Triplex Ceramic Plunger Pump Operating Instructions/ Repair and Service Manual

HR Series

Patent No. 4,583,921

GIANT

MADE IN THE USA

Contents:

Updated 2/98

INSTALLATION INSTRUCTIONS

Installation of the Giant Industries, Inc., pump is not a complicated procedure, but there are some basic steps common to all pumps. The following information is to be considered as a general outline for installation. If you have unique requirements, please contact Giant Industries, Inc. or your local distributor for assistance.

1. The pump should be installed flat on a base to a maximum of a 15 degree angle of inclination to ensure optimum lubrication.

2. The inlet to the pump should be sized for the flow rate of the pump with no unnecessary restrictions that can cause cavitation. Teflon tape should be used to seal all joints. If pumps are to be operated at temperatures in excess of 120^0 F, it is important to insure a positive head to the pump to prevent cavitation.

3. The discharge plumbing from the pump should be properly sized to the flow rate to prevent line pressure loss to the work area. It is essential to provide a safety bypass valve between the pump and the work area to protect the pump from pressure spikes in the event of a blockage or the use of a shut-off gun.

4. Use of a dampener is necessary to minimize pulsation at drive elements, plumbing, connections, and other system areas. The use of a dampener with Giant Industries, Inc. pumps is optional, although recommended by Giant Industries, Inc. to further reduce system pulsation. Dampeners can also reduce the severity of pressure spikes that occur in systems using a shut-off gun. A dampener must be positioned downstream from the unloader.

5. Crankshaft rotation on Giant Industries, Inc. pumps should be made in the direction designated by the arrows on the pump crankcase. Reverse rotation may be safely achieved by following a few guidelines available upon request from Giant Industries, Inc. Required horsepower for system operation can be obtained from the charts on pages 3-6.

6. Before beginning operation of your pumping system, remember: Check that the crankcase and seal areas have been properly lubricated per recommended schedules. Do not run the pump dry for extended periods of time. Cavitation will result in severe damage. Always remember to check that all plumbing valves are open and that pumped media can flow freely to the inlet of the pump.

Finally, remember that high pressure operation in a pump system has many advantages. But, if it is used carelessly and without regard to its potential hazard, it can cause serious injury.

IMPORTANT OPERATING CONDITIONS

Failure to comply with any of these conditions invalidates the warranty.

1. Crankcase oil should be changed after the first 50 hours of operation. Then at regular intervals of 500 hours or less depending on operating conditions.

Use AMSoil 20w50 racing synthetic

2. Pump operation must not exceed rated pressure, volume, or RPM. A pressure relief device must be installed in the discharge of the system.

3. Acids, alkalines, or abrasive fluids cannot be pumped unless approval in writing is obtained before operation from Giant Industries, Inc.

4. Run the pump dry approximately 10 seconds to drain the water before exposure to freezing temperatures.

NOTE: Contact Giant Industries for Service School Information. Phone: (419)-531-4600

Specifications
Model HR Series
Axial Pump with Electric Motor or Gas Engine Mounting

Volume (HR 20/HRC20)	2.0 GPM
Volume (HR 25/HRC25)	2.5 GPM
Volume (HR 30/HRC30)	3.1 GPM
Maximum Discharge Pressure (HR20/HRC20)	2000 PSI
Maximum Discharge Pressure (HR25/HRC25 & HR30/HRC30)	2500 PSI
Maximum Inlet Pressure	up to 90 PSIG[1]
RPM	3450
Plunger Diameter	18mm
Stroke (HR20/HRC20)	3.5mm (4.8 ° angle)
Stroke (HR25/HRC25)	4.5mm (5.8 ° angle)
Stroke (HR30/HRC30)	5.5mm (6.8 ° angle)
Crankcase Oil Capacity	4.5 fl. oz.
Temperature of Pumped Fluids	Up to 80 °F
Inlet Port	1/2" NPT
Discharge Ports	3/8" NPT
Shaft Rotation	Either Direction[2]
Weight	11.7 lbs. (12.7 lbs. w/ # 09103)
Width	6-9/16"
Height	6-9/16"
Swash Plate Bore	3/4" x 3/16" Keyway[3]
Valve Type	Polyamide Plastic

