



Controls Ltd.

INSTRUCTION MANUAL

## CVS Controls Series 470 Piston Actuators

The CVS Series 470 is a double acting pneumatic Piston Actuator, suitable for use with Globe, Angle, Three Way, and Reverse acting valves as well as Steam Equipment. Capable of high thrust applications to 19,500 lb-f, with a maximum travel to 8 1/8 inches.

The CVS Series 470 Actuator may be used in on/off applications, as well as throttling service when used with a positioner.



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## CVS Series 470 Piston Actuator – Specifications:

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Standard Input: 3-15psig, 6-30psig or split range

Maximum Cylinder Pressure: 125psig, (\*not to exceed max allowable thrust)

Temperature Rating: -30°F to 175°F, standard with Nitrile O-Rings

### Material Specifications (Standard):

Yoke: Cast Iron (standard) or WCB Steel (optional)

Cylinder and Piston: Aluminum

Seal Bushings: Brass

O-Rings: Nitrile

Other materials may be available upon request, please contact a CVS Controls representative for more information.

Maximum Travel and Piston Area:

Model	Maximum Travel (in)	Piston Area (in <sup>2</sup> )
CVS 471-16-80	8 1/8	88.5
CVS 471-16-100	8 1/8	130.5

Specifications and Maximum Allowable Thrust:

Model	Yoke Boss Diameter (in)	Stem Diameter (in)	Max allowable Thrust*	
			Cast Yoke**	Steel Yoke
CVS 471-16-80	5	1 1/4	13200	13200
CVS 471-16-100	5	1 1/4	17000	19500

\*reduce max thrust by 10% if using a positioner  
\*\* Cast Iron Yoke Standard

The CVS 471 Piston Actuator operates by pneumatic air loading pressure to one side of the piston, and unloading the opposing side. Because no positioner is included, a loading device such as a 4 way switch valve must be installed if no additional positioner has been ordered for use in conjunction with the CVS 471 Actuator.

## CVS Series 470 Piston Actuator – Installation

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**Note:** Ensure proper safety procedures are followed to avoid personal injury or property damage.

### CVS 471 Piston Actuator Installation

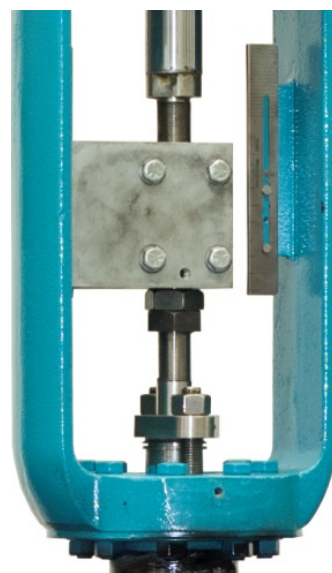
The CVS 471 Actuator should be installed in a location which will allow adequate room for service, maintenance and removal if required.

1. Mounting of the CVS 471 Actuator is achieved by using the 8 supplied nuts and bolts, rather than a yoke locknut. Although the actuator may be mounted in any position, typical installation is with the CVS 471 in the vertical position above the control valve.
2. Stem connections should be made to clamp the actuator stem and valve plug stem together to ensure proper travel of the valve.

### Stem Connections:

**Note:** Do not rotate the valve plug once it is seated to avoid damage to seating surface. Use proper tools to avoid damaging the valve plug stem during travel adjustments. Should the stem connections not be made properly in the stem connector, thread damage, or improper operation may occur. The amount of each stem pressed in the stem connector should be equal to or greater than the diameter of the stem itself. DO NOT loosen the stem connector cap screws unless all pressure or force has been removed from the stems.

