TS-1 Series Continuous Degaussing System

Operation and Installation Manual





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Manufactured in the U.S.A

PN 4075-364E

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WARNINGS

WARNING HIGH VOLTAGE! NEVER Power up this equipment with covers or safety features removed. Even when the equipment is powered down, high voltage (up to 1,000 Volts) can be present inside the chassis.

WARNING! NEVER remove the ground pin from the power cord nor use a plug adaptor that doesn't provide grounding continuity.

WARNING! NEVER disable safety interlocks. Doing so can allow unpredictable operation that is dangerous to the equipment operator and bystanders.

CAUTION! NEVER change the internal settings of this equipment. This may reduce the equipment performance and/or cause damage to the equipment. In particular, incorrect settings for power mains. The equipment warranty does not cover any problems caused by unauthorized internal adjustment.

CAUTION! The equipment weighs approx. 66 kg (146 lb). Always have two people available to carry, lift or turn over the equipment.

CAUTION! Be sure the table, desk, or bench this equipment will be operated or stored on is stable and can support the weight of this equipment. If this equipment falls on someone, it can cause serious injuries or death.

CAUTION! The line-voltage receptacle must be near the equipment and must be easily accessible. Avoid extension cords.

NEVER let metal, wire or other objects protrude into the equipment. This may result in an electric shock, electrocution or damage to the equipment.

NEVER block any cooling vents on the top, rear or bottom of the equipment.

NEVER expose the equipment to rain, snow or any liquids.

NEVER operate the equipment dusty or dirty environments. Doing so can cause damage to the equipment and void the warranty.

NEVER install the equipment in a place without adequate ventilation. Heat dissipation may be reduced, and the equipment may be damaged.

NEVER operate or touch the equipment with wet hands. This may result in an electric shock or damage to the equipment.

AVOID using or storing the equipment in areas with temperatures below 0°C (+32°F) or above +50°C (+122°F).

AVOID placing the equipment in excessively dusty environments or in direct sunlight.

AVOID placing the equipment against walls or putting anything on top of the equipment. Always place unit in a secure place to avoid inadvertent use by unauthorized personnel.

INSPECTION

Inspect the degausser for shipping damage as soon as it is unpacked. If the degausser or any accessories are damaged or fail to operate correctly, notify carrier and Garner Products, Inc. immediately. For assistance from Garner Products, Inc. call (916) 784-0200 or fax (916) 784-1425. For warranty information, please refer to the Warranty section inside this manual.

INTRODUCTION

The Garner Products, Inc. Model **TS-1** is a continuous duty capacitive discharge degausser. The TS-1 is designed to erase hard drives and tape cartridges that fit inside the drawer. The convenient drawer loading design accommodates many different types and sizes of media, without the need for adapters.

MAGNETIC FIELDS

Magnetic fields measured around perimeter

The **TS-1** produces a single focused magnetic pulse lasting less than 1/20 of a second. The focused intensity allows the TS-1 to erase today's highest coercivity media while also limiting the magnetic field exposure to 1 second for every 20 pieces of media degaussed.

Distance from degausser	<u>Magnetic Field</u> (Front Panel)	<u>Magnetic Field</u> (Side)	Duration of Field
0cm (0 inches)	1320 gauss	68 gauss	< 0.05 Second
10cm (4 inches)	440 gauss	22 gauss	< 0.05 Second
20cm (8 inches)	145 gauss	8 gauss	< 0.05 Second
30cm (12 inches)	49 gauss	3 gauss	< 0.05 Second

Note: The testing room measured 0.4 gauss before degausser was plugged in.

Average Operational Distance (AOD) from user to the TS-1 is 12-18 inches (30-45cm). According to the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (2005) - Static Magnetic Fields, whole body exposure limits recommended for an 8 hour shift are 600 gauss. Because of the short duration of each pulse from the TS-1 (1/20^{th*} of a second) and the extremely small magnetic field outside of the unit (<49 gauss, AOD) the total 8 hour whole body exposure is 1/800th of the recommended limit.

*Pulse duration was rounded to ½ second per discharge for calculations to cover any build up of magnetic fields generated before or after discharge.



PACE MAKER USERS: WARNING Due to stray magnetic fields, <u>consult your physician before operating</u>.

