



## Vestil Manufacturing Corp.

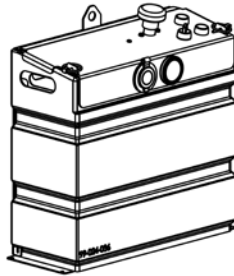
2999 North Wayne Street, P.O. Box 507, Angola, IN 46703

Telephone: (260) 665-7586 -or- Toll Free (800) 348-0868

Fax: (260) 665-1339

Web: [www.vestilmfg.com](http://www.vestilmfg.com) e-mail: [info@vestil.com](mailto:info@vestil.com)

# MPU-DC GEN2 Battery-Powered Modular Power Unit Instruction Manual



### Receiving instructions:

After delivery, remove the packaging from the product. Inspect the product closely to determine whether it sustained damage during transport. If damage is discovered, record a complete description of it on the bill of lading. If the product is undamaged, discard the packaging.

### NOTE:

The end-user is solely responsible for confirming that product design, use, and maintenance comply with laws, regulations, codes, and mandatory standards applied where the product is used.

### Replacement Parts and Technical Assistance:

For answers to questions not addressed in these instructions and to order replacement parts, labels, and accessories, call our Technical Service and Parts Department at (260) 665-7586. The department can also be contacted online at [http://www.vestilmfg.com/parts\\_info.htm](http://www.vestilmfg.com/parts_info.htm).

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## SIGNAL WORDS

This manual uses SIGNAL WORDS to indicate the likelihood of personal injuries, as well as the probable seriousness of those injuries, if the product is misused in the ways described. Other signal words call attention to uses of the product likely cause property damage. The signal words used appear below along with the meaning of each word:



Identifies a hazardous situation which, if not avoided, WILL result in DEATH or SERIOUS INJURY. Use of this signal word is limited to the most extreme situations.



Identifies a hazardous situation which, if not avoided, COULD result in DEATH or SERIOUS INJURY.



Indicates a hazardous situation which, if not avoided, COULD result in MINOR or MODERATE injury.



Identifies practices likely to result in product/property damage, such as operation that might damage the product.

## Hazards of Improper Use:

We strive to identify foreseeable hazards associated with the use of our products, but no manual can address every risk. The most effective means for avoiding injury is to exercise sound judgment whenever using this device.



Improper or careless operation might result in serious personal injuries.

- **Read and understand the entire manual before assembling, using or servicing the power unit.** Read the manual to refresh your understanding of proper use and maintenance procedures as necessary.
- DO NOT work on a battery UNLESS you are wearing personal protective equipment, particularly a face shield. Batteries contain sulfuric acid and produce explosive gases. A battery explosion could result in loss of eyesight and/or serious burns.
- DO NOT smoke near the battery or expose the battery to sparks or flames.
- Charge batteries ONLY in clean, dry, and well-ventilated locations.
- DO NOT touch the battery terminals. Remove personal items like rings and watches BEFORE beginning to work on the battery. The battery can produce energy sufficient to weld jewelry to metal; underlying skin could be severely burned.
- Keep fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes. Immediately rinse any skin that has been contacted by acid. If acid gets in your eyes, rinse them thoroughly with eye wash. After rinsing the affected area, notify your supervisor about the incident.
- Replace damaged cables and wiring as soon as the damage is discovered.
- Check the water level in the battery at least once per month.
- Operating the power unit when battery voltage is low can cause premature motor contactor failure.
- DO NOT perform maintenance on this power unit UNLESS it is unloaded. Refer to the "Inspections & Maintenance" section of your product owner's manual (i.e. the manual for your cart, table, lift, etc.). Put the product into the recommended maintenance configuration. If repairs are necessary, ONLY install manufacturer-approved replacement parts.
- DO NOT use the power unit unless it is in normal condition. See [Inspections & Maintenance](#) on p. 20.
- Watch the cylinder while extending and retracting the piston. It should move smoothly. Watch for binding or jerky movement and listen for unusual noises. Tag the unit "Out of order" and do not use it if you observe anything abnormal.
- DO NOT continue to press the UP button if the piston is fully extended.
- DO NOT use the power unit UNLESS all labels are in place and readable. See [Labeling diagram](#) on p. 21.
- DO NOT modify this power unit in any way. Modifications automatically void the limited warranty and might make the unit unsafe to use.

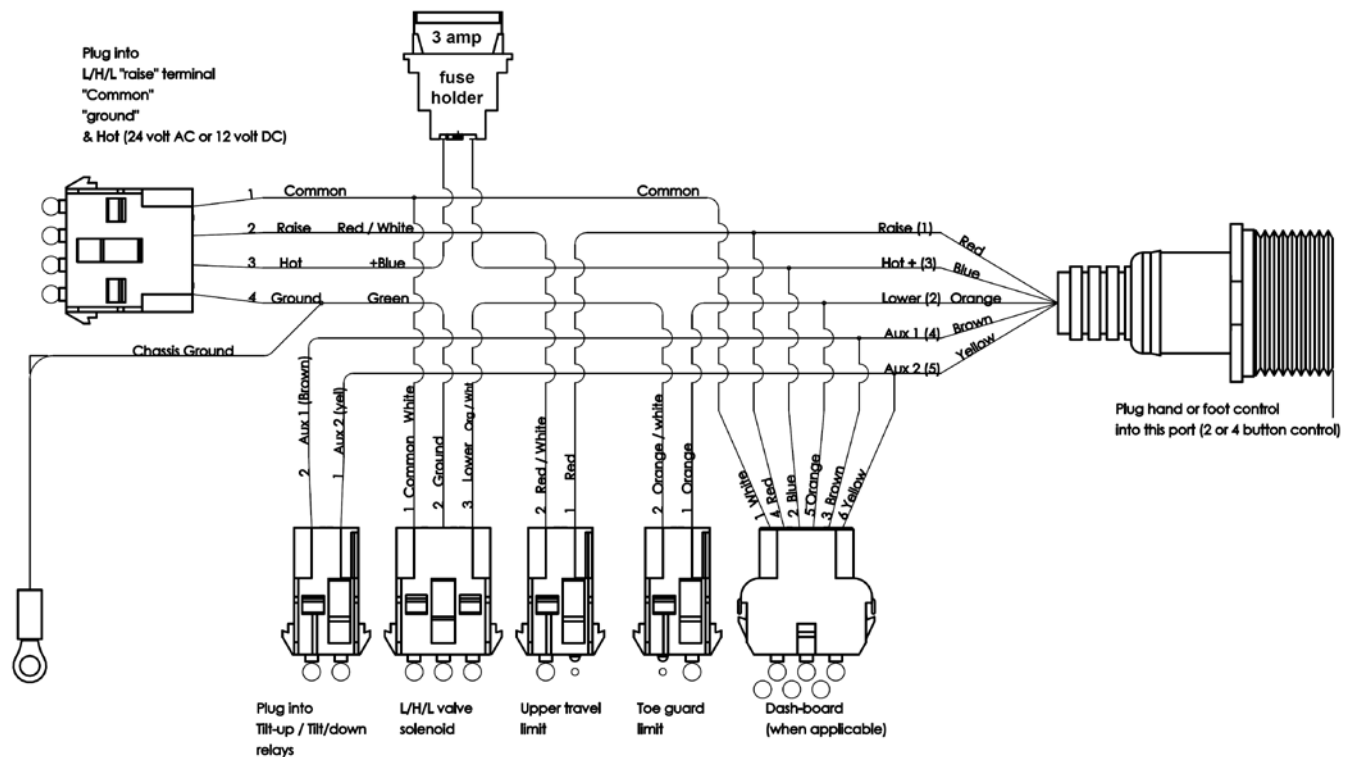


Proper use and maintenance are essential for this product to function properly.

- Periodically lubricate moving parts.
- Keep the product clean & dry.
- Only use approved replacement parts. To order replacement or spare parts for this equipment, contact the factory.

NOTES:

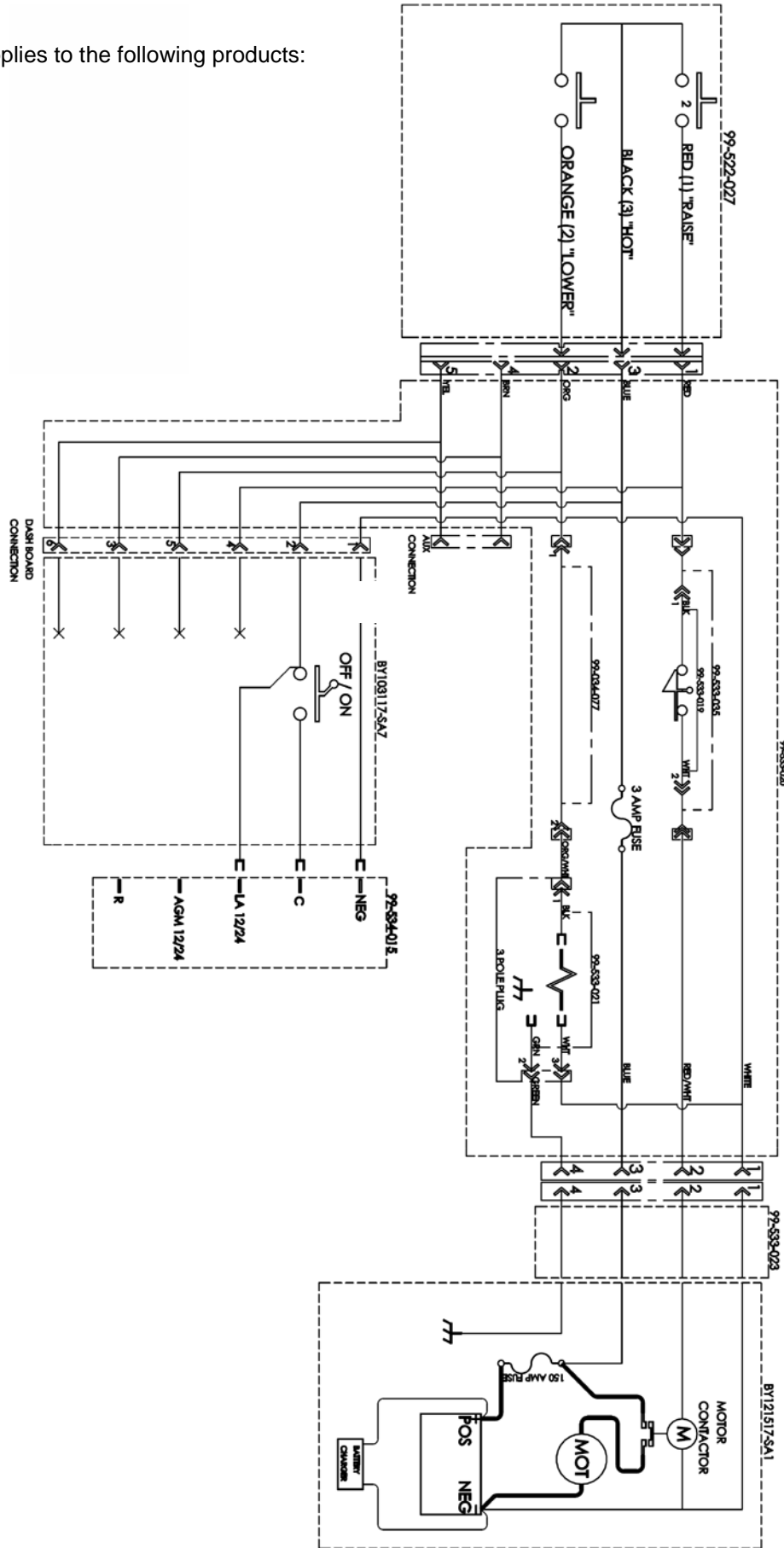
MPU Harness Wiring Diagram: (Detail Views on Pages 6, 8, 10, & 12)



# 12V DC Circuit Diagram (by103117-sa4): Upper Travel Limit Switch; No Toeguards

Schematic applies to the following products:

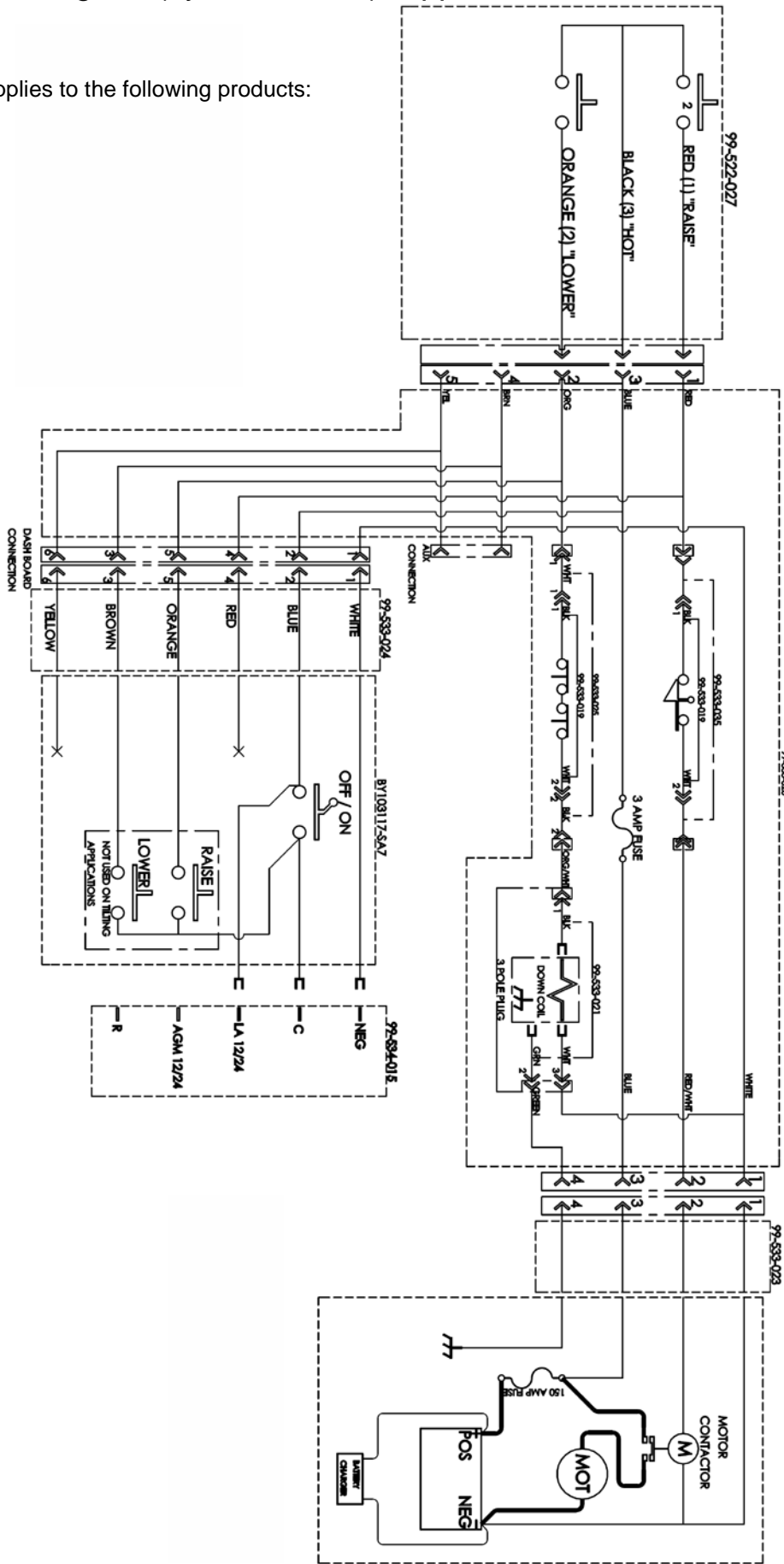
- TM
- TMS
- TCD
- HBD



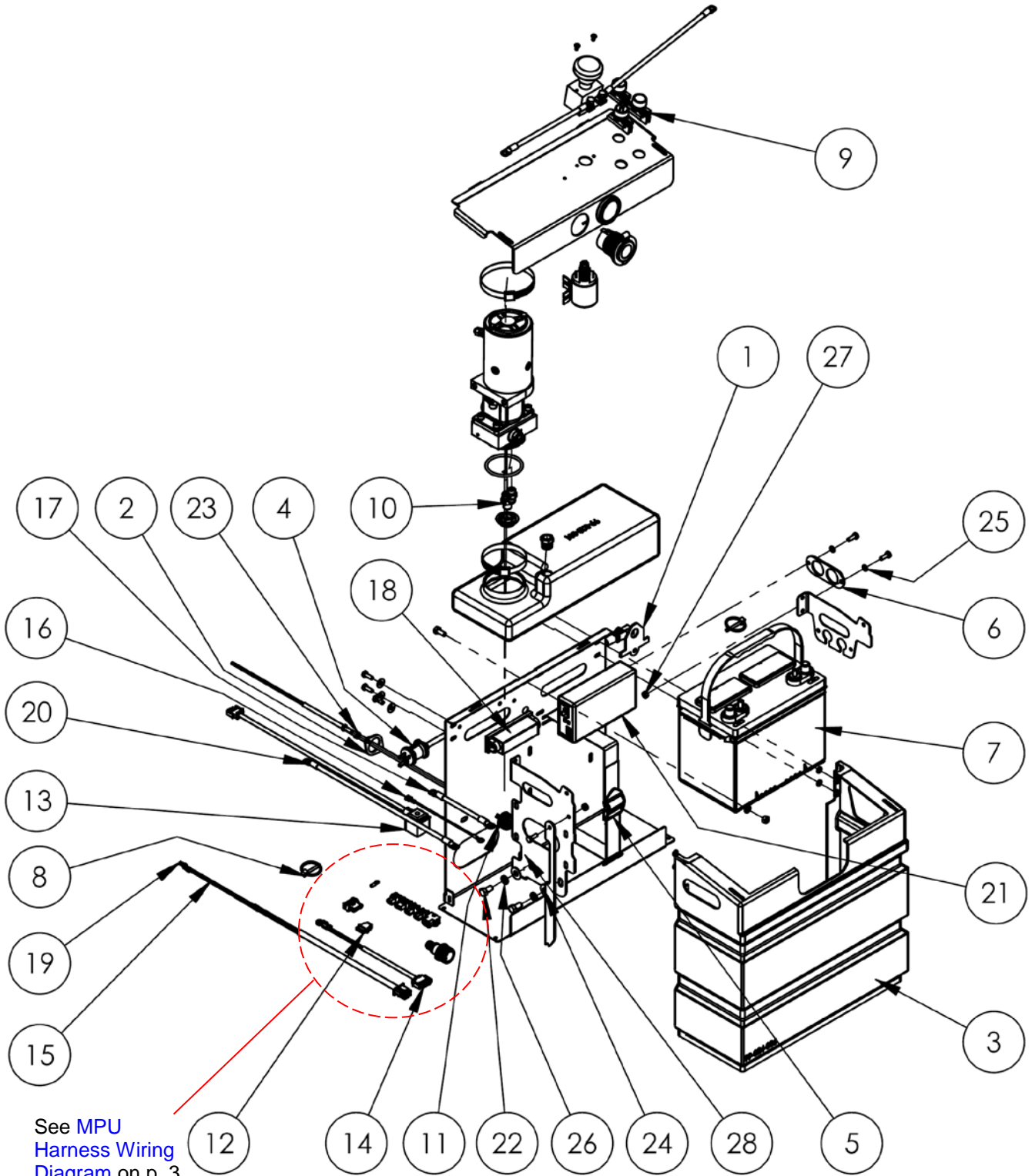
# 12V DC Circuit Diagram (by103117-sa5): Upper Travel Limit Switch + Toeguard

Schematic applies to the following products:

- PST
- EHLT-WS



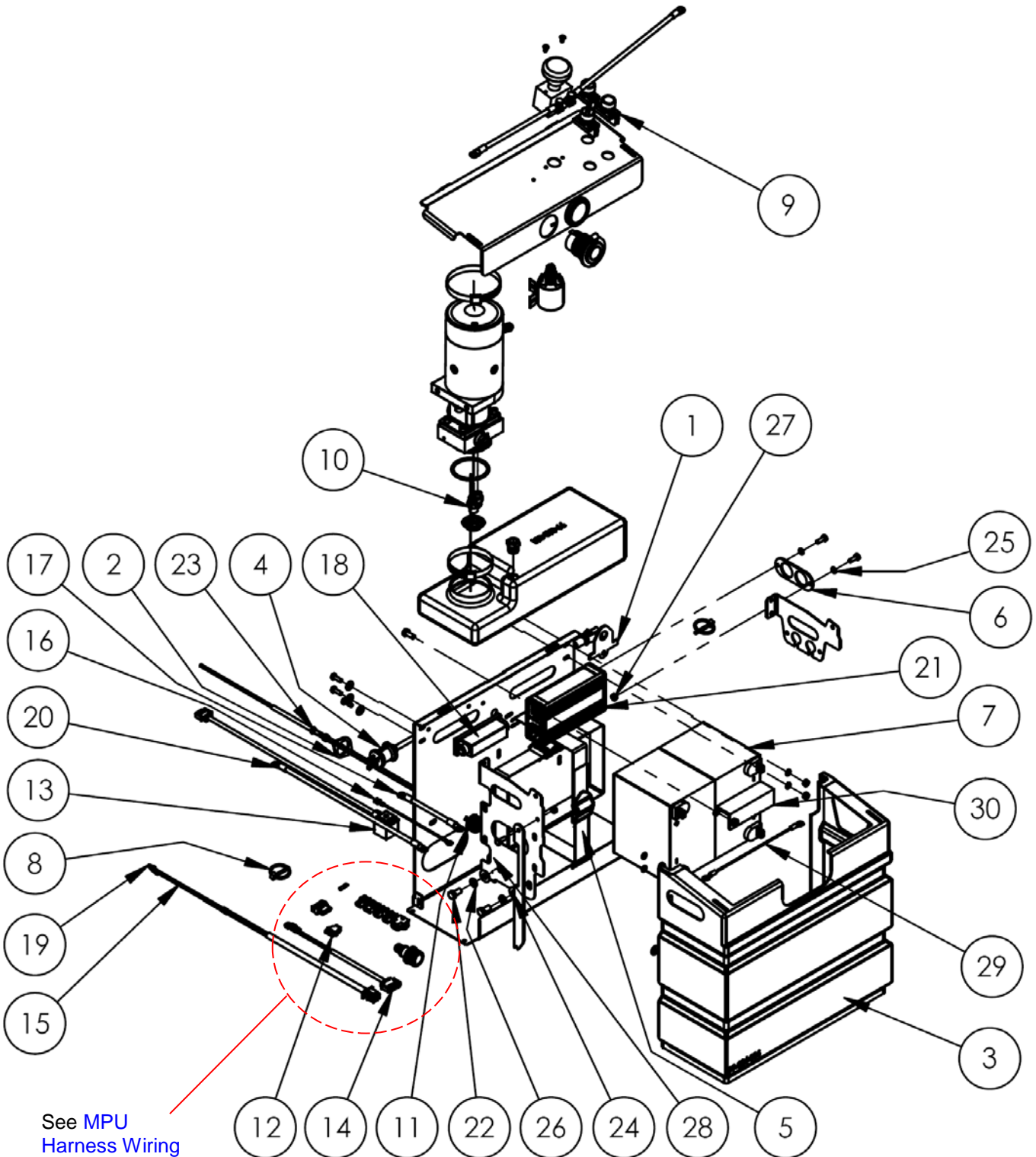
**12V POWER UNIT ASSEMBLY:** 12V DC, 1-PHASE, 1.14HP OR 2.15HP MOTOR,  
99-660-(001-024)-MANUALS DASHBOARD WITH 2-PUSHBUTTONS  
USER SELECTED PUMP DISPLACEMENT AND FLOW CONTROL  
L-H-L HYDRAULIC CIRCUIT  
1.5 GALLON HORIZONTAL TANK



