

10900 Series

Spring Diaphragm and Differential Pressure
Actuators for use with 500 Series Regulators

Instruction Manual (Rev.F)



THESE INSTRUCTIONS PROVIDE THE CUSTOMER/OPERATOR WITH IMPORTANT PROJECT-SPECIFIC REFERENCE INFORMATION IN ADDITION TO THE CUSTOMER/OPERATOR'S NORMAL OPERATION AND MAINTENANCE PROCEDURES. SINCE OPERATION AND MAINTENANCE PHILOSOPHIES VARY, BAKER HUGHES COMPANY (AND ITS SUBSIDIARIES AND AFFILIATES) DOES NOT ATTEMPT TO DICTATE SPECIFIC PROCEDURES, BUT TO PROVIDE BASIC LIMITATIONS AND REQUIREMENTS CREATED BY THE TYPE OF EQUIPMENT PROVIDED.

THESE INSTRUCTIONS ASSUME THAT OPERATORS ALREADY HAVE A GENERAL UNDERSTANDING OF THE REQUIREMENTS FOR SAFE OPERATION OF MECHANICAL AND ELECTRICAL EQUIPMENT IN POTENTIALLY HAZARDOUS ENVIRONMENTS. THEREFORE, THESE INSTRUCTIONS SHOULD BE INTERPRETED AND APPLIED IN CONJUNCTION WITH THE SAFETY RULES AND REGULATIONS APPLICABLE AT THE SITE AND THE PARTICULAR REQUIREMENTS FOR OPERATION OF OTHER EQUIPMENT AT THE SITE.

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Safety Information

Important - Please read before installation

These instructions contain **DANGER**, **WARNING**, and **CAUTION** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully before installing and maintaining your control valve. **DANGER** and **WARNING** hazards are related to personal injury. **CAUTION** hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can lead to injury or death. Total compliance with all **DANGER**, **WARNING**, and **CAUTION** notices is required for safe operation.



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



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



When used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Note: Indicates important facts and conditions.

About this Manual

- The information in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without Baker Hughes's written permission.
- Please report any errors or questions about the information in this manual to your local supplier.
- These instructions are written specifically for the **Masoneilan™** 10900 Series Actuators, and do not apply for other valves outside of this product line.

Useful Life Period

The current estimated useful life period for the 10900 Series Actuators is 25+ years. To maximize the useful life of the product, it is essential to conduct annual inspections, routine maintenance and ensure proper installation to avoid any unintended stresses on the product. The specific operating conditions will also impact the useful life of the product. Consult the factory for guidance on specific applications if required prior to installation.

Warranty

Items sold by Baker Hughes are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Baker Hughes recommended usages. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

Note: Prior to installation:

- The valve must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.
- Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the product.

1. General

These adjustment and maintenance instructions apply to the 10900 Series Actuators used with the Masoneilan 500 Series Pressure Regulators. They include a parts reference list including recommended spare parts.

For installation, operation, adjustment and maintenance of the 500 Series Regulators body S/A refer to instructions numbers indicated by the following table.

Regulator Model No	Body S/A Instruction No
525; 525-50 526; 526-50	31664
535H; 535H-50 536H; 536H-50	31597
535V; 535V-50	34597

Spare parts

When performing maintenance always use Baker Hughes replacement parts. Masoneilan Parts are obtainable through your local Baker Hughes Representative or Masoneilan Spare Parts Department. When ordering parts, always include Masoneilan Model and Serial Numbers shown on serial plate.

After sales Department

Baker Hughes has a highly skilled After Sales Department available for start-up, maintenance and repair of our regulators and components parts. Contact the nearest Baker Hughes Sales Office or Representative.

Training

Baker Hughes Masoneilan regularly holds training seminars for technicians. In order to participate in one of these training seminars you should contact our local Baker Hughes Masoneilan Representative or our Training Department.

The following instructions should be thoroughly reviewed and understood prior to installing operating or performing maintenance on this equipment. Only qualified personnel to service this equipment. Non-compliance with safety rules and caution notes of this instruction may bring about malfunction of the device or damage it seriously. In addition, such negligence might expose personnel present in the field to grave hazards.