[1] **A 25 PSIG minimum inlet pressure is <u>required</u>.**

[2] **The pump itself can be driven in either direction of rotation; however, the cooling fan on TEFC motors must always be positioned so that the cooling air is drawn from the non-drive end of the motor towards the pump.**

[3] **For applications requiring a swash plat bore size other than 3/4", consult the factory.**

HR20/HRC20 HORSEPOWER REQUIREMENTS

RPM	GPM	1000 PSI	1500 PSI	1700 PSI	2000 PSI
3450	2.0	1.4	2.1	2.3	2.7

HR25/HRC25 HORSEPOWER REQUIREMENTS

RPM	GPM	1000 PSI	1500 PSI	2000 PSI	2500 PSI
3450	2.5	1.7	2.6	3.4	4.3

HR30/HRC30 HORSEPOWER REQUIREMENTS

RPM	GPM	1000 PSI	1500 PSI	2000 PSI	2500 PSI
3000	2.7	1.8	2.8	3.7	4.6
3200	2.9	2.0	3.0	3.9	4.9
3450	3.1	2.1	3.2	4.2	5.3

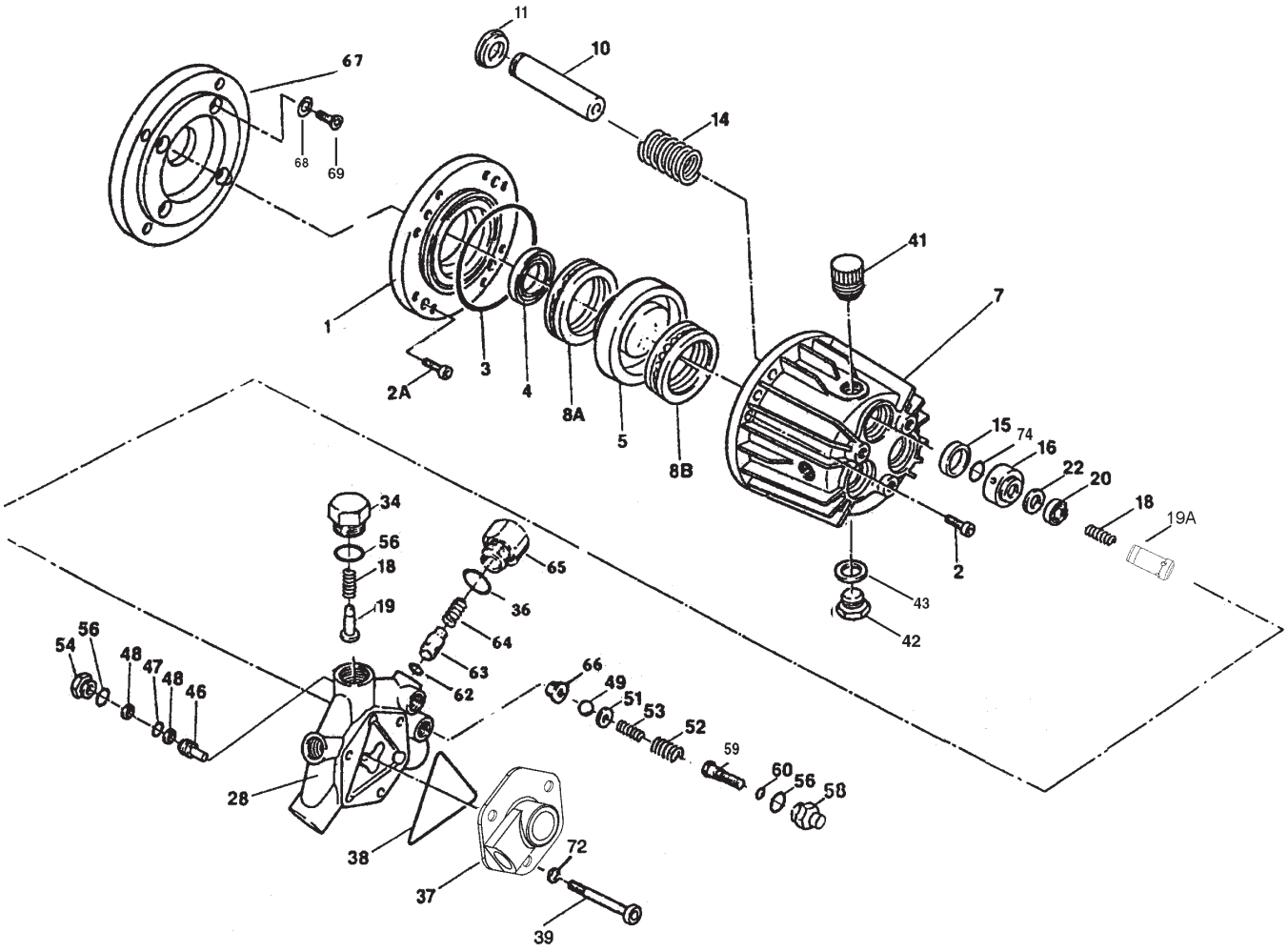
HORSEPOWER RATINGS:

