10 Maintenance

Recharging the Battery

The monitor battery is recharged whenever the monitor is placed into a cradle that is connected to a suitable power source. Recharging occurs whether the monitor is on or off. While in a cradle that is connected to AC power, the monitor also receives operating power from the cradle, thus preserving battery power for use when the monitor is removed.

To Recharge the Battery

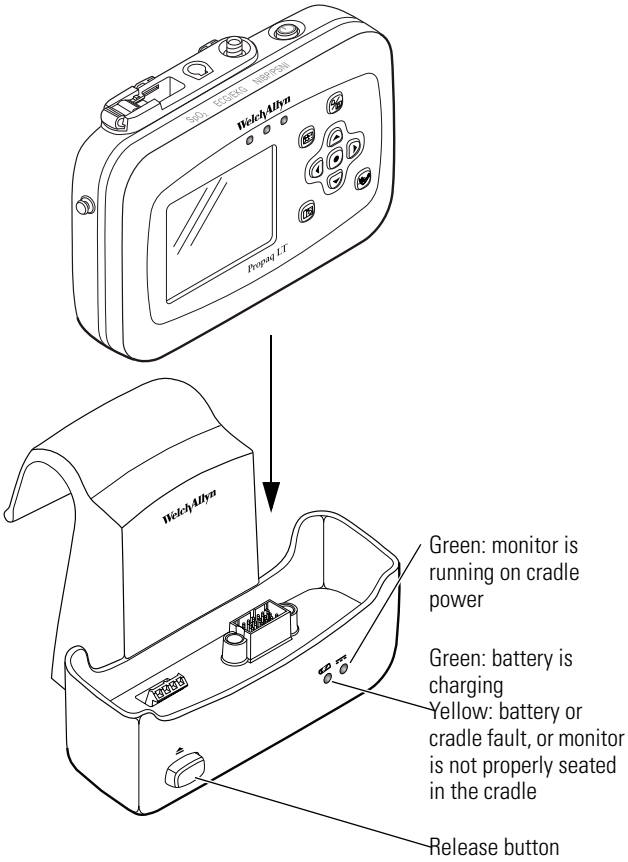
1. Confirm that the green "power" light (the right of two on the cradle) is on.

   If it is off, plug the power adapter into the cradle.

2. Insert the monitor into the cradle until it clicks into place.

3. Confirm that the green "battery charging" light on the cradle (the left of two on the cradle) is on.

   - If the green "battery charging" light is off, the monitor battery is already fully charged.
   - A steady yellow light indicates a problem with the battery or the cradle (contact a qualified service technician) or that the monitor is not properly seated in the cradle.



Note The yellow light might flash briefly when the monitor is being inserted in the cradle or removed from the cradle. This is normal behavior and does not indicate a problem.

4. When the battery is fully charged, the green "battery charging" light is off.

- Keep the monitor in the cradle whenever the patient is in bed. This keeps the monitor battery at full charge, so that it is ready for use if it must be removed from the cradle.
- You can leave the monitor in the cradle when the battery is fully charged.

WARNING Do not incinerate, submerge, crush, disassemble, or autoclave the lithium-ion battery.

Caution Do not remove or replace the battery unless you are a Welch Allyn qualified service technician.

Caution Do not use the monitor while the battery is being replaced.

Inspecting and Cleaning the Monitor and Accessories

WARNING Do not autoclave the monitor, the cradle, the AC power adapter, or any accessories.

WARNING Do not immerse the monitor, the cradle, or the AC power adapter in liquid when cleaning. Do not immerse accessories in liquid when cleaning unless the accessory manufacturer's cleaning instructions explicitly instruct you to do so.

WARNING **Fire and electrical shock hazard.** Always unplug the AC power adapter from the electrical power outlet before inspecting or cleaning the cradle, the AC power adapter, or the monitor. Exposing any of these to liquids, such as cleaning solutions, while they are connected to electrical power could result in electrical shock or fire.

Before cleaning the monitor, cradle, AC power adapter, or any accessories, thoroughly inspect them.

- Look for any signs of damage and any improper mechanical function of buttons or connectors.
- Gently bend and flex cables, inspecting them for damage or extreme wear, exposed wires, or bent connectors.
- Confirm that all connectors engage securely.

Immediately report any sign of damage or malfunction to your service department.

At least once per year, thoroughly inspect the cradle and the AC adapter power cord for damage or extreme wear.

To clean the monitor, the cradle, or any accessories, follow these steps:

1. Wipe the equipment with a cloth slightly moistened (not wet) with one of the approved cleaning solutions listed in Table 12 on page 162.
2. Thoroughly wipe off any excess cleaning solution. Do not let the cleaning solution run into or accumulate in connector openings, latches, or crevices. If liquid gets into connectors, dry the area with warm air, and then check the equipment to confirm that it operates properly.

Caution Use only a cleaning solution recommended by Welch Allyn for this equipment. Use of any other cleaning solutions which have a high acid content or are otherwise inappropriate can cause damage to the equipment, including cracking and deterioration of the plastic case.

Caution Always follow the mixing/diluting instructions provided by the manufacturer of the cleaning solution.

Caution Never use any of the following solutions or similar products to clean the equipment: butyl alcohol, denatured ethanol, Freon™, mild chlorine bleach solution, isopropyl alcohol (except for the SpO_2 cable), trichloroethane, trichloroethylene, acetone, Vesphene II, Enviroquat®, Staphene®, Misty®, Glutaraldehyde, Formula 409®, or Fantastik®.