SPECIFICATIONS

Power Supply (TS-1):	Selectable: 95~105, 105~115, 115~125, 215~225, 225~235 or	
	235~240. See "Input Voltage Configuration" section of this	
	manual.	
Power Consumption	100V: Under Standby 0.3A	
(TS-1):	While charging 5.0A	
	At the time of ERASE 0.6A	
	110V: Under Standby 0.25A	
	While charging 4.5A	
	At the time of ERASE 0.55A	
	120V: Under Standby 0.2A	
	While charging 4.0A	
	At the time of ERASE 0.5A	
	220V: Under Standby 0.17A	
	While charging 2.5A	
	At the time of ERASE 0.35A	
	230V: Under Standby 0.16A	
	While charging 2.25A	
	At the time of ERASE 0.325A	
	240V: Under Standby 0.15A	
	While charging 2.0A	
	At the time of ERASE 0.3A	
Degausser System:	Capacitive Discharge	
Operating Time Duty Cycle:	Continuous	
Erasing time:	< 15 milliseconds	
Cycle time:	45 seconds per cycle.	
Magnetic Field:	20,000 Oe measured in center.	
Max. Media Size:	108mm (4.25 in.)(W) x 31.5mm (1.25 in.)(H) x 149mm (5.86 in.)(D)	
Erasing Area Size:	108mm (4.25 in.)(W) x 31.5mm (1.25 in.)(H) x 149mm (5.86 in.)(D)	
Media:	2.5 type HDD, 3.5 type HDD, DLT, LTO, 3490 and more	
Temperature:	5°C - 40°C (41°F - 104°F)	
Humidity:	10%H - 40%H (without condensation)	
Weight:	TS-1 : 146 lbs. (65.7 kg)	
-	Shipping: 181 lbs. (83.6 kg)	
Dimensions:	TS-1: 19 in. H x 17.5 in. W x 21.5 in. L	
	(47.5cm H x 44cm W x 54cm L)	
	Shipping: 34 in. H x 26 in. W x 29 in.	
	(77.5cm x 62.5cm x 82.5cm)	
Warranty:	(77.5cm x 62.5cm x 82.5cm) 1 Year Factory Warranty Standard, Optional 3 Year Factory	

INSTALLATION

All trouble shooting and wiring checks must be performed by a qualified electrician or authorized plant personnel.

Power Requirements

It is important to ensure correct power is applied to the degausser. Unless otherwise specified and noted on the power specification label on the back of the TS-1, the TS-1 is factory configured for 120VAC. Check the power specifications label to ensure the factory configured TS-1 input voltage is configured to match the voltage from the power mains the TS-1 will plug into. Call Garner Products, Inc. if the voltage listed is not compatible with your voltage or if you have any questions. International customers call 011 916 784-0200.

Line Voltage Selection Reference

The Line Voltage Selection Reference is a guide for configuring the voltage jumper to the correct tap of the transformer. This allows the TS-1 to be used world wide under a variety of voltages. For detailed instruction please see the "Input Voltage Configuration" section of this manual.

Line Voltage Selection Reference			
Line Voltage	Terminal		
235 ~ 240 VAC	240 VAC		
225 ~ 235 VAC	230 VAC		
215 ~ 225 VAC	220 VAC		
115 ~ 125 VAC	120 VAC		
105 ~ 115 VAC	110 VAC		
95 ~ 105 VAC	100 VAC		
Line Voltage must be verified by a qualified electrician. Disconnect ALL power from power mains before servicing or inspecting circuits.			
Technical Support: 916-784-0200 www.Garner-Products.com			

All trouble shooting and wiring checks must be performed by a gualified electrician or authorized plant personnel.

Input Voltage Configuration WARNING

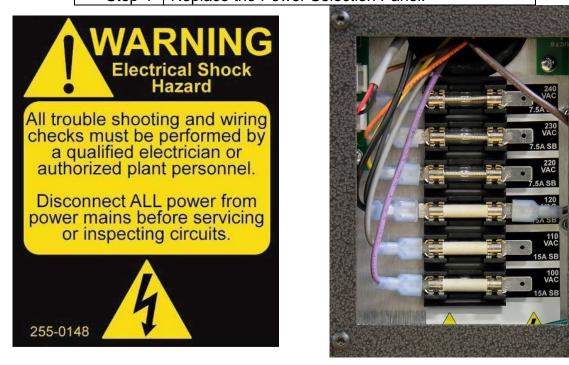
The TS-1 model is equipped with a voltage selection block allowing the TS-1 to be configured for use in any country.