The rating shown are the power requirements for the <u>pump</u>. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend a 1.15 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the Following formula:

HP = (GPM X PSI) / 1460

HR SERIES EXPLODED VIEW



HR SERIES REPAIR KITS

Plunger Packing Kit
 # 09138

Qty.	Part #	Description
3	08087	V-Sleeve
3	07904	Pressure Ring

Valve Assembly Kit
 # 09125

Qty.	Part #	Description
6	07374	Valve Spring
3	07375	Valve Cone (Outlet)
3	06267	Valve Cone (Inlet)

Oil Seal Kit
 # 09144

Qty.	Part #	Description
3	08356-0010	Oil Seal

Unloader Repair Kit
 # 09235

Qty.	Part #	Description
2	12007	O-Ring, Adapter
1	12326	O-Ring
2	12031-0002	Back up Ring, Piston
1	06227	Ball, By Pass Valve
1	07935A	Seat, By pass Valve
1	07913	O-Ring
1	08086	Spacer

Complete Manifold Kit
 # 08090

Includes Item Numbers:

18, 19, 20, 28, 34, 36, 38, 46, 47, 48, 49, 51, 52, 53, 54, 56, 58, 59, 60, 62, 63, 64, 65, 66

HR SERIES PARTS LIST

ITEM	PART #	DESCRIPTION	QTY.	ITEM	PART #	DESCRIPTION	QTY.
1	07874	Adapting Plate (HR20/HRC20)	1	37	06229*	Suction Flange	1
1	06260	Adapting Plate (HR25/HRC25/HR30/HRC30)	1	38	07910A	O-Ring, Formed	1
2	07881	Socket Head Cap Screw, 1/4"	8	39	06200*	Stud Bolt (HR20/HRC20)	3
2A	07435	Socket Head Cap Screw, 3/8"	4	39	06228	Stud Bolt (HR25/HRC25/HR30/HRC30)	3
3	07344	O-Ring	1	41	08083	Oil Fill Cap	1
4	07805	Radial Shaft Seal	1	42	06273	Oil Drain Plug	1
5	06271	Swash Plate (HR20/HRC20)	1	43	08192	Gasket	1
5	06259	Swash Plate (HR25/HRC25)	1	44	08250	Sight Glass (Optional)	1
5	06257	Swash Plate (HR30/HRC30)	1	46	07914B	Piston	1
7	08066*	Crankcase	1	47	07937	O-Ring	1
8A	06264	Rear Bearing, Complete (HR20/HRC20)	1	48	12031-0002	Back up Ring	2
8A	06264	Rear Bearing, Complete (HR25/HRC25/HR30/HRC30)	1	49	06227	Ball, By pass Valve	1
8B	07930	Front Bearing, Complete	1	51	07917A	Washer	1
10	08070	Plunger Assembly, HR20/HR25/HR30	3	52	07918	Adjusting Spring	1
10	08030	Plunger Assembly, Ceramic HRC20/HRC20/HRC30	3	53	07919	Pressure Spring	1
11	06212	Spring Disc Retainer	3	54	06239	Guide Plug	1
14	07873	Plunger Spring	3	56	12007	O-Ring	5
15	08356-0010	Oil Seal, Viton	3	58	07936A	Adjusting Plug	1
16	07899A	Spacer Ring	3	59	07938A	Adjusting Screw	1
18	07374	Valve Spring	6	60	07937	Spacer	1
19	07375	Valve Cone (Discharge)	3	62	12326	O-Ring	1
19A	06267	Valve Cone (Inlet)	3	63	12325	Kick-Back Valve Cone	1
20	08087	V-Sleeve	3	64	12328	Kick-Back Valve Spring	1
22	07904	Pressure Ring	3	65	12340	Kick-Back Valve Spring Retainer	1
28	08065*	Manifold	1	66	07935A	By Pass Valve Seat	1
34	07379	Manifold Plug	3	67	07466EX	Mounting Plate	1
36	07913	O-Ring	1	68	07468	Washer	4
				69	07467	Bolt	4
				72	06224*	Washer	3
				74	08573	O-Ring (Flinger)	3