Table 12. Cleaning Instructions and Cleaning Solutions

Equipment	Cleaning Instructions	Approved Cleaning Solutions
Monitor[a] Charging/ Communication Cradle[a]	• Wipe with a nearly dry cloth moistened with cleaning solution. • Thoroughly wipe off any excess cleaning solution. Do not let cleaning solution run into connector openings or crevices.[b]	Warm water, liquid soap, Coverage®, Windex®, Ovation®, hydrogen peroxide solution, Wex-cide®[c], T.B.Q.®[c]
ECG cable, extension cable	• Wipe gently with damp cloth moistened with a mild detergent solution. • Thoroughly wipe off any cleaning solution.	Mild detergent.
SpO_2 cable, extension cable	• Wipe the cable with a 70% isopropyl alcohol pad and allow it to dry.	70% isopropyl alcohol pad.
Other accessories	• Consult manufacturer's instructions.	Consult manufacturer's instructions.

a. The equipment can be disinfected to comply with OSHA requirements for cleaning and decontaminating spills of blood and other body fluids. (Federal OSHA Standard on bloodborne pathogens: 29 CFR 1910.1030, 12/6/91.)
b. If liquid gets into the connectors, dry the area with warm air and then verify all monitoring functions.
c. Wex-cide (Wexford Labs, Inc., Kirkwood, MO) and T.B.Q. (Calgon Vestal Lab., Calgon Corp., St. Louis, MO) are disinfectants that meet OSHA requirements, are EPA approved, and will not harm the outside of the monitor, battery, or battery charger. Wipe away disinfectants with a water-dampened cloth after the manufacturer's recommended period.

Recycling Monitor Components

Within the EU

Do not dispose of this product as 'unsorted municipal waste'. Prepare it for reuse or separate collection as specified by Directive 2002/96/EC of the European Parliament and the Council of the European Union on Waste Electronic and Electrical Equipment (WEEE).

Note If the monitor, the cradle, or the battery is contaminated, this directive does not apply.

For more specific disposal information, see www.welchallyn.com/weee, or contact Welch Allyn Customer Service.

Outside the EU

When the monitor, the cradle, or the battery reaches end of life, recycle it locally according to national, state, and local regulations, or return it to Welch Allyn.

A Specifications

ECG

Table 13. Specification: ECG

Characteristic	Specification	
Regulatory standards	Meets ANSI/AAMI EC13-2002 and EN 60601-1:1990 + A1 + A2	
Connector	Hypertronics 9-pin female D01 latching connector	
Selectable leads		
3-lead cable	Displayable	I, II or III
	Internally provides	I, II or III
5-lead cable	Displayable	I, II, III, aV_R, aV_L, aV_F, V
	Internally provides	I/II, III and V
Cable type detection	Automatic detection and differentiation of 3- or 5-lead cable	
Lead fault indicator	Displayed chest icon with flashing indicator for each electrode	
ECG Size (sensitivity)	0.2, 0.5, 1, 2, 4, and 8 mV/cm	
Display sweep speed	25 mm/sec	
Bandwidth (monitor display)	0.5 to 40 Hz	Monitor Mode, Adult
	0.05 to 40 Hz	Extended Mode, Adult
	0.5 to 80 Hz	Monitor Mode, Pediatric or Neonate
	0.05 to 80 Hz	Extended Mode, Pediatric or Neonate
Bandwidth (to Acuity)	0.05 to 80 Hz	Monitor or Extended Mode, Adult, Pediatric, or Neonate
Notch filters	50 and 100 Hz, 60 and 120 Hz, or OFF, selectable at Acuity or at the monitor	

Table 13. Specification: ECG (continued)

Sample rate	363.64 Hz (181.82 Hz to Acuity)
Input protection	Protected against electrosurgery and defibrillator when used with ECG cables specified in the Welch Allyn *Products and Accessories* guide.
Electrosurgery interference suppression	Included on all vectors when Welch Allyn-approved cables are used.
Lead-fail sense current	70 nA DC typical for active leads 140-280 nA DC typical for reference electrode, depending on number attached.
Tall T-wave rejection	Meets AAMI (USA) EC13-2002, section 4.1.2.1.c, up through 1.2 mV, using AAMI test waveform
Common mode rejection FILTER function OFF FILTER function ON	 < 1 mV p-p RTI for 10V rms, 50/60 Hz into unbalanced input < 30 μV p-p RTI for 10V rms, 50/60 Hz into unbalanced input
Input impedance	> 2.5 MΩ single-ended @ 60 Hz
Input range (AC)	10 mV peak-to-peak (local display) 10 mV peak-to-peak (Acuity)
Input range (DC)	Up to ±500 mV
Accuracy of input signal reproduction-impulse response	Requires ECG bandwidth to be set to extended mode.
System noise	≤ 30 μV peak-to-peak, RTI notch filter on
Baseline recovery (trace restore)	Automatic
QRS detector	Adult or pediatric amplitude range: 0.22 to 5.0 mV (RTI) Neonate amplitude range: 0.1 to 5.0 mV Adult width range (duration): 70 to 120 msec Pediatric or neonate width range (duration): 40 to 120 msec
HR range (in all patient modes)	25 to 350 beats/min (measurement) 25 to 300 beats/min (display)
Alarm limits	25 to 298 beats/min (lower) 27 to 300 beats/min (upper)
HR resolution	1 beat/min
HR alarm resolution	5 beats/min
HR meter response time	Responds to change in heart rate within 13 seconds depending on physiological waveform. (As measured per AAMI standard EC13-2002 clause 5.1.2.1 (f), including 4.1.2.1 parts f. and g. waveforms.) Includes 1-second readout update interval.
HR accuracy	±3 beats/min or 3%, whichever is greater
HR display update interval at monitor	1 second
AAMI HR response to "ineffectively paced QRS pattern"	Indicates rate of 30 to 46 during AAMI EC13-2002 part 5.1.4 part (f), (g), and (h) tests. NOTE: AAMI Test 5.1.4 part (f), (g), and (h): Accuracy is affected when QRS and pacer spikes are nearly simultaneous as occasionally is the case during this test.

