

## pT2-500

*PRECISION MICROPHONE  
PREAMPLIFIER  
with Direct Input and Thru*

*500 series compatible module*



**CERTIFICATION****Declaration of Conformity**

Sunrise Engineering and Design Inc. hereby declares the **True Systems pT2-500** single channel microphone preamplifier module to be in material conformity with the following EC directives and related standards:

- 2006/95/EC Low Voltage Directive
- 2004/108/EC EMC Directive

Technical files are maintained at corporate headquarters of Sunrise Engineering and Design Inc., 1630 S. Research Loop, Suite 150, Tucson, Arizona 85710, U.S.A

**Certificate of Compliance**

This is to certify that the **True Systems pT2-500** is RoHS compliant and meet the requirements and specified limits of restricted substances according 2002/95/EC directive.

**WEEE**

**pT2-500** is marked with the WEEE symbol to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. The symbol indicates that this product should not be treated as household waste. It must be disposed and recycled separately as electronic waste. Please assist to keep our environment clean.

Above declarations are void by modification of the device without approval, or unauthorized servicing.

Tucson, 06-01-2010

Tim Spencer, president

## SAFETY & OPERATING PRECAUTIONS

### Important symbols:



This symbol appearing on the product or in this manual indicates the presence of dangerous voltage within the product enclosure that presents the risk of electric shock injury. When this symbol appears next to an operation discussed in this manual, only qualified technical personnel should perform that operation.



This symbol indicates important operating or maintenance instructions that should be read carefully. Failure to observe these instructions could result in damage to this product or other equipment.



### **WARNINGS:**

While no hazardous voltage is present within this product during normal operation, please observe the following warnings regarding any AC-powered equipment into which this product is installed:

- To reduce the risk of electric shock injury, do not remove the access covers on AC-powered equipment. Refer servicing to qualified personnel.
- This unit is intended for indoor operation only
- Do not operate this unit in the presence of rain, liquids or condensing moisture.
- Do not expose the unit to dripping or splashing liquids.
- Do not place liquid-filled objects on the unit.
- Do not defeat the earth ground connection in the AC power cable.
- Do not defeat intended AC power connection polarization.
- Do not use a damaged or excessively worn cord to connect the equipment to AC power.



### **CAUTIONS:**

- Severe damage to **pT2-500** will occur if incorrect power supply voltages are applied to the card edge connector. Please consult the "CONNECTIONS" section in this manual for proper power supply specifications/connections.

#### **Disclaimer:**

**Product failure caused by improper voltage application cannot be covered under warranty.**

- Liquid entering the product enclosure is likely to cause performance degradation or failure. Failures due to moisture entering the enclosure cannot be covered under warranty. Should liquid spill on the unit, immediately disconnect it from the AC power source and contact **TRUE Systems** for servicing instructions
- This product is designed to operate in an ambient temperature range of 10°C to 50°C (50°F to 122°F).

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## PRODUCT OVERVIEW

Thanks for using our product! We appreciate the confidence you place in **TRUE Systems** by purchasing the **pT2-500** microphone preamplifier/instrument DI. We design our products to deliver stunning musical accuracy, uniquely useful features, exceptional value, and reliability. Every aspect of this product design was determined by careful listening tests and extensive user feedback. Please feel free to contact us with questions or comments. And, we always appreciate hearing about (and hearing) successful projects you've completed!

### **NEW TYPE 2 CIRCUIT DESIGN**

The **pT2-500** is the first instance of our new-technology Type 2 circuit design. Our Type 2 design provides the traditional ultra-resolution musicality of our original design preamps, but adds serious analog depth and warmth. In short: It sounds *BIG!*

New technology alone certainly doesn't guarantee better sonic performance (frequently, just the opposite). But, frankly, neither do transformers, Class A circuit topology, through-hole components, etc., etc. We've spent great effort designing, refining, and working with major component manufacturers in order to implement the Type 2 design. And, we believe you'll be very pleased with the results!