* HR20/HRC20 pumps manufactured prior to 5/97, require different parts than those listed on this page - consult the factory.

HR SERIES TORQUE SPECIFICATIONS

Position	Item#	Description	Torque Amount (ft.-lbs)
2	07881A	Socket Head Cap Screw	100 in.-lbs.
39	06200	Stud Bolt, 8mm (older style HR20)	220 in.-lbs.
39	06270/06228	Stud Bolt, 10mm	360 in.-lbs.

PUMP SYSTEM MALFUNCTION

MALFUNCTION	CAUSE	REMEDY
The Pressure and/ or the Delivery Drops	Worn packing seals	Replace packing seals
	Broken valve spring	Replace spring
	Belt slippage	Tighten or Replace belt
	Worn or Damaged nozzle	Replace nozzle
	Fouled discharge valve	Clean valve assembly
	Fouled inlet strainer	Clean strainer
	Worn or Damaged hose	Repair/Replace hose
	Worn or Plugged relief valve on pump	Clean, Reset, and Replace worn parts
	Cavitation	Check suction lines on inlet of pump for restrictions
	Unloader	Check for proper operation
Water in crankcase	High humidity	Reduce oil change interval
	Worn seals	Replace seals
Noisy Operation	Worn bearings	Replace bearings, Refill crankcase oil with recommended lubricant
	Cavitation	Check inlet lines for restrictions and/or proper sizing
Rough/Pulsating Operation with Pressure Drop	Worn packing	Replace packing
	Inlet restriction	Check system for stoppage, air leaks, correctly sized inlet plumbing to pump
	Accumulator pressure	Recharge/Replace accumulator
	Unloader	Check for proper operation
	Cavitation	Check inlet lines for restrictions and/or proper size
Pressure Drop at Gun	Restricted discharge plumbing	Re-size discharge plumbing to flow rate of pump
Excessive Leakage	Worn plungers	Replace plungers
	Worn packing/seals	Adjust or Replace packing seals
	Excessive vacuum	Reduce suction vacuum
	Cracked plungers	Replace plungers
	Inlet pressure too high	Reduce inlet pressure
High Crankcase Temperature	Wrong Grade of oil	Giant oil is recommended
	Improper amount of oil in crankcase	Adjust oil level to proper amount

REPAIR INSTRUCTION - HR SERIES

NOTE: Always take time to lubricate all metal and nonmetal parts with a light film of oil before reassembly. This step will ensure proper fit, at the same time protecting the pump's nonmetal parts (elastomers) from cutting and scoring.