2. Description-Operation

The 10900 Actuator is a simple powerful mechanical device. It is Air-to-Extend Stem type. The nominal range of an actuator is the pressure range in pounds per square inch (psi) in which the pressure setting can be obtained by adjustment.

Conformation of the diaphragm (11) to the diaphragm plate (10) serves as a flexible upper guide for the actuator stem (6). Nylon reinforced neoprene diaphragms permit smooth, sensitive operation. The lower guide is an oil impregnated bronze bushing (3) located in the spring adjuster (2).

Function	Regulator Model No	Actuator Type
REDUCING	525 535H 535V	Spring Diaphragm
BACK PRESSURE	526 536H	
DIFFERENTIAL REDUCING	525-50 535H-50 535V-50	Differential
DIFFERENTIAL BACK PRESSURE	526-50 536H-50	

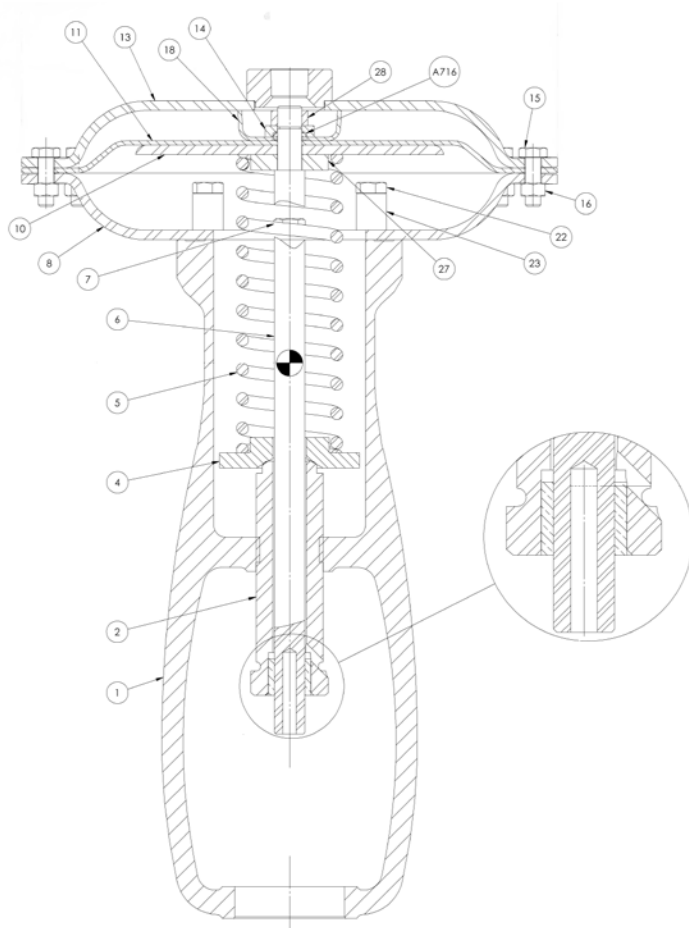
The 10900 Series Actuators are designed for use with the 500 Series Regulators for reducing, back pressure and differential pressure applications.

The above chart indicates the combinations available to provide the desired function. The 10900 Series Actuators are designated by the nominal range (psi). See the following chart.

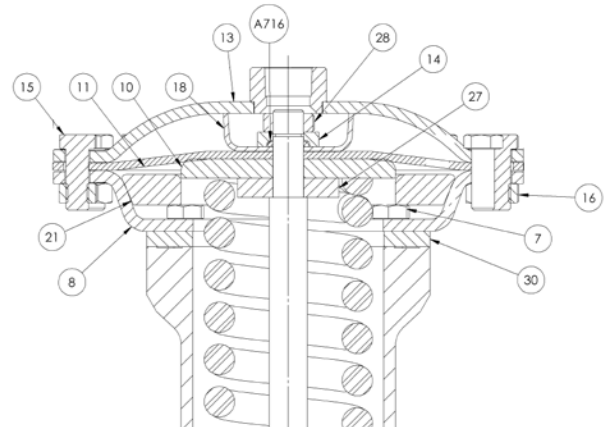
In Spring Diaphragm Actuators, three actuator cases are available: a case rated for 60 psi static pressure, a case rated for 250 psi static pressure and a case rated for 750 psi static pressure.

