



MEC | MPEG-2 Encoder



MEC Owners Manual

Please read this manual thoroughly before use.
Keep this manual handy for future reference.

Visit Our Website www.picomacom.com
Contact Us **858.546.5050**
Toll Free **800.421.6511**

Pico Macom MEC- MPEG-2 Encoder OWNERS MANUAL

Product Inspection

Inspect the equipment for shipping damage. Should any damage be discovered, immediately file a claim with the carrier.

Important Safety Instructions

To ensure proper installation and operation, take a moment to read this guide before proceeding with the installation. If you have any questions or comments about the **MEC MPEG-2 Encoder**, please contact your dealer or have him contact the **PICO MACOM** Service Center at this phone number: 800-421-6511.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING:

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. DO NOT OPEN THE CABINET. REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

CAUTION:

TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENCION:

POUR PREVENIR LES CHOCS ELECTRIQUES, NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

- 1. Read Instructions:** All safety and operating instructions should be read before the appliance is operated.
- 2. Retain Instructions:** The safety and operating instructions should be retained for future reference.
- 3. Heed Warnings:** All warnings on the appliance should be adhered to.
- 4. Follow Instructions:** All operating and user instructions should be followed.
- 5. Cleaning:** Unplug this appliance from the wall outlet before cleaning. Use a damp cloth for cleaning. Do not use liquid cleaners or aerosol cleansers.
- 6. Do Not Use Attachments:** Use of attachments not recommended by the manufacturer may cause hazards.
- 7. Water and Moisture:** Do not use this product near water for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool and the like.
- 8. Accessories:** Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the appliance.
- 9. Elevated Operating Ambient:** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) 50°C.
- 10. Reduced Air Flow:** Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- 11. Mechanical Loading:** Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- 12. Circuit Overloading:** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- 13. Reliable Earthing:** Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

14. Power Sources: This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your appliance dealer or local power company.

15. Power-cord Protection: Power-supply cords should be routed so they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords and plugs, convenience receptacles, and the point where they exit from the appliance.

16. Lightning: For added protection for this product during a lightning storm, or when it is left unattended or unused for long periods of time, the unit should be disconnected from power source.

17. Power Lines: An outside antenna system should not be located in the vicinity of overhead power lines, other electric light or power circuits, where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them may be fatal.

18. Object and Liquid Entry: Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

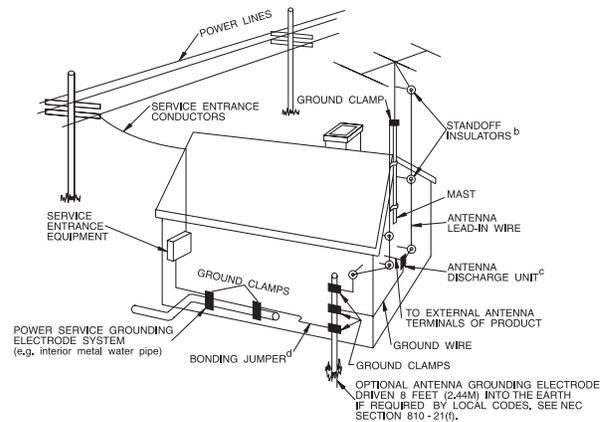
19. Servicing: Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

20. Damage Requiring Service: Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- a. When the power-supply cord or plug is damaged.
- b. If liquid has been spilled, or objects have fallen into the product.
- c. If the product has been exposed to rain or water.
- d. If the product does not operate normally by following the operating instruction. Adjust only those controls that are covered by the operating instructions. An improper adjustment may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- e. If the product has been dropped or the cabinet has been damaged.
- f. When the product exhibits a distinct change in performance—this indicates a need for service.

21. Replacement Parts: When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original parts. Unauthorized substitutes may result in fire, electric shock or other hazards.

EXAMPLE OF ANTENNA GROUNDING ACCORDING TO NATIONAL ELECTRICAL CODE INSTRUCTIONS CONTAINED IN ARTICLE 810 - "RADIO AND TELEVISION EQUIPMENT"



22. Safety Check: Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating conditions.

23. Outdoor Antenna Grounding: Before attempting to install this product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges.

