

How To Use This Manual

Our products and parts change with design enhancements or improvements. We suggest that you check our website frequently, and feel free to call the technical department listed at the bottom of each page for clarification.

Products are listed according to category as defined by dividers, then as follows:

- Currently manufactured products
- Discontinued Products

The number in the upper right corner of each product sheet is the date of the latest revision.

GROCO® Warranty Policy

GROCO will repair or provide a replacement, at its discretion, for any part of any product manufactured by GROCO, or for the entire product if it is determined by GROCO (or by an authorized GROCO Warranty Service Center) to be defective in materials and/or workmanship within one of year of the OEM installation date or the distributor's original date of sale, provided:

1. The product has been installed in accordance with the instructions provided.
2. No repairs have been made without written factory authorization.
3. Proof of Purchase is provided.
4. The product is under original ownership.
5. The product has not been abused, misused, or altered.
6. The complete product is delivered, properly packaged and freight paid, to GROCO (or to an authorized GROCO Warranty Service Center).

Conditions that void the GROCO product warranty:

1. Physical damage or alterations to the product.
2. Repairs or adjustments made without written GROCO authorization.
3. Damage caused by improper use of the product.
4. Damage caused by improper installation of the product.
5. Damage caused by improper winterization.
6. Damage caused by negligence.
7. Damage caused by improper packaging of products being returned to GROCO.
8. Missing or modified product labels.

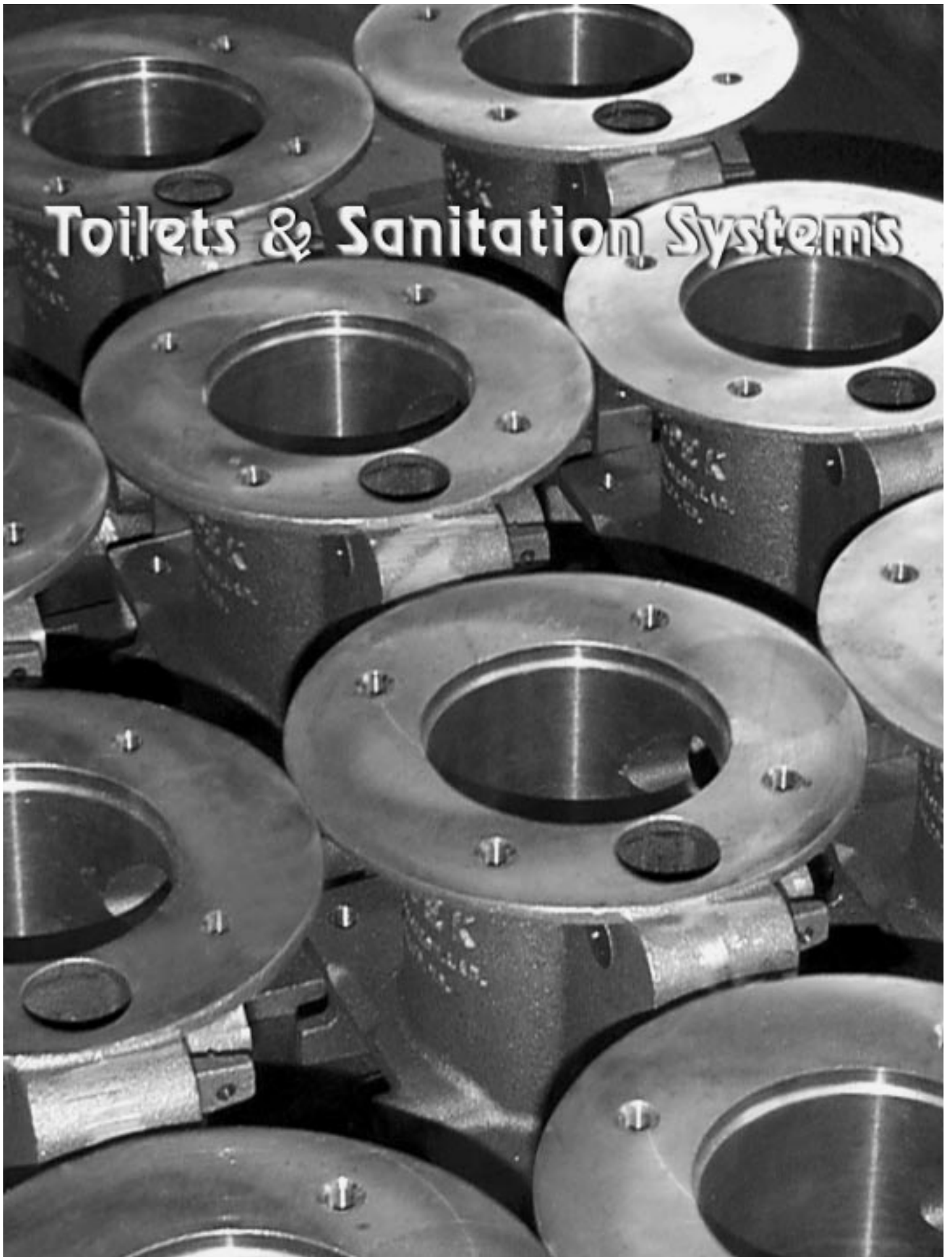
Limitations of the GROCO product warranty:

1. The maximum liability of GROCO under this warranty shall not exceed the contract price of the product prior to installation or use.
2. The GROCO warranty does not include the cost of installation or removal of the product or part.
3. The GROCO warranty does not compensate the buyer for travel expenses for any party affecting repairs.
4. The GROCO warranty does not compensate the buyer for shipping expenses for shipping the product to GROCO or to an authorized GROCO Service Center, though if warranty eligibility is verified, GROCO will pay freight charges (GROCO will select the carrier) to return the repaired or replaced product to the original buyer.

Follow this procedure to request warranty consideration:

1. Call the GROCO Service Department noted at the bottom of the product instructions sheet.
2. Request an RGA number (Return Goods Authorization) to return a product for warranty consideration.
3. Package the complete product carefully for return to GROCO. Do not return parts of a product for warranty consideration (except for removing bowls from toilets); we must evaluate the complete product in order to make a warranty eligibility determination.

Toilets & Sanitation Systems



155 Series Waste Macerator Pumps Installation and Operation Instructions

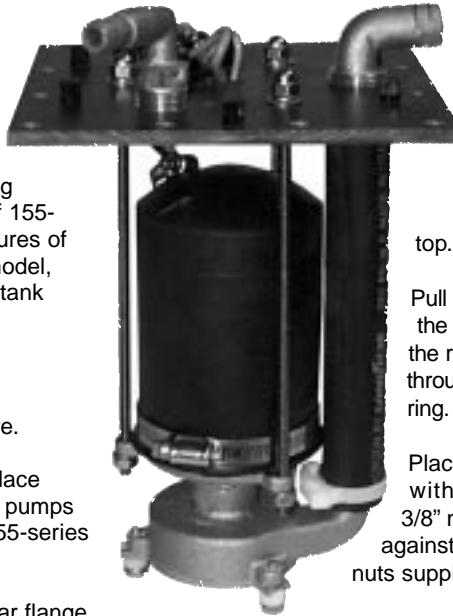
THE CONCEPT: Between 1980 and 1999 GROCO Macerator Pumps were offered in four different models. MPS-600 and MPS-720 were submersible models, and MPT-600 and MPT-720 were tank-top models.

Our experience in manufacturing waste-handling equipment has brought us to the introduction of 155-series pumps, which combines all the best features of all previous models into a single submersible model, offered in lengths (1-inch increments) to fit any tank depth from 9-inches to 36-inches.

INSTALLATION NOTE: If your purchase of a 155-series macerator pump is for a new installation you must order GROCO #MP Hardware.

If your purchase of a 155-series pump is to replace one of the previously made GROCO macerator pumps (MPS-600, MPS-720, MPT-600 or MPT-720), 155-series will fit the same tank mounting.

Early MPT and MPS series pumps had a circular flange and mount pattern. If you are replacing a pump with a circular flange and mount pattern, the six plastic plugs on the 155-series pump flange are to be removed; the vacated holes will align with the old circular flange mount pattern. If you wish to replace the circular gasket at this time order GROCO #MP-726.



Remove twelve (12) hex nuts, one of the square gaskets, and two (2) flat-head screws from the ring.

With one square gasket remaining on the ring insert the ring into the 5-3/4" x 5-3/4" hole cut into the tank top. Position the ring so the twelve bolts align with the holes in the tank top.

Pull the ring against the under-side of the tank top so the twelve bolts come up through the tank top. Hold the ring in place by screwing two flat head screws through the countersunk tank top holes and into the ring.

Place the 155-series Macerator Pump onto the tank with the discharge hose aligned with the 1-1/4" x 3/8" notch in the tank top. Secure the pump flange against the tank with the plastic flat washers and hex nuts supplied.

VENTING TO ATMOSPHERE: Safety and proper macerator pump operation depend upon proper tank venting. It is absolutely essential that the holding tank be vented to outside the vessel. A chromed thru-hull vent fitting is included in MP Hardware for this purpose. Use 5/8" ID non-collapsible hose in a continuous uphill run to the thru-hull vent.

OVERBOARD DISCHARGE: The direct overboard discharge of untreated waste is unlawful in most areas. Consult local regulations and restrictions before plumbing your macerator pump for overboard discharge. Regulations will change with geographic location.

VENTED LOOPS: If your macerator pump is plumbed for overboard discharge, a 3/4" vented loop is required between the pump and the overboard discharge point. GROCO #HVL-750 is ideal for this purpose.

PLUMBING: Use 3/4" ID reinforced hose designed for waste service to plumb the 155-series pump discharge to HVL-750 Vented Loop, and to its ultimate discharge point. Double-clamp hose connections.

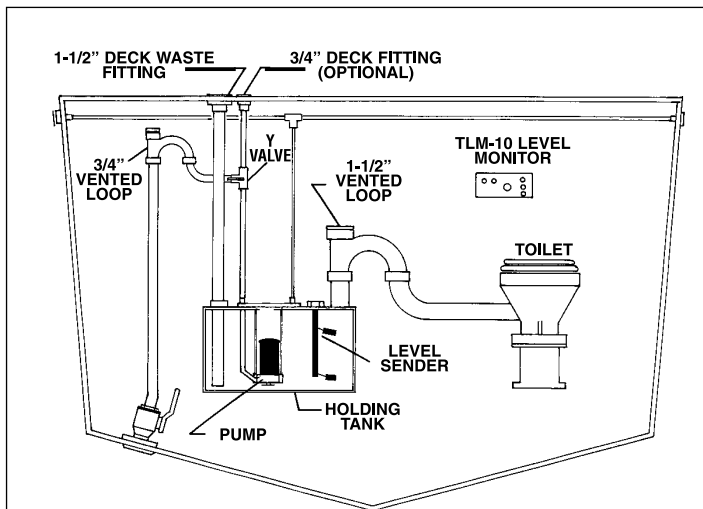
ELECTRICAL REQUIREMENTS: Proper wire size selection is essential for safe and efficient pump operation. Refer to the wire size selection chart enclosed.

Protect 12V DC 155-series pumps with a 20-amp circuit breaker (10 amps for 24V or 32V pumps).

LEVEL MONITOR: End surprises with a GROCO TLM series Level Monitor (refer to the sample installation). TLM sending unit screws into any 1-1/2" NPT threaded tank top opening, and uses simple but reliable technology to tell you when it's time to have the tank pumped out.

The Operator Panel includes connections for operating the 155-series Macerator Pump, and can be installed in wet areas such as combination shower/head compartments.