CVS 471 Piston Actuator  
Typical Stem Connection



## CVS Series 470 Piston Actuator – Installation

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### Push Down to Close Installation – Direct Acting Valves:

1. After installation of the CVS 471 Actuator to the control valve set the actuator to the top of its stroke and ensure the valve plug is in the **closed position**. Install two valve stem locknuts, as well as travel indicator disc (if used) all the way onto the stem threads.
2. Apply pressure to the actuator until the piston rod of the CVS 471 has moved down from the top of its stroke to the correct valve travel required.
3. Attach the Stem Connector to the Piston Rod and Valve Stem, tighten the 4 hex bolts once in position.
4. Raise the stem locknuts and travel disc (if used) and secure against the bottom of the stem connector.
5. Once the Stem Connector is secured, cycle the CVS 471 Actuator to verify the required total travel settings are met, and that the valve plug seats properly before the actuator makes contact with the lower travel stop adjustment.

Adjustments if needed:

Should minor travel adjustments be necessary, loosen the hex bolts slightly on the stem connector. Tighten the stem locknuts together and make minor adjustments by turning the valve stem into or out of the stem connector as needed using a wrench on the stem locknuts.

For major adjustments, repeat the stem connection of the valve and actuator as listed above.

6. After required travel has been achieved, secure the Stem Connector hex bolts. Lock the stem locknuts against the Stem connector. Finally, adjust the actuators travel scale on the yoke to reflect the correct valve position.
7. Using a gauge to measure the pressure to the actuator, make final adjustments to the actuator, or positioner if used, setting the start and end points of travel for the required instrument range.

## CVS Series 470 Piston Actuator – Installation

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### Push Down to Open Installation – Reverse Acting Valves:

1. Once the CVS 471 actuator is installed, pressure the actuator in order to cycle the Piston Rod to the extreme upward position. Reverse loading pressure to move the Piston Rod lower approximately 1/8".
2. Raise the valve stem upwards in order to seat the valve plug.
3. Attach the Stem Connector to the valve stem and piston rod. Tighten the 4 Stem connector hex bolts.
4. If a travel indicator disc, raise it to the stem connector and secure with the stem locking nuts. The travel indicator should point to show the valve being in the open position, with the actuator piston at the bottom of its stroke. Make adjustments to the travel indicator scale as needed to properly show the valve position as needed.
5. Once the Stem Connector is secured, cycle the CVS 471 Actuator to verify the required total travel settings are met, and that the valve plug seats properly before the actuator makes contact with the lower travel stop adjustment.

Adjustments if needed:

Should minor travel adjustments be necessary, loosen the hex bolts slightly on the stem connector. Tighten the stem locknuts together and make minor adjustments by turning the valve stem into or out of the stem connector as needed using a wrench on the stem locknuts.

6. After required travel has been achieved, secure the Stem Connector hex bolts. Lock the stem locknuts against the Stem connector. Finally, adjust the actuators travel scale on the yoke to reflect the correct valve position.
7. Using a gauge to measure the pressure to the actuator, make final adjustments to the actuator, or positioner if used, setting the start and end points of travel for the required instrument range.

## CVS Series 470 Piston Actuator – Inspection and Maintenance

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Certain operating conditions may require increased inspection and maintenance intervals.

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**Note: Ensure proper Safety and Lockout procedures are followed prior to inspection.**

**Relieve all pressure to the actuator and disconnect air supply line to avoid sudden open or close action of the valve.**

**Shut off process to the valve or use bypass to isolate and relieve process from both sides of the valve installation.**

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1. Verify the control valve is bypassed, pressure is relieved, and proper safety procedures are followed.
2. Remove the stem connector.
3. Remove the Socket Head Cap Screws connecting the Piston Cylinder to the Piston Cylinder Flange.
4. Remove the cylinder from the cylinder flange. It may be necessary to use a flathead screwdriver or similar to pry the connection, once all cap screws have been removed.
5. The Piston and Piston Rod should be able to be removed with the Piston Cylinder when lifting off of the Cylinder Flange. Once removed the Piston and Rod may be pulled out of the Piston Cylinders open end. Take caution to not score or damage the cylinder walls.
6. Remove the Upper and Lower Seal Bushings. The Upper Seal Bushing is located at the top end of the Piston Cylinder, the Lower Seal Bushing is located on the top end of the actuator yoke.

