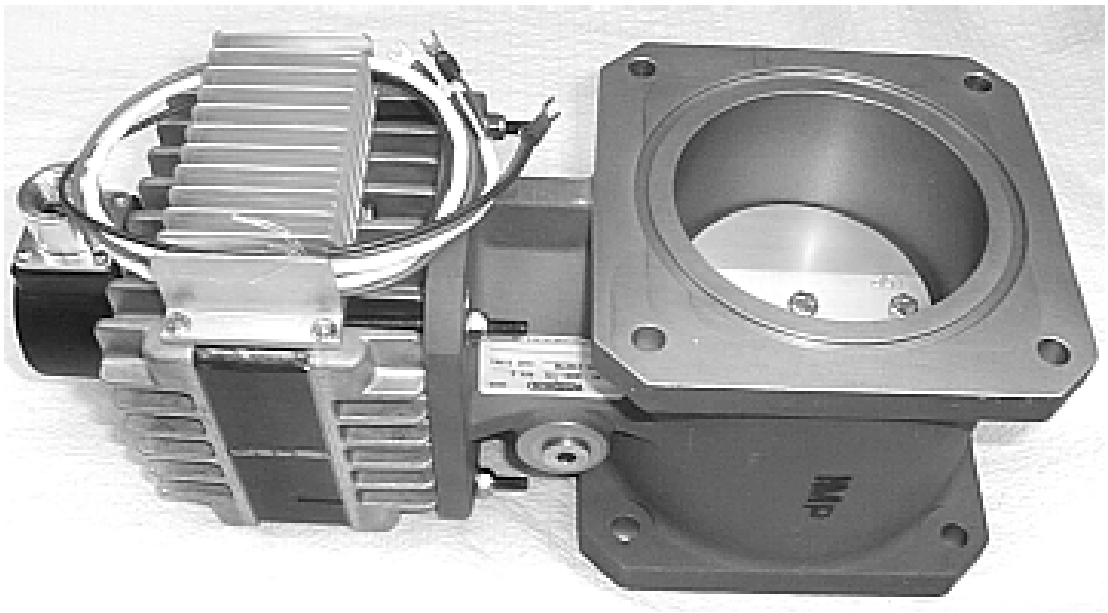
WOODWARD

Product Manual 26467
(Revision NEW)
Original Instructions



120 mm Throttle Valves

Disassembly and Reassembly Repair Procedure

Repair Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Contents

Illustrations and Tables

IMPORTANT **Disassembling the throttle valve will void the warranty.**

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Chapter 1.
120 mm Throttle Valve with Actuator Parts

Parts Description

1. Throttle Housing
2. Shaft/Housing Needle Bearing (6V-2830)
3. End Cap O-Ring (5P-5599)
4. End Cap
5. End Cap Screws (2)
6. Butterfly Plate Screws (3) (331-1698)
7. Butterfly Plate (331-2910)
8. Plug
9. Shaft (331-2905)
10. Flat Washers (4)
11. Nylok Nuts (4)
12. Screws (4)
13. Actuator
14. Shaft Coupler
15. Carrier Assembly (331-2904)
16. Carrier screws (2)
17. O-Ring
18. Washer (4)
19. O-Ring
20. Drive Screw (2) N/S
21. Nameplate N/S
22. O-Ring (2)

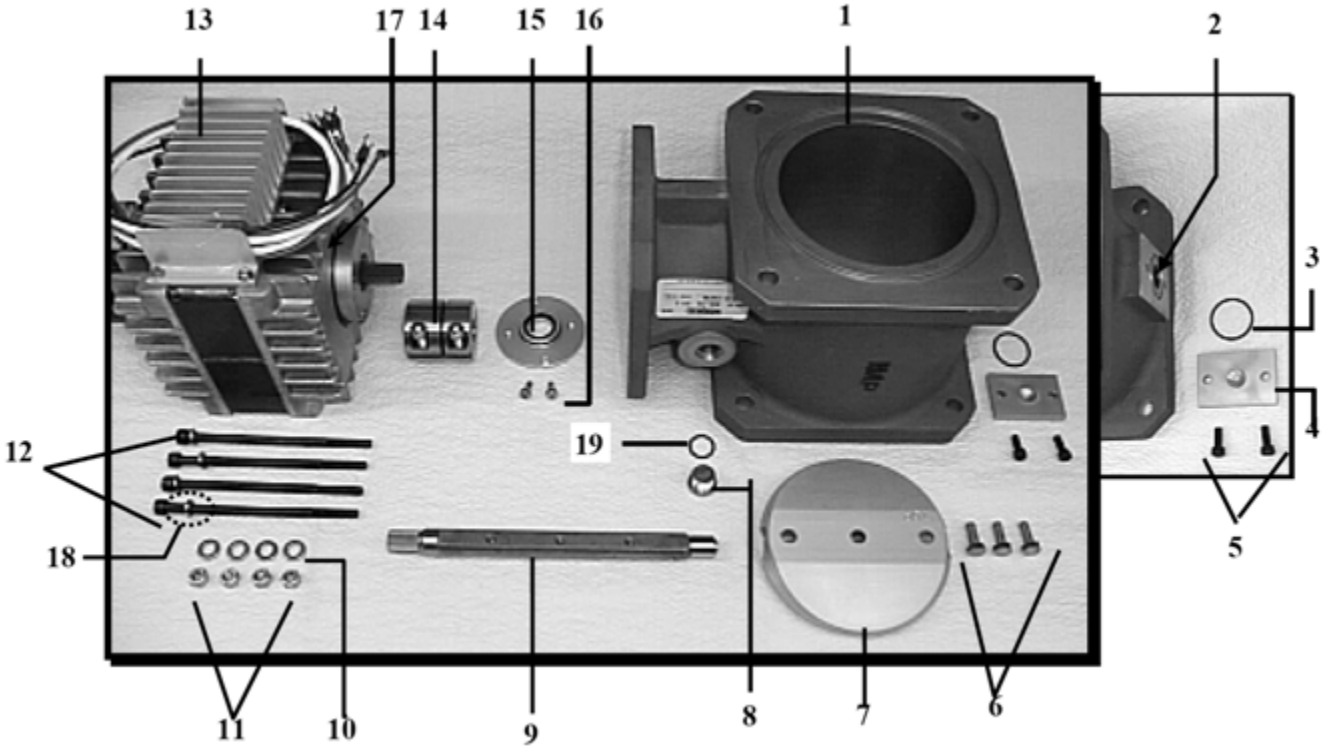


Figure 1-1. Parts Description

Chapter 2.
120 mm Throttle Valve with Actuator Disassembly

Disassembly of Throttle Valve

1. Remove coupler plug (8) with ¼-inch hex bit.
2. Rotate the throttle plate to position bolts for access. Loosen the coupler bolt with a 5 mm hex bit.
3. Remove four screws holding the actuator to the valve, use a 5 mm hex bit and 10 mm box end wrench.
4. Separate the actuator from the valve body.