1. With a 19mm socket wrench, remove the three discharge valve plugs (34). Inspect the valve plug o-rings (56) for wear, and replace as necessary.
2. Remove the valve spring (18) and valve cone (19) from the manifold (28). Inspect the parts for wear and replace as necessary.
3. With a crescent wrench, remove the kickback valve spring retainer (65). Inspect the o-ring (36) for wear and replace as necessary. Remove the kickback valve spring (64), kickback valve cone (63), and the o-ring (62) from the manifold (28). Inspect the parts for wear and replace as necessary.
4. With a 19mm crescent wrench, remove the adjusting screw assembly (58, 56, 60, and 59). Unscrew the adjusting screw (59) from the adjusting screw plug (58). Inspect the o-rings (56 and 60) for wear and replace as necessary.
5. Remove the adjusting spring (52), pressure spring (53), washer (51) and by pass valve ball (49) from the manifold (28). Inspect the parts for wear and replace as necessary.
6. Next, remove the three manifold studs nuts (39) with a 17mm wrench. Remove the suction flange (37) and flange o-ring (38). Inspect the o-ring for wear and replace as necessary.
7. Tap the back of the manifold (28) with a rubber mallet to dislodge, and slide off the plungers (10). Take note of the position of the discharge port so as to place the port in the same position during reassembly.
8. With a 19mm socket wrench, remove the guide plug (54) and o-ring (56). Remove the piston (46), o-ring (47), and backup rings (48). Using a 7/32" Allen wrench, remove the bypass valve seat (66). Inspect the parts for wear and replace as necessary.
9. Remove the valve cones (19), valve springs (18), v-sleeves (20) and pressure rings (22). Inspect for wear and replace as necessary.
10. Remove the spacer ring (16) and flinger (74) from the plungers (10).
11. If the crankcase oil seals (15) are to be replaced, they can be removed by prying loose with a straight pin. Take care not to make contact with the plunger (10) and pry out the oil seals from their housing. Seals should not be reinstalled until after step #16.
12. In an even sequence, remove the four socket head screws (2A) that secure the adapting plate (1) to the electric motor (or engine plate - 67 on gas engine models). Remove the adapting plate/crankcase assembly from the motor/engine plate. Place the adapting plate crankcase assembly flat on a table with the plungers (10) pointing up. In an even sequence, remove the eight socket head screws (2) that secure the crankcase (7) to the adapting plate.

CAUTION: The plunger springs (14) will cause the crankcase (7) to separate from the adapting plate (1) very rapidly. Be certain to maintain control of the crankcase when removing the socket head screws (2). Remove the crankcase from the adapting plate. Next, remove the front bearing (8B), swash plate (5) with race and rear bearing (8A). Inspect the o-ring (3) for wear and replace as necessary.

13. To remove the shaft seal (4) press out the shaft seal from the front of the adapting plate (1). Replace, reversing the above procedure.
14. Pull the plunger assemblies (10, 10A, and 11) with the plunger springs (14) straight out of the crankcase (7). Inspect the parts and replace as necessary.

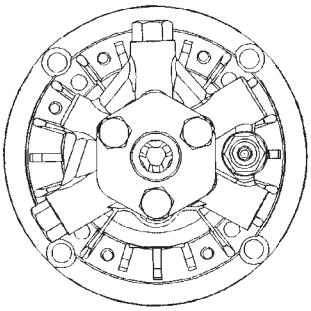
NOTE: If replacing the high pressure water seals (20), take time to first soak the seals in warm water for thirty minutes. This in necessary to ensure proper sealing upon start-up of the pump.

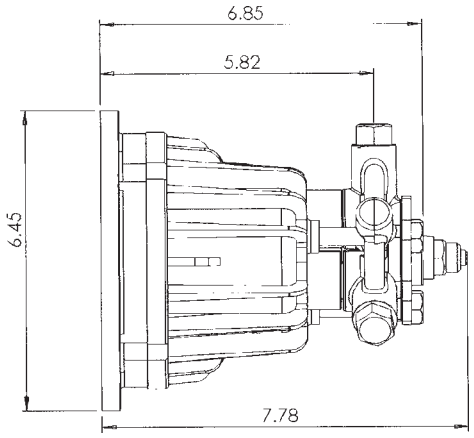
15. To reassemble, replace the plunger assemblies (10, 10A and 11) and plunger springs (14) into the crankcase (7), making sure the plunger springs are properly seated against the spring disc retainers (11).

NOTE: When mounting the swash plate (5) onto the adapting plate (1), be certain to lubricate both the shaft seal (4) and the ring which is pressed onto the swash plate. Take care not to damage the lips of the shaft seal when mounting.

