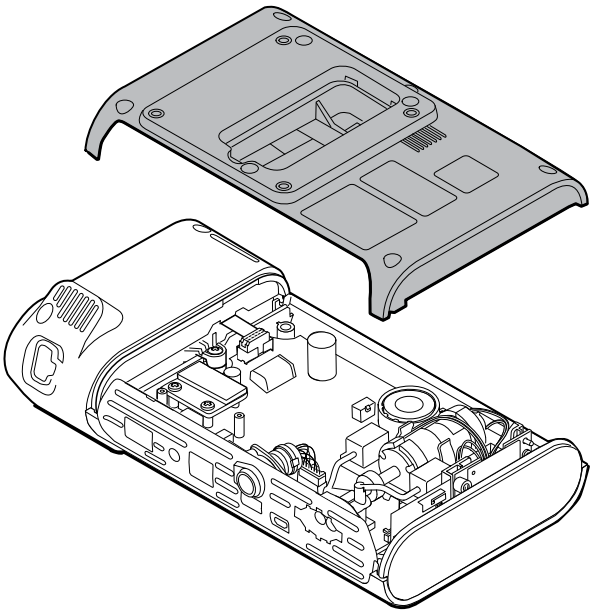
WARNING Defective batteries can damage the monitor. If the battery shows any signs of damage or cracking, it must be replaced immediately and only with a battery approved by Baxter.

Remove the back housing

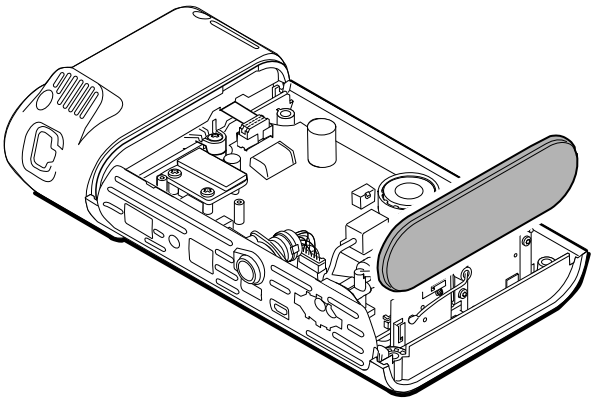
1. Remove the 6 Phillips screws on the back of the device to remove the back housing.



2. Lift the back housing straight up off the device.



3. Remove end cap on the right by pulling it out of its slot.



Reassembly notes

Kit items:

- 105939, End cap
- 105923, Back housing (includes battery, speaker foam, 6 screws, and labels)

NOTE The back housing is not available for direct purchase. Baxter limits availability of certain parts to Authorized Service Personnel only. These limitations are required to maintain product safety or maintain current regulations.

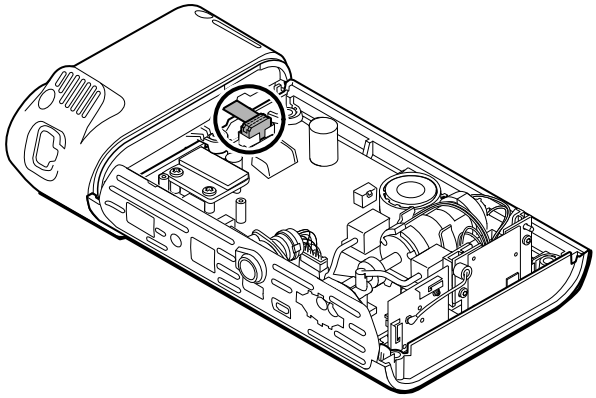
NOTE Reassembly is the reverse of disassembly.

Remove the temperature module or housing

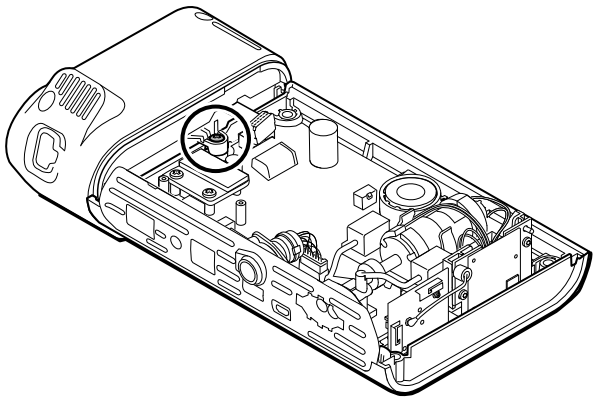
The monitor is configured with either a **SureTemp** or **Braun ThermoScan**® PRO 6000 temperature module. Proceed witih the disassembly steps that apply to your device.

Remove the **SureTemp** module

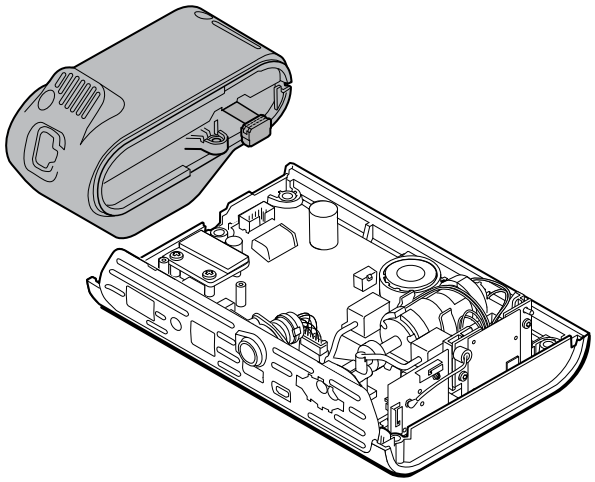
1. Disconnect the ribbon cable by lifting the connector.



2. Remove the Phillips screw that holds the module in place.



3. Lift the module out of the left side slot.



Reassembly notes

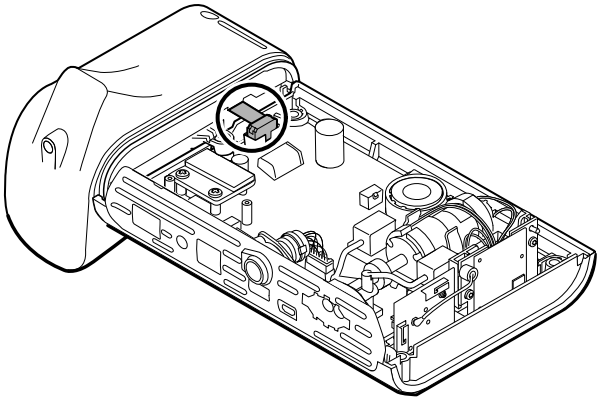
Kit item:

- 105940, **SureTemp** Plus module

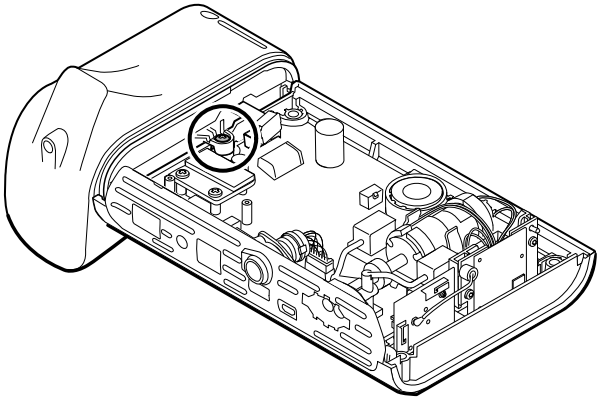
NOTE Reassembly is the reverse of disassembly.

Remove the **Braun ThermoScan®** PRO 6000 module

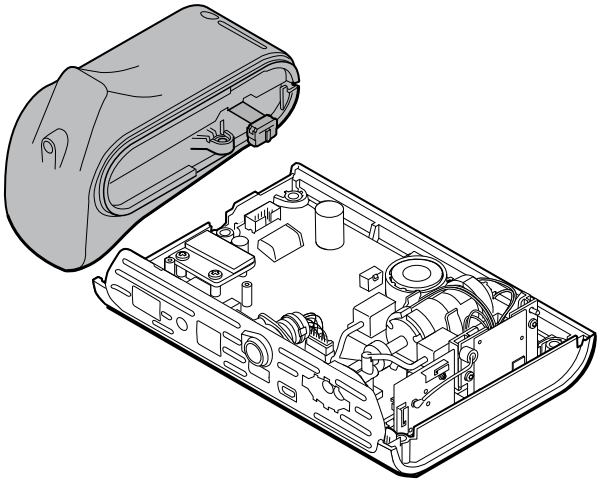
1. Disconnect the ribbon cable by lifting the connector.



2. Remove the Phillips screw that holds the module in place.



3. Lift the module out of the left side slot.



Reassembly notes

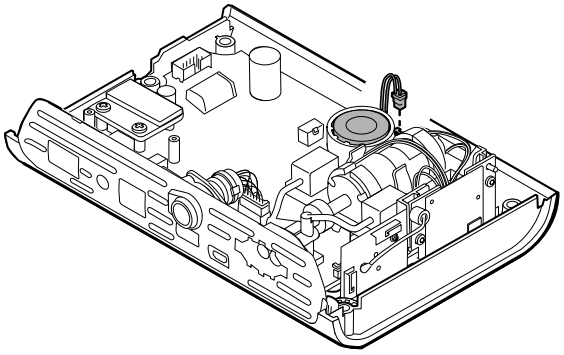
- 105941, **Braun ThermoScan**® PRO 6000 dock

NOTE Reassembly is the reverse of disassembly.

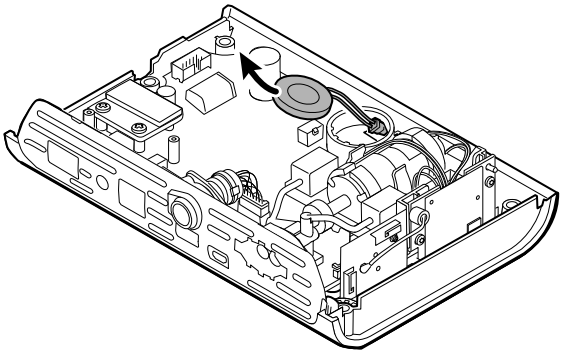
Disassemble the main PCA board

Remove the speaker

1. Disconnect the speaker wire.



2. Remove the speaker.



Reassembly notes

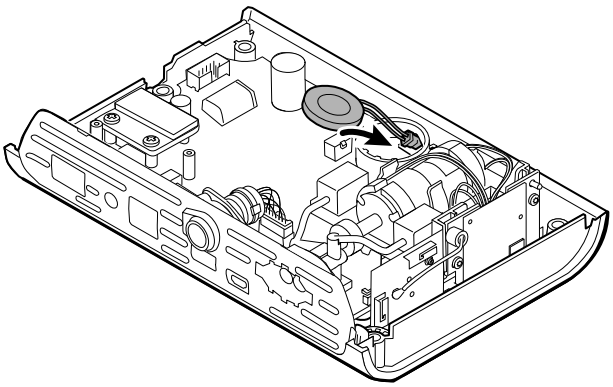
Kit item:

- 105942, Speaker

NOTE Reassembly is not the reverse of disassembly.

When replacing the speaker

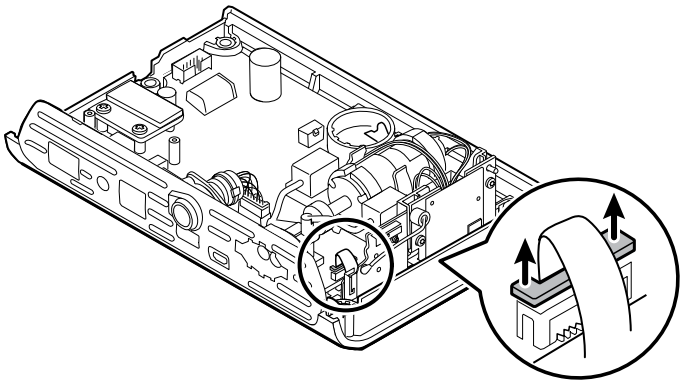
1. While holding the speaker, guide the wire through the hole in the pump assembly and drop the speaker into place.



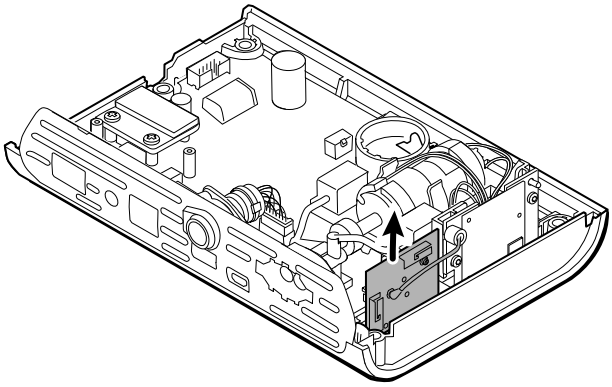
2. Connect the speaker wire to the main PCA board.

Separate the main PCA board from the front housing

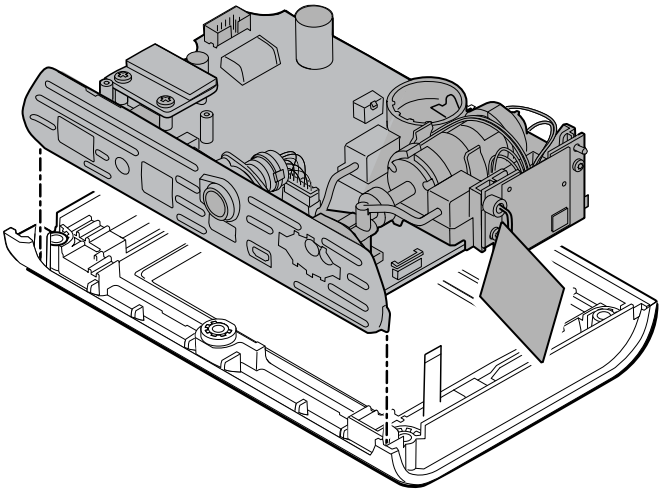
1. Disconnect the power switch flex cable from the main PCA board.



2. Lift the antenna board straight up out of its slot and let it hang.



3. Remove the main PCA board from the front housing.

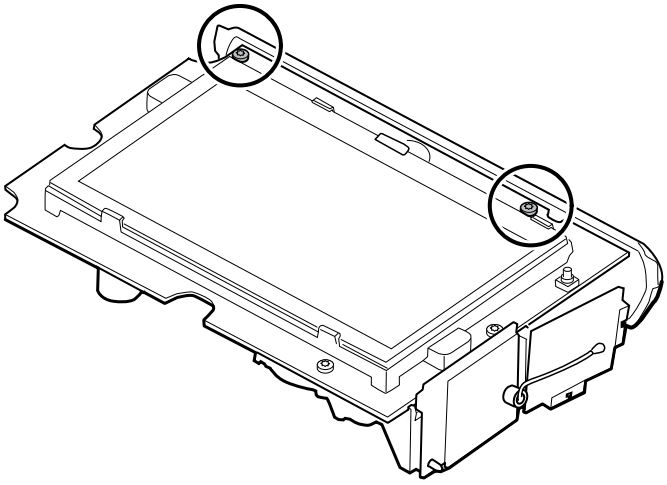


Reassembly notes

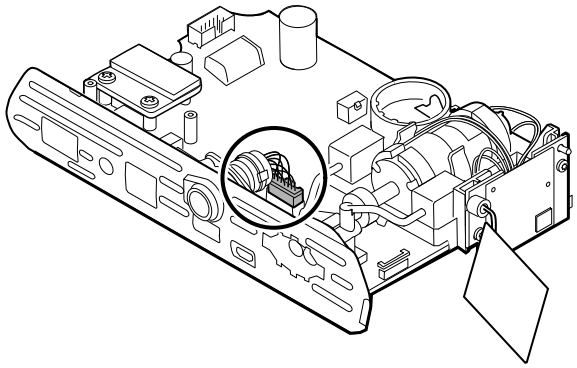
NOTE Reassembly is the reverse of disassembly.

Remove the SpO2 insert

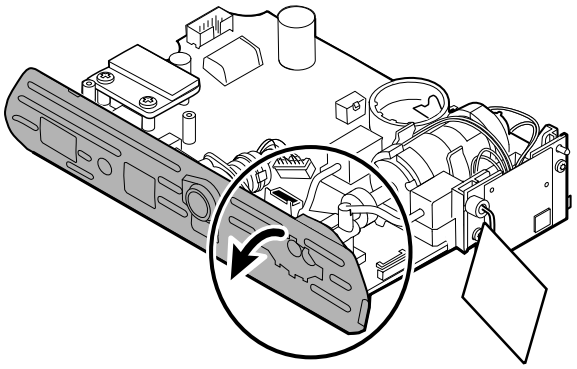
1. Turn over the main PCA board and remove the 2 T-10 **Torx** screws attaching the sensor insert to the main PCA board.



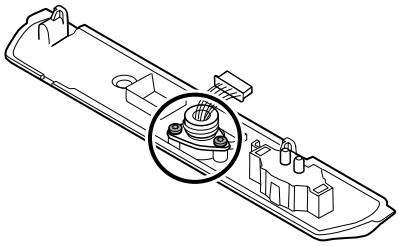
2. Turn over the main PCA board again so that the SpO2 board is facing you; then disconnect the power harness from the main PCA board.



3. To disconnect the insert from the pump manifold, hold the black pump manifold with one hand and tilt the top of the insert away from the main PCA board with the other hand.



4. Remove the 2 T-10 **Torx** screws from the power harness, and remove the power harness from the SpO2 insert.



Reassembly notes

SpO2 insert options are Masimo, Nellcor, Nonin, or none.

Kit items:

- 105926, Masimo insert only
- 105927, Nellcor insert only
- 105929, Nonin insert only
- 105928, No SpO2 insert only

NOTE Reassembly is not the reverse of disassembly, but it is the same for each insert.

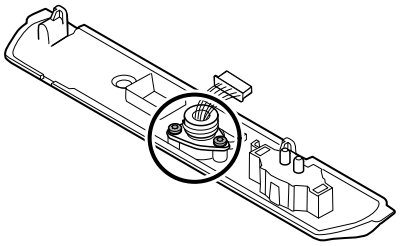
When replacing the SpO2 insert

Complete the following steps:

- Attach the power harness to the SpO2 insert. (See "Attach the power harness to the insert.")
- Install any new SpO2 board, if applicable. (See the reassembly notes in "Remove the SpO2 board.")

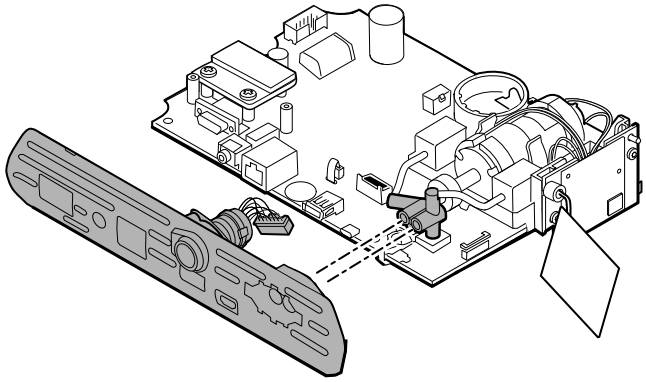
Attach the power harness to the insert

Align the power harness with the insert and secure it with 2 T-10 **Torx** screws (see the Torque Value Table).

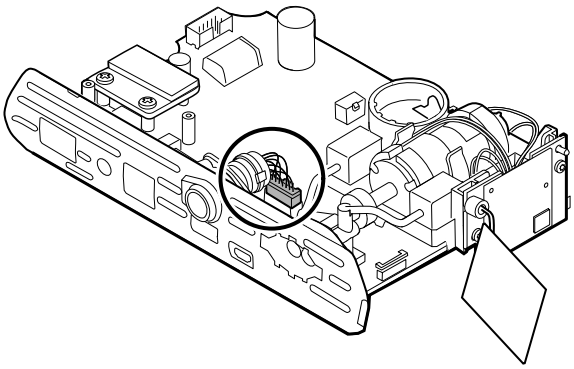


Attach the SpO2 insert to the main PCA board

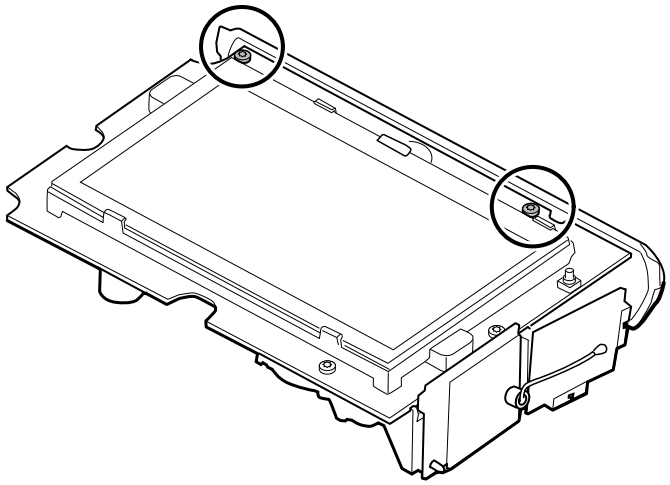
1. Align the insert with the edge of the main PCA board. Connect the pump tubing to the insert as shown and press firmly. Adjust the insert to fit snugly along the side of the board.



2. Connect the power harness to the main PCA board.



3. Turn over the board and secure the insert to the main PCA board with 2 T-10 **Torx** screws.

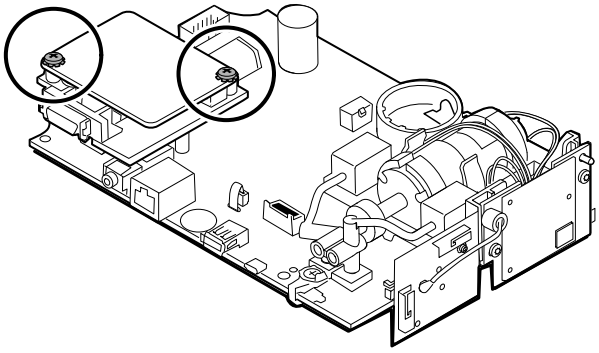


Remove the SpO2 board

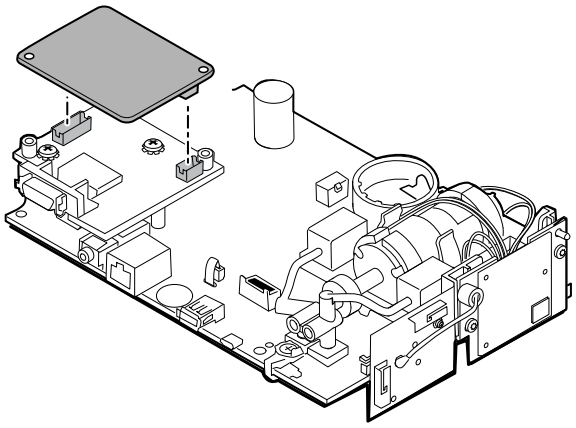
The monitor is configured with one of the following SpO2 boards: Masimo, Nellcor, Nonin, or none. Proceed witih the disassembly steps that apply to your device.

Remove the Masimo board

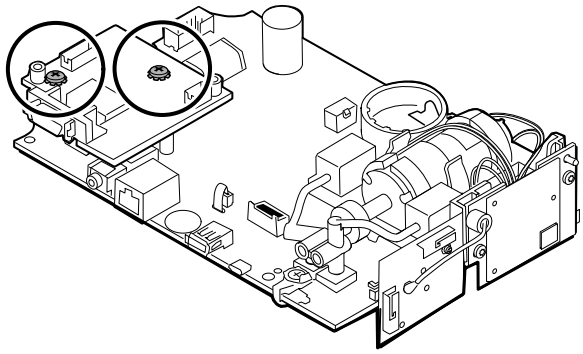
1. Remove the 2 Phillips screws from the SpO2 board.



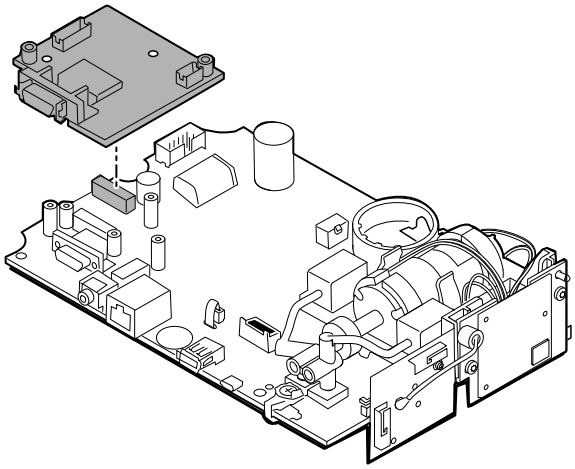
2. Lift the SpO2 board to remove it from the adapter board.



3. Remove the 2 Phillips screws that hold the adapter board to the main PCA board.

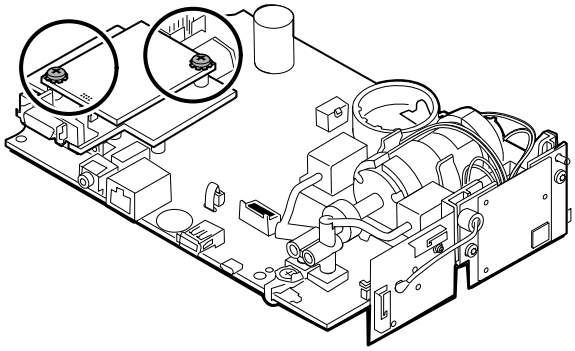


4. Firmly grasp the adapter board and lift it straight up to disconnect the pins.

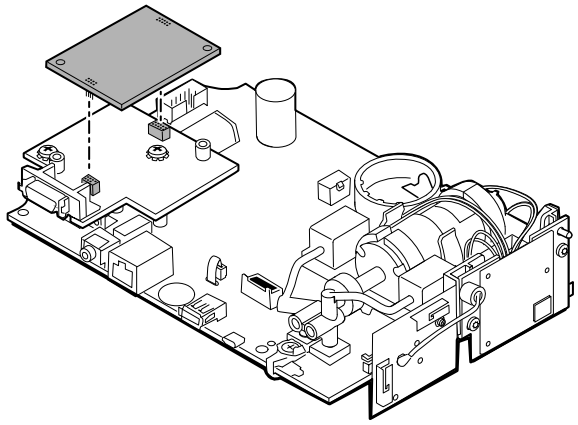


Remove the Nellcor board

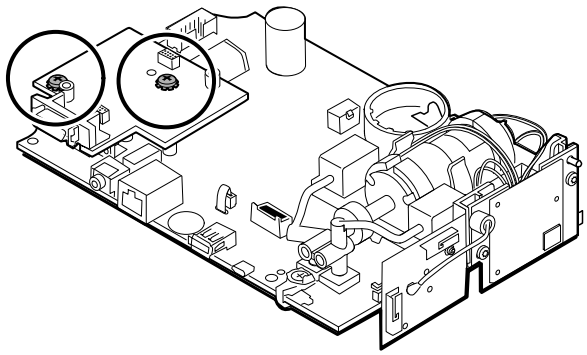
1. Remove the 2 Phillips screws from the SpO2 board.



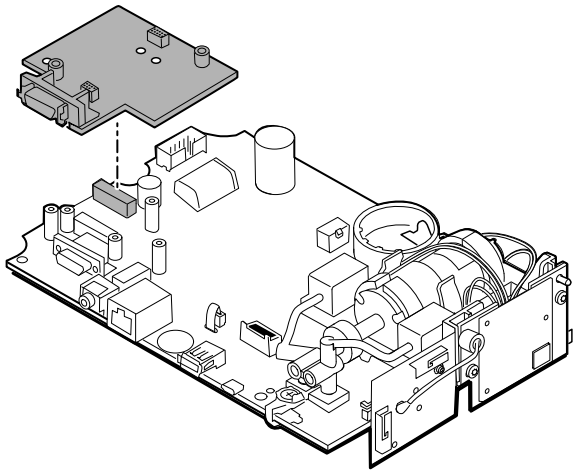
2. Lift the SpO2 board to remove it from the adapter board.



3. Remove the 2 Phillips screws that hold the adapter board to the main PCA board.

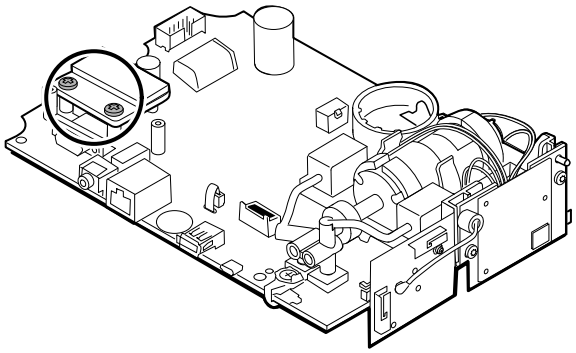


4. Firmly grasp the adapter board and lift it straight up to disconnect the pins.

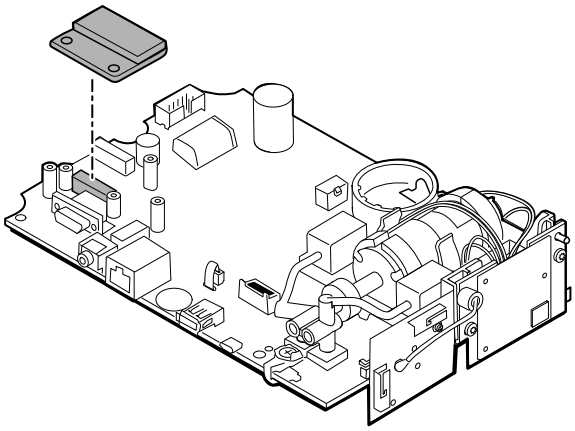


Remove the Nonin board

1. Remove the 2 Phillips screws that attach the SpO2 board to the main PCA board.



2. Remove the board.



Reassembly notes

SpO2 board options are Masimo, Nellcor, and Nonin.

Kit items:

- 105931, adapter board, Masimo board, and 2 Phillips screws (4-40 0.250 pan steel zinc)
- 105932, adapter board, Nellcor board, and 2 Phillips screws (4-40 0.250 pan steel zinc)
- 105933, Nonin board and 2 Phillips screws (4-40 0.250 pan steel zinc)

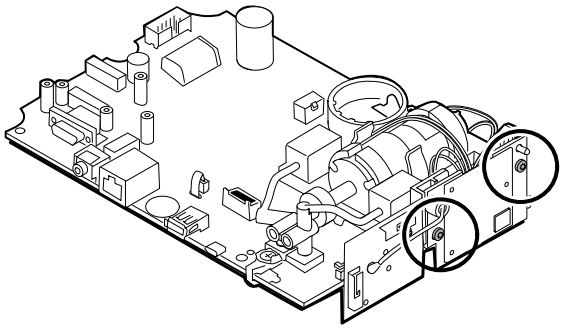
NOTE Reassembly is the reverse of disassembly for each board.