To check or change the voltage configuration of the TS-1, follow the steps listed below:

All trouble shooting and wiring checks must be performed by a qualified electrician or authorized plant personnel.

If you are installing the TS-1 for the first time, or if the TS-1 has moved to a new location, confirm the input power setting of the TS-1 is configured to match the power at your location**.

	Changing the Voltage Configuration		
Step 1	Un-plug the TS-1 from the power mains.		
Step 2	Loosen and remove the Power Selection Panel		
-	from the rear panel. (4) T-20 Torx Screws		
Step 3	Move the (brown) power selection wire (located on		
	the right side of the fuse block) to the appropriate		
	tap/fuse on the right side of the fuse block. The		
	picture below shows the brown wire on the		
	120VAC connector.		
Step 4	Replace the Power Selection Panel.		



**If the power at your location is prone to voltage sag, the TS-1 may/will report a "CHARGE ERROR" fault. This is an operational feature designed to ensure the degausser will only operate when an optimal charge condition is present. If the charge error fault persists when the power is known to be stable, call customer support.

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Power Plug

Plug the EIA connector attached to the power cord supplied into the receptacle on the back of the TS-1.

Fuse Block

Located behind the removable panel on the front side of the TS-1, there are six separate fuses, one each for 100, 110, 120, 220, 230 & 240 VAC power. Only one fuse is used at a time. Therefore, for any voltage range, the two unused fuses of the same value can be used as spares.

Location

The degausser must be placed on a flat, hard surface. Keep at least a 6 inch (15cm) distance from any object that may interfere with the cooling fan exhaust located on the backside of the degausser. As a general rule, media not intending to be erased should be kept about 60cm (2 feet) away.

Cooling

Forced air-cooling is used to maintain safe operating temperatures within the degausser. The air intake and exhaust are located on the back panel. To ensure proper cooling, do not block the air-intake or exhaust and maintain at least a 15cm (6 inches) distance from the back of the degausser to any obstacle.

OPERATION

Controls and Indicators Overview:

LCD Display	The LCD display gives status, automatic count, total count, software version, field strength, user instructions and fault messages.
Media Drawer	The media drawer holds the media to be degaussed and activates and deactivates the degaussing cycle when in the closed and open positions.
Control Panel	The Control Panel consists of two active push buttons and three indicator lamps.
POWER:	The Power button controls power to the TS-1. When in the ON position, the Power button illuminates Yellow.
STATUS:	The Status button illuminates Red when the unit is charging and flashes during precharge.
ERASE:	The Erase button initiates an erase cycle when pressed. The Erase button illuminates Green when the TS-1 is ready to erase media, blinks when the drawer is open and flashes during precharge.

Degaussing Instructions:

	-		
Step 1	Press power button ON.		
Step 2	Lift up on the drawer to unlock it and slide the drawer out		
-	until it stops		
Step 3	Place the media into the drawer and push the drawer to the		
_	closed position. Orientation of the media is not important as		
	long as the drawer closes freely and completely.		
Step 4	Press the "Erase" button.		
-			
	Note: After approximately 45 seconds, the LCD will read		
	"Erase Successful Remove Media" indicating that the media		
	has been degaussed and is ready for removal from the		
	media drawer.		
Step 5	Remove media by lifting up and sliding out the drawer.		
Step 6	Insert another hard drive or turn the power off and close the		
	drawer.		

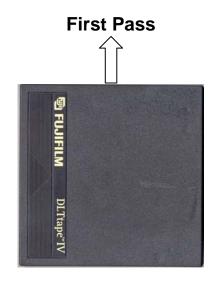
Degaussing Instructions for DLT Media:

Remove the plastic protective cases. Simply follow the degaussing instructions above for complete erasure.

Note: For DLT media that is to be re-used.

Although the data is completely degaussed in one operation, a second pass rotated at 90 degrees is required to smooth out any magnetic fluctuation. **Note**: If the second pass is not completed, the tape drive may eject the tape from the tape drive and indicate that the tape needs cleaning. The second pass at 90 degrees will correct this condition.

