

LT-15 Meat Tumbler



LANCE
INDUSTRIES
- SINCE 1985 -

MANUAL

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MACHINE MODEL NO. _____

SERIAL NO. _____

POWER SOURCE VOLTAGE _____

LT-15

LT-15 SPECIFICATION SHEET

CONSTRUCTION

All Stainless Steel Construction with USDA approval.

PHYSICAL DIMENSIONS

Length	52"
Width	31"
Height	49"
Drum Size	20" (Diam. x 29" Long)
Approximate Weight	250#

PRODUCT CAPACITY

Gallons	40
Liters	150
Pounds	200

VACUUM PUMP SYSTEM

Pump capable of delivering 25" Hg (Mercury)
Easily Accessible Liquid Trap

DRUM SPEED

Variable Speed 1-9 RPM

TIMER CONTROLS

Tumble Timer	99H 59M (Changeable)
Intermittent Timer (Optional Equipment)	
On Time	Up to 99 Hr. 59 min
Off Time	Up to 99 Hr. 59 min

MOTORS

Variable Speed Motor	1/2 HP, 11.0 Amps
Vacuum Pump Motor	3/4 HP, 11.1 Amps

ELECTRICAL CONNECTIONS

115 volts, 60 cycle single phase (standard)
220 volts, 50 cycle single phase
220 volts, 60 cycle single phase
380 volts, 50 cycle single phase

(See outside cabinet of machine for electrical requirement, below serial # plate)

Specifications subject to change at anytime.

NOTICE TO OWNERS AND OPERATORS

Lance’s machines are designed to process food products safely and efficiently. Unless the operator is properly trained and supervised, there is the possibility of a serious injury. It is the responsibility of the owner to assure that this machine is used properly and safely, strictly following the instructions contained in this manual and any requirements of local law.

No one should use or service this machine without proper training and supervision. All operators should be thoroughly familiar with the procedures contained in this manual. Even so, Lance cannot anticipate every circumstance or environment in which its products will be used. You, the owner and operator, must remain alert to the hazards posed by the function of this equipment. No one under eighteen (18) years of age should operate this equipment. If you are uncertain about a particular task, ask your supervisor.

- NOTE -

A copy of this manual is included with each model, the descriptions and illustrations contained in this manual are not binding. The manufacturer reserves the right to introduce any modification without updating the manual.

SAFETY TIPS

 IMPORTANT SAFETY NOTICE: MOVING YOUR LANCE MEAT TUMBLER

All LT-15, LT-30, and LT-60 models come equipped with heavy-duty casters (two straight and two swivel) for convenient mobility and ease of use in various workspaces. However, improper movement or inattention during transport can lead to serious injury or damage.

 **WARNING!**
Do not roll the tumbler across any surface that includes grates, drains, uneven flooring, ramps, or open thresholds. These can cause the unit to tip, potentially resulting in personal injury or damage to the equipment.

- To prevent accidents when moving your tumbler:
- Always **inspect your intended path** before rolling the machine.
 - Use **two people** when moving larger models to maintain control.
 - Avoid rolling over **open floor grates, trench drains**, or any unstable/unsupported surfaces.
 - When not in use, lock the swivel casters to prevent unintended movement.

Note: Tipping accidents can result in serious injury. Always move equipment with caution and awareness.

- To avoid serious personal injury:
- **ALWAYS** read operation and service manual BEFORE operating, cleaning, or servicing.
 - **ALWAYS** turn off, unplug from power source and perform lockout/tagout procedure to this machine **BEFORE** attempting to unjam or unclog, clean or service.
 - **NEVER** attempt to remove the drum lid unless the vacuum has been released and the drum is positioned vertically with the lid at the top.
 - **NEVER** operate the vacuum pump unless properly connected to the tumbler drum.
 - **ONLY** operate the vacuum pump in recommended vacuum range (20-25” of HG) **NEVER TO EXCEED** 25” Hg. Do **NOT** modify or replace with a pump capable of exceeding 26”.
 - Machine **MUST** be properly grounded.
 - **ONLY** install on a level, non-skid surface in a clean, well-lighted work area away from children and visitors.
 - Storing or operating the machine in a meat cooler **WILL CAUSE** condensation to form in the machine and could potentially cause issues with the photo-eye safety device.
 - **DO NOT** intentionally allow food particles, liquids or any other foreign material to enter the vacuum hose, empty the vacuum trap jar if anything gets into it.
 - We strongly recommend that the machine is **NOT LEFT UNATTENDED** while operating.
 - **NEVER** bypass, alter or modify this equipment in any way from its original condition.
 - **PROMPTLY REPLACE** any worn or illegible warning labels.
 - **USE ONLY** Lance parts and accessories properly Installed

 **VACUUM PUMP WARNING:** the motor is thermally protected and can automatically restart when the overload resets. Always disconnect from power source before servicing to avoid personal Injury.

ROTATING DRUM

- To avoid serious personal injury:
- **ONLY** properly trained personnel should use this equipment.
 - **ALWAYS** keep hands and body clear of the rotating drum and other moving parts.
 - **DO NOT** tamper with, bypass, alter or modify this equipment in any way from its original condition.
 - **NEVER** operate without all warning labels attached.
 - **NEVER** use the motor cover plate for preparing the product.

- HANDLING TO PREVENT CONTAMINATION**
- **ALWAYS** clean and sanitize all utensils and surfaces that have been in contact with raw products.

- TO PROCESS PRODUCT**
1. Refer to your ingredient chart for suggested amount of marinade seasoning and water.
 2. Place product, marinade and water into tumbler drum.
 3. Install gasket on drum opening and place lid on drum.
 4. Connect vacuum hose to valve on drum opening. Be sure valve handle is in the open position, parallel with the valve body.

STARTUP INSTRUCTIONS

A. UNPACKING



1. Carefully remove crate from the skid.

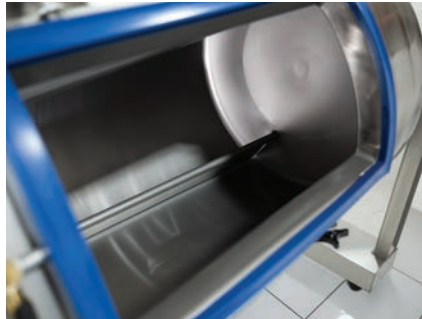


2. Remove machine from skid.



3. Wipe down outside of the machine.

NOTE:
This machine ships under vacuum. They will need to loosen the cover knobs, then release vacuum by opening the valve on the drum opening. With two hands on one corner of the lid, pull up to remove lid.



4. Clean inside of the drum
(use the bolts on the end of the frame to hold the drum cover when not on the drum).



5. Check aim of photo-eyes (see instructions in trouble-shooting section)- This is required due to vibration in shipping.

B. CHECKING CONTROL PANEL



1. Check outside the cabinet for the required voltage requirement for your machine. Plug the machine into the required outlet.



2. Press the (RST) button on the tumbler timer.



3. Check photo-eyes for power This can be seen through the observation circles on the side of the control panel. If the red light is not visible in both circles, wipe the face of the photo eye and the reflectors opposite them to remove all moisture.

STARTUP INSTRUCTIONS (CONTINUED)

C. CHECK VACUUM PUMP CONTROL

1. Press the vacuum start button. It should run.

D. CHECK TUMBLER MOTOR CONTROLS



1. Set variable speed control to 20.



2. Set tumbler timer to 2 minutes. (See "SETTING THE CONTROL TIMER" in the Operating Instructions Section).



3. Set continuous-forward-reverse jog switch to continuous.



4. Press the tumbler start button - Drum will now turn.



5. Turn the variable speed control up & down (Drum will speed up & slow down).



6. The drum will turn until the tumbler timer counts down to zero at which time the drum will stop.



7. Press the (RST) button on the tumbler timer.



8. The machine is now ready to use.

STARTUP INSTRUCTIONS (CONTINUED)

E. CHECK FORWARD & REVERSE JOG (USEFUL FOR UNLOADING THE DRUM)



1. Set variable speed control to a slow speed setting (0-10).



2. Set continuous-forward-reverse jog switch to reverse.



3. Press and hold the start button. The drum will turn only while the start button is being held in.

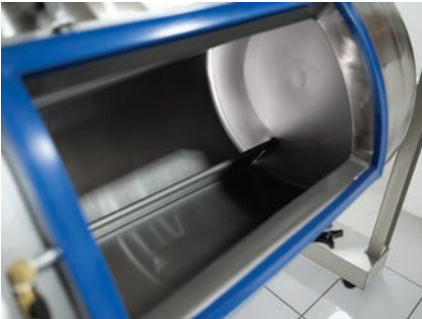


4. Repeat steps 2 & 3 for forward jog.

NOTE:
Changing the position of the switch while the drum is rotating will result in a blown fuse.

OPERATING INSTRUCTIONS

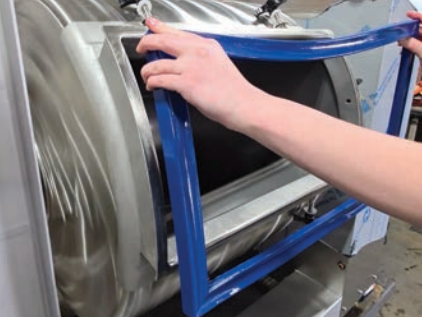
A. LOADING AND TUMBLING



1. Clean the Machine drum.



2. Put the gasket and drain cap on the drum drain pipe.



3. Place the gasket over the drum opening



4. Load the product into the drum.



5. Place the cover on the gasket.

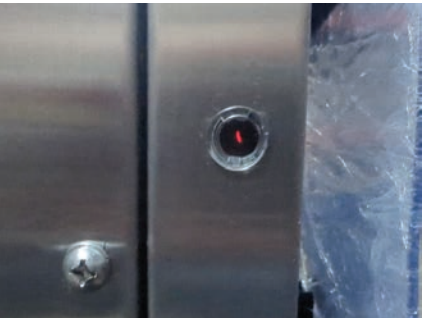
6. Make sure the gasket is under the cover all the way around by pushing it up and into the opening or by visual inspection.



7. Tighten the cover by alternately tightening the knob in a diagonal pattern.



8. Plug the machine into the proper voltage receptacle.



9. Check photo-eyes for power
This can be seen through the observation circles on the side of the control panel. If the red light is not visible in both circles, wipe the face of the photo eye and the reflectors opposite them to remove all moisture.

OPERATING INSTRUCTIONS (CONTINUED)



10. Turn on vacuum pump.

11. If necessary, rotate the drum until the vacuum valve is in an upright position at the top of the machine. Open vacuum valve on the drum. Ensure the vacuum passage to the drum is clean. Pulling vacuum when the fitting is not in the proper position will result in liquid being drawn into the vacuum pump. THIS WILL DAMAGE THE PUMP!



12. Push vacuum hose onto drum fitting.



13. Run vacuum pump until 15 inches of vacuum (or desired level) is drawn.



14. Shut off the valve on the drum.



15. Remove the hose.



16. Turn off the vacuum pump.



17. Set the tumbler timer to the desired time.

OPERATING INSTRUCTIONS (CONTINUED)



18. Set variable speed knob to the desired speed.



19. Set the mode switch to continuous.

20. Before starting the machine, double-check to ensure the vacuum hose is disconnected.



21. Press tumbler start button, The drum will now rotate until the tumbler timer runs down to zero.



NOTE: The drum can be stopped at any time by pressing the tumbler stop button or by breaking the beam from the photo-eye to the reflector.



NOTE: To restart the machine, press the tumbler start button, it will run for the time remaining on the timer.

OPERATING INSTRUCTIONS (CONTINUED)

B. UNLOADING THE DRUM - MANUAL UNLOADING



1. Set the mode to Forward Jog



2. Press and hold the tumbler start button until the cover is facing you, at the 2 o'clock position.



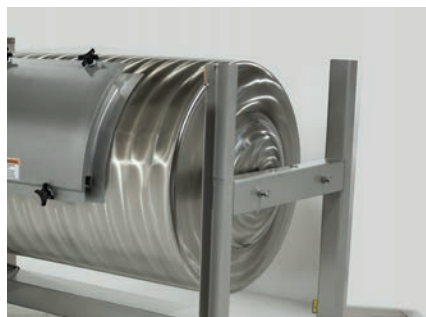
3. Loosen the cover knobs, starting with one corner and moving to the opposite corner



4. Open the vacuum valve on the drum to release the vacuum (Loosen cover knobs first).



5. Remove the cover.



NOTE: The two mounting posts on the right side of the tumbler are designed to hold the cover when it is removed.



6. Remove the gasket.



7. Unload the drum.

OPERATING INSTRUCTIONS (CONTINUED)

C. UNLOADING THE DRUM INTO A BUGGY CART



1. Set the mode to Forward Jog



2. Press and hold the tumbler start button until the cover is facing you, at the 2 o'clock position.



3. Loosen the cover knobs, starting with one corner and moving to the opposite corner



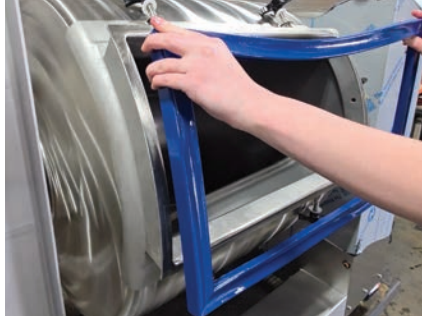
4. Open the vacuum valve on the drum to release the vacuum (Loosen cover knobs first).