Remove the communications board

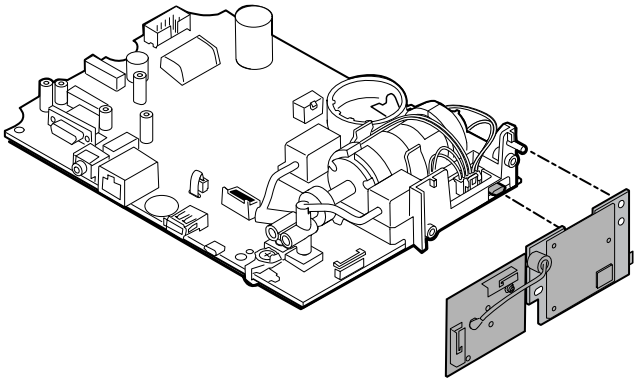
The monitor is configured with one of the following communications boards: wireless radio, **Bluetooth** wireless technology, or none. Proceed with the disassembly steps that apply to your device.

Remove the wireless radio board from the main PCA board

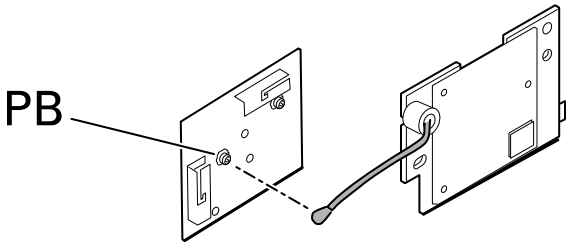
1. Remove the 2 T-10 **Torx** screws from the wireless radio board attached to the pump assembly.



2. Pull the board straight out to disconnect the micro USB connector.



3. Disconnect the antenna wire from the PB connector on the antenna board.



Reassembly notes

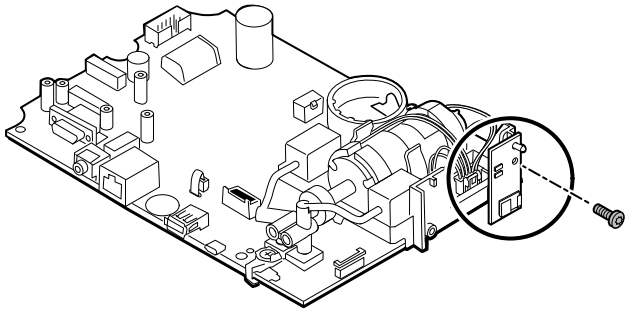
Kit items:

- 105936, Wireless radio board, antenna, and 2 T-10 **Torx** screws
- 105938, Antenna board

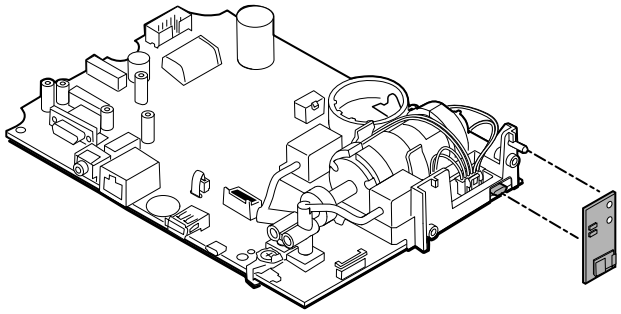
NOTE Reassembly is the reverse of disassembly.

Remove the **Bluetooth** board from the main PCA board

1. Remove the T-10 **Torx** screw from the **Bluetooth** radio board.



2. Pull the board straight out to disconnect the micro USB connector.



Reassembly notes

Kit items:

- 105937, **Bluetooth** board and a T-10 **Torx** screw

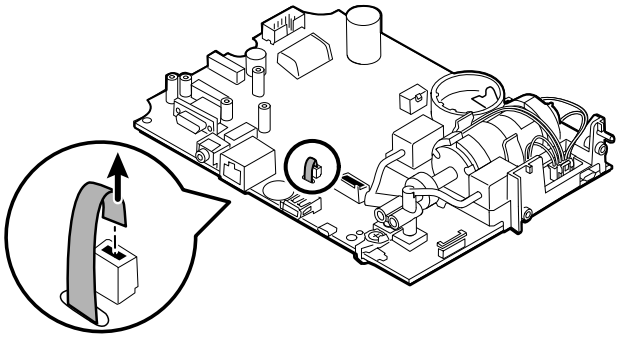
NOTE Reassembly is the reverse of disassembly.

Remove the touchscreen and display ribbon cable separately from the main PCA board

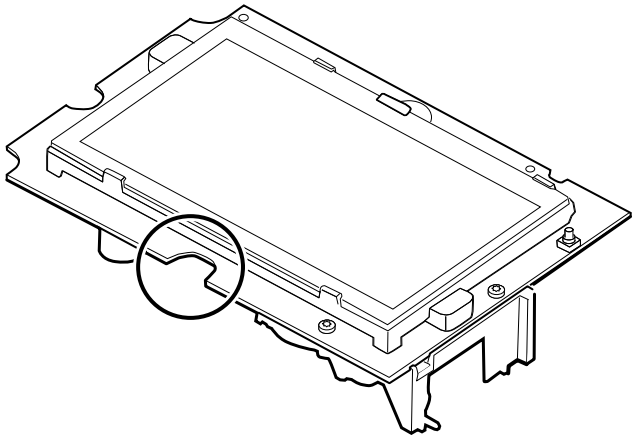
NOTE The touchscreen contains a serial number: TFC-K9700RTWV37TR or TFC-K9700RTWV55. Removal and Reassembly steps are the same for both serial numbers, except that the TFC-K9700RTWV37TR serial number has an integrated (soldered) LCD flex cable.

NOTE The TFC-K9700RTWV55 touchscreen and display ribbon cable (available as service kit item: 108241, Srv Kit HW A-F, LCD with Touchscreen) works with the 409703-16 CSM Main Board and with existing software versions. When using the TFC-K9700RTWV37TR touchscreen and display ribbon cable (available as service kit item 108121, Srv Kit CSM, LCD with Touchscreen New), you are required to upgrade your device with the newer 409703-18 CSM Main Board, the new LCD Touchscreen, and upgrade the software to 1.41 or greater.

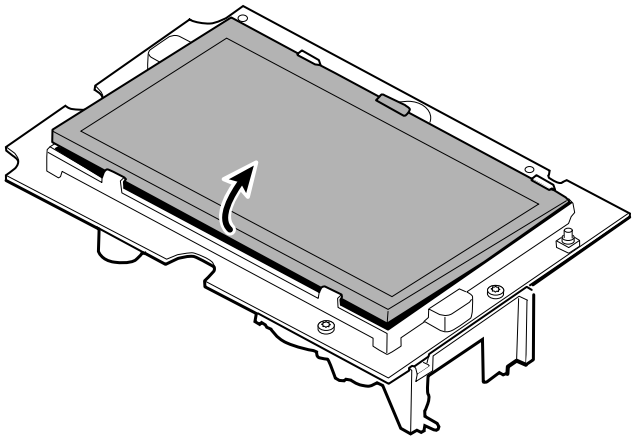
1. For the TFC-K9700RTWV55 serial number, carefully separate the LCD flex cable from its connector on the main PCA board by pulling the cable straight up.



2. Turn over the main PCA board so that the notch on the board faces you.

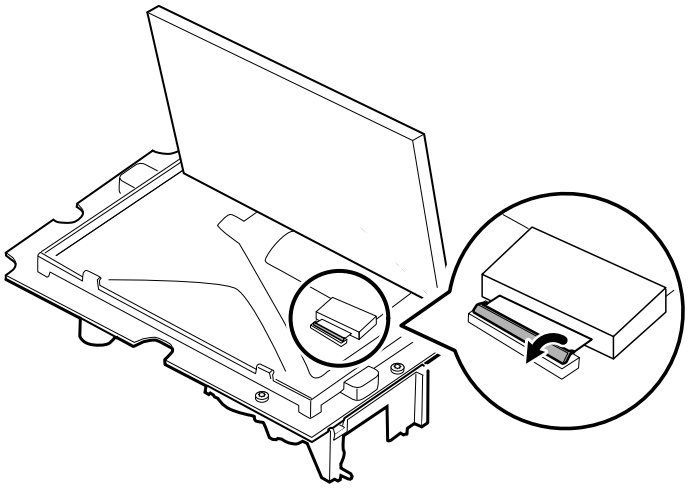


3. On the side of the main PCA board with the notch, carefully lift the LCD past the tabs, and tilt the LCD upward.



4. Remove the Gaff tape covering the bale connector and set it aside for reassembly.

5. Carefully lift the bale (locking mechanism) of the LCD flex cable connector on the main PCA board and remove the LCD.



Reassembly notes

Kit item:

- 108241, Srv Kit HW A-F, LCD with Touchscreen
- 108121, Srv Kit CSM, LCD with Touchscreen New

NOTE The TFC-K9700RTWV55 touchscreen and display ribbon cable (108241, Srv Kit HW A-F, LCD with Touchscreen) works with the 409703-16 CSM Main Board and with existing software versions.

NOTE When using the TFC-K9700RTWV37TR touchscreen and display ribbon cable (available as service kit item 108121, Srv Kit CSM, LCD with Touchscreen New), you are required to upgrade your device with the newer 409703-18 CSM Main Board, the new LCD Touchscreen, and upgrade the software to 1.41 or greater.

NOTE Reassembly is not the reverse of disassembly.

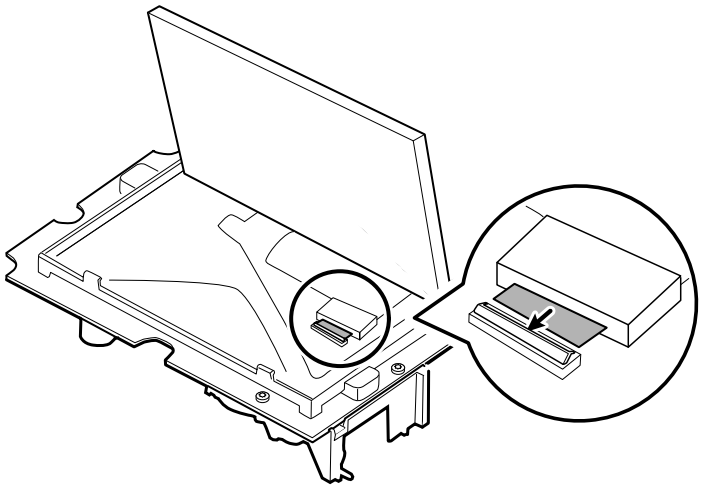
NOTE Use the **Pro-Gaff** tape set aside during disassembly to reassemble the LCD.

Attach the touchscreen and display ribbon cable separately to the main PCA board

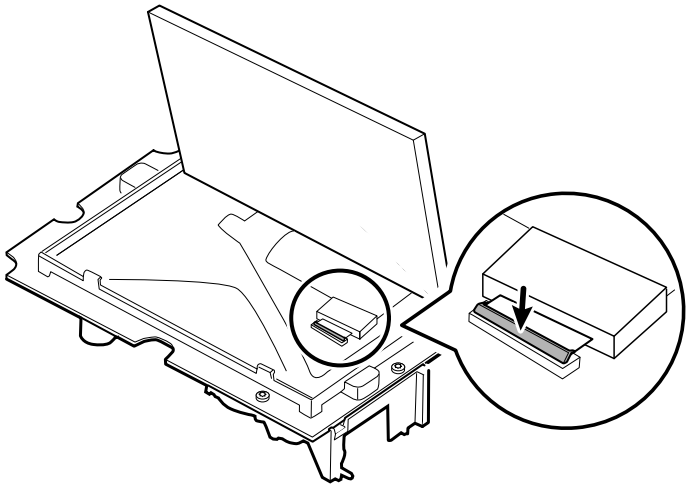
NOTE The touchscreen contains a serial number: TFC-K9700RTWV37TR or TFC-K9700RTWV55. Reassembly steps are the same for both serial numbers, except that the TFC-K9700RTWV37TR serial number has an integrated (soldered) LCD flex cable.

NOTE The TFC-K9700RTWV55 touchscreen and display ribbon cable (available as service kit item: 108241, Srv Kit HW A-F, LCD with Touchscreen) works with the 409703-16 CSM Main Board and with existing software versions. When using the TFC-K9700RTWV37TR touchscreen and display ribbon cable (available as service kit item 108121, Srv Kit CSM, LCD with Touchscreen New), you are required to upgrade your device with the newer 409703-18 CSM Main Board, the new LCD Touchscreen, and upgrade the software to 1.41 or greater.

1. With the LCD frame facing up, carefully insert the LCD flex cable into the connector.



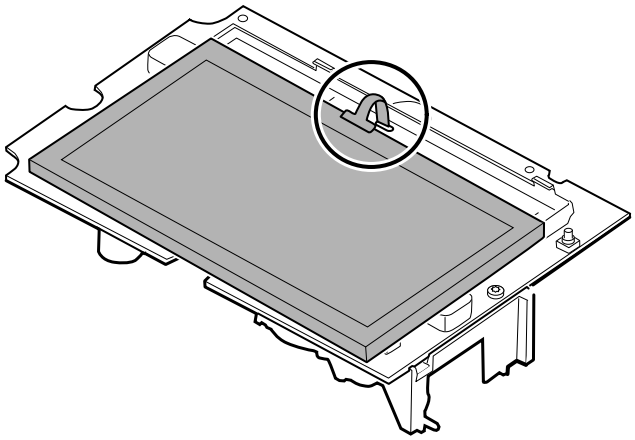
2. With two fingers, press down the bale to secure the LCD flex cable.



3. Apply the **Pro-Gaff** tape (removed during disassembly) to the connector bale and the LCD flex.

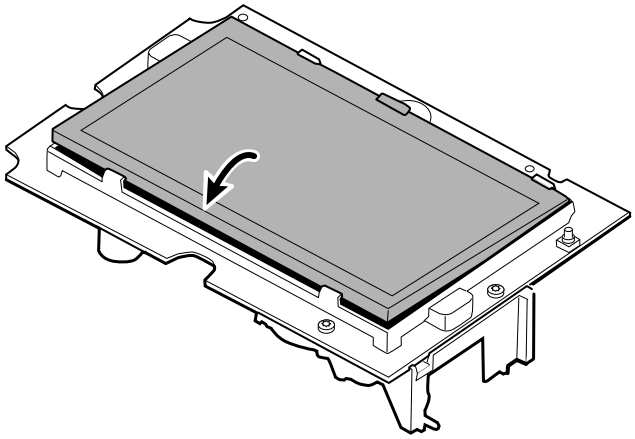
NOTE Do not allow the tape to touch the board or the ferrite to touch the end of the flex cable when assembled.

4. For the TFC-K9700RTWV55 serial number, insert the small touchscreen flex cable into the hole on the main PCA board.

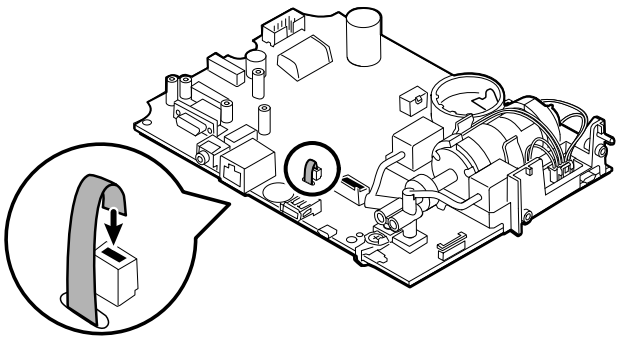


5. Place the LCD at an angle under the tabs on the flex cable side of the LCD.
6. Lower the LCD into place and carefully move the tabs on the opposite side just enough to catch and secure the LCD in the frame.

NOTE Ensure that the tabs hold the LCD securely.

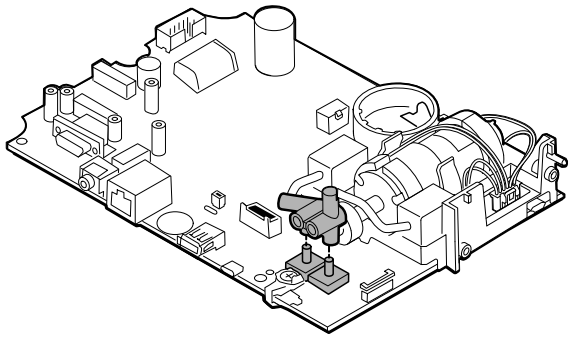


7. Turn over the main PCA board.
8. For the TFC-K9700RTWV55 serial number, insert the flex cable into its connector.

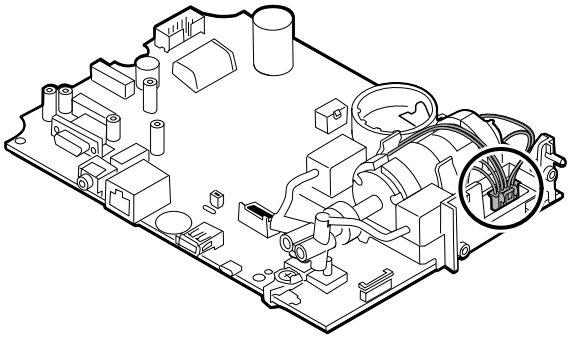


Remove the pump assembly

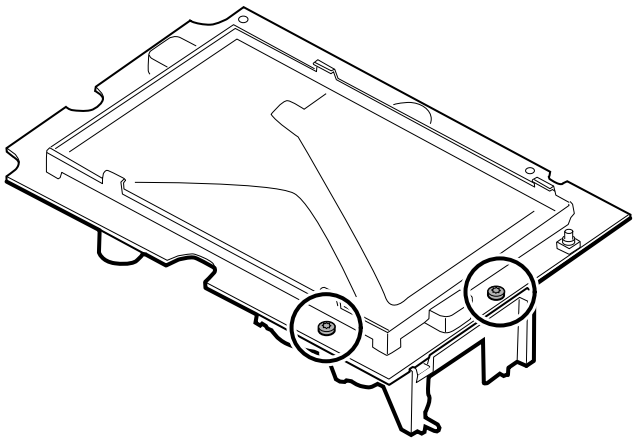
1. Remove the pump manifold from the main PCA board transducers.



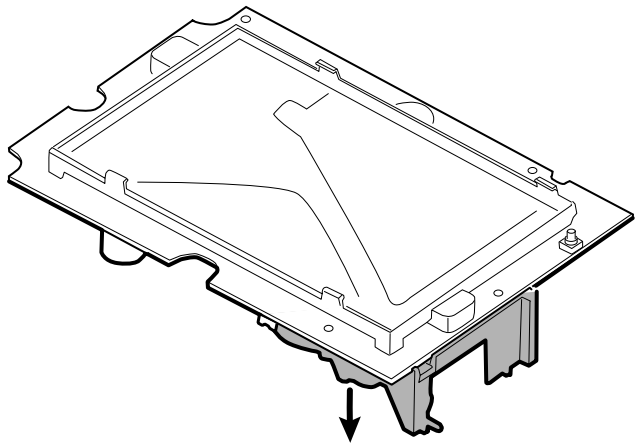
2. Pinch and remove the pump assembly connector from the main PCA board.



3. Turn over the main PCA board and remove 2 T-10 **Torx** screws.



4. Separate the pump assembly from the main PCA board.



Reassembly notes

Kit items:

- 108610, Pump assembly and 2 T-10 **Torx** screws

NOTE Reassembly is not the reverse of disassembly.

Attach the pump assembly to the main PCA board

1. Place the pump manifold onto the main PCA board transducer. Ensure that the pump manifold is fully seated on the transducer.

   (See "Remove the pump assembly," step 1.)
2. Connect the pump to the main PCA board.

   (See "Remove the pump assembly," step 2.)
3. Turn over the main PCA board.
4. Secure the pump assembly to the main PCA board with 2 T-10 **Torx** screws (see the Torque Value Table).

   (See "Remove the pump assembly," steps 3 and 4.)

Replace the main PCA board

Replace the main PCA board as needed after removing all other components.

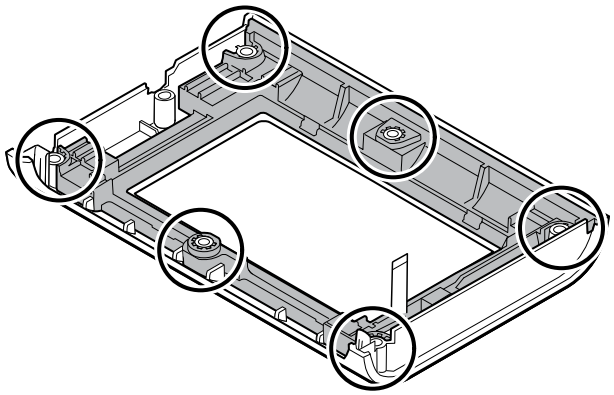
NOTE New PCA boards must be prepared for first use after installing them. Perform an NIBP board initialization during the full device functionality and calbration using the **Welch Allyn** Service Tool, Gold edition. See "Initialize the NIBP board" in the "Full functional verification and calibration" section.

NOTE When repairs are complete and the device is calibrated, the **Welch Allyn** Service Tool CSM Configuration screen includes a tab for "First Boot Settings" that allows you to place the device into the following First Boot states: *Production Complete* (formerly described as 'State when it leaves the factory'). On boot up the language and date/time are shown.

Disassemble the front housing

Remove the bezel from the front housing

Lift the rubber bezel up and over the power switch cable and the 6 bosses on the housing.



Reassembly notes

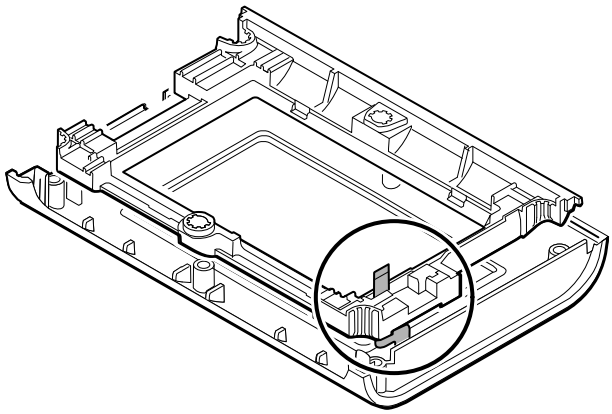
Kit items:

- 105922, Bezel
- 105921, Front housing (housing, power switch, and 6 Phillips screws)

NOTE Reassembly is not the reverse of assembly.

Attach the bezel to the front housing

1. Align the bezel with the front housing and feed the power switch flex cable through the slot in the bezel.



2. Place the bezel onto the 6 bosses on the housing.

Accessory Power Management (APM) work surface

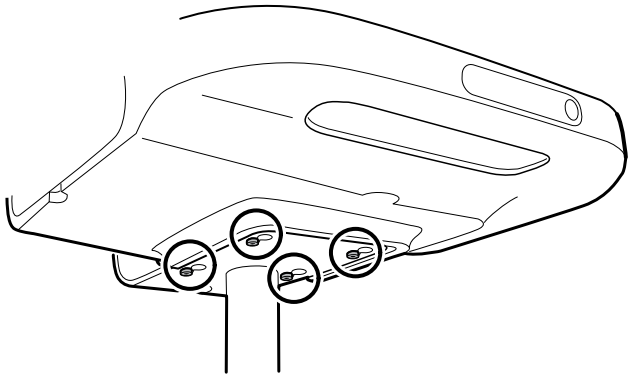
This section applies only to devices with an APM stand.

Remove the APM work surface from the stand

Before removing the APM work surface, power down the monitor, disconnect the power and communication cables from the monitor, and disconnect the power cord from the wall.

1. Using a 3mm hex key, remove the 4 screws from the stand bracket and put them aside.

NOTE Save the screws for reassembly.



2. Lift the APM work surface off the stand.
3. If replacing the APM, remove the battery and put aside for reassembly.

Reassembly notes

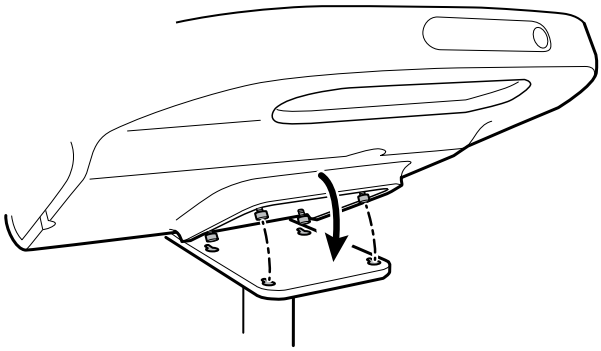
Kit item:

- 105943, APM work surface

NOTE Reassembly is the not the reverse of disassembly.

Attach the APM work surface to the stand

1. Take the 4 screws used to attach the APM work surface to the stand and partially screw them into the APM work surface with your fingers. Do not tighten.
2. Lower the screws into the stand bracket keyholes.



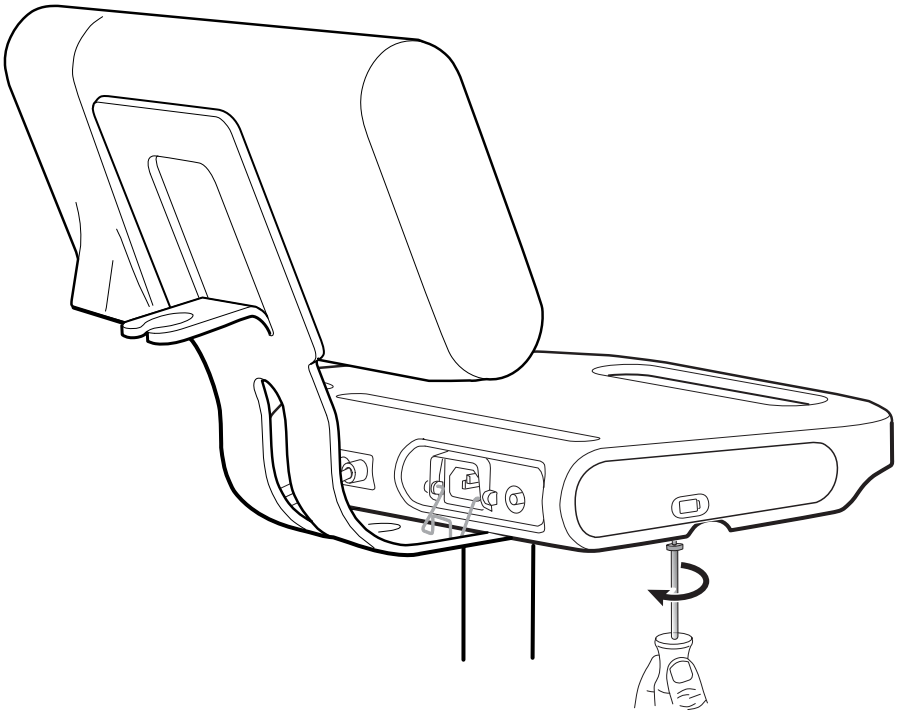
3. Slide the APM work surface backward on the stand bracket.
4. Tighten the 4 screws using a 3mm hex key.
5. Insert the battery.

Remove the APM work surface battery

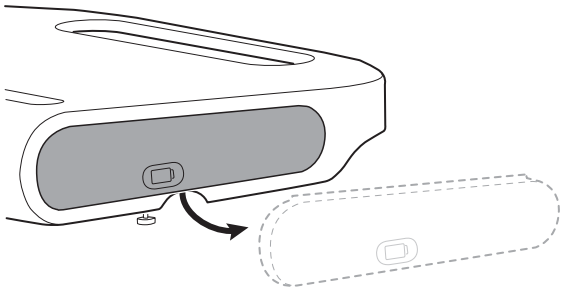
Before removing the APM work surface battery, power down the monitor and disconnect the power cord from the wall.

NOTE You do not have to remove the APM work surface from the stand to remove the APM work surface battery.

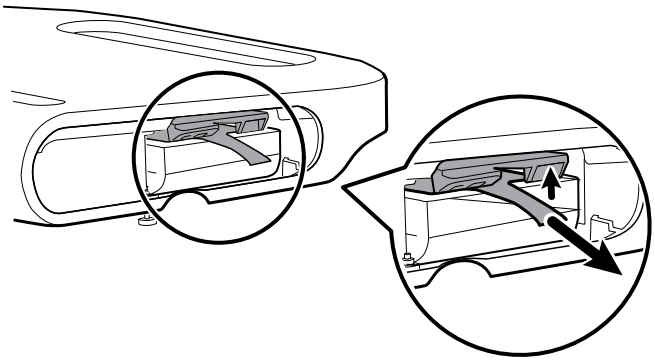
1. Loosen the captive screw on the bottom of the APM work surface that secures the battery door.



2. Remove the battery door and put it aside.



3. Gently lift the latch with one hand and pull the tab on the top of the battery with your other hand to remove the battery from its slot.



Reassembly notes

Kit items:

- Batt99, 9-cell Lithium-ion battery, single pack
- 105972, APM work surface, battery door (if needed)

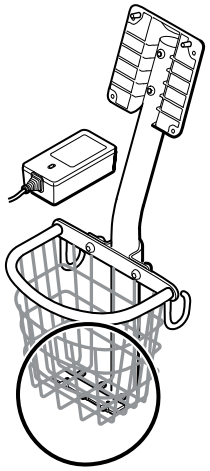
NOTE Reassembly is the reverse of disassembly.

Disassembly and assembly notes for mobile stands and power supplies

The following table provides an at-a-glance view of the service kits that are compatible with the combination of mobile stand and power supply based on the date of manufacture. This section is divided into four major subsections, defined in the table below.

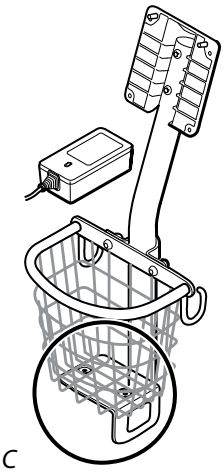
Section A 	CSM devices with a 7000-MS3 mobile stand meeting these criteria: • 7000-MS3 mobile stand manufactured before 02/2022[1] • 7000-PS power supply manufactured before 02/2022[1] • Power supply model: MENB1035A1500F02

Section B



CSM devices with 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured after 02/2022[1]
- 7000-PS power supply manufactured after 02/2022[1]
- Power supply model: FW8031M/DT/15

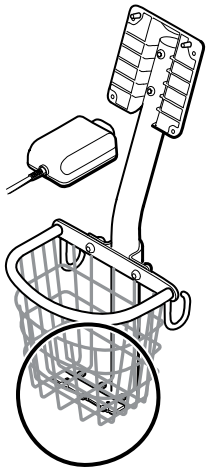


Section C

CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured before 02/2022[1]
- 7000-PS power supply manufactured after 02/2022[1]
- Power supply model: FW8031M/DT/15
- Adapter plate kit REF 411626

Section D



CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured after 02/2022[1]
- 7000-PS power supply manufactured before 02/2022[1]
- Power supply model: MENB1035A1500F02

[1] See the model number and label for further information.

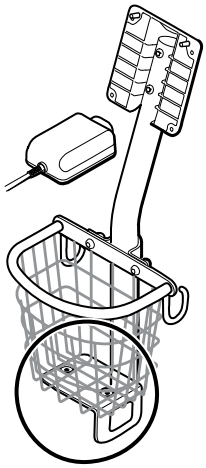
Examine your mobile stand and power supply to determine which section you should follow to complete disassembly and assembly procedures.

Many service kits are backward-compatible and/or interchangeable, while others are compatible with only one or two of the stand and power supply combinations.