Once disassembled, inspect all components for excessive wear or damage. Replace worn O-Rings as required, lubricate with Lubriplate Mag-1 or equivalent.

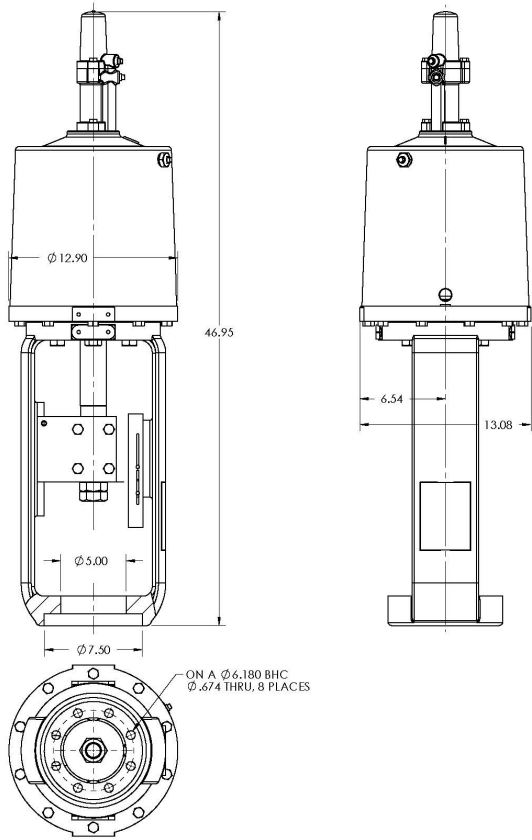
Reassembly: in order to reassemble the Piston Rod Extension after removal from the Piston Rod, clean the threads and inspect for visible damage, replace if necessary. Apply Loctite 242 or equivalent thread sealant. The torque value for the Piston rod Extension is 150 ft/lbs .

Reassemble the CVS 471 Actuator in reverse order as described above.

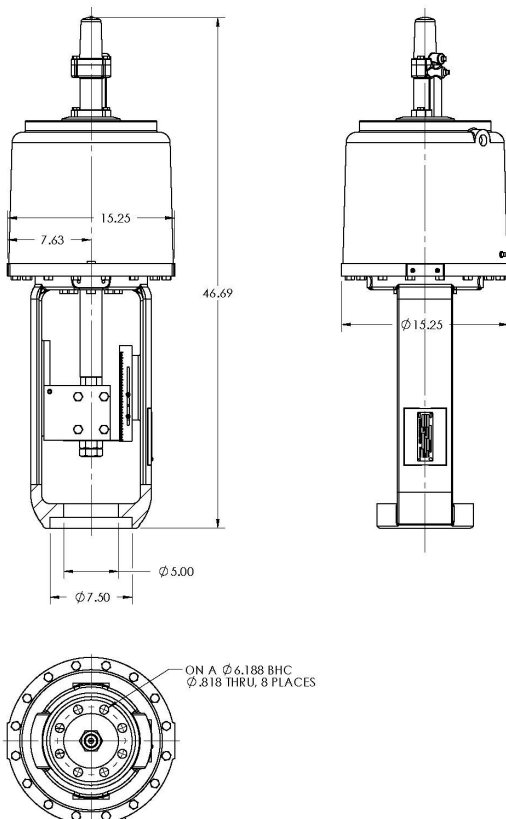
Contact a CVS Controls Ltd. representative for more information or to order spare parts as required.