5. Remove the cover and tighten the knobs so you don't lose them while unloading



NOTE: The two mounting posts on the right side of the tumbler are designed to hold the cover when it is removed.



6. Remove the gasket.



7. Place the cart under the drum.



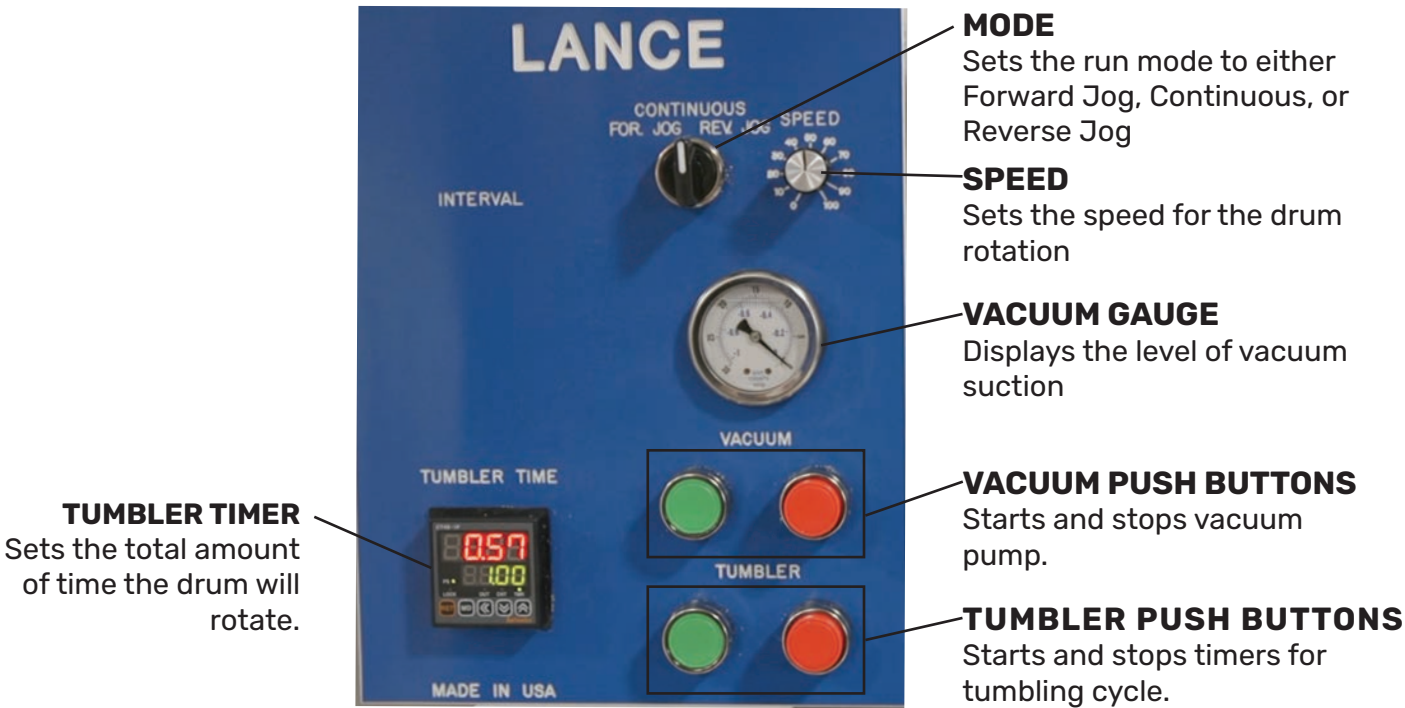
8. Press and hold the tumbler start button until the product starts to roll out of the drum opening.

9. To stop unloading the drum, set the mode to reverse. Press and hold tumbler button until the product stops coming out of the drum. Repeat process switching between forward and reverse mode until the machine is empty.

CONTROL PANEL FUNCTIONS

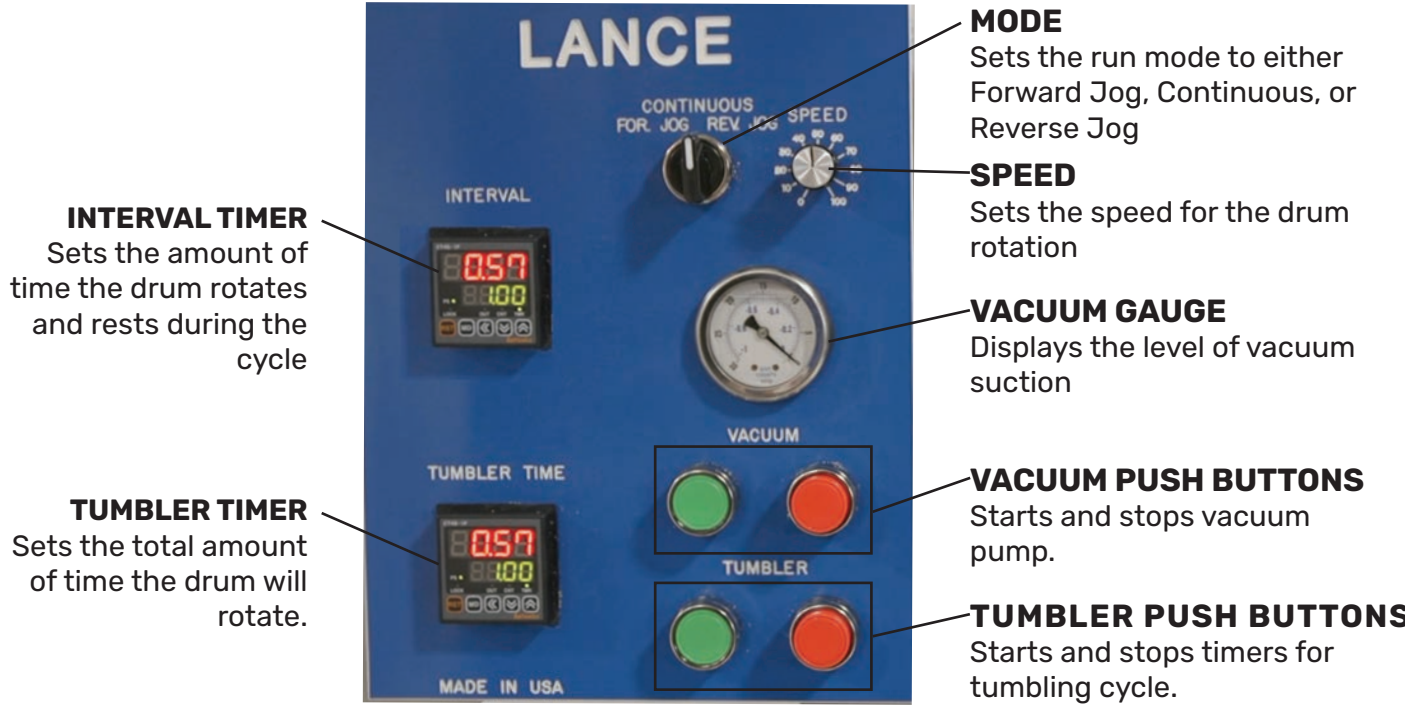
LT-15, LT-30 or LT-60

CONTROL PANEL WITH ELECTRONIC TUMBLER TIMER #CT4S



LT-15, LT-30 or LT-60

CONTROL PANEL WITH ELECTRONIC INTERVAL AND TUMBLER TIMER #CT4S



SETTING THE TUMBLER TIMER

! WARNING: Pressing and holding the MD button for more than 2 seconds will take the timer into programming mode. You cannot set the timer while in programming mode. If you accidentally enter programming mode, press and hold the MD button again for 2 seconds. Numbers will reappear in the timing slots once you have exited programming mode.

1. Set the Set Timer button for total tumbling time (required for the drum to rotate).
2. Press the left arrow button (Set Timer) on the timer, notice the far right position on the lower display is blinking.
3. Use the up and down arrow buttons to change the value of this number. (The timer is set for hour-min.).
4. Use the left arrow button (Set Timer) to change to a new position, then repeat step #4. Do this for each position.
5. When all the values are entered, press the MD button (Save Settings) on the timer. This will enter the time into memory.
6. Press the "Reset" (RST) button to change the upper values on the timer.
7. The tumbler timer is ready to run.
8. Press the tumbler start button to begin the cycle.

Stopping the tumbler with the STOP button or photo-eye switch will stop the tumbler timer and maintain it's time.

Pressing the tumbler START button will restart the total timer where it left off. Pressing the reset button on the tumbler timer in the middle of a tumbling cycle will reset that timer to the preset time setting.



SETTING THE INTERVAL TIMER

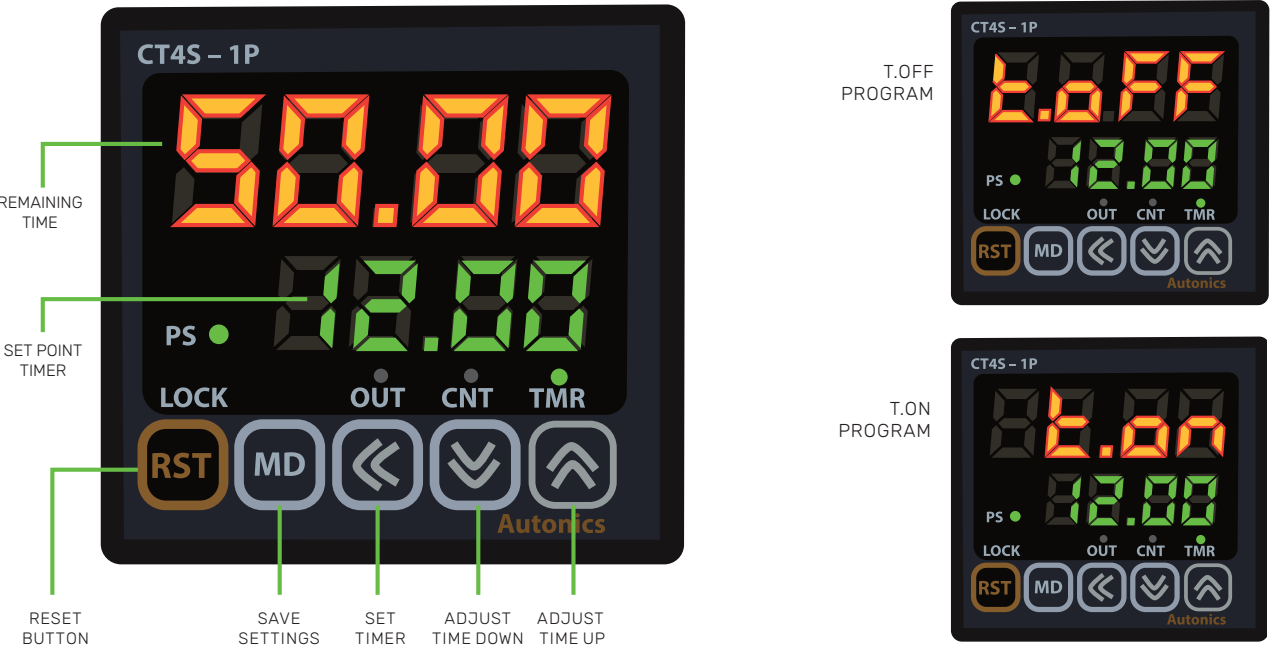
NOTE: The tumbler time sets the total amount of time the drum will rotate. During the intermittent tumbling cycle, this timer runs only during the ON period of the cycle.

! WARNING: Pressing and holding the MD button for more than 2 seconds will take the timer into programming mode. You cannot set the timer while in programming mode. If you accidentally enter programming mode, press and hold the MD button again for 2 seconds. Numbers will reappear in the timing slots once you have exited programming mode.

SET POINTS

Set point 1 “t.off” sets amount of time drum rotates during ON cycle.
Set point 2 “t.on” sets amount of time drum rests during OFF cycle.

DIRECT START INTERMITTENT TUMBLING



1. Before programming the intermittent timer, set the tumbler timer for total tumbling time using the directions in the previous section. Once you have completed programming the tumbler timer, proceed to set the intermittent timer.
2. Press the “set timer” button (left arrow) to set point 1 “t.off” for the amount of time you want the tumbler to run during it’s ON cycle. The ON cycle will start first.
3. “t.off” will display in the upper timer for the ON time and the far right position on the lower display is blinking.
4. Use the up or down arrow button to change the value of this number. (The timer is set for hour-min.)
5. Use the left arrow button to change to a new position, then repeat step #4.

SETTING THE INTERVAL TIMER (CONTINUED)

Do this for each position. Set this time for the amount of time you want the tumbler to run during it’s ON cycle, which will occur first.

