



PNEUMATIC ROLLING DRIVE MODEL 850 OPERATING MANUAL



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PNEUMATIC ROLLING DRIVE MODEL 850

Operation and Maintenance Guide





General Information:

Always read and understand the safety recommendations before operating this tool.

Technical Details:

| Description | J50-400 | J50-600 | J50-1250 |
|----------------------|-----------------|-----------------|-----------------|
| Free Speed RPM | 400 | 600 | 1250 |
| Minimum Torque (N.M) | 5 | 2.49 | 1.58 |
| | (44.15.in.lbs.) | (22.in.lbs.) | (14.in.lbs.) |
| Maximum Torque (N.M) | 36 | 21.8 | 12.2 |
| | (318.in.lbs.) | (193.in.lbs.) | (108.in.lbs.) |
| Air Consumption | 60 CFM | 60 CFM | 60 CFM |
| Tube Capacity | 1.1/4" | 1" | 3/4" |
| Dimension MM | 320 X 210 X 110 | 320 X 210 X 110 | 320 X 210 X 110 |
| Weight (KG) | 5.1 | 5.1 | 5.1 |

Safety Precautions:

Please read and understand the safety precautions and operating instructions before use.

Always wear protective equipment!

EYE AND FACE PROTECTION

CAUTION

Impact resistance protection is recommended when operating or working near this tool.



HEARING PROTECTION

CAUTION

Personal resistance protection must be worn while operating or working near this tool.

Impact resistant eye protection must be worn while operating or working near this tool. Hearing protection is recommended when working or operating near this tool.

Moving components can entangle and enwrap, thereby potentially causing serious injury. Never wear loose fitting clothes, gloves, ties or jewelry when working with tools.

Reaction Arm / Handles:

A Reaction Bar is supplied with high torque pneumatic tools for proper gripping.

These bars can be braced at suitable points to absorb or relieve the operator of torque reactions. These reaction arms are designed to work up to specified torque as per that tool. Another option is to use Tool Balance Arm which is available optionally. This arm balances the weight of the tool and absorbs the torque reaction of the tool.

Improper gripping of continuous, repetitive, vibrative work may cause cumulative trauma disorder to hands and arms. It may develop gradually over periods of months or years.

While operating the tool, care should be taken that the wrist is maintained in a normal position. Flexed, hyper-extended or turned to extreme side positioning may be avoided by proper selection of the tools or changing the work area. Stressful postures should be avoided.



Recommendation for Safe Working

- 1) Always maintain a clean and dry work area
- 2) Hold the tool with straight hands and normal wrist position
- 3) Hold the tool with minimum handgrip, consistent force with proper control (use of our Balancing Arm is recommended in such cases)

Before starting of operation:

- 1) Before starting of tool physically check the tool, coupling and air hoses for any crack or damage. Replace or rectify the same before starting the work.
- 2) Check the throttle for smooth ON and OFF operation by pressing and releasing the throttle before connecting the air supply.
- 3) Clean all the dust and moisture from air hoses.
- 4) Also take care that trigger is not accidentally pressed.
- 5) Operator of this tool should ensure proper and firm balancing of the tool with proper posture. He should be quite alert for the torque reaction in both the directions.
- 6) While working operator should be careful of his hands getting wedged or pinched between the job and the tool.
- 7) Be sure to shut off the air line and drain the air before removing the tool from service or changing the socket



Operating Instructions:

Product is designed to operate on minimum 95 psig (6.5 bar) and maximum 125 psig (8.6 bar) air pressure.

NOTE:

Please note that if air pressure over 100 psi (6.8 bars) is used, it may cause faster tool operation and may also cause premature wear and tear of the tool's internal parts. It may also result in breakage of tube expander, mandrel or rolls.

Tools with a clutch mechanism may stall rather than shut-off when adjusted over the maximum power output or if there is a drop in air pressure. Operator must then resist the stall torque until the throttle is released.

Air pressure higher than specified above is absolutely unnecessary if the right tool selection and application is followed. Higher pressure may lead to increased load and stresses on the internal part of tool, mandrels, rolls and cages. This may result in premature wear and or breakage.

It is always recommended to install a FRL unit (Filter-Regulator-Lubricator) in the air supply line before the tool.