12V, 2-PUSHBUTTONS POWER UNIT ASSEMBLY BILL OF MATERIALS

Item	Part no.	Description	Qty.	Item	Part no.	Description	Qty.
1	99-514-021	FRAME, MPU GEN2	1	15	99-533-024	ASSEMBLY, 18/7, 6-PIN, MATE-N-LOCK X 24"	1
2	99-016-076	BRACKET, CLAMP PLATE, BACK CONNECTION	1	16	99-533-057	ASSEMBLY, WIRE, STRAIGHT, 18/1, 6 <sup>1</sup> / <sub>2</sub> " WITH RING TERMINAL AND FEMALE SPADE	1
3	99-024-036	COVER, POWER UNIT, DC, GEN II	1	17	99-533-060	ASSEMBLY, WIRE, STRAIGHT, 4/1, WELD WIRE, 4' RED, DOUBLE RING TERMINAL	1
4	99-033-024	CORD CHARGER	1	18	99-642-001	FUSE HOLDER FOR ANL ASSEMBLY	1
5	99-034-013	STRAP, BATTERY BOX, WITH BUCKLE	1	19	01-034-001	ACCESSORIES, ELECTRICAL, WIRE NUT, GRAY 2-22GA TO 2-16GA	2
6	99-034-084	ELECTRICAL CORD CLAMP PLATE	1	20	15-533-012	ASSEMBLY, WIRE, STRAIGHT, 4/1 WELD WIRE, 12' BLACK, DOUBLE RING TERMINAL	1
7	99-139-003	BATTERY, WET, LEAD-ACID, GROUP 24, DEEP CYCLE	1	21	21-034-008	ACCESSORIES, ELECTRICAL CHARGER, 12V, 5A	1
8	99-145-142	LOCKING PIN WITH RING, <sup>3</sup> / <sub>16</sub> DIAMETER X 1 <sup>1</sup> / <sub>4</sub> EFFECTIVE LENGTH	2	22	11103	HEX BOLT, GRADE A, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "-16x <sup>3</sup> / <sub>4</sub> "	2
9	99-160-099	POWER UNIT, SUBASSEMBLY, DC, GEN II MPU DASHBOARD, 2-BUTTON, PBE	1	23	11033	HEX BOLT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20x <sup>3</sup> / <sub>4</sub> "	4
10	POWER UNIT SUBASSEMBLY: 12V DC, 1-PHASE, 1.14HP, 1800RPM MOTOR; L-H-L CIRCUIT; 1.5 GAL. HORIZONTAL TANK & FITTINGS; PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "POWER UNIT SUBASSEMBLY" ON P. 14)			10	POWER UNIT SUBASSEMBLY: 12V DC, 1-PHASE, 2.15HP, 1800RPM MOTOR; L-H-L CIRCUIT; 1.5 GAL. HORIZONTAL TANK & FITTINGS; PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "POWER UNIT SUBASSEMBLY" ON P. 14)		
	0.035 DISPLACEMENT PUMP:				0.035 DISPLACEMENT PUMP:		
	99-160-137	0.5GPM FLOW CONTROL	1		99-160-149	0.5GPM FLOW CONTROL	1
	99-160-138	1.0GPM FLOW CONTROL	1		99-160-150	1.0GPM FLOW CONTROL	1
	99-160-139	1.5GPM FLOW CONTROL	1		99-160-151	1.5GPM FLOW CONTROL	1
	99-160-140	2.0GPM FLOW CONTROL	1		99-160-152	2.0GPM FLOW CONTROL	1
	0.060 DISPLACEMENT PUMP:				0.060 DISPLACEMENT PUMP:		
	99-160-141	0.5GPM FLOW CONTROL	1		99-160-153	0.5GPM FLOW CONTROL	1
	99-160-142	1.0GPM FLOW CONTROL	1		99-160-154	1.0GPM FLOW CONTROL	1
	99-160-143	1.5GPM FLOW CONTROL	1		99-160-155	1.5GPM FLOW CONTROL	1
	99-160-144	2.0GPM FLOW CONTROL	1		99-160-156	2.0GPM FLOW CONTROL	1
	0.073 DISPLACEMENT PUMP:				0.073 DISPLACEMENT PUMP:		
	99-160-145	0.5GPM FLOW CONTROL	1		99-160-157	0.5GPM FLOW CONTROL	1
	99-160-146	1.0GPM FLOW CONTROL	1		99-160-158	1.0GPM FLOW CONTROL	1
99-160-147	1.5GPM FLOW CONTROL	1	99-160-159	1.5GPM FLOW CONTROL	1		
99-160-148	2.0GPM FLOW CONTROL	1	99-160-160	2.0GPM FLOW CONTROL	1		
11	99-533-017	ASSEMBLY, CORD, STRAIGHT, 18/5, 30" MOLDED FEMALE RECEPTACLE, 5-PIN	1	24	33008	FLAT WASHER, LOW CARBON, USS, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "	2
12	99-533-020	ASSEMBLY, WIRE HARNESS. MAIN	1	25	33618	MEDIUM SPLIT LOCK WASHER, <sup>1</sup> / <sub>4</sub> "	4
13	99-533-021	ASSEMBLY, 3-PIN, MATE-N-LOCK, TO DIN COIL CONNECTOR	1	26	33622	SPLIT LOCK WASHER, CARBON STEEL, MEDIUM ZINC FINISH, <sup>3</sup> / <sub>8</sub> "	2
				27	36102	HEX NUT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20	4
14	99-533-023	ASSEMBLY, 18/4, 4-PIN, MATE-N-LOCK	1	28	H-9x450	TIE STRAP, BLACK	2

**24V POWER UNIT ASSEMBLY:** 24V DC, SINGLE PHASE, 2.15HP, 1800RPM MOTOR,  
99-660-(025-036)-MANUALS DASHBOARD WITH 2-PUSHBUTTONS  
USER SELECTED PUMP DISPLACEMENT AND FLOW CONTROL  
L-H-L HYDRAULIC CIRCUIT  
1.5 GALLON HORIZONTAL TANK



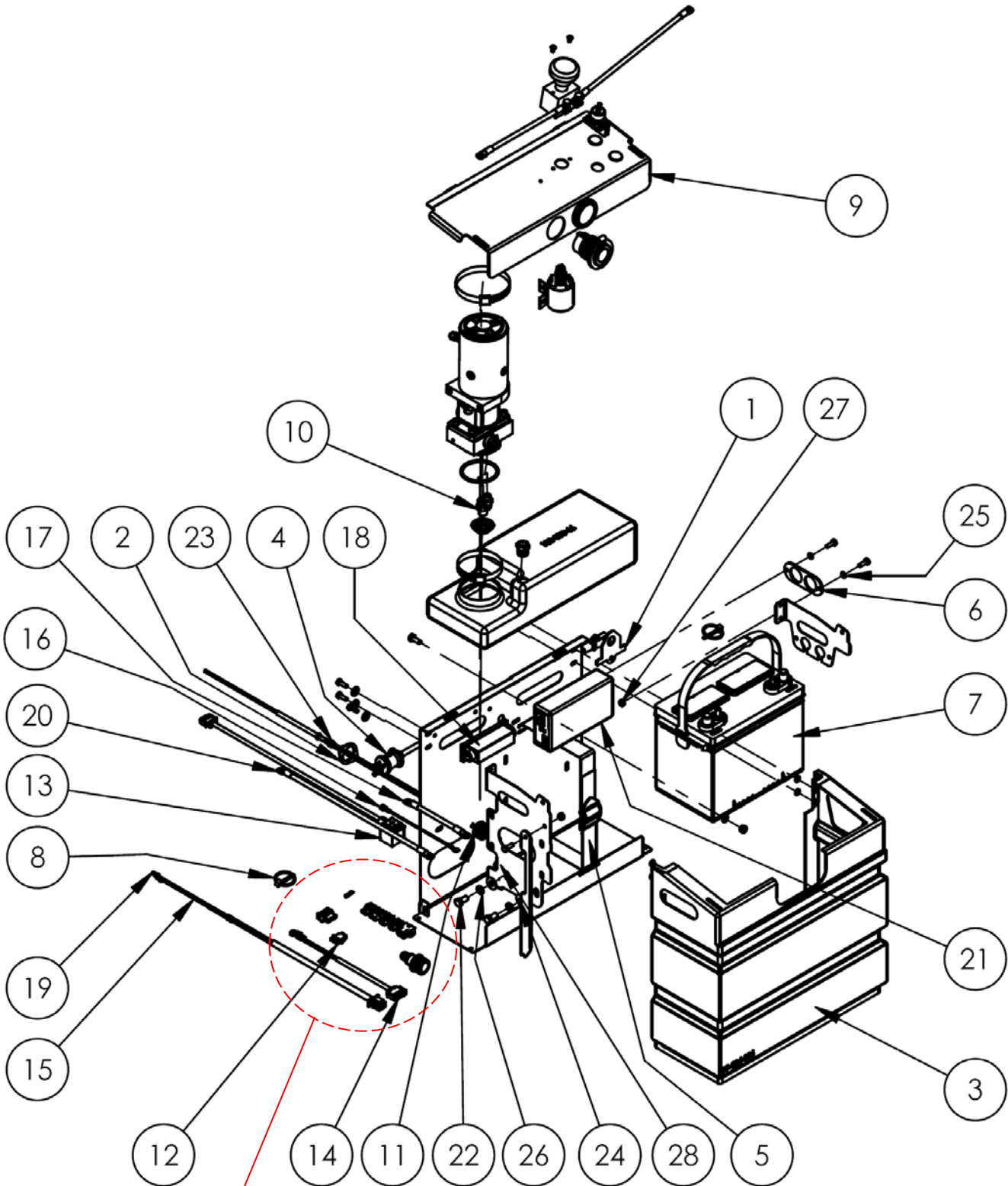


**24V, 2-PUSHBUTTONS POWER UNIT ASSEMBLY BILL OF MATERIALS**

Item	Part no.	Description	Qty.	Item	Part no.	Description	Qty.
1	99-514-021	FRAME, MPU GEN2	1	14	99-533-023	ASSEMBLY, 18/4, 4-PIN, MATE-N-LOCK	1
2	99-016-076	BRACKET, CLAMP PLATE, BACK CONNECTION	1	15	99-533-024	ASSEMBLY, 18/7, 6-PIN, MATE-N-LOCK X 24"	1
3	99-024-036	COVER, POWER UNIT, DC, GEN II	1	16	99-533-057	ASSEMBLY, WIRE, STRAIGHT, 18/1, 6 <sup>1</sup> / <sub>2</sub> " WITH RING TERMINAL AND FEMALE SPADE	1
4	99-033-024	CORD CHARGER	1	17	99-533-060	ASSEMBLY, WIRE, STRAIGHT, 4/1, WELD WIRE, 4' RED, DOUBLE RING TERMINAL	1
5	99-034-013	STRAP, BATTERY BOX, WITH BUCKLE	2	18	99-642-003	FUSE HOLDER FOR ANL ASSEMBLY, w/ 100A ANL	1
6	99-034-084	ELECTRICAL CORD CLAMP PLATE	1	19	01-034-001	ACCESSORIES, ELECTRICAL, WIRE NUT, GRAY 2-22GA TO 2-16GA	2
7	21-139-002	BATTERY, 12V DC	2	20	15-533-012	ASSEMBLY, WIRE, STRAIGHT, 4/1 WELD WIRE, 12' BLACK, DOUBLE RING TERMINAL	1
8	99-145-142	LOCKING PIN WITH RING, <sup>3</sup> / <sub>16</sub> DIAMETER X 1 <sup>1</sup> / <sub>4</sub> EFFECTIVE LENGTH	2	21	21-034-010	ACCESSORIES, ELECTRICAL CHARGER, 24V	1
9	99-160-099	POWER UNIT, SUBASSEMBLY, DC, GEN II MPU DASHBOARD, 2-BUTTON, PBE	1	22	11103	HEX BOLT, GRADE A, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "-16x <sup>3</sup> / <sub>4</sub> "	2
10	POWER UNIT SUBASSEMBLY: 24V DC, 1-PHASE, <u>2.15HP, 1800RPM MOTOR</u> ; L-H-L CIRCUIT; 1.5 GAL. HORIZONTAL TANK & FITTINGS; PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "POWER UNIT SUBASSEMBLY" ON P. 15)			23	11033	HEX BOLT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20x <sup>3</sup> / <sub>4</sub> "	4
	<u>0.035 DISPLACEMENT PUMP:</u>			24	33008	FLAT WASHER, LOW CARBON, USS, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "	2
	99-160-161	0.5GPM FLOW CONTROL	1				
	99-160-162	1.0GPM FLOW CONTROL	1	25	33618	MEDIUM SPLIT LOCK WASHER, <sup>1</sup> / <sub>4</sub> "	4
	99-160-163	1.5GPM FLOW CONTROL	1				
	99-160-164	2.0GPM FLOW CONTROL	1				
	<u>0.060 DISPLACEMENT PUMP:</u>			26	33622	SPLIT LOCK WASHER, CARBON STEEL, MEDIUM ZINC FINISH, <sup>3</sup> / <sub>8</sub> "	2
	99-160-165	0.5GPM FLOW CONTROL	1				
	99-160-166	1.0GPM FLOW CONTROL	1				
	99-160-167	1.5GPM FLOW CONTROL	1				
	99-160-168	2.0GPM FLOW CONTROL	1	27	36102	HEX NUT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20	4
<u>0.073 DISPLACEMENT PUMP:</u>							
99-160-169	0.5GPM FLOW CONTROL	1					
99-160-170	1.0GPM FLOW CONTROL	1					
99-160-171	1.5GPM FLOW CONTROL	1					
99-160-172	2.0GPM FLOW CONTROL	1	28	H-9x450	TIE STRAP, BLACK	2	
11	99-533-017	ASSEMBLY, CORD, STRAIGHT, 18/5, 30" MOLDED FEMALE RECEPTACLE, 5-PIN					1
12	99-533-020	ASSEMBLY, WIRE HARNESS. MAIN	1	30	99-035-003	ANGLE, STIFFENER, PLASTIC, FORMED, MPU BATTERY 24V	1
13	99-533-021	ASSEMBLY, 3-PIN, MATE-N-LOCK, TO DIN COIL CONNECTOR	1				