In Differential Pressure Actuators, two actuator cases are available: a low-pressure case rated for 60 and 250 psi static pressure, and a high-pressure case rated at 600, 1000 and 1500 psi static pressure.

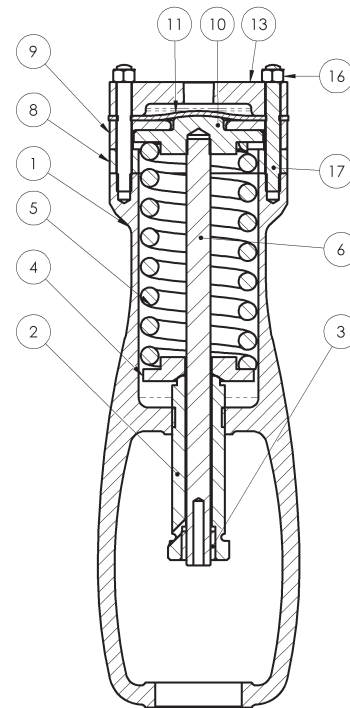
Actuator Type	Range (psi)	Max. Static Pressure (psi)	Case Size
Spring Diaphragm	0.5 - 3 2 - 10 6 - 20 15 - 40	60	9
	30 - 75 60 - 125 80 - 250	250	5 4 3.5
	150 - 300 150 - 450 400 - 750	750	3.5
	Low Pressure Case		
	15 - 40	60	9
Differential	3 - 12 10 - 30 30 - 75 60 - 125	250	5 4
	High Pressure Case		
	3 - 15 30 - 85	600	5
	5 - 30 10 - 60	1000	4
	10 - 30 75 - 185 100 - 330	1500	3.5



**Design for the 0.5-3, 2-10, 6-20 and 15-40 psi
(0.03-0.21, 0.14-0.69, 0.41-1.38 and 1.03-2.76 bar) ranges**



**Design for the 30-75, 60-125 and 80-250 psi
(2.07-5.17, 4.14-8.62 and 5.52-17.24 bar) ranges**



**Design for the 150-300, 150-450 & 400-750 psi
(10.34-20.68, 10.34-31.03 & 27.58-51.71 bar) ranges**

**Figure 1 — Spring-Diaphragm Actuators for
500, 500H and 535V Model Regulators**

Parts Reference

Ref.	Part Name	Ref.	Part Name	Ref.	Part Name
1	Yoke	9	Diaphragm Chamber	18 ¹	Stop Cup
2	Spring Adjuster	10	Diaphragm Plate	21 ³	Reducing Ring
3	Bushing (Incl. Ref. 2)	11	Diaphragm •	22 ⁴	Stop Screw
4	Lower Spring Seat	13	Diaphragm Case (Upper)	23 ⁴	Stop Spacer
5	Actuator Spring	14 ¹	Diaphragm Washer	27 ¹	Upper Spring Washer
6	Actuator Stem	15 ¹	Cap Screw (Diaph. case)	28 ¹	Nut (Actuator stem)
7	Cap Screw (L. case to yoke)	16	Nut (Diaph. case)	30	Spacer Ring (only on 80-250 psi range)
8	Diaphragm Case (Lower)	17 ²	Stud (Diaph. case)	A716 ¹	O-Ring •