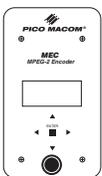
- a. Use No.10 AWG (5.3mm) copper, No.8 AWG (8.4mm) aluminum, No.7 AWG (10mm) copper-clad steel or bronze wire or larger, as ground wire.
- b. Secure antenna lead-in and ground wires to house with stand-off insulators spaced from 4 feet (1.22m) to 6 feet (1.83m) apart.
- c. Mount antenna discharge unit as close as possible to where lead-in enters house.
- d. A driven rod may be used as the grounding electrode where other types of electrode systems do not exist. Refer to the National Electrical Code, ANSI/NFPA 70-1984 for information.
- e. Use jumper wire not smaller than No.6 AWG (13.3mm) copper or equivalent, when a separate antenna grounding electrode is used.

NOTE TO THE CATV SYSTEM INSTALLER

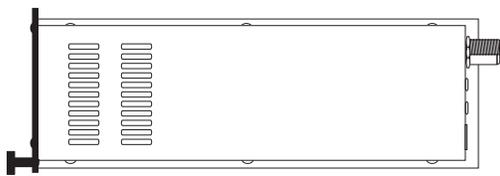
THIS REMINDER IS PROVIDED TO CALL THE CATV SYSTEM INSTALLER'S ATTENTION TO ARTICLE 820-22 OF THE NEC THAT PROVIDES GUIDELINES FOR PROPER GROUNDING AND, IN PARTICULAR, SPECIFIES THAT THE CABLE GROUND SHALL BE CONNECTED TO THE GROUNDING SYSTEM OF THE BUILDING, AS CLOSE TO THE POINT OF CABLE ENTRY AS PRACTICAL.

MEC MPEG-2 Encoder

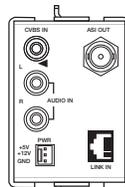
- 2RU modular design with low power consumption.
- Analog composite video input in NTSC/PAL format.
- 4:2:0 MP@ML video compression from 2.5 to 15 Mbps.
- Analog stereo audio input.
- MPEG-1 layer2 or Dolby Digital® (AC3) audio compression.
- ISO/IEC 13818-1 PAT and PMT tables with Single Program Transport Stream (SPTS) output transport stream.
- Local control via front panel display and keys.
- Remote control via supplied utility.



Front View



Side View



Rear View

Specifications

VIDEO INPUT

Signal	Composite (NTSC / PAL)
Connector	RCA Jack (Yellow)
Level	1 Vp-p, 75 Ohm unbalanced

ENCODING

Type	MPEG-2 MP@ML
Supported Resolution	720 x 480 (NTSC) 720 x 576 (PAL)
Frame Rate	29.97 (NTSC) 25 (PAL)

AUDIO INPUT

Signal	Stereo
Connector	RCA Jack (Red, White)
Level	2Vrms max.

ENCODING

Type	MPEG-1 Layer 2 or Dolby Digital™ (AC3)
Sampling Rate	32 / 44.1 / 48 KHz
Mode	MPEG-1 Layer 2: Stereo / Joint Stereo / Dual Channel / Single Channel
Bit Rate	MPEG-1 Layer 2: 32 to 384 Kbps Dolby Digital (AC3): 128 to 448 Kbps

OUTPUT

Output Interface	DVB-ASI
Connector	BNC
Level	800 mVpp Nominal, 75Ω

MULTIPLEX

Type	ISO/IEC 13818-1
Single Program Transport Stream (SPTS) with PAT and PMT tables	
Bit Rate	Up to 19.2 Mbps

CONTROL

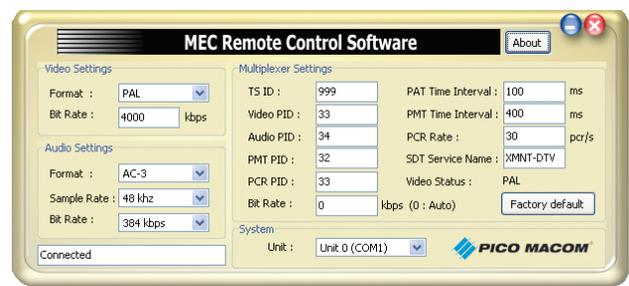
Local Operation	8x2 LCD Display & Five front control keys
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REMOTE OPERATION