### **FEATURES**

- ◆ API™ 500 series module format
- ◆ Totally Balanced Topology for:
  - insensitivity to ground noise/loops
  - Insensitivity to EMI, both external and from adjacent modules/power supplies
  - reduced distortion
- ◆ Rail-to-Rail design for:
  - higher internal headroom
  - higher maximum input level without pad (up to +22dBu)
  - higher output level without transformer and excessive power supply current
- ◆ 0.1% precision resistors for:
  - exceptional Common-Mode and Output Signal Balance performance
  - excellent unit-to-unit sonic consistency
- ◆ "Real DI" IN and THRU jacks for:
  - Easy hookup to amps for simultaneous DI and amp'd tracking or live sound
  - Easy hookup to other DI's or effects for simultaneous tracking or live sound
- ◆ Detented, continuous Gain Control and Dual Gain Ranges for:
  - easy gain resetability
  - easy gain setting over wide gain ranges
- ◆ Steel Enclosure for:
  - protection from EMI and RFI
  - protection from ESD and handling contamination/damage
- ◆ 80Hz High Pass Filter
- ◆ 4-Level Signal Meter

## INSTALLATION

### Unpacking

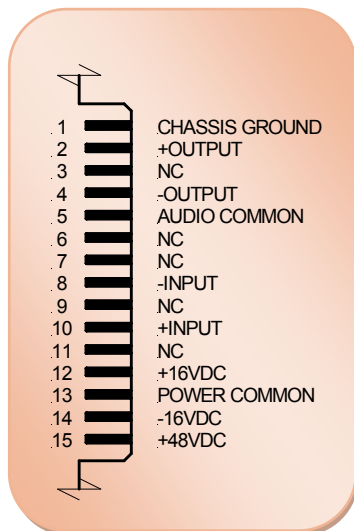
Please read and follow instructions on the Caution sticker on the anti-static bag enclosing the **pT2-500**:

- Please ground yourself to dissipate static electricity before opening anti-static bag and handling the **pT2-500**.
- Save the anti-static bag, carton, and foam supports for future storage or shipment.

### Card Rack Installation

1. Turn off card rack AC power and remove AC power cord.
2. Carefully align the **pT2-500** with the desired card slot edge connector. This is a blind installation, so take your time in order to avoid scratching this unit or adjacent units in the card rack.
3. Press the unit firmly and evenly until you feel it seat in the card edge connector.
4. If you have difficulty inserting this unit, check for debris in the card rack edge connector. It may help to rearrange adjacent modules in the card rack.
5. Secure the front panel with two 4-40 flat head philips mounting screws (supplied with API™ card racks and Lunchbox™).
6. Reconnect the AC power cord and turn on the rack power.

### Card Edge Connections



If you are using a custom card rack, or a card rack not manufactured by API™, please verify the following power supply terminations:

Pin 12 = +16VDC  
 Pin 13 = Power Common  
 Pin 14 = -16VDC  
 Pin 15 = +48VDC

**Note:**

Pin 1 is located at the top of the card edge connector.

**Disclaimer:**

**Damage caused by incorrect power supply termination or voltage cannot be covered under warranty.**

### Ventilation

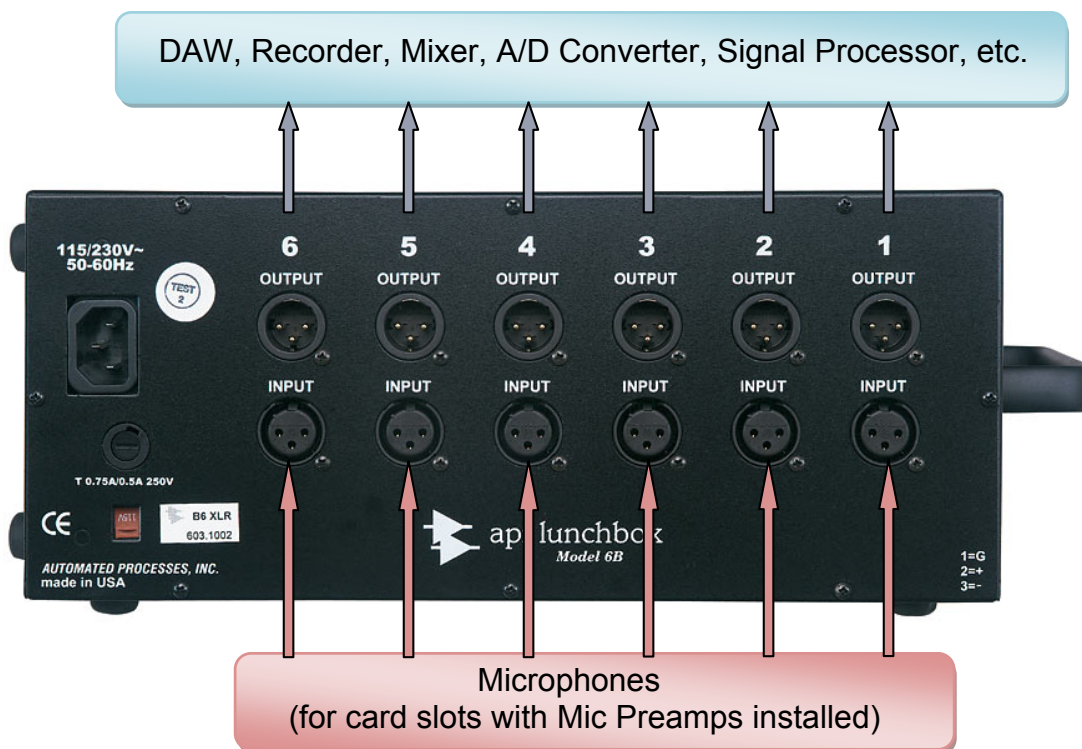
We recommend that the card rack containing the **pT2-500** have adequate ventilation to maintain the unit within an operating ambient temperature range of 10°C to 50°C (50°F to 122°F).