6. When all the values are entered, press the “Save Settings” (MD) button on the timer. This will enter the time into memory, and “t.on” will be displayed in the upper timer.
7. Next, set point 2 “t.on” for the amount of time you want the tumbler to rest during it’s OFF cycle. The total timer will not count down during this time.
8. The far right position on the lower display should now be blinking on the interval timer.
9. Use the up or down arrow buttons to change the value of this number. (The timer is set for hour-min.)
10. Use the left arrow to change to a new position, then repeat step #18. Do this for each position.
11. Press the “Save Settings” button (MD) on the timer to enter the time into memory. The display will go to the “t.off” time on the display.
12. After the times are set, press the “Reset” (RST) button to enter the time.
13. The Interval timer is now ready to run.
14. Press the tumbler start button to begin the cycle.

During the continuous or intermittent timing cycle the tumbler timer will only count down during the “t.off” cycle on the interval timer.

Stopping the tumbler with the STOP button or photo-eye switch will stop the tumbler timer and maintain it’s time. The interval timer will reset to the preset times.

NOTE: **Pressing the tumbler START button will restart the interval timer.** The total timer will restart from where it left off. Pressing the reset button on either the tumbler timer or interval timer in the middle of a tumbling cycle will reset that timer to the pre-set time setting.

CLEANING PRECAUTIONS

Do not clean photo-eyes and reflectors with abrasive material, this could damage the components.

Do not spray water directly at the control panel, it could damage the components.
Use a damp rag to clean the control panel face.

CLEANING YOUR MACHINE

Fill your machine so warm water goes to top of paddle. Using your standard cleaning solution, put in 1/2 to 1 cup, depending on the strength. Turn machine on and agitate for ten to fifteen minutes. When you stop the machine, make sure the drain plug is on top. Remove the plug and turn the machine on until drain is at the bottom. Remove lid and rinse. (CAUTION: Extremely hot water will cause fat to bake on walls.) Wipe off safety eyes and reflectors after cleaning.

FLUSHING VACUUM VALVE ON DRUM

Open vacuum valve and thoroughly flush with water. This must be done between loads, before pulling vacuum on the drum. If valve is not cleaned properly, food particles will be drawn into the vacuum hose.

CLEANING VACUUM HOSE

To clean food particles from the vacuum hose, remove vacuum trap jar from the filter, and flush water through hose. Clean trap jar before replacing.

EMERGENCY STOP PHOTO-EYES

These are installed for your protection! When the sensor beam is broken, the machine will automatically shut off. If the machine will not start, it is possible either the reflector or sensor eyes are dirty or wet. If you do have a problem with the sensor, check the photo eye lens windows for the green & amber lights located on the back of the left side of the tumbler. Check for power to the photo eyes through the observation windows. If the green and amber lights are not showing through the photo eye windows, wipe the photo-eye face and reflector to remove moisture. For detailed instructions on diagnosing problems with your photo eye, please view the troubleshooting videos on our website at meattumblers.com or scan the QR code printed on this manual.

RECIPES: RECOMMENDED PROCEDURES FOR TUMBLING PRODUCT

Product & Instruction	% of Brine Green WT.	Total Time	Drum Load	Motor Speed %
Dried Beef Pump product with normal or recommended % of brine. Put product and excess purge into tumbler.	10%	3 hrs 2.5 hrs	1/2 or more 1/2 or less	40
Beef Jerky Get total weight of sliced product to verify % of brine to be added.	10%	25 min. 15 min.	1/2 or more 1/2 or less	40
Chunked & Formed Using Ham Meat and Boston Butt parts (90% lean), run on grinder. Get total weight to verify % of brine to be added. Tumble for stated period of time. Remove from tumbler. Run product through stuffer into large casing. Put into ham press and smoke under normal smoking conditions.	10%	1 hr.		70
Chicken After obtaining total weight of birds, add normal or recommended % of brine and tumble product and brine for required time.	10%	1 hr.	1/2 or more	40
Turkey Obtain total weight of birds. Pump breast, leg and wings on both sides with normal or recommended % of brine. Put product and excess purge in tumbler for recommended time. Then follow normal smoking procedures.	10%	1 hr.	1/2 or more	60
Bone-in-Ham Pump your normal or recommended % of brine per green weight and put product and excess purge in tumbler.	15%	3.5 hrs. 3 hrs.	1/2 or more 1/2 or less	60

RECIPES: RECOMMENDED PROCEDURES FOR TUMBLING PRODUCT

Product & Instruction	% of Brine Green WT.	Total Time	Drum Load	Motor Speed %
Boneless Ham Same process as Bone-In	15%	3 hrs 2.5 hrs	1/2 or more 1/2 or less	50
Bacon Obtain total weight of all product. Using your normal or recommended % of brine per green weight, put bellies and brine into tumbler.	10%	3 hrs. 2.5 hrs.	1/2 or more 1/2 or less	50
Cottage Bacon Pump product with normal or recommended % of brine per green weight. Put product and excess purge into tumbler.	10%	3 hrs. 2.5 hrs.	1/2 or more 1/2 or less	50
Pork Ribs Get total weight of the product to verify % of brine to be added.	10%	.5 hr.		40
Pork Hocks Get total weight of the product to verify % of brine to be added	15%	2 hrs. 1.5 hrs.	1/2 or more 1/2 or less	40
Beef or Pork Roast Pump roasts with normal or recommended soluble roast spice.	10%	4 hrs. 3.5 hrs.	1/2 or more 1/2 or less	40

MAINTENANCE

WARNING: DISCONNECT POWER BEFORE SERVICING.

NOTE: Lock and tag power disconnect to prevent application of power.

CLEANING

Properly selected and installed electric motors are capable of operating for long periods with minimal maintenance. Periodically clean dirt accumulations from open-type motors, especially in and around vent openings, preferably by vacuuming (avoid embedding dirt in windings). At the same time check that electrical connections are tight.

LUBRICATION

The motor is equipped with pre-lubricated ball bearings and will not require re-lubrication. The gears and bearings should be re-lubricated on a regular basis, use type “L-Industrial 30” (American Oil Co.) grease or its equivalent. The following is a list of lubricants which can be used: Mobile UX-EP2, Philube =EP2, Gulf Crown =EP2, Alvania =EP2, or Mutifax =EP2.

IMPORTANT: COMPLETELY CLEAN THE OLD LUBRICANT FROM THE GEAR BOX BEFORE ADDING FRESH LUBRICANT. UNDER NO CIRCUMSTANCES SHOULD DIFFERENT TYPES OF LUBRICANTS BE MIXED!

Troubleshooting Videos

Troubleshooting your meat tumbler just got easier! Our step-by-step video guides are available online 24/7 to help you resolve common issues quickly and keep your operation running smoothly. Simply scan the QR code to access our troubleshooting library or visit our website at <https://meattumblers.com/resources>.



MAINTENANCE & LUBRICATION SCHEDULE

MOTOR BRUSHES

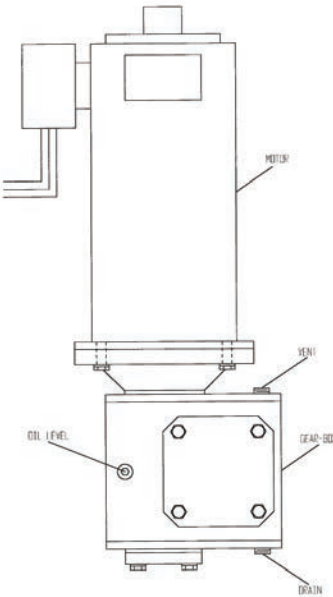
Motor brushes need period inspection and replacement as wear indicates. Brush wear is greatly influenced by individual application. It is recommended that brush wear be checked at intervals of operation in order to determine future required inspection. Standard LEESON brushes have an initial length of 1-1/4". When the brushes are worn to a length of 5/8" they should be replaced.

LUBRICATION

This motor is supplied with pre-lubricated ball bearings, lubricated for life of bearings.

GEAR BOX MAINTENANCE

Frequently check the oil level of the reducer. If the oil level is low add lubrication through filler plug until it comes out the oil level plug. Inspect vent plug often to insure it is clean and operating.

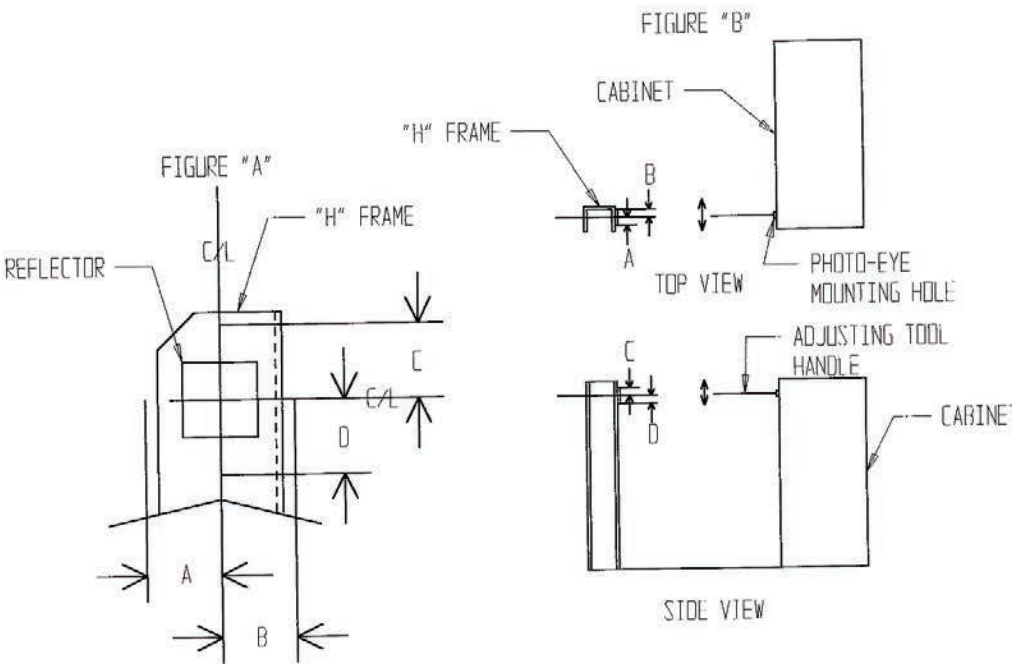


MAINTENANCE & LUBRICATION SCHEDULE

MANUFACTURER		30-100 F AMBIENT TEMPERATURE AMGA Compounded No.7
Mobile Oil Corp.		600 W Super Cylinder

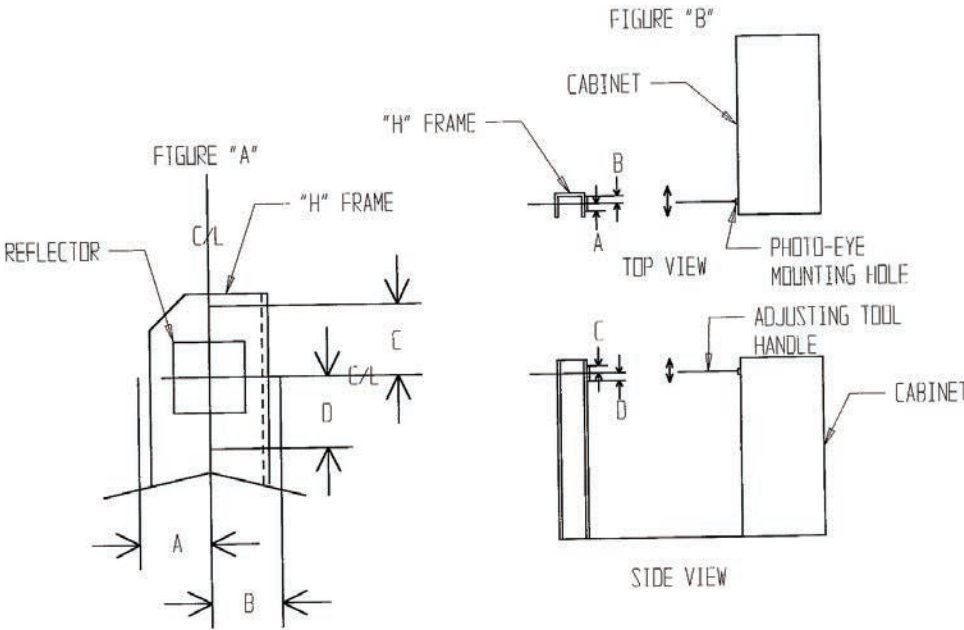
CHECKING THE AIM OF A PHOTO-EYE

1. Press the (RST) button on the timer. This will supply power to the photo-eyes which will be indicated by a green & amber lights on at the back of the photo-eye. (If they won't come on, the photo-eye might be out of alignment.)
2. Take a piece of masking tape and cover up the reflector. Only the one reflector that is opposite of the photo-eye that you are checking.
3. Use a reflector for checking the sensing range of the photo-eye.
Take this reflector and hold it over the reflector that you taped up.
 - A. Move the reflector to the left until the amber light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call distance "A".
 - B. Move the reflector to the right until the amber light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call distance "B".
 - C. Move the reflector up until the amber light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call distance "C".
 - D. Move the reflector down until the amber light on the photo-eye goes out, measure this distance (see Figure "A"), which we will call Distance "D".
4. Distance "A" & "B" should be about the same and "C" & "D" should be about the same. If measurement "A" & "B" are not equal and "C" & "D" are not equal the photo-eye aim needs to be adjusted (see ADJUSTING THE AIM OF THE PHOTO-EYE). If they are equal repeat this procedure on the second photo-eye (Model LT30 and LT60 only).