Connector	(PC) RS232 (UNIT) RJ-11
Interface	Supplied Utility

MECHANICAL

Power Consumption	12V / 0.486A 5V / 0.760A
Dimension	2"x 3.5"x 10"(52.8 x 88 x 254 mm)
Weight	1.6 lbs (0.726 kg) approx



MEC Remote Control Software

Ordering Information

MEC MPEG-2 Encoder

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Introduction

The MEC is a single pass standard definition MPEG-2 compliant encoder which accepts analog composite video and two audio inputs for stereo analog audio and outputs one single program transport stream in the DVB-ASI format. The highly integrated silicon encoding solution along with a custom FPGA provides an inexpensive solution to adding a digital channel to local cable systems, hospitality and similar applications. For compatibility with digital (ATSC) televisions and North American set top boxes, the MEC includes both MPEG Layer II and Dolby Digital™ audio coding.

The inputs, RCA for composite baseband video and audio left and right signals, match common sources in small systems. The ASI output on BNC matches QAM modulators such as the Pico PQM modulator and common multiplexers for those that wish to combine several MEC outputs in a multiple program transport stream before transporting in a QAM modulator. The PQM and the MEC are the same size and can mix in the same MPC-12 chassis

A simple, yet flexible, user interface on the front panel allows selection of output rate, video rate, and audio sampling and data rates. Additional user selection for transport stream ID, PID numbers, and more ensure compatibility with your application. The MEC includes a DVB SDT (Service Description Table) to ensure scanning devices (many set top boxes, for example) will find the program from the MEC and be able to store the channel data and tune to it.

The MEC also provides for a remote PC management via a RJ11 jack on the rear. A cable is included in the MEC package that converts from a PC DB9 EIA232 serial port to the RJ11 plug. A PC client is included which, when loaded, displays the operational parameters on a colorful and simple on-screen interface to select keyboard setup of the unit while viewing the entire parameter set of the MEC. The MEC is not addressable so the user interacts with one MEC at a time.

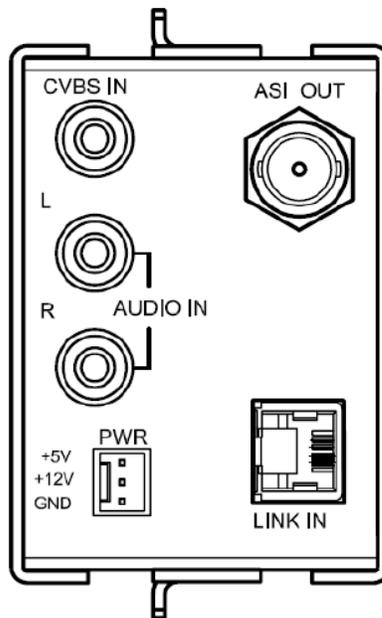
The low power consumption allows placing up to 8 of these encoders in a MPC-12C 2RU rack mounted chassis with a 1RU MPC-16PS/CS power supply and cooling system above the chassis, or 6 MEC in a MPC-12 chassis alongside the power supply inside the 2 RU chassis. The low power consumption makes for reduced temperature, reliable operation.

Hardware Installation

Front View

1. First, unpack and rack mount the chassis and power supply. (sold separately)
 - The MPC-12 2RU chassis offers 12 useable slots with a power supply installed in the right 4 slots, allowing you to install up to 6 MECs which take two slots each. If using PQM QAM modulators matched with the MEC, these also take 2 slots, so you may, for example fit 3 MEC and 3 PQM in the 2 RU chassis with power supply. Other Pico mini-modules may be mixed and any model may be installed in any slot(s).
 - The 2RU MPC-12C (chassis only-no power supply) offers 16 usable slots to allow you to install up to 8 MEC in one chassis, or any mix of MEC, PQM and other Pico mini-modules. For example, 4 PQM modulators and four MEC encoders can be accommodated in the chassis. However, this requires the MPC-16PS/CS top mounted cooling system/power supply (sold separately) to drive and cool the chassis' modules, for a total of 3 RU. The MPC-16PS/CS must be mounted directly above the MPC-12C chassis for proper operation. See instructions packed with the MPC-12 and/or MPC-16PS/CS.
2. Install the modules into the chassis, aligning the top and bottom rail in the chassis track. It is easiest to first install and align the leftmost or rightmost module against the chassis edge to make sure the module is aligned, and then align the next position, until all are installed and positioned properly, without gaps. There is no mechanical fastener.