The pneumatic drive works as follows:

To start the drive, push the handle forward. Compressed air is released into the working pocket of the motor and turns the rotor. This rotation is transferred through the torque clutch and the planetary gear to the tube expander affixed on the spindle. When the set torque is reached, the clutch stops the motor. To rotate the drive in a reverse direction, pull the handle backwards.

Uniform Expansion:

Uniform expansion can be achieved because the torque control unit is an independent section and has no effect of the fluctuation in air pressure. In case the air pressure is low, tool will operate at lower speed and time for expansion will increase.

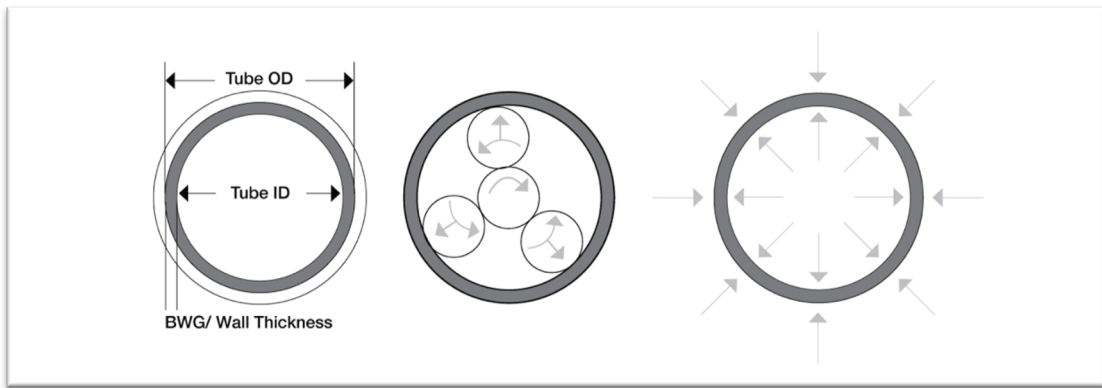
Tube Rolling Procedure:

Before starting the actual process of tube rolling in heat exchanger, condenser or boiler, one needs to do a trial job with identical condition(s) as that of the actual job. Follow the steps below:

- A. Pick 3 to 5 tubes in the unit to be rolled and measure the dimension of the tube as shown on page 7. It is important that the measurements used to calculate the trial set-up are actual. Never use average dimensions.
- B. After the worksheet is finished, start setting up the torque control motor by test rolling the first of the tubes. The first test roll must be done with the rolling motor set for low torque to avoid over rolling.

- C. Measure the tube I.D. after rolling if more expansion is needed increase the torque setting on the control and roll the second tube. Check the finished I.D. This step may have to be repeated on tube 3 by this time, the torque setting should be corrected.
- D. Roll tubes 4 and 5 to double check the set-up. These tubes should measure as calculated within the allowable tolerance given by the designer.
- E. The rolling control is now set and ready to roll tubes in the unit. The use of the torque control system will ensure the uniform expansion of all tubes.

Calculating % of Expansion:



- Tube Sheet Hole (measure) ***h***
- Tube O.D. (measure)..... ***b***
- Clearance ***c = h-b***
- Tube I.D. (measure) ***d***
- Wall Thickness ***w = b-d***
- 5% Wall Reduction ***f = (0.05 x w)***
- Finished I.D. ***g = (c + d + f)***



Example:

3/4" (19.0mm) O.D. x 14-gauge tubes

| | |
|------------------------|----------------|
| Recommended Expansion: | .008" (.20mm) |
| Tube Sheet Hole: | .760" (19.3mm) |

Therefore, expand as follows:

| | |
|--|----------------|
| Tube I.D. before expanding. | .584" (14.8mm) |
| Recommended expanding. | .008" (.20mm) |
| Clearance between tube and tube sheet hole | .010" (.25mm) |
| Finish 1.0 | .602" (15.2mm) |

IMPORTANT NOTE:

TO ENSURE THE BEST TOOL LIFE AND THE HIGHEST QUALITY TUBE TO TUBE SHEET CONTACT, PERIODIC CLEANING OF THE EXPANDER IS NECESSAERY. PROPER LUBRICATION OF THE ROLL MANDREL AND THRUST BEARING IS A MUST!