TLM is offered in lengths (one-inch increments) to suit your tank



Sample Installation shows 155-series Macerator Pump and related components

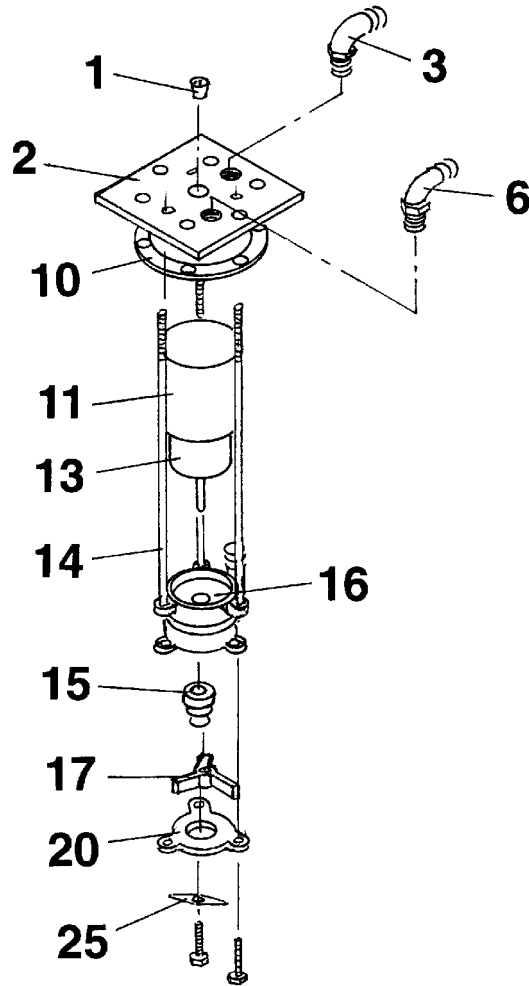
INSTALLATION: For new installations use the template attached to mark the location of the mounting holes on the top of the tank, or use the gasket to mark hole locations.

Note that there are two holes marked on the template that are not on the gasket. These are for the two (2) flat-head screws that hold the ring to the tank and are shown as concentric circles on the template.

Drill fourteen (14) holes, 5/16" diameter plus the two (2) countersinks and one notch (clearance for the discharge hose) as shown on the template.

155 Series Macerator Pumps

Parts and Assembly



ITEM	PART NUMBER	PART NAME	QTY
1	BP-10-2	Grommet	1
2	99-0009-00	Pump Flange	1
3	99-0003-10	Discharge Assy	1
6	PTHC-5062	Vent Fitting	1
10	MP-726	Round Gasket	1
	01-0001-50	Square Gasket	
11	SBP-204	Motor Boot	1
13	(Voltage)-C-MPS	Motor	1
14	MP-725-(length)	Tie Rod	3
15	009-0375-00	Seal Assembly	1
16	MPS-600-B	Pump Casting	1
17	MP-603	Impeller	1
20	MP-601	Pump Cover	1
25	MP-727	Macerator Blade	1
NS	Snap Ring-1	Snap Ring	1

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Installation Instructions for Model K Marine Toilets

000227



K-H Hand Operated Toilet

The Concept: Model K marine toilets are designed and built for years of dependable service. Commercial users, live-aboards, and frequent boaters will appreciate the durability and rugged construction. Waste is pumped manually or electrically from the bowl with a 3" bronze piston with replaceable rings.

Installation: Fasten the pump securely to the floor or mount platform. Assure that there is sufficient room to operate the manual pump handle, and to completely open the seat and cover.

Plumbing: The inlet is at the back of the toilet. To make a connection straight back use 1" ID hose or **GROCO**® TP-750 for 3/4" ID hose. To make a 90-degree connection use **GROCO**® TPC-750 for 3/4" ID hose.

The toilet discharge is the swivel fitting at the left and below the bowl. Loosen the hex nuts and screws that secure the swivel and point it to the desired direction. Retighten (do not overtighten) the swivel screws. Connect 1-1/2" ID sanitation hose.

Vented Loops: The 1-1/2" plumbing line between the toilet discharge and the holding tank or treatment device should be fitted with a **GROCO**® HVL-1500 vented loop to prevent waste from flowing back to the toilet after pumping has stopped or while the boat is moving, especially in sailboats. A vented loop will help to maintain an odor-free toilet compartment.

Electrical: Adequate wire size is essential for the proper operation of any motorized equipment. Refer to the wire size selection chart enclosed with electric models.



K-H Electrically Operated Toilet

Operation: K toilets have two modes of operation, water-in and waste-out. Each is independently controlled by the user to suit the desired operation.

While pumping, depress the footpedal to open the inlet valve and allow flush water to enter. Release the footpedal when no more water is needed.

The removal of waste and tissue is controlled by the action of the pump handle. As long as pumping takes place the contents of the bowl will be removed. The footpedal does not need to be depressed to remove waste.

To dry-flush or to reduce the amount of water in the bowl after a flush, pump the handle without depressing the footpedal. A small amount of water should remain in the bowl after flushing.

Note: Once the bowl has been cleared pump an additional five strokes to clear the toilet discharge arm and joker valve.

Note: Do not flush cigarette butts or trash.

Maintenance: Periodic lubrication of the pump's piston and rings will prevent salt build-up. Pour 1/4 cup of vegetable oil into the bowl and flush normally.

Winterization: Freezing water will damage the toilet pump. Remove two (2) drain plugs to drain water before freezing weather. One is located at the bottom of the discharge elbow as it exits the toilet body; the other is at the bottom of the toilet body on the left side below the footpedal.

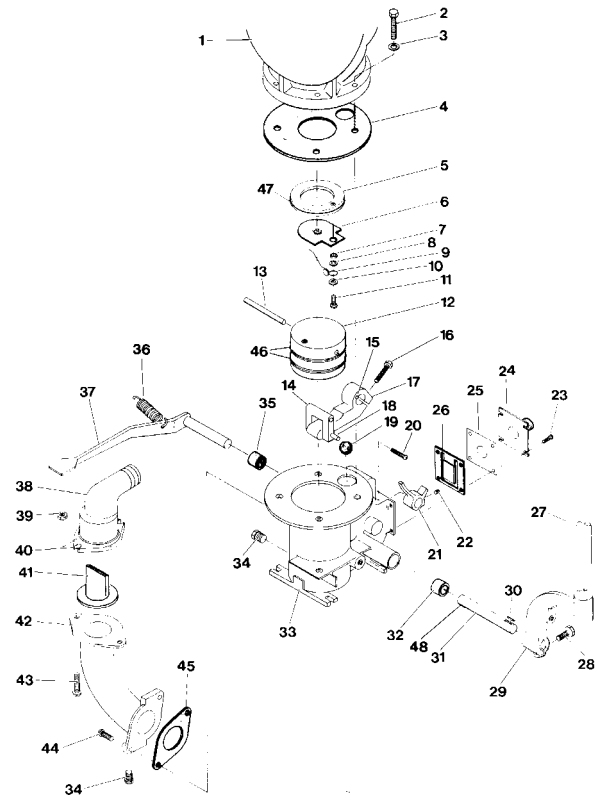
Disconnect inlet and discharge hoses before draining.

K Series Toilet Parts and Assembly

Service Notes

- The manufacture date is stamped on the mount pad for the electric drive motor. If there is no date stamp the manufacture date is prior to 11/92.
- 4985 series bowl is standard after 6/94; 4978 bowl is no longer available. When replacing 4978 with 4985, the seat must be replaced with 500-D.
- Replacement bowls and seats are available in standard white, bone and gray.
- K-32 is standard after 10/91. It replaces K-3 and K-2, and enables the piston rings to be replaced from the top of the pump without removing K-2.
- The replacement of HT-6566-K is recommended after eight (8) years of use.
- Special-order HA-13 to replace HA-1 if a straight discharge is desired.

Item	Part Number	Description	Qty	K Regular Kit
1	4985-0	Bowl (White color)	1	
	4985-1	Bowl (Bone color)		
	4985-2	Bowl (Grey color)		
2	51618x2HB	Bolts	4	
3	20LP	Washers	4	
4	HT-52-A	Gasket	1	X
5	K-4	Plate	1	
6 - 7	HT-26-A	Gasket	1	X
8 - 11	HT-84-A	Spring Assembly	1	X
12-18	K-32	Piston & Crank 1		
12	K-92	Piston & Rings		
13	K-3-P	Piston Pin	1	
14-18	K-2	Crank Assembly	1	
19	HT-56	Check Ball	1	X
21-22	K-1	Cam	1	
23	1024x12HB	Screws	4	
24	HT-3556	Inlet	1	
25	HT-3557-A	Gasket	1	X
26	HT-3557	Gasket	1	X
27	HT-3560-C	Handle	1	
28	51618x1HB	Bolt	1	
29	HT-3560-D	Arm	1	
30, 31	HT-6566-K	Shaft	1	
30, 48	KS	Key Set	1	
32	WS-2422	Seal	1	X
33	K-A	Pump Housing	1	
34	1827HB	Drain Plug	2	
35	HT-3564	Seal	1	X
36	S-72587	Spring	1	
37	HT-3570-A	Pedal	1	
38	HA-1	Discharge	1	
40	HA-11	Bracket	1	
41	H-27-A	Joker Valve	1	X
42	K-8	Discharge	1	
45	K-7-A	Gasket	1	X
46	K-3-R	Piston Rings Set (2)	1	X
47	2-041	O-Ring	1	X
NS	500-D-0	Seat (White color)	1	
	500-D-1	Seat (Bone color)		
	500-D-2	Seat (Grey color)		
NS	TT-50 NLA	Seat for 4978 bowl	1	



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Installation and Operation Instructions for EB/K Conversion Kit for EB and K Model Toilets

THE CONCEPT: EB/K Conversion Kit converts EB or K model hand operated toilets to electric operation. Guests need not understand the workings of a marine toilet, as flushing is simplified to pressing a button.

INSTALLATION ON EB MODEL TOILETS

If your EB has operating arm HT-3560-B (identified by the part number on the casting and the gradual curve), install EB/K Conversion as shown in Figure-3. Note that connecting rod RG-3049-A is between arm HT-3560-B and 58X12 bushing.

If the operating arm is HT-3560-E (identified by the part number on the casting and the 90-degree bend), install EB/K Conversion as shown in Figure-2. Note that 58X12 bushing is between HT-3560-B arm and connecting rod RG-3049-A.

EB toilets have a mount pad on the right side of the pump body (facing toilet). Use the 3/8" bronze bolt and 3/8" lockwasher to fasten the gearbox to the mount pad.

If you ever replace the bowl (4985 is the only available bowl), because of the lower profile of 4985, your EB toilet must be fitted with HT-3560-E operating arm. Replace HT-3560-B with HT-3560-E if necessary.

INSTALLATION ON K MODEL TOILETS

Refer to Figure-2



EB/K Conversion Installed on K model Toilet

ELECTRICAL: Adequate wire size is essential for the proper operation. Refer to the wire size selection chart included with this product.

Mount the momentary switch in a 5/8" hole and use ring terminals to wire in accordance with the schematic shown below.

Over-current protection must be provided. Installing a dedicated circuit breaker of the proper capacity.

Voltage	Amps	Breaker
12V	12-18	25
24V	5-7	15
32V	3-5	10

BEFORE APPLYING POWER: Add 1/2 oz. of gear oil (supplied) through the hex plug with the red tag attached. Do not add more oil. Leakage will occur.

OPERATION: Depressing the momentary switch will actuate the operating arm. To allow water to enter the toilet step on the foot pedal at the left side of the toilet while the momentary switch is depressed.

DRY-BOWL FLUSHING: To pump the bowl dry, depress the momentary switch but do not step on the foot pedal.

NOTE: Pump at least six pump strokes more than necessary to clear the bowl. This assures that the waste has been moved completely out of the toilet and discharge arm.