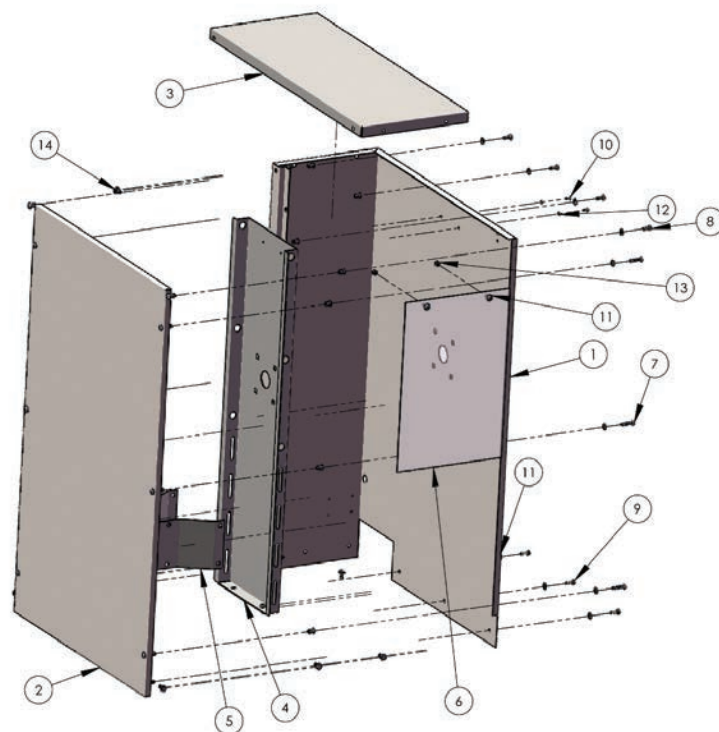
ADJUSTING THE AIM OF A PHOTO-EYE

1. Remove side panel of cabinet.
2. Press the (RST) button on the timer. This will supply power to the photo-eyes which will be indicated by a green & amber lights on at the back of the photo-eye. (If they don't come on, the photo-eye might be out of alignment.)
3. For adjusting the mounting hole on the cabinet, there is an Adjusting Tool available.
 - A. Remove the photo-eye from the cabinet.
 - B. Remove one of the nuts that is threaded onto the Adjusting Tool and insert the threaded end into the hole in the cabinet (from the outside) and thread the nut back on the tool.
 - C. Pull the handle of the Adjusting Tool into the direction of the smaller measurements that you recorded in step #4 (see Figure "B"). You should be able to bend the mounting hole in the cabinet, to align the photo-eye.
4. Install the photo-eye back into the cabinet.
5. Repeat instructions for **CHECKING THE AIM OF THE PHOTO-EYE**.
Re-adjust again if necessary.
6. Once this is complete remove the tape from the reflector and put the side panel back on the cabinet.
7. Alignment is now complete.



CONTROL PANEL ASSEMBLY

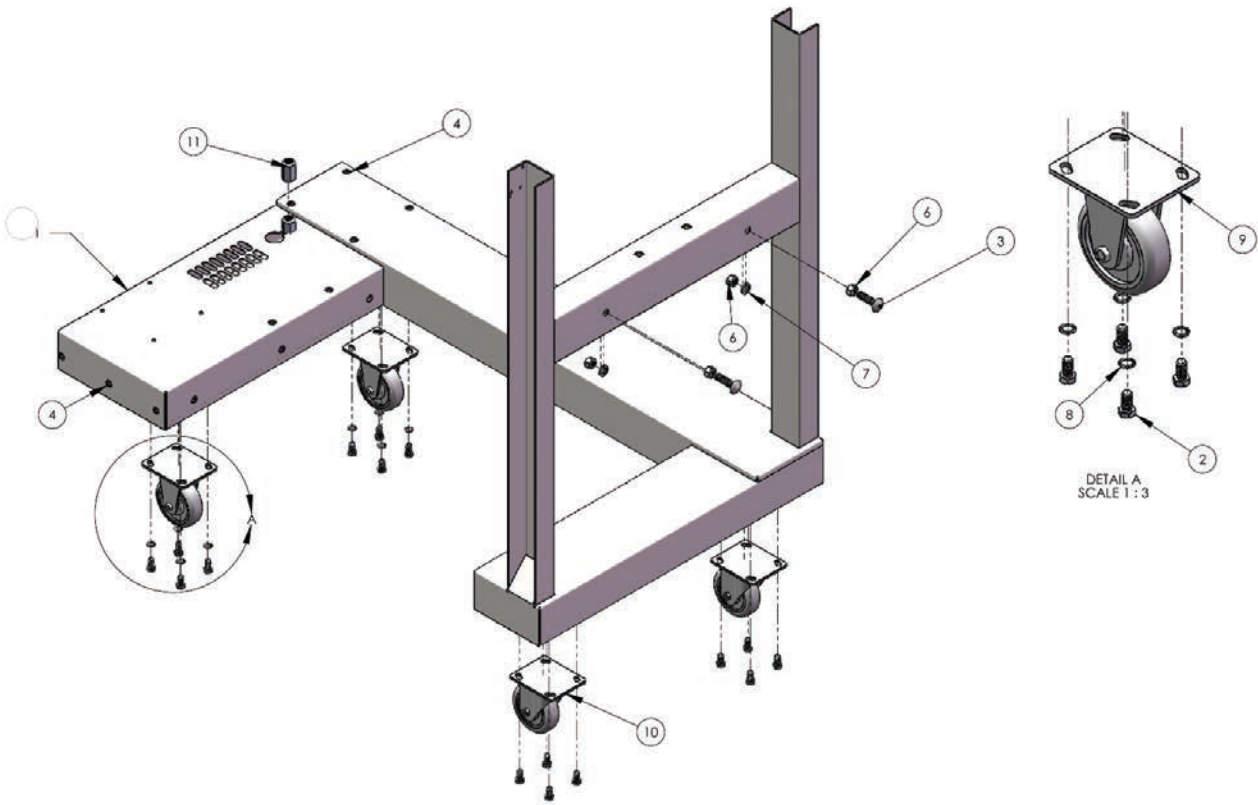
REF NO.	PART NO.	DESCRIPTION	QTY
1	1013	BACK PANEL	1
2	1014	SIDE PANEL	1
3	1015	TOP COVER	1
4	1024	DRUM SUPPORT	1
5	1030	MOTOR BRACKET	2
6	PL75-209-02	PANEL, VINYL COVER LT3060	1
7	BOX0AU200125	1/4"-20 X 1-1/4" PH RHMS	9
8	BOX0AU200075	1/4"-20 X 3/4" PH RHMS SS	10
9	BOX0AA200075	1/4"-20 X 3/4" HHCMS SS	13
10	BOX0AU160037	10-24 X 3/8" PH RHMS SS	2
11	WASG1025	1/4" STD LOCK WASHER SS	32
12	WASG168	#10 SPRING WASHER SS	2
13	NUSOEA20	1/4"-20 HEX NUT SS	2
14	RNAHA1-420-165	1/4"-20 ALUM RIVNUT	17



LT3060CA MANUAL

FRAME ASSEMBLY

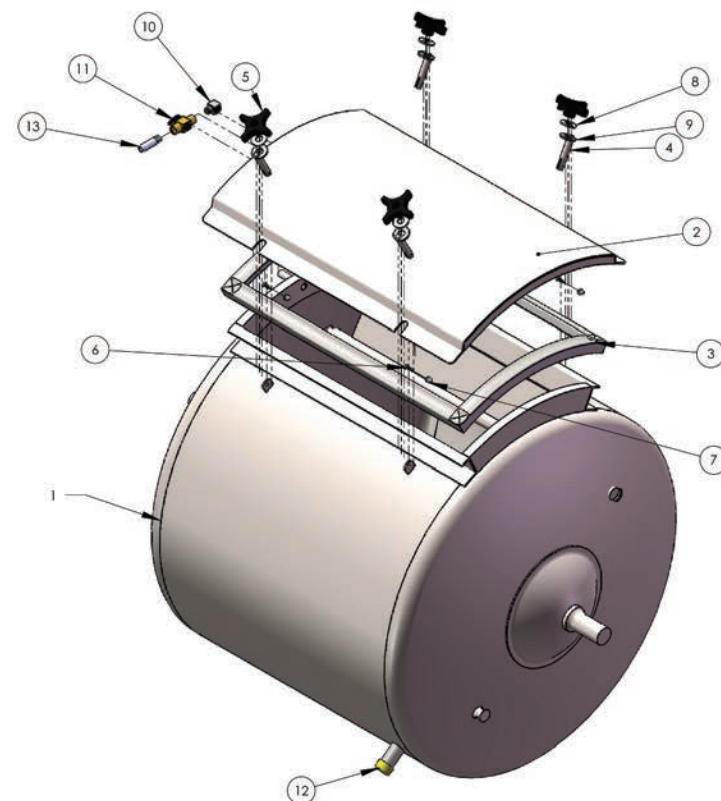
REF NO.	PART NO.	DESCRIPTION	QTY
1	LT30FW	MAIN FRAME	1
2	BOS0AA240075	3/8"-16 X 3/4" HHCS SS	16
3	BOS0AB280175	1/2"-13 X 3/4" HHCS SS	2
4	RNAHA1-420-165	1/4"-20 ALUM RIVNUT	17
5	RNAKA1616-150	3/8"-16 ALUM RIVNUT	16
6	NU0EA28	1/2"-13 HEX NUT SS	4
7	WASG1050	1/2" STD LOCKWASHER SS	2
8	WAS90895A031	3/8" BELLVILLE SERRATED WASHER SS	8
9	CS4W890	RIGID CASTER	2
10	CS4W887	SWIVEL CASTER	2
11	CR3217	SNAP BUSHING	1
12	CS4W932 (not shown)	CASTER BRAKE KIT	2



LT30FW-ASSY MANUAL

DRUM ASSEMBLY

REF NO.	PART NO.	DESCRIPTION	QTY
1	LT15DW	LT15 DRUM WELDMENT	1
2	LT15CW	LT15 COVER WELDMENT	1
3	GALT153060	GASKET	1
4	250-39	COVER BOLT	4
5	PK2840	COVER KNOB	4
6	BOS0BF700062	10-32 X 5/8" PH TH HD MS SS	4
7	NUS0EN17	10-32 ACORN NUT SS	4
8	PW1041	1/2" FLAT WASHER PLASTIC	4
9	WASGA050	1/2" STD FLAT WASHER SS	4
10	EL116SC	90 STREET ELBOW 1/4" NPT	1
11	PV4886K56	BRASS VALVE	1
12	PC3014N324	END CAP	1
13	LT60-56	AIR FITTING	1