**12V POWER UNIT ASSEMBLY:** 12V DC, 1-PHASE, 1.14HP OR 2.15HP, 1800RPM MOTOR  
DASHBOARD WITHOUT PUSHBUTTONS  
USER SELECTED PUMP DISPLACEMENT AND FLOW CONTROL  
L-H-L HYDRAULIC CIRCUIT  
1.5 GALLON HORIZONTAL TANK

99-660-(037-060)-MANUALS



See [MPU Harness Wiring Diagram](#) on p. 3

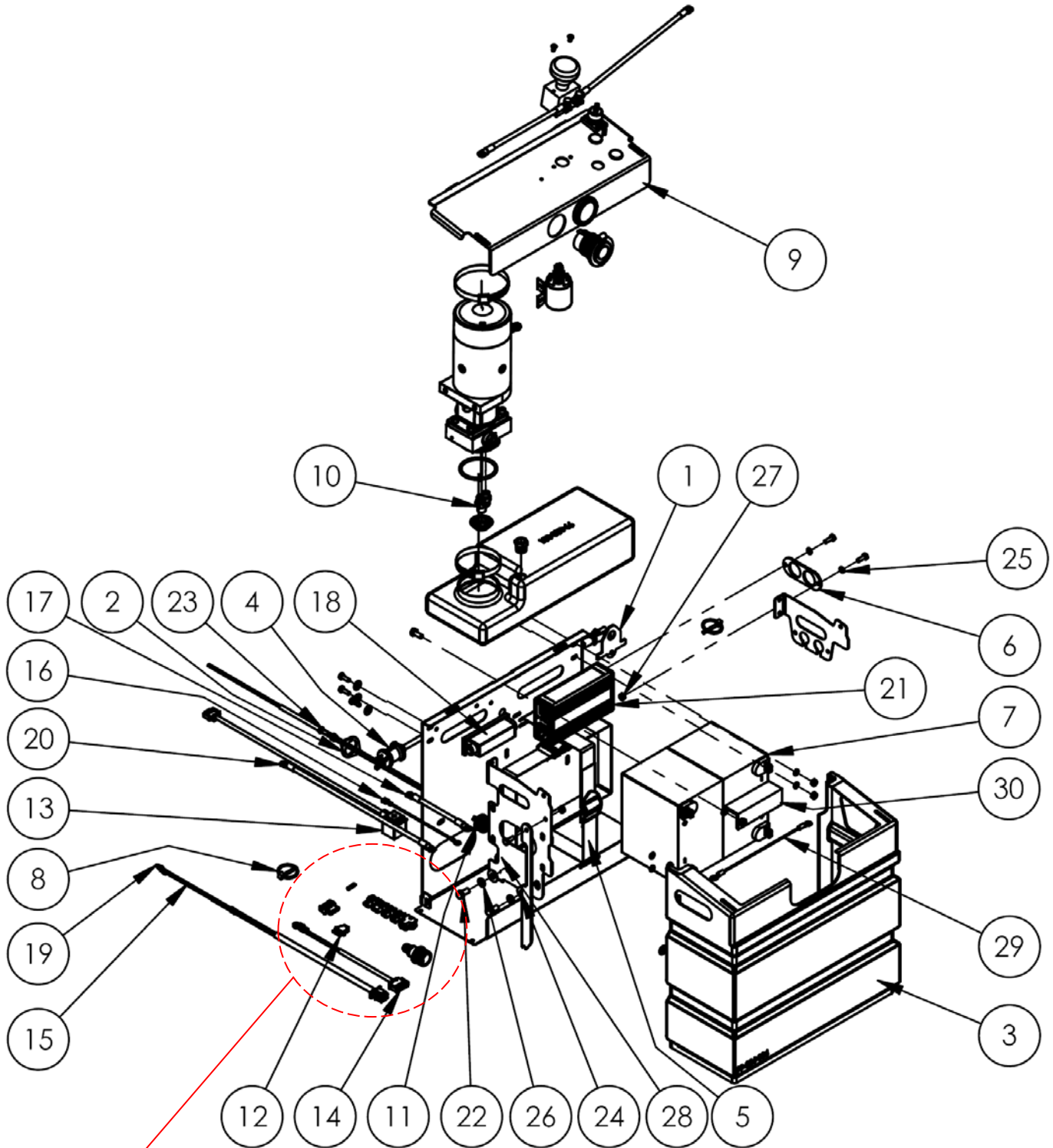
12V, NO PUSHBUTTONS POWER UNIT ASSEMBLY BILL OF MATERIALS

Item	Part no.	Description	Qty.	Item	Part no.	Description	Qty.
1	99-514-021	FRAME, MPU GEN2	1	15	99-533-024	ASSEMBLY, 18/7, 6-PIN, MATE-N-LOCK X 24"	1
2	99-016-076	BRACKET, CLAMP PLATE, BACK CONNECTION	1	16	99-533-057	ASSEMBLY, WIRE, STRAIGHT, 18/1, 6 <sup>1</sup> / <sub>2</sub> " WITH RING TERMINAL AND FEMALE SPADE	1
3	99-024-036	COVER, POWER UNIT, DC, GEN II	1	17	99-533-060	ASSEMBLY, WIRE, STRAIGHT, 4/1, WELD WIRE, 4' RED, DOUBLE RING TERMINAL	1
4	99-033-024	CORD CHARGER	1	18	99-642-001	FUSE HOLDER FOR ANL ASSEMBLY	1
5	99-034-013	STRAP, BATTERY BOX, WITH BUCKLE	1	19	01-034-001	ACCESSORIES, ELECTRICAL, WIRE NUT, GRAY 2-22GA TO 2-16GA	2
6	99-034-084	ELECTRICAL CORD CLAMP PLATE	1	20	15-533-012	ASSEMBLY, WIRE, STRAIGHT, 4/1 WELD WIRE, 12' BLACK, DOUBLE RING TERMINAL	1
7	99-139-003	BATTERY, WET, LEAD-ACID, GROUP 2A, DEEP CYCLE	1	21	21-034-008	ACCESSORIES, ELECTRICAL CHARGER, 12V, 5A	1
8	99-145-142	LOCKING PIN WITH RING, <sup>3</sup> / <sub>16</sub> DIAMETER X 1 <sup>1</sup> / <sub>4</sub> EFFECTIVE LENGTH	2	22	11103	HEX BOLT, GRADE A, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "-16x <sup>3</sup> / <sub>4</sub> "	2
9	99-160-100	POWER UNIT, SUBASSEMBLY, DC, GEN II MPU DASHBOARD, NO BUTTONS, PBE	1	23	11033	HEX BOLT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20x <sup>3</sup> / <sub>4</sub> "	4
10	POWER UNIT SUBASSEMBLY: 12V DC, 1-PHASE, 1.14HP, 1800RPM MOTOR; L-H-L CIRCUIT; 1.5 GAL. HORIZONTAL TANK & FITTINGS; PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "POWER UNIT SUBASSEMBLY" ON P. 14)			10	POWER UNIT SUBASSEMBLY: 12V DC, 1-PHASE, 2.15HP, 1800RPM MOTOR; L-H-L CIRCUIT; 1.5 GAL. HORIZONTAL TANK & FITTINGS; PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "POWER UNIT SUBASSEMBLY" ON P. 14)		
		<u>0.035 DISPLACEMENT PUMP:</u>				<u>0.035 DISPLACEMENT PUMP:</u>	
	99-160-137	0.5GPM FLOW CONTROL	1		99-160-149	0.5GPM FLOW CONTROL	1
	99-160-138	1.0GPM FLOW CONTROL	1		99-160-150	1.0GPM FLOW CONTROL	1
	99-160-139	1.5GPM FLOW CONTROL	1		99-160-151	1.5GPM FLOW CONTROL	1
	99-160-140	2.0GPM FLOW CONTROL	1		99-160-152	2.0GPM FLOW CONTROL	1
		<u>0.060 DISPLACEMENT PUMP:</u>				<u>0.060 DISPLACEMENT PUMP:</u>	
	99-160-141	0.5GPM FLOW CONTROL	1		99-160-153	0.5GPM FLOW CONTROL	1
	99-160-142	1.0GPM FLOW CONTROL	1		99-160-154	1.0GPM FLOW CONTROL	1
	99-160-143	1.5GPM FLOW CONTROL	1		99-160-155	1.5GPM FLOW CONTROL	1
	99-160-144	2.0GPM FLOW CONTROL	1		99-160-156	2.0GPM FLOW CONTROL	1
		<u>0.073 DISPLACEMENT PUMP:</u>				<u>0.073 DISPLACEMENT PUMP:</u>	
	99-160-145	0.5GPM FLOW CONTROL	1		99-160-157	0.5GPM FLOW CONTROL	1
	99-160-146	1.0GPM FLOW CONTROL	1		99-160-158	1.0GPM FLOW CONTROL	1
99-160-147	1.5GPM FLOW CONTROL	1	99-160-159	1.5GPM FLOW CONTROL	1		
99-160-148	2.0GPM FLOW CONTROL	1	99-160-160	2.0GPM FLOW CONTROL	1		
11	99-533-017	ASSEMBLY, CORD, STRAIGHT, 18/5, 30" MOLDED FEMALE RECEPTACLE, 5-PIN	1	24	33008	FLAT WASHER, LOW CARBON, USS, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "	2
12	99-533-020	ASSEMBLY, WIRE HARNESS. MAIN	1	25	33618	MEDIUM SPLIT LOCK WASHER, <sup>1</sup> / <sub>4</sub> "	4
13	99-533-021	ASSEMBLY, 3-PIN, MATE-N-LOCK, TO DIN COIL CONNECTOR	1	26	33622	SPLIT LOCK WASHER, CARBON STEEL, MEDIUM ZINC FINISH, <sup>3</sup> / <sub>8</sub> "	2
				27	36102	HEX NUT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20	4
14	99-533-023	ASSEMBLY, 18/4, 4-PIN, MATE-N-LOCK	1	28	H-9x450	TIE STRAP, BLACK	2

**24V POWER UNIT ASSEMBLY:  
NO PUSHBUTTONS**

99-660-(061-072)-MANUALS

24V DC, 1-PHASE, 2.15HP MOTOR, NO PUSHBUTTONS  
USER SELECTED PUMP DISPLACEMENT AND FLOW CONTROL  
L-H-L HYDRAULIC CIRCUIT  
1.5 GALLON HORIZONTAL TANK  
[BILL OF MATERIALS ON FOLLOWING PAGE]