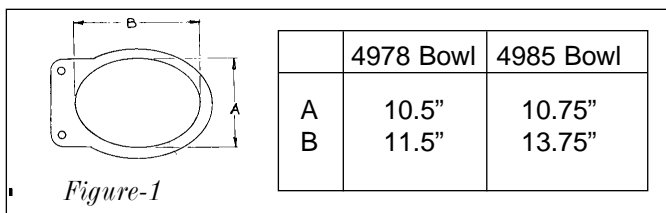


Figure-1

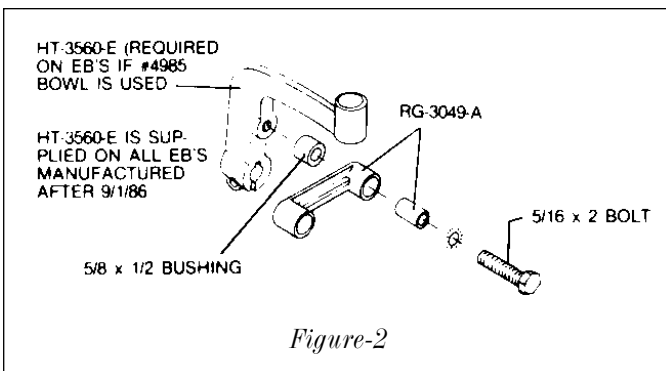
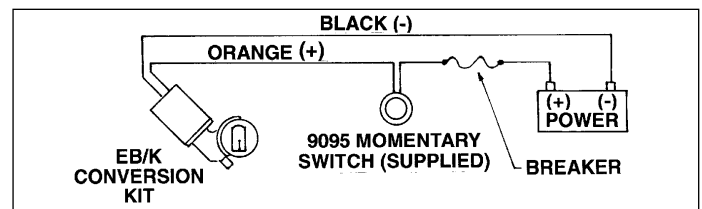


Figure-2

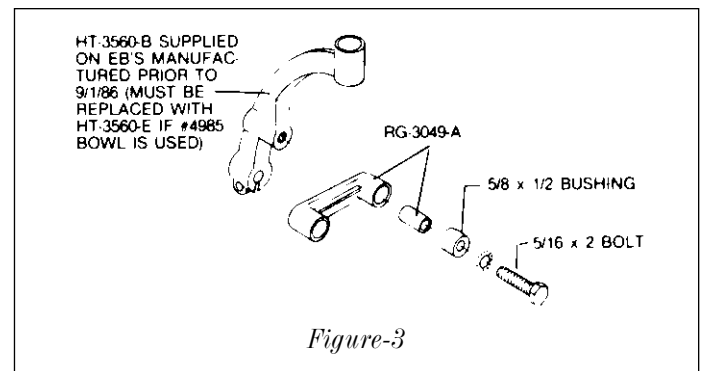
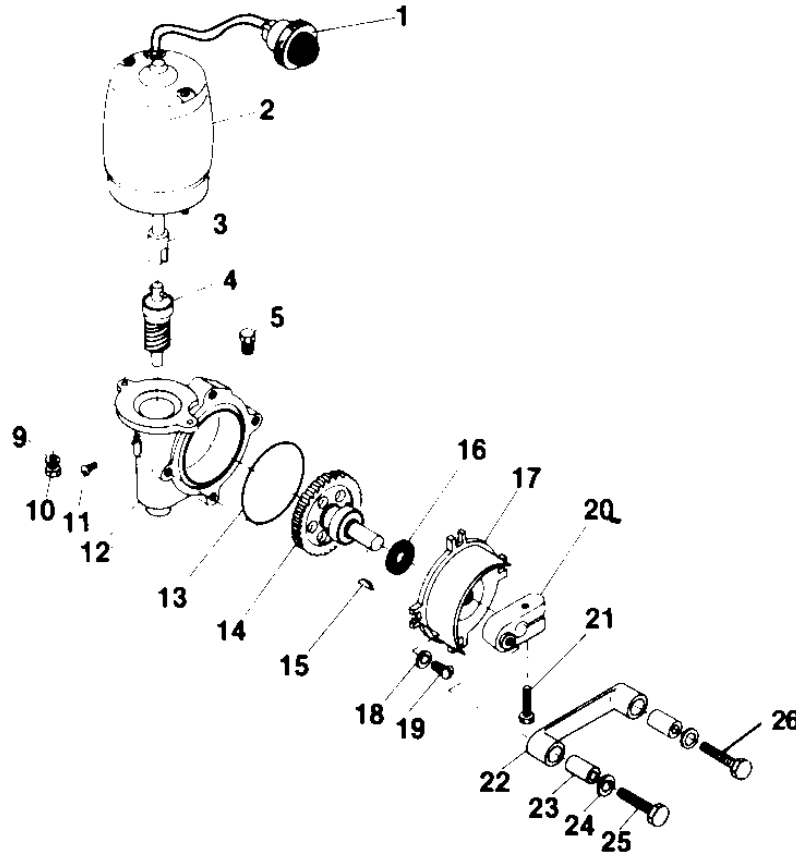


Figure-3

Parts List and Assembly EB/K Conversion Kit



Item	Part Number	Description	Qty
1	9095	Momentary Switch	1
2, 3	(Voltage)-C	Motor	1
4	RG-3038	Worm Assembly	1
5	1827HB	Hex Plug	1
9	10ETB	Lockwasher	2
10	1032X58HS	Bolt	2
11	1024X1RB	Screw	1
12	RG-3041	Gearbox Housing	1
13	2-232	O-Ring	1
14, 15	RG-3037	Gear Assembly	1
16	RG-3037-A	Seal	1
17	RG-3042-A	Gearbox Cover	1
18	14ETB	Lockwasher	4
19	1420X12HB	Bolt	4
20, 21	RG-3048	Eccentric	1
22-25	RG-3049-A	Connecting Rod Assembly	1
22	RG-3049-R	Connecting Rod only	1
23	RG-3049-B	Bearings set (2)	1
24	516ETB	Lockwasher	2
25	51618X112HB	Bolt	1
26	51618X2HB	Bolt	1
NS	600-W	Gearbox Oil	1
NS	58X12	Bushing	1

Installation and Operating Instructions for HF Series Toilets

000315



Installation: Fasten the HF toilet base to the floor with 1/4" or larger stainless steel bolts and flat washers.

Plumbing Connections: Connect 3/4" ID hose to the inlet fitting on the pump (the fitting that points diagonally downward). The inlet line must not be shared with the water supply or drain for any other accessory.

To the pump discharge connect 1-1/2" ID hose that is intended for use with raw sewage.

Double clamp both hose connections to assure efficient pumping and leak-free operation.

Vented Loops: The proper use of vacuum breakers (Vented Loops) is essential for safe efficient operation. Use a 1-1/2" Vented Loop (GROCO HVL-1500) between the HF toilet and the holding tank, treatment system, or overboard discharge seacock. The Vented Loop should be 12" or higher above the outside waterline. The relation between the outside waterline and the internal toilet plumbing will change with vessel movement, especially with sailboat installations.

Overboard Discharge: It is illegal to discharge untreated waste directly overboard. Consult local regulations governing overboard discharge. Restrictions will vary with geographic location.

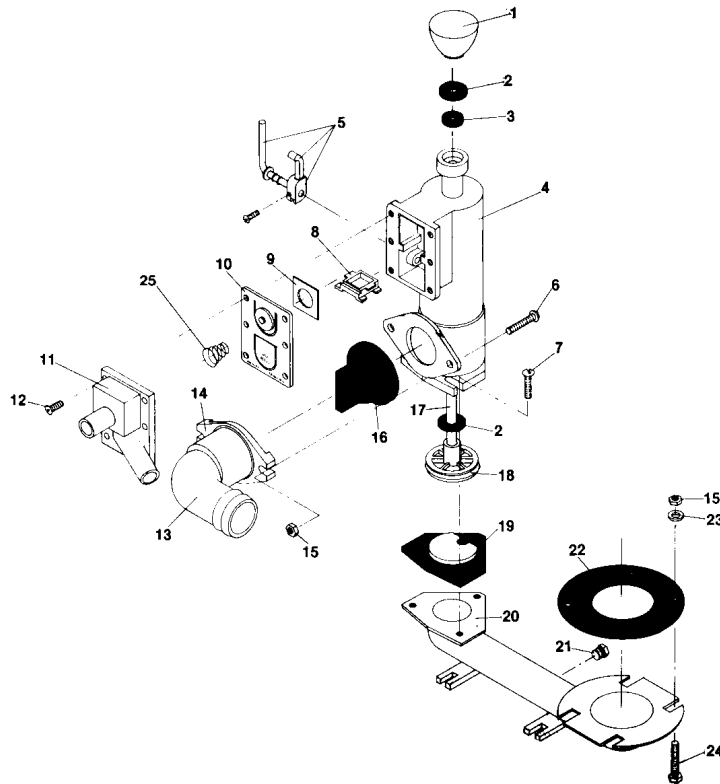
Operation: To flush open the valve (vertical) on the right side of the pump. This allows raw water to be drawn into the toilet pump. Pump the T-Handle up and down until the waste is removed. Apply additional pump strokes to allow the vented loop and connected plumbing lines to be flushed clear.

Close the valve handle (horizontal) when flushing is complete. You will hear the valve "click" closed.

Warning: Failure to close the valve could flood the toilet.

Dry Bowl Feature: Flushing liquid waste can be accomplished without opening the valve. With the valve closed (horizontal) pump the T-Handle until the liquid is flushed clear

HF Series Toilets Parts and Assembly



Item	Part Number	Description	Qty	HF Regular Kit	HF Master Kit
1	HT-1085	T-Handle	1		
2	HC-12	Washer	2		
3	031-075-8	Seal	1	X	X
4	HF-C	Cylinder	1		
5	HF-20	Cam Assembly	1		
6	1420X114RS	Screw	2		
7	1420X78RS	Screw	3		
8	HF-28	Bridge	1		
9	HC-5	Check Plate	1	X	X
10	HF-1	Gasket & Spring	1	X	X
11	HC-2-A	Valve Cover	1		
12	1032X58HS	Screw	6		
13	HA-1	Discharge, 90-degree	1		
14	HA-11	Discharge Bracket	1		
15	1420HS	Hex Nut	6		
16	H-27-A	Joker Valve	1	X	X
17	HF-21	Shaft	1		
18	HF-10	Piston & Ring Assembly	1		X
19	HE-8	Gasket	1	X	X
20	HF-22-B	Base, bronze	1		
21	1827HB	Drain Plug	1		
22	H-6	Gasket	1		X
23	16S	Washer	4		
24	1420X2HB	Bolts	4		
25	HF-26	Spring	1		

For service assistance or information, call (410) 712-4242. Ask for Strainer Service Department.
2740 Standard Drive ♦ Hanover, MD 21076 ♦ www.groco.net

Installation and Operation Instructions for HVL and PVL Series Vented Loops



HVL Series is for Hose Connections



PVL Series is for Pipe Connections

The Concept: In boats, liquids are generally pumped from one location to another location at a higher or lower level. When the pump stops there will likely be a pressure difference from one side of the system to the other, and natural siphoning (similar to the action of an aquarium pump and filter system) will cause the liquid in the system to equalize its level and pressure.

To prevent siphoning utilize a "Vented Loop" at the highest point in the system over which the liquid is pumped. Air is introduced by the Vented Loop allowing the pressure and level of the liquid in the system to equalize without unwanted "backflow".

With a Vented Loop, when the pump stops running, the liquid on each side of the Vented Loop stays where it is. Without a Vented Loop system level would try to equalize (the ocean would try to flow into your boat).

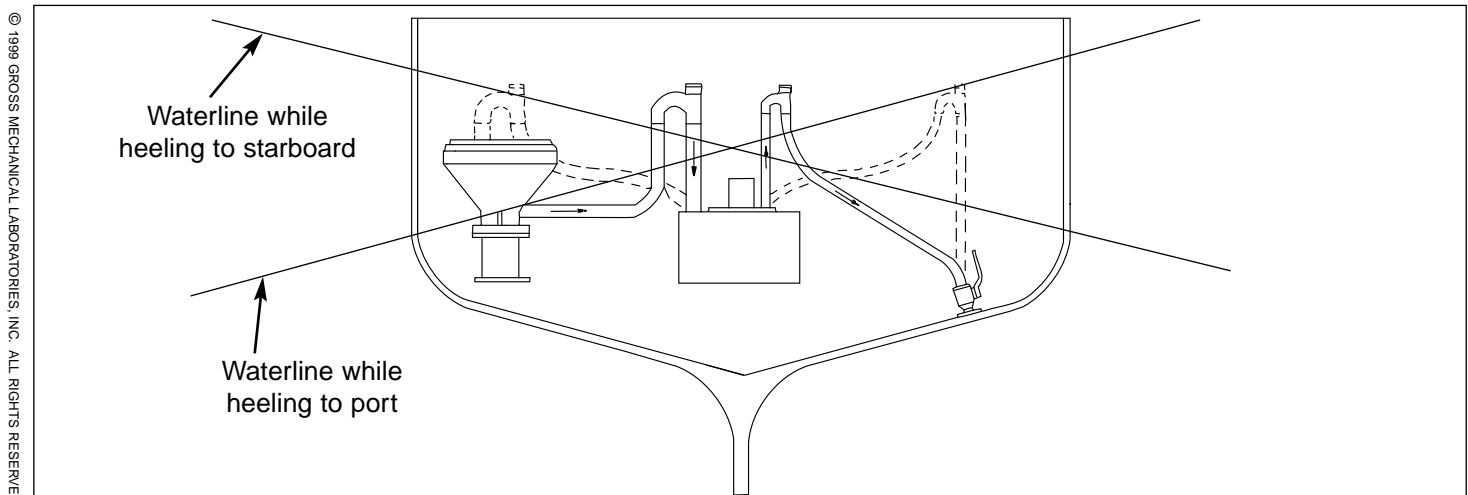
Installation Location: The installation drawing shows two possible locations. The solid lines show the best method by locating the Vented Loops near the vessel centerline to minimize the effects of side to side boat movement. The broken lines show the least desirable location. Particularly

with sailboats note that the waterline changes with vessel movement and that the Vented Loops could actually be below the outside waterline and unable to break a siphon.