Section A, remove the power supply from the mobile stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

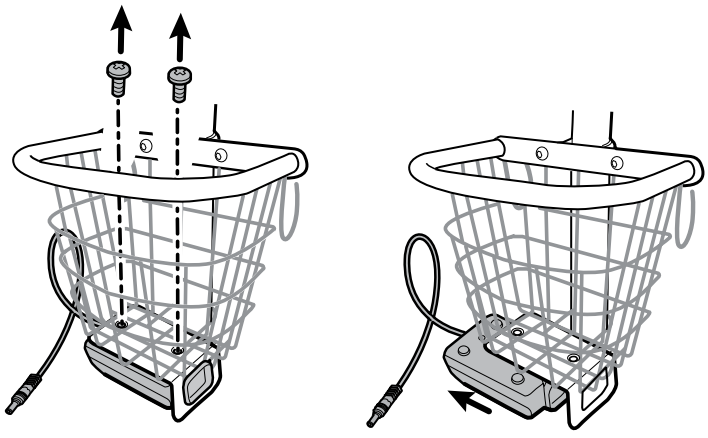
- 7000-MS3 mobile stand manufactured before 02/2022.
- 7000-PS power supply manufactured before 02/2022.
- Power supply model: MENB1035A1500F02



NOTE See the model number and label for further information.

1. Power down the device.
2. Disconnect the power cable from the device and disconnect the power cord from the wall.
3. With one hand holding the power supply, remove the 2 Phillips screws that attach the power supply to the bracket.

NOTE Set the screws aside for reassembly.



4. Remove the power supply unit.

Recycle or dispose of the power supply unit in an environmentally safe manner consistent with local regulations.

Section A, attach the power supply to the stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured before 02/2022.
- 7000-PS power supply manufactured before 02/2022.
- Power supply model: MENB1035A1500F02

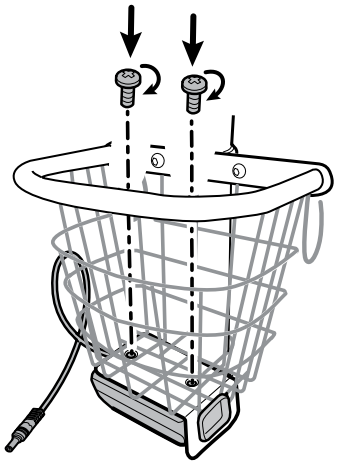
NOTE See the model number and label for further information.

Kit item:

- 7000-PS, **Connex Spot** Power Supply

1. Ensure that the side with the screw holes is facing upward, and then insert the power supply socket into the support frame.

2. Holding the power supply unit snugly to the frame, attach the power supply to the bracket using the 2 Phillips screws.



3. Thread the power cable from the power supply through one of the spaces next to the pole to reach the device, and then connect the power cable to the device.
4. Connect the power cord to the mains outlet.
5. Power up the device.

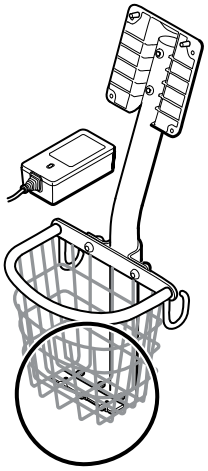
Section B, remove the power supply from the mobile stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured after 02/2022
- 7000-PS power supply manufactured after 02/2022

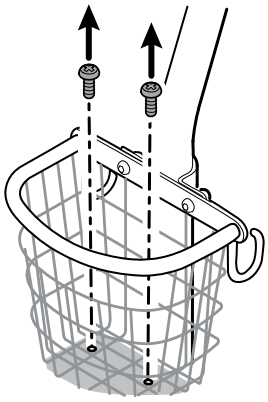
NOTE See the model number and label for further information.

- Power supply model: FW8031M/DT/15



1. Power down the device.
2. Disconnect the power cable from the device and disconnect the power cord from the wall.
3. With one hand holding the power supply, remove the 2 Phillips screws that attach the power supply to the bracket.

NOTE Set the screws aside for reassembly.



4. Remove the power supply unit.

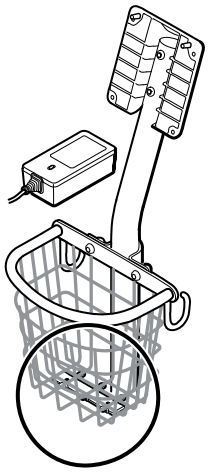
Recycle or dispose of the power supply unit in an environmentally safe manner consistent with local regulations.

Section B, attach the power supply to the stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured after 02/2022
- 7000-PS power supply manufactured after 02/2022
- Power supply model: FW8031M/DT/15

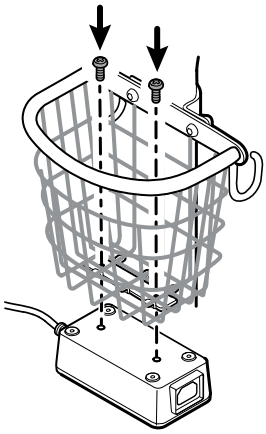
NOTE See the model number and label for further information.



Kit item:

- 7000-PS, **Connex Spot** Power Supply

1. Holding the power supply unit snugly to the support bracket, attach the power supply to the bracket using the 2 Phillips screws.

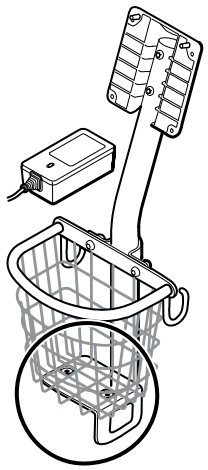


2. Thread the power cable from the power supply through one of the spaces next to the pole to reach the device, and then connect the power cable to the device.
3. Connect the power cord to the mains outlet.
4. Power up the device.

Section C, remove the power supply from the mobile stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

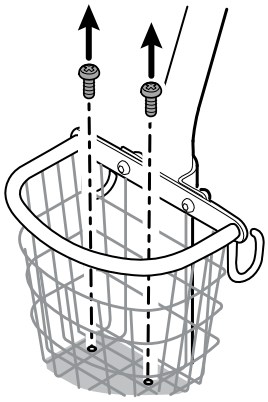
- 7000-MS3 mobile stand manufactured before 02/2022
- 7000-PS power supply manufactured after 02/2022
- Power supply model: FW8031M/DT/15



NOTE See the model number and label for further information.

1. Power down the device.
2. Disconnect the power cable from the device and disconnect the power cord from the wall.
3. With one hand holding the power supply, remove the 2 Phillips screws that attach the power supply to the bracket. With the other hand, hold the adapter plate and the well nuts.

NOTE Set the screws, adapter plate, and well nuts aside for reassembly.



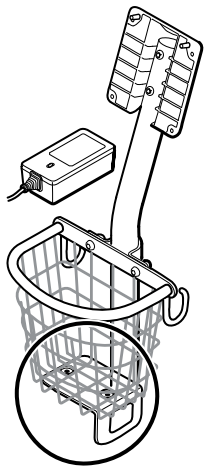
4. Remove the power supply unit.

Recycle or dispose of the power supply unit in an environmentally safe manner consistent with local regulations.

Section C, attach the power supply to the stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured before 02/2022
- 7000-PS power supply manufactured after 02/2022
- Power supply model: FW8031M/DT/15

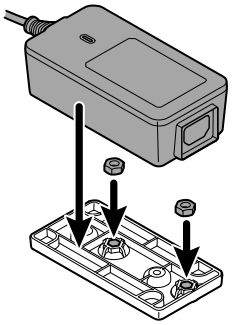


NOTE See the model number and label for further information. To install the new power supply onto an existing stand, you need to use the adapter plate kit REF 411626.

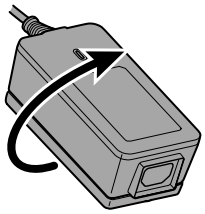
Kit item:

- 7000-PS, **Connex Spot** Power Supply
- 411626, MS3 Power Supply Bracket Kit

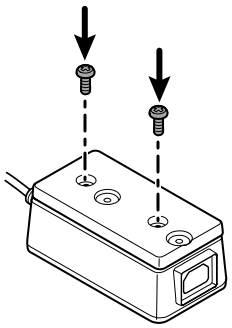
1. Install the 2 nuts by placing each nut into the adapter plate well. With one hand holding the power supply, use the other hand to close up the power supply onto the adapter plate.



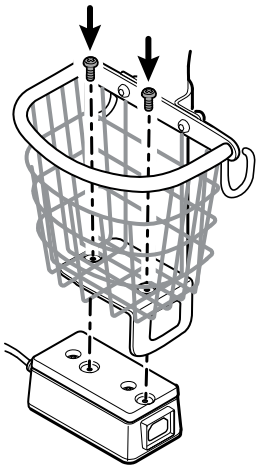
2. Flip the power supply over to ensure that the side with the screw holes is facing upward,



and then attach the power supply to the adapter plate by aligning the holes and then tighten using the 2 Phillips screws.



3. Holding the power supply unit snugly to the support bracket, tighten the 2 Phillips screws.

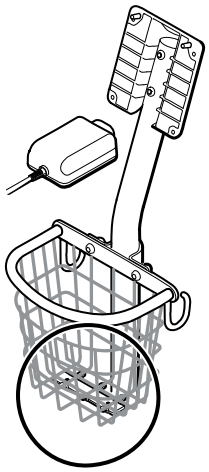


4. Thread the power cable from the power supply through one of the spaces next to the pole to reach the device, and then connect the power cable to the device.
5. Connect the power cord to the mains outlet.
6. Power up the device.

Section D, remove the power supply from the mobile stand

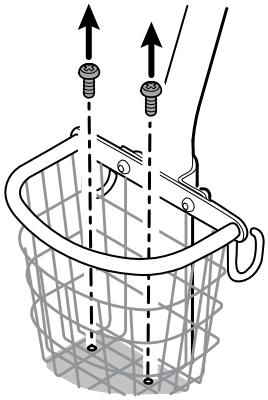
This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured after 02/2022
- 7000-PS power supply manufactured before 02/2022
- Power supply model: MENB1035A1500F02



1. Power down the device.
2. Disconnect the power cable from the device and disconnect the power cord from the wall.
3. With one hand holding the power supply, remove the 2 Phillips screws that attach the power supply to the bracket.

NOTE Set the screws, adapter plate, and well nuts aside for reassembly.



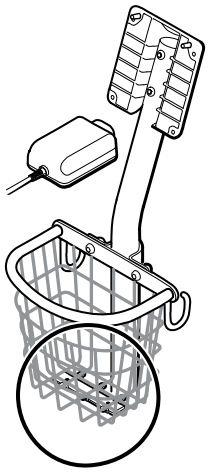
4. Remove the power supply unit.

Recycle or dispose of the power supply unit in an environmentally safe manner consistent with local regulations.

Section D, attach the power supply to the stand

This section applies to CSM devices with a 7000-MS3 mobile stand meeting these criteria:

- 7000-MS3 mobile stand manufactured after 02/2022
- 7000-PS power supply manufactured before 02/2022
- Power supply model: MENB1035A1500F02



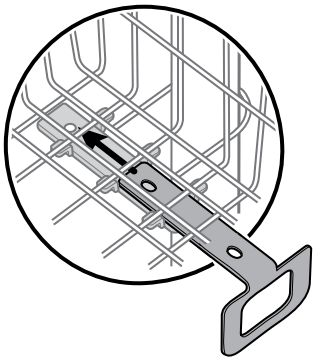
NOTE See the model number and label for further information.

Kit item:

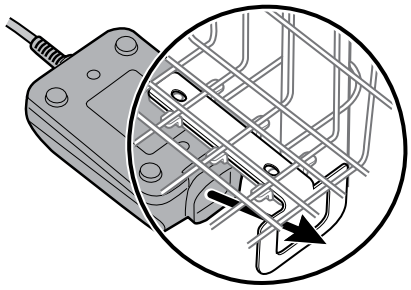
•

• 7000-PS, **Connex Spot** Power Supply

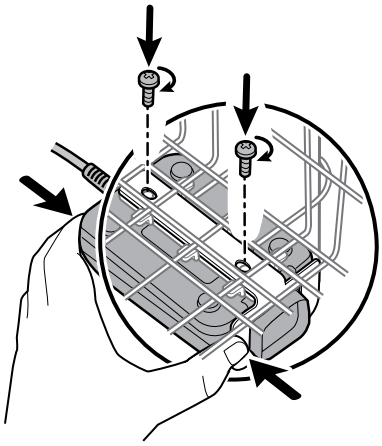
1. Install the adapter plate onto the wire bracket of the mobile stand.



2. Attach the power supply to the adapter plate by aligning the holes.



3. Holding the power supply unit snugly to the support bracket, tighten the 2 Phillips screws.



4. Thread the power cable from the power supply through one of the spaces next to the pole to reach the device, and then connect the power cable to the device.
5. Connect the power cord to the mains outlet.
6. Power up the device.

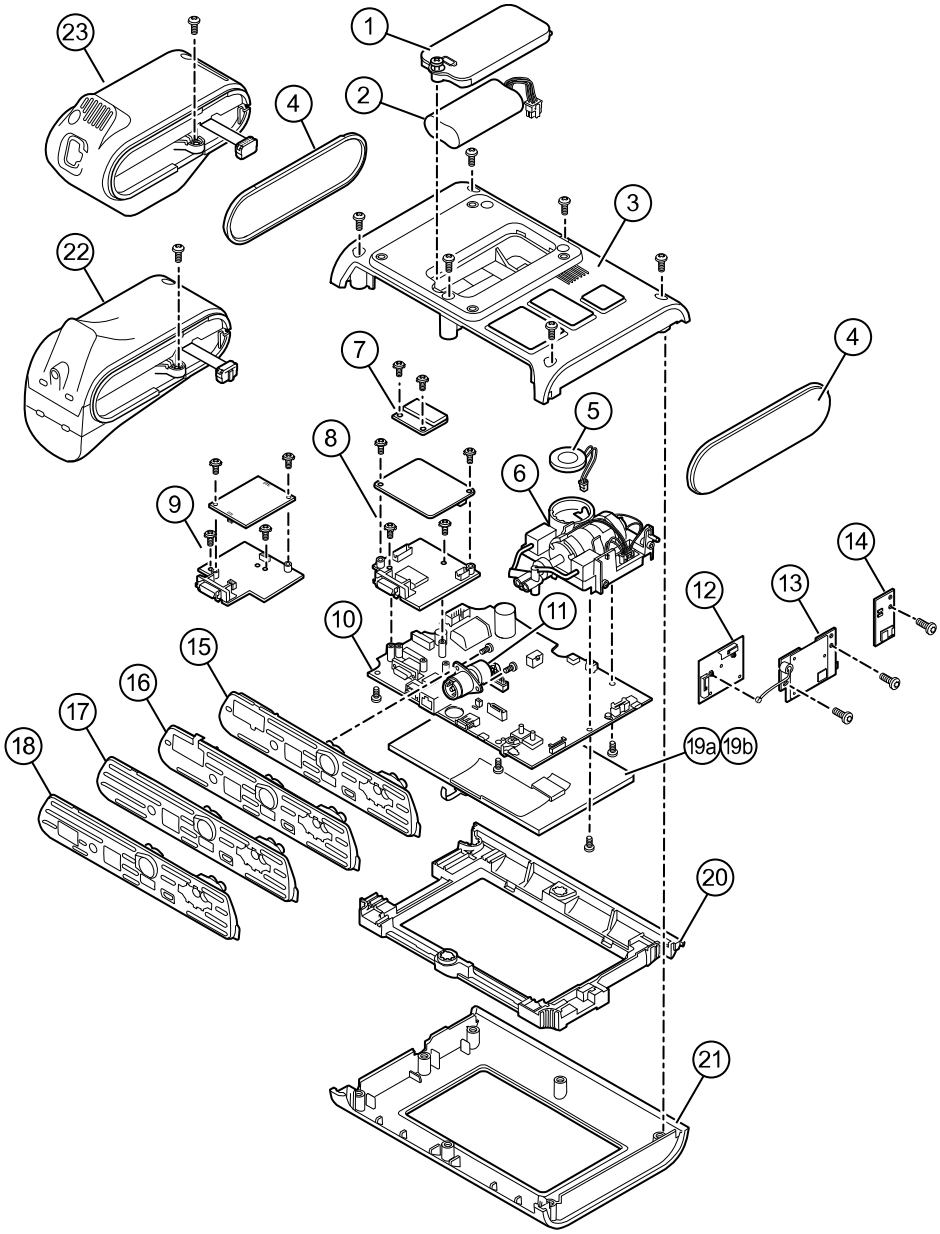
Field replaceable units

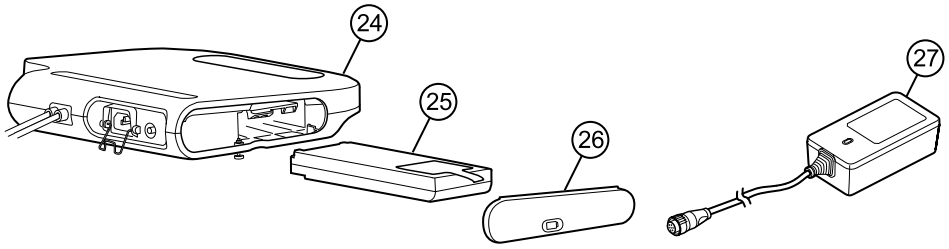
This listing includes only field-replaceable service parts. Product accessories—including patient sensors, probes, cables, batteries, probe covers, and other consumable items—are listed separately in the accessories list in the Appendix of the Instructions for use or at Hillrom Parts Store.

This section begins with an illustration of the entire device followed by lists of service kits.

Repair parts/kits can be purchased through Baxter sales channels.

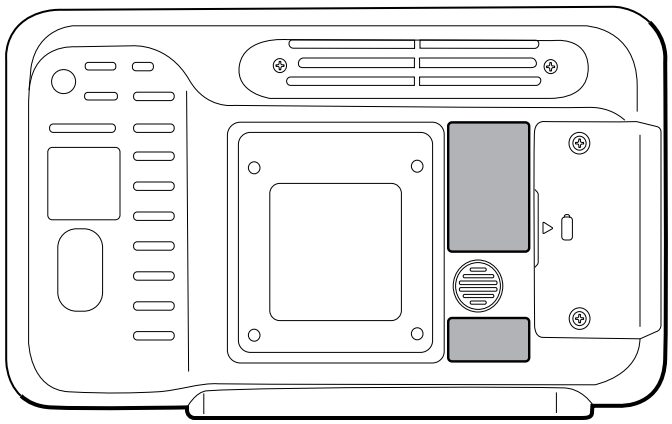
NOTE Baxter may limit availability of certain parts to Authorized Service Personnel only. These limitations are required to maintain product safety, or maintain current regulations. After the End of Manufacturing (EoM) date, repair and service parts will be provided for 5 years or until parts are no longer available. The Expected Service Life, per IEC60601-1 3rd Edition Sub-clause 4.4, is defined as a period of 5 years.





Device serial number and model label

The model number and serial number can be found on a label on the back housing.



The Serial number (SN) of a device reveals many details about its manufacture. The first five digits of the device SN reveal the device's date of manufacture and the last seven digits indicate the sequence number.

SN: YYYWWSSSSSSS

where

YYY= Year of manufacture

WW= Week of manufacture

SSSSSSS = Sequential number (7 digits)

Serial Number 121040608667

Year: 2021

Week: 04

Sequence Number: 0608667

About 4th Edition Service kits

The table describes the components of the device and APM and the associated service kits for replaceable parts for devices manufactured per IEC60601-1 4th Edition from 2019 and later. To determine which year your device was manufactured in, refer to the serial number. The year of manufacture is listed as the last two digits of the serial number.

Future revisions of a part might not always be backwards compatible with a legacy part.

List of 4th edition service kits

To determine the correct replacement part for your unit, always provide the serial number and model when ordering.

Service Kit Number	Material Number	Description
1	105945	Srv Kit CSM, Battery Door
2	Batt22	Srv Kit 2 Cell Lithium-ion Battery
3	105923	Srv Kit CSM, Back Housing[1]
4	105939	Srv Kit CSM, End Cap
5	105942	Srv Kit CSM, Speaker
6	108610	Srv Kit CSM, NIBP Pump Assembly
7	105933	Srv Kit CSM, Nonin SpO2 PCBA
8	105931	Srv Kit CSM, Masimo SpO2 PCBA
9	105932	Srv Kit CSM, Nellcor SpO2 PCBA
10	105925	Srv Kit CSM, Main PCA, and LCD Frame
11	105930	Srv Kit CSM, Power Harness
12	105938	Srv Kit CSM, Newmar Antenna PCBA
13	105936	Srv Kit CSM, Newmar Radio PCBA
13	109112	SRV UPG KIT, CSM Newmar Radio 2.00.04[2]
13	109116	SRV KIT CSM, Newmar Radio PCBA 2.00.04[2]
14	105937	Srv Kit CSM, **Bluetooth** Radio PCBA
15	105926	Srv Kit CSM, Masimo SpO2 Insert
16	105927	Srv Kit CSM, Nellcor SpO2 Insert
17	105928	Srv Kit CSM, No SpO2 Insert
18	105929	Srv Kit CSM, Nonin SpO2 Insert
19a	108241	Srv Kit HW A-F, LCD with Touchscreen
19b	108121	Srv Kit CSM, Combined LCD with Touchscreen New [3]
20	105922	Srv Kit CSM, LCD Bezel
21	105921	Srv Kit CSM, Front Housing
22	105941	Srv Kit CSM, **Braun ThermoScan**® PRO 6000 Module[4]
23	105940	Srv Kit CSM, **SureTemp** Plus Module
24	105943	Srv Kit CSM, APM Work Surface
25	Batt99	Srv Kit 9 Cell Lithium Ion Battery
26	105972	Srv Kit CSM, APM Work Surface, Battery Door
27	7000-PS	**Connex Spot** Power Supply

Service Kit Number	Material Number	Description
28	105954	Srv UPG KIT, CSM NEWMAR RADIO 2.00.04[2]
29	105936	Srv Kit CSM, NEWMAR RADIO PCBA 2.00.04[2]

1 Not available for direct purchase.

2 CSM firmware 1.54 or higher required.

3 When using the 108121 (Srv Kit CSM, Combined LCD with Touchscreen New), you are required to upgrade your device with the newer 409703-18 CSM Main Board, the new LCD Touchscreen, and to upgrade the software to 1.41 or greater. Contact Baxter for further details.

4 When using a replacement service kit (Srv Kit CSM, **Braun ThermoScan**® PRO 6000 Module) in China substitute 108189 for 105941. This kit contains the new software version 5.28.

About 3rd Edition service kits

The tables describe the components of the device and APM and the associated service kits for replaceable parts for devices manufactured per IEC60601-1 3rd Edition from 2015 through 2018. To determine which year your device was manufactured in, refer to the serial number. The year of manufacture is listed as the last two digits of the serial number.

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

To repair a 3rd edition device component, you might need to use a service kit to upgrade the component. To determine whether you need to use an upgrade kit to replace a component for the first failure, consult the 3rd edition service kits for the first component failure table to locate the correct service kit to use with your device.

NOTE Upgrading a component does not make the device 4th edition compliant.

If the device encounters a failure after you upgrade a device component, consult the 3rd edition service kits for subsequent component failure table to determine which service kit to use.

3rd edition service kits for first component failure

Use this table to determine the correct part to order for the first component failure.

Device Model Number	Main Board	SURETEMP Plus	Masimo	Nellcor	Nonin	BRAUN Dock	BRAUN Thermometer
7[1]CE	107156	-	-	107156	-	107156	107156
7[1]CT	107155	107155	-	107155	-	-	-
7[1]CX	107162	-	-	107162	-	-	-
7[1]ME	107157	-	107157	-	-	107157	107157
7[1]MT	107154	107154	107154	-	-	-	-
7[1]MX	107158	-	107158	-	-	-	-
7[1]XE	107153	-	-	-	-	107153	107153
7[1]XT	107152	107152	-	-	-	-	-
7[1]XX	107163	-	-	-	-	-	-

Device Model Number	Main Board	SURETEMP Plus	Masimo	Nellcor	Nonin	BRAUN Dock	BRAUN Thermometer
7[1]WE	107153	-	-	-	105933	107153	107153
7[1]WT	107152	107152	-	-	105933	-	-
7[1]WX	107163	-	-	-	105933	-	-

[1] Varies depending on the model number of your device.

3rd edition service kits for a subsequent component failure

Use this table to determine the correct part to order if you encounter a component failure after upgrading using the components in the 3rd edition service kit for first component failure.

NOTE For a first component failure, refer to the 3rd edition service kits for a first component failure table.

Device Model Number	Main Board	SURETEMP Plus	Masimo	Nellcor	Nonin	BRAUN Dock	BRAUN Thermometer
7[1]CE, 7[1]CT, 7[1]CX, 7[1]ME, 7[1]MT, 7[1]MX, 7[1]XE, 7[1]XT, 7[1]XX, 7[1]WE, 7[1]WT, 7[1]WX	105925	105940	105931	105932	105933	105941	105948

[1] Varies depending on the model number of your device.

List of 3rd edition service kits

To determine the correct replacement part for your unit, always provide the serial number and model when ordering.

Service Kit Number	Material Number	Description
1	105945	Srv Kit CSM, Battery Door
2	Batt22	Srv Kit 2 Cell Lithium-ion Battery
3	105923	Srv Kit CSM, Back Housing[1]
4	105939	Srv Kit CSM, End Cap
5	105942	Srv Kit CSM, Speaker
6	108610	Srv Kit CSM, NIBP Pump Assembly
7	105933	Srv Kit CSM, Nonin SpO2 PCBA
8	105931	Srv Kit CSM, Masimo SpO2 PCBA
9	105932	Srv Kit CSM, Nellcor SpO2 PCBA
10	105925	Srv Kit CSM, Main PCA, and LCD Frame
11	105930	Srv Kit CSM, Power Harness

Service Kit Number	Material Number	Description
12	105938	Srv Kit CSM, Newmar Antenna PCBA
13	105936	Srv Kit CSM, Newmar Radio PCBA
14	105937	Srv Kit CSM, **Bluetooth** Radio PCBA
15	105926	Srv Kit CSM, Masimo SpO2 Insert
16	105927	Srv Kit CSM, Nellcor SpO2 Insert
17	105928	Srv Kit CSM, No SpO2 Insert
18	105929	Srv Kit CSM, Nonin SpO2 Insert
19a	108241	Srv Kit CSM, LCD with Touchscreen
19b	108121	Srv Kit CSM, Combined LCD with Touchscreen New [2]
20	105922	Srv Kit CSM, LCD Bezel
21	105921	Srv Kit CSM, Front Housing
22	105941	Srv Kit CSM, **Braun ThermoScan**® PRO 6000 Module[3]
23	105940	Srv Kit CSM, **SureTemp** Plus Module
24	105943	Srv Kit CSM, APM Work Surface
25	Batt99	Srv Kit 9 Cell Lithium Ion Battery
26	105972	Srv Kit CSM, APM Work Surface, Battery Door
27	7000-PS	**Connex Spot** Power Supply

[1] Not available for direct purchase.

[2] When using the 108121 (Srv Kit CSM, Combined LCD with Touchscreen New), you are required to upgrade your device with the newer 409703-18 CSM Main Board, the new LCD Touchscreen, and to upgrade the software to 1.41 or greater. Contact Baxter for further details.

[3] When using a replacement service kit (Srv Kit CSM, **Braun ThermoScan**® PRO 6000 Module) in China substitute108189 for 105941. This kit contains the new software version 5.28.

Cleaning requirements

This section presents procedures for cleaning the **Connex Spot** Monitor (including the monitor, stands, APM work surface, accessories, and accessory basket and bins).

Baxter has validated these instructions to be capable of preparing your **Connex Spot** Monitor devices and above accessories for re-use. Clean on a routine basis according to your facility's protocols and standards or local regulations. If the monitor is on, lock the display.

WARNING Patient injury risk. Clean all accessories, including cables and tubes, before storing the accessories on the device or stand. This helps reduce the risk of cross contamination and nosocomial infection.

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

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

WARNING Liquids can damage electronics inside the monitor. Prevent liquids from spilling on the monitor.

CAUTION Do not sterilize the monitor. Sterilizing the monitor could harm the device.

If liquids are spilled on the monitor:

1. Power down the monitor.
2. Disconnect the power cord from the mains outlet and the power source.
3. Remove 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 battery pack.
6. Reconnect the power cord.
7. Power on the monitor and verify that the monitor functions normally before using it.

Prepare to clean the equipment

CAUTION Some cleaning agents are not appropriate for all components of the device. Use only approved cleaning agents, and observe restrictions noted for some components in the following table. Using unapproved cleaning agents may cause damage to components.

CAUTION Do not use bleach solutions of any kind when cleaning metal electrical contacts. They will damage the device.

Select a cleaning agent from the following table.

Section 1. Approved for all **Connex Spot** *Monitor components*

Cleaning agent	Additional information
Accel INTERVention	
Accel TB	

Cleaning agent	Additional information
CaviWipes	
Clinell Universal Wipes	
Oxivir TB	
Sani-Cloth Plus	
Super **Sani-Cloth**	
70 percent isopropyl alcohol solution	Applied to a clean cloth

Section 2. Not approved for all **Connex Spot** *Monitor components*

NOTE The following cleaning agents are NOT approved for cleaning **Connex Spot** Monitors equipped with the **Braun ThermoScan**® PRO 6000.

Cleaning agent	Additional information
Bacillol AF Wipes	Not approved for use on the display
CleanCide	
Clinitex Detergent Wipes	Not approved for use on the display
Clorox Dispatch Wipes	Not approved for use on the display
Clorox Fuzion	Not approved for use on the display
Clorox HealthCare Bleach Germicidal Cleaner	
Mikrozid AF Wipes	Not approved for use on the display
Oxivir 1 Wipes	Not approved for use on the display
Oxivir Plus 1:40 Solution	Not approved for use on the display
Reynard Neutral Detergent Wipes	Not approved for use on the display
Reynard Premier Disinfectant Wipes	Not approved for use on the display
Sani-Cloth Active Wipes	Not approved for use on the display
Sani-Cloth Bleach	Not approved for use on the display
Sani-Cloth Prime Wipes	Not approved for use on the display
Sekusept Plus 1.5% Solution	Not approved for use on the display
Super **HDQ** L10	Dilution rate of ½ oz per gallon of water (1:256) applied to a clean cloth
Tuffie 5 Cleaning Wipes	
Viraguard Wipes	Not approved for use on the display
Virex II (256)	Dilution rate of ½ oz per gallon of water (1:256) applied to a clean cloth
10 percent bleach solution	(.5% - 1% sodium hypochlorite) applied to a clean cloth

Remove liquid spills from the monitor

Liquids can damage electronics inside the monitor. Follow these steps if liquids spill on the monitor.

1. Power down the monitor.
2. Disconnect the power cord from the mains outlet and the power source.
3. Remove battery pack from the monitor.
4. Dry excess liquid from the monitor.
5. Reinstall battery pack.
6. Reconnect the power cord.
7. Power on the monitor and verify that the monitor functions normally before using it.

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

Clean the equipment

The screen lock blocks the display of patient information and prevents any input, which may be useful when cleaning the display.

Follow the cleaning agent manufacturer's instructions to prepare solution, if applicable, and clean all exposed surfaces of the monitor, APM work surface, accessory bin(s) and basket, cords and cables, and stands. Wipe all surfaces until no visible soil remains. Change the wipe or cloth throughout the cleaning procedure as needed.