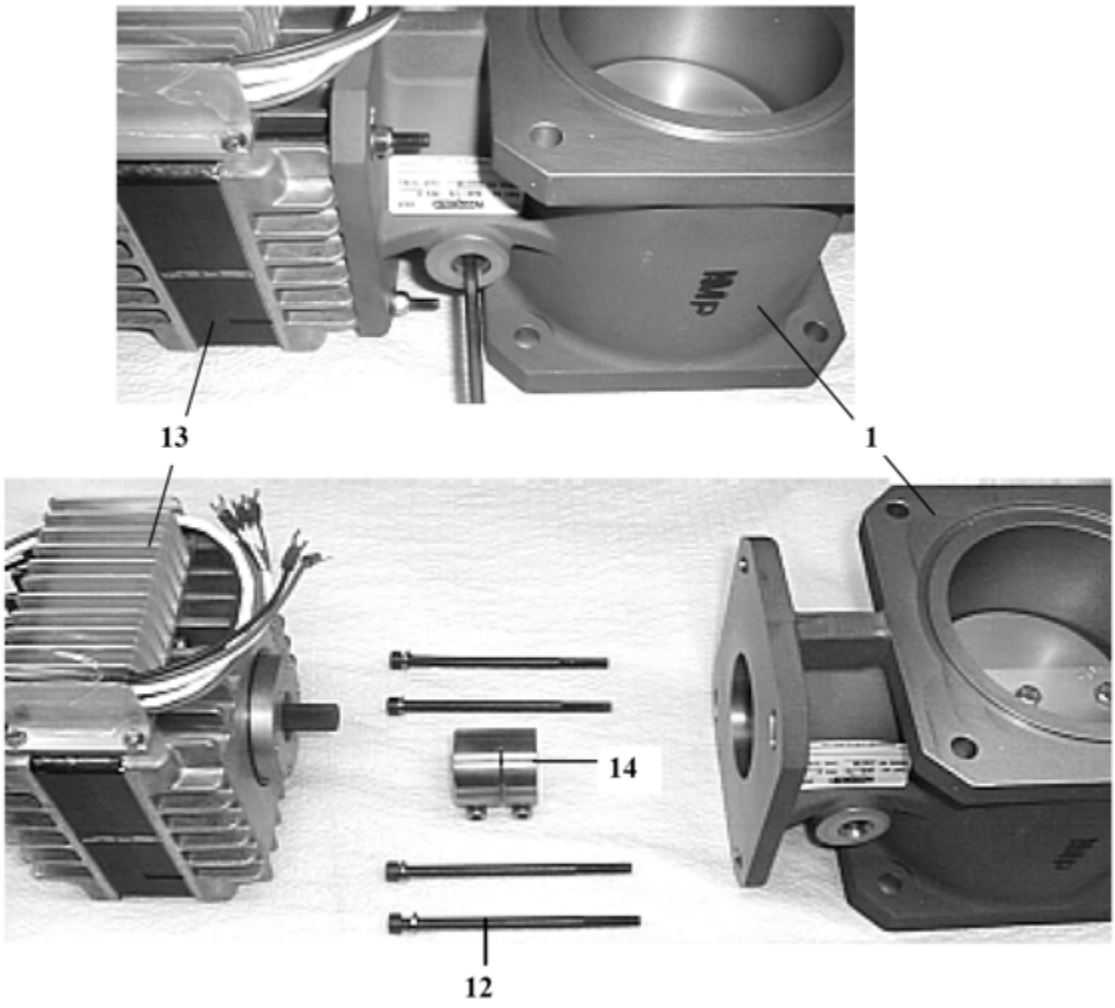


Figure 2-1. Disassembly of Throttle Valve

5. Remove the three screws (6) holding the throttle plate (7). Use a 10 mm socket.
6. Remove end cap (4) with 5/32 inch hex, and remove O-ring (3).
7. Remove carrier assembly (15) with 3 mm hex bit.
8. Gently tap, with soft tool, the shaft out from end cap side.
9. Press out needle bearing on end cap, (tap from inside valve).
10. Change out required parts and reassemble per Chapter 3.