LUBRICATION OF THE TUBE EXPANDERS:

We recommend using a quality lubricator, LUBE ONE, for tube expansion. This is a water-soluble lubricant. It is available in tubes and containers of various sizes. Please contact our Sales Office for more details.

LUBRICATION:

We recommend using a lubricator within 15 to 20 ft of supply line. Setting of lubricator should be at 8-10 drops of oil per minute. Gear section of tool should be greased once in four weeks. Do not over lubricate as the grease may enter the motor section which may result in sluggish operation.

SERVICE INSTRUCTION:

For better performance and long life of tool it is always recommended to service and adjust the tool periodically. The mechanism of the tool is highly reliable but in the case that accurate torque cannot be maintained, check the Shut-Off Trip Mechanism as shown on page 10.



WARNING: MAKE SURE THAT AIR SUPPLY IS DISCONNECTED FROM TOOL PRIOR TO ANY DISASSEMBLY.

Refer to the exploded view on page 12. Locate the two screws (64) on your tool. Remove the screw holding valve cover (65) in its position. After removing the screws, slowly remove the cover, this will expose the trip mechanism.

To remove the torque section follows the procedure given below.

Carefully remove four Allen Cap Screws (8). Remove the Lock Ring (6) with appropriate pliers. Remove the Driving Cam (34) and Operating Cam (30) carefully. Prevent the loss of balls contained in the units during this process. Clean Drive Spindle (24) with a soft cloth and inspect for any damage in ball spline grooves. Replace the spline if it is worn or dimpled. In case the spline and front bearing (20) are not damaged, then further disassembly of this unit is unnecessary. Also check Follower (15) for excessive wear.

During reassembly, Regulating Spring (23) should be carefully positioned on the Spring Guide (22). Take care to align grooves of the Spindle and grooves in the Operating Cam while placing the Operating Cam (45) on the Spindle. Check the condition of guide springs (25). Place a spring in each groove. Install five 5/3" (3.96mm) balls in each groove.

Note: There are extra precision balls so in any case no substitution should be made.

Apply little grease on each angled face of the Operating Cam. Place Inner Ball Retainer (32) and Ball Retainer (31). Two larger balls should be placed on each angled face of the cam. Install Driving Cam (34) and take care that not to dislodge the balls from the helical faces. Place large Lock Ring (35). Now the unit is ready for handling.

To disassemble the motor section follows the steps below:

Hold the end of the Drive Spider of the motor and pull gear section from the machine. Slide motor section from the unit. Disassemble the motor section and check for any wear or damage in cylinder liner. Examine the motor blades for damage. If necessary, replace the old blades.

Cylinder should be installed on the end plate, check whether the blades are properly placed. Install the Front Bearing Support (53). Carefully slide the motor section into place. Drop the dowel pin at the rear end of the cylinder into the locating hole at the bottom of the case. The gear section of the 600RPM tool is made up of a standard two-stage planetary system and disassembly and reassembly of the unit is very simple. For checking the gears, slide the rears from the gear case. Clean, inspect, re-grease and reinstall the gear case. Slide gear case into the housing and install Dowel Pin (39).

Reinstall the Torque Unit on the motor case. While installing the Cam Section on motor housing, be sure to depress the trip so that the follower will not jam on the top side of the Operating Cam while aligning front case with the motor.

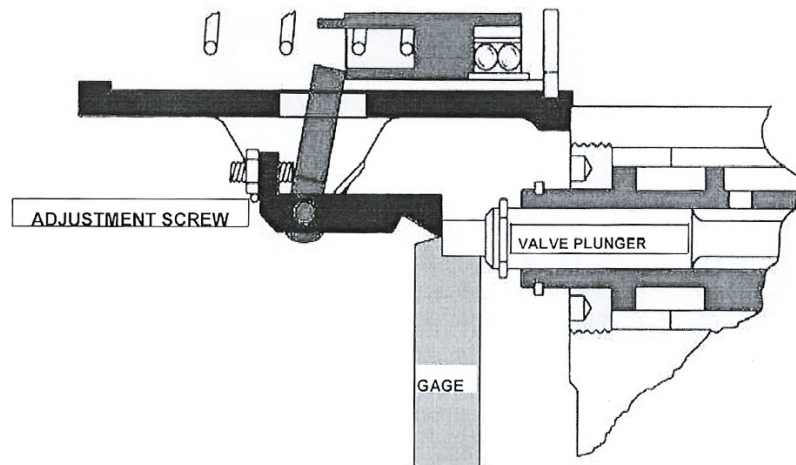
Trip should be released only after the alignment of torque case in the motor housing and the screw are fixed.