WARNING Electric shock hazard. Do not open the monitor or attempt repairs. The monitor has no user-serviceable internal parts. Only perform routine cleaning and maintenance procedures specifically described in this manual. Inspection and servicing of internal parts shall only be performed by qualified service personnel.

CAUTION Sterilizing the monitor could damage the device.

Dry the equipment

1. Allow all components except the LCD screen to air dry.
2. Wipe the LCD screen dry with a clean cloth.

Store the device

Store the device according to facility guidelines to keep the device clean, dry, and ready for service.

Cleaning accessories

Accessories include components like blood pressure cuffs and hoses, SpO2 sensors and cables, thermometers, and the barcode scanner. Follow accessory manufacturer’s instructions for cleaning and disinfection.

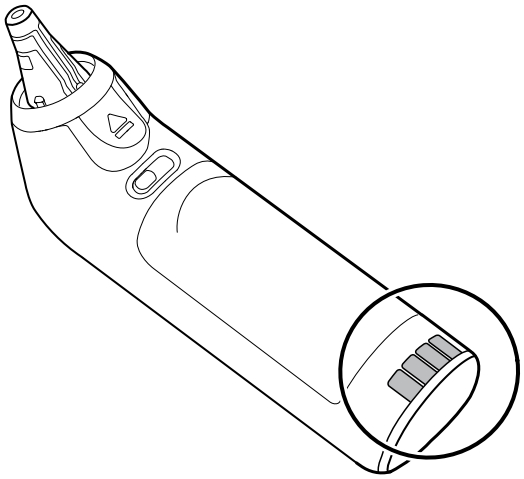
1. For cleaning the wallboard and VESA mount use only 70 percent isopropyl alcohol solution applied to a clean cloth.
2. For the **Braun ThermoScan**® PRO 6000 thermometer, use only the approved cleaning agents published in the manufacturer's instructions for cleaning. Unapproved cleaning agents can damage the device and interfere with data transmission.

Clean the **Braun ThermoScan®** PRO 6000 contacts

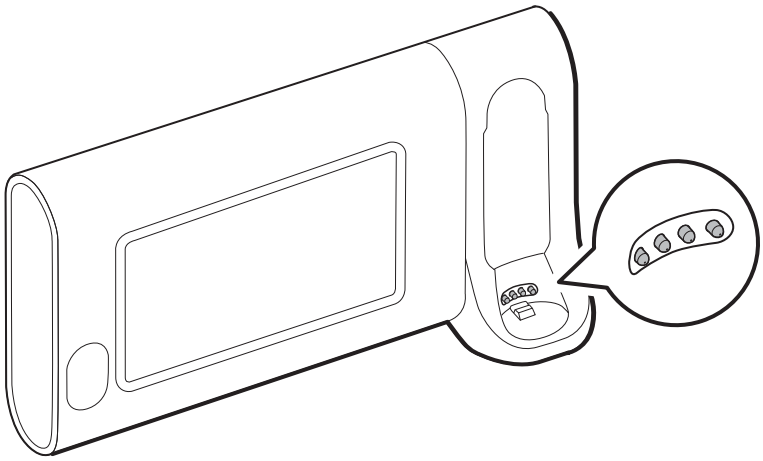
Debris that accumulates on the **Braun ThermoScan®** PRO 6000 electrical contacts can interfere with data transmission. Baxter recommends cleaning the contacts on the thermometer and the dock once every 4 months to maintain optimal performance.

CAUTION Do not use bleach solutions of any kind when cleaning metal electrical contacts. They will damage the device.

1. Slightly dampen a cotton swab with 70% isopropyl alcohol.
2. Remove the thermometer from the dock and clean the metal electrical contacts on the thermometer with the cotton swab.



3. Place the thermometer aside for 1 minute, allowing the contacts to air dry.
4. Clean the metal electrical contacts on the device dock with the cotton swab.



5. Allow the contacts to air dry for 1 minute.
6. Return the **Braun** thermometer to the dock.

Decontamination and cleaning requirements for returns

As a general safety precaution, the monitor must undergo decontamination before being returned to Baxter for service, repair, inspection, or disposal. Cleaning is an essential prerequisite for effective disinfection or decontamination. Follow the cleaning instructions presented earlier in this section.

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

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

Device configuration and setup

Configuration overview

A configuration file can be created that specifies preferences for all **Connex Spot** Monitor options. When powered on, the monitor recognizes all available options and features and applies the associated configuration file preferences.

If no customized configuration file has been loaded onto the device, the device applies factory defaults to all available options. See "Factory defaults" in the Appendix.

In addition to creating or modifying a configuration file, it is possible to change some settings by navigating to Advanced settings. Changes made in Advanced settings take effect immediately on the device, but they do not change the configuration file.

NOTE The device does not support configuration filenames that include parentheses. If these are present in the filename, the device will not recognize the file. This is a common issue if you've downloaded the same file multiple times from your web browser. For example, the web browser may automatically rename `"MyFile.config"` to `"MyFile.config(2)"` if you download it a second time. If this happens, rename the file by deleting the parentheses; then it will appear in the list on the CSM.

The remainder of this section instructs you how to do the following:

- Edit a configuration file
- Copy a configuration file
- Download a configuration file to install on another device
- Create a new configuration file
- Install a configuration file

Edit a configuration file

To edit a saved configuration file, complete the following steps:

1. Access the Configuration Tool at http://config.welchallyn.com.
2. Log in with a username and password.
3. Click **List Configurations** on the navigation bar.
4. Locate the configuration file to be edited in the list, and click the on the right side of the table to launch the editor.
5. Under Progress Summary, locate the section you want to edit (Clinical, Informatics, IT, or Biomed) and click the specific step you want to edit.
6. Review the selections in each step and modify them as desired.
7. Click **SAVE AND CONTINUE** to accept the changes or BACK to return to the previous screen without saving.

   Clicking **SAVE AND CONTINUE** automatically moves you to the next step in that section of the Progress Summary. When you reach the last step in a section, clicking **SAVE AND CONTINUE** returns you to the Progress Summary.
8. Repeat steps 5 through 7 until you complete all desired edits.
9. Click **List Configurations** on the navigation bar to see a new date stamp in the Updated column for your configuration file.

Copy or restore a saved configuration file

To copy or restore a saved configuration file, complete the following steps:

1. Access the Configuration Tool at http://config.welchallyn.com.
2. Log in with a username and password.
3. Click **List Configurations** on the navigation bar.
4. Locate the configuration file to be copied in the list, and click the on the right side of the table.
5. Either accept or enter a new name for the copied file in the Copy Configuration dialog, then click **Copy**.
6. Observe your new configuration file on the List Configurations tab.

Download a configuration file to install on another device

NOTE Before you use a USB flashdrive to download a configuration file, ensure the flashdrive is free from malware and unnecessary data.

To download a saved configuration file, complete the following steps:

From the Configuration Tool

1. Access the Configuration Tool at http://config.welchallyn.com.
2. Log in with a username and password.
3. Click **List Configurations** on the navigation bar.
4. Locate the configuration file to be downloaded in the list, and click the on the right side of the table.
   The configuration file downloads to the tray on your PC.
5. Using the dropdown menu on the right side of the downloaded file, select **Show in folder**.
   Windows Explorer opens the Downloads folder with the most recent download selected.
6. Copy the downloaded configuration file to a USB flash drive.
7. See "Install a configuration file" for instructions to load this configuration on another device.

Create a new configuration file

To create a new configuration file, complete the following steps:

1. Access the Configuration Tool at http://config.welchallyn.com.
2. Log in with a username and password.
3. Click **New Configuration** on the navigation bar.
4. Select **Connex Spot Monitor** as the product you would like to configure.
5. Enter a user-friendly name for your configuration, then click **CONTINUE**.
   The Configuration Tool advances to the Product Use Location screen.
6. Select your location type, then click **SAVE AND CONTINUE**.
   The Progress Summary screen appears.
7. Under Progress Summary, click the first step you want to configure.
8. Review the selections in each step and modify them as desired.
9. Click **SAVE AND CONTINUE** to accept the selections or BACK to return to the previous screen without saving.
   Clicking **SAVE AND CONTINUE** automatically moves you to the next step in that section of the Progress Summary. When you reach the last step in a section, cllicking **SAVE AND CONTINUE** returns you to the Progress Summary.

10. Repeat steps 7 through 9 until you configure each section.
11. When you are finished, click **List Configurations** on the navigation bar to see your configuration file.

Install a configuration file

To install a configuration file, you must first download the configuration file to a USB flash drive. If you have not done so already, complete the steps in "Download a configuration file to install on another device," then complete the following steps:

1. Insert the flash drive into the device which needs to have the configuration loaded onto it.

   A pop-up dialog appears listing the configuration file(s) on your flash drive.
2. Select the desired configuration file and touch **Load**. (Depending on your facility's configuration, selecting "Load" may require you to enter the Advanced Settings Password.)
3. Repeat this process on as many devices as you wish.

Functional verification and calibration overview

Functional verification tests

The functional verification tests help to confirm the proper operation of the device and its options. The tests may also be useful as a diagnostic tool to help isolate a malfunction. It is not necessary to disassemble the device to perform these tests.

For periodic service, you can—at a minimum—perform the basic functional verification tests described in this manual. If you have the Gold edition of the service tool, you have the additional capability to perform a complete functional verification and calibration of the device, but this is not required for minimal periodic service.

In contrast, any time you open the device case, you must use the **Welch Allyn** Service Tool, Gold edition, to perform a complete functional verification and calibration of the device before returning the device to service.

NOTE For instructions on using the Gold edition, see the service tool help files.

About the **Welch Allyn** Service Tool

The service tool is required to complete functional verification and calibration tests. The service tool is available in the following editions:

- *Standard unlicensed edition*: Enables NIBP functional verification tests to satisfy the recommended annual service. If any Standard unlicensed edition testing shows an out-of-specification result, use the Gold edition to perform a full calibration.
- *Gold edition*: Checks the functionality and calibration of the device. As it checks the device, the Gold edition also performs any needed calibration to bring the device within specifications. This full suite of tests is required to complete a repair. Each time you open the case, you must use the Gold edition to test the device before returning the device to normal use.

NOTE Verify that the final test service record from the shows evidence that each of the tests required for a given model number are present and the test was performed.

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 and Configuration Guide.
- To use the Standard unlicensed edition to test the NIBP module, follow the instructions in this service manual.
- For instructions on using the Gold edition, see the service tool help files.

Standard unlicensed edition service tool tests performed

The service tool performs the following functions on the host device and installed options.

Test	Description	NIBP	Temp	SpO2	Host
Reads firmware	Displays the firmware version	✓	✓	✓	✓
Firmware upgrade	Loads the latest firmware into the module				✓
Leak test	Verifies leaks using 100 cc volume	✓			
Accuracy test (NIBP)	Checks the accuracy of transducers across the pressure range	✓			

Test	Description	NIBP	Temp	SpO2	Host
Overpressure test	Verifies the maximum cuff pressure	✓			

Gold edition service tool tests performed

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

Test	Description	NIBP	Temp	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	✓			
Accuracy (NIBP)	Checks the accuracy of transducers across the pressure range	✓			
Dump	Checks dump valves	✓			
Pump inflation	Verifies the pneumatic pump	✓			
Overpressure	Verifies pump limits	✓			
Probe detect	Verifies the operation of the probe detect switch[2]		✓		
Accuracy (Temp)	Verifies the accuracy of the thermometer across range		✓		
Temperature functional check	Verifies temperature module with cal-key[2]		✓		
SpO2 functional check	Verifies module operation with an SpO2 simulator			✓	
Display	Verifies video output				✓
Back light interface	Verifies display LED back light				✓
Touchscreen interface	Verifies touchscreen calibration				✓
LED	Verifies the LED				✓
Beeper	Verifies the buzzer				✓
Battery operation	Verifies the internal battery				✓

[1] POST testing checks the following:

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

Test	Description	NIBP	Temp	SpO2	Host
	◦ SpO2: ROM and RAM, and connection to the SpO2 board.				

[2] **SureTemp** Plus only.

Electrical safety testing

Baxter recommends performing ground continuity and leakage current tests after all open-case repairs and dielectric strength testing is not recommended.

NOTE Perform dielectric strength testing only if there is a reason to doubt the integrity of the electrical insulation (for example, 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 Baxter for service.

These recommendations trace 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.

Because of the variability of test equipment in the field, Baxter does not include specific instructions to perform electrical safety tests. When performing electrical safety tests, refer to your test equipment manuals for detailed instructions to ensure proper test equipment setup that aligns with the appropriate standard. The following table provides connections and test limits to assist you in performing these tests.

Test	Limits
Ground continuity (see Note above)	Ground continuity from EP stud (equipotential terminal)[1] to the Gnd pin of the IEC power connector shall be no greater than 0.1 ohms.
Leakage current (see Note above)	Leakage current shall be less than 500 µA from EP stud[1] to mains (Line and Neutral pins of the IEC power connector).
Insulation resistance	Dielectric strength shall be 500 V (DC) EP stud[1] to IEC mains (Line and Neutral pins of the IEC power connector), and insulation resistance is measured.

[1] To locate the equipotential terminal, see “Controls, indicators, and connectors."

Devices with an external power supply

The power bricks are CB Certified and UL Listed; they meet ALL of the requirements that the Medical Device standard requires for power supplies. The manufacturer is required to perform 100% electrical safety testing on all of their power bricks prior to shipment. Baxter does not perform nor recommend testing on these external power bricks because additional testing would put undue stress on the insulation system and possibly cause premature failures in the field. Open case repairs of devices with external power supplies are only dealing with DC circuitry and robust isolation circuits built into the printed circuit boards. No additional after-servicing testing is required in that instance. The patient isolation systems within the device (Temperature Probe, SpO2 sensor, etc.) all have visible isolation gaps built into the printed circuit board. The quality control on the PCB and the thorough type-testing performed by the testing agency (ETL) eliminates the need for further testing on the devices that are downstream from the mains isolation device.

Devices with an internal power supply

The internal power supplies are CB Certified and UL Registered. These power supplies are an open frame style (no protective enclosure). Therefore, the products that contain an internal power supply require electrical safety testing. Open case repairs of devices with an internal power supply require the recommended testing because those devices contain the open frame power supply, and the testing involves the manipulation of wiring that

carries 120 or 240 volts AC. Baxter does not recommend HiPot / Dielectric Withstand testing because of a potential stress on the insulation system, which could cause premature failures.

Basic functional verification

Basic functional verification checks

NOTE Calibration is available only with the service tool, Gold edition.

These tests verify basic functionality of the NIBP, SpO2, and thermometry parameters. These tests support the requirements of routine preventive maintenance. However, they are not a substitute for the complete functional tests available with the service tool, Gold edition. Baxter recommends using the service tool, Gold edition, to perform preventive maintenance and verification of the device when completing a repair.

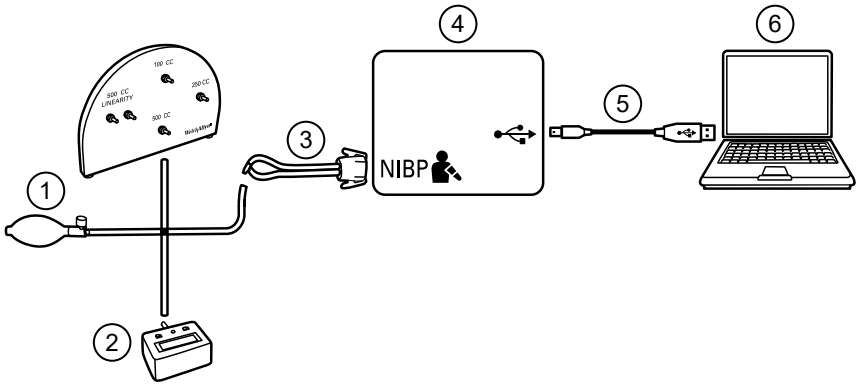
Basic functional verification tools

The list of tools below is what Baxter uses to perform a basic device functionality check. Most facilities use a device simulator or equivalent products to perform this test.

Material no.	Description	Qty	Component
407672	BP test volume repair fixture 113670	1	NIBP
N/A	SpO2 simulator	1	SpO2
DOC-10	Nellcor SpO2 extension cable	1	Nellcor SpO2
06138-000	Cal-key, assembly, M690/692	1	**SureTemp** Thermometry Module
N/A	Pressure meter (must include at least two decimal points and be accurate to within ±0.5 mmHg)	1	NIBP
6000-30	Single-tube blood pressure hose, 5 feet	1	NIBP
N/A	PC running **Windows** 10	1	All
web download	**Welch Allyn** Service Tool https://www.hillrom.com/en/services/welch-allyn-service-tool/	1	NIBP, Software updates
N/A	Blood Pressure Y-tube	1	NIBP
620216	Fitting "Y" 1/8 X 1/8 X 1/8	1	NIBP

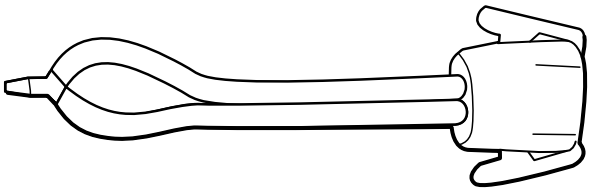
NIBP test setup

For the NIBP leak test, overpressure test, or accuracy check, connect the test equipment shown below. Connect the manifold to the volume repair fixture as indicated by the service tool or the test procedure.



No.	Item	No.	Item
1	Test volume repair fixture with test manifold, bulb, and valve	4	Device
2	Pressure meter (must include at least two decimal points and be accurate to within ±0.5 mmHg)	5	USB 2.0/5-pin type A to micro-B cable
3	Blood pressure Y-tube	6	PC

Create a blood pressure Y-tube



The blood pressure Y-tube is a piece of custom test equipment that connects the device to the test setup. The Y-tube is composed of a modified blood pressure hose and a Y-type fitting. Follow these instructions to create a Y-tube.

1. Cut a 4500-30 blood pressure hose approximately 6 inches from the connector that connects to the device.
2. Split the end of the dual-lumen hose to create two separate hoses. Make sure not to puncture either hose.
3. Insert one end of the Y-type fitting into each end of the hose.

NIBP tests

For the NIBP leak test, overpressure test, or accuracy check, connect the test equipment according to the test setup diagram for your configuration presented in the next section. Connect the manifold to the volume repair fixture as indicated by the service tool or the test procedure.

NIBP leak test (Standard unlicensed edition)

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. Set up the test equipment.
2. Launch the service tool on the PC.
3. If the simplified interface is active, choose the **Service** option.
4. Log in as ADMIN or any account with Admin privileges.
5. Power on the device.
6. Select the device you want to test from the device list.
7. Click **NIBP Sensor** under the Device Information tab.
8. Click **Leak Test** in the NIBP Sensor pane on the right side of the window.
9. Follow the prompts until the test completes.
10. Click **Close**.
11. To view the results, open the active log file by selecting **File** > **View Log File** > **Active log file** > **Ok**.
12. To record the results of your test, go to the NIBP tests in the "Service record" section.

NIBP overpressure test

The NIBP overpressure test is performed automatically using the Embedded Service Tool. The overpressure 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 overpressure test

NOTE If you are performing this test after performing the NIBP leak test, skip to step 7.

1. Set up the test equipment.
2. Launch the service tool on the PC.
3. If the simplified interface is active, choose the **Service** option.
4. Log in as ADMIN or any account with Admin privileges.
5. Power on the device.
6. Select the device you want to test from the device list.
7. Click **NIBP Sensor** under the Device Information tab.
8. In the NIBP Sensor pane on the right side of the window, click **Over Pressure Test**.
9. Follow the prompts until the test completes.
10. Click **Close**.
11. To view the results, open the active log file by selecting **File** > **View Log File** > **Active log file** > **OK**.
12. To record the results of your test, go to “Service record.”

NIBP accuracy check (Standard unlicensed edition)

The NIBP accuracy check is performed manually using the service tool to control 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 record section of the service manual. If a calibration is required, run the NIBP calibration included with the Gold edition of the service tool.

NOTE The APM must be connected to AC power 15 V while calibrating NIBP.

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

CAUTION Equipment calibration error can occur. This accuracy check verifies only the accuracy of the primary transducer. If the safety transducer is out of calibration, a calibration error can occur due to the pressure difference between the primary transducer and the safety transducer. To avoid equipment calibration errors, Baxter recommends that 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 7.

1. Set up the test equipment.
2. Launch the service tool on the PC.
3. If the simplified interface is active, choose the Service option.
4. Log in as ADMIN or any account with Admin privileges.
5. Power on the device.
6. Select the device you want to test from the device list.
7. Click **NIBP Sensor** under the Device Information tab.
8. Click **Accuracy Check** in the NIBP Sensor pane on the right side of the window.
9. Connect the 500 CC volume.
10. Turn on the pressure meter and zero if necessary.
11. Check the accuracy at 0 mmHg.
12. Record the reading on the pressure meter and the service tool and compare the results.
13. Using the hand bulb, pressurize the NIBP system to 50 mmHg ± 5 mmHg and allow 10 seconds for the pressure to stabilize.
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 150 mmHg ± 5 mmHg 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 250 mmHg ± 5 mmHg and allow 10 seconds for the pressure to stabilize.
18. Compare the reading on the pressure meter to the service tool reading and record the results.
19. Click **Open valve** to open the NIBP valves. Verify that the pressure on the meter and service tool change to zero.
20. Click **Done** to complete the check.
21. To record the results of your test, go to “Service record.”

Perform an NIBP accuracy test without the **Welch Allyn** Service Tool

The following tools are required to perform this test:

- CSM with SWF ver. 1.33.00 -X0006 or greater
- Blood Pressure Bulb
- Pressure Meter
- Dual Lumen Pressure Tubing
- Pressure Test Box

1. Navigate to the Advanced tab.
2. In the Advanced settings code box, enter your advanced settings password.
3. Navigate to **Service** > **General**.

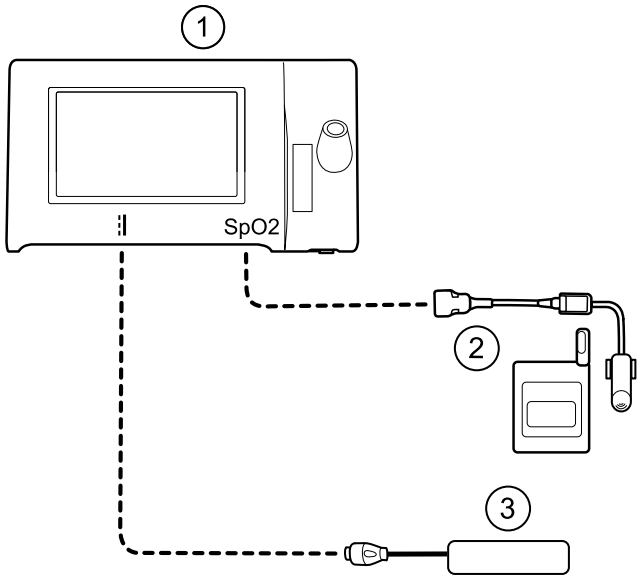
   The NIBP Pressure Verification feature is located in the bottom right of the screen.
4. Connect the dual lumen tubing to the device.
5. Connect one end of the tubing to the pressure meter and the other end to the test box. Ensure each end is connected tightly and there are no leaks.
6. To initiate the verification process, touch **Close Valve**.
7. Use the blood pressure bulb to adjust the pressure to each threshold of 20/50/100/150/250 mmHg.
8. Compare the pressure displayed on the NIBP Pressure Verification screen and the pressure meter.

SpO2 test

Select the procedure here that applies to your configuration to test the device's SpO2 function. Connect the test equipment according to the test setup diagram for your configuration presented here.

SpO2 test setup

For the SpO2 test, connect the test equipment shown below.



No.	Item
1	**Connex Spot** Monitor
2	SpO2 simulator
3	Power supply

Perform an SpO2 test

Use this procedure to test only the device SpO2 function.

1. Power on the device.

2. Connect the SpO2 functional simulator to the SpO2 input connector.

   NOTE In the following tests, if the simulator defaults are outside the device alarm limits, adjust the limits or silence the alarms.

3. Adjust the simulator settings as follows:

   For Nonin and Nellcor configurations, set the simulator SpO2 saturation to 90% and pulse rate to 60 bpm.

   For Masimo configurations, set the simulator SpO2 saturation to 80% and pulse rate to 61 bpm.

4. Give the device up to 30 seconds to stabilize.
5. Verify the displayed saturation and pulse rate as follows:

   For Nonin and Nellcor configurations, saturation should be 90% ±1 sat point, and pulse rate should be 60 ±1 bpm.

   For Masimo configurations, saturation should be 80% ±3 sat point, and pulse rate should be 61 ±1 bpm.

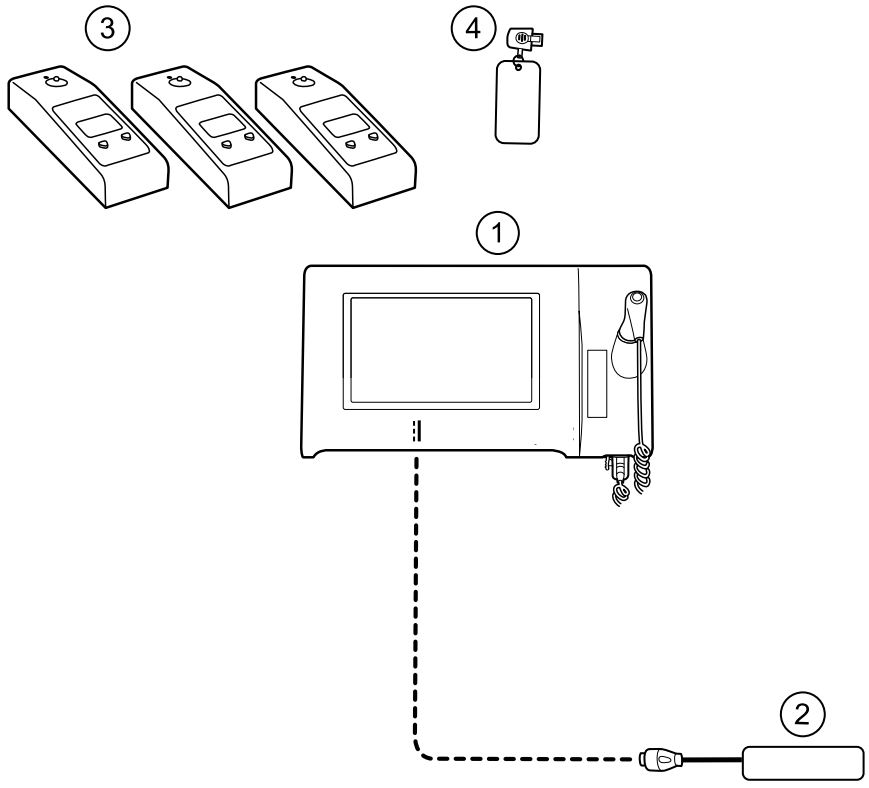
6. Disconnect the simulator.

Thermometry tests

Thermometry test setup

For the thermometry test, connect the test equipment shown below.

NOTE The drawing shows a **SureTemp** Plus configuration, but the setup for a **Braun ThermoScan**® PRO 6000 configuration is identical minus the Cal-key.



No.	Item	No.	Item
1	**Connex Spot** Monitor	3	Tester, calibration, 9600 Plus

No.	Item	No.	Item
2	Power supply	4	Cal-key, assembly, M690/692 (used only with **SureTemp**)

SureTemp temperature system test

The **SureTemp** temperature system test is performed using a calibration key (cal-key). 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).

NOTE If your facility requires you to test the temperature probes, you will also need to have heaters at three temperature settings to test the probes. See "**SureTemp** temperature probe and system test."

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 bottom of the device.
2. Connect the calibration 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 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, Baxter 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 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 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 bottom of the device.

2. Connect the calibration 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).

Braun ThermoScan® PRO 6000 thermometer test

This explains how to perform a functional verification on the **Braun ThermoScan®** PRO 6000 thermometer using the 9600 Plus Calibration Tester.

NOTE Use this procedure with the **Welch Allyn** Service Tool version 1.8.0 and later.

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 Instructions for use.

Perform a Braun ThermoScan® PRO 6000 functional verfication test

Complete the preliminary checks as described in step 1, then 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. Before testing the thermometer verify the following:
   a. The sensor (probe tip) is functional. Check the position of the sensor with a magnifying glass if necessary. If the sensor is displaced, the unit is damaged and must be replaced. There should be no visible gap between the bezel and the lens.
   b. The sensor is clean. Clean the sensor using a Q-tip lightly moistened with isopropyl alcohol, using a minimum amount of pressure to avoid displacing the sensor. Use a dry Q-tip to remove any excess alcohol. Allow 5 minutes for any remaining alcohol to evaporate.
   c. The room temperature is within the range of 65.0 °F (18.3 °C) to 80.0 °F (26.7 °C).
   d. The thermometer is allowed to reach the ambient room temperature. Remove the thermometer from the product packaging and wait at least 30 minutes before beginning the test.
   e. The thermometer is fully charged.
2. Place the thermometer from sleep mode into calibration (CAL) mode as follows:
   a. Remove the device from the dock.
   b. Wait for 20 seconds for the device to go into sleep mode (the display goes blank).
   c. Press and release the C/F button.
   d. When the self check/startup display appears, press and hold the C/F and Mem buttons for 5 to 7 seconds.
   e. When the device beeps, release the C/F and Mem buttons.

      If the device is in CAL mode, the display will alternate between the '- -' lines and "CAL".
   f. If the device doesn't enter CAL mode, wait for the device to return to sleep mode and repeat from substep c.
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 Measure button.

   The ExacTemp light flashes.
5. Leave the thermometer in the tester until a long 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 Measure 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.