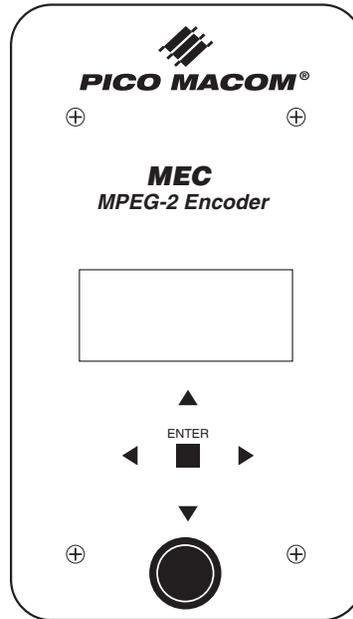
3. Connect to the unit on the rear panel.
 - It is recommended to connect power to all units in the chassis first. Since the power cables vary in length, connect power to the unit furthest from the power supply output port first, then work toward the module closest to the power supply output port. The cables are terminated with a keyed connector so take care to orient the connector with the two “ribs” on the left next to the +5/+12/GND marking. Do not force the connector; when aligned properly, they will slide smoothly onto the MEC’s pins.
 - Connect signal inputs next using RCA type connectors, yellow typically for the video CVBS signal, white for audio left, and red for audio right.
 - Connect the output using a BNC 75-ohm coax cable to the QAM modulator or multiplexer input. Slide the connector onto the MEC output and twist about 45 degrees to ensure it is locked.



Set Up and Operation

After making rear panel connections, apply mains AC power to the MPC-12 power supply or MPC-16PS/CS power supply. All modules should have a front panel LCD display within 3~5 seconds. When the unit is operating properly, it will display a home or default screen of “Pico Macom MEC”. If the video input is lost, the display will show “No Video Input”. The MEC encoder will light its backlight when any key is pressed; the backlight will be turned off after several seconds of no key presses.

The MEC will power on in an operational mode from the factory, outputting a valid MPEG-2 encoded program in a single program transport stream on the ASI output. Editing the parameters using the menus discussed below is optional for those that wish to fine tune the operation.



Menu Navigation

Pressing any button will move you to the Main Menu level as the first step. If there is an alarm, press Enter to acknowledge the alarm and move to the Main Menu level. These Main Menu cover Video, Audio, Mux, and System parameters. The first menu shown is Video. Press the Up or Down buttons to move among the Main Menu groups. Pressing the Left button will return you to the Video Main Menu and if you wait several seconds without a key press the unit will return to the Top level home menu (or Alarm message.)

From any Main menu, press the Right button to move to a lower sub-menu. (Enter works as well.) An example would be the Video Main Menu moves to the VIDEO Format parameter. Press Right again to view the current setting of the parameter and press Enter to edit it. Or, from the VIDEO Format parameter sub-menu, press Enter once and the setting is viewed and in edit mode with one keystroke. Make your changes (select PAL or NTSC, in this example), press Enter again to exit the edit mode and make the setting valid. If you wish to exit the parameter editing without making your change valid, press the left button.

Pressing Up or Down buttons moves you to other VIDEO parameters in our example. Pressing Left moves you back to the Main Menu level and then using Up or Down buttons moves you to Audio, System or Mux menu groups.

Menu Description

The following table lists the front panel controls.

Main Menu	Sub Menu	Select / Values	Type
Video	Format	NTSC/PAL	List
	Bit Rate	2,500 ~ 15,000 kbps	Value
Audio	Format	AC3, MPEG1 L2	List
	Sample Rate	32 / 44.1 / 48 kbps	List
	Bit Rate	AC3: 128 / 160 / 192 / 224 / 256 / 320 / 384 / 448 kbps L2: 32 / 48 / 56 / 64 / 80 / 96 / 112 / 128 / 160 / 192 / 224 / 256 / 320 / 384 kbps	List
Mux	TS ID	0 ~ 65535	Value
	Video PID	21 ~ 8190	Value
	Audio PID	21 ~ 8190	Value
	PMT PID	21 ~ 8190	Value
	PCR PID	21 ~ 8190	Value
	Bit Rate	2,500 ~ 19,200 kbps (for Auto, select "00000")	Value
	PAT ARRIVAL TIME	20 ~ 500 ms	Value
	PMT ARRIVAL TIME	20 ~ 500 ms	Value
	PCR RATE	20 ~ 40 PCR/s	Value
SYSTEM	RANK ID	Reserved for future use, Must be zero	Value
	UNIT ID	Reserved for future use, Must be zero	Value
	RESET	Reset to factory default setting	List

Do not change Rank ID or Unit ID. Reserved for future use. Changing unit ID may cause future communication error with this MEC when using the RJ-11 remote port.