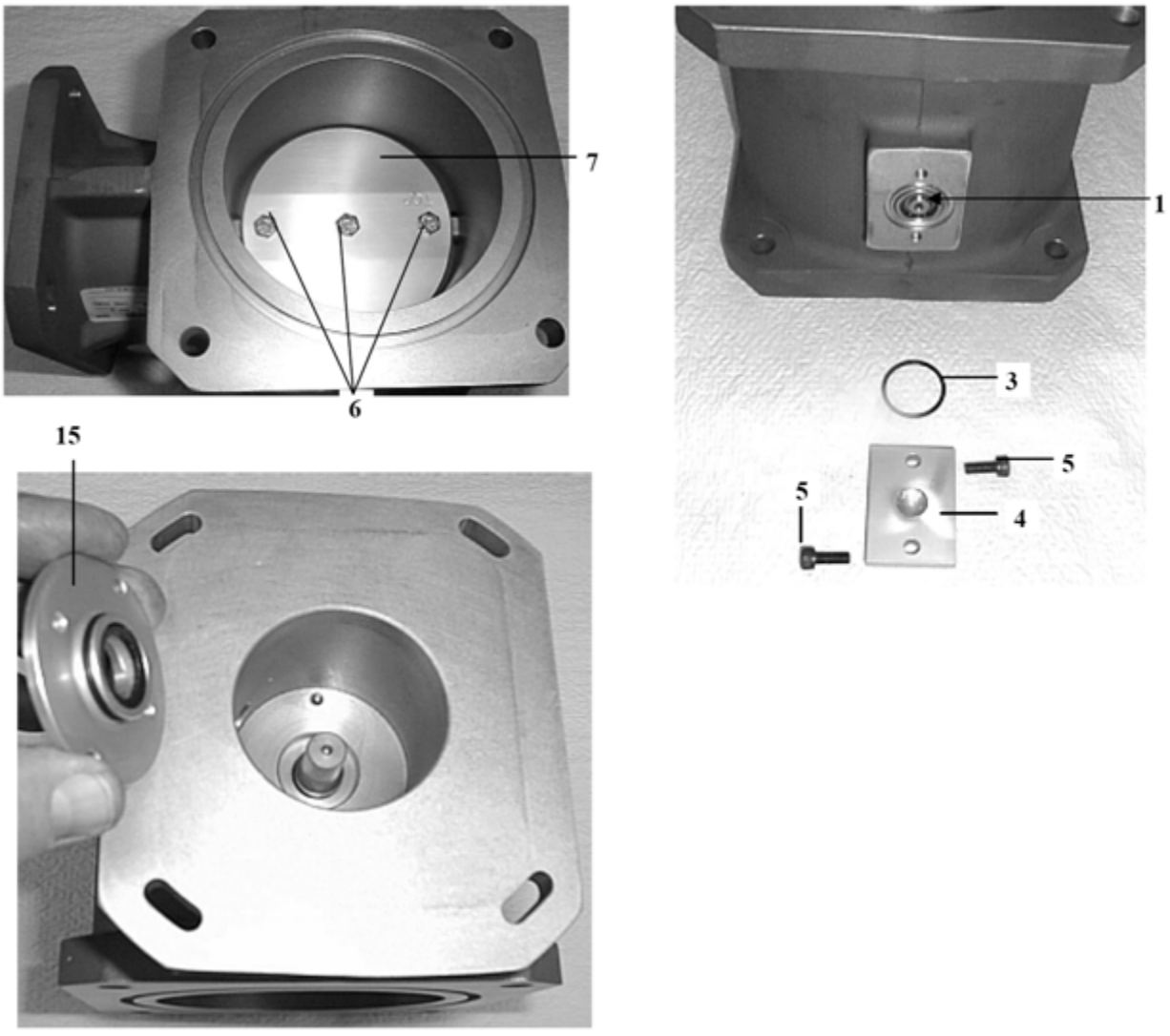


Figure 2-2. Disassembly of Throttle Valve

Chapter 3.
120 mm Throttle Valve with Actuator Reassembly

Parts Preparation and Shaft / Throttle Housing Bearing Installation

1. If visibly dirty, wash the throttle housing (1) (**before installing the needle bearing**), butterfly plate (7), end cap (4) and coupler (14). **Do not use ultrasonics**. Use an air gun to blow out the carrier assembly.

2. Using tool #1007-7403, press needle bearing (2), seal end first, into throttle housing (1).

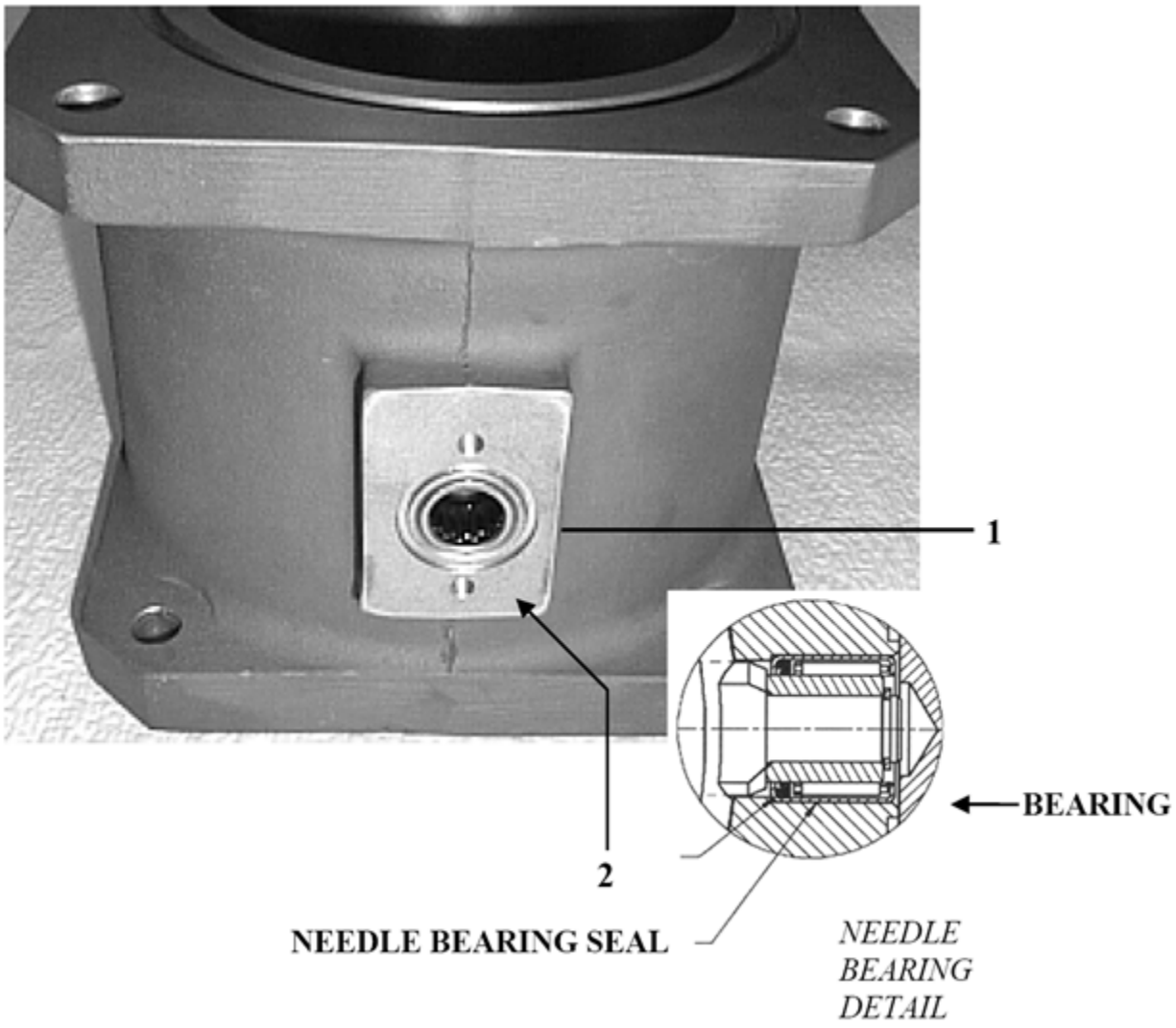


Figure 3-1. Installation of Shaft / Throttle Housing Bearing

Install the Shaft and Butterfly Plate

1. With throttle housing (1) setting as shown, hold butterfly plate (7) inside the throttle throat with the word “top” in the position shown.