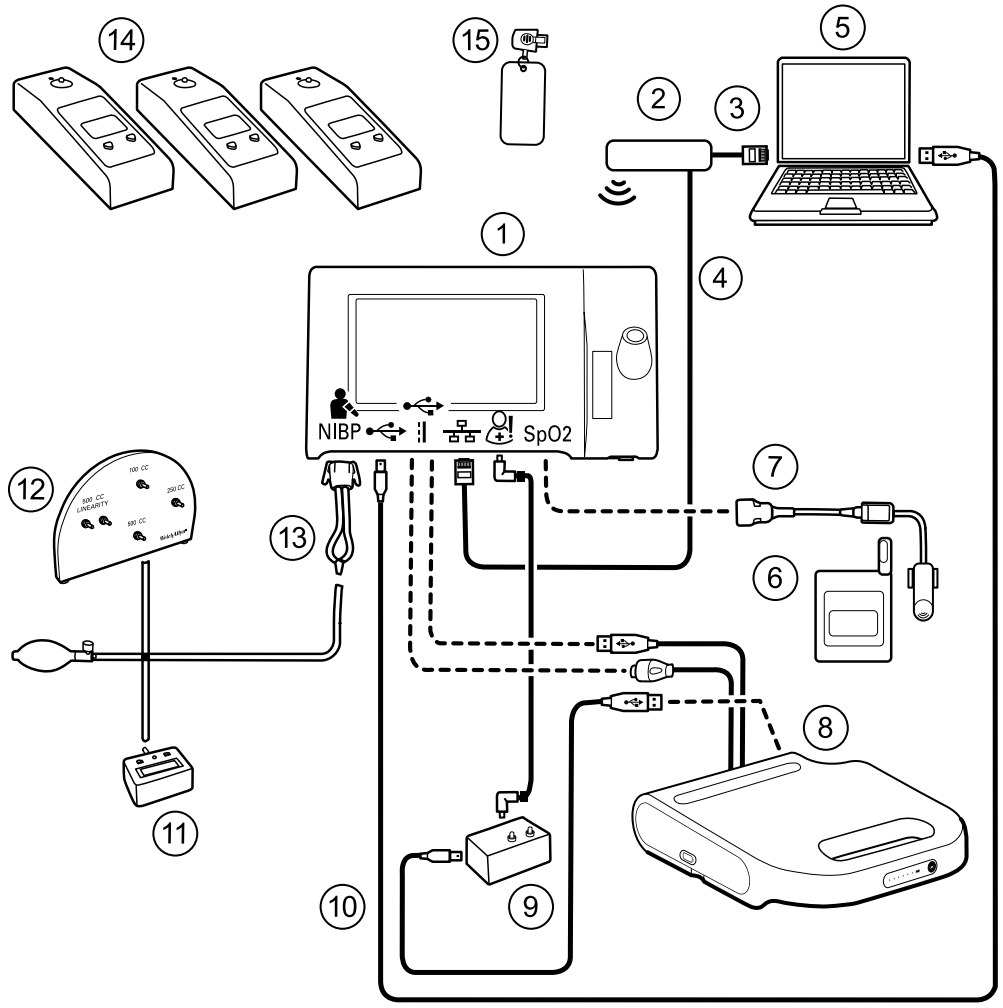
10. Repeat the procedure from step 3 as necessary until all thermometers are tested at each temperature.
11. Exit CAL mode using one of the following methods:
    - Press and hold the C/F and mem buttons until you hear the beep and the display is blank.
    - Wait and don't press any buttons for 10 minutes. The thermometer automatically exits CAL mode.

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

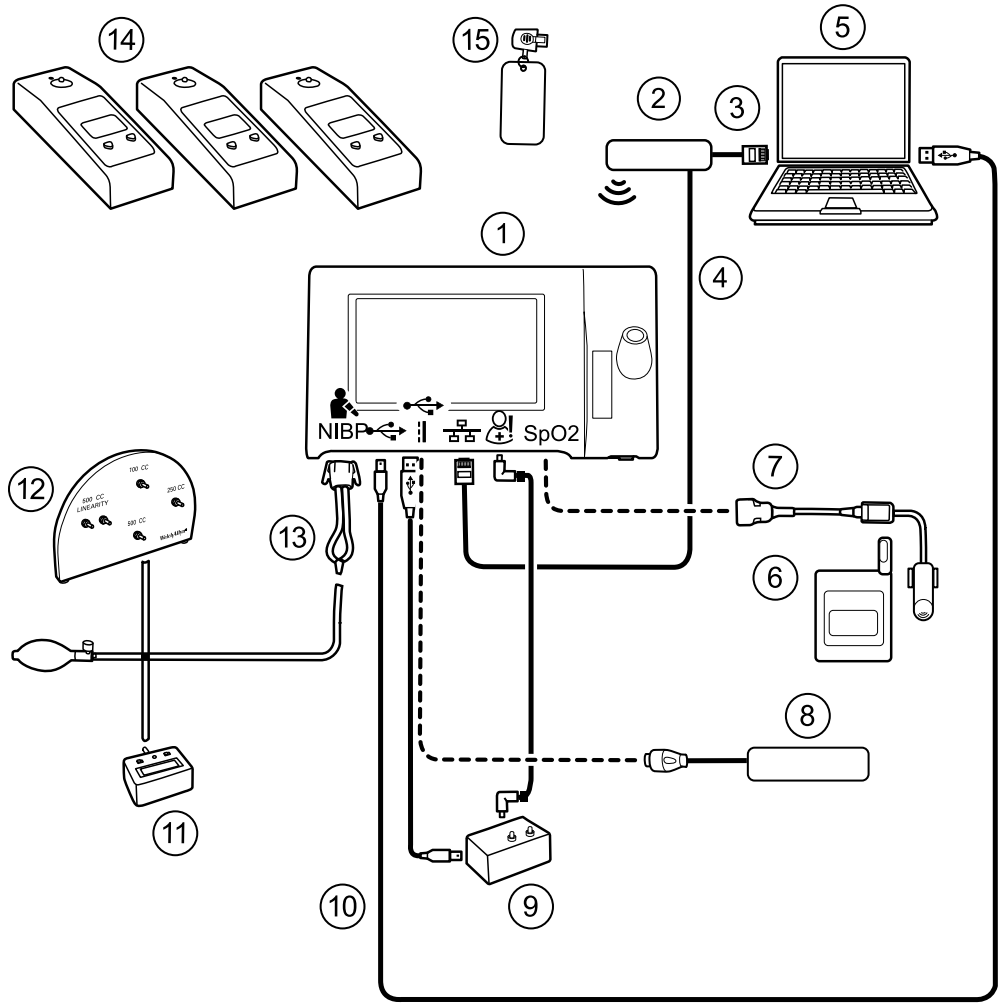
Full functional verification and calibration

Functional verification test setup

Connect the test equipment to your device as shown in these drawings to complete the functional tests described in this section.



Option 1. Configurations with Accessory Power Management (APM)



Option 2. Configurations without Accessory Power Management (APM)

Item No.	Material No.	Description	Qty	Required Corporate purchase	Optional Corporate purchase
				(see Notes)	
1	Varies	**Connex Spot** Monitor	1	X	
2	N/A	Wireless router, a/b/g or equivalent	1		
3	N/A	Ethernet cable	1		
4	N/A	Ethernet cable	1		
5	N/A	PC running the Welch Allyn Service Tool on **Windows** 10	1		
6	N/A	SpO2 simulator	1		
7	Doc-10	Nellcor SpO2 extension cable	1		X

Item No.	Material No.	Description	Qty	Required Corporate purchase	Optional Corporate purchase
				(see Notes)	
8 (Option 1)	Varies	APM (configurations with Accessory Power Management)	1	X	
8 (Option 2)	Varies	Power supply (configurations with no APM)	1	X	
9	106270	Service test box	1	X	
10	106275	Micro USB cable	1		X
11	N/A	Pressure meter (must include at least two decimal points and be accurate to within ±0.5 mmHg)	1		
12	407672	Test volume repair fixture (113670) with test manifold, bulb, and valve	1		X
13	N/A	Blood pressure Y-tube	1	See instructions for creating the Y-tube in the Basic functional verification section.	
14	01802-110	Tester, calibration, 9600 Plus, **SureTemp**	3		X
15	06138-000	Cal-key, assembly, M690/692	1		X

NOTE All items listed in this table are required to complete a full functional verification and calibration. If Baxter does not make an item available for purchase, you must provide it yourself.

NOTE You may substitute items marked as an optional Baxter purchase with comparable OEM products.

Full functional verification check and calibration tools

The list of tools below is what is required to perform a full device functionality check and calibration. The tools are used in conjunction with the **Welch Allyn** Service Tool, Gold license, to perform a device calibration.

Material no.	Description	Qty	Component
01802-110	Tester, calibration, 9600 Plus	3	**Braun ThermoScan**® PRO 6000 & **SureTemp** Plus probes
407672	BP test volume repair fixture 113670	1	NIBP
N/A	SpO2 simulator	1	SpO2
06138-000	Cal-key, assembly, M690/692	1	**SureTemp** Plus Thermometry Module
N/A	Pressure meter (must include at least two decimal points and be accurate to within ±0.5 mmHg)	1	NIBP
DOC-10	Nellcor SpO2 extension cable	1	Nellcor SpO2

Material no.	Description	Qty	Component
106270	Service test box	1	Nurse Call, USB ports
N/A	Ethernet cable	1	Ethernet Test
106275	Micro USB cable	1	All
6000-30	Single tube blood pressure hose, 5 feet	1	NIBP
N/A	Wireless router, a/b/g or equivalent	1	Wired & Wireless Test
N/A	PC running the **Welch Allyn** Service Tool on **Windows** 10	1	All
1001120	**Welch Allyn** Service Tool Gold license	1	NIBP, Software updates
web download	**Welch Allyn** Service Tool https://www.hillrom.com/en/services/welch-allyn-service-tool/	1	NIBP, Software updates and calibration
4500-30	Blood pressure hose, 5 ft.	1	NIBP
620216	Fitting "Y" 1/8 X 1/8 X 1/8	1	NIBP

Initialize the NIBP board

Functional verification and calibration must be performed each time the device is disassembled or more frequently if your facility's procedures require a full calibration on a specified basis. If you have just replaced a Main PCA board, your first step before performing a full verification and calibration is to initialize the NIBP Board.

1. Set up the equipment for full functional verification as shown earlier in this section.
2. Log in to the **Welch Allyn** Service Tool, highlight your device in the Device list, and click Select.

   This action opens the **Connex Spot** Monitor Device information subtab. Depending on your configuration, it could take 30-45 seconds to populate this subtab.
3. Select the **Verify and calibrate** subtab.
4. Select **NIBP sensor** in the Device field.
5. Click **Calibrate**.

   This opens the Verify and calibrate NIBP Sensor dialog.
6. Click **Begin**.

   A list of tests appears in the left pane of the dialog along with three controls in the right pane.
7. Click **Initialize NIBP Board** in the right pane.

   A confirmation window appears with the message, `"Are you sure you want to reset the calibration offsets of the NIBP Board?"`
8. Click **Yes**.

   This action places two tests in the queue for initialization: the Power Calibration Test – Primary/Safety and the Pressure Calibration – Primary/Safety.

   NOTE A message appears in the right pane to indicate the first test is in progress. If the test passes, a green check appears to the left of the test name, and the second test begins. If the test fails, a red check appears to the left of the test name, followed by a prompt to rerun the test. You cannot proceed to the second test until the first test passes.
9. Rerun the Power Calibration Test as needed until the test passes.

10. If you did not set up your equipment for a full calibration initially, connect the 500cc volume to the device when prompted and then click **Next**.

    NOTE Your cannot initialize the board without setting up the equipment for the Pressure Calibration test.

11. Observe the pressure calibration messages onscreen and follow the onscreen prompts to manually adjust device pressure with the hand bulb to 250 ± 5 mmHg.
12. Once you reach the targeted pressure, enter the exact value on the pressure meter in the Meter pressure field, then click **Next** to record this value.

    If the test passes, a green check appears to the left of the test name. If the test fails, a red check appears to the left of the test name, followed by a prompt to rerun the test.

13. Rerun the Pressure Calibration test as needed until the test passes.
14. If the second test passes, click **Close**.

    The NIBP board is now initialized.

Options and upgrades

Baxter supports option and software upgrades for most models.

NOTE Software in the **Braun ThermoScan**® PRO 6000 is not upgradable in the field when installed in the **Connex Spot** Monitor. To upgrade the **Braun ThermoScan**® PRO 6000 software, return the monitor to a service center.

Option upgrades for devices still under warranty that require any installation inside the device must be performed by a Baxter service center unless you participate in the **Partners in Care** Biomed Partnership Program. 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, Baxter recommends performing a complete functional test whenever the device is serviced.

NOTE For the **Welch Allyn** Service Tool to support updates and upgrades, adjust your firewall settings to permit access for IP address 169.254.10.10 (the local feed server for the software upgrade process).

Software upgrades, when available, can be purchased or provided at no charge if your device is covered by a Baxter Service Agreement. The upgrades can be installed by either a Baxter service center or by using the service tool, Standard unlicensed 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.

NOTE The device must be plugged in to AC power and have at least 15 minutes of battery charge remaining to execute software upgrades. You can download software upgrades on battery power, but you cannot implement them without AC power.

Available options

The following options can be added to each model's base configuration.

CAUTION Before installing any option, disconnect the patient from the monitor and power down the device.

NOTE Some model numbers and product features described in this publication might not be available in your country. For the latest information about products and features, please contact Baxter Customer Care.

Options

Model	7100	7300	7400	7500
Masimo	*X*	○1	●1	●1
Masimo SpO2 with **RRp**	*X*	●2	●2	●2
Nonin	○	○	●	●
Nellcor **OxiMax**	*X*	○	●	●
SureTemp Plus	○	○	○	○
Braun ThermoScan® PRO 6000	○	○	○	○

Model	7100	7300	7400	7500
Wireless radio	*X*	*X*	○	●
Bluetooth radio	*X*	●	*X*	○[3]

[1] Contact Baxter Customer Care to purchase the optional respiration rate software license: 7000-RRP Masimo MX5 **RRp** CSM license.
[2] Configurations 73RE, 73RT, 73RX, 74RE, 74RT, 74RX , 75RE, 75RT, and 75RX come with Masimo SpO2 and **RRp**.
[3] Contact Baxter Customer Care to purchase the optional **Bluetooth** Low Energy software license: 108060BLE CSM 7300 BLE license.

● Standard with this model.

○ Software upgrade available for this model. Hardware upgrade available only on a case-by-case basis.

X No software upgrade available for this model. Hardware upgrade available only on a case-by-case basis.

Install options

All internal option installations entail opening the device case and performing some disassembly. Because this process requires disconnecting internal components, Baxter 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.

Upgrading software with the **Welch Allyn** Service Tool

The **Connex Spot** Monitor and the **Welch Allyn** Service Tool (WAST) interact through Ethernet over USB technology, enabling the monitor to function as a USB device with both a network and an IP address. This connection separates logically into two distinct interfaces: a generic USB serial connection and a Remote Network Driver Interface Specification (RNDIS) network interface, which is a Microsoft **Windows** driver. Most interactions between the WAST and the **Connex Spot** Monitor take place over the generic USB serial connection. In contrast, software upgrades require the RNDIS interface for the device to connect the WAST and download the firmware.

During software upgrade, the Ethernet over USB interface with the WAST is auto-configured with the specifications noted in the table below. When the **Connex Spot** Monitor reaches out to the WAST for the firmware package, it uses TCP port XXXX. Be prepared to modify any firewall(s) that prevent incoming connections to allow this traffic. The WAST attempts to configure the **Windows** firewall by opening this specific port on the RNDIS interface. If administrative controls such as a Group Policy Object (GPO) or third-party software have been implemented to prevent this change, the WAST attempts to diagnose the problem and then inform you of possible remediation steps. Work with your IT staff or Network Administrator as needed to enable this functionality.

Interface specifications	IP address	Network mask
Device Ethernet over USB interface	169.254.10.10	255.255.255.255
WAST RNDIS interface	169.254.10.1	255.255.255.255

At the start of a software upgrade, the **Welch Allyn** Service Tool creates a local HTTP server and uses the USB connection to transfer necessary file package to the **Connex Spot** Monitor. Once the file package is on the device, it launches the installation of host controller firmware and reboots the device immediately following the installation. When the device auto-reboots, the software upgrade of individual modules and sensors (NIBP, SpO2, and/or Temperature) is complete.

Software upgrade availability for the Connex Spot Monitor can be checked directly within the **Welch Allyn** Service Tool (WAST). Availability of software upgrades is also communicated via the Customer Service Bulletin on Baxter's website at

https://www.hillrom.com/en/products/connex-spot-monitor/.

Software rollback capability

The **Connex Spot** Monitor utilizes a primary and secondary software structure. In the final step of the software upgrade, the device rolls the previous firmware package to a secondary image and identifies the newly installed firmware as its primary image. This structure allows rollback to previous versions as needed. For example, if you performed a software upgrade and then determined that it didn't meet your expectations or conform to your workflow, you can execute a software rollback in seconds and limit device downtime.

NOTE When operating with software version 1.54.00, the software will not allow rollback to an older version.

To roll back your software, follow these steps:

1. Connect the device to your laptop and open the **Welch Allyn** Service Tool.
2. Click the **Configure** tab.
3. In the Current settings window, click **Change...**.
4. Click the **Device Software Rollback** tab.
5. Click **Rollback**.
6. In the Confirm Device Software Rollback dialog, click **Yes** to confirm.

In addition, because the software upgrade is already loaded on your device, you can use the rollback capability at a later time to implement the upgrade and complete the associated setup activities. Follow the same steps presented above to activate the new firmware

Upgrade the device firmware

Updating a device requires a PC, a USB cable, and an Internet connection. See the Service Tool Installation Guide for Admin password information.

SmartCare services for maintenance and repair

SmartCare protection plans

Part number	**Description**
S1-CSM-PRO-1	CSM **SmartCare** Protection 1YR
S1-CSM-PRO-3	CSM **SmartCare** Protection 3YR
S1-CSM-PRO-PS	CSM **SmartCare** Protection 3YR POS

SmartCare protection plus plans

SmartCare protection plus plans include onsite repair.

Part number	**Description**
S9-CSM-PROPLUS-1	CSM **SmartCare** Protection Plus 1YR
S9-CSM-PROPLUS-3	CSM **SmartCare** Protection Plus 3YR
S9-CSM-PROPLUS-PS	CSM **SmartCare** Protection Plus 3YR POS

SmartCare biomed plans

Part number	**Description**
S1-CSM	CSM, Comprehensive partnership program, 1 year
S1-CSM-2	CSM, Comprehensive partnership program, 2 years
S1-CSM-5	CSM, Comprehensive partnership program, 5 years
S1-CSM-C	CSM, Comprehensive partnership program, 1 years + Calibration
S1-CSM-2C	CSM, Comprehensive partnership program, 2 years + Calibration
S1-CSM-5C	CSM, Comprehensive partnership program, 5 years + Calibration
S2-CSM	CSM, Biomed partnership program, 1 year
S2-CSM-2	CSM, Biomed partnership program, 2 years
S2-CSM-5	CSM, Biomed partnership program, 5 years

SmartCare biomed plans (available only in selected international countries)

Part number	**Description**
S4-CSM	CSM, Warranty Extension, 1 year
S4-CSM-2	CSM, Warranty Extension, 2 years
S4-CSM-5	CSM, Warranty Extension, 5 years

Service and repair training

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

Part number	**Description**
CSMREP-TRN	CSM repair training
CSMREPW-TRN	CSM repair web training

Troubleshooting

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

- *Interpreting log file output*: The tables and sample calculations in this topic show you how to parse and interpret error log messages.
- *Symptoms and solutions*: This simple table lists symptoms you might observe, possible causes, and suggested actions that might 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. Compared to the Symptoms and solutions table, these tables are much more exhaustive.

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. Baxter 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 Baxter Technical Support immediately.

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

Interpreting log file output

The device supports saving log files to a USB flash drive. You can then read saved log files on a PC to assist in analysis. This method allows access to the log files without having to connect the device to a PC.

Save log files

Complete the following steps to save a log file to a USB flash drive:

1. Insert a compatible USB flash drive into the USB port of the monitor or the APM work surface if one is configured for your device.
2. Access Advanced settings.
3. Navigate to Service > Log file.
4. Touch Save to USB.

   A "Save successful" message appears after a successful save.
5. Remove the USB flash drive from the USB port.

Access log files

Complete the following steps to access and start working with log files saved to a USB flash drive:

1. Insert the USB flash drive into a USB port on your PC.
2. Open the USB flash drive and identify the saved log files.

   Look for .zip files that resemble this example, with the first set of numbers being a datestamp in the YYYYMMDD format:

   ```
   logfiles_20150108_193903_179.zip
   ```

3. Open the .zip file, and then open the desired messages .zip file.

   Multiple messages files might be saved on the USB drive, so check the datestamp in the filename to select the desired .zip file. For example,

   ```
   messages_2015_01_08.zip
   ```

   The available log files appear onscreen. The largest file is the latest file of the day. The filenames resemble this example:

   ```
   messages_2015_01_08_0000000008
   ```

4. Right-click the desired log file, select **Open**, and then select WordPad as the program to open the file.

   The log file opens and is ready for analysis.

Log message format

Knowing how to interpret log file output can help you to troubleshoot issues on the device. All log messages follow this format:

```
<PRI>ISODATE(sp)MSGHDR:(sp)MSG(new-line)
```

The following table defines each element of the log message.

<PRI>	The facility number and the severity number concatenated into an 8-bit value. **NOTE** The PRI values and calculations performed with them are useful primarily to **Welch Allyn** engineers. Most biomeds and service personnel can focus on the other details of log messages to complete their analysis.
ISODATE	The date and time at which the message was generated in the ISO 8601 compatible standard timestamp format (yyyy-mm-ddThh:mm:ss.mmm+-ZONE). This is picked up from the CSM device system time.
MSGHDR	Message header: The name and the PID of the program or process that sent the log message in PROGRAM[PID]: format. It includes a trailing whitespace.
MSG	The text of the log message from the sending program or process. This is a free-format text string, terminating with a new-line character.
(sp)	A single-space character.
(new-line)	A new-line character.

Sample log messages:

```
<13>2014-09-26T12:18:45.000+00:00 wa_nibpd[1326]: NibpManualBpCancelState->Enter
```

```
<150>2014-09-08T05:55:00.000+00:00 wa_spo2nonind[1521]: Code 1, SPO2 sensor not connected
```

As noted above, the calculations performed using PRI values have little significance for most users but are valuable for Baxter engineers. Therefore, the following instructions for calculating facility and severity numbers target Baxter engineers.

To obtain the facility number, divide the PRI value by 8 (dropping the fraction from the result). The facility number is one of the following:

Facility Number	Description
0	Kernel messages
1	User-level messages
2	Mail system
3	System daemons
4	Security/authorization messages (auth)
5	Messages generated interally by syslogd
6	Line printer subsystem
7	Network news subsystem
8	UUCP subsystem
9	Clock daemon
10	Security/authorization messages (authpriv)
11	FTP daemon
12	NTP subsystem
13	Log audit
14	Log alert
15	Clock daemon (cron)
16	BioMed messages (aka local-0)
17	Manufacturing messages (aka local-1)
18	Service messages (aka local-2)
19	Engineering messages (aka local-3)
20	Not Used (aka local-4)
21	Not Used (aka local-5)
22	Not Used (aka local-6)
23	Not Used (aka local-7)

To obtain the severity number, subtract the (facility times 8) value from the PRI value. The severity number is one of the following:

Severity Number	Severity Name	Description
0	EMERG	A panic condition
1	ALERT	A condition that should be corrected immediately
2	CRITICAL	Critical conditions, such as hard device errors
3	ERROR	Error messages
4	WARNING	Warning messages
5	NOTICE	Conditions that are not errors but may require attention

Severity Number	Severity Name	Description
6	INFO	Information messages
7	DEBUG	Debug messages

Sample calculation/interpretation

For each of the sample error logs presented, we can determine the following:

```
<13>2014-09-26T12:18:45.000+00:00 wa_nibpd[1326]: NibpManualBpCancelState->Enter
```

<PRI> = 13

ISODATE = 2014-09-26T12:18:45.000+00:00

MSGHDR = wa_nibpd[1326]:

MSG = NibpManualBpCancelState

Facility = <PRI> ÷ 8 = 13 ÷ 8 = 1.625 = 1 when rounded down = User-level messages

Severity = <PRI> – (Facility x 8) = 13 – (1 x 8) = 13 – 8 = 5 = NOTICE

```
<150>2014-09-08T05:55:00.000+00:00 wa_spo2nonind[1521]: Code 1, SPO2 sensor not connected
```

<PRI> = 150

ISODATE = 2014-09-08T05:55:00.000+00:00

MSGHDR = wa_spo2nonind[1521]:

MSG = Code 1, SPO2 sensor not connected

Facility = <PRI> ÷ 8 = 150 ÷ 8 = 18.75 = 18 when rounded down = Service messages (aka local-2)

Severity = <PRI> – (Facility x 8) = 150 – (18 x 8) = 150 – 144 = 6 = INFO

Symptoms and solutions

General

Condition	Cause	Remedy
All tests for the device were not run with the **Welch Allyn** Service Tool.	The device is not connected to a power supply.	Plug the device into the electrical outlet and then connect the power supply to the device.
	Initialization of the device and the **Welch Allyn** Service Tool is required.	Re-boot the device and the PC. Relaunch the **Welch Allyn** Service Tool and retest the device.

Condition	Cause	Remedy
The device does not power up.	A new battery was installed.	Connect AC power to wake up the battery.
	The battery is discharged.	Connect AC power to charge the battery.
	The power switch is defective.	Replace the power switch.
	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 dead or 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 touchscreen is unresponsive.	Touchscreen needs calibration.	Calibrate the touchscreen. Run the Host Calibration Sequence from the Service Tool. Replace the LCD / touchscreen. Replace the main board.
The device does not signal alarm conditions for the Nurse Call option.	Alarm limit settings are set too high or too low.	Adjust the alarm limit settings.
	Audio alarms have been silenced.	Turn on audio alarms.
	A hardware component has failed.	Run the Host Calibration Sequence from the Service Tool. Replace the main board.
The device is powered on but the display is blank.	The device is in Sleep mode.	Touch the screen.
	A hardware component has failed.	Run the Host Calibration Sequence from the Service Tool. Replace the LCD / touchscreen. Replace the main board.

Bluetooth

Condition	Cause	Remedy
The monitor cannot connect with a **Bluetooth** device.	A pairing issue occurred.	Pair the monitor to the device. Ensure that the monitor and the device are within range. The **Bluetooth** device driver has not been installed properly. PC Service for the device has not started. Perform a **Bluetooth** radio functional check. Update the device software. Replace the **Bluetooth** radio. Replace the main board.
	A connectivity issue occurred.	Configure monitor to network settings. Verify local network settings. Ensure that the monitor and the device are within range. Perform a **Bluetooth** radio functional check. Update the device software. Replace the **Bluetooth** radio. Replace the main board.
	A hardware component has failed.	Perform a **Bluetooth** radio functional check. Replace the **Bluetooth** radio. Replace the main board.
	The software has failed.	Update the software. Replace the **Bluetooth** radio. Replace the main board.

Wireless radio

Condition	Cause	Remedy
The monitor cannot connect with a Wireless network.	A connectivity issue occurred.	Configure monitor to network settings. Verify local network settings. Ensure that the monitor and the device are within range. Perform a Newmar radio functional check. Update the device software. Replace the Newmar radio. Replace the main board.
	A hardware component has failed.	Perform a Newmar radio functional check. Replace the Newmar radio. Replace the main board.
	The software has failed.	Update the software. Replace the Newmar radio. Replace the main board.
Attempt to upgrade the software failed.	The hardware or software between the Host and the Newmar radio is incompatible.	Retry software update. Replace Newmar radio. Replace main board.
	The monitor lost communication with the network or a timing issue occurred during the upgrade.	Retry software update. Replace Newmar radio. Replace the main board.
	The Newmar radio malfunctioned.	Update the software. Replace Newmar radio. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.

Ethernet

Condition	Cause	Remedy
The monitor cannot connect to the network.	A connectivity issue occurred.	Verify local network settings. Verify that the port on the network is configured and functional. Perform an Ethernet functional check. Update the software. Replace the main board.
	A hardware failure occurred.	Perform an Ethernet functional check. Replace the main board.
	A software failure occurred.	Update the software. Replace the main board.
Attempt to upgrade the software failed.	The hardware or software between the Host and the Ethernet module is incompatible.	Retry software update. Replace the main board.
	The monitor lost communication with the network or a timing issue occurred during the upgrade.	Retry software update. Replace the main board.
	The Ethernet module malfunctioned.	Update the software. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.

NIBP

Condition	Cause	Remedy
Blood pressure readings are inaccurate.	Incorrect cuff size, improperly placed cuff, or incompatible cuff.	Determine correct cuff size by measuring patient's arm circumference midway between the elbow and the shoulder. Then use a properly sized cuff. Use reference markings on the cuff to place it properly. Use only Baxter cuffs.
	Patient's arm is not positioned properly or moves during blood pressure cycle.	Ensure patient's arm is resting on a surface at heart level. Keep arm still to reduce artifact.

Condition	Cause	Remedy
	Blood pressure cuff is placed over clothing.	Take blood pressure on a bare arm.
	The patient is experiencing arrhythmia.	Check for regularity of heart rate (palpate pulse or check device).
	There is a leak in the pneumatic system.	Ensure all cuff attachments are tight. Carefully check for leaks in blood pressure cuff and tubing attached to the device. Replace the cuff. Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
	The NIBP module needs calibration.	Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
	The NIBP module malfunctioned.	Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
	The single or dual lumen switch failed.	Ensure that the cuff is the properly sized. Clean the cuff connections. Replace the cuff and tubing. Replace the main board.

Condition	Cause	Remedy
The NIBP cuff does not inflate. NIBP is not functioning.	There is a leak in the pneumatic system.	Ensure all cuff attachments are tight. Carefully check for leaks in blood pressure cuff and tubing attached to the device. Replace the cuff. Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
	The NIBP module malfunctioned.	Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
	The main board malfunctioned.	Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
	The single or dual lumen switch failed.	Ensure that the cuff is the properly sized. Clean the cuff connections. Replace the cuff and tubing. Replace the main board.
	The NIBP module needs calibration.	Update the software. Perform NIBP functional checks. Perform NIBP calibration checks. Replace the pump assembly. Replace the main board.
Attempt to upgrade the software failed.	The hardware or software between the Host and the Ethernet module is incompatible.	Retry software update. Replace the main board.
	The monitor lost communication with the network or a timing issue occurred during the upgrade.	Retry software update. Replace the main board.

Temperature

Condition	Cause	Remedy
Temperature measurements are inaccurate.	Probe is placed improperly.	Ensure that the probe is properly placed in the measurement site. For oral temps, place the probe in the most posterior sublingual pocket.
	The probe malfunctioned.	Replace the probe. Perform temperature functional checks.
	The probe cover is faulty or incorrectly attached.	Verify the condition of the probe cover and that it covers the probe completely. Replace the probe cover.
	The probe or the window is dirty or contaminated.	Clean the probe or window. Replace the probe.
	The temperature module malfunctioned.	Update the software. Replace the temperature module. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.
Temperature measurements are not displayed.	The probe is disconnected from the monitor.	Ensure that the temperature probe is connected and seated in the probe well before taking a measurement.
	Probe is placed improperly.	Ensure that the probe is properly placed in the measurement site. For oral temps, place the probe in the most posterior sublingual pocket.
	The probe malfunctioned.	Replace the probe. Perform temperature functional checks.
	The temperature module malfunctioned.	Update the software. Replace the temperature module. Replace the main board.
	A software issue occurred.	Update the software. Replace the temperature module. Replace the main board.

Condition	Cause	Remedy
	The probe or the window is dirty or contaminated.	Clean the probe or window. Replace the probe.
	The main board malfunctioned.	Update the software. Replace the main board.
Attempt to upgrade the software failed.	The hardware or software between the Host and the Ethernet module is incompatible.	Retry software update. Replace the temperature module. Replace the main board.
	The monitor lost communication with the network or a timing issue occurred during the upgrade.	Retry software update. Replace the temperature module. Replace the main board.
	The temperature module malfunctioned.	Update the software. Replace the temperature module. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.
	The thermometer is not in the cradle.	Placed the thermometer in the cradle.
	The thermometer contacts are dirty.	Clean the thermometer contacts. Replace the thermometer. Replace the thermometer module.
	The thermometer batteries are dead.	Place the thermometer in the cradle to charge. Clean the thermometer contacts. Replace the thermometer batteries. Replace the thermometer. Replace the thermometer module.

