

10/05

4110-1-703 Rev-D

**IMPORTANT INFORMATION:** File in your records

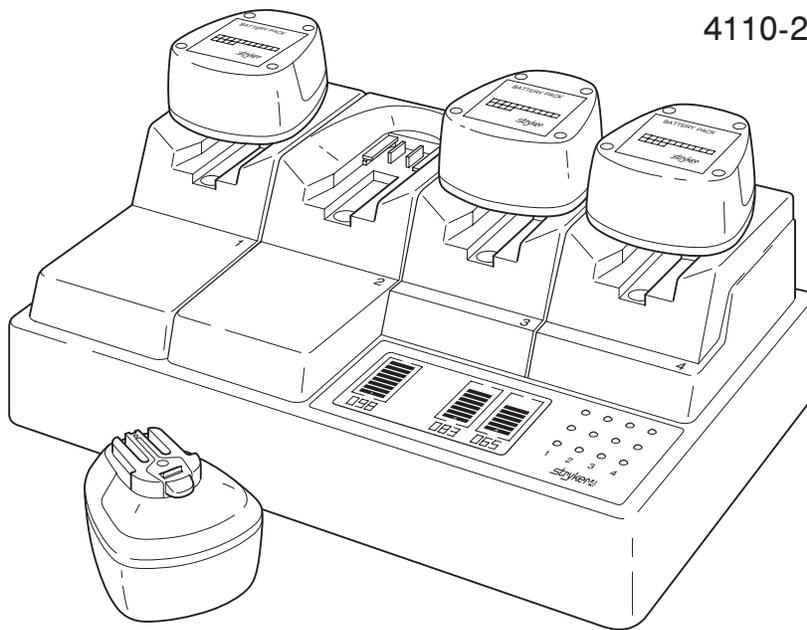
**stryker**  
**SYSTEM5**

## Battery Charger

REF 4110-100

4110-120

4110-240



**stryker**<sup>®</sup>

### Instruments

4100 E. Milham  
Kalamazoo, Michigan  
(USA) 49001  
269-323-7700  
1-800-253-3210

[www.stryker.com](http://www.stryker.com)

### European Authorized Rep:

**RA/QA Manager**  
Stryker France  
ZAC Satolas Green Pusignan  
Av. de Satolas Green  
69881 MEYZIEU Cedex  
France

US Patents: 6,018,227  
6,160,376  
6,184,655  
6,331,761

## WARNING - CAUTION - NOTE

Please read this manual and follow its instructions carefully. The words **WARNING**, **CAUTION** and **NOTE** carry special meanings and should be carefully reviewed.

**WARNING:** The personal safety of the patient and/or user may be involved. Disregarding this information could result in injury to the patient and/or user.

**CAUTION:** These instructions point out special service procedures or precautions that must be followed to avoid damaging the instrument.

**NOTE:** This provides special information to make maintenance easier or important instructions clearer.



When displayed on the product, this symbol is intended to alert the user to important operating and maintenance instructions in this manual.

## *Important Information*

The System 5 Battery Charger is a component of Stryker's System 5 Battery Powered Instruments. This charger comes configured with modules (REF 4110-415) for the purpose of charging four System 4 or System 5 battery packs.

The charger's flexible design allows reconfiguration with different charging modules made by Stryker so that it can be used to recharge a variety of Stryker batteries.



**CAUTION:** Use only Stryker approved components in the System 5 charger.

System 5 charger and batteries are "design integrated" – this means they are specifically designed to work together so that the charger's information screen will provide specific battery information.

Due to design differences, the charger does not display information for Stryker battery packs (REF 2115, 4112 and 4116) or "replacement" batteries made by other manufacturers. This charger is designed and intended to charge batteries manufactured only by Stryker.



**WARNING:** Read and understand the information in this manual. Familiarization with the System 5 Battery Charger prior to use is important. For further information contact your Stryker Instruments sales representative or contact Customer Service at 1-800-253-3210. Outside the USA, contact your nearest Stryker subsidiary.