2. Insert the bearing race end of shaft (9) into throttle housing (1) from left to right, through butterfly plate (7) and into the needle bearing previously installed in the throttle housing.

IMPORTANT **The plate must be able to rotate as shown in the lower photo of Figure 3-2.**

To ensure proper installation, note the position of the coupler screw access port (1a) in relation to the word “TOP” on the butterfly plate. Do not secure the butterfly plate at this time.

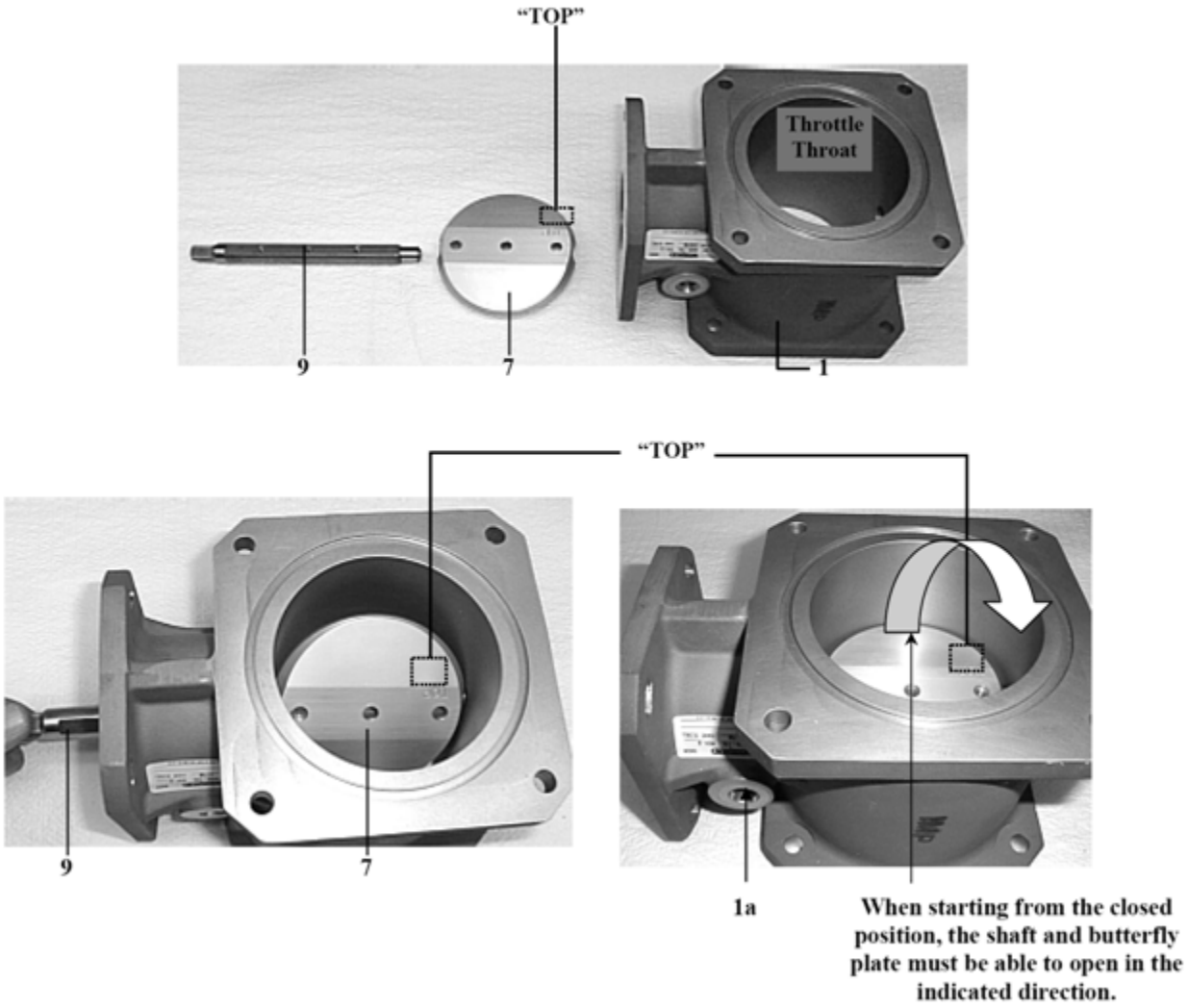


Figure 3-2. Install the Shaft and Butterfly Plate

Install the Carrier Assembly

1. Apply a light film of petroleum jelly to O-ring (15a) and Glyd seal (15b). Place carrier (15) over shaft (9) and gently push it down into place. Some resistance will come from Glyd seal (15b) slipping onto the shaft race and some from O-ring (15a) slipping into the housing counterbore.

2. Make sure carrier assembly (15) is completely seated, then apply one drop Loctite 243 to screws (16) and secure the carrier to throttle housing (1). Torque the screws to 7.0 ±0.4 lb-in (0.79 ±0.05 N·m).