Check the following test before installing the Value Cover - push forward the Operating Lever. (83)

Manually push the trip so that the value will slide forward. This will be a stimulation of the tool at shut-off *position*.

Pull back the Lever (83) so that outer valve which surrounds the Valve (76) should slide into the rearward position before Valve (76) moves within. In case the outer valve is tight to the degree of sticking in the Bushing (69) the motor would run forward rather than in reverse, and this may result in over rolling of the tube joints. Hence it is very important that the outer valve have free movement in the bushing. Reinstall the valve cover only after the above checks have been made. Ensure that all the parts are sufficiently lubricated while reassembly.

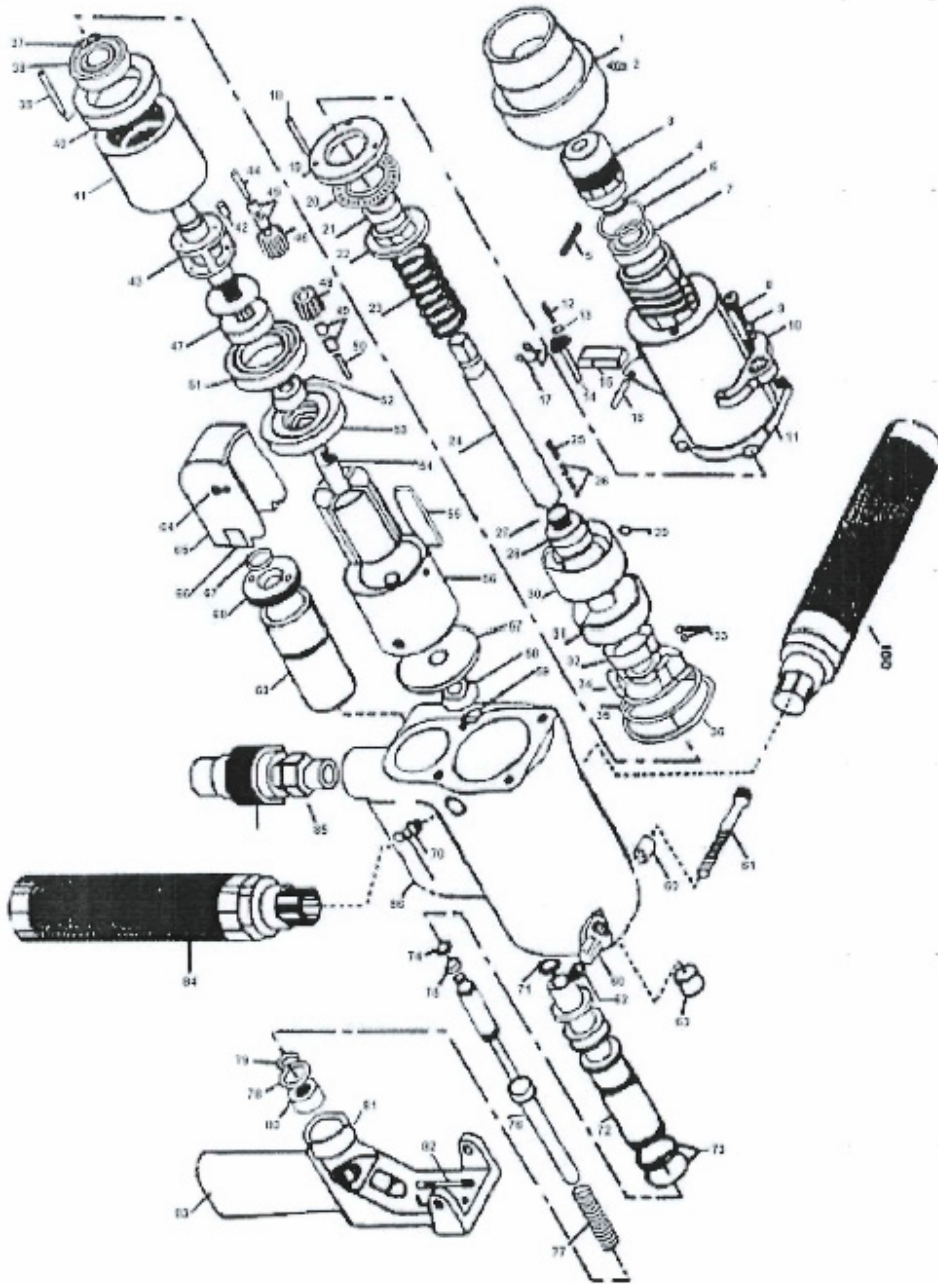
Trip Adjustment:



The trip mechanism has an overall confined travel of the trip and should be set to a maximum engagement of 0.06 with the abutting valve plunger (*refer to diagram*). This setting helps the valve shut-off at the midpoint of the total trip movement of the tool.

We recommend that above adjustment be made with the tool running in the clockwise direction and with no load on the tool. To ensure the correct setting of trip mechanism, our Adjustment Gauge is always recommended. (*refer to diagram*)

EXPLODED VIEW:





Part List:

| Item No. | Description | Qty. | 850-400 Part No. | Qty. | 850-600 Part No. | Qty. | 850-1250 Part No. |
|----------|-----------------------|------|------------------|------|------------------|------|-------------------|
| 1. | Torque Adjustment Nut | 1 | P 850 - 1 | 1 | P 850-1 | 1 | P 850-1 |
| 2 | Set Screw | 1 | P-M3 X6 | 1 | P-M3 X6 | 1 | P-M3 X6 |
| 3 | Quick Change Chuck | 1 | P 850-375 | 1 | P 850-375 | 1 | P 850-375 |
| 4 | Circlip | 1 | P 850 - 4 | 1 | P 850 - 4 | 1 | P 850-4 |
| 5 | Split Pin | 1 | P 1/8" X 7/8" | 1 | P 1/8" X 7/8" | 1 | P 1/8"X7/8" |
| 6 | Circlip | 1 | P 850-6 | 1 | P 850-6 | 1 | P 850-6 |
| 7 | Bearing | 1 | P-R8-ZZ | 1 | P-R8-ZZ | 1 | P-R8-ZZ |
| 8 | Allen Cap Screw | 4 | P-M5 X 20 | 4 | P-M5 X 20 | 4 | P-M5-X 20 |
| 9 | Spring Washer | 4 | P 850- 9 | 4 | P 850- 9 | 4 | P 850-9 |
| 10 | Bracket of Balancing | 1 | P 8 50 - 10 | 1 | P 850- 10 | 1 | P 850-10 |
| 11 | Cam Case | 1 | P 850 - 11 | 1 | P 850 - 11 | 1 | P 850-11 |
| 12 | Grub Screw | 1 | P-M3X12 | 1 | P-M3 X 12 | 1 | P-M3 X 12 |
| 13 | Self-Lock Nut | 1 | P-M3 | 1 | P-M3 | 1 | P-M3 |
| 14 | Trip | 1 | P 850-14 | 1 | P 850 - 14 | 1 | P 850-j 4 |
| 15 | Follower | 1 | P 850-15 | 1 | P 850 - 15 | 1 | P 850-15 |
| 16 | Pin | 1 | P - 1/8" X 1' | 1 | P - 1/ 8' X 1' | 1 | P - 1/8" X 1' |