Table 13. Specification: ECG (continued)

HR averaging method	HR = 60/(latest average interval in seconds) For higher HR, latest avg interval = 7/8 (previous avg interval) + 1/8 (latest interval). For lower HR, latest avg interval = 3/4 (previous avg interval) + 1/4 (latest interval). Transition rates for choice of formula include hysteresis and are 70 and 80 beats/min.
Drift tolerance (AAMI spec. EC13-2002, 4.2.6.3)	80 beats/min indicated for 80 beats/min ECG plus drift waveform
Pacer pulse display indication	Pacer indicator (dashed vertical marker) shown on screen if pacer indicator is ON; pacer signal always shown if of sufficient amplitude.
Pacer pulse detection (i.e., for which the monitor displays a dashed vertical marker in trace)	Pulses = ± 3.2 mV to ± 700 mV @ 0.1 ms and ± 2 mV to ± 700 mV @ 0.2 to 2 ms, all with or without overshoot, in electrically quiet environment. Thresholds automatically adjust to reject repetitive ambient noise. Pacer detector influences QRS picking even while pacer display indication is disabled.
Pacer pulse rejection	Does not count as heartbeats approximately 95% of pacemaker pulses within pacer pulse detection range, with or without AAMI (EC 13-2002) tails of 4, 8, 15, 25, 50, 75, or 100 ms decay time constant, whose tail amplitudes meet either EC 13's method A or method B criteria for single pacer pulses, or A-V sequential pulses (150 ms and 250 ms separation), all per AAMI tests 4.1.4.1 and 4.1.4.2.
Pacer pulse detector minimum slew rate detection threshold	2.5 V/sec RTI, per EC13:2002, 4.1.4.3
ECG trace duration	3 seconds in single or double trace display 6 seconds in cascade
Response to Irregular Rhythm (AAMI specification EC13-2002, 4.1.2.1. Part e.)	
Ventricular bigeminy (VB)	78 to 81 beats/min (80 beats/min expected)
Slow alternating VB	57 to 65 beats/min (60 beats/min expected)
Rapid alternating VB	118 to 123 beats/min (120 beats/min expected)
Bidirectional systole	88 to 93 beats/min (90 beats/min expected)
1 mV ventricular tachycardia	197 to 198 beats/min (206 beats/min expected)
2 mV ventricular tachycardia	193 to 197 beats/min (195 beats/min expected)

Resp

Table 14. Specification: Impedance Pneumography (Resp)

Characteristic	Specification
Connector (shared with ECG)	Hypertronics 9-pin, female D01 latching connector
Input protection	Electrosurgery and defibrillator protected and Resp fully functional when used with any of the ECG cables specified in Welch Allyn *Products and Accessories* (810-0409-XX)
Electrosurgery interference suppression	Yes, but not quantifiable.
Selectable Leads	Ld-1 (RA-LA), or Ld-2 (RA-LL) from either 3-lead cable or 5-lead cable, when using an ECG cable specified for this monitor in *Products and Accessories* (810-0409-XX).
Base impedance range (in addition to 1K resistors in ECG cable)	Approximately 200 ohms to 1200 ohms is normal monitoring range. Approximately 1200 –1500 ohms range produces equipment alert "Resp Fault. Noisy signal. Check electrodes". Above approximately 1500 ohms produces equipment alert "Resp Fault. Lead Fail". Thresholds depend on ECG cable type and length.
Impedance dynamic range	20 ohms
Baseline recovery (trace restore)	Automatic
Resp size (sensitivity) selections	0.5X, 1X, 2X, 4X, 8X, 16X
Signal bandwidth after detection (Monitor display and at Acuity)	0.05 to 4.0 Hz at 3dB point
Sample rate	22.73 Hz
Cardiovascular artifact (CVA) rejection	Presence of CVA is detected automatically. Breaths are picked in the presence of CVA unless the breath rate is within 5% of the heart rate or a submultiple of the heart rate.
Resp channel noise	$\leq$ 50 milliohms peak-to-peak typical
Breath detection threshold	0.14 ohms or 2x CVA, whichever is greater, set automatically
Resp rate (RR) range	2 to 150 breaths/min (adult/pediatric mode) 3 to 150 breaths/min (neonate mode)
RR alarm limits	2 to 148 breaths/min (lower, adult/pediatric) 4 to 150 breaths/min (upper, adult/pediatric) 3 to 148 breaths/min (lower, neonate) 5 to 150 breaths/min (upper, neonate)
Resp rate resolution	1 breath/min
Resp rate alarm resolution	1 breath/min
Breath rate accuracy	± 2 breaths/min or 2%, whichever is greater
Motion artifact rejection	Not rejected
Obstructive apnea	Not detected
RR display update interval at monitor	1 second
Excitation signal characteristics	65.16 kHz, pseudosine wave, 65 µA RMS ± 5%
Display sweep speed	6.25 mm/sec

SpO_2

Table 15. Specification: Pulse Oximetry (SpO_2)

Characteristic	Specification
Saturation (% SpO_2) Range Resolution	 1% to 100%, but limited by sensors and by sensor manufacturers' technology 1%
Alarm limits	50% to 98% (lower) 52% to 100% (upper)
Probe accuracy (adult, pediatric, neonate)	Accuracy for saturation levels below 70% is unspecified. See Table 16, "Specification: Pulse Oximetry (SpO2) Nellcor Sensor" on page 167 for sensor accuracy.
Pulse rate alarm limits	25 to 298 beats/min (lower) 27 to 300 beats/min (upper)
Pulse rate accuracy	± 3 beats/min typical; varies with sensor model
Display update interval at the monitor	1 second
Alarm hold-off period	10 seconds; resets if the sensor reports levels within limits before 10 seconds elapses.
Circuitry	Microprocessor controlled Automatic self-test of oximeter when powered on Automatic setting of default parameters Automatic alarm messages
Electrosurgery interference suppression	Yes
Sensor compatibility	Compatible only with Nellcor sensors listed in Table 16, "Specification: Pulse Oximetry (SpO2) Nellcor Sensor" on page 167.
Sensor lights Red wavelength Infrared wavelength	 660 nm (nominal) 920 nm (nominal)