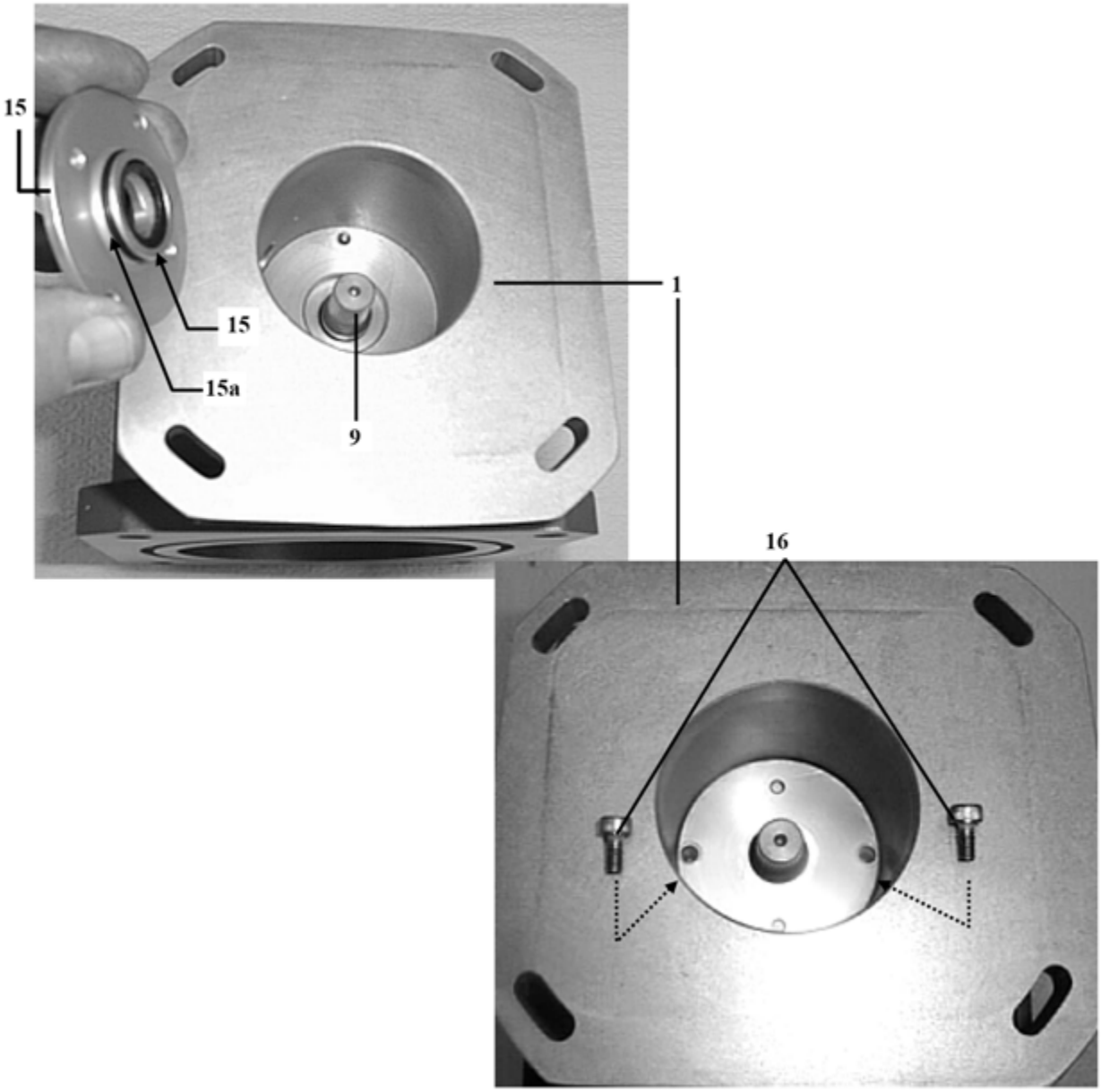


Figure 3-3. Install the Carrier Assembly

Secure the Butterfly Plate and Install the End Cap

1. Install three screws (6) through butterfly plate (7) and start them into the shaft.

2. To ensure butterfly plate (7) is properly located on the shaft (9) and in the throttle throat, use your fingers to firmly close the side with the word “TOP” down several times to center it in the bore. A slight bind will be felt in the closed position. Hold it there while you tighten the center screw (6). Continue holding it in place and torque the three screws (6) to 72 ±4 lb-in (8.1 ±0.5 N·m).

3. Apply petroleum jelly to O-ring (3) and install it in the groove in throttle housing (1).

4. Apply Loctite 242 to two screws (5). Secure end cap (4) to throttle housing (1). Torque the screws (5) to 13.0 ±0.7 lb-in (1.47 ±0.08 N·m).