## Important Safety Instructions



### WARNINGS:

- Prior to each use, operate system components and inspect for damage. DO NOT use if damage is apparent. Take special precautions regarding electromagnetic compatibility (EMC) when using medical electrical equipment like the System 5 Battery Charger. Install and place the charger into service according to the EMC information in this manual. Portable and mobile RF communications equipment, such as wireless phones, can affect the function of the charger.
- Use only Stryker approved accessories. Other accessories may result in increased emissions or decreased immunity of the system. Contact your Stryker sales representative for a complete list of accessories. DO NOT modify any accessory. Failure to comply may result in patient and/or operating room staff injury.
- Inspect batteries for damage before every use. DO NOT charge or use a battery that shows any evidence of damage. A cracked housing has the potential to leak electrolytes. This may result in serious injury due to contamination of the surgical site and/or chemical burns of skin and eyes.
- This equipment is not suitable for use in the presence of flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- The charger is designed to operate from a power source with the voltage rating indicated on the back of the unit. Do not attempt to operate the charger from any other voltage.
- To reduce risk of injury, charge only Stryker batteries (REF 2115, 4112, 4115, 4116, 4126-110, 4212, 4215 and 4222-110). Other batteries may explode causing personal injury and damage.
- Use of an attachment not recommended or sold by Stryker Instruments may result in a risk of fire, electric shock, or injury.
- DO NOT operate the charger with a damaged cord or plug.
- DO NOT modify the ground of power cord. Plug charger directly into a hospital grade mains outlet only.
- Do not disassemble or service charger except to replace the modules; return unit to Stryker for service or repair. Incorrect reassembly may result in a risk of electric shock or fire.
- To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning.



### CAUTIONS:

- Do not place charger in an autoclave. It is not designed for sterilization.
- Do not immerse the charger or charger modules.
- Do not touch the battery receptacle terminals with metal objects.
- Place the cord where it will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- To reduce the risk of damage to electrical plug and cord, pull by plug rather than cord when disconnecting.

# Charger Features

## Charger modules

As many as four batteries can be charged at a time. The charger's standard configuration includes four Modules (REF 4110-415) for charging the System 4 or System 5 Battery (REF 4115).

NOTE: Stryker offers a variety of interchangeable modules for the purpose of charging various Stryker batteries. The modules plug into the charger's main housing allowing you to configure the charger to meet your specific charging requirements. Installation instructions are supplied with modules.

## Power on/off

To disconnect the charger from the mains supply, unplug it from the hospital grade outlet.

## Indicator Lights

These lights indicate the status of the batteries in the corresponding charger modules: CHARGE, READY, and REPLACE. See *Charging Instructions* for details.

## Information Screen

The information screen functions separately from the indicator lights and provides additional information for "design integrated" batteries only. A "design integrated" battery works with the charger to indicate the battery's charging capacity and track its charge cycles. For example, Battery (REF 4115) is a "design integrated" battery.\*

## Battery Charge Cycles

This odometer provides the number of times a battery has undergone a complete charge cycle.

NOTE: To ensure an accurate count, the battery must only be charged on a "design integrated" charger. Charge cycles from a System 2000 charger are not included in the odometer reading.

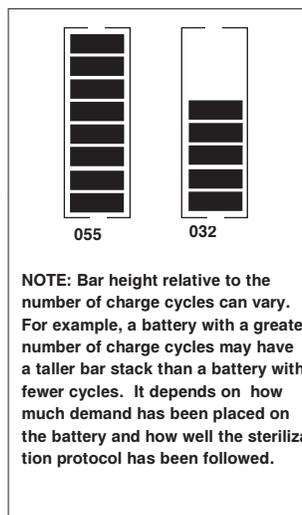
## Battery Capacity

Displayed only at the end of the charge cycle, the bar stack indicates the battery's condition by comparing it to a new battery.

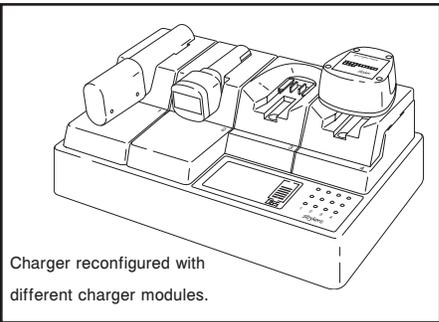
A bar stack with eight bars identifies a battery that will provide the best performance; this battery will deliver the greatest amount of energy and run the longest relative to the demand placed on it.