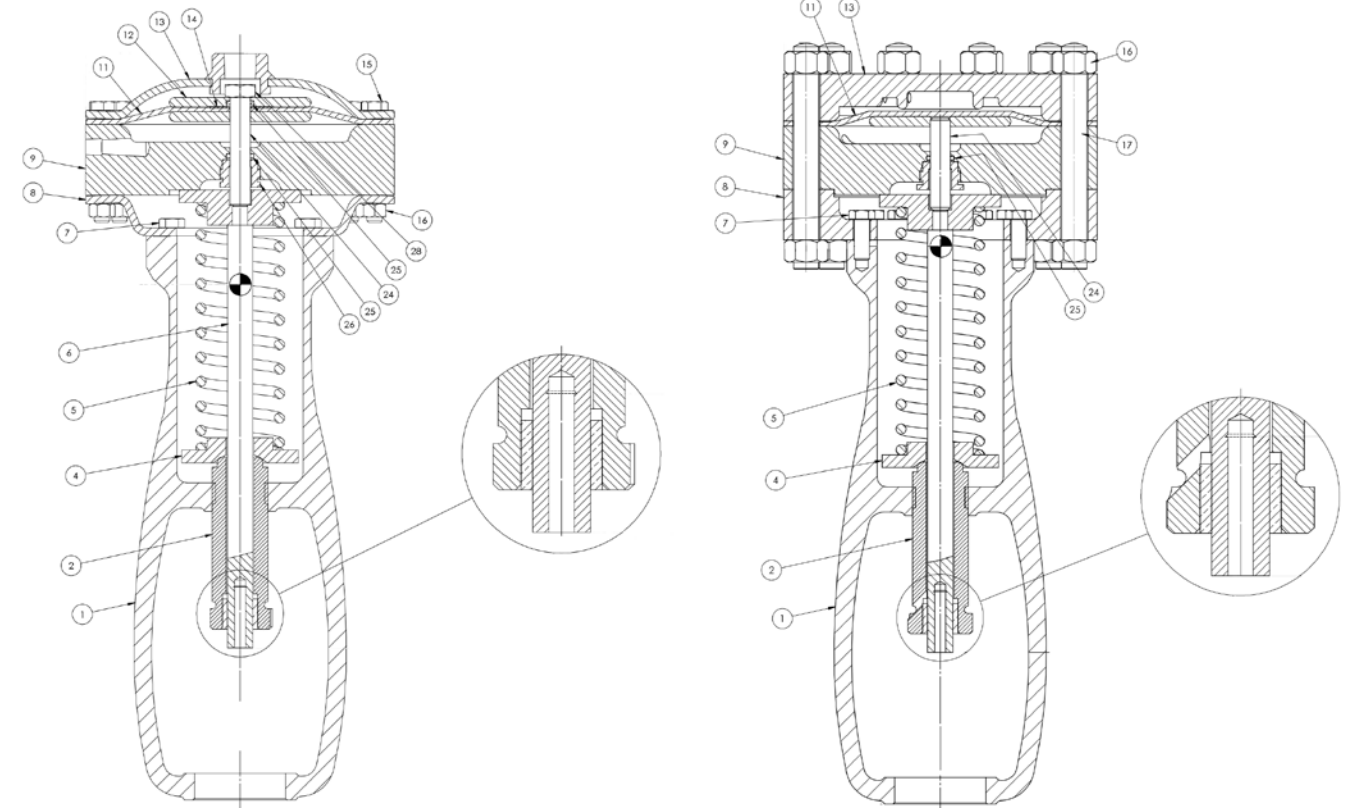
• Recommended spare parts

1. On 0.5-3, 2-10, 6-20, 15-40, 30-75, 60-125 and 80-250 psi ranges

2. Only on 150-300, 150-450 and 400-750 psi ranges

3. Only on 60-125 and 80-250 psi ranges

4. Only on 0.5-3, 2-10, 6-20 and 15-40 psi ranges



Low Pressure Case Design
for 3-12, 10-30, 30-75, 60-125 psi
(0.21-0.83, 0.69-2.07, 2.07-5.17, 4.14-8.62 bar) ranges

High Pressure Case Design
for 3-15, 30-85, 5-30, 10-60, 10-30, 75-185, 100-330 psi
(0.21-1.03, 2.07-5.86, 0.34-2.07, 0.69-4.14, 0.69-2.07, 5.17-12.76, 6.89-22-75 bar) ranges

Figure 2 — Differential Pressure Actuators for 500-50, 500H-50 and 535V-50 Models Regulators