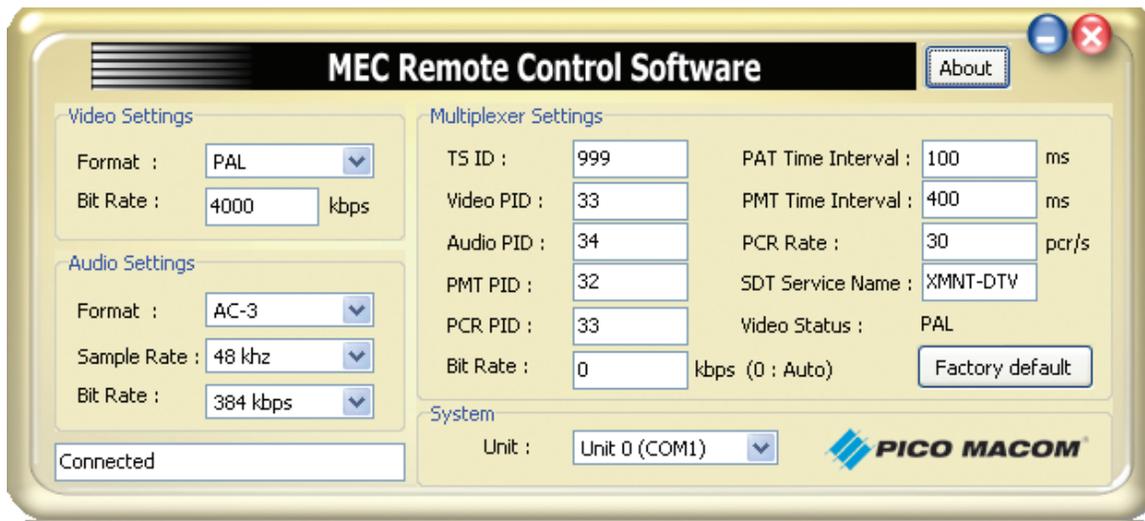
The Mux Bit Rate Auto mode (selected by entering the number “0”) will adjust output rate to accommodate audio, systems data and the video rate chosen by the user with minimal Null packets. If other than “0” is selected, the output will be fixed at that rate and the difference will be stuffed with Null packets. The MEC will attempt to prevent you from entering a video rate greater than a non-zero Mux rate can handle. For example, after setting a Mux rate of 8 Mbps, you will not be able to enter a video rate of 9 Mbps.

Video and audio rates should be operated at the highest value allowable in your system. Using Mux Bit rate = 0, set audio bit rate to at least 256 kbps and Video bit rate to over 6 Mbps to avoid compression artifacts in the audio or video.

System Reset is useful when all other troubleshooting efforts have failed.

Remote Control Screen

The CD in the package which contains this manual will also contain the PC program. To install the utility program, use Window Explorer to navigate to a convenient folder or make a new folder, C:\MyDocuments\PicoMacom, or similar folder. Insert the CD into the CD drive and open the drive. Copy the file “MEC_RCS.exe” (unzip if necessary) into your folder. Highlight the file name, right button click and select Create Shortcut. Drag the shortcut to the desktop.



Using the supplied cable, connect the RJ-11 plug into the MEC which you wish to remotely control or setup. Connect the RS232C female plug to your PC. The program will auto-negotiate the rate and port. (COM 1 is typical.) When connected, click the shortcut on your desktop or double click the file name MEC_RCS.exe in your target folder to open the window show above.

The screenshot above shows all of the menu settings of the MEC as currently selected.