## OPERATION

### Connections

Read “**Safety and Operating Precautions**” on page 3, and “**Installation**” on page 6 of this manual before making any connections to the **pT2-500**.

1. Connect output signal cables from the XLR **OUTPUT** connectors on your 500-series compatible card rack to the analog line-level inputs of your DAW, recorder, mixer, A/D converter, signal processor, etc.
  - ▶ XLR outputs used with unbalanced cable configuration must be wired correctly. ◀ See page 9 “Output Cable Connection – unbalanced”.



2. Connect microphone cables to the XLR **INPUT** connectors on card slots that contain your **pT2-500** or other mic preamp.
  - ▶ Do not attempt to connect unbalanced microphones to the **pT2-500** ◀ It is not intended to operate with this type of microphone.



**NOTE:** The input and output connector locations on some 500-series compatible card racks are different than on API™ units. In order to prevent time-consuming errors and possible damage to your equipment, please consult the manufacturer’s documentation for the particular card rack you are using.



**CAUTION:**

We recommend that you avoid “hot-patching” microphone inputs when using a patch bay at the microphone inputs of the **pT2-500**. Please **TURN OFF** phantom power and turn down the gain prior to connecting or re-patching microphone inputs routed through a patch bay. Failure to do so may result in transients that can damage the **pT2-500** or equipment that is connected to its outputs-not to mention your ears!

**Instrument Input and Thru (DI)**

1. Connect your instrument cable to **IN**. This interrupts the microphone input on the rear panel and routes your instrument to the discrete FET DI in the **pT2-500**. This input is intended for unbalanced signal sources.
  - ▶ **DO NOT** use TRS plugs for this input or the DI will not be activated ◀
2. If desired, connect a cable from **THRU** to a guitar/bass amp, another DI, or additional signal processing device.



3. The **IN** and **THRU** jacks are directly connected as in any typical standalone DI. Since the input impedance of the **pT2-500** FET DI is 2.5 Megohms, it does not provide any significant electronic load to the instrument pickup. When connection is made via the **THRU** jack to an amp or other device, the input impedance of that device will essentially determine the electronic load on the instrument pickup. Keep in mind that lower impedance may alter the tonal character of your instrument.



**A Word About Cables...**

Most users of the **pT2-500** have invested much time and money in their selection of microphones and preamplifiers. We recommend that you give some consideration to the microphone, instrument and output cables you select, as well.

- Use high-quality, low capacitance cable. Braided shielding and “star quad” type mic cables will perform better in electrically noisy environments. Manufacturers such as Canare®, Mogami® (and others) make high performance cable of this type.
- Some “house brand” cables are made by quality manufacturers, but others can be inferior. Be careful. Use cables with high-quality connectors (Neutrik®, Switchcraft®, etc.).
- Our studio testing has shown that some of the more esoteric guitar/instrument “super-cables” do, indeed, sound better. Noticeable improvement, but at a stiff price. Try before you buy!
- Avoid excessive cable length.
- Replace damaged connectors.