Installation: Use the three (3) plastic standoffs to mount the Vented Loop securely in the desired location with the threaded cap at the highest point.

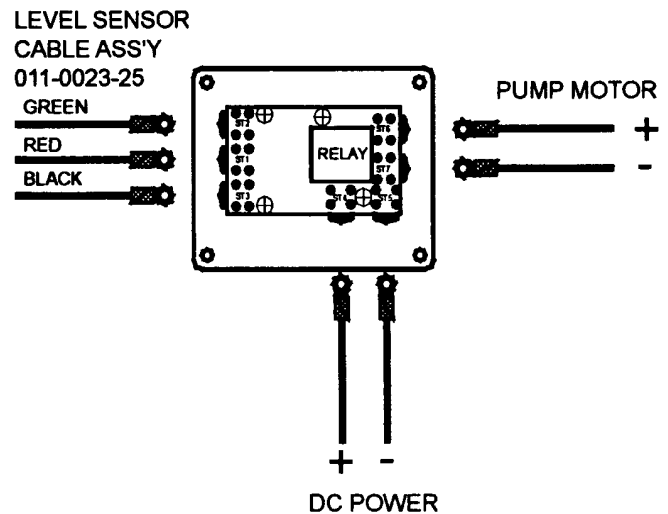
Maintenance: It is essential, particularly when used in waste systems, that the cap be removed periodically and the inside of the loop inspected for obstructions. Ensure that the flapper is not sticking. A sticking flapper will not allow the vacuum to be broken and may result in back-filling of the toilet or waste treatment system. Rinse the flapper vigorously with clean water.

Service Note: An unavoidable dimensional change during early production has current replacement check gasket #VL-1504 slightly smaller in diameter than the gasket you may be replacing. In this case, in order to prevent the gasket from falling out during reassembly, apply a drop or two of marine caulk to the outer rubber ring only to hold it to the bronze cap while the parts are being screwed together. (The concave side of the check gasket faces the liquid).



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Installation Instructions TLM Series Level Monitors



The Concept: TLM Series uses simple and reliable level sensing technology (floats) to indicate tank level in fresh water or waste water applications.

The sending unit is designed for tank-top installation into a 1-1/2" NPT female threaded port.

If your tank does not have a suitable 1-1/2" port, order GROCO #450-4 adaptor and cement it into a 2" diameter hole cut into the tank top. Use marine sealant, such as 3M #5200, to secure and seal the adaptor.

Indicator Panel: The gasketed indicator panel fits into a 2-1/16" x 3-3/8" wall cut-out and is suitable for use in wet locations such as combination shower/head compartments. 2" clearance is required behind the wall. A template is included to assist with cut-out dimensions.

Level Sender: Apply several wraps of TFE thread tape to the threads and screw into a 1-1/2" NPT port, *hand tight only*. Important: The mark on the top of the PVC plug must face toward the center of the tank and away from the nearest tank wall or other hardware. This is to ensure that the floats do not hang up on obstructions that will prevent accurate level indications.

Electrical: Refer to the wire size selection chart enclosed to properly size the DC power and Pump Motor connections shown above. Make electrical connections with ring terminals for #6 stud. Refer to the instructions for the macerator pump you are using for proper motor protection.

Operation: TLM Series monitors will indicate level (if greater than 1/4) at all times, as long as power is applied. If you wish to see level indicated only when the "Show Level" button is pressed, carefully cut the tagged jumper on the back of the indicator panel PCB.

It is illegal to discharge untreated waste overboard. Consult local regulations regarding restrictions governing overboard discharge.

To activate a macerator/discharge pump (30-amp maximum motor current) press "Pump Out". The pump will operate only while the "Pump Out" switch is pressed.

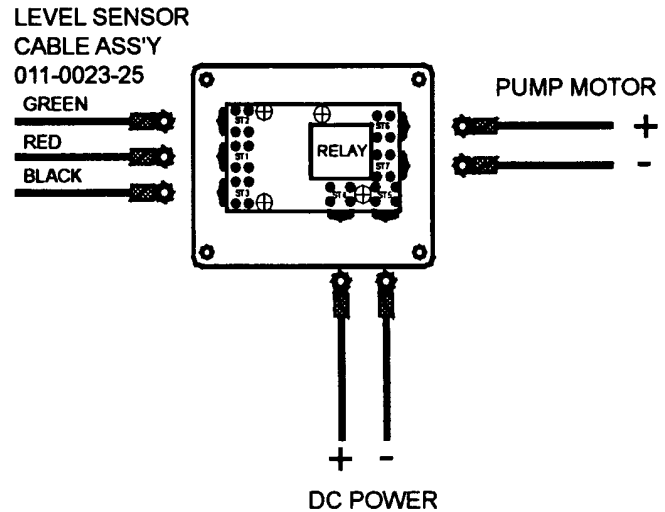
Tank Level Indications are:

- Tank level below 1/4 float - no level is shown
- Tank level between 1/4 and 3/4 - 1/4 level is shown
- Tank level above 3/4 float - both 1/4 and 3/4 levels are shown

Custom Length Sender: Custom length senders are manufactured in one inch increments and are available by special order. To order, specify 08-0004-(tank depth in inches)

Maintenance: Periodically remove and rinse the sender. Re-install with a fresh application of TFE thread tape, *hand tight only*.

Installation Instructions TLMG Series Level Monitors



The Concept: TLMG Series uses simple and reliable level sensing technology (floats) to indicate tank level in fresh water or waste water applications.

The sending unit is designed for tank-top installation into a 1-1/2" NPT female threaded port.

If your tank does not have a suitable 1-1/2" port order GROCO #450-4 adaptor and cement it into a 2" diameter hole cut into the tank top. Use marine sealant, such as 3M #5200, to secure and seal the adaptor.

Indicator Panel: The gasketed indicator panel fits into a 2-1/16" x 3-3/8" wall cut-out and is suitable for use in wet locations such as combination shower/head compartments. 2" clearance is required behind the wall. A template is included to assist with cut-out dimensions.

Level Sender: Apply several wraps of TFE thread tape to the threads and screw into a 1-1/2" NPT port, *hand tight only*. Assure that the floats are not in contact with the holding tank walls or other in-tank hardware.

Electrical: Refer to the wire size selection chart enclosed to properly size the DC power and Pump Motor connections shown above. Make electrical connections with ring terminals for #6 stud.

Operation: TLMG Series monitors will indicate level (if greater than 1/4) only when the "Show Level" button is pressed.

It is illegal to discharge untreated waste overboard. Consult local regulations regarding restrictions governing overboard discharge.

To activate a macerator/discharge pump (20-amp maximum motor current draw) press "Pump Out". The pump will operate only while the "Pump Out" switch is pressed.

Tank Level Indications are:

- Tank level below 1/4 float - no level is shown
- Tank level between 1/4 and 3/4 - 1/4 level is shown
- Tank level above 3/4 float - both 1/4 and 3/4 levels are shown

Custom Length Sender: Custom length senders are manufactured in one inch increments and are available by special order. To order, specify 08-0004-(tank depth in inches)

Maintenance: Periodically remove and rinse the sender. Re-install with a fresh application of TFE thread tape, *hand tight only*.

Installation Instructions for GM-50 Sender Assembly



Concept: Your new **GROCO** #450 Assembly will appear to be much different than the sender you are replacing, however, it is identical in fit and function, and is vastly superior in terms of reliability and repeatable accuracy.

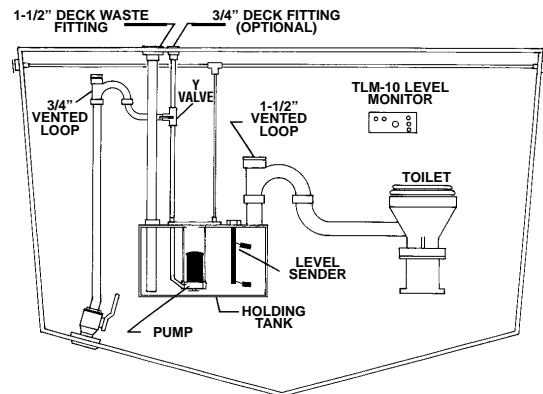
Sender Installation: Apply two wraps of TFE thread tape to the threaded portion of the PVC plug. Gently (to assure that the floats do not get pinched between the sender stem and other in-tank hardware), insert the new sender through any 1-1/2" NPT threaded opening in the top of the holding tank, and screw it on **hand tight** only.

Note the mark on top of the PVC plug and ensure that in its final orientation the mark is pointing toward the center of the tank and/or away from the tank walls or in-tank hardware such as pumps or the suction standpipe.

Electrical Connection: The three-wire plug-in connector on the end of the 450 Sender Assembly will plug into the end of the cable already in place that leads from the GM-50 indicator panel. After full engagement between the two plug halves is achieved, apply several wraps of electrical tape to prevent inadvertent moisture-related failures or false level indications.

Maintenance: Periodically remove and gently rinse the sender. Re-install with a fresh application of TFE thread tape.

Installation Instructions for ZDSG and ZDS Series Type-III MSDs



ZD System Sample Installation

It is illegal to discharge untreated waste overboard. Consult local regulations regarding restrictions governing overboard discharge. Restrictions vary with geographic location.

Holding Tank Installation: Mount the holding tank in a sturdy location that provides room for routine cleaning and service. Electrical connections and plumbing connections are on top of the holding tank for ease of service and installation. Secure the holding tank with straps or brackets to prevent tank movement while underway.

Plumbing: Double-clamp hose connections. Use TFE thread tape on threaded connections. The 1-1/2" NPT threaded openings on top of the holding tank are interchangeable. Use them for:

- Level Sender - Screw in hand-tight only
- Toilet(s) Inlet - Multiple toilets may be used
- Standpipe - Connect to deck mounted waste suction pick-up fitting for suction pump-out

Vented Loops: The proper use of vacuum breakers (Vented Loops) is essential in any plumbing system to assure safe and efficient operation. Use a 1-1/2" vented loop (GROCO #HVL-1500) between the toilet(s) and the holding tank, and a 3/4" Vented Loop (GROCO #HVL-750) between the holding tank and the overboard discharge seacock. Each vented loop should be located 12" or higher above the outside waterline.

Note: The relation between the outside waterline and the plumbing system will change, especially with sailboat installations.

Venting: Efficient venting is essential for proper pump operation. Bilateral venting (venting to both sides of the vessel) will improve efficiency and reduce odors. Install the thru-hull vent fitting into a 3/4" diameter hole cut as high as possible above the outside waterline. Use non-collapsible 5/8" ID hose to connect the thru-hull vent to the 90-degree vent on the pump flange. Assure that the vent hose runs continuously downhill to the holding tank with no sags or sharp bends.

Indicator Panel Installation: Refer to Operator Panel installation pages that follow. A template is included to assist with cut-out dimensions.

Electrical Connections: Refer to the wire size selection chart enclosed for DC power connections to the pump motor and to the operator panel.