As the bar stack shortens, the battery's ability to store energy is diminishing. When the battery is no longer recommended for use, the bar stack disappears and the REPLACE light glows. The number of charge cycles continues to be displayed.

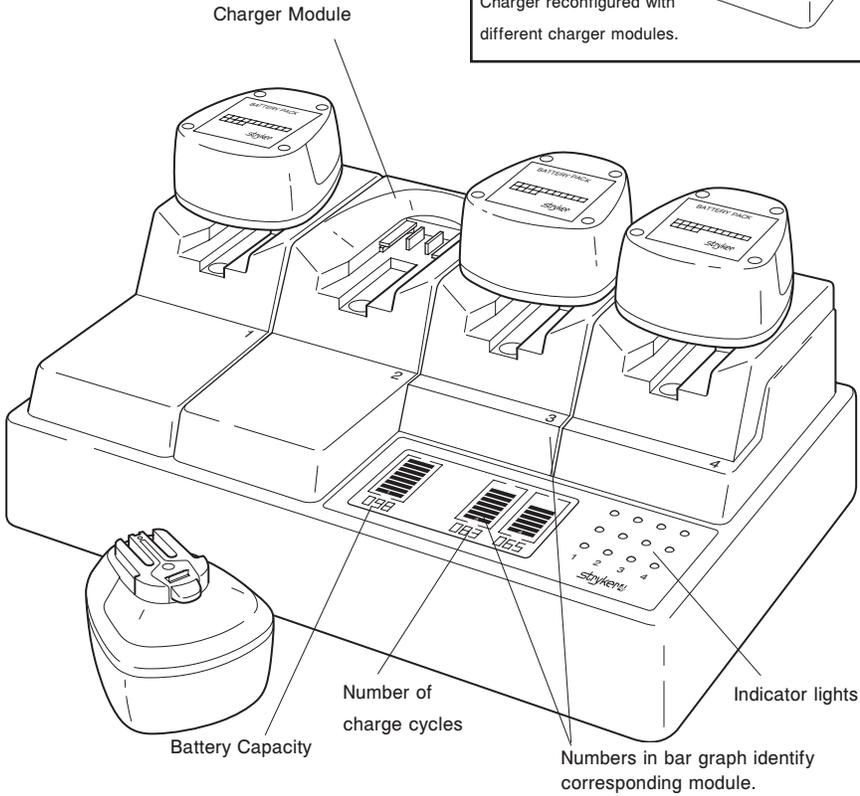
NOTE: Battery condition is dynamic and its capacity reading is influenced by battery temperature at the time of charging. Allow the battery to cool at least one hour after sterilization before placing it in the charger.



\*NOTE: Stryker Batteries (REF 2115, 4112 and 4116) can be recharged in this charger with the appropriate modules but are not "design integrated," therefore, the information screen remains blank.



Charger reconfigured with different charger modules.



**Indicator Lights**

**CHARGE**  
Yellow light illuminates while battery is charging

**READY**  
Green light illuminates when battery is fully charged and ready for use

**REPLACE**  
Yellow light illuminates when battery has expended its life and must be replaced  
**NOTE:** Replace indicators illuminate even when modules are empty.

**Symbol Definition**

 **Safety and precautionary information**

**BATTERY CAPACITY** -Capability of the battery to store energy

**BATTERY CHARGE CYCLES** -Number of charger cycles the battery has undergone

## Recharging Battery Packs

NOTE: To assure maximum run time, always recharge the battery packs before sterilization even if they have not been used.



**CAUTION:** When batteries require postsurgical sterilization, allow them to cool for 1 hour before recharging. Excess heat buildup from sterilization and charging will damage batteries.

NOTE: The information screen will not display the number of charge cycles or provide battery capacity for batteries that are not “design integrated”.

1. Plug the power cord into the receptacle on the back of the charger. Plug the other end into a hospital grade wall outlet.