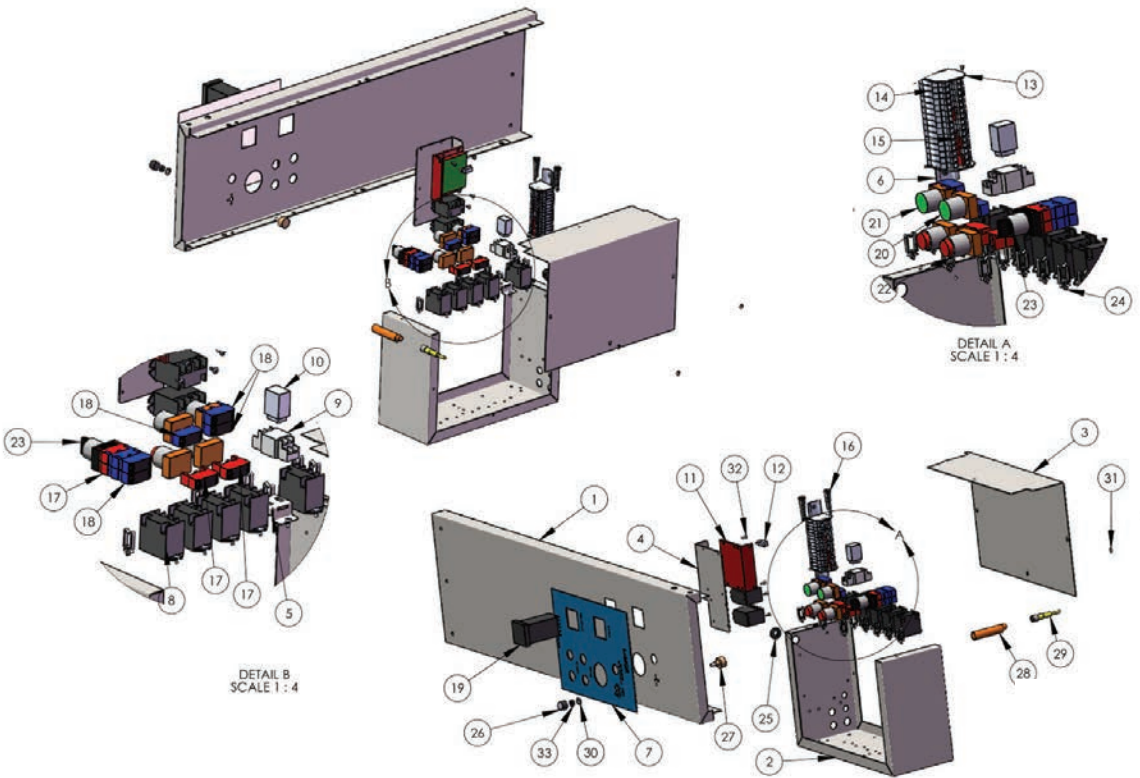
LT30DA

ELECTRICAL ASSEMBLY

REF NO.	PART NO.	DESCRIPTION	QTY
1	1012A	FACE PANEL	1
2	1016A	ELECTRICAL BOX	1
3	1018	ELECTRICAL BOX COVER	1
4	LT30-77	CONTROLLER BRACKET	1
5	LT30-78	RELAY BRACKET	1
6	LT60-102	TERMINAL STRIP BRKT	1
7	LT3060PA-1	LT3060 FACE PANEL	1
8	RL2XC20	RELAY	1
9	S06CVD3	RELAY SOCKET	7
10	RL2W928	RELAY	1
11	BCBC141	CONTROLLER	1
12	BCBR0025	HP RESISTOR	1
13	TE23NY30	END SECTION	2
14	TE23NY11	TERMINAL SECTION	15
15	TE23NY21	TERMINAL JUMPER	5
16	FHHTB-36I	FUSE HOLDER	2
17	CBHW-U01	CONTACT BLOCK-N.C.	1
18	CBHW-U10	CONTACT BLOCK-N.C.	2
19	TMCT4S	TIMER	1
20	PBHW4B-M1F10-G	PUSH BUTTON-GREEN	1
21	PBHW4B-M1F20-G	PUSH BUTTON-GREEN	1
22	PBHW4B-M2F01-R	PUSH BUTTON-RED	2
23	SWHW4S-3JTF21N1	SELECTOR SWITCH	1
24	CL3610	CABLE HOLDER	14
25	GM9600K22	GROMMET	1
26	SK543-1202	SPEED KNOB	1
27	SPBC149	5K SPEED POTENTIOMETER	1
28	PE-0G0044	PHOTOELECTRIC EYE	2
29	PE-E18212	IFM CORD SET	2
30	WA9350A160	SEALER WASHER	1

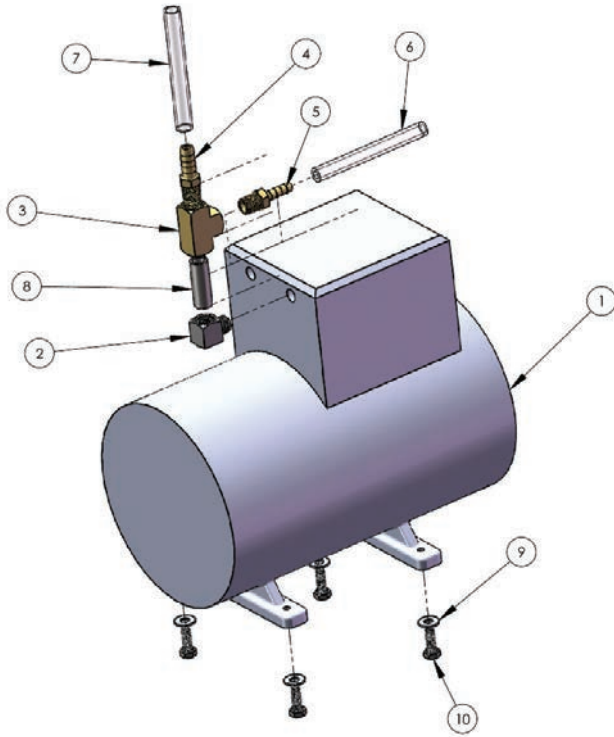
ELECTRICAL ASSEMBLY (CONTINUED)

REF NO.	PART NO.	DESCRIPTION	QTY
31	WASGI014	#8 STD LOCKWASHER SS	3
32	BOS0AI140037	8-32 X 3/8" PH RHMS SS	24
33	NU70205K21	SEALING NUT	1
34	CN6VG23	WIRE NUT (NOT SHOWN)	4
35	SR1200	5/8" STRAIN RELIEF (NOT SHOWN)	3
36	SR1184	1/2" STRAIN RELIEF (NOT SHOWN)	2
37	WI1W661	16/3 WIRE (NOT SHOWN)	4'
38	CR3217	CORD RESTRAINT FOR MOTOR (NOT SHOWN)	1
39	CT3503	NYLON CABLE TIES (NOT SHOWN)	10
40	CN4X308	.09 RING TONGUE CONNECTOR (NOT SHOWN)	4
41	CS2W687	POWER CORD 12' (NOT SHOWN)	1
42	FU6F019	GGC12-12 AMP FUSE (NOT SHOWN)	1
43	FU6F046	GAB8-8 AMP FUSE (NOT SHOWN)	1



VACUUM ASSEMBLY

REF NO.	PART NO.	DESCRIPTION	QTY
1	VU1207PK80	VACUUM PUMP	1
2	EL116SC	90 STREET ELBOW 1/4" NPT	1
3	TEE101C	TEE 1/4"	1
4	HN5346K18	MALE HOSE NIPPLE 3/8"-1/4"	1
5	HN5346K14	MALE HOSE NIPPLE 1/4"-1/4"	1
6	HS26-702AM-30	1/4" HOSE (30" LG)	1
7	HS26-705 AM-46	3/8" HOSE (46" LG)	1
8	PNS025B0150	1/4" X 1.5" SS NIPPLE	1
9	WASGI025	1/4" STD LOCK WASHER SS	4
10	BOS0AA200075	1/4"-20 X 3/4" HHCMS SS	4

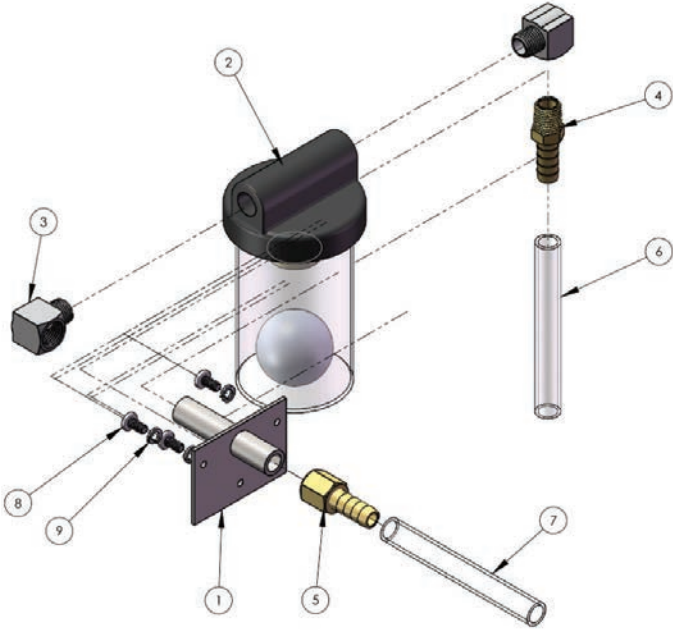


LT-VAC-ASSY MANUAL

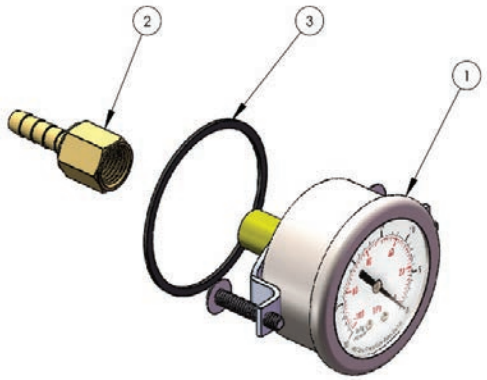
TRAP JAR ASSEMBLY

REF NO.	PART NO.	DESCRIPTION	QTY
1	1036TW	TRAP BRACKET WELDMENT	1
2	VTAA672K	BALL TRAP	1
3	EL116SC	90 STREET ELBOW 1/4" NPT	2
4	HN5346K18	MALE HOSE NIPPLE 3/8" - 1/4"	1
5	HN5346K35	3/8" ID HOSE 1/4" NPT BRASS FEMALE	1
6	HS26-705 AM-30	3/8" ID HOSE (30" LG)	1
7	HS26-705 AM-46	3/8" ID HOSE (46" LG)	1
8	BOS0AU160037	10-24 X 3/8" PH RHMS SS	3
9	WAGI68	#10 SPRING WASHER SS	3
10	OR9464K26	O-RING	1
11	0002-49	AIR VALVE PLUG	1

LT-VAC-TRAP-ASSY MANUAL



GAUGE ASSY MANUAL



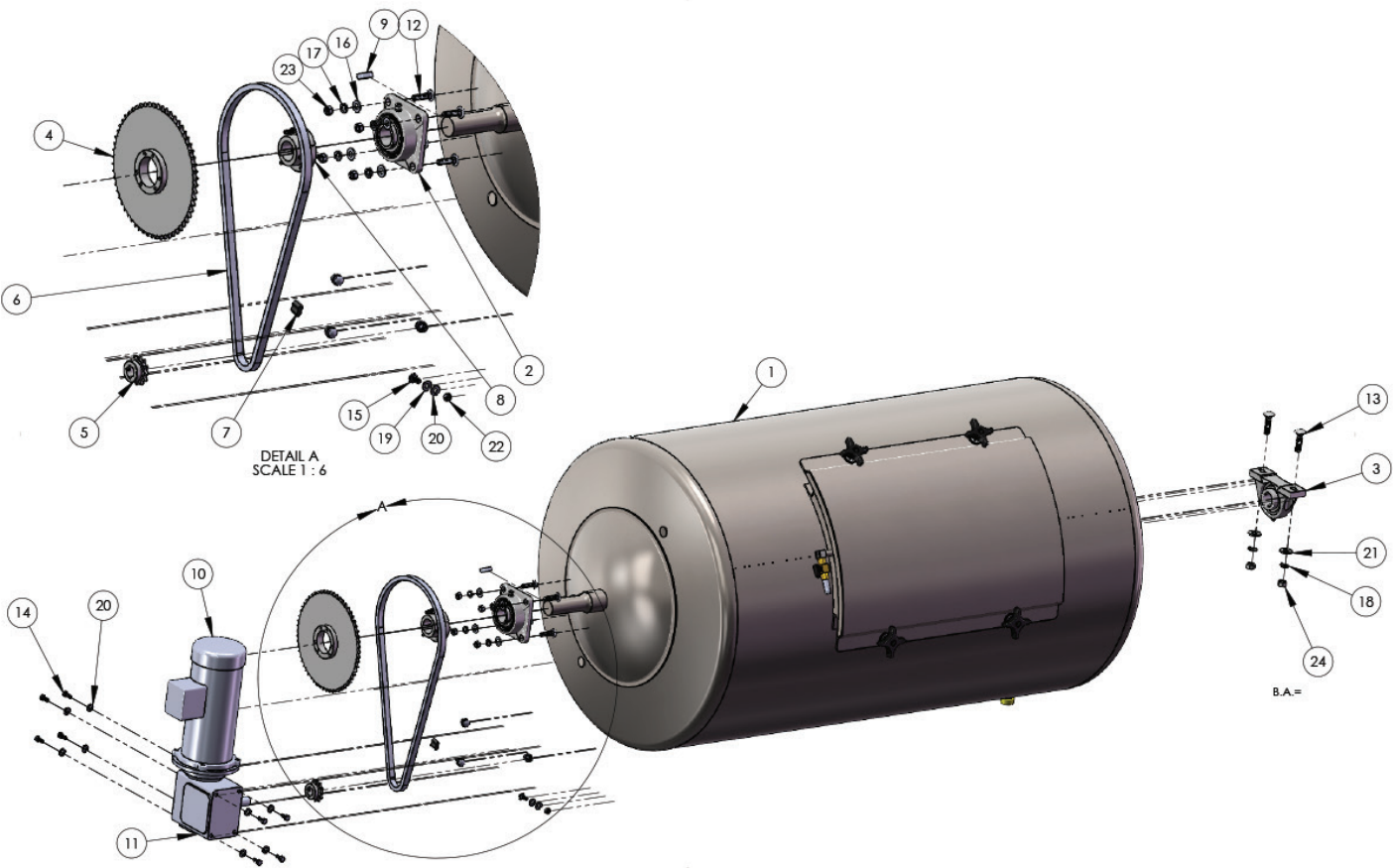
VACUUM GAUGE ASSEMBLY

REF NO.	PART NO.	DESCRIPTION	QTY
1	VG203L-204A	VACUUM GAUGE ASSY	1
2	HN5346K42	FEMALE HOSE NIPPLE 1/4"-1/4"	1
3	OR9557K3	GAUGE SEAL	1