Table 16. Specification: Pulse Oximetry (SpO_2) Nellcor Sensor

Sensor	Application Site(s)	Measurement Range[a]	Accuracy[b] (digits)
Single Use - OxiMax			
MAX-A Adult	Finger, thumb or toe	70% to 100%	± 2% [c]
MAX-AL Adult (36" cable)	Finger, thumb or toe	70% to 100%	± 2% [c]
MAX-N Adult	Finger	70% to 100%	± 2% [c]
MAX-N Neonatal	Foot	70% to 100%	± 3% [c]
MAX-P Pediatric	Finger, thumb or toe	70% to 100%	± 2% [c]
MAX-I Infant	Great toe or thumb	70% to 100%	± 2% [c]
MAX-FAST Adult	Forehead	70% to 100%	± 2%
MAX-R Adult	Nose	70% to 100%	± 3.5%

Table 16. Specification: Pulse Oximetry (SpO_2) Nellcor Sensor (continued)

Single Use - OxiCliq			
OxiCliq A Adult	Finger, thumb or toe	70% to 100%	± 2.5%
OxiCliq P Pediatric	Finger, thumb or toe	70% to 100%	± 2.5%
OxiCliq N Adult	Finger	70% to 100%	± 2.5%
OxiCliq N Neonate	Foot or hand	70% to 100%	± 3.5%
OxiCliq I Infant	Great toe or thumb	70% to 100%	± 2.5%
Reusable			
D-YS DURA-Y, Multisite (with D-YSE, Earclip for use with D-YS)	Ear lobe or pinna	70% to 100%	± 3.5%
D-YS Neonate	Ear lobe or pinna	70% to 100%	± 4%
D-YS Infant to Adult	Ear lobe or pinna	70% to 100%	± 3%
DS-100A DURASENSOR Adult	Index finger	70% to 100%	± 3%
OXI-A/N OXIBAND Adult	Finger, thumb or toe	70% to 100%	± 3%
OXI-A/N OXIBAND Neonatal	Foot or hand	70% to 100%	± 4%
OXI-P/I Pediatric	Finger, thumb or great toe	70% to 100%	± 3%
OXI-P/I Infant	Great toe	70% to 100%	± 3%

a. Probe accuracy for saturation levels below 70% is unspecified.
b. When sensors are used on neonatal subjects as recommended, the specified accuracy range is increased by ± 1 digit as compared to adult usage, to account for the theoretical effect on oximeter measurements of fetal hemoglobin in neonatal blood. For example, MAX-N accuracy on neonates is ± 3 digits, rather than ± 2 digits for adults.
c. The accuracy specification under motion conditions is ± 3.

NIBP

Table 17. Specification: Noninvasive Blood Pressure (NIBP)

Characteristic	Specification
Method	Oscillometric
Regulatory standards	Meets AAMI SP10:2002, IEC 60601-1:1990, IEC 60601-2-30:1999(E); EN 1060-1:1996, EN 1060-3:1997
Control	Automatic (at selected intervals), turbo, and manual
Auto intervals	1, 2, 3, 5, 10, 15, 30, and 60 minutes
Smartcuf (Available in 2006)	Available when ECG is used on adult patients
Reported pressures	Systolic, diastolic, and mean plus real-time manometer pressure
Pressure resolution	1 mmHg

Table 17. Specification: Noninvasive Blood Pressure (NIBP) (continued)

Systolic range	Adult	30 to 260 mmHg		
	Pediatric	30 to 160 mmHg		
	Neonate	25 to 120 mmHg		
Alarm limits	Adult	low 30 to 258 mmHg	high	32 to 260 mmHg
	Pediatric	low 30 to 158 mmHg	high	32 to 160 mmHg
	Neonate	low 25 to 118 mmHg	high	27 to 120 mmHg
Diastolic range	Adult	20 to 235 mmHg		
	Pediatric	15 to 130 mmHg		
	Neonate	10 to 105 mmHg}		
Alarm limits	Adult	low 20 to 233 mmHg	high	22 to 235 mmHg
	Pediatric	low 15 to 128 mmHg	high	17 to 130 mmHg
	Neonate	low 10 to 103 mmHg	high	12 to 105 mmHg
Mean range	Adult	20 to 255 mmHg		
	Pediatric	15 to 140 mmHg		
	Neonate	10 to 110 mmHg		
Alarm limits	Adult	low 20 to 253 mmHg	high	22 to 255 mmHg
	Pediatric	low 15 to 138 mmHg	high	17 to 140 mmHg
	Neonate	low 10 to 108 mmHg	high	12 to 110 mmHg
Pulse rate range	30 to 220 beats/min, in adult, pediatric, and neonate modes			
Alarm limits	Low	25 to 298 beats/min		
	high	27 to 300 beats/min		
Static manometer accuracy	0-300mmHg ±3 mmHg or 2% of reading, whichever is greater. Can be checked in the field, but no adjustments are provided (or needed).			
Manometer baselining (zeroing)	Automatic			
Atmospheric pressure compensation	Automatic			
Minimum inflation pressure	Adult	100 mmHg		
	Pediatric	80 mmHg		
	Neonate	50 mmHg		
Maximum inflation pressure	Adult	270 mmHg		
	Pediatric	170 mmHg		
	Neonate	132 mmHg		
Default inflation pressure	Adult	160 mmHg		
	Pediatric	120 mmHg		
	Neonate	90 mmHg		
Normal overpressure limit	Adult	280 mmHg		
	Pediatric	200 mmHg		
	Neonate	141 mmHg		
Single fault overpressure limit	Adult	308 mmHg		
	Pediatric	220 mmHg		
	Neonate	154 mmHg		

Table 17. Specification: Noninvasive Blood Pressure (NIBP) (continued)