| 17 | Trip Spring | 1 | P 850-17 | 1 | P 850 - 17 | 1 | P 850-17 |
| 18 | Pressure Pin | 3 | P 850-18 | 3 | P 850 - 18 | 3 | P 850-18 |
| 19 | Pressure Pad | 1 | P 850-19 | 1 | P 850 - 19 | 1 | P 850-19 |
| 20 | Front Bearing | 1 | P 850-20 | 1 | P 850- 20 | 1 | P 850-20 |
| 21 | Bearing | 1 | P-B-105 | 1 | P-B-105 | 1 | P-B-105 |
| 22 | Spring Guide | 1 | P 850-22 | 1 | P850-22 | 1 | P 850-22 |
| 23 | Pressure Spring | 1 | P 850 400 23 | 1 | P 850 600 23 | 1 | P 850 1250 23 |
| 24 | Rolling Spindle | 1 | P 850-24 | 1 | P 850-24 | 1 | P 850-24 |
| 25 | Guide Spring | 3 | P 850-25 | 3 | P 850- 25 | 3 | P 850-25 |
| 26 | Steel Ball | 15 | P 850-26-4 | 15 | P 850 - 26-4 | 15 | P 850-30 |
| 27 | Circlip | 1 | P 850-27 | 1 | P 850- 27 | 1 | P 850-27 |
| 28 | Support Ring | 1 | P 850-28 | 1 | P 850- 28 | 1 | P 850-28 |
| 29 | Grub Screw | 1 | P-M4 X4 | 1 | P-M4 X4 | 1 | P-M4 X 4 |
| 30 | Operating Cam | 1 | P 850-30 | 1 | P 850- 30 | 1 | P 850-30 |
| 31 | Retainer Ring | 1 | P 850-31 | 1 | P850-31 | 1 | P 850-31 |
| 32 | Ball Retainer ring | 1 | P 850-32 | 1 | P 850 - 32 | 1 | P 850-32 |
| 33 | Steel Ball | 6 | P 850-33 | 6 | P 850 - 33 | 6 | P 850-33 |
| 34 | Cam | 1 | P 850-34 | 1 | P 850 - 34 | 1 | P 850-34 |
| 35 | Circlip | 1 | P 850-35 | 1 | P 850 - 35 | 1 | P 850-35 |
| 36 | "O" Ring | 1 | P 850-36 | 1 | P 850 - 36 | 1 | P 850-38 |
| 37 | Circlip | 1 | P 850-37 | 1 | P 850- 37 | 1 | P 850-37 |
| 38 | Bearing | 1 | P-R-10-ZZ | 1 | P-R-10-ZZ | 1 | P-R-12-ZZ |
| 39 | Pin | 1 | P - 1/8" X 3/4" | 1 | P- 1/8" X 3/4" | 1 | P - 1/8" X 3/4" |
| 40 | Bearing Supporter | 1 | P 850-40 | 1 | P 850-40 | 1 | P 850-40 |
| 41 | Gear Housing | 1 | P 850 400-41 | 1a | P 850 600-41 | 1 | P 850 1250 -41 |
| 42 | Gear Key | 1 | P 850-42 | 1 | P 850-42 | 1 | P 850-42 |
| 43 | Spider | 1 | P 850-43 | 1 | P 850-43 | 1 | P 850-43 |