The REPLACE indicators illuminate indicating power to the charger.

NOTE: The replace indicators continue to illuminate until batteries are installed in the modules.

2. Insert clean, dry batteries into the module pockets. Batteries are fully seated when the corresponding yellow CHARGE indicator glows and the information screen displays the number of charge cycles.

• **The charge cycle takes 5-45 minutes depending on the existing level of charge in the battery.**

NOTE: If applicable, see instructions for use supplied with modules for battery conditioning information.

NOTE: If the yellow **REPLACE** indicator flashes, make sure the battery is fully installed.

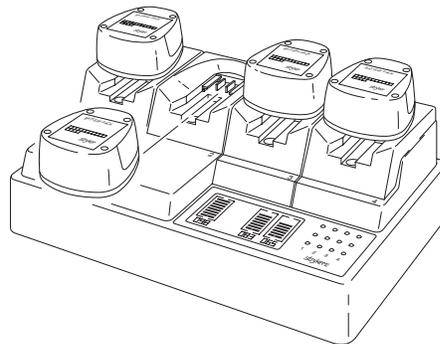
If it continues to flash, the battery and/or charger contact may be dirty. Located between the battery contact grooves is a small contact pin. Make sure it is free from debris. Also check the mating contact in the charger module for debris.

If there is no debris and the yellow light continues to flash, the battery has exceeded its operational life and should be disposed of in an acceptable manner according to local rules for nickel-cadmium disposal.

• The green READY indicator will glow when the battery pack is fully charged. For “design integrated” batteries only, the charge cycle count updates and the battery capacity bar graph appears on the information screen.

3. Store charged battery packs in the charger prior to sterilization.

NOTE: Batteries should remain connected to the charger where they will be maintained fully charged. This is the best method for extended storage.



## Troubleshooting Guide

<b>Problem</b>	<b>Instrument</b>	<b>Cause</b>	<b>Remedy</b>
Indicator lights do not illuminate.	Charger	No power to charger.	Reseat cord connections on back of charger and in the hospital grade outlet.
		Damaged charger.	Return charger for repair.
Slow flashing indicator.	Charger module	Module not properly connected.	Reseat module cable connectors. See instructions supplied with module.
		Damaged module.	Replace module.
Fast flashing indicator.	Battery	Battery is not fully seated in module.	Reseat battery.
	Battery/Charger module	Dirty contacts.	Clean contacts.
CHARGE indicator does not illuminate when battery is inserted.	Battery	Damaged battery.	Replace battery.
Battery does not fit module.	Charger module	Module intended for different battery.	Reconfigure charger. See <i>Important Information</i> .
Module is loose.	Charger module	Screw not secure.	Tighten screw.
Battery becomes unusually hot during use or while charging.	Charger module	User error.	Make sure battery is placed in appropriate module.
	Battery	Internal problem.	Check battery status in charger and replace it if indicated.
	Charger	Internal problem.	Return charger for repair.
Information screen does not display battery capacity.	Charger	The charger is designed to display battery capacity at the end of the charge cycle.	Wait until charge cycle is complete.
	Battery	Battery life is expended.	Replace battery if indicated.
Information screen does not display cycle count or battery capacity information.	Charger	Battery is not recognized by charger.	If charging Stryker battery REF 2115, 4112 or 4116 this is normal. Observe indicator lights to verify battery status.
	Battery	Battery is not manufactured by Stryker.	Use Stryker batteries only.

## Troubleshooting Guide continued

<b>Problem</b>	<b>Instrument</b>	<b>Cause</b>	<b>Remedy</b>
E01 message	Module	Module is disconnected from charger.	Connect the module to the charger.
E02 message	Battery	Battery has lost smart communication function.	Replace the battery.
	Battery	Battery contact is broken.	Replace the battery.
	Module	Module contact is broken.	Replace the module.
E03 message	Battery	Battery ID is not present.	Replace the battery.
		Refurbished battery is not programmed.	Replace the battery.

For more information contact your Stryker Instruments Sales Representative or call Stryker Service Center at 1-800-253-3210. Outside the U.S.A., contact your nearest Stryker subsidiary.