# CVS Series 470 Piston Actuator – Dimensions (inches)

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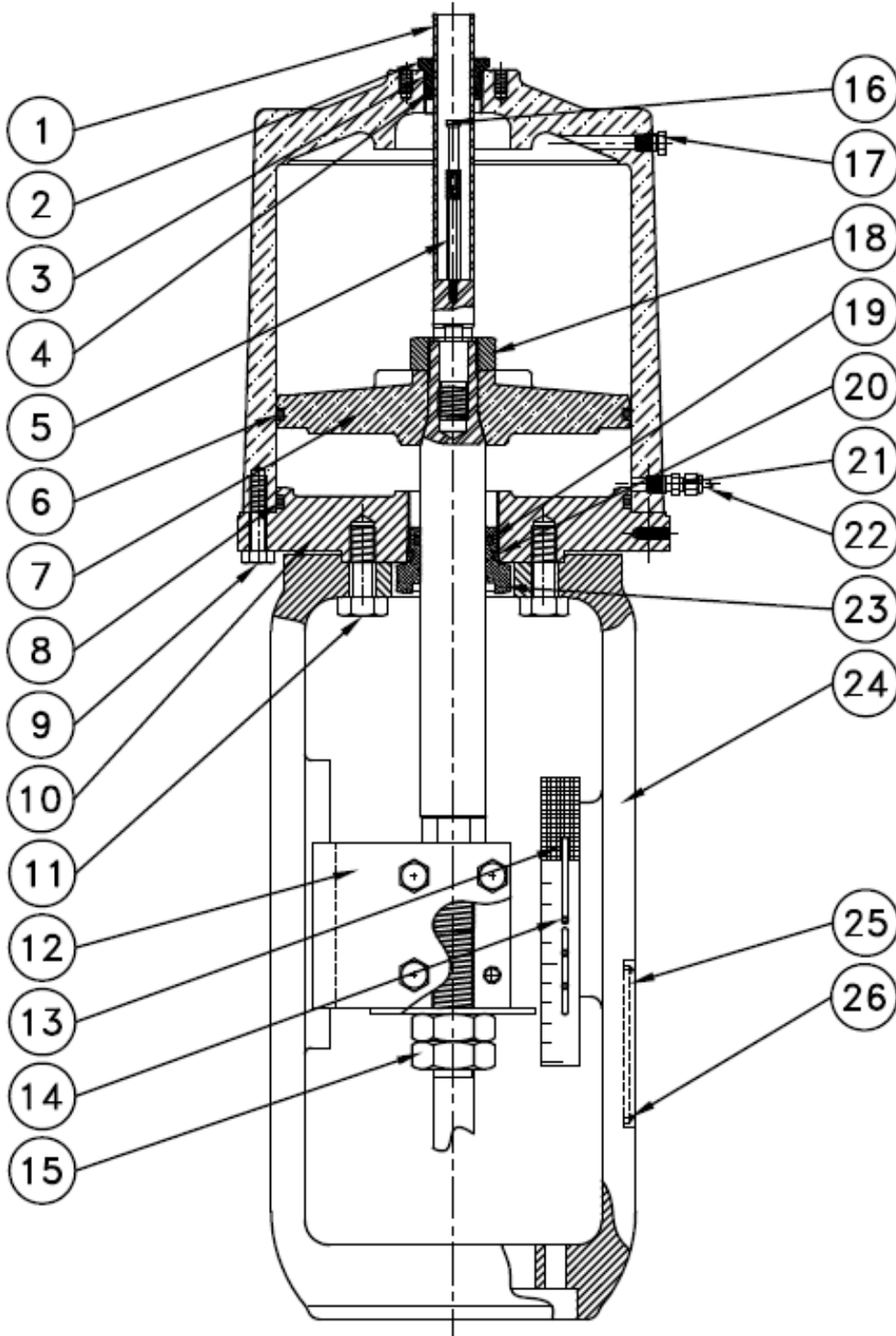
CVS 471-16 Size 80



CVS 471-16 Size 100

# CVS Series 470 Piston Actuator – Assembly

CVS 471-16 Size 80:





## CVS Series 470 Piston Actuator – Assembly

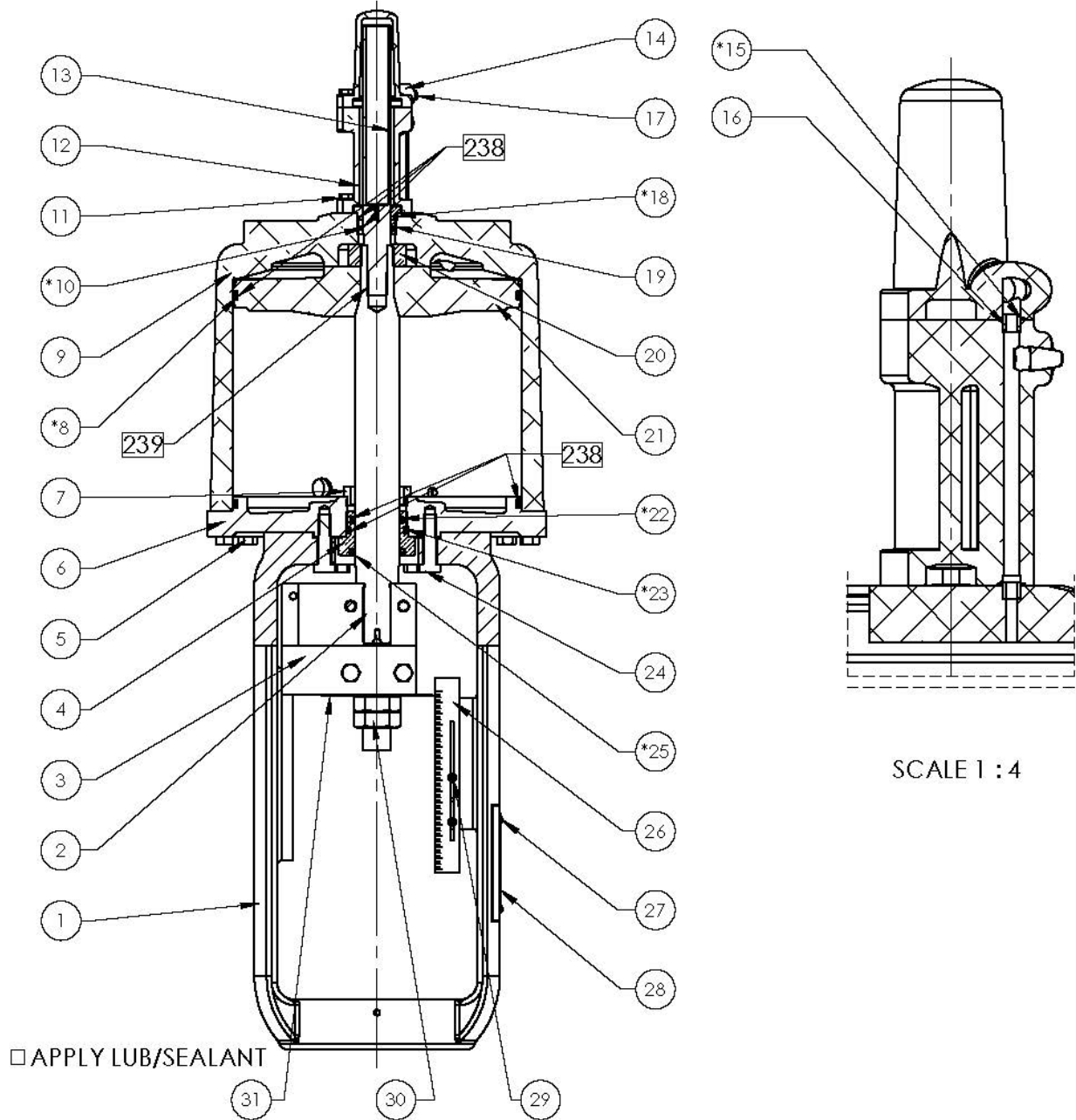
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### CVS 471-16 Size 80:

Item Number	Part Number	Description	Quantity
1	CVS 2R853346582	Piston Rod Extension	1
2	CVS 1H865114042	Upper Seal Bushing	1
3	CVS 1D348306992	O-Ring, Nitrile	1
4	CVS 1E736906992	O-Ring, Nitrile	1
5	CVS 1P3957X0012	Spring Retainer Spacer	1
6	CVS 1H862 506992	O-Ring	1
7	CVS 2H873707062	Piston	1
8	CVS 1H862506962	O-Ring	1
9	CVS 1A771132982	Cap Screw	10
10	CVS 20A6353X012	Cylinder Flange	1
11	CVS 1A485724052	Cap Screw	4
12	CVS 10A6354X012	Stem Connector	1
13	CVS 470A008	Travel Indicator Scale	1
14	CVS 1A343128982	Screw	2
15	CVS 0W073524122	Hex Nut	2
16	CVS 1H8909X0012	Spring Retainer	1
17	CVS 1A649528992	Pipe Plug	1
18	CVS 1H872024102	Piston Nut	1
19	CVS 1H862706992	O-Ring	1
20	CVS 1C334206992	O-Ring	1
21	CVS 1L249718992	Elbow	1
22	CVS 1H866017012	Cylinder Tubing	1
23	CVS 1R945614042	Lower Seal Bushing	1
24	CVS 30A6352X012	Yoke	1
25	CVS 1H863538992	Name Plate	1
26	CVS 1A368228982	Drive Screw	4

# CVS Series 470 Piston Actuator – Assembly

CVS 471-16 Size 100:



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|-----|---------------------------------------|
| 238 | Apply Lubriplate Mag-1, or equivalent |
| 239 | Apply Loctite 242, or equivalent      |

## CVS Series 470 Piston Actuator – Assembly

### CVS 471-16 Size 100:

Item Number	Part Number	Description	Quantity
1	CVS 32A1321X012	Yoke, D65-45-12	1
2	CVS 2R8514X0012	Piston Rod, 416 SST, Cr-pl	1
3	CVS 10A6354X012	Connecting Block, 1018	1
4	CVS 1R945614042	Lower Seal Bushing, Brass C36000	1
5	CVS 1A771132982	Cap Screw, 1/2-13 X 2.13	16
6	CVS 32A1322X012	Cylinder Flange, D65-45-12	1
7	CVS 1U181124012	Travel Stop, Steel	1
8*	CVS 1H862606992	O-Ring, Nitrile	2
9	CVS 3U8248000A2	Cylinder Assembly	1
10*	CVS 1E736906992	O-Ring, Nitrile	1
11	CVS 1A344924052	Cap Screw, Steel, pl, 3/8-16 X 1.00	4
12	CVS 2R8537X0022	Positioner Extension, AL356.0 T6	1
13	CVS 2R853346582	Piston Rod Extension, 416 SST	1
14	CVS 2H888507062	Cylinder Cover, AL356.0 T6	1
15*	CVS 1C853806992	O-Ring, Nitrile	2
16	CVS 2R8537X0012	Insert, 6061 T6	2
17	CVS 1A649528992	Pipe Plug, 1/4 NPT	3
18*	CVS 1D348306992	O-Ring, Nitrile	1
19	CVS 1H865114042	Upper Seal Bushing, Brass C36000	1
20	CVS 1H872024102	Piston Nut, Steel	1
21	CVS 2H873707062	Piston, AL356.0 T6	1
22*	CVS 1H862706992	O-Ring, Nitrile	1
23*	CVS 1C334206992	O-Ring, Nitrile	1
24	CVS 1R281124052	Cap Screw, 9-16-12 X 1.50	8
25*	CVS 1R946499012	Wiper Scraper, SKF504272	1
26	CVS 2R851338982	Travel Indicator Scale, 302 SST	1
27	CVS 1A368228982	Drive Screw, 302 SST, .13 X .20	4
28	CVS 18A5089X0A2	Name Plate, 302 SST	1
29	CVS 1A343128982	Screw, 10-24 X .50	2
30	CVS 0W073524122	Hex Nut, 1 1/4	2
31	CVS 10A6358X012	Travel Indicator Disc, 302 SST	1
*Recommended Spare Parts			

# CVS

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