Parts Reference

Ref.	Part Name	Ref.	Part Name	Ref.	Part Name
1	Yoke	10	Diaphragm Plate (Incl. w. Ref. 24)	25 ^{3,4}	O-Ring •
2	Spring Adjuster	11	Diaphragm •	26	O-Ring Retainer
3	Bushing (Incl. Ref. 2)	12 ¹	Upper Diaphragm Plate	27	Upper Spring Seat (Incl. w. Ref. 6)
4	Lower Spring Seat	13	Diaphragm Case (Upper)	28 ¹	Nut
5	Actuator Spring	14 ¹	Diaphragm Washer		
6	Actuator Stem	15 ¹	Cap Screw (Diaph. case)		
7	Cap Screw (L. case to yoke)	16	Nut (Diaph. case)		
8	Diaphragm Case (Lower)	17 ²	Stud (Diaph. case)		
9	Diaphragm Chamber	24	Plunger Sub-Assembly		

• Recommended spare parts

1. Only on Low Pressure Case Design

2. Only on High Pressure Case Design

3. Qty: 2 on Low Pressure Case Design

4. Qty: 1 on High Pressure Case Design

3. Installation

On steam service, the regulator should be installed with the actuator down so that the diaphragm will be protected by a condensate barrier. If installed otherwise, an adequate condensate barrier must be incorporated.

In the Spring Diaphragm Actuators, the 1/2" NPT pressure connection is located on the upper diaphragm case (13).

In the Differential Pressure Actuators, the 1/2" NPT high pressure connection is located on the upper diaphragm case (13) and the 1/2" NPT low pressure connection is located on the diaphragm chamber (9). Refer to Regulators Body S/A Instructions for installation according to the regulator function.

4. Adjustment

When pressure setting has been specified in order, the regulator is set accordingly at the factory for test. **Then, the spring compression is fully removed to avoid unnecessary stress to parts (diaphragm, spring) during the stocking.**

CAUTION

It is necessary to proceed with adjustment before servicing.

The regulator pressure range is engraved on the serial plate.

Proceed as follows :

- Open stop valve on the outlet side of the regulator and partially open stop valve on the inlet side, allowing pressure in the system to build up slowly.
- Open controlled pressure line valve(s) and check setting by means of the gauge(s). Set by means of the spring adjuster (2) of the actuator.

Note: To increase pressure setting (or pressure differential), turn adjusting screw clockwise to compress the spring. To decrease the setting, turn adjusting screw counterclockwise to relieve spring compression.

- Fully open stop valve on the inlet side of the regulator.

5. Maintenance

CAUTION

Regulator must be isolated and pressure vented before disassembly.

Replacing diaphragm

On Spring Diaphragm Actuators (500 Series Regulators - Figure 1)

- Remove the controlled pressure line from the diaphragm case (13).

! WARNING

- Relieve all spring compression by unscrewing spring adjuster (2).
- Remove upper diaphragm case (13), [nuts (16) and screws (15)], [not screws (15) on 150-300, 150-450 and 400-750 psi range].

a) On 0.5-3 / 2-10 / 6-20 / 15-40 / 30-75 / 60-125 and 80-250 psi ranges:

- Remove nut (28), Stop Cap (18), diaphragm washer (14), O-Ring (A716) and diaphragm (11).

Note: By means of a wrench applied on the plug stem nuts, hold the actuator stem during this operation.

b) On 150-300, 150-450, 400-750 psi ranges:

- Remove diaphragm (11).

- Install new diaphragm and reassemble by reversing of the above description order.
- Readjust the spring compression (see above).

On Differential Actuators (500-50 Series Regulators - Figure 2)

a. On low pressure case design:

- Remove the high and low pressure lines from the diaphragm case (13) and the diaphragm chamber (9).

! WARNING

- Relieve all spring compression by unscrewing spring adjuster (2).
- Remove nuts (16) and cap screws (15). Remove upper diaphragm case (13).
- Remove nut (28), upper diaphragm plate (12), upper O-Ring (25), washer (14) and diaphragm (11).
- Install new diaphragm and reassemble by reversing of the above description order. Replace upper O-Ring (25) if necessary.
- Readjust the spring compression (See Section 4).

b. On high pressure case design:

- Remove the high and low pressure lines from the diaphragm case (13) and the diaphragm chamber (9).