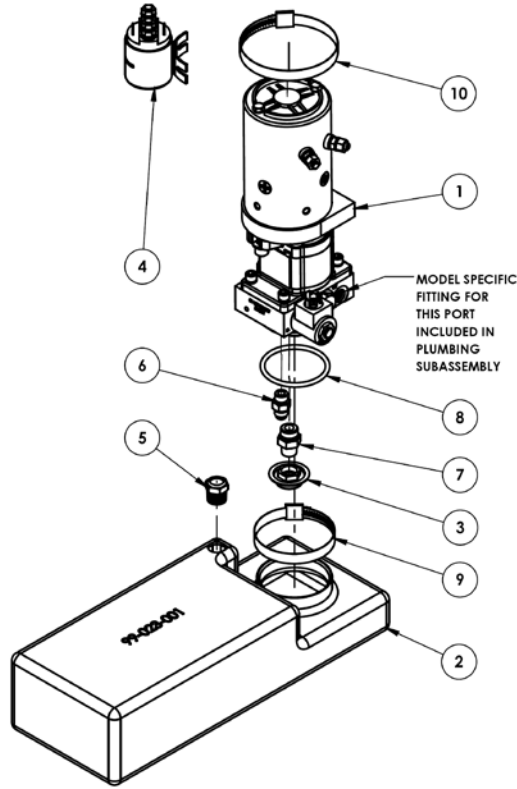


See [MPU Harness  
Wiring Diagram](#) on p. 3

**24V, NO PUSHBUTTONS POWER UNIT ASSEMBLY BILL OF MATERIALS**

Item	Part no.	Description	Qty.	Item	Part no.	Description	Qty.
1	99-514-021	RIGID MAINTENANCE PROP	1	14	99-533-023	ASSEMBLY, 18/4, 4-PIN, MATE-N-LOCK	1
2	99-016-076	BRACKET, CLAMP PLATE, BACK CONNECTION	1	15	99-533-024	ASSEMBLY, 18/7, 6-PIN, MATE-N-LOCK X 24"	1
3	99-024-036	COVER, POWER UNIT, DC, GEN II	1	16	99-533-057	ASSEMBLY, WIRE, STRAIGHT, 18/1, 6 <sup>1</sup> / <sub>2</sub> " WITH RING TERMINAL AND FEMALE SPADE	1
4	99-033-024	CORD CHARGER	1	17	99-533-060	ASSEMBLY, WIRE, STRAIGHT, 4/1, WELD WIRE, 4' RED, DOUBLE RING TERMINAL	1
5	99-034-013	STRAP, BATTERY BOX, WITH BUCKLE	2	18	99-642-003	FUSE HOLDER FOR ANL ASSEMBLY, w/ 100A ANL	1
6	99-034-084	ELECTRICAL CORD CLAMP PLATE	1	19	01-034-001	ACCESSORIES, ELECTRICAL, WIRE NUT, GRAY 2-22GA TO 2-16GA	2
7	21-139-002	BATTERY, 12V DC	2	20	15-533-012	ASSEMBLY, WIRE, STRAIGHT, 4/1 WELD WIRE, 12' BLACK, DOUBLE RING TERMINAL	1
8	99-145-142	LOCKING PIN WITH RING, <sup>3</sup> / <sub>16</sub> DIAMETER X 1 <sup>1</sup> / <sub>4</sub> EFFECTIVE LENGTH	2	21	21-034-010	ACCESSORIES, ELECTRICAL CHARGER, 24V	1
9	99-160-100	POWER UNIT, SUBASSEMBLY, DC, GEN II MPU DASHBOARD, NO BUTTONS, PBE	1	22	11103	HEX BOLT, GRADE A, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "-16x <sup>3</sup> / <sub>4</sub> "	2
10	POWER UNIT SUBASSEMBLY: 24V DC, 1-PHASE, 2.15HP, 1800RPM MOTOR; L-H-L CIRCUIT; 1.5 GAL. HORIZONTAL TANK & FITTINGS; PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "POWER UNIT SUBASSEMBLY" ON P. 15)			23	11033	HEX BOLT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20x <sup>3</sup> / <sub>4</sub> "	4
	0.035 DISPLACEMENT PUMP:			24	33008	FLAT WASHER, LOW CARBON, USS, ZINC PLATED, <sup>3</sup> / <sub>8</sub> "	2
	99-160-161	0.5GPM FLOW CONTROL	1				
	99-160-162	1.0GPM FLOW CONTROL	1				
	99-160-163	1.5GPM FLOW CONTROL	1				
	99-160-164	2.0GPM FLOW CONTROL	1	25	33618	MEDIUM SPLIT LOCK WASHER, <sup>1</sup> / <sub>4</sub> "	4
	0.060 DISPLACEMENT PUMP:						
	99-160-165	0.5GPM FLOW CONTROL	1				
	99-160-166	1.0GPM FLOW CONTROL	1				
	99-160-167	1.5GPM FLOW CONTROL	1	26	33622	SPLIT LOCK WASHER, CARBON STEEL, MEDIUM ZINC FINISH, <sup>3</sup> / <sub>8</sub> "	2
	99-160-168	2.0GPM FLOW CONTROL	1				
0.073 DISPLACEMENT PUMP:			27	36102	HEX NUT, GRADE A, ZINC PLATED, <sup>1</sup> / <sub>4</sub> "-20	4	
99-160-169	0.5GPM FLOW CONTROL	1					
99-160-170	1.0GPM FLOW CONTROL	1					
99-160-171	1.5GPM FLOW CONTROL	1					
99-160-172	2.0GPM FLOW CONTROL	1	28	H-9x450	TIE STRAP, BLACK	2	
11	99-533-017	ASSEMBLY, CORD, STRAIGHT, 18/5, 30" MOLDED FEMALE RECEPTACLE, 5-PIN	1	29	99-533-061	ASSEMBLY, WIRE, STAIGHT, 10/1, 9' W/ DOUBLE RING TERMINAL	1
12	99-533-020	ASSEMBLY, WIRE HARNESS. MAIN	1	30	99-035-003	ANGLE, STIFFENER, PLASTIC, FORMED, MPU BATTERY 24V	1
13	99-533-021	ASSEMBLY, 3-PIN, MATE-N-LOCK, TO DIN COIL CONNECTOR	1				

**POWER UNIT SUBASSEMBLY:** 12V DC, SINGLE PHASE, 1.14HP OR 2.15HP MOTOR  
**ITEM 10 ON P. 6 & P. 10** USER SELECTED PUMP DISPLACEMENT AND FLOW CONTROL  
 99-160-(137-160)-MANUALS L-H-L HYDRAULIC CIRCUIT  
 1.5 GALLON HORIZONTAL TANK

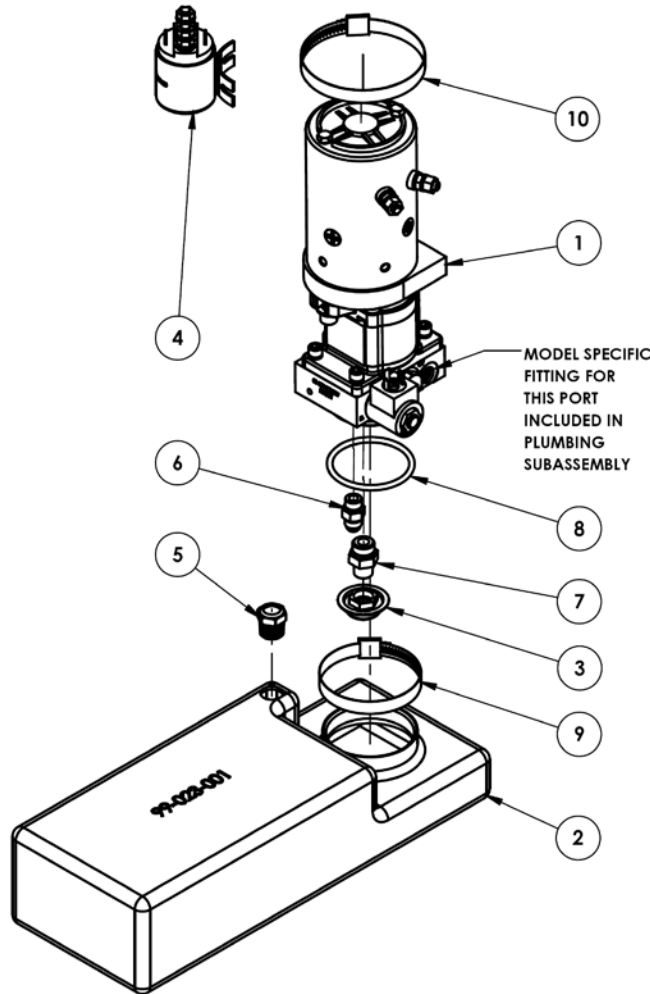


**NOTE:** ITEM 1 CONSISTS OF 2 SUBASSEMBLIES:

- MOTOR + PUMP (**DETAIL VIEWS A & B ON P. 16**)
- MANIFOLD (**DETAIL VIEW E ON P. 17**)

Item	Part no.	Description	Qty.	Item	Part no.	Description	Qty.
1	POWER UNIT SUBASSEMBLY: 12V DC, 1-PHASE, 1.14HP, 1800RPM MOTOR, L-H-L, 1.5 GAL. HORIZONTAL TANK & FITTINGS, PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "DETAIL A" ON P. 16 & "DETAIL E" ON P. 17)			1	POWER UNIT SUBASSEMBLY: 12V DC, 1-PHASE, 2.15HP, 1800RPM MOTOR, L-H-L, 1.5 GAL. HORIZONTAL TANK & FITTINGS, PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE "DETAIL B" ON P. 16 & "DETAIL E" ON P. 17)		
	<u>0.035 DISPLACEMENT PUMP:</u>				<u>0.035 DISPLACEMENT PUMP:</u>		
	99-160-125	0.5GPM FLOW CONTROL	1		99-160-113	0.5GPM FLOW CONTROL	1
	99-160-126	1.0GPM FLOW CONTROL	1		99-160-114	1.0GPM FLOW CONTROL	1
	99-160-127	1.5GPM FLOW CONTROL	1		99-160-115	1.5GPM FLOW CONTROL	1
	99-160-128	2.0GPM FLOW CONTROL	1		99-160-116	2.0GPM FLOW CONTROL	1
	<u>0.060 DISPLACEMENT PUMP:</u>				<u>0.060 DISPLACEMENT PUMP:</u>		
	99-160-129	0.5GPM FLOW CONTROL	1		99-160-117	0.5GPM FLOW CONTROL	1
	99-160-130	1.0GPM FLOW CONTROL	1		99-160-118	1.0GPM FLOW CONTROL	1
	99-160-131	1.5GPM FLOW CONTROL	1		99-160-119	1.5GPM FLOW CONTROL	1
	99-160-132	2.0GPM FLOW CONTROL	1		99-160-120	2.0GPM FLOW CONTROL	1
	<u>0.073 DISPLACEMENT PUMP:</u>				<u>0.073 DISPLACEMENT PUMP:</u>		
	99-160-133	0.5GPM FLOW CONTROL	1		99-160-121	0.5GPM FLOW CONTROL	1
	99-160-134	1.0GPM FLOW CONTROL	1		99-160-122	1.0GPM FLOW CONTROL	1
	99-160-135	1.5GPM FLOW CONTROL	1		99-160-123	1.5GPM FLOW CONTROL	1
	99-160-136	2.0GPM FLOW CONTROL	1		99-160-124	2.0GPM FLOW CONTROL	1
2	99-023-001	RESERVOIR, HYDRAULIC, 1.5 GAL, HORIZONTAL TANK	1	6	99-116-030	FITTING, HYDRAULIC, 06MJ-06MORB STRAIGHT	1
3	99-031-029	ACCESSORIES, HYDRAULIC	1	7	99-116-150	FITTING, HYDRAULIC, 08MORB-06MP STRAIGHT	1
4	99-034-028	ACCESSORIES, MOTOR CONTACTOR, 12V COIL	1	8	99-144-007	O-RING, MANIFOLD, 3" OD	1
5	01-116-003	BREATHER, 1/2" NPT	1	9	99-145-061	CLAMP, 2 <sup>13</sup> / <sub>16</sub> " - 3 <sup>3</sup> / <sub>4</sub> "	1
				10	99-145-164	CLAMP, 3 <sup>9</sup> / <sub>16</sub> " - 4 <sup>1</sup> / <sub>2</sub> "	1

**POWER UNIT SUBASSEMBLY:** 24V DC, SINGLE PHASE, 2.15HP MOTOR  
**ITEM 10 ON P. 9 & P. 13** USER SELECTED PUMP DISPLACEMENT AND FLOW CONTROL  
 99-160-(161-172)-MANUALS L-H-L HYDRAULIC CIRCUIT  
 1.5 GALLON HORIZONTAL TANK

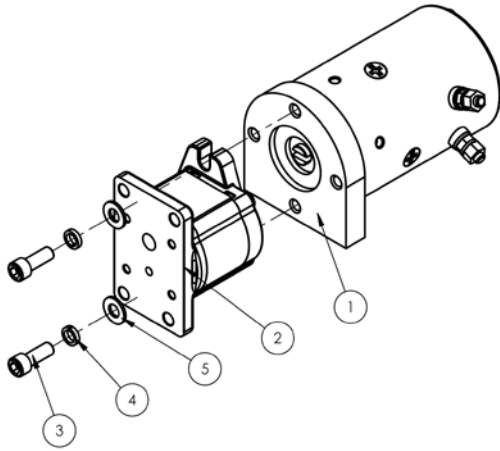


**NOTE:** ITEM 1 CONSISTS OF 2 SUBASSEMBLIES:

- MOTOR + PUMP ([DETAIL VIEW C](#) ON P. 17)
- MANIFOLD ([DETAIL VIEW D](#) ON P. 17)