**Cable Types**

There are two styles of audio cables used for connections to the **pT2-500** in a 500-series rack:

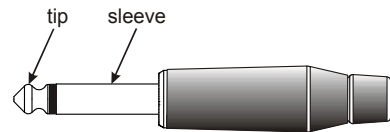
- Shielded / single-conductor type for unbalanced signals (Instrument cables)
- Shielded / twisted-pair type for balanced signals ( Microphone / Line level cables)

We recommend that all interconnecting cables are wired according to the following standards. Failure to do this can result in malfunction or audible distortion.

**For Instrument cables (unbalanced)**

on TS connectors:

- Tip = positive (+) signal
  - Sleeve = shield

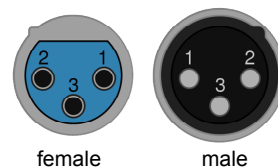


TS connector (1/4" plug, mono)

**For Microphone and Line level cables (balanced)**

on XLR connectors:

- Pin 1 = shield
- Pin 2 = positive (+) signal
- Pin 3 = negative (-) signal



XLR connector (front side)

**Output cable connection – unbalanced**



**NOTE:** When connecting an XLR output from **pT2-500** to a subsequent audio device with an unbalanced input, the negative signal lead (from Pin 3) must be wired to shield (Sleeve) at the TS connector. For this type of connection, the Maximum Output Level is reduced to +23dBu.

**Front Panel Layout**

**CONTROLS**

**Gain**

The detented rotary gain control along with the **HI GAIN** button setting determines the overall gain through the preamp. When **HI GAIN** is off, the rotary gain control range is from 6dB to 58dB and maximum input level is approximately +22dBu. When **HI GAIN** is on, the rotary gain control range is from 18dB to 70dB with maximum input of +10dBu.

**Polarity**

Output signal polarity is reversed when the **POL** button is depressed.

**High Pass Filter**

The **HPF/80Hz** button activates the high pass filter (-3dB at 80 Hz).

**Phantom Power**

The **+48V** button activates phantom power for microphones that require it.