Leak rate (manufacturing spec)	After a 1-minute settling period, not more than 1 mmHg per second at 200 mmHg when connected to a volume of at least 15 cc.
Rapid exhaust (dump) time	3 seconds typical to drop pressure in a 500 cc volume from 300 mmHg to < 10 mmHg
Cuff inflation time	7-8 seconds typical to 270 mmHg into a 500 cc volume in adult mode at sea level
Maximum determination time (without retries)	Adult 3 minutes Pediatric 2 minutes Neonate 1.5 minutes
Minimum time between automatic measurements	30 seconds (Auto Mode) 2 seconds (Turbo Mode)
Allowable retries	Two in each patient mode
Electrosurgery interference suppression	Included

Alarms and Alerts

Characteristic	**Specification**	
Visual alarm indicator at the monitor		
Patient alarm	Flashing red	0.3 seconds on, 0.3 seconds off
Equipment alert	Flashing yellow	1.0 seconds on, 1.0 seconds off
Any alarm limit disabled	Continuous yellow	
Visual alarm indicator at Acuity (when connected)	See *Acuity Directions For Use*.	
Alarm indicators	Red lights	
Alert indicators	Yellow lights	
Audible alarm location	Monitor Acuity (when connected)	
Audio tone frequency (at the monitor)	1024 Hz	
Audio tone volume (d = 1 meter) (Can be configured with distinct tone volume settings for standalone and networked operation.)	High Medium Low Off	67 dB typical (A) 60 dB typical (A) 53 dB typical (A)
Audio alarm indicator at the monitor		
Patient alarm high-priority limit violation	[100 ms on, 80 ms off, 100 ms on, 80 ms off, 100 ms on, 260 ms off, 100 ms on, 80 ms off, 100 ms on, 1 sec off, 100 ms on, 80 ms off, 100 ms on, 80 ms off, 100 ms on, 260 ms off, 100 ms on, 80 ms off, 100 ms on, 4 sec off]; repeat.	
Equipment alert medium priority	[160 ms on, 200 ms off, 160 ms on, 200 ms off, 160 ms on, 3.96 sec off]; repeat.	

Limits	Settable on all parameters Separate adult/pediatric/neonate mode settable limits
Alarm control	Automatic preset or manual settings
Alarm priority	High — Patient alarms (Life-threatening) Medium — Equipment alerts Low — Alarm off
Alarm on tachycardias	Most tachycardias alarm in less than 8 seconds. These include AAMI 3.1.2.1 part f. waveforms. Certain multifocal tachycardias can initially alarm as "low rate."
Alarm hold-off period	HR/PR — 3 seconds % SpO_2 — 10 seconds RR — 5 seconds To keep false alarms to a minimum, the monitor briefly delays or "holds off" triggering audible and visual alarms for limit violations for these vital signs. After the hold-off period begins, if the monitor detects that the vital sign has returned to acceptable limits, the monitor cancels the alarm. The next time a limit is violated, the monitor starts a new hold-off.
Audio alarm hold-off with Acuity	When a monitor is connected to Acuity, the audio alarms at the monitor can be delayed up to 4 minutes and 15 seconds. The delay time is selected in Acuity software at the time of Acuity installation. Visual alarm indications are not delayed. Acuity has a default audio alarm hold-off of 11 seconds.
Alarms suspend	When 'alarms suspend' is enabled, the monitor alarm tones for all parameters can be suspended on the floor for a configurable period: 90 seconds, 2 minutes, 3 minutes, 4 minutes (default), 5 minutes, 10 minutes, 15 minutes, or 60 minutes.
Patient out-of-range; transmitter failure	When a monitor is used with Acuity, an equipment alert is generated whenever the monitor fails to communicate with Acuity after a connection has been successfully established. In addition, the 'No Acuity' icon is displayed on the monitor.
Battery failure	An equipment alert is generated before the monitor battery becomes exhausted.
Snapshot/event mark	When is pressed, the monitor records a Snapshot. If the monitor is connected to Acuity, the monitor also sends a message to Acuity so Acuity can mark and print it.

Table 18. Specification: Default Alarm Limits

Characteristic	Specification			
	Upper		Lower	
HR/PR	Adult Pediatric Neonate	120 beats/min 150 beats/min 150 beats/min	Adult Pediatric Neonate	50 beats/min 50 beats/min 50 beats/min
Resp	Adult Pediatric Neonate	30 breaths/min 45 breaths/min 60 breaths/min	Adult Pediatric Neonate	5 breaths/min 10 breaths/min 10 breaths/min
SpO_2	Adult Pediatric Neonate	100% 100% 98%	Adult Pediatric Neonate	90% 90% 85%

Table 18. Specification: Default Alarm Limits (continued)

NIBP Systolic	Adult	220	Adult	75
	Pediatric	145	Pediatric	75
	Neonate	100	Neonate	50
NIBP Diastolic	Adult	110	Adult	35
	Pediatric	100	Pediatric	35
	Neonate	70	Neonate	30
NIBP MAP	Adult	120	Adult	50
	Pediatric	110	Pediatric	50
	Neonate	80	Neonate	35

Table 19. Specification: Display

Characteristic	Specification
Type	Color transflective; LCD module
Resolution	320 x 240 pixels Quarter VGA
Active viewing area	> 3.5" (8.9 cm) diagonal
Pixel pitch	0.2235 mm X 0.2235 mm
Viewing angle	± 40° from normal, horizontal and vertical; Contrast ratio > 2
Daylight viewable	Daylight viewable with backlight off
Back light	Display back light can be turned on or off
Brightness (back light full on)	50 cd/m^2 typical
Contrast ratio	80 typical (Back light on)
Display colors	256

Wireless Monitor (Model 802LTRN)

Table 20. Specification: Wireless (Radio)

Characteristic	Specification
FlexNet™ Network	2.4 GHz frequency-hopping spread-spectrum (FHSS) wireless local area network (WLAN) and 10/100 base-T Ethernet network
Frequency	2.402 to 2.480 GHz (subject to country-specific variations within this range)
Modulation	GPSK
Output power	100 mW
IEEE 802.11 compliant	Yes
Monitors per access point	15 (max.)