! WARNING

- Relieve all spring compression by unscrewing spring adjuster (2).
- Remove nuts (16), upper diaphragm case (13) and diaphragm (11).
- Install new diaphragm and reassemble by reversing of the above description order.
- Readjust the spring compression (See Section 4).

Replacing O-ring(s) (25) (low and high pressure case) On differential actuators, (Figure 2)

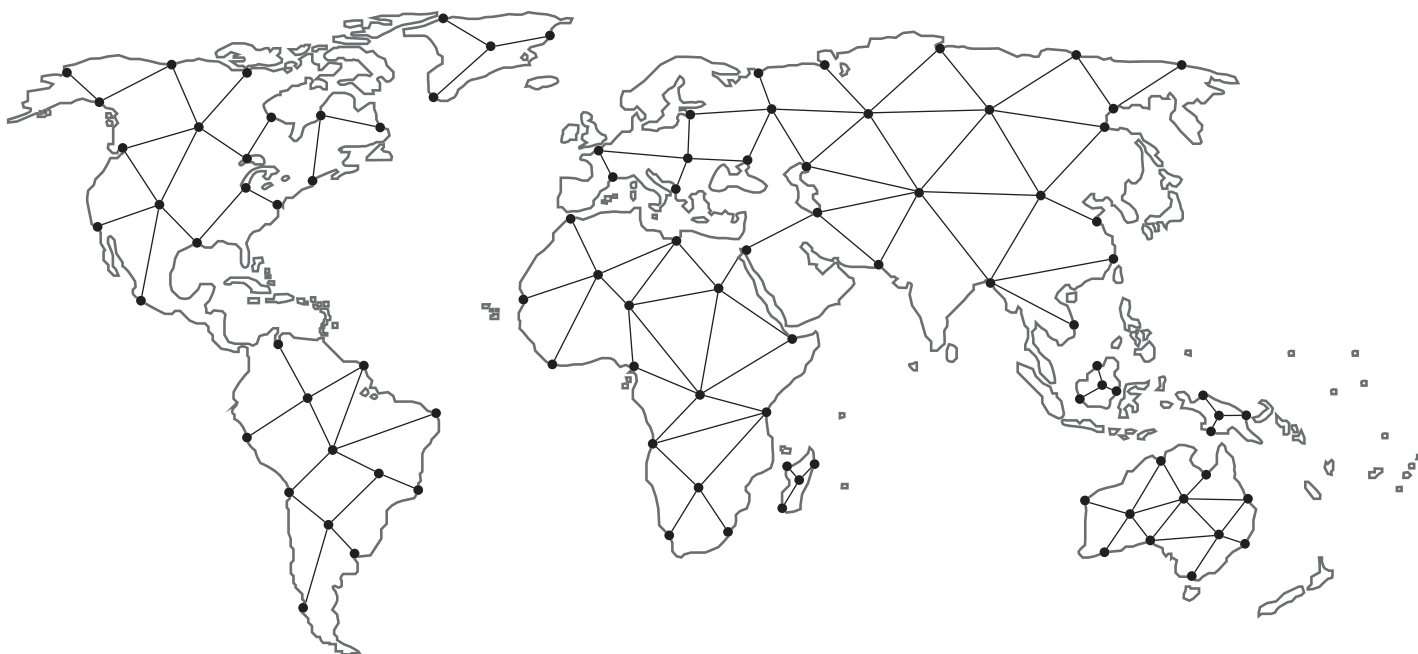
- Disassemble the actuator head as described on the paragraph : "Replacing diaphragm".
- Remove diaphragm chamber (9) with plunger S/A (24).
- With a wrench applied over O-Ring retainer (26), unscrew it out of diaphragm chamber (9).
- Remove O-Ring (25), being careful not to damage plunger. Install new O-Ring, replace and tighten O-Ring retainer (26).
- Reassemble and readjust spring compression.

CAUTION

Uniformly tighten all diaphragm case nuts (16) when reassembling.

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