16. Next, place the adapting plate (1) flat on a table. Place the o-ring (3) around the pilot on the adapting plate. Position the rear bearing (8A), swash plate (5) with race, and front bearings (8B) on top of the adapting plate. Make certain that the plunger assemblies (10, 10A, and 11) and the plunger springs (14) are pushed into the crankcase (7) as far as possible. Then wrap a rubber band tightly around the plungers (on the manifold (28) side) to secure them in place, as the next step is to turn the crankcase upside down and position it on the adapting plate and bearings. Press down firmly on the crankcase to secure the crankcase on the adapting plate, making certain that the swash plate (5) is properly positioned against the adapting plate. Replace the socket head screws (2) and tighten securely in a sequential pattern to 100 in-lbs. Remove the rubber band used to hold the plungers in place.
17. Replace the oil seals (15), making sure the lips of the seal face the crankcase (7). Place the flingers (74) over the plungers (10).
18. Replace the spacer rings (16) over the plungers (10) and seat into the crankcase (7). Make certain that the weep holes are facing towards the oil drain plug (42).
19. Insert the valve spring (18) and valve cone (19) into the plungers (10).
20. Assemble the adjusting screw (59) with o-ring (60) into the adjusting screw plug (58). Assemble the o-ring (56) onto the adjusting screw plug.
21. Replace the bypass valve seat (66) using a 7/32" Allen wrench. (A sealing compound such as Loctite 572 should be applied to the threads to ensure a proper seal.) Drop the ball (49) onto the seat. Replace the washer (51) with the concave side toward the ball. Next, replace both springs (53 and 52). Replace the adjusting screw assembly (from the above) and tighten down with a 19mm wrench.
22. Insert the piston (46) with o-ring (47) and backup rings (48) into the manifold (28). Screw in the guide plug (54) with o-ring (56) and tighten.
23. Replace the kickback valve cone (63) with o-ring (62) and kickback valve spring (64) in place. Assemble the o-ring (36) onto the kickback valve spring retainer (65). Screw the kickback valve spring retainer into the manifold (28) and tighten.
24. Place the valve cones (19) and valve springs (18) into the discharge bores. Replace the valve plugs (34) with o-rings (56) and tighten.
25. With the grooved sides pointing down, place the v-sleeves (20) into the manifold (28). Next, place the pressure rings (22) into the manifold.
26. Grease the end of the plungers (10). Replace the manifold (28) over the plungers (10) and seat firmly against the spacer rings (16). If necessary, gently tap manifold with a rubber mallet .
27. Grease the suction flange o-ring (38) and place it into the groove on the suction flange (37). Replace the stud bolts (39) and washers (72) and tighten bolts to 220 in.-lbs.
28. Fill the crankcase with 4.5 fluid ounces of oil. The pump is now ready for operation.

HR SERIES DIMENSIONS





GIANT INDUSTRIES LIMITED WARRANTY

Giant Industries, Inc. pumps and accessories are warranted by the manufacturer to be free from defects in workmanship and material as follows:

1. For portable pressure washers and self-service car wash applications, the discharge manifolds are guaranteed for the life of the pump. Our other pump parts, used in portable pressure washers and in car wash applications, are warranted for five years from the date of shipment for all pumps used in NON-SALINE, clean water applications.
2. One (1) year from the date of shipment for all other Giant industrial and consumer pumps.
3. Six (6) months from the date of shipment for all rebuilt pumps.
4. Ninety (90) days from the date of shipment for all Giant accessories.

This warranty is limited to repair or replacement of pumps and accessories of which the manufacturer's evaluation shows were defective at the time of shipment by the manufacturer. The following items are NOT covered or will void the warranty:

1. Defects caused by negligence or fault of the buyer or third party.
2. Normal wear and tear to standard wear parts.
3. Use of repair parts other than those manufactured or authorized by Giant.
4. Improper use of the product as a component part.
5. Changes or modifications made by the customer or third party.
6. The operation of pumps and or accessories exceeding the specifications set forth in the Operations Manuals provided by Giant Industries, Inc.

Liability under this warranty is on all non-wear parts and limited to the replacement or repair of those products returned freight prepaid to Giant Industries which are deemed to be defective due to workmanship or failure of material. A Returned Goods Authorization (R.G.A.) number and completed warranty evaluation form is required prior to the return to Giant Industries of all products under warranty consideration. Call (419)-531-4600 or fax (419)-531-6836 to obtain an R.G.A. number.

Repair or replacement of defective products as provided is the sole and exclusive remedy provided hereunder and the MANUFACTURER SHALL NOT BE LIABLE FOR FURTHER LOSS, DAMAGES, OR EXPENSES, INCLUDING INCIDENTAL AND CONSEQUENTIAL DAMAGES DIRECTLY OR INDIRECTLY ARISING FROM THE SALE OR USE OF THIS PRODUCT.

THE LIMITED WARRANTY SET FORTH HEREIN IS IN LIEU OF ALL OTHER WARRANTIES OR REPRESENTATION, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL SUCH WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY THE MANUFACTURER.

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