Environmental

Caution The monitor might not meet performance specifications if it is not used or stored within these environmental specifications.

Note The specifications apply when the battery is installed and the battery cover is in place.

Table 21. Specification

Characteristic	Specification
Operating temperature	0° to 40° C
Shipping and storage temperature	-20° to 60° C for monitor and cradle. See Table 25, "Specification: Monitor Battery" on page 175 for details about long-term storage of the internal monitor battery.
Operating altitude	-2,000 to 15,000 ft (-610 to 4,572 m)
Shipping and storage altitude	-2,000 to 40,000 ft (-610 to 12,192 m)
Operating relative humidity	5% to 95%, noncondensing per MIL STD 810E, Procedure 1-natural
Shipping and storage relative humidity	5% to 95%, noncondensing per MIL STD 810E, Procedure 1-natural
Water resistance	IPX1
Drop	2 meter onto vinyl tile over concrete per EN60601-1 (Cosmetic damage is not considered a failure.)
Shock	75 g, 11 ms half sine waveform, three shocks per face for a total of 18 shocks.
Vibration, random	$0.02g^2$/Hz from 10 to 500 Hz, ramping down to $0.002g^2$/Hz at 2000 Hz. Superimposed sine frequencies of 30 Hz at 2.5 g and 60, 90, and 120 Hz at 1.5 g. Operating 1 hour per axis, 3 hours per test.
Electromagnetic compatibility (EMC)	EN 60601-1-2: 2001, Emission Class A for monitor with Large Color Display Interface, Emission Class B for monitor without Large Color Display Interface

Physical

Table 22. Specification

Characteristic	Specification
Protection Classifications, all Configurations	
Type of protection against electric shock—monitor (connected to internal battery power source or to cradle.)	Battery operation or connection to isolated cradle. Battery must be charged in the monitor while the monitor is in the cradle.
Degree of protection against electric shock, for parts applied to patients	See monitor labels. Type CF, defibrillator protected.

Table 22. Specification (continued)

Method of cleaning	Not suitable for autoclaving. See "Inspecting and Cleaning the Monitor and Accessories" on page 161.
Flammable anesthetics	Not suitable for use with flammable anesthetics.
Physical Dimensions	
Monitor height	5.4 in (13.71 cm)
Monitor width	7.5 in (19.05 cm)
Monitor depth	2.1 in (5.33 cm)
Monitor weight (including battery and radio card)	approximately 32 oz (0.9 kg)

Power

Table 23. Specification: Monitor Power

Characteristic	Specifications
Operating Times on Battery for Ambient Temperature ≥ 20° C	
Standalone Continuous monitoring with minimal display use (defined as 5 minutes display use per hour)	ECG and Resp only: 24 hrs ECG, Resp, SpO_2. NIBP every 15 min.: 8 hours
Acuity connected (Model 802LTRN) In communication, with continuous monitoring and minimal display use (5 min display use/hour)	ECG and Resp only: 24 hrs ECG, Resp, SpO_2. NIBP every 15 min.: 8 hours

Table 24. Specification: Power Adapter

Characteristic	Specification
Input	100-240 volts AC, 50/60 Hz, 700 mA max
Output	15 volts DC ± 5% no load to 2A load
Output ripple	200 mV p-p maximum (90 VAC RMS, 50 Hz, 24-watt load)
Power	24 watts minimum
Holdup time	1/2 sine-wave cycle, full load, 115 V/60 Hz, 230 VAC/50 Hz, per IEC EN 61000-4-11
Overvoltage protection	Built in
Overcurrent protection	Built in
Efficiency	80% minimum at full load, 115 VAC input
Dielectric withstanding voltage	4.8 KV for 1 sec or 4.0 KV for 60 sec (mains) input to DC output

Table 24. Specification: Power Adapter (continued)

Patient leakage current	10 μA maximum, normal condition type CF per IEC EN 60601-1 50 μA maximum, single-fault condition type CF per IEC EN 60601-1
Enclosure leakage current	100 μA maximum, per IEC EN 60601-1
Protection against harmful ingress of water	IPX1 when the LED faces up IPX0 otherwise
Humidity	95% per MILT-28800 Par 4.5.5.1
Strain-Relief Strength	30 N per UL/IEC EN 60950-1 and UL/IEC EN 60601
Weight	≤ 0.8 lb
Insulation class (transformer)	UL Rated 105° C
Width	2.68 in (68 mm)
Height	1.54 in (39 mm)
Length	4.13 in (105 mm)
Weight	10.6 oz (300 g)
AC input connector	IEC 60320-C8, 2.5 A rated input housing
DC output connector	Hypertronics DO2-size latching 3-pin male
Output cable length	8 feet for IEC power cord

Table 25. Specification: Monitor Battery

Characteristic	Specification
Type	7.4 V, rechargeable, lithium ion. Field-replaceable by service technician.
Capacity	> 1800 mA-hr minimum
Charger	Contained in the cradle. Batteries are charged in place in the monitor.
Fuse rating	5A, 125V – User cannot access the fuse. Note: Internal electronic overload circuitry is used as the primary method of protection. This circuit resets itself when an overload is removed.
Recharge time	≤ 3 hours at 25° C (typical), with monitor either on or off.
Storage	< 30 days -4°F to 122°F -20°C to 50°C 30 days to 90 days -4°F to 104°F -20°C to 40°C > 90 days -4°F to 86°F -20°C to 30°C NOTE: For best charge retention during extended storage, remove the battery from the monitor.
Cycle life	300 full charge/discharge cycles @ 20° C (to 70% of initial capacity)