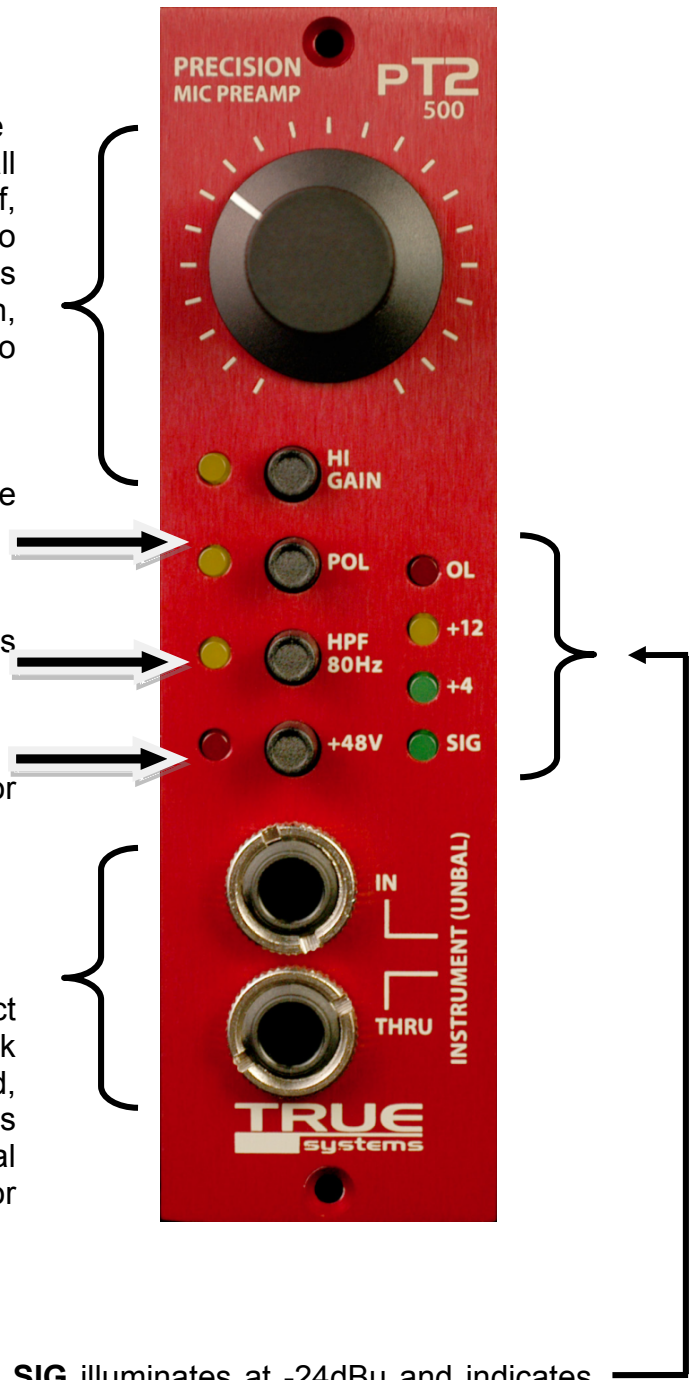
**CONNECTIONS**

**Instrument Input**

Discrete FET Instrument Direct IN. Connect your instrument cable to the **IN** jack (unbalanced instrument cable only). If desired, connect a cable from **THRU** to a guitar/bass amp, another DI, or additional signal processing device. See previous section for details.

**LEVEL INDICATORS**

The level indicators show output signal level. **SIG** illuminates at -24dBu and indicates that a signal is present on the channel. **+4** illuminates when the output signal reaches normal operating level of +4 dBu. **+12** illuminates when the output signal reaches +12dBu. **OL** illuminates when the output signal level exceeds +26dBu which is 3dB below actual preamp overload.



## SPECIFICATIONS\*

<b>Frequency Response</b> @ 40dB gain (-3 dB)	1.5 Hz – 600 kHz
<b>THD+N</b> @ 40dB gain, +26 dBu out, 20Hz to 20kHz BW	0.0004%
<b>Intermodulation Distortion</b> SMPTE/DIN 4:1 (60Hz/7kHz), @40dB, +26dBu	0.0009%
<b>Noise (E.I.N)</b> Rs = 0 Ohms	-133 dB
<b>CMRR</b> @40dB gain, Vcm = +10dBu	85 dB
<b>Slew Rate</b>	50 V/us
<b>Microphone Input</b>	1x balanced (XLR-type) (via card edge connector)
<b>Maximum Input Level</b>	+ 22 dBu
<b>Input Impedance</b>	5.5 kOhm
<b>Gain</b>	+6 to +58 dB (LO gain) +18 to +70 dB (HI gain)
<b>Instrument Input (DI)</b> FET discrete circuit	1x unbalanced, (jack type) (IN jack on front panel)
<b>Maximum Input Level (DI)</b>	+11 dBu
<b>Input Impedance (DI)</b>	2.5 MOhm
<b>Gain (DI)</b>	-14 to +38 dB (LO gain) -2 to +50 dB (HI gain)
<b>Output</b>	1x balanced (XLR) (via card edge connector) 1x unbalanced (TS jack) (THRU jack on front panel)
<b>Output Impedance</b>	100 Ohm
<b>Maximum Output Level</b>	+29 dBu
<b>Power Requirements</b>	±16 VDC, +48 VDC (power supply - 500 format rack) (via card edge connector)
<b>Power Consumption</b>	65 mA = 1.04 W (±16V) 2 mA = 0.01 W (+48V)
<b>Dimensions</b>	1.5" x 5.25" x 6.05" (W x H x D) 38.1 x 133.4 x 153.8 mm
<b>Weight</b>	1.4 lbs. (0.64 Kg)

\*Typical performance. Specifications subject to change without notice.

## TROUBLESHOOTING

### Symptom

No signal output. Main power switch on rack power supply is ON, but no LED's illuminate on **pT2-500**.

No signal output. Main power switch on rack power supply is ON and appropriate LED's illuminate on **pT2-500**.

Output signal is distorted. Outputs are connected for **balanced operation**.

Output signal is distorted. Outputs are connected for **unbalanced operations**.

Hum can be heard in the audio program.

Electric instrument connected to a Direct Input does not produce a signal or signal is distorted.