Condition	Cause	Remedy
	The thermometer malfunctioned.	Place the thermometer in the cradle to charge. Clean the thermometer and module contacts. Clean the probe or window. Replace the probe cover. Perform temperature functional checks. Update the software. Replace the thermometer batteries. Replace the thermometer. Replace the thermometer module. Replace the main board.
	The temperature module malfunctioned.	Perform temperature functional checks. Update the software. Replace the temperature module. Replace the main board.
	The probe or the window is dirty or contaminated.	Clean the probe or window. Perform temperature functional checks. Replace the probe.
	The main board malfunctioned.	Update the software. Replace the main board.

SpO2

Condition	Cause	Remedy
SpO2 measurements are not displayed.	The sensor is faulty or incorrectly attached.	Connect the sensor to the patient and the device. Replace the sensor. Perform SpO2 functional checks.
	The sensor is contaminated or dirty.	Clean the optical area of the sensor. Replace the sensor. Perform SpO2 functional checks.

Condition	Cause	Remedy
	The SpO2 module malfunctioned.	Perform SpO2 functional checks. Update the software. Replace the SpO2 module. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.
SpO2 measurements are inaccurate.	The sensor is faulty or incorrectly attached.	Connect the sensor to the patient and the device. Replace the sensor. Perform SpO2 functional checks.
	The sensor is contaminated or dirty.	Clean the optical area of the sensor. Replace the sensor. Perform SpO2 functional checks.
	The SpO2 module malfunctioned.	Perform SpO2 functional checks. Update the software. Replace the SpO2 module. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.
Attempt to upgrade the software failed.	The hardware or software between the Host and the SpO2 module is incompatible.	Retry software update. Replace the SpO2 module. Replace the main board.
	The monitor lost communication with the network or a timing issue occurred during the upgrade.	Retry software update. Replace the SpO2 module. Replace the main board.
	The temperature module malfunctioned.	Update the software. Replace the SpO2 module. Replace the main board.
	The main board malfunctioned.	Update the software. Replace the main board.

Technical alarm and information messages

This section presents tables of technical alarm and information messages to help you troubleshoot issues on the monitor.

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

- Information messages, which appear on a blue background.
- Very low-priority alarms, which appear on a cyan background.
- Low- and medium-priority alarms, which appear on an amber background.
- High-priority alarms, which appear on a red background.

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

Alarm logs are not viewable by clinicians. However, all logs are transferred to **Welch Allyn** on a regularly scheduled basis. In the event of an unplanned power failure, all information, including device logs and patient data, are retained on the system.

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 monitor 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 to perform a functional test on the module reporting the message.

NOTE Performing functional tests on modules requires the service tool, Gold edition.

NIBP messages

Condition	Cause	Remedy	Priority
User canceled NIBP reading.	The NIBP measurement was canceled by user	Clear the alarm and retry NIBP.	Information
NIBP not functional. 050002	The NIBP measurement is not available	Internal malfunction. If the problem persists, replace the module.	Medium
Unable to determine NIBP; check connections; limit patient movement. 050003	The NIBP measurement may be inaccurate, patient motion occurred, or the settings for patient readings obtained might not be accurate	Make sure the NIBP settings/patient mode is appropriate. If the problem persists, replace the module.	Medium
Unable to determine NIBP; check connections; limit patient movement. 050004	Excessive artifact, no blood pressure parameters could be calculated	Unable to determine blood pressure. Check connections; restrict patient movement. If problem persists, replace module.	Low
Unable to determine NIBP; check inflation settings. 050005	Low inflation on blood pressure measurement attempt	Make sure the NIBP settings/patient mode is appropriate. If the problem persists, replace the module.	Low

Condition	Cause	Remedy	Priority
Unable to determine NIBP; check connections and tubing for kinks. 050006	The NIBP tubing has a kink, or there is a NIBP transducer calibration failure	Internal malfunction. If the problem persists, replace the module.	Medium
Unable to determine NIBP; check connections; limit patient movement. 050007	The blood pressure measurement dumped too soon	Make sure the NIBP settings/patient mode is appropriate. If the problem persists, replace the module.	Low
Unable to determine NIBP; check connections; limit patient movement. 050008	There were not enough steps on the measurement attempt	Unable to determine blood pressure. Check connections; restrict patient movement.	Low
Unable to determine NIBP; check inflation settings. 050009	There is invalid patient information for the selected mode	Make sure the NIBP settings/patient mode is appropriate. If the problem persists, replace the module.	Medium
Unable to determine NIBP; check connections; limit patient movement. 05000A	The re-inflation was too late on the measurement attempt	Unable to determine blood pressure. Check connections; restrict patient movement.	Low
Unable to determine NIBP; check inflation settings. 05000B	There were many re-inflate attempts on the measurement attempt	Unable to determine blood pressure. Check connections; restrict patient movement.	Low
Unable to determine NIBP; check connections and tubing for kinks. 05000C	Couldn't bleed pressure below safe venous return pressure	Unable to release cuff pressure. Check tubing for kinks and connection integrity.	Medium
NIBP air leak; check cuff and tubing connections. 05000D	Leak was detected in BP cycle.	Check the tubing and connections.	Low
No display	The safety check failed on the measurement attempt	Internal malfunction. If the problem persists, replace the module.	
Unable to determine NIBP; check connections; limit patient movement. 05000F	Auto Zero check failure. The NIBP pressure is not stable and the transducer zero value cannot be set	The NIBP pressure is not stable and the transducer zero value cannot be set. If problem persists, replace module.	Medium
NIBP not functional. 050105	WACP message CRC mismatch on NIBP module	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
NIBP not functional. 050201	This message is not implemented by the NIBP module	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050202	This message is not supported by the NIBP module	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050203	The NIBP module has run out of memory	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050205	The NIBP module has received a invalid parameter	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050206	The parameter provided by the NIBP module is outside of the allowable range for the specified message	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050207	The NIBP module message requires an object, but did not contain one	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050208	The NIBP module object provided with the message could not be deserialized	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050209	The NIBP module object could not be serialized	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05020A	The NIBP module message is performing a request or action when the module state prohibits the request or action.	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not calibrated. 050503	Factory EEPROM checksum error on NIBP. Units internal configuration was corrupted	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
NIBP not functional. 050504	User EEPROM checksum error. Configuration data which can be set in the user's configuration menu was damaged or lost on NIBP	Calibrate the NIBP Module. If problem persists, replace module.	Very low
NIBP not functional. 050505	Post failure of A/D convertor	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not calibrated. Calibrate the module. 050509	NIBP module calibration failure, the calibration signature is zero	Calibrate the NIBP module.	Very low
Invalid algorithm. Select correct algorithm and retry. 05050A	Invalid NIBP Algorithm. NIBP component software tried to configure the sensor in an illegal manner	Verify the correct algorithm. If the problem persists, replace the module.	Very low
NIBP not functional. 050513	Invalid NIBP initiation code	Internal malfunction. If the problem persists, replace the module.	Very low
Invalid patient mode. Select correct patient mode and retry. 050514	Invalid patient mode on NIBP. The NIBP component software tried to configure the sensor in an illegal manner	Verify correct patient mode. If the problem persists, replace the module.	Very low
NIBP not functional. 050515	Invalid module configuration for NIBP	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050516	NIBP module malfunction	Internal malfunction. If the problem persists, replace the module.	Very low
Ambient temperature out of range. Clear error and retry. 050517	Ambient temp out of range on NIBP	Restore device to normal temperature ranges and try again.	Very low
Low battery. Plug into outlet. 050518	The NIBP module power rail is too low	Plug device into an AC outlet to charge the battery.	Very low
Battery overcharged. Disconnect from outlet. 050519[1]	The NIBP module power rail is too high.	Battery is overcharged. Remove from charging source.	Very low

[1] When calibrating NIBP, the use of a 15V power supply will avoid this error. The APM needs to be connected to AC power while calibrating NIBP.

Condition	Cause	Remedy	Priority
NIBP not calibrated. Calibrate the module. 050601	NIBP failed to load safety processors calibration record from EEPROM	Calibrate the NIBP module. If the problem persists, replace the module.	Very low
NIBP not functional. 050602	NIBP safety processor failed ROM checksum	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not calibrated. Calibrate the module. 050603	NIBP safety processor not calibrated, missing calibration signature	Calibrate the NIBP module. If the problem persists, replace the module.	Very low
Cuff pressure limits exceeded. 050604	NIBP system failure. Overpressure	Restrict patient movement.	Medium
Premature auto cycle skipped. 050605	NIBP auto cycle skipped, SVRP requirement not satisfied	Cuff pressure is not below safety return pressure long enough to allow a cycle to occur.	Very low
Cuff pressure too high. Clear error to retry. 050606	NIBP cuff pressure above SVRP for too long	Verify cuff connections. If the problem persists, replace the module.	Medium
NIBP not functional. 050607	NIBP cannot clear the failsafe alerts	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050608	NIBP safety processor has stopped responding	Internal malfunction. If the problem persists, replace the module.	Very low
Stat mode requested too soon. Clear to retry. 050609	NIBP excessive stat mode time. The time between readings is less than one minute and the readings plus time between readings result in the device taking over 15 minutes to complete the averaging cycle.	Internal malfunction. If the problem persists, replace the module.	Very low
Unable to determine NIBP; check connections and tubing for kinks. 05060A	NIBP transducers are not matched	The transducers are above 5 mmHg and the difference in pressure is greater than 40 mmHg. Check cuff for pinched or obstructed tubing. If the problem persists, replace the module.	Medium
NIBP not calibrated. Calibrate the module. 05060B	Factory EEPROM checksum error on NIBP. Units internal configuration was corrupted	Calibrate the NIBP module. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
NIBP not functional. 05060C	NIBP command not implemented	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05060D	NIBP wrong data count	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05060E	NIBP data range error	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05060F	NIBP no POST error to clear	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050610	NIBP cannot clear this POST error	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050611	NIBP command not command type	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050612	NIBP communication timeout	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050613	NIBP response header wrong	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050614	NIBP response checksum wrong	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050615	Too much NIBP data was received	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050616	NIBP FPROM erase error	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050617	NIBP FPROM programming error	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 050618	Invalid NIBP target pressure	Internal malfunction. If the problem persists, replace the module.	Very low
Check cuff inflation settings.	Cuff inflation target was overridden due to max pressure being too low	Change cuff inflation target or maximum pressure so that the cuff inflation target is at least 20 mmHg lower than maximum pressure.	Information
Tube type does not match device configuration.	Tube type settings and actual type do not match	Change tube type setting to match actual tube type	Information
NIBP not functional. 05FF01	Unrecognized WACP parameter received from sensor	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
NIBP not functional. 05FF02	Timeout waiting for sensor response	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF03	Error deserializing the WACP message received from the sensor	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF04	WACP stack send message failure	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF05	Timeout waiting for asynchronous sensor message	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF06	One or more undetermined numerics when reading status indicates OK	Check connections. Restrict patient movement.	Very low
NIBP not functional. 05FF07	Unrecognized sensor reading status code	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF08	Sensor power up failure	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF09	WACP rendezvous failure	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF0A	Application firmware retrieval error during POST	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF0B	Upgrade `.pim` file is corrupt	Internal malfunction. If the problem persists, replace the module.	Very low
NIBP not functional. 05FF0C	Configured upgrade firmware directory cannot be accessed	Internal malfunction. If the problem persists, replace the module.	Very low
Device configuration issue. 05FF0D	Configured parameter (NIBP or SpO2) used in Intervals is missing	Use configured parameters for Intervals	Very low
NIBP not functional. 05FF0E	The NIBP sensor unexpectedly reset	Clear the error and try again	Very low
NIBP not functional. 05FF0F	The NIBP sensor firmware failed to upgrade	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Tube type does not match device configuration.	Switching to StepBP	Change tube type to dual lumen or change the algorithm configuration to StepBP	Information

SpO2 messages

General SpO2 messages

Condition	Cause	Remedy	Priority
SpO2 not functional. 044900	SpO2 module is not responding	Internal Hardware malfunction in SpO2 module. Replace module.	Very low
SpO2 rebooting. 044a00	SpO2 module is not responding	Informational error. Indicates that host software is attempting to clear an error by rebooting the SpO2 module. No action required.	Very low
SpO2 rebooting. 044b00	The SpO2 module stopped sending data	Informational error. The host software is attempting to clear an error by rebooting the SpO2 module. No action required.	Very low
SpO2 rebooting. 044c00	SpO2 received a packet with bad CRC from module	Informational error. The host has received a packet with bad CRC from the SpO2 module. The packet in question is ignored. No action required.	Very low
SpO2 rebooting. 044d00	The SpO2 power on self test failed	Internal hardware malfunction in SpO2 module. Replace the module.	Very low
SpO2 rebooting. 044e00	The SpO2 power on self test timed out	Internal hardware malfunction in SpO2 module. Replace the module.	Very low

Masimo messages

Condition	Cause	Remedy	Priority
Sensor not connected. Clear to retry. 040600	The SpO2 cable is not connected	Connect SpO2 cable. If the problem is still present, replace the SpO2 sensor. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Replace the SpO2 cable. 040700	The SpO2 cable life has expired	Replace the SpO2 cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Replace the SpO2 cable. 040800	The SpO2 cable is incompatible with the monitor	Replace the SpO2 cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Replace the SpO2 cable. 040900	The SpO2 cable is not recognized by the monitor	Replace the SpO2 cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Replace the SpO2 cable. 040a00	The SpO2 cable is defective	Replace the SpO2 cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Sensor not connected. Clear to retry. 040b00	The SpO2 sensor is not connected to the monitor	Connect SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
The sensor has expired. Replace the SpO2 sensor. 040c00	The SpO2 sensor has expired	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Incompatible sensor. Replace the SpO2 sensor. 040d00	The SpO2 sensor is not recognized by the monitor	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Incompatible sensor. Replace the SpO2 sensor. 040e00	The SpO2 sensor is not recognized	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Replace the SpO2 sensor. 040f00	The SpO2 sensor is defective	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Replace the SpO2 sensor. Replace the SpO2 cable. 041000	There was a fault with the SpO2 sensor and cable.	Check the sensor and cable connection. If the problem is still present, replace the SpO2 sensor. If the problem is still present, replace the cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists replace the module.	Very low
Sensor not connected. Clear to retry. 041100	An adhesive SpO2 sensor is not connected	Connect SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
The sensor has expired. Replace the SpO2 sensor. 041200	The adhesive SpO2 sensor is expired	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Incompatible sensor. Replace the SpO2 sensor. 041300	The adhesive SpO2 sensor is incompatible	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Incompatible sensor. Replace the SpO2 sensor. 041400	The adhesive SpO2 sensor is not recognized	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Replace the SpO2 sensor. 041500	The adhesive SpO2 sensor is defective	Replace SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Searching for pulse signal. 041800	SpO2 pulse search	Pulse search is part of normal operation, and does not have an associated corrective action.	High
SpO2 interference detected. Clear to retry. 041900	SpO2 module interference detected.	No action required.	Very low

Condition	Cause	Remedy	Priority
Low perfusion index. Clear to retry. 041a00	There is marginal SpO2 pulse quality or artifact.	Reapply the sensor to a better perfused monitoring site. Assess the patient and, if indicated, verify oxygenation status through other means. If the problem is still present, replace the SpO2 sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists replace the module.	Very low
Demo mode active. 041b00	The SpO2 parameter is in demo mode	None. [2]	Very low
Sensor not connected. Clear to retry. 041c00	Check the SpO2 sensor connection	Check the sensor and cable connection. If the problem is still present, replace the SpO2 sensor. If the problem is still present, replace the cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists replace the module.	Very low
SpO2 rebooting. 041e00	There is an SpO2 raw queue overrun	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

[2] Demo mode is reported when you plug a Masimo demo tool into the patient cable connector. This tools simulates a patient being connected, and is only used in a development environment. Because this tool simulates a patient without a patient actually being connected, it should NEVER be present in a clinical setting.

Condition	Cause	Remedy	Priority
SpO2 rebooting. 041f00	There is an SpO2 hardware failure	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042000	There is an SpO2 MCU failure	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042100	There is an SpO2 watchdog failure	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 not functional. 042200	There is an invalid SpO2 board type	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

Condition	Cause	Remedy	Priority
SpO2 rebooting. 042300	There is an invalid SpO2 master control state	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042400	There is an SpO2 SRAM transfer failure	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042500	There is an SpO2 SRAM task queue overrun	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042600	There is an SpO2 database failure	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

Condition	Cause	Remedy	Priority
SpO2 rebooting. 042700	There is an invalid SpO2 flash memory device	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042800	There is an SpO2 anode voltage configuration failure	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042900	There is a problem with the SpO2 analog ground	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042a00	There is a problem with the SpO2 digital ground	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

Condition	Cause	Remedy	Priority
SpO2 rebooting. 042b00	There is a problem with the SpO2 LED ground	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042c00	There is a problem with the SpO2 reference voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042d00	There is a problem with the SpO2 DSP core voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 042e00	There is a problem with the SpO2 filtered input voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

Condition	Cause	Remedy	Priority
SpO2 rebooting. 042f00	There is a problem with the SpO2 DSP I/O voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043000	There is a problem with the SpO2 positive detector voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043100	There is a problem with the SpO2 negative detector voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043200	There is a problem with the SpO2 positive LED Voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

Condition	Cause	Remedy	Priority
SpO2 rebooting. 043300	There is a problem with the SpO2 LED drive voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043400	There is a problem with the SpO2 positive preamp voltage	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043500	There is a problem with the SpO2 Sensor ID	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043600	There is a problem with the SpO2 thermistor	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low

Condition	Cause	Remedy	Priority
SpO2 rebooting. 043700	There is a problem with the SpO2 LED current	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 043800	There is a problem with the SpO2 preamp	A malfunction is detected. There are two possible causes of these failures. First, the power provided to the board is out of specification. In this case, the failure may be cleared once the underlying cause is removed. Second, the board has an actual hardware failure and recovery is not possible. It is recommended that the SpO2 module be replaced, and if problem is still present replace the monitor's main board.	Very low
SpO2 rebooting. 044300	The SpO2 module received bad packet	There is an internal software malfunction in the main PCBA. Update the software. If the problem persists, replace the module.	Very low
SpO2 rebooting. 044400	The SpO2 module received an invalid command	There is an internal software malfunction in the main PCBA. Update the software. If the problem persists, replace the module.	Very low
SpO2 rebooting. 044500	The SpO2 module received a command that would result in more output than the baud rate can support	There is an internal software malfunction in the main PCBA. Update the software. If the problem persists, replace the module.	Very low
SpO2 rebooting. 044600	The SpO2 module received a command that requires an application that is not present	There is an internal software malfunction in the main PCBA. Update the software. If the problem persists, replace the module.	Very low
SpO2 rebooting. 044700	The SpO2 module received a command while still locked	There is an internal software malfunction in the main PCBA. Update the software. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
SpO2 low signal quality. Check sensor. 044f00	SpO2 low Sat signal quality	Reapply the sensor to the patient. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
SpO2 rebooting. 045000	Low PR confidence	Reapply the sensor to the patient. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
SpO2 low signal quality. Check sensor. 045100	Low PI confidence	Reapply the sensor to the patient. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
RRp low confidence. Check sensor. 045200	Low **RRp** confidence	Reapply the sensor to the patient. Move the sensor to a better perfused site, or a site with less movement. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low

Nellcor messages

Condition	Cause	Remedy	Priority
Sensor not connected. Clear to retry. 043900	The SpO2 sensor is not connected	Connect SpO2 sensor. If the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Searching for pulse signal. 043a00	SpO2 pulse search	None [3]	High
SpO2 interference detected. Clear to retry. 043c00	SpO2 module interference detected.	Reapply the sensor to the patient. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
SpO2 rebooting. 043d00	SpO2 module hardware error	A module hardware error is detected. Replace module.	Very low
SpO2 rebooting. 043e00	SpO2 module hardware error	A module hardware error is detected. Replace module.	Very low
SpO2 rebooting. 043f00	SpO2 module software error	A module software error is detected. Wait for module to reset itself.	Very low
SpO2 rebooting. 044000	SpO2 module received a bad message	None. Contact Baxter Technical Support: http://www.baxter.com/contact-us	Very low
Replace the SpO2 sensor. 044100	SpO2 defective sensor.	Replace the SpO2 sensor. If the problem is still present, replace the SpO2 sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low

[3] Pulse search is a normal part of operation and does not have an associated corrective action.

Condition	Cause	Remedy	Priority
SpO2 rebooting. 044200	The SpO2 module received a bad message	None. Contact Baxter Technical Support: http://www.baxter.com/contact-us	Very low

Nonin messages

Condition	Cause	Remedy	Priority
Sensor not connected. Clear to retry. 040100	The SpO2 sensor is not connected	Connect SpO2 sensor, if the problem is still present, replace the SpO2 cable. If the problem is still present, verify the module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Searching for pulse signal. 040200	None	None [4]	High
SpO2 interference detected. Clear to retry. 040400	The SpO2 interference detected.	Reapply the sensor to the patient. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low
Low SpO2 perfusion index. Clear to retry. 040500	SpO2 marginal pulse quality or artifact	Reapply the sensor to the patient. If the problem is still present, replace the SpO2 Sensor. If the problem is still present, replace the cable. If the problem is still present, verify module functionality by replacing the sensor with an applicable SpO2 tester. If the message persists, replace the module.	Very low

Temperature messages

SureTemp temperature messages

Condition	Cause	Remedy	Priority
Temperature not functional. 030105	WACP message CRC mismatch on temperature module	Internal malfunction. If the problem persists, replace the module.	Very low

[4] Pulse search is a normal part of operation and does not have an associated corrective action.

Condition	Cause	Remedy	Priority
Temperature not functional. 030201	This message is not implemented by the temperature module	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030202	This message is not supported by the temperature module	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030203	The temperature module has run out of memory.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030205	The temperature module received a invalid parameter	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030206	The parameter provided by the temperature module is outside of the allowable range for the specified message.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030207	The temperature module message requires an object, but did not contain one.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030208	The temperature module object provided with the message could not be deserialized.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030209	The temperature module object could not be serialized.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03020A	The temperature module message is performing a request/action when the module state prohibits the request/action.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03020B	The temperature module requested item is not currently available due to the module state.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030503	The temperature module factory settings, and calibration information is corrupt.	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 030504	The temperature module user settings are corrupt.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030509	The temperature module calibration is not set.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03050C	The temperature module error log is corrupt.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030516	A hardware malfunction on the temperature module has been detected.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030518	The temperature module power rail is too low.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030519	The temperature module power rail is too high.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03051A	The temperature module reference voltage circuit was detected to be under voltage or unstable.	Internal malfunction. If the problem persists, replace the module.	Very low
Ambient temperature out of range. Clear to retry. 030801	The temperature module measurement is below the allowable temperature values and beyond the low ambient or patient limits.	Verify conditions are greater than 50 °F or 10 °C. If conditions are valid and the problem persists, replace the probe. If the problem still persists, replace the module.	Very low
Ambient temperature out of range. Clear to retry. 030802	The temperature module measurement is above the allowable temperature values and beyond the high ambient or patient limits.	Verify conditions are less than 104 °F or 40 °C. If conditions are valid and the problem persists, replace the probe. If the problem still persists, replace the module.	Very low
Temperature not functional. 030803	The temperature module internal calibration resistor (RCAL) on the board is damaged or contaminated (pulse too long).	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 030804	The temperature module internal calibration resistor (RCAL) on the board is damaged or contaminated (pulse too short).	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030805	The temperature module internal circuit validation resistor (PTB) on the board is damaged (value is over).	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030806	The temperature module internal circuit validation resistor (PTB) on the board is damaged (value is under).	Internal malfunction. If the problem persists, replace the module.	Very low
Ambient temperature out of range. Clear to retry. 030807	The temperature module A/D measurement timed out	Verify conditions are greater than 50 °F or 10 °C. If conditions are valid and the problem persists, replace the probe. If the problem still persists, replace the module.	Very low
Replace temperature probe. 030808	The temperature module probe was not characterized/calibrated	Probe malfunction. Replace the probe. If the problem persists, replace the module.	Very low
Insert correct color-coded probe well. 030809	The temperature module is missing the probe well	Insert the probe well	Very low
Temperature not functional. 03080A	The temperature module has a problem saving to the monitor EEPROM in biotech mode	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03080B	The temperature module error detection mechanism detected an error	Internal malfunction. If the problem persists, replace the module.	Very low
Replace temperature probe. 03080C	The temperature module probe error detection mechanism detected an error	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 03080D	The temperature module log error detection mechanism detected an error	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 03080E	The temperature module calibration error detection mechanism detected an error	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Connect temperature probe. 03080F	The temperature module detected no probe connected	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Replace temperature probe. 030810	The temperature module cannot read the probe EEPROM correctly or the probe left the factory without being tested.	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 030811	The temperature module has an invalid events index	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030812	There is a problem reading the temperature module EEPROM or saving to the monitor EEPROM in biotech mode.	Internal malfunction. If the problem persists, replace the module.	Very low
Replace temperature probe. Code 030813	The temperature module has a problem reading the probe EEPROM.	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 030814	The temperature module TEMP CONFIG ACQUIRE FAILURE	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030815	The temperature module TEMP CONFIG RELEASE FAILURE	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030816	The temperature module TEMP CONFIG INVALID PTR FAILURE	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030817	The temperature module internal error. EEPROM not initialized	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Unable to detect new temperature. Retry measurement. 030818	The temperature module heater indicates on when turned off.	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Unable to detect new temperature. Retry measurement. 030819	The temperature module heater indicates off when turned on.	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 03081A	The temperature module HTR_Q is on and HTRC is off but still has voltage.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03081B	The temperature module HTR_Q is tri-stated with HTRC enabled and has heater power.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03081C	The temperature module turned Q&C on and the heater voltage is not high enough.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03081D	The temperature module heater hardware failsafe should have turned off but did not.	Internal malfunction. If the problem persists, replace the module.	Very low
Replace temperature probe. 03081E	The temperature module probe is above 112°F or 43.3°C.	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Replace temperature probe. 03081F	The temperature module has excessive heater energy	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 030820	The temperature module host interface error	Internal malfunction. If the problem persists, replace the module.	Very low
Ambient temperature out of range. Clear to retry. 030821	The temperature module over ambient 45 °C temp	Verify conditions are less than 104 °F or 40 °C. If conditions are valid and the problem persists, replace the probe. If the problem still persists, replace the module.	Very low
Ambient temperature out of range. Clear to retry. 030822	The temperature module under ambient temp	Verify conditions are greater than 50 F or 10°C. If conditions are valid and the problem persists, replace the probe. If the problem still persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 030823	The temperature module has an invalid SureTemp algorithm	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030824	The temperature module is over max battery volts	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030825	The temperature module is under min battery volts	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030826	The temperature module battery volts not set	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030827	The temperature module predict algorithm is not set	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030828	The temperature module ambient temp is not set	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 030829	The temperature module has a non-responsive probe. The thermistor has pulled away from the tip or the heater is broken.	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 03082A	The temperature module is experiencing bad probe gain	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 03082B	The temperature module has a bad probe response value	Probe malfunction. Replace probe. If the problem persists, replace the module.	Very low
Temperature not functional. 03C800	The temperature module is not functional	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03C900	Unable to deserialize messages from the temperature module	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03CA00	Unsupported message received from the Temperature module	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03CB00	Unable to send message to the Temperature module	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 03CC00	Temperature module communication times out	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03CD00	Failed to upgrade the temperature module	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 03CE00	Unable to read PIM file	Retry the device update.	Very low
Temperature not functional. 03CE01	Upgrade file directory could not be accessed	Retry the device update	Very low
Direct mode reading timed out	Direct mode reading times out	Direction mode reading times out	Information
Tissue contact lost.	Lost tissue contact while attempting to acquire a temperature measurement or acquired measurement was performed with limited tissue contact.	Check the tissue contact and try the measurement again.	Information
Temperature module reset. 03D000	Temperature sensor reset unexpectedly	None	Very low

Braun ThermoScan® PRO 6000 temperature messages

Condition	Cause	Remedy	Priority
Temperature not functional. 3F0105	WACP message CRC mismatch.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0201	This message is not implemented by the module.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0202	This message is not supported by the module.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0203	The module has run out of memory.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0204	No parameter provided for the specified message.	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 3F0205	The parameter provided is invalid for the specified message.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0206	The parameter provided is outside of the allowable range for the specified message.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0207	The message requires an object, but did not contain one.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0208	The object provided with the message could not be deserialized.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0209	The object could not be serialized.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F020A	The message is performing a request/ action when the module state prohibits the request/action.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F020B	The requested item is not currently available due to the module state.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0503	The factory settings, and calibration information is corrupt.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0504	The user settings are corrupt.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0509	The calibration is not set.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F050C	The error log is corrupt.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0516	A hardware malfunction has been detected	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0518	The module power rail is too low.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0519	The module power rail is too high.	Internal malfunction. If the problem persists, replace the module.	Very low

Condition	Cause	Remedy	Priority
Temperature not functional. 3F051A	The reference voltage circuit was detected to be under voltage or unstable.	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0821	The ambient temperature is too high	For version 5.25 and below: Verify conditions are less than 104 °F or 40 °C. If conditions are valid and the problem persists, replace the probe. If the problem continues to persist, replace the module. For version 5.28 and above: Verify conditions are less than 95 °F or 35 °C. If conditions are valid and the problem persists, replace the probe. If the problem continues to persist, replace the module.	Very low
Temperature not functional. 3F0822	The ambient temperature is too low	For version 5.25 and below: Verify conditions are greater than 50 °F or 10 °C. If conditions are valid and the problem persists, replace the probe. If the problem continues to persist, replace the module. For version 5.28 and above: Verify conditions are greater than 61 °F or 16 °C. If conditions are valid and the problem persists, replace the probe. If the problem continues to persist, replace the module.	Very low
Temperature not functional. 3F0824	The battery is over the maximum voltage	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0833	The sensor not functional	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3F0E04	Low battery	Recharge the battery. If the problem persists, check the battery.	Very low
Unable to detect new temperature. Retry measurement.	No temperature measurement was available from the thermometer at the time it was docked.	If a measurement should have been available, retry the measurement. If problem the persists, replace the module.	Information
Thermometer might be docked improperly. Check contacts and connections.	Communication failure with docked Braun	The thermometer might be docked improperly. Check contacts and connections. If problem the persists, replace the module.	Information

Condition	Cause	Remedy	Priority
Temperature not functional. 3FFF01	Unrecognized WACP parameter received from sensor	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3FFF02	Timeout waiting for sensor response	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3FFF03	Error deserializing WACP message received from sensor	Internal malfunction. If the problem persists, replace the module.	Very low
Temperature not functional. 3FFF04	WACP stack send message failure	Internal malfunction. If the problem persists, replace the module.	ery low
Re-dock Braun. 3FFF05	Anti-theft timer expired	Re-dock the thermometer after taking a measurement.	Very low

Patient and clinician data messages

Condition	Cause	Remedy	Priority
Unable to identify clinician. No provider configured at host.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify clinician. Security provider error.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify clinician. User not found.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify clinician. Invalid ID or system password.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify clinician. Account disabled/expired.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify clinician. Password expired/reset required.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify clinician. Group membership error.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information