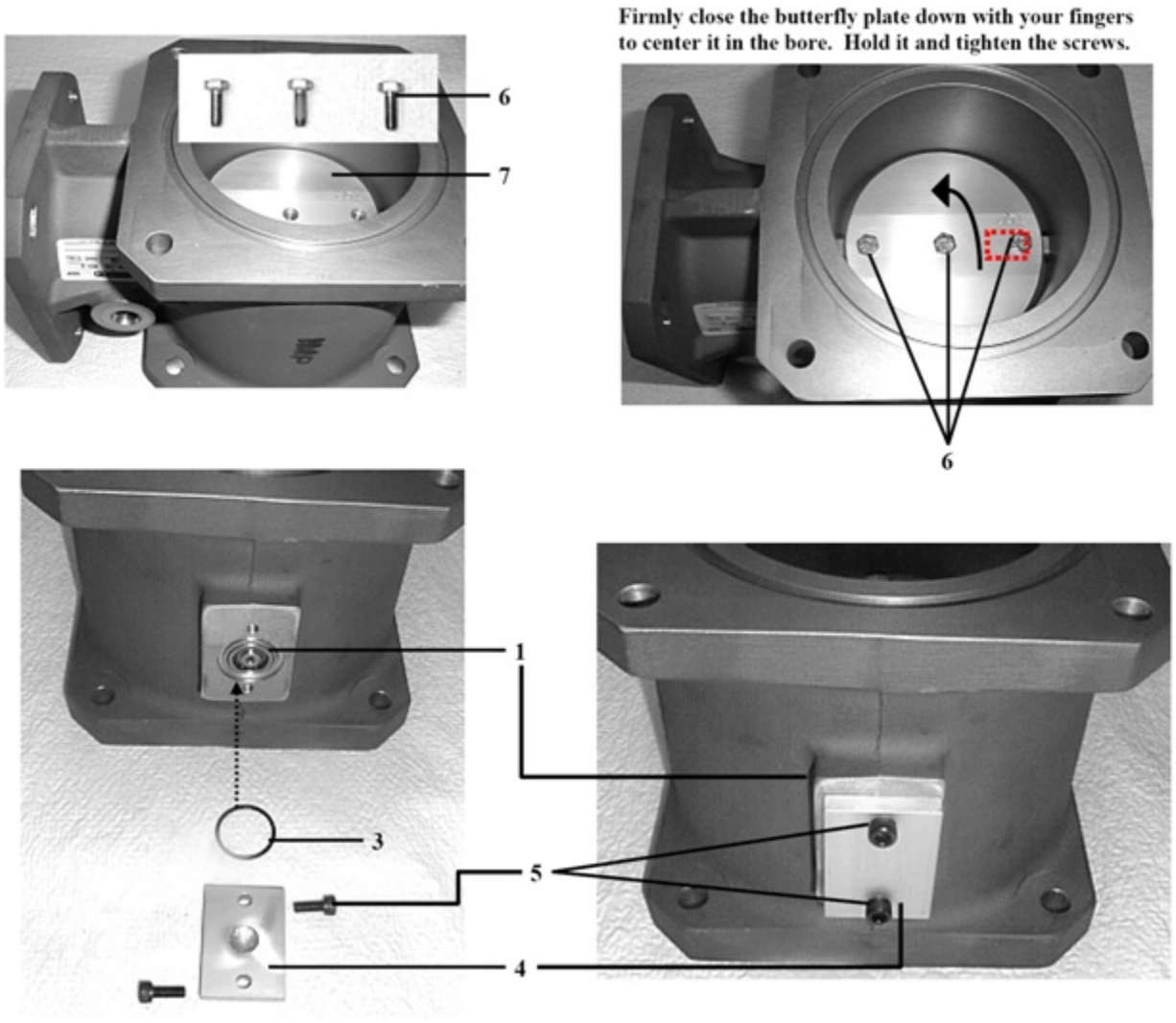


Figure 3-4. Secure the Butterfly Plate and Install the End Cap

Install the Coupler

1. Slide the wide section of coupler (14) on actuator shaft (13a) with the screws (14a) & (14b) at the bottom as shown. Leave approximately a 0.070 inch (1.78 mm) gap between the coupler (14) and the actuator housing.

2. Tighten screw (14a) on the actuator side of coupler (14). Torque to 78 ±4 lb-in (8.8 ±0.5 N·m). Leave screw (14b) loose.

3. Install O-ring (17) on actuator (13). Apply a light film of petroleum jelly to the O-ring.

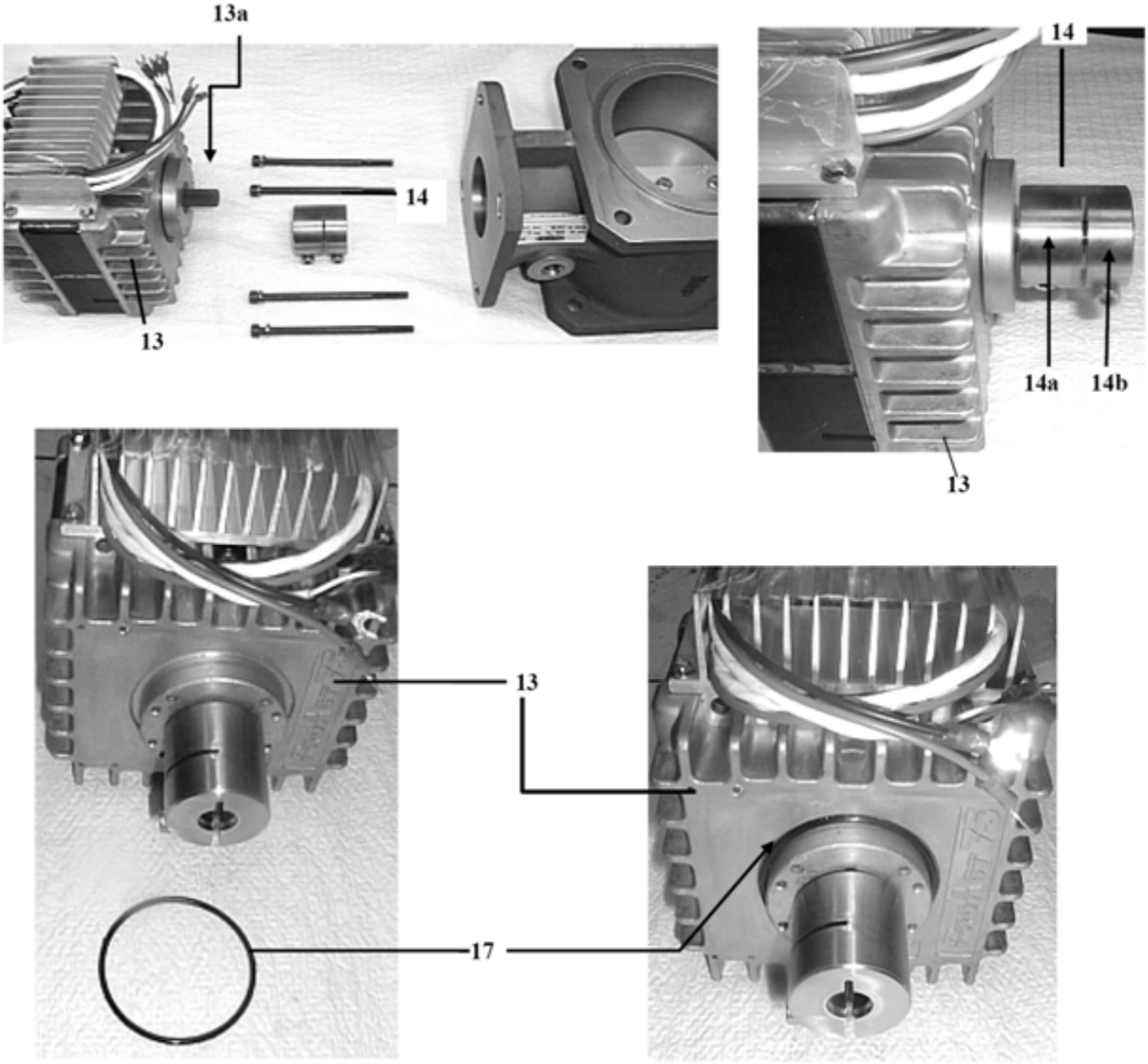


Figure 3-5. Install the Coupler

Attach the Actuator to the Throttle Housing

1. Determine if the actuator has a return spring by rotating the shaft. After determination, do the following:
   a. **With return spring:** With butterfly plate (7) fully closed (CCW) and with actuator (13) tilted slightly CCW, slide the coupler completely onto the throttle shaft until the actuator housing is against throttle housing flange (1a).
   b. **Without return spring:** Turn butterfly plate (7) approximately 45° from the closed position. With actuator (13) tilted slightly CCW, slide the coupler completely onto the throttle shaft until the actuator housing is against throttle housing flange (1a).

2. Insert four screws (12)with flat washers (18) through the actuator housing and the slotted holes in housing flange (1a). Secure but do not tighten with four flat washers (10) and four nylok nuts (11).