Item	Part no.	Description	Qty.	Item	Part no.	Description	Qty.
1	POWER UNIT SUBASSEMBLY: 24V DC, 1-PHASE, 2.15HP, 1800RPM MOTOR, L-H-L, 1.5 GAL. HORIZONTAL TANK & FITTINGS, PLUS 1 OF THE FOLLOWING PUMP + FLOW CONTROL COMBINATIONS (SEE <a href="#">DETAIL VIEW C</a> ON P. 16 AND <a href="#">DETAIL VIEW D</a> ON P. 17)			<b>FITTINGS AND ACCESSORIES</b>			
		<u>0.035 DISPLACEMENT PUMP:</u>		2	99-023-001	RESERVOIR, HYDRAULIC, 1.5 GAL, HORIZONTAL TANK	1
		99-160-125 0.5GPM FLOW CONTROL	1	3	99-031-029	ACCESSORIES, HYDRAULIC	1
		99-160-126 1.0GPM FLOW CONTROL	1			ACCESSORIES, MOTOR CONTACTOR, 24V COIL SOLENOID	1
		99-160-127 1.5GPM FLOW CONTROL	1	4	99-034-029		1
		99-160-128 2.0GPM FLOW CONTROL	1	5	01-116-003	BREATHER, 1/2" NPT	1
		<u>0.060 DISPLACEMENT PUMP:</u>		6	99-116-030	FITTING, HYDRAULIC, 06MJ-06MORB STRAIGHT	1
		99-160-129 0.5GPM FLOW CONTROL	1	7	99-116-150	FITTING, HYDRAULIC, 08MORB-06MP STRAIGHT	1
		99-160-130 1.0GPM FLOW CONTROL	1	8	99-144-007	O-RING, MANIFOLD, 3" OD	1
		99-160-131 1.5GPM FLOW CONTROL	1	9	99-145-061	CLAMP, 2 <sup>13</sup> / <sub>16</sub> " - 3 <sup>3</sup> / <sub>4</sub> "	1
		99-160-132 2.0GPM FLOW CONTROL	1	10	99-145-164	CLAMP, 3 <sup>9</sup> / <sub>16</sub> " - 4 <sup>1</sup> / <sub>2</sub> "	1
		<u>0.073 DISPLACEMENT PUMP:</u>					
		99-160-133 0.5GPM FLOW CONTROL	1				
		99-160-134 1.0GPM FLOW CONTROL	1				
		99-160-135 1.5GPM FLOW CONTROL	1				
		99-160-136 2.0GPM FLOW CONTROL	1				

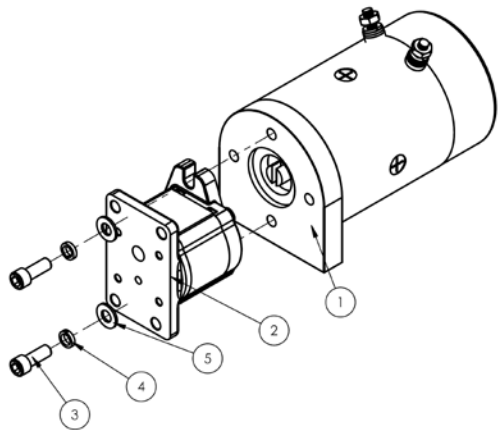
**DETAIL VIEW A: SINGLE PHASE, 12V, 1.14HP, 1800RPM MOTOR + PUMP SUBASSEMBLY  
COMBINES WITH MANIFOLD SUBASSEMBLY (DETAIL VIEW E ON P. 17)**



\*Diagram from 99-137-(024-026)

Item	Part no.	Description	Qty.
1	99-135-010	MOTOR, DC, 12V, 850W WITH ZINC PLATED COVER	1
2	01-143-914-002 01-143-905-002 01-143-906-002	PUMP, HYDRAULIC GEAR, TANG SHAFT, MANIFOLD MOUNT 0.035DISP. 0.6CC/R 0.06DISP. 1.0CC/R 0.073DISP. 1.3CC/R	1
3	23305	BOLT, SHCS, UTILITY GRADE, 3/8" - 16 X 1"	2
4	33688	LOCK WASHER, HIGH COLLAR, 3/8"	2
5	96056	WASHER, FLAT, 3/8" NOMINAL, 0.406" I.D., YELLOW ZINC SAE	2

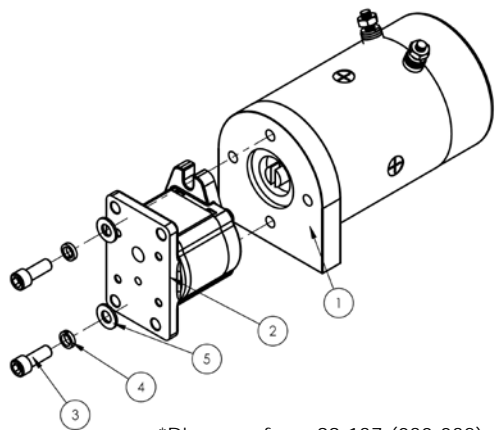
**DETAIL VIEW B: SINGLE PHASE, 12V, 2.15HP, 1800RPM MOTOR + PUMP SUBASSEMBLY  
COMBINES WITH 12V MANIFOLD SUBASSEMBLY (DETAIL VIEW E ON P. 17)**



\*Diagram from 99-137-(027-029)

Item	Part no.	Description	Qty.
1	99-135-011	MOTOR, DC, 12V, 1600W WITH ZINC PLATED COVER	1
2	01-143-914-002 01-143-905-002 01-143-906-002	PUMP, HYDRAULIC GEAR, TANG SHAFT, MANIFOLD MOUNT 0.035DISP. 0.6CC/R 0.06DISP. 1.0CC/R 0.073DISP. 1.3CC/R	1
3	23305	BOLT, SHCS, UTILITY GRADE, 3/8" - 16 X 1"	2
4	33688	LOCK WASHER, HIGH COLLAR, 3/8"	2
5	96056	WASHER, FLAT, 3/8" NOMINAL, 0.406" I.D., YELLOW ZINC SAE	2

**DETAIL VIEW C: MOTOR + PUMP SUBASSEMBLY [ITEM 1 ON P. 15; PART NO. 99-160-(125-136)]  
PAIRS WITH 24V MANIFOLD SUBASSEMBLY (DETAIL VIEW D ON P. 17)**



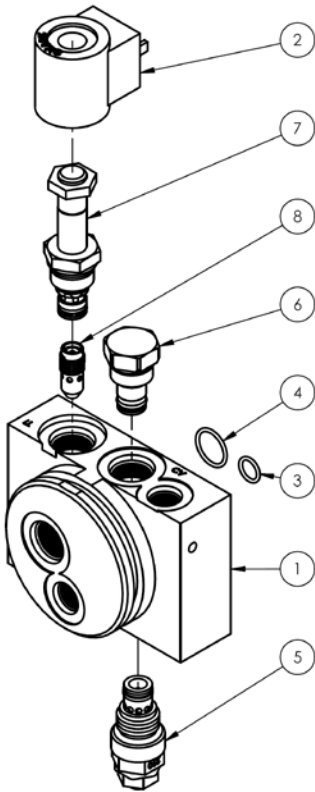
\*Diagram from 99-137-(030-032)

Item	Part no.	Description	Qty.
1	99-135-048	MOTOR, DC, 24V, 1600W WITH ZINC PLATED COVER	1
2	01-143-914-002 01-143-905-002 01-143-906-002	PUMP, HYDRAULIC GEAR, TANG SHAFT, MANIFOLD MOUNT 0.035DISP. 0.6CC/R 0.06DISP. 1.0CC/R 0.073DISP. 1.3CC/R	1
3	23305	BOLT, SHCS, UTILITY GRADE, 3/8" - 16 X 1"	2
4	33688	LOCK WASHER, HIGH COLLAR, 3/8"	2
5	96056	WASHER, FLAT, 3/8" NOMINAL, 0.406" I.D., YELLOW ZINC SAE	2



**DETAIL VIEW D: [ITEM 1 ON P. 15; PART NO. 99-160-(125-136)]**

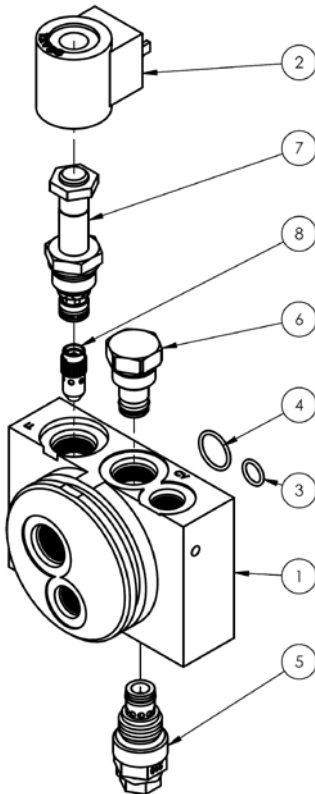
**MANIFOLD SUBASSEMBLY, 24V COIL, LIFT-HOLD-LOWER, FLOW RATE 0.5GPM, 1.0GPM, 1.5GPM, OR 2.0GPM**



Item	Part no.	Description	Qty.
1	01-127-010	MANIFOLD, L-H-L	1
2	99-034-008	ACCESSORIES, 24V COIL WITH DIN CONNECTOR	1
3	99-144-008	O-RING, MANIFOLD, 1/2" OD	1
4	99-144-009	O-RING, MANIFOLD, 3/4" OD	1
5	99-153-006	VALVE, PRESSURE RELIEF, 210 BAR	1
6	99-153-011	CHECK VALVE, SIZE 08, NOSE-INSIDE-OUT	1
7	99-153-058	VALVE, SOLENOID, ZERO LEAK, WITH NUT	1
8	99-153-049	FLOW CONTROL, PRESSURE COMPENSATED: 0.5GPM	1
	99-153-038	1.0GPM	1
	99-153-039	1.5GPM	1
	99-153-040	2.0GPM	1

**DETAIL VIEW E: [ITEM 1 ON P. 14; PART NO. 99-160-(113-136)]**

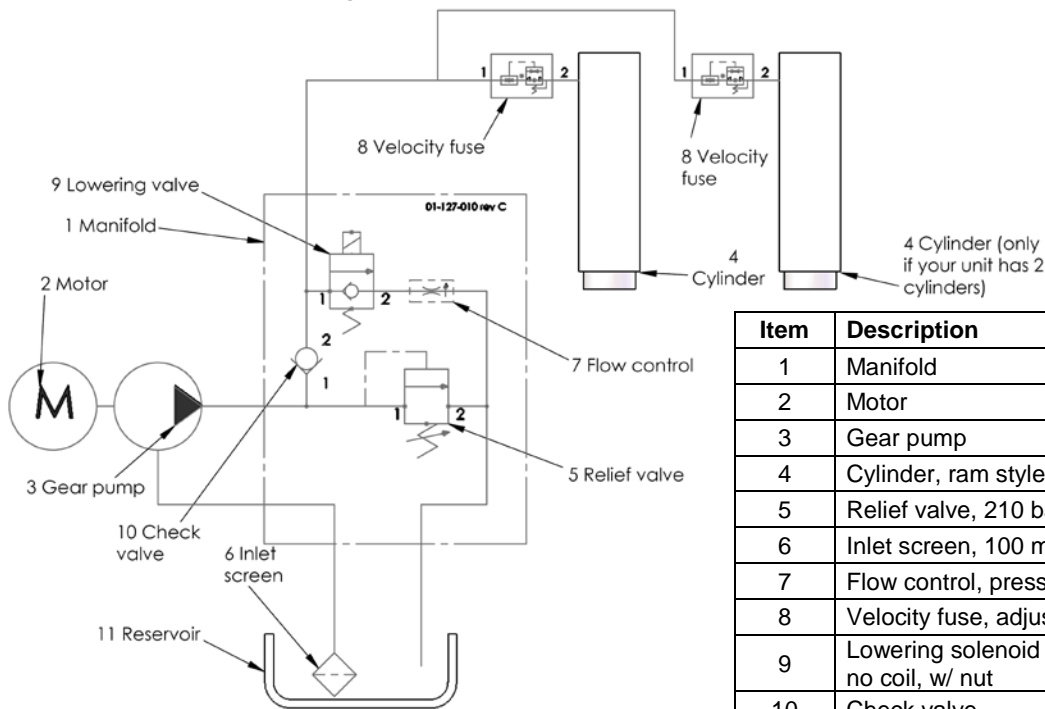
**MANIFOLD ASSEMBLY, 12V COIL, LIFT-HOLD-LOWER, FLOW RATE 0.5GPM, 1.0GPM, 1.5GPM, OR 2.0GPM**