Operation: Press "Show Level" to energize the circuit. The pump will operate only when "Pump Out" is depressed. The panel will indicate level only when "Show Level" is depressed. Level indications are as follows:

- Tank level below the level of the 1/4 float - no level will be indicated.
- Tank level above the level of the 1/4 float but below the 3/4 float - 1/4 tank level will be indicated.
- Tank level above the 3/4 float - both 1/4 and 3/4 level will be indicated.

Maintenance: Periodically remove and gently rinse the sending unit. Re-install with a fresh application of TFE thread tape, *hand tight* only.

THERMOPURE 2
NON-CHEMICAL WASTE TREATMENT SYSTEM[®]

TYPE I WASTE TREATMENT SYSTEM

MODEL TP-210, TP-215, TP-220, TP-230

USCG Certification Numbers 159.015/983/0



Concept:

THERMOPURE-2 is a Type-I MSD, which means that it may be installed aboard uninspected vessels less than 65-feet in length for the purpose of treatment and direct overboard discharge of waste from toilets.

Treatment is accomplished by macerating the waste in the holding tank, and then pumping it through a separate treatment chamber where sufficient low level heat is introduced to eliminate bacteria. No chemicals or additives are required, and operation is equally efficient in fresh, brackish, or salt water.

The effluent is free from harmful bacteria and visible solids, and is in complete compliance with current Type-I MSD requirements.

The vessel owner need only monitor system level, and apply AC power (through the vessel's generator or via a shore power connection). All system functions and operation are completely automatic.

Treatment Capacity:

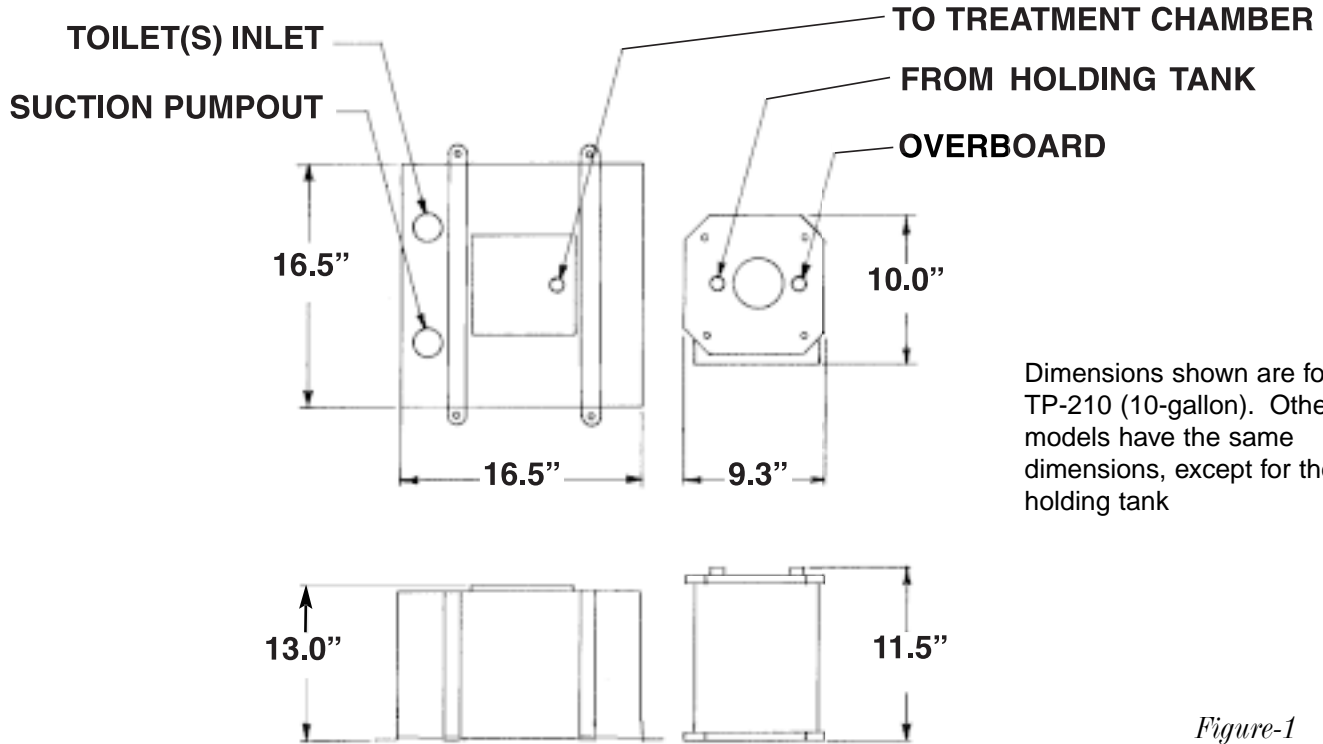
There is no exact answer to the question: "How long does it take to treat a flush?" Treatment time and capacity will vary with flush water temperature and volume. Installations where flush water temperature reaches 80°F or higher may realize a treatment capacity as high as 60 gallons per 8-hour day. Significantly colder flush water will result in reduced treatment capacity as low as 40 gallons per 8-hour day. In a typical example with 65°F flush water THERMOPURE-2 has a peak-load treatment capacity of 46 gallons per 8-hour day. Warm-up time (measured from the time when AC power is first applied to when the system is ready to treat and discharge) is approximately 6 minutes. Consult the factory if greater treatment capacity is needed.

Power Consumption:

THERMOPURE-2 requires both AC and DC power. The AC circuit requires 15 amps of power for about 6 minutes to reach treatment temperature, after which maceration, treatment and discharge begins. The DC circuit requires 16 amps of power for the short time during which the pump is running. When the pump is not running, only the control circuit is operating, which draws approximately 150mA. The following values represent power consumption in an 8-hour day.

	Stand-by	During Treatment
AC Circuit	No current draw	12.0 kWh
DC Circuit	1.2 amp-hours	14.7 amp hours

HARDWARE INSTALLATION



Dimensions shown are for TP-210 (10-gallon). Other models have the same dimensions, except for the holding tank

Figure-1

Installation Notes (Figure-1):

- If your toilet(s) use less than 1/2 gallon of water per flush, (such as Sea Land VacuFlush) GROCO 200-0015 Auto-flush kit is required to automatically rinse the treatment module if no activity occurs in a 24 hour period. The Auto-Flush kit is recommended for all installations as it simplifies periodic maintenance and treatment module flushing.
- THERMOPURE-2 is modular. Plumbing and electrical connections are made between the Holding Tank and the Treatment Chamber, which may be up to ten feet apart.
- The Treatment Chamber may be installed horizontally, with the control panel facing up. This installation option may simplify plumbing connections and save several inches in the height required for this component.
- The maximum efficient operating angle of the MSD is 30°.
- The holding tank should be at the same level as the treatment chamber. If this is not possible, or if significant heeling is anticipated (as with sailboats), GROCO HVL-750 3/4" Vented Loop (not supplied) is required between the holding tank and the treatment chamber, and must be installed at least 12" higher than the top of the treatment chamber.
- The treatment chamber and holding tank may be installed below the waterline, but in this case the vented loops between the toilet(s) and the holding tank, and the treatment chamber and the discharge seacock, must be at least 12" above the waterline. Consider the effects of vessel heeling in locating the vented loops.

- Recommended clearance above the top of the holding tank is 12"; recommended clearance above the top of the treatment chamber is 6".

Holding Tank:

- Place the holding tank with the toilet inlet fitting on the most convenient side for plumbing connections convenience.
- Secure the mount straps across the tank top. Fasten the hold-down brackets securely to the floor.

Treatment Chamber:

- In a location not more than 10-feet from the holding tank, fasten the treatment chamber to the floor with (4) 1/4" stainless steel bolts and flat washers (not supplied). THERMOPURE-2 treatment chamber may be installed on its back (display panel facing up) to conserve space if desired.

Operator Panel:

- The Operator Panel may be mounted anywhere monitoring of the MSD is desired. A 25-foot cable is supplied for connecting the Operator Panel to the Treatment Module. The panel fits into a 3" x 2" wall cut-out, and requires 1-1/2" clearance behind the wall.

PLUMBING

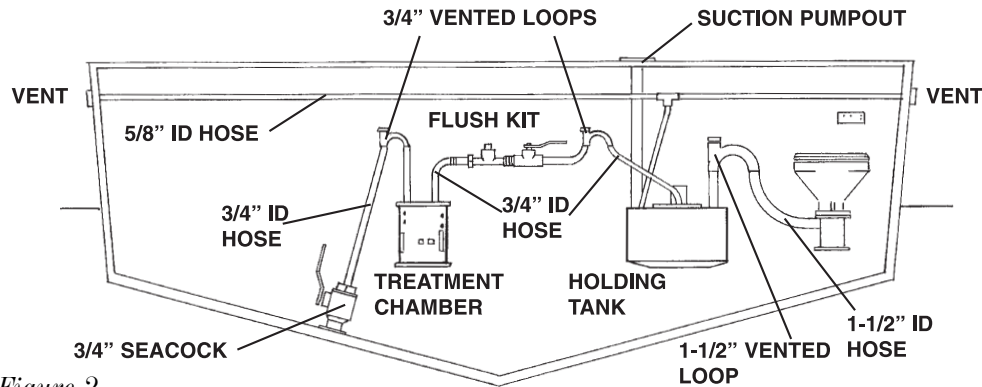


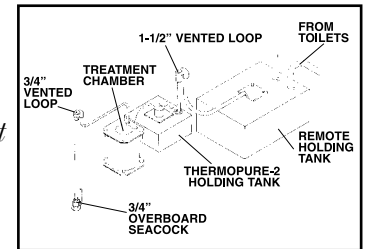
Figure-2

Plumbing Notes (Figure-2):

- Vented loops and hoses to and from THERMOPURE-2 are to be installed under the premise that the treatment chamber must remain wetted.
- Avoid running plumbing lines above electronics.
- Secure plumbing connections are essential for safe odor-free operation. Double-clamp all hose connections and use Teflon thread tape on all pipe connections.
- To prevent plumbing-related odors, use only hose which is specifically intended for use with sanitation systems, or use rigid PVC pipe.
- It is essential that the 3/4" ID hoses to and from the treatment chamber be suitable for use with fluids as hot as 250 °F.
- Thermopure-2 is programmed to enable interface with an remote holding tank which acts as the primary waste storage tank, and which automatically sends waste to Thermopure-2 holding tank when there is room. Refer to *figure-2 Inset*. In this case the remote tank would require its own level monitor and discharge pump, and a power relay or solenoid to carry the pump motor load. A connection is made to the phone-type jack marked "Remote" on Thermopure-2 Treatment Chamber panel, which instructs the remote pump to send waste to Thermopure-2 if Thermopure-2 has less than 10% capacity, and if the remote tank has any level at all. Consult GROCO MSD technical information for additional details.

Atmosphere Vent: The holding tank portion of Thermopure-2 must be vented to the atmosphere. Bilateral venting is recommended (venting to both port and starboard). A tee fitting for 5/8" ID hose and two thru-hull vents are supplied for this purpose. The thru-hull vents require a 3/4" hole and must be located as high above the water line as possible on the outside of the hull. Vent hoses must be free from sags and must make a continuous downhill run from the thru-hull vent fittings to the tee fitting and then to the holding tank.

Toilet Vented Loop: In order to keep holding tank odors out of the head compartment and to prevent backflow toward the head, a 1-1/2" vented loop (GROCO HVL-1500) is required between each toilet and the holding tank. This loop is not included because many existing head installations already include a vented loop. Install the vented loop as near the vessel centerline as possible, and at least 12" higher than the top of the holding tank.



Inset

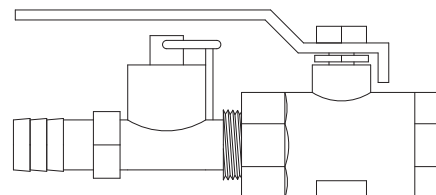
Discharge Vented Loops: 3/4" vented loops (two included) are required between the Holding Tank and the Treatment Chamber (before the Flush Kit), and between the Treatment Chamber and the discharge seacock. Both must be installed at least 12" higher than the top of the treatment chamber, or 12" higher than the outside waterline in the event the treatment chamber and holding tank are installed below the waterline.