DRIVE ASSEMBLY

REF NO.	PART NO.	DESCRIPTION	QTY
1	LT15DA	LT15 DRUM ASSY	1
2	PBHCFS207-23-1-7/16	FLANGE BEARING	1
3	PBUCP207-23-1-7/16	PILLOW BLOCK BEARING	1
4	SP40SDS60	SPROCKET (FOR 60 CYCLE MACHINES)	1
5	SP40B12-7/8	SPROCKET	1
6	RC40-39	#40 ROLLER CHAIN (39" LG)	1
7	LII40-S-CC-L	#40 CONNECTING LINK	1
8	BUQDSDSX1.43	BRUSHING	1
9	KE98481A240	3/8" X 1-1/4" WOODRUFF KEY	1
10	M0098000	1/2 MOTOR (LESSON)	1
11	RDBMQ818-40-RR-56C	GEAR BOX	1
12	BOS0AB240150	3/8"-16 X 1-1/2" CARRIAGE BOLT SS	4
13	BOS0AB280175	1/2"-13 X 1-3/4" CARRIAGE BOLT SS	2
14	BOS0AA220075	5/16-18 X 3/4" HHCS SS	8
15	BOS0AB220075	5/16"-18 X 3/4" CARRIAGE BOLT SS	4
16	WASGA037	3/8" STD FLAT WASHER SS	4
17	WASGI037	3/8" STD LOCK WASHER SS	4
18	WASGI050	1/2" STD LOCK WASHER SS	2
19	WASGA031	5/16" STD FLAT WASHER SS	4
20	WASGI031	5/16" STD LOCK WASHER SS	12
21	WASGA050	1/2" STD FLAT WASHER SS	2
22	NUS0EA22	5/16"-18 HEX NUT SS	4
23	NUS0EA24	3/8"-16 HEX NUT SS	4
24	NUS0EA28	1/2"-13 HEX NUT SS	2

DRIVE ASSEMBLY (CONTINUED)



LT-3060-DRIVE TRAIN MANUAL



668/688 SERIES

MODELS

Standard models

668CE44
668CGHI44

688CE44
688CGHI44

Other models based on availability and minimum purchase.

668CE22
668CE32
668CE40
668CGHI22
668CGHI32
668CGHI40
668CS44

688CE22
688CE32
688CE40
688CGHI32
688CGHI40
688CS44






FEATURES

- Oil-less, non-lube piston and cylinder
- Permanently lubricated bearings
- Stainless steel valves
- Lightweight diecast aluminum components
- Long-life, high performance piston seal
- Thin wall, hard coated aluminum cylinder for maximum heat transfer
- Low noise design
- High efficiency, permanent split capacitor motor
- 115 Volt, UL recognized motor and thermal protector
- Balanced for smooth, low vibration operation
- Intake filter
- Six foot cord and plug assembly (688)
- Field service capability
- All wetted aluminum parts treated for corrosion protection from moisture
- Open drip proof motor shell
- CE approval on all standard 220-240/50 Hz models
(Consult factory for non-standard and TUV approved models)

Consult factory for custom applications

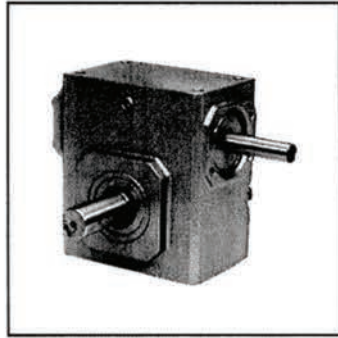




A Gardner Denver Product

GROVE GEAR

FLEX-A-LINE SPEED REDUCERS



Installation, Lubrication and Maintenance Instructions

CONGRATULATIONS!

Your decision to purchase an American Crafted Speed Reducer from Grove Gear will provide you with many years of trouble free service if the following installation and maintenance instructions are adhered to.

Instruction Manual

GROVE GEAR

Selection Information

Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.

Written authorization from Grove Gear is required to operate or use reducers in man lift or people moving devices.

Check to make certain application does not exceed the allowable load capacities published in the current catalog.

Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.

Safety Alert

⚠ WARNING

- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Hot oil and reducers can cause severe burns. Use extreme care when removing lubrication plugs and vents.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.
- Reducers are not to be considered fail safe or self-locking devices. If these features are required, a properly sized, independent holding device should be utilized. Reducers should not be used as a brake.
- Any brakes that are used in conjunction with a reducer must be sized or positioned in such a way so as to not subject the reducer to loads beyond the catalog rating.
- Lifting supports including eyebolts are to be used for vertically lifting the gearbox only and no other associated attachments or motors.
- Use of an oil with an EP additive on units with backstops may prevent proper operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.
- Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.

⚠ CAUTION

- Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- If the speed reducer cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.
- Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Important Information

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranties or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

Resellers/Buyers agree to also include this entire document including the warnings above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This instructions manual should be read together with all other printed information such as catalogs, supplied by Grove Gear.

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General Operation

1. Run the motor which drives the reducer and check the direction of reducer output rotation. Consult motor nameplate for instructions to reverse the direction of rotation.
2. Attaching the load: On direct coupled installations, check shaft and coupling alignment between speed reducer and loading mechanism. On chain/sprocket and belt/pulley installation, locate the sprocket or pulley as close to the oil seal as possible to minimize overhung load. Check to verify that the overhung load does not exceed specifications published in the catalog.
3. High momentum loads: If coasting to a stop is undesirable, a braking mechanism should be provided to the speed reducer output or the driven mechanism.

CAUTION

The system of connected rotating parts must be free from critical speed, torsional or other type vibration, no matter how induced. The responsibility for this system analysis lies with the purchaser of the speed reducer.

Installation

1. Mount the unit to a rigid flat surface using grade 5 or higher fasteners. The mounting fasteners should be the largest standard size that will fit in the base mounting hole. Shim as required under flange or base feet which do not lie flat against the mounting surface.
2. For shipment, pipe plugs are installed in the unit and a vent plug is packed separately. After mounting the unit in position, remove the appropriate pipe plug and install the vent plug in the location shown on page 5. On double reduction units both the primary and the secondary must be vented. Failure to vent the unit can cause premature seal wear or loss of seal and oil. These conditions are not covered by warranty. Check for correct oil level. Contact the factory for level and vent recommendations on non-standard mounting positions. **Grove Gold** units with optional internal pressure compensating system do not use vents. See (internal pressure compensating system) under **Lubrication** for further information.
3. **Grove Gold** units include synthetic oil and an internal pressure compensation system pre-installed at the factory. It is not necessary to vent these units, and they can be used as supplied from the factory. Do not loosen the nut holding the stem of the pressure compensator, and do not block the hole in the stem. Do not blow pressurized air into the hole, and avoid spraying washdown chemicals directly into the hole.
4. Connect motor to speed reducer.

WARNING

Depending upon gear geometry and operating conditions worm gear reducers may or may not backdrive. Special consideration should be given to high inertia loads connected to the output shaft. Consult the factory for further details.

CAUTION

DO NOT CHANGE MOUNTING POSITIONS WITHOUT CONTACTING FACTORY. Altering the mounting position may require special lubrication provisions which must be factory installed.

CAUTION

Do not operate the reducer without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result. **Grove Gold** units are lubed and sealed for life, so in most applications it will not be necessary to drain or re-fill the unit.

CAUTION

A unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted either through a shaft-mounted arrangement, and any shaft mounted power transmitting device. (e.g., sprockets, pulleys, couplings)

CAUTION

For safe operation and to maintain the unit warranty, when changing a factory installed fastener for any reason, it becomes the responsibility of the person making the change to properly account for fastener grade, thread engagement, load, tightening torque and the means of torque retention.

Lubrication - Standard Units

With the exception of unit sizes 2700, 2800 and 21000 which are shipped dry, all standard reducers ordered from the factory are filled with lubricant to operate within a 30° to 100° F ambient temperature range. Double and triple reduction units have separate oil sumps and must be filled/checked independently. Prior to startup, verify that the oil is at the level shown on the drawings on page 5. If the ambient temperature will be outside the range for the lubricant installed at the factory, drain and refill the reducer with the proper viscosity lubricant prior to use. Consult the chart on page 4 or the factory for alternate lubricants.

Change Intervals: Standard compounded lubricants should be changed every six months or 2500 operating hours, whichever comes first. Factory installed synthetic lubricants should be changed every two years or 6000 hours, whichever comes first.

Internal pressure compensating system: **Grove Gold** and stainless steel reducers come standard with an internal pressure compensating system and synthetic oil pre-installed at the factory. It is not necessary to vent these reducers, and they can be used as supplied from the factory.

CAUTION

Oil should be changed more often if reducer is used in a severe environment. (i.e. dusty, humid)

CAUTION

In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied oil is not suitable for these applications or this industry.

CAUTION

Do not mix different oils in the reducer. Oils should be compatible with Viton® seal material.

Special Lubrication Requirements - Sizes 218 & Larger

Units shipped from the factory are assembled to properly lubricate all internal components based on a specific assumed mounting orientation. The factory assumed mounting orientations are given below. If a size 218 or larger unit will be mounted in a different orientation than listed below, or run with sustained input speeds less than 900 RPM, it should be specified with the order. The unit can then be modified to assure proper lubrication.

Factory Assumed Mounting Orientation	Applicable Unit Styles*	
Worm Over	B, T, F, H, FH, C, D, DT, DF, DH, DFH, DX, DXT, DXH, DXFH, TT	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm Triple Reduction Worm-Worm-Worm
Worm Under	U DU	Single Reduction Double Reduction Worm-Worm
Vertical Output	VL/VH, FE DVL/DVH, DFE DXVL/DXVH, DXFE	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm
Vertical Input	J DJ DXJ	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm
* Includes "M" and "MQ" versions of all styles listed		

The precision-made gears and bearings in Grove Gear Speed Reducers require high-grade lubricants of the proper viscosity to maintain trouble-free performance. For best results, use lubricants on the following chart for worm gear reducers:

Manufacturer	30° to 100° F Ambient Temperature AGMA Compounded No. 7	50° to 125° F Ambient Temperature AGMA Compounded No. 8
Amoco Oil Co.	Worm Gear Oil	Cylinder Oil #680
Chevron USA, Inc.	Cylinder Oil #460X	Cylinder Oil #680X
Exxon Co. USA	Cylsstic TK-460	Cylsstic TK-680
Gulf Oil Co.	Senate 460	Senate 680D
Mobile Oil Corp.	600 W Super Cylinder	Extra Hecla Super
Shell Oil Co.	Valvata Oil J460	Valvata Oil J680
Sun Oil Co.	Gear Oil 7C	Gear Oil 8C
Texaco	Honor Cylinder Oil	650T Cylinder Oil
Union Oil Co. of CA	Steaval A	Worm Gear Lube 140

Standard factory-installed lubricant, shipped with 6.00" C.D. and smaller units.

Some gear lubricants contain E.P. additives that can be corrosive to gear bronze. Avoid lubricants that are compounded with sulfur and/or chlorine.

For temperature ranges not shown, contact factory.

For lubrication requirements of **Grove Gold** or helical reducers (primaries of helical/worm reducers, ratio multipliers, and styles BAMCQ, BAMC, and BA), contact factory.

Instruction Manual

GROVE GEAR

Oil Capacities (pints) - Standard Units

Mounting Position	UNIT SIZE													
	213	215	217	220	224	226	230	232	242	252	2600	2700*	2800*	21000*
Worm Over	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8 1/4	12 1/2	19 1/2	35	48	72
Worm Under	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5 1/2	8	13 1/2	20 1/2	32 3/4	51 1/4	80
Vertical Output	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8	13 1/2	20	20 3/4	28 3/4	40
Vertical Input	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8	13 1/2	20 1/3	36 1/2	50	75
Extended Bearing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	12	17	27	40	63	102
Worm over on Secondary Unit of Double Reduction	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12	19 1/4	20	30 1/3	50 1/3	71 1/2	107 1/4

*Shipped Dry

16 oz. = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
1 gallon = 128 oz. = 231 cu. in.

CAUTION Always check for proper oil level after filling. Capacities vary somewhat with model and mounting position. Oil should rise to bottom edge of level hole. Do not overfill.

Synthetic Lubricants

Synthetic lubricants provide the potential for numerous benefits including wider temperature range and increased interval between changes. Use of synthetics can cause problems if they are not compatible with the seals or the conventional lubricants they replace. For continuous duty at normal ambient temperatures (-10°F to 105°F) we recommend the use of Mobil SHC 634 which is compatible with the standard compounded oil shipped in our product and the Viton® seal material used through size 252. For other temperatures, or for intermittent operation below 20° F, contact the factory for a recommendation.