Cradle

Table 26. Specification: Cradle

Characteristic	Specification
Functional	
Capacity	One monitor with internal battery.
Mounting	Tabletop or bed rail use. Can be attached to walls, IV poles, etc. with third-party mounting brackets.
	Protection Classifications
Duty cycle	Continuous
Type of protection against electric shock	Type CF isolation exists between the monitor installed in the cradle and the cradle DC power input, regardless of type of DC power input. The line-operated power adapter accessory is a type CF medical-grade power supply. Type CF isolation exists between the monitor installed in the cradle and the cradle USB connector.
Degree of protection against harmful ingress of water	IPX1
Method of cleaning	Not suitable for autoclaving. See "Inspecting and Cleaning the Monitor and Accessories" on page 161.
Flammable anesthetics	Not suitable for use with flammable anesthetics.
	Environmental
Operating temperature	0° to 40° C
Shipping and storage temperature	-20° to 60° C
Operating altitude	-500 to 15,000 feet (-152 to 4,572 m)
Shipping and storage altitude	-2,000 to 40,000 feet (-610 to 12,192 m)
Operating relative humidity	5% to 95%, noncondensing
Shipping, storage relative humidity	5% to 95%, noncondensing
Shock	50 g
Vibration, random	$0.02g^2$/Hz from 10 to 500 Hz, ramping down to $0.002g^2$/Hz at 2000 Hz. Superimposed sine frequencies of 30 Hz at 2.5 g and 60, 90, and 120 Hz at 1.5 g. Operating 1 hour per axis, 3 hours per test.
Electromagnetic compatibility (EMC)	with USB option EN60601-1-2:2001 Class A without USB option EN60601-1-2:2001 Class B
	Physical
Depth	6.0 in (15.24 cm)
Width	7.6 in (19.3 cm)
Height	5.7 in (14.48 cm) including feet
Weight	16 oz (0.45 kg)

Table 26. Specification: Cradle (continued)

	Electrical
Rated input	12V to 28V DC, 22 W max, current is inversely proportional to input voltage.
Rated fuse (externally accessible)	3A, 250V, 2AG size, type T3A.
Rated output to cradle connector	Monitor power = 2 Adc max @ 8.2V - 8.6V, depending on the battery charge level. (See Charge Scheme, below.)
Charge scheme	Constant current ≈ 900 mA. Constant current for preconditioning ≈ 180 mA for pack voltage of 4.3V - 6.2V. Constant voltage = 8.4V ± 0.06V total at the battery cells.
Charge termination triggers	Charge current ≈ 90 mA. Total charge timeout ≈ 4 hours. Precondition charge timeout ≈ 1 hour.
Charge time (with monitor on or off)	≤ 3 hours typical for battery fully discharged but not exhausted. The cradle can precondition most exhausted batteries, which adds to the total charge time. Charging terminates when the battery is fully charged or when a fault is detected.
Charge time required on a dead battery before NIBP can be used.	NIBP can be used as soon as monitor is powered by the cradle.
Output overcurrent	Electronic overload protection. If overload occurs, monitor must be removed and reinserted to reset the charger.
Cradle-to-monitor connector	Hypertronics L-Series Module D,17-pin male
Power input connector	Hypertronics Panel Mount D02 size latching 3-pin female
	Status Indicators
Status light yellow	Battery or cradle fault (time out, temperature out of range, a cell is overcharged, cradle latch button is pressed, monitor not seated in the cradle, overload, no battery or nonrejuvenatable battery in monitor.)
Status light green	Monitor connected and battery charging
Status light off	Monitor not connected, or monitor connected and battery fully charged
Power light green	DC input power is being applied to the cradle.
Both lights off	Cradle not powered, cradle fuse is blown, or cradle has shut itself down.
	Communications Functions
Cradle to attached PC communications	Per USB 1.1 (not fully compliant)
USB device type	Vendor-defined class, Full-Speed Communications (12 MBPS)
USB ID	Vendor: 0x0770 Device: 0x0802
USB connector	USB type B female (device)

B EMC Compliance

Overview

Special precautions concerning electromagnetic compatibility (EMC) must be taken for all medical electrical equipment.

- All medical electrical equipment must be installed and put into service in accordance with the EMC information provided in this document.
- Portable and mobile RF communications equipment can affect the behavior of medical electrical equipment.

Propaq LT Series monitors and accessories comply with all applicable and required standards for electromagnetic interference.

- They do not normally affect nearby equipment and devices.
- They are not normally affected by nearby equipment and devices.
- It is safe to operate them in the presence of high-frequency surgical equipment; however, it is good practice to avoid using the monitors near other equipment.

Monitor, Battery-Operated

Guidance and manufacturer's declaration—electromagnetic emissions		
The battery-operated Propaq LT Series monitor is intended for use in the electromagnetic environment specified below. The customer or the user of the monitor should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment—guidance**
RF emissions CISPR 11	Group 1	The battery-operated Propaq LT Series monitor uses RF energy only for its internal function.[a] Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The battery-operated Propaq LT Series monitor is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	No connection to mains (battery-operated)	
Voltage fluctuations/flicker emissions IEC 61000-3-3	No connection to mains (battery-operated)	

a. The battery-operated Propaq LT Series monitor contains a 2.4-GHz frequency-hopping spread-spectrum transmitter for the purpose of wireless communication. The radio is operated according to the requirements of various agencies, including FCC 47 CFR 15.247 and R&TTE Directive (1995/5/EC). The radio is excluded from the EMC requirements of 60601-1-2:2001, but should be considered when addressing possible interference issues between this and other devices.

Guidance and manufacturer's declaration—electromagnetic immunity

The battery-operated Propaq LT Series monitor is intended for use in the electromagnetic environment specified below. The customer or the user of the monitor should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment—guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/ burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	No connection to mains (battery-operated). No other cables requiring EFT/Burst testing.	Since there is no connection to the mains, there is no requirement for mains quality.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	No connection to mains (battery-operated).	
Voltage dips, short interruptions, and voltage variations on power-supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	No connection to mains (battery-operated).	
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Note U_t is the AC mains voltage prior to application of the test level.