Discharge Seacock: A discharge seacock is not included; the 1-1/2" seacock originally used for the head discharge will be satisfactory if it is functioning properly. If a discharge seacock larger than 3/4" is used, reducing bushings will enable you to reduce the top plumbing connection to 3/4" to accept the 3/4" ID discharge hose line from the treatment chamber.

Dockside Suction Pump-out: A capped 1-1/2" port is provided on top of the holding tank for connection to a deck waste fitting. If the dockside suction pump-out feature is not desired, leave this port securely capped.

Flush Kit: A Flush Kit is included, which simplifies winterization and maintenance, and provides an access port to clear a blockage, should one occur. Install the Flush Kit with the quick-release plug facing up, between the holding tank and the treatment chamber, higher than either component. The valve must face the holding tank so when it is closed and the flush function is utilized, the flushing pressure is directed away from the holding tank and through the treatment chamber. Plumb the Flush Kit with heavily reinforced 3/4" ID hose. Refer to the Maintenance section for more information.

Flush Kit



ELECTRICAL

THERMOPURE-2 requires separate AC and DC power circuits. The AC circuit powers the treatment chamber, while the DC circuit powers the macerator/discharge pump and all level monitoring and control circuitry.

AC Circuit:

The AC circuit requires dedicated 115VAC 15 amp service. No other AC powered appliances are to share this circuit. Make AC connections to the treatment chamber AC terminal block with #14/3 marine grade stranded copper wire. G=ground, N=neutral, L=line

Overcurrent protection for the AC circuit is provided by a 15-amp 3AG panel mounted fuse on the treatment chamber panel above the terminal block, but additional protection is required by making AC connections to a 15-amp breaker on the vessel's AC power distribution panel.

DC Circuit:

The DC circuit requires a dedicated 25-amp circuit breaker for 12V systems (15-amp for 24V or 32V). As with any electrical system, full input voltage is essential for proper operation. Select the proper wire size from the enclosed "Wire Size Information" sheet, and make (+) and (-) DC connections to the treatment chamber DC terminal block.

Overcurrent protection for the DC circuit is provided by the panel mounted fuse adjacent to the DC terminal block, but additional protection is required by making DC connections to a 25-amp breaker on the vessel's DC power distribution panel.

Cables:

25-foot cable (Operator Panel to Holding Tank):

The holding tank-to-operator panel connection is made with the 25-foot cable assembly supplied. Fasten the end with the pre-fitted connector to the holding tank jack marked "Operator Panel". The other end of the cable has nine (9) wires which are to be securely fastened to the clamp-type terminal block on the back of the operator panel in strict observance of the color coding sequence indicated in figure-3

10-foot cable (Pump flange to Treatment Module):

Pump and level sensor connections are made between the terminal block mounted on the pump flange, and the electric panel on the treatment module with the 10-foot harness provided. The red, yellow, black, and white light gauge wires are for the level detector. On the treatment module push the snap-in plug (with release mechanism facing up) into the receptacle marked "Level". Connect the large gauge orange (+) and black (-) wires to the "DC Hookups" terminal block positions marked "Pump +" and "Pump -".

Conversion to a Type-II MSD:

The Holding Tank panel is equipped with a telephone jack-type interface port for use with add-on equipment (available soon from GROCO) which will convert your Type-I MSD to a Type-II MSD. Contact the GROCO MSD Technical Service department for information regarding design and availability.

Remote Holding Tank Interface:

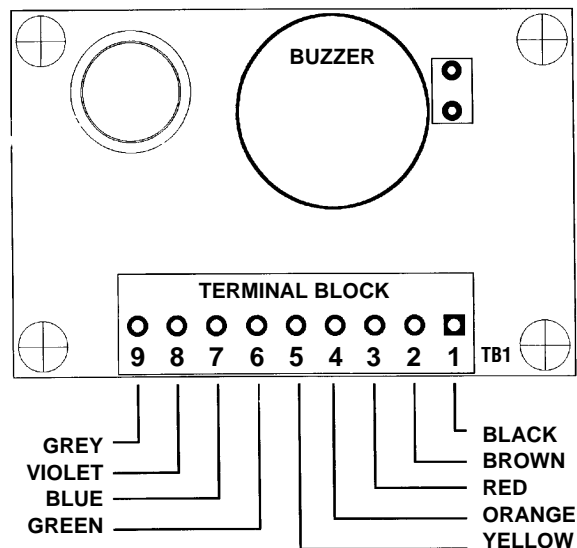
On the Treatment Module electric panel is a 1-amp capacity, 2-position, green terminal block marked "Remote". This normally closed port is for use with any remote holding tank and macerator/discharge pump. Your vessel may already be fitted with a holding tank, and your toilet(s) may already be plumbed to it.

Rather than removing the remote holding tank from service you may wish to use it as your primary waste receiving tank, and pump waste from it into the Thermopure-2 Holding Tank for treatment and discharge.

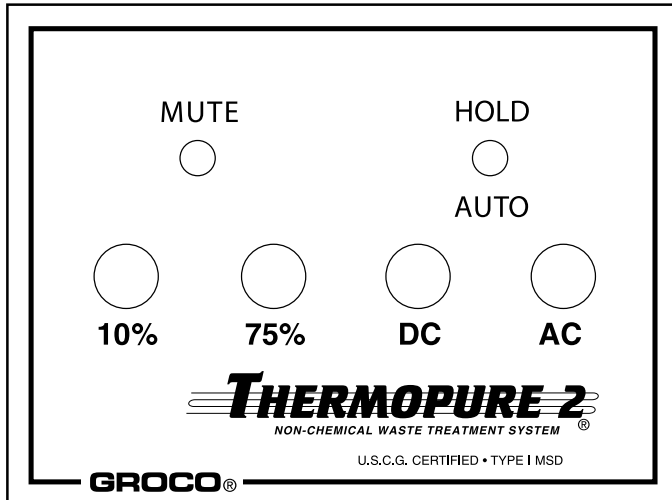
When properly utilized the "Remote" interface will allow the remote pump to deliver waste to the Thermopure-2 holding tank when the level in Thermopure-2 is less than 10%. You must provide a level monitor, discharge pump, and power relay for the remote holding tank and discharge pump.

Order GROCO 155-Series Macerator Pump and TLM Level Monitor, which are designed specifically for this purpose. For more information contact the GROCO MSD Technical Service department.

Figure-3: Back View of Operator Panel Circuit Board



OPERATION



Operator Panel

Operation:

Operation requires no user interface. Turn on AC and DC power and use the toilet normally, remembering that **only human waste and toilet tissue is to be flushed into the toilet.**

Operator Panel Indications and Controls

- 10% Tank Level - Yellow light indicates 10% level and initiates treatment and discharge if adequate temperature is present in the treatment chamber. It may take several flushes to reach 10%.
- 75% Tank Level - Flashing yellow light and audible alarm.
- AC power “on” indication
- DC power “on” indication

- **Auto/Hold Switch** - Disables the treatment and discharge cycle if the vessel is temporarily operating in a no-discharge zone. Level indications continue to be displayed.
- **Mute Switch** - The audible 75% alarm can be silenced by placing this switch in the up position. The visual 75% indication will continue to be displayed.
- **System Failure Alarm**-Audible (buzzer) and visual (blinking LEDs) indications from the operator panel indicate a system problem. If this should occur, refer to the troubleshooting guide on P-7. If the system failure alarms continue consult GROCO MSD technical service.

Important Start-up Note: Before using Thermopure-2 to process sewage, fill the treatment tank to 10% with fresh flush water. Then actuate the Emergency Discharge button on the front of the Treatment Chamber. Carefully check for plumbing leaks. This exercise also primes the treatment chamber, and assures that it will not attempt a dry heat-up cycle when the system is first used.

Extended Periods of Non-use: During periods of non-use of more than twenty-four hours the treatment chamber should be flushed with fresh or salt water containing no solid waste or paper. This can be done manually by filling the tank to 75% capacity (by flushing the toilet or by utilizing the flush kit as shown on page-3) and then allowing the system to process and discharge normally.

EMERGENCY DISCHARGE

It is illegal to discharge untreated waste. Utilize the Emergency Discharge feature only when beyond the “three-mile limit” or in extreme emergency. The Emergency Discharge push button is located on the treatment chamber panel.

WINTER OPERATION AND STORAGE

Winter Operation:

Freezing will damage your Holding Tank and Treatment Chamber . If you will be using Thermopure-2 in sub-freezing conditions it is imperative to maintain AC power to the system at all times to prevent the Treatment Chamber from freezing.

The contents of the Holding tank must be kept from freezing. Agitation from flushing toilets will be sufficient to prevent freezing in most cases, but if extended periods of non-use are anticipated (such as overnight) it is recommended that a small amount of “environmentally friendly” antifreeze be flushed through the toilet on the final flush.

Note: In order to protect the pump motor, System Failure mode will be initiated if the system temperature falls below -5° C. If this occurs refer to the trouble-shooting guide on page 7.

Winter Storage:

Step-1: Flush fresh water into the toilet to flush the system. Allow Thermopure-2 to process normally until complete, or use the flush kit (see Maintenance for more information).

Step-2: Flush enough “environmentally-friendly” antifreeze through the toilet and into Thermopure-2 to activate the 10% level indication. Allow the pump to pump the antifreeze through the treatment chamber. When pumping is complete, disconnect AC and DC power to Thermopure-2 at the vessel power distribution panel. Enough Antifreeze will remain in the holding tank and the treatment chamber to prevent the system from freezing.

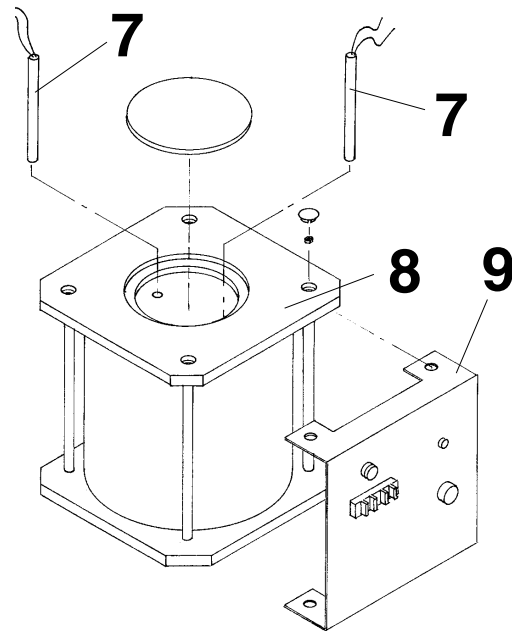
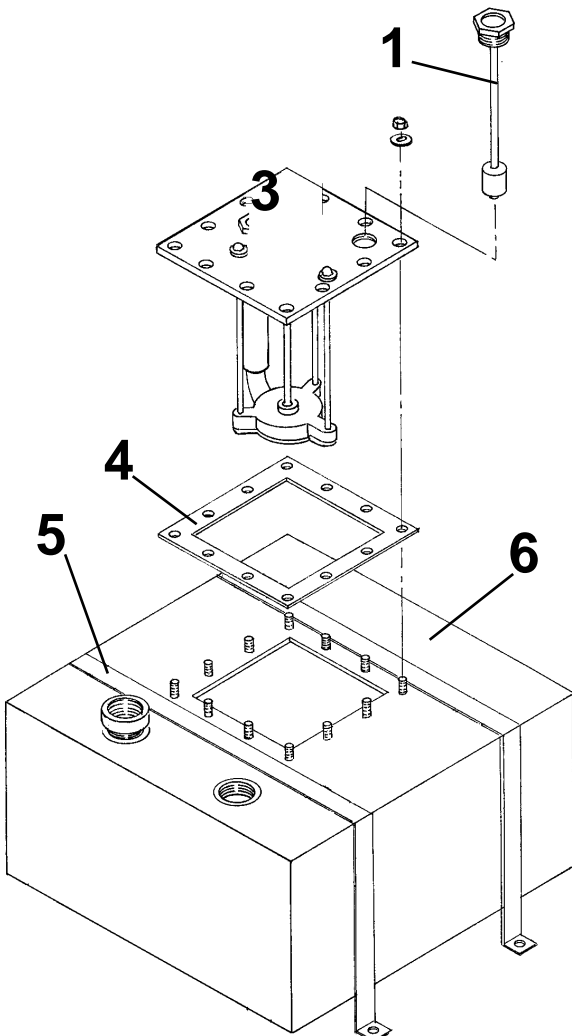
MAINTENANCE

Thermopure-2 is designed to be low maintenance, but these “preventive maintenance” steps are recommended:

- Weekly - Flush the system by filling the Holding Tank to 75% capacity with fresh water. Allow Thermopure-2 to process normally. Or, utilize the flush kit (see below).
- Monthly - Remove the cap from all of the vented loops in you system. Ensure that there is no solids or paper blocking the loop, and ensure that the flapper is not sticking. A sticking flapper will prevent vacuum from being broken and may cause system alarms to trigger.
- Monthly - Clean the level sensor. Disconnect it electrically and unscrew it from the tank top. Gently rinse the floats, apply fresh TFE thread tape and screw into tank top hand tight only.
- Monthly - unscrew the level sensor and rinse clean.
- Annually - shut off AC and DC power to Thermopure-2 and remove the pump from the holding tank for inspection and cleaning. Note that the bottom of the pump is fitted with a sharp cutting blade. Be aware of its presence when servicing the pump.

