Electromagnetic compatibility (EMC) compliance

Guidance and manufacturer's declaration

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 monitor 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.

The EMC specifications listed on pages 1-12 apply to a Propaq LT monitor using any cable approved by Welch Allyn *other than cable 008-0799-00 or 008-0799-00*. The EMC specifications listed on pages 13-24 apply to a Propaq LT monitor using cable 008-0799-00 or 008-0799-00.

Propaq LT vital-signs monitor, battery-operated

Electromagnetic emissions		
The Propaq LT vital-signs monitor, battery-operated, is intended for use in the electromagnetic environment specified below. The customer or the user of thePropaq LT vital-signs monitor, battery-operated, should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Guidance**
RF emissions CISPR 11	Group 1	The Propaq LT vital-signs monitor, battery-operated, 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 Propaq LT vital-signs monitor, battery-operated, 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 Propaq LT vital-signs monitor, battery-operated, contains either a 5-GHz orthogonal frequency-division multiplexing transmitter or 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.

Electromagnetic immunity

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

Immunity test	IEC 60601 test level	Compliance level	Guidance
EN ISO9919	20 V/m. 1 KHz AM modulation	20 V/m	Intended for use during patient transport outside the healthcare facility
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 line(s) to line(s) ±2 kV line(s) to line(s)	No connection to mains (battery-operated).	
Voltage dips, short interruptions, and voltage variations on power-supply input lines IEC 61000-4-11	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	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.

Electromagnetic immunity

The Propaq LT vital-signs monitor, battery-operated, 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	Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Propaq LT vital-signs monitor, battery-operated, 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 2Hz AM	3 V_{rms}	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz 2Hz AM	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 vital-signs monitor, battery-operated, is used exceeds the applicable RF compliance level above, the Propaq LT vital-signs monitor, battery-operated, 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 vital-signs monitor, battery-operated.

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

Rated maximum output power (watts) of transmitter	Separation distance (meters) according to frequency of transmitter		
	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 and communication cradle

Electromagnetic emissions

The charging and communication cradle, with or without the Propaq LT Series monitor, is intended for use in the electromagnetic environment specified below. The customer or the user of the charging and communication cradle should assure that it is used in such an environment.

Note: The EMC specifications listed on pages 5-8 apply to the following configurations:

- Charging and communication cradle alone
- Charging and communication cradle and Propaq LT vital-signs monitor
- Charging and communication cradle and Propaq LT vital-signs monitor in communication with a personal computer via USB cable

Emissions test	Compliance	Guidance
RF emissions CISPR 11	Group 1	The charging and communication cradle 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 and communication cradle 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	

Electromagnetic immunity			
The charging and communication cradle is intended for use in the electromagnetic environment specified below. The customer or the user of the charging and communication cradle should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**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 line(s) to line(s) ±2 kV line(s) to line(s)	±1 kV line(s) to line(s) ±2 kV line(s) to line(s)	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	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the charging and communication cradle requires continued operation during a power mains interruption, it is recommended that the charging and communication cradle 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.

Electromagnetic immunity

The charging and communication cradle 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	Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the charging and communication cradle, 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 2Hz AM	3 V_{rms}	$d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz 2Hz AM	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 and communication cradle is used exceeds the applicable RF compliance level above, the charging and communication cradle should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the charging and communication cradle.

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 and communication cradle

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

Rated maximum output power (watts) of transmitter	Separation distance (meters) according to frequency of transmitter		
	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.

Propaq LT vital-signs monitor and charging cradle with large color display interace

Electromagnetic emissions		
The Propaq LT vital-signs monitor and charging cradle with large color display interace is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor and charging cradle with large color display interace should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Guidance**
RF emissions CISPR 11	Group 1	The Propaq LT vital-signs monitor and charging cradle with large color display interace 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 vital-signs monitor and charging cradle with large color display interace 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	

Electromagnetic immunity			
The Propaq LT vital-signs monitor and charging cradle with large color display interace is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor and charging cradle with large color display interace should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**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 line(s) to line(s) ±2 kV line(s) to line(s)	±1 kV line(s) to line(s) ±2 kV line(s) to line(s)	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	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Propaq LT vital-signs monitor and charging cradle with large color display interace requires continued operation during a power mains interruption, it is recommended that the Propaq LT vital-signs monitor and charging cradle with large color display interace 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.

Electromagnetic immunity

The Propaq LT vital-signs monitor and charging cradle with large color display interace is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor and charging cradle with large color display interace should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Propaq LT vital-signs monitor and charging cradle with large color display interace, 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 2Hz AM	3 V_{rms}	$d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz 2Hz AM	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 vital-signs monitor and charging cradle with large color display interace is used exceeds the applicable RF compliance level above, the Propaq LT vital-signs monitor and charging cradle with large color display interace 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 vital-signs monitor and charging cradle with large color display interace.

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 vital-signs monitor and charging cradle with large color display interace

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

Rated maximum output power (watts) of transmitter	**Separation distance (meters) according to frequency of transmitter**		
	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.

Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01

Electromagnetic emissions		
The Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Guidance**
RF emissions CISPR 11	Group 1	The Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, 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 Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, 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 Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, contains either a 5-GHz orthogonal frequency-division multiplexing transmitter or 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.

Electromagnetic immunity			
The Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**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 line(s) to line(s) ±2 kV line(s) to line(s)	No connection to mains (battery-operated).	
Voltage dips, short interruptions, and voltage variations on power-supply input lines IEC 61000-4-11	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	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.

Electromagnetic immunity

The Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01,is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, 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 2Hz AM	1 V_{rms}	$d = 3.5\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz 2Hz AM	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 vital-signs monitor, battery-operated, with cable 008-0799-00/01, is used exceeds the applicable RF compliance level above, the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, 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 vital-signs monitor, battery-operated, with cable 008-0799-00/01.

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 vital-signs monitor, battery-operated, with cable 008-0799-00/01

The Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Propaq LT vital-signs monitor, battery-operated, with cable 008-0799-00/01, as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power (watts) of transmitter	**Separation distance (meters) according to frequency of transmitter**		
	150 kHz to 80 MHz $d = 3.5\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.35	0.12	0.23
0.1	1.1	0.38	0.73
1	3.5	1.2	2.3
10	11	3.8	7.3
100	35	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 cable 008-0799-00/01

Electromagnetic emissions

The charging and communication cradle with cable 008-0799-00/01, with or without the Propaq LT monitor, is intended for use in the electromagnetic environment specified below. The customer or the user of the charging and communication cradle with cable 008-0799-00/01 should assure that it is used in such an environment.

Note: The EMC specifications listed on pages 17-20 apply to the following configurations:

- Charging and communication cradle with cable 008-0799-00/01
- Charging and communication cradle and Propaq LT vital-signs monitor, with cable 008-0799-00/01
- Charging and communication cradle and Propaq LT vital-signs monitor, with cable 008-0799-00/01, in communication with a personal computer via USB cable

Emissions test	Compliance	Guidance
RF emissions CISPR 11	Group 1	The charging and communication cradle with cable 008-0799-00/01 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 and communication cradle with cable 008-0799-00/01 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	

Electromagnetic immunity			
The charging and communication cradle with cable 008-0799-00/01is intended for use in the electromagnetic environment specified below. The customer or the user of the charging and communication cradle with cable 008-0799-00/01 should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**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 line(s) to line(s) ±2 kV line(s) to line(s)	±1 kV line(s) to line(s) ±2 kV line(s) to line(s)	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	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the charging and communication cradle with cable 008-0799-00/01 requires continued operation during a power mains interruption, it is recommended that the charging and communication cradle with cable 008-0799-00/01 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.

Electromagnetic immunity

The charging and communication cradle with cable 008-0799-00/01 is intended for use in the electromagnetic environment specified below. The customer or the user of the charging and communication cradle with cable 008-0799-00/01 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the charging and communication cradle with cable 008-0799-00/01, 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 2Hz AM	1 V_{rms}	$d = 3.5\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz 2Hz AM	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 and communication cradle with cable 008-0799-00/01 is used exceeds the applicable RF compliance level above, the charging and communication cradle with cable 008-0799-00/01 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the charging and communication cradle with cable 008-0799-00/01.

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 and communication cradle with cable 008-0799-00/01 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the charging and communication cradle with cable 008-0799-00/01 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the charging and communication cradle with cable 008-0799-00/01 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power (watts) of transmitter	**Separation distance (meters) according to frequency of transmitter**		
	150 kHz to 80 MHz $d = 3.5\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.35	0.12	0.23
0.1	1.1	0.38	0.73
1	3.5	1.2	2.3
10	11	3.8	7.3
100	35	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.

Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01

Electromagnetic emissions		
The Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Guidance**
RF emissions CISPR 11	Group 1	The Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, 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 vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, 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	

Electromagnetic immunity			
The Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**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 line(s) to line(s) ±2 kV line(s) to line(s)	±1 kV line(s) to line(s) ±2 kV line(s) to line(s)	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	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	>95% dip for 0.5 cycle 60% dip for 5 cycles 30% dip for 25 cycles >95% dip for 5 seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, requires continued operation during a power mains interruption, it is recommended that the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, 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.

Electromagnetic immunity

The Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, is intended for use in the electromagnetic environment specified below. The customer or the user of the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, 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 2Hz AM	1 V_{rms}	$d = 3.5\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz 2Hz AM	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 vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, is used exceeds the applicable RF compliance level above, the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, 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 vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01.

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 vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01

The Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Propaq LT vital-signs monitor, charging cradle, and large color display interface, with cable 008-0799-00/01, as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power (watts) of transmitter	**Separation distance (meters) according to frequency of transmitter**		
	150 kHz to 80 MHz $d = 3.5\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.35	0.12	0.23
0.1	1.1	0.38	0.73
1	3.5	1.2	2.3
10	11	3.8	7.3
100	35	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.