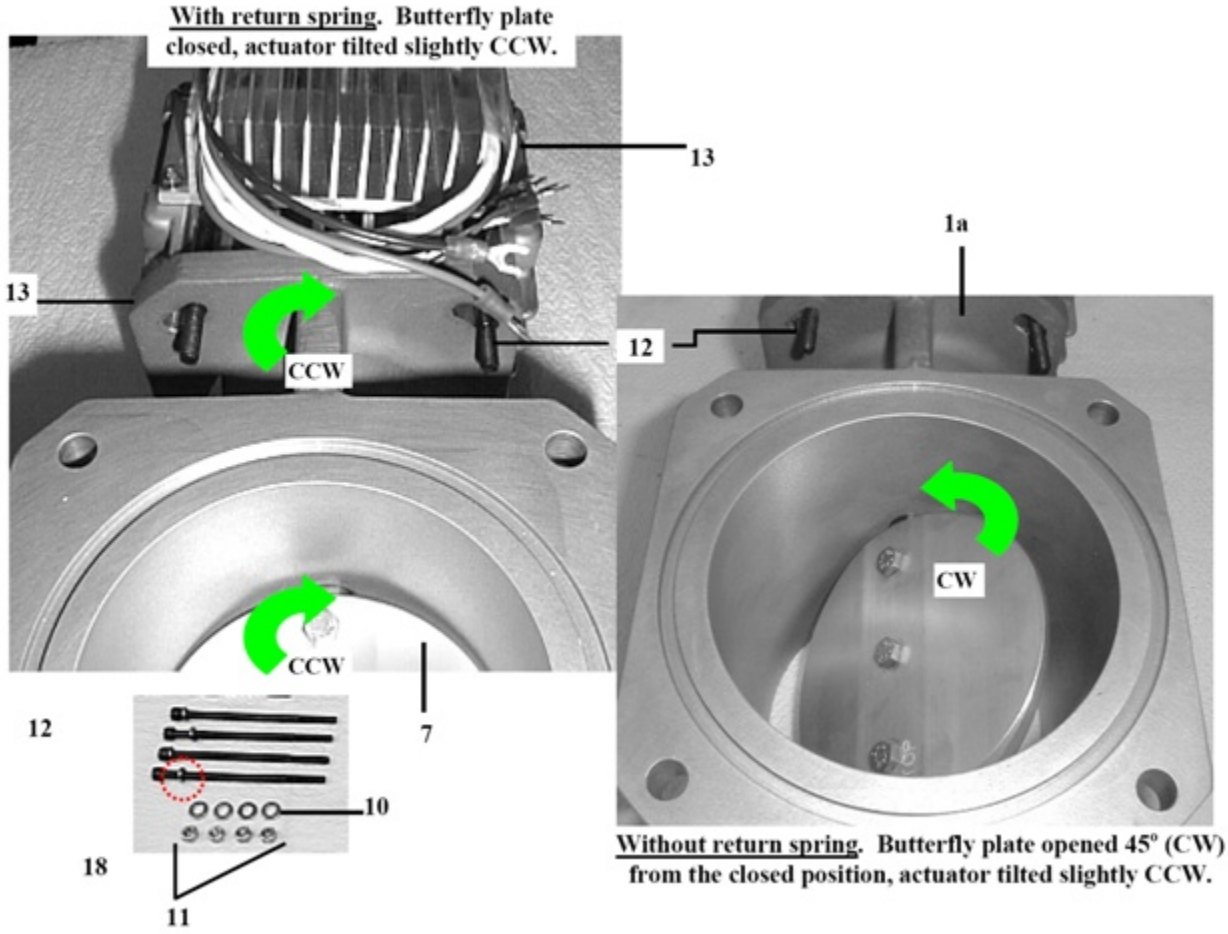


Figure 3-6. Attach the Actuator to the Throttle Housing

Set the Throttle Gap

1. Rotate actuator (13) CW until there is a 0.012 inch (0.30 mm) gap between butterfly plate (7) and the throttle throat. If the flange slots do not allow enough rotation to establish the 0.012 inch (0.30 mm) gap, pull the coupler off the throttle shaft, rotate the actuator one serration CCW, and try again.

2. Also check to see that the valve can actuate from fully closed to fully open. If not, rotate the actuator one serration and try again.

3. After achieving the 0.012 inch (0.30 mm) gap, tighten four nuts (11). Recheck the gap. Using a cross-hatch pattern, torque the nuts to 12.0 ±0.6 lb-ft (16.3 ±0.8 N·m). Go back and recheck the torque a second time.