Item	Part no.	Description	Qty.
1	01-127-010	MANIFOLD, L-H-L	1
2	99-034-006	ACCESSORIES, 12V DC COIL WITH DIN CONNECTOR	1
3	99-144-008	O-RING, MANIFOLD, 1/2" OD	1
4	99-144-009	O-RING, MANIFOLD, 3/4" OD	1
5	99-153-006	VALVE, PRESSURE RELIEF, 210 BAR	1
6	99-153-011	CHECK VALVE, SIZE 08, NOSE-INSIDE-OUT	1
7	99-153-058	VALVE, SOLENOID, ZERO LEAK, WITH NUT	1
8	99-153-049	FLOW CONTROL, PRESSURE COMPENSATED: 0.5GPM	1
	99-153-038	1.0GPM	1
	99-153-039	1.5GPM	1
	99-153-040	2.0GPM	1

\*Diagram from 01-627-(017-020)

### Hydraulic Circuit Diagram:



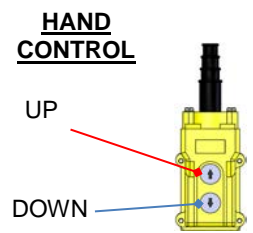
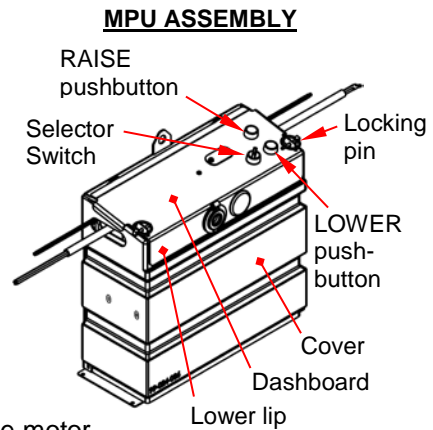
Item	Description	Qty.
1	Manifold	1
2	Motor	1
3	Gear pump	1
4	Cylinder, ram style	2
5	Relief valve, 210 bar, size 08	1
6	Inlet screen, 100 mesh 2" pancake	1
7	Flow control, pressure compensated	1
8	Velocity fuse, adjustable, brass	2
9	Lowering solenoid valve, cartridge, NC, no coil, w/ nut	1
10	Check valve	1
11	Reservoir	1

### Power Unit Operation:

This modular power unit provides electric-hydraulic power to extend and retract the piston of one or more cylinders. Piston motion is utilized in various ways, such as raising and lowering a tabletop, rotating a drum or garbage chute, and moving a carriage (e.g. forks or platform). Piston motion is driven by a gear-type pump directly coupled to an electric motor. Many components of the hydraulic system are housed inside a manifold which is bolted to the gear pump. All components are rated for 3,000psi working pressure.

Noteworthy elements of the hydraulic system include the following:

- Selector switch:** *for the hand control and dashboard pushbuttons to operate, the selector switch must be turned to the ON position.*
- Hand control:** connects to the power unit via a pigtail cord. The control has 2 buttons: UP and DOWN. The UP button causes the piston to extend. The DOWN button allows the piston to retract.
  - Extending the piston:** Pressing the UP button activates the electric motor. The motor turns the pump. As the pump rotates, oil is drawn from the reservoir, passes through the suction filter, and enters the pump. The pump pushes oil through the check valve and to the cylinder. As the cylinder fills with oil, the piston extends.
    - Releasing the button turns off the motor. The piston maintains its position until a control button is pressed.
    - Limit switches, if included in the electrical circuit of your product, also shut off the motor. (See Electric Circuit Diagram(s) in the owner's manual for your product).
  - Retracting the piston:** Pressing the DOWN button activates the lowering solenoid valve. When the valve opens, oil can bypass the check valve and flow to the reservoir (through return hoses). Oil flow to the reservoir is regulated by the pressure compensated flow control valve. Regulating the volume of oil that can flow through the spool, the piston retraction speed is kept constant.
    - Releasing the button closes the lowering solenoid valve. The piston maintains its position until a control button is pressed.
    - Limit switches, if included in the electrical circuit of your product, also shut off the motor. (See Electric Circuit Diagram(s) in your owner's manual).
- Dashboard pushbuttons (2-Pushbuttons models only):** the buttons are labeled "RAISE" and "LOWER". Pressing the RAISE button causes the piston to extend. Pressing the LOWER button retracts the piston.



4. **Electric motor:** the motor is either AC powered (wall socket) or DC powered (battery). The motor is activated whenever the user presses a button (up or down) on the hand control.
  - AC-powered motors can be wired for either single-phase or three-phase operation. Regardless of phase configuration, every motor is dual-voltage capable.
  - Power for 12V DC-powered motors operate is provided by one 12V DC deep cycle battery. 24V power units use two (2) 12V batteries.
5. **Pump:** the pump shaft is directly coupled to the shaft of the electric motor. Several displacements are available to match the horsepower of the motor.
6. **Check valve:** restricts oil flow to one direction through the circuit by preventing oil backflow through the pump to the reservoir. Without a check valve, oil would return to the reservoir after the motor (and pump) stop. Oil can only flow in response to an electrical signal from the hand control. This allows the piston to maintain any degree of extension.
7. **(Pressure) Relief valve:** prevents system pressure from exceeding 3000psi. The valve opens a path for oil to follow to the reservoir without traveling to the cylinder if pressure in the system exceeds 3,000psi.
8. **Lowering solenoid valve:** electrically-operated cartridge valve that activates when the DOWN button is pressed. The valve has an integral screen to prevent contaminants from entering it.
9. **Pressure compensated flow control spool:** regulates the flow of oil to the reservoir when the lowering valve opens. The spool is located beneath the lowering valve. It allows the piston to retract at a set, constant rate regardless of the load applied (e.g. on the forks, platform, chute, tabletop, etc.). Several sizes are available.
10. **Cylinder (not part of the modular power unit):** the modular power unit controls movement of one or more displacement style cylinders. As oil fills the cylinder, it pushes the piston out of the cylinder. Each cylinder includes a bleeder valve at the top end. The valve allows air to be removed from the cylinder.
11. **Velocity fuse:** a safety device installed in the hose port of each cylinder. If a failure occurs that results in a sudden loss of hydraulic pressure (e.g. punctured hose, leaking fitting or coupling), the velocity fuse automatically closes. By closing, the fuse traps oil in the cylinder and prevents the piston from retracting. The piston remains stationary until pressure is reapplied to the system.

**NOTE:** Air in the hydraulic system can also cause the velocity fuse to close even though no failure occurred. To reset (open) the fuse, unload the work surface (forks, tabletop, chute, platform, etc.). Press and release the UP button several times. Then, extend and retract the piston completely to purge air from the system.
12. **Hydraulic fluid:** HO150 hydraulic fluid. To replenish the fluid, add anti-wear hydraulic fluid with a viscosity grade of 150 SUS at 100°F (ISO 32 @ 40°C) like AW-32 or Dexron transmission fluid.

## Removing the Cover: [Refer to [MPU Assembly](#) diagram on p. 18]

To access the internal components of the power unit, the plastic cover must be removed. First, remove the locking pins to disconnect the dashboard from the metal frame. Open the dashboard by lifting the front lip and rotating it up to a vertical position. Grasp the rear edges of the cover and pull them away from each other. The cover will disengage the frame. Reinstall the cover by reversing these steps.

## Cleaning the Lowering Solenoid Valve: [[Detail Views D & E](#), item 7, p. 17; manifold port RV]

**NOTE:** This instruction does not apply to pneumatic (air) power units.

If the piston slowly retracts without pressing the DOWN button, then the lowering solenoid valve might not be closing properly. The valve should be removed and cleaned.

- Unload the work surface of your unit (e.g. forks, tabletop, chute, or platform).
- Completely retract the piston.
- Lock out electrical power. Tag the unit "Out of Service". Turn the selector switch to the OFF position.
- **Remove the cover** to access the internal components. Then, remove the nut that fastens the solenoid coil to the valve stem.
- Remove the coil and unscrew the valve from the manifold.
- Inspect the valve for blockage.
- Inspect O-rings and back-up washers for damage such as cuts and tears.
- Submerge the valve in mineral spirits or kerosene.
- Use a thin tool, such as a small screwdriver or a hex wrench, to push the poppet in and out several times from the bottom end of the valve. The valve should move freely, about 1/16" between the closed and open positions. If the poppet sticks, examine the valve stem to determine if it is bent. Replace the valve if it doesn't move freely after cleaning.
- Remove mineral oil from the valve with compressed air.
- Inspect the bottom of the valve cavity in the manifold for foreign matter.
- With the thin tool, press the middle of the flow control spool, which is located in the bottom of the cavity. It should move up-and-down smoothly.
- Reinstall the valve in the manifold. Tighten it with a torque wrench to 20 lb·ft of torque.

## Bleeding Air from Hydraulic System:

If the piston retracts extremely slowly or does not retract when the DOWN button is pressed, air might be caught in the cylinder. Air can cause the velocity fuse(s) to close. When the velocity fuse is closed, the piston will not retract. To correct this issue, bleed air from the system. A bleeder screw is located at the top of each cylinder. Study the appropriate “Exploded view” in the owner’s manual for your product to locate the bleeder screw. The bleeder screw includes a hose fitting for a small diameter hose. By attaching a hose to the screw, any oil that escapes during the bleeding process can be directed into a container for proper disposal.

- Unload your unit.
- If your product includes a maintenance stop, move it into maintenance position. Push the DOWN button until the work surface is entirely supported by the stop.
- Locate the bleeder valve located at the top of the cylinder (it looks like a grease zerk; see the corresponding “Exploded View” in the owner’s manual for your product). Hold a rag over the valve. Open it about a half turn with a wrench (turn the hex until air begins to escape). Oil and air will sputter from the valve.
- Jog the motor a few times by briefly pressing and then releasing the UP button. If air continues to escape from the bleeder valve, jog the motor several more times. Wait at least a few seconds between jogs.
- Close the valve once air no longer is heard or seen bubbling out of the valve. Just a clear stream of oil should be seen flowing from the bleeder valve.
- [Remove the cover](#) from the modular power unit. Check the oil level in the reservoir. If the surface of the oil is lower than 1 to 1½ in. below the fill port, then add oil. Use anti-wear hydraulic fluid with a viscosity grade of 150 SUS at 100°F (ISO 32 @ 40°C) like AW-32 or Dexron transmission fluid.

## Recharging the Battery:

To recharge the battery, you must provide a suitable 3-prong extension cord. The extension cord should be as short and as thick as possible to minimize the output of the charger due to voltage drop in the line. Plug your extension cord into the flanged inlet on the back of the MPU cover. Plug the other end of the cord into an 115VAC, 60Hz outlet. When connected to a power source, the LED display on the charger, or the optional battery charge indicator on the dashboard/lid, displays the charge status:

- a. Red only: charger is providing full output to the battery.
- b. Red and Green: charger is topping off the battery.
- c. Green only: battery is completely charged. The charger is providing a float (maintenance) charge.

[NOTE: LED’s are not visible unless the cover is removed from the MPU.]

The charger is current limited and cannot exceed its rated output. This means that even if loads are placed on the battery while charging (raising and lowering a tabletop while charging the battery, for example) current will not exceed the rated output.

## Written Record:

Before putting your product into regular service, make a written record that describes the appearance and function of the modular power unit. Page 3 of this manual provides a space for notes. [Remove the cover](#) and photograph the internal components. Describe their appearance in writing. Record the oil level in the reservoir by marking it in a few places with a permanent marker. Describe the electrical connections. Replace the cover and turn on the power unit. Use the hand control to extend and retract the piston (raise and lower the tabletop/forks). Describe the sound of the power unit as the piston extends and retracts. Indicate whether the piston extends/retracts smoothly.