If you have any questions, please call Garner Products, Inc. at 1-800-624-1903 or 916-784-0200.





Display Messages:

The LCD display gives status, automatic count, total count, software version, field strength, user instructions and fault messages.

The following information appears on the LCD Display from power-up through one automatic degaussing cycle:

Action	LCD Display	Description
Step 1: Press POWER button ON	GARNER PRODUCTS 0 00	Total Erase Cycles: The left counter indicates the total number of times the right counter reached 50,000. The right counter indicates the total number of erase cycles on the TS-1 up to 49,999.
	TS-1 Firmware Ver 1.2	Displays degausser model and firmware version.
	Ready	Indicates TS-1 is ready to have media loaded into the drawer.
	Session = 0	Session is the number of erase cycles since the last power up. Indicates media drawer is open – this
Step 2: Open Drawer Insert Media	Drawer Open	is normal when inserting media to be erased. Note: The READY light blinks when drawer is open.
Close Drawer	Ready Session = 0	TS-1 is ready to perform an erase cycle.
Step 3: Press ERASE Button	Precharge	The TS-1 is managing the current to evenly charge the capacitors.
	Charging 30 >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Displays capacitor charging status as it counts down from 60 seconds. Although 60 seconds is the maximum time allowed for charging, full charge is normally completed between 25 and 35 seconds.
	ERASE	Displays as the fully charged capacitors are discharged into the degaussing coil.
	FS(Tesla)- 2.0 + = ===	Displays the measured Field Strength in Tesla during the erase cycle. The bar graph easily identifies the field strength. (1 Tesla = 10,000 gauss)
	Erase Successful Remove Media	Indicates the onboard diagnostics confirmed the magnetic field was sufficient to fully erase the media and it is ok to remove the media.

Error Codes

Charge Error

"CHARGE ERROR" is displayed on the LCD screen. This error indicates that the TS-1 failed to charge to the determined power level necessary to successfully erase the media in the degaussing chamber.

Action: Turn off the TS-1 for one minute and restart. (Turning off the power to the TS-1 will clear the error.) If the error repeats, have the power mains checked and also check the TS-1 to make sure the power setting is set to match the power mains. If error persists, call Garner Products technical support.

Drawer Open Error

The LCD displays "DRAWER OPEN". This error indicates that the Media Drawer is not completely closed. The TS-1 continuously checks to see if the Media Drawer is closed. If the drawer is not closed, the "DRAWER OPEN" will persist on the LCD. Once the drawer is closed, the TS-1 will automatically continue the erase function.

Action: Check to see that drawer is seated in detent.

Gauss Error

The LCD displays "GAUSS ERROR". This error indicates the erasing field may not have been adequate to effectively erase the media in the degaussing chamber.

Action: Turn off the TS-1 for approximately one minute. Turning off the power to the TS-1 will clear the error. Turn the TS-1 back on and press the ERASE button. The media in the degaussing chamber will be erased if the field is sufficient otherwise the "Gauss Error" will persist on the LCD screen. If error persists, call Garner Products technical support.

Overheat Error

LCD displays "OVER HEAT". This error indicates the internal temperature has risen to a level that may be harmful to the TS-1.

Action: When the TS-1 indicates an overheat error, it will inhibit any further operation until the TS-1 returns to an acceptable temperature. Leave the TS-1 powered on as the chassis fan will help reduce the heat inside the TS-1. When the temperature is low enough, the TS-1 will return to normal operation. If this error persists, call Garner Products technical support.

Change Batteries

LCD displays "WARNING: REPLACE AA BATTERIES" or "WARNING: REPLACE 'D' BATTERIES". This message indicates that the AA OR D cell batteries used in the TS-1 are becoming weak and should be replaced at the earliest opportunity.

Action: Replace AA or D batteries.