### Solution

- Check AC power source and cord connection
- Check fuse on rack power supply.
- Check that preamp card edge connector is properly seated.
- Check status of phantom power.
- Check continuity of mic and electric instrument cables.
- Check continuity of output cables.
- Make sure GAIN control is adjusted.
- Make sure GAIN is adjusted so that the **OL** indicator does not activate during the audio program.
- Make sure the high output capability of this unit is not overloading the device or monitoring system to which it is connected.
- Check continuity of output cable.
- Make sure outputs are not connected to a load impedance of less than 600 ohms.
- Make sure the minus (-) output signal pins are connected to the shield and not left unconnected. See "Output Cable Connection" section, page 9.
- Check troubleshooting tips for balanced operation (above).
- Check continuity of output cables (particularly shields).
- Alternatively, disconnect shields on one end of output cables (not appropriate for unbalanced connections).
- Check continuity of electric instrument cables.
- Check the batteries or AC power source of any "foot pedal" effects processors connected to the Direct Input.
- Make sure that the instrument cables have standard tip-sleeve 1/4" phone plugs.

**Symptom**

Radio Frequency Interference can be heard in the audio program (swishing sound or audio from a radio transmitter)

**Solution**

**DO NOT** use TRS plugs!

- Make sure that mic cables are of good quality and that the shield is properly connected. Avoid excessive length.
- Make sure that earth ground connection is maintained via the AC power cord.  
**DO NOT** use an isolator!
- Make sure the unit is located away from known sources of radio frequency energy. (e.g. cell phone, walky-talky etc.)

## WARRANTY & SERVICE INFORMATION

### REGISTRATION

Don't forget to register your **pT2-500** by completing the registration form online at our website [www.true-systems.com](http://www.true-systems.com) (Tech Support/Product Registration). Alternatively, fill out the enclosed Registration Card and return it to us. This allows **TRUE Systems** to contact you regarding any updates, upgrades or applications information that may become available.

### WARRANTY

SUNRISE ENGINEERING and DESIGN INC. ("SUNRISE") warrants the **TRUE systems pT2-500** to be free from defects in material and manufacture, when properly installed and used according to instructions in the Operation Manual, for a period of **one year** from the date of sale to the original purchaser. Units returned for warranty repair to SUNRISE or an authorized **TRUE Systems** repair facility will be repaired or replaced at the manufacturer's option, free of charge. Supplementary shipping charges will apply to units returned to addresses outside the continental USA. All units returned to SUNRISE or authorized **TRUE systems** repair facility must be **prepaid, insured and properly packaged**. Purchaser must obtain a Return Authorization (RA) number from SUNRISE prior to returning a product. SUNRISE may require proof of the purchase date in the form of a copy of a dated original retail invoice.

This warranty is void if, in the sole judgment of SUNRISE, the product has been abused, neglected, misapplied, or has been damaged by an accident, modification, or attempted repair by unauthorized personnel. This warranty will not apply to cosmetic damage incurred due to normal handling and use. SUNRISE reserves the right to change or improve the product design at any time without prior notice. Incorporation of design changes in future versions of the product does not imply the availability of upgrades for existing units.

This warranty is in lieu of all other warranties, expressed or implied, and SUNRISE specifically disclaims all implied warranties, including, but not limited to, warranties of merchantability and fitness for a particular purpose. The purchaser acknowledges and agrees that in no event shall SUNRISE be held liable for any special, indirect, incidental or consequential damage, or for injury, loss or damage sustained by any person or property, that may result from the use of, or failure of this product to operate correctly at any time. In the USA, some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damage, so the previous exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.



**SERVICE and SUPPORT**

Other than cleaning the exterior surfaces of your **pT2-500** and occasional inspection of the audio cables for damage, no maintenance procedures should be attempted by the user. Cleaning can be performed using a lint-free cloth dampened with Windex®.

There are no user-serviceable components inside the product enclosure. Many of the electronic components are selected and matched at the factory. For this reason, as well as personal safety considerations, we recommend that you refer service requirements to **TRUE Systems** or authorized repair facilities.

All units returned to **TRUE systems** or authorized **TRUE systems** repair facility must be **prepaid, insured and properly packaged**. Purchaser must obtain a Return Authorization (RA) number from SUNRISE prior to returning a product.

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