- You may place the cursor in a text box and type a numeric entry and press enter to make it valid. The program checks to determine if the number is outside of acceptable range and, if not, accepts it. Otherwise, when outside the range, it returns the last valid value.
- You make place your cursor on the down arrow and select from a list of allowed entries. Selecting the list item make it valid.
- In the lower left is a text box that cautions when the MEC is disconnected from the PC.
- At the bottom of the window is a “Unit” display. This cannot be changed. It is reserved for future use. It does indicate which COM port is in use. Do Not Change UNIT ID on the front panel menu to attempt to make changes here. Changing UNIT ID on the front panel may cause the remote control program to no longer work on that MEC.

Five-Year Limited Warranty



Most products designated as “Headend Electronics” are covered for a full 5-year warranty period. Considered the best warranty in the industry, Pico Macom will repair or, at its discretion, replace without cost to the original purchaser, the product which, upon inspection by Pico Macom, appears to be defective or not conforming to the Factory Specifications. Pico Macom will cover the cost of parts, labor, and return freight from factory.



Three-Year Limited Warranty

Some Pico Macom products are covered with a full 3-year warranty period. Pico Macom will repair or, at its discretion, replace without cost to the original purchaser, the product which, upon inspection by Pico Macom, appears to be defective or not conforming to the Factory Specifications. Pico Macom will cover the cost of parts, labor, and return freight from factory.



One-Year Limited Warranty*

Pico Macom warrants to the original purchaser a full 1-year warranty period on all new products. Pico Macom will repair or, at its discretion, replace without cost to the original purchaser, the product which, upon inspection by Pico Macom, appears to be defective or not conforming to the Factory Specifications. Pico Macom will cover the cost of parts, labor, and return freight from factory.

Warranty Limitations

This warranty excludes coverage of damage or inoperability resulting from (1) use or installation other than in strict accordance with Pico Macom’s written instructions, (2) disassembly or repair by someone other than Pico Macom or a Pico Macom authorized repair center, (3) misuse, misapplication or abuse, (4) alteration, (5) lack of reasonable care or (6) wind, ice, snow, rain, lightning, power surges, excessive heat, or any other weather conditions or acts of God. Pico Macom’s warranty with respect to third-party proprietary sub-assembly modules and/or private-label products are limited to the duration and terms of third-party vendors’ warranty. Pico Macom shall in no event and under no circumstances be liable or responsible for any consequential, indirect, incidental, punitive, direct or special damages based upon breach of warranty, breach of contract, negligence, strict tort liability or otherwise or any other legal theory, arising directly or indirectly from the sale, use, installation or failure of any product acquired by buyer from Pico Macom. This limited warranty extends to the original purchaser and cannot be assigned or transferred to any other party without the prior express written permission of Pico Macom, which permission Pico Macom may withhold for any reason or for no reason at all. Pico Macom reserves the right to modify or discontinue this warranty at Pico Macom’s sole discretion without notification. No other warranties are expressed or implied.

Damage or Shortage Claims

Our shipping staff carefully packs and ships your orders in compliance with common carriers’ requirements. Please make note of any obvious damage or shortage on the freight bill or carrier’s receipt next to your signature. The carrier’s agent must also sign acknowledging the loss. Failure to do so may result in the carrier’s refusal to honor the claim. Please open your order immediately upon receipt to check for concealed damage and compare the packing list to the items shipped. If damaged, keep the original shipping cartons for possible inspection by the carrier. You must report claims for loss or damage within 3 days of delivery, while claims for erroneous charges or price corrections must be presented within 30 days of invoice date.

Returning Shipped Items

To return any shipped items, including those shipped for warranty repairs or credit, call our Customer Service desk to request a Return Merchandise Authorization (RMA) number. Please reference the original invoice number and purchase date, and product serial number (if any). Be certain to mark the RMA number on the package boldly and legibly. Unless we specify a different carrier, please ship your returned items to us via UPS freight prepaid and fully insured. If returned for credit, we will promptly process your request upon receipt of your return order.

Our Return Policy: Your Satisfaction Guaranteed

Our goal is your complete satisfaction. If for any reason, our products were not quite what you anticipated, simply call your customer service rep and we will be happy to assist you in replacing or returning the order. You may return current, non-discontinued items for full credit for up to 30 days from invoice date. Our requirements are simple: Excepting defective items, the products must be returned in their original packaging and in re-salable condition. Re-certification fees of 10% to 50% of original purchase price may otherwise apply beyond this period or if products are not returned in their original condition. Please contact your customer service rep for more information.

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