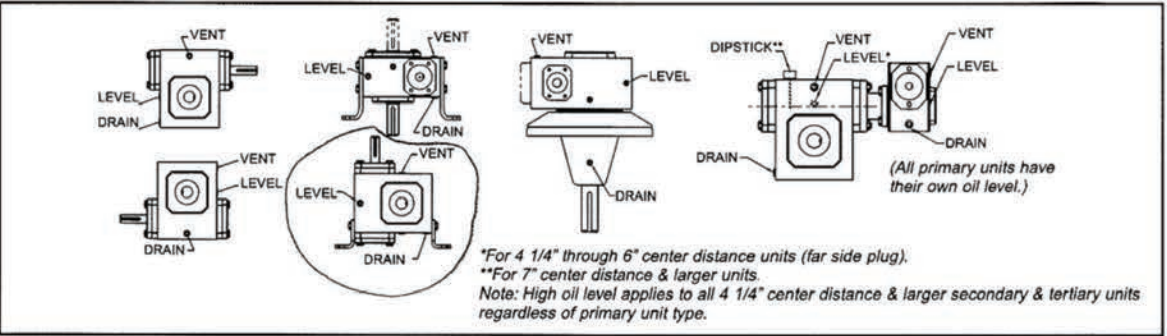
For synthetic lubrication to be used in helical reducers (primaries of helical/worm reducers, ratio multipliers, and styles BAMCQ, BAMC, and BA), contact factory.

Lubrication - Grove Gold

All **Grove Gold** reducers are shipped from the factory filled with synthetic lubricant suitable for continuous operation within a -10° F to 105° F ambient environment. If ambient temperature will be outside the above range, or if operation will be intermittent at temperatures below 20° F, consult the factory for lubrication recommendations. The unit is factory filled with the correct amount of oil for most mounting positions. If the unit will operate at input speeds below 900 RPM, or if a 230 or larger unit is to operate with one of its shafts in a vertical position, consult the factory for special lubrication considerations.

CAUTION In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied oil is not suitable for these applications or this industry.

Standard Speed Reducer Mounting Positions & Vent Plug, Level and Drain Locations



Maintenance - Standard Units

Your Grove Gear reducer has been tested and adjusted at the factory. Dismantling or replacement of components must be done by Grove Gear to maintain the warranty.

Frequently check the oil level of the reducer. If oil level is low, (refer to reducer vent and level position chart) add proper lubrication through the filler plug until it comes out the oil level plug.

Inspect vent plug often to insure it is clean and operating.

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Instruction Manual

CAUTION Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The Grove Gear line of speed reducers utilize premium quality seals which are the state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can be easily accomplished by following the steps below:

1. Remove the worn seal without damaging the shaft surface or the seal bore. This can be done by drilling a .062 diameter hole in the seal casing (being careful not to drill into the bearing behind the seal). Screw a #10 sheet metal screw into the hole and pry out the seal.
2. Clean the seal bore of sealant.
3. Before installing the new seal, use electrical tape to cover any keyways on the shaft to prevent seal lip damage.
4. Grease the seal lips with bearing grease and apply a sealant to the seal bore.
5. Slide the seal into the shaft being careful not to fold the inner lip over on any shaft steps.
6. Press the seal into its bore with a sleeve that presses on the seal casing, being careful to keep the seal square in its bore.

Maintenance - Grove Gold

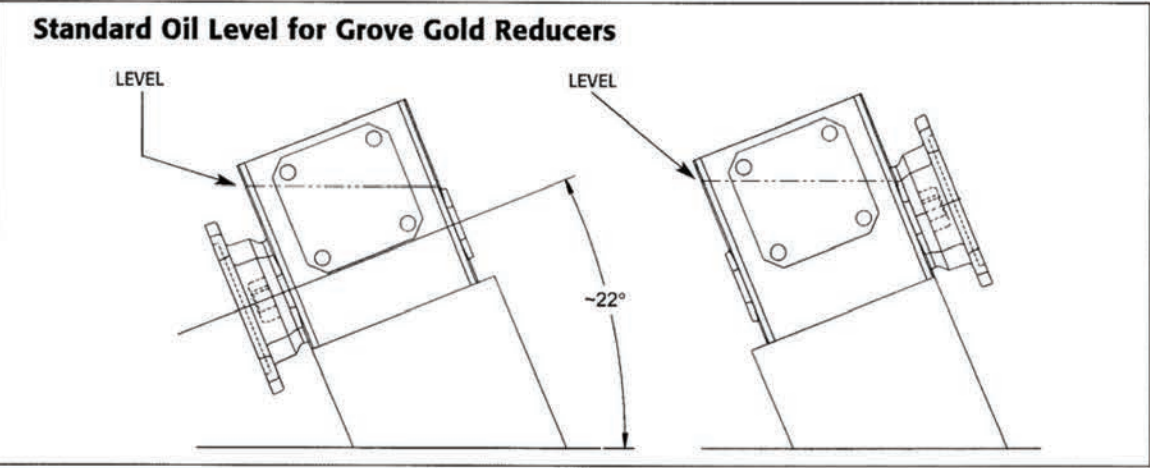
Your **Grove Gold** reducer has been tested and adjusted at the factory. Dismantling or replacement of components must be done by Grove Gear to maintain the warranty.

Inspect the stem of the pressure compensating system often to ensure it is clean and operating properly.

CAUTION Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The **Grove Gold** line of speed reducers utilize premium quality seals which are state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can easily be accomplished by following the procedure given under **Maintenance - Standard Units** above.

If seal leakage has resulted in the loss of a significant amount of oil, it may be necessary to add more lubricant. For normal ambient temperature conditions, Grove Gear recommends Mobil SHC 634 synthetic gear oil for worm drives, and Mobil SHC 150 for helical drives. For all worm drives, fill the gearbox to the level indicated in the diagram below.



CAUTION Always check for proper oil level after filling. Do not overfill or underfill with oil, or injury to personnel, reducer, or other equipment may result.

CAUTION Do not mix different oils in the reducer.

Class of Service

All capacity ratings are based on American Gear Manufacturers Association (AGMA) Standards. Load conditions must be within cataloged ratings published in the current Grove Gear Catalog (available upon request).

Warranty From Grove Gear - See catalog pages 192-195 for warranty terms and conditions.

GROVE GEAR

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6-02/BH

Single Reduction Parts List

Item # Description

Basic Single Reduction Unit

- 1. Gear Housing
- 2. Pipe Plug
- 3. Vent Plug
- 4. Splash Guard
- 5. Input Cover
- 6. O-Ring
- 7. Hex Head Cap Screw
- 8. Input Oil Seal
- 9. Input Bearing
- 10. Input Bearing
- *11. Retaining Screw
- 12. Input Shaft
- 13. Output Cover
- 14. Output Cover
- 15. O-Ring
- 16. Output Cover Gasket (as required)
- 17. Output Oil Seal
- 18. Output Bearing
- 19. Hex Head Cap Screw
- ***20. Single Output Shaft
- ***21. Double Output Shaft
- 22. Gear Spacer
- 23. Gear Key (only used on size 2-5/8" center distance and larger units)
- 24. Output Gear (supplied only as output assembly on size 1-1/3" through 2-3/8" center distance units)
- 25. Input Cover (only used on size 4-1/4" center distance and larger units)
- 26. Input Cover
- 27. Input Oil Seal
- *28. Retaining Ring - Shaft
- 29. Double Input Shaft
- 170. Internal Pressure Compensation Chamber (optional)
- 171. Internal Pressure Compensation Chamber Stem Plug
- 172. Internal Pressure Compensation Chamber Stem Nut

*not used on 4-1/4" center distance and larger units

Quill Motor Flange Unit

- 30. Double Input Shaft
- 40. Quill Motor Flange
- 41. Input Oil Seal
- 42. Hex Head Cap Screw
- 43. Retaining Ring - Shaft
- 44. Retaining Ring - Housing (only used on size 4-1/4" center distance and larger units)
- 45. Quill Input Shaft

Hollow Output Shaft Unit

- 50. Gear Housing
- 51. Output Cover
- 52. Output Oil Seal
- 53. Output Bearing
- 54. Gear Spacer
- ***55. Output Shaft
- 56. Setscrew
- 57. Gear Key (only used on size 2-5/8" center distance and larger units)

Item # Description

- 58. Output Gear (supplied only as output assembly on size 1- 1/3" through 2-3/8" center distance units)

Mounting Bracket Options

- 70. Horizontal Mounting Foot
- 71. Cap Screw
- 72. High and Low Riser Bracket
- 73. Hex Head Cap Screw
- 74. "J" Mount Bracket
- 75. Output Flange
- 76. Machine Faced Output Cover (only used on size 2-3/8" center distance and larger solid output shaft units)
- 77. Hex Head Cap Screw
- 78. Torque Bracket
- 79. Hex Head Cap Screw

Extended Bearing Unit

- 90. Flange
- 91. Output Shaft
- 92. Bearing
- 93. Output Oil Seal
- 94. Hex Head Cap Screw
- 95. Pipe Plug
- 96. Expansion Plug
- *97. Flange Cover
- *98. Gasket
- *99. Hex Head Cap Screw

*only used on size 5-1/4" center distance and larger units

Long Motor Flange and Coupling Kit

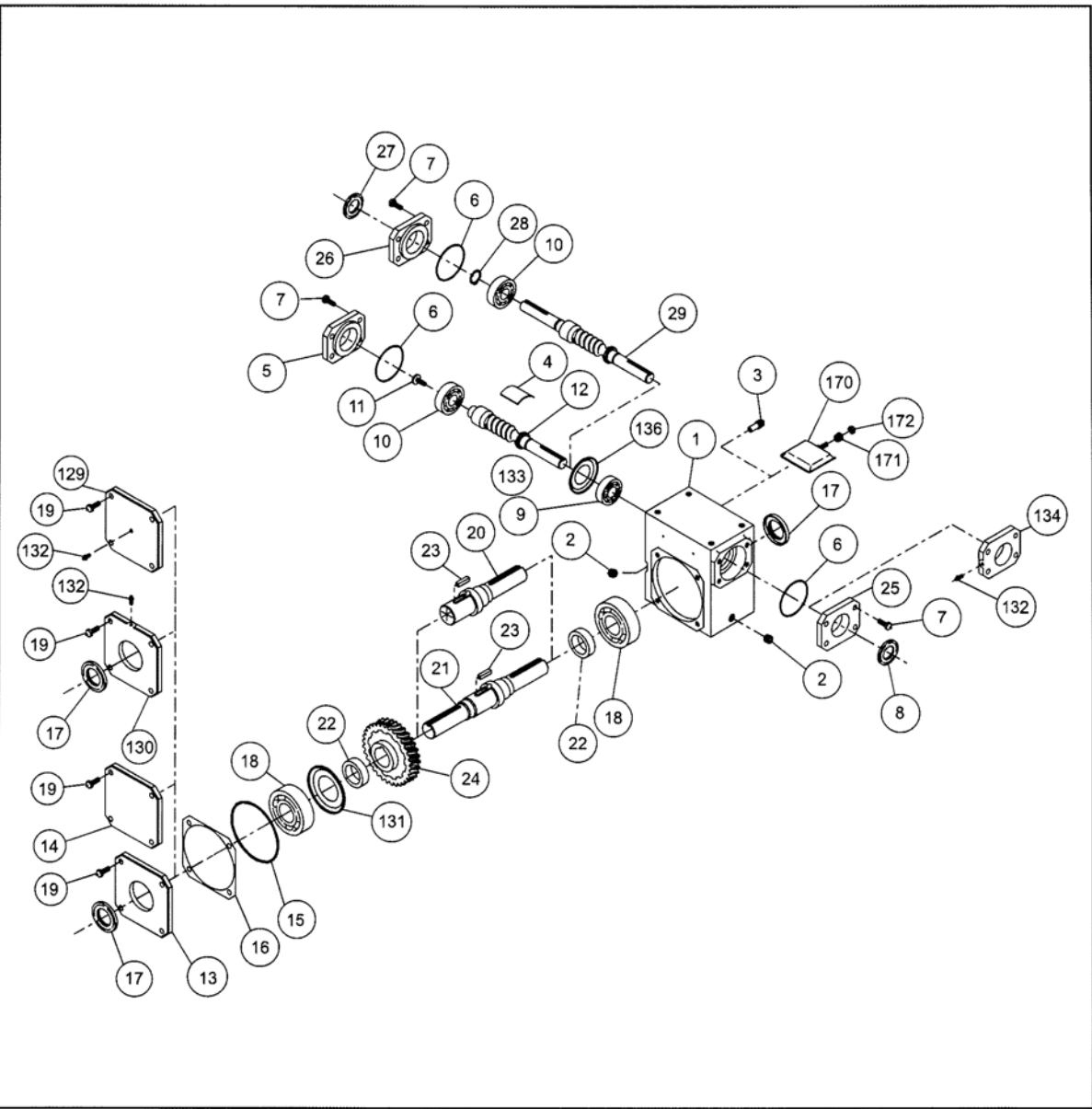
- 110. "C" Face Motor Flange
- 111. Hex Head Cap Screw
- 112. Coupling Key - Reducer Shaft
- 113. Setscrew - Reducer Shaft
- 114. Coupling Gear - Reducer Shaft
- 115. Coupling Sleeve
- 116. Setscrew - Motor Shaft
- 117. Coupling Gear - Motor Shaft
- 118. Coupling Key - Motor Shaft

Vertical Shaft Required Parts
(Supplied only when mounting position involves a vertical shaft.)