Step 1	Unplug the TS-1 from the power mains.	
Step 2	Remove the (4) four screws that fasten the Battery Drawer to the rear panel with a T-20 (torx) screwdriver.	
Step 3	Using the handle on the drawer, pull to slide the Battery Drawer out. It may be necessary to lift the handle slightly as you pull to clear hardware on the bottom of the Battery Drawer.	
Step 4	Remove and replace the batteries ensuring the correct battery orientation as indicated by the + and – symbols silk screened onto the PCB.	
Step 5	Reinsert the Battery Drawer into the TS-1 and secure with the (4) four screws removed in Step 1. Be sure the card slides into both the upper and lower slots on each guide block. Note: Metal bracket was removed for photographic purposes only.	Upper Slot
		Lower Slot

Part Number	Description	
1500-040	Description	
	Capacitor, 15,000uF 400VDC	
225-0033	Filter assy	
225-0034	Fan guard, internal	
250-0015	Handle, recessed pull	
356-0001	Relay, 25A	
3500-056	Fan, 115V	
3700-002	Sensor, reflective	
3700-006	Display, 2x16 serial LCD	
398-0073	Power cord set, 10A 120V	
2800-027	High point grounding contact	
3900-002	Battery, Alkaline AA	
3900-003	Battery, Alkaline D	
4300-032	Fuse, 15A 250V AGC Slow Blow	
4300-022	Fuse, 7.5A 250V Time Delay	
4300-027	Fuse Block, 20 amp	
4700-046	Resistor, 330R 300W	
4800-017	Diode module, 100A 1200V	
4800-019	SCR Thyristor	
4800-020	Diode, zener 1N3349B	
4800-021	Diode, zener 1N3349RB	
4800-022	Bridge rectifier, 1400V 25A	
4800-023	SCR, Thyristor 1600V 20A	
4800-052	Bridge rectifier, 1.6kV 25A	
5600-023	Transformer	
SA1400-279	Handle, chassis lifting	
MS2500-142A	Tray, battery slide	
SA1400-280	Assy, power support	
SA1400-293	Assy, front panel	
SA1400-294A	Assy, rear panel	
SA1400-295	Assy, coil support	
SA1400-296	Assy, base plate	
SA1400-297	Assy, capacitor bank	
SA1400-298A	Assy, battery tray	
SA1400-301	Assy, top cover	
SA1400-304	Assy, media drawer	
SA1700-301A	PC Assy, controller	
SA1700-302A	PC Assy, SCR Drive	
SA1700-303A	PC Assy, control panel	
SA1700-304	PC Assy, gauss detector	
SA1700-305	PC Assy, charge sense isolation	
SA1700-306A	PC Assy, Battery drawer	
SA2400-104	Assy, display panel	

Declaration	f Conformit	y	Q544803WDCe.01.D Page 1 o
Manufacturer's Name	Garner Produ	cts, Inc.	
Manufacturer's Addro	ess: 10620 Indust Roseville, CA <u>www.garner</u>		
declares that the pro	duct		
Product Name	s: Continuous D	egaussing System	
Model Number	s: 1) TS-1 2) Intimus 2 3) HD-9	0 000	
Product Option	ns: All		
conforms with the es	sential requiremen	ts of the following prod	duct specifications
	2006 N 61010-1: 2010		
Pulver Laboratories I Supplementary Infor		onformance Q544803W	/C.DoC
	omplies with the esse	ential requirements of the	following Directives and
	Product Safety	2001/95/EC	
 Low-Volta Machiner 		2006/95/EC 2006/42/EC	
	25 December 2011		
For Compliance Infor	mation ONLY cont	act	
Australian Contact:	Garner Products, Inc.		nager, 10620 Industrial A <u>nerproducts.com</u>
	Garner Products, Inc., Office of the Quality Manager, 10620 Industrial Ave Suite 100 Roseville, CA 95678, USA, <u>www.garnerproducts.com</u>		
USA Contact:		, Office of the Quality Ma CA 95678, USA, <u>www.gar</u> i	nager, 10620 Industrial A
	Suite 100 Roseville, G	CA 95070, USA, <u>www.gan</u>	icipioddeco.com

PULVER LABORATORIES INC. ELECTROMAGNETIC SHIELDS



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GARNER WARRANTY

Garner Products, Inc. ("Garner") warrants this Garner-branded product against defects in materials and workmanship under normal use for a period of ONE (1) YEAR from the date of purchase by the original end-user ("end-user") as evidenced by end-user's packing slip or invoice ("Warranty Period"). If a defect arises and a valid claim is received within the Warranty Period, at its option, Garner will either: (1) repair the product, (2) exchange the product, or (3) request that end-user replace defective parts with new or refurbished user-installable parts that Garner provides in fulfillment of its warranty obligations. A replacement product or part, including a user-installable part that has been installed in accordance with instructions provided by Garner, assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever provides longer coverage. Garner's obligation is limited to the cost of material and labor to repair or replace and does not include transportation expenses.