## Inspections and Maintenance:

*Review the “Inspections & Maintenance” section of the owner’s manual for your product. Put the product into recommended inspection configuration (e.g. apply maintenance props) before performing the following inspections and maintenance.*

DO NOT inspect the power unit or perform any repairs or maintenance on it unless the selector switch is OFF.

- (A) Before each use, check the cart for any of the following conditions:
- Oil leaks
  - Pinched or chafed hoses
  - Damaged electrical cords/hand control
- (B) At least once per month, remove the cover and:
- Check the oil level. Oil should be 1in. to 1½in. below the top of the reservoir/tank (item no. 2 on [pages 14 & 15](#)) when the piston is completely retracted. Add oil, if necessary. Only use AW-32 hydraulic fluid or its equivalent. If the oil looks milky, water is present and must be replaced.
  - Check for oil leaks. Resolve the issue as described in [Troubleshooting](#) on p. 21-22.
  - Check hand control and pigtail cord for severe wear.
  - Examine battery terminals. Remove deposits accumulated on battery terminals.
  - Cycle the piston. Watch for binding. Listen for unusual noises. See [Troubleshooting](#).

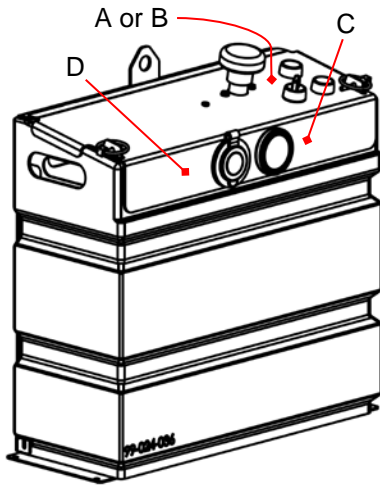
- Make sure all labels are in place & in readable condition. See [Labeling diagram](#) (below).

(C) Yearly:

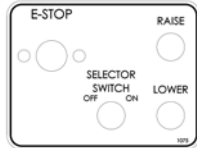
Change the oil at least once a year. The oil should be changed as soon as it darkens, becomes gritty, or appears milky. Milky appearance indicates the presence of water. Only use AW-32 hydraulic fluid or its equivalent.

**Labeling diagram:**

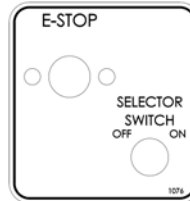
The cart should be labeled as shown below. Contact Vestil to order replacement labels.



A: Label 1075  
(units with  
powered lift)



B: Label 1076  
(units with only  
powered tilt)



C: Label 1079  
(all units)



D: Label 1080  
(all units)



Label 206 (all units; applied to  
reservoir inside power unit housing):  
Hydraulic oil specifications



Label 295 (all units;  
applied to outside of  
power unit housing):  
Battery handling  
hazards

**WARNING**

Enclosed battery contains hazardous chemicals.  
DO NOT handle enclosed battery UNLESS wearing eye protection and other appropriate personal protective equipment.  
DO NOT directly contact skin with battery.  
DO NOT expose to sparks or extreme heat; battery contains explosive gases.

**ADVERTENCIA**

La batería incluida contiene materiales peligrosos.  
NO use la batería incluida A NO SER que lleve protección de ojos y otros equipos de protección apropiados para el personal.  
NO tenga contacto directo en la piel con la batería.  
NO exponga a destellos o a calor excesivo, la batería contiene gases explosivos.

295  
REV 0111

**Troubleshooting:**

Contact Vestil for assistance with issues not listed below.

Issue	Explanation	Remedy
1. Cylinder/piston does not extend when UP button pressed, but pump is running.	a. Voltage at motor terminals too low to run pump;  b. Hydraulic hose leaking; c. Fluid level in hydraulic reservoir too low;  d. Load exceeds capacity/max. rated load limit, i.e. relief valve opening; e. Clogged suction filter; f. Suction line leaking or loose fittings; g. Clogged filler/breather cap on tank; h. Lowering valve energized by faulty wiring or stuck open; i. Hydraulic pump malfunctioning;  j. Low battery charge.	a. Measure voltage at motor terminals (or as close to terminals as possible) while pump runs under load. If voltage is adequate, check wiring. Compare wiring to applicable diagram on pages 4 or 5. b. Correct as appropriate. c. Add fluid. The system uses HO150 hydraulic fluid. Replace the hydraulic fluid with an anti-wear hydraulic fluid of viscosity grade of 150 SUS at 100°F (ISO 32 @ 40°C) such as AW-32 or Dexron transmission fluid. d. Reduce weight of load. DO NOT change relief valve setting!! e. Remove filter and clean it. f. Inspect all fittings for proper fit. g. Remove and clean. h. Remove lowering valve and clean (see instructions on p. 19). i. Disconnect hydraulic line from cylinder. Put free end of hose in large container and cycle the pump. If no oil output, check pump-motor coupling. Contact factory to order replacement pump, if necessary. j. Recharge battery.
2. Piston extends slowly	k. Debris stuck in lowering solenoid valve causing portion of fluid to flow to	k. Remove solenoid valve and clean (see instructions on p. 19).

	<p>reservoir;</p> <p>l. Debris clogging suction filter or breather cap;</p> <p>m. Pinched hose;</p> <p>n. Low motor voltage;</p> <p>o. Load exceeds capacity;</p> <p>p. Pump malfunctioning;</p> <p>q. Insufficient battery charge.</p>	<p>l. Correct as appropriate (see also remedies <a href="#">f</a> and <a href="#">h</a>).</p> <p>m. Repair the hose.</p> <p>n. Measure voltage at motor terminals (or as close to terminals as possible) while pump runs under load. If voltage is adequate, check wiring. Compare wiring to applicable diagram on page <a href="#">4</a> or <a href="#">5</a>.</p> <p>o. Reduce load. DO NOT change relief valve setting!!</p> <p>p. Disconnect hydraulic line from cylinder. Put free end of hose in large container and cycle the pump. If no oil output, check pump-motor coupling. Contact factory to order replacement pump, if necessary.</p> <p>q. Recharge battery.</p>
3. Motor labors or is really hot	<p>r. Low voltage;</p> <p>s. Incorrect wiring;</p> <p>t. Oil starvation causing pump to bind. High heat produced. Pump might be permanently damaged;</p> <p>u. Binding cylinder(s);</p> <p>v. Insufficient battery charge.</p>	<p>r. See remedy <a href="#">a</a>.</p> <p>s. Confirm that neither motor line is connected to ground.</p> <p>t. See <a href="#">d</a>, <a href="#">f</a>, <a href="#">g</a>, <a href="#">h</a>, and <a href="#">i</a>.</p> <p>u. Align cylinder(s).</p> <p>v. Recharge battery.</p>
4. Piston extends in jerks or feels spongy.	<p>w. Fluid starvation</p> <p>x. Air trapped in cylinder(s)</p>	<p>w. See remedies <a href="#">d</a>, <a href="#">f</a>, <a href="#">g</a>, and <a href="#">l</a>.</p> <p>x. See "Bleeding air from hydraulic system" on p. 20-21.</p>
5. Piston retracts slowly when loaded.	<p>y. Filter of lowering solenoid valve clogged;</p> <p>z. Pinched hydraulic hose;</p> <p>aa. Debris in flow control valve;</p> <p>bb. Binding cylinder(s);</p> <p>cc. Debris in velocity fuse.</p>	<p>y. Remove lowering solenoid and clean filter.</p> <p>z. Repair hose.</p> <p>aa. Remove and clean flow control valve.</p> <p>bb. Align cylinder(s) properly.</p> <p>cc. Remove and clean fuse.</p>
6. Piston retracts rapidly.	<p>dd. Leaking hoses and/or fittings;</p> <p>ee. Check valve stuck open;</p> <p>ff. Debris in flow control valve.</p>	<p>dd. Repair as appropriate.</p> <p>ee. Remove and clean check valve.</p> <p>ff. Remove flow control valve from manifold and clean.</p>
7. Piston extends but does not maintain extension and slowly retracts on its own.	<p>gg. Lowering solenoid valve incorrectly wired or stuck open by debris in valve;</p> <p>hh. Check valve stuck open;</p> <p>ii. Leaking hoses or fittings;</p> <p>jj. Cylinder packing worn or damaged.</p>	<p>gg. See remedy <a href="#">k</a>. Valve located in RV port of manifold.</p> <p>hh. Remove and clean check valve.</p> <p>ii. Repair as appropriate.</p> <p>jj. Replacing packing.</p>
8. Piston extends but does not retract.	<p>kk. Lowering solenoid wired incorrectly;</p> <p>ll. Lowering solenoid valve stuck open;</p> <p>mm. Faulty lowering solenoid coil;</p> <p>nn. Object in frame blocking leg rollers;</p> <p>oo. Binding cylinders;</p> <p>pp. Velocity fuse is open.</p>	<p>kk. Correct wiring. Refer to applicable diagram on page <a href="#">4</a> or <a href="#">5</a>. Valve located in RV port of manifold.</p> <p>ll. <i>Lightly</i> tap the solenoid coil body to seat it properly. Striking the coil hard might damage the stem. DO NOT remove the solenoid from the manifold because the tabletop will descend dangerously quickly.</p> <p>mm. Valve located in RV manifold port.</p> <p>nn. Raise tabletop a clean debris affecting rollers from frame.</p> <p>oo. Align cylinders properly.</p> <p>pp. Jog the motor to pressurize hydraulic system.</p>
9. Erratic operation	<p>qq. Insufficient battery charge</p>	<p>qq. Recharge battery.</p>

## LIMITED WARRANTY

Vestil Manufacturing Corporation (“Vestil”) warrants this product to be free of defects in material and workmanship during the warranty period. *Our warranty obligation is to provide a replacement for a defective original part if the part is covered by the warranty, after we receive a proper request from the warrantee (you) for warranty service.*

### Who may request service?

Only a warrantee may request service. *You are a warrantee if* you purchased the product from Vestil or from an authorized distributor AND Vestil has been fully paid.

### What is an “original part”?

An original part is a part used to make the product as shipped to the warrantee.

### What is a “proper request”?

A request for warranty service is proper if Vestil receives: 1) a photocopy of the Customer Invoice that displays the shipping date; AND 2) a written request for warranty service including your name and phone number. Send requests by any of the following methods:

<u>Mail</u>	<u>Fax</u>	<u>Email</u>
Vestil Manufacturing Corporation 2999 North Wayne Street, PO Box 507 Angola, IN 46703	(260) 665-1339 <u>Phone</u> (260) 665-7586	info@vestil.com

In the written request, list the parts believed to be defective and include the address where replacements should be delivered.

### What is covered under the warranty?

After Vestil receives your request for warranty service, an authorized representative will contact you to determine whether your claim is covered by the warranty. Before providing warranty service, Vestil may require you to send the entire product, or just the defective part or parts, to its facility in Angola, IN. The warranty covers defects in the following *original* dynamic components: motors, hydraulic pumps, electronic controllers, switches and cylinders. It also covers defects in *original* parts that wear under normal usage conditions (“wearing parts”), such as bearings, hoses, wheels, seals, brushes, and batteries.

### How long is the warranty period?

The warranty period for original dynamic components is the same as the period applied to your product. For wearing parts, the warranty period is also the same as the period applied to your product. Read the Limited Warranty included with the product owner’s manual to determine the length of these periods. The warranty periods begin on the date when Vestil ships the product to the warrantee. If the product was purchased from an authorized distributor, the periods begin when the distributor ships the product. Vestil may, at its sole discretion, extend the warranty periods for products shipped from authorized distributors by *up to* 30 days to account for shipping time.

### If a defective part is covered by the warranty, what will Vestil do to correct the problem?

Vestil will provide an appropriate replacement for any *covered* part. An authorized representative of Vestil will contact you to discuss your claim.

### What is not covered by the warranty?

1. Labor;
2. Freight;
3. Occurrence of any of the following, which automatically voids the warranty:
  - Product misuse;
  - Negligent operation or repair;
  - Corrosion or use in corrosive environments;
  - Inadequate or improper maintenance;
  - Damage sustained during shipping;
  - Collisions or other incidental contacts causing damage to the product;
  - Unauthorized modifications: DO NOT modify the product IN ANY WAY without first receiving written authorization from Vestil. Modification(s) might make the product unsafe to use or might cause excessive and/or abnormal wear.

### Do any other warranties apply to the product?

Vestil Manufacturing Corp. makes no other express warranties. All implied warranties are disclaimed to the extent allowed by law. Any implied warranty not disclaimed is limited in scope to the terms of this Limited Warranty.