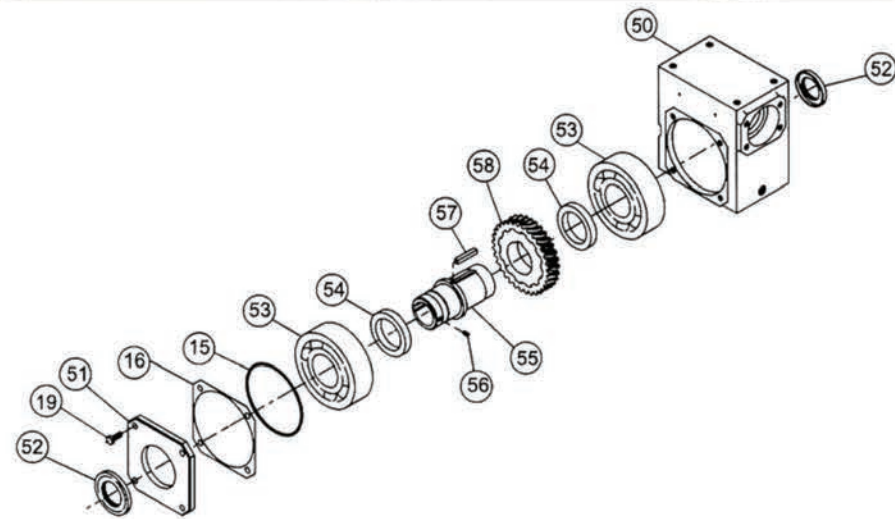
- *129. Output Cover
- *130. Output Cover
- *131. Output Bearing Grease Retainer
- 132. Grease Fitting
- 133. Sealed Ball Bearing (only used on size 1-3/4" through 2-5/8" center distance units)
- **134. Input Cover
- **136. Input Bearing Grease Retainer
- * Only used on size 4-1/4" center distance and larger units.
- ** Only used on size 3" center distance and larger units.
- *** Supplied only as output assembly on size 1-1/3" through 2-3/8" center distance units.

Parts List

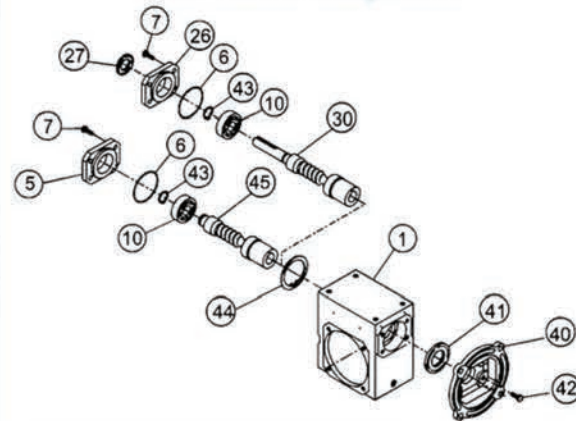
Basic Single Reduction Unit



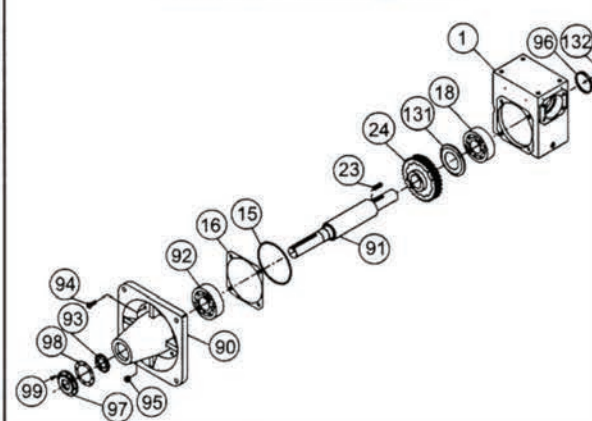
Hollow Output Shaft Unit



Quill Motor Flange Unit

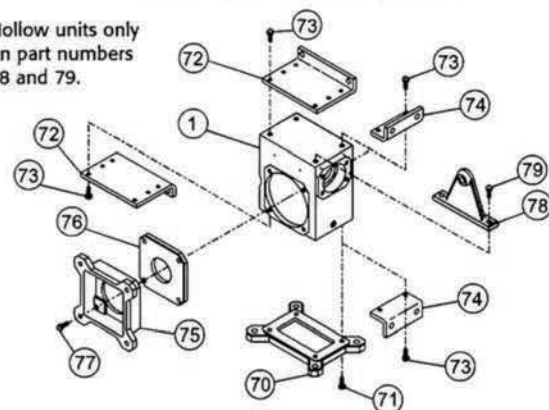


Extended Bearing Unit

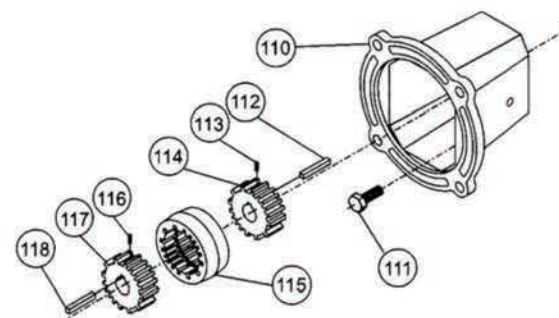


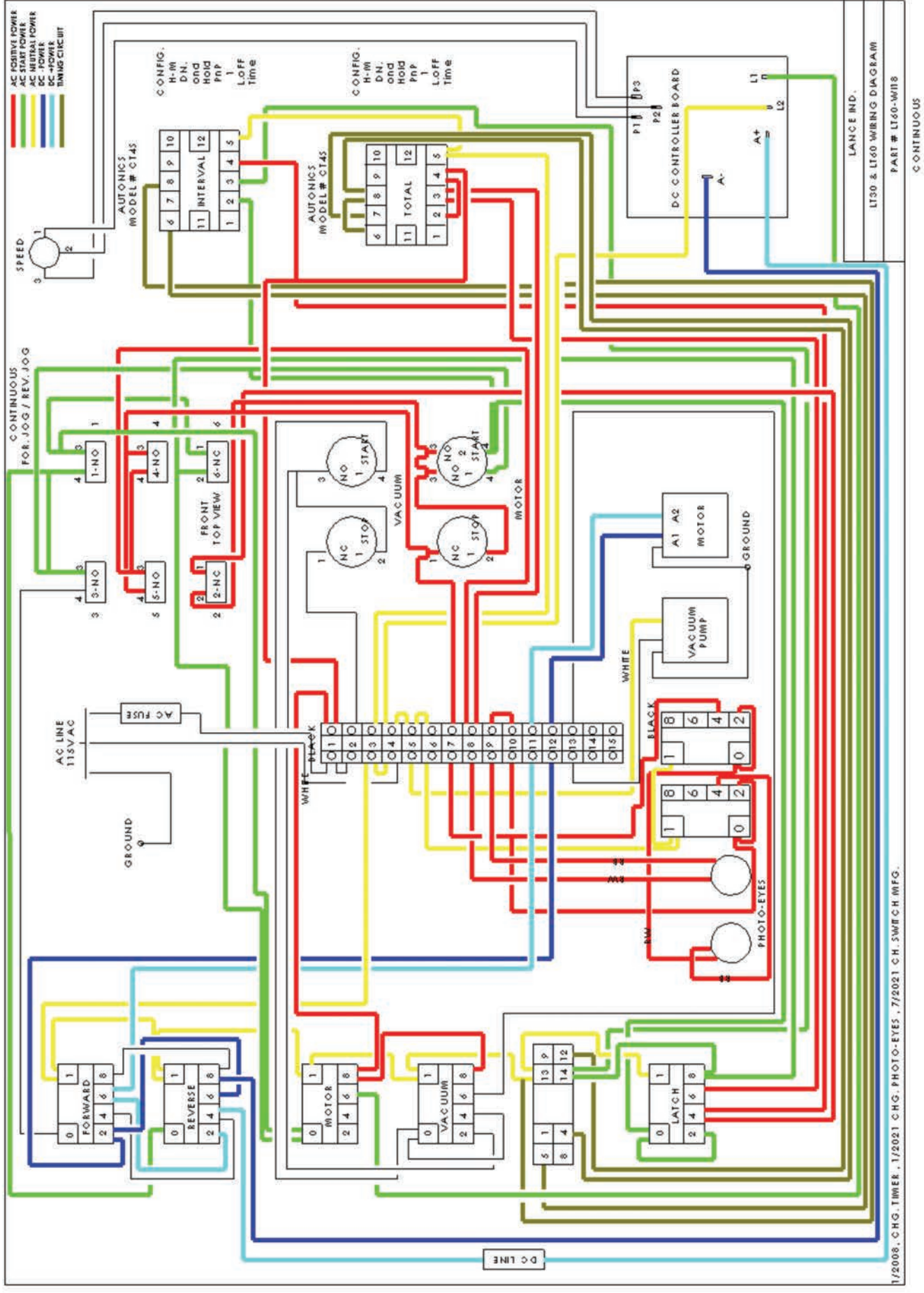
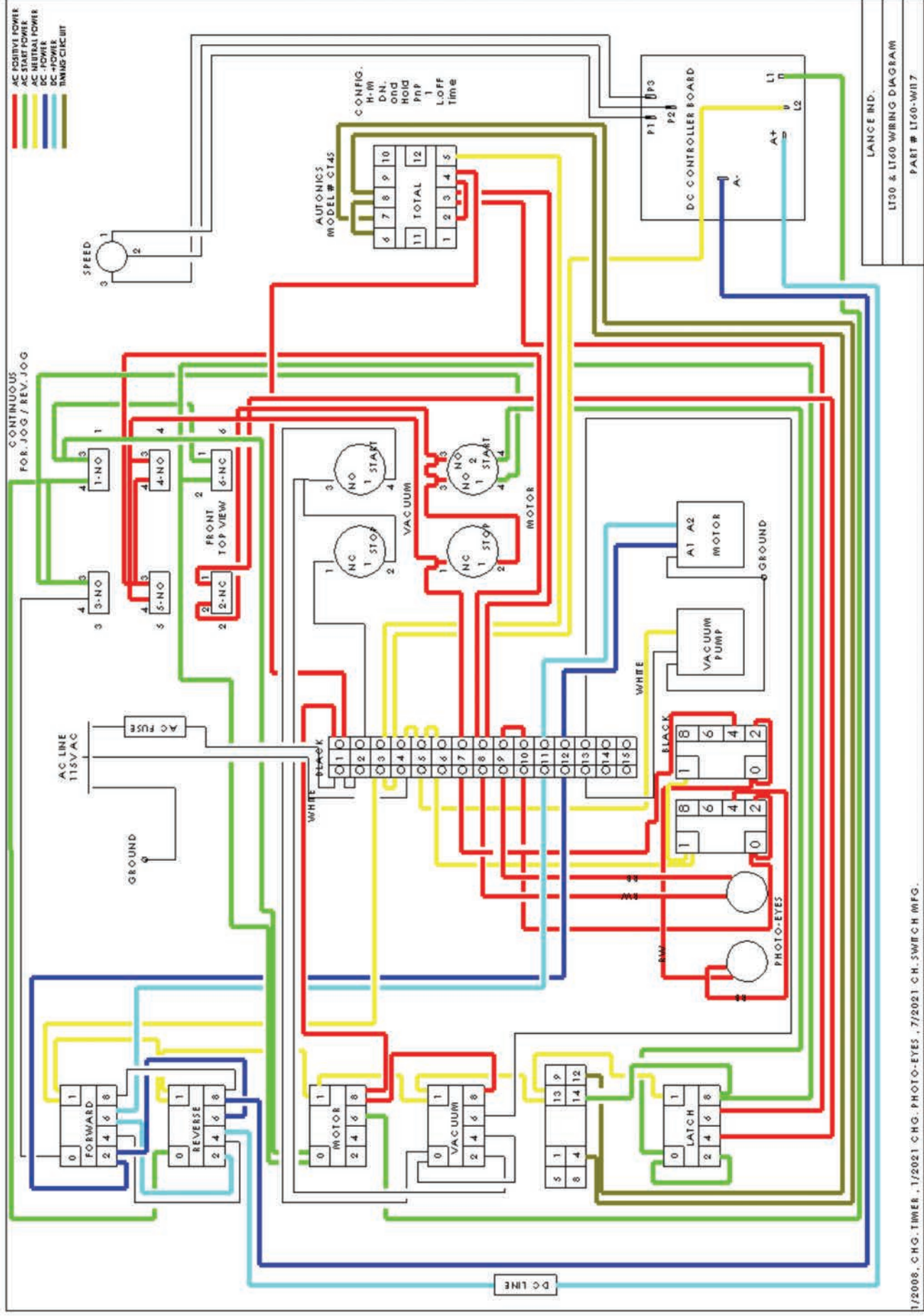
Mounting Bracket Options

Hollow units only
on part numbers
78 and 79.



Long Motor Flange & Coupling Kit





[illegible]



***Built to Last.
Designed to Perform.***