Guidance and manufacturer's declaration—electromagnetic immunity

The battery-operated Propaq LT Series monitor is intended for use in the electromagnetic environment specified below. The customer or the user of the monitor should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment—guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the battery-operated Propaq LT Series monitor, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	$d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz where **P** is the maximum output power rating of the transmitter in watts according to the transmitter manufacturer and **d** is the recommended separation distance in meters. Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1 At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the battery-operated Propaq LT Series monitor is used exceeds the applicable RF compliance level above, the battery-operated Propaq LT Series monitor should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the battery-operated Propaq LT Series monitor.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the battery-operated Propaq LT Series monitor

The battery-operated Propaq LT Series monitor is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the battery-operated Propaq LT Series monitor can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the battery-operated Propaq LT Series monitor as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (w) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Charging/Communication Cradle with Monitor

Guidance and manufacturer's declaration—electromagnetic emissions

The Charging/Communication Cradle with Propaq LT Series monitor is intended for use in the electromagnetic environment specified below. The customer or the user of the Charging/Communication Cradle with Propaq LT Series monitor should assure that it is used in such an environment.

Note: The EMC specifications on pages 184-187 apply to the following:

- Charging/Communication Cradle alone
- Propaq LT Series monitor with Charging/Communication Cradle
- Propaq LT Series monitor with Charging/Communication Cradle in communication via USB cable with personal computer

Emissions test	Compliance	Electromagnetic environment—guidance
RF emissions CISPR 11	Group 1	The Charging/Communication Cradle with Propaq LT Series monitor uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The Charging/Communication Cradle with Propaq LT Series monitor is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration—electromagnetic immunity

The Charging/Communication Cradle with Propaq LT Series monitor is intended for use in the electromagnetic environment specified below. The customer or the user of the monitor should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment—guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IED 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power-supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Charging/Communication Cradle with Propaq LT Series monitor requires continued operation during a power mains interruption, it is recommended that the Charging/Communication Cradle with Propaq LT Series monitor be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Note U_t is the AC mains voltage prior to application of the test level.

Guidance and manufacturer's declaration—electromagnetic immunity

The Charging/Communication Cradle with Propaq LT Series monitor is intended for use in the electromagnetic environment specified below. The customer or the user of the monitor should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment—guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Charging/Communication Cradle with Propaq LT Series monitor, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	$d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz where **P** is the maximum output power rating of the transmitter in watts according to the transmitter manufacturer and **d** is the recommended separation distance in meters. Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1 At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Charging/Communication Cradle with Propaq LT Series monitor is used exceeds the applicable RF compliance level above, the Charging/Communication Cradle with Propaq LT Series monitor should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Charging/Communication Cradle with Propaq LT Series monitor.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the Charging/Communication Cradle with Propaq LT Series monitor

The Charging/Communication Cradle with Propaq LT Series monitor is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Charging/Communication Cradle with Propaq LT Series monitor can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Charging/Communication Cradle with Propaq LT Series monitor as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 1.2\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (w) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Monitor and Cradle with Large Color Display Interface

Guidance and manufacturer's declaration—electromagnetic emissions		
The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface is intended for use in the electromagnetic environment specified below. The customer or the user of the The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment—guidance**
RF emissions CISPR 11	Group 1	The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration—electromagnetic immunity

The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface is intended for use in the electromagnetic environment specified below. The customer or the user of the The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment—guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IED 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power-supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface requires continued operation during a power mains interruption, it is recommended that the The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Note U_t is the AC mains voltage prior to application of the test level.

Guidance and manufacturer's declaration—electromagnetic immunity

The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment—guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	$d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz where **P** is the maximum output power rating of the transmitter in watts according to the transmitter manufacturer and **d** is the recommended separation distance in meters. Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1 At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface is used exceeds the applicable RF compliance level above, the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface

The Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Propaq LT Series monitor with Charging/Communication Cradle and Large Color Display Interface as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 1.2\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (w) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Limited Warranty

This product is sold by Welch Allyn under the warranties set forth in the following paragraphs. These warranties are extended only to the end user with respect to the original purchase of this product directly from Welch Allyn or from Welch Allyn's authorized distributors.

For two years (one year for remanufactured monitors) from the date of the original delivery to the buyer, the Propaq LT Monitor and the Propaq LT Monitor Charging/ Communications Cradle are warranted to be free from functional defects in materials and workmanship and to conform in all material respects to the description of the product contained in the directions for use and other labeling of the product.

This warranty is valid only under the following conditions:

- The product is properly operated under conditions of normal use in accordance with applicable safety and regulatory requirements;
- The product is configured, modified, adjusted and repaired only by Welch Allyn or by persons expressly authorized by Welch Allyn, in accordance with Welch Allyn's service procedures; and
- The product has not been damaged by misuse, negligence, or accident.

For a period of 90 days, unless otherwise specified, this same warranty is made for any accessories provided by Welch Allyn.

Under the above warranties, Welch Allyn's sole and exclusive obligation and buyer's sole and exclusive remedy is limited to the repair or replacement, at the discretion of Welch Allyn, free of charge, of products found to be defective during the warranty period. Warranty claims must be made, not more than seven days after expiration of the warranty period, by calling the customer service number shown below to obtain a returned material authorization number (RMA), and returning the product with the RMA documentation, transportation charges prepaid, to the address specified by Welch Allyn customer service.

Welch Allyn
8500 S.W. Creekside Place
Beaverton, Oregon 97008-7107 USA
Telephone: (503) 530-7500 or (800) 289-2500
Facsimile: (503) 526-4200

Welch Allyn shall not be otherwise liable for any damages, including but not limited to incidental, consequential, or special damages.

No express or implied warranties extend beyond the warranties defined in this document. Welch Allyn makes no warranty of merchantability or fitness for a particular purpose.

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