LIMITATIONS

This warranty does not apply: (a) to cosmetic damage, including but not limited to scratches, dents and broken plastic; (b) to freight damage; (c) to normal wear; (d) to damage caused by accident, abuse, inadequate wiring, power surge, rust, corrosion, neglect, misuse, flood, fire, earthquake or other external causes; (e) to damage caused by operating the product outside the permitted or intended uses described by Garner; (f) to damage caused by service performed by anyone who is not a representative of Garner or a Garner authorized service provider; (g) to a product or part that has been modified to alter functionality or capability without the written permission of Garner; or (h) if any Garner serial number has been removed or defaced.

DISCLAIMER

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, STATUTORY, EXPRESS OR IMPLIED. AS PERMITTED BY APPLICABLE LAW, GARNER SPECIFICALLY DISCLAIMS ANY AND ALL STATUTORY OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES AGAINST HIDDEN OR LATENT DEFECTS, IF GARNER CANNOT LAWFULLY DISCLAIM STATUTORY OR IMPLIED WARRANTIES, THEN TO THE EXTENT PERMITTED BY LAW. ALL SUCH WARRANTIES SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS EXPRESS WARRANTY AND TO REPAIR OR REPLACEMENT SERVICE AS DETERMINED BY GARNER IN ITS SOLE DISCRETION. No Garner dealer, reseller, agent, or employee is authorized to make any modification, extension, or addition to this warranty. If any term is held to be illegal or unenforceable, the legality or enforceability of the remaining terms shall not be affected or impaired.

EXCEPT AS PROVIDED IN THIS WARRANTY AND TO THE EXTENT PERMITTED BY LAW, GARNER IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY, INCLUDING BUT NOT LIMITED TO LOSS OF USE; LOSS OF REVENUE; LOSS OF ACTUAL OR ANTICIPATED PROFITS (INCLUDING LOSS OF PROFITS ON CONTRACTS); LOSS OF USE OF MONEY; LOSS OF BUSINESS; LOSS OF OPPORTUNITY; LOSS OF GOODWILL; LOSS OF REPUTATION; LOSS OF DAMAGE TO OR CORRUPTION OF DATA; OR ANY INDIRECT OR CONSEQUENTIAL LOSS OR DAMAGE HOWSOEVER CAUSED INCLUDING THE REPLACEMENT OF EQUIPMENT AND PROPERTY, ANY COSTS OF RECOVERING, PROGRAMMING, OR REPRODUCING ANY PROGRAM OR DATA STORED OR USED AND ANY FAILURE TO MAINTAIN THE CONFIDENTIALITY OF DATA. IN NO EVENT SHALL GARNER BE LIABLE FOR ANY CLAIMS, WHETHER ARISING FROM BREACH OF CONTRACT OR WARRANTY OR CLAIMS OF NEGLIGENCE OR NEGLIGENT MANUFACTURE, IN EXCESS OF THE PURCHASE PRICE.

WARRANTY RETURN POLICY

If a problem occurs with this product, contact Garner directly by **Email at Info@Garner-Products.com** or by **phone at (916) 784-0200** to obtain technical support and/or to get a Return Authorization Number (RA#). All returns must be specifically authorized by Garner prior to shipment and returned to Garner **FREIGHT PREPAID** with the RA# marked prominently near the shipping label. Securely package the product. It is end-user's responsibility to ensure the product is packaged properly to prevent damage during transit to Garner. Garner will provide product packaging to end-user at end-user's request and expense. Enclose proper documentation, including RA#, the return address, a name and phone number of the contact person, the serial number of the merchandise being returned and a description of the reason for the return. Omission of any of this information may delay service. Garner recommends end-user insure the shipment; otherwise end-user accepts the risk if product is lost or damaged in shipment.

Garner will pay to ship the repaired or replacement products to end-user's shipping dock if end-user's delivery address is in the United States (excluding Puerto Rico and U.S. possessions and territories); otherwise Garner will ship the product to end-user freight collect. Garner will select method for return shipment. Alternate shipment methods may be made at end-user's expense.

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