Refer operating difficulties not detailed in this manual to your Stryker sales representative or Stryker Customer Service. Outside the USA, contact the nearest Stryker subsidiary.

## Cleaning

### Battery Charger and Modules



#### CAUTIONS:

- DO NOT immerse.
  - Do not use solvents, lubricants, or other chemicals to clean the charger.
  - Do not sterilize.
1. Unplug the charger from the hospital grade wall socket.
  2. Wipe clean with a damp cloth and immediately wipe dry. Do not allow water to collect in the modules or on top of the charger.

### Battery Packs

NOTE: Refer to the cleaning and sterilization recommendations provided with battery packs.

## Periodic Maintenance Schedule

#### **Activity**

Check leakage current, ground impedance and current draw and compare with specifications.

#### **Interval**

12 months

#### **Tools & Equipment**

True RMS digital multimeter and safety analyzer.

# Specifications

**All Models**

**Mechanical**  
**Dimensions:** 10.125 W x 5.125 H x 15.5 L  
 (257mm x 130mm x 394mm)  
**Weight:** 11.5 lbs (5.2 Kg)

**IPX0 Ordinary Equipment**

**Class I**

**Protective Earth Ground** 

 **Duty Cycle: Continuous Operation**

**Approvals:**  
 CSA International  
 • IEC 60601-1  
 • CAN/CSA-C22.2 No. 601.1-M90  
 C US • UL 60601-1

Specifications listed are approximate and may vary slightly from unit to unit or by power supply fluctuations.

**Battery Charger REF 4110-120**

**Electrical**  
**Input:** 120V~, 1.7A, 50-60Hz  
**Output:** Open Circuit 20V   
**Cord:** 2m long, fitted with NEMA 5-15 Hospital grade plug

**Battery Charger REF 4110-240**

**Electrical**  0197  
**Input:** 230V~, 0.9A, 50-60Hz  
**Output:** Open Circuit 20V   
**Cord:** 2.5m long, fitted with CEE 7/7 "Schuko"

**Battery Charger REF 4110-100**

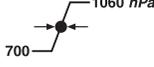
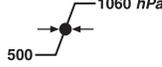
**Electrical**  
**Input:** 100V~, 1.9A, 50-60Hz  
**Output:** Open Circuit 20V   
**Cord:** 2m long, fitted with NEMA 5-15 Hospital grade plug

**If experiencing sporadic electrical interference:**

- Turn off all electrical equipment not in use.
- Relocate electrical equipment; increase spacial distance.
- Plug the charger and other equipment into different outlets.

To ensure the longevity, performance and safety of this equipment, package in original packaging materials when storing or transporting.

**Environmental Conditions**

	<u>Temperature</u>	<u>Relative Humidity</u>	<u>Atmospheric Pressure</u>
<b>Operation:</b>			
<b>Storage and Transportation:</b>			

<b>Guidance and manufacturer's declaration - electromagnetic emissions</b>		
<p>The System 5 Battery Charger is intended for use in the electromagnetic environment specified below. The customer or the user of the System 5 Battery Charger should assure that it is used in such an environment.</p>		
<b>Emissions test</b>	<b>Compliance</b>	<b>Electromagnetic environment - guidance</b>
RF emissions  CISPR 11	Group 1	The System 5 Battery Charger 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.
RF emissions  CISPR 11	Class B	
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 System 5 Battery Charger is intended for use in the electromagnetic environment specified below. The customer or the user of the System 5 Battery Charger should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	<p>Portable and mobile RF communications equipment should be used no closer to any part of the System 5 Battery Charger, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d=1.67\sqrt{P}$ <p>80 MHz to 800 MHz</p> $d=1.67\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d=2.33\sqrt{P}$ <p>800 MHz to 2.5 GHz</p> <p>Where <math>P</math> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and <math>d</math> is the recommended separation distance in meters (m)</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
NOTE 1: At 80 MHz and 800MHz 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.			