Part List:

| Item No. | Description | Qty. | 850-400 Part No. | Qty. | 850-600 Part No. | Qty. | 850-1250 Part No. |
|----------|---------------------|------|------------------|------|------------------|------|-------------------|
| 44 | Gear pin | 3 | P - 1/8" X 3/4" | 3 | P-1/8" X 3/4" | | - |
| 45 | Bearing | 6 | P-B-24 | 6 | P-B-24 | | - |
| 46 | Planet Gear | 3 | P 850 400 46 | 3 | P 850 60046 | | - |
| 47 | Gear Spider | 1 | P 850 - 47/A | 1 | P 850 - 47 | | - |
| 48 | Planet Gear | 2 | P 850 400 48 | 2 | P 850 60048 | 2 | P 850 1250 48 |
| 49 | Bearing | 4 | P-B-24 | 4 | P-B-24 | 4 | P - B-24 |
| 50 | Gear Pin | 2 | P - 1/8" X 3/4" | 2 | P - 1/8" X 3/4" | 2 | P-1/8"X 1.1/4" |
| 51 | Bearing | 1 | P -6 906-ZZ | 1 | P - 6906 ' .zz | 1 | P-R-14-ZZ |
| 52 | Bearing | 1 | P-6901-ZZ | 1 | P-6901-ZZ | 1 | P-R-6-ZZ |
| 53 | Upper Centre Plate | 1 | P 850 - 53 | 1 | P 850 - 53 | 1 | P 850 - 53/A |
| 54 | Rotor | 1 | P 850 - 54 | 1 | P 850 - 54 | 1 | P 850- 54/A |
| 55 | Rotor Blade | 4 | P 850 - 55 | 4 | P 850 - 55 | 4 | P 850 - 55 |
| 56 | Cylinder | 1 | P 850 - 56 | 1 | P 850 - 56 | 1 | P 850 - 56 |
| 57 | Lower Centre Plate | 1 | P 850 - 57 | 1 | P 850 - 57 | 1 | P 850 - 57 |
| 58 | Bearing | 1 | P - R-6-ZZ | 1 | P-R-6-ZZ | 1 | P - R-6-ZZ |
| 59 | Circlip | 1 | P 850 - 59 | 1 | P 850 - 59 | 1 | P 850 - 59 |
| 60 | Bushing | 2 | P 850 - 60 | 2 | P 850 - 60 | 2 | P 850 - 60 |
| 61 | Lever Pin | 1 | P-M6 X 55 | 1 | P-M6 X 55 | 1 | P-M6 X55 |
| 62 | Self-Lock Nut | 1 | P-M6 | 1 | P-M6 | 1 | P-M6 |
| 63 | Plug | 1 | P 850- 63 | 1 | P 850 - 63 | 1 | P 850-63 |
| 64 | Allen Cao Screw | 2 | P-M4 X 12 | 2 | P-M4 X 12 | 2 | P-M4 X 12 |
| 65 | Cover of trio | 1 | P 850 - 65 | 1 | P 850 - 65 | 1 | P 850-65 |
| 66 | Trio Gauge | 1 | P 850 - 66 | 1 | P 850 - 66 | 1 | P 850-66 |
| 67 | Circlip | 1 | P 850-67 | 1 | P 850 - 67 | 1 | P 850-67 |
| 68 | Lock Nut | 1 | P 850-68 | 1 | P 850 - 68 | 1 | P 850 - 68 |
| 69 | Air Direction Bush | 1 | P 850-69 | 1 | P 850 - 69 | 1 | P 850-69 |
| 70 | Gears Nipple | 1 | P-M-6 | 1 | P-M-6 | 1 | P-M-6 |
| 71 | Circlip | 1 | P 850-71 | 1 | P 850 - 71 | 1 | P 850 - 71 |
| 72 | Direction Valve | 1 | P 850-72 | 1 | P 850 - 72 | 1 | P 850- 72 |
| 73 | "O" Ring | 2 | P 850-73 | 2 | P 850 - 73 | 2 | P 850 -73 |
| 74 | "O" Ring | 1 | P 850-74 | 1 | P 850 - 74 | 1 | P 850-74 |
| 75 | "O" Rina | 1 | P 850-75 | 1 | P 850 - 75 | 1 | P 850- 75 |
| 76 | Valve | 1 | P 850-76 | 1 | P 850 - 76 | 1 | P 850- 76 |
| 77 | Valve Spring | 1 | P 850-77 | 1 | P 850 - 77 | 1 | P 850- 77 |
| 78 | "O" Rina | 1 | P 850-78 | 1 | P 850 - 78 | 1 | P 850 - 78 |
| 79 | "O" Ring | 1 | P 850-79 | 1 | P 850 - 79 | 1 | P 850 - 79 |
| 80 | Valve Seal | 1 | P 850-80 | 1 | P 850 - 80 | 1 | P 850 - 80 |
| 81 | Direction Valve Cap | 1 | P 850-81 | 1 | P 850 - 81 | 1 | P 850 - 8 |
| 82 | Pin | 1 | P 850-82 | 1 | P 850 - 82 | 1 | P 850 - 82 |
| 83 | Lever | 1 | P 850-83 | 1 | P 850- 83 | 1 | P 850 - 83 |
| 84 | Silencer | 1 | P 850-84 | 1 | P 850 - 84 | 1 | P 850 - 84 |
| 85 | Air Push Fitting | 1 | P 850-85 | 1 | P 850- 85 | 1 | P 850 - 85 |
| 86 | Main Case | 1 | P 850-86 | 1 | P 850- 86 | 1 | P 850 - 86 |