- Annually - Utilize the flush kit to flush accumulated solids from the treatment chamber. First, shut off all power and close the flush kit ball valve. Remove the quick-release plug (1/4-turn counter-clockwise) and insert the service adaptor (1/4-turn clockwise). Connect a garden hose and pump fresh water through the treatment chamber for several minutes.
- As necessary - With mild soapy water and a soft cloth or sponge clean the exterior surfaces of the Treatment Chamber and Holding Tank. Do not use abrasives or harsh chemicals.

NOTE: The EPA standards state that in freshwater lakes, freshwater reservoirs or other freshwater impoundments whose inlets or outlets are such as to prevent the ingress or egress by vessel traffic subject to this regulation, or in rivers not capable of navigation by interstate traffic subject to this regulation, marine sanitation devices certified by the U.S. Coast Guard installed on all vessels shall be designed and operated to prevent the overboard discharge of sewage, treated or untreated, or of any waste derived from sewage. The EPA standards further state that this shall not be construed to prohibit the carriage of Coast Guard-certified flow-through marine sanitation devices which have been secured so as to prevent such discharges. They also state that waters where a Coast Guard-certified marine sanitation device permitting discharge is allowed include coastal waters and estuaries, the Great Lakes and interconnected waterways, freshwater lakes accessible through locks, and other flowing waters that are navigable interstate by vessels subject to this regulation (40 CFR 140.3).



ITEM	PART NO.	DESCRIPTION	QTY.
1	08-0004-02	Level Sensor Assy.	1
NS	(Voltage)-C-MPS	Motor	1
3	155-6110-(volts)	Macerator Pump	1
4	001-0001-50	Gasket	1
5	099-0029-00	Mounting Strap	2
6	005-2010-00	Holding Tank	1
7	EE-1	Treatment Element	2
8	152-0612-11	Treatment Module	1
9	027-0012-00	Treatment Module Electric Assy.	1

TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	CORRECTIVE STEPS
<ul style="list-style-type: none"> 10% and 75% level indicators are flashing, and the audible alarm is sounding. The motor continuous run time has exceeded 45-seconds. 	<ul style="list-style-type: none"> Low voltage 	<ul style="list-style-type: none"> Check battery and wire size to system.
<ul style="list-style-type: none"> 10% level indicator is on but pump will not operate. 	<ul style="list-style-type: none"> AC power is not on AC fuse has blown AC breaker is tripped 	<ul style="list-style-type: none"> Turn on generator or plug in shore power Check AC fuse on treatment module Check AC circuit breaker
<ul style="list-style-type: none"> 10% level indicator is on, AC power is applied, but pump will not operate 	<ul style="list-style-type: none"> Treatment Chamber is not hot "Hold" switch is on 	<ul style="list-style-type: none"> Wait 10-minutes Turn off DC power, switch to "Auto", then turn on DC power.
<ul style="list-style-type: none"> 10% level in tank, Treatment Chamber is hot (on for more than 10-minutes), pump is operating, but system is not emptying. 	<ul style="list-style-type: none"> Blockage in the Treatment Chamber 	<ul style="list-style-type: none"> Use System Flush Kit
<ul style="list-style-type: none"> 10% level indicator stays on after system is empty, causing system shut-down (see fatal errors). 	<ul style="list-style-type: none"> Level sensor is stuck 	<ul style="list-style-type: none"> Remove and rinse level sensor.
<ul style="list-style-type: none"> Level and power indications do not operate properly 	<ul style="list-style-type: none"> Fuses are blown Breakers are tripped 	<ul style="list-style-type: none"> Check AC and DC Fuses Check AC and DC Breakers
<ul style="list-style-type: none"> Heater light on Treatment Module stays on continuously but system does not pump out. 	<ul style="list-style-type: none"> Dry start-up has caused the Thermal Switch on Treatment Module to open. 	<ul style="list-style-type: none"> Contact GROCO.

In the unlikely event of a "Fatal System Error" the audible alarm on the Operator Panel will sound, and signals the type of error that has occurred. Shut off AC and DC power to the system, and identify the cause of the problem. Once corrected the AC and DC power may be turned back on, which re-initializes the control.

ERROR CONDITION	PROBABLE CAUSE	CORRECTIVE STEPS
<ul style="list-style-type: none"> 10% and 75% level indicators flash rapidly, accompanied by simultaneous beeping of the audible alarm. 	<ul style="list-style-type: none"> The pump has exceeded the 45-second maximum allowable continuous running time. 	<ul style="list-style-type: none"> Clean the level sensor. Use the Flush Kit to clear any obstruction in the Treatment Chamber.
<ul style="list-style-type: none"> 75% level indicator is blinking briefly every 2-seconds, and the audible alarm beeps simultaneously. 	<ul style="list-style-type: none"> Treatment Chamber Thermal Switch has opened. Heater Control has been removed 	<ul style="list-style-type: none"> Contact GROCO.
<ul style="list-style-type: none"> 10% level indicator is blinking briefly every 2-seconds, and the audible alarm beeps simultaneously. 	<ul style="list-style-type: none"> No AC power in a cold climate Heater Control is disconnected. 	<ul style="list-style-type: none"> Apply AC power Check connection in side of Treatment Chamber block.
<ul style="list-style-type: none"> 10% level indicator is off and 75% level indicator is flashing. The audible alarm sounds a continuous tone and cannot be silenced. 	<ul style="list-style-type: none"> 75% float is stuck in the up position with tissue paper or hair. 	<ul style="list-style-type: none"> Clean the level sensor.

Parts, Assembly and Maintenance for EB Toilets

000417

TYPE PUMP: Diaphragm

TYPE OPERATION: Hand or Electric

MANUFACTURED: 1963 - 1995

OPERATION: Flush water is pumped into and out of the model EB toilet by actuating the operating arm at the right side of the toilet. This may be done manually by pumping the handle back and forth, or electrically by depressing the momentary switch. The flow of water into the bowl is controlled by stepping on or off the footpedal on the left side of the toilet.

WINTERIZATION: Freezing water will damage the toilet. Winterize the unit by draining all water from the toilet base by removing the two drain plugs on the front of the base. Loosen the connecting plumbing to drain water from hose or pipe connections to and from the toilet.

MAINTENANCE CHECKS:

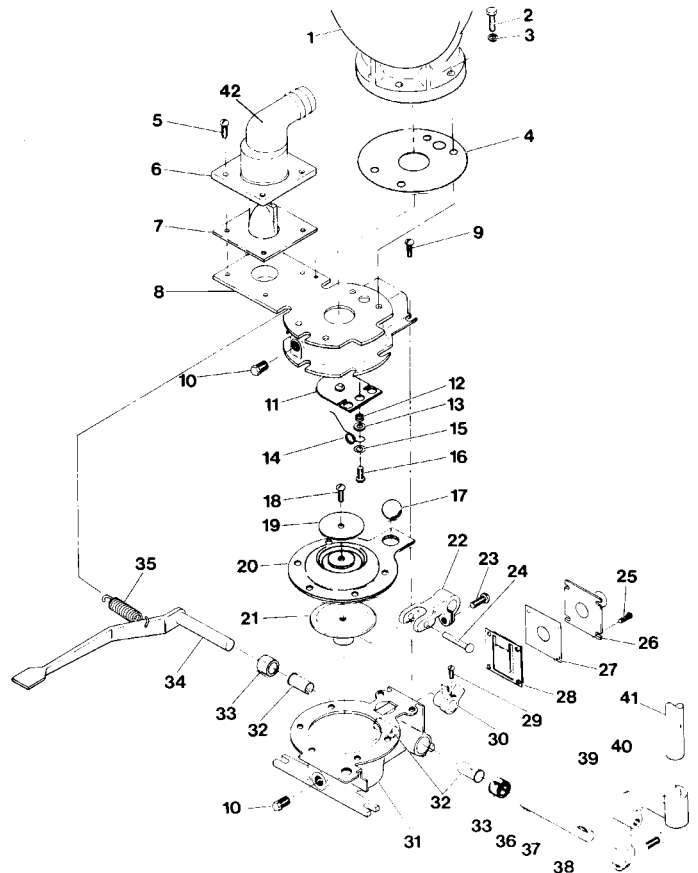
- When released, footpedal HT-3570-A should "spring" up off the floor. This action automatically closes the inlet gasket. Replace S-72587 if necessary.

- Looking into the bowl, flap HT-26-A should sit tight against the underside of the base casting. Replace HT-84-A and HT-26-A if necessary.
- There should be no noticeable play in arm HT-3560-B. If there is play it is probably due to wear in the keyways of the pump shaft. We recommend replacement of HT-6566 every five (5) years, or when excessive play is detected.
- When the footpedal is released and it springs up, the flow of water from the rim of the bowl should cease (except for the small amount of water still inside the rim). If water continues to flow into the bowl, replace HT-3557 and HT-3557-A gaskets. When replacing HT-3557 the gasket hinge is to be at the top and the bronze weight facing the toilet. Verify that cam HT-3559 strikes the bronze weight when the footpedal is up, but allows the gasket to swing open when the footpedal is depressed.

NOTES:

- 4978 bowl is NLA, replacement must be 4985. When bowl is replaced, 500-D Seat & Cover must be ordered.
- TT-50 Seat & Cover is NLA.
- If the bowl is replaced on EB toilets equipped with an electric drive, arm HT-3560-E must be ordered to replace HT-3560-B.