Condition	Cause	Remedy	Priority
Unable to identify clinician. Touch Clear to delete all data.	Clinician authentication failure	Information status message; press OK button to dismiss.	Information
Unable to identify patient. Touch Clear to delete all data.	Patient authentication failure	Information status message; press OK button to dismiss.	Information
Database schema out of date; recreating.	The database was cleared due to a schema update	Information status message; press OK button to dismiss.	Information
Database is unreadable during startup; recreating. 1F0001	The database was unreadable during startup	Press OK button to dismiss.	Very low
Error accessing PDM database; restarting PDM. 1F0002	Database corrupted when device is in operation	Press OK button to dismiss.	Very low
Maximum number of patient records + Oldest record overwritten.	Data was deleted as it contained more than 400 records	Information status message; press OK button to dismiss.	Information
No data saved.	A manual save is not allowed	Information status message; press OK button to dismiss.	Information
Save successful.	Log saved successfully	Information status message; press OK button to dismiss.	Information
Patient ID required to save data.	A Patient ID is required to save data	Information status message; press OK button to dismiss.	Information
Patient ID required to start intervals.	A Patient ID is required to start intervals	Information status message; press OK button to dismiss.	Information
Clinician ID required to save data.	A Clinician ID is required to save data	Information status message; press OK button to dismiss.	Information
Clinician ID required to start intervals.	A Clinician ID is required to start intervals	Information status message; press OK button to dismiss.	Information
Patient ID match required to save data.	A Patient ID match is required to save data	Information status message; press OK button to dismiss.	Information
Patient ID match required to start intervals.	A Patient ID match is required to start intervals	Information status message; press OK button to dismiss.	Information

Condition	Cause	Remedy	Priority
Clinician ID match required to save data.	A Clinician ID match is required to save data	N/A	Information
Clinician ID match required to start intervals.	A Clinician ID match is required to start intervals	N/A	Information
Unable to auto save.	The device was unable to auto save	Information status message; press OK button to dismiss.	Information
Barcode scan not accepted.	Barcode scanning is not available	Information status message; press OK button to dismiss.	Information
Invalid NIBP interval parameter during interval capture.	An invalid interval parameter was detected.	Information status message; press OK button to dismiss.	Information
Save successful.	The auto save is successful	Information status message; press OK button to dismiss.	Information
Unsent records: N of M	There are unsent records waiting when the device is powered down	Information status message; press OK button to dismiss.	Information
Barcode scanning is not available. Enter patient information manually.	Barcode scanning is not available. Enter patient information manually.	Information status message; press OK button to dismiss.	Information
Invalid SpO2 interval parameter during interval capture.	An invalid interval parameter was detected. SpO2 intervals are enabled or SpO2 sensor was removed	Either stop the intervals or reattach the SpO2 sensor. Information status message; press OK button to dismiss.	Information

Radio messages

Condition	Cause	Remedy	Priority
Radio not functional. 35000a	Invalid SDC profile. There is an internal software error on the radio	Check for a software update and apply it. If still present, replace the radio.	Very low
Lost network communications. Radio out of network range. 350400	Radio lost association	Ensure the access point is still powered on and in range.	Very low

Condition	Cause	Remedy	Priority
Invalid radio configuration. Reconfigure and try again. 350700	Radio configuration is invalid.	Check the radio configuration. If problem is still present, reset the radio to factory defaults. If the problem persists, check for software update and apply it. If still present, replace the radio.	Very low
Radio certificate is out of date. 350800	Indicates that the radio certificate is out of date. The clock may be incorrect causing the certificate to not be in the valid date range.	Clock needs to be set properly, or the certificate needs to be updated.	Very low

Connectivity messages

Condition	Cause	Remedy	Priority
Unable to obtain wired device IP address. 210000	No wired connection	Verify DHCP functionality and configuration.	Very low
Network not found; check network cable connection. 210100	Lost ethernet DHCP address	Check wired connection into device then verifiy DHCP functionality and configuration.	Very low
Unable to communicate with NRS. 360000	Cannot communicate with NRS	Verfiy NRS IP configuration and functionality.	Very low
Communication error with host. 1A0000	Communication timeout failure with external Host	Verify the external host services are loaded and started on the server. If the problem persists, check for available software upgrades of the monitor or the system.	Very low
Data rejected. CRC mismatch. 1A0001	The WACP stack has detected a CRC mismatch in the message	Check the data and try again. If the problem persists, contact your system administrator.	Very low
Data rejected. Unsupported message. 1A0002	External Host NACK - The host does not support the message/object.	Check the monitor and try again. If the problem persists, contact your system administrator.	Very low
Data rejected. Invalid parameter. 1A0003	The message has an invalid parameter.	Check the data and try again. If the problem persists, contact your system administrator.	Very low
Data rejected. Deserialize the object. 1A0004	The monitor failed to deserialize the object.	Check the data and try again. If the problem persists, contact your system administrator.	Very low

Condition	Cause	Remedy	Priority
Data rejected. Unsupported message. 1A0005	The host is in a state that cannot accept the message.	Check the data and try again. If the problem persists, contact your system administrator.	Very low
Data rejected. Patient ID required. 1A0006	The message has a missing patient ID	Add the patient ID to the record.	Very low
Data rejected. Clinician ID required. 1A0007	The message is missing a clinician ID	Add the clinician ID to the record.	Very low
Data rejected. Time mismatch. 1A0008	The message has a mismatched time	Ensure that the clock on the monitor and the server match.	Very low
Unable to establish network communications. 1A0009	No network connection is available	Connect the device to an active network so that the clinician ID can be imported.	Very low
Unable to connect due to invalid client certificate. 1A000A	Corrupted or invalid certificate.	Update the client certificate.	Very low
Client certificate has expired. 1A000B	Certificate expiration date passed.	Update the client certificate.	Very low
No connection for send.	No connection for send.	None	Information
Send not successful.	Send not successful.	None	Information
Error in record. Try again	Connectivity NACK recieved for NRS/ECS/CS/NCE	NRS/ECS/CS/NCE NACK that is record specific and can be fixed by a clinician in the next record	Information
Send successful.	Data was successfuly sent over USB/BT	None	Information
Client certificate was not successfully loaded. Internal error.	Unable to load client certificate.	Information status message; press OK button to dismiss.	Information
Client certificate load successful.	Client certificate was successfully loaded.	None	Information
Client certificate load failed.	Unsuccessful load.	Reinsert USB drive and try again.	Information
Client certificate load failed. Invalid certificate format.	Corrupted certificate.	Generate new client certificate.	Information

Condition	Cause	Remedy	Priority
Client certificate load failed. Outside of valid date range.	Certificate dates misaligned.	Generate new client certificate.	Information
Client certificate not loaded.	Client authentication is enabled, but no client certificate is loaded.	Load a valid client certificate.	Information
Client certificate expires within 30 days.	Certificate close to expiration date.	Update the client certificate.	nformation

System messages

Condition	Cause	Remedy	Priority
000001	System failure	Restart the monitor	N/A
000002	System failure	Restart the monitor	N/A
000003	System failure	Restart the monitor	N/A
000004	System failure	Restart the monitor	N/A
000005	System failure	Restart the monitor	N/A
000006	System failure	Restart the monitor	N/A
Internal hardware failure.	The root file system is corrupted; restart not possible	Restart the monitor. If the problem persists, replace the main PCBA.	N/A
Internal hardware failure. 140100	EEPROM access failed. The device boot is possible, but wired communications are disabled	Reprogram the EEPROM. If the problem persists replace the main PCBA.	Very low
Internal hardware failure.	SPL memory test failure, the monitor will sound an SOS pattern	Restart the monitor. If the problem persists, replace the main PCBA.	N/A
Internal hardware failure. 1C1000	The monitor PIC communications never starts or quits. The communication won't reasonably recover at startup or during operation	Restart the monitor. If the problem persists, replace the main PCBA.	N/A

Condition	Cause	Remedy	Priority
Low battery 30 minutes or less remaining. 1C1005	The battery power is low	Connect the power supply to AC power to charge the monitor.	Very low
Low battery 5 minutes or less remaining. 1C1006	The battery power is extremely low	Connect the power supply to AC power to charge the monitor.	High
Battery is critically low; plug into outlet. Device is shutting down. 1C1007	The battery power is critically low	Connect the power supply to AC power to charge the monitor.	High
Update unsuccessful. Reboot and retry. 1C1008	The software update failed	Restart the monitor. If the problem is still present, replace the main PCBA.	Very low
Host battery not charging. 1C100A	The host battery is not charging	Restart the monitor. If the problem is still present, check cable connections. If the problem is still present, perform functional checks for host. If the problem is still present, replace battery. If the problem persists, replace the main PCBA.	Very low
Factory default settings now active. 3A0001	The factory configuration settings are active	The monitor has been configured to factory defaults, any user settings have been reset.	Very low
Unable to read configuration from USB. 3A0002	Unable to load file from the external USB memory device.	Retry the USB connection. If the problem is still present, check for a proper format of the USB drive. If the problem is still present, replace the USB device. If the problem persists, replace the main PCBA.	Very low
Internal hardware failure. Device will shut down. 1C100D	Power supply issue. The PMIC is too hot	Check the operating environment temperature. Allow the monitor to cool down before operating again. If the problem is still present, check the cable connections. If the problem is still present, perform functional checks for host. If the problem is still present, replace the battery. If the problem is still present, replace the main PCBA.	High

Condition	Cause	Remedy	Priority
Input voltage too low. Device will shut down. 1C100C	Power supply issue. The PMIC input voltage is too low	Check the operating environment temperature. Allow the monitor to cool down before operating again. If the problem is still present, check the cable connections. If the problem is still present, perform functional checks for host. If the problem is still present, replace the battery. If the problem is still present, replace the main PCBA.	High
Unexpected restart occurred. 1C1012	The monitor unexpectedly restarted	Continue normal operation	High
Audio system not functional 1D0100	The speaker or audio codec is faulty	Replace speaker. If the problem is still present, replace the main PCBA.	High
CSM battery is not installed. 1C100E	There is no battery in the monitor	Check the monitor for a battery and install one if it is missing. If the problem is still present, perform diagnostic checks on the monitor. If the problem persists, replace the main PCBA.	Very low
Device shutdown is not available at this time	System shutdown failure	Monitor cannot perform an immediate shutdown. Disconnect AC power and remove battery.	Information
No valid files found	No valid files were found on the USB flash drive	Re-insert the USB flash drive with valid files.	Information
Firmware update successful.	The software successfully updated	Information status message; press OK button to dismiss.	Information
Audio alarms are off.	The monitor alarm audio is off	Information status message; press OK button to dismiss.	Information
Advanced settings unavailable.	The advanced settings are unavailable because the monitor is not in an idle state	Confirm that no sensors are attached to the monitor, no alarms are active, and there is no unsaved data in the Spot or Intervals profile.	Information
USB accessory disconnected.	The USB device was disconnected from the monitor	Information status message; press OK button to dismiss	Information
Advanced settings	The Advanced settings code was entered correctly	Information status message; Exit Advanced settings to dismiss.	Information

Condition	Cause	Remedy	Priority
Save not successful.	The device configuration or logs were not saved to the USB device	Information status message; press OK button to dismiss	Information
Save successful.	The device configuration or logs were saved to the USB device	Information status message; press OK button to dismiss	Information
Software upgrade is downloading. Do not shutdown.	Cannot power down device as software install is in progress	N/A	Information
Factory reset successful.	The monitor was reset to factory settings	Information status message; press OK button to dismiss	Information
Factory reset failed. Custom configuration file not deleted.	The monitor factory reset has failed.	Information status message; Exit Advanced settings to dismiss.	Information
Configuration upload successful.	The device configuration has successfully uploaded	Information status message; press OK button to dismiss	Information
Unable to load configuration.	The device configuration was not successfully uploaded	N/A	Information

Software update messages

Condition	Cause	Remedy	Priority
Software Update: Manifest transfer timed out. Verify connection and retry.	The manifest file transfer timed out or connection was lost during download	Verify the connection and retry.	Information
Software Update: Package file transfer timed out. Verify connection and retry	The package file transfer timed out or connection was lost during download	Verify the connection and retry.	Information
Software Update: Invalid token file.	There was an invalid token file	Verify and update the token file.	Information
Software Update: Unable to find manifest file on server.	The manifest file was not found on the server	Verify the manifest file is on the server.	Information
Software Update: Unable to verify manifest file signature.	The manifest file signature verification failed.	Regenerate the software package and retry.	Information

Condition	Cause	Remedy	Priority
Software Update: Package file corrupted. Regenerate package and retry.	The package file is corrupt, does not have expected SHA256 hash	Regenerate the software package and retry.	Information
Software Update: Unable to find package file.	The package file cannot be found	Verify the package file is on the server.	Information
Software Update: Installation failed. Reboot and retry.	Failure to install subsystem	Restart the monitor.	Information
Software Update: Upgrade unsuccessful. Insufficient disk space.	The partition is running out of space	Free up adequate space needed to perform the upgrade.	Information
Software Update: Update unsuccessful. Incompatible firmware.	The current firmware version is lower than the one required by the token file	Try to update to an earlier software package.	Information
Software Update: SWUP internal error	SWUP NIBP is not functional	Information status message; click OK button to dismiss.	Information
Software Update: Manager internal error	Software update manager internal error	Information status message; click OK button to dismiss.	Information
Radio software upgrade failed. 350600	The radio software was not upgraded.	Check for software update and apply it. If message is still present, replace the radio.	Very low

Bluetooth messages

Condition	Cause	Remedy	Priority
Bluetooth not functional. 370001	The monitor detected a **Bluetooth** device that is not functional	Reboot the monitor. If the problem persists, replace the **Bluetooth** radio. If the problem persists, replace the main PCBA.	Very low
Bluetooth not functional. 370002	The monitor cannot detect a **Bluetooth** module	Replace the **Bluetooth** radio. If the problem persists, replace the main PCBA.	Very low
Bluetooth device connection successful	The **Bluetooth** device connected	None.	Information

Condition	Cause	Remedy	Priority
The **Bluetooth** device failed to pair with the monitor.	The **Bluetooth** device failed to pair with the monitor.	Verify a successful pairing between the device and the PC. If the problem is still present, verify the **Bluetooth** signal strength. If the problem persists, verify authentication code, verify the computer hardware and configuration. If the problem persists, verify if the computer has prior pairing information for the monitor. Version of stack on the PC does not support simple secure pairing. The device requires 2.1+EDR **Bluetooth** stack on the host PC.	Very low
The **Bluetooth** device did not connect with the monitor	The **Bluetooth** device did not connect with the monitor	**Bluetooth** device connection dropped due to distance, application crash on host end. RF connection not possible. RF connection possible, but cannot find device. **Bluetooth** connection was established, but WACP connection not possible	N/A
Bluetooth device disconnected	The **Bluetooth** device disconnected	None.	Information

APM messages

Condition	Cause	Remedy	Priority
APM not functional. 1C1001	The APM is detected as connected but there is no communication through the APM serial port	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low

Condition	Cause	Remedy	Priority
APM not functional. 1C100B	The APM battery is installed, but does not communicate with the monitor	Review the *APM Assembly Instructions*. Ensure that the APM has been connected to the mains outlet before initial use. Perform diagnostic checks on the monitor. If the problem is still present, replace the APM battery. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low
APM battery is absent or faulty. 1C100F	The APM battery is not installed	Ensure than an APM battery is installed, and install one if it is missing. If the problem is still present, perform diagnostic checks on the monitor. If the problem is still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low
The APM is disconnected. 1C1002	The APM is unplugged from the monitor while the monitor is powered on	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low
USB cable is disconnected. 1C1003	The APM USB hub is unplugged from the monitor while the monitor is powered on	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low
APM is plugged in.	The APM was plugged in while the monitor is powered on.	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Information
APM not functional. 1C1010	The APM USB hub is plugged in while the monitor communication cable is disconnected	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low

Condition	Cause	Remedy	Priority
APM not functional. 1C1004	The APM PIC cannot communicate with the accelerometer	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace APM. If the message persists, replace the main PCBA on the monitor.	Very low
APM not functional. 1C1009	The APM PIC software update and any retries have failed	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, retry the software update. If still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low
APM not functional. 1C100B	The APM battery is not recharging	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low
APM not functional.	The APM USB changes from unplugged to plugged after monitor startup	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, retry the software update. If still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Information
Device is operating in battery mode.	AC power cord has been disconnected.	Information status message; press OK button to dismiss.	Information
Sleep mode is unavailable. Intervals monitoring is in progress.	Sleep mode is not allowed when intervals are in progress	Stop any active intervals.	Information
Sleep mode is unavailable. An alarm is active.	Sleep mode is not allowed when alarms are active	Clear all active alarms.	Information
Display lock is unavailable. Missing patient context.	Lockout is not allowed without active patient information	Enter patient information	Information

Condition	Cause	Remedy	Priority
Power cable is disconnected. 1C1011	The APM communication cable is plugged in while the APM USB cable is disconnected	Restart the monitor and the APM. If the problem is still present, check the cable connections from the monitor to APM. If the problem still present, retry the software update. If still present, replace the APM. If the message persists, replace the main PCBA on the monitor.	Very low

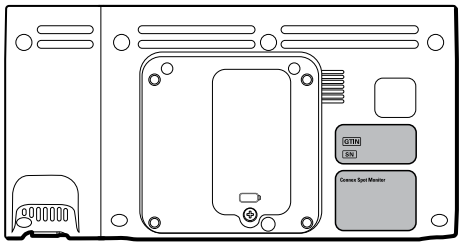
Identifying the monitor and subsystems

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 a label on the back housing.



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

Monitor circuit board and internal options label PCBA identifier

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

Monitor circuit board and internal options label serial number

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

Model configuration

NOTE Some model numbers and product features described in this publication might not be available in your country. For the latest information about products and features, please contact Baxter Customer Care.

NOTE For more configuration options, including approved accessories, see the accessories list in the Instructions for use on the user documentation CD or baxter.com/contact-us.

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

The device has multiple configurations. Use the following table to determine 7100, 7300, 7400, and 7500 model configurations. Not all configurations may be available. Model numbers include one item from each column.

Examples: 75CE-B (North America), 71XE-4 (United Kingdom)

71 = 7100 Value series

Parameter		
SpO2	**Temperature**	**Power cord**
• W = Nonin • X = Blank / None	• E = **Braun ThermoScan**® PRO 6000 IR • T = **SureTemp** Plus • X = Blank / None	• A = Denmark • B = North America • C = China • G = Argentina

73 = 7300 BLUETOOTH series

Parameter		
SpO2	**Temperature**	**Power cord**
• C = Covidien / Nellcor • M = Masimo • R = Masimo SpO2/**RRp** • W = Nonin • X = Blank / None	• E = **Braun ThermoScan**® PRO 6000 IR • T = **SureTemp** Plus • X = Blank / None	• K = South Korea • N = India/UAE • P = Thailand • T = Taiwan • Y = Italy • Z = Brazil • 2 = Europe • 3 = Israel • 4 = United Kingdom • 5 = Switzerland • 6 = Australia/New Zealand • 7 = South Africa

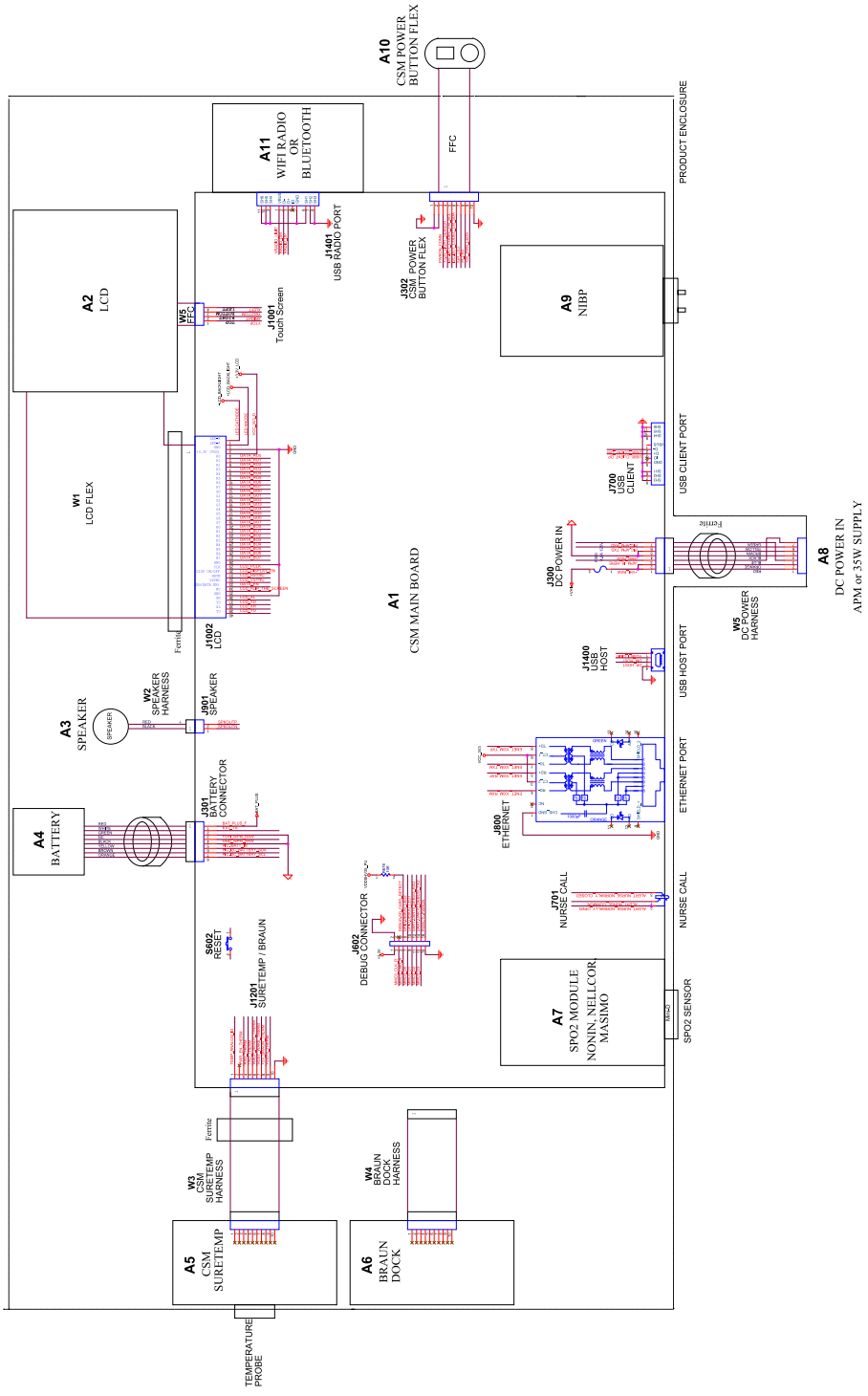
74 = 7400 WI-FI series

Parameter		
SpO2	**Temperature**	**Power cord**
• C = Covidien / Nellcor • M = Masimo • R = Masimo SpO2/**RRp** • W = Nonin	• E = **Braun ThermoScan**® PRO 6000 IR • T = **SureTemp** Plus • X = Blank / None	• K = South Korea • N = India/UAE • P = Thailand • T = Taiwan • Y = Italy • Z = Brazil • 2 = Europe • 3 = Israel • 4 = United Kingdom • 5 = Switzerland • 6 = Australia/New Zealand • 7 = South Africa

75 = 7500 WI-FI series

Parameter		
SpO2	**Temperature**	**Power cord**
• C = Covidien / Nellcor • M = Masimo • R = Masimo SpO2/**RRp** • W = Nonin	• E = **Braun ThermoScan**® PRO 6000 IR • T = **SureTemp** Plus • X = Blank / None	• K = South Korea • N = India/UAE • P = Thailand • T = Taiwan • Y = Italy • Z = Brazil • 2 = Europe • 3 = Israel • 4 = United Kingdom • 5 = Switzerland • 6 = Australia/New Zealand • 7 = South Africa

Interconnect diagram



Service and maintenance toolset

Connex Spot Monitor

The following is the listing of tools and test equipment required to perform basic functional verification checks, full functional verification checks and calibration, and service and maintenance on the Welch Allyn **Connex Spot** Monitor. Please refer to the device service manual for detailed instructions to service your device.

NOTE Tools and test equipment must also be readily available to complete Baxter Technical Service Training for this device.

Material no.	Description	Qty	Usage	
			Full	Basic
General test equipment				
106270	Service test box	1	X	
106275	Micro USB cable	1	X	
N/A	Wireless router, a/b/g or equivalent	1	X	
N/A	Ethernet cable	1	X	
N/A	PC running Windows 10	1	X	X
web download	**Welch Allyn** Service Tool	1	X	X
1001120	**Welch Allyn** Service Tool, Gold license	1	X	
NIBP testing				
407672	BP test volume repair fixture 113670	1	X	X
N/A	Pressure meter (must include at least two decimal points and be accurate to within ±0.5 mmHg)	1	X	X
N/A	Blood pressure Y-tube	1	X	X
6000-30	Single tube blood pressure hose, 5 feet	1	X	X
4500-30	Blood pressure hose, 5 ft.	1	X	
620216	Fitting "Y" 1/8 X 1/8 X 1/8	1	X	X
SpO2 configuration testing				
N/A	SpO2 simulator	1	X	X
DOC-10	Nellcor SpO2 extension cable	1	X	X
SureTemp Plus configuration testing				

Material no.	Description	Qty	Usage	
			Full	Basic
06138-000	Cal-key, assembly, M690/692	1	X	X
01802-110	Tester, calibration, 9600 Plus	3	X	
Braun ThermoScan® PRO 6000 configuration testing				
01802-110	Tester, calibration, 9600 Plus	3	X	

NOTE All items marked "N/A" in the Material no. column are OEM or off-the-shelf tools and equipment not available from Baxter. The remaining items are available through Baxter or a Baxter distributor.

NOTE All items marked in the Full column are required for full functional verification checks and calibration. The **Welch Allyn** Service Tool software and an active Gold license is also required to perform these checks. The Gold license is obtained upon successful completion of Baxter Technical Service Training.

NOTE All items marked in the Basic column are required for basic functional verification checks. The **Welch Allyn** Service Tool software Standard unlicensed edition can be used to perform the NIBP checks and SWF upgrades/updates.

Miscellaneous Tools

- Phillips #1 screwdriver
- T-10 **Torx** screwdriver
- 3 mm hex key

Service software IT setup

Installed Baxter service component	**Required outbound network** **Domain name** **IP address** **Port**	**Service feature description**
Welch Allyn Service Tool (via **Windows** service called **PartnerConnect**)	servicehub.iot.hillrom.com/ IP: 52.224.38.138 HTTP/HTTPS port: 443	Inbound - Used by customers to receive software/device firmware upgrades. Outbound - Used by customers to send device service information.
	IP: 12.38.86.181 TCP port: 5094	Used to activate the Service Tool and enable device feature licenses. (This IP address does NOT respond to "ping.")
PartnerConnect software	servicehub.iot.hillrom.com/ IP: 52.224.38.138 HTTP/HTTPS port: 443	Used by customers to receive software/device firmware upgrades from the **Cumulocity** platform.
Connex Server (via **Windows** service called **PartnerConnect**)	partnerconnect.iot.hillrom.com IP: 52.224.38.138 HTTP/HTTPS port: 443 servicehub.iot.hillrom.com/	Inbound - Used by customers to receive software/device firmware upgrades. Outbound - Used by customers to send device service information.
Teamviewer Host	IP: multiple depending on geographic location Default TCP port: 80/443 (can be configured to use TCP port 5938)	Used by Baxter Service personnel to access a customer's machine (with customer's consent/ permission) to address device issues.
Welch Allyn Service Hub	servicehub.iot.hillrom.com/ IP: 40.76.153.225 (inbound) IP: 52.224.38.138 (outbound) HTTP/HTTPS port: 443	Used by customers to view the status of their devices and deploy firmware upgrades and device configurations. The portal requires prior account setup.
File outbound types	.log, .xml, .zip, .txt	
File inbound types	.tar.gz, .tar, .seq, .wsf, .pim, .xml, *.txt, *.pdf	

Service record

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

NIBP tests

Leak test

Specification	*Actual reading*	*Pass*	*Fail*
Max: 5			

Overpressure test

Mode	***Specification***	***Actual reading***
Adult mode:	280 329	
Neonate mode:	130 164	

NIBP accuracy check

Target pressure ± 5 mmHg	*Pressure meter*	*Service tool*	*Tolerance*	*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 tests

Masimo SpO2

Test	***Specification***	***Actual reading***	***Pass***	***Fail***
SpO2 heart rate 61 bpm	Pulse rate 61 ±1 bpm 60 to 62 bpm	bpm		

Test	*Specification*	*Actual reading*	*Pass*	*Fail*
SpO2 saturation 80%	Saturation 80% ±3% sat point 77 to 83%	%		

Nonin or Nellcor SpO2 and pulse rate test

Test	*Specification*	*Actual reading*	*Pass*	*Fail*
SpO2 pulse rate 60 bpm	Pulse rate 60 ±1 bpm 59 to 61 bpm	bpm		
SpO2 saturation 90%	Saturation 90% ±1 sat point 89 to 91%	%		

Thermometry tests

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 °F (± 0.1 °C)*		*Actual reading*	*Pass*	*Fail*
96.8 °F (36.0 °C)	96.6 °F to 97.0 °F	35.9 °C to 36.1 °C	°F or °C		
101.3 °F (38.5 °C)	101.1 °F to 101.5 °F	38.4 °C to 38.6 °C	°F or °C		
105.8 °F (41.0 °C)	105.6 °F to 106.0 °F	40.9 °C to 41.1 °C	°F or °C		

Braun ThermoScan® PRO 6000

Temperature tested	*Specification ± 0.4 °F (± 0.2 °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	°F or °C		
101.3 °F (38.5 °C)	100.9 °F to 101.7 °F	38.3 °C to 38.7 °C	°F or °C		
105.8 °F (41.0 °C)	105.4 °F to 106.2 °F	40.8 °C to 41.2 °C	°F or °C		

Recommended service intervals

To confirm that the device is functioning within the design specifications, perform periodic service as indicated in the following table. Customers who have the Silver edition of the **Welch Allyn** Service Tool can perform the basic functional verification and calibration procedures referenced in the table by following the instructions in this manual. If you have the Gold edition of the service tool, use the tool to perform a complete functional verification and calibration of the device in lieu of performing the basic tests.

Component	Service interval	Service procedure
NIBP module	Annually	Basic functional verification
SpO2 module	Annually	Basic functional verification
SureTemp Plus	Annually	Basic functional verification
Braun ThermoScan® PRO 4000	Annually	Basic functional verification
Battery	300 charge cycles	Replace the battery

Use the service tool, Gold edition, to perform a complete functional verification and calibration of the device whenever any of the following conditions exist:

- Based on the basic functional verification, the device does not meet specifications
- Based on the basic functional verification, the device does not meet specifications
- The device has been dropped or otherwise damaged
- The device is malfunctioning
- The case has been opened
- An internal part has been replaced (battery excluded)

NOTE For instructions on using the Gold edition, see the service tool help files.