<b>Guidance and manufacturer's declaration - electromagnetic immunity</b>			
The System 5 Battery Charger is intended for use in the electromagnetic environment specified below. The customer or the user of the System 5 Battery Charger should assure that it is used in such an environment.			
<b>Immunity test</b>	<b>IEC 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment - guidance</b>
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±2, 4, 6 kV contact ±2, 4, 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 IEC 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	95% Reduction (10ms)  60% Reduction (100ms)  30% Reduction (500ms)  95% Reduction (5s)	Mains power quality should be that of a typical commercial or hospital environment. If the user of the System 5 Battery Charger requires continued operation during power mains interruptions, it is recommended that the System 5 Battery Charger be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m @ 50Hz CRT 1A/m	Power frequency magnetic fields should be at levels characteristics of a typical location in a typical commercial or hospital environment.
NOTE: $U_T$ is the a.c. mains voltage prior to application of the test level.			

Recommended separation distances between portable and mobile RF communications equipment and the System 5 Battery Charger			
<p>The System 5 Battery Charger is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the System 5 Battery Charger can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the System 5 Battery Charger as recommended below, according to the maximum output power of the communications equipment.</p>			
Rated maximum output power of transmitter  W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz  $d = \left[ \frac{3.5}{V_1} \right] \sqrt{P}$	80 MHz to 800 MHz  $d = \left[ \frac{3.5}{E_1} \right] \sqrt{P}$	800 MHz to 2.5 GHz  $d = \left[ \frac{7}{E_1} \right] \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.37
100	11.70	11.70	23.30
<p>For transmitters rated at a maximum output power not listed above, the recommended separation distance <math>d</math> in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where <math>P</math> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.</p> <p>NOTE 1: At 80 MHz and 800MHz, the separation distance for the higher frequency range applies.</p> <p>NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>			

## ***Repair and Loaner Program***

This service is available in the United States only. Outside the U.S.A., contact your Stryker sales representative or your nearest subsidiary listed on the last page.

**On request, Stryker Instruments will provide a loaner unit for your use while repairs are being made. Please clean and sterilize all potentially contaminated products being sent in for repair, credit, or return of a loaner unit. The policy of Stryker Instruments is not to accept or process potentially contaminated products which do not meet this requirement.**

**Also, please be aware that it is unlawful to transport bio-contaminated products through interstate commerce which are not properly packaged and labeled as such.**

- 1. Contact Stryker Customer Service at 1-800-253-3210 to request a loaner.** Provide a name and address for shipping. Every effort will be made to send a loaner unit immediately.
- 2. Send the inoperative unit to Stryker with a purchase order number of authorization for repair.** The order should explain the nature of the difficulty. Also, provide a name and address for shipping the repaired instruments.

**Return the inoperative unit to:**

**Stryker Instruments  
Repair Department  
4100 E. Milham  
Kalamazoo, Michigan, 49001.**

- 3. The repaired unit will be shipped back and the repair invoice will follow under separate cover.** Under most conditions, repair turnaround time will be approximately 2-3 weeks.
- 4. As soon as your repaired unit is returned, return the loaner to Stryker Instruments.**

### **Limited Warranty**

In the U.S.A. only, products of Stryker Instruments are warranted to the original purchaser for a period of one year from the date of purchase, with exceptions noted below. Products are warranted to be free from defects in material and workmanship. Abnormal wear and tear or damage caused by misuse or by failure to perform normal and routine maintenance as set out in these instructions, or as demonstrated by an authorized Stryker Instruments representative, is not covered by the warranty. Any effort at field repair or adjustment may invalidate your warranty.

The warranty extends to all purchasers and is limited to the repair or replacement of the product without charge when returned prepaid to Stryker Instruments. There are no other expressed warranties. This warranty gives you specific legal rights and you may have other rights which vary by state and municipality.

**For selected products.**

Batteries are warranted for a period of 90 days from the date of invoice.



European Equivalent: 4110-1-713  
Japanese Equivalent: 4110-1-720

**stryker**<sup>®</sup>

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**Instruments**

4100 E. Milham  
Kalamazoo, Michigan  
(USA) 49001  
269-323-7700  
1-800-253-3210

**European Authorized Rep:**  
**RA/QA Manager**  
Stryker France  
ZAC Satolas Green Pusignan  
Av. de Satolas Green  
69881 MEYZIEU Cedex  
France