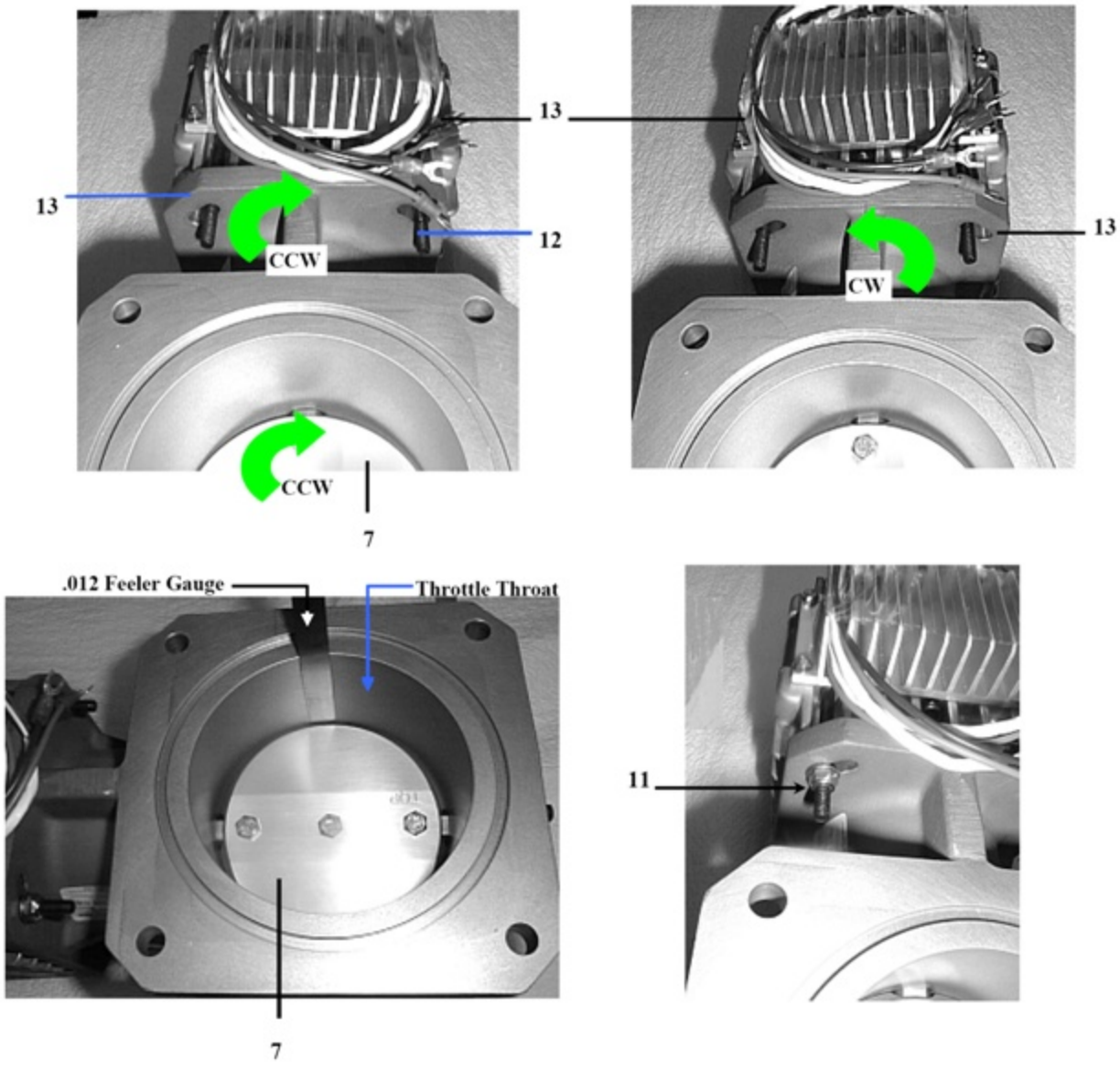


Figure 3-7. Set the Throttle Gap

Tighten the Coupler and Install Access Port Plug and Nameplate

1. Insert an Allen wrench (A) through the coupling screw access port (1a) and tighten the coupler screw on the throttle shaft side. Torque to 78 ±4 lb-in (). Re-check the gap at 0.012 inch (0.30 mm) and the butterfly plate for smooth rotation.

2. Install O-ring (19) on plug (8). Apply petroleum jelly and install it in access port (1a). Turn it in tight.

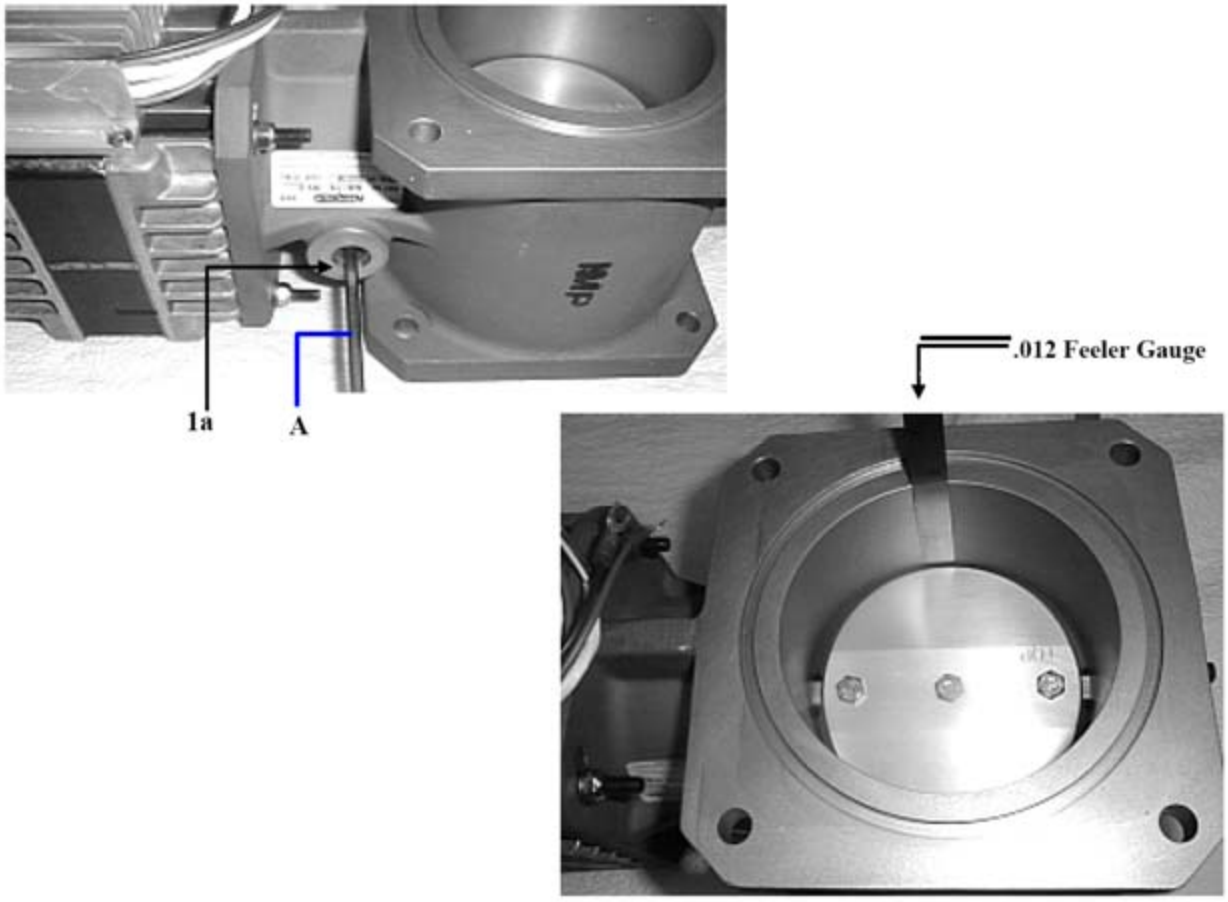


Figure 3-8. Tighten the Coupler and Install Access Port Plug

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 26467.

PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

2013/4/Colorado