Appendix

Specifications

Physical specifications

Protection classifications, all monitor configurations

Characteristic	Specification
Electrical rating	Power supply model: FW8031M/DT/15 Input: 100 – 240 V AC, 50 – 60 Hz, 0.6 A – 0.3 A Output: 15 V DC, 2.0 A Power supply model: MENB1035A1500F02 Input: 100 – 240 V AC, 50 – 60 Hz, 0.8 A – 0.5 A Output: 15 V DC, 2.33 A
Duty cycle	Continuous operation
Type of protection against electric shock	Class I internally powered
Degree of protection against electric shock, for parts applied to patients	Type BF defibrillator proof IEC EN 60601-1, 2nd and 3rd Editions
Recovery time following defibrillator discharge	Less than or equal to 15 seconds
Flammable anesthetics	**WARNING** Not suitable for use with flammable anesthetics.
Degree of protection provided by the enclosure with respect to harmful ingress of liquids	IPX2 Protection against vertically falling water drops when enclosure tilted up to 15°
Height	Standard chassis: 6.3 in. (16.1 cm) Extended chassis: 6.5 in. (16.5 cm) with **Braun** Extended chassis: 6.4 in. (16.3 cm) with **SureTemp**
Width	Standard chassis: 9.2 in. (23.4 cm) Extended chassis: 11.7 in. (29.8 cm) with **Braun** Extended chassis: 11.7 in. (29.8 cm) with **SureTemp**
Depth	Standard chassis: 2.3 in. (5.8 cm) Extended chassis: 4.4 in. (11.0 cm) with **Braun** Extended chassis: 4.2 in. (10.6 cm) with **SureTemp**

Characteristic	Specification
Weight (including battery)	Standard chassis: 2.9 lb (1.3 kg) Extended chassis: 3.7 lb (1.7 kg) with **Braun** Extended chassis: 3.5 lb in. (1.6 kg) with **SureTemp**
Graphical display resolution	
Dimensional outline	6.5 in. (W) x 4.1 in. (H) x 0.13 in. (D) (164.9 mm [W] x 103.8 mm [H] x 3.40 mm [D])
Active area	6.1 in. (W) x 3.4 in. (H) (154.08 mm [W] x 85.92 mm [H])
Resolution	800 x 480 pixels
Pixel arrangement	RGB (red, green, blue)
Pixel size	63.2 µm (W) x 179 µm (H)
Luminance	530 cd/m2
Speaker volume	
Minimum Output sound pressure	60 dB at 1.0 meter
Alarm and pulse tones	per IEC 60601-1-8 per IEC 60601-1-8:2003
Pulse frequency (f_0)	150 – 1000 Hz
Number of harmonic components in the range 300 Hz to 4000 Hz	minimum of 4
Effective pulse duration (t_d)	high priority: 75 –200 ms medium and low priority: 125 – 250 ms
Rise time (t_r)	10 – 20% of t_d
Fall time [1](t_f)	$t_f < t_s - t_r$

NOTE The range of the relative sound pressure level of the harmonic components should be between a minimum of at least 53 dBa and a maximum of at least 80 dBa at the pulse frequency.

[1] Prevents overlap of pulses

Battery specifications

2 Cell battery specifications[1]	Hours of use
Continuous run time (Nellcor)	5.22
6 patients/hour - 41 patient cycles (Nellcor)	6.83
8 patients/hour - 54 patient cycles (Nellcor)	6.78
8 patients/hour - 55 patient cycles (Nonin)	6.90

2 Cell battery specifications[1]	Hours of use
Acute care continuous 10 minute cycles - 49 patient cycles - BP, temp, SpO2, no radio, no scanner (Nellcor)	8.22
Acute care continuous 10 minute cycles - 50 patient cycles - BP, temp, SpO2, no radio, no scanner (Nonin)	8.37
Acute care continuous 10 minute cycles - 49 patient cycles - BP, temp, SpO2, no radio, no scanner (Masimo)	8.29
Acute care continuous 10 minute cycles - 41 patient cycles - BP, temp, SpO2, radio, scanner (Nellcor)	6.84
Acute care continuous 10 minute cycles - 41 patient cycles - BP, temp, SpO2, radio, scanner (Nonin)	6.96
Acute care continuous 10 minute cycles - 41 patient cycles - BP, temp, SpO2, radio, scanner (Masimo)	6.90

[1] Nellcor is the default for these examples.

Mobile stand specifications

Mobile stand	Basket/bins maximum weight limit	Mobile stand maximum weight limit
7000-MS3	2.0 lb /0.9 kg	22 lb /10 kg
7000-MWS	Front bin: 5.0 lb /2.27 kg Rear bin: 4.0 lb /1.81 kg	44 lb /20 kg
7000-APM	Front bin: 5.0 lb /2.27 kg Rear bin: 4.0 lb /1.81 kg	44 lb /20 kg

Nurse Call connection specifications

Nurse Call	24V at 500mA maximum

NIBP specifications

Characteristic	Specification
Cuff pressure range	Meets or exceeds IEC/ISO 80601-2-30 standards for cuff pressure range
Systolic range	Adult: 30 to 260 mmHg (StepBP, **SureBP**) Pediatric: 30 to 260 mmHg (StepBP, **SureBP**) Neonate: 20 to 120 mmHg (StepBP)

Characteristic	Specification
Diastolic range	Adult: 20 to 220 mmHg (StepBP, **SureBP**) Pediatric: 20 to 220 mmHg (StepBP, **SureBP**) Neonate: 10 to 110 mmHg (StepBP)
Cuff Inflation Target	Adult:160 mmHg (StepBP) Pediatric: 140 mmHg (StepBP) Neonate: 90 mmHg (StepBP)
Maximum Target Pressure	Adult: 280 mmHg (StepBP, **SureBP**) Pediatric: 280 mmHg (StepBP, **SureBP**) Neonate: 130 mmHg (StepBP)
Blood pressure determination time	Typical: 15 seconds Maximum: 150 seconds
Blood pressure accuracy	Meets or exceeds ANSI.AAMI SP10:2002 standards for noninvasive blood pressure accuracy (±5 mmHg mean error, 8 mmHg standard deviation)
Mean Arterial Pressure (MAP) range The formula used to calculate MAP yields an approximate value.	Adult: 23 to 230 mmHg (StepBP, **SureBP**) Pediatric: 23 to 230 mmHg (StepBP, **SureBP**) Neonate: 13 to 110 mmHg (StepBP)
Pulse rate range (using blood pressure determination)	Adult: 30 to 200 bpm (StepBP, **SureBP**) Pediatric: 30 to 200 bpm (StepBP, **SureBP**) Neonate: 35 to 220 bpm (StepBP)
Pulse rate accuracy (using blood pressure determination)	±5.0% (±3 bpm)
Overpressure cutoff	Adult: 300 mmHg ±15 mmHg Pediatric: 300 mmHg ±15 mmHg Neonate: 150 mmHg maximum

SureTemp Plus temperature module specifications

Characteristic	Specification
Temperature range	80 °F to 110 °F (26.7 °C to 43.3 °C)
Calibration accuracy	±0.2 °F (±0.1 °C) (Direct mode)

Braun ThermoScan® PRO 6000

BRAUN THERMOSCAN® PRO 6000 thermometer specifications (refer to BRAUN THERMOSCAN® PRO 6000 Instructions for use for additional information)

Temperature range	68 °F to 108 °F (20 °C to 42.2 °C)
Calibration accuracy	• ±0.4 °F (±0.2 °C) for temperatures ranging from 95 °F to 107.6 °F (35.0 °C to 42 °C) • ±0.5 °F (±0.25 °C) for temperatures outside of this range
Display resolution	0.1 °F or °C

SpO2 specifications

Refer to sensor manufacturer's instructions for use for additional information.

NOTE Functional testers cannot be used to assess the accuracy of a pulse oximeter monitor.

While functional testers may be useful for verifying that the pulse oximeter sensor, cabling, and monitor are functional, they are incapable of providing the data required to properly evaluate the accuracy of a system's SpO2 measurements. Fully evaluating the accuracy of the SpO2 measurements requires, at a minimum, accommodating the wavelength characteristics of the sensor and reproducing the complex optical interaction of the sensor and the patient's tissue. These capabilities are beyond the scope of known bench-top testers. SpO2 measurement accuracy can only be evaluated in vivo by comparing pulse oximeter readings with SpO2 measurements obtained from simultaneously sampled arterial blood made using a laboratory CO-oximeter.

NOTE Contact the sensor manufacturer for further SpO2 clinical testing information.

NOTE Refer to sensor manufacturers' instructions for use for further accuracy information.

SpO2 specifications (Masimo specifications)[1 2 3 4 5 6]	
SpO2 performance measurement range	1 to 100%
Masimo SpO2 specifications	Accuracy specified when used with Masimo **SET** pulse oximetry monitors or with licensed Masimo **SET** pulse oximetry modules using PC series patient cables, during no motion. Numbers present ± 1 standard deviation. Plus or minus one standard deviation represents 68% of the population.
Masimo SpO2, No Motion	60 – 80 ± 3%, adults/pediatrics/infants 70 – 100 ± 2%, adults/pediatrics/infants; ± 3%, neonates
Masimo SpO2, Motion	70 – 100 ± 3%, adults/pediatrics/infants/neonates
Masimo SpO2, Low perfusion	70 – 100 ± 2%, adults/pediatrics/infants/neonates
Perfusion	0.02 % to 20 %
Masimo pulse rate , No Motion	25 – 240 ± 3 bpm, adults/pediatrics/infants/neonates
Masimo pulse rate, Motion	25 – 240 ± 5 bpm, adults/pediatrics/infants/neonates
Masimo pulse rate, Low perfusion	25 – 240 ± 3 bpm, adults/pediatrics/infants/neonates

SpO2 specifications (Masimo specifications)[1 2 3 4 5 6]	
Pulse rate	25 to 240 beats per minute (bpm) No motion: ± 3 digits Motion: ± 5 digits
Saturation **NOTE** Saturation accuracy varies by sensor type. Refer to the sensor Directions for use for additional accuracy information.	60% to 70% Adults, Neonates: ± 3 digits
Masimo respiration rate specifications	4 to 70 respirations per minute (rpm), 3 RPM ARMS 1 RPM Mean Error Adult and pediatric patients
Nellcor sensor accuracy guide[7 8]	SpO2 measurement accuracy can only be evaluated in vivo by comparing pulse oximeter readings with SpO2 measurements obtained from simultaneously sampled arterial blood made using a laboratory CO-oximeter. SpO2 accuracy was validated through breathe-down-equivalent testing by Covidien using electronic measurements to prove equivalence to the Nellcor N600x predicate device. The Nellcor N600x predicate device was validated by performing human-subject, "breathe-down" clinical trials.
Pulse rate	25 to 240 beats per minute (bpm) ± 3 digits (no motion)
Saturation **NOTE** Saturation accuracy varies by sensor type.	70% to 100% Adult, neonate: ± 3 digits Low Perfusion: 0.02 % to 20 % ± 2 digits
Detected pulse rate	20 to 250 beats per minute (bpm) ± 3 digits
Nonin sensor accuracy guide	SpO2 accuracy testing is conducted during induced hypoxia studies on healthy, non-smoking, light-to-dark-skinned subjects during motion and no-motion conditions in an independent research laboratory. The measured arterial hemoglobin saturation value (SpO2) of the sensors is compared to arterial hemoglobin oxygen (SaO2) value, determined from blood samples with a laboratory co-oximeter. The accuracy of the sensors in comparison to the co-oximeter samples measured over the SpO2 range of 70 – 100%. Accuracy data is calculated using the root-mean-squared (A_{rms} value) for all subjects, per ISO 9919:2005, Standard Specification for Pulse Oximeters for Accuracy.
Perfusion	40–240 BPM. Adult/Ped = +/- 3 digits; Neonate = +/- 3 digits
Pulse rate	18 to 321 beats per minute (bpm) No motion (18 to 300 bpm): ± 3 digits Motion (40 to 240 bpm): ± 5 digits

SpO2 specifications (Masimo specifications)[1 2 3 4 5 6]		
Saturation	70% to 100%	70% to 100%
NOTE Saturation accuracy varies by sensor type.	*ADULT/PEDIATRICS*	*NEONATES*
	NO MOTION	*NO MOTION*
	Finger Clip: ± 2 digits	Finger Clip: ± 3 digits
	Flex: ± 3 digits	Flex: ± 3 digits
	Soft Sensor: ± 2 digits	Soft Sensor: N/A
	8000R: ± 3 digits	8000R: N/A
	8000 Q: ± 4digits	8000 Q: N/A
	MOTION	*MOTION*
	Finger Clip: ± 2 digits	Finger Clip: ± 3 digits
	Flex: ± 3 digits	Flex: ± 4 digits
	Soft Sensor: ± 3 digits	Soft Sensor: ± 4 digits
	LOW PERFUSION	*LOW PERFUSION*
	All Sensors: ± 2 digits	All Sensors: ± 3 digits

1 SpO2, accuracy was determined by testing on healthy adult volunteers in the range of 60-100% SpO2 against a laboratory pulse oximeter. SpO2 accuracy was determined on 16 neonatal NICU patients ranging in age from 7-135 days old and weighing between 0.5-4.25 kg. Seventy-nine (79) data samples were collected over a range of 70-100% SaO2 with a resultant accuracy of 2.9% SpO2.

2 The Masimo sensors have been validated for no motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies in the range of 70-100% SpO2 against a laboratory pulse oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

3 The Masimo sensors have been validated for motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies in the range of 70-100% SpO2 against a laboratory CO-oximeter and ECG monitor. This variation equals plus or minus one standard deviation which encompasses 68% of the population.

4 The Masimo **SET** Technology has been validated for low perfusion accuracy in bench top testing against a BioTek Index 2 simulator and Masimo's simulator with signal strengths of greater than 0.02% and transmission of greater than 5% for saturations ranging from 70–100%. This variation equals plus or minus one standard deviation which encompasses 68% of the population.

5 The Masimo sensors have been validated for pulse rate accuracy for the range of 25-240 bpm in bench top testing against a BioTek Index 2 simulator. This variation equals plus or minus one standard deviation which encompasses 68% of the population.

6 The following substances may interfere with pulse oximetry measurements:

- Elevated levels of Methemoglobin (MetHb) may lead to inaccurate SpO2 measurements
- Elevated levels of Carboxyhemoglobin (COHb) may lead to inaccurate SpO2 measurements
- Severe anemia may cause erroneous SpO2 readings
- Dyes, or any substance containing dyes, that change usual blood pigmentation may cause erroneous readings
- Elevated levels of total bilirubin may lead to inaccurate SpO2 reading

7 Some models of commercially available bench-top functional testers and patient simulators can be used to verify the proper functionality of Nellcor pulse oximeter sensors, cables and monitors. See the individual testing device's operator's directions for use for the procedures specific to the model of tester being used.

SpO2 specifications (Masimo specifications)[1 2 3 4 5 6]

[8] Many functional testers and patient simulators have been designed to interface with the pulse oximeter's expected calibration curves and may be suitable for use with Nellcor monitors and/or sensors. Not all such devices, however, are adapted for use with the Nellcor **OxiMax** digital calibration system. While this will not affect use of the simulator for verifying system functionality, displayed SpO2 measurement values may differ from the setting of the test device. For a properly functioning monitor, this difference will be reproducible over time and from monitor to monitor within the performance specifications of the test device.

Environmental specifications

Operating temperature	50 °F to 104 °F (10 °C to 40 °C)
Storage temperature	-4 °F to 122 °F (-20 °C to 50 °C)
Operating altitude and atmospheric pressure	-1250 to 10,000 ft. (-381 m to 3,048 m) 70 kPA to 106 kPa
Operating humidity	15% to 90% noncondensing
Storage humidity	15% to 95% noncondensing

USB flash drive requirements

The multiple vendor technologies used in the manufacture of USB flash drives make some of them incompatible with this monitor. Common issues that cause flash drives not to function are NTFS formatting, proprietary drive security, and the need for **Windows** drivers to run or access them.

The requirements for a USB flash drive to work with this monitor are the following:

- USB 2.0+ compliant
- Formatted as FAT 32
- USB-A connector

Dimensions: Assuming the USB flash drive will be inserted in the APM, the length of the stick does not matter. The size of the stick surrounding the USB metal head should be no larger than 9.5 mm x 18.5 mm to fit in the USB port.

Monitor radio

The monitor's radio operates on 802.11 networks.

Wireless network interface	IEEE 802.11 a/b/g/n	
Frequency	2.4 GHz frequency bands	5 GHz frequency bands
	2.4 GHz to 2.483 GHz	5.15 GHz to 5.35 GHz (C 36/40/44/48/52/56/60/64) 5.47 GHz to 5.725 GHz (Ch 100/104/108/112/116/120/124/128/ 132/136/140) 5.725 GHz to 5.85 GHz (Ch 149/153/157/161/165)

Channels	2.4 GHz channels	5 GHz
	Up to 14 (3 non-overlapping); country-dependent,	Up to 23 non overlapping; country-dependent
Authentication/ Encryption	WPA2 (**Wi-Fi** Protected Access) – Advanced Encryption Standard (AES) CCMP Protocol WPA2 Personal – 64 hex-digit key / 8-63 character ASCII passphrase WPA2 Enterprise 802.1x Extensible Authentication Protocol (EAP) Types: EAP-TLS, EAP-TTLS, PEAP-MSCHAPv2, PEAP-GTC, PEAP TLS, EAP-FAST	
Antenna	Ethertronics WLAN_1000146	
Wireless data rates	802.11a (OFDM): 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
	802.11b (DSSS, CCK): 1, 2, 5.5, 11 Mbps	
	802.11g (OFDM): 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
	802.11n (OFDM,HT20,MCS 0-7): 6.5,13,19.5, 26, 39,52, 58.5, 72.2 Mbps	
Agency approvals	US: FCC Part 15.247 Subpart C, FCC Part 15.407 Subpart E	
	Europe: Radio Equipment Directive 2014/53/EU	
	Canada: (IC) RSS-210 standard. IC 3147A-WB45NBT for Wi-Fi devices, IC 3147A-BT800 for **Bluetooth** devices Singapore: Model BT800, manufactured by Laird, complies with IDS standards	
Protocols	UDP, DHCP, TCP/IP	
Data transfer protocols	UDP/TCP/IP	
Output power	39.81 mW typical, country-dependent ERP 98.4 mW	
Ancillary IEEE standards	802.11d, 802.11e, 802.11h, 802.11i, 802.1X	

To ensure compliance with local regulations, be sure the correct country in which the access point is installed is selected. This product can be used with the following restriction(s):

Norway - Does not apply for the geographical area within a radius of 20 km from the center of Ny-Ålesund.

France - Outdoor use is limited to 10 mW EIRP within the band 2454 to 2483.5 MHz.

NOTE Effective Isotropic Radiated Power (EIRP).

NOTE Some countries restrict the use of 5-GHz bands. The 802.11a radio in the monitor uses only the channels indicated by the access point with which the radio associates. The hospital IT department must configure access points to operate with approved domains.

Bluetooth module

Category	Feature	Implementation
Wireless specification	**Bluetooth**	2.1 + EDR
	Frequency	2.402 - 2.480 GHz
	Maximum transmit power	Class 1 +8 dBm from antenna
	ERP	5.66 mW
	Receive sensitivity	-89 dBm
	Range	Circa 100 meters
	Data rates	Up to 3 Mbps (over the air)
Host interface	USB	Full speed USB 2.0
	GPIO	Four configurable lines (1.8V/3.3V configurable by VDD_PADS)
Operational modes	HCI	Host Controller Interface over USB
	HID proxy mode	Human Interface Device
EEPROM	2-wire	64K bits
Coexistence	802.11 (**Wi-Fi**)	Three-wire CSR schemes supported (Unity-3, Unity-3e, and Unity+)
Supply voltage	Supply	5V ± 10%
Power consumption	Current	Idle mode ~5 mA File transfer ~58 mA
Antenna option	Internal	Multilayer ceramic antenna with up to 41% efficiency
Physical	Dimensions	8.5 × 13 × 1.6 mm (BT800 module) 16 × 43 × 11 (BT820 USB dongle)
Environmental	Operating	-30 °C to 85 °C
	Storage	-40 °C to 85 °C
Miscellaneous	Lead free	Lead free and RoHS compliant
	Warranty	1 year
Approvals	**Bluetooth**	Controller subsystem approved
	FCC / IC / CE	All BT800 series

Factory defaults

NOTE Factory defaults are the settings in the device when it comes off the manufacturing floor. Customized configuration files modify these defaults based on preferences for specific sites. Restoring default settings on a device returns it to its manufacturing floor defaults, not the custom configuration.

Device

Settings	Default value
Active Config file name	Factory
Device location displayed	Yes
First-time startup screen displayed	Yes
Touchscreen lockout interval	2 minutes
Auto sleep mode allowed	Yes
Sleep mode duration	2 minutes
Auto shutdown allowed	Yes
Auto shutdown timeout	15 minutes
Display brightness	5
Touchscreen calibration	55, 57, 4003, 3993, 193, 3910, 200, 3900 (array of 8 integers)
Splash screen	Baxter logo
Load new software on power cycle enabled	No
Load new software to device	Greyed out
Screen off allowed	Yes
Screen off timeout	1 minute
Power line frequency	60[1]

[1] Power line frequency can be modified in the Configuration Tool to support specific parameters like Masimo SpO2. With both new and existing configurations, follow these steps:

1. Navigate to the Progress Summary page.
2. Scroll down to Section: Biomed (Required) at the bottom of the page and click General Device Settings.
3. Select Custom.
4. Scroll down to Other on the General Device Settings page and select the desired Power Line Frequency.
5. Click DONE at the bottom of the page.
6. Click SAVE AND CONTINUE.

Data management

Settings	Default value
Date format	MM/DD/YYYY

Settings	Default value
Prevent date and time changes	No
Display date and time	Yes
Daylight savings time (DST) enabled	No
Device time zone offset (minutes)	0
Configured language	English
Office profile option enabled	Yes
Intervals profile option enabled	Yes
Spot Check profile option enabled	Yes
Profile	Spot Check
Automatically send confirmed readings on Save	No
Delete confirmed readings after successful send	No
Automatically send unconfirmed interval readings	No

General alarms

Settings	Default value
Alarm volume	Medium
Audio pause time	120 seconds
Minimum alarm volume	Low
Alarm condition priority to activate Nurse call	Medium
Allow global audio off (Note: Must be enabled in configuration file for option to be available,)	No
Alarm audio on and Alarm audio off controls available	Yes (if "Allow global audio off" is enabled in configuration)
Allow alarms to be disabled	Yes

Patient and Clinician information

Settings	Default value
Patient	
Default patient type	Adult
Name format	Full name
Primary label	Name
Secondary label	Patient ID
Require patient ID to save readings	No

Settings	Default value
Clear patient information on manual save	Yes
Patient ID match required for save	No
Search/Query by patient ID	No
Clinician	
Clinician ID display format	Clinician ID
Require clinician ID to save readings	No
Require clinician ID match to save readings	No
Retrieve clinician information from clinician ID	No
Require password to save readings	No
Clear clinician information on manual save	No
Require entry of "required modifiers" to save readings	No
Require prescribed login	No

NIBP

Settings	Default value
Systolic upper limit enabled	Yes
Systolic: Upper limit	Adult: 220 mmHg (29.3 kPa) Pediatric: 145 mmHg (19.3 kPa) Neonate: 100 mmHg (13.3 kPa)
Systolic lower limit enabled	Yes
Systolic: Lower limit	Adult: 75 mmHg (10.0 kPa) Pediatric: 75 mmHg (10.0 kPa) Neonate: 50 mmHg (6.7 kPa)
Diastolic upper limit enabled	Yes
Diastolic: Upper limit	Adult: 110 mmHg (14.7 kPa) Pediatric: 100 mmHg (13.3 kPa) Neonate: 70 mmHg (9.3 kPa)
Diastolic lower limit enabled	Yes
Diastolic: Lower limit	Adult: 35 mmHg (4.7 kPa) Pediatric: 35 mmHg (4.7 kPa) Neonate: 30 mmHg (4.0 kPa)
MAP upper limit enabled	No

Settings		Default value
MAP: Upper limit		Adult: 120 mmHg (16 kPa) Pediatric: 110 mmHg (14.7 kPa) Neonate: 80 mmHg (10.7 kPa)
MAP lower limit enabled		No
MAP: Lower limit		Adult: 50 mmHg (6. 7 kPa) Pediatric: 50 mmHg (6.7 kPa) Neonate: 35 mmHg (4.7 kPa)
Advanced		
Default view		sys_dia_map
Tube type		2 tubes
Unit of measure		mmHg
Algorithm default		SureBP
Cuff inflation target (step algorithm)		
	Adult	160 mmHg (21.3 kPa)
	Pediatric	140 mmHg (18.7 kPa)
	Neonate	90 mmHg (12.0 kPa)
Maximum cycle pressure		
	Adult	Automatic
	Pediatric	Automatic

Intervals

Settings	Default value
Time between each Automatic interval	15 minutes
Intervals profile default intervals mode	Automatic
Office profile intervals mode	Averaging (fixed)
Selected interval parameter	NIBP
Automatic mode time interval	15 minutes

SpO2

Settings	Default value
SpO2 upper limit enabled	Yes

Settings	Default value
Upper limit	Adult: 100% Pediatric: 100% Neonate: 100%
SpO2 lower limit enabled	Yes
Lower limit	Adult: 90% Pediatric: 90% Neonate: 90%
Default view	% SpO2
Advanced	
SpO2 alarm condition delay	10 seconds
SatSeconds (Nellcor only)	25 seconds

RR

RRp alarm condition delay - The quickest detection of a change in respiratory rate would take at least two breaths. Depending on respiratory rate, anything less than 6 breaths per minute must be greater than 10 seconds.

Settings	Default value
RR upper limit enabled	Yes
Upper limit	Adult: 30 Pediatric: 30 Neonate: 80
RR lower limit enabled	Yes
Lower limit	Adult: 6 Pediatric: 6 Neonate: 12
Default view	BPM

Temperature

Settings	Default value
Temperature upper limit enabled	No
Upper limit	101 °F (38.3 °C)
Temperature lower limit enabled	No
Lower limit	94 °F (34.4 °C)

Settings	Default value
Advanced	
Unit of measure	°F (Fahrenheit)
Display temperature conversion	Yes
Default **SureTemp** Plus site	Oral
Braun antitheft time undocked before alarm	2 hours
Braun temperature conversion enabled	Yes
Braun timer icon enabled	Yes
Braun technique compensation algorithm enabled	Yes
Braun °F or °C hardware switch enabled (in the battery compartment)	Yes
Braun unadjusted mode enabled	No

Manual parameters

Settings	Default value
Custom Score feature active	No
Display height	Yes
Display weight	Yes
Display pain	Yes
Display respiration	Yes
Display BMI	No
Height units	in
Weight units	lb
Enable manual override NIBP	Yes
Enable manual override Pulse rate	Yes
Enable manual override Respiration rate	Yes
Enable manual override Temperature	Yes
Enable manual override SpO2	Yes

Network

Settings	Options	Default value
ESSID selection	Alphanumeric entry (32)	com.welchallyn
Radio mode	a/b/g/n, a/b/g, a/n, a only	a/b/g/n
Radio enabled	Yes / No	Yes

Settings	Options	Default value
Radio alarms enabled	Yes / No	No
Ethernet MAC address	MAC address	00:1A:FA:FF:FC:00
Wireless MAC	Alphanumeric entry (18)	
Authentication/Encryption type	Open, WPA Personal(TKIP), WPA Enterprise(TKIP), WPA2-Personal(AES/CCMP), WPA2-Enterprise(AES/CCMP), WEP n(could be 64(40), 128(104) specific)	WPA2-Personal
Authentication/Encryption method	Alphanumeric entry (64)	1234567890ABCDEF1234567890ABCDEF1234567890ABCDEF1234567890ABCDEF
Enhanced Auth Protocol (EAP) type	TLS, TTLS, PEAP-MSCHAPv2, PEAP-GTC, PEAP-TLS, EAP-FAST	PEAP-MSCHAPv2
Enhanced Auth Protocol (EAP) identity	Alphanumeric entry (32)	vitalsigns
Enhanced Auth Protocol (EAP) password	Alphanumeric entry (32)	password
Dynamic Frequency Selection	Yes / No	Yes
Roaming type	PMK Caching, OKC, CCKM	OKC
Server validation enabled	Yes / No	No
Auth server type	Type 1, Type 2	Type 2
Inner EAP setting type	Auto, PAP	Auto
PAC provisioning field	Auto, Manual	Auto

Network Connectivity Method

Options	Selections	Default value
Host IP, NRS, DNS, DHCP		DNS
Host IP	Host IP address	127.0.0.1
	Port	281
NRS	Network rendezvous service (NRS) IP address (###.###.###.###)	0.0.0.0
	Port (####)	7711
DNS	Network rendezvous service DNS name	WANRS
	Port (####)	7711
DHCP	DHCP vendor class identifier	welchallyn-nrs

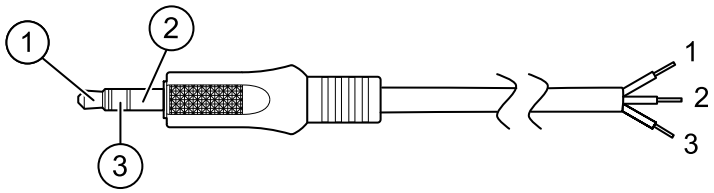
Options	Selections	Default value
	Port (####)	7711
	NRS IP addresses (multiple)	Those network rendezvous service (NRS) IP addresses used by your organization
Data Encryption		No
Radio Static IP Enabled		No
Radio Static IP Address		0.0.0.0
Radio Static IP Mask		255.255.255.0
Radio Static IP Gateway		0.0.0.0
Radio Static IP DNS		0.0.0.0
Ethernet Static IP Enabled		No
Ethernet Static IP Address		0.0.0.0
Ethernet Static IP Mask		255.255.255.0
Ethernet Static IP Gateway		0.0.0.0
Ethernet Static IP DNS		0.0.0.0
Time Zone		GMT
Display Time Zone		GMT
NTP Enable		No
NTP DNS Name		blank
Patient Query and Vitals Send **HL7** Enable		No
HL7 DNS Name		127.0.0.1
HL7 IP port		281
Server Authentication Enable		No
FIPS Enable		No
Wi-Fi Power Save Poll Mode		Max

BLUETOOTH

Settings	Options	Default value
MAC address for **Bluetooth** pairing		00:1A:FA:FF:FC:00
Bluetooth configuration allowed	Yes / No	No
Pairing new laptop allowed	Yes / No	No
Name of device as shown on a paired laptop	######## is unique based on serial #	WACSM - ########
Enable BLE (**Bluetooth** Low Energy)	Yes / No	No

Install the Nurse Call cable

Use this drawing and the following table as a reference for the Nurse Call cable and wiring a Nurse Call system.



No.	Cable connector	Wires (terminate according to manufacturer's specifications)
1	Tip (red wire)	Normally open wire (red)
2	Barrel (black wire)	Arm wire (black)
3	Center (white wire)	Normally closed wire (white)

Configure a remote VNC connection

To allow a view-only remote session to the device from a device on the same network, complete the following steps:

1. Create a configuration file with VNC enabled on the Config Tool.
2. Load the configuration file on to the device.
3. Connect the device to the network.
4. On the device, navigate to **Setting** > **Device**, and click Authorize under Remote Screen Sharing.
5. Note the password in the Remote Screen Sharing box.
6. Navigate to **Settings** > **Advanced** . Locate the device's IP address under Ethernet IP or Radio IP.
7. Using VNC Remote Viewer app on the network, connect to the IP address. Enter the password noted from the Remote Screen Sharing box.
8. To end the remote session, navigate to **Setting** > **Device**, and click Stop Sharing.

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