R	M	Item	Part Number	Description	Qty
		1	4985-0	Bowl, white	
			4985-1	Bowl, bone	1
			4985-2	Bowl, gray	
		2	51618X134HB	Bolt	4
		3	20L	Washer	4
•	•	4	HT-52-A	Gasket	1
		5	1420X34RB	Screw	4
		6	HT-11	Bracket	1
•	•	7	H-27	Joker Valve	1
		8	HT-3551	Top Casting	1
		9	1420X12RB	Screw	7
		10	1827HB	Drain Plug	2
•	•	11-12	HT-26	Gasket	1
•	•	13-16	HT-84-A	Spring Assembly	1
•	•	17	HT-56	Check Ball	1
•		18-20	HT-3554-A	Diaphragm	1
		21-24	HT-3558-A	Yoke Assembly	1
		25	1024X12HB	Screw	4
		26	HT-3556	Inlet	1
•	•	27	HT-3557-A	Gasket	1
•	•	28	HT-3557	Gasket	1
		29-30	HT-3559	Cam	1
		31	HT-3552-A	Bottom Casting	1
•	•	32	HT-3563-A	Bearing	3
•	•	33	HT-3564	Seal	2
		34	HT-3570-A	Footpedal	1
		35	S-72587	Spring	1
		36-38	HT-6566	Shaft & Keys	1
		36, 38	KS	Key Set	1
		39-40	HT-3560-E	Arm	1
		41	HT-3560-C	Handle	1
		42	HA-1	Elbow	1
		NS	500-D	Seat & Cover	1
•	•		EB Regular	Service Kit	
•	•		EB Master	Service Kit	



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Parts, Assembly and Maintenance for ET-50-A Toilet

000417

Type Pump: Vane and Rubber Impeller

Type Operation: Electric

Manufactured: 1954 - 1965

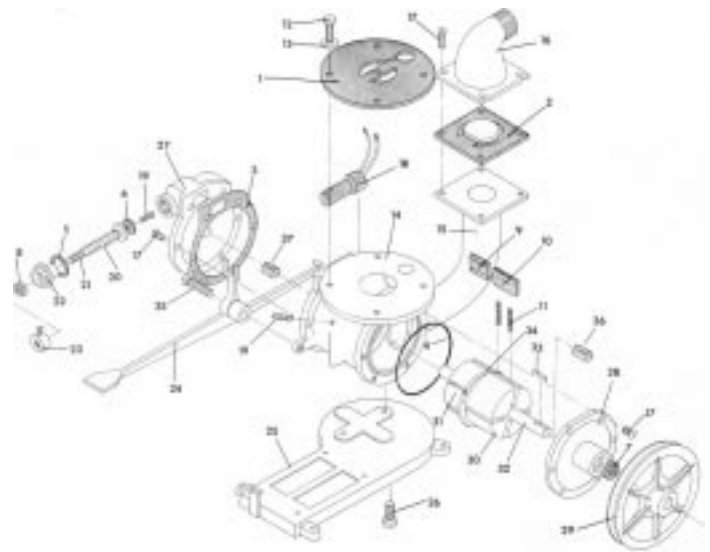
Operation: Flush water is pumped into and out of the model ET-50-A toilet by depressing the footpedal at the left side of the toilet. This simultaneously opens the water inlet and starts the pump motor. The flow of water into the bowl is provided by a rubber impeller, and is

evenly matched to that of the discharge vane pump, which also macerates the effluent.

Winterization: Freezing water will damage the toilet. Drain all water from the toilet base by removing both pump end plates. Loosen the connecting plumbing to drain water from hose or pipe connections to and from the toilet.

Note: Consult GROCO for parts availability. Though some parts are no longer available, there may be a suitable substitute part. Some parts may be repairable if returned to the factory.

S	Item	Part Number	Description	Qty
•	1	ET-67	Gasket	1
•	2	ET-72-A	Gasket	1
•	3	ET-68	Gasket	1
•	4	ET-69-A	O-Ring	1
•	5	ET-70	Gasket	1
•	6	ET-71	Washer	1
•	7	ET-73	Seal	1
•	8	ET-74	Seal	1
•	9	ET-84-A	Inlet Blades Set (6)	1
•	10	ET-85	Disch Blades Set (4)	1
•	11	ET-88	Springs Set (4)	1
	12	51618X134HB	Bolt	4
	13	20L	Washer	4
	14	ET-50-A	Body Casting	1
	15	ET-65-A	Discharge	1
	16	ET-64	Discharge Cap	1
	17	1420X34RB	Screw	4
	18	ET-75	Mercury Switch	1
	19	1024X12RB	Screw	2
	20	ET-108	Spring	1
	21	ET-109-A	Shaft	1
	22	ET-59	Valve Nut	1
	23	ET-60-A	Thrust Nut	1
	24	ET-62-A	Footpedal	1
	25	ET-63-A	Base	1
	26	3816X34HB	Bolt	2
	27	ET-51-A	Inlet End Plate	1
	28	ET-52-A	End Plate	1
	29	ET-81	Pulley	1
	30	ET-53-A	Inlet Rotor	1
	31	ET-54-A	Discharge Rotor	1
	32	ET-55	Shaft	1
	33	ET-56	Key	1
	34	ET-54	Spacer	1
	35	51618X112HB	Bolt	1
•	36	HT-3563-3	Bearing	1
•	37	HT-3563-4	Bearing	1
	NS	Lamb	Motor	1
	NS	ET-80	V-Belt	1
	NS	ET-77	Bowl	1
	NS	ET-76	Seat & Cover	1
•		ET-50-A	Service Kit	



Parts, Assembly and Maintenance for FA Toilets

Type Pump: Diaphragm

Type Operation: Hand or Electric

Manufactured: 1955 - 1957

Operation: Flush water is pumped into and out of the model FA toilet by actuating the operating arm at the right side of the toilet. This may be done manually by pumping the handle back and forth, or electrically by depressing the momentary switch. The flow of water into the bowl is controlled by stepping on or off the footpedal on the left side of the toilet.

Winterization: Freezing water will damage the toilet. Winterize the unit by draining all water from the toilet base by removing the two drain plugs on the front of the base. Loosen the connecting plumbing to drain water from hose or pipe connections to and from the toilet.

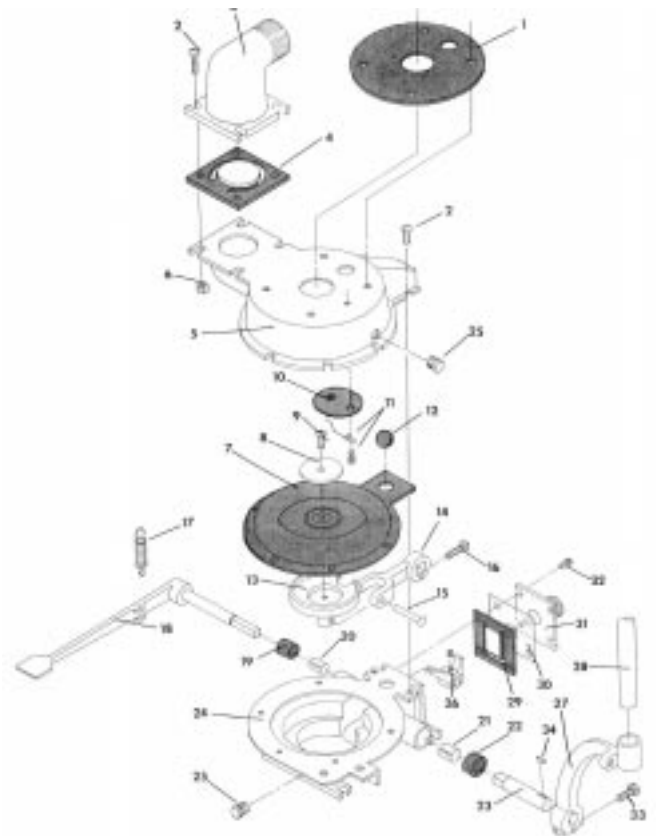
Maintenance Checks:

- When released, footpedal HT-3570 should “spring” up off the floor. This action automatically closes the inlet gasket. Replace S-72587 if necessary.
- Looking into the bowl, flap HT-26-A should sit tight against the underside of the base casting. Replace HT-84-A and HT-26-A if necessary.
- There should be no noticeable play in the movement of arm HT-3560-A. If there is play it is probably due to wear in the keyways of the pump shaft. We recommend replacement of HT-6566-FA every five (5) years, or when excessive play is detected.
- When the footpedal is released and it springs up, the flow of water from the rim of the bowl should cease (except for the small amount of water still inside the rim). If water continues to flow into the bowl, replace HT-3557 and HT-3557-A gaskets. When replacing HT-3557 the gasket hinge is to be at the top and the bronze weight facing the toilet. Verify that cam HT-3578-Square strikes the bronze weight when the footpedal is up, but allows the gasket to swing open when the footpedal is depressed.

Notes:

- 4978 bowl is NLA, replacement must be 4985. When bowl is replaced, 500-D Seat & Cover must be ordered.
- TT-50 Seat & Cover is NLA.

M	Item	Part Number	Description	Qty
•	1	HT-52-A	Gasket	1
	2	14X34RB	Screw	11
	3	HT-2369	Discharge	1
•	4	HT-3562	Gasket	1
	5	HT-3576	Top Casting	1
	6	1420HB	Hex Nut	4
•	7	HT-3579	Diaphragm	1
	8	HT-3569	Washer	1
	9	1420X1RB	Screw	1
•	10	HT-26	Gasket	1
•	11	HT-84-A	Spring Assembly	1
•	12	HT-56	Check Ball	1
	13	HT-3581	Boss	1
	14	HT-3580-Square	Crank	1
	15	Rivet-1	Rivet	1
	16	1420X1FB	Screw	1
	17	S-72587	Spring	1
	18	HT-3570	Footpedal	1
•	19	HT-3564	Seal	1
•	20	HT-3563-1	Bearing	1
•	21	HT-3563-2	Bearing	1
•	22	WS-2422	Seal	1
	23	HT-6566-FA	Shaft	1
	24	HT-3577	Casting	1
	25	1827HB	Drain Plug	2
	26	HT-3578-Square	Cam	1
	27	HT-3560-A	Arm	1
	28	HT-3560-C	Handle	1
•	29	HT-3557	Gasket	1
•	30	HT-3557-A	Gasket	1
	31	HT-3556	Casting	1
	32	1024X12RB	Screw	4
	33	51618X114HB	Bolt	1
	34	#8 Key	Woodruff Key	1
	NS	4978	Bowl	1
	NS	TT-50	Seat & Cover	1
•		FA Master	Service Kit	



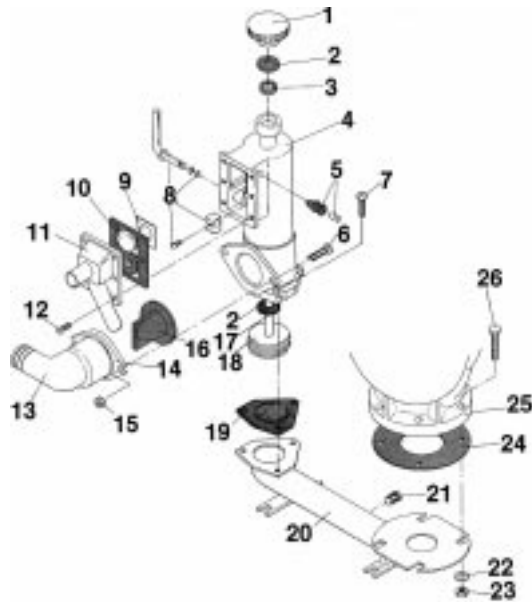
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Model HE Toilet - Parts and Assembly

Type Pump: Piston

Production: 1981 - 1985

Type Operation: Hand only



Service Notes:

- Model HE was replaced with HF in 1985.
- HF has improved valving, improved vacuum breaker, improved dry bowl flushing, and improved piston assembly.
- HE models can be upgraded to HF with the installation of HF Upgrade, or by installing HF Pump Assembly.
- HF Pump Assembly will bolt onto your HE base.

Item	Part Number	Description	Qty	Comment
1	2-236	Pump Handle	1	NLA. Replaced by HT-1085
2	HC-12	Washer	2	
• 3	HA-15	Seal	1	NLA. Replaced by 037-075-8
4	HE-C	Pump Housing	1	
• 5	HT-49-A	Vacuum Breaker	1	
6	1420X114RS	Screw	2	
7	1420X34RS	Screw	3	
8	HC-20	Cam Assembly	1	
• 9	HC-5	Check Plate	1	
• 10	HC-1	Gasket	1	
11	HC-2	Valve Cover	1	NLA. Replaced by HC-2-A
12	1032X58HS	Screw	6	NLA. Replaced by 1024X58HS
13	HA-1	Discharge	1	HA-13 straight discharge is available
14	HA-11	Bracket	1	
15	1420HS	Hex Nut	2	
• 16	H-27-A	Joker Valve	1	
17	HC-21	Shaft	1	NLA. Replaced by HF-21
•• 18	HC-10	Piston Assembly	1	
• 19	HE-8	Gasket	1	
20	HE-22-P	Base, plastic	1	NLA. Replaced by HF-22-P
	HE-22-B	Base, bronze	1	NLA. Replaced by HF-22-B
21	1827HB	Drain Plug	1	
22	16S	Washer	4	
23	1420HS	Hex Nut	4	
24	H-6	Gasket	1	
25	4967	Bowl	1	
26	1420X112HS	Bolt	4	
NS	TC-50	Seat & Cover	1	
NS	HC-23	Hose	1	
•	HE Regular	Service Kit		
••	